10 Secret FINISH FORMULAS Revealed

POPULAR Woodworking

APRIL 2007
ISSUE #161

Learn How. Discover Why. Bui

COMPLETE PLANS INSIDE

Easiest Barrister Bookcase

13 Steps to an American Classic

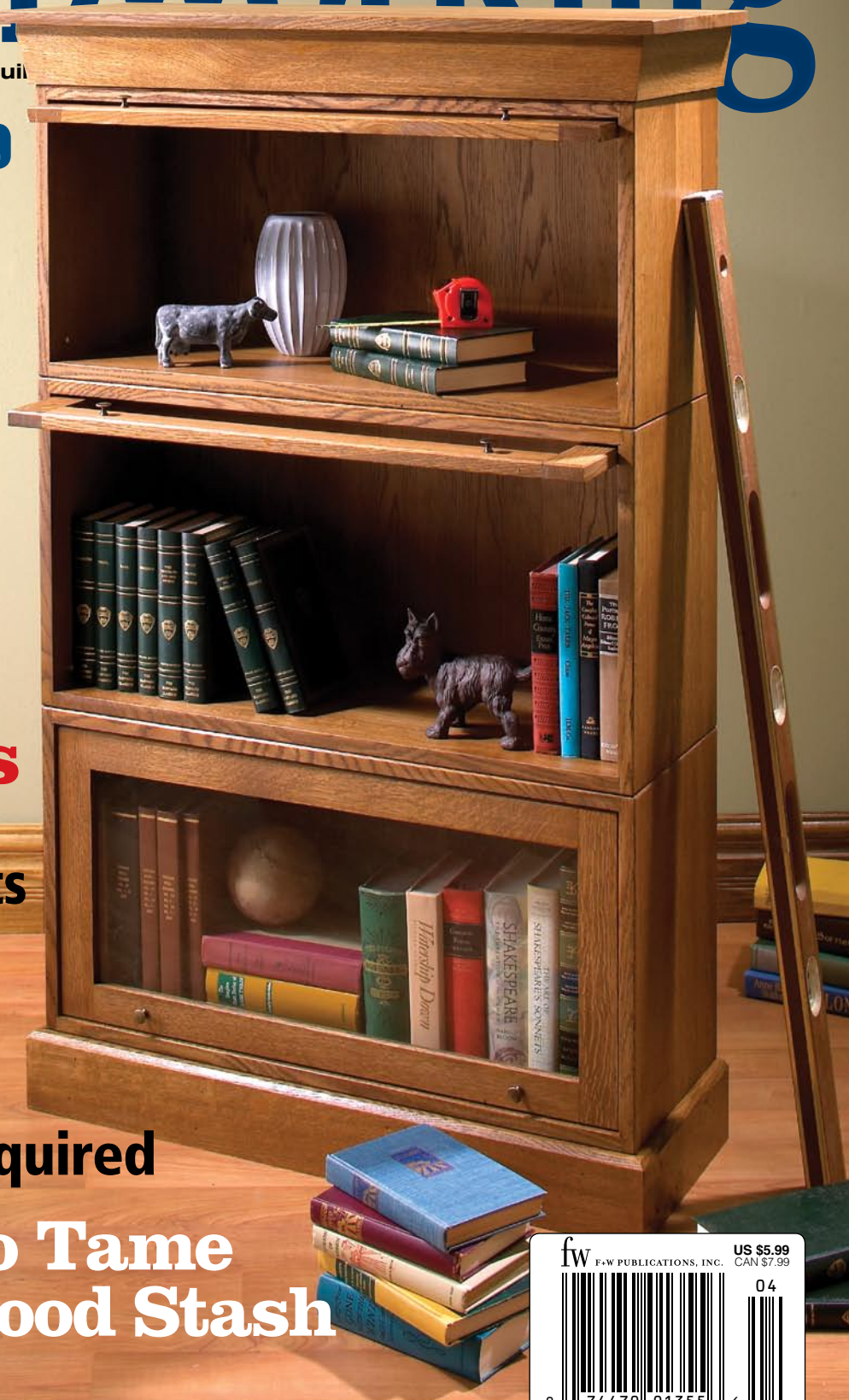
The Right Way to Fix Your Chairs

How the Pros Repair Loose Joints

Sensible Sharpening

No Fussy Jigs or Magic Stones Required

25 Ways to Tame Your Wood Stash



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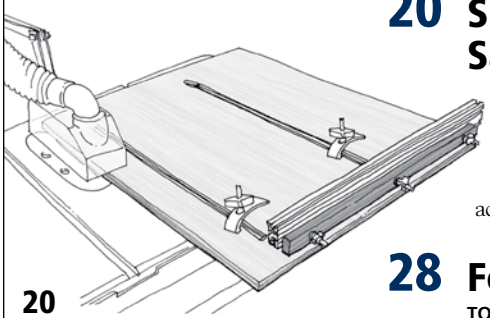

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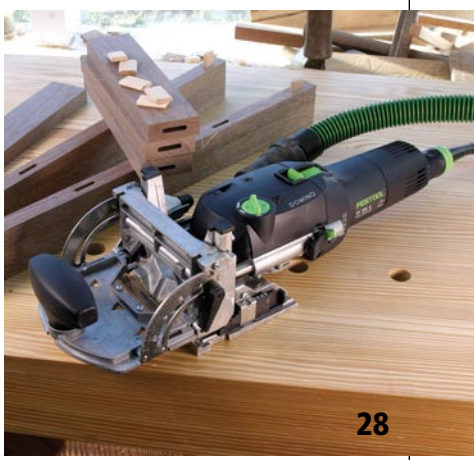

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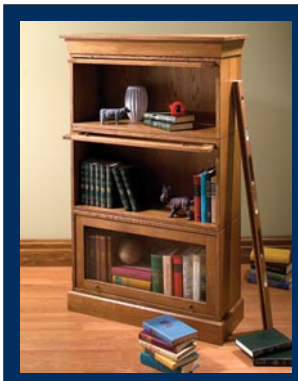


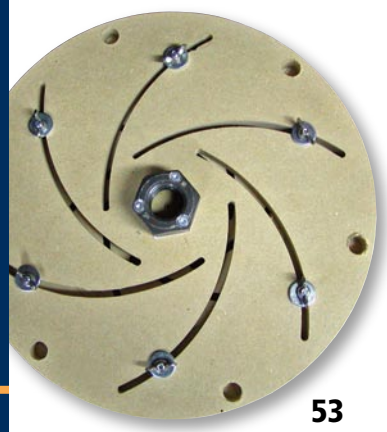
ON THE COVER

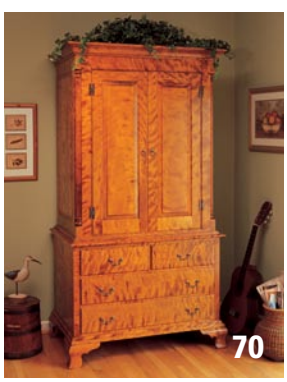
Even if you are a beginning woodworker, you can build these stackable barrister bookcases. Build a single set or build a roomful for your law practice.

Cover photo by Al Parrish

DEPARTMENTS

PROJECTS, TOOLS AND TECHNIQUES





Online Tools

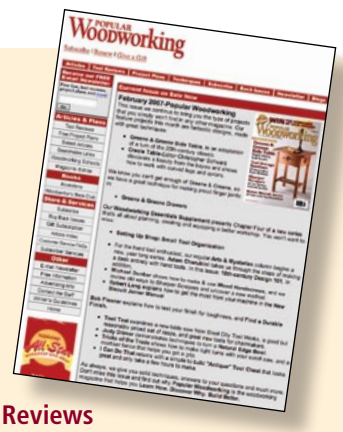
You Could Win a 10" Cabinet Saw from Steel City Toolworks

You'll be eligible to win a Steel City Toolworks 10" Deluxe Titanium Table Saw, just for answering a few questions about the saw at our web site! In addition to the unique patent-pending titanium nitrite top, this model (35630) includes a 50" industrial fence, a heavy-duty 3hp capacitor motor, three-belt drive system and more.

And to be honest, we're kinda jealous – this is beefier than the 35601 saw we tested in our shop (February 2007, issue #160). We liked that one: The table was flat, the fence was parallel and easy to use and assembly was quick and easy.

To enter, visit our web site at popularwoodworking.com and click on the contest link to answer the questions. All who submit correct entries will be eligible to win. But hurry – the contest ends March 31. **PW**

Inside Online



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Here, you'll find article corrections (yes, it's true – once in a while we make a mistake), expanded project plans, 18th-century shop inventories and other curious items. You also can read about what our editors are doing in the shop right now on our blogs.

Tool Reviews

From miter saws to metal-bodied spokeshaves, you'll find a selection of tool reviews you need to outfit your shop with the machines and hand tools that best fit your needs and price range.

Writer's Guidelines

Got a great idea for an article? Here's how to submit your proposal.

Contact the Staff

If you have a question about *Popular Woodworking*, about woodworking in general … or even a complaint about the magazine, we want to hear it. You can contact us directly through our web site – and we even give you our direct phone numbers.

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SAFETY NOTE

Safety is your responsibility. Manufacturers place safety devices on their equipment for a reason. In many photos you see in *Popular Woodworking*, these have been removed to provide clarity. In some cases we'll use an awkward body position so you can better see what's being demonstrated. Don't copy us. Think about each procedure you're going to perform beforehand.

Fix the Chairs, but Rip Up the Curtains

A few years ago we held a focus group of readers to pick their brains about changes we were considering to this magazine. One of our wild ideas was to add some home-improvement content to the magazine – stuff you could construct with your woodworking tools, such as built-in pantries, closet systems and fireplace mantles.

The dozen or so readers weren't impressed with the idea. OK, they hated it. One reader in particular spoke up to tell us why it was such a bad thing, and I'll never forget what he said.

When it comes to building stuff, he said that home-improvement projects and furniture projects were different animals. The home improvement projects were like the oatmeal that his doctor told him to eat every morning to stay healthy. He'd eat the oatmeal (and fix the kitchen doors), but he wouldn't enjoy it.

However, building furniture was like eating a delicious oatmeal cookie – the ingredients were the same (mostly) but the result was a far more enjoyable way to spend a Saturday.

Now I like oatmeal cookies quite a bit. But I know that oatmeal can be really tasty, too. However, you have to buy the right brand (McCann's Steel Cut Irish Oatmeal) and prepare them correctly. With the right oats, you can have best of both worlds. And that's what we're trying to do in this issue.

Every family has a few wobbly chairs. And it falls to the woodworkers in the family tree to fix them. But what do we know about fixing old chairs? Probably just enough to be dangerous to the chair, if my experience is typical.

So we enlisted Bob Flexner, our finishing columnist and a furniture restorer, to condense his decades of experience in fixing thousands of chairs into one guide for a woodworking audience. His methods are time-tested, reliable and fast. The story, "Regluing Doweled Chairs," begins on page 64 of this issue.

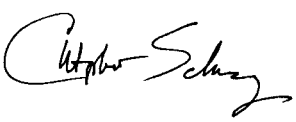
No more will you have to fumble with your fixing and despair at your repair. You can get this chore done with confidence and speed – and get back to building your own stuff.

Another giant bowl of undercooked porridge for many woodworkers is finishing. There are just too many choices of colors, techniques and topcoats. And so many woodworkers fall back on rubbed-on oil finishes.

You can do better. But the problem isn't entirely your fault. Many professional finishers are loathe to share their exact recipes. They'll say: It's a dye stain with a topcoat. But what brand and color? Is there a glaze in there, too? What kind of topcoat? What brand? What sheen? And how – exactly how – did you apply each of these products?

I've also been frustrated with this dark curtain across this important part of the craft. And that's why I've asked Senior Editor Glen D. Huey to help pull it down in this very issue. Glen eagerly agreed to share the recipes for his most beautiful finishes. Check out his story "Finishing Formulas" on page 70.

I know that many of you feel the same frustration as I do with this final "black art" of our craft. You've told us this every year during focus groups and in your letters. So here's a little evidence that we do listen – but we also try to slip in a little oatmeal among the cookies. **PW**



Christopher Schwarz
Editor

CONTRIBUTORS

BOB FLEXNER

If you're a regular reader of *Popular Woodworking*, you know Bob as our finishing guru. What you might not know is that Bob sort of stumbled into his role as a finishing expert after not being able to find answers to his own finishing questions. He spent more than two decades running a woodworking and restoration shop, where he was often frustrated by a lack of really good finishing information. So he decided to write down what he discovered, and years later, he's the go-to guy for all things finishing. But he also remains an expert in furniture restoration and repair. In this issue, Bob shares his skill and knowledge on regluing doweled chairs. His story starts on page 64.

DON WEBER

Although born in New York and now living in Paint Lick, Ky., Don was raised in Wales, where he apprenticed as a joiner. We know him as "the bodger," a 19th-century term to describe a chairmaker – a traditional craft at which he excels.

But he's also a woodworking teacher of all things traditional, a blacksmith and an avid golfer. To help support his links habit, Don makes hickory-shaft clubs. But he also appreciates the solid thwack (and good looks) of a persimmon driver such as those made by Louisville Golf. He writes about it on page 96.

Don is also part of the Madera Verde Project in Honduras, where he trains artisans in toolmaking and woodworking.

How to Install a Primitive Ring Pull

Steps to Pull Perfection

I am making the cherry tool cabinet you featured a while back (December 2004, issue #145). I am installing traditional ring pulls, bought from Lee Valley. Their web site says to just hammer them in, and then bend back the staples to secure them. Is this what you did? The staples are pretty long for the smaller drawers, and I was wondering if it would harm anything if I just cut them a little short before bending them over. The pulls seem pretty secure without needing the extra security of bending the staples back, anyway.

Allan Hill
Lancaster, California

Sure, you can file them down a bit. Then, it's a two-stage bending operation. Drill a hole and knock the two tines through it. Make sure the pull still swings.

Pry the two tines apart inside the drawer/door. Take some pliers and bend 1/4" of the tip of each tine at a right angle. With the pliers, then bend each tine until the tip contacts the work. Use a hammer to drive each tip into the wood, and you're done.

— Christopher Schwarz, editor

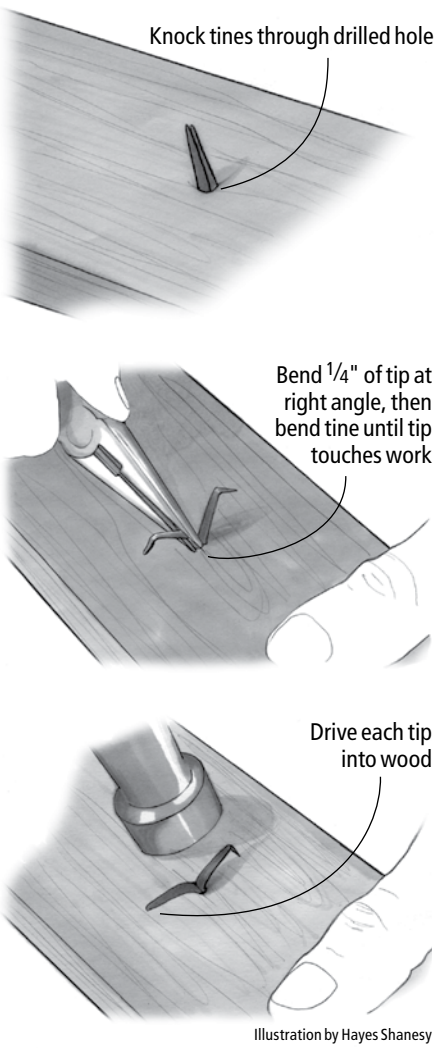


Illustration by Hayes Shanesy

Sharpening Scraper Plane Blades

Because you've recently been looking into scrapers (February 2007, issue #160), I thought that maybe you could answer a question about scraper-plane blades.

Recently I acquired a Stanley #12 scraper plane and the three Lie-Nielsen scraper planes (modern versions of the Stanley #112, #85, and #212). I am in the process of preparing and using these scraper planes to smooth the surfaces of the blanket chest that I made at a woodworking course. I intend to thereby avoid sanding.

I intend to paint the chest (which is made of poplar) following the methods given in the painting article in the Autumn 2006 issue of *Woodworking Magazine* (Ed: the sister publication to *Popular Woodworking*).

I am preparing the scraper-plane blades just as I would plane blades: both back and bevel, five diamond plates of grits from #120 to #1,200 followed by four waterstones of grits from #2,000 to #16,000. The burnishing of the 45° bevels to produce a burr is being done with a Glen-Drake burnisher following the method of David Charlesworth (which is similar to the method given by Garrett Hack).

It is my understanding that when a scraper plane ceases to produce shavings and starts to produce "sawdust" that I must go back to honing and redo the burnishing to produce a new burr.

Here is my question: How far back must I go in the honing sequence?

Certainly I need not go back to the diamond plates. But, do I need to go back to the #2,000-grit waterstone? And, can I get away with only re-honing the bevel, or must I re-hone both the back and the bevel?

If you are able to help me understand how to do the refurbishing of defunct scraper-plane burrs, I would greatly appreciate it.

Dave Raeside
Norman, Oklahoma

On scrapers, I have indeed been doing a lot of work on their care and feeding this year. In brief, they are like any other edge tool. All the same rules apply. The burr is strongest when it is turned from the intersection of two highly polished planes.

And so resharpening of scrapers involves exactly the same regimen as it would for a plane or chisel.

1. If the edge is only slightly degraded, I'll begin with a polishing stone (#8,000) and then turn the burr.

2. If the edge is mostly used up but still unchipped, I'll begin with the #1,000, then polish, then turn the burr.

3. If the edge is chipped or otherwise damaged, I drop back to the diamond stones, grinder or other grinding abrasives. Then I use the #1,000, #8,000 and burnisher.

What I don't do much of, is to try to resharpen with burnishing alone. My results have always been inconsistent. Occasionally it works. Usually I get a burr that is OK in some places and weak in others. Other times I get nothing but a trip back to the grinder.

— Christopher Schwarz, editor

Stickley Table Seems a Bit Tricky

This is my first official week of 'retirement' and I am contemplating making the "Lost Stickley Table" (November 2006 issue #158). I am a fairly accomplished woodworker and have focused on Arts & Crafts and Greene & Greene reproductions. However, this table has me a tad spooked. As I proceed with the table may I prevail upon you for some advice

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along the way? I do have both the article that appeared in the magazine, along with the additional information you provided on the web site (popularwoodworking.com, "magazine extras").

And, finally, what are your thoughts on making a prototype out of secondary wood such as poplar?

Randy Moon
Akron, Ohio

We're glad to help when we can; e-mail is the best way to ask these questions.

I think it's a great idea to make a practice piece. Woodworkers as a group are often reluctant to practice, but it's really the only way to improve skills. If things don't turn out, you haven't wasted expensive material, and if they do turn out well, you can paint it and then you have something nice to show for your effort.

— Robert W. Lang, senior editor

The Plane Truth or Not, Mr. T Haunts

I read with interest your editor's note on "When the Gospel Truth Isn't True."

As a 12-year-old student in the late 1930s in Montreal, I took a first course in woodworking called "sloyd," which started me on a life-long love of woodworking. We used only hand tools and were instructed never to lay a plane down on its sole.

Our teacher, Mr. Turnbull, was a crusty, tough veteran of World War I whose discipline was severe. A plane found on the bench on its sole would surely result in a good rap on the offender's knuckles with a ruler and a drill-sergeant-like tongue lashing. So to this day I can't lay a plane down on its sole – no way!

I believe that the reasoning behind the rule was that a stray nail or similar debris on the bench might cause a nick in the plane iron? Perhaps the reason why many pictures show planes on their soles is that they look attractive that way as tools. I agree with you that in general one needs to question authority, but gospel truth or not: I will never lay a plane on its sole for fear that Mr. T will come back to haunt me.

Don Davis
Scotia, New York

Mike Dunbar asserts (and I tend to agree) that the admonition to keep planes on their sides was a product of manual arts instruction, which began in the late 19th century. Sloyd is one example of the many ways woodworking was taught to children and adults. There are no earlier references to this practice with handplanes in the literature that I can find.

And while I agree that planes look better when photographed when on their soles, I don't think that was the case from my research. One of the most telling pieces of evidence was a series of sweeping photographs of a large German factory that made workbenches and wooden handplanes. These were action shots of a couple dozen woodworkers at work throughout the plant. None of the planes were on their sides anywhere in any of the photos.

And while I also agree that a nail could damage a plane iron on its sole, I know that a stray hammer or chisel or other handplane could damage the iron of a plane on its side. Bottom line here: We all should be in complete control of our workbench space, no matter how we set our planes down.

— Christopher Schwarz, editor

Blade Stiffener and Fence Advice

I just finished reading *Essential Guide to Table Saws*, (January 2007 newsstand-only publication) and I have a couple questions.

First, I didn't see any reference to blade dampeners or stiffeners such as the type that Forrest Blades makes. I'm wondering if you've noticed any value added to using one? The idea is that they reduce vibrations, but on my cabinet saw there is little vibration anyway, and the stiffeners will reduce cutting depth.

My second question has to do with adding hold-downs and/or featherboards to Biesemeyer-style fences. Because the fence is held down only at one end, would there not be some lift as the stock passes through? I have a large outfeed table attached to the saw, and it prevents clamping the fence at the other end.

Gary Fleck
via e-mail

Senior Editor Robert W. Lang and I both feel stiffeners are unnecessary. In fact, the only place we would consider using them is with a thin-kerf blade. (And I don't think there's a need for thin-kerf blades unless you are using a greatly under-powered saw).

Regarding fence movement, Bob and I agree that it is possible. However, if you have your fence set with a tight lever (where you need to apply pressure to close and lock) then the amount of lift is considerably less versus a loose-fitting fence. In fact, the end of the fence may lift a bit, but in the middle around the saw blade area the lift will be much less.

Our suggestion is to create an opening – a series of holes or a slot of some design – in your outfeed table that would allow "F"-style clamp use to secure the fence and prevent lifting.

— Glen D. Huey, senior editor

Mixing Wiping Varnish, Revisited

Several years ago, Bob Flexner wrote a great tip about finishing furniture with polyurethane. I tried it and it was super. However, I have lost the tip. It went something like: "On the final coat of polyurethane, mix a certain amount of polyurethane with a certain other product and hand wipe the product on the furniture."

Obviously, I can't remember how much of each to mix and I can't recall if the other product was thinner.

Russell Dionne
via e-mail

The tip was to make a wiping varnish from the polyurethane. Thin it about half with mineral spirits (paint thinner) so it flows out level and is also easy to wipe on. Sand the last coat of the polyurethane level with fine sandpaper and then apply one or two thinned coats to get a more perfect result.

— Bob Flexner, contributing editor

Tweak Shooting Board Beds to Compensate for Out-of-square Soles

I thought the article on shooting boards (December 2006, issue #159) was excellent; I need to make one soon for a project I'm working on. My bench planes are all vintage Stanleys that have been in my family for a couple of generations. They are excellent and I use them all the time.

However, none of them has sides that are perfectly square to the sole, and I don't even know how I would go about correcting this defeat short of finding a machinist with a milling machine.

Many craftsmen over the last couple centuries must have had the same problem. I can think of two ways the problem could be solved (other than lapping the sides of the plane):

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1. Use the lateral adjustment lever to skew the blade so that it is perpendicular to the side of the plane rather than parallel to the sole to compensate for the side and sole not being square, or …

2. For boards that are rectangular in cross-section, when shooting, flip one of the boards of a pair that will be joined so that the angles of the "shot" edges will be complementary even though they are not 90° (analogous to edge-jointing two boards at once). Of course this wouldn't work for mouldings.

I was wondering if you or the author, Paul Sellers, have any thoughts on this subject.

Mark Ketelsen
Lincolnshire, Illinois

I always tweak the bed of the shooting board instead of the tool.

Usually a strip or two of strategically placed blue painter's tape will fix things. You can get scientific about it if you like: Use a machinist square and feeler gauges to determine how out of square you are at the top of the sidewall. In my experience, the old Stanley planes are more likely to be toed in at the top.

Then measure the thickness of your tape with a dial caliper and lay down enough strips of tape on your shooting board to compensate for the plane. This will get you close, but it won't be perfect. You might need to add or remove another strip of tape to get things perfect. Test your results on wood.

Once your square says you are shooting square, you're done.

— Christopher Schwarz, editor

Matching Sapwood and Heartwood

I'm in the process of building a full-size, adjustable Mission-style entertainment center (adjustable for regular televisions, full-size units and the new thin televisions). I'm building it out of cherry and have cut around knots and defects. Unfortunately, I simply can't afford to cut around sapwood. Nor could I select boards from one flitch.

Having said that, I have the utmost confidence that I can blend the sapwood and heartwood in the finishing process – that's where you come in. (You didn't know you were assisting with this project, did you?) I've read some articles on matching sapwood to heartwood (they vary so I wanted your input), but it goes beyond sapwood and heartwood. I also need

to color match the entire project since not all boards came from the same flitch.

How do you do match sapwood to heartwood and color match the entire project?

Chuck Steger
Corinth, Texas

The best way to do the color matching you're talking about is with toners, especially dye toners. That is, dye added to a finish you're spraying. It's harder to do it with brushing finishes, but it is possible. For example, you could add an alcohol-soluble dye to shellac or a water-soluble dye to water-based finish or even an oil-soluble dye to varnish. Using pigment can cause muddying problems that show at certain angles because of the buildup necessary over the sapwood.

You also could do the toning with aerosol lacquer toners.

If you are limited to oil stains and finishes, you might be able to achieve a partial match by applying a second coat of stain to the lighter areas. Be careful not to build up the stain too much, however, because you will end up with a weaker bond. The finish could separate at the stain layer. **PW**

— Bob Flexner, contributing editor

QUESTION? COMPLAINT? WRITE TO US

Popular Woodworking welcomes comments from readers about the magazine or woodworking in general, as well as questions on all areas of woodworking. We are more than happy to share our woodworking experience with you by answering your questions or adding some clarity to whatever aspect of the craft you are unsure about, and if you have a complaint, we want to address it whenever possible.

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WEB: dogwoodwoodworking.com
The Dogwood Institute School of Fine Woodworking is a new school in the North Atlanta, Ga., area offering courses for beginning, intermediate and advanced woodworkers. A signature series consisting of five two-day courses teaches the detailed foundation techniques necessary for building fine furniture. Courses include furniture making, veneering, woodturning and carving. New classes are now forming.

ILLINOIS

Furnituremaking Workshops
1774 W. Lunt Ave.
Chicago, IL 60626
(773) 761-3311
E-MAIL: jeff@furnituremaking.com
WEB: furnituremaking.com
Furnituremaking Workshops offers a wide range of hands-on classes, from woodworking techniques to building furniture. Classes are small, with most taught by award-winning author and furniture maker Jeff Miller.

Alpine School of Woodcarving, Ltd.
225 Vine Ave.
Park Ridge, IL 60068
(847) 692-2822
E-MAIL: wayne@chipcarving.com
WEB: chipcarving.com
Our school is dedicated to the study and learning of the decorative art of chip carving, taught by the acclaimed international carver and author Wayne Barton. Related to architecture and furniture design, all techniques and design aspects are taught. Visit our web site for a class schedule.

INDIANA

Marc Adams School of Woodworking
5504 E. 500N
Franklin, IN 46131
(317) 535-4013
E-MAIL: marcadams@marcadams.com
WEB: marcadams.com
Marc Adams School of Woodworking is committed to excellence through education with the best woodworkers of modern time. Classes range from one day to two weeks and enrollment is limited. Call or write for information today and start your woodworking dreams tomorrow.

American Sycamore Woodworkers' Retreat
7559 East County Rd 950 South
Cloverdale, IN 46120
(877) 845-2666
E-MAIL: aswr@ccrtc.com
WEB: aswrs.com
American Sycamore Woodworkers' Retreat is located in Cloverdale, Ind. and is one of the finest woodworking schools in the nation. Small class size, attention to detail and a relaxing atmosphere are paramount at American Sycamore. Woodworking, furniture making, turning and finishing.

MASSACHUSETTS

New England School of Architectural Woodworking
One Cottage St.
Easthampton, MA 01027
(413) 527-6103
E-MAIL: info.nesaw@verizon.net
WEB: nesaw.com
There are three woodworking training programs at the New England School of Architectural Woodworking. We offer a 35-week certificate career-training program in architectural woodworking with job placement assistance, a summer six-week intensive program for the serious woodworker and a short-term adult education introduction to woodworking classes.

Heartwood
Johnson Hill Road
Washington, MA 01223
(413) 623-6677
E-MAIL: willb@heartwoodschool.com
WEB: heartwoodschool.com
Heartwood, founded in 1978, offers one-week workshops in the fundamentals of woodworking, cabinetmaking, furniture making and various timber-framing topics. The charming schoolhouse in the woods features a shop, library, dining room and classroom. Tuition includes materials and lunch.

The Furniture Institute of Massachusetts
116 Water St.
Beverly, MA 01915
(978) 922-0615
E-MAIL: furniture@verizon.net
WEB: furnituremakingclasses.com
The Furniture Institute of Massachusetts offers two-year programs with Master Furniture Maker and the 2005 Cartouche Award Winner Philip C. Lowe. Summer and weekend workshops are also available.

MAINE

Center for Furniture Craftsmanship
25 Mill St.
Rockport, ME 04856
(207) 594-5611
E-MAIL: cfc@woodschool.org
WEB: woodschool.org
Center for Furniture Craftsmanship is a year-round woodworking school for all levels from novice to professional. We offer one-week and two-week workshops, 12-week intensives, nine-month comprehensive and studio fellowships. Messler Gallery is on our premises. We have an outstanding international faculty.

NEW HAMPSHIRE

Homestead Woodworking School
52 Bald Hill Road
Newmarket, NH 03857
(603) 659-2345
E-MAIL: WoodSchool@comcast.net
WEB: woodschoolNH.com
Homestead Woodworking School offers classes for novice, intermediate and advanced woodworkers. We're located in rural Newmarket, N.H., near the seacoast. Our instructors are professional woodworkers with unique areas of specialization.

MISSOURI

American Woodworking Academy
1495 Hoff Industrial Center
O'Fallon, MO 63366
(636) 343-3750
E-MAIL: info@awacademy.com
WEB: awacademy.com
Woodworking you can grow with. Our foundation of hands-on training gives students the opportunity to develop their skills step-by-step. Courses range from a single class to our 22- or 44-week Master Woodworking Program. Looking for a new trade, setting up for the golden years or fulfillment and opportunity to be your own boss? Let us help you.

NEW YORK

Art's Wood Shop & School of Woodworking
240 Portage Road
Niagara Falls, NY 14303
(716) 285-1814
E-MAIL: awsnfny@aol.com
WEB: awsnf.com
Art's Wood Shop & School of Woodworking offers programs in basic woodworking, cabinetmaking, fine furniture making and wood finishes.

NORTH CAROLINA

Country Workshops
990 Black Pine Ridge Road
Marshall, NC 28753
(828) 656-2280
E-MAIL:
langsner@countryworkshops.org
WEB: countryworkshops.org
Country Workshops offers week-long classes in traditional woodworking. Classes include: Windsor and ladderback chairmaking, carving bowls and spoons, Japanese woodworking, woodworking for women and more. Materials, use of special tools, and room and board are included with tuition. Established 1978.

Rockingham Community College
Highway 65 & County Home Road
P.O. Box 38
Wentworth, NC 27375
(336) 342-4261
E-MAIL: quinnm@rockinghamcc.edu
WEB: rockinghamcc.edu
The Fine & Creative Woodworking Program prepares individuals to build high-quality furniture and accessories. The students will begin by developing a strong foundation in basic hand-tool use and machining. Course work progresses to include study of finishing, turning, veneering, equipment maintenance and principles of operating a business.

John C. Campbell Folk School
1 Folk School Road
Brasstown, NC 28902
(800) 365-5724
E-MAIL: hanne@folkschool.org
WEB: folkschool.org
The John C. Campbell Folk School offers week-long and weekend classes for all skill levels in scenic, rural western North Carolina. Classes include Windsor, Shaker, Twig, Fly Rod, Musical Instruments, Hand Tools, Marquetry, Bamboo, Chairs, Stools, Cabinets, Tables, Timber Framing, Coopering, Painting, Refinishing and more. Call for a free course catalog, including lodging and meal options.

OHIO

Conover Workshops
P.O. Box 679
Parkman, OH 44080-0679
(440) 548-3491
E-MAIL: info@conoverworkshops.com
WEB: conoverworkshops.com
Conover Workshops was founded in 1980 by Ernie Conover with the mission of teaching technically correct, proper and safe woodworking. All teaching is at the highest level, and all instructors are acknowledged leaders in their fields. We offer workshops in hand- and machine-tool joinery, woodturning, Shaker chairmaking, etc.

OREGON

The Northwest Woodworking Studio
1002 SE 8th Ave.
(503) 284-1644
Portland, OR 97214
E-MAIL: nws_info@
northwestwoodworking.com
WEB: northwestwoodworking.com
The Northwest Woodworking Studio offers craftsman workshops led by nationally known experts for woodworkers of all skill levels, from novice to advanced. Master Woodworker and published author Gary Rogowski offers the two-year Mastery and Distance Mastery Programs. Workshop schedules are available at northwestwoodworking.com or call 503-284-1644 for more information.

PENNSYLVANIA

J.D. Lohr School of Woodworking
242 N. Limerick Road
Schwenksville, PA 19473
(610) 287-7802
E-MAIL: jdlohrwood@aol.com
WEB: jdlohrwood.com
Forty-eight hour, one week long and total-immersion courses in practical, get-the-job-done, machine-based woodworking. Focus is on safe, efficient production skills with home-shop-type table saws, jointers, planers and routers. Woodcarving and other weekend classes are also offered in this well-equipped, expertly staffed Pennsylvania studio.

TENNESSEE

Arrowmont School of Arts and Crafts
556 Parkway P.O. Box 567
Gatlinburg, TN 37738
(865) 436-5860
E-MAIL: kgeib@arrowmont.org
WEB: arrowmont.org
Arrowmont School of Arts and Crafts is an internationally known visual arts complex in Gatlinburg, Tenn., offering one- and two-week programs plus weekend workshops in spring, summer and fall. The school is known for its excellence in woodturning and woodworking instruction. For complete course offerings, call or register online.

Lonnie Bird's School of Fine Woodworking
1145 Carolina Drive
Dandridge, TN 37725
(865) 484-1145
E-MAIL: lonniebird@earthlink.net
WEB: lonniebird.com
Choose from a variety of hands-on classes from dovetailing and casework to joinery and chairmaking. Classes range from one day to two weeks in length. Small class size guarantees that you'll get personalized instruction – you won't get lost in the crowd.

TEXAS

Center for Essential Education School of Woodworking
608 Day Creek Road
Waco, TX 76705
(254) 799-1480
E-MAIL: cfeeschool@mailsw.com
WEB: cfeeschool.com
The Center for Essential Education School of Woodworking is dedicated to establishing foundational skills in all areas of traditional woodworking by providing hands-on instruction through week-long and apprenticeship courses in general woodworking, fine furniture making and woodturning. Contact Paul Sellers, director.

WISCONSIN

The Wild Earth School
924 County Road N.
Hudson, WI 54016
(715) 749-9011
E-MAIL: info@aboutwildearth.com
WEB: aboutwildearth.com
We offer woodworking classes for all skill levels. George Vondriska's Wild Earth School offers entry-level to advanced classes. We have hands-on classes in cabinet, furniture making and lathe turning. Our one- and two-day classes fit any schedule and our Wisconsin school is easy to get to.

ONTARIO, CANADA

Rosewood Studio Inc.
P.O. Box 839
83 Little Bridge St.
Almonte, Ontario K0A 1A0
Canada
E-MAIL: info@rosewoodstudio.com
WEB: rosewoodstudio.com
Welcome to Rosewood Studio! We offer an environment for creative woodworking and relaxation, with instructors from around the world. Students learn how to make heirloom-quality furniture while enjoying every step of their journey. Our courses run year-round. Call or visit our web site for further details and schedules.

Compiled by Paul Anthony
Illustrations by Matt Bantly

Saw Sled Expansion Innovations

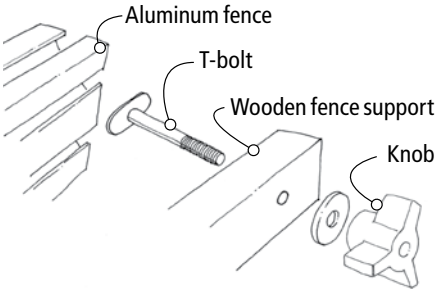
THE WINNER:

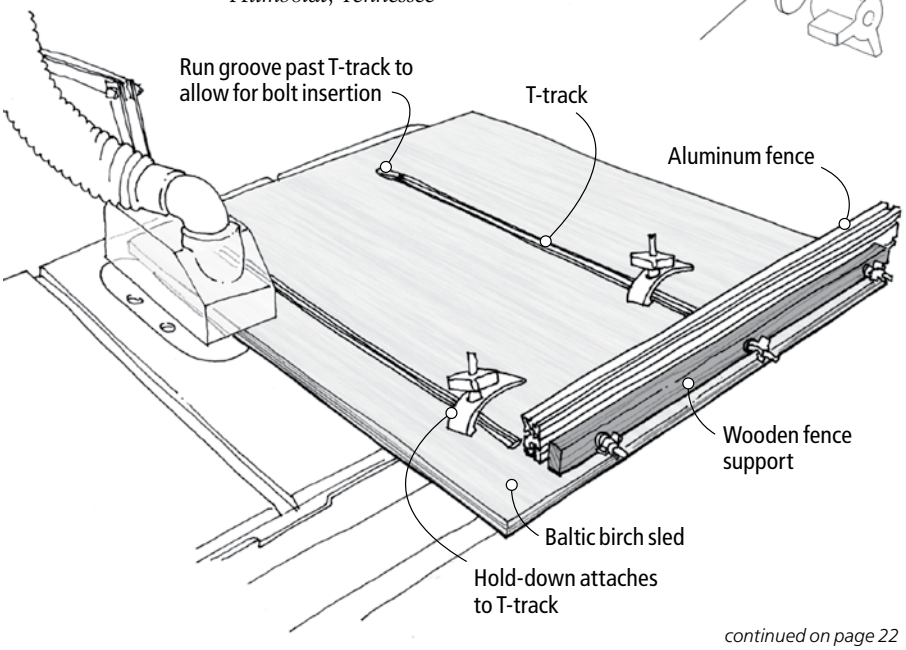
When designing a table saw crosscut sled, I decided that I wanted a large crosscut capacity, a sliding fence and a way to clamp the work to the sled. This single-runner sled is 32" deep x 26" wide and was easy to build. It will carry panels up to 30" wide, with a 24"-clamping capacity. The fence can slide to align with the saw-blade edge of the sled for maximum workpiece support, or it can be slid out of the path of my blade guard. The T-slots in the fence also allow for attaching adjustable stops.

The aluminum extrusion fence is straight and flat, and attaches to a wooden support with three T-bolts (sometimes called toilet bolts) through the support into a channel in the fence. Knobs on the end of the bolts allow side-to-side adjustment. I bought the 1½" x 3" aluminum extrusion from 80/20, through the company's e-Bay store (stores.ebay.com/8020-Inc-Garage-Sale).

To accommodate the hold-downs, I epoxied two 24"-long T-tracks into grooves I routed in the ⅝"-thick Baltic birch sled panel. Setting the T-track 1" away from the fence allows clamping of 24" panels from the opposite end. Also, make sure to run the groove an inch or so past the end of the track to allow insertion of the hold-down T-bolt into the track. The hold-downs, knobs and T-track are commonly available from various woodworking mail-order supply houses.

Steve McDaniel
Humboldt, Tennessee





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CASH AND PRIZES FOR YOUR TRICKS AND TIPS!

Each issue we publish useful woodworking tips from our readers. Next issue's winner receives a $250 gift certificate from Lee Valley Tools, good for any item in the catalog or on the web site (leevalley.com). (The tools pictured at right are for illustration only, and are not part of the prize.)

Runners-up each receive a check for $25 to $100. When submitting a trick (either by mail or e-mail) you must include your complete mailing address and a daytime phone number. If your trick is selected for publication, an editor will need to contact you. All entries become the property of *Popular Woodworking*. You can send your trick by e-mail to popwoodtricks@fwpubs.com, or mail it to Tricks of the Trade, *Popular Woodworking*, 4700 E. Galbraith Road, Cincinnati, OH 45236.

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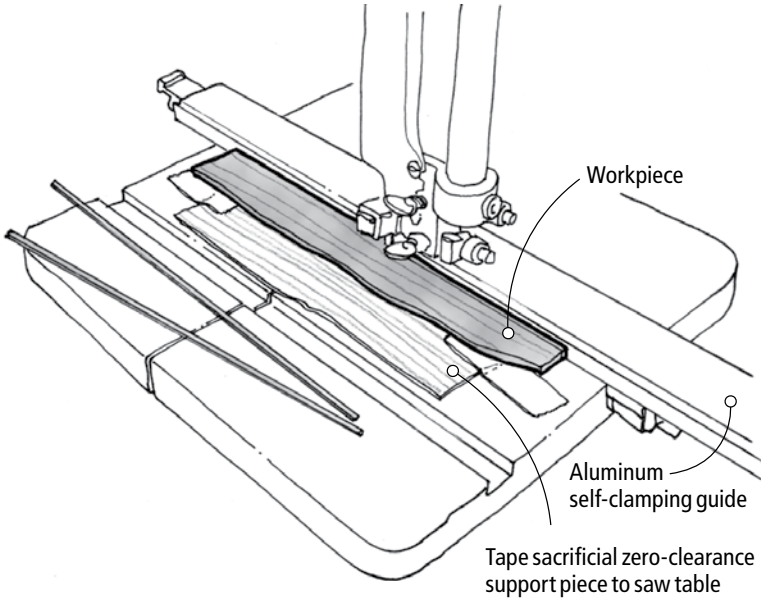
Tips for Thin Rips

As a guitar maker, I rip a lot of very narrow wood strips, which can be difficult and dangerous to cut on a table saw. Instead, I cut them on the band saw using a low-profile fence, which allows setting the upper blade guides as close as possible to the stock to prevent blade deflection, and increases accuracy. It also allows my fingers better access for feeding the stock. For convenience and quick setup, I use a commercial self-clamping aluminum tool guide. If necessary, it can be angled up to 5° or so to accommodate band saw blade drift.

Using a sharp six teeth-per-inch blade, I find that I can accurately rip pieces as narrow as about 1/32", with tolerances to within about .002". To prevent the narrow rippings from falling down into the throat plate, I feed the stock on top of an underlying sacrificial zero-clearance piece that I tape to the saw table.

Bil Mitchell
Riegelsville, Pennsylvania



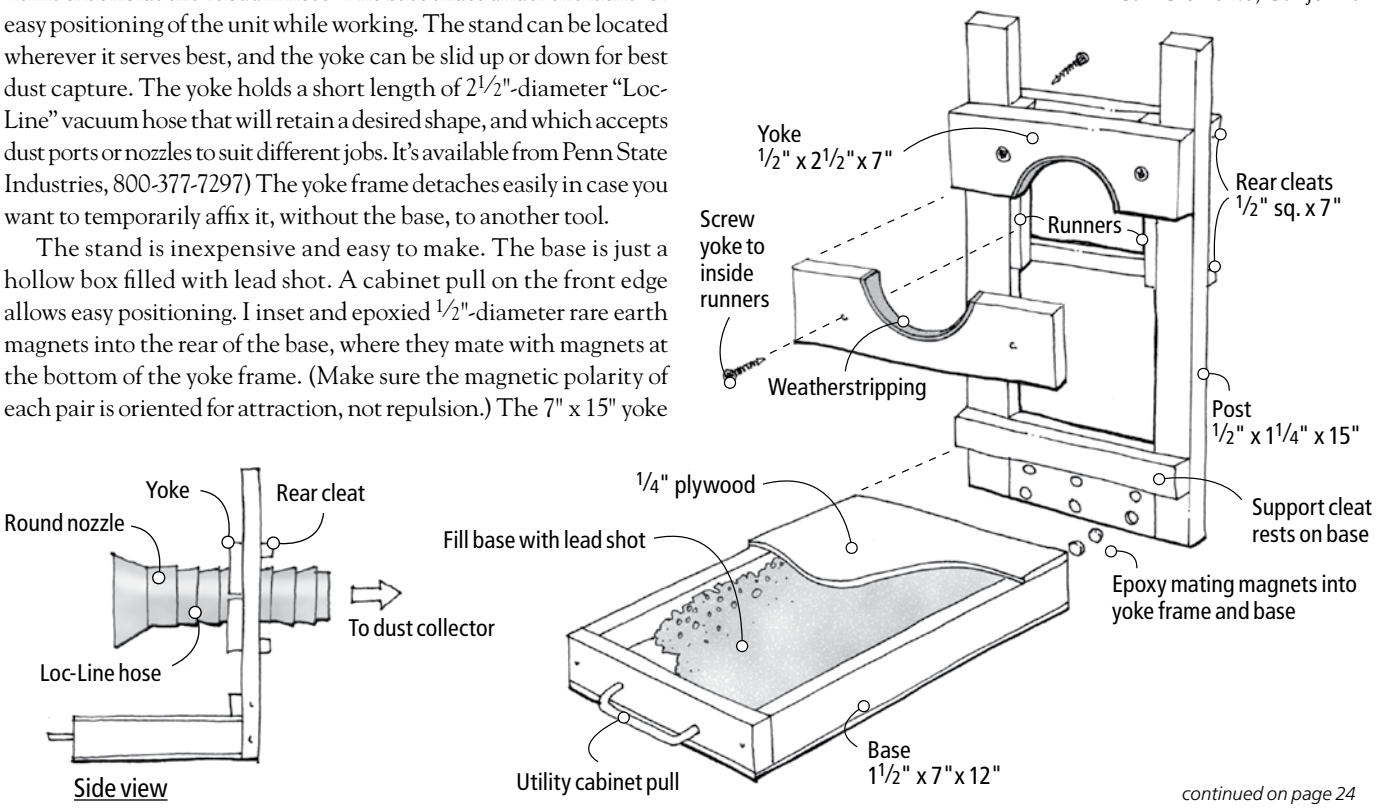
Benchtop Dust Port Stand

Dust collection for the lathe can be a problem because the port needs to be flexible and adjustable enough to direct at various areas as they're being worked. I devised this dust port stand for use with my benchtop lathe, although it could also be used for other tools.

The stand consists of two parts: A weighted base and a vertical yoke frame that holds the vacuum hose. The base slides under the lathe for easy positioning of the unit while working. The stand can be located wherever it serves best, and the yoke can be slid up or down for best dust capture. The yoke holds a short length of 2 1/2"-diameter "Loc-Line" vacuum hose that will retain a desired shape, and which accepts dust ports or nozzles to suit different jobs. It's available from Penn State Industries, 800-377-7297) The yoke frame detaches easily in case you want to temporarily affix it, without the base, to another tool.

The stand is inexpensive and easy to make. The base is just a hollow box filled with lead shot. A cabinet pull on the front edge allows easy positioning. I inset and epoxied 1/2"-diameter rare earth magnets into the rear of the base, where they mate with magnets at the bottom of the yoke frame. (Make sure the magnetic polarity of each pair is oriented for attraction, not repulsion.) The 7" x 15" yoke frame is made entirely from 1/2"-thick pieces. The upper and lower yoke pieces screw to runners and rear cleats that allow the yoke to adjust up and down the frame posts. Weather stripping on the yoke holds the vacuum hose firmly in place.

Bob Lloyd
San Clemente, California



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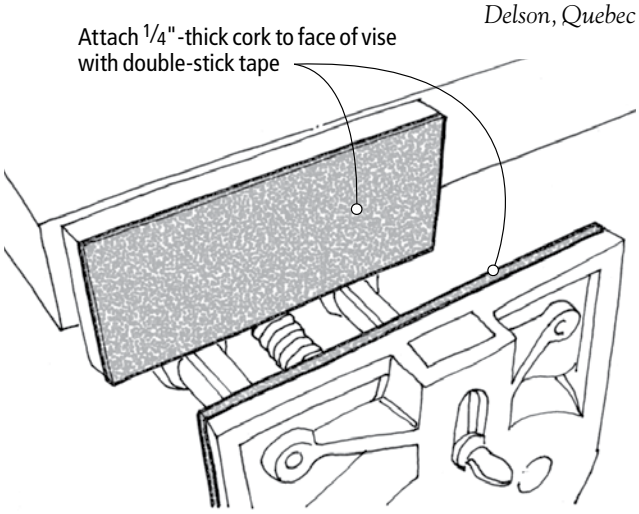
Cork Vise Facing for a Soft Touch

I've found that padding my vise faces with cork prevents them from marring many surfaces, especially softer woods or finished workpieces. I use 1/4"-thick cork, which is available by the square foot in rolls from home-supply centers. I attach it to my vise faces using wide double-stick tape. Cork is also great for holding irregular stock such as dowels or wooden balls.

Serge Duclos
Delson, Quebec

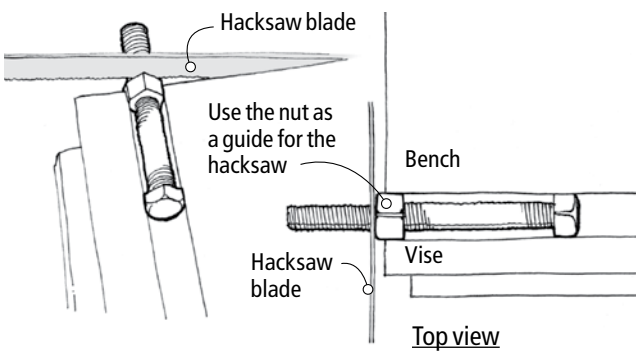


Easy Bolt Sawing

Over the years, I've shortened a fair number of long bolts to some desired size rather than traipsing to the hardware store for just a few of the proper length. Unfortunately, I always encountered two problems with sawing bolts. The first was that it's difficult to mark an accurate cutline on bolt threads. The second was that securely clamping the bolt in a vise for sawing can be awkward because the head and threads are different diameters.

It finally dawned on me that the solution is to select a nut the same width as the bolt head, thread it onto the bolt so its outer face aligns with the desired cutline, and then clamp the assembly into the vise, squeezing the nut and bolt head between the jaws. Voilà! The assembly is now firmly clamped, and by running the hacksaw blade against the nut, I can cut the bolt to perfect length.

Brad Nixon
Missoula, Montana

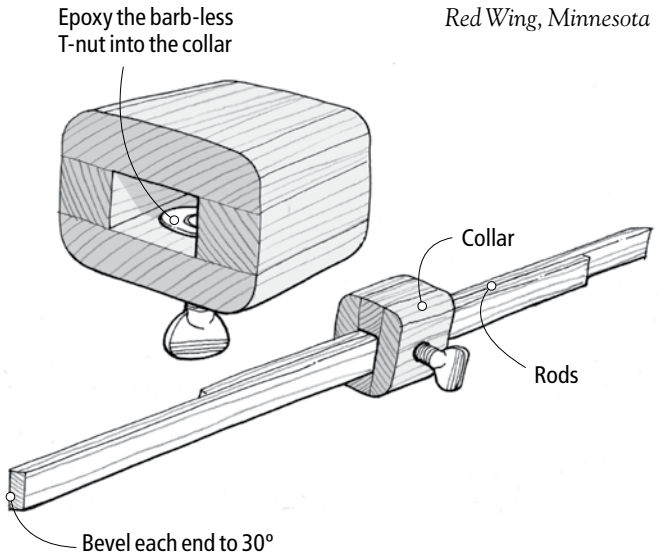


Shop-made Pinch Rods

One of the most accurate approaches for checking a case or other assembly for square is to compare the inside diagonal measurements for equidistance. The easiest way to do this is using pinch rods – a pair of sticks clamped together with a collar to create the appropriate length for measuring. To use pinch rods, simply slide them apart until the ends slip inside two opposing case corners, then lock them together to check the opposite diagonals. I make pinch rods in various lengths to suit different-sized projects. For rods longer than 24", I use two collars, clamping one at each end of the overlapping rods.

I make my pinch rods by ripping 3/16" strips from 3/4"-thick hardwood, beveling one end of each to about 30°. I make the collar by gluing together 1/2"-thick hardwood pieces as shown. The collar is 1 3/4"-wide by 1 3/4"-long, with a 1/2" x 25/32"-wide tunnel for the rods. The 1/2" dimension accommodates the two rods plus the head of a T-nut that holds a 5/16"-diameter x 1"-long clamping thumbscrew. I install the barb-less T-nut before assembling the collar, epoxying it in place from the inside face of the collar. After gluing the collar together, I round its edges for comfort, using a 3/8"-roundover bit in my router table. (For safety, hold the piece with a wooden handscrew clamp while routing.)

Pete Dulak
Red Wing, Minnesota



Miter Gauge Quick Slip

Here's a dead simple little maneuver that will shave a few seconds of aggravation from your shop day. If your table saw's miter gauge bar includes a washer that fits the saw's T-slots, you already know how awkward it can be to thread the bar into the slot from the front of the saw. Instead, drop the bar into the table slot with the washer end overhanging the rear of the saw table, then simply pull the gauge backward toward you.

Greg Strately
Truth or Consequences, New Mexico

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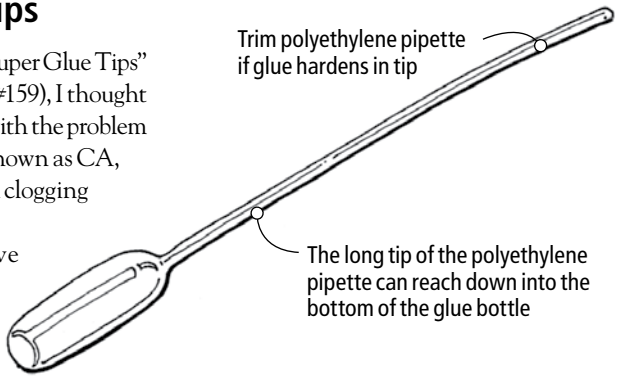
More Super Glue Tips



After reading Clark Lang's "Super Glue Tips" in the December 2006 issue (#159), I thought I'd share another way to deal with the problem of cyanoacrylate glue (also known as CA, or "super glue") drying up and clogging the bottle tips.

You can buy inexpensive polyethylene pipettes for applying CA glue. These handy little disposable squeeze droppers provide great application control due to their long, slender tubes. You simply suction up the amount of glue you need from the bottle, then squeeze it onto the workpiece. Afterward, you can clean the dropper by squeezing the bulb rapidly to blow out most of the remaining liquid. If any tiny droplets adhere to the inside of the tube, they can usually be removed by slapping the pipette on the inside of a trash can.

In my experience, one of these pipettes lasts about five times longer than the nozzles that come with the glue. You'll also find that you can leave glue in one for days without it setting up. After much use they will clog, but usually near the tip. When that happens, you can trim off that part and continue to use the pipette until it's too short to reach in the bottle. (You can get a pack of 10 for $2.87 from Stewart-MacDonald, 800-848-2273 or stewmac.com.)

Russ Merz
Cincinnati, Ohio

White Marks the Spot

As my eyes mature, some previously simple tasks are becoming quite tricky. For example, I was recently trying to drill a number of holes at precise locations marked with fine pencil lines on a piece of dark wood. However, even in good light, I had great difficulty seeing the layout lines. In frustration I decided to start over, but tried a different approach.

I first covered the area to be marked with white correction fluid – the kind sold for correcting typing errors. Layout lines drawn on the white area were then clearly visible, and I could work accurately. The correction fluid works great because it dries almost instantaneously, doesn't soak into the surface, and can easily be scraped off afterward. It's commonly available and has a long shelf life. I suppose you could use white correction tape for the same purpose. **PW**

Frank Penicka
Mount Pearl, Newfoundland

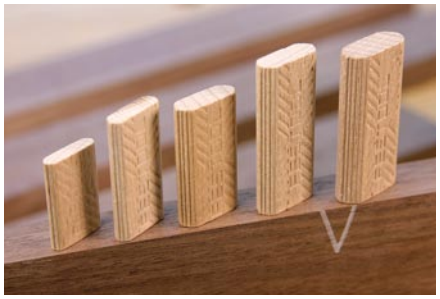
The Domino DF 500 Q Changes the Rules of Woodworking Joinery

When it comes to joinery, you have two basic kinds. On one hand you have the traditional, strong and time-consuming joints (think dovetails). On the other hand, you have the joints that are fast to make but are frowned upon by purists (think biscuits or pocket screws).

With the release of the Festool Domino DF 500 Q system, those old rules have just been chucked into the dumpster. The Domino is a hand-held tool that cuts perfect mortises in your work. A little glue and a loose tenon (which resembles a domino) completes the joint. In my 14 years of working wood, it is the fastest, easiest and most accurate way to cut this traditional joint that I have ever used (and I've used them all).

The Domino is as swift as a biscuit joiner but makes joints as strong as you could ever want. The trick is the machine's bit and how it moves when the tool is on. The bit (which is available in 5, 6, 8 and 10mm diameters) spins at 25,500 rpm and moves left to right as it plunges into the work. A single four-second plunge creates a mortise that is perfectly sized for one of the beech Dominos, which come in five sizes at press time.

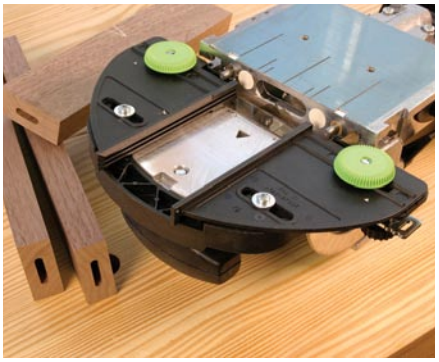
Loose-tenon joinery is nothing new, but what is different about the Domino DF 500 Q is that you can do such a traditional and strong joint with little (or no) marking on the work. And you can work anywhere on a board and at any angle. Plus, because the Domino is hand-held, you can take the tool to the work (always my preference) rather than moving large workpieces over a tiny cutter in a table saw or router table. Plus you can put a mortise in places no biscuit joiner can go, such as into the end of a 1"-wide rail.



Dominos come in five sizes: 5, 6, 8 and 10mm thicknesses and 30, 40 and 50mm lengths.

To make a joint, you place your two workpieces against one another and draw a single line across the joint at the location where you want the mortises to go. Set the tool to make a mortise of the desired depth and width (it's easy, just a dial and a switch). Then you line up the tool's cursor with your pencil line, turn on the tool and make a plunge cut.

You can even skip some marking chores by using the tool's built-in retractable pins. These allow you to bore mortises at a fixed distance from the ends of boards that are wider than 2½" wide without marking (we're going to post a demonstration of this on our blog at popularwoodworking.com).



The LA-DF 500 accessory snaps on the fence and allows you make mortises on the ends of thin rails.

SPECIFICATIONS

Festool Domino DF 500 Q
Street price: $700 ($660 until May 31, 2007)
Max depth of cut: 1 3/32" (28mm)
Max width of cut: 1"
Fence: 0° to 90°
Performance: ●●●●●
Price range: $$$$
Festool USA: 888-337-8600 or festoolusa.com

All told, if you have ever used a biscuit joiner you will be immediately at home with the Domino. And there are many tricks to use the machine in surprising ways (again, check out our blog for details).

Are there downsides to the tool? All the controls are in metric, so get a metric ruler to guide your early efforts with the tool. And though the tool is safer than most, you do need to be more concerned about safety with this tool than with a biscuit joiner because the bit plunges deep into the work.

Some people will be put off by the price ($700), but the tool is well made and is actually less expensive than many mortise-and-tenon systems that use a router plus a jig (or a table saw plus a mortiser) for the joint.

After just a few weeks of use, I was completely sold on the tool. Now there is no excuse not to use a mortise-and-tenon joint.

— Christopher Schwarz

For more information, circle # 114 on Free Information Card.

Makita 18-volt Drill-Driver is Lightweight

At just more than 3.5 pounds the Makita 18-volt 1/2" Compact Cordless Drill-driver (BDF452) is 25 percent lighter than its predecessor, the BDF451. The loss of weight is because Makita has made changes in the drill that made it a full inch shorter in length without sacrificing much in the way of torque (only 20 percent) and let's face it, you don't generally have to worry much about torque in the woodshop, but the savings in length can come in handy when you're trying to get into those small areas. Makita also dropped back to the standard two-speed design that still delivers plenty of rpm.

The good news for Makita owners is that the new drill-driver will accept the lithium batteries from your older Makita units. The bad news is, the new batteries will not fit with the older drills.

The drill-driver kit includes the drill, two 1.5-amp hour (Ah) batteries and the charger. The recharge time for the battery is a mere 15 minutes.

How does the power of the drill stand up? I used this tool for the entire day in the shop as I made shop cabinets using pocket screws and not one time did I have to recharge the battery. The next day, as I continued the job, I finally had to recharge – and the battery recharged so fast that it was at full power before I was ready to use the drill again.

There is one concern with this drill. If you are a power-tool aficionado, you'll find that the keyless chuck does not close 100 percent, so using the smallest of bits (under 1/16"), will be an issue. But you still have the built-in LED light, which I found to be a nice benefit when working deep in the corner of cabinets. The new "gym shoe"-styled white and black exterior design distinguishes it from the standard Makita blue. — *Glen D. Huey*

For more information, circle # 132 on Free Information Card.

SPECIFICATIONS

Makita 18v Compact Lithium-ion 1/2" Cordless Drill-Driver Kit
Street price: $219
Recharge time: 15 minutes
Replacement battery: 3.0 Ah ($70)
Performance: ●●●●○
Price range: $$$$
Makita: 800-462-5482 or makitatools.com

Grex 23-gauge Headless Pinner

Twenty-three gauge headless pinners have come a long way in recent years, and we were glad to test the new Grex model P645L in the shop. The new edition is an upgrade from the P630 model in a number of ways.

First, there's the additional range of fastener lengths. Now you can use fasteners in 12 different lengths from 1/2" to 1 3/4" in size. This is a 3/8" increase in the total fastener length from the earlier tool's top end. Is this something big? If you're attaching face frames, it might just be great news because of the additional holding power. This was evident in plywood as well.

Next, while Grex has continued using the adjust-free magazine (no need to adjust for each change in fastener size), the double trigger safety and rubber hand grip, there is a new feature in the P645L that I found especially interesting – the lock-out mechanism (shown in the inset photo). If you have ever attached mouldings to your projects only to find that the pinner was emptied sometime during the task, you will appreciate this feature, too. Dry firing will not happen after the number of remaining fasteners drops below six or seven pins. Of course, this feature can be over-ridden if you are about to complete the task.

How does the pinner operate? I shot the 1 3/4" pins through 4/4 pine and 6/4 red oak without any problems. The pins did move slightly with the grain of the wood, however nothing more than you would expect. The P645L is a bit weightier than the previous model by almost a half-pound but it is still light enough to use for an eight-hour work day.

Unlike many of those in the construction trades, I am not a fan of the belt hook. I cannot see dragging the air hose around the woodworking shop while attaching mouldings. Fear not, I am sure that the feature can be removed if need be. — *GH*

For more information, circle # 122 on Free Information Card.

SPECIFICATIONS

Grex 23-gauge Headless Pinner
Street price: $330
Fastener sizes: 1/2" to 1 3/4"
Weight: 2.68 lbs.
Performance: ●●●●●
Price range: $$$$
Grex: 626-289-7618 or grexusa.com

Blue Spruce Dovetail Chisels

Using a garden-variety bevel-edge chisel when dovetailing can be frustrating. The bevels on the side of the tool are supposed to allow you to clean any junk out of the acute corners of the joint. But the problem is that the bevels are too chunky and you end up damaging the walls of your tails.

Many woodworkers will grind down the side bevels of their chisels to a knife edge or they will purchase a Japanese chisel specifically designed for this task.

But now Blue Spruce Toolworks (makers of our favorite marking knife) makes chisels in four sizes (1/8", 1/4", 3/8" and 1/2") that are perfectly suited to dovetailing. Not only are the chisels ground down to a knife edge on the sides, but those side bevels are actually concave. There is little opportunity for you to bruise the side of your joint with these tools. And perhaps because of the reduced friction, the tools seem to glide through the work.

Hands down, these are the most gorgeous chisels I have ever handled. They are perfect in every detail and under the highest scrutiny. The ferrules have one closed end (an unusual detail) and are fitted perfectly over the tool's tang. The cocobolo handles are exquisitely turned, with a dainty 1/8" bead tucked behind the ferrule. These tools are simply over the top in every way.

Do they cut wood, you might ask? Indeed. The blades are made from A2 steel, which, when ground at a 30° angle, is stout. The two sets of chisels we have tested were heat-treated well – they weren't warped in any way and the unbeveled side of the tool was dead flat.

You probably don't need the whole set ($220), but having one in your arsenal (I'd get the 1/4" or the 3/8") would be a worthwhile extravagance. Highly recommended. — CS

For more information, circle # 107 on Free Information Card.

SPECIFICATIONS

Blue Spruce Toolworks Chisels
Street price: $220/set of four, $50-$65/each
Overall length: 8 1/2" to 7 3/4"
Handle diameter: 1" max.
Performance: ●●●●○
Price range: $$$$$
Blue Spruce: bluesprucetoolworks.com

Bosch Router Table

Benchtop router tables have been around long enough that all the bugs should be worked out of them. This new one from Bosch has all the features you could want in an easy-to-assemble compact package. The cabinet helps reduce noise and control dust, and includes a safety-switch controlled electrical outlet that provides a place to plug in your shop vacuum as well as your router.

The fence is taller than most, and has easy-to-adjust MDF faceplates as well as a slotted track to mount the two included featherboards and a clear plastic safety guard. Shims are also provided to allow for offsetting the outfeed fence. The router mounting plate is cast aluminum with plastic inserts, and the laminated tabletop includes a second track extrusion. The plate can be leveled to the table from above, and all the adjustments for the fence use knobs, allowing toolless setup.

The only complaints I had were minor; it's hard to see and reach the outlet when plugging in the router and vacuum, and the dust-collection port behind the fence is so close to the knobs for the guard that the hose must be removed to adjust the guard. The plusses far outweigh the minuses. This router table is well-made, convenient and easy to use. **PW**

— Robert W. Lang

For more information, circle # 167 on Free Information Card.

SPECIFICATIONS

Bosch RA1171 Router Table
Street price: $169.99
Fence: Aluminum with MDF faces
Mounting Plate: Aluminum
Electrical: Two switch-controlled outlets
Performance: ●●●●○
Price range: $$$
Bosch: 877-267-2499 or boschtools.com

18th-Century Stock Preparation

Different goals allowed period woodworkers to surface boards quickly.

I'm building a standing desk for my shop. I need a place to do design work, store important papers and lay furniture books. I designed this desk using the process described in my last article. The completed design is available on my blog at artsandmysteries.com. In this article, I'll discuss the techniques I used to prepare my stock for this project.

Dressing stock by hand isn't hard work. The trick to doing it efficiently is forgetting everything you know about woodworking machines and just about everything you've read on the Internet.

Woodworking machines produce a consistent level of surface and dimensional quality. Trying to emulate machine quality by hand is a waste of time. Some boards need more attention, some need less; you need to sort them out before you start. It just doesn't make sense to have a "one-surface-fits-all" approach. Ninety percent of what I read on the Internet involves people trying to produce aerospace precision with their hand tools then complaining about how long it takes.

Believe it or not, I'm not judging these folks. It's a perfectly fine way to work wood if that's what you're into. But don't be fooled: This isn't how people worked in the 18th century. Let's take a look back at the evidence together.

Tools

There's little question about the tools used in 18th-century shops for surfacing stock. They

by Adam Cherubini

In addition to woodworking, Adam enjoys drawing and painting. He studied art at the Fleischer Art Memorial in Philadelphia. Visit his blog at artsandmysteries.com.

Photos by the author

Preparing stock by hand isn't nearly as difficult or awkward as this picture makes it look. Eighteenth-century craftsmen weren't stupid and they didn't need slave labor to build things. You can easily learn their tricks to working smarter, not harder. Then you'll be free of your masters: your planer, table saw and jointer.

used a fore or jack plane for roughing, a long try plane for flattening and a smooth plane to achieve the finished surface. Anglo-American woodworkers in the 18th century did not use anything resembling a scrub plane. By the end of the century, finish carpenters called joiners used several long planes.

Technique

We know very little about the specific stock preparation techniques of the 18th century. We have two documentary sources written just before and just after the century: Joseph Moxon's "Mechanick Exercises" (1678) and Peter Nicholson's "The Mechanic's Companion" (1831). The techniques discussed are similar and would sound familiar to you. Anglo-American workmen probably started with jack or fore planes, followed with longer trying planes, then finished the surface with smoothing planes. They used winding sticks to detect twist in the faces of boards. They straightened edges with their long planes.

Stock

Eighteenth-century craftsmen purchased lumber much as commercial shops do today,

When I'm working wide stock for a carcase side, I don't worry if the stock is cupped or twisted a little. I can usually straighten the stock with the dovetails. If I tried to plane out a cup, I'd lose a lot of thickness and the cup would come back.

The basic tools for 18th-century stock preparation include these three planes: the try plane (left), jack or fore plane (middle) and the smoother (right). Eighteenth-century craftsmen undoubtedly valued planes that took coarse shavings. Modern plane makers have focused on making tools for smoothing regardless of their length or configuration. This is approach is detrimental for basic hand-tool stock prep.

buying an entire tree's worth at a time. Pitsaw operations in the 18th-century were able to produce lumber in the same thicknesses and in roughly the same surface qualities as modern rough-sawn lumber. Craftsmen had no need to plane 2"-thick boards down to ¾".

Surface Quality

Extant surfaces vary from undressed, rough-sawn surfaces, to quite nicely smoothed surfaces. I've maintained that exterior surfaces were always fairer than interiors. Effort was placed where it had the most impact on the style-conscious public. But recent examinations are causing me to reconsider. Centuries of refinishing have caused exteriors to be smoother now than they were originally. Also, interiors of early Philadelphia mahog-

Williamsburg's housewrights, who include journeyman carpenter Ted Boscana, can quickly produce dimensional lumber with pitsaws. The surfaces produced with these saws are surprisingly comparable to those from modern band saw mills.

any pieces are surprisingly fair. It could be that both exterior and interior surfaces were given the exact same attention. But the John Townsend (of Goddard and Townsend fame) pieces I saw at the Metropolitan Museum of Art in New York last year clearly showed very rough interiors, backs and undersides. These pieces were made for very wealthy customers. Furniture with rough interiors does not necessarily correspond to second-quality furniture, nor second-quality shops. Judging from period furniture alone, it appears the effort expended on any given piece of wood varied

This is one of the legs for my desk. It will have mortises at the top and bottom so this stock cannot be twisted. The twist or wind must be removed. Winding sticks help me find where the board is twisted. Any two sticks will do. This is the next step in facing this leg stock.

Squaring-up is done with my long try plane. This is an important task easily done with hand tools. Sometimes I think folks only think about face planing (called facing) when designing and building their workbenches. Every bench should be designed to allow this basic operation.

This may not look like a big deal, but this is as hard as it gets. This stock is 2 7/8" thick, and 60" long. I had to flip it over periodically to keep this cut square. It took me almost 10 minutes to complete this cut. Material one-third this thickness would probably take me two minutes.

regionally and according to its use in the finished product.

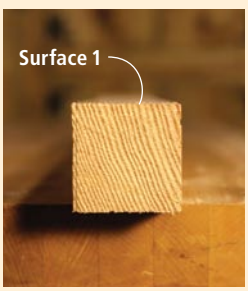
Facing

Facing is the term Nicholson used for flattening one side of a piece of stock. I begin with my fore plane, working in the direction of the grain. I often hold the plane askew or at a slight angle to the stroke. I like a lightweight wooden plane. I use my upper body to press down on the plane, controlling both the cut and the stock below it. My fore plane has a cambered blade which takes a thick, but narrow (1") shaving. It will remove rough saw marks quickly, but leaves shallow troughs in the face of the stock. These are acceptable for the insides of my furniture, but I like the exteriors smoother. Depending on the piece, I'll either use my smoother next, or my try plane followed by the smoother. A wide carcase side needs to be smooth but perfect flatness usually isn't required. Legs such as those for this desk need to be worked straight with the try plane. If they are not straight, you'll be able to notice it from a long way away, and I'll also have problems with my joinery.

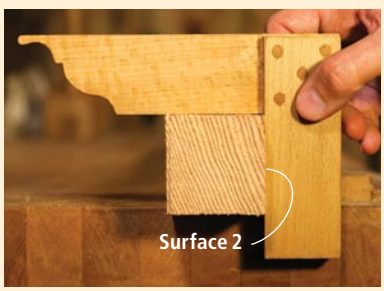
Shooting

In the modern lexicon, shooting an edge usually involves holding a plane on its side. But both Moxon and Nicholson use the term more generally. For them and likely all English-speaking 18th-century craftsmen, shooting meant edge straightening. In my shop, this is done with the board held on edge and typically completed in less than a minute with my try plane. I'm not getting aerospace tolerances in one minute. But a perfectly straight edge is rarely required. I square and straighten simul-

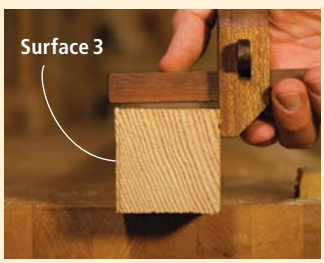
TRYING UP STOCK



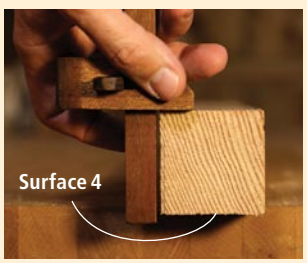
Faced: Surface 1 is faced, or flattened. Wind is removed.



Squared-up: Surface 2 is squared to surface 1.



Gauging: The stock is made parallel in width by gauging from surface 2 to surface 3. Plane or saw to the gauged line. Then square to surface 1.



Tried-up: Surface 4 is made parallel to surface 1 by gauging right and left sides and planing or sawing to the gauged line.

taneously. It's a trick you probably know. Like my fore plane, my try plane has a curved blade. By positioning the plane side to side, I can take off a wedge-shaped shaving. But again, I don't typically need a perfectly square edge.

Ripping

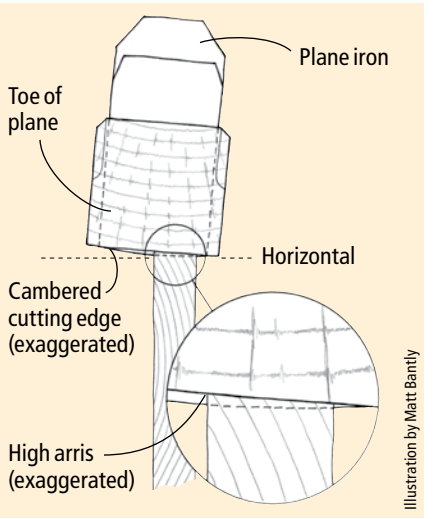
With one face flattened and one edge straightened and squared, the stock is said to be squared. This is the time to do any ripping required. Ripping thin stock is easily done with a good saw in a matter of a few moments. I tend to leave the line, as shooting the ripped edge will be required anyway and is very quick work. Ripping thick stock is more difficult physically. Variations in the angle of the cut are magnified due to the thickness so it's more difficult technically. What I do is mark both sides and flip the board over every six or so inches. In time, you will master a perfectly plumb rip. In the meantime, or whenever your stock is very thick, I recommend flipping the board over.

Tried Up

Stock that has had its four long-grain sides squared was called tried or tried-up in the 18th century. Though I typically remove the saw or planer marks, I very rarely try-up or "four square" my stock. The degree to which I four square stock varies according to the needs of the project. In this case, only the inside faces are mating surfaces. But I'd like my carcase to be flush with the outside faces. So I'm stuck cleaning up all four sides.

Crosscuts and End Grain

Eighteenth-century craftsmen had planes they used to clean up end grain. They were called strike or straight blocks. But frankly, I don't like them. No matter what, planing end grain will always be a problem. For this reason, I prefer to do my crosscut sawing very carefully and as accurately as possible to limit the amount of planing I have to do. Crosscutting is usually the last thing I do before I start the joinery. I have long suspected that once that fresh end grain is exposed from the center of some long board, the board will move. End grain is very often covered in all sorts of traditional woodwork. Because glue joints involving end grain don't work well, it's rare to find end-grain glue joints. For this reason, these surfaces often needn't be perfect.



My try plane has a cambered or curved iron. The resulting shaving is thickest in the middle and thin at either edge. By centering the plane on one edge of the board, I can remove a wedge-shaped shaving. This saves me from having to hold my plane perfectly level.

Conclusion

The wide range of surface treatments found on any given 18th-century piece of furniture, indicates period craftsmen planed their stock with each piece's specific use in mind. While modern woodworkers, willing to use hand tools, have focused their attention on getting "the most" from their planes (which usually means the finest shavings), a look back tells us period craftsmen were instead focused on getting "the least." Like our approach of optimizing our planes and developing our techniques to produce flawless hand-worked surfaces, period craftsmen clearly optimized their tools and developed their techniques to produce surfaces that we might consider barely acceptable.

From my perspective, both approaches are equally valid and are equally challenging. They are, as the poet said, like two roads diverging in the woods. But I can tell you what's ahead along the road less traveled: For me, 18th-century stock preparation is not a collection of techniques, but rather an opportunity for me to express my wit and judgment and experience. The resulting surfaces are like footprints on a path; a record of my passing. I know preparing stock with machines requires less effort. But the well-trod road leaves no trace of those who've traveled it. So is it worth taking? **PW**

TIPS FROM A POWER PLANER

- **Go with the grain.** When the grain turns on you, turn the board or turn the plane. Western planes can be pulled quite nicely, thank you.
- **Open your mouth and take a big bite.** A plane's tight mouth limits the size of shaving you can take. Tight mouths are good for finishing but bad if you want to remove material quickly.
- **Long planes make things straight.** Put away your straightedges and learn to trust your long planes.
- **Lower your bench.** A bench whose top is beneath your palms allows you to get your upper body over the work, using your upper body weight to provide pressure and control.
- **Don't get caught up in Planeaholics Anonymous.** Skip the Internet pundits, and get the cheapest plane you can find. The skills you develop getting it working will be invaluable later. If you can make a $5 flea-market special work, you've earned the bronze-bodied beauty you've been wanting. Of course you could end up like me – still using the $5 plane!

Shaker Shelves

Clear finish updates the look of this classic design.

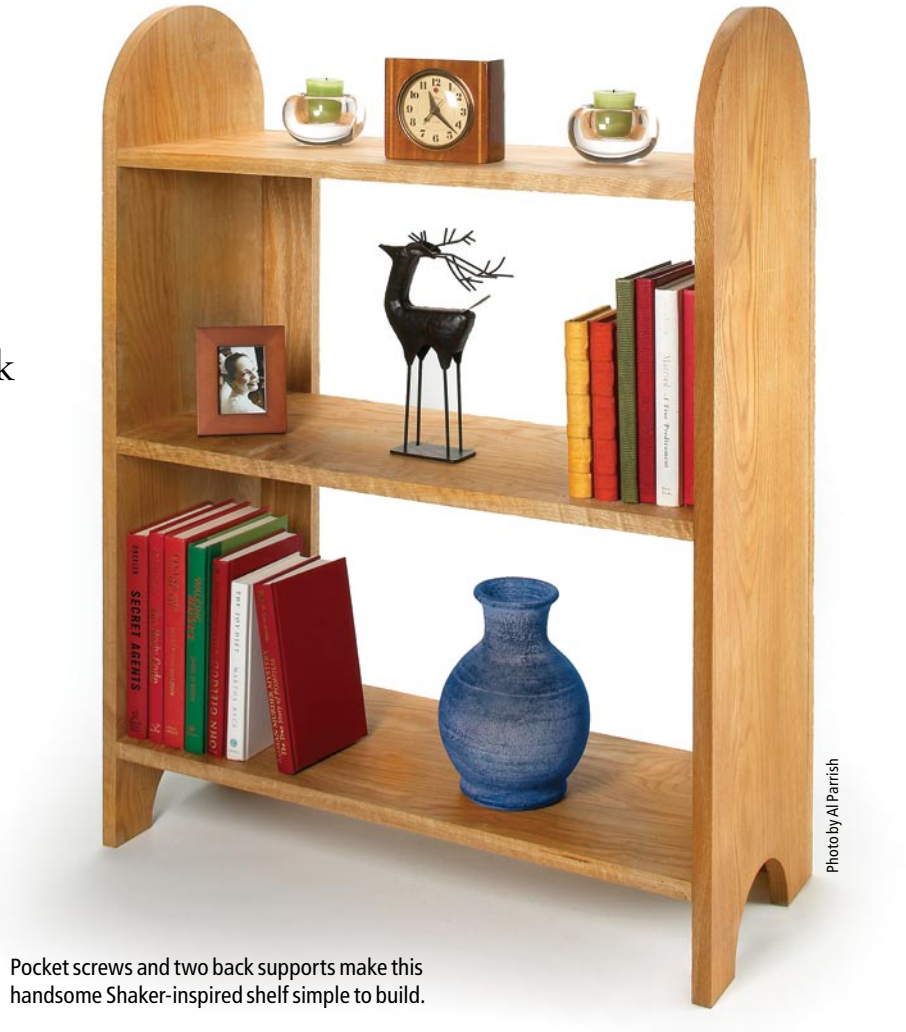


Photo by Al Parrish

Pocket screws and two back supports make this handsome Shaker-inspired shelf simple to build.

Skills you've honed in previous "I Can Do That" projects are all it takes to create this graceful set of shelves, so with this project we'll teach you a few clever tricks to draw arcs without a compass, and to straighten twisted boards – which is often a problem when working with wider pieces of wood.

This modified Shaker design, downsized from a set of creamery shelves, is adapted from a Shaker Workshops catalog. To ensure our ¾"-stock would not bow under the weight of even the heaviest items, we decided to make these shelf pieces a bit shorter than those you'll find on the company's web site (shakerworkshops.com).

Many home centers carry only pine, poplar and oak (you may also find maple or aspen, depending on your region). We decided on oak because we think it has the best natural appearance.

One of the biggest challenges you'll have with this project is finding wide boards that are straight and flat … and that remain straight and flat after you cut them to size. Take time to look through the racks for the best boards – and if at all possible, avoid shrink-wrapped boards, no matter how pretty. You'll need two 6' and one 4' 1 x 12s (or one 10' and one 8' length). You'll also need a 6' length of 1 x 4 for the supports.

Once you're back in the shop, your first step is to cut the sides to length on your miter saw. If you have a 10" miter saw, your crosscuts on the sides (and shelves) will be a two-step process because the diameter of the saw blade limits the width of the cut. You'll need to first cut on one side of your board, then flip it over and carefully line up the kerf with the saw blade before completing the cut (see picture at right).

Now, you're ready to lay out the arched top and cutout at the bottom. Align the top edges of the sides and stick the faces together with double-stick tape to keep them from slipping, then clamp both pieces together flat to your workbench. Now, measure across the width to find the center of your board, and make a mark. That measurement is the same distance you'll measure down from the top edge to mark the intersection of the two points ($5\frac{5}{8}$"unless you've resized the plan, or used different-sized stock). This point is where you'll place your compass point to draw the half-circle arch across the top.

And if you don't have a compass, it's no problem. It's easy to make a compass jig. Simply grab a thin piece of scrap and drive a nail through the middle near one end. Now, using the same measurement you already established to find the compass point (again, it's $5\frac{5}{8}$" on our plan), mark and drill a hole that distance

by Megan Fitzpatrick & Glen D. Huey

Comments or a question? Contact Megan at 513-531-2690 ext. 1348 or megan.fitzpatrick@fwpubs.com. Contact Glen at 513-531-2690 ext. 1293 or glen.huey@fwpubs.com.

Because the wood for the sides and shelves is $11\frac{1}{4}$"-wide and your miter saw is likely a 10" model, you'll have to cut the pieces in two steps. Measure and make the first cut. Then flip the board over and line up the saw blade to the kerf you've already cut, and make the second cut.

A thin piece of scrap, a nail and a drill are all it takes to make this simple compass jig.

from the nail, and stick a pencil point through it. Voilà – a compass jig.

You can use that same jig for the bottom arched cutout. Simply drill another hole 3 1/8" away from your nail. Set the nail as close to the center of the bottom edge as possible and mark the cutout arch. Or, mark the arch with a traditional compass.

Now use your jigsaw to cut as close to the lines as possible, and use a rasp and sandpaper to clean up the cuts. If you keep the pieces

You can pull a cup out of a board by clamping the piece to a straightedge and pulling it tight with clamps before screwing it down.

Make sure your drill is at a 90° angle to the most narrow stock through which you're drilling – in this case, the 3/4" edge of the side beneath the support.

clamped together during this process, you should end up with nearly identical arches. If you're not confident in your jigsaw skills, practice making curved cuts on some scrap pieces before moving on to the real thing.

Now cut the shelves to length.

Set up your pocket-hole jig for 3/4"-thick material. Mark the placement for three pocket holes on each end of each shelf, two of them 3/4" from each long edge, and one in the center of the end. Drill the holes. (For more pocket-hole instruction, see the December 2006 project or the PDF manual.)

Cut the back supports to length, and sand all pieces to #150-grit before assembly (#120 if you're planning to paint).

Now you're ready for assembly, and the second trick we promised. Lay one side flat on your bench and mark the location of the top shelf at either side. You may not be able to line up the shelf with your marks because of cupping in the wide board; that's where the trick comes in. Position the back support (or any straight piece of scrap) along the bowed side of the shelf, if there is one, and use clamps to bring the edges of the shelf flat to the support or straight scrap. Slide the clamped unit to the layout lines, hold or clamp it in place then use screws to attach. This trick will work to pull the bow from any of the shelves.

Attach all three shelves to both sides, straightening the pieces where necessary.

Now lay the assembly face down, line up the support with the top of your top shelf. Drill countersunk holes at the top shelf, at the bottom shelf, and at the inside edge where the support meets the middle shelf. Be sure to hold your drill at 90° to the sides; because you're drilling into 3/4" stock, you could easily drill through the side if you're not careful.

Attach the uprights with #8 x 1 1/4" screws (rubbing the threads on some wax will help them seat more easily). Pay particular attention at the top and bottom as the stock can easily split. If it does crack, stop your drill immediately – but don't panic. Just back the screw out a tiny bit, and the split will close up.

Finish the shelves with two coats of wiping varnish. **PW**

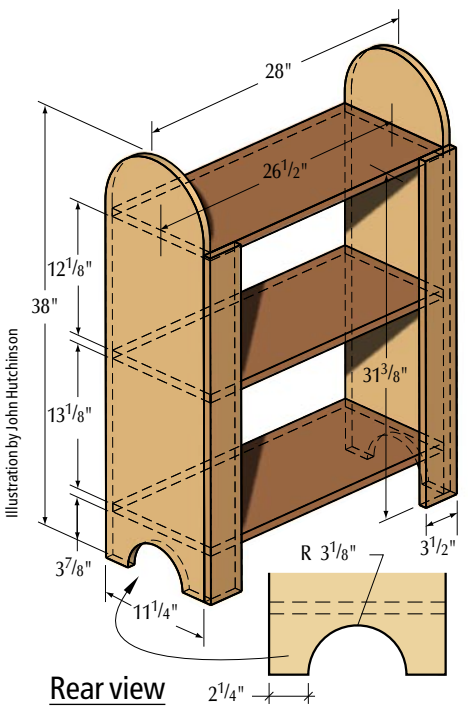


Illustration by John Hutchinson

SHAKER SHELVES

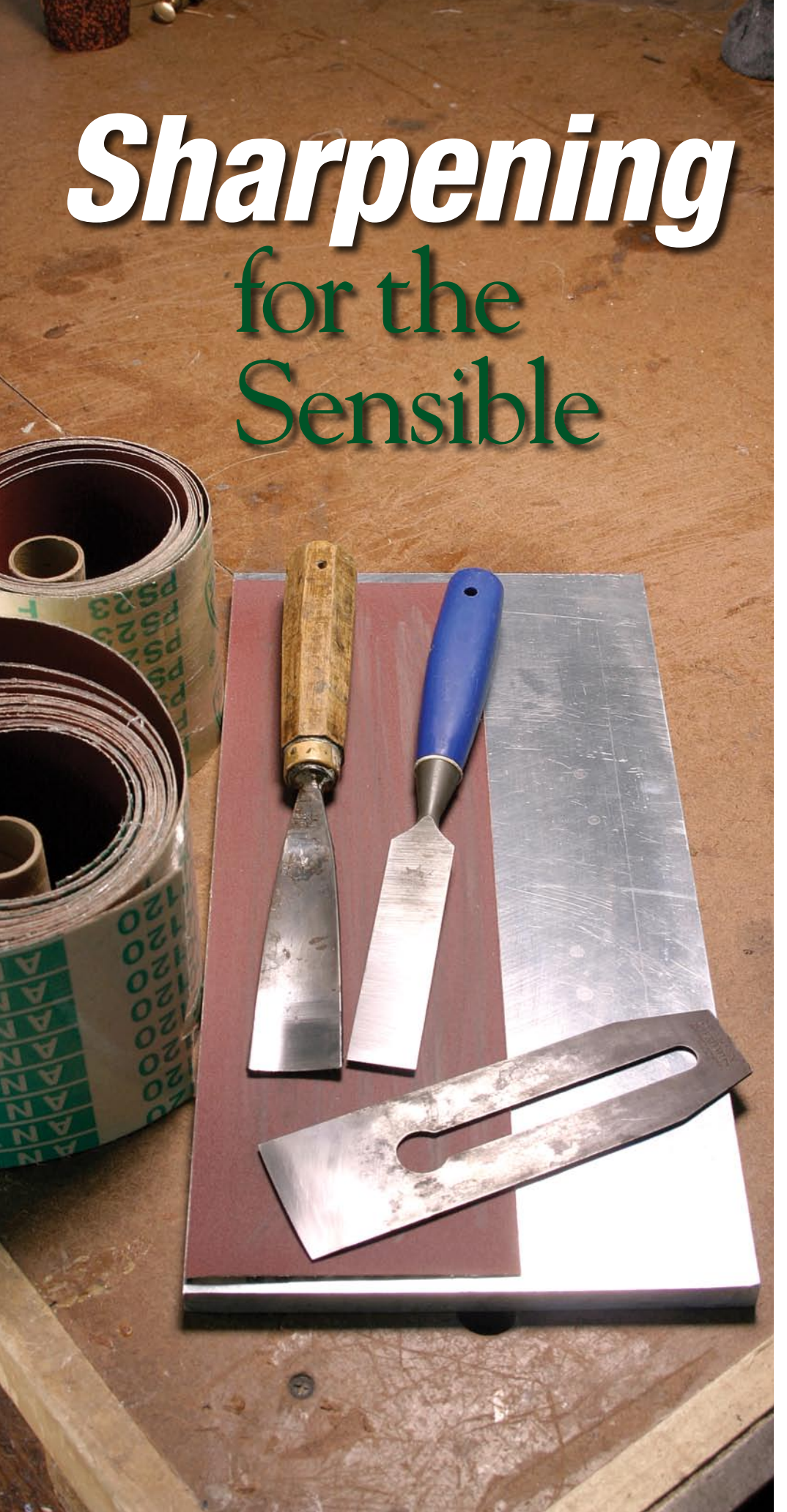
	NO.	ITEM	DIMENSIONS (INCHES) T	W	L	MATERIAL
❑	2	Sides	3/4	11 1/4	38	Oak
❑	3	Shelves	3/4	11 1/4	26 1/2	Oak
❑	2	Supports	3/4	3 1/2	31 3/8	Oak

ABOUT THIS COLUMN

Our "I Can Do That" column features projects that can be completed by any woodworker with a modest (but decent) kit of tools in less than two days of shop time, and using raw materials that are available at any home center. We offer a free online manual in PDF format that explains all the tools and shows you how to perform the basic operations in a step-by-step format. You'll learn to rip with a jigsaw, crosscut with a miter saw and drill straight with the help of our manual.

To download the free manual, visit ICanDoThatExtras.com.

Sharpening for the Sensible



Michael Dunbar distills three decades of sharpening into a simple, inexpensive and do-able system.

This is a subversive article. Woodworking gurus and companies that make expensive sharpening equipment don't want you to read this, because when you discover that sharpening is both easy and inexpensive, they are all out of a job.

When I began teaching Windsor chairmaking in 1980, I was an itinerant. I traveled from city to city and provided a tool list for the students in advance. When the class began, I was amazed at the tools that showed up. Few were ready to use. Many were brand new and had never been sharpened. Others had been on the barn wall where great-granddaddy had hung them decades ago.

These tools were not in working order because the students who had brought them did not know how to sharpen. That meant that I either spent the first morning of a class sharpening tools, or the class would be a disaster.

My problems were compounded by the absence of suitable sharpening equipment. None of my hosts ever had a dedicated sharpening station, and any paraphernalia they could provide consisted of a few waterstones or oilstones. I had to develop a solution, or stop teaching.

by Michael Dunbar

A chairmaker since 1971, Michael is the founder of The Windsor Institute in Hampton, N.H., where he teaches hundreds of students each year to build Windsor chairs. For more information, visit thewindsorinstitute.com.

These were my criteria. I had to do more than just hone an edge. I had to be able to reshape an entire blade in very short order. My classrooms were full of unusable tools and I could not spend a lot of time on each one. A lot of chairmaking tools have curved blades, and also use both chisel- and knife-edge profiles. So, my eventual solution would have to be versatile. Finally, I would need supplies that were easy to find and provide. Hosts were not going to buy expensive equipment just for me.

The Answer: Sandpaper

Three things I could find in any host's work space were sandpaper, a flat surface and small pieces of wood. This was my answer. It was not so much a "eureka" moment as it may appear. I had already been using sandpaper on plate glass for a decade to lap plane soles. I was really taking a process I already used and expanding on it.

Sandpaper sharpening solved my problem. It also had an added benefit. It is so easy and simple that once shown, my students got it and were able to sharpen their own tools. Other advantages are that you will never again burn an edge, and you will be able to use this system to sharpen just about anything, from your best plane to a lawn mower blade.

The primary piece of equipment and the one that will probably cost the most (but not much) is a suitable hard, flat surface. In the beginning I used plate glass, as glass is easy to find. However, it breaks. While no one was ever hurt, I worried. Today, I use ½"-thick aluminum plates that I bought from a metal dealer. You could also use a piece of granite countertop. Whatever you select, it should be long enough to hold numerous strips of sandpaper of various grits.

The actual sharpening is done with sandpaper. I prefer aluminum oxide, as it seems to hold up best. You can adhere the paper to the lapping plate with spray adhesive, or purchase self-adhering rolls. I do both. Purchase the rolls from a sandpaper catalog and the adhesive at a hardware store.

You will need a variety of grits. We use #80, #120, #180, #220, #330, #650, #1,000 and #1,500. The last three grits are wet-and-dry sandpaper available from automotive-supply dealers. Do not confuse these sandpaper grits with waterstone grits. They are not the same measurement.

You will also want to have on hand a stiff brush for keeping your paper clean of loose grit. I use a wallpaper brush. Single-edge razors and a holder help remove worn-out paper. Paint thinner dissolves any leftover adhesive. These are all available at a paint store. Finally, you will need a variety of hardwood ¾" blocks of a size that will fit comfortably in your hand. Pieces of dowel of various diameters about 4" long complete the equipment.

Setting up your sandpaper system depends on your needs. I keep a strip of #80-, #120- and #330-grit paper on one side of the plate and the wet-and-dry papers on the other. You will be more able to plan your own setup by reading on.

Know What a Sharp Edge Is

A lot of the problems woodworkers have with sharpening stem from not knowing, or not being able to envision, what they are trying to accomplish. A sharp edge is simply two flat, polished surfaces intersecting at an angle that will cut wood cleanly. While that is a simple definition, it is very demanding, in that anything less is not sharp. The definition permits no shortcuts, no half measures.

How to proceed depends on whether you are starting with a new, factory-ground edge; an old beat-up, nicked and rusted edge; or a well-maintained edge that merely needs to be honed. It will also depend on whether the tool has a chisel edge or a knife edge. As you can see, this requires some judgment. Sharpening is not a rote process of so many strokes of this surface, followed by so many strokes on another. You need to combine whatever variety of processes your tool needs to achieve our definition.

Factories usually create an edge by coarsely grinding the two surfaces. This is the condition of many cutting edges on newly purchased tools. The grinding leaves behind a series of parallel scratches. If you were to magnify these scratches, each one is a tiny furrow in the metal. Where each furrow intersects the cutting edge it creates a dip. Under magnification, this row of dips looks like the teeth on a saw. Imagine trying to push a saw blade across a piece of wood. It would take a lot of force and the result would be a row of scratches. That is what happens if you try to use a factory edge.

A beat-up edge, as you frequently find on secondhand tools, usually has nicks and rust. A nick is similar to a furrow as described above, but nicks are not evenly spaced and are frequently bigger. Rust will pit the steel, and these pits too, when they intersect the cutting edge, act like the furrows. They leave scratches and require more force to work the tool.

Furrows, nicks and pits need to be removed. This is the reason for the #80-grit sandpaper in my system. It will cut metal fast.

Sharpen a Chisel

Let's start on a chisel edge as it is the one most woodworkers recognize. Remember our definition. An edge is two flat, polished sur-

You don't need expensive equipment to get a sharp edge. Here you can see my aluminum plates, sandpaper and small scraps of wood that allow me to sharpen all of my tools. The razor blades, utility knife and brush round out the equipment needs.

With a new tool, you need to address both the flat back of the tool and the bezel. Here I'm removing factory grinding marks on #80-grit sandpaper. Note the hand position, which allows me to apply consistent and heavy pressure on the tool.

After a few dozen strokes with #80-grit paper, you can see how the scratch pattern is consistent on the back of this chisel. This tool is ready for the next finer grit.

faces. The wide surface is the back and the narrow sloping surface is the bezel. No, this is not a typo. It is actually the precise word. The dictionary defines a bezel as the sloping surface of a cutting edge. In other words, all bezels are bevels, but not all bevels are bezels.

Begin by flattening the back surface. Place it flat on the strip of #80 grit. It is imperative that the blade remain flat on the paper, and that you never lift it, which would round the surface. The action on sandpaper is side to side, rather than front to back, as you would hone on a stone. I rock on my legs and move my body with the blade. This helps to avoid rocking the tool, or applying uneven pressure.

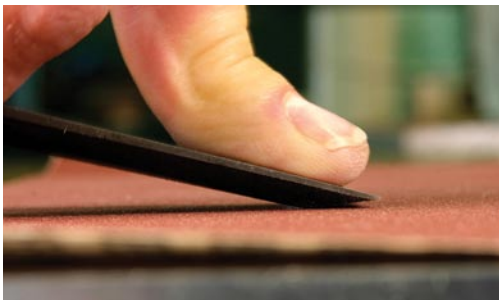
After a dozen or more strokes, examine the results. It is best to do this under natural light and I will usually step to a nearby window. Use a magnifying glass or a jeweler's loupe if your eyes, like mine, are aging, and no longer see details very well. You will see scratches left by the #80 grit. Scratches are evidence that you have begun to remove the surface grinding, and to reduce any nicks and pits. You may also detect low spots in the surface. It is not uncommon to find that a blade is not actually flat.

Continue this action on the #80 grit until these blemishes are completely replaced by an even matte of sandpaper scratches. The exception is a nick or pit directly in the cutting edge. These may not completely disappear until you work the bezel.

Our definition does not mention how wide those two flat surfaces are. It is not always necessary to flatten the entire back of the blade. A couple inches is usually sufficient. You will probably feel the tool grow hot. It may even get too hot to keep your fingers on it. I usually blow on the tool to cool it. The good news is that you could not possibly hold the tool long enough to burn the edge. That old bugaboo does not occur with sandpaper sharpening.

Use the brush to clean away any loose grit that remains on the lapping table. This is an important procedure to perform at every step, as this grit will damage later stages of the process. Move to the next grit, in my case #120. Repeat the side-to-side lapping, the same as before. If you look at the results after about a dozen strokes, you will see the finer scratches beginning to replace those created by the #80 grit. This is a eureka moment for someone learning to sharpen. The polishing part of our definition is really a process of replacing coarse scratches with finer ones. You have completed the work on the #120 grit when this matte of finer scratches has completely replaced the previous coarser matte. If you look at this surface in a good light you will see what appears to be a shadow moving within it. That shadow is you, beginning to reflect on a surface that is becoming increasing more polished. Now, move to the #180 grit and repeat the process of replacing the #120-grit scratches with an even finer matte.

At this point, I will usually focus some attention on the bezel. This is a narrower surface and flattening and polishing it does not normally require the coarser grits. However, if the blade has nicks or pits that were not removed in flattening the back, you may need to work the bezel with a coarser paper. The bezel is one of our two flat surfaces and you need to be careful to not round it. No need for a honing jig. The trick is to place



To find the correct position of the bezel on the sandpaper, I first set the tool down with the heel of the bezel touching.

Then I pivot the tool until the bezel rests flat on the surface of the sandpaper.

the bezel on the paper on its heel. Now, lift the back until you feel the cutting edge make contact. It is a positive feeling that you cannot easily miss. This is the angle. Apply even downward pressure as you go back and forth, and you should have no trouble maintaining the angle.

The remainder of the process of sharpening a chisel edge is moving through the finer grits. You will notice that your reflection takes on more definition with each finer grit. By the time you reach the wet-and-dry paper, you should be able to recognize that good-looking face peering back at you. In fact, #1,000 grit will create a polish so fine that you cannot detect any scratches in the metal, and by looking closely you can pick out individual hairs in your eyebrows. Examine the cutting edge by looking directly at it and rolling it slowly up and down. You should see no metal glinting back at you. This is because you can see a dull edge, but a sharp one disappears. If the tool is as described, it should be razor sharp. Test it by paring end grain. You should be able to slice off a shaving that will hold together, and the resulting surface should be glassy smooth.

Here you can see my body motion as I sharpen the bezel. My arms are fixed and I rock my body forward and back. This motion assists in achieving consistent results.

Gouges and Their Cannels

Chisels and jointer plane blades all have the classic straight cutting edge. A gouge is essentially a chisel, except the blade is rolled like a rain gutter. To complicate our jargon even more, a chisel's bezel is called a cannel, and a gouge can either be out-cannel or in-cannel. A mere word does not change our definition of sharp. If you cut a section of a gouge's cutting edge, it is still two flat polished surfaces.

Most gouges you will use are out-cannel. In this case, the problem is to flatten the blade's back surface, which is a concave curve. I do this by applying strips of various grits of sandpaper to appropriately sized dowels. The larger the gouge, the larger the dowel's diameter, up to about 1".

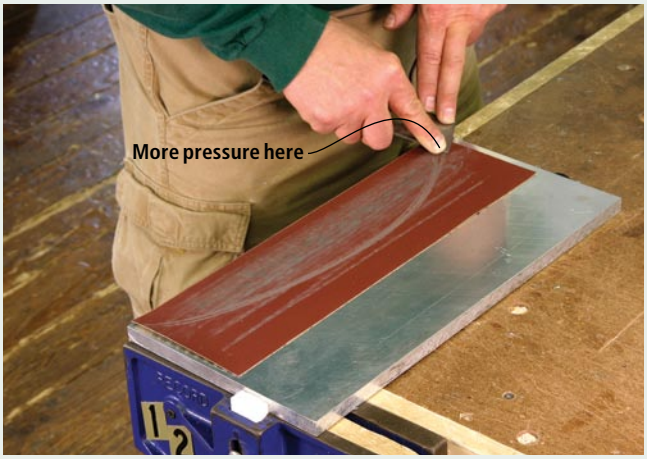
If the gouge's condition requires, I will start with #80 grit and move on up through finer papers. The trick is to lay the dowel flat on the gouge's concave surface. This means you have contact all along the dowel. Unless you are trying to create a knife edge on a carving gouge, you do not want to round over the concave surface. Work the dowel down one side of the curve and up the other. Repeat this until you have a uniform matte all the way out to the cutting edge. Repeat this through the grits.

Sharpening the concave section of a gouge involves sandpaper around a dowel – use a bigger dowel for gouges with shallower sweeps. As with sharpening a chisel, you want the unbeveled part of a gouge to exhibit a consistent scratch pattern (left).

When you reach #120 grit start to work the cannel through the same grits as was on your dowels. (Depending on the size of the gouge, some judgment is required here.) The cannel is worked on the lapping plate. Once again, find the correct angle by placing the heel on the paper and raising the handle until the cutting edge makes contact. Now, roll the bezel on the paper. Roll up to one corner of the cannel and back to the other. Try to make this a smooth, fluid movement. After a few strokes, check the width of your cannel to make sure it is uniform.

An in-cannel gouge is easier to sharpen. Flatten the convex surface by rolling it from one edge to the other while moving it side

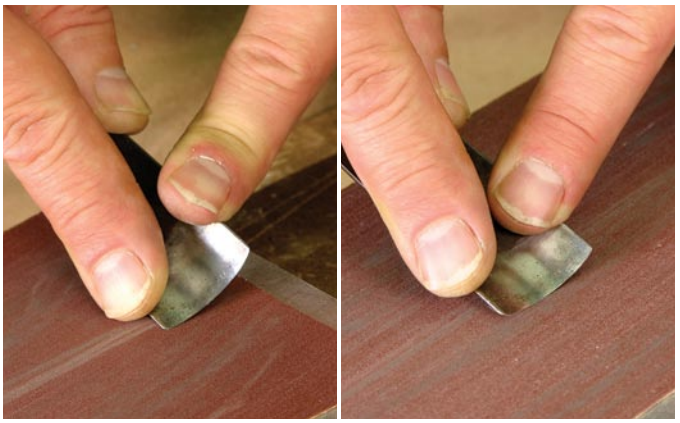
SHARPENING A CRESTED BLADE



The motion is side to side and in an arc. At the beginning of the arc, my finger pressure is on the right corner of the plane blade.

As I move the tool to the right, I shift my finger pressure to the center.

At the end of the arc, I shift my finger pressure to the left corner of the blade.



Sharpening the cannel of a gouge involves rolling the tool as you move it along the sandpaper. Begin with the cannel contacting the sandpaper on one end (left). As you move the tool along the paper, roll the gouge (right) so that at the end of the stroke you have the opposite corner of the cannel touching the paper.

to side along the paper. To work the cannel, use various grits of sandpaper applied to dowels.

Crested Plane Blades

Jack and smooth plane blades are crested. In other words, the cutting edge is an arc that looks like a fingernail. This is easy to do on sandpaper. In this case, I shape the edge before flattening the back. Place the blade on its bezel and find the correct angle by lifting the end until the cutting edge makes contact.

You are going to use a side-to-side motion, but it will also be arced. Begin on one corner applying pressure there with the fingers of one hand. As you slide along the edge, gradually shift the pressure to your other hand, so that by the time you reach the other corner the weight is all on those fingers. By moving the blade along an arc and shifting the weight, you will abrade more metal from the corners. Keep up this motion and the blade becomes crested. How much you crest the cutting edge depends on the plane's purpose.

Once the cutting edge is crested, flatten the back of the plane blade as you would a chisel. As you proceed through increasingly finer grits, return to the bezel and work it in conjunction with the back.

The Knife-edge Tools

Many tools have a knife edge. A knife edge is most desirable when a tool cuts down into wood and back out again. Most knife-edge tools are used for shaping and other fairly rough work. An ax, adze and scorp (inshave) are examples of knife-edge tools. A drawknife is also a knife edge, but is a slightly different matter. I do not use the lapping plate for knife-edge tools. Instead, I use wood blocks or dowels with paper adhered to them.

The two sides of a knife edge are symmetrical. Although they are slightly rounded, their shape only defines the angle of the cutting edge. Our definition of sharp still applies, for at the very cutting edge the surfaces are still flattened and polished.

Sharpen an Ax

The ax is the simplest knife-edge tool. So, let's start here. I adhere several grits of paper to $\frac{3}{4}$"-thick hardwood blocks about 3" by 4". I have a small hand with stubby fingers. If you have a big hand, use a block that fits you comfortably.

Because I am running a block over the blade with the cutting edge uncomfortably close to my fingers, I like to have the tool well secured. If a knife-edge tool will not rest stable on a benchtop, I will typically hold it in a vise.

If I am working a new tool that has been coarsely ground, or one that is beat, I begin with #80 grit. The process is one of stroking the block along the cutting edge, starting at the edge itself, and then overlapping the strokes down the curved surface. Work both sides the same and keep at the process until all blemishes have been removed.

Once again, the result will be an even matte of scratches. Now move through the finer grits, repeating the process of polishing. With each grit be sure to work right up to the cutting edge on both sides of the blade and then back down.

Scorp and Adze

Both these tools are concave. While a block works well on the convex surface, you have to use dowels on the inside curve. The only difference between them and an ax is that the stroking is done along inside and outside curves.

Drawknife

This is a modified knife edge. Unlike the other examples, a drawknife's cutting edge is not symmetrical. Like a chisel edge, one side is flat, while the other is rounded. This point is not appreciated by most modern drawknife manufacturers, who typically grind the tool to a chisel edge. This shape edge prevents the tool from being able to slice into the wood and out again, in the way that knife-edge tools are supposed to work. Instead, a chisel edge on a drawknife causes the tool to dive into the work, frustrating the poor user.

Begin by flattening a drawknife as you would do lapping a chisel or plane blade. However, the tool's handles prevent this from being possible on a lapping plate, and you need to use a wood block. The back is as much as 1⅜" wide and usually 8" to 10" long. I typically begin with #80 grit, as there is so much metal to remove.

With the back flat and with a uniform matte, work the curved upper surface as you did on the ax. Overlap your strokes all the way out the cutting edge. Repeat across the blade until you have the same uniform matte as on the flat bottom. Now, move through a progression of finer papers until you have the degree of sharpness you desire.

Maintain the Edge

These are the steps for sharpening a new tool fresh from the factory, or a secondhand tool that is worn. Some new tools (such as Pfiel carving gouges) are sharpened by the manufacturer. They and any tool you have sharpened, will eventually dull and will have to be sharpened again. This is a slightly different category that I think of as maintenance, as opposed to the preparation described above.

A tool usually dulls due to friction and wear resulting from use. The keen cutting edge created by the arris of two flat intersecting surfaces rounds over. Instead of engaging the wood and shaving it, the rounded cutting edge begins to skate. Engaging it into the wood is only possible by using more force. You can see if an edge is dull. Take the blade to a source of natural light and examine it closely. Again, magnification will help weak eyes. Roll the edge in the light and you will see the rounded edge reflecting the light back to you. Remember, you cannot see a sharp edge, so this is visual proof that it is time to hone.

The good news about honing is that it usually pretty fast. Unless the blade has been nicked, you can usually begin on a medium grit such as #180 or #220 (for a large tool and even finer for a small one.) Hone a chisel edge by lapping the back until the rounded edge on that side is completely removed and the uniform matte extends all the way out to the edge. Remember, there are no shortcuts and half measures. Here's a trick that may help as you learn to sharpen: Color the rounded edge with a red Sharpie and lap until that red disappears. Now hone the bezel until

Sharpening an ax is best done with the tool secured in a vise, leaving both of my hands free to work the edge. The sandpaper here is affixed to a block of wood.

A drawknife should also be secured in a vise when sharpening. Work both cutting surfaces of the tool using overlapping strokes until you obtain a consistent scratch pattern.

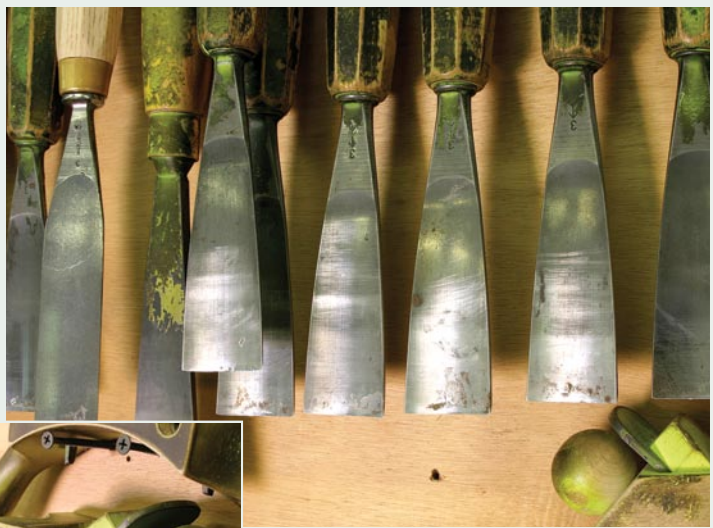
the rounding on that side of the edge also is removed and the red ink is all gone. You can polish through as many finer papers as you need to achieve the desired result.

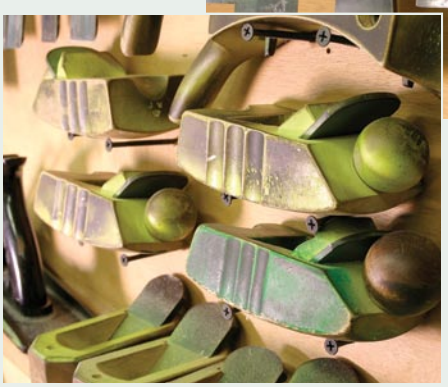
For a knife edge the process is similar. Only here, use a medium-grit paper on a block or dowel to remove the line of polish that reveals a rounded edge. Now, work in the same way through the finer grits.

Routine honing brings back a sharp edge for a while. However, repeated honings will eventually remove enough metal from the cutting edge that you begin to change the blade's angle. The angle can increase to a point where it no longer cuts well. If the blade is mounted in a tool such as a plane, it can even lose the clearance behind the cutting edge that's required for the tool to take a shaving. In most sharpening methods, this requires going to the grinding wheel. With sandpaper sharpening, you return to the #80 grit and reestablish the original angle through the aggressive abrasion of a coarse paper. Now, hone the newly shaped edge with finer papers. **PW**

Next issue: Dunbar on setting up handplanes.

SHARPENING PHILOSOPHY: DON'T GO CRAZY; USE YOUR JUDGMENT





The sharpening system outlined here works for the wide variety of edge tools for woodworking, including the small selection shown here that I maintain for my chairmaking classes.

Here are some general thoughts and advice on sharpening, as well as answers to some frequently asked questions. Every shop should have a dedicated sharpening system. You should work with sharp tools. It is easier and safer. You are less likely to stop and hone a tool that is beginning to skate if you have to dig out your sharpening equipment and set it up.

Sandpaper sharpening is a complete system. I not only maintain all my personal tools with it, we maintain the many score of tools we provide for our students' use. Fred Chellis, who teaches with me, runs a sideline sharpening service, and uses the sandpaper system. When sharpening as many tools as we do, one wants a system that is fast. However, there is no reason why the method cannot be blended with other equipment you may already own or prefer. For example, Fred likes diamond hones and uses those instead of wet-and-dry paper applied to a wood block.

How flat is flat? I receive e-mails and read comments from people who are unsatisfied with a lapping plate because when tested with a dial indicator or other precision equipment it was out of flat by some otherwise imperceptible amount. Don't go crazy here. Over the years obsessive-compulsive authors and letter-to-the-editor critics have convinced too many of us that we cannot work wood unless we are accurate to three decimal places. Remember, when lapping we are sharpening woodworking tools – not making equipment for NASA's Mars Rover.

How sharp is sharp? The answer to a lot of woodworker questions is, "It depends." In this case, it really does. Not all tools have to be equally sharp. A tool one woodworker relies on for finish work, such as a plane, another may use for rough stock removal. Generally speaking, chisel-edge tools will need to be sharper than knife-edge tools. The former are more commonly used for finish work, while the latter are for shaping and heavy stock removal. I only take my drawknife up to #330 grit, but my best Bedrock 404 smooth plane is honed to a bright mirror polish on #1,500-grit wet-and-dry paper.

What angle should I use for my cutting edges and how accurate do I have to be? This answer combines the last two. It depends, and don't get crazy. The more acute the angle, the more easily it will cut. However, the more acute the angle, the more fragile the edge. So, the heavier the work you do, the less acute (or more robust) the edge. For example a jack plane blade's edge will have less angle than a smooth plane. Mortise and firmer chisels have more robust edges than paring chisels. Don't get wrapped up in how accurate your angles are relative to what you read or hear. If someone writes the proper angle for a tool should be 35°, do you think it will matter if you really get 37°? No. In other words, use your judgment.

I think (insert any system here) results in a sharper edge. Assume there is a sharpening scale of 1 to 100. If your tools were only at 50 on this scale, would you complain if a system resulted in 93, as opposed to another that created 95? I once visited a shop run by a real sharpening fanatic. He was so proud of his edge that he gave me jeweler's loupe to watch the action as he shaved hair. It was not like shaving your beard, he shaved along the follicle like you would whittle a stick. I asked how long such a sharp edge would last in a plane. He replied: "About a half dozen strokes. Then the super edge wears to merely sharp."

How often do you sharpen? Sharpening is a function of use, not time. Simply put, sharpen when you need to. A dull tool requires more force and does not create a cleanly cut surface. You can also see the rounded edge under good light.

What about micro bezels? I don't use them and my tools cut fine. Sandpaper sharpening is real easy, and I don't like to complicate what can be done easily. *— MD*

WOODWORKING ESSENTIALS

BY SCOTT GIBSON

CHAPTER 5

Setting Up Shop: Material Storage

It takes more than a room full of tools to make a productive woodworking shop. Along with stationary power tools and a collection of handplanes and chisels comes a diverse list of materials that must be kept on hand and accessible when you need them.

Not surprisingly, most of us focus on storing lumber. In addition to being the basic raw material that woodshops must have to operate, lumber has its own intrinsic pleasure. We can always make room for it.

Lumber also varies tremendously in size, shape and potential use. Rough hardwood that needs jointing and thickness planing before it can be used is nothing like the finished pine we can buy at the local lumberyard. In addition to various kinds of solid lumber, most shops also will need at least a modest inventory of plywood and other panel goods.

And wood is only the beginning. Shops also need everything from stains and finish to boxes of wood screws, pencils and paper, nuts and bolts, glue, cleaning supplies and light bulbs.

It's not hard to find yourself awash in shop clutter. You know you're in trouble when you'd rather go to the hardware store and buy a tube of 5-minute epoxy rather than take the time to look for the tube you know you already have. It's just plain easier than pawing through the stuff you can't seem to keep organized.

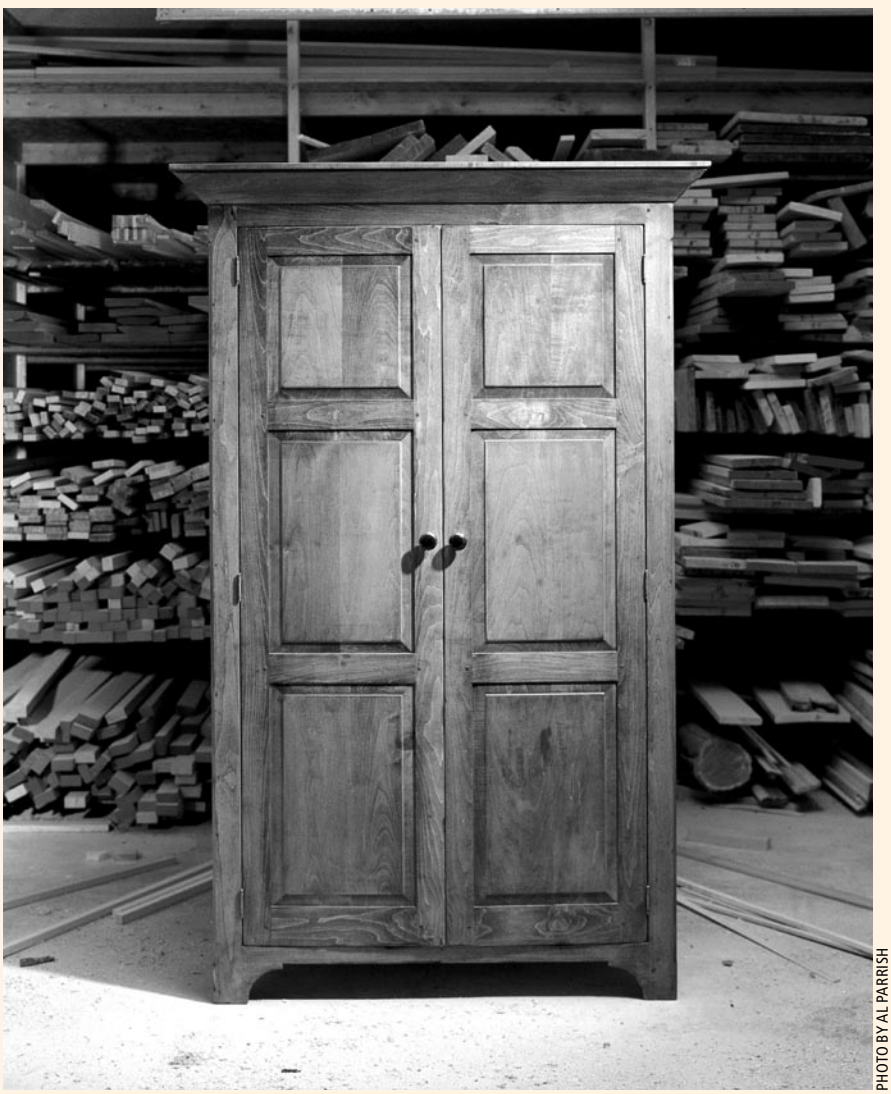
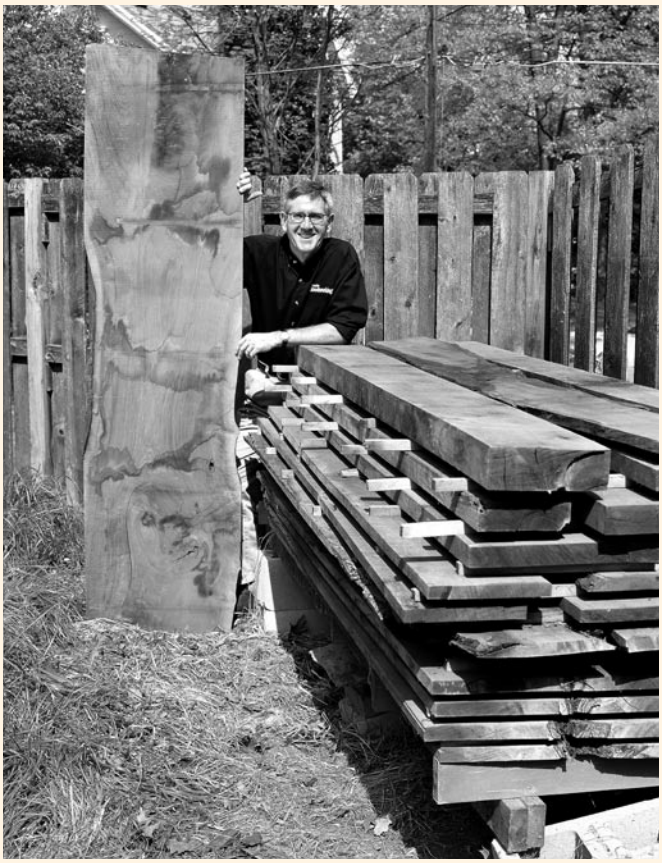


PHOTO BY AL PARRISH

Finished work, whether it's a turned bowl or an entertainment center, is at center stage in most woodworking shops. But material storage and handling, such as these racks of lumber in the background, play an important if not as obvious supporting role.



Careful stacking will help preserve these walnut boards for *Popular Woodworking* Publisher Steve Shanesy. The wood pile should start on a flat base elevated off the ground.

Layers of boards are separated from each other by narrow stickers that should be aligned with each other vertically. The ends of these freshly sawn cherry boards will be painted with a wax-based product to help prevent end checks.

Keeping all of these supplies straight is something like the process of organizing tools. By balancing work flow, convenience and safety, you can come up with a quartermaster's plan for your shop. All you have to do is stick with it. But that's another issue.

Storing Lumber Outdoors Saves Space in the Shop

Many woodworkers keep a good deal of lumber on hand – not just enough for the current project but hundreds of board feet tucked away for future use. Maybe the wood was available at a great price, or the big cherry tree in a neighbor's front yard came down in a storm and you've paid to have it sawn into boards.

If you can spare the room, stocking lumber is an excellent approach. It's liberating to have a stack of rough lumber at the start of a project. Resting in those planks is a diversity of grain and range of color that opens many possibilities as a piece of furniture takes shape. You'll have an easier time matching figure in adjacent boards when it really counts or finding a board of exactly the right width when you need it.

A big stack of lumber represents not only opportunity but also responsibility. If properly cared for, those boards will be sound and straight years down the road. I still have some walnut that came from a tree my father cut on the family's southern Maryland farm in 1949. Among the planks is one that's 11' long, 18" wide and 2½" thick. I'm saving it for a table.

If, on the other hand, wood is improperly stored you'll have a king-sized headache but nothing you can make furniture with.

It's always better to keep lumber indoors where it's protected from harsh sunlight, rain, snow and insects, than outside. But lumber can successfully be stored outside, too, as long as you're careful about it.

Never store lumber on the ground. It will rot. Start with a sturdy, level foundation of 4x4s spaced 16" to 24" apart. Take the time not only to level each 4x4 individually but also to arrange them so they are all in the same plane. The idea is to create a stable platform that's as flat as you can get it.

The space beneath the bottom layer of lumber and the ground will promote air circulation. If the lumber is just coming from a mill, that will also help it dry. And moving air will reduce the risk of mold. It's also a good idea to put a layer of polyethylene plastic or tarpaper on the ground beneath the 4x4s to keep moisture from migrating upward into the bottom layer of lumber.

Next are the stickers, the narrow pieces of lumber that are used to separate each row of lumber. It's better to use dry material for stickers to minimize the risk of mold. Keep them narrow to get the most air circulation possible; material that's 1" wide and ¾" to 1" thick is more than adequate. Use a consistent thickness throughout each layer.

When you go to build the pile, the key is to align the stickers in the pile with one another, beginning with the

first ones that are placed directly over the 4x4s at the very bottom of the heap. Here's the sequence: 4x4s, then a layer of boards separated by an inch or so of space between them. Then a layer of stickers placed exactly over the 4x4s, then another layer of lumber, then stickers. As long as the stack is stable and in no danger of toppling, you can make it as high as you like.

Stickers aren't arranged in that way to satisfy some pathological need for neatness and order. They help the lumber stay flat. If you locate stickers without regard to the layer below you run a good risk of getting lumber that dries into a series of delicate waves – like the pasta that goes into lasagna. The distortion may be too much to joint out of the wood, rendering it useless. If the 4x4 foundation is not flat, it's easy to create a twist in wood that will likewise make it useless for building furniture.

A piece of salvaged corrugated roofing, weighted down with scrap wood or rocks, will keep most of the rain and snow off the lumber. If you buy the lumber green, paint the ends of the boards or use a specialty sealer from a lumberyard supplier to keep the boards from drying at the ends first and splitting.

Just remember that wood that's been stored outside will need to shed some of its moisture before it can be used in furniture. Bring it into the shop and let it acclimate for a couple weeks. If you have a moisture meter, take advantage of it. Also, outside storage probably shouldn't be viewed as an indefinite solution for furniture woods.

The lumber rack on the far wall of this shop doesn't take up much floor space. But one disadvantage is that the area in front of the rack must be kept relatively free of clutter to make the lumber accessible.

A rack made of 2x4s and pipe lagged securely to the wall makes excellent wood storage. Here, it makes use of wall space that's not practical for other uses.

A lumber shed at the shop of Kelly Mehler provides lots of storage possibilities. This open-ended rack makes it easy to see what's available.

Inside the Shop, Build Racks or Store Lumber Vertically

There are two basic strategies for storing lumber inside a shop: It can be organized in wall-mounted racks, or stood on end vertically and leaned against the wall. Both methods have their advantages and disadvantages.

Wall racks can be made from either wood or metal. They don't have to be fancy, just strong and mounted securely to wall framing with adequately sized lag bolts. One advantage of a rack is that lumber can be sorted by width or species or in some other way that makes it easy to find what you want. The closer that supports are to each other vertically, the greater number of shelves the rack will provide. Even when supports are separated only by 12" or so, they can provide lots of useable space.

Another plus is that a lumber rack can be mounted on a wall that otherwise would go to waste. In a shop with a high ceiling, a two- or three-shelf rack above window height is a great way of storing wood you don't need access to very often. When the time comes, get a stepladder and haul down what you need. For the rest of the time, you're saving a lot of floor space.

The downside of a rack is that you usually end up moving lumber to get the board you want. Unless you can slide the board from beneath the stack you'll end up removing a number of boards,

retrieving the one you're after, and then restacking the entire pile. At the same time, you can't see everything in this sort of stack. Visibility is limited to the top board and then a series of edges along the side of the stack. For a really good look at what you have, count on taking the boards off the rack and examining them one at a time.

Another disadvantage is that the space in front of a rack should be kept relatively clear of clutter so getting to a piece of lumber is not akin to running an obstacle course – not only a pain in the neck but potentially hazardous. Avoiding this problem can be tough in many shops where space is at a premium.

The other school of thought is to store boards vertically on their ends and lean them against a wall. George Nakashima, the influential post-war furniture maker whose studio is still in family hands, used this approach to store some of his lumber.

He was a great collector of wood in many forms. Nakashima would buy whole trees and cart them to a mill where they were turned into boards. He had them stacked in exactly the same order in which they came off the saw and banded together so they could dry. That method, storing wood in boule form, is beyond most of us. But vertical storage is not.

In his book "The Soul of a Tree" (Kodansha), there is a wonderful photograph of Nakashima in his wood room, surrounded by a thicket of wide hardwood planks as if he were standing in a grove of trees. All of that beauty in anyone's shop is inspiring. You will be limited, of course, by the height of the room. And the more lumber you collect and store this way, the harder it will be to get to any particular board you're looking for.

But one advantage is that you can easily see all sides of a board once you've found it. By tilting a plank up on one of its lower corners and holding the board in a near-vertical position you can pivot the wood freely to see either the front face or back face.

Woodcarver David Monhollen has ready access to lumber that's stored upright. He can easily leaf through what he has on hand.

For shorts and small offcuts – those boards that are left over when you cut a big plank – vertical storage is probably the best solution. They won't easily fit on a rack horizontally and a large number of pieces can be stored on a relatively small amount of floor space. The only caveat here is to remind yourself to sort through the pile periodically and get rid of anything that doesn't serve a genuine purpose. It's easy to hang on to every bit of scrap lumber you create ("I just know I'll use that for something someday") but the truth is that without periodic weeding every garden becomes overgrown.

Another approach for short scraps is to make a storage bin from short lengths of PVC pipe. In these makeshift bins, you can sort short pieces of moulding, lumber and dowel for easy retrieval when you need them.

Panel Products Need Their Own Kind of Storage

Panel goods are a mainstay of many cabinetmaking jobs and shops often gather a good assortment of them: MDF, veneer-core plywood, high-strength Baltic-birch plywood, particleboard for countertops. A time will come for all of them. And because most panel goods come in 4' x 8' sheets, there is often a good deal of leftover when a job has been completed so you may find yourself the curator of many pieces in different thicknesses and materials.

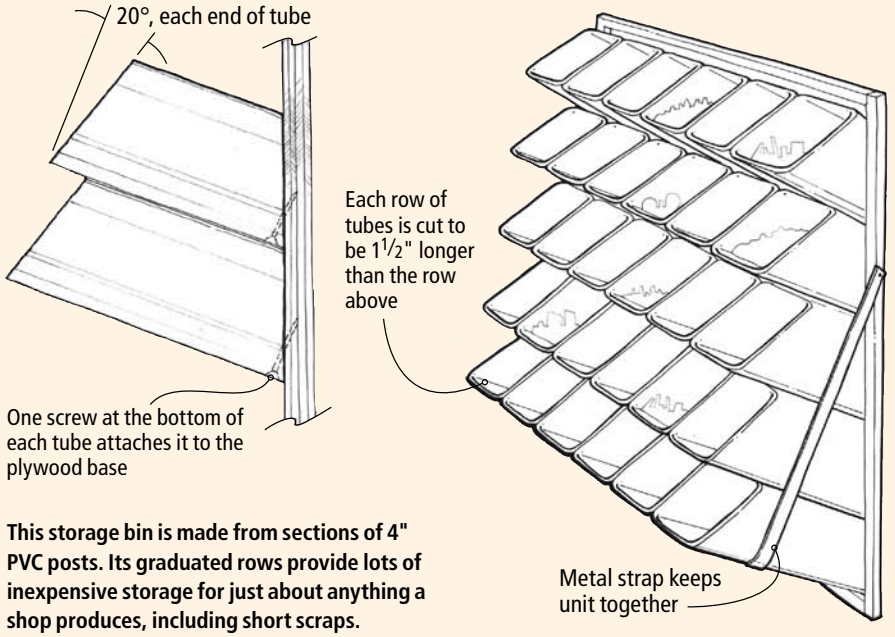
Their size dictates that panels be stored on edge. Very few shops will have the kind of room you need to store panels flat. And besides, unless you have a lot of one kind of panel, this is probably the least practical of all storage solutions because you'll have to move a lot of material to get the one sheet you need (remember that a 4' x 8' sheet of MDF weighs nearly 100 pounds).

A practical solution is to build a narrow rack, a couple feet wide and 8' long, to hold panels on edge. Locate it so you can pull a full sheet of plywood straight out without running into anything else. The width can be divided into two or more individual bays to help you organize different types of panel goods – ¾"-hardwood plywood can go in one, a mixed lot of sheet goods in the others.

Make the bottom of the rack smooth and flat so the sheets will slide easily and elevate it slightly from the rest of the floor (hardwood plywood is ideal for this). This works especially well if you have a shop with a concrete floor – it's hard work to drag plywood across rough concrete, and it's tough on the material as well.

Unless you have a very large shop with lots of wall space, try not to store plywood against a wall so you have to approach it from the side. Only the top sheet will be readily accessible (everything else will have to be moved to get to sheets on the inside) and it is virtually impossible not to lean offcuts and shorts against the pile. Before you know it, the sheet of plywood you need is buried beneath a pile of scrap lumber you don't want to handle.

Whenever sheet goods are stored on edge, take care to get them as vertical as possible and rotate unused sheets once in a while. If not, the sheet will take on a bow that will make it tough to build straight cabinets and shelves. One way



This storage bin is made from sections of 4" PVC posts. Its graduated rows provide lots of inexpensive storage for just about anything a shop produces, including short scraps.

In Scott Phillips' large workshop, panel goods can be stored upright against a wall. Rotate the panels once in a while if they sit around so they don't develop a bow.

Jigs and patterns are another kind of material that most shops have plenty of. Furniture-maker Troy Sexton is in good company keeping them on a wall over a bench.

These metal racks, in the workshop of Tom Willenborg, hold a lot of plywood. Storing panel goods on edge, as Willenborg does in the rack in the foreground, saves floor space and makes access relatively easy.

to avoid this if you do store plywood against a wall is to secure it flat against the wall with bungee cords, rope or by some other means so it can't sag.

Liquid Storage: Paints, Stains, Finishes and Glue

The many liquid materials that woodshops accumulate present their own storage and handling challenges. While the containers take up far less room than does lumber, what's inside all those bottles and cans can be a good deal more finicky. In some cases, liquids can present safety hazards if not handled carefully.

Finishes come in a wide variety, from water-based latex paints to lacquers and shellacs made with volatile solvents. In general, water-based finishes must be protected from freezing temperatures if they are to remain useful. If you work in an unheated shop in a cold climate, these materials will have to be stored inside when it gets cold.

Solvent-based finishes are not as temperature sensitive, but they are usually more flammable and the powerful solvents they contain can be a fire or explosive hazard in an enclosed space. Companies that specialize in safety equipment sell metal cabinets made specifically for hazardous liquids – it's a good investment if you have a lot of finish on hand and want to protect your shop from the possibility of fire.

Finishes also don't last forever. Polymerizing oils, varnishes and similar finishes have a way of turning into thick gunk over time. It's a good practice to mark the cans with the date of purchase, or the date on which they were mixed if you make your own brew, so that you know when they should be retired. (When the time comes, don't toss them out the back door or dump them down the drain. Contact your local municipal offices or state environmental office for advice on getting rid of expired finishes.)

Try to store finishes out of direct sunlight and away from sources of heat. They will last longer.

Some materials common to woodworking shops are hazardous if not handled properly. Rags soaked in oil finish can ignite spontaneously if they are not spread out to dry or immersed in a pail of water.

A locker specifically designed for flammable materials is a good investment. Its double-wall construction would help prevent the spread of fire.

Glue is another material that can be sensitive to time, sunlight and temperature. Yellow and white polyvinyl acetate glues (Titebond and Elmer's Carpenter's Glue, for example) as well as liquid hide glues are happier if they are not allowed to freeze. Even if still in a liquid state, these glues should not be used if they are too cold because the bond will not be reliable – check the label for the specifics. If you have a heated space for

water-based finishes, store your glue in there as well.

Epoxy and other two-part adhesives that are not water-based don't need as much hand-holding although these adhesives do have a limited life span. The manufacturer of West Systems epoxy says this adhesive has a shelf life of about one year from the date of manufacture, although this is probably a conservative estimate.

Polyurethane glue and liquid hide glue also are given about a year's shelf life from the time of manufacture before they should be discarded. Glue that comes in powder form can pick up moisture from the air over time. As with finish, it's a good idea to keep an eye on glue containers and get rid of those that are no longer reliable. Glue is one of those things you should buy as you go and use when it's fresh – you're not accomplishing much when you buy a 10-year supply of an adhesive that only lasts a year.

This easy-to-build cabinet holds a series of plastic trays – perfect for storing everything from ferrules to rivets.

Nuts, Bolts and All Those Other Loose Ends

Who hasn't been in a woodshop at least once and looked up to see a series of neatly labeled baby-food jars suspended from the ceiling for storing nuts, screws and washers? In theory, it's an ingenious approach to storage. All you have to do is nail the lid to the ceiling and screw on the jar. When you need what's inside, just reach up and remove the jar.

But in truth, most of have trouble staying that organized. Even with the best of intentions, nails, screws and everything else too small to bother with ends up in a couple coffee cans under the bench. In time, we have absolutely no idea what's in them. Like the missing tube of 5-minute epoxy, the fastener we need is easier to replace at the hardware store than to find under our haphazard storage system.

Open bins and trays for the fasteners used most frequently can help. With a few hours to spare and a bit of 1/2" plywood, you can make a stack of

Wire shelving helps turner Judy Ditmer stay organized. These shelves not only hold a lot of material, their design promotes air circulation.

sturdy storage containers that will hold a dozen kinds of wood screws in plain view. These stackable containers can be parked on a shelf and pulled out when you need something.

Plastic storage bins – either those with flip-up tops or banks of small drawers – are an excellent way of organizing very small parts that you don't need many of and don't use all the time. Cotter pins, set screws, small lock-washers, machine screws and small electrical components may not be what we think of first when it comes time to build a highboy. But when your router is on the fritz you'll be glad to know where to find an extra switch.

Sandpaper is another commodity item that's easy to lose track of. A few pieces of leftover hardboard or plywood can be turned into a storage rack with multiple shelves in very little time. Even if your system is as simple as lumping "rough," "medium" and "fine" grits of paper with each other it will save you time in the long run.

For bulk storage, there are a variety of low-cost avenues to explore. Used kitchen cabinets are worth looking at (skip cheaply made cabinets because they won't last). Yard sales, used furniture stores and newspaper classified ads all are good places to look.

If all this organization makes you nervous, try to remember that it really will make the shop safer, because it eliminates clutter, and more enjoyable, because it eliminates the frustration of never finding what you need. It's worth a try. **PW**

Ditmer's system includes a labeling system for material stored on shelves. It makes identification and retrieval much easier.

Longworth Chuck

This jig helps you easily reverse your work for base turning.

Photo by Al Parrish

Properly finished bowls never reveal how the turner mounted them. However, traditional methods for reversing a bowl to turn the base involve a lot of fuss and bother. Cole Jaws, for example, require cranking at least 48 hex screws for each use (not to mention the aggravation of having to scrabble in the shavings for dropped screws).

Leslie Longworth must have been aggravated, too, because he did something about it. Two decades ago he conceived an ingenious self-centering scroll chuck that does the reversing job fast and elegantly. Unfortunately, it attracted little interest, perhaps because it appears complicated. His instructions were incomplete, because he was able to write only the first of two intended articles on its construction before passing away.

However, with a little imagination, the first article contains enough information to not only make his chuck but to develop it further.

by Garrett Lambert

Garrett got his woodworking start in his father's professional woodshop in Toronto, Ontario. After years in the Canadian Diplomatic Service, he's now semi-retired and is the editor of WoodCentral.com's Articles & Reviews department.

The chuck is just a pair of counter-rotating disks. Their maximum radius is a smidgen less than the distance between the lathe's headstock and bed. Outboard turners could size chucks to accommodate still larger work, but they should consider increasing the thickness of the materials. One further outboard consideration is that the routed arcs should be cut in the opposite direction from those described below if the headstock is not reversed such that the workpiece is rotating counterclockwise.

Some preliminary comments before starting to build:

1. Longworth's design shows only four jaws that are not well suited to handle side pressure. I discovered that it's just as easy to make a six-jaw chuck.

2. It's crucial to do the following steps in order. Trust me.

3. The spinning jaws and wing nuts can hurt. A lot.

Start by cutting matching disks of 3/4" MDF for the back and 1/4" Baltic birch for the front. Other materials might work, but I know these stay flat.

The next step is choosing how to mount the chuck on the lathe. You could turn a hardwood flange to fit your scroll chuck's jaws, and glue and screw it to the MDF disk. However, a self-mounting chuck is a convenience, so adding a small faceplate works well. It also ties up an expensive component, because removing and replacing the faceplate would soon wear the screw holes in the MDF. An alternative is a nut with the same thread as the lathe's headstock. (See "Make the Headstock" on page 55.)

Whatever you decide, tack the front disk to the back disk with four small finishing nails set about 1/2" in from the rim. Mount the assembly on the lathe, true up the rim, and round the edges.

Now for the most crucial step: Use a chuck in the tailstock to drill a 1/16" hole through the exact center of both disks. This hole will ensure the chuck runs true after final assembly.

Remove the chuck from the lathe and clamp it in a vise. Draw three circles. The smallest is the diameter of your faceplate or nut, plus about an inch; the largest is the diameter of the disk less about an inch; the middle circle is centered between the other two.

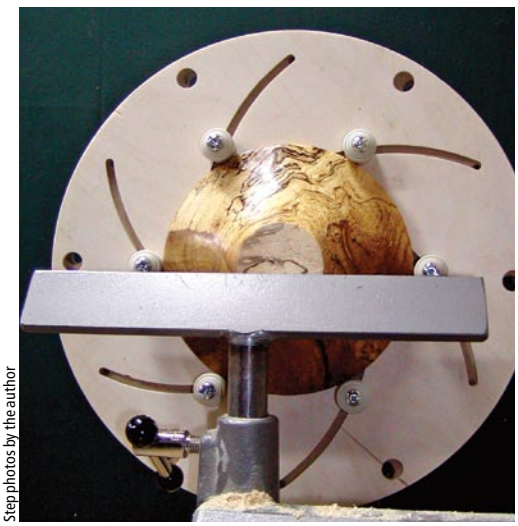
At this point, if you're making a chuck larger than about 14", you have to decide how many jaws you want. I've made both, and while four are adequate, I recommend six. The photo at the bottom of the page shows the layouts for a four-jaw and a six-jaw chuck. For four jaws, draw two perpendicular lines through the center of the 1/16" hole you drilled earlier. For six jaws, draw three lines at 60° angles. I used drafting triangles.

Dimple the intersections of the diameter lines with the middle ring, and then use the dimples to draw arcs from the outer ring to the tangent of the inner ring. (Drawing these arcs helps avoid mistakes while routing.) Keep the compass set for the router jig.

I made a circle-cutting base (photo next page) for my router out of 1/4" Baltic birch. The hole is 3" in diameter for good vision, because all start and stop points are by eye. With a 1/4" bit in a router, set the compass pin against the edge of the bit closest to the wing on the router base, and draw a short arc on the wing. Drill a 1/16" hole through that arc and insert a nail as a pivot pin. Push it through so that about 1/2" protrudes and set it in a dimple on the disk. Push the jig flat and hammer the nail in at least 1/8" to ensure the jig can't slip out of position.

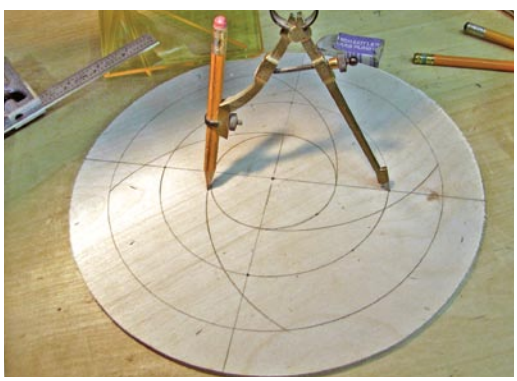
Routing the arcs is so easy that one can become a tad complacent and make a ruinous mistake. Take your time. Begin a cut by plunging the bit partially into the work about 1" away from an outside start point, back it up to that point – cautiously; this is a climb cut – and then pull forward to the end point.

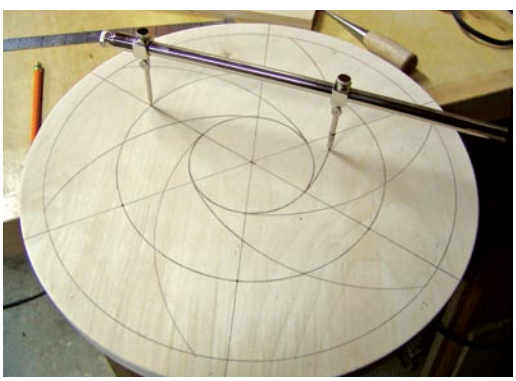
Step photos by the author



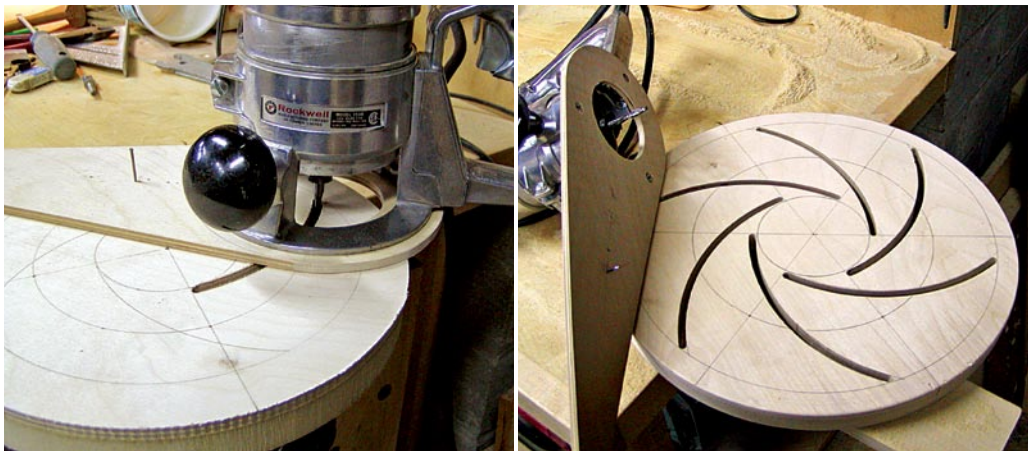
This 15" version of the Longworth chuck has six long jaws. Here, it's being used to hold a small spalted maple bowl.

Use your band saw to cut matching disks of 3/4" MDF for the back and 1/4" Baltic birch for the front.





The layouts for both a four-jaw and a six-jaw chuck. (You could use a trammel for both layouts.)



Use a solid carbide upcut router bit to cut your arcs, as this will produce the cleanest cut in both plywood and MDF.

A solid carbide bit required only two gentle passes to go through both disks. Repeat until all arcs are cut. The result will look like the photo at above right.

Now drill finger holes (about 3/4" diameter) around the perimeter of the disk sandwich; drill four for a small chuck, and six for a large one. These provide the means to counter-rotate the disks to set the jaws.

A #10 x 1" roundhead wood screw with an unthreaded shoulder serves as an axle, so enlarge the center hole in the front disk just enough for a snug fit on the screw shoulder. Enlarge the center hole in the back disk to the inside diameter of the screw's thread.

Sand both faces of both disks smooth, taking particular care to get rid of any fuzz on the edges of the routed arcs. Apply a couple well-buffed coats of paste wax to the face of the MDF disk, and to the face of the Baltic-birch disk that has the drawing on it. This will ease rotation. Now reverse the front disk and place it against the back disk so that the routed arcs cross. Drive in the axle screw, and back it off just enough to permit the front disk to rotate. This completes the chuck body.

Now for the jaws. The photos at right show the buttons on the front of a 10" four-jaw chuck and the wing nuts on the rear of a 15" six-jaw chuck.

The jaws are made from rubber leg tips available from hardware and housewares stores. (Do not buy the vinyl versions. They do not grip.) The 5/8" sleeve type is best for large chucks, and also provides more reach. However, I've found the screw-on button type is the best choice for smaller models.

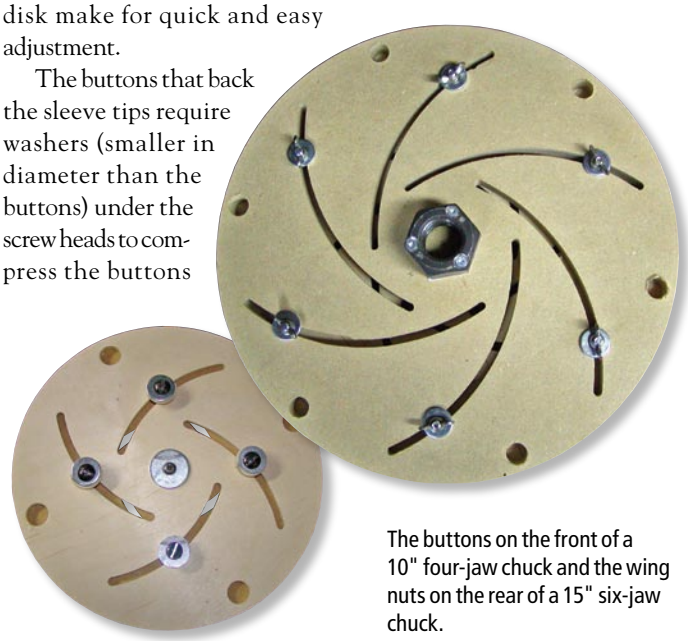
The sleeve tips require wooden inserts for attachment, so turn a dowel to 5/8" diameter, and cut lengths to fit inside each sleeve. Drill 1/4" holes lengthwise through the top of the rubber tip and the dowel. With 1/4" x 2 1/2" machine screws inserted through the dowels and the arcs, wing nuts and washers on the rear of the back disk make for quick and easy adjustment.

The buttons that back the sleeve tips require washers (smaller in diameter than the buttons) under the screw heads to compress the buttons against the workpiece.

Rotate the disks until the outer ends of the arcs overlap. Insert the jaws and place the washers and wing nuts loosely on the back side. Rotate the front disk again, and watch how it perfectly synchronizes all four or six jaws as they move in and out. Place a reversed bowl against the disk face, rotate the jaws until they press against the outer – or inner – edge of the bowl, tighten the wing nuts, and the whole unit is secure.

Now, retire your Cole Jaws and jam chucks. **PW**

A more detailed story of this process is available in the articles section at WoodCentral.com.



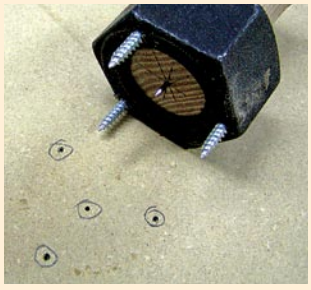
The buttons on the front of a 10" four-jaw chuck and the wing nuts on the rear of a 15" six-jaw chuck.

MAKE THE HEADSTOCK

Headstocks on smaller lathes generally use standard pipe thread, and nuts are readily available. Unfortunately, for those with 1 1/4" headstocks, the standard 1 1/4" pipe thread is seven teeth per inch (TPI), so you'll have to go to a specialty supplier for 1 1/4" x 8 TPI nuts. I bought several and have been using them to make a variety of faceplates. To mount them, I drill and countersink three holes through the face of the nut – the metal is soft – and use wood screws to fasten it. (Size the holes so the screws fit snugly.) A small nut has a further advantage in that the diameter of the nut/faceplate establishes the limit of inward travel for the buttons.

However, manufacturers have no need to ensure the faces are perfectly coplanar. All of mine have been off just a little, inducing wobble in the chuck. The fix is not difficult. You can put the nut on the headstock, and use a sanding disk in the tailstock to face it. Alternatively, mount the nut on the MDF disk centered as well as possible. Although this positioning is not critical, I turned a plug that will just squeeze through the nut, and drove a small finishing nail into its center. By dimpling the center of the disk, the nail will ensure the nut is centered. Tapping the three screws with a hammer marks the pilot holes.

If your nut does induce wobble, you can reduce it to almost nothing by shimming one side of the nut with a single business card. Eliminate the rest by facing the rear disk. *— GL*



Barrister Bookcases

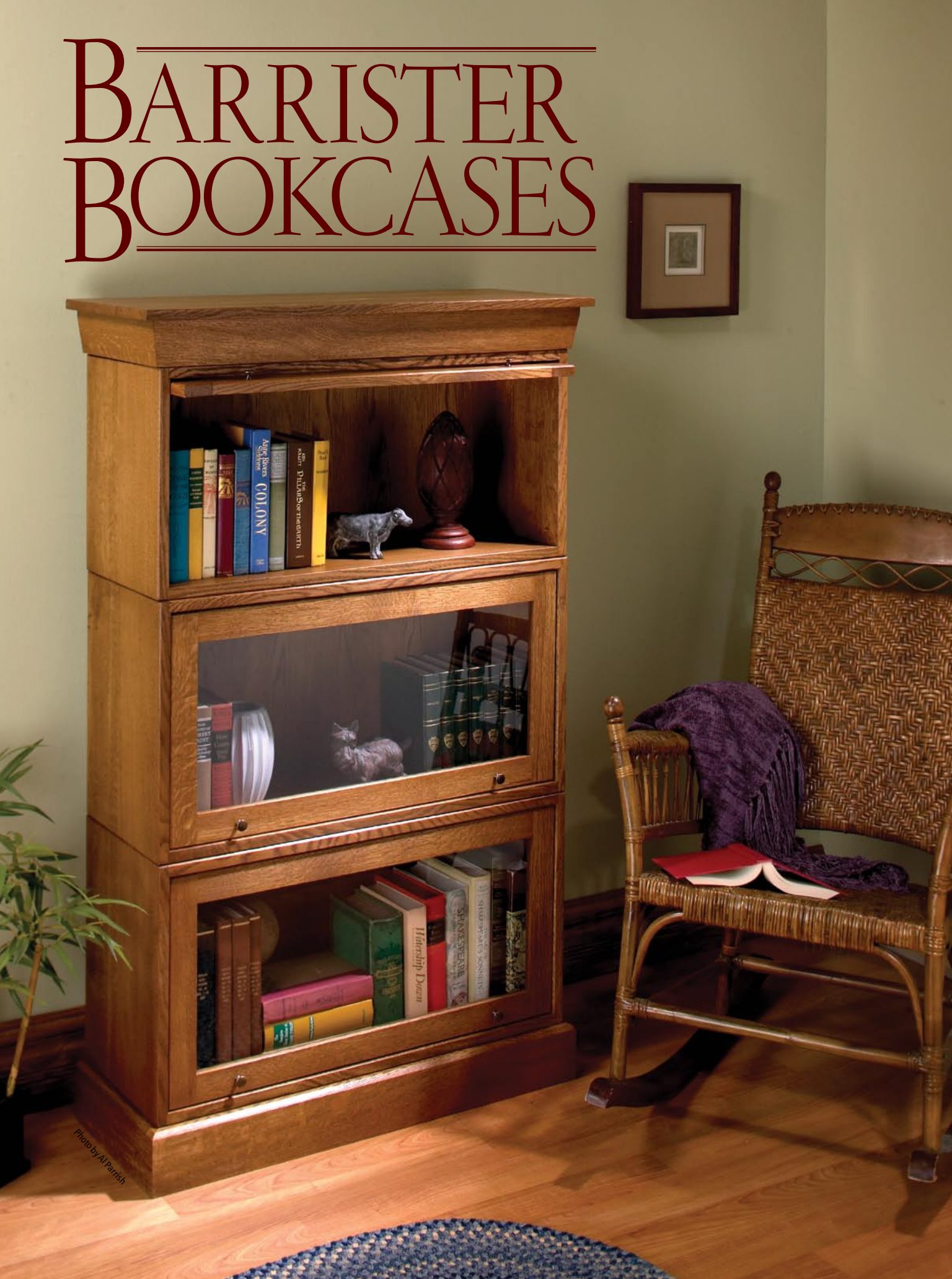


Photo by Al Parrish

Almost everyone likes the look of barrister bookcases. But what makes them so appealing? I think there are a number of characteristics that make the barrister design popular and enduring.

First is that the individual units of the case stack together. And because they are separate units, they can be arranged in any desired height configuration to fit any area of your home or office.

Second, they are elegant as well as functional. The wood-framed glass doors, when lowered, protect your books or other valuables from moisture and dust – not to mention those tiny pudding-laced fingers of the little ones. They also allow you to look through the glass for a specific item without the undo stress of operating the doors. In the open position, with the doors raised and slid back into the case, you have easy access to those leather-bound sources of knowledge.

Third, as you will see, we rethought the construction so these cases can be built with the easiest techniques – without sacrificing any classic design elements. These are the easiest barrister bookcases you will ever build.

We decided to build a stack of three units – each identical in construction and design, with one slightly different in height. There are two larger units for oversized books and special keepsakes, and one that is slightly shorter in height. Those, along with the top and bottom units, add up to the appropriate design for our bookcase needs.

Your set can be created with only one unit, or it could be a stack of five, along with the top and bottom sections. (More than five units is unwieldy and potentially unstable.)

One Panel Chops into Three

We wanted the grain on each case side to be consistent from top to bottom as we stacked our individual units. This is a matter of aesthetics, not a necessity. (I'm sure somewhere during this case's lifetime, the units will be stacked without regard to the grain.)

What is a necessity, in order to get the units to stack without problems, is to make the width of each unit equal in size. This is best accomplished by starting with one large glued-up panel of the correct width that is then crosscut into the appropriate lengths.

Once the sides are milled according to the plan, there are three rabbets that need to be cut in each side panel. One rabbet goes at the top and bottom of each side panel. Those rabbets are for the full-width case bottom and the front and back rails at the top. You also need a rabbet at the back edge of the side panels that will house the backboards. That rabbet hides the backboards when viewing the bookcase from the side.

A dado blade is the best choice for cutting the rabbets. Install a sacrificial fence, set the blade for the widest cut (at least 3/4") and position the blade below the saw top. Adjust the fence to the blade so that 3/4" of cutting width is exposed and with the blade running, slowly raise the cutter to a height of 1/8". With this setting, a single pass over the blade will create the 3/4"-wide x 1/8"-deep rabbets at the top and bottom edge of the side panels.

Using the widest setting on a dado stack along with a sacrificial fence is the best choice for creating rabbets for these case sides. This will ensure that the cut clears the waste entirely.


Raising the blade height is the only adjustment needed to cut the backboard rabbets. The front edge of this side looks as though it is raised from the saw top because of the previous rabbet cut.

Next, again with the blade moving, raise the height to 7/16". This is to create the rabbet for the backboards. They fit into a 3/4"-wide x 7/16"-deep rabbet. If you are trying to keep the grain aligned, as we have, you need to determine the front edge of the bookcase prior to crosscutting the individual side panels into smaller sections. Or, choose the best edge of your stock for the front face at this time and cut the backboard rabbets into the opposite edge.

> We've rethought this classic with techniques so simple even a beginner can do it!

Your Groove is Important

Creating the groove in which the doors slide is the most difficult task involved in building these bookcases – but all it takes is a plunge router with a guide fence and a 1/4" upcut spiral router bit.

Positioning this groove is the trick. It needs to be located correctly from the top edge of the sides, so the guide fence of the router becomes key. Set the fence so the router bit plunges into the side with 1 1/8" of material between the top edge and the groove. The 1/4" cut will then be perfectly set for the placement of the centered brass rods in the bookcase doors, and it builds in the necessary 1/8" spacing so the top edge of the door does not bind when opened.

Next, you need to find the starting or stopping point of the cut depending on which side you're working. On each right-side panel you'll plunge at the front edge and finish the cut through the backboard rabbet. On the left-side panels you'll begin coming through that rabbet and complete the cut by stopping at the correct location and removing the bit from the work surface. Attacking the groove this way registers each cut off of the top edge of the side panels and makes the best use of the guide fence.

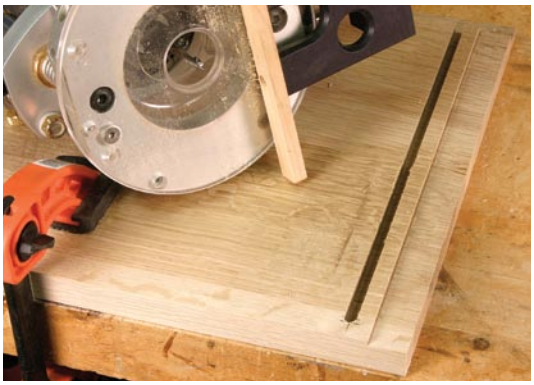
The location that you need to stop on is 3/8" in from the front edge of the sides to the beginning of the routed groove. Where did this number come from, beside the plan? The 1/4" brass rods that

by Glen D. Huey

Comments or questions? Contact Glen at 513-531-2690 ext. 1293 or glen.huey@fwpubs.com. You can view his work and books at woodworkersedge.com.

are used to hang the doors are located in the center of the 3/4"-thick doors. The outer 1/4" of door stock along with the design feature of the 1/8" offset of the door to the front edge of the case adds up to that exact location.

With the setup and location locked in, rout the 5/16"-deep grooves into the sides as shown in the picture at right.



Creating the groove for the door pins to ride in is the most exacting step of the process. A plunge router with a guide fence makes it short work. Check the layout before routing.

There are pin locations at both the top and bottom that act as guides for the doors. Use the drill press for this step – unless you've a steady hand and good eye.

The doors will be held in position toward the front with two brass rods per side. The top rod is centered 1 3/4" from the top edge of the side and in 1" from the front edge. These two rods act as a pivot for the sliding door.

The second rod location is pulled from the bottom edge of the sides and is also set at a measurement of 1 3/4". It too is located 1" in from the front edge. This rod placement gives the door something to close against while holding the door parallel to the case front when closed.

Assemble the Box

Mill to size and thickness the material for the top-front rails, rear rails and the catch rails, as well as the bottoms. You can get away with using a secondary wood for the rear and catch rails, as we chose to do, because these pieces will not be seen as you view the bookcase. All pieces connect to the sides with pocket screws.

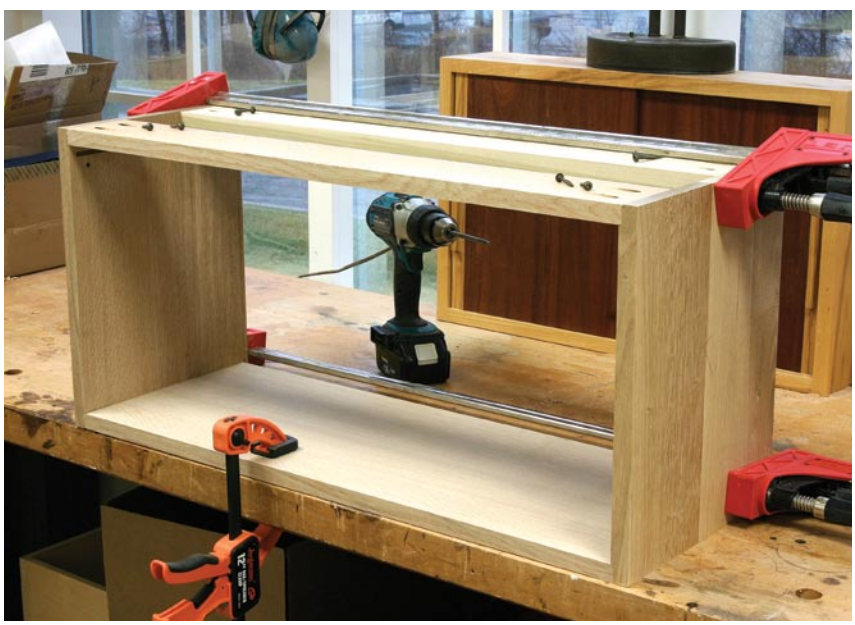
Cut three pocket-screw holes on the worst face of the bottoms, leaving the best face for the inside of the piece. Position a hole at 1 1/2" from each edge and one that is centered across the bottoms. The rails used for the top also attach with pocket screws. Place two holes at each end of both rails.

Now you are ready to assemble the boxes. Position the bottom on your bench and match the two sides to the bottom, making sure that the bottom fits into the shallow rabbets. Next, slide the top rails in place – the oak at the front and the secondary wood at the rear. These rails fit into the rabbets at the top edge. Add clamps as shown below then attach the rails to the sides with the screws. Flip the box then add the screws to attach the bottom.

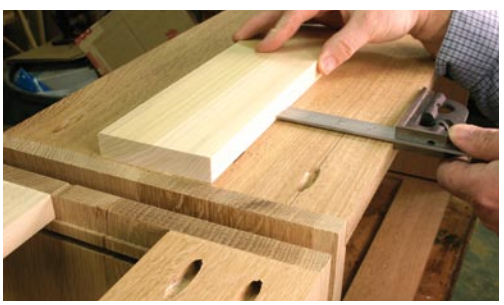
With the box set on its top, position and attach the catch rail to the bottom. Align the piece off of the front edge of the unit and center the rail from side to side. Each rail lines up with the inside face of the side, not the edge of the rabbet area. Attach the rails to the bottom with wood screws.

Creating the frames for the top and base units is next. We found that building the frames and then attaching the mouldings was the best way to approach this part of the project. It also allowed us to use secondary wood for these hidden areas.

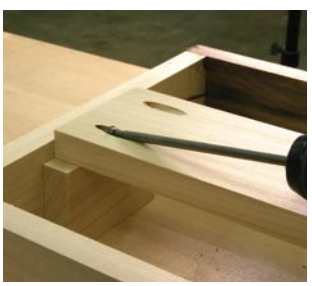
Each frame starts with the assembly of a box. The end supports receive the pocket-screw holes and are attached to the rails through that connection. Also, while you have the pocket-screw jig out, add a number of holes to the top frame that you'll use for attaching the top.



Assembling the boxes is a matter of 14 pocket screws. Clamping the box ensures that it will be square. The opening in the top is for the adjoining catch rail on a second unit.



The catch rail is fastened to the box bottom. It is important to properly align the piece to fit the other units.



The catch rail for the top unit rests inside the end rails. To keep the rail from sliding downward as the screws are installed, rest the piece on a block cut to the correct size.

With the narrowness of the frames, you should arrange the pieces so the screws are to the outside of the unit. The drill, with the square drive installed, is too large for the inside of the frame. You should also attach the center support, the piece that runs from front to back and is centered along the width of each frame, through the outside with four #8 x 1¼" wood screws.

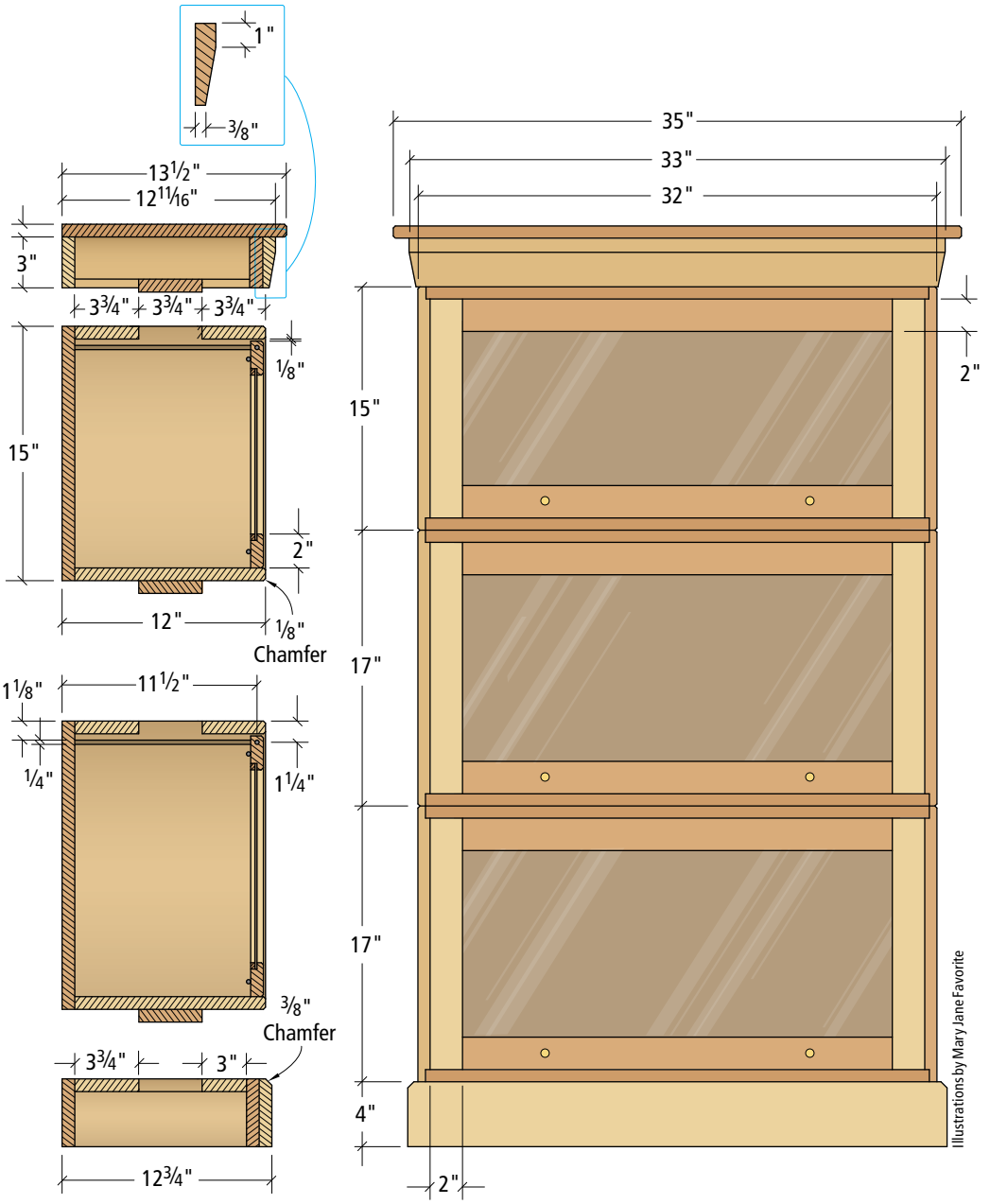
From this point the construction of the frames differs. In order for the top and base units to fit the design of the bookcase, the top unit must have a catch rail while the base unit receives a front and back flat rail.

The catch rail of the top unit fits between the frame's side rails, with a ¼" extending beyond the side rails, and attaches to the center support with two #8 x 1¼" wood screws.

Make sure that the catch rail is aligned to fit into the top rails of any of the bookcase units – they are all consistently positioned, making them interchangeable.

In the base unit the front and rear flat rails are set flush with the top edge of the frame and attached using the pocket-screw method. Remember that the front rail is only 3" wide, whereas the rear rail is 3¾". Each of these flat rails also attaches to the center support with #8 x 1¼" wood screws.

The mouldings are next. Mill the material for the crown moulding, the base moulding and the bookcase top to size and thickness. The top edge of the base moulding has a ⅜" chamfer. Cut the edge with a router equipped with a chamfering bit, then fit the pieces to the base. Because there is a solid frame backing the mouldings you can nail the pieces in place with brads. Add a small bead of glue at the mitered corners as you assemble the mouldings for added strength.



Section

Elevation

The 3" rail in the base unit is toward the front while the wider rail is held to the back. Each rail is not only connected to the frame sides, it is also attached to a center support.

The chamfered base moulding is fit to the base frame on three sides. The secondary wood of the frame is hidden when the bookcase is stacked.

Make the Crown Moulding

The crown moulding is a bit more complex than the base moulding. It begins with a cut at the table saw. Tip the blade to 10° and position the fence so that the blade exits the stock about 1" down from the top. This will leave about 3/8" of material at the bottom edge of the stock. This setting will need to be fine-tuned at your saw. Run the cut for both pieces of stock – one for the front and one piece that is crosscut into the two ends.

I elected to make a pass over the jointer to clean up the saw marks on my mouldings. Set a light depth of cut and be sure to use push sticks. If you choose not to use the jointer you can sand the moulding face smooth. Once the piece is cleaned and sanded it can be attached to the top frame.

I work counter-clockwise around the unit to get an accurate fit when wrapping mouldings. This allows for easy marking of cutlines as well as easy positioning of the cuts at the miter saw and it allows me to make my mitered cuts without changing the angle of the saw. Cut and fit the first mitered corner and clamp the pieces to the frame. Slide the third piece, with its end cut square, to meet the back of the front crown piece as shown in the photo below and mark the top edge on the front moulding.

At the miter saw, align the mark with your blade (saw angled to the right) and make the 45° cut. With the top edge up it is easy to match the blade to the layout line. Now to cut your final miter, simply place the end piece at the saw with the top edge pointing down while the face side is out and make the cut. The angle of the saw doesn't change and the cuts are correct. This is also how I would cut the first mitered corner.

Place the top unit, with the moulding now applied, onto the bookcase top, centered from side to side and flush to the back edge of the top unit. Use pocket screws to attach the frame to the top then set the completed top unit aside.

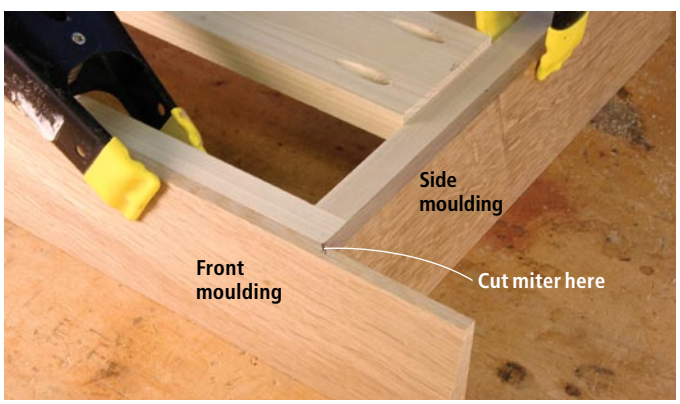
The Doors are a Snap

The only easier method that could be used to build doors would be a flat-paneled door and that wouldn't give us the glass panels that we need for these cases. The secret for these doors is accurate cutting of the pieces.

Rip the material to the required width then set stops at the saw to allow for accurate cutting of the required lengths. If

While the setup is involved, the ripping of the crown moulding is straightforward. Just make sure to have a push stick handy.

The cutting of the crown moulding can leave saw kerf indications and burn marks. A quick run over the jointer knives works best to clean the face.



The crown moulding is attached to three sides of the top frame. Miter the corners and add a small amount of glue to reinforce the area. Brads will affix the pieces to the frame.

Complete the work on the top unit by attaching the moulded frame to the case top. Pocket screws are quick and easy.

the pieces are all cut to the same sizes (two matching sets of the rails and stiles per door) two things will happen – one, the doors will be square when assembled and two, the assembled doors will correctly fit the openings of the boxes.

Cut the stiles to be 3/16" less than the opening of the box and the rails to be 4 1/8" less than the total width of that opening. This will build in the appropriate reveal around the doors.

These doors are also assembled with pocket screws placed in the rails, and the location of the holes is important. If the hole is too close to the outside of the rail, as you drive the screws there is potential to crack the end of the stiles. If the hole is set too near the interior of the rails, as you rabbet for the glass, you have the possibility of cutting into the screw area. The best location is at 5/8" from both edges.

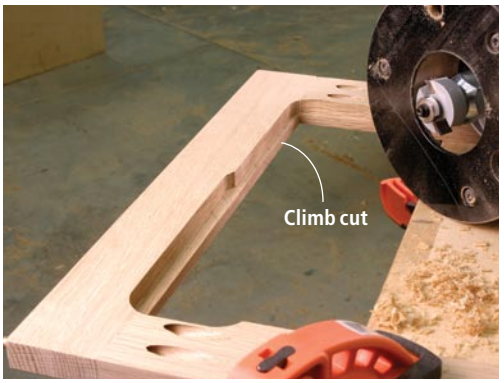
With the pocket-screw holes cut you can now assemble the doors. Place a clamp over the intersection of the two pieces, a rail and a stile, and drive the screws. Work the four corners of each door in the same manner.

Rabbeting the doors for the glass and glass-retainer strips is another router operation. Install a rabbeting bit, set for a 3/8" rabbet, and cut the interior of the frame. It is necessary to position the door hanging over the edge of your table or bench so the bearing screw does not rub the bench.

If you try to make the entire cut by running the router in the standard manner, into the bit rotation, you're likely to have areas, especially in quartersawn white oak, that will splinter and tear out. To remedy this you must climb cut during a portion of this process.

Start by climb cutting the first 1/8" of the rabbet then reverse the routing procedure and complete the rabbet. By having a small shelf of routed area from climb cutting, the removal of the balance of the waste material will shear off at that point and prevent most tear-out.

Positioning the pocket-screw holes in the door rails is important. Too close to either edge can cause problems. Don't forget to add glue at the joint.



The 3/8" x 1/2" rabbet for the glass and the retainer strips requires that you climb cut a portion to eliminate any tear-out.

Squaring the corners left rounded from the router bit is a job for the chisel. It works best to begin with a cut across the end grain and to then take small cuts with the grain, removing the waste.

Adding a small bevel to the edges of the piece will help hide the joints between the separate units. This edge work also allows the doors to flip up and slide back into the case without binding.

To complete the rabbet you'll need to square the rounded corners left from the router bit. Use a straightedge to continue the lines to reveal the exact corner and use a sharp chisel to bring the rounded corners to square. Clean the corners until you're level with the bottom of the rabbet.

Before moving forward now is the time to create the small bevel on the edges of the doors as well as the edges of the boxes themselves. Chuck a chamfer bit in a router and set it to cut 1/8" and run the profile around the doors outside edge and along the top and bottom of the boxes, including both sides and the front.

Each door edge, at the top of the door, needs to have a hole drilled to accept the short brass rod (available at any hardware store) on which the door will hang and travel in the groove as it is opened. A shop-made jig is just the trick to complete this step quickly and accurately.

Build the jig using a scrap of the cutoff material from your door pieces. Locate the center of the piece, which will be 3/8" from the edge, and also mark a line that is 3/8" in from the end. At that crossing is where you need to drill the 1/4" hole completely through the block. Use the drill press because you need the hole to be straight.

Next, add two pieces of Masonite, or other thin plywood-type material, to both sides of the block. To use the jig, slide it over the long grain of the stile, keeping the 3/8" space toward the top edge of the door. Add a clamp to hold the jig and drill the hole using the jig as a guide. Set the drill bit to cut to a depth of 3/4".

Drill two holes per door, install a 1" piece of brass rod using no

Aligning the holes for the doors to pivot becomes easy work with the use of this shop-made jig.

glue (we need to be able to remove them over the remainder of the project). Once the rods are in place you can test the door to the opening. If you have a problem it will most likely be binding at the top or bottom.

In either case you will need to remove a sliver of material to allow the fit. This can be done at the jointer or with a plane. Both solutions require you to work carefully around the end grain. All that's left is to cut the plywood pieces that comprise the backs of the individual units and mill a number of pieces to use as the glass retainers from some scrap.

Finish as Easy as the Project

This finish technique was developed by *Popular Woodworking* Senior Editor Robert W. Lang. If this method had been around years ago when I was working with oak, I would have built many more projects from this hardwood. You will not find an easier finish anywhere that I know of.

To begin, don't waste a huge amount of time sanding. I know you like the sound of that! Bring the piece to #120 grit with the random-orbit sander and finish sand by hand using #150-grit sandpaper. Done! Now you are ready to stain the bookcase.

The staining process continues in the easy category. Rag on a coat of Olympic oil-based "Special Walnut" stain. Apply an even coat and allow it to sit for 15 minutes before wiping any excess away. That coat needs to dry for 24 hours before moving on.

Next up is one coat of Dark Walnut Watco Danish Oil. Apply this in the same fashion as the stain. Rag a coat onto the stained bookcase and allow that to cure for 15 minutes, then wipe away any extra oil with a clean rag. In this process the oil acts as a toner that will even the shading as it adds color to the project. Again, let the oil coat dry for a day.

The rags used in both of the previous steps can become a fire hazard if not disposed of properly. You can lay the rags out on the floor of your shop or put them into a bucket of water. Combustion is a result of these rags thrown into a pile either in the trash can or a corner of the shop. Always dispose of rags properly.

The final step in the finishing process is to apply a coat of amber shellac. Can you guess how this is applied? You bet: Rag it on. Keep a wet edge on the wide-open areas and on any other areas simply coat

BARRISTER BOOKCASES

	NO.	ITEM	DIMENSIONS (INCHES) T	W	L	MATERIAL	COMMENTS
❑	2	Case sides	3/4	12	50	QSWO*	Cut to length shown in drawing
❑	3	Bottoms	3/4	11 1/4	30 3/4	QSWO*	
❑	3	Top front rails	3/4	3 3/4	30 3/4	QSWO*	
❑	3	Top back rails	3/4	3 3/4	30 3/4	Poplar	
❑	3	Box catch rails	3/4	3 3/4	30 3/4	Poplar	
❑	2	Top frame rails	3/4	3	32	Poplar	
❑	2	Top frame sides	3/4	3	10 1/2	Poplar	
❑	1	Top frame center support	3/4	2 1/2	10 1/2	Poplar	
❑	1	Top frame catch rails	3/4	3 3/4	30 1/2	Poplar	
❑	1	Front crown moulding	3/4	3	36	QSWO*	
❑	1	Side crown moulding	3/4	3	26	QSWO*	Makes both sides
❑	1	Case top	3/4	13 1/2	35	QSWO*	
❑	2	Base frame rails	3/4	4	32	Poplar	
❑	2	Base frame sides	3/4	4	10 1/2	Poplar	
❑	1	Base frame center support	3/4	3 1/4	10 1/2	Poplar	
❑	1	Base frame front flat rail	3/4	3	30 1/2	Poplar	
❑	1	Base frame back flat rail	3/4	3 3/4	30 1/2	Poplar	
❑	1	Base moulding/front	3/4	4	36	QSWO*	
❑	1	Base moulding/sides	3/4	4	26	QSWO*	Makes both sides
❑	6	Door rails	3/4	2	26 3/8	QSWO*	Rails for three doors
❑	4	Door stiles/tall	3/4	2	15 1/16	QSWO*	Stiles for two doors
❑	2	Door stiles/short	3/4	2	13 1/16	QSWO*	Stiles for one doors
❑	9	Glass retainer strips	5/16	5/16	28	QSWO*	For three doors
❑	1	Short unit back	3/4	14 7/8	31 7/16	QSWO*	Plywood
❑	2	Tall unit back	3/4	5/16	31 7/16	QSWO*	Plywood

* QSWO=Quartersawn White Oak

The barrister bookcase gets an Arts & Crafts look with the simple finishing method described for this project. It works great for oak – both white and red.

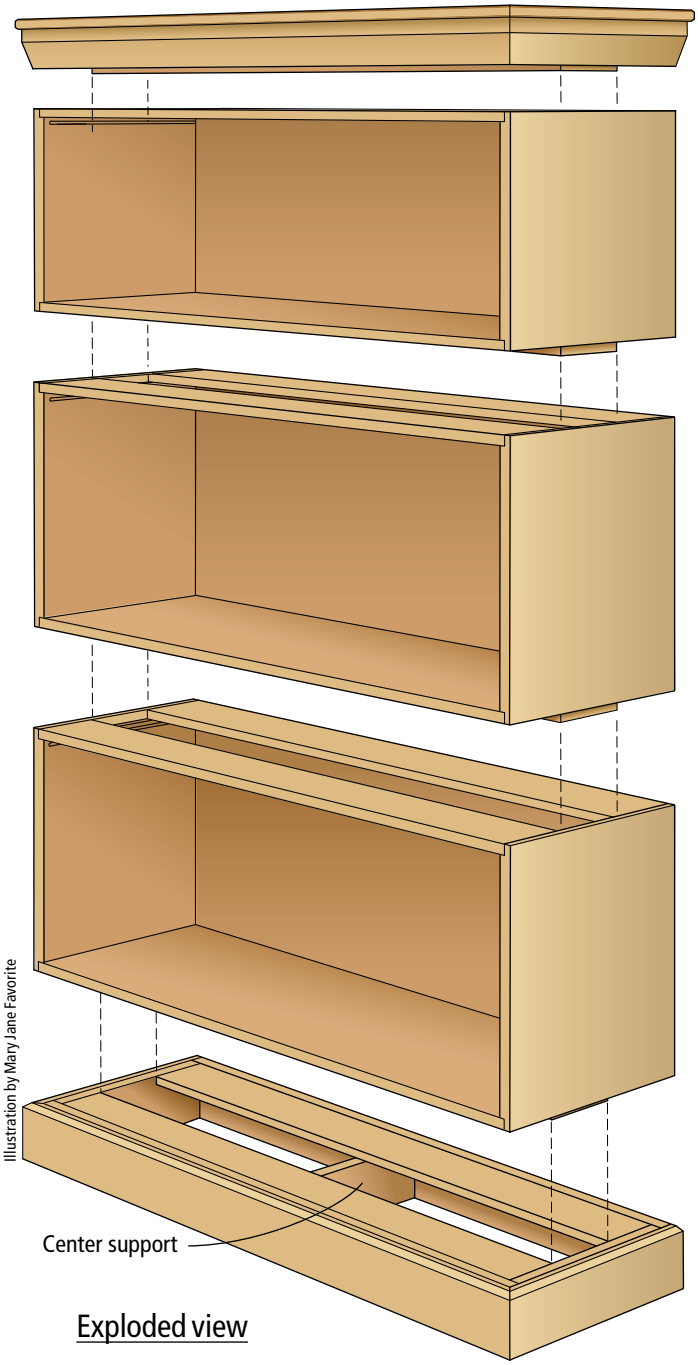


Illustration by Mary Jane Favorite

Exploded view

them. That's it. Once the shellac is dry (the next day) add a coat of paste wax after knocking down any nibs with a non-woven abrasive pad.

The Finishing Touch

Attach the plywood backboards to the back of the units with screws after the finish is complete. All that is needed is to run four screws, one at each corner, through the pieces and into the unit bottom and the rear rail of the unit top. Use a countersink and wood screws for a professional look.

Installing the glass and knobs will complete the bookcases. Have 1/8" glass cut to fit the openings of the doors and fit a glass-retainer strip around the inside of the rabbet holding the glass in place.

The knobs are like the rest of the project; simple and elegant. What would finish this project better than a simple brass knob? Find the location and drill a pilot hole to make installing the knobs a snap. A bit of wax on the threads will ensure easy installation.

Sliding the doors into the boxes is the last step before filling the bookcase with your books. Slide the door into the case on a slight angle to the front, lift the brass rod on the side toward the rear of the case into the groove and position the other rod to move into the groove as you bring the door square to the front.

Lift the door so it is perpendicular to the case and slide it to the rear of the case. Holding the door up to the top of the unit, install 3/4"-long brass rods into the remaining holes. Your barrister bookcase is ready to use.

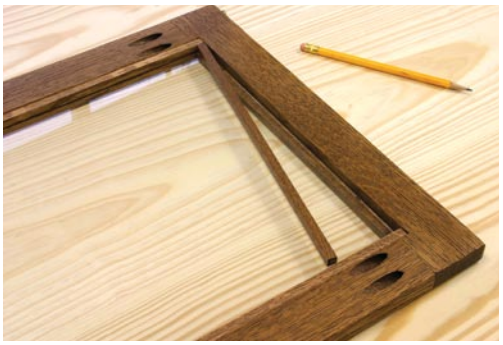
The great thing about this barrister bookcase design is that as your collection grows, and you know it will, so can your bookcases. You can add to the existing stack or start another bookcase. They are easy to build and adding to the stack is something you will enjoy. **PW**

SUPPLIES

Horton Brasses
800-754-9127 or
horton-brasses.com

6 • knobs, 3/4" semi-bright #H-42

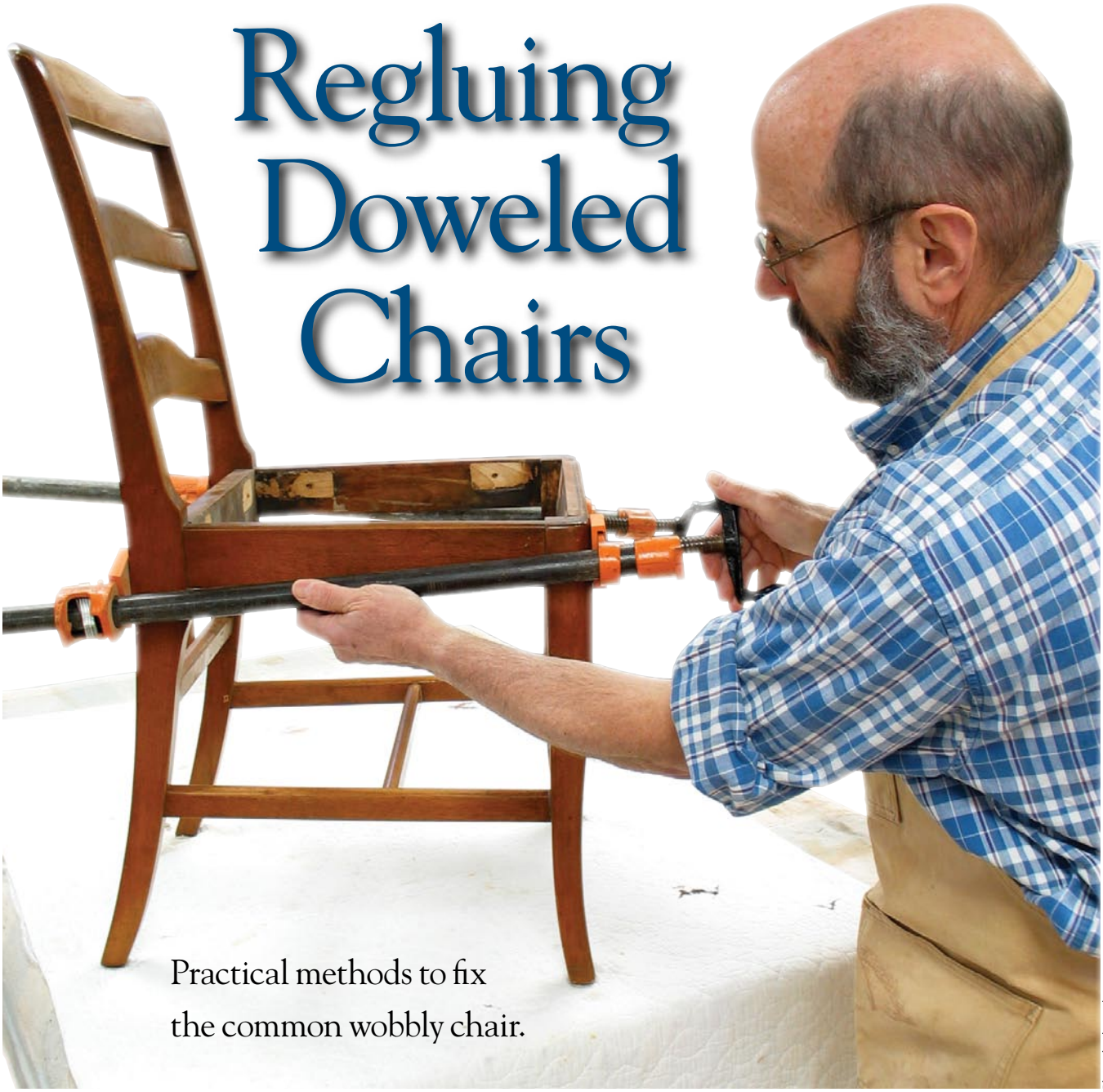
Call for pricing.



With the finish complete, an easy way to install the glass for the doors is with matching retainer strips. They are cut and fit then attached with a 23-gauge pinner.

No glue is used to hold the brass rods in place. They can be removed if the door should ever need to be taken out of the bookcase.

Regluing Doweled Chairs



Practical methods to fix the common wobbly chair.

Photos by the author

The chair I'm regluing is factory made, glued with animal hide glue and finished with shellac. The dowels are spiral-grooved and the nails used in the stretchers are wire, not "square." So the chair is probably from the 1920s or early 1930s. Once you have cleaned all the joints and replaced dowels as explained in the article, apply glue and clamp the chair together.

As a woodworker, you must be asked now and then to reglue loose chair joints. Chairs are the most abused of all furniture and also among the most complex. The subject of chair regluing is huge and, to my knowledge, has never been covered well in the woodworking literature.

I love regluing chairs. Call me weird, but I get really deep into the subtle construction differences. Even with a set of six or eight factory-made chairs, I can get lost in the minutest variations. I don't know how many chairs I've reglued during the last three decades, but it must be in the thousands.

There are two primary types of joinery used in straight-backed chair construction: mortise-and-tenon or dowels. Mortise-and-tenon joinery is pre-industrial, though many woodworkers and a very few factories still use it to join legs and rails. Dowels are machine age because the dowels themselves are machined.

Dowel joinery is much easier and faster to cut than mortise and

by Bob Flexner

Bob is a contributing editor to Popular Woodworking. *His video, "Repairing Furniture with Bob Flexner," is available from Taunton Press, 800-477-8727.*

tenon. But doweled joints don't have nearly as much glue surface, side-grain-to-side-grain, so these joints don't hold up as well.

Because most chairs made since the mid-19th century are doweled, and because doweled chairs don't hold up as well as mortise-and-tenon joinery, the chairs you are asked to reglue will most likely be doweled. So this article is about doweled chairs.

For illustration purposes, I've chosen a simple doweled chair from the 1920s or '30s with problems typical of factory chairs.

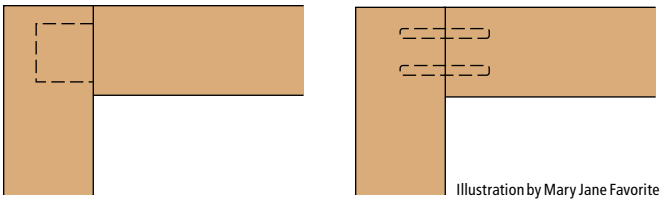


Illustration by Mary Jane Favorite

Mortise-and-tenon joints (left) are much stronger and longer lasting than doweled joints because they have far more side-grain-to-side-grain contact. Dowels inserted into legs have less wood contact overall, and fully half the contact they do have is with end grain – top and bottom.

Philosophy of Regluing

Unfortunately, it has become common to reglue, or "tighten," chairs by inserting some sort of adhesive into the joints in order to avoid having to take them apart. Sometimes it's done using a syringe held right to the joint, hoping the adhesive wicks inside. Sometimes tiny holes are drilled at an angle into the joint and the adhesive inserted with a syringe. Sometimes "magic" swelling products are wicked into the joints to cause the wood to swell and produce temporary tightening.

None of these methods works for long. Wicked adhesive bonds only to the old glue that has already given way. It doesn't bond to the wood, which it can't get to through the old glue. Swelled wood compresses again with seasonal humidity changes, and when the chair is racked in use.

The only way to restore the original strength to joints is to disassemble the chair, clean off the old glue, apply new glue, then clamp the chair back together. In the case of doweled joints, it's often best to replace the dowels.

You'll sometimes find joints that resist separation. You then have to decide whether to leave them attached, betting they will hold their strength as long as the other joints you're regluing, or figure out a way to get them apart.

If you have determined the glue is animal hide glue (it becomes sticky when you rub it with water or saliva), you can usually get the joints apart by inserting denatured alcohol. If the joints are held together with a modern adhesive, such as white or yellow glue, epoxy, polyurethane or urea-formaldehyde (plastic-resin), you may not be able to get them loose if they aren't already. You may have to work around them.

Speaking as a repairman, I hate all glues other than animal hide glue because they are so difficult to work with.

Knocking Apart

The first step in regluing a loose chair is knocking it apart. Before you can do this, however, you need to remove the corner blocks and any nails or other restraining devices that have been inserted.

It's glue that holds chair joints tight, not corner blocks, nails (wire, square or "wooden"), screws or metal brackets applied during manufacture or restoration. This is basic woodworking, but many people seem not to understand it. These devices might keep joints from coming apart but they don't keep joints from becoming loose.

This is an important point because so often chair repair is done by adding metal devices that do little good but make the eventual regluing more difficult because they have to be removed. In many cases, the devices cause serious damage, including splits and breaks that are sometimes difficult to repair.

In this chair, the corner blocks were inserted during manufacture to support the chair seat. Nails were also inserted in all the stretcher joints. This is typical on factory-made chairs, but I've never understood the reasoning. The nails don't prevent the glue from giving way and they are a pain to remove, which they have to be to get the chair apart.

To remove the corner blocks, first take out the screws. Then try knocking the blocks loose with a hammer. My favorite is a deadblow hammer made of plastic with a hollow chamber containing shot. I find this widely available hammer far more effective for disassembling furniture than rubber or leather mallets. (If you use a metal carpenter's hammer, be sure to cushion the blows with leather or softwood blocks so you don't put dents in the wood.)

Corner blocks will usually have separated from one of the rails, so you can also wait until the chair is disassembled to remove them.

Removing nails is a problem. I don't like damaging the wood and finish, but I've given up with nails. The only efficient method of removing them is to dig them out. I first cut away some of the wood on two sides of the nail using a $\frac{1}{8}$" chisel, which I don't keep sharp and which I dedicate to this operation. Then I pry out the nail with some sort of tool. My favorite is a pair of electrician's pliers.

Sometimes you can knock the joints apart with just the right amount of force to cause

The first step in regluing a chair is to remove corner blocks inserted to support the seat. Remove the screws and then the blocks using a deadblow hammer. If the blocks resist, try wicking denatured alcohol into the bond using a syringe. If these blocks were attached with animal hide glue, the alcohol will crystallize the glue, making it easy to knock them loose.

Nails are often inserted into stretchers in factory-made chairs. To remove the nails, first dig out some of the wood on two sides of each using a 1/8" chisel.

With enough wood removed so you can grab each nail with a pair of electrician's side-cutting pliers, pry them out of the wood. Fill the damage with wood putty if you are refinishing, or with a matching colored wax crayon after the chair has been reassembled if you aren't.

With all restraining devices removed, knock the chair apart. The most efficient tool to use is a deadblow hammer. Hold the parts a fraction of an inch above a soft surface and strike them as close to the joint as possible to avoid breaking or splitting something.

If a joint resists separating, try wicking denatured alcohol into the joint using a syringe. If the glue is animal hide glue, the alcohol will cause it to crystallize making separation easy. If alcohol doesn't work, try white vinegar (white so as not to cause staining). It will soften white and yellow glue, if it can get to the glue.

the nails to bend. But you always risk breaking or splitting something. In most cases, I remove the nails first. It's easy enough to fill the damage with a colored wax crayon after the chair has been reassembled. (I don't put the nails back in unless I can see a purpose for doing so.)

With all devices removed, it's usually easy to disassemble a loose chair with a few whacks of a deadblow hammer. To reduce the risk of breaking something, lift the part you are hitting a fraction of an inch above the table or workbench surface and hit the wood as close to the joint as possible. You should place blankets or other soft materials on the surface to avoid causing damage when the part bangs against it.

If you hit the part far from the joint, leverage increases the risk of breaking something. If you hold the parts well above a surface, something may break when they separate out of control.

If the joints resist and they are glued with hide glue (almost all furniture made or restored before the 1950s), you can cause the glue to crystallize, making it easier to separate, by wicking in some denatured alcohol. A syringe is a handy tool to use because it concentrates the alcohol where you want it.

Alcohol may cause the finish to turn white. If you aren't refinishing, you can easily remove this "blushing" by rubbing with #0000 steel wool. In almost all cases, it's best to do the regluing before stripping and refinishing, not after. You don't want to get glue on bare wood or damage a newly applied finish.

As you disassemble the parts, keep track of them so you don't reassemble them incorrectly. There are two easy methods. Number or letter them either directly on the part or on a piece of tape attached to each part. Or lay the parts out on a table in the order they will be reassembled.

I prefer the second method because it's faster. But I have done this many times, so I have a system I can trust. You should probably do both to begin with. Eventually, you will gain trust that your system for laying out is foolproof.

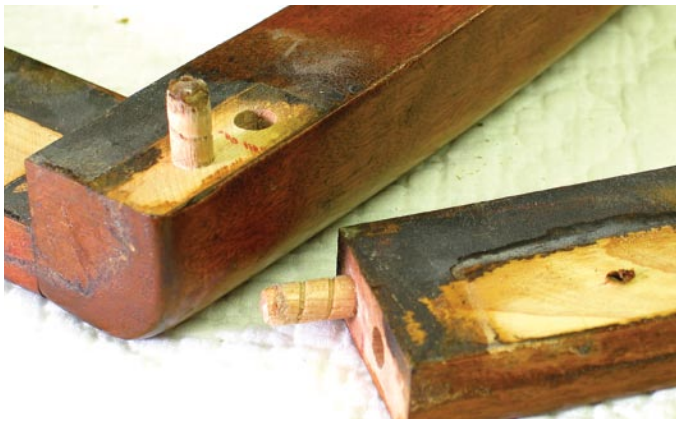
Preparing the Joints

With the parts separated, you can prepare each joint for regluing. To achieve success gluing wood parts together, each part must be clean and you must achieve tight wood-to-wood contact. When gluing new wood, cleanliness is not an issue because the parts are newly machined or cut. To reglue, you must remove the old glue first.

The exception is when using hot animal hide glue over old hide glue. Because of the heat and wetness, the new glue dissolves the old and the two become one. I love using hot hide glue because of this time-saving advantage; in most situations, I don't have to clean off the old glue.

As you separate the chair parts, label them so you don't get them mixed up.

Along with, or instead of, labeling the parts, you can lay them out in an order you understand to keep track of how they will go back together.



If any dowels separate from rails with their theoretically stronger side-grain-to-side-grain bonds, it's best to replace all the dowels because you can't trust any of the bonds to hold. If the dowels separate only from the perpendicular legs, you can choose to clean the dowels and the holes and avoid having to replace them.

But hot hide glue requires effort to prepare and takes practice to learn to use, so for the purpose of this article I'm assuming you will use white or yellow glue. Therefore, you will need to remove the old glue. (White glue provides more working time and still creates a bond stronger than the wood itself; I've never understood the rationale for exterior adhesives on indoor projects.)

You may also have to replace some or all of the dowels.

A basic rule of joinery is that wood bonds well side-grain-to-side-grain and poorly end-grain-to-end-grain or side-grain-to-end-grain. (One reason corner blocks can't be counted on to strengthen joints is that the blocks are cut on a 45° angle.)

Notice that dowels inserted parallel in rails are 100 percent side-grain-to-side-grain while dowels inserted perpendicularly into legs are in contact with end grain on two sides, top and bottom. The leg side of the dowel is therefore weaker than the rail side, and dowels usually separate from the leg long before the rail.

Assuming this happens with a chair you're regluing, you can choose to leave the dowels attached to the rails and hope they remain strong for as long as they do in the reglued legs. Or you can avoid taking chances and replace them. I usually remove all dowels and replace them. But I'm an exception in the professional restoration trade.

Sometimes, as with the chair I'm using for illustration, the chair will tell you which path is best. Notice (above) that some of the dowels separated from the rail rather than the leg. This indicates the bond on the rail side can't be trusted. I always choose to replace all dowels in this situation.

Whatever you decide, the one thing you can't compromise on is cleaning off the old glue, including from the holes, before regluing the chair. There are two ways to do this: scrape the glue off or dissolve and wash it off.

If the old glue is hide glue, it's easy to wash off using hot water. This is the best method because scraping removes some of the wood, which may reduce wood-to-wood contact.

You can also break down white and yellow glue by soaking in hot water. You can add vinegar to the water to accelerate the process a little. Other adhesives will have to be scraped. Do the best you can to remove as much of the glue and as little of the wood as possible.

Replacing Dowels: First, Out With the Old

Replacing dowels requires removing the old dowels from the joints first. Sometimes you can strike the ends of the dowels with a metal hammer or twist them with pliers to break glue bonds. With the dowels loose, twist and pull them out using pliers.

If the dowels won't break loose and you still want to remove them, follow this procedure.

With the part clamped in a vise, saw off the dowel about $1/16$" above the surface. Then, using a brad-point drill bit $1/16$" smaller in diameter than that of the dowel, drill down the center of the dowel until you reach the air pocket at

the bottom. You will feel a slight give when you hit it.

It's usually easy to separate the remaining part of the dowel from the original drilled hole using a 1/8" chisel with a relatively dull edge; you don't want to cut into the sides. (I use the same dedicated chisel I use to remove nails.)

Remove the dowel pieces and clean the hole by drilling out any remaining dowel parts using a twist drill bit the diameter of the hole. You can then scrub the hole with hot water or scrape using a needle-nose rasp. I almost always use the rasp because rasping is faster and new spiral-grooved dowels are usually a little thicker than necessary anyway.

Assembling

With the joints cleaned, you're ready to reglue. This is the easy step; it's the same process as gluing up a new chair.

In many cases, this one included, the backs of chairs are tight and don't need regluing (they're rarely racked). The order for regluing most doweled chair designs is as follows: First the back (if necessary), then the front legs and rail, and finally join these together simultaneously with the side rails and stretchers.

When replacing dowels, it's critical that the new dowels not be too long. You can use calipers or simply a matchstick or other thin object to determine the depth of the holes. Add the lengths of the two corresponding holes and either trim the dowels to size or drill the holes in the rail deeper to accommodate the length.

The best dowels are spiral-grooved, available from most woodworking suppliers. Straight-grooved dowels have very little wood surface actually contacting the wood in the hole, so they don't hold as well.

Dowels cut from longer rods have two problems. First, the rods most commonly available are no longer cut from maple and don't fill out their listed dimensions. They are too thin, so they don't succeed in producing tight wood-to-wood contact. Second, even when cut from maple they aren't grooved, so they don't allow excess glue to escape during clamping. If you put excess glue into the hole,

The first step in replacing dowels is to remove them. If you can't knock or twist them loose and pull them out, saw them off about 1/16" above the rail or leg and drill down through the center of each dowel (it's not necessary to be exactly centered) using a brad-point drill bit 1/16" smaller in diameter than the thickness of the dowel. Drill to the bottom of the dowel where you will feel a slight give when you hit the air pocket.

With a hole drilled through the center of the dowel, pick the remainder away from the sides using a 1/8" chisel.

When you have separated the remaining dowel from the sides of the holes, pick out the pieces.

To clean the glue and any remaining small parts of the dowel out of the hole and get it ready for regluing, first drill it using the correct size twist drill bit, usually 3/8" or 7/16". Then scrape the sides of the hole using a needle-nose rasp. You can feel and hear the difference between scraping glue and scraping wood.

Be aware that dowel holes are often drilled at an angle. You can set up a guide using a sliding T-bevel. Set the angle using the dowel itself before cutting it off, or set it 90° to the angle of the end of the rail.

the dowel won't penetrate as deep as you expected and the joint may not pull fully together.

To add grooves to a maple rod of the proper dimension, scrape with the 90° corner of a chisel or make a jig to add them. Drill a hole slightly larger than the diameter of the dowel (I use metric bits) through a small block of wood and insert a screw from the side so it protrudes about 1/32" into the hole. Then drive the ungrooved dowels through the hole several times each so several grooves are scraped into them by the screw.

In all cases, the dowels should be chamfered on the ends so they line up quickly in the holes as you are inserting them. You can chamfer cut dowels using a rasp, chisel, large pencil sharpener or sandpaper, ideally attached to some type of sanding machine.

It's usually best to insert new dowels into the rails first. In other words, into the parallel part before the perpendicular. It won't matter if the dowel taps out at the bottom of the parallel hole, but you want to leave at least 1/32" at the bottom of the perpendicular hole to allow for cross-grain shrinkage. If you don't, the leg might split.

You may need to trim dowels to the proper length before inserting them into the legs.

All surfaces should be coated with glue. This means the sides of both the holes and the dowels. It's easiest to do this with a narrow brush, working out of a glass or plastic container.

When clamping the chair back and chair front, it's important that the parts be square. You can check this by measuring the diagonals – that is, from the top of one leg to the bottom of the other. The two diagonals should be the same. If they aren't, adjust your clamps at angles to make them so. Look at the photo on the first page of this article to see an example. I'm lowering the front leg by raising the clamp on it and lowering the clamp on the back leg. I've done the opposite on the far side. I have exaggerated the angles so you can see them better.

When clamping the front to the back, it's important that all four legs touch a flat surface so the chair doesn't rock. With the clamps on the chair, place it on a flat surface such as a table, floor or table saw. Adjust the clamps if necessary by raising and lowering opposite sides until the chair doesn't rock. **PW**

From the left are a spiral-grooved dowel, a straight-grooved dowel, a dowel pin cut from a maple dowel rod and a smooth surface maple dowel rod. Spiral-grooved dowels are the best because they provide plenty of glue surface together with grooves that allow excess glue to escape from the hole. Straight-grooved dowels are weak because they don't provide enough glue surface. To groove dowel pins cut from a dowel rod, drive the pins through a hole drilled in a hardwood block with a screw inserted so it protrudes about 1/32" into the hole. Be aware that machined dowels and holes often differ slightly in dimension so you may need to make some adjustments.

Hide glue is easy to clean from joints. Simply wash or scrub it off with hot water. For hot water in my shop, I use a commercial coffee maker I bought used at a yard sale. To clean white or yellow glue, you may need to scrub using hot water and a stainless-steel scrubbing pad from the supermarket. For adhesives that don't soften in water, you will need to scrape or rasp them off the wood.

Apply glue to both the dowels and the holes before putting them together. The only way to do this efficiently is with a brush.

Photo by Al Parrish

FINISHING FORMULAS

Some woodworkers keep a tight lid on their recipes, but we pour it all out.

Some say that finishing can be a "ruination of a nicely built piece of furniture." Well, to build that piece you have to study the different techniques and have access to good plans. Plans and procedures are now shared openly by most woodworkers. But when it comes to finishing, some of the best woodworkers slip into a secret back room and never let their exact procedures see the light of day.

How are you supposed to become a better finisher if you are not shown the techniques and formulas? That's why we are "blowing the doors off" this little-shared but highly important aspect of woodworking. This article is an all-access pass to the finishing methods I've used for a number of projects from my books and magazine articles.

Sand Less Than You Think

All finishing starts with the sanding, and I think that many of us sand more than necessary. Once you move to a paper that's finer than #180 grit, you begin to close the wood pores, which will affect the stain's penetration. Because these stains depend on soaking into the wood to obtain the best results, sanding too fine should be avoided. I hope that's music to your ears because most of us complain about sanding.

What's important is to remove all imperfections, so while you don't need to go past #180 grit, you do need to sand effectively to gain the upper hand. I use a random-orbit sander and begin with #120 grit, if necessary, and move through the #150 and #180 grits, followed up by hand sanding with #180 grit, making sure to move in the wood's grain direction. Also, use sandpaper to knock off any sharp edges on the project because these will show wear first.

A Homemade Wipe-on Finish for a Clear Topcoat

Once the sanding is complete we can move on. Some projects require that you add only a protective clear topcoat. I have used the commercial products that are available for a wipe-on finish, but I keep returning to my own mixture. Why? It's cheap and easy

by Glen D. Huey

Comments or questions? Contact Glen at 513-531-2690 ext. 1293 or glen.huey@fwpubs.com.

to make with ingredients from a hardware store.

My mixture is one-third turpentine, one-third spar varnish (a marine finish) and one-third boiled linseed oil (sometimes abbreviated as BLO). Make sure it's boiled – not raw – linseed oil. I mix enough in a batch for about 1½ applications to my piece.

The turpentine thins the mixture, which allows it to seep into wood pores. As the oil/varnish dries, the first coat acts to bridge between the pores. Successive applications then allow the finish to build. Keep the surface of your work wet for five minutes before wiping away any excess.

After the first coat, you need to allow the mixture to thicken before wiping the excess. Look for the consistency of honey. Once the mixture dries to that consistency, wipe away any excess before it dries completely. Create more mixture as needed for the next coat. But at this stage add only equal parts of the varnish and oil, leave out the turpentine. You don't need to have any soaking into the grain at this point.

Also, there is no need to sand the surface between coats provided you have wiped all the excess off your work. The beauty of this oil/varnish blend is that if you missed wiping an area, you just need to go back and sand that spot before applying another coat. It is a forgiving topcoat. Apply three coats to your work to build up the finish; a fourth coat will enhance the sheen.

Dying to Add Color

If I need to first color the piece, I use Moser's aniline dye (available from woodworker.com). Aniline dyes are soluble in water, oil or alcohol. I use water-based dye because it's easy to mix and to clean up. In addition, the water-soluble dyes are the most resistant of the dyes to fading in sunlight.

The alcohol-soluble dye dries too fast, leading to the possibility of lapping marks. And the oil-soluble dyes can cause several problems, including choosing a compatible topcoat as well as combustion concerns.

The mixing of the dye is a very scientific procedure. Simply mix one ounce of powder to four cups of water. Most manufacturers recommend mixing in that ratio, or making the stain twice as strong by mixing two ounces of stain into the same amount of water. In my experience, there is no reason to mix the stronger solution.

If your tap water is high in any one chemical, such as lime, use bottled water to reduce any chances of the chemicals affecting the stain's color. But generally, I use plain tap water. That's it!

Heat the water until it's simmering (you should see small bubbles rising from the bottom of the pan). Place the powder into an opaque container; I use an empty orange juice jug to minimize the reaction to sunlight. Then add the water when it reaches temperature. Replace the lid tightly and shake the mixture. Do this carefully. Pay attention to the lid. I've had one loosen as I began to shake – not a pretty sight. Some instructions say it's necessary to strain the stain prior to use, but I've not found that to be necessary.

Won't the water-based stain raise the wood's grain when you apply it? Yes, the grain of your piece will raise – so you need to trick the wood into believing that this has already happened before you apply the solution. Use a water-soaked sponge or cloth to wet the entire project, then allow it to dry and lightly sand with #180 grit, knocking down the raised grain.

In applying the dye my rule is to saturate the project. This is why I recommend you purchase a high volume low pressure (HVLP) spray system, or spray gun of some type, to apply the dye. HVLP systems are reasonably priced and will make your finishing a snap.

You can apply dye with a brush (in fact you should stain any drawers with a brush) but to stain an entire piece with a brush is more difficult. If you plan to brush your finishes I would keep the projects on the small side.

The staining begins with any drawers in your project. Use a foam brush to apply the stain in an even coat. Only stain the drawer fronts. Don't stain any part of the actual drawer box. Staining and finishing the interior parts of the drawer will hinder the sliding of the drawer and not allow any naturally occurring patina. Use the edge of the dovetails as your cut-off point for staining.

With the stain applied to a drawer front, set the first drawer aside and start staining the next. As you set aside the second drawer, apply another coat of color to the first drawer. This method allows the drawer fronts to obtain the same depth of color that the case will achieve during the process of spraying.

As for the carcase or any project that has no drawers, spray the dye onto your piece until it drips from the project and the piece is

The most effective way to apply the stain to a drawer front without getting the interior of the drawer covered is to use a foam brush.

Any case can be stained with a high-volume low-pressure (HVLP) system. Flood the surface when applying stain. Let the stain soak into the wood in order to get the best results.

totally saturated. You want to see pooling on the flat surfaces. Once you have given it a good soaking, let it sit for five minutes and wipe away any excess stain. If you do not have any to wipe away, you did not saturate the piece!

Now the warning – a fresh, wet stain looks great. In a few hours, after the stain has dried completely, you may feel the piece is ruined because of the dull, lackluster appearence. It's not. My heart stopped when I first saw this happen. Worry not – the next coat of finish, be it linseed oil or sealer, will renew that great look.

Glue stains or spots have a tendency to show up during the staining. You have two choices to fix this problem. First, as you are applying the stain, you can grab your sandpaper or sander, remove the spots immediately and continue to stain. But if you didn't notice the glue problem prior to the stain drying, don't try to sand or touch-up the area until you have applied a sealer coat over the dye. Trying to stain before the sealer will result in a large halo around the trouble spot because the surrounding area will also stain.

With the sealer applied you can sand the problem spot, then stain again to bring the area to a matching color. The sealer prevents any staining of the area surrounding that which was sanded down to the bare wood.

Allow the newly stained piece to dry thoroughly, then lightly hand sand using #400-grit paper to knock down any raised grain that didn't get the hint in the wetting process. This is a step that can present a problem. If you sand too much you will sand through the stain. So don't be aggressive.

Give Your Finish Depth

What's next after the stain? That depends on the hardwood selected for the project. If you are building with a figured hardwood you should add a coat of boiled linseed oil. This will soak into the figured grain and reflect the light, which adds depth to the piece.

A coat of boiled linseed oil is a great way to add depth to your finish. Make sure it is boiled (not raw) linseed oil. The raw will not dry properly.

To apply, simply brush the oil onto the project and allow it to soak for five minutes before wiping away the excess. The more it soaks in, the more of an effect will be seen after you have the finish complete. Allow the oil to dry at least 24 to 36 hours.

If you don't apply the BLO there is no adverse reaction or negative look to the piece, so it is your choice. Make sure that you dispose of all oily rags in a proper manner. They are a fire hazard.

Using the BLO dictates the next step. Because lacquers do not adhere well to oil products (unless given weeks to cure completely) it is necessary to seal the piece with something that will. Shellac is the answer in my shop.

In reading the various recipes given for the finishes of the book projects in "I Do It My Way" (page 74), you'll notice that shellac is used for a sealer coat and/or for

Whether you are using it as a sealing coat or a topcoat, shellac is best when sprayed. The resulting surface will be smooth and make sanding for additional coats of finish much easier to complete.

SUPPLIES

All three of Glen's books are available at a discount to members of WoodWorker's Book Club (woodworkersbookclub.com or 386-246-3404), from Popular Woodworking Books (fwbookstore.com, click on "woodworking" or 800-448-0915) or from your local bookstore.

- "Fine Furniture for a Lifetime" (#70533; Popular Woodworking Books)
- "Building Fine Furniture" (#70593; Popular Woodworking Books)
- "Glen Huey's Illustrated Guide to Building Period Furniture" (#70722; Popular Woodworking Books)

Woodworker's Supply
800-645-9292 or
woodworker.com
- Moser's Aniline Dye

Woodcraft Supply
800-535-4482 or
woodcraft.com
- Behlen Wool-Lube Blonde shellac, garnet shellac

Mohawk Finishing Products
800-545-0047 or
mohawk-finishing.com
- glaze

Sherwin-Williams
800-524-5979 or
sherwin-williams.com
- Sherwin-Williams lacquer and lacquer sanding sealer

Olde Century Colors
800-222-3092 or
oldecenturycolors.com
- Olde Century Colors paints

Rockler
800-279-4441 or rockler.com
- Briwax

a topcoat finish depending on the finish formula. In either case you apply the shellac in the same manner.

Spray the shellac mixed to a 1½# cut. As a sealing coat, a single coat of shellac is all that's needed. Sand the dried shellac with a sanding pad for any flat surfaces and an abrasive pad for any mouldings. Using a sanding pad reduces finger-friction heat so the finish doesn't gum up in the pad; the results are great.

If you didn't add a coat of boiled linseed oil you have a choice to make about the sealer. You can use shellac, as we have discussed, or another option is lacquer sanding sealer, which is also sprayed over the stained piece.

The sanding sealer builds a nice coating that powders well as you sand and leaves a smooth surface for your topcoats.

Sand the sealer just as you would the shellac; then you're ready for the topcoat. Either method of sealing will work fine, but don't use the lacquer product if you ultimately plan to finish the piece with shellac.

How About a Topcoat?

In order to obtain an antique appearance for your furniture there are two choices when selecting a topcoat. Either finish the project with shellac or apply a few coats of lacquer.

If you are completing the project with shellac you should spray two coats over the sealer coat of shellac, allowing each to dry completely, before sanding. Next, add an additional two coats of shellac. A total of four topcoats will have the proper build.

Shellac has quite a sheen when applied to a project. You need to reduce the sheen for a more antique appearance and to inhibit showing any slight imperfections in your finish. To do this use #0000 steel wool and Behlen's Wool-Lube to rub out the piece. Mix the Wool-Lube with water to thin it a bit and rub the piece with the steel wool dipped in the lube. A lot of elbow grease is needed for this method and sometimes getting into the small crevices and around mouldings is a task, but the results will be an antiqued hand-rubbed appearance.

If you're hoping for a way to reduce that sheen without the time and effort of hand rubbing – look to dull-rubbed effect lacquer. One coat over the sanded shellac and the result is a hand-rubbed sheen without all the extra hand work.

If you are finishing the project with a lacquer topcoat, apply three or four coats over the sealer, allowing each coat to dry before moving forward.

For most furniture, Sherwin-Williams Dull-rubbed Effect lacquer is the best choice (few Sherwin-Williams retailers carry it, but they can order it for you). For tabletops and other pieces that will see heavy use I would choose a pre-catalyzed lacquer. The application of each is the same.

The spraying of lacquer is straightforward – an HVLP system is highly recommended. Pay attention to the application and keep any runs or sags out of the picture as these will need to be removed after the surface is completely dry.

Or There's Paint

To apply an antique paint finish to pieces such as the New York/Canadian Stepback cupboard pictured on page 77, the first step is to go through the staining process as described above. On top of the stain add two coats of shellac. I have tried a single coat without good results. Sand the shellac thoroughly before beginning to paint your surfaces.

An old look for paint begins with a small amount of sawdust in the paint and the mixture applied to the project. Work in small areas to keep the process from getting away from you as it dries.

Use a wet cloth to wipe away paint in areas as the paint begins to dry. Try to best simulate wear areas based on antique originals.

If you are overzealous, which is easy to do, and clear too much paint from the piece, simply go back and add additional paint to help bring the look back to what you want.

Use an Olde Century Colors (oldecenturycolors.com) or an acrylic latex paint for this process. Pour paint into a can. You'll want to separate some from the original container, and add a small amount of fine sawdust to the liquid. This may seem odd but there is a method to this madness. As you spread the paint onto your

surface, the granules will be distributed across the piece.

When the paint begins to dry – timing this requires close attention – take a wet cloth and rub the painted areas. The small pieces of dust, as they are rolled and removed, will reveal the stained surface below. Continue to wipe away paint only in the areas where wear would typically be displayed.

Don't go overboard when simulating wear. A little can go a long way. And if you remove more paint than you want, simply add paint back onto the surface. This time don't use the sawdust. With practice you can develop a talent and eye to achieve what appears to be an old painted finish.

Glaze for Age

Glaze is used to simulate years of age and to even the tonal differences in your work. The only difference between stain and glaze is that the glaze is sandwiched between two layers of finish whereas stain is applied directly to the raw wood. Any oil-based stain can become a glaze if positioned correctly, but I use a product made especially for glazing: Mohawk's heavy-bodied glazing stain (Mohawk-finishing.com)

Sand the shellac sealer smooth with #320 grit. Remember: Lacquer and oil don't play well together so use shellac, and place the drawers, if there are any, into the case. Spray a coat of glaze onto the surface.

As the glaze dries it will turn whitish in color or flash (turn from wet to dry in sheen). At that time you need to wipe away the majority of the glaze, leaving heavy areas in recesses, corners or around mouldings. Don't worry that you're wiping away too much. The glaze will get into the shellac and make those tonal changes. When the surface is dry, after 24 to 36 hours, apply another coat of shellac to lock in the glaze.

These processes, when applied in proper order, can move you to the next level in finishing your masterpieces. Give them a try and you'll not look back to those old methods any more. And be sure to share your experiences with your fellow woodworkers. **PW**

A heavy-bodied glaze is the best choice to add years of time to your project. Any oil-based stain will work, but remember that it needs to be sandwiched between two layers of film finish to be called a glaze.

I DO IT MY WAY; YOU CAN TOO

I was never taught the process of finishing my furniture projects. My father and I worked through the mysteries surrounding this subject using a trial-and-error approach. I think the outcome of those trials, pictured on selections taken from my books, shows I must be doing something right – and I hope you agree. Follow the recipes and you too can stand back and look proudly at the results.

Photo by Tim Grondin

Massachusetts High Chest

From "Glen Huey's Illustrated Guide to Building Period Furniture"

Mahogany hardwood

1 ▪ Spray a coat of Moser's Dark Antique Sheraton aniline dye.

2 ▪ Sand with #400-grit wet/dry sandpaper.

3 ▪ Spray one coat of blonde shellac.

4 ▪ Sand with a 3M fine sanding sponge.

5 ▪ Apply a heavy-bodied glaze – Mohawk Van Dyke Brown.

6 ▪ Spray three coats of blonde shellac.

7 ▪ Rub out with #0000 steel wool and Behlen Wool-Lube.

8 ▪ Apply a coat of paste wax.

Photo by Tim Grondin

Pennsylvania Tall Case Clock

From "Glen Huey's Illustrated Guide to Building Period Furniture"

Mahogany hardwood

1. Spray a coat of Moser's Dark Wine Cherry aniline dye.
2. Sand with #400-grit wet/dry sandpaper.
3. Spray one coat of blonde shellac.
4. Sand with a 3M fine sanding sponge.
5. Spray three coats of Sherwin-Williams Dull-rubbed Effect Lacquer (T70F63).

Shaker Small Chest of Drawers

From "Building Fine Furniture"

Cherry hardwood

1. Spray a coat of Moser's Dark Wine Cherry aniline dye.
2. Sand with #400-grit wet/dry sandpaper.
3. Spray one coat of Sherwin-Williams Lacquer Sanding Sealer (T60F64).
4. Sand with a 3M fine sanding sponge.
5. Spray three coats of Sherwin-Williams Dull-rubbed Effect Lacquer (T70F63).

Photo by Al Parrish

Chippendale Entertainment Center

From "Fine Furniture for a Lifetime"

Flame or curly birch hardwood

1. Spray a coat of Moser's Golden Amber Maple aniline dye.
2. Sand with #400-grit wet/dry sandpaper.
3. Spray one coat of Sherwin-Williams Lacquer Sanding Sealer (T60F64).
4. Sand with a 3M fine sanding sponge.
5. Spray three coats of Sherwin-Williams Dull-rubbed Effect Lacquer (T70F63).

Photo by Al Parrish

FINISHING **TIP**

- Make it a practice, when spraying multiple coats of finish, to change the spray pattern of the nozzle with each coat – one with the fan horizontal, then one vertical. This method eliminates lapping lines.

Photo by Al Parrish

Slant-lid Desk on Frame

From "Building Fine Furniture"

Tiger maple hardwood

1 ▪ Spray a coat of Moser's Golden Amber Maple aniline dye.

2 ▪ Sand with #400-grit wet/dry sandpaper.

3 ▪ Apply a soaking coat of boiled linseed oil.

4 ▪ Rub with a maroon non-woven abrasive pad.

5 ▪ Spray four coats of blonde shellac.

6 ▪ Rub-out with #0000 steel wool and Behlen Wool-Lube.

7 ▪ Apply a coat of paste wax.

Photo by Al Parrish

Shaker Sewing Desk

From "Fine Furniture for a Lifetime"

Tiger maple hardwood

1 ▪ Spray a coat of Moser's Golden Amber Maple aniline dye.

2 ▪ Sand with #400-grit wet/dry sandpaper.

3 ▪ Apply a soaking coat of boiled linseed oil.

4 ▪ Rub with a maroon non-woven abrasive pad.

5 ▪ Spray one coat of blonde shellac.

6 ▪ Sand with a 3M fine sanding sponge.

7 ▪ Spray three coats of Sherwin-Williams Dull-rubbed Effect Lacquer (T70F63).

Seymour Sideboard

From "Fine Furniture for a Lifetime"

Mahogany, tiger maple and walnut hardwoods

1 ▪ Brush on four coats of oil/varnish mixture.

2 ▪ Apply a coat of paste wax.

Photo by Al Parrish

FINISHING TIPS

- Remove small sags or runs in your shellac using a single-edge razor blade. Use the blade as you would a small scraper.
- Finishing the drawer box (with the exception of the front) will cause problems with operation. Also, future generations will not be able to see any natural patina.
- Light or clear waxes will effectively remove dark waxes.

New York/Canadian Stepback Cupboard

From "Fine Furniture for a Lifetime"

Painted pine

1. Stain with Moser's Golden Amber Maple aniline dye.
2. Sand with #400-grit wet/dry sandpaper.
3. Spray two coats of blonde shellac.
4. Sand with a 3M fine sanding sponge.
5. Apply a coat of acrylic latex paint with a little sawdust added. I used Olde Century Colors in Yankee Blue.
6. Wipe paint to simulate wear.
7. Add a coat of dark brown Briwax.

Photo by Al Parrish

FINISHING TIPS

- Raw linseed oil will not dry properly. Make sure to use the boiled product.
- The cut in shellac is the amount of shellac flakes, in weight, that is dissolved into a gallon of denatured alcohol.
- If you elect to brush the shellac, use a good brush. The better the brush, the better the results.

Photo by Al Parrish

18th-century Hanging Cupboard

From "Building Fine Furniture"

Walnut hardwood

1. Spray four coats of garnet shellac, lightly sanded between each coat.
2. Rub out with #0000 steel wool and Behlen Wool-Lube.
3. Apply a coat of paste wax.

Massachusetts Blockfront Chest

From "Glen Huey's Illustrated Guide to Building Period Furniture"

Cherry hardwood

1. Stain with Moser's Dark Wine Cherry aniline dye.
2. Sand with #400-grit sandpaper.
3. Spray one coat of blonde shellac.
4. Sand with a 3M fine sanding sponge.
5. Apply a heavy-bodied glaze – Mohawk's Van Dyke Brown.
6. Spray two coats of blonde shellac.
7. Sand with a 3M fine sanding sponge.
8. Spray three coats of Sherwin-Williams Dull-rubbed Effect Lacquer (T70F63). **PW**

Photo by Tim Grondin

A Review:

Pleasant Hill Shaker Furniture

A welcome exploration of the Western Shaker community.

Hand-drawn illustrations deliver copious amounts of furniture details for the history student as well as the woodworker looking to reproduce these fine selections.

The untold story of the birth, death and resurrection of a Kentucky Shaker community is revealed by Kerry Pierce in his new book, "Pleasant Hill Shaker Furniture" (Popular Woodworking Books). This inspiration to woodworkers showcases seldom-seen furniture and details of period construction methods, and it's a history aficionado's study of how people lived during the 19th century.

This is the first in-depth look into the furniture and lives of one of the most prolific Western communities, and an area of study that Shaker enthusiasts should welcome with open arms.

Why Kerry Pierce? As a woodworker who has studied Shaker furniture for many years and the author of several woodworking books – not to mention a retired English teacher – who could be better?

While beginning my detailed inspection, I was sure this was a book on building Shaker furniture – one that I could take into the shop and use. Hey, it includes measured drawings after all.

Well, while this is not technically a "how-to" book, I'm sure any inspired woodworker could extrapolate the necessary information from the drawings and pages of descriptions, in order to build any one of the 17 projects.

But this book is more by far. It is also a study of the history of the times, of the fortitude of hardworking people to build what they considered a better life, and of a religious denomination that found its way into the modern woodworker's world through simple furniture designs.

I found myself enthralled by the elegant writing, fantastic pictures and great detail. Kerry pays homage to the ever-popular story of Mother Ann Lee (a well-detailed journey in most Shaker books) then moves quickly to the mission undertaken by three selected representatives of the New Lebanon Shaker community – to set out for the West to establish additional branches of the Shaker religion. That mission was the beginning of the Pleasant Hill community. I felt as if I was there in the background, watching the happenings as the picture was painted.

I am particularly fond of the section on the 19th-century woodshop; it's filled with historical information on the materials used in furniture construction and of the tools used in the shop, such as the lathe made by Francis Montfort, a long-time member who made many pieces in his woodworking career.

Kerry also explores the craftsmen of Pleasant Hill, including job descriptions and more in mini-biographies. This presents a comprehensive picture of the work of the day and the rugged times that were experienced by all.

This entire section is balanced with an account of the woodshop as it is today – how the interpreters are devoted to telling the storied past of the Shakers correctly while using tools from the period and dressed in period clothing.

The Western Shaker designs veered from the Eastern Shaker austerity, as shown in this foot design, which illustrates the stronger influence of the outside world on Western Shaker communities.

The Furniture

In addition to the community history, Kerry shows and describes the design features of the Pleasant Hill furniture. He explains how the work differs from the furniture in Eastern Shaker communities, as well as how craftsmen who joined the community brought their design influences from the outside world.

As you read, you will become aware of the difficulty in establishing true attribution to furniture coming from Pleasant Hill.

by Glen D. Huey

Comments or questions? Contact Glen at 513-531-2690 ext. 1293 or glen.huey@fwpubs.com.

There's an often-twisted path that led to pieces being in the community, pieces that might not have been produced at the Pleasant Hill woodshop. However, there is a great selection of bona fide Pleasant Hill pieces in the community from which to choose.

The crowning jewel in the book is the curly cherry secretary – a masterpiece of Shaker furniture. The four flat-panel doors set over the four-drawer base, including the secretary compartment, oozes simple Shaker style.

The construction description of this outstanding piece is narrative rather than "step by step," as well it should be. The author presents a detailed look at each aspect of the secretary including the maker's use of the figured wood to frame the cupboard doors.

But, Kerry also points out a few problems that are apparent with the piece, giving you his view of what determines quality in craftsmanship. This is a great learning tool for students of furniture building.

It is within this section that you are treated to a generous look at the illustrations, which adds greatly to the information presented in the book. The drawings are shop-ready for woodworkers and are in a detailed hand-drawn look instead of an overly technical computer-aided design look, and will allow a non-woodworker to decipher large amounts of period construction details.

After the secretary, the examples in the book lose some of the stylistic appeal we've come to expect with Shaker pieces. While the balance of the pieces are well-designed representations of Pleasant Hill Shaker furniture (and all are directly attributable to the community), there are other pieces attributable to the community that I feel are stronger examples of the Western Shaker influence – pieces that have been seen in other books, but that have not been examined with the in-depth view Kerry has adapted for this book.

Where is the medicine cabinet, which may have been designed by Pleasant Hill physician William Pennebacker? Or the nearly famous firewood box that Shaker scholars have studied and that would have been a great example of the nail construction that is examined in the book? Maybe Kerry has future plans for these pieces as well as for the Charles Hamlin piece that he sneaks into his work without giving a full description. I feel these projects would have propelled this book into the stratosphere.

This curly cherry secretary is maybe the most fantastic piece from the Pleasant Hill collection. It shows many of the design details from this Shaker community including the turned feet.

Shaker chairs are best known from the Eastern communities but this gem, the sewing rocker, brings some attention to the West, namely to Pleasant Hill.

That is not to say his selections are poor. The miniature blanket chest Kerry includes is a sweet example of fine Shaker style and construction. Two other blanket chest variations are shown as well. One has a definite Western Shaker appearance that closely resembles a sugar chest (a Southern gem of a dovetailed box attached to a turned-leg base that was a common theme throughout the Kentucky and Tennessee region).

Also included are a number of tables, from a stubby-legged farm table, to two side tables, to the octagonal-legged "Saturday Table." Each has straightforward Shaker construction that is rather simple. A large cupboard and a few smaller pieces with interesting histories and construction details round out the book as far as casework is considered.

Then come the chairs – and Kerry Pierce knows Shaker chairs! His reflection on how people today, given our larger body sizes, affect the design of chairs versus how they were designed during the latter half of the 19th century, is very interesting. You may never look at chairs the same again.

The rocker with arms (one of the finest in the community according to Kerry), and the sewing rocker, which was originally built with a mixture of materials, are the two worthwhile chair entries in this book. There's a third chair that the author uses to display the "cobbled together" ingenuity that some Shaker craftsmen possessed. It's interesting, but it could have been bypassed in favor of a third great chair example.

Overall, I think this is a very good book – one I will certainly add to my shelf on Shaker work. I am especially pleased that the study of the Western communities is coming into focus. There is a large body of furniture, both casework and chairs, that needs to be brought to light for all Shaker enthusiasts. **PW**

"Pleasant Hill Shaker Furniture" will be available in May from Popular Woodworking Books (go to fwbookstore.com, then click "woodworking" or call 800-448-0915). You should also find it at your local bookstore.

Tiny Goblets

Miniature turnings are perfect projects for trying out new techniques.

Photos by Al Parrish

Goblets are classic forms; practicing small variations will deepen your understanding of the basic shape. Captive rings are fun to make and good technical practice. They can also be used on other items such as pens, ornaments and rattles.

These little goblets are fun and easy projects, though the ring(s) on the stem may make them a bit more challenging. Because they're small and relatively quick to make, they're good projects for exploring variations. Prepare and turn 10 or 20 of them, changing the shapes, proportions and details a bit each time. This is how you learn to make those many tiny decisions which, taken as a whole, determine the look of the final object. You'll learn more by making several goblets than you would by drawing the same number. There is no substitute for seeing the object in three dimensions, and while you are trying all those variations, you are also practicing the turning itself.

A goblet is made by first preparing stock between centers for a glue mount. This mount is especially good for such small objects because it is very safe; you will be working very close to the headstock, so the smooth, round surface of the waste block is much safer than the jaws of a chuck spinning so close to your hands.

A piece about ½" to ¾" square and 1½" to 2" long is good to start with, but don't hesitate to try larger and smaller versions.

Any hard, close-grained wood will work well. Small pieces like this are a good opportunity to use interesting domestic woods that aren't typically available in large dimensions. Rose-of-Sharon, black haw, American hornbeam, most fruitwoods, dogwood and many ornamentals are great. You'll want a piece large enough to cut the entire blank from wood outside the pith, or at the very least to have the pith well to one side of the center. The pith is weak in most woods, so the stem of the goblet shouldn't include any of it. And look for wood with particularly outstanding color or grain; plain woods won't show well in such a small object.

The goblet is turned entirely from the glue mount, and is sanded and finished on the lathe. After parting it off, you can hand-sand the bottom of the base as needed.

Again, you should make at least several of these little goblets. Besides the technical and design practice, these are much more interesting in groupings than as singletons. Have fun with them.

by Judy Ditmer

Judy, author of two turning books and many articles, has been turning since 1985. She teaches and demonstrates her skills throughout the United States and Canada.

1

Prepare the stock between centers by turning it to a cylinder and cutting a slightly tapered spigot (the larger diameter should be at the workpiece and the smaller diameter on the outside end) on one end.

Prepare a waste block by mounting a piece of hard maple (or other hard, close-grained wood) on a faceplate, turning it round and flattening the surface. Measure the taper on the workpiece with a metal caliper. (The red here is because I've already turned a goblet on this waste block; that's the bit of the spigot left over.)

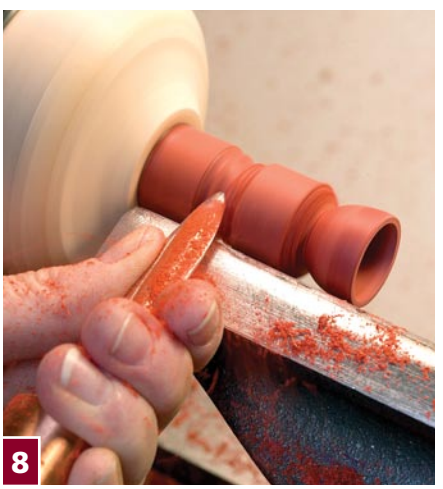
Transfer the measurement to the waste block. Be careful to touch the wood only with the left point of the caliper; if the right one touches the wood it may be bent or pulled from your hands as the wood on the right of center is traveling upward.

With a long fingernail-grind detail gouge, cut a tapered recess to the mark. Check the fit and adjust until it fits well at the shoulder (on the face of the waste block) and the taper is snug in the recess.

Spray accelerator on the waste block, and put a bead of thick cyanoacrylate glue on the shoulder and taper of the workpiece.

Face off the end of the workpiece so it is even and very slightly concave.

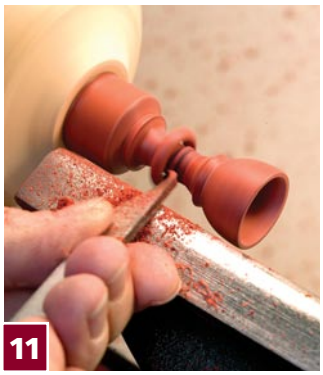
Begin hollowing the cup of the goblet by gently pushing the long spindle (detail) gouge into the center and making a light scraping cut as you pull the tool up the side and out. You may want to use a small round-nose scraper to refine the curve and clean up the surface.



Begin shaping the outside of the cup and the curve of the base. Leave the material in the center; you'll be cutting the ring(s) from it. Keep cutting until …

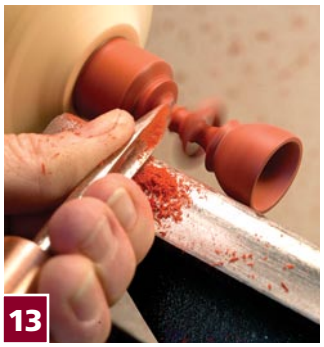
… the stem is roughed in and you have left a clean, high bead in the center. This ring tool is one I made from a small scraper, (but you can buy one, too). It has a tiny hook made by grinding gently on the corner of the grinding wheel, and is the same top and bottom. That is, the bevel is at 90°, so the tool can be used either left- or right-handed. (Ordinarily, I wouldn't recommend a 90° bevel on anything, but since you are removing so little wood here, it actually works and saves the trouble of keeping two tools for the purpose.)

Make undercuts on the ring with the ring tool, alternating sides, until the ring is nearly parted from the workpiece. (The answer to your inevitable question here is, "Practice!")

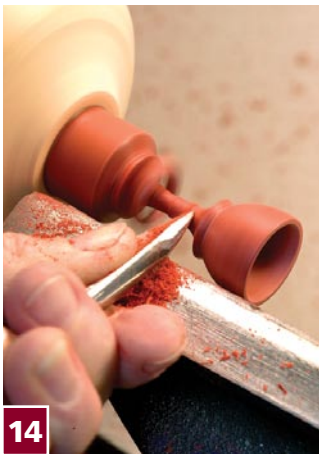


You may want to do a little sanding on the ring before parting it; it's a little trickier to sand when it's loose. Make the final cuts to separate the ring.

You can also make a little shoulder (out of material that will be turned away in the final shaping) on the goblet stem that is just the size to press the ring onto it. Then you can sand a bit further toward the underside of the ring. Be careful; it's very easy to break the ring.



Continue shaping the base and stem. If you find the ring whirling around to be distracting, or can't keep it out of the way, just tape it to one side while finishing the opposite end.



Complete the turning of the stem, and sand the goblet.

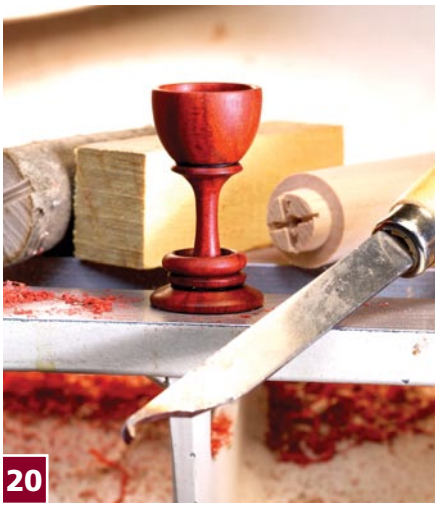
Begin to part off at the base. Make a slight undercut so the piece will sit well and not wobble. I use this parting tool with a tiny, sharp point on the right side; this leaves a cleaner cut than a square-ended parting tool. You can make one by simply hanging the right edge of the parting tool very slightly over the edge of the grinding wheel as you sharpen the bottom bevel.

I decided to put a burn mark in the grooves at the top and bottom of the piece, to add a nice detail. Attach a wire to a couple of dowel scraps; holding the wire only by the dowels, lay the wire in the groove with the lathe on, and apply pressure until it burns the wood. Don't wrap the wire too far around the workpiece or the wood may grab it.

Before parting off all the way, apply finish and buff it with the lathe on. I am using a soft wax.

Gently push the parting tool toward the center, maintaining the slight undercut …

… until the piece separates from the waste. Sand the bottom as necessary, and apply finish.



The completed goblet, along with some material for making more of them. A quick toast (no more than a third of the gobletful), and then start the next one before you forget how to do it. **PW**

Beaded Face Frames

Discover how to join rails and stiles when you just can't cope.

Sticking is the profile cut on the edge of a frame's rails and stiles. These days, we generally cut such profiles on the router table, and most often they embellish a frame-and-panel assembly. Frame-and-panel constructions are primarily cope and stick, produced either on the router table or shaper.

But cope and stick is precluded in some situations, such as frames with full beads, and frames with mortises and integral tenons. You won't find a profile that includes a full bead in cope-and-stick cutters because the workpiece orientation that's required to cut a bead (on edge rather than face down) and because it's nigh on impossible to cope a full bead.

But a full bead is a great-looking profile, whether on a door or other frame with a panel, or in a face frame.The bead softens the hard inside edge around drawers, doors and openings and it's less likely to show the dings and dents that are inevitable in a cabinet used for storing heavy or cumbersome objects.

If you're using a bead as sticking or mortise-and-integral-tenon joinery, you need to trim the profile away from the shoulders of the joints and miter the ends of what remains to dress up the intersections. If that seems a bit ticklish to do, it probably is because you haven't tried it. Rest assured, it gets easier with practice. Let's look at a face frame first, because there we're not distracted by panel grooves, and mortises and tenons.

The work begins with careful layout. Account for the sticking width in calculating rail and intermediate stile lengths. (For a rail length, for example, subtract the width of the two stiles from the final frame width, then add back the width of the sticking on each stile.) Crosscut the parts.

Rout the sticking next. Profile one edge of the stiles and top and bottom rails, but both edges of intermediate rails and stiles. When you rout the sticking, make extra pieces to set up the table saw for the next operation.

Photos by the author

A decorative bead around each opening in the face frame of this bank of cabinets provides an attractive accent for what is otherwise fairly ordinary casework.

Now you must miter the sticking, so the joints close completely and tightly, and you get the crisp right-angle joint between the sticking on the stiles and that on the rails. This is largely a table saw operation.

In preparation, I dry-assemble the frame and extend a line from the shoulder of the sticking on the rail across the face of the stile, as seen at the top of page 91. When you've marked each joint, extend the lines across the outside edge of the stiles.

Begin setting up the saw by attaching a wooden facing to the miter gauge. It must be taller than the stiles and rails are wide and long enough to extend beyond the blade. (On my left-tilting saw, I put the miter gauge in the right-hand slot for this operation.) Set a marking gauge to the width of the sticking, and mark parallel to the facing's bottom edge. Trace the mark with a sharp pencil.

Tilt the blade to 45° and adjust the height to match the sticking. Drop the blade almost below the table, then kerf the facing. I raise the blade gradually, kerfing the facing after each little adjustment. The goal is to just meet the line established with the marking gauge.

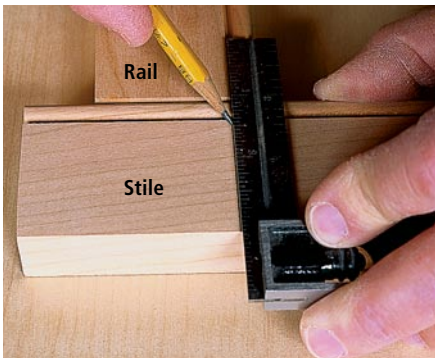
When the height is set, extend a perpendicular reference line from the corner of the kerf to the top edge. Test your setup by cutting miters in the sticking of your scraps.

To miter the sticking on the rails, align the butt end of the rail on the vertical reference line on the miter-gauge facing. Then snick off the corner of the sticking. To miter the sticking on the stiles, align the sticking width line on the stile with the line on the facing. Make the cut.

The rails are ready for assembly, but the stiles must have the sticking trimmed away, from the butt end up to the miter. You do this

by Bill Hylton

Bill is the author of several books about furniture construction and router operations. When he isn't writing about woodworking, he's doing it in his home shop in Kempton, Penn.



Assemble each mortise-and-tenon joint, and at each joint, use a square to extend the shoulder of the sticking from the rail across the face of the stile. Then extend the line across the stile edge. You'll find these lines essential for lining up the stile in the miter gauge for mitering the sticking.

A stopped cut on the table saw trims the waste almost completely off the stile. You want to cut to within a 1/4" or so of the miter, with the blade cranked up as high as possible to minimize the cut's arc. The waste then can be snapped free, and the edge pared smooth with a chisel.

A tight miter joint is the goal. The end of the rail must seat tight against the stile, and the miter of the sticking must also be tight.

on the table saw, with the blade set back at 90° and raised as high as you can. Adjust the rip fence so the distance between it and the outside of the blade matches the width of the sticking as seen above. Remember that the cut will end in an arc, with the long side down. Use scraps to test and confirm the accuracy of the fence setting.

Feed the stile into the blade and cut, stopping just shy of the miter. Snap off the sticking, and pare the stile edge smooth with a chisel. On one end of each stile, you will be able to see the sticking as you make the cut. But on the other end, you'll have to make this cut with the sticking facing down. If your cuts were accurate, the sticking on the rail and stile should meet in a tight joint.

What I've described works for a simple four-piece frame. But trimming the sticking for an intermediate rail or stile requires a slightly different approach. You need two miter cuts, pitched in opposite directions, and you need to clear the waste sticking with something other than a rip cut. Here's my approach:

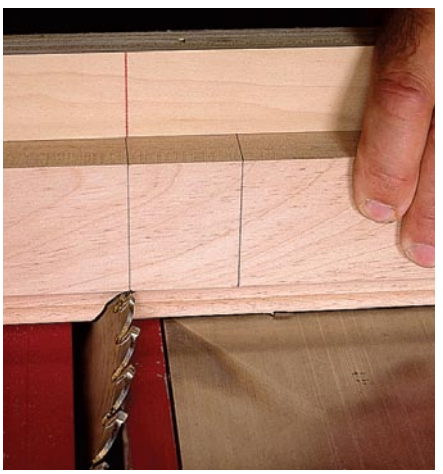
Extend lines from both of the intersecting rail's sticking shoulders across the stile, and carry the lines onto the outside edge. Cut one miter with the sticked face out, and the second with the sticked face in, as seen below. These two cuts establish the boundaries of the sticking that must be trimmed off.

I waste this sticking with repeated, closely spaced cuts. The result is a rough, ridged surface. To smooth it, position the miter gauge so the work is directly over the blade and slide the work side to side. The ridges are scrubbed off, and the surface is left surprisingly smooth. Because of the blade's curvature, make several passes to smooth the entire width.

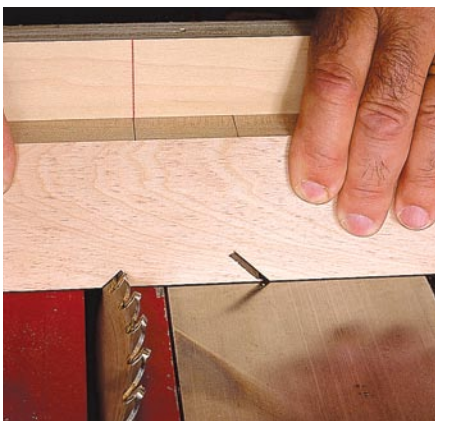
If you are uncomfortable with this part of the operation, pare the surface with a chisel. You may find it desirable to pare the surface even if you do skim it on the table saw.

The real challenge here is fit. The thickness of pencil lines is significant. I've found that positioning the workpiece's layout line dead on the miter-gauge's reference line results in a gappy fit. It's far better to position the layout line to the shy side of the reference line. A too-tight fit can be tuned with a chisel and shopmade guide block, as seen on the next page, but a gappy fit means starting over. Practice on some scraps before working the real project parts.

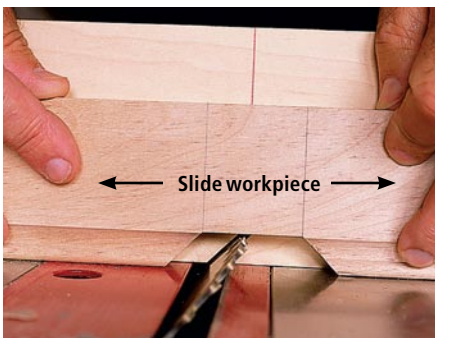
With the sticking mitered, the rails and stiles fit together nice and tight, but what's going to hold the parts together?



For an intermediate rail, the stile's sticking needs two carefully positioned miter cuts. Aligning the shoulder line on the work just to the outside of the reference line on the miter gauge facing gives you a paper-thin fitting allowance.



Turn the stile around, so its sticked face is against the miter gauge. Align the line on the work with the line on the miter gauge and make the second cut.



With the blade still spinning and the miter gauge still cradling the work, line up the gap over the saw's arbor and slide the piece side to side, skimming the shoulder surface.

A face frame doesn't need the robust joinery required for a door. A reasonable approach is pocket screws, but my preference is loose tenons as shown in the photo bottom right. I use a plunge router, edge guide, and the mortising block I wrote about in issue #140 (April 2004) to make the mortises in both rails and stiles. Dry assemble the frame, and mark the centers of the mortises by drawing a line crossing the seam between the mating parts – the way you would lay out biscuit slots.

Set up the router and fixture, and rout mortises about ½" deep. I make the tenons from scraps, and I don't get too nutsy about having a perfect fit. I want face-to-face alignment from the tenons; the mitered sticking supplies the lateral alignment.

Loose-tenon joinery is suitable for any type of frame or doors. The benefit is you can rout the mortises after the trimming and fitting. If the frame is structural – a case side or a door – rout mortises that are 1" to 1½" deep.

That said, I think you can see how to apply this approach to building a frame for a panel. You simply need a panel groove.

For a perfect fit, saw the miters just shy of your layout, then pare the angle surface with a chisel. Use a saddle-style guide block to stabilize the chisel and hold the angle.

Plow it after sticking the parts. Usually, the panel groove is as deep as the sticking is wide. As long as it is no deeper than that, the groove can be plowed end to end because it will be trimmed off during the process of mitering the sticking. In addition, you can offset the groove rather than centering on the edge. This is beneficial if you use a conventional raised panel and want it flush.

However, if the sticking is narrow, you may need to make the groove deeper. In that situation, the groove must be stopped on the ends of the stiles so it doesn't show on the top and bottom edges of the assembly. Either way, the groove can be cut on the router table. **PW**

Using the loose-tenon setup I described in issue #140 enables you to miter the sticking, and then rout mortises. Mark the middle of each rail mortise, then dry assemble the frame and transfer the marks to the stiles.

A long tenon isn't needed for a face frame. One that penetrates ½" into both rail and stile is plenty.

Old-school Persimmon Driver

Louisville Golf keeps links tradition alive – and with a satisfying thwack.

I've been a woodworker for more than 40 years and a golfer for the past 14. When I was growing up in Wales, there was a golf links near the Metrapol Hotel, where my grandmother used to work. We lads would dash across the greens to fish in the ponds at the corner of the course. The old duffers would chase us off the field with curses while shaking sticks. I swore at the time I would never be one of those fellows in plus fours, argyle sweaters and tam-o'-shanters.

Little did I know in those days that a golf ball could kill ya. We only wanted to catch a fish or two. But 14 years ago I was reintroduced to the game by a friend who lived by the fifth hole of a lovely golf course in northern California. I've been hooked ever since.

My first set of clubs, and the ones I still use today, were an old set of Pings – a persimmon driver and a 3-wood. The fellow who taught me insisted I learn the short clubs first, so it was quite some time before I got to the driver. I was all over the place with that thing. Then the new metal woods and drivers came along, getting bigger every day it seemed. So I swung a 460 cc lump of metal at the end of a long stick. The sound was enough to drive me up a tree (literally). Then I saw a fellow walking around at a woodworking show with a beautiful wooden club; the woodworker in me was taken at first sight. Unfortunately, the price was out of my range, so I had to let it go for the while. But I keep thinking of that beautiful driver.

Recently, I was working on the restoration of an old timber-framed building in Louisville, Ky., when I called upon the people of Louisville Golf (louisvillegolf.com), who still make the beautiful persimmon drivers and other wooden-headed clubs. Mike Just, one of the five brothers who started Louisville golf, showed me around the shop and

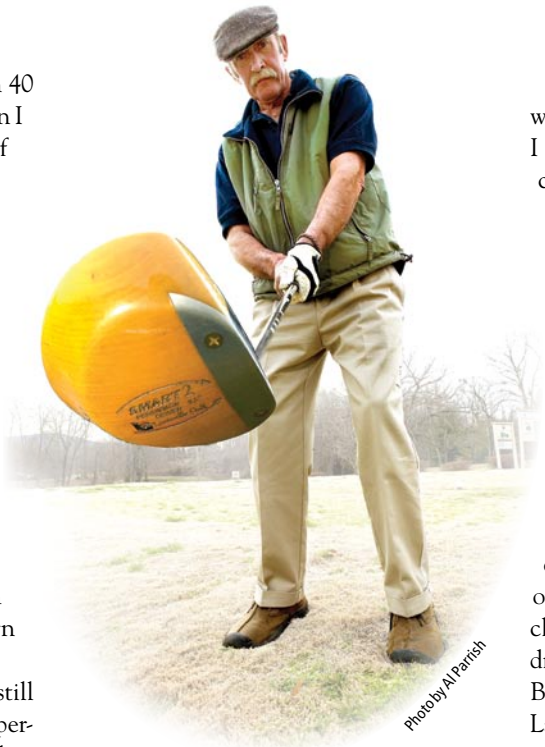


Photo by Al Parrish

even gave me a beautiful driver (a used one, of course). I call her "Blondie."

Louisville Golf was founded in 1974 by Elmore Just and his four brothers, continuing a tradition that goes back to the conception of the game in the sheep fields of St Andrews, Scotland.

Elmore Just discovered that persimmon was the desired wood for wooden-headed golf clubs. The dark heartwood (which isn't formed until the tree is a century old) resembles ebony, and is exceeded in hardness in North America only by dogwood and ironwood. Persimmon weighs 52 pounds per cubic foot and cushions little at impact, allowing the wood to maximize the energy transference to the ball – properties that make it ideal for golf clubs.

by Don Weber

Comments or questions? Contact Don at dbodger@kyblue.com.

I've been using wooden drivers and fairway woods for a long time, even though I purchased a new metal driver (used, of course) that was supposed to get me down the fairway many miles further. I still love the blonde driver I was gifted by the Louisville Golf people; not only is it beautiful, it gets me just as far down the fairway as that metal thing.

Louisville Golf has manufactured persimmon woods for giants in the industry – including Ben Hogan, Tommy Armor and Spalding. When metal woods hit the market, the company thought it might not survive. But there are plenty of people who, like me, prefer the sound of the ball struck off the head of a wooden club. And the Louisville Golf "Smart" driver out-distanced Callaway's "Great Big Bertha" in tests conducted in the Pro Golf Lab in San Diego, Calif.

The company also makes wooden putters of different beautiful hardwoods, as well as hybrids and fairway woods. The company's "Niblic," a trouble club, makes getting out of the rough a cakewalk.

The widow of Elmore Just, Lawren Just, recently opened the "Golf House," home to the new Kentucky Golf Hall of Fame. It's a golfer's dream – right down the road from Persimmon Ridge Golf course, where Elmore Just built a 774-acre links – perfect for testing your new driver.

A stroll through the plant is a woodworker's delight, particularly for those of us who are still hands-on turners. A golf club is an odd shape to turn on a lathe – multi-axis turning at its best. Bins of persimmon blocks and rough-turned heads ready for final shaping cover the warehouse floor. Skilled craftsmen stand at their machines turning this beautiful wood into even more beautiful golf clubs that will be cherished by golfers like myself, with every hearty thwack. **PW**