

The Secret to Perfect Dadoes

Cube in a Cube, Puzzle or Trick?

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Puzzle or Trick?



page 40

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#130 September 2007

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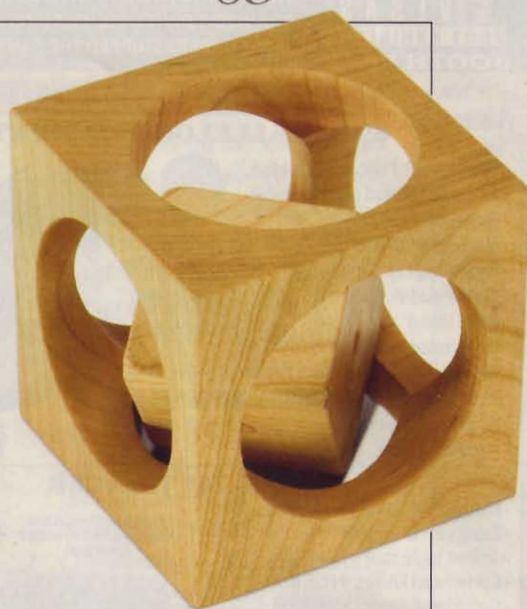
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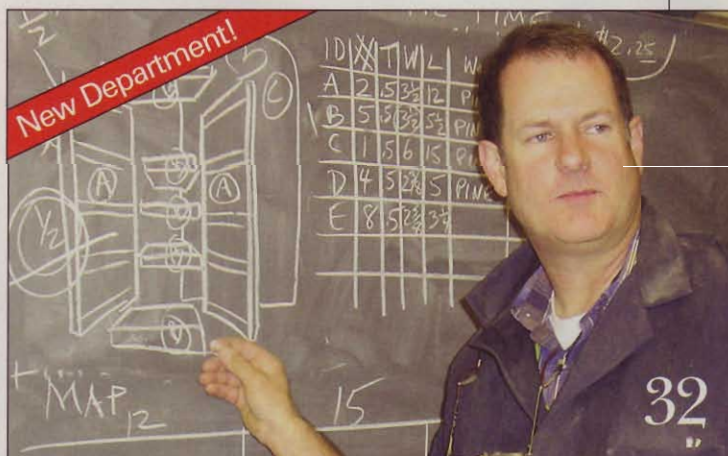
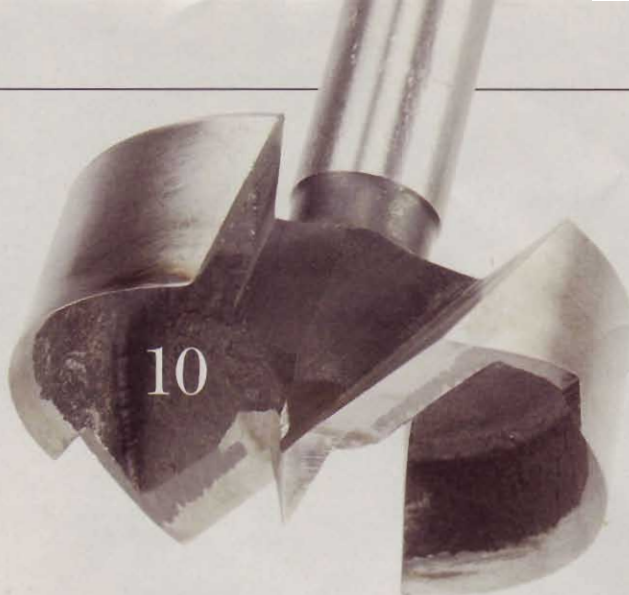
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Frameless Cabinet Joinery

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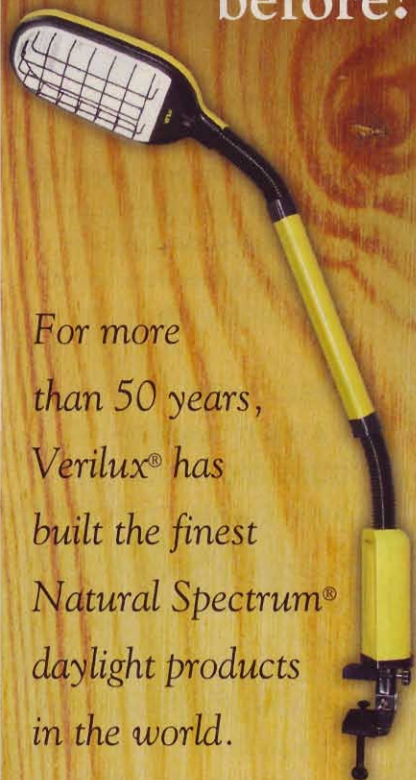
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EDITOR'S LETTER



Tomorrow's Woodworkers

We've all heard about the decline of high school shop programs and students' apparent loss of interest in working with their hands. While it's true that many school shops have closed due to funding cuts and curriculum changes, I've had the pleasure of talking with several woodworking teachers whose programs are flourishing. Not only are these teachers providing students with the opportunity to learn practical woodworking skills and techniques, but they also report that the problem-solving abilities students develop through hands-on shop activities are contributing to increased interest and achievement in math and science classes.

To highlight these stories of success, we're adding a new department called "School News." Our first installment features a high school in Prescott, Arizona. Tom Bockman has taught woodshop at Prescott High for 26 years, so he's experienced the challenges of declining enrollment and shrinking budgets first hand. But rather than allowing his program to fail, Tom developed proactive recruiting strategies and teaching methods that have brought phenomenal success. For the complete story, see page 32. In future issues we'll bring you more good news about woodworking programs that are making positive contributions to the lives of their students and communities.

College and adult woodworking programs are also doing great things to promote the craft and pass on the joys of woodworking. There are as many class offerings as there are styles of furniture. No matter what area of woodworking you want to learn about, there's a school that will help you develop the skills, whether it's mastering hand tools, building a bookcase or designing art furniture. For an extensive listing of woodworking schools visit www.americanwoodworker.com/wwschools.

We may be practicing a traditional, even ancient craft, but there's still a lot to be gained in the classroom while learning how to square a box, fit a joint, and calculate a board foot. Pass it on!

Until next time,

Randy Johnson

Randy Johnson - Editor
rjohnson@americanwoodworker.com

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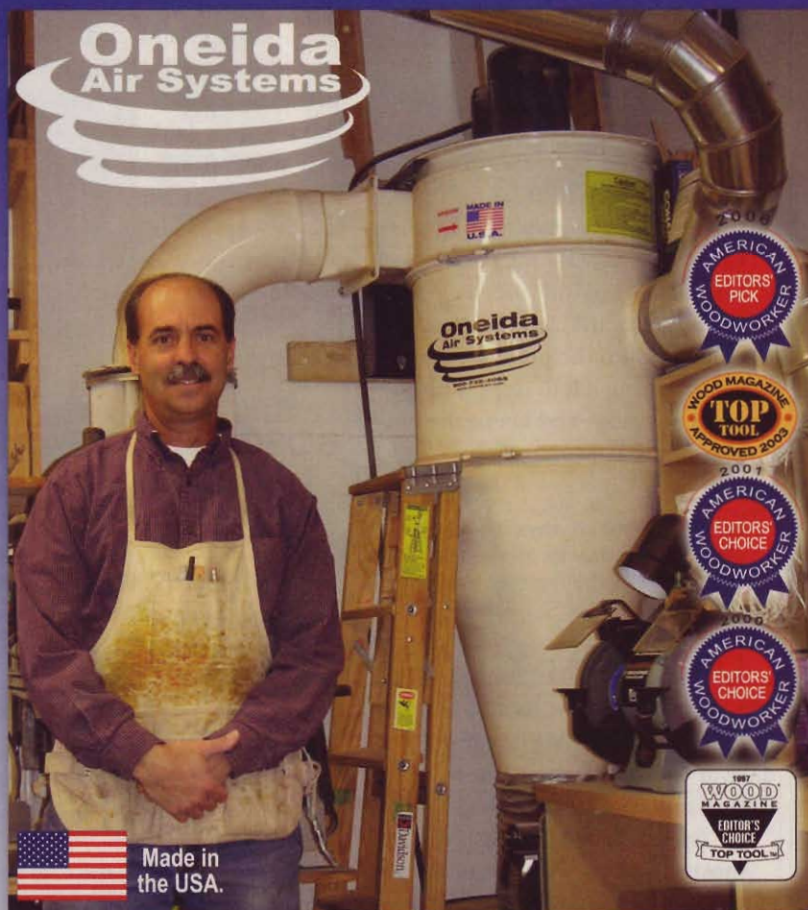
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MORTISING CHISEL FLAK

I noticed in "Master your Mortiser" (AW#128, May 2007) that the mortise chisel's opening is facing front, toward the woodworker. I turn my mortise chisel opening to the left, so that the chips fall into the previous plunge, when cutting left to right. This prevents any clogs and keeps the chisel running cool.

Kevin Greene

Good idea, but I always face the chisel's opening towards the front so the chips don't fill the mortise. Works for me. -*Tim Johnson*

DRILL SPEED GOTCHA

In "Lithium-Ion for the Woodworker" (AW#129, July 2007) your description of the 10.8 V Bosch Pocket Driver stated "Its single speed is too low for drilling most holes." Please check your specs. This drill is a *variable* speed drill/driver. I find this to be a very versatile tool, and it is certainly a worthwhile addition to most anyone's shop.

Bill Wilson

You're right, the Pocket Driver is a variable speed drill, but its fastest speed is well below a typical drill/driver's. Most drill/drivers have two speed ranges: fast for drilling holes and slow for driving screws. You can certainly drill holes with the Pocket Driver, it's just a bit tedious.

-*Dave Munkittrick*

TIP FROM A SCROUNGER

On sharpening mortising chisels ("Master Your Mortiser," AW#128, May 2007), I have a relatively fine, cone-shaped stone that exactly fits my chisels' shape and curve. I chuck its metal shaft into my drill press and touch up my chisels' faces with it by hand. I inherited this stone from my father, but I have no idea where he got it. He was notorious for scrounging stuff like this from all over the place. Do you know who might make one?

Wayne Shellock

Any ideas, readers?

BOSCH COLT PARTS

I purchased a Bosch Colt trim router after reading your article "Trim Routers Tool Test" (AW#127, March 2007). However, I haven't been able to find the "Dust Collection" accessory on page 57. Where can I get one?

Ricardo Redick

It should be available at toolbarn.com. The Bosch part reference is "PR007 Side-Handle Subbase with Dust Extraction Hood."



CORNSTARCH?

In "Tune Up Your Trim Router" (AW#127, March 2007) the text under a photo says, "sprinkle some talcum powder on the motor housing [to reduce sticking]." However, you're using cornstarch in the photo. Wouldn't cornstarch tend to attract moisture from the air and make the situation worse?

Robert M. Fox

Sharp eye! You're right, we inadvertently swapped products. I've used cornstarch without any problems, but I don't work in a particularly humid environment. If your shop is damp, stick with talcum powder. In any case, most of the powder is removed when you take off the base to change bits. -*Tom Caspar*



WD-40 TO THE RESCUE

In "Tips For Repairing Finishes" (AW#128, May 2007) you suggest several techniques for removing sticky stickers, but you didn't mention one of the safer "sticky dissolvers" out there: WD-40. As a light oil, WD-40 will dissolve most sticky glues and then can easily be washed with soap and water - safe for any wood product. Any absorption of the oil into the wood is limited because WD-40 is so light. If it

does soak into the wood, it will evaporate over a short time.

Gary Coyne
author of *The Laboratory Companion*

EPOXY OVER STAIN?

I want to use epoxy as a sealer on some outdoor furniture as you suggest in "Outdoor Finishes" (AW#128, May 2007). Can it be put on top of a stain?

Ed McKenna

Epoxy is best applied to bare wood but it will work over some stains. West System conducted an adhesion test and found that their epoxy adhered to several types of stains. For their results go to: http://www.westsystem.com/ewmag/21/epoxy_adhesion.html. They prefer WD Lockwood's (www.wdlockwood.com) water-based aniline dye stains for use under epoxy. -Randy Johnson

T-MOLDING TIP

Nice article on T-Moldings (AW#128, May 2007). Maybe the problem of shrinkage has been solved, but when products with T-molding first became popular back in the early '60s, they usually arrived with a 1/4 in. or so gap at the butt joint. The gap came about due to shrinkage in the vinyl material. Apparently workers stretched the molding slightly while pounding it into the slot. They soon learned to trim the butt end a little long and force-fit (hammer) the joint together.

John Fischbach

I also remember the shrinkage issues years ago. I used T-molding on some tables a few years ago and the joints have stayed pretty tight, but I did make the butt ends a bit long. Good tip! -Randy Johnson

DROP US A LETTER

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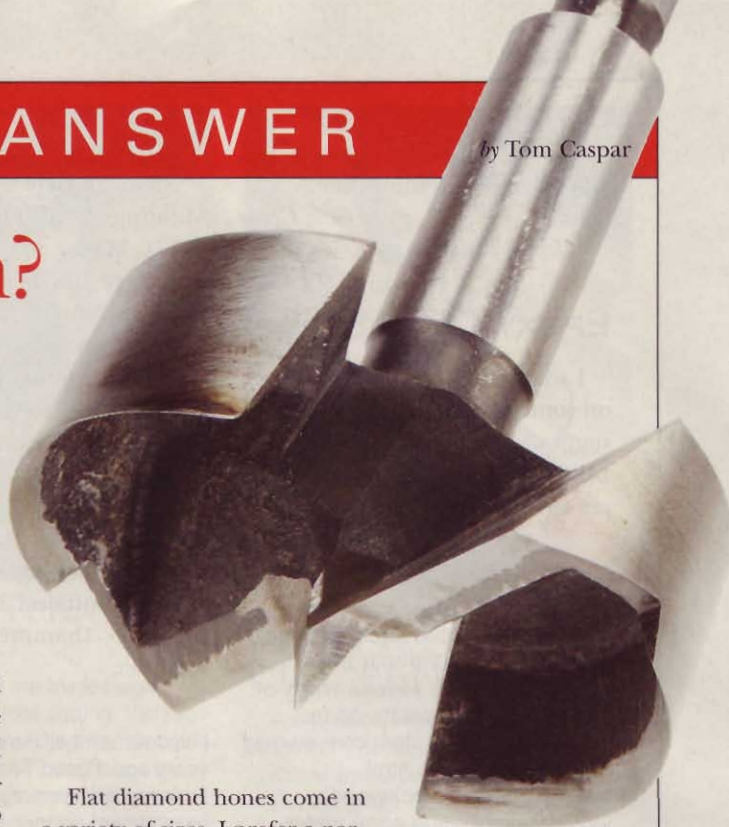
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Toss or Sharpen?

Q My large Forstner bit seems awfully dull. Can I sharpen it?

A You certainly can. You'll be amazed at how much faster and cleaner a Forstner bit cuts when it's really sharp. In fact, some new bits aren't sharp enough. They'll perform much better if you sharpen them right out of the package.

You'll need two tools for sharpening: a flat diamond hone for the chippers and a convex diamond hone for the rim (see Source, below). Oilstone or ceramic hones will work OK, but you'll probably get better results with diamond hones because they work faster. It's important to retain the bit's original geometry. The more honing strokes you take, the greater the chance that you'll round over a bevel and create an extra-steep angle. The type of hone that cuts the fastest is thus the best choice, and you can't beat diamond for speed.



Flat diamond hones come in a variety of sizes. I prefer a narrow, tapered style, because it's the easiest one to balance on the bit's chipper (Photo 1). If your bit is particularly dull, use a coarse flat hone.

During each honing step, secure the bit in a wooden-jawed vise, so you don't mar the shaft. Hone the chipper's short bevel first, then move to the long bevel (Photo 2). If the long bevel's surface is quite rough with machining marks, create a smooth micro-bevel by leaning the hone one or two degrees above the flat surface. Sharpen the rim with a round hone (Photo 3). Some round hones have a small diameter, but a large diameter works better on big bits. The best all-purpose round hone is conical, tapering from large to small diameters.



1 Begin sharpening by honing the chippers' short bevels. Continue until you feel a wire edge or burr develop on the bevel's tip.



2 Next, hone the chipper's long bevel. Lay the hone flat on the bevel or raise it slightly to create a microbevel. Stop honing when the wire edge is gone.



3 Hone the rim's bevel with a convex hone. Follow the original angle, rubbing back and forth around the circle. Don't hone the rim's wall.

Source:

DMT, (800) 421-1223, www.dmtsharp.com Diafold diamond flat-folding honing file, #FFC (coarse, 45 micron), \$27.50. #FFF (fine, 25 micron), \$27.50. Diamond honing cone, #DCMF (medium/fine, 25 micron), \$29.50.

WHAT'S IN A NAME?

Q Some old planes on E-bay are described as "sweethearts." What does that mean?

A Planes with the "Sweetheart" trademark on their irons date from the golden era of Stanley tools, roughly 1920 to 1934. They were beautifully made and well engineered. Planes made before this period were still being improved with new patents; planes made after this era slowly declined in quality.

The trademark celebrates the merger of two companies, the Stanley Rule and Level Company (the notched rectangular logo) and the Stanley Works (the heart-shaped logo). The heart honors William H. Hart, who joined the Stanley Works at age 19 in 1854 and rose to be chairman of the board. He died in 1919. The new trademark was adopted the following year.

ARE DOWELS NECESSARY?

Q I'm gluing some boards together to make a tabletop. Should I reinforce the joints with dowels or biscuits to make them stronger?

A No, dowels or biscuits aren't necessary. They do help in aligning boards, so you have less evening-up to do later, but they have only a marginal benefit in making the joints stronger. If your edges are machined straight, square and flat, the joints will be just fine without additional help.

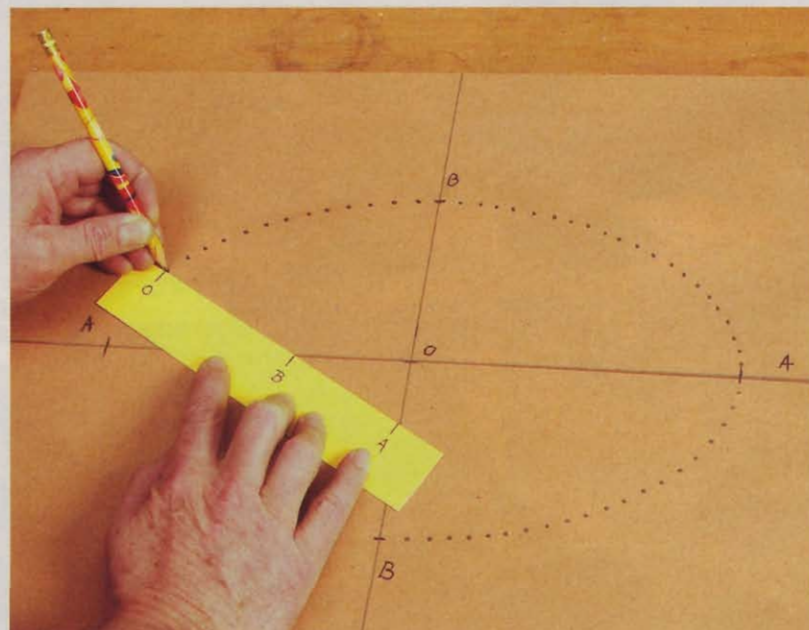
LAY OUT AN OVAL

Q Way back in junior high school, my shop teacher showed us a simple method for laying out an oval. All he used was a ruler and a strip of paper. I can't remember how it worked. Can you help?

A Sure, here goes: Draw horizontal and vertical lines that intersect at point 0. Mark half the oval's length (A) on the horizontal axis. Mark half the oval's width (B) on the vertical axis. On a strip of paper, mark a 0 on one end and distances 0 to A and 0 to B.

Place the strip of paper so that mark A falls anywhere on the vertical line and mark B falls on the horizontal line. Mark a dot on the board next to the strip's 0 point.

Reposition the strip and make



another mark where the 0 point lands. Continue making these tick marks all the way around. Drawing the oval is just a matter of connecting the dots.

If you have a question you'd like answered, send it to us at Question & Answer, American Woodworker, 1285 Corporate Center Drive, Suite 180, Eagan, MN 55121 or e-mail to qanda@americanwoodworker.com. Sorry, but the volume of mail prevents us from answering each question individually.

edited by Tim Johnson

Adjustable Board Support

In the good old days, when a woodworker wanted to plane a board's edge, he'd clamp one end in the bench's face vise and support the cantilevered end with a free-standing device called a "deadman". My modernized version mounts in the tail vise. After drilling holes in a 2-in.-thick post, I glued and screwed on a 3/4-in.-thick top. By simply moving the dowel, I can support virtually any board or panel at a comfortable work height. And instead of taking up valuable floor space, my deadman stores compactly until the next use.

Dave Brown



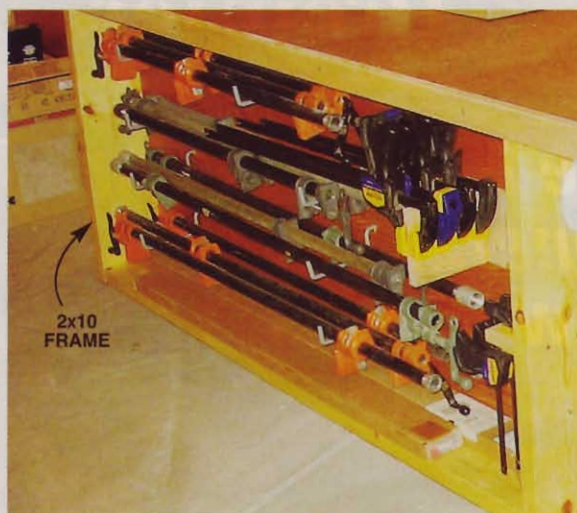


MARK THIEL

ZERO CLEARANCE DUST PORT

Zero clearance inserts are wonderful for eliminating tearout, but unfortunately, they also impede dust collection. To give my collection system an opening to pull sawdust through, I cut a 1/2-in.-dia. hole at the front end of the blade slot. In this location, the hole doesn't adversely affect the benefits of my zero clearance insert.

Mark Thiel



WADE EGAN

HANDY CLAMP STORAGE

I store my clamps under my assembly table so they're always right where I need them. I made a frame to hold the clamps and attached it to the table's base. The frame is made of 2x10 lumber with a 3/4-in.-thick back, so it's sturdy enough to handle all my heaviest clamps. I made some of the clamp hangers and bought the rest at a home center.

Wade Egan



SHOOT FROM THE BLUE LINE

I use a piece of painter's tape to mark dados when I assemble cabinets. Then I know exactly where to shoot nails or install screws. There aren't any pencil lines to sand off when I'm finished—I just remove the tape.

Stanley Krasovic

SMALL PARTS DRYING RACK

I made this rack so the finish on my small projects would dry without leaving marks. I cut strips off of a 3/4-in. board with my tablesaw's blade tilted 30 degrees. For each new strip, I just flipped the board and moved the fence over 1/2-in. Then I glued the strips on a piece of plywood, varying the spacing to support different sized items.

Jay McClellan



JAY MCCLELLAN



PAUL DUVENDACK

PRECISION DEPTH GAUGE

My dovetail jig doesn't have a depth gauge, and with my engineering background, I like things to be precise. This depth gauge allows me to set my router bits to within .001 of an inch. I also use it to set saw blade heights and check the depth of rabbets and dadoes. Start with a 4-in.-square piece of 1-in. thick hardwood. Drill a 2-1/4-in.-dia. hole in the center, then cut the piece in half to create the arched legs. Next, drill a hole through the top, the same diameter as the stem of your dial indicator. A brass threaded insert with a setscrew locks the indicator in place.

Source
www.Grizzly.com, G1479, \$12.95.

Paul Duvendack



CHANGING OF THE GUARD

After years of use, I could hardly see through my table saw's guard. While at a car show, I heard that polish for renewing aluminum wheels also worked to clear up old headlight lenses—so I tried it on my saw's guard. After two applications, it was as good as new! Since then, I've cleaned all my guards and my face shield as well.

Ross Bierma

Source
Mother's Mag and Aluminum Polish, available at NAPA auto stores, about \$5 for a 5-ounce can.



GARAGE-FRIENDLY ASSEMBLY TABLES

Efficient storage is important in my garage shop, so after use, my assembly tables tip, fold, clamp and roll. Each table has one apron-mounted caster (\$7 at a home center) and a stabilizer. I used two sheets of 3/4-in. plywood to make the tabletops and aprons and mail-ordered the folding legs. My tables are very stable and only 10-in. wide when clamped together.

Source
Rockler, (800) 279-4441, www.rockler.com #13772, \$32 per pair.

Roy Smith



ROY SMITH



ANOTHER ANGLE ON FLAT GLUE-UPS

To keep panels from bowing under clamp pressure while gluing, I install lengths of angle aluminum on each end. I clamp the angle pieces just firmly enough to hold things in place. Then I tighten the pipe clamps. Unlike iron or steel, aluminum won't leave black marks where it contacts squeezed-out glue. Unlike a wooden cleat, it won't become glued to the panel.

Brandon Williams

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LABOR OF LOVE

After 50 years of woodworking, I've got a confession to make. I enjoy fixing up an old machine or re-arranging my shop more than wood-working itself.

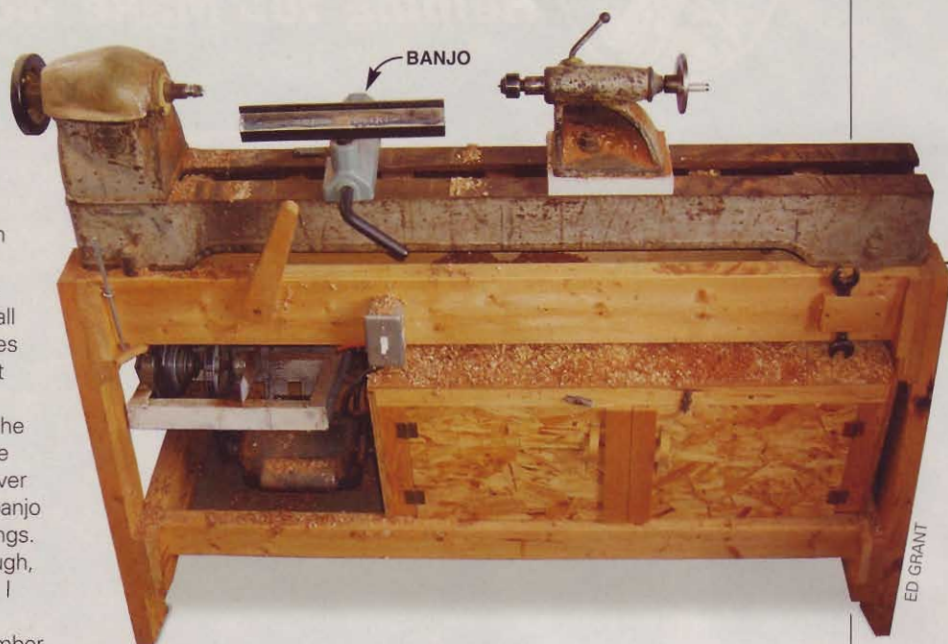
A few years ago a friend gave me an old Rockwell lathe which clearly needed a lot of help. The motor, pulley, belt cover, tool rest and tailstock base had all gone missing. The few remaining pieces just oozed with potential. It was love at first sight!

I spent a fun six months making all the missing parts. I made the tailstock base from maple and hardboard, the belt cover from fiberglass, and the tool rest and banjo from some old angle iron and pipe fittings. The banjo didn't work out so well, though, because it required a wrench to move. I bought a replacement - instead.

I built the base from construction lumber and plywood. I welded a frame for a used 3/4 HP motor and installed a step pulley on the motor's shaft. My pride and joy is a wooden lever that raises the motor when I want to change speeds.

This sturdy machine will outlast my days in the shop. Someday, one of my sons will have it, too.

Ed Grant



ED GRANT

BLOCK PLANE MECHANIC

Last year I made my wife a window bench that required 92 mortise and tenon joints. After fine-tuning two or three tenons with a chisel, I realized I needed a rabbit plane to speed up the process. Of course, I didn't have one.

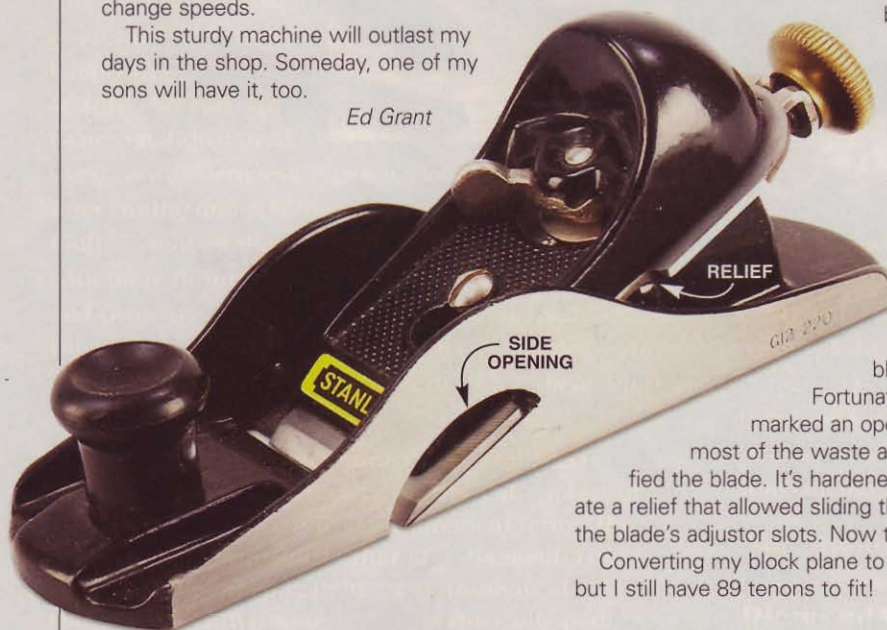
Rabbit planes can be expensive, so I thought I'd make one. I know that sounds daunting, but I'm a mechanic and I had a \$15 flea-market block plane that was begging to be transformed into a better tool.

To make a rabbit plane, I had to create an opening and move the blade to the block plane's outside edge.

Fortunately, cast iron is very easy to work. I marked an opening on the plane's side, drilled out most of the waste and filed the edges smooth. Next, I modified the blade. It's hardened, of course, so I used my grinder to create a relief that allowed sliding the blade over 1/8-in. I also lengthened the blade's adjuster slots. Now the blade sits flush with the plane's side.

Converting my block plane to a rabbit plane was easy, but I still have 89 tenons to fit!

Jon Brinkerhoff



ADJUSTING SLOTS

RELIEF



Are you a Tool Nut, too? You'll get the new Leatherman Charge AL aerospace aluminum multi-tool if we publish your story. Send your tale to toolnut@americanwoodworker.com, or mail it to American Woodworker, 1285 Corporate Center Drive, Suite 180, Eagan, MN 55121. Please include digital photos of your tool if possible. For more on the Charge AL, visit www.leatherman.com

LEATHERMAN®



EDITOR: TOM CASPAR

THE WELL-EQUIPPED SHOP

Super New Dovetail Jigs



PHOTOS COURTESY OF MANUFACTURER

Leigh Industries has a well-deserved reputation for making top-of-the-line dovetail jigs. They've just introduced three new ones: the Super Jigs. They're available in 12, 18 and 24-in. models and are priced at \$199, \$259, and \$329 respectively. Super Jigs provide the same top-notch accuracy as other Leigh jigs.

Super Jigs have two qualities that I really like. You can cut both boards of a half-blind dovetail at the same time. And you can cut dovetails on lipped drawer fronts. Super Jigs also have quick-action cam clamps, which make tightening and releasing your workpiece a snap.

But the most intriguing aspect of these jigs is a new type of guide bushing: the Elliptical Guide. A simple twist of this guide enables you to

make the joint tighter or looser. As the name implies, the Elliptical Guide is oval-shaped. You turn it with a spanner wrench (provided) to give it a wider or narrower profile, and this affects how it fits between the jig's fingers. There's a catch, though. You have to hold your router in the same position for every cut. I thought this would be difficult, but when I realized that I usually orient my router the same way when dovetailing, I didn't find this restriction to be a big deal.

Leigh has also introduced a nice accessory for supporting your router and collecting dust. The VRS (Vacuum Router Support) helps you to make consistently tight joints by reducing the risk that you'll tip your router.

-Randy Johnson



Lock your workpieces with quick action cam clamps.



Twist the Elliptical guide to adjust the joint's fit.

Source:
Leigh Industries Ltd, (800) 663-8932, www.leighjigs.com Leigh Super 12, \$199. Leigh Super 18, \$259. Leigh Super 24, \$329. Leigh VRS (vacuum router support), \$65-\$76 depending on size.



PHOTO COURTESY OF MANUFACTURER

BIG JOINTER FOR BIG WORK

If you're a woodworker who needs a machine large enough to face joint 12-in. material, the new Grizzly G0609 jointer, \$1,695, could be just what you're looking for. With a 12 x 84-in. bed, this giant looks more like an aircraft carrier than a jointer.

The G0609 has a four-knife cutterhead driven by a 3-hp (18-amp) 220-volt motor. Knife elevation is controlled by jackscrews. You can get a helical carbide-insert cutterhead instead of the four-knife head for an additional \$795.

The parallelogram tables are controlled by handwheels, which typically offer finer control than levers. The fence, 5-1/2-in. tall and 46-3/4-in. long, tilts 45 degrees in both directions, with positive stops at 45, 90, and 135 degrees. The machine comes with a 5-in. dust port. Plan on having some friends over when this machine arrives, since it weighs a beefy 875 lbs.

Source

Grizzly Industrial, (800) 523-4777, www.grizzly.com G0609 12-in. jointer, \$1,695.

SMALL, BUT EFFECTIVE, DUST COLLECTOR

Steel City's cool new Mini DC, \$100 can be used two ways. You can run it as a stand-alone dust collector or place it in-line with a central dust collection system to "supercharge" the air flow and get better collection.

The Mini DC offers 340 CFM of air flow. At 1 micron, the bag's filter captures even fine dust. Used alone, it provided good collection on my benchtop planer.

I liked the Mini DC even better as an airflow supercharger. My planer is at the end of the line on my dust collection system, so collection isn't always great. When I put the Mini DC between the planer and the dust collection line, my main collector barely missed a chip.

Source

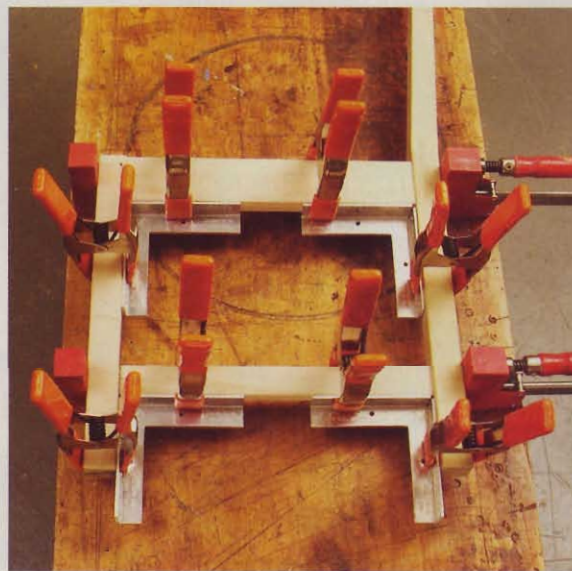
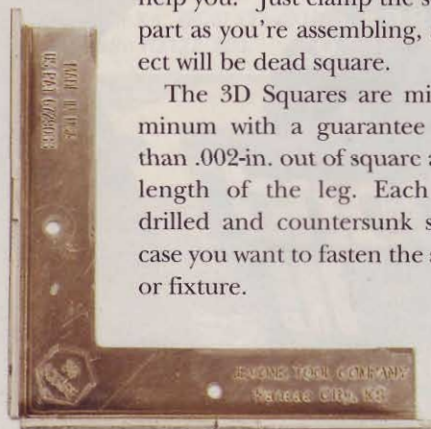
Steel City Tool Works, (877) 724-8665, www.steelcitytoolworks.com Mini DC, \$100.



GET IT DEAD SQUARE

Assembling projects perfectly square can be a challenge. The more parts you have, the more complicated it gets. Having a set of 3D Squares, \$50 for four, is like having your woodworking buddy in the shop to help you. Just clamp the squares to each part as you're assembling, and your project will be dead square.

The 3D Squares are milled from aluminum with a guarantee of being less than .002-in. out of square across the 6-in. length of the leg. Each leg contains drilled and countersunk screw holes in case you want to fasten the squares to a jig or fixture.



Source

Jevon Tool Company, (913) 384-0023, www.jevonstoolco.com 3D Squares, \$50 for four.

HIDE-AWAY SHOP DESK

I used to have a desk in my shop for reviewing cutlists and drawing plans. I really liked having that permanent spot for my calculator, pens, pencils and paper, but its big horizontal surface was a magnet for piling up junk.

That's why I was thrilled to find Duluth Trading Company's new Plan Station, \$69.50. Although designed with a job-site contractor in mind, I've found it's a perfect solution for my shop. Since it folds up, it removes the temptation to "pile stuff here" and takes up no floor space.

The Plan Station, made of heavy-duty nylon fabric, hangs on the wall by two steel loops 48-in. apart. The



Plan Station's rigidity comes from two 24 x 48 in. plywood panels that you'll need to provide. Just slip them into the vertical



and horizontal panels. When the desk is open, you have a 24 x 48-in work surface. The vertical panel has large and small pockets to keep office supplies organized. There's even an access hole for a laptop cord and a drink holder to secure my ever-present coffee thermos. When you're done, fold up the horizontal surface and secure it with the hook and loop closures. It seals very well, and stays fairly dust-free inside.

Source

Duluth Trading Company, (800) 505-8888, www.duluthtrading.com
Plan Station, #22668, \$69.50.

MOTION-ACTIVATED DUAL LASER

A laser is an excellent addition to a miter saw, improving both accuracy and safety by showing you precisely where the blade is about to cut. The new model 3800 10-in. compound miter saw from Skil, \$180, contains a motion-activated dual laser that turns on as you approach the saw. It shuts off when you're done. On some saws, the laser is on all the time, requiring a separate switch to turn it off. On others, the laser isn't activated until you turn on the saw. This requires you to adjust the position of your material under a spinning blade.

More good news about the Skil 3800: the lasers' position can be fine-tuned left and right. However, you can't shift the dual lasers independently. Depending on your saw blade's kerf, you will be able to get the laser in perfect alignment on one side or the other, but not both. This doesn't bother me too much, since I almost always position my "keeper piece" to the left side of the blade.

The Skil 3800 miters left and right to 47 degrees with 9 positive stops. It bevels left to 47 degrees. Cutting capacity is 2-5/8-in. high x 5-1/16-in. wide at 90 degrees, and 2-5/8-in. x 3-1/2-in. at 45 degrees.

The saw comes with handy extension tables, a hold-down clamp, and crown-molding stops.

Source

Skil, (877) 754-5999,
www.skiltools.com
Model 3800 10-in.
compound miter saw,
\$180.



NICELY-PRICED HVLP

You can spend plenty of dough on an HVLP (high volume low pressure) spray system, so I was surprised to see the price on the Earlex HVLP 3000. At \$120, it looked like it might be too good to be true. Now that I've run lots of finish through the unit, I'm impressed.

I covered the gamut with this unit, spraying solvent-based shellac, lacquer, and polyurethane, as well as water-based polyurethane. Low viscosity products, like shellac and some water-based polys, will spray better if you get a needle kit specifically designed for them. This adds \$25 to the price.

The Earlex 3000 does have some compromises compared to higher-end units. Airflow is either on or off, not adjustable. This means you can't finesse the droplet size as the finish comes out of the gun, which can affect the look of the finished product. And at 9-ft. 6-in., the hose is quite short. I nearly pulled the turbine off my bench when I stretched



the hose too far.

Overall I was able to get a reasonably good finish from the Earlex 3000. It wasn't perfect, but spraying a finish is much quicker than brushing. If you're interested in trying out HVLP finishes, this unit is a good starting point.

Source

Earlex, (888) 783-2612

www.earlex.com

Earlex HVLP 3000, \$120.

Thin Finish needle kit, HVACC10R, \$24.99.



LASER-GUIDED ROUTER BASE

Lasers seem to be everywhere in the shop these days. Thanks to the folks at MLCS, routers are no exception. The new OnPoint Laser Router Plate, \$59.95, contains laser cross hairs that helps you perfectly position your router for plunge cuts.

I have to admit I was skeptical when I first saw this product. But now that I've used it to cut some dadoes and mortises, I'm a believer. The cross hairs do a great job of simplifying a joint's layout. You just have to remember that with the OnPoint plate your layout must be based on the center of the plunge cut, not the joint's edge.

To mount the OnPoint plate to your router, you install a V-bit in the machine. Then, to align the lasers with the tip of the bit, you mark out and drill the screw hole locations for your router's base.

This is a fussy set up, and needs to be done correctly to make good use of the cross hairs. Take your time and make certain it's right. From then on your router will be perfectly sighted in.

Source

MLCS, (800) 533-9298,

www.mlcswoodworking.com

OnPoint Universal Laser Router Plate, \$59.95.

COMPUTER-GENERATED CARVING

Here's a new machine from Craftsman that, according to the folks at Sears, is selling faster than they can make it. It's no wonder. This sounds like an amazing machine. The CompuCarve, \$1900, is a computer-controlled

three-dimensional carving machine.

Working on your PC, you can use a library of clip art, or create your own. You save the artwork on a flash card, which is then inserted into the



PHOTO COURTESY OF MANUFACTURER

CompuCarve. Like a planer, the material is automatically fed through the machine while the router bit does the carving. Adding text to the carving, according to the manufacturer, is as easy as typing in a word processor.

If you want to duplicate an existing shape, add the 3D Scanning Probe, \$400. The manufacturer says the probe is gentle enough to be used even on soft materials. So, in addition to scanning a wooden carving or molding, you can also copy a shape made from wax or clay.

The CompuCarve will handle material up to 5 in. thick and 14-1/2-in. wide. Length is virtually unlimited. It requires a PC running Windows 2000 or XP with 128 MB RAM (256 MB or greater recommended), 75 MB of hard drive space and an accelerated graphics card with OpenGL support. You can watch a video of it in action on the Sears web site.

Source

Sears, (800) 349-4358,
www.sears.com/Craftsman
CompuCarve, #21754, \$1899.99.
3D Scanning Probe, \$399.99.



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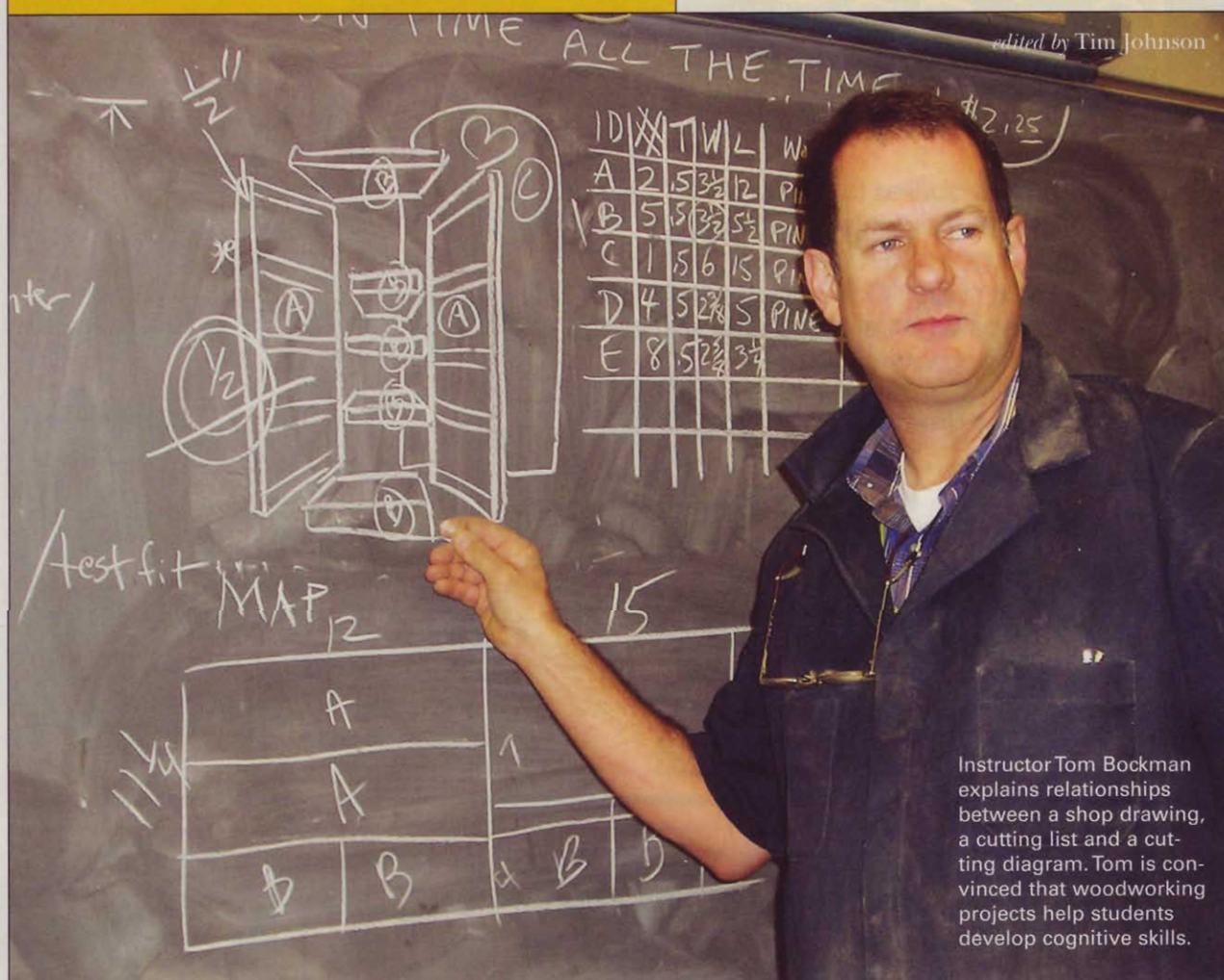
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edited by Tim Johnson



Instructor Tom Bockman explains relationships between a shop drawing, a cutting list and a cutting diagram. Tom is convinced that woodworking projects help students develop cognitive skills.

Prescott, Arizona

is loaded with young men and women excited about woodworking, thanks to woodshop instructor Tom Bockman. While high school woodworking programs have been under siege nationwide in recent years, enrollment in Prescott High School's woodshop program has quadrupled, requiring the addition of new classes and a second teacher.

There's more. Tom's students are respected at school and throughout the city. Woodshop students develop conceptual and business skills. They learn the value of teamwork and experience the satisfaction of community service involvement. When we talked, Tom eagerly shared his teaching strategies.

You've been teaching for 28 years. What was it like when you started?

I was blissfully unaware of what I was getting into. Woodworking was popular, so it wasn't hard to attract

students. But when Arizona authorized charter schools, about a dozen small, alternative high schools quickly appeared in town. To keep my classes filled, I had to learn how to successfully compete for students.

How do you explain your program's amazing success?

Good publicity has been one of the most valuable tools for strengthening our program. Parent and student interest spikes whenever woodshop activities are spotlighted, so when my students do great things, I make sure they get noticed. Over the years, our program has benefited from dozens of local newspaper articles. We've even been featured in magazines and on television.

How do other faculty members view your woodshop program?

Positively. I make every effort to connect woodworking with academics, because I'm convinced that



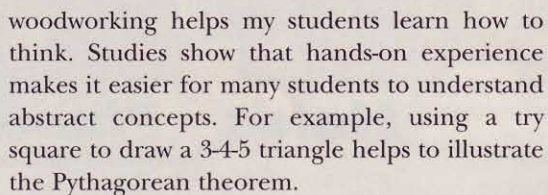
Projects by Prescott High School's woodshop students are frequently featured in the local newspaper.



Jonathan Novak and Dustin Olague begin work on a trophy case project for the middle school.



Devin Dennis and Zach McClintock build miniature chairs to donate to the Elks Theater restoration fundraiser.



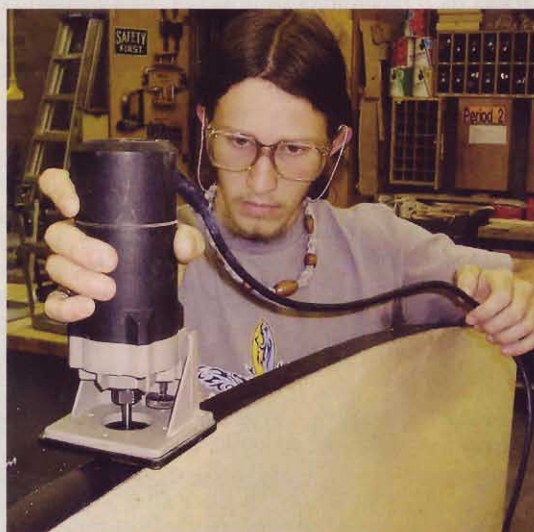
Earlier this year, mathematics students studying probability visited the woodshop to make spinners, like the one used in a Bingo game. Woodshop students used lasers to produce parts for the math students to assemble. During the activity many math students told me “this is cool!”

Why do you promote student involvement in community service projects?

Involving students in service projects is a top priority, because it helps them develop the habit of good citizenship. These large projects also emphasize the value of teamwork. Part of each team's job is to analyze and solve problems that arise during the project, and these challenges help students learn to think creatively.

Developing individual projects is no different. I encourage students to create their own designs instead of relying on printed plans or patterns. Designing a project helps a student develop thinking and problem-solving skills.

Because of our reputation, community members freely suggest challenging service projects. They know the terrific capabilities of woodshop student teams. Recently, student teams worked with the fire department to install smoke alarms in the homes of residents who depend on "Meals on Wheels." Teams have completed educational



Elliot Logan trims the edging on a new table for the school board's meeting room.

environmental displays and constructed new furniture for the school board's meeting room. They've built trophy cases for both middle schools and even a wishing well—a community “thank you” gesture to the founder of the international “Make-A-Wish” Foundation, who lives in Prescott.

Do students ever profit from their work?

Of course. The chance to make money can be a great motivator. Woodshop students sell projects to libraries, furniture stores, city government and private citizens. Connecting with local businesses gives woodshop students a chance to learn business skills and profit from creativity and hard work. Some students set up their own businesses, making pens for example, or laser-engraved name plaques.

We also help our students develop employable skills. I encourage local industries to provide opportunities for on-the-job training, internships and apprenticeships. Many of my students have gone on to work in cabinet shops and other woodworking-related industries; others have become business owners.

What role does new technology play?

Students embrace technology, so a woodshop full of cool new equipment attracts them like moths to a flame. Using state-of-the-art equipment helps students understand the changing nature of woodworking. New acquisitions also keep our program in compliance with state Department of Education requirements and standards. Recently, our program received a state grant to obtain a computer-operated laser engraver—my students love using this machine; it never sits idle. Donations from the Prescott Area Woodturners Club allowed purchasing a CompuCarve machine.

How do you attract new students?

Well, that's the \$64,000 question. I actively recruit new students, and I use the best salespeople I've got: woodshop veterans. Before 8th grade students register for high school, they attend an open house to learn about our Career and Technical Education (CTE) programs. I have woodshop students make the case for choosing woodshop.

The 8th-graders also receive an interactive CD with information about each CTE program. Both parents and students tell me the woodshop presentation is very effective. It includes digital photography, video, documents and sound to deliver



Jodi Clayton sets up the laser engraver.



Jonathan Novak mastered the Craftsman CompuCarve machine.



TJ Shermann finishes a custom-order project.



Woodshop veterans Lindsey Dill and Denise Harrison recruit new students by talking shop and handing out promotional CDs.



Erick Ornedo gets ready to turn his first pen.

Alisha Apolinar helped recruiting efforts by appearing on the promotional CD and naming woodshop as her favorite class.



the message that woodshop is cool. (Copies of the Prescott woodshop recruiting CD are available by contacting Tom at tom.bockman@prescottschools.com.)

Historically, attracting young women into woodworking hasn't been easy. And now governmental standards require achieving 30% non-traditional enrollment to stay funded (in woodshop, females qualify as non-traditional students). We're committed to being the first woodworking program in Arizona to reach this goal, so a portion of our woodshop CD focuses on young women working on fabulous projects and talking about their unique experiences in woodshop.

At the most recent CTE open house, our female demonstrators drew such large crowds that one mother asked me if there were any woodshop classes open for boys! As a result of attending the open house or viewing our CD, more than 50 girls have signed up for woodshop.

It's also very important to coordinate recruiting efforts with the counseling staff. Last fall, during the days of standardized testing, our counseling staff sent groups of students through the woodshop. Many of them expressed interest in enrolling.

What does it take to sustain this program?

It's a huge balancing act, really, between maintaining enrollment, refining the curriculum, providing cool hands-on experiences and developing new recruiting strategies. Full enrollment brings its own set of challenges, like space for projects, machine wear and tear, and overcrowded classes. On the flip side, increased popularity strengthens the woodshop program and makes its future more secure. I believe most instructors would welcome the challenges rather than face extinction.

Tom Bockman is the 2003 "Yavapai County High School Teacher of the Year."

Prescott High School is located in Prescott Arizona, a rural mountainous region north of Phoenix.

Copies of the Prescott woodshop recruiting CD are available by contacting Tom at tom.bockman@prescottschools.com.



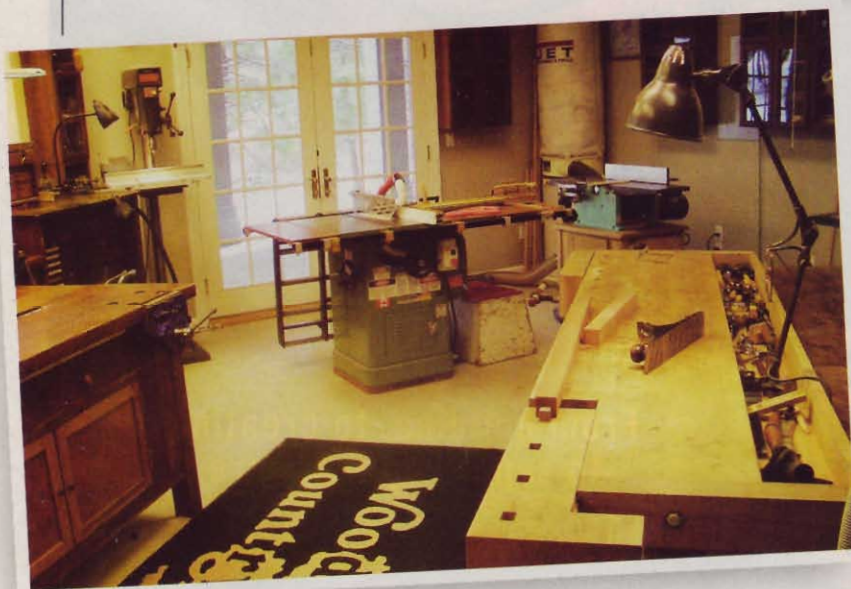
Tell us about a dynamic woodworking school or vibrant teaching program. What makes it work? Point out notable teaching strategies and student accomplishments. Explain how the program excites students about woodworking and tell us how it helps them develop woodworking skills. Whether the program operates in a public school, community center or a private workshop, we want to hear about its success. E-mail your story to schoolnews@americanwoodworker.com.



Wedge Workshop

I built my wedge-shaped workshop twelve years ago. It's 470 square feet, which is too small, as every woodworker knows, but my options were limited, because the shop had to fit between my house and garage. I love how the windows flood the space with light.

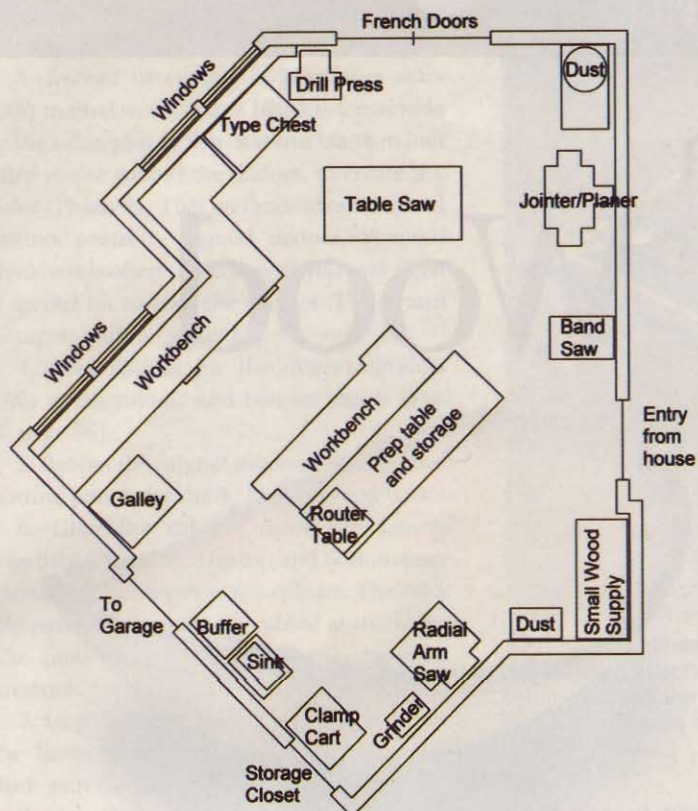
My biggest challenge has been to make my stationary tools fit the space. For example, my tablesaw and



jointer/planer face a pair of French doors, which I have to open to process long boards. I store lumber in the garage.

I built all the shop cabinets and augmented them with other pieces, such as the antique type chest (from an old print shop) that stores all my nuts and bolts. The cabinets are filled with old tools that I've collected. I keep them all in working order and use them regularly. I enjoy the quiet nature of working with hand tools, and one of my

EDITOR: TIM JOHNSON • PHOTOGRAPHY: COURTESY OF ERIK LESSING



favorite occupations is using them to restore old furniture pieces. I've become an expert at repairing worn-out drawer parts!

I also like to build replicas of period pieces: Nightstands, bookcases, chests of drawers, etc. I recently completed two Chippendale-style bureaus made from 100-year-old, 21-inch-wide cherry boards, although I can't take all the credit. I always receive lots of help from my able shop assistant, Gussie the cat.

*Erik Lessing
Monument, CO*

Tell us about your shop!

Send us photos of your shop, a layout drawing and a description of what makes your shop interesting. Tell us what you make in it and what makes your shop important to you. If "My Shop" features your shop, you'll receive \$100.

E-mail your entry to myshop@americanwoodworker.com with digital photos attached. Or mail your description with prints or digital photos on a disc to **My Shop, American Woodworker, 1285 Corporate Center Drive, Suite 180, Eagan, MN 55121**. Please include your phone number. Submissions cannot be returned and become our property on acceptance and payment. We may edit submissions and use them in all print and electronic media.

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Turning a Green Wood Bowl



Making a functional object

directly from raw material in its natural state is incredibly satisfying. Just ask any potter. For woodworkers, green woodturning captures that feeling. You literally start with a log and end up with a beautiful bowl.

If you've never turned green wood before, you're in for a treat. Green wood is easier to turn than kiln-dried wood. It cuts cleaner and produces very little dust. To top it off, the wood itself often costs nothing.



1 Cut green bowl blanks in lengths that are equal to the log's diameter, plus one inch. Start by lopping off a short section to eliminate any end checks. Mark a line through the pith where the log will be split into two bowl blanks.



2 Cut the log along the marked line. A 1/2" wide, 3 to 4 tpi skip tooth blade is a good choice for a 14" bandsaw with riser blocks. If the log is too big to cut on your bandsaw, use your chainsaw or split the log with a wedge.



3 Round up the blank using a 1/4-in. plywood template as a guide. I keep a set of these discs in 1/2-in. increments. Simply nail the template on the bark edge and follow the shape.



4 Locate the faceplate on the blank's flat surface. This will eventually be the inside of the bowl. Center the round template on the blank and use the nail hole to mark the center. Then draw a circle that's slightly larger than the faceplate's diameter.

TOOLS AND SUPPLIES:

- 1/2" bowl gouge (from a 5/8" rod)
- 1-1/4 to 1-1/2-in. heavy scraper (usually 3/8" thick)
- Jacobs style chuck
- A 5/8" to 1" drill bit
- Double ended calipers
- Vernier style caliper
- Sanding discs and soft pads (5" and 2" dia.)
- Flexible shaft tool or flexible shaft for a drill
- 1/8" rubber router mat material
- CA glue

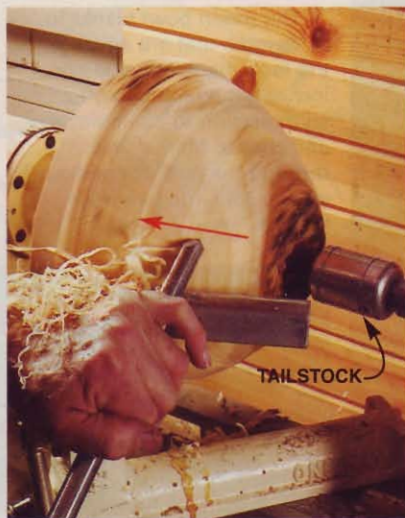
MATERIAL

The process works best if the wood is wet and freshly cut. Storm-downed trees, areas being cleared for development and tree service dumping sites (often called "bone yards") are all good sources of green wood. For ease of handling and cutting, choose logs or limbs that are smaller in diameter than your lathe's swing.

Almost any species is worth trying, but here are some of my favorites: maple, walnut, butternut, ash, birch, locust, white oak, cherry, beech, Osage orange, and pear. My rule for green bowls is to try whatever is locally available—you may be pleasantly surprised by the abundance of material in your own backyard.



5 Screw the faceplate into what will be the opening of the bowl. The screws should penetrate the wood at least 1" for initial rough turning.



6 Rough the bowl with a bowl gouge. Point the flute in the direction of the cut and keep the bevel rubbing on the wood. The tailstock adds support.



7 Remove the tailstock and flatten the bowl's bottom with a scraper. The bottom must be at least 1-in. larger than the faceplate.

SAFETY FIRST!

Wet logs weigh a lot! You don't want one flying off the lathe. Use a faceplate that's made from one piece of steel and is at least 3/8" thick at the screw hole flange. For bowls less than 10 inches in diameter, I use a 6-hole, 3-in.-diameter faceplate. The type of screw is also critical: Use #12 sheet metal screws. Avoid dry wall, deck and wood screws. Be sure the faceplate sits flat on the log's surface—if it doesn't, use a small hand plane across the grain to create the desired fit. Last but not least, be sure to wear a full-face shield—goggles are not sufficient for bowl turning.

TIP

Avoid a Splintered Rim

If you run the tool off the ends of the blank into air (most commonly at the rim area), the fibers will break off along the edge—much like sawing through a board that is not supported on the back side of the cut. Solution: Work from the open air into the wood for the first 1-in. or so. (see Photo 11)



8 Draw a series of circles with a pencil to aid in mounting the faceplate for the next step. One of the circles will be close enough to the size of your faceplate to center it. Remove the bowl and remount the faceplate on the base.



9 The bowl is now mounted with the base towards the headstock. Cut the bowl's height so the pith is removed. Use the gouge in a scraping fashion with the bevel facing away from the wood and the bottom edge scraping.



10 Begin the final shaping. Establish a base with enough waste for the screws. Then, concentrate on perfecting the upper two-thirds of the bowl. Work from small to large diameters to reduce tearout.



11 Finish with a shear-cut. Place the gouge high on the piece and keep the bevel rubbing. You can tell a good shear cut by the thin, wispy curls of wood. Work up to within an inch of the rim, then from air into the rim (see TIP).



12 Start the hollowing process by drilling out the center of the bowl. The hole gives a place for the tool to end each cut and eliminates the need to constantly check the depth. Use a 5/8–1-in.-dia. bit mounted in a Jacobs-style chuck. Drill to a depth that is 1/2-in. less than the finished depth will be.



13 Hollow the bowl's interior. Start an inch or so back from the drilled hole. Roll the tool on its side to about a 45-degree angle and cut with the bevel rubbing. Work from large to small diameters. Continue this backing-up process until the walls are 3/8 to 1/2-in. thick.



14 Shape the rim with a scraper before you finish hollowing. Green bowls change shape rapidly once they are hollowed, making the rim nearly impossible to shape later. Here, I'm rolling the rim to round it like a bead.



15 Establish the bowl's final depth with a heavy scraper. Use the scraper for the bottom and a little up the sides. Scrapers cut poorly across end grain, so rely on the gouge for cutting most of the bowl's sides.



16 Remove the extra material around the faceplate and base of the bowl. Then, remove the bowl from the lathe—but don't unscrew the faceplate just yet.



17 Reverse chucking is a way to mount the bowl backwards in order to finish off the underside of the base. Start by mounting a dead center in the headstock. Then screw the bowl back on the lathe so the pin marks the center of the base. Remove the bowl from the lathe and unscrew the faceplate.



18 Mount a 2-in. thick block of wood to your faceplate. True the sides and flatten the face. Slightly round the corners where the sides meet the face.



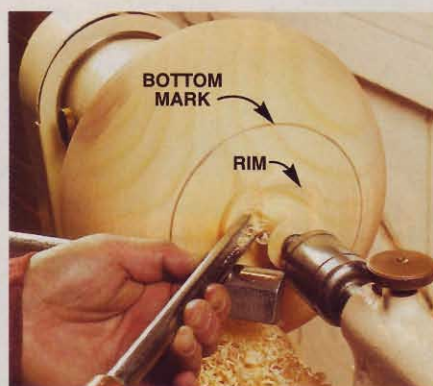
19 Glue a piece of router anti-slip pad to the chuck. I use CA glue on the wood and an accelerator on the rubber for an instant bond. The inside of the bowl will be held against the rubber with pressure from the tailstock.



20 Use calipers to mark the depth of the hollow on the outside of the bowl. It's good to know where the bottom of the bowl is as you cut the base. Set the bowl over the chuck and bring the tailstock forward to engage the center mark you made earlier on the base.



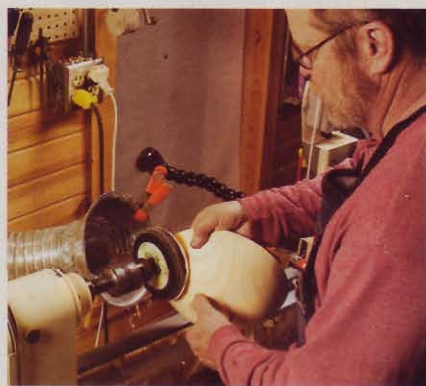
21 Cut away the waste block where the screws were fastened. Refine the final shape of the base and the bottom third of the bowl with light, finishing cuts.



22 Undercut the bowl's base to create a rim for the bowl to sit on. This looks better than a flat bottom. Watch the bottom mark (made by holding a pencil on the mark made earlier) so you don't cut too deep.



23 Break off the remaining nib with a rap from a tool handle. It takes little effort to break the nib. This leaves a small area to be cleaned up by hand.



24 Sand the bowl after it has dried for 4-5 days. Use a soft foam-backed disc mounted on the lathe with a drill chuck. Keep the bowl moving to avoid creating flat spots. Start with 100- grit and work through 220 - grit.



25 Sand the inside with a smaller foam disc. A flexible shaft that attaches to your drill or a flexible shaft tool such as a Foredom works well for getting inside the bowl.

FINISHES

Is your bowl functional (made for food) or decorative? If it's decorative, choose any finish that gives the look and feel you prefer. My favorite finishes for functional bowls are mineral oil, walnut oil and pure tung oil. Mineral oil looks great on light colored wood, as it adds no color of its own. However, it never dries so it needs to be reapplied regularly, especially after washing. Walnut oil adds a little color and will dry in time. It's available at health food stores. I also like pure tung oil. It adds a deeper color that looks great on dark woods and it will dry.

TIP

Prevent Drying Cracks

Every green bowl will distort as it dries—I think this adds character. Too often green-turned bowls dry so rapidly they crack. Slow down the drying process by placing the completed bowl in a two paper bags. Store it in a cool damp location.

adjustable



workbench



The coolest
bench ever:
It changes
size before
your eyes!

My workbench has always been the heart of my small shop. When I made it years ago, I outfitted it with a good face vise, an innovative sliding tail-vise and a plain trestle base. But the bench's height always bugged me. It was too low for some jobs and too high for others.

I found a solution! I retrofitted my top with commercially-made adjustable legs (about \$480, see *Adjust-A-Bench Legs*, page 53). I also built a new cabinet-style base for added storage space.

Adjustability has saved a lot of strain on my back. When routing, I raise the bench; when sanding, I lower it. The bench has 12 different heights, from 28 to 44 in.

Adjustable metal legs allow you to raise or lower the bench to a variety of working heights. Set low, it's an excellent assembly table.



Raise the top all the way for detail work. A tall bench is a wonderful luxury. It's perfect for drawing sketches, routing inlay, sawing dovetails and many more jobs.



FIG. A
EXPLODED VIEW

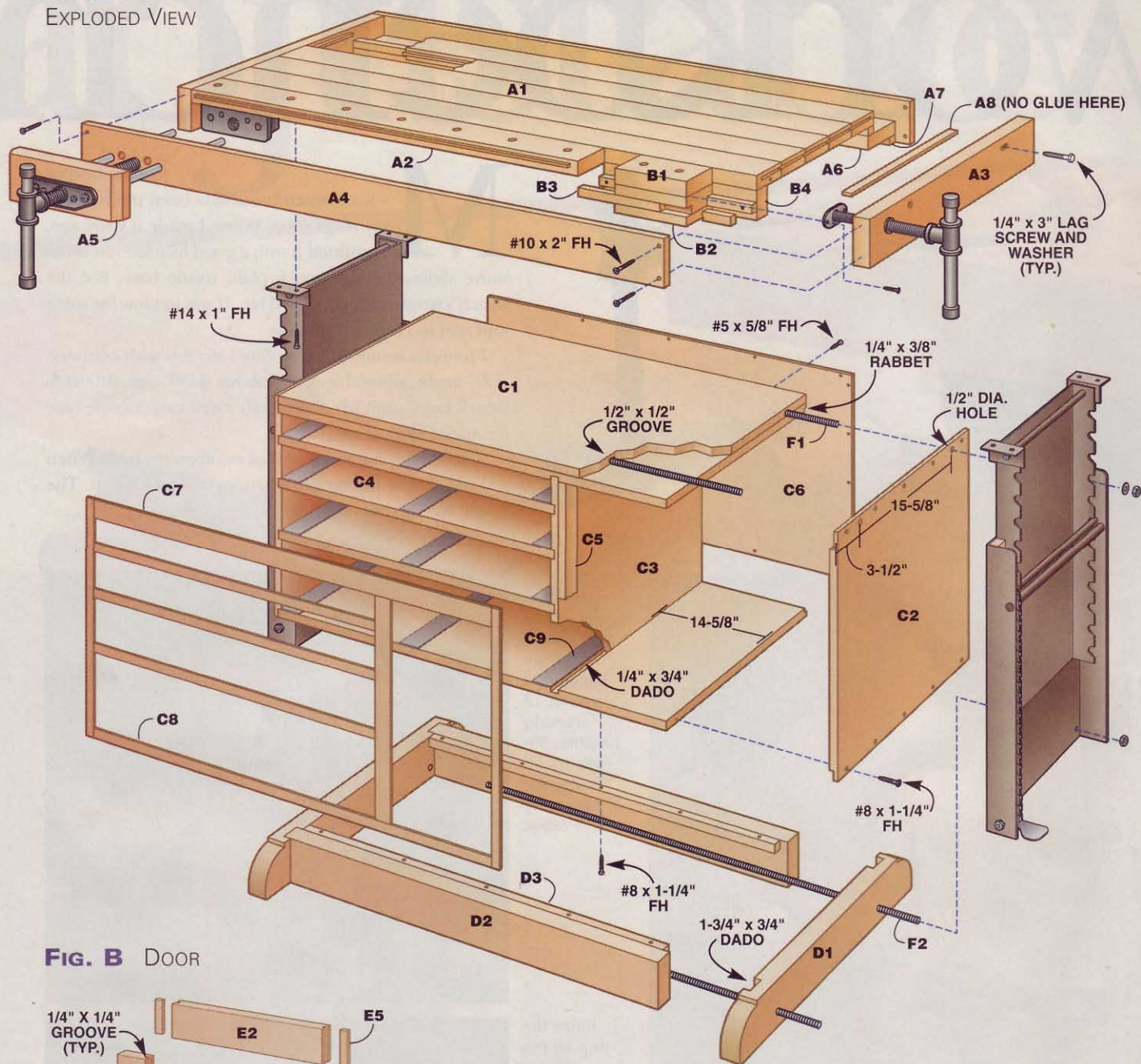


FIG. B DOOR

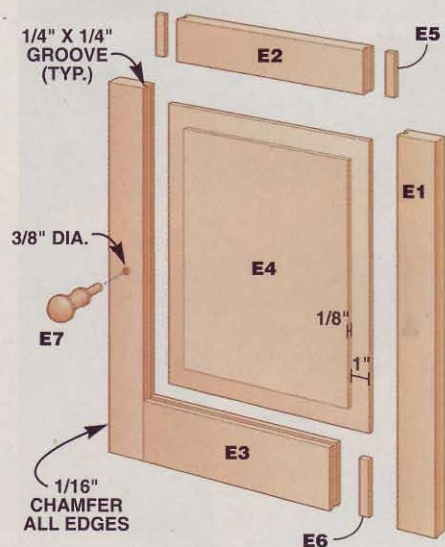


FIG. C DRAWER

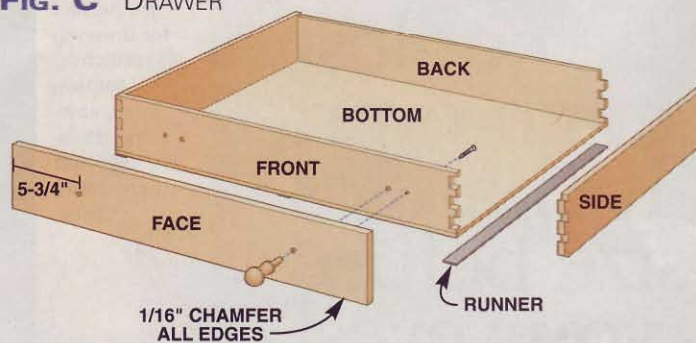


ILLUSTRATION: FRANK ROHRBACH

BUY THE HARDWARE

Every experienced woodworker knows this rule, but it bears repeating: Buy the hardware before you build. With this bench, those critical parts are the adjustable legs, the face vise and the tail vise. Check their dimensions and the placement of their mounting holes, then fine-tune the plans if necessary.

BUILD THE TOP

The top is fairly straightforward, but there are a few things to consider as you're building. The main top (A1) may be composed of as many boards as you want. Cut them 1 in. extra-long and rout slots for splines (A8). You could alternatively use biscuits to help with alignment. Glue the boards together, then trim them all the same length (see Cutting List, page 53). Cut the dog board (A2) an extra inch long, too, and drill the dog holes (Fig. H) before gluing the dog board to the top, again using a spline or biscuits for alignment. Trim the top and dog board to final length using a router, straightedge and flush trim bit.

A solid wood top with a frame must be able to shrink and swell with changes in humidity, or it will crack. Rout spline slots in both ends of the top to align it with the ends (A3). Don't glue these splines or the ends when you assemble the top. Use two lag bolts to hold each end in place. Make an elongated hole for the rear bolt (Fig. E), so the bolt can move with the top. Drill extra-large diameter holes for the screws that hold the tool tray (A6) to the top (Fig. D). They allow the tray to remain fixed to the back (A4) and the top free to move. Don't glue the spacing cleat (A7) under the top where it connects to the tray.

The tail vise is simplicity itself (Fig. F). Slide the dog block (B1 and B2) along the guides (B3) before attaching the right end (A3) to the top. The screw mechanism for the vise comes with a loose plate that fastens to the dog block and a threaded guide that fastens to the bench's end (see photo, at right). After drilling the hole for the threaded guide, rout the inside of the hole with a 1/2 in. roundover bit to accommodate the threaded guide's curved shape (Fig. E). Buy or make round bench dogs for the dog holes (see Source, page 53). Finish the top with oil to keep glue blobs from sticking.

BUILD THE CABINET

This cabinet is designed to be very rigid. Three shelf dividers (C4) dadoed into the sides (Fig. J) pre-

FIG. D CROSS SECTION OF TOP

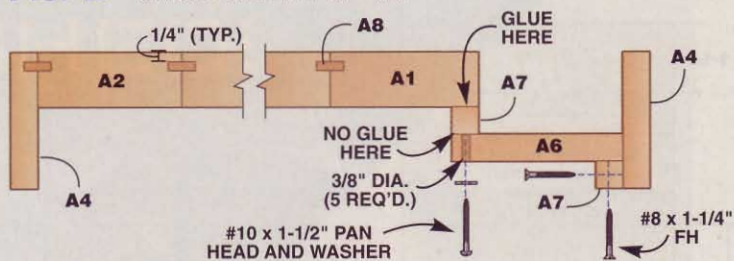


FIG. E END VIEW OF TOP

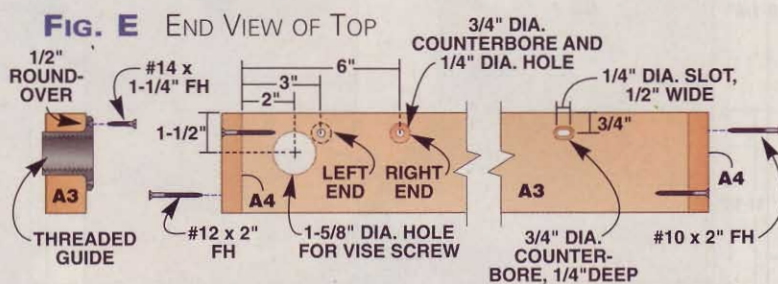


FIG. F CROSS SECTION OF END VISE

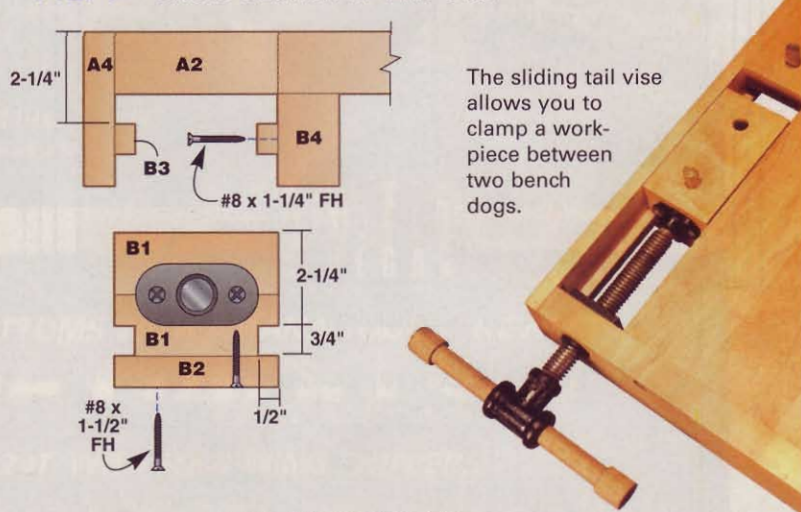


FIG. G FACE VISE MOUNTING HOLES

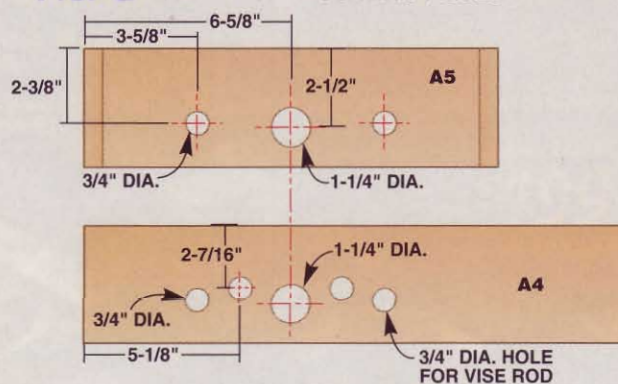


FIG. H BENCH DOG HOLE SPACING



FIG. J CABINET RABBET AND DADO LAYOUT

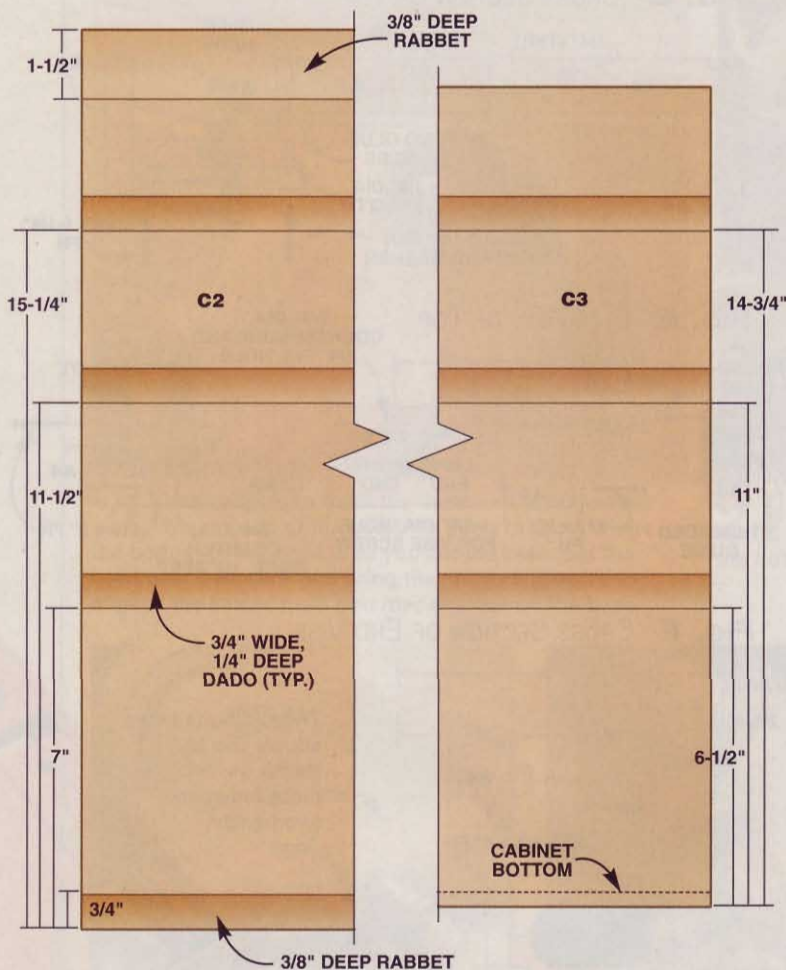


FIG. K PLYWOOD CUTTING DIAGRAM

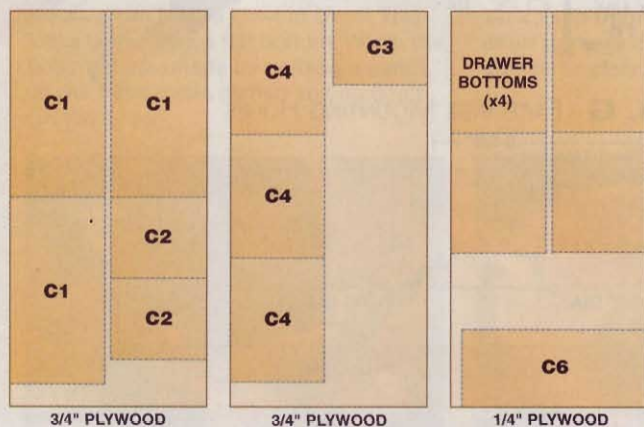
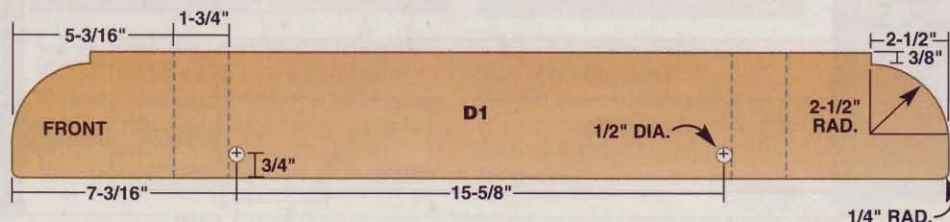


FIG. L BASE STRETCHER



vent the cabinet from twisting. A double-thick top and a stout base keep the cabinet box from bending. The cabinet's back (C6) prevents racking.

Here's a few tips on making the base: Be sure to cut two grooves in the top for the threaded rod before gluing the top pieces (C1) together. Make the two top pieces oversize before gluing. Place weights such as bricks or sandbags on top of them to apply clamping pressure. Glue on all the edging parts before you cut the cabinet pieces to size (see *Frameless Cabinet Joinery*, page 92), or cut and apply the parts one at a time after you assemble the cabinet box. Using the latter method, make the edging 1/16 in. extra wide and trim it flush to the cabinet with a router.

BUILD THE DRAWERS

The drawers are simple boxes with applied faces (Fig. C). Loaded with tools, these drawers can get quite heavy. Use half-blind or through dovetails for a strong joint between the front and sides. Make the back of the drawer boxes 1/16-in. narrower than the front, as specified in the cutting list. A tapered drawer box is easier to slide. If you use drawer slides, build the drawer boxes with parallel sides.

To give each drawer maximum depth, glue the bottom directly to the underside of the drawer box. Glue plastic-laminate strips to the underside of the drawer bottom and to the shelf dividers to additionally help the drawers slide.

FIT THE BASE

The base and cabinet should be exactly the same length because the adjustable legs fasten to both parts. It's best to build the cabinet first, then build the base and adjust its length to fit the cabinet. To start, make the base about 1/8 in. longer than the cabinet. After dry-fitting the base, remove one of the short stretchers (D1, Fig. L) and joint it a few times to fine-tune the base's length.

ASSEMBLE THE BENCH

You'll need a helper to put the bench together. First, attach the base to the cabinet. Next, slide the threaded rods through the holes in the base. Put on the adjustable legs. One person must hold the nut on one end of each threaded rod while the other tightens the nut on the other end.

Raise the adjustable legs about halfway up to give you clearance when attaching the top. Clamp together the two telescoping parts of each end so the upper portions are plumb. Place the top on the legs so the rear brackets butt against the tool tray cleat (A7). Shift the top side to side so the bracket on the left end sits midway between the face vise's left rod and the vise's screw. Mark all the holes, turn the top over, drill the pilot holes and attach the top.



ADJUST-A-BENCH LEGS

Cabinetmaker Geoffrey Noden first designed these legs for his own shop. Their operation is very simple. Each end is composed of two heavy-gauge metal panels. The adjustable panel has a series of notches that engage a rod in the fixed panel. Depressing a pedal rotates the rod out of a notch, allowing you to lower the bench. To raise the bench, you just lift its top.

The whole system is so robust that it can take an enormous amount of weight. Its simplicity ensures that it will work for many years, even in a dusty shop. You'll find much more information, alternative bench plans and castor sets at www.adjustabench.com or by calling (609) 882-3300.

Source:

Adjust-A-Bench, (609) 882-3300, www.adjustabench.com Adjust-A-Bench leg set, \$430 plus \$50 S&H.
Lee Valley, (800) 871-8158, www.leevalley.com Bench dog, #05G04.01, \$12 ea. Shoulder-vise screw (for the tail vise), #70G01.51, \$31.50. Front vise, #70G08.01, \$55. Handle for each vise, #05G12.03, \$5.
Horton Brasses, (800) 754-9127, www.hortonbrasses.com Cherry cabinet knob – Shaker style, #WK-7, \$2 ea.

CUTTING LIST				Overall dimensions: Top: 3-3/4" Th X 60" L x 30" D Cabinet: 19-5/8" H x 46" L x 23-5/8" D Base: 4" H x 46" L x 30" D		
Section	Part	Name	Qty.	Material	Th x W x L	Notes
Top						
	A1	Top	1	Maple	1-1/2" x 20-3/8" x 57"	(A)
	A2	Dog board	1	Maple	1-1/2" x 4" x 42"	(B)
	A3	End	2	Maple	1-1/2" x 3-3/4" x 28-1/2"	
	A4	Front, back	2	Maple	3/4" x 3-3/4" x 60"	
	A5	Vise face	1	Maple	2" x 3-3/4" x 13-1/4"	
	A6	Tool tray	1	Maple	3/4" x 4-3/4" x 57"	
	A7	Cleat	2	Maple	3/4" x 3/4" x 57"	
	A8	Spline	30 ft.	Maple	1/4" x 1/2" x length as needed	
Dog Block						
	B1	Block	2	Maple	1-1/2" x 3-15/16" x 7"	
	B2	Bottom	1	Maple	3/4" x 3-15/16" x 7"	
	B3	Guide	2	Maple	1/2" x 23/32" x 15"	
	B4	Support	1	Maple	1-1/2" x 2-1/4" x 15"	
Cabinet						
	C1	Top and bottom	3	Birch plywood	3/4" x 23-3/8" x 45-1/4"	(C)
	C2	Side	2	Birch plywood	3/4" x 23-3/8" x 19-5/8"	
	C3	Door divider	1	Birch plywood	3/4" x 23-1/8" x 17-7/8"	
	C4	Shelf divider	3	Birch plywood	3/4" x 23" x 30"	
	C5	Stile	1	Birch plywood	3/4" x 1-3/4" x 17-3/8"	
	C6	Back	1	Birch plywood	1/4" x 18-7/8" x 45-1/4"	
	C7	Wide edging	6 ft.	Birch	1/4" x 1-1/2"	(D)
	C8	Narrow edging	14 ft.	Birch	1/4" x 3/4"	(E)
	C9	Wear strips	12	Plastic laminate	1/32" x 2" x 23"	
Base						
	D1	Short stretcher	2	Maple	1-3/4" x 4" x 30"	
	D2	Long stretcher	2	Maple	1-3/4" x 4" x 44"	
	D3	Cleat	2	Maple	3/4" x 3/4" x 42-1/2"	
Door						
	E1	Stile	2	Birch or maple	5/8" x 2" x 17-3/8"	(F)
	E2	Upper rail	1	Birch or maple	5/8" x 2-1/2" x 9-1/2"	
	E3	Lower rail	1	Birch or maple	5/8" x 3" x 9-1/2"	
	E4	Panel	1	Birch or maple	1/2" x 9-7/8" x 12-1/4"	
	E5	Upper spline	2	Birch or maple	1/4" x 1/2" x 2-1/4"	
	E6	Lower spline	2	Birch or maple	1/4" x 1/2" x 2-3/4"	
	E7	Knob	1			
Drawers						
	#1	Face	1	Birch or maple	5/8" x 2-1/16" x 29-1/2"	
		Front	1	Poplar	1/2" x 1-3/4" x 29-1/2"	(G)
		Back	1	Poplar	1/2" x 1-1/2" x 29-3/8"	(H)
		Side	2	Poplar	1/2" x 1-3/4" x 22-13/16"	(J)
	#2	Face	1	Birch or maple	5/8" x 2-15/16" x 29-1/2"	
		Front	1	Poplar	1/2" x 2-5/8" x 29-1/2"	(G)
		Back	1	Poplar	1/2" x 2-3/8" x 29-3/8"	(H)
		Side	2	Poplar	1/2" x 2-5/8" x 22-13/16"	(J)
	#3	Face	1	Birch or maple	5/8" x 3-11/16" x 29-1/2"	
		Front	1	Poplar	1/2" x 3-3/8" x 29-1/2"	(G)
		Back	1	Poplar	1/2" x 3-1/8" x 29-3/8"	(H)
		Side	2	Poplar	1/2" x 3-3/8" x 22-13/16"	(J)
	#4	Face	1	Birch or maple	5/8" x 6-3/16" x 29-1/2"	
		Front	1	Poplar	1/2" x 5-7/8" x 29-1/2"	(G)
		Back	1	Poplar	1/2" x 5-5/8" x 29-3/8"	(H)
		Side	2	Poplar	1/2" x 5-7/8" x 22-13/16"	(J)
		All bottoms	4	Birch plywood	1/4" x 22-13/16" x 29-3/8"	
		Runners	12	Plastic laminate	1/32" x 2" x 22-3/4"	
		Knobs	8			
Adjustable Ends						
	F1	Upper rod	2		3/8" x 49-1/2"	
	F2	Lower rod	2		3/8" x 47-1/2"	

Notes

- (A) Make from 5 boards 1-1/2" x 4-1/8" x 58"
- (B) Trim board to 43" rough length, glue to top.
- (C) Make tops 24" wide and 46" long; trim to final size after gluing.
- (D) Make 1-5/8" wide and trim after gluing.
- (E) Make 7/8" wide and trim after gluing.
- (F) After gluing, trim door 1/8" less than height and width of opening.
- (G) Total height of drawer box is 1/8" less than opening's height. Length of front is 1/32" less than opening's width.
- (H) Length of back is 1/8" less than length of front. All backs are 1/4" lower than sides.
- (J) Sides are 9/16" shorter than opening's depth. Drawer face is 1/16" proud of cabinet.





Sliding Door Bookcase

Dust-Free Display and No Hinges to Mount!

by Seth Keller

Glass doors make a bookcase, but doors that swing on hinges are a pain to install. Ditto for doors that lift open and slide back—on a Barrister's bookcase, for example. Regular sliding doors are much easier to install. In addition, they're ideal for a bookcase designed to fit in a space where swinging doors might get in the way.

This bookcase features super-smooth sliding door hardware that installs in minutes (see "Euro-Style Sliding Door Hardware", page 58). The shelves are generously deep and widely spaced. Following the lead of Arts and Crafts era builders, my design incorporates elements inspired by traditional Asian furniture.

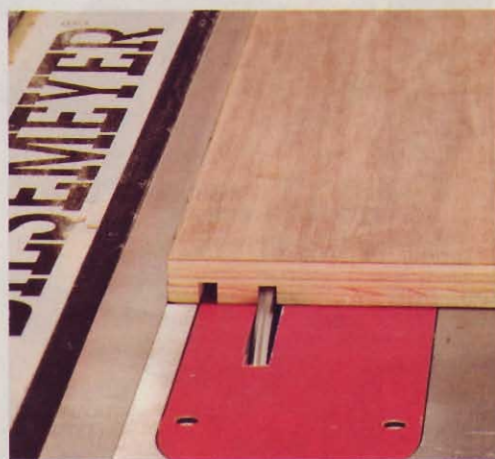
Building this project requires two sheets of walnut plywood (one 3/4-in. thick and one 1/4-in. thick) and about 40 bd. ft. of 5/4 walnut. The total cost, including glass and hardware (see Sources, page 60) is about \$600.

BUILD THE CABINET

1. Start by cutting the plywood panels and shelves to final size (Fig. A, page 56, A1-A4 and Cutting List, page 61).

2. Cut grooves for the sliding door tracks in the top and middle panels (Photo 1 and Fig. G, page 60. Cut the first groove in each

1 Saw grooves for the sliding door tracks in the top and middle cabinet panels. **Caution:** The blade guard must be removed for this operation.



2 Rip both cabinet sides from a single wide panel in which all the dados have already been routed. This method guarantees that the dados in both sides will align.



FIG. A EXPLODED VIEW

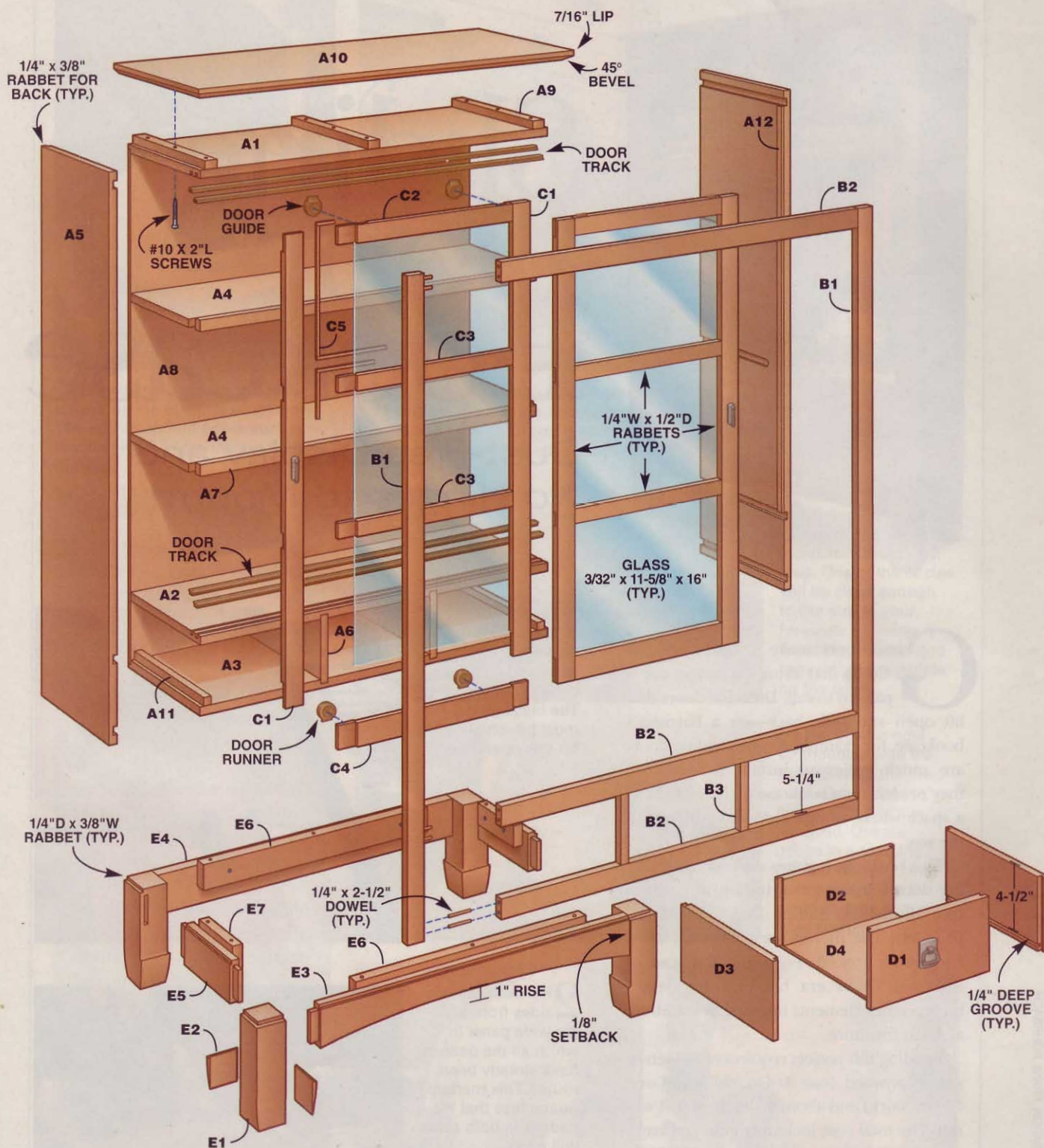
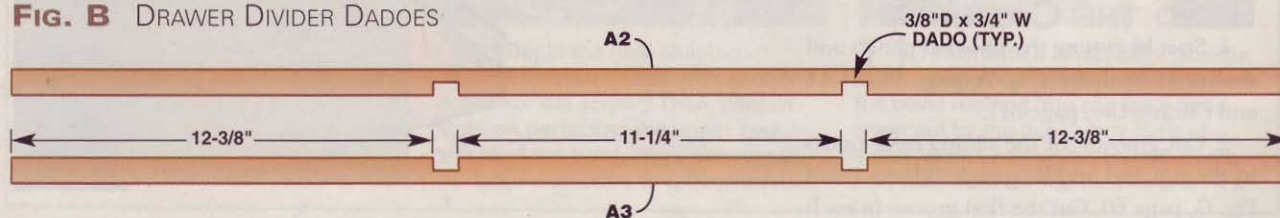


FIG. B DRAWER DIVIDER DADOES



panel, then reposition the fence and cut the second grooves).

3. Instead of cutting both cabinet sides (A5) to final size, cut one blank twice as wide as the sides, plus 1/8-in. Rip this blank in half after you've routed the dados, to create the sides (Photo 2). This method saves time and assures perfectly aligned dados. Plywood thickness is often undersize, so you may need a special bit to rout the dados (Fig. C and Sources, both on page 60).

4. Rout dados for the drawer dividers (A6) in the middle and bottom panels (Fig. B, page 56).

5. Rabbet the cabinet sides and the top and bottom panels for the 1/4-in. plywood back.

6. Glue the cabinet sides and panels together (Photo 3). The top and bottom panels run the full depth of the cabinet. The middle panel aligns with the rabbet at the back. Use cauls to evenly distribute the clamping pressure.

7. Glue in the shelves. They slide in from the back. Make sure their back edges are flush with the rabbets for the cabinet's back.

8. Glue on the shelf edging (A7). The edging hides the stopped dados in the cabinet's sides.

9. Glue in the drawer dividers.

10. Fit and install the sliding door track.

11. Cut and fit the plywood back (A8), but don't install it.

12. Glue spacers (A9) on the top panel. They allow fastening the top.

13. Glue up the top (A10) and cut it to final length and width. Then rout a 45-degree bevel around the front and sides.

INSTALL THE FACE FRAME

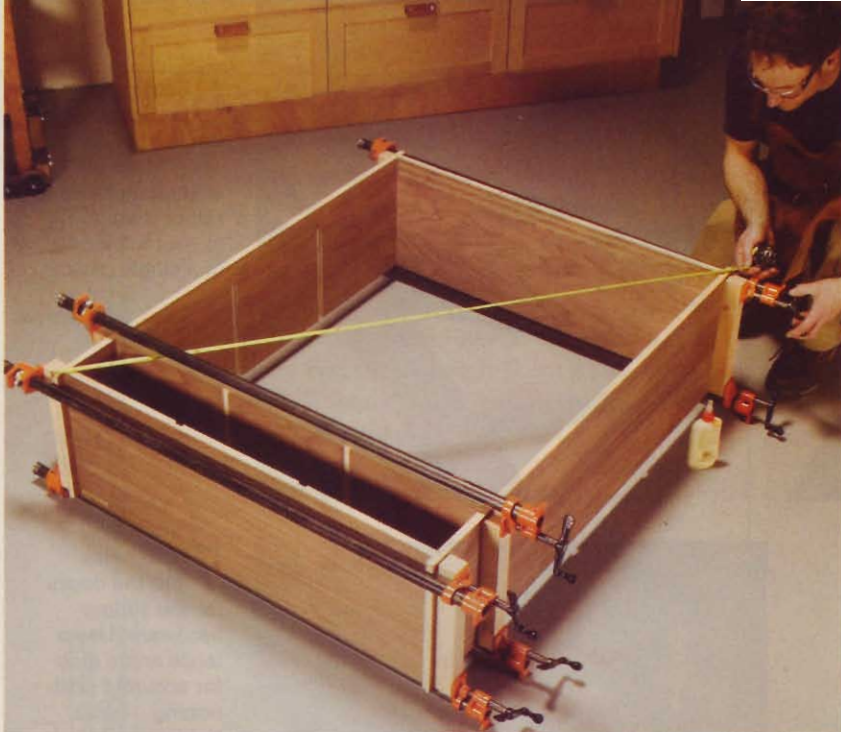
14. Cut the face frame stiles and rails (B1 and B2) to final length and width.

15. Assemble the stiles and rails with dowels. Make sure the assembly is square and the bottom and middle rails are spaced 5-1/4 in.

16. Glue the face frame to the cabinet. Make sure the top of the frame's bottom rail is flush with the top of the cabinet's bottom panel. Center the frame on the cabinet—it should slightly overhang on both sides. After the glue dries, trim the face frame stiles flush with the cabinet.

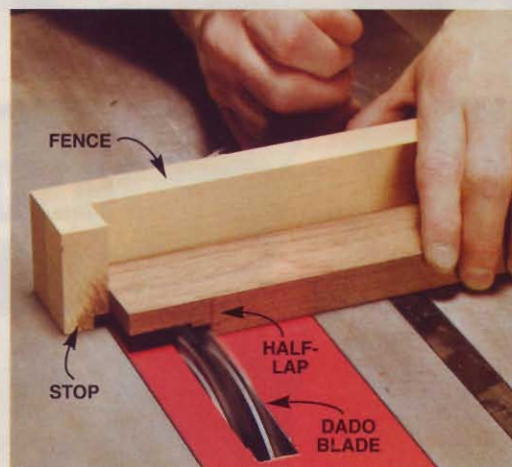
17. Glue on the dividers (B3).

18. Install the drawer guide blocks (A11). They fill the cavities behind the face frame, so the outside drawers track smoothly.



3 Glue the cabinet together in stages, starting with the sides and the top, middle and bottom panels. Measure diagonally to be sure the cabinet is square. Glue in the shelves and drawer dividers later. This two-stage method doesn't require as many long clamps.

4 Outfit your miter gauge with a fence and a stop to cut the doors' half-lap joints. The stop guarantees that all the tenons will be the same length.



5 Assemble the doors in two steps. First glue and clamp the two middle rails to the stiles and check for squareness. Then add the top and bottom rails and recheck to make sure the assembly is square.





6 Rout rabbets for the glass in the back of each door. Make several shallow passes, rather than trying to rout full-depth in a single pass.



7 Bore holes into the doors for the sliding hardware. Use a fence and a stop for accurate positioning. Add a hold-down to keep the door flat on the table.



8 Use a drawer lock bit (right) to build the drawers. It creates both sides of the joint using the same setting. Rout the drawer fronts and backs flat on the table. Rout the sides vertically against the fence.



9 The protruding drawer bottoms act as stops by bumping the back of the cabinet. Install each drawer and measure how far it protrudes beyond the face frame. Trim that much from the drawer bottom's back edge to make the drawer flush.

BUILD THE DOORS

19. Cut the door stiles and rails (C1-C4) to final width and length.

20. Cut the half-lap joints using a fence with a stop (Photo 4 and Fig. H, page 60). Make test cuts in scrap stock to dial in the blade's height and the stop's location.

21. Remove the stop to cut the stiles' inner half lap notches.

22. Dry fit each door to make sure all the joints fit. Glue and clamp the doors (Photo 5). Make sure the assembly is square.

23. Rout rabbets for glass in the backs of the doors (Photo 6). Square the corners with a chisel.

24. Drill holes for the sliding door hardware with a 35mm-dia. (or 1-3/8-in.-dia.) Forstner bit (Photo 7 and Fig. D, page 60). These holes must be precisely centered 13 mm from the doors' edges. The depth of the holes varies: The top holes are 12-mm deep; the bottom holes are 13-mm deep.

25. Press in the sliding door hardware, install the doors and test their operation. The center stiles won't align when the doors are closed until you add the door stop (A12). Fine-tune the alignment by adjusting the thickness of the stop or by jointing a

EURO-STYLE SLIDING DOOR HARDWARE

This system takes its cue from Euro-style cup hinges. The components press into 35-mm holes, install in seconds and adjust to fit. Each door requires two upper guides and two lower runners. Rollers integrated into the runners ride on the track's flange. The roller assembly adjusts in and out to raise or lower the door. Retractable tongues in the upper guides click up into the track after the door is tipped into position.



smidge off one or more of the doors' outside edges.

BUILD THE DRAWERS

26. Cut the drawer fronts, backs and sides (D1-D3) to final size. I made the grain flow across the front of the bookcase by cutting the drawer fronts sequentially from the same piece of walnut.

27. I use a router table and a special bit to cut the drawer joints (Photo 8 and Sources).

28. Rout 1/4-in.-deep grooves in the drawer fronts and sides for the drawer bottoms (D4).

29. Glue the drawers together. Make sure the bottom edges of the drawer backs align with the tops of the grooves in the sides, so the bottoms will slide in.

30. Cut the drawer bottoms to size, using walnut plywood left over from making the cabinet back.

31. Insert the drawer bottoms—they'll extend well beyond the back. Install each drawer to determine how much to trim off to make the drawer front flush with the face frame (Photo 9). Remove the bottom for trimming. Then reinstall and fasten it with nails or screws.

BUILD THE BASE

32. Glue together three 1-in.-thick pieces of walnut to create a blank for the legs (E1). Joint and plane this blank to 2-3/4-in.-square, then cut it into the four legs.

33. Cut mortises in the legs (Fig. F)

34. To create the Chinese-style horsehoof feet (Fig. E), rip and plane a pair of blocks (E2) to add to each leg.

35. Miter the blocks and glue them on (Photo 10).

36. When the glue is dry, rough-saw the top cove on your bandsaw. Then smooth the curves, using a sanding drum chucked in your drill press, or a spindle sander (Photo 11).

37. Transfer the outside curves to each foot, bandsaw them and sand them smooth (Photo 12).

38. Cut tenons on the aprons (E3-E5).

39. Saw the arc on the front apron and sand it smooth.

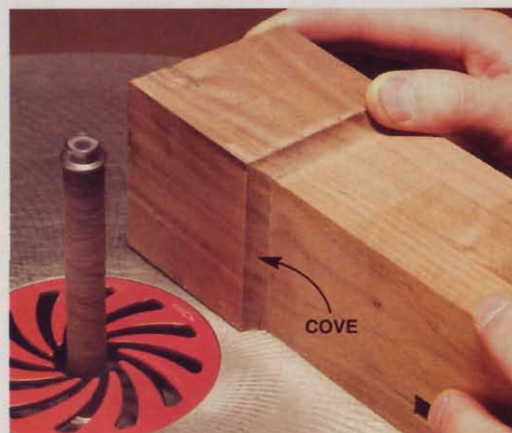
40. Dry-fit the base and check its dimensions. The depth and width should match the cabinet. Glue the base together. Make sure it's square.

41. Rout a rabbet around the top of the base (Photo 13).

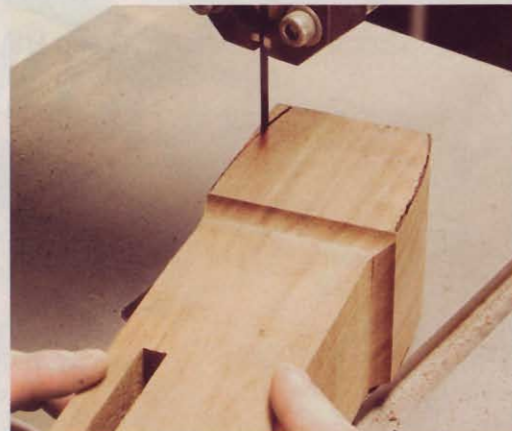
10 Create the horsehoof feet by building up the two inside faces of each leg. Miter the corner joint between the two added pieces.



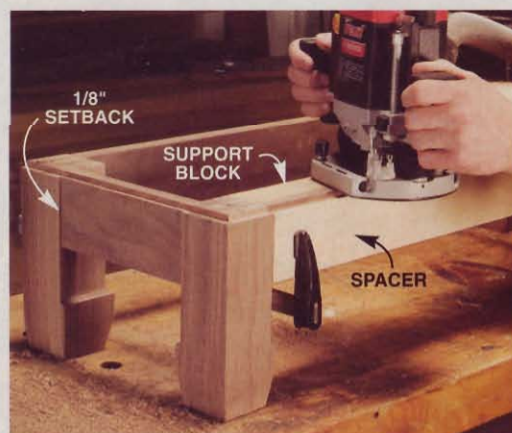
11 Sand coves to ease the transition between the glued-on blocks and the leg.



12 Bandsaw the outside curves on one face. Then turn the leg onto the adjacent face and cut a second set of curves.



13 Rout a rabbet on the top of the base. The rabbet creates a shadow line that hides slight dimensional differences between the cabinet and the base. Clamp on a support block to make the router ride smoothly and a 1/8-in. spacer to compensate for the apron's setback.





14 Attach the base to the cabinet with cleats. Glue and screw the cleats to the bottom of the cabinet, after positioning them flush against the aprons. Then screw the cleats to the aprons.



15 Install the inside door first, then the outside door. Installing both doors takes less than a minute.

FIG. C CABINET SIDE DADOES

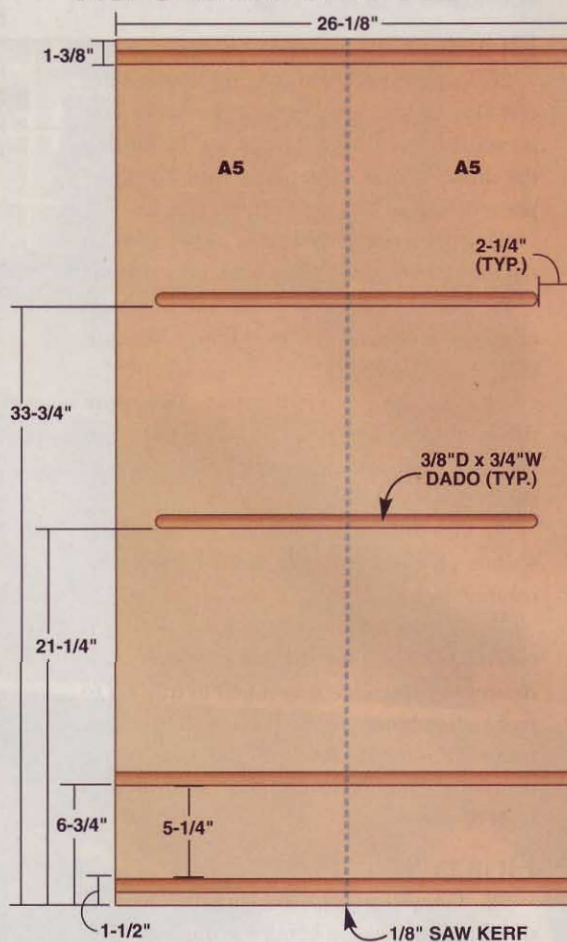


FIG. D DOOR HARDWARE MOUNTING HOLE LOCATION

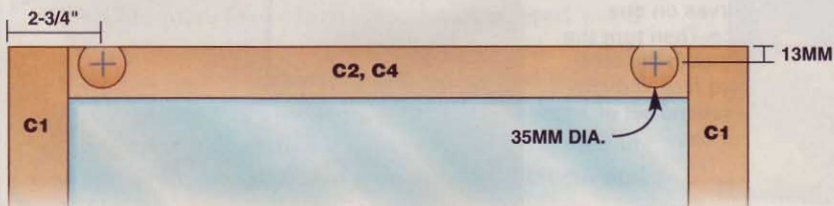


FIG. E LEG PROFILE

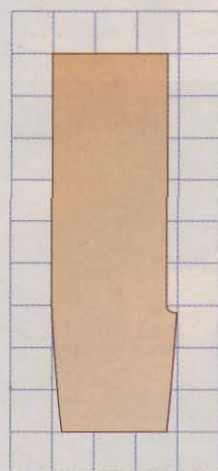


FIG. F BASE MORTISES & TENONS

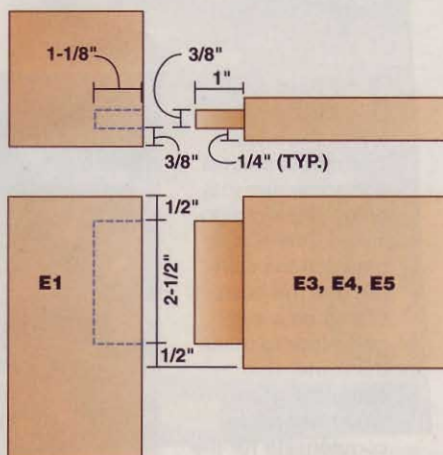
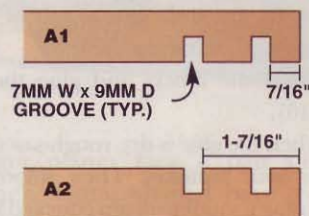


FIG. G DOOR TRACK GROOVES



Sources

Rockler, (800) 279-4441, www.rockler.com
 35-mm Forstner bit, #46532, \$17. European-Style Sliding Door Hardware Set, #88155, \$18.29 each (2 sets required). Stickley Dark Copper Pendant Pull, 1-1/4" x 1-3/4", #10877, \$22.00 each. Stickley Dark Copper Pendant Pull, 7/8" x 2-3/16", #26815, \$17 each.
 Freud, (800) 334-4107, www.freudtools.com
 23/32"-dia. Mortising Bit, #16-103, \$16. Rabbeting Bit, #32-102, \$35. Drawer Lock Bit, #99-240, \$37.

FINAL ASSEMBLY

42. Apply a finish before assembling the rest of the parts. I used a wipe-on urethane.

43. After the finish is dry, flip the cabinet upside down and align the base on the bottom of the cabinet.

44. Glue and screw cleats (E6 and E7) to the bottom of the cabinet (Photo 14).

Then attach the base by screwing

through the cleats into the aprons. Stand the cabinet right-side up.

45. From inside the cabinet, drill shank holes for screws through the top and the three spacers.

46. Clamp the top in position and then attach it with screws.

47. Screw on the plywood back (A8).

48. Install glass in the doors. Cut and fit the retaining strips (C5) and tack

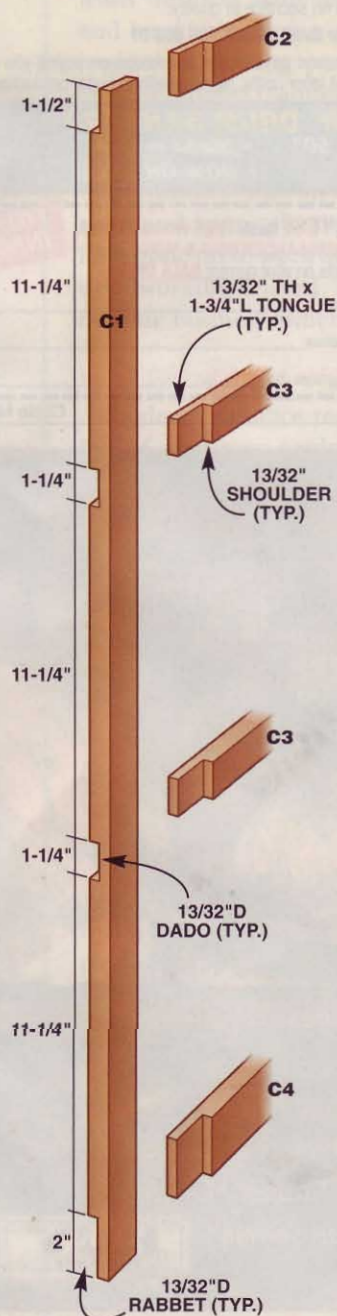
them in place.

49. Install hardware on the doors and drawers (see Sources).

50. Install the doors. Engage the bottom hardware, then tip the door upright to engage the top (Photo 15). You'll have to remove the inner door's pull to install the outer door.

51. Load up the cabinet, then sit down and relax with a good book.

FIG. H DOOR JOINERY



CUTTING LIST

OVERALL DIMENSIONS: 14-3/4"D x 40-1/4"W x 58-5/8"H

Part	Name	Materials	Qty.	Dimensions
Cabinet (w/out top)				
A1	Top Panel	Walnut Plywood	1	3/4"*** x 13" x 37-1/2"
A2	Middle Panel	Walnut Plywood	1	3/4"*** x 12-3/4" x 37-1/2"
A3	Bottom Panel	Walnut Plywood	1	3/4"*** x 13" x 37-1/2"
A4	Shelf	Walnut Plywood	2	3/4"*** x 10" x 37-1/2"
A5	Side*	Walnut Plywood	2	3/4"*** x 13" x 48-3/4"
A6	Drawer Divider	Walnut Plywood	2	3/4"*** x 6" x 12-3/4"
A7	Shelf Edging	Walnut	2	3/4" x 1" x 36-3/4"
A8	Back	Walnut Plywood	1	1/4"*** x 37-1/2" x 46-5/8"
A9	Spacer	Pine	3	5/8" x 1-1/4" x 13"
A10	Top	Walnut	1	7/8" x 14-3/4" x 40-1/4"
A11	Drawer Guide Block	White Oak	2	3/4" x 3/4" x 12-1/2"
A12	Door Stop	Walnut	1	1/4" x 3/4" x 39-7/8"
Face Frame				
B1	Stile	Walnut	2	3/4" x 1-1/2" x 48-3/4"
B2	Rail	Walnut	3	3/4" x 1-1/2" x 35-3/8"
B3	Divider	Walnut	2	3/4" x 3/4" x 5-1/4"
Door				
C1	Stile	Walnut	4	13/16" x 1-3/4" x 39-3/4"
C2	Top Rail	Walnut	2	13/16" x 1-1/2" x 19-1/8"
C3	Middle Rail	Walnut	4	13/16" x 1-1/4" x 19-1/8"
C4	Bottom Rail	Walnut	2	13/16" x 2" x 19-1/8"
C5	Glass Retainer	Walnut	24	3/16" x 3/8" x cut to length
Drawer				
D1	Front	Walnut	3	5-1/8" x 11-3/16" x 13-1/4"
D2	Back	White Oak	3	1/2" x 4-1/2" x 11-3/16"
D3	Side	White Oak	6	1/2" x 5-1/8" x 12-3/4"
D4	Bottom	Walnut Plywood	3	1/4"*** x 10-5/8" x 13-1/2"
Base				
E1	Leg	Walnut	4	2-3/4" x 2-3/4" x 9"
E2	Block	Walnut	8	1/4" x 3" x 3"
E3	Front Apron	Walnut	1	7/8" x 3-1/2" x 34-3/4"*****
E4	Back Apron	Walnut	1	7/8" x 3-1/2" x 34-3/4"*****
E5	Side Apron	Walnut	2	7/8" x 3-1/2" x 10-1/4"*****
E6	Long Cleats	Pine	2	1" x 2-1/2" x 24"
E7	Short Cleats	Pine	2	1" x 2" x 7-3/4"

*Rip both sides from one 26-1/8"-wide blank

**Nominal plywood thickness

***Trim flush after mounting

****Includes 1"-long tenons on both ends

Seth Keller designs and builds custom furniture in the Twin Cities, where he lives with his wife Michelle and cat Luis. He studied literature and art at UW-Madison and UNC-Asheville and Interior Design at Parson's School of Design in New York City. Seth is a member of the Fourth Street Guild, a cooperative woodworking shop. He's a regular contributor to American Woodworker.

Cube ^{in a} Cube



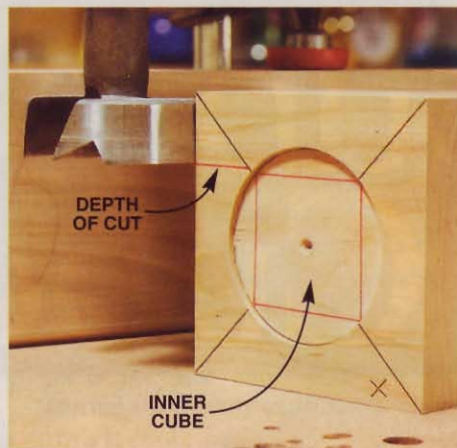
"Kids play with it like a toy, but it drives adults nuts. They think it's a puzzle. They're sure there's some way to get the little cube out of the big cube. You can't."

by Jock Holmen

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1 Crosscut a 3x3x14-in. blank into four cubes. Solid wood is best, so it doesn't look like you put the little cube in the big cube by gluing parts together. Three-in. table-leg stock works well, but you can make the cubes from 2-1/2 in. or smaller stock if you want.



5 Set the bit's depth of cut. Draw a line from the point where a diagonal intersects the hole you made. Adjust the drill press so the bit stops about 1/16 in. above this line. This method works for any size cube and any size hole. (I've drawn the inner cube so you can see how this works.)



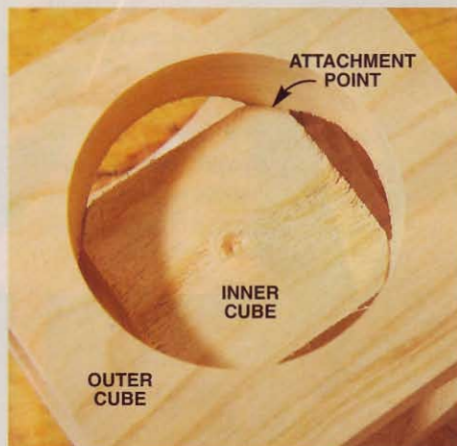
2 Mark center-lines on one face. Mark one corner of every face with a small X. You'll be drilling each hole more than one time. The X's will help register the cube in the same orientation on the drill press.



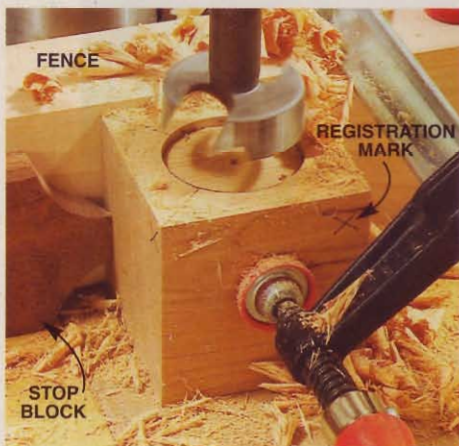
6 Drill holes in the end-grain sides first. Then drill the other four faces. Always place the X's in the same corner relative to the fence and stop block.



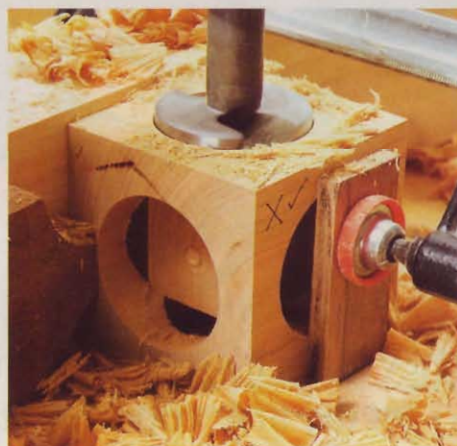
3 Set your drill press to run at its slowest speed. Arrange the belts so the smallest diameter drive pulley turns the idler pulley. Connect the idler to the largest diameter spindle pulley.



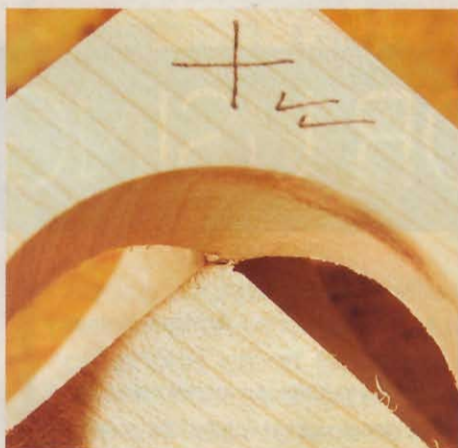
7 Drilling all six faces produces a cube in a cube. The inner cube is attached to the outer cube by a thin section of wood. The reason for drilling the end-grain faces first is to avoid breaking these weak attachment points. End-grain drilling requires more downward pressure than face-grain drilling.



4 Set up your drill press with a 2 in. Forstner bit. (Use a smaller bit with a smaller block.) Position a fence and stop block so the bit drills exactly in the cube's center. Drill one hole about 1/16-in. deep.



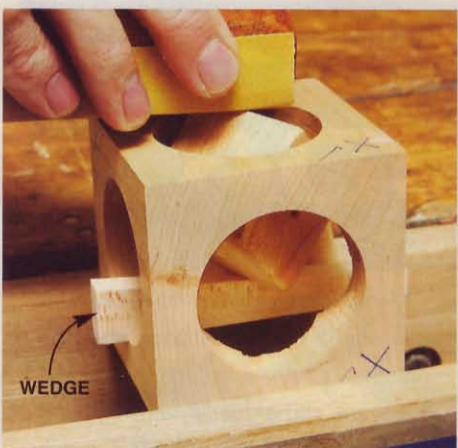
8 Set the drill bit 1/32-in. deeper and repeat drilling all the holes. Again, drill the end-grain faces first. Use light pressure to avoid breaking the attachment points.



9 As you drill, check the thickness of the attachment points. Your goal is to make them as small as possible, to the point where the inner cube almost releases itself. This may require drilling some holes a tiny bit deeper. Draw check marks to show how many times you've drilled each hole.



10 Release the inner cube by cutting the attachment points with a thin knife, going with the grain. After cutting all eight corners, the inner cube will drop free. But it won't come out!



11 Sand the corners of the inner cube. Raise the inner cube above the hole by positioning it at a diagonal. Prop up the cube with a wedge or your fingers.



12 Sand burn marks or rough grain with a fine-grit drum-sanding attachment. Rub the drum with a crepe-rubber belt cleaner now and then to keep the drum working efficiently.

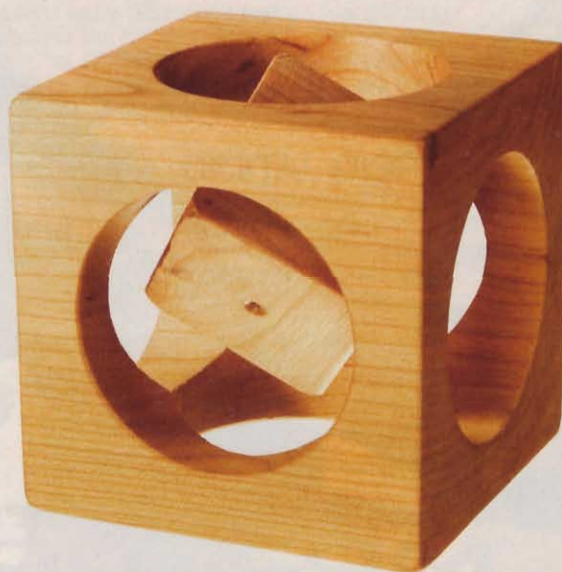


13 Smoothing the faces of the inner cube is tough, because they're hard to get to. I usually just leave them alone, but if you must do some clean-up work, use a file to start, then switch to sandpaper.



14 Dip the cube in oil to finish it. Rub thoroughly with a rag to remove the excess oil, and you're ready to play!

"I'm a carver. I've always admired whittled curiosities like balls trapped inside a cage, but never wanted to spend the time to make them. I figured there must be some way to make a similar object with a drill press."



TIPS FOR USING

by Mitch Kohanek

Recently I was asked to judge a woodworking show. One of the best pieces was a wonderfully constructed grandfather clock. Unfortunately, a quick brushing of polyurethane ruined the clock's appearance. The clock's creator said he chose polyurethane for protection. But how durable does a coating on a grandfather clock have to be? Why put a finish originally designed for floors on a beautiful clock? What a difference shellac would have made. Don't get me wrong, polyurethane is a great choice for high wear surfaces like a desk or kitchen tabletop. However, I find people use poly by default simply because it's readily available as well as durable. But is durability all that matters? There are many other considerations that make shellac a great choice for adding beauty and protection to your projects.

Many woodworkers have walked (stormed) away in frustration after trying shellac. It's a unique finish and there are some fundamental ground rules one must follow. The tips in this story cover the basics that will get you going on the right track.

Mitch Kohanek is a member of the American Institute of Conservation and has interned at the Smithsonian Museum Conservation Institute in Washington D.C. He founded the National Institute of Wood Finishing at Dakota County Technical Center where he has been the primary instructor for 29 years. It is the only certified wood finishing school in the country. Visit his website at www.woodfinishing.org.



SHELLAC

Make friends with this beautiful, versatile finish.

SHELLAC'S MANY ADVANTAGES

- **Non-toxic** - Shellac is one of the safest finishes you can use. It is a naturally occurring material that's approved by the FDA to coat apples, candy and pharmaceuticals. When mixed with pure grain alcohol, shellac is free of toxic chemicals.
- **Repairable** - A damaged or worn shellac finish is easy to restore or repair.
- **Rubs out well** - Shellac is harder than most finishes. The hardness gives it excellent rubbing qualities.
- **Excellent moisture barrier** - If you want to keep wood movement to a minimum, shellac can't be beat.
- **Fast drying** - That means fewer troubles with dust settling into a wet film. You can usually recoat in under an hour for a fast build.
- **Universal sealant** - Dewaxed shellac can be used as a seal coat under almost any finish.
- **Less Sanding** - Shellac does not require sanding between coats in order for one coat to adhere to another.



BUYING ADVICE

Should you buy waxed or dewaxed shellac? Wax occurs naturally in shellac. If shellac is going to be the only finish, then shellac with wax works fine. The wax decreases drag when padding or brushing shellac. If shellac is used as a sealer or undercoat for other finishes, choose the dewaxed version to avoid adhesion problems, especially with polyurethane. Dewaxed shellac also has greater clarity and is more heat and water resistant. You can dewax your own shellac by letting the wax settle out and pouring off the clear dewaxed portion.

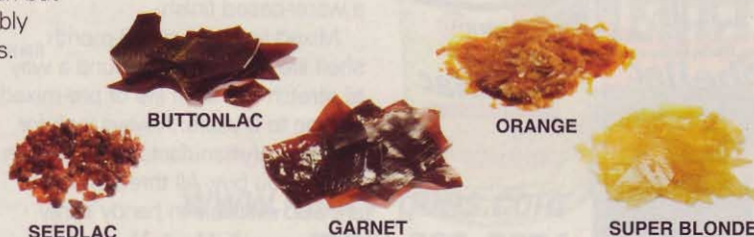
The next decision a shellac buyer makes is color. A good rule of thumb is to use the darker colors on dark woods and light colors on light woods.

Shellac is a natural product made from lac beetle (*Lacifer lacca*) excretions. Shellac comes in colors that range from dark reddish brown to a golden amber color depending on the time of harvest and degree of processing. There are five commonly available grades of shellac from least to most refined: seedlac, buttonlac, garnet, orange and super blonde.

Seedlac is simply collected from the trees, washed and dried. It still contains leaves, sticks and bug parts. Buttonlac has been filtered a bit. It has a rich, dark brown color. Garnet is a little lighter colored and has more red than but-

tonlac. Orange shellac is probably the most familiar grade to consumers.

Super blonde shellac is the most highly refined. It has most of the color and all the wax removed. All dry shellacs should be strained through a fine filter after mixing.



THE RIGHT MIX



Using shellac that is mixed too thick is the #1 mistake people make. Until you gain experience using shellac, it's best to thin your shellac to a 1lb. cut (1-lb. of flakes dissolved in 1-gal. of alcohol). Old-time cabinet-makers used pure ethanol, or "spirits", to mix their shellac. Pure ethanol is still sold at liquor stores in some states as "Everclear" (\$20 a quart). Make sure it's the 190-proof stuff.

When mixed with dry shellac flakes Everclear produces an all-natural, non-toxic finish (safer than any water-based finish). When the liquor store cashier wonders where the heck you're going with a case of 190-proof Everclear, just say, "I'm going to get shellacked"!

Denatured alcohol is the most common solvent for shellac. It costs a lot less than Everclear. It's essentially ethanol contaminated with another chemical to poison or "denature" the ethanol. This saves you from paying a liquor tax.

Specialty alcohols that contain no water (200 proof) are also available. These alcohols are blended to dissolve shellac a little quicker and dry a little slower, so it has more time to level out.

GRIND YOUR OWN FLAKES

Shellac flakes take quite a while to dissolve. When my shop is cool, I've had to wait more than 2-days. Too often I failed to plan ahead and have been forced to wait for my shellac to dissolve before work could progress.

You can greatly reduce the time it takes to mix shellac by grinding up the flakes. A simple blade-type coffee grinder does the trick. Warm temperatures also speed up the process. If your shop is on the cool side, find a warm place to mix your shellac. I've been known to put a jar in my car on a sunny day. In an hour or less the ground flakes are totally dissolved.



SMOOTH OUT THE FINISH

Brushed-on shellac can "window pane", leaving fat thick edges. It can also "orange peel" when sprayed. This happens most often with heavy mix, so keeping your shellac thin (1-2lb. cut) is your best defense. If you are still having problems, try some "Shellac-Wet." Just a few drops in a quart of shellac will greatly improve flow-out and leveling. Do not use this additive if you plan to topcoat the shellac with a different finish, as it may cause adhesion problems.



READY TO USE

Zinsser's "Amber" shellac is a ready to use orange shellac and their "Clear" shellac is a blonde shellac. Both of these products contain wax and come as a 3-pound cut that should be thinned to a 1-2 pound cut before use.

"SealCoat" is a 2-pound cut of dewaxed blonde shellac. SealCoat is a universal sealer that adds just the right amount of warmth and color under a water-based finish.

Mixed shellac has a 6-month shelf life. Zinsser has found a way to stretch the shelf life of pre-mixed shellac to 3 years. Always look for the date of manufacture on the can before you buy. All three products are also available in handy spray cans.



QUICK MIX SHELLAC



For quick repair work, or for those times when you didn't mix quite enough shellac there's "Gold Dust." It's basically pulverized shellac that's light yellow to amber in color. The powder is designed for fast, no-wait mixing of small batches.

CONTROL THE SHEEN

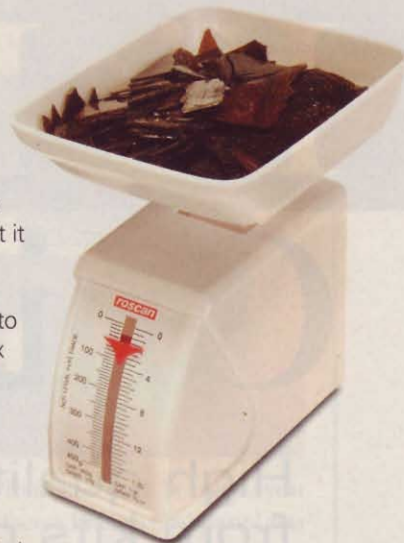
Most woodworkers are used to buying finishes with the desired sheen (gloss, semi-gloss, satin or flat) right off the shelf. With shellac you have one choice – high gloss. Traditionally shellac's sheen was adjusted by rubbing it out. Shellac is easy to rub to a glass smooth finish with the desired sheen. However, carved or heavily molded surfaces can be tricky to rub out. Thankfully, you can add a flattening agent like Shellac Flat to adjust the sheen. Shellac Flat is made with amorphous silica and alcohol.



MIX SMALL BATCHES

I make shellac in small batches so it won't go bad before I can use it up. Mixed shellac's shelf life is about 6 months. After that it may not dry properly.

I use a small food scale (available at grocery stores) to weigh out the flakes. To mix one pint of 1-lb.-cut shellac, dissolve 2 oz. of shellac flakes in 16 oz. of alcohol. For a 2-lb. cut, double the flakes. After the shellac is fully dissolved, strain it through fine mesh cheesecloth or filter to remove impurities.



CUSTOM COLORS

Shellac is easy to color. Whether you're looking for deep, soft brown or garish cadmium yellow, shellac can handle it. Just add alcohol-based dye. For pure colors, super-blond shellac works best.



USE THE RIGHT BRUSH

Using the right brush is essential if you want your relationship with shellac to start off on the right foot. An inexpensive oval sash brush, like the Biest-Liebco #12 shown here, is perfect for applying shellac on trim work and molded edges. The natural china bristles easily wrap around contours without leaving big drips.

Golden Taklon is an amazing synthetic material used on brushes like the Athena 7100 Series. The bristles are wonderfully fine and soft and give you a precise edge and control. A high quality natural bristle brush with a chisel edge, like the Dunnet Fitch, is great for applying shellac on a large, flat surface like a tabletop.

SOURCES

Homestead Finishes, (216) 631-5309, www.homesteadfinishing.com Shellac-Wet, #7099, \$10, 2 oz. Shellac Flat, #7080, \$13, 16-oz. Dunnet-Fitch Brush, 2-1/2-in., \$34. Biest-Liebco Birch Oval Sash, #12, \$12. Athena Series 7100 Golden Taklon, 1-1/2", \$32.

Wood Finishers Depot, (866) 883-3768, www.woodfinishersdepot.com "Gold Dust" Ground Shellac, 1/2 pound, #SH1-8, \$6. Shellac Thinner-200 Proof, 1-quart, #LT200-Q, \$9.

Woodworker's Supply, (800) 645-9292, www.woodworker.com J.E.Moser's Seedlac, #848-817, 1-lb., \$17. J.E.Moser's Buttonlac Pure Flake, #848-824, 1-lb., \$18. J.E.Moser's Garnetlac, #848-831, 1-lb., \$21. J.E.Moser's Orange Shellac, #848-838, 1-lb., \$20. J.E.Moser's Super Blonde (dewaxed), #848-845, 1-lb., \$26.

Shellac.net, www.shellac.net Shellac Colour Sampler 5 Pack, five 4-oz. pkgs. of PLATINA (Platinum Blonde Dewaxed, Ruddy Amber (Dewaxed), Kusmi (Caramel Amber) Button, Garnet, Kusmi Seed; \$25. DEWAXED Shellac Sampler 5 pack, five 4-oz. pkgs. Of Dewaxed Super Blonde, Dewaxed Beige (Almost Blonde), Dewaxed Orange, Dewaxed Lemon, Dewaxed Garnet, \$25.

Kit-Built Guitars

High quality guitars
from kits designed
to fit your skill level.

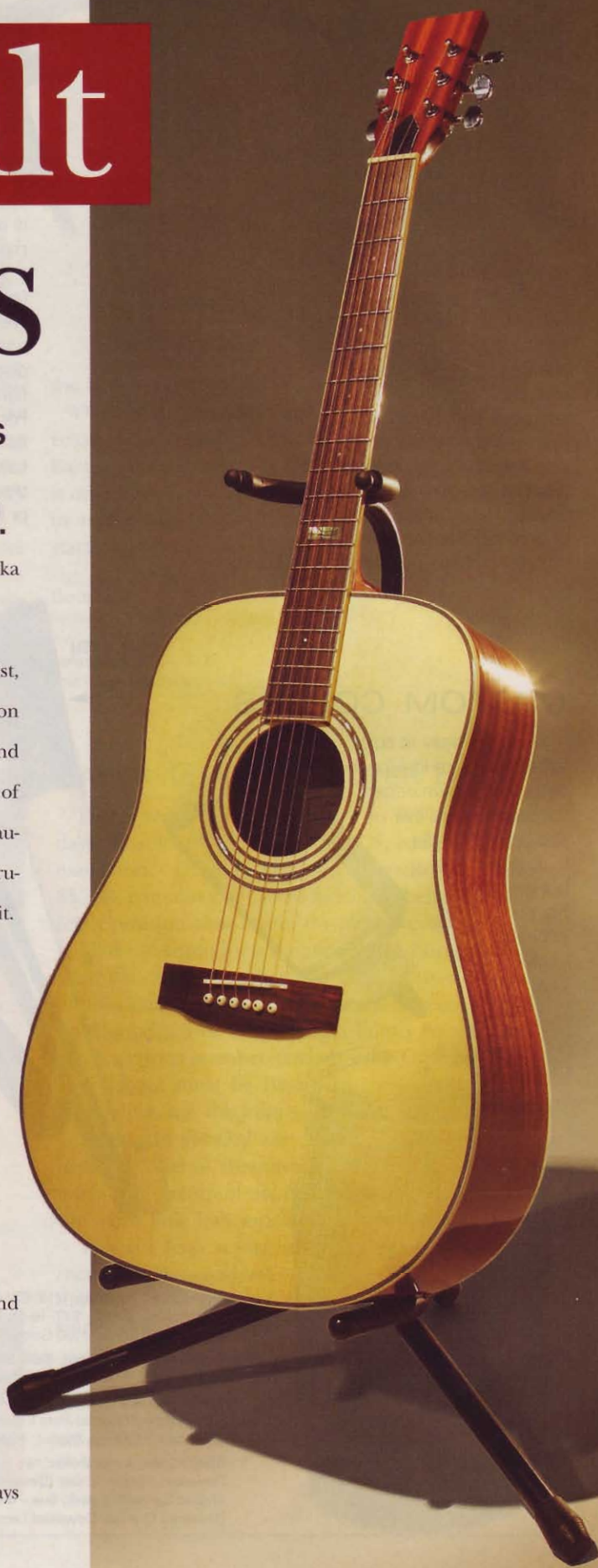
by George Vondriska

Guitar making was never on my to-do list, but then I stumbled upon a guitar kit on the internet. I ordered it, built it, and have been hooked ever since. Just seeing the anatomy of a guitar and how the parts work together to make a beautiful sound, was really cool! Now that I have an instrument I made myself, I should really learn how to play it.

This story gives an overview of what it takes to make a guitar from a kit. I picked guitar kits from Grizzly, Musicmakers, U.S. Guitar and Stewart-MacDonald, priced from \$80 to \$400. The four kits cover a range of prices, skill levels and styles. In general, the more expensive kits will give you a better sounding guitar because they are built more from solid wood and with higher quality materials. Before you buy, visit their websites – these companies offer more kits than just these four.

SPECIAL TOOLING

If you're reasonably good at problem solving and improvising in the shop, you can build even the most sophisticated kit without buying special tools. The Grizzly and Musicmaker's kits don't require any specialized tooling. The U.S. Guitar and Stewart-MacDonald kits call for some specialized tooling like a tiny rabbeting bit and a tapered reamer. But, as with most woodworking projects, there are always work-arounds.



Hide glue is the luthier's traditional adhesive. That's because hide glue is reversible so repairs and adjustments are easier to perform. That said, all four kits give you the green light to use the more familiar yellow glue.

SOLID VERSUS LAMINATED MATERIALS

Guitar bodies (the sides, top and back) are made out of laminated material (think very thin plywood), solid wood, or some mix of the two. Using solid wood throughout the guitar provides the best sound, but adds significantly to the kit's cost. Most of the sound quality comes from the guitar's top. A solid-wood top combined with laminated sides and back is a good compromise between sound and price. Other factors like the shape and placement of bracing also affect the guitar's sound.

BODY WORK

The Stewart-MacDonald and Musicmakers kits require the builder to assemble the sides then glue the bracing to the top and back (Photos 1 - 3). The shape and placement of each brace affects the guitar's voice. By removing some material from the bracing you're making the top respond differently to the sound from the strings. Of course there's a limit. If you remove too much bracing material the top will become too flexible and distort under string tension. There's a real art to the science of bracing. It's best to do some research if you want to experiment. Otherwise, play it safe and follow the manufacturer's brace pattern and don't worry about reshaping the stock braces, they work well as is.

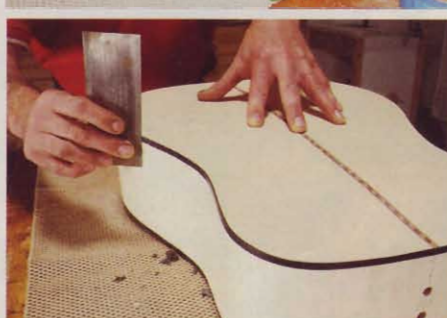
The top and back are attached oversized (Photo 4) then flush-trimmed to the sides. Next, a rabbet is cut for a decorative inlay (called binding) where the sides meet the top and bottom. The rabbet is much smaller than a standard rabbeting bit can create. A special bit is available (\$85) to do the job. Glue in the binding (Photo 5) then trim flush (Photo 6).

SHAPE THE NECK

One of the great things about making your own guitar is you can customize it to suit your taste and needs. For example, you can shape the neck to better fit your hand (Photo 7). My wife's commercially made guitar has a neck that's too wide for her. She loves the thinner neck I made on my guitar. You can also add your own personal touch to the guitar (Photo 8). Most kit companies offer cool hardware upgrades you can build into your kit or add on later.

THE NECK TO BODY JOINT

Joining the neck to the body is crucial to a well made guitar. There are three common ways to make this joint: dowels, bolts, or a dovetail.



1 The more advanced kits, like the Stewart-MacDonald (shown) and the Musicmakers, require you to build the guitar body. Assembly starts with the preformed sides.

2 Detailed plans help you attach bracing to the top and back on the Musicmaker's and Stewart Macdonald kits. Pro luthiers develop unique bracing schemes for a signature sound to their instruments.

3 Reshaping the bracing is an option on kits that require body assembly. Removing material from the braces alters the sound of the guitar. Experience is the best guide for customizing a brace profile.

4 Got clamps? You may use every clamp in your shop to glue on the top and back. Only the Grizzly kit allows you to skip this step. This joint must be made uniformly tight with light, even pressure.

5 Binding adds a clean detail where the top and bottom join the sides. Some kits require you to rout the rabbet and apply the binding. Masking tape acts like a thousand little clamps.

6 A card scraper works well to flush the binding with the guitar body. Be extra careful with laminated materials, you don't want to go through the veneer on the body.



7 Fine-tune the shape of the neck to fit your hand. You can use a spoke-shave, file or a sander.



8 Customize the look of your guitar. I carved a horse on the peghead of my guitar and replaced the original veneer with a herringbone pattern of cherry.



9 A bolt-on neck joint makes assembly easy. It can be taken apart if future repairs are necessary. The traditional dovetail joint is trickier to fit, but stronger. It's available as a no-cost option on the Stewart-MacDonald kit.

The Kits we built.



GRIZZLY INDUSTRIAL

- Laminated sides, top, and back
- No machining required
- Dowelled neck

The Grizzly kit gets pretty close to instant gratification. The time from opening the box to gluing together the neck and body is very short. The kit's low price and ease of assembly make it a great first guitar for you or to work on side by side with a young person.

Classical Guitar Kit, (800) 523-4777, www.grizzly.com H3122, \$80.



MUSIC-MAKERS

- Solid sides, laminated top and back
- Body construction required but, unique neck-to-side joint simplifies assembly
- Binding is optional

The Renaissance Guitar from Musicmakers is a teardrop shaped guitar based on early guitars of the Renaissance. Although this kit requires gluing the bracing, the process is very straightforward with their excellent plans. If you can follow directions, you can build this guitar.

Renaissance Guitar, (800) 432-5487, www.musikit.com \$300.



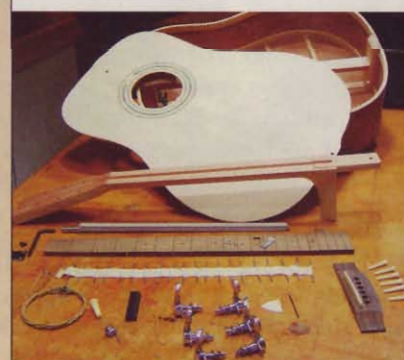
U.S. GUITAR

- Solid top, laminated sides and back
- Sides and back pre-assembled
- Bolt on neck
- Includes hardshell case
- Binding is builder installed

This is a great kit for an intermediate woodworker.

It comes with the back and sides glued together, but a loose top. The bracing is pre-glued to the back and the top. This was the only kit that included a hard shell case.

Sycamore Kit, www.usguitarkits.com \$300.





10 Positioning the bridge is critical. The bridge must be placed an exact distance from the 12th fret on the fingerboard for proper intonation. Every kit requires this step, but the procedure is well described in the manuals.



11 The nut is glued in place at the top of the fret board. You may have to file or shim the nut to fine-tune the action or height of the strings off the fingerboard.



12 Pin the strings to the bridge using tapered pegs. Tune the guitar and you're ready to play or, in my case, start learning how to play.



STEWART-MACDONALD

- All solid wood construction
- Dovetailed neck
- Fingerboard requires shaping
- Binding and body construction req.

The Stewart-MacDonald kit involves the most work and highest skill level. The instructions and DVD are excellent. Nothing is pre-assembled but you do get preformed sides and some machined parts. The quality of the parts and opportunity to customize the guitar's sound make this an appealing kit for the advanced woodworker. It's interesting to note that some professional luthiers use this kit as a starting point. They tweak the details according to their own specs and sell the finished product as a customized instrument.

Dreadnought Guitar with Indian Rosewood, (800) 848-2273, www.stewmac.com \$425.



Bolting the neck to the body (Photo 9) is easy, strong and allows the neck to be removed for repairs. Dowels are easy too, but difficult to remove for repairs. In addition, dowels aren't as strong as bolts over time. Luthiers prefer a dovetail for attaching the neck to the body. It's stronger than bolts or dowels, but it's also the hardest joint to fit. Expect some fussy handwork when using this joint.

TIME TO FRET

The Grizzly kit comes with the frets already installed on the fingerboard. The other kits require you to tap the frets in place. On the Stewart MacDonald kit, you also shape the fingerboard to fit the neck. Before gluing the fingerboard, you set a truss rod into the neck. The truss rod can be adjusted to counteract wood movement and adjust the height of the strings off the fingerboard. Adjusting the height of the strings is known as adjusting the action of the guitar.

Installing the bridge is a critical operation (Photo 10). On some kits, you'll also need to create the tapered holes for the pegs that hold the strings to the bridge. A tapered reamer is worth every penny for this job.

The nut at the top of the fingerboard is now glued in place at the end of the fingerboard (Photo 11). On some kits the nut is cut to length and shaped for you. On others you'll need to do all the work. You may need to file or shim the nut, depending on how it affects the guitar's action or position of the strings above the frets.

FINISH

Nitro-cellulose lacquer is the typical finish for guitars. Shellac is an excellent alternative. Both finishes are easy to repair and restore. The bridge and fingerboard should not be coated with a film finish, but can be lightly coated with linseed or tung oil.

STRING IT AND PLAY IT

With the finish complete you can fasten the tuners and string your guitar (Photo 12). Once the strings are under tension, fine-tune the guitar's action with the truss rod. The action is primarily controlled by the height you set for the nut and bridge. Even though its primary purpose is to keep the neck straight, you can adjust the truss rod to raise or lower the strings a bit. The higher the strings, the less prone they are to buzzing when banging out those Ozzy Osbourne chords. The lower the strings, the easier it is to finger those super fast Metallica licks. Have fun!

Tablesaw Extension

MAKE WIDE
CUTS IN
A SMALL
SHOP.

There's not enough room in my garage shop for a tablesaw with a 52-in.-capacity rip fence. But no worries—I don't need one! To make wide cuts, I simply install a shop-made extension that bridges my saw to the wall—and doubles its 30-in. rip capacity!

I made my extension by framing a piece of 3/4-in. mdf with rails on three sides. I covered the top of the extension—and the face of its fence—with plastic laminate.

I attached U-shaped mounting brackets to the wall and the saw. The extension simply drops in place (see Fig. A and top photo, page 75). I had to drill holes through the saw wing to mount the saw bracket. A cleat on the bottom of the

extension wing hooks into the saw bracket. The wall brackets's wide "U" makes it a bit easier to jockey the tablesaw into position, because it allows a little wiggle room.

I routed grooves in the extension to recess the T-track and the adhesive-backed rules. To calibrate the rules, I set the extension's fence parallel to the blade and made a test cut. The width of the test piece now indicated the fence's distance from the blade, so I used its measurement to install the rules (middle photo, page 75). An L-shaped storage cleat mounted on the extension's bottom allows storing the extension wing vertically (bottom photo, page 75).

by Roy Smith



The extension installs easily. Its front and back rails capture the saw bracket to minimize movement.

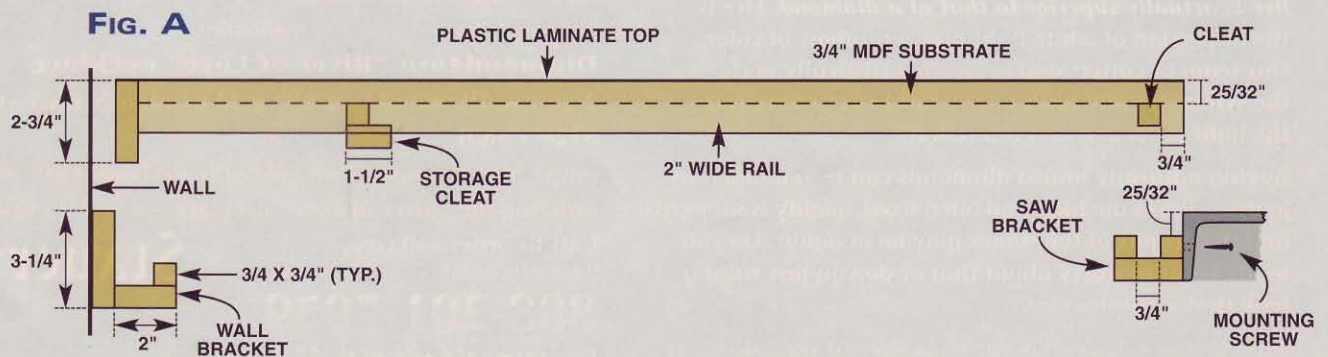


Use both rules to set the fence. The rules are calibrated so the fence is parallel to the blade when both measurements match.



The extension table stores on the wall. This flexibility frees shop space that would have been occupied by my saw if it had a super-wide-capacity rip fence.

Source
Rockler, (800) 279-4441, www.rockler.com, 36033 Aluminum T-Track, 3/8" x 3/4" x 36", \$11 ea. 33965 1" T-Slot Bolt, \$.79 ea. 71514 2" T-Knob, \$1.29 ea. 69116 Left-to-Right Self Adhesive Rule, 6', \$8 ea.



magazine rack

by Bruce Kieffer



A simple design
that will test your skills.

EDITOR: DAVE MUNKITTRICK • ILLUSTRATOR: BRUCE KIEFFER

A friend of mine recently asked me to make a mission style magazine rack as a special gift for her husband. So off to my computer I went and designed this piece.

At first glance the project looks simple, but the wedged through tenons present a challenge. Getting them to fit perfectly requires patience, careful machine setups, and a bit of fine-tuning with a chisel. Keep in mind that a small project like this really benefits from meticulous attention to detail. I like to say it's a weekend project that will take two weekends to build. Here's how it's made:

RAILS AND SLATS

1. Cut the slats (C) and rails (B). Lay out the slat mortises and the through mortises for the wedges on the rails (Fig.B).

2. Chop the angled mortises for the tenon wedges in the rails (Photo 1).

3. Switch to a 1/2-in. chisel. Cut a sample mortise the same size as the ones that will be cut in the sides (Fig. B). Use the sample mortise to size the rail tenons.

4. Cut the through tenons on the rails (Photo 2).

5. Use the mortising machine to chop the slat mortises in the rails.

6. Cut the slat tenons. Note that the backs of the slats align flush with the backs of the rails. This ensures that magazines won't catch on the lower rail.

7. Sand the slats and rails, then dry fit them together.

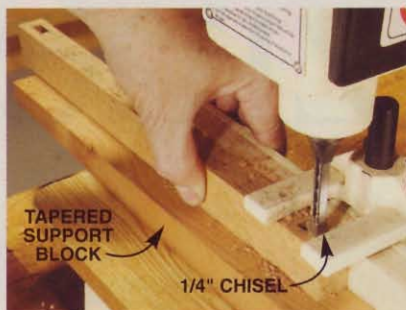
MAKE THE SIDES

8. Cut the sides (A) but leave them 1/16-in. oversize in thickness. This allows you to clean up any blow-out from chopping the through mortises.

9. Cut the angled top on a miter saw. Cut the long taper on the front edge on the bandsaw.

10. Use the assembled front grill to locate the through mortises on the sides (Photo 3).

11. Chop the side mortises. To insure a tight fit on the tenon, keep

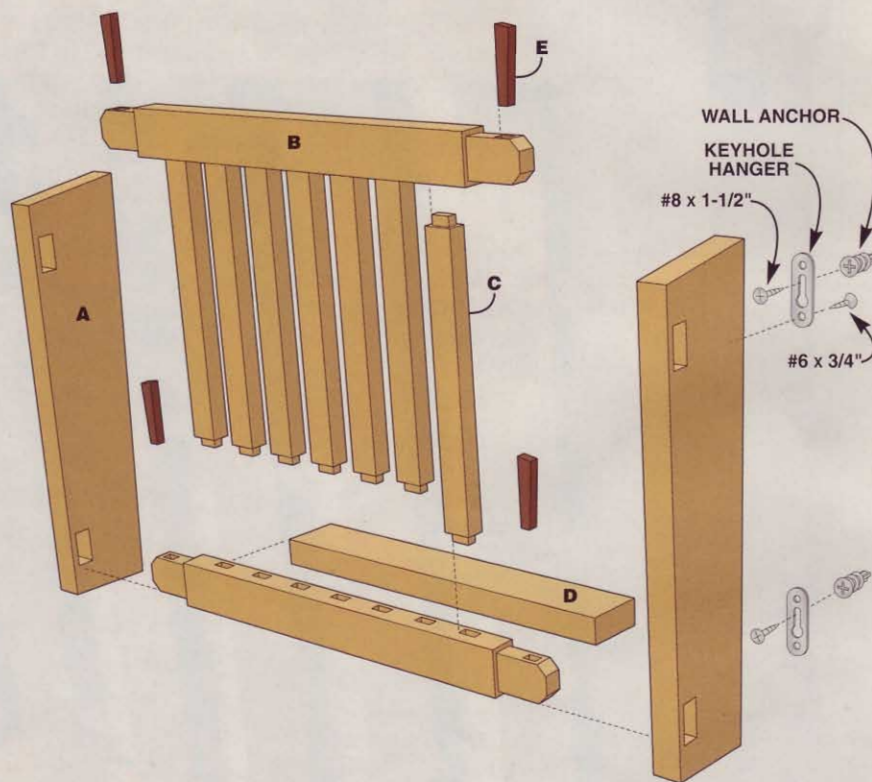


1 Cut the angled mortises at the ends of each rail using a tapered support block (see Fig. B) to hold the rail at the correct angle.



2 Cut the rail tenons. A tenoning jig makes the job a lot easier. Use a sample mortise as a guide for sizing the tenons.

FIG. A EXPLODED VIEW

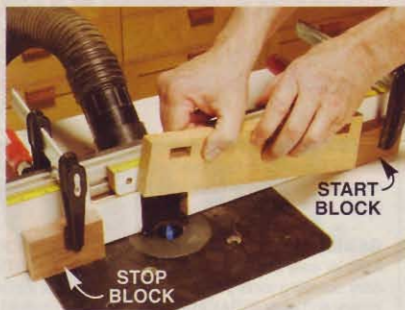


CUTTING LIST		OVERALL DIMENSIONS: 3"D x 14"W x 12"H		
Material	Part	Name	Qty.	Dimensions
Quartersawn White Oak	A	Sides	2	*3/4" x 3" x 12"
Quartersawn White Oak	B	Rails	2	3/4" x 1-1/4" x 14"
Quartersawn White Oak	C	Slats	7	1/2" x 3/4" x 8"
Quartersawn White Oak	D	Bottom	1	3/4" x 1-11/16" x 11"
Walnut	E	Wedges	2	1/4" x 3/8" x 1-3/4"

* Make 1/16-in. extra thick and plane to finish thickness after mortising is complete.



3 Use the assembled front grill to precisely locate the through mortises in the sides. You want these tenon locations to be dead-on, so put a sharp chisel point on your pencil.

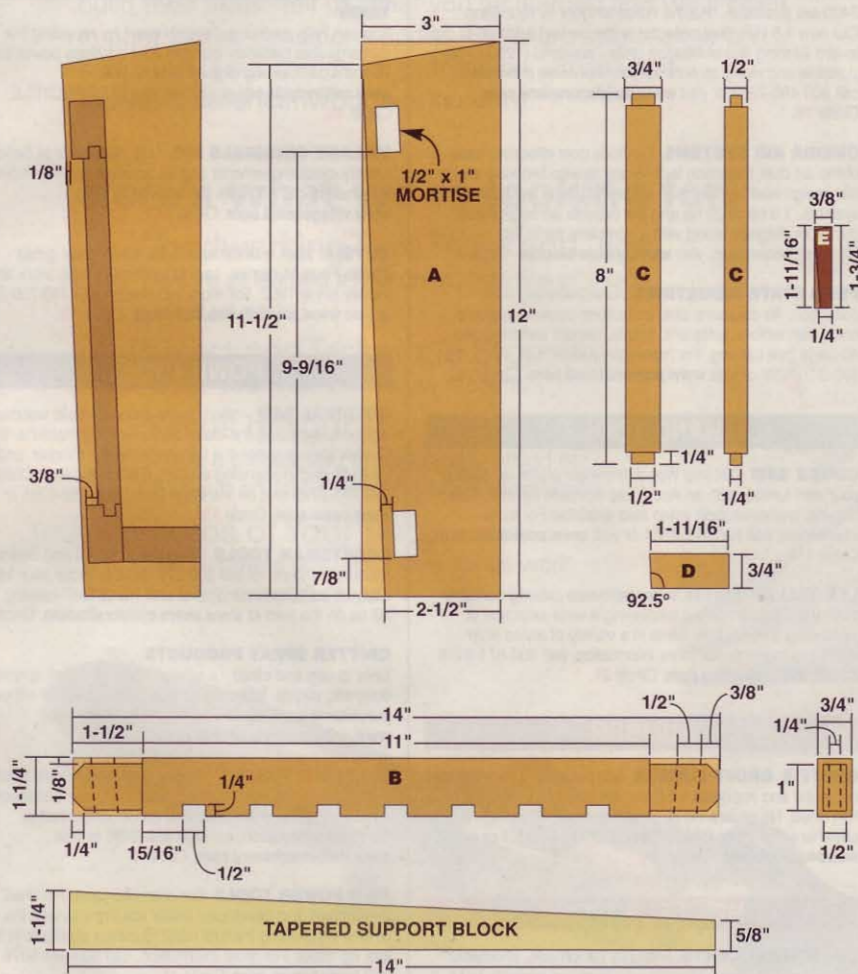


4 Cut the mortises for the keyhole hangers using a 5/8-in. straight bit. Set a start and a stop blocks on the fence to gauge the mortise length.



5 To mark precise locations on your wall for screw anchors, tape the screws in the hanger slots. Locate the rack on your wall, make sure it's level and then give it a push.

FIG. B PLAN LAYOUTS



Bruce Kieffer is a freelance woodworking author, technical illustrator, and custom furniture builder. You can see a collection of his work from the past 30-years on his website, www.kcfi.biz.

the mortise a bit short. It's easy to pare down the tenon to fit. If the mortise is cut even a hair too long, you're sunk.

12. Plane the sides to their finished thickness removing any blowout from cutting the mortises.

13. Rout the keyhole hanger grooves on the back edge of the sides (Photo 4).

FINISHING TOUCHES

14. Glue and clamp the slats into the rails.

15. Cut the bottom (D) and glue it in place.

16. Make the wedges (E). Leave them a bit wide and pare them with a chisel to fit. Each wedge will be slightly different, so mark which goes where to keep track.

17. Disassemble, sand and apply the finish. I used Watco Medium Walnut Danish Oil Finish because I find it resembles fumed oak.

18. Reassemble the rack and screw on the keyhole hangers.

WALL MOUNTING

19. Tape short screws into the keyhole fastener slots (Photo 6). Align the rack to the wall and press to mark the wall anchor locations.

20. Insert the wall anchors, and then hang the rack using #8 x 1-1/2-in. flat-head screws.

Source

Rockler, (800) 279-4441, www.rockler.com, 2 pair -Keyhole Fittings, 5/8" x 1-21/32", Part #28837. \$2 a pair

11 Tips to Help You Master Dadoes & Rabbets



Dadoes and rabbets are two of the most widely used joints in cabinetmaking. Cabinets, drawers and jewelry boxes all lend themselves to this simple but strong joinery. I've been woodworking, demonstrating and teaching woodworking for a long time. Over the years, I have accumulated some great tips for making and using dadoes and rabbets.

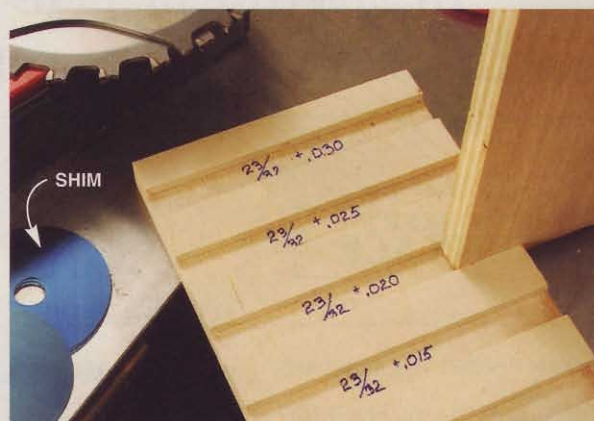
PROPER TERMS

Some people get pretty worked up about using the right word for the right joint. Perhaps they have a point since imprecise use of terms can lead to confusion. So, to be precise, here are the proper definitions:

A **dado** is a U-shaped, square-bottomed channel cut across the grain (see photo, top right).

A **groove** looks just like a dado, but runs with the grain. A lot of people call a groove a dado I think that's OK - but imprecise.

A **rabbet** is an L-shaped channel cut across or with the grain. A rabbet is always cut on the stock's edge.

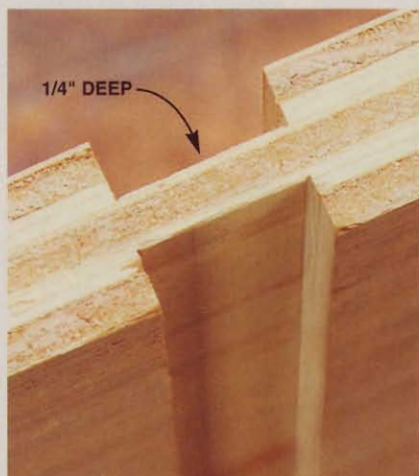


MAKE A GAUGE BLOCK

Setting up a stackable dado head to fit your plywood can be fussy and time consuming but, you'll significantly reduce the guesswork by making a dado gauge block.

To make the block, cut a 23/32-in. wide dado in a board big enough to allow for six more dados with space between. Add a single .005-in. shim to the 23/32-in. set up and plow a second dado next to the 23/32-in. one. Continue adding shims and making dados in .005-in. increments until you get to a 3/4-in. dado. Mark the dadoes as you go.

To use, slip your plywood into the test dadoes until you find the perfect fit. Then, read the number of shims needed.



BEST DADO DEPTH

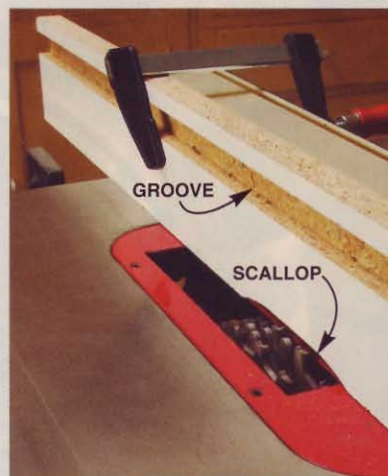
For years, I made all my dados 3/8-in. deep in 3/4-in. plywood. If I made dados on opposite sides of a divider, however, I had to change their depth and recalculate shelf lengths just for that joint.

I've since learned it's a lot easier and just as strong to set the depth of cut for every dado to 1/4 in. This makes calculating shelf lengths a whole lot easier, and I never have to make special calculations for a double dado.



LOCK THE HEIGHT

Always lock the blade-height handwheel before cutting. Vibration can make the handle turn, changing the depth of cut. This change is often hard to observe until assembly time. A big oops, if you just cut dados for a kitchen full of cabinets.



CUT RABBETS WITH A SACRIFICIAL FENCE

A sacrificial fence protects your stock fence from damage. I make my fence from melamine because its slippery. I cut a 3/8-in. x 3/4-in. groove to accept a commercial featherboard. A scallop cut in the face of the sacrificial fence allows me to bury part of the blade.



A FEATHERBOARD GUARANTEES ACCURACY

A featherboard provides consistent downward pressure on the material right over the blade. This will compensate for a slight warp in plywood and insure a consistent depth all along your rabbet. I always use a push block to keep something between my hands and the unguarded blade.



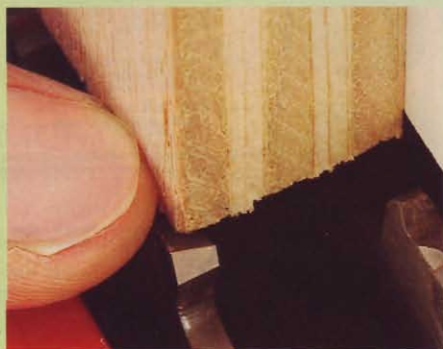
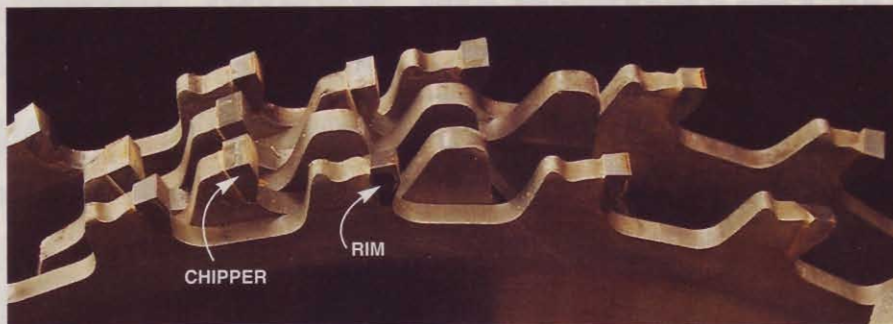
WHAT'S THE RIGHT FIT?

A properly fitted joint should go together with hand pressure. At the same time it should be tight enough to lift a modestly sized assembly without falling apart.

Cut perfect
dados
without the
guesswork.

STAGGER THE TEETH

Rim blade teeth and chipper teeth are meant to nestle between each other. If they touch you can chip or knock off a tooth when you tighten the arbor nut.



CUT RABBETS SLIGHTLY OVERSIZED

I cut the rabbet at the top of cabinet sides slightly wider than the top's thickness. The top is used to set the fence so the dado head projects 1/32-in. past the plywood. This positions the top just below the cabinet side after assembly. To make the side flush with the top, lay the cabinet on its side and make a quick pass with a flush trim bit.



DON'T OVER-GLUE

Often we tend to think, "If a little is good, a lot has got to be better." During glue-up, this is definitely not the case.

A brush makes it easier to gauge the amount of glue you're putting down and where you're putting it. Spread a uniform film that's just thick enough so you can't see through it. Keep the glue in the bottom of the dado or rabbet but off the sides. I find this technique prevents excess glue from oozing out of the joint during assembly.



USE A CAUL 'N CARD

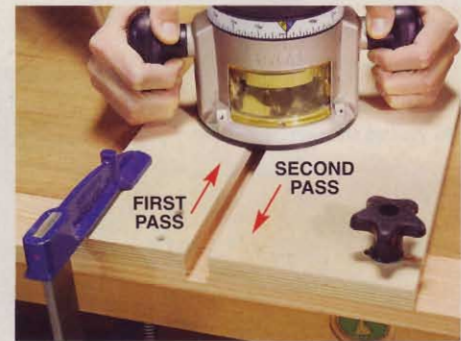
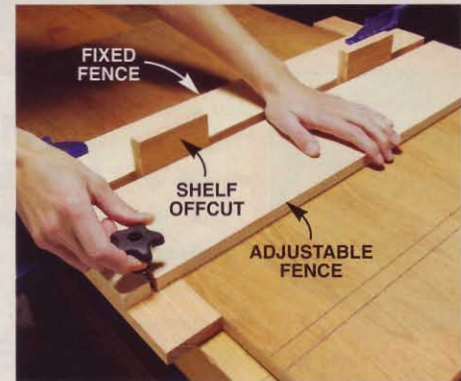
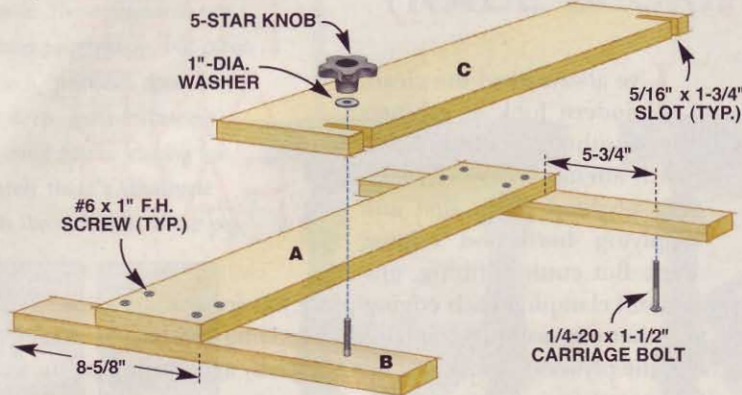
Guarantee clamp pressure in the middle of the joint as well as the ends by putting a playing card or two between the caul and the cabinet. Tightening the clamps bows the caul and puts clamping pressure along the entire joint.

MAKE PERFECT DADOES WITH A ROUTER AND A JIG

This jig automatically cuts perfectly-sized dados. It was first featured in Issue #120, March, 2006. We include it here for those who might have missed it and also in *Modern Cabinetmaker*, p.91, Photo 1.

Locate the jig so the fixed fence lines up with the bottom of the marked dado. Squeeze a couple plywood offcuts from the shelf stock between the fixed and adjustable fences and tighten. This sets the space between them to perfectly match the material thickness.

Using a 1/2-in. pattern cutting bit in your router, make one pass with the bearing against the fixed fence and another with the bearing against the adjustable fence. The result is a dado that perfectly matches your material.



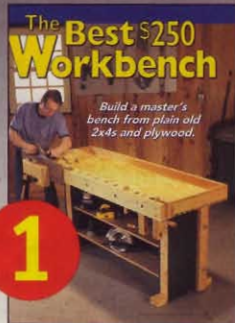
Sources

Woodworkers Supply, (800) 645-9292, www.woodworker.com 3/8-in. Glue brush, #875-247, \$6/12. Benchdog Featherboard, #103-322, \$29. Push block, #95-410, \$20/pair.

Amana Tool, (800) 445-0077, www.amanatool.com 5/8-in. diameter x 1/2-in. flush trim plunge-routing (pattern) bit, #45462, \$24. 3/8-in. diameter x 1-in cut length flush trim bit #47101 \$18.

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Frameless Cabinet Joinery

HASSLE
FREE
AND
FAST

I've always liked the clean, modern look of cabinets built without face frames. My early attempts involved building plywood boxes first and applying hardwood edging later. But cutting, fitting, gluing and clamping each edging piece was frustratingly slow — and that was nothing compared to leveling the edging flush with the plywood. A task that was especially aggravating on the inside corners.

I had almost given up making this style of cabinet when I learned a new technique that streamlines construction. It allows you to put the edging on before assembly. Flushing up the edging on a flat panel is no problem. I can even pre-finish the cabinet parts before gluing them together. I get perfect looking butt joints and an almost invisible line where the edging joins the plywood (see photo below, left).

HERE'S HOW IT WORKS:

1. Cut all your cabinet parts to size. Leave one shelf about 1/2-in. long to use later for test cuts.

2. Cut all the rabbets and dados (Photo 1). Because this technique requires consistent dado depth I prefer to use a router and a jig rather than a tablesaw. For more on the jig we used, see "Dado Tips", p. 91.

3. Glue the hardwood edges to the side panels and shelves by sandwiching a single piece of hardwood between two panels (Photo 2). The hardwood piece is twice as thick as the finish thickness of the edging plus an extra 1/8-in. for the saw kerf. For example, for a 3/16-in. thick hardwood edge use a 1/2-in. thick piece of hardwood. I like the looks of a thin edge and it still offers plenty of protection for the plywood edge.

4. Rip the glued-together panels (Photo 3). The hardwood edge creates stopped dados and rabbets on the cabinet sides.

5. Flush up the edging with the panels. I start with a block plane (Photo 4) and finish with a light sanding. Using a power sander is asking for a sand-through on the veneer.

6. Trim the edging to length with a handsaw.

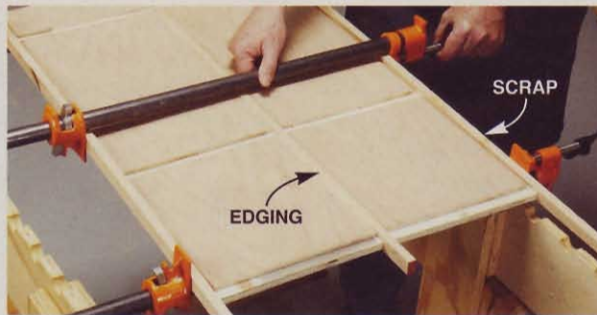
7. Use the extra long shelf to set your jointer for notching the plywood (Photo 5). It'll take some trial and error to get the depth of cut just right. The extra length on the shelf allows you to trim and retest the joints' fit.



This blind dado joint is quick to make and nearly invisible.



1 Cut all dados and rabbets with a router, a pattern bit and a simple dado jig. A couple of offcuts are all you need to perfectly size your dados without fussy trial and error set-ups.



2 Glue a single strip of hardwood edging to two panels at once. The single piece of edging is twice the desired thickness of the finished edge plus a saw kerf thickness more. Scrap wood protects the plywood edges.



3 Rip the panels down the middle of the edging.



4 Plane the edging flush with the panel sides. A block plane gives better control than a power sander. Set the blade for a light cut and ride the plane's heel on the panel.

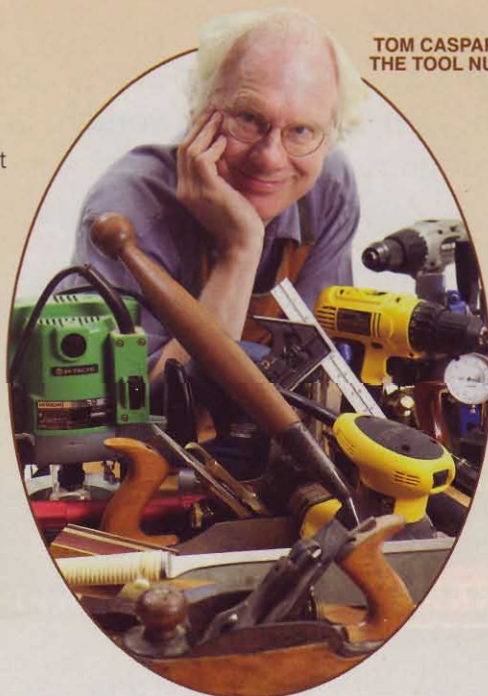
Calling all Tool Nuts!

I really don't need five cordless drills, seven routers or 24 antique hand planes, but I can't help it. I'm a tool nut. **Are you?**

Have you ever bought an old woodworking machine just because it looked cool? Tried a new tool and said, "Wow! This just changed my life!" Used a big, industrial machine and wondered how in the world you could sneak it into your shop?

We'd like to hear your stories. So e-mail or send us a letter about a tool or machine that really gets you excited. We'll send you a new Leatherman Charge AL multi-tool if we publish your story. Please include a photograph, too. We'd prefer a digital image, but a slide or print is OK. Visit our Web site, www.americanwoodworker.com/tool-nut for some examples of what we've got in mind.

E-mail your entry to toolnut@americanwoodworker.com or write to us at The Tool Nut, American Woodworker Magazine, 1285 Corporate Center Drive, Suite 180, Eagan, MN 55121.



**TOM CASPAR,
THE TOOL NUT**

8. Test the shelf's fit by sliding it forward in the rabbet (Photo 6). If the notched edge butts into the back of the side's edging, the cut needs to be made deeper. If the notch slides over the side's edging and leaves a gap, the jointer needs to be set for a shallower cut.

9. Once you get the right fit, go ahead and notch all the shelves.

10. Dry fit the cabinet to check for any problem areas. An open joint is almost always the result of a high spot in a dado.

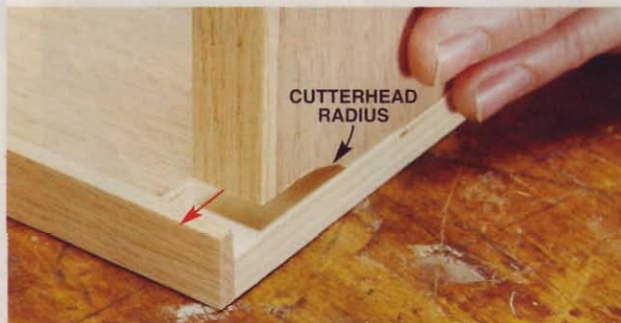
11. Do any finish sanding on the edges while the cabinet is clamped together. It's too easy to ruin the fit if you sand the edging when the cabinet is apart.

12. Disassemble the cabinet and finish sand the flat panels taking care not to round the corners on the hardwood edges at the joints.

13. At this point, you can reassemble the cabinet with glue or prefinish the panels and then assemble. Be sure to tape off glue areas and be careful not to build the finish on the shelves so much they no longer fit the dado. I often stain and seal before assembly, then add the last coat or two when the cabinet is glued together.



5 Test cut a notch on the leading edge of a shelf that's been cut extra long. The jointer's depth of cut must exactly equal the dado's depth. It takes a little trial and error to get the right setting on the jointer.



6 Slide the shelf forward in the joint to test the depth of the notch. The notch is cut long enough to leave no trace of the cutterhead radius on the hardwood edge.

A Call for Entries!

Woodworker's Showcase

Here is your chance to share your best work with fellow woodworkers across the country and around the world.

As woodworkers, we love to build things, but we also love to share our work and the ideas behind them. American Woodworker Magazine is debuting a new department called "Woodworker's Showcase." We're looking for projects that range from practical, everyday pieces to one-of-a-kind artistic masterpieces.

Here's how to submit your work! We ask that the piece you submit be made primarily of wood by your own two hands. Only high quality photos will be selected for publication so make sure you put some time and effort into your photograph. Check out our web page (www.americanwoodworker.com/phototips) for tips on taking good photographs. Digital photographs are preferred but slides and color negatives are also acceptable. If you want your slides or negatives back, you must include a stamped, self-addressed envelope with your submission.

Send your pictures along with a description of the piece that includes the wood(s), joinery and finish that you used. It seems like every piece has a story behind it – please feel free to share yours. We look forward to hearing from you.

Send entries to: Showcase@AmericanWoodworker.com or mail to: American Woodworker Magazine, 1285 Corporate Center Drive, Suite 180, Eagan, MN 55121.



Cherry
Cabinet

by Dave Munkittrick
River Falls, WI



SHOCKING TASTE

I turned on my shop vac to clean up the pile of sawdust that had accumulated while I ripped some pine boards for a cabinet. I live in Colorado, where the air is always dry, and my shop vac isn't high tech, so occasionally I get zapped by a static-discharge shock.

This time while I was vacuuming, my wife came out, offering a bite of her famous cheesecake. I cheerfully opened wide, but once the spoon got close to my tongue, POW! I didn't know what hit me. When I had recovered enough to explain what happened, my wife apologized...and then insisted I try another bite of cheesecake. I agreed. After that terrific shock, I thought I deserved a reward. Then—BAM! Who says lightning never strikes the same place twice?

Reg Mills

FEATHERED FINISH

I was building a shadow box for a big charity event, with a picture and a baseball autographed by Stan Musial, the legendary St. Louis Cardinal. It was a nice afternoon, so I had the garage door open, and the windows up to let a breeze come through the screens. I applied a coat of dark cherry stain, and laid everything out to dry.

Suddenly, a flash of red zoomed by, followed by a loud "thunk!" A cardinal had flown in through the open door and tried to exit through a window, only to smack into the screen. It bounced off and landed right on my freshly stained shadow box. I gently picked the cardinal up and carried it outside. Fortunately, it recovered and went its way.

I went back to survey the damage: The box now carried the unmistakable impression of a cardinal! I grabbed a rag to make repairs, but put it down when I realized that this was probably the most perfect custom finish I could ever achieve.

Lanny Ribes



Make your woodworking mistakes pay! Send us your most memorable "What was I thinking?" blunders. You'll receive \$25 for each one we print. **E-mail to oops@americanwoodworker.com or send to AW Oops!, American Woodworker, 1285 Corporate Center Drive, Suite 180, Eagan, MN 55121.** Submissions can't be returned and become our property upon acceptance and payment. We may edit submissions and use them in all print and electronic media.