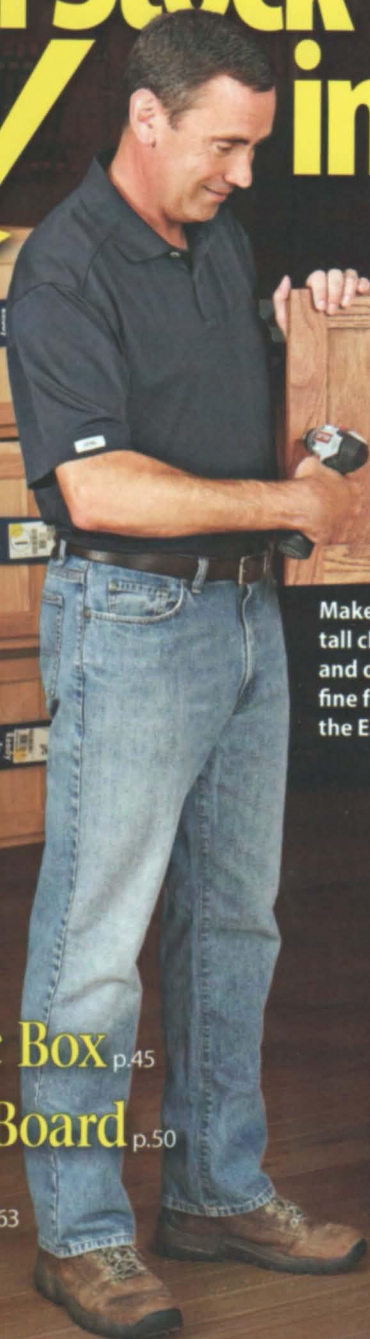


WOOD

Turn Stock Cabinets into Furniture!

p.32



Make this tall chest, and other fine furniture, the EASY way.



Great Projects!

- ▶ Jewelry Box p.38
- ▶ Carousel Music Box p.45
- ▶ Backgammon Board p.50
- ▶ Rockin' Truck p.63

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WHAT'S NEW? INNOVATIVE TOOLS FOR 2012



Check out the woodworking tools and supplies your buddies will be talking about next year, as *WOOD* names the Innov8 Award winners for 2012. You'll find it only online at woodmagazine.com/2012innov8.



Bessey's self-sizing toggle clamps (*left*) eliminate the fussy adjustments required to get perfect clamping pressure for any task. These cool new clamps earned a 2012 *WOOD* magazine Innov8 Award.

HOLIDAY GIFT GIVEAWAY: PLANS, TOOLS, AND A WHOLE LOT MORE

WOOD's Holiday Bonanza Giveaway provides great gift ideas under \$100, free project plans (including those shown below), and more. Check in frequently at woodmagazine.com/holidaygiveaway for freebies from November 21, 2011, through January 6, 2012.

- Pagoda Box** (week of 11/21)
- Intarsia Snowman** (week of 11/30)
- Arts & Crafts Clock** (*right*, week of 12/7)
- Chip & Dip Tray** (week of 12/14) and more!

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Vol. 28, No. 7

Issue No. 209

What tool is at the top of your wish list?

A slow-speed bench grinder with aluminum-oxide wheels and Wolverine Grinding Jig to keep my lathe tools sharp.

A heater for my garage shop, and mobile bases so my wife can park her car in there.

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The art of teaching woodworking

Woodworking teacher retires, then goes “bowling”

During my time as a university woodworking professor, I pretty much perfected the art of making compartmental bowls with a router—especially those with geometric patterns, as shown *below*.

Since “retiring,” I travel to Florida during the winter months to teach other woodworkers how to make these bowls at a large golf and RV resort. Last year we made more than 160 bowls, and I’ve recruited three other woodworkers to assist me next winter! It’s a real joy to help others enjoy woodworking—and I know the families and friends of my students enjoy the gifts that result from it.

—Everett Israel, Putnam, Ill.



Everett’s free form router bowls incorporate unique patterns through the use of contrasting wood species.

Everett Israel crafts another one of his signature bowls.



Find the plan for this a chip and dip tray in issue 195 (Dec/Jan 2009). Or, download the plan for a small fee at woodmagazine.com/chipanddip.

Trebuchets makes physics fun for students

As a teacher, I always look for new ways to communicate lessons to my students, and the trebuchet project in issue 204 (May 2011) was a great way to teach them about physics. Each student built a trebuchet (I modified the plans slightly to ease construction); then they collected data and made a graph on how the trebuchet’s counterweight affects the distance of the projectile. They then used that information to help them in a competition to destroy a fortress—a fun way to learn!

—Paul Steiner, Woodbridge, Va.



Students display their trebuchets in Paul Steiner’s physics class. From left to right: Greg Cantori, Pablo Menses, Kaila Williams, and Jackie Saldia.

To try your hand at building the trebuchet, download the project plans at woodmagazine.com/trebuchetplans for a small fee. Or watch a free video of the trebuchet in action at woodmagazine.com/trebuchetvideo.

—WOOD® Editors



continued on page 8

HOW TO REACH US

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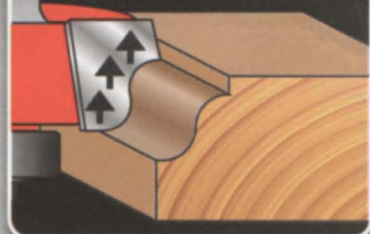
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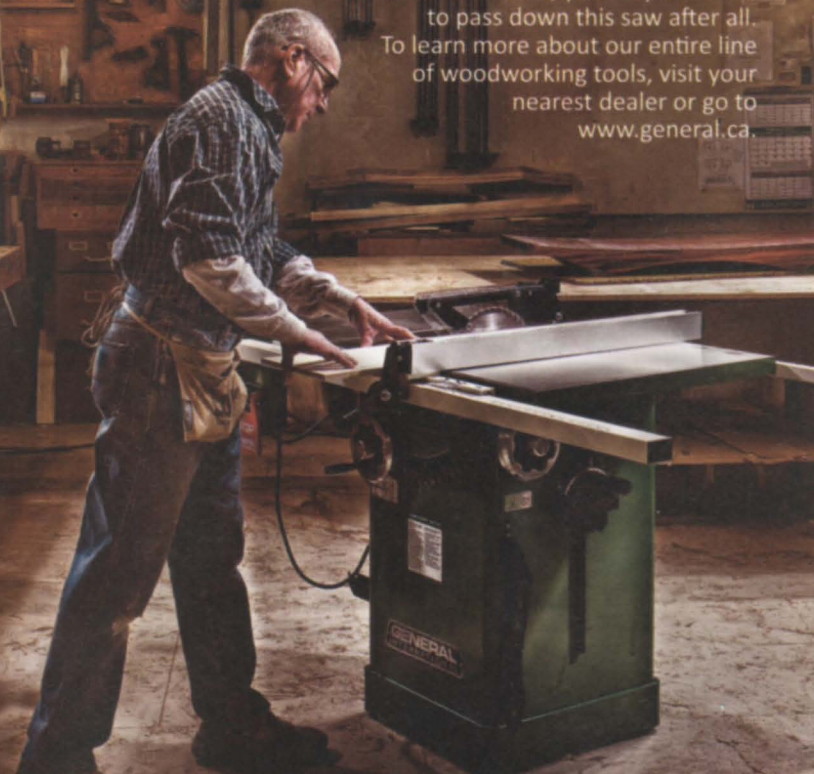
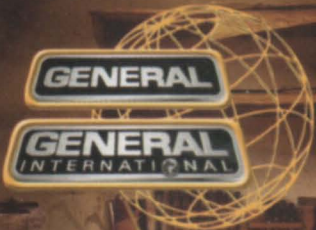
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Sounding Board

Article Updates

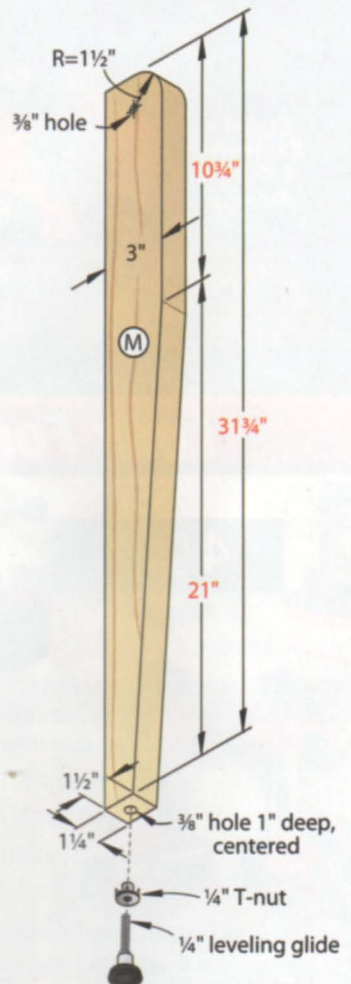
Issue 205 (July 2011)

► In issue 205 (July 2011), the patterns for the Construction-Grade Tractor/Trailers and the left-most potpourri box lid on page 46 were printed too large. To correctly size the patterns, photocopy them at 98% of their original size. Or download a corrected copy of the patterns at woodmagazine.com/205correct.

Issue 207 (October 2011)

► To allow room for the leg levelers in the Fold-Flat Workbench project in issue 207 (October 2011), the legs (M) should be 31¾" long, not 32¾". These dimensions are shown on Drawing 2, p. 40; Drawing 3, p. 41; and the Materials List.

In Drawing 3, replace the red dimensions shown below. 🌲



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Salvage short scraps by "stretching" them

I have lots of rough scraps that would make good small project parts, but they're too short to safely joint and plane to thickness. So I came up with a way to make small pieces large enough to mill.

First, sort scraps by width and similar thickness. If you have a lot of pieces of the same species, keep those together, too. Rip the scraps to common widths that minimize waste; then glue those of the same width and similar thickness end-to-end with scrapwood runners along each edge, forming planks.

When you need small parts, find a plank of the right approximate thickness, width, and species; joint and plane the plank to thickness; and rip away the runners. Because the plank is connected by a weak end-grain joint, simply snap off short pieces and rip and crosscut them to final size.

—Alan Schaffter, Washington, N.C.



For submitting this issue's Top Shop Tip, Alan receives a Shop Fox Heavy-Duty Mortising Machine worth \$300.



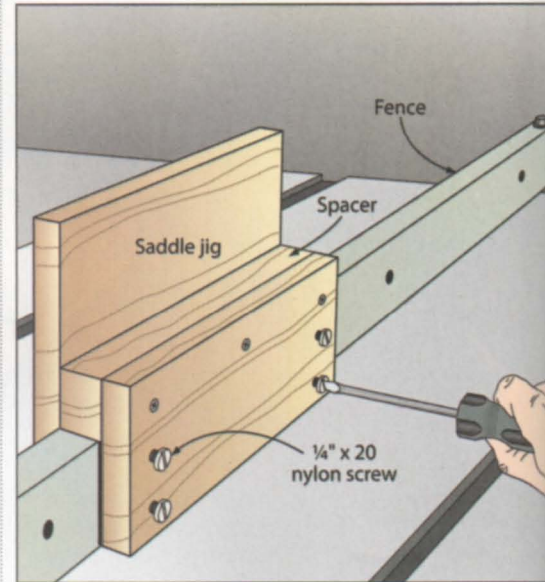
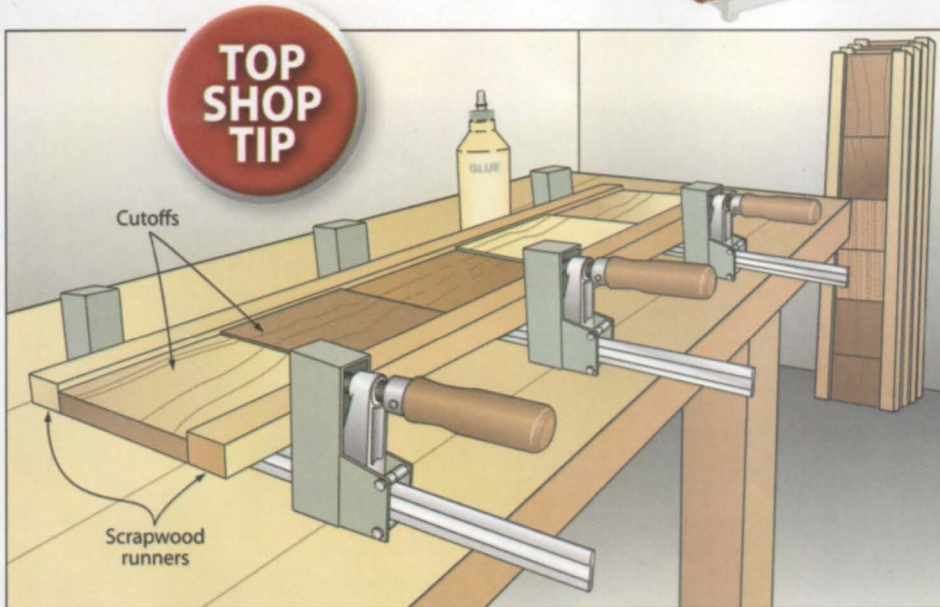
Foolproof fit, weather or not

For jigs that ride on a tablesaw fence, there's a fine line between smooth and sloppy. You want it to fit without side play, while still sliding smoothly along the fence. Throw seasonal wood movement into the equation and it may not work at all. But I've developed a simple solution for keeping those fence straddling jigs right on track.

When building the jig, make the spacer about $\frac{1}{16}$ " wider than the fence. Then add $\frac{1}{4}$ "x20 nylon screws along the outboard side of the jig. Drill a $\frac{3}{16}$ " pilot hole for each; then use a $\frac{1}{4}$ "x20 tap to thread the holes. (If you don't have a tap, use a new $\frac{1}{4}$ "x20 steel machine screw to form the thread).

Use at least four screws arranged in vertical pairs at the front and rear of the saddle, taking care to avoid putting them in line with existing holes in the saw fence. Snug the jig to the fence by adjusting the nylon screws.

—John Cusimano, Lansdale, Pa.



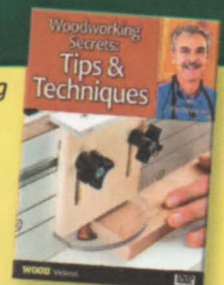
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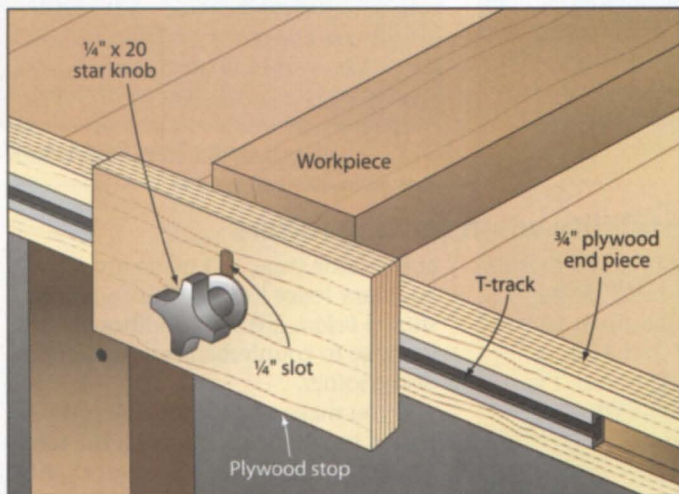


End stop drops when not in use

When using a hand plane, a solid edge on your workbench to butt stock against keeps things from sliding around. This sliding stop fits the bill: It mounts directly to a workbench and can be adjusted up or down and back and forth.

To make the end piece, cut a groove in a piece of $\frac{3}{4}$ " plywood to accommodate a length of T-track. Install the track, and mount it to the end of your bench as shown. Cut a stop from $\frac{3}{4}$ " plywood, and slot it to accept a T-bolt, positioning the slot to allow the stop to fall below the benchtop for times you want it out of the way.

—Charles Mak, Calgary, Alta.



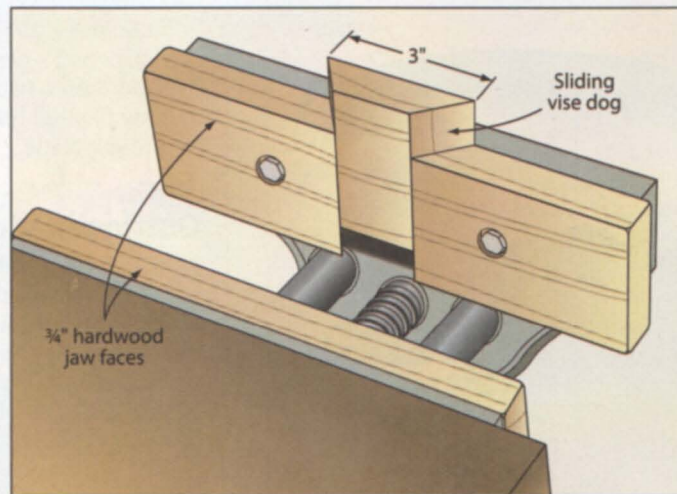
woodmagazine.com

Add a new dog to an old vise

I've owned the same bench vise for years, and have always wished I had bought one with a dog that could be raised and lowered as needed. So, when replacing my vise's wood jaw faces, I incorporated my own dog.

To do this on your vise, cut a 45° dovetail-shaped dog centered in the face of the movable jaw. Push the three pieces of the facing back together and bolt the two outer faces to the vise, leaving the center free. The snug fit holds the dog in position when in use, but it can still be raised and lowered by hand.

—Bill Wells, Olympia, Wash.



continued on page 12

11

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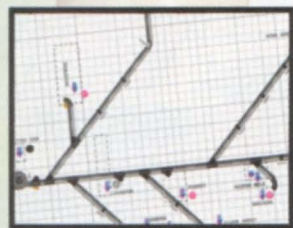
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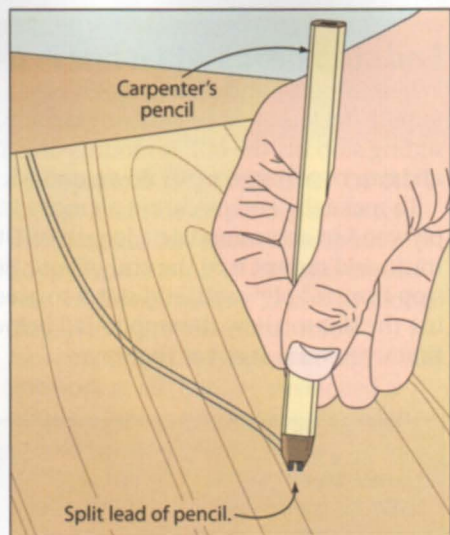
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Shop Tips

Split the tip for perfectly parallel bandsaw cutlines

I loved the Top Shop Tip by Warren Perkins in *WOOD* magazine issue 187 (November 2008) where he drew two parallel lines on curved cuts and shot the gap with his bandsaw. Warren's "freehand" must be steadier than mine, though, because I found it difficult to mark a freehand line parallel to the original cutline.

To help me do that, I sharpen the tip of a carpenter's pencil, and then split the lead with a bandsaw. Now it's easy to draw parallel lines the exact width of a bandsaw blade.



—Gene Taylor, Brookeville, Md.

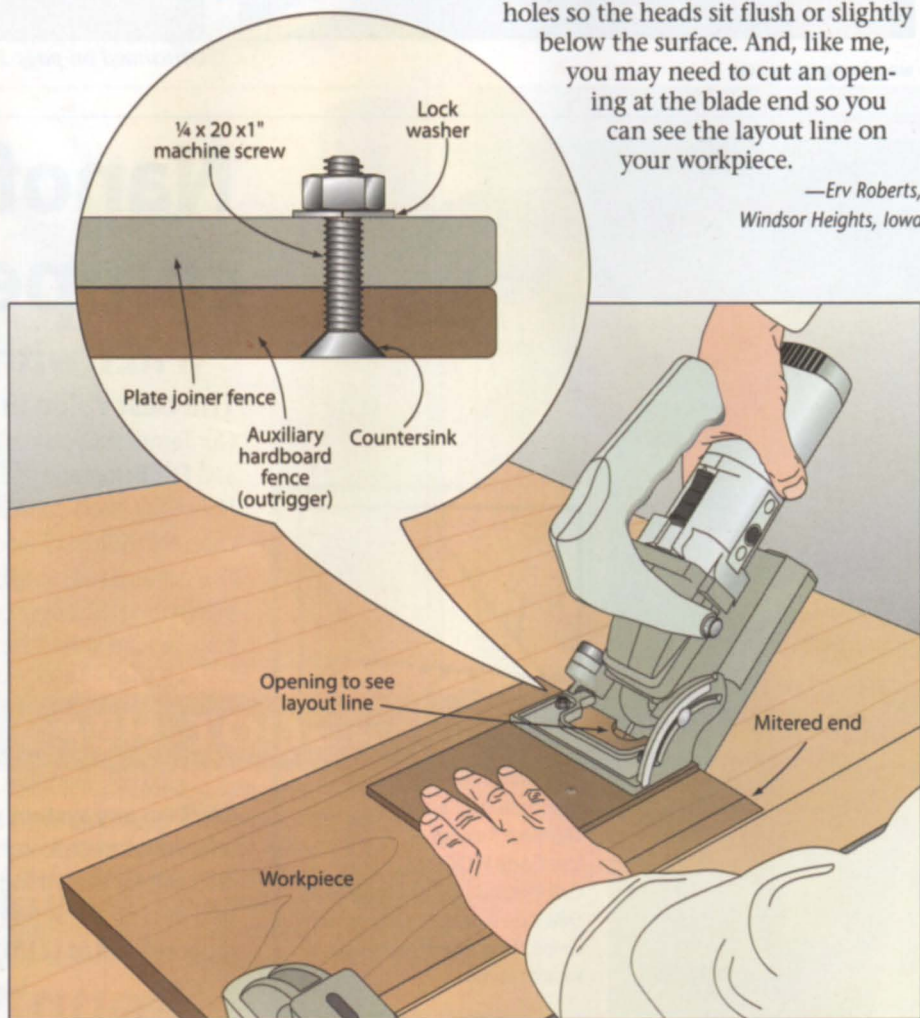
Outrigger adds stability when slotting miters

I enjoyed the batch of biscuit joiner tips in *WOOD* magazine issue 205 (July 2011), especially the one about taping on an auxiliary fence to the joiner when slotting miters. However, I've always found it difficult to hold the biscuit joiner steady at 45° and plunge it

at the same time, so I made my auxiliary fence longer. This "outrigger," shown below, gives me additional leverage to counterbalance the weight of the joiner.

If you make one for your biscuit joiner, be sure to countersink the screw holes so the heads sit flush or slightly below the surface. And, like me, you may need to cut an opening at the blade end so you can see the layout line on your workpiece.

—Erv Roberts,
Windsor Heights, Iowa

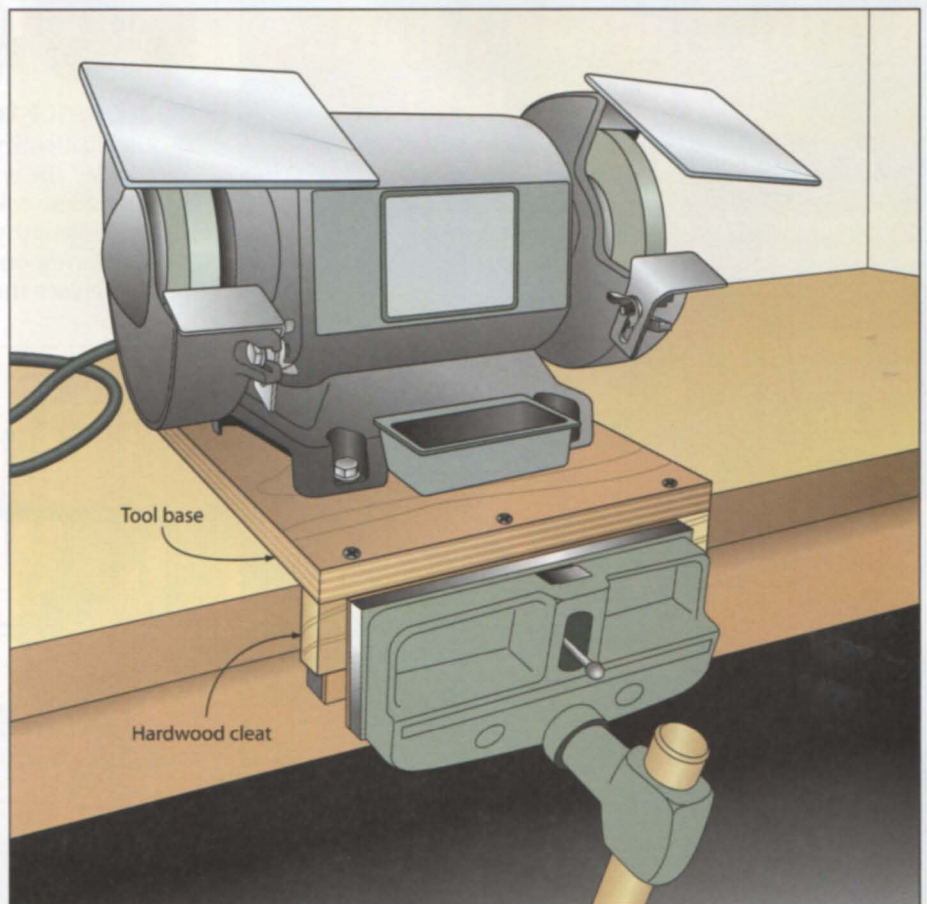


Vise keeps benchtop tools from scooting

As in many shops, I have more benchtop tools than space to keep them at the ready. Here's an easy solution: Mount seldom used benchtop tools on plywood bases with a 2"-wide hardwood cleat screwed to their fronts.

When there's a need for one of these tools, simply drop the cleat between the jaws of a woodworker's vise and tighten. In storage, the cleat keeps the tool to the front of the shelf—easy to find should it be needed again.

—Robert Hall, Scarborough, Maine



continued on page 14

More Power! More Features! More Fun!

Turncrafter Commander Midi Lathes

Packed with features, Turncrafter Commander™ Midi Lathes are the most advanced, powerful and easy to use lathes in their class. These 10" and 12" swing workhorses will help you more easily, effectively and affordably tackle all your turning projects. Ask about our pen making starter sets and FREE pen making DVD!

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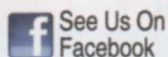
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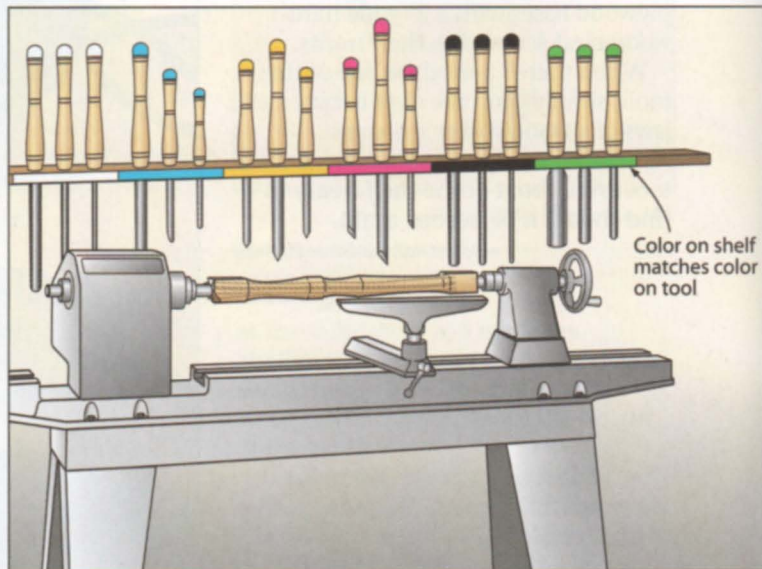
Dust Collection Since 1993.

Shop Tips

At-a-glance tool ID

To quickly identify, choose, and replace my turning tools, I color-coded the ends of the handles with paint. All bowl gouges get one color, scrapers get another, and so on. This eliminates lengthy browsing time I'd rather spend turning. I painted corresponding strips of color on the tool holder to quickly replace the tool when I'm finished with it.

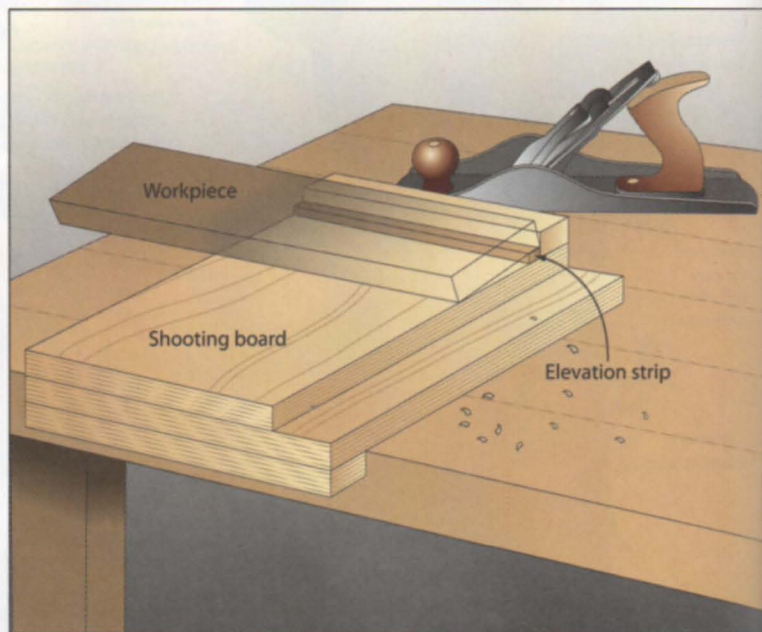
—Robert McGee, Massena, N.Y.



Easy end-grain shooting board

Paring down end grain with a hand plane can be jarring both to your hand and to the tool. Cutting at an angle eases the blade into the work and engages more of the blade to do the work. The solution: I added a removable elevation strip to my shooting board to slightly raise one edge of the board as shown. Different thicknesses of elevation strips vary the angle to account for different board widths.

—David Brown, Germantown, Md.

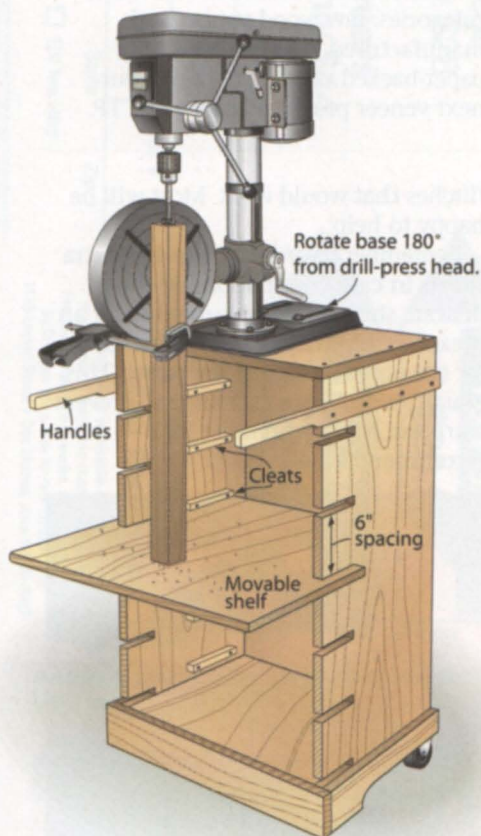


This benchtop drill press acts all grown up

My family gave me a benchtop drill press for a present. And even though I really wanted a bigger one, I decided it would be more considerate to make the smaller drill press act bigger than to return the gift. To make that happen, I mounted my drill press to a portable stand that I made out of 3/4" plywood.

The movable shelf actually works better and faster than cranking the table up and down on a stationary press. And, because I mounted casters and handles to the stand, it's more portable and stable than a top-heavy floor model. Because I rarely use the bottom shelf slots, the bottom of the stand can be used for temporary storage. 🌲

—Gordon Schrader, Murfreesboro, Tenn.



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How To Buy Veneer Online

A wide world of beautiful woods waits virtually a mouse-click away.

By slicing logs into thin veneers, mills bring rare, beautiful, and exotic wood into a price range accessible to all. Try to find it locally,



though, and “accessible” probably is not the word you’re muttering under your breath. Fortunately, the modern world has caught up with those widely scattered mills, and online veneer retailers have stepped up with expertise

and extensive catalogs of species. You’ll find veneer sold online in two main categories: raw-wood veneer and manufactured veneer (commonly paper-backed veneer), making your next veneer project as easy as HTTP.

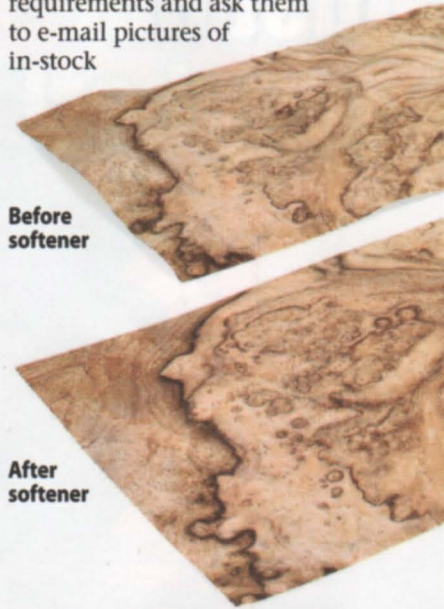
Raw-wood veneer

Like brick-and-mortar retailers, most dealers in raw-wood veneer sell sheets in bundles (called *flitches*). Stacked in the order they came off the log, they allow you to create striking matched patterns on your project. (Avoid any veneer listings labeled “random” if you plan to make a matched pattern, such as a bookmatch.)



Some veneer ships with taped ends to protect against splitting caused by humidity changes. Leave the tape in place until you use the veneer.

The best retailers display photos of a sheet from the actual flitch, alongside dimensions and available quantity, so you know exactly what you’re buying. If your online veneer supplier shows only photos representative of the veneer’s species, explain your project requirements and ask them to e-mail pictures of in-stock



Before softener

After softener

Wildly figured veneers often require flattening using a wood softener (such as glycerine—Rockler.com item no. 58446).

flitches that would work. Most will be happy to help.

Remember to order a couple of extra sheets in case you split one of the delicate sheets. And be sure to order an inexpensive veneer of similar density for the opposite side of the panel. This equalizes moisture exchange to prevent warpage. Ask your retailer for a recommendation.



To keep it flat, store veneer that you don’t plan to use immediately between MDF platens secured with screws.

Manufactured veneer

Don't let the term "manufactured" fool you. This veneer is real wood; only it's glued together in patterns (much like plywood facing) yielding larger sizes and more consistent quality. It typically has a substrate, such as paper, for added stability. Because of uniform color and grain patterns, retailers typically show only a representative image of each species they carry.

Most commonly available in 2x8' and 4x8' rolls, you pay more for the large size, consistency, and stability. But you'll appreciate these attributes for big veneering jobs, such as refacing a bank of cabinets, covering a tabletop, or wrapping a large furniture piece. 🌲



Manufactured veneer ships in large rolls. Store it in the shipping box or flatten it between two sheets of plywood.

Our favorite online veneer dealers:

- ▶ **B & B Rare Woods:**
wood-veneers.com, 303-986-2585
- ▶ **Certainly Wood:**
certainlywood.com, 716-655-0206
- ▶ **Veneer Supplies:**
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Small-part Tapering Sled

Build this simple sled for a fast, accurate, and safe way to achieve perfect tapers, even when cutting small or thin project parts.

Note: We built this sled to cut the veneer used in the "Boxed-Up Backgammon Board" on page 50, but you can modify it to cut almost any taper.

First, cut a hardwood fence the same thickness and length as your workpiece, and two 1/2"-thick cleats for the front and back to contain the workpiece. Next, cut the sled's base. It must be large enough so at least 2" of the base remains uncovered on either side of the workpiece. Set your table saw fence to leave enough of

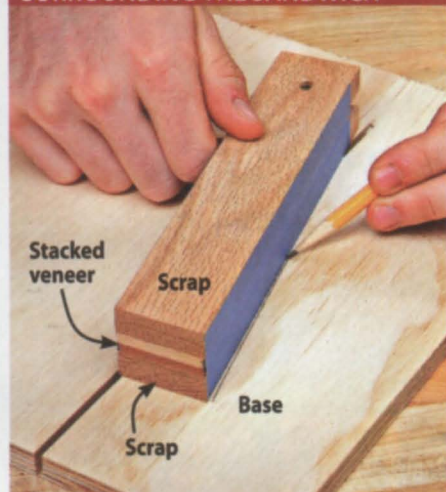
the base on both sides of the saw kerf to support your workpiece. Cut through the base, leaving a minimum of 2" uncut at the rear. Leave your fence in place for the next cut.

Lay out the taper on your workpiece, then place it where the kerf aligns with the waste side of your taper line. Trace around your workpiece on the base, as

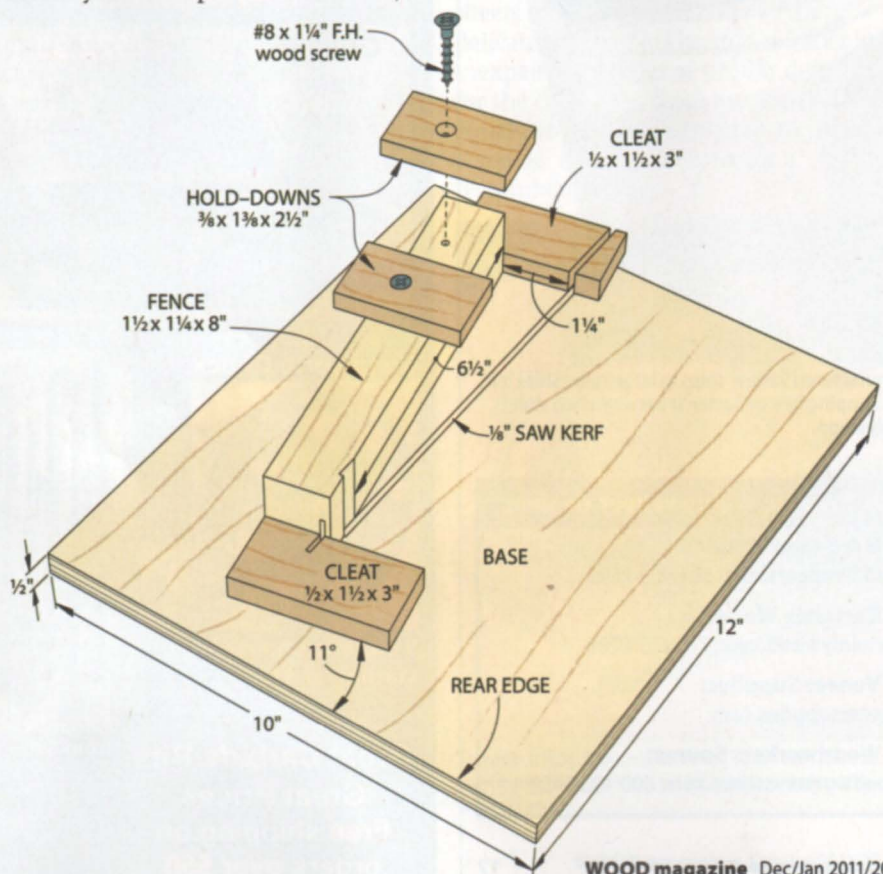
shown *below left*. Glue the fence and both cleats in place along the outline, where shown.

To cut a taper, nestle the workpiece against the jig's fence and between the two cleats on either end, and secure it there with hold-downs using #8x1 1/4" wood screws. Then make your tapered cut as shown *above*. 🌲

SURROUNDING THE SANDWICH



If you plan to cut veneer or another thin material, sandwich the piece or pieces between scraps of hardwood.



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Finishing School



Countdown-to-Christmas Finishes

'Twas the night before Christmas and out in the shop
That vein in Dad's forehead was ready to pop!
The children's toys had all been crafted with care
But the last-minute finish caused Father to swear.

When, what to his wondering eyes should appear?
This guide to quick clear coats, an answer to his prayers.
We soon heard him exclaim as he turned off the shop light
"Happy Christmas to all," and to Dad a good night.

The trick to clear-coating a project quickly, says finishing expert Bob Flexner, is in the *second* coat. The first application of any finish acts as a sealer, filling pores and locking any errant wood fibers in place. But the second coat begins to add visual depth and protection. In a time crunch, you need a finish that cures to a sandable hardness fast enough for you to apply that critical second coat.

A few caveats, though: Film-forming finishes start their journey to film-dom when solvents or thinners begin to evaporate, a process that happens best in warmer temperatures. In cooler-than-ideal conditions, accelerate the drying speed by circulating the air around—not on—your project using small fans. This keeps air flowing without blowing dust directly into the drying finish.

You could run into the opposite problem in a warm shop: Dry winter weather causes some finishes to dry too quickly, broadcasting brush strokes and locking drips in place. Where necessary, thin finishes for easier application.

And crack a window or door to keep a fresh air exchange even if it means cranking up the heat for a time. Then check the calendar and choose one of these fast-drying finishes.

continued on page 22

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- Speed: 5,200rpm
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Three days before Christmas: Aerosol Lacquer



Because it cures by evaporation, lacquer dries extremely fast, but the high solvent content means continued off-gassing of noxious fumes that could knock Santa on his bowl-full-of-jelly backside. So wrap up a lacquer finish with a couple days to spare.

Spray the first coat starting with the nooks and crannies, moving to edge and end grain, and finishing with wide flat surfaces. Begin each sweep off the wood, moving across the project, and

then off the other side, overlapping the spray pattern as you progress.

After the first coat dries (30–45 minutes in a warm, dry shop, 60–90 in a cold or humid shop), sand with 320-grit sandpaper, remove the dust, and apply a second coat. No more sanding after that first coat, and you can recoat as quickly as the previous one dries. Let the project sit in a well-ventilated area on the 23rd and 24th before dropping it under the tree.

The downsides: Aerosol lacquer works great for small giftables but becomes pricey for large projects. And lacquer's fumes necessitate both ventilation and a respirator when spraying.



Two days and counting: Shellac



Another evaporative finish, shellac dries nearly as quickly as lacquer. But the fumes from Shellac's solvent—usually denatured alcohol—aren't nearly as potent, allowing you to push your deadline a bit.

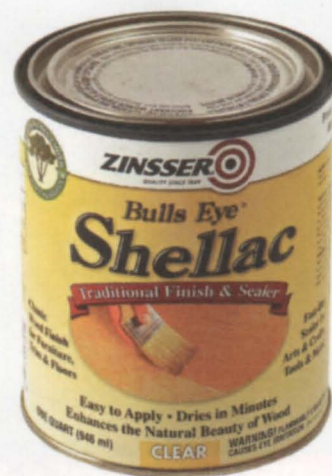
Pre-mixed shellac found on home-center shelves usually comes in a 3-pound cut (three pounds of shellac flakes for each gallon of alcohol). To speed drying and improve brushability, thin this to a 1½-pound cut, mixing equal parts finish and denatured alcohol.

Then use a natural-bristle brush and spread the shellac quickly to avoid

noticeable brush strokes. If you leave gaps of unfinished wood in your stroke pattern, don't try to rebrush them; catch them on the next coat.

Allow the first coat to dry for 90 minutes in a warm and dry shop (two hours in a cold or damp shop). Then sand lightly with 320-grit sandpaper, cleaning or switching the paper if it starts to gum up. Remove the dust and repeat for the remainder of the day—coat, dry, sand—until you are satisfied with the buildup. Give your project a rest on Christmas Eve and give it away on Christmas.

The downside: Shellac has a limited shelf life (around three years). So, if you can't find a manufacturer's date on the can, ask the retailer about the freshness of their stock on hand.



'Twas the night before: Water-based Poly



Water-based polyurethane has many advantages: It dries fast, builds fast, and puts off only minor fumes, so you can finish indoors.

For best results, stir the can well, and apply with a synthetic or foam brush. Use a brushing technique similar to that for shellac: Work fast, apply a thin coat, and avoid overworking the finish.

Allow two hours for the first coat to dry. If the grain raises noticeably, don't sweat it. Sand it smooth again with 220-grit sandpaper, remove the dust, and apply the next coat. Water-based

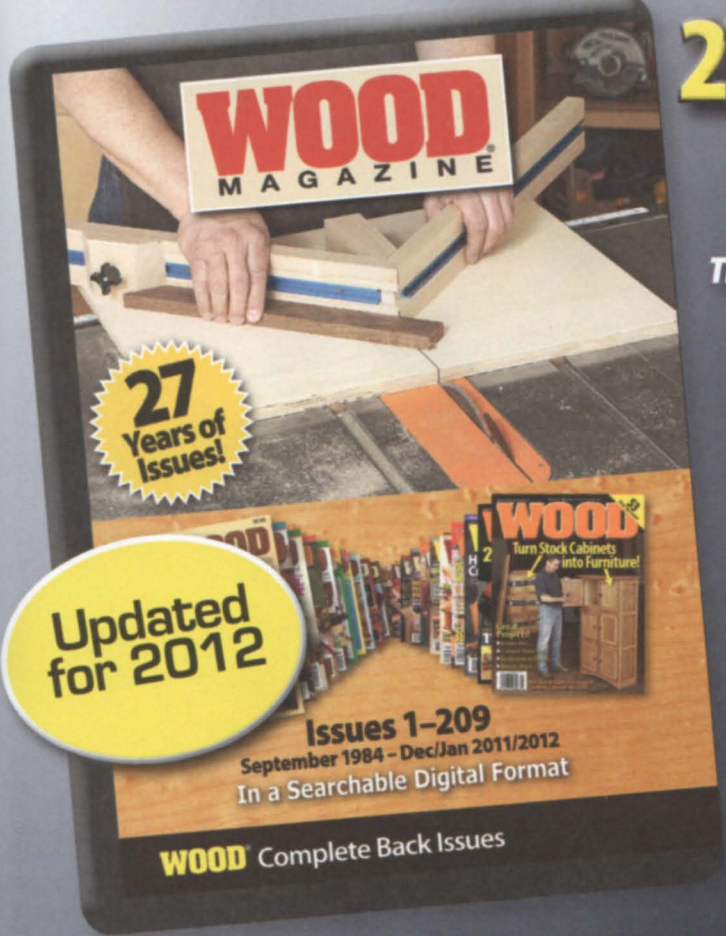
poly builds fast, so two or three coats usually suffice.

The downside: Because it dries so quickly, water-based polyurethane can be finicky to brush. It is temperature-sensitive. And it raises the grain. But follow the steps above, and when the last coat dries, the minimal fumes mean you don't have to wait. Drop the gift under the tree, nestle yourself snug in your bed, and watch visions of sugar-plums dance in your head. 🍷

More Resources

- ▶ Bob Flexner's book *Wood Finishing 101* offers a step-by-step look into a variety of finishes. Buy it here: woodmagazine.com/flexner.





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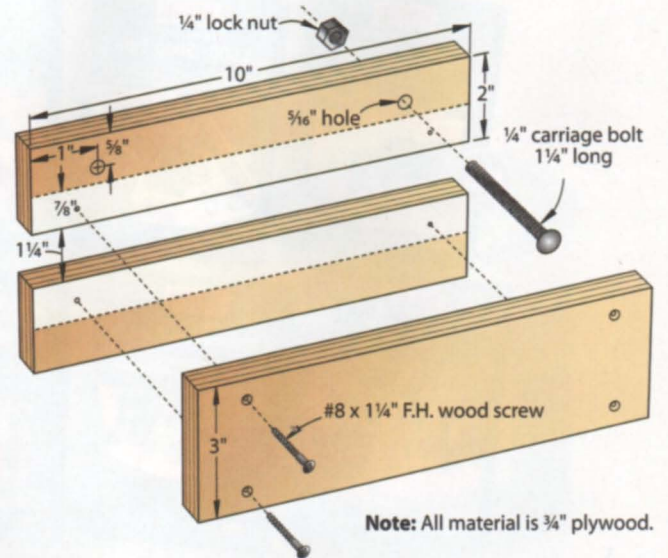
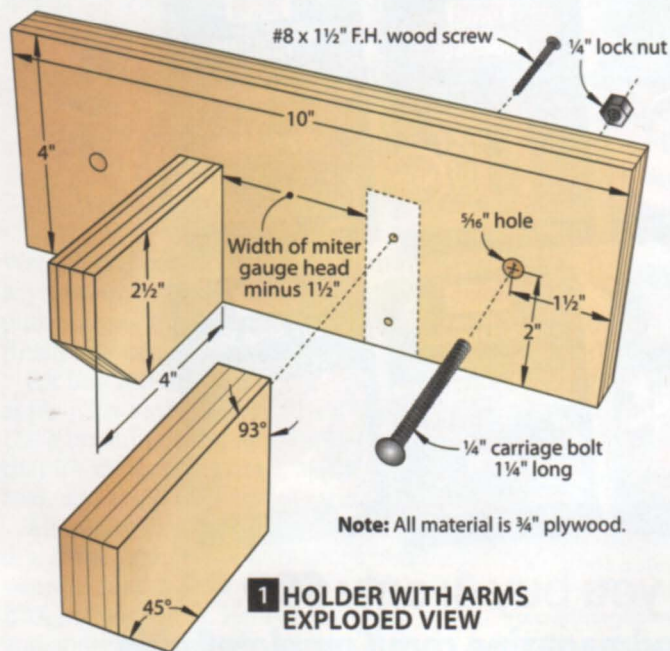
Where can you stow your table saw's miter gauge so it's easy to reach when needed? Our suggestion: Add one of these simple holders to your saw's cabinet or open-leg stand. For a miter gauge with a fence, build the Holder With Arms

[Drawing 1] that hangs your gauge vertically. Make it from $\frac{3}{4}$ "-thick plywood or hardwood cutoffs you have on hand.

If your miter gauge has a short fence (or none at all), opt for the Holder With Slot [Drawing 2]. Make sure your gauge's

miter bar fits loosely in the slot for easy in-and-out access.

For either holder, drill two mounting holes through the saw's steel frame and bolt the holder in place. Attach a holder where it won't interfere with the saw's handwheels or the motor-access door. 🌲



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Why Buy?

These kits save you big money compared to buying individual drilling and driving accessories, and they come in a carrying case for easy transportation to and from the shop or around the house. We tested 11 kits that all include twist-drill bits, multiple screw-driving bits, and cost \$25 or less. Here's how the top kits performed in three key areas.

Our Editors Test:

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Tested by Marlen Kemmet
— Managing Editor



Porter-Cable PCDD58, \$25, 58 pieces
888/848-5175, portercable.com



Tested by Bob Hunter
— Tools & Techniques Editor



Ryobi A986001, \$20, 60 pieces
800/525-2579, ryobitools.com



Tested by Lucas Peters
— How-To Editor



Drilling

► **Ryobi:** The only kit we tested that included brad-point bits— $\frac{3}{16}$ ", $\frac{1}{4}$ ", $\frac{5}{16}$ ", and $\frac{3}{8}$ ". Also boasts 19 titanium-coated twist bits from $\frac{1}{16}$ " to $\frac{1}{4}$ " (with duplicates of the most commonly used diameters) and a countersink.

► **Black and Decker:** Includes 14 black-oxide twist bits ranging between $\frac{1}{16}$ " and $\frac{3}{16}$ ", with duplicates of the smallest diameters. The bits stayed sharp, but showed runout in wood. Also comes with $\frac{1}{4}$ ", $\frac{1}{2}$ ", $\frac{3}{4}$ ", and 1" spade bits.

► **Porter-Cable:** Comes with 8 black-oxide twist bits ranging between $\frac{1}{16}$ " and $\frac{1}{4}$ ". Durable, but the range of diameters was too limited.

Driving

► **Porter-Cable:** Kit includes 46 top-quality driver bits in three lengths: 3½", 2", and 1", plus a 5" magnetic extension to reach deep spots. Comes with multiples of Phillips, flat, and square-drive bits, but no Torx bits.

► **Black and Decker:** Comes with 30 screwdriving bit tips in Phillips, flat, square-drive, and Torx configurations, as well as seven 2"-long driving bits in Phillips, flat, and Torx.

► **Ryobi:** Presents relatively few (20) driver bit tips, but does cover most Phillips, flat, hex, Torx, and square bit sizes. The included magnetic bit holder makes rapidly switching between these bits a breeze.

DIY

► **Black and Decker:** Plenty of handy accessories for use around the house, like an 11" flexible shaft that makes driving screws in hard-to-reach spots easy. Also comes with a set of 12 hex keys, a five-piece socket set, and four holesaws from 1¼" to 2½".

► **Ryobi:** The included 1" spade bit and 2½" hole saw work great for door set installation. The nail set and five nut drivers that come with the kit also proved handy.

► **Porter-Cable:** Aside from two nut drivers and the twist bits, this driver-heavy set offers little variety for the DIYer.

Bottom Line:

The Ryobi kit comes with great wood-worker-specific accessories that are both affordable and durable.

The Porter-Cable kit was focused almost entirely on driving; the bits showed outstanding durability in our tests.

Black and Decker overwhelmed the competition with a staggering number of accessories to fit lots of DIY tasks. 🌿

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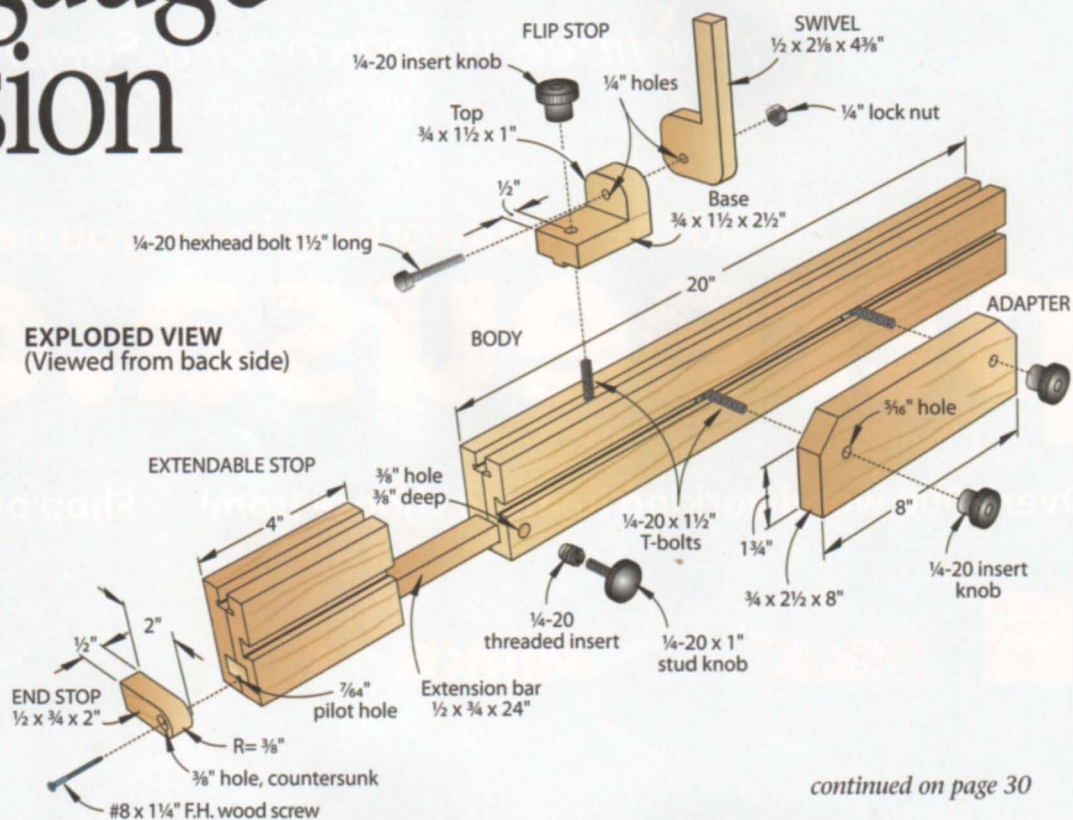
Great Ideas For Your Shop



Miter-gauge Extension

Reliable and accurate crosscuts on a table saw require a miter-gauge extension with an adjustable stop. You'll find many good miter-gauge extensions on the market, but you can make your own and save some cash in the process.

Construct the four main components shown on the drawings: extendable stop, body, adapter, and flip stop. See the **Exploded View** drawing at right and the full-size patterns on page 30. Make the body and extendable stop as one long piece. When making the body/extendable stop, we cut the



continued on page 30

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• Make repeatable plunge cuts for mortises and dados. The built in **Depth Stop** sets the maximum height the bit can protrude above the table.



Only The PowerLift...

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• Tap the footswitch to make incremental passes, achieving clean cuts without turning off the router.

• Make your table a mortising machine. A jig that controls the work piece up top, combined with raising the spinning bit via the footswitch yields perfect mortises.

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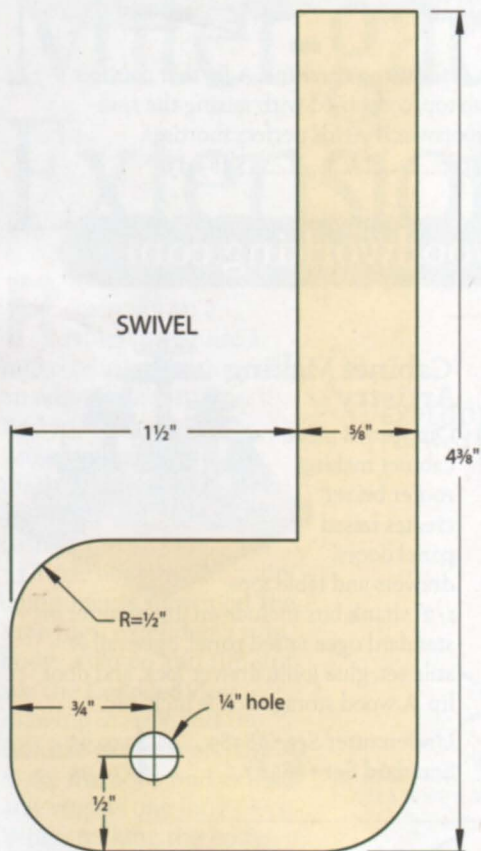
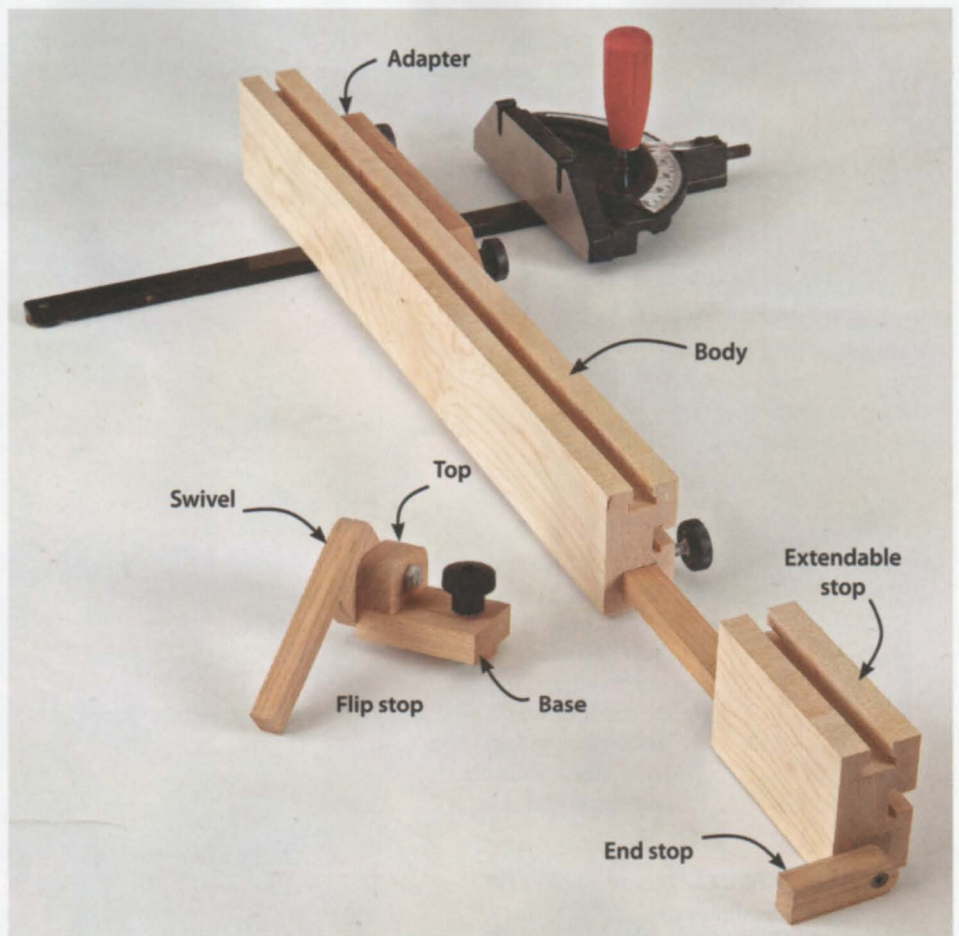
Great Ideas For Your Shop

grooves in the mating pieces with a dado blade and regular $\frac{1}{8}$ "-kerf blade. Be careful to keep glue out of the groove and T-slot when gluing the two pieces together.

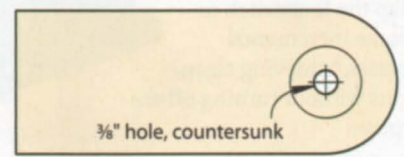
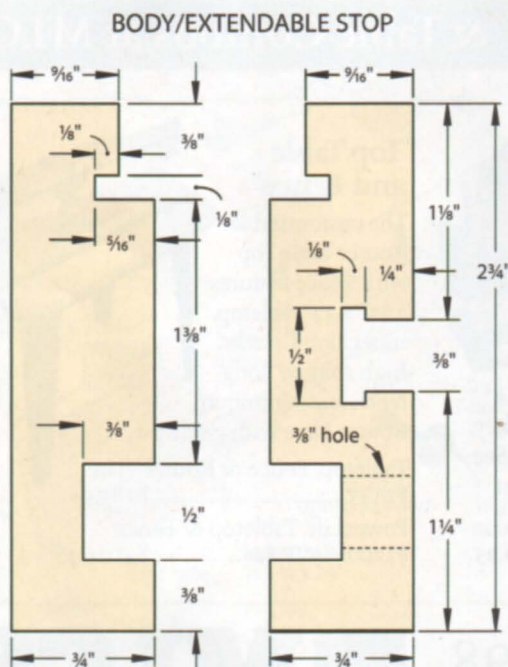
Crosscut 4" off the end of the lamination for the stop. Glue the extension bar in place in the extendable stop, making sure it slides freely in the body by sanding it as necessary. Construct the flip stop to fit and slide freely in both the top of the extendable stop and the body. Drill mounting holes in the adapter allowing you to secure it to your miter gauge. Use the $\frac{3}{16}$ " holes in the adapter to connect it to the body with a pair of T-bolts and knobs.

When attaching the body to the adapter, position the body just to the left of the blade, where shown in the photo on page 28, to prevent cutting through the extension. 🌲

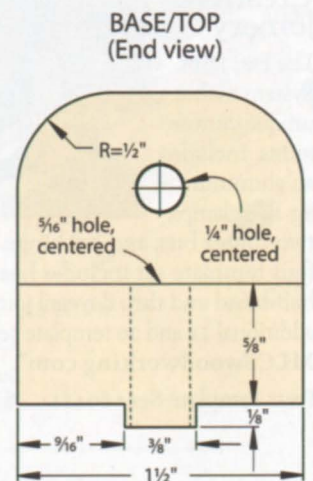
Project design: **Ralph Bagnall**, Murfreesboro, Tenn.
Illustrations: **Lorna Johnson**

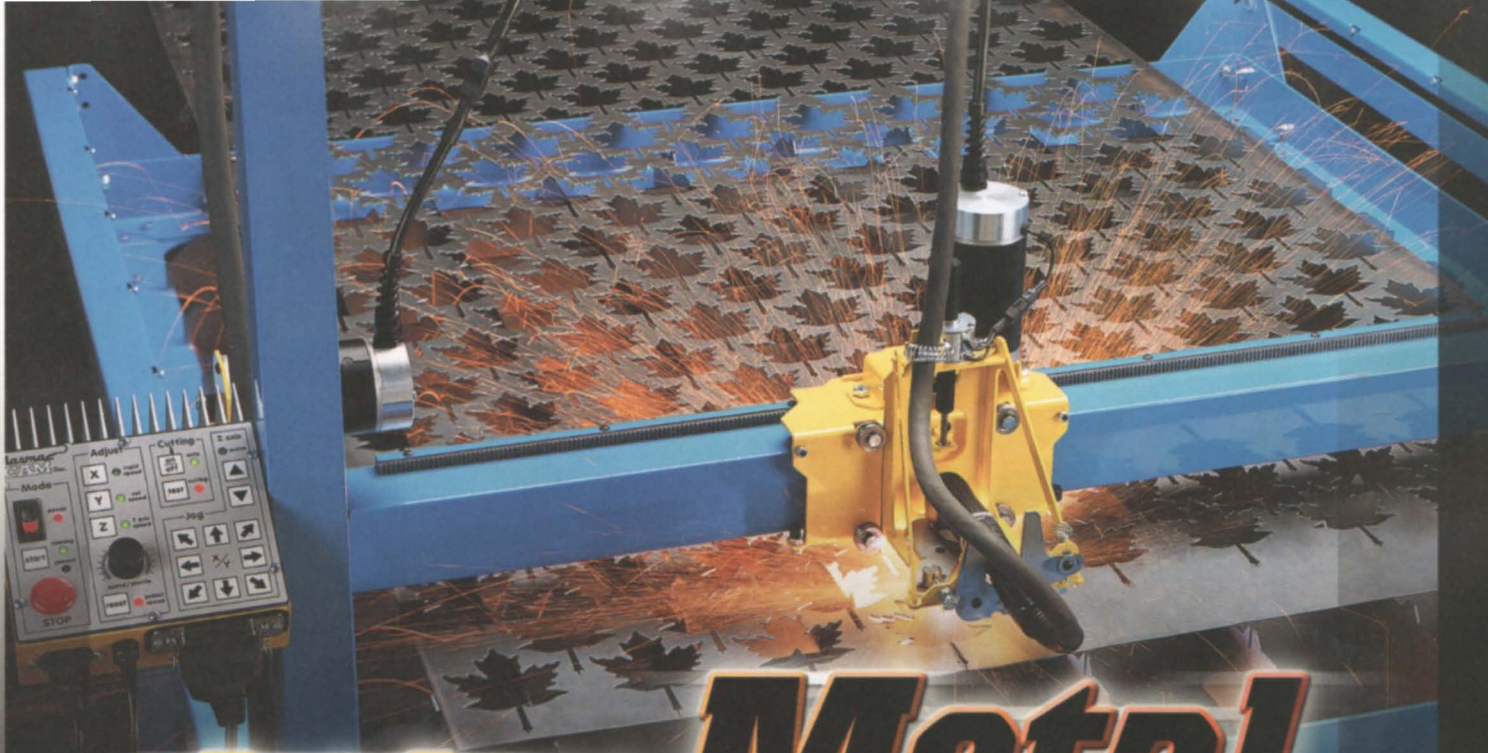


MITER-GAUGE EXTENSION FULL-SIZE PATTERNS



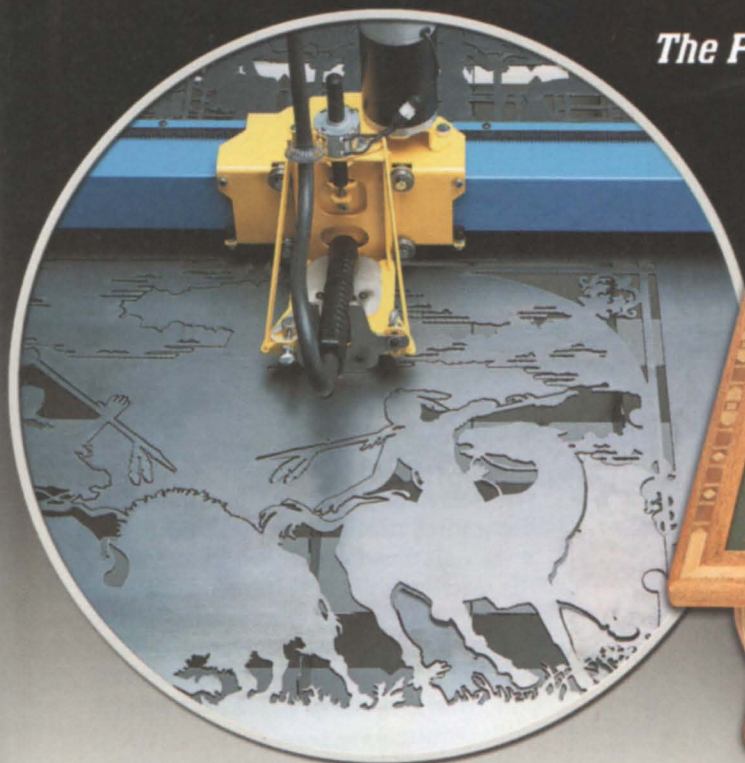
END STOP





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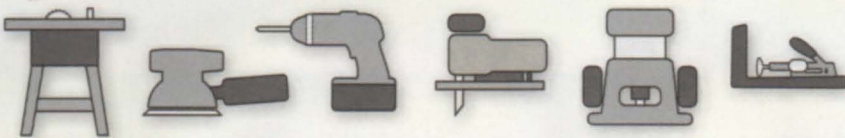
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WHAT YOU'LL NEED



▶ **Dimensions:** 34½"W × 15½"D × 58"H

▶ **Approximate materials cost:** 30 × 18" unfinished cabinets \$81 each; lumber and plywood \$85.

Tell someone this cabinet started as three unfinished, prebuilt cabinets from the home center, and the reaction will likely be an astonished "Really?" To pull off this nifty trick, you simply sandwich the cabinets between two frames that dress up the sides, then add trim and a top panel. No special skills required!

Here you'll learn how to build the six-door cabinet shown *above*; but using the same techniques with a few minor variations, you could also make a sideboard or a buffet. Instructions for those pieces begin on *page 37*.

SCREW THE FRAMES TOGETHER



A Butt the stile (D) and lower rail (C) against a scrap to align them, then clamp the parts to your worksurface. Drive pocket screws.

ROUT RABBETS FOR THE PANELS



B Clamp a side assembly (A–D) to your worksurface and rout $\frac{3}{8}$ " rabbets $\frac{1}{4}$ " deep around each opening. Repeat for the other side assembly.

Build the side assemblies

Before beginning, stack the three cabinets on top of each other and measure their combined height. Add $3\frac{1}{2}$ " (the width of the front lower rail [G] plus $\frac{1}{4}$ ") to this measurement to determine the actual length of the stiles (D) [Drawing 1].

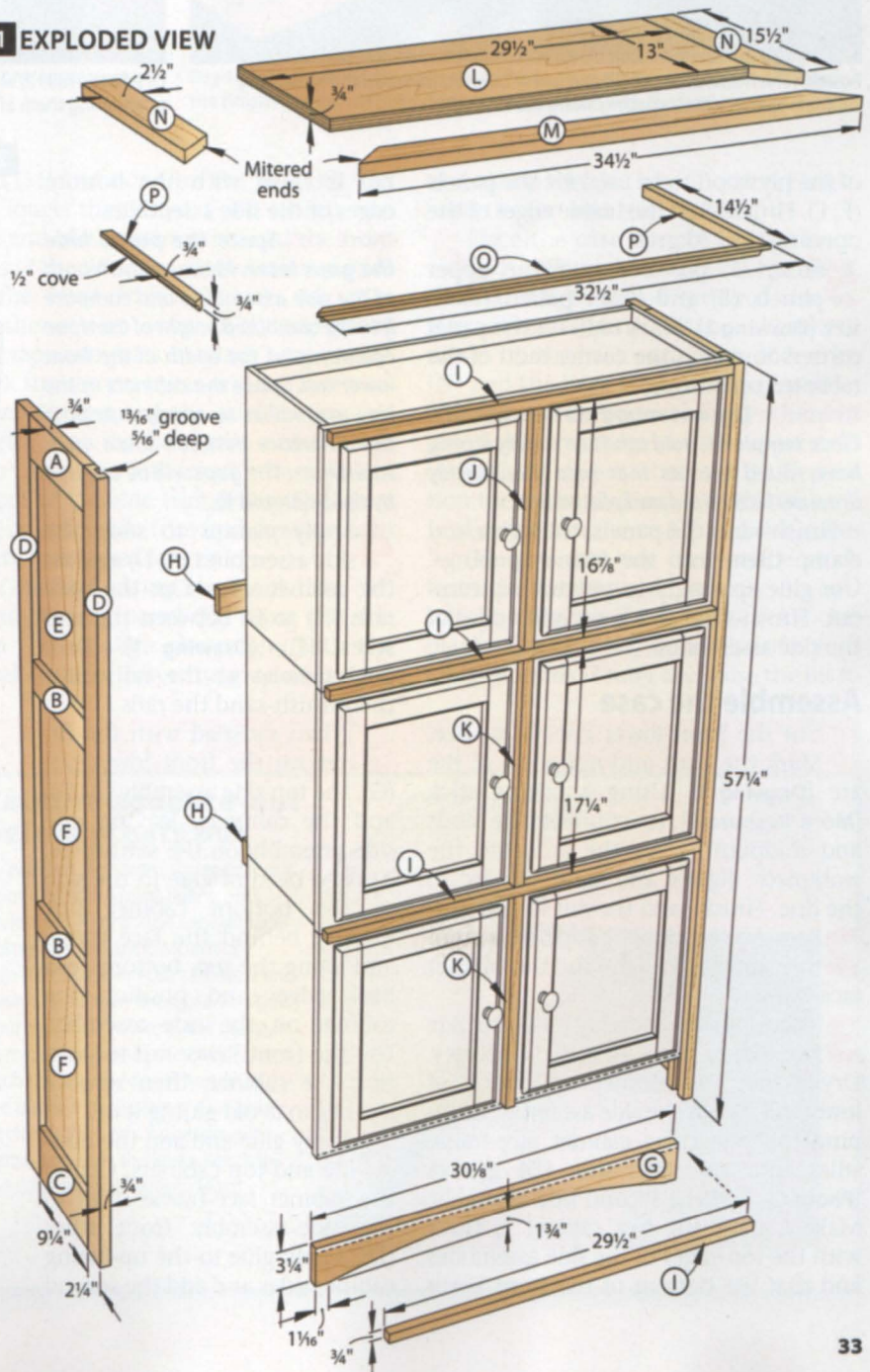
1 From $\frac{3}{4}$ "-thick stock, cut the upper rails (A), middle rails (B), lower rails (C), and stiles (D) to size [Materials List, Drawing 2].

2 Arrange the parts as shown [Drawing 1], placing them for the best color and grain match on the outside face. Mark the inside face of each part and the locations of the grooves in the two front stiles (D) [Drawing 2]. With a dado blade in your tablesaw, cut a groove in each stile to fit the projecting edge of the cabinet face-frame stiles. Work for a snug fit that still allows for easy insertion.

3 Use a pocket-hole jig to drill pocket holes into the backs of the rails (A, B, C) [Drawing 2]. Assemble the side frames [Photo A], then sand them smooth.

4 Chuck a $\frac{3}{8}$ " rabbet bit into your hand-held router and rout $\frac{1}{4}$ "-deep rabbets along the inside edges of the openings in each side assembly (A–D) [Photo B]. To prevent tear-out, rout the rabbets in two steps, increasing the depth between passes so the depth matches the thickness

1 EXPLODED VIEW



SHOP TIP

The world's simplest (and cheapest) workbench

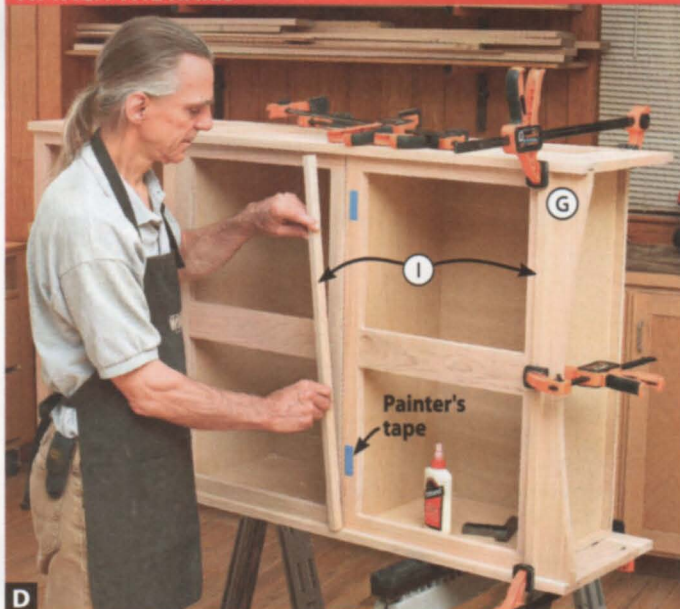
A piece of $\frac{3}{4}$ " plywood on a pair of sawhorses makes a suitable workbench for assembling this project. Stiff enough to provide a flat surface, the plywood is thin enough to allow easy clamping for the pocket-hole joinery.

MAKE A TEST-FIT BEFORE ASSEMBLY



Position the front lower rail (G) and lower cabinet, then add the remaining cabinets to check their spacing along the stiles (D).

ATTACH THE RAILS



Dry-fit the rails (I) and mark their locations with painter's tape to assist with positioning them after the glue has been applied.

of the plywood to be used for the panels (E, F). Finish-sand the inside edges of the openings to 220 grit.

5 From $\frac{1}{4}$ " plywood, cut the upper panels (E) and lower panels (F) to size [Drawing 2]. Mark radii on the panel corners to match the corner radii of the rabbeted openings.

Quick tip! Lay out round corners quickly. Circle templates, sold at office supply stores, have round cutouts that help you quickly draw perfectly sized and placed arcs.

Finish-sand the panels, then glue and clamp them into the frame openings. Use glue sparingly to prevent squeeze-out. Finish-sand the faces and edges of the side assemblies.

Assemble the case

1 Cut the front lower rail (G) to size. Mark the ends and midpoint of the arc [Drawing 1]. Using a fairing stick [More Resources] to connect the ends and midpoint, trace the arc onto the workpiece. Jigsaw and sand the arc to the line. Finish-sand the rail to 220 grit.

2 Remove the doors and hinges from the cabinets. Finish-sand the cabinet face frames.

3 Place one side assembly (A–D) outside face down on a pair of sawhorses. Dry-fit the three cabinets and the front lower rail (G) on the side assembly, dropping the projecting cabinet face-frame stiles into the front-stile (D) groove [Photo C]. Add the second side assembly. Make certain the top cabinet is flush with the top edges of the side assemblies and that the bottom of the front lower

rail is flush with the bottom edges of the side assemblies.

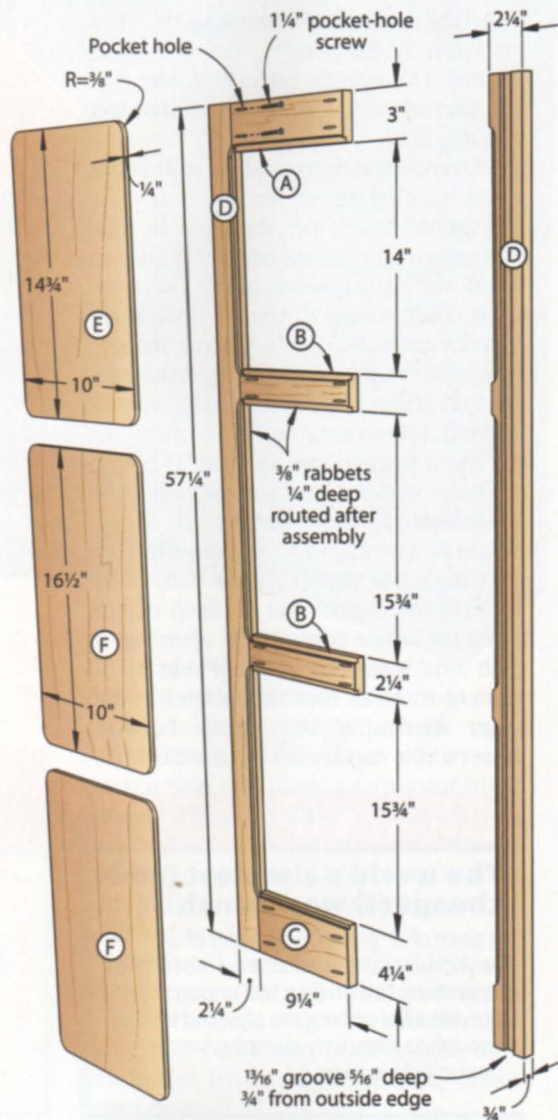
Quick tip! Space the parts, hide the gaps later. Measure the length of the side assemblies and compare it to the combined height of the three cabinets plus the width of the front lower rail. Space the cabinets in the side assemblies to evenly distribute the difference between these measurements. The gaps will be covered by the front rails (I).

4 Apply clamps to snug the side assemblies (A–D) against the cabinet sides. Cut the back rails (H) to fit between the rear stiles (D) [Drawing 1]. Drill pocket holes at the rail ends, then finish-sand the rails.

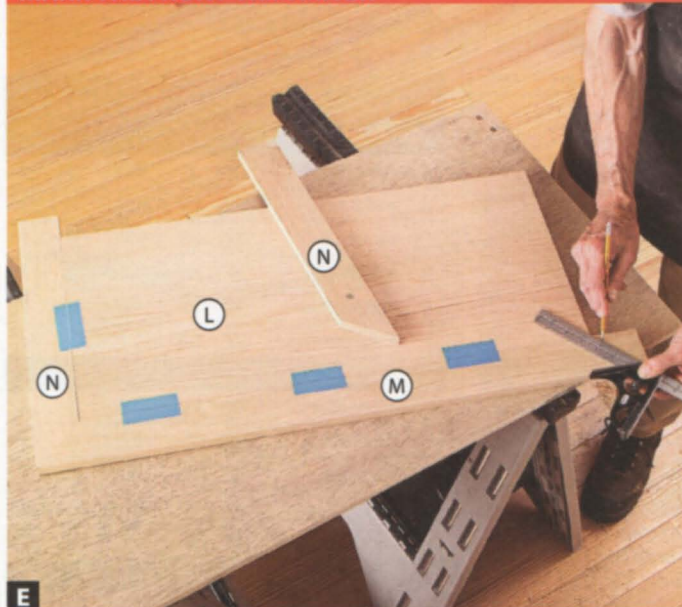
5 When satisfied with the fit, remove the front lower rail (G), the top side assembly (A–D), and the cabinets, leaving one side assembly on the sawhorses. Apply a bead of glue to the side of the bottom cabinet box directly behind the face frame and along the top, bottom, and back edges and position the cabinet on the side assembly. Use the front lower rail to position the cabinet, then remove the rail to avoid gluing it in.

6 Apply glue and add the middle and top cabinets. Clamp the cabinet face-frame stiles to the side-assembly front stiles (D). Apply glue to the up-facing cabinet sides and add the second

2 SIDE ASSEMBLY (Right side shown from rear)

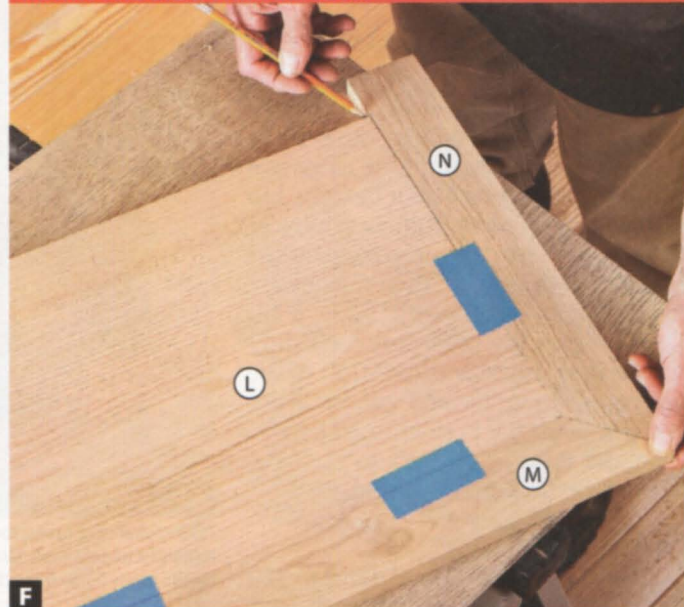


MARK THE FRONT-TRIM MITER



E With the front trim (M) and a side trim (N) dry-fit together at one corner, use a combination square to help mark the opposite miter.

MARK THE SIDE TRIM LENGTH



F Dry-fit the remaining side trim (N) to the top panel (L) and front trim (M). Mark the finished length of both side-trim pieces flush with the back edge of the top.

side assembly. Clamp the cabinet face-frame stiles to the second side-assembly front stile.

7 Insert the back rails (H) between the side assemblies, centering them over the joints between the cabinets, and drive pocket screws through the rails and into the rear stiles (D).

8 Apply glue to the edge of the bottom cabinet lower face-frame rail and in the front-stile (D) grooves. Slide the front lower rail (G) into place and clamp it to the lower cabinet. Because the front lower rail may be thinner than the width of the groove, make sure the front of the rail presses against the front of the groove to eliminate any gap.

Add the trim and top

1 Cut the front rails (I) to fit between the side-assembly front stiles (D), and cut the upper divider (J) and lower dividers (K) to width, but 1" longer than listed. Finish-sand the parts. Cut glue-relief kerfs in the front rails and dividers [**Shop Tip, right**], then glue and clamp the rails to the cabinets face frames, centered on the face-frame-to-face-frame and face-frame-to-front-lower-rail joints [**Photo D, Drawing 1**]. Make sure the rails are square to the side-assembly stiles.

2 Cut the upper and lower dividers (J, K) to fit between the front rails (I). Glue and clamp the dividers to the cabinet face-frame center stiles, centered from side to side. Make sure the dividers align vertically.

3 Cut the top panel (L) to size from $\frac{3}{4}$ " plywood [**Drawing 1**]. Cut the front

trim (M) and side trim (N) to width, but $1\frac{1}{2}$ " longer than listed. Cut a 45° miter on one end of the front trim and the front ends of the side trim. Fit the mitered ends of the front trim and one side trim together at one corner of the top panel, and tape the parts in place temporarily. Mark the second miter on the front trim [**Photo E**], and cut the part to finished length. Tape the front trim and the side trim in place and mark the finished length of the side trim [**Photo F**]. Repeat for the other side trim and crosscut both pieces to finished length.

4 Glue and clamp the front trim (M) to the top panel (L), using the side trim (N) to align the miters with the panel corners. After the glue dries, glue

and clamp the side trim in place. Finish-sand the top and trim to 220 grit.

5 Place the case upright on the floor, and position the top (L-N) on it, flush at the back and centered side-to-side. With a pencil, draw alignment marks on the back ends of the side trim (N) and the back edges of the rear stiles (D). Remove the top and apply a bead of glue to the top edges of the upper rails (A) and the upper front rail (I). Reposition the top and clamp it to the case.

6 For the front cove (O) and side coves (P), you can buy ready-made stock from the lumberyard, or make it yourself. To make the coves, cut a $\frac{3}{4} \times 2\frac{1}{4} \times 34$ " blank. Chuck a $\frac{1}{2}$ " cove bit into your table-mounted router and raise the bit to

SHOP TIP

Capture squeeze-out before it gets out

To prevent glue from squeezing out from under the front rails (I) and dividers (J, K) onto the cabinet face frames, try this trick. Mount a thin-kerf blade in your tablesaw and raise it $\frac{1}{16}$ " above the table. Position your rip fence $\frac{1}{16}$ " from the blade, then cut grooves in the back face of each rail and divider. When gluing the parts in place, apply glue only between the kerfs. Squeeze-out gets trapped in the kerfs, keeping the cabinet face frames clean.



cut a full 1/2" cove. Position the fence so 1/8" of the bit protrudes beyond the faces of the fence. Make a pass along both edges of the blank [Photo G], then make additional passes, moving the fence back between passes until the fence face lines up with the bit's pilot bearing. Rip a 3/4"-wide cove piece from each edge of the blank. Crosscut one cove piece in half for the side coves, then finish-sand the coves.

7 Following the procedure for fitting the front and side trim (M, N) to the top panel (L), miter and cut the front and side coves (O, P) to finished length. Glue and clamp the coves to the case, tight to the front and side trim.

Finish it up

1 Finish-sand the cabinet doors to 220 grit. Inspect the case and finish-sand where needed. If desired, apply a stain. (We used ZAR oil-based stain no. 120 Teak Natural Color.) Apply a clear finish of your choice. (We sprayed on three coats of satin water-based polyurethane.) To avoid sanding through the finish and into the stain, we waited until after the second coat to lightly sand away any roughness with 320-grit sandpaper.

2 Drill holes in the doors for the knob screws and install the knobs. Reinstall the hinges on the doors and the doors on the case. Now that you know how easy this project is, consider one of the design variations on the *next page*.

MAKE YOUR OWN COVE MOLDING



G Taking shallow passes, rout a cove profile on each edge of a wider blank. Use a push pad to keep your hands safely away from the bit.

More Resources

- ▶ Learn about pocket-hole joinery in issue 152 (November 2003) or download the article for a small fee at woodmagazine.com/pocket.
- ▶ Get a free fairing stick plan and watch a free video on using it at woodmagazine.com/fairing.
- ▶ Find more Basic-Built projects, tips, techniques, and videos at woodmagazine.com/basicbuilt.

Materials List: Floor cabinet

Part	FINISHED SIZE			Matl.	Qty.	
	T	W	L			
Side frames						
A	upper rails	3/4"	3"	9 1/4"	O	2
B	middle rails	3/4"	2 1/4"	9 1/4"	O	4
C	lower rails	3/4"	4 1/4"	9 1/4"	O	2
D	stiles	3/4"	2 1/4"	57 1/4"***	O	4
E	upper panels	1/4"	10"	14 3/4"	OP	2
F	lower panels	1/4"	10"	16 1/2"	OP	4
Case trim						
G	front lower rail	3/4"	3 1/4"	30 1/8"	O	1
H	back rails	3/4"	2"	29 1/2"	O	2
I	front rails	3/4"	3/4"	29 1/2"	O	4
J*	upper divider	3/4"	3/4"	16 7/8"	O	1
K*	lower dividers	3/4"	3/4"	17 1/4"	O	2
Top						
L	top panel	3/4"	13"	29 1/2"	OP	1
M*	front trim	3/4"	2 1/2"	34 1/2"	O	1
N*	side trim	3/4"	2 1/2"	15 1/2"	O	2
O*	front cove	3/4"	3/4"	32 1/2"	O	1
P*	side coves	3/4"	3/4"	14 1/2"	O	2

*Parts initially cut oversize. See the instructions.

**See the instructions to determine actual length.

Materials key: O—oak, OP—oak plywood.

Supplies: 18 x 30" cabinets (3), 1 1/4" fine-thread pocket screws, 1 1/8"-diameter knobs (6).

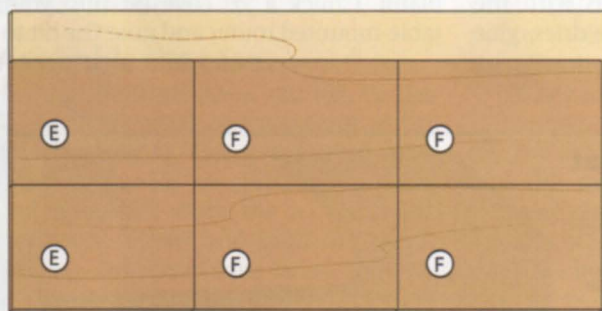
Blade and bits: Dado blade; 3/8" rabbet, 1/2" cove router bits.

Produced by **Craig Ruegsegger** with **Jan Svec**

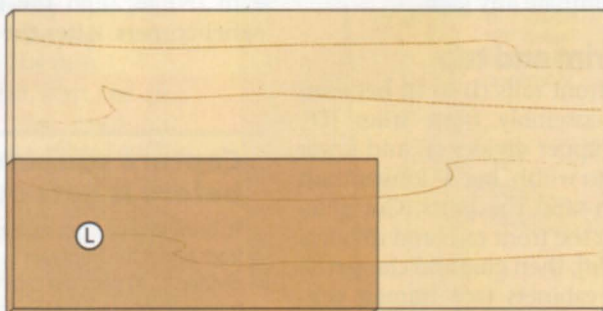
Project design: **Jan Svec**

Illustrations: **Lorna Johnson** and **Mike Burns**

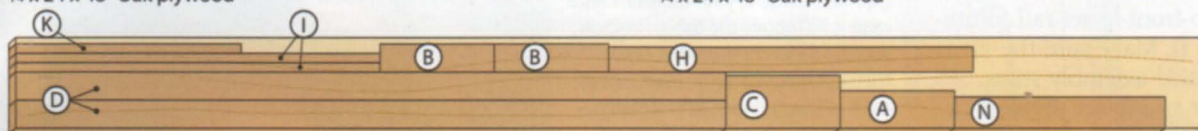
Cutting Diagram



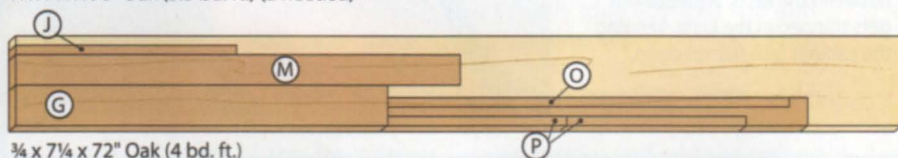
1/4 x 24 x 48" Oak plywood



3/4 x 24 x 48" Oak plywood



3/4 x 7 1/4 x 96" Oak (5.3 bd. ft.) (2 needed)



3/4 x 7 1/4 x 72" Oak (4 bd. ft.)

Design options: Buffet and Sideboard



Buffet: 40½"W×15½"D×34"H



Dimensions:

Sideboard: 34½"W×15½"D×32"H

Applying the same construction techniques to cabinets of different sizes yields this buffet and sideboard. The buffet uses a 30×36" cabinet; the sideboard, a 30×15" unit. The **highlights** in the **Materials Lists** at *right* indicate dimensions changed from the floor cabinet on the previous pages. For the legs of the sideboard, fill the exposed grooves below the front lower rail (G) with filler strips (Q). 🌲

Let's see your design

Home centers have a wide variety of sizes of unfinished cabinets. So we've just scratched the surface of what you can make using those stock cabinets and these techniques. Let your imagination go, then head to the shop and build it! Snap some photos of what you come up with, and we'll feature them in a photo gallery on our Web site. Upload your pictures at woodmagazine.com/galleries.



Materials List: Buffet

Part	FINISHED SIZE			Matl.	Qty.	
	T	W	L			
Side frames						
A	upper rails	¾"	3"	9¼"	O	2
B	Not needed					
C	lower rails	¾"	4¼"	9¼"	O	2
D	stiles	¾"	2¼"	33¼"	O	4
E	upper panels	¼"	10"	26¾"	OP	2
F	Not needed					
Case trim						
G	front lower rail	¾"	3¼"	36½"	O	1
H	Not needed					
I	front rails	¾"	¾"	35½"	O	2
J*	upper divider	¾"	¾"	28½"	O	1
K	Not needed					
Top						
L	top panel	¾"	13"	35½"	OP	1
M*	front trim	¾"	2½"	40½"	O	1
N*	side trim	¾"	2½"	15½"	O	2
O*	front cove	¾"	¾"	38½"	O	1
P*	side coves	¾"	¾"	14½"	O	2

*Parts initially cut oversize. See the instructions.

Materials key: O—oak, OP—oak plywood.
Supplies: 30×36" cabinet, 1¼" fine-thread pocket screws, 1½"-diameter knobs (2).

Materials List: Sideboard

Part	FINISHED SIZE			Matl.	Qty.	
	T	W	L			
Side frames						
A	upper rails	¾"	3"	9¼"	O	2
B	Not needed					
C	lower rails	¾"	4¼"	9¼"	O	2
D	stiles	¾"	2¼"	31¼"	O	4
E	upper panels	¼"	10"	13"	OP	2
F	Not needed					
Case trim						
G	front lower rail	¾"	3¼"	30½"	O	1
H	Not needed					
I	front rails	¾"	¾"	29½"	O	2
J*	upper divider	¾"	¾"	13⅞"	O	1
K	Not needed					
Top						
L	top panel	¾"	13"	29½"	OP	1
M*	front trim	¾"	2½"	34½"	O	1
N*	side trim	¾"	2½"	15½"	O	2
O*	front cove	¾"	¾"	32½"	O	1
P*	side coves	¾"	¾"	14½"	O	2
Q	filler	¾"	1"	13"	O	2

*Parts initially cut oversize. See the instructions.

Materials key: O—oak, OP—oak plywood.
Supplies: 30×15" cabinet, 1¼" fine-thread pocket screws, 1½"-diameter knobs (2).

Cantilevered Jewelry Box

Build this stunning project from those prized cutoffs you've been saving.

Inspired in part by Frank Lloyd Wright's clever use of architectural cantilevers, this suspended jewelry box utilizes deceptively simple dadoses and rabbets for joinery. To open the drawer, simply push the opposite end through the drawer box.

Start with the drawer box

1 From $\frac{1}{4}$ "-thick stock, cut $8\frac{1}{4}$ "-long blanks for the box top and bottom (A) and sides (B) [Drawing 1, Materials List] with 45° bevels along the edges of each. Sand the inside faces smooth.

2 Arrange those parts on your workbench with the bevels facing down, alternating wide (A) and narrow (B) parts. With the bevel tips touching and the ends aligned, apply painter's tape across both ends of the four parts. Roll up the parts to form the box, and check that all bevels come together tightly [Photo A]. Then glue it together.

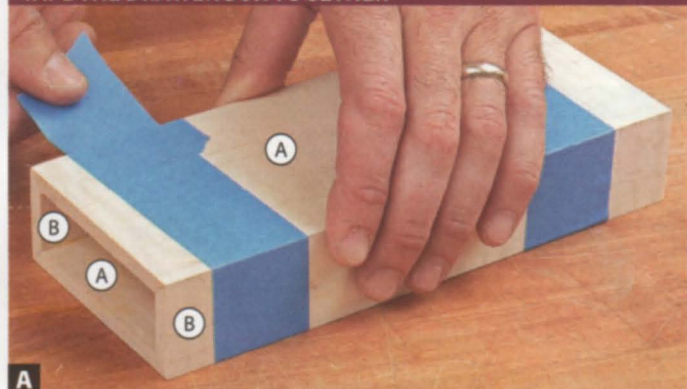
3 After the glue dries, remove the tape. Locate the centerpoint on the bottom (A) and draw the end curves [Drawing 2, Photo B]. Bandsaw the ends to within $\frac{1}{32}$ " of the line and sand smooth.

Now for the support

1 From $\frac{1}{2}$ "-thick contrasting stock, cut a pair of leg blanks (C) $4\frac{1}{2}$ " wide by 4" long [Drawing 3].

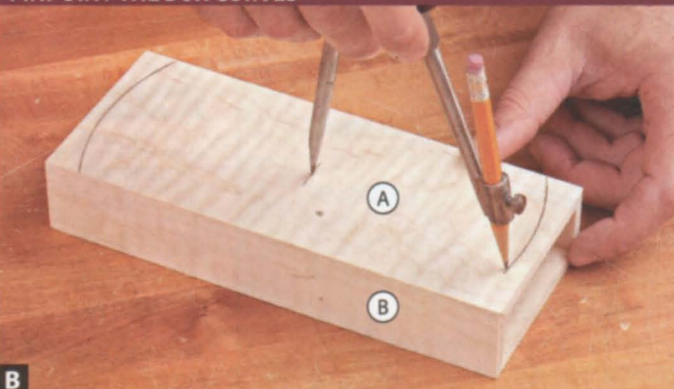
2 Install a $\frac{1}{2}$ " stacked dado blade on your tablesaw and set it for a $\frac{1}{4}$ "-deep

TAPE THE DRAWER BOX TOGETHER



A After gluing the beveled edges, roll up the top and bottom (A) and sides (B) and wrap with tape to pull the bevels together tightly.

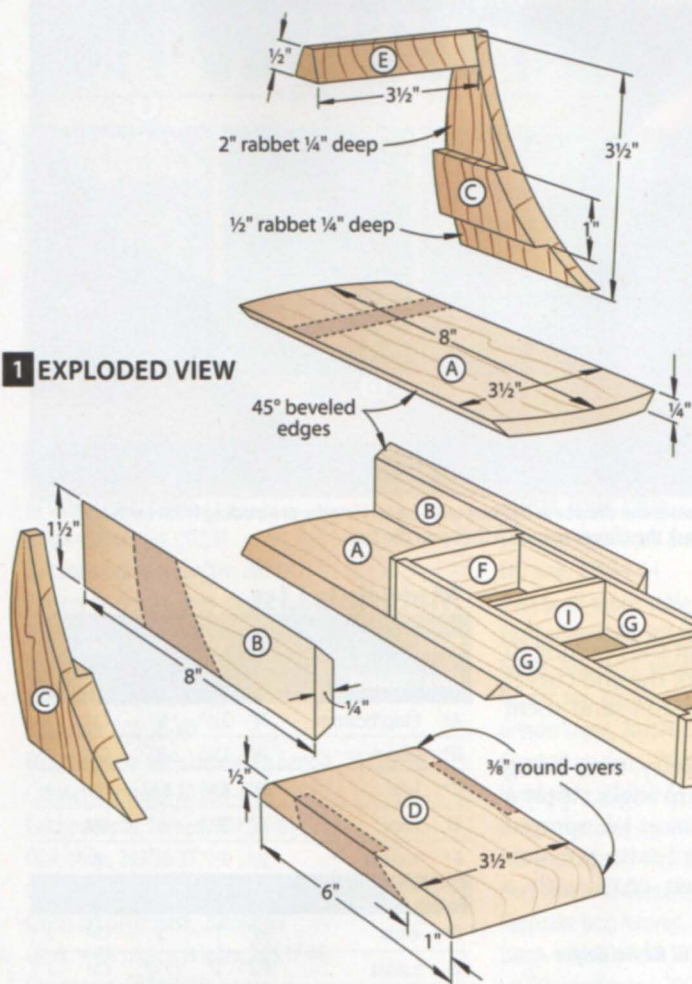
PINPOINT THE BOX CURVES



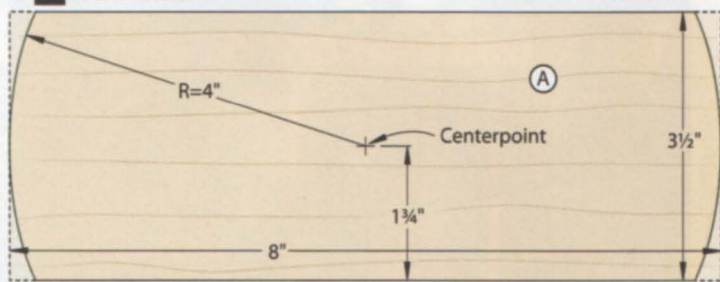
B With the box bottom face up, place the compass point lightly on the centerpoint and draw a 4" radius across each end.



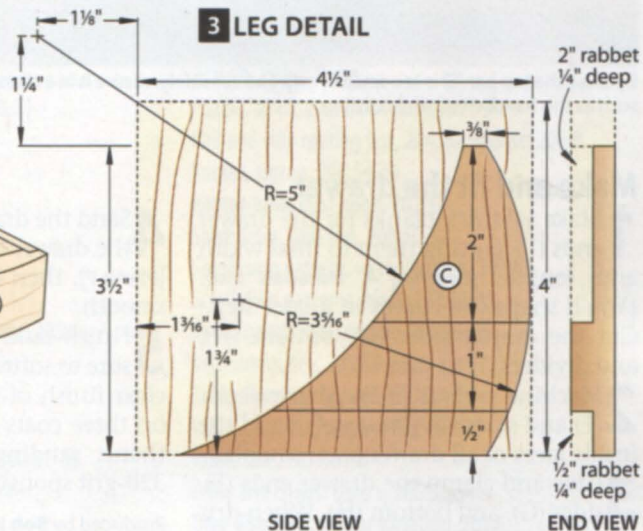
1 EXPLODED VIEW



2 PART VIEW



3 LEG DETAIL



cut. Attach an auxiliary face to your saw's rip fence, and slide it flush against the dado stack. Cut a $\frac{1}{2}$ " rabbet along the inside bottom edge of each blank.

3 Slide the rip fence 1" to the right, and then make successive cuts on the same face of each blank to form a 2"-wide dado [Drawing 3]. (The remaining $\frac{1}{2}$ " lip, used to support the blank while making these cuts, will be cut away in Step 5.)

4 To make sure you have matching right and left parts, secure the leg

blanks (C) face-to-face, using double-faced tape, with the dados and rabbets aligned. Lay out the centerpoint locations for the arcs on each end as shown in Drawing 3, and use a compass to draw both arcs. Bandsaw and sand smooth.

5 Crosscut the top of each leg (C) at the dado's top edge, cutting away the top $\frac{1}{2}$ "-wide section to turn the dado into a rabbet.

6 Cut the base (D) to size [Drawing 1], making sure it matches the width of

the drawer box (A/B). Rout a $\frac{3}{8}$ " round-over on the base ends.

7 Apply glue in the rabbets of each leg (C), but not above the drawer-box height in the top rabbet. Clamp the assembly and allow to dry [Photo C].

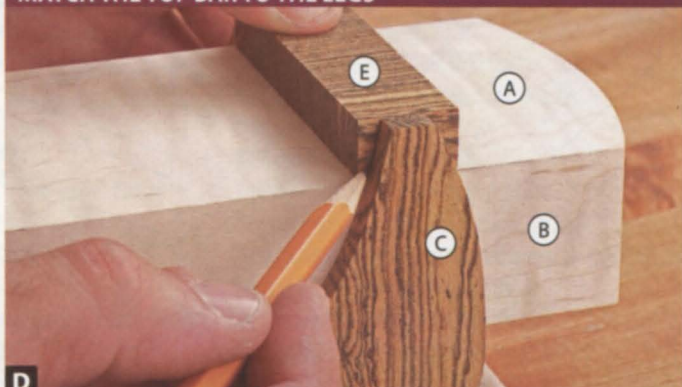
8 Cut the top bar blank (E) $\frac{1}{2} \times 3\frac{1}{2} \times \frac{7}{8}$ ". Place it between the legs (C) and mark the cutlines [Photo D]. Bandsaw just outside the lines [Photo E] and sand to final shape. Glue and clamp the top bar to the legs and drawer box (A/B).

CLAMP THE PROJECT TOGETHER



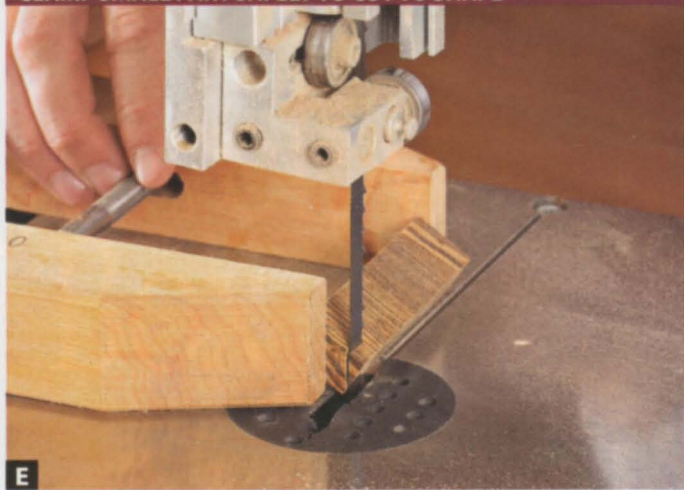
C Position the front point of the legs 1" from the front end of the base, with the drawer box centered over the base.

MATCH THE TOP BAR TO THE LEGS



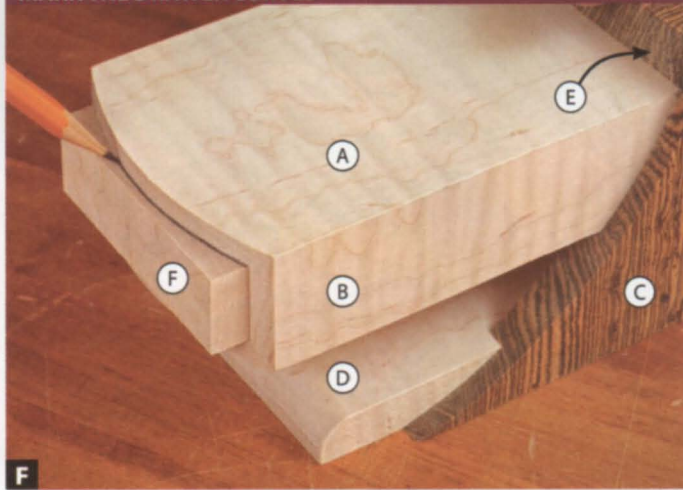
D Center the top bar blank (E) between the legs (C), and trace the front and rear leg curves onto it. Repeat for the other side.

CLAMP SMALL PART SAFELY TO CUT TO SHAPE



E Because the top bar (E) is too small to grip and cut safely, secure it in a clamp, such as this handscrew, while cutting.

MARK THE DRAWER CURVES



F Center the drawer in the box with equal lengths protruding from each end. Mark the curves to match those on the box.

Make and fit the drawer

1 Make $\frac{3}{8}$ "-thick blanks for the drawer ends (F), cutting them to final width and length [Drawing 4, Materials List]. (You'll shape the curves in a later step.) Cut the drawer sides (G), bottom (H), and dividers (I) to size.

2 Machine rabbets in the drawer ends (F) and sides (G) [Drawing 4]. Sand the inside faces of all drawer parts smooth.

3 Glue and clamp the drawer ends (F), sides (G), and bottom (H). When dry, glue and clamp the dividers (I) into the box, making three equal compartments.

4 Sand the drawer to fit the opening in the drawer box. Mark the end curves [Photo F], then bandsaw and sand them smooth.

5 Finish-sand the jewelry box, being sure to soften all sharp edges. Apply a clear finish of your choice. We sprayed on three coats of aerosol satin polyurethane, sanding between coats with a 320-grit sponge. 🌿

Produced by **Bob Hunter** with **Kevin Boyle**
Project design: **John Olson**
Illustrations: **Lorna Johnson**

Materials List

Part	FINISHED SIZE			Matl.	Qty.
	T	W	L		
Box/Stand					
A* † top/bottom	$\frac{1}{4}$ "	$3\frac{1}{2}$ "	8"	CM	2
B* † sides	$\frac{1}{4}$ "	$1\frac{1}{2}$ "	8"	CM	2
C* legs	$\frac{1}{2}$ "	$4\frac{1}{4}$ "	$3\frac{1}{2}$ "	B	2
D base	$\frac{1}{2}$ "	$3\frac{1}{2}$ "	6"	CM	1
E* top bar	$\frac{1}{2}$ "	$3\frac{1}{2}$ "	$\frac{7}{8}$ "	B	1
Drawer					
F* ends	$\frac{1}{2}$ "	1"	3"	CM	2
G † sides	$\frac{3}{16}$ "	1"	$7\frac{1}{4}$ "	CM	2
H bottom	$\frac{1}{8}$ "	$2\frac{7}{8}$ "	$7\frac{1}{4}$ "	P	1
I † dividers	$\frac{3}{16}$ "	$\frac{7}{8}$ "	$2\frac{5}{8}$ "	CM	2

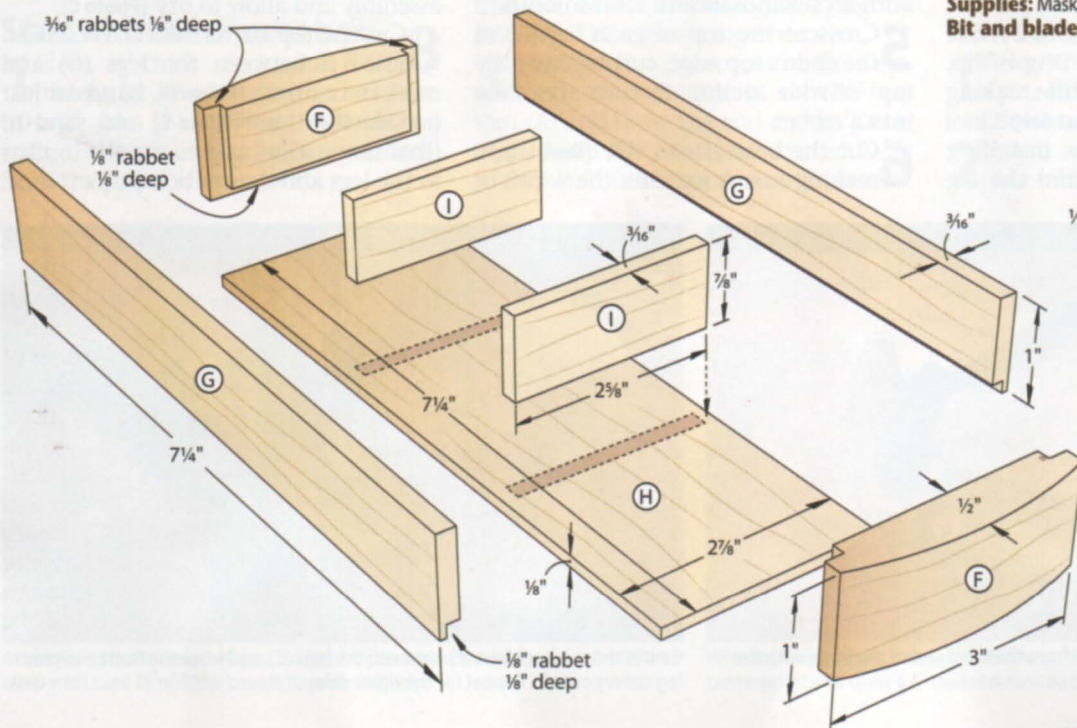
* Parts initially cut oversize; see the instructions.
† Plane or resaw to thickness.

Materials key: B—bocote; CM—curly maple; P—plywood.

Supplies: Masking tape, double-faced tape.

Bit and blade: $\frac{3}{8}$ " round-over router bit, dado blade.

4 DRAWER EXPLODED VIEW



Cutting Diagram

$\frac{1}{2}$ x $5\frac{1}{2}$ x 36" Curly maple (.75 bd. ft.)
*Plane or resaw to the thicknesses listed in the Materials List.

$\frac{1}{2}$ x $5\frac{1}{2}$ x 12" Bocote (.25 bd. ft.)

$\frac{1}{8}$ x 12 x 24" Plywood



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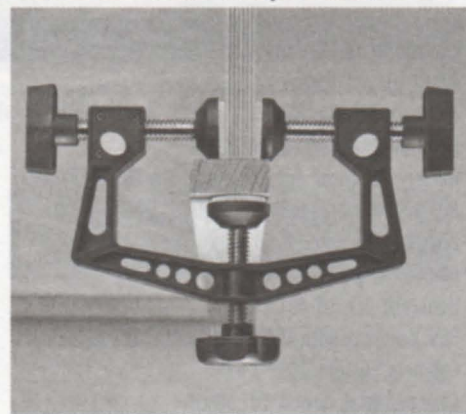
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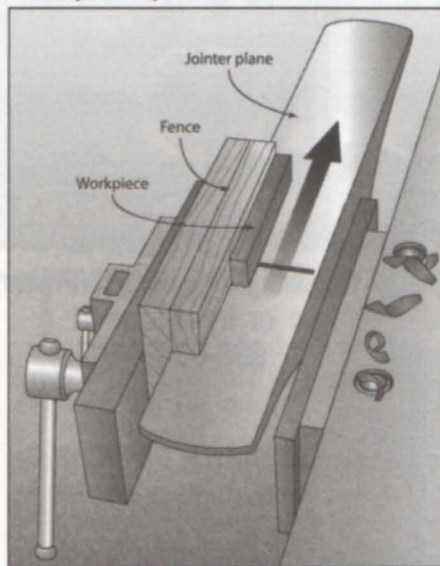
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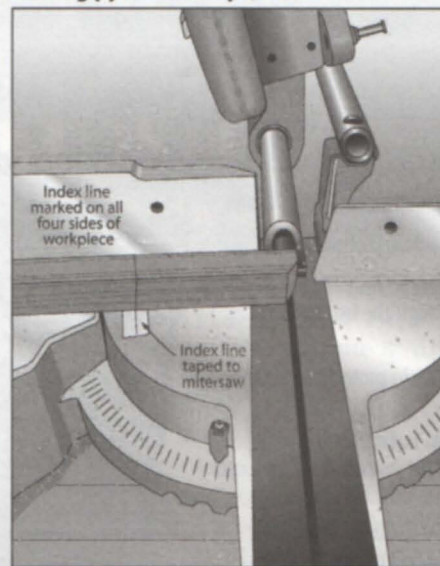
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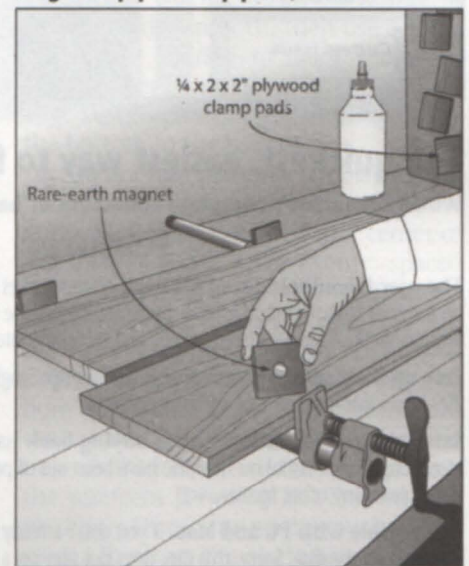
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This annual index includes every article and Shop Tip that appeared in *WOOD*® magazine from the December/January 2010/2011 issue through the November 2011 issue. To quickly find the article you're looking for, first identify the major index category most likely to contain the article:

- Projects (plans with step-by-step instructions)
- Tools & Materials (product reviews and guidance on using tools, accessories, hardware, and wood products)
- Techniques and Features (specific skills and articles of general interest, such as craftsman profiles)

- Shop Tips/Skill Builders (quick ideas you can put to use in your shop today)
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Music-Box Carousel

Fill your home with cheery tunes this holiday season.

This holiday, build a gift sure to become a seasonal family favorite. This project requires no turning and can be completed using scrapwood and less than \$10 in parts.

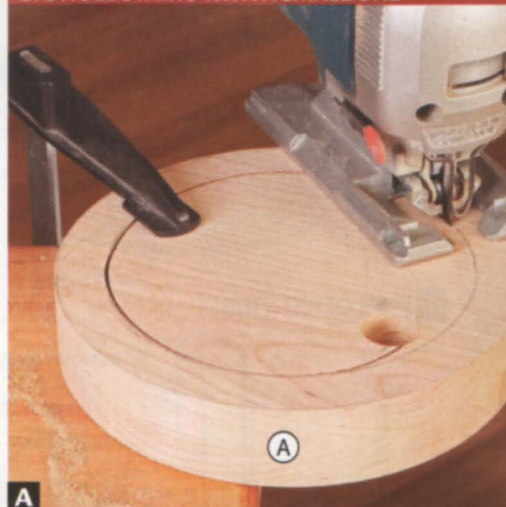
Start with a solid base

1 Lay out an 8"-diameter disc for the base (A) [Drawing 1, Materials List] using a 1½"-thick cherry blank. (If you

don't have 1½"-thick stock, laminated stock works too.) Lay out a 6¼" circle in the center of that disc. Cut the 8" disc and sand the outside edges smooth. Using a jigsaw with a 10-tpi blade, cut out the center of the base [Photo A].

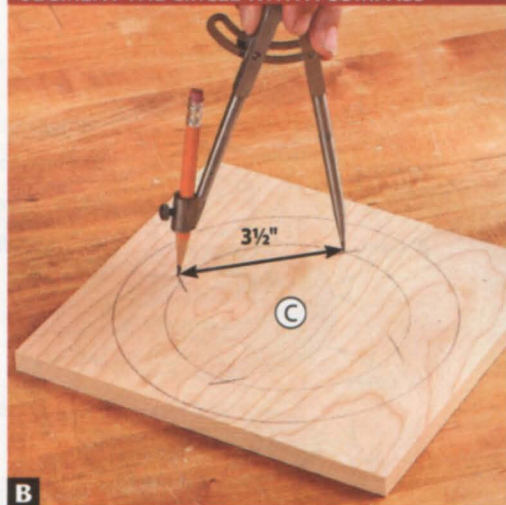
2 Install a ¼" cove bit in your router table, then rout coves around the top and bottom outside edges of the base (A) [Drawing 1].

BIG HOLE STARTS WITH A SMALL ONE



A Before jigsawing the base's center, you'll need to drill a ¼" blade start hole inside the layout line, where shown.

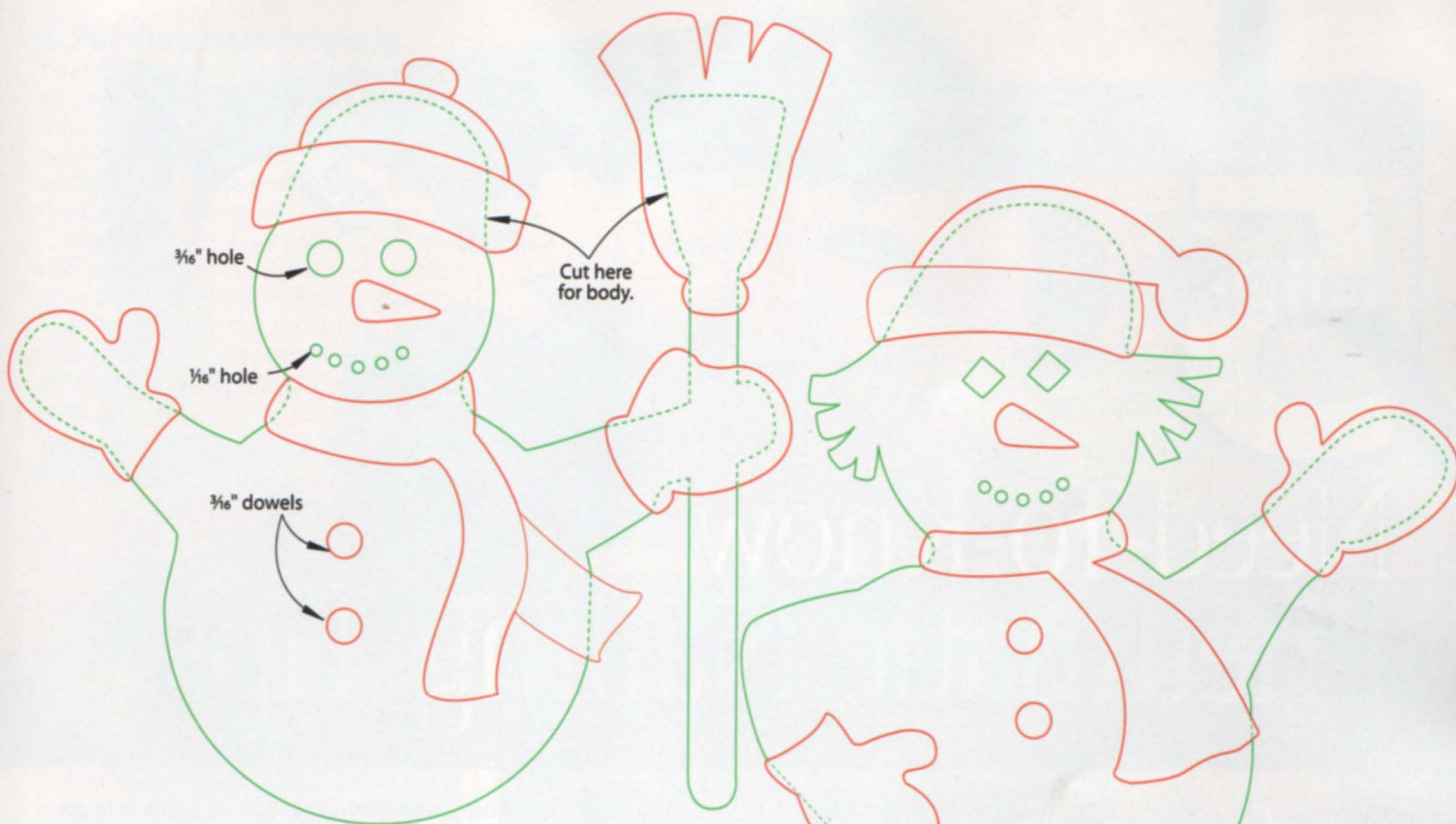
SEGMENT THE CIRCLE WITH A COMPASS



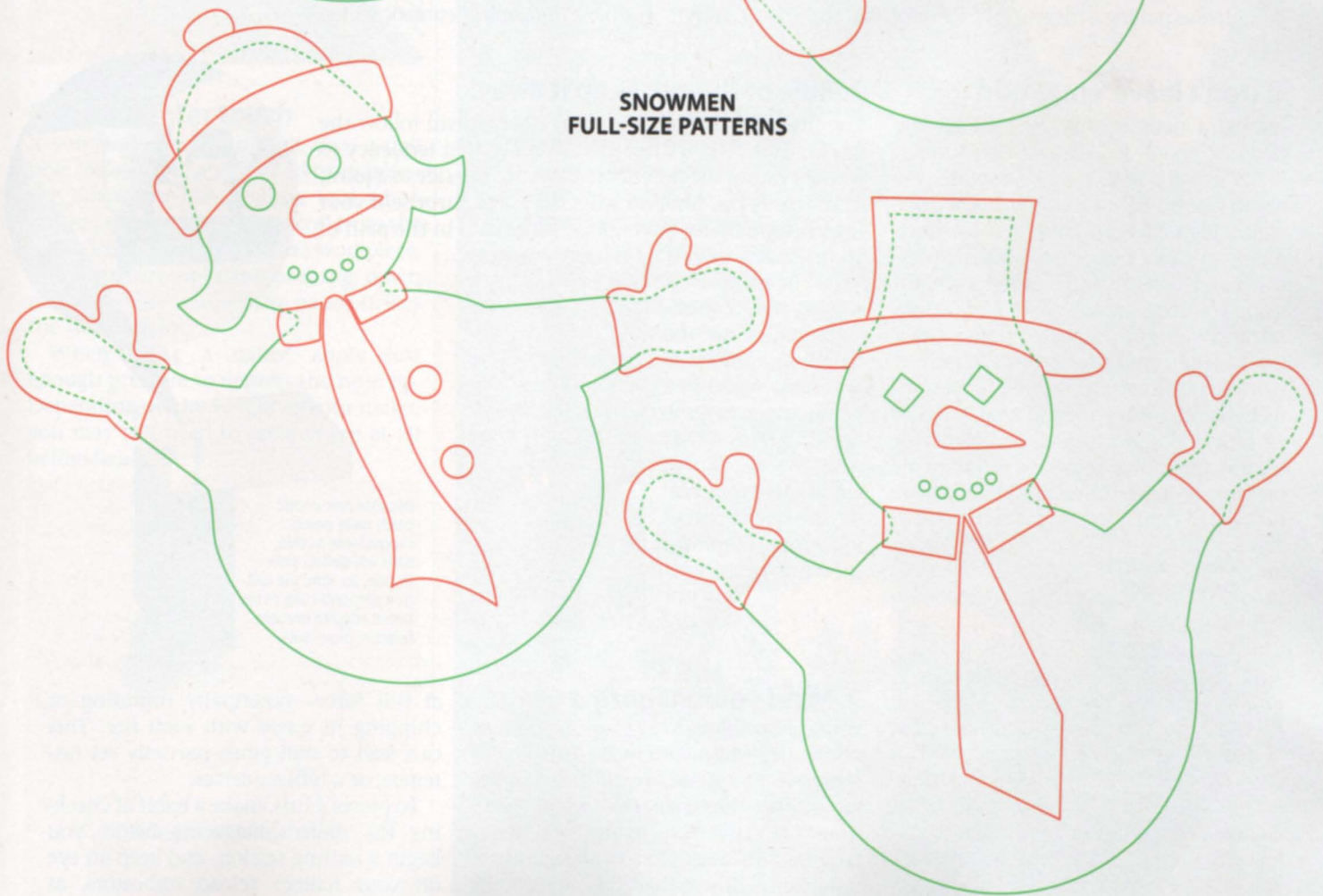
B Set your compass to 3½", and after marking anywhere on the 5" ring, move the compass point to your marked line and repeat.

3 Using ¼" plywood, cut a 7"-diameter disc for the bottom (B) [Drawing 1]. Sand the edge smooth, then use a black permanent marker to color the edge. (The marker helps to conceal the visible edge of the plywood.) Center and glue the bottom to the base (A).

4 Cut an 8x8" platform (C) blank from ½" stock. Draw a 7"-diameter circle and a 5"-diameter circle in the center of the blank. Mark four evenly spaced points anywhere on the 5"-diameter ring [Drawing 2, Photo B]. Using a ¼" bit, drill a ⅜"-deep hole at each of the four points. Switch to a ¼" Forstner bit, and bore a ⅜"-deep hole in the platform's center. In the center of the ⅜"-diameter hole, drill a ⅛" hole all the way through the platform [Drawing 2]. (This will be used later for mounting the music movement.) Bandsaw the platform to size and



**SNOWMEN
FULL-SIZE PATTERNS**



5

Need-To-Know Pneumatic Nailing Tips

Pneumatic pin, brad, and finish nailers make project assembly as simple as pulling a trigger. But these tools can also lead to costly (and painful) goofs if used improperly. Follow these pointers to get the most from any pneumatic nailer.

1. Don't leave 'em proud

Ideally, a nailer's driver should set the fastener about $\frac{1}{16}$ " below the surface. Many newer nailers have on-tool mechanisms (shown *below*) to easily adjust drive depth. For nailers without on-tool adjustment, you can tweak the hose air pressure, and consequently fastener depth, using your compressor's regulator. Before using your freshly adjusted nailer, fire a few fasteners into a scrap piece of project stock to make certain they set to the correct depth. Keep in mind that hard or dense wood species, such as hickory or hard maple, may require additional air pressure to drive the fasteners.

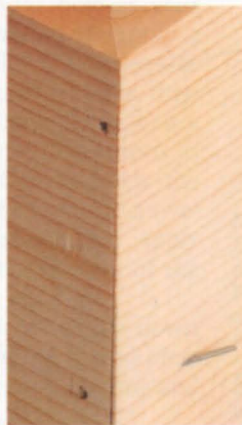
Depth-of-drive adjustment

Reload indicators

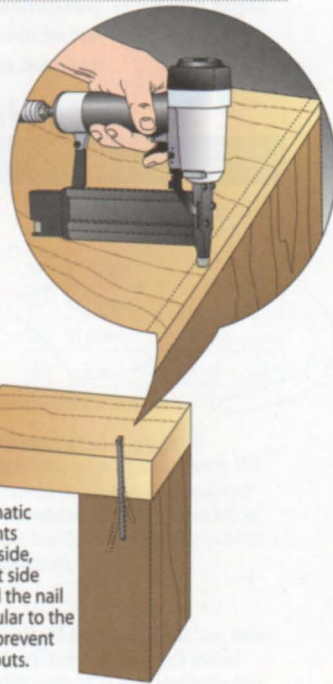
2. Rule of thumb: Keep it away!

The finer the fastener, the more likely it will follow the wood's grain when fired. Occasionally, that tendency to wander causes the fastener to blow out the side of a joint, as shown *below*. Now imagine the nasty surprise if your fingers were there. Never place your hand in the path of an off-course nail.

To help prevent stray fasteners, move your nailer so the chiseled point of its fasteners runs perpendicular to the wood grain. That way, the point will cut across grain patterns rather than following them (as shown at *right*).



Because pneumatic brads have points clipped side to side, nails will deflect side to side. So, hold the nail gun perpendicular to the board edge to prevent fastener blow-outs.



3. Mind your magazine

While assembling a big project, you may not realize when your nailer runs out of fasteners: Many nailers still fire, leaving an empty dimple in the wood. Every time you fire your nailer, its driver punches forward, and if there isn't a fastener in line below it to absorb the impact, the driver slams into the wood

at full force—potentially rounding or chipping its edges with each fire. This can lead to nail jams, partially set fasteners, or a broken driver.

To prevent this, make a habit of checking the nailer's magazine before you begin a nailing session, and keep an eye on your nailer's reload indicators, as shown at *left*.

4. Put the pins in properly

Pinners shoot fasteners with no crowns or heads, making it difficult to determine which end is the point. Fortunately, pin manufacturers print arrows on fastener sticks to ensure that you load them chisel-point-down.

Loading them backwards can cause the tool's driver to strike the chiseled point, likely driving it with a glancing blow that leaves the pin proud of the wood. If done repeatedly, this can deform the tool's driver until it won't work properly.



5. Try a lighter touch

If you find an extra dimple near a nail hole (*below*), it likely resulted from pressing down too hard on the tool when pulling the trigger. Slight recoil from the nailer causes it to lift off the workpiece, and with the operator pushing down forcefully, the nose of the nailer strikes the wood again.

When using a nailer, apply just enough pressure to depress the nose tip. Depending on the weight of your nailer, you may not need to press down at all before firing. 🌲



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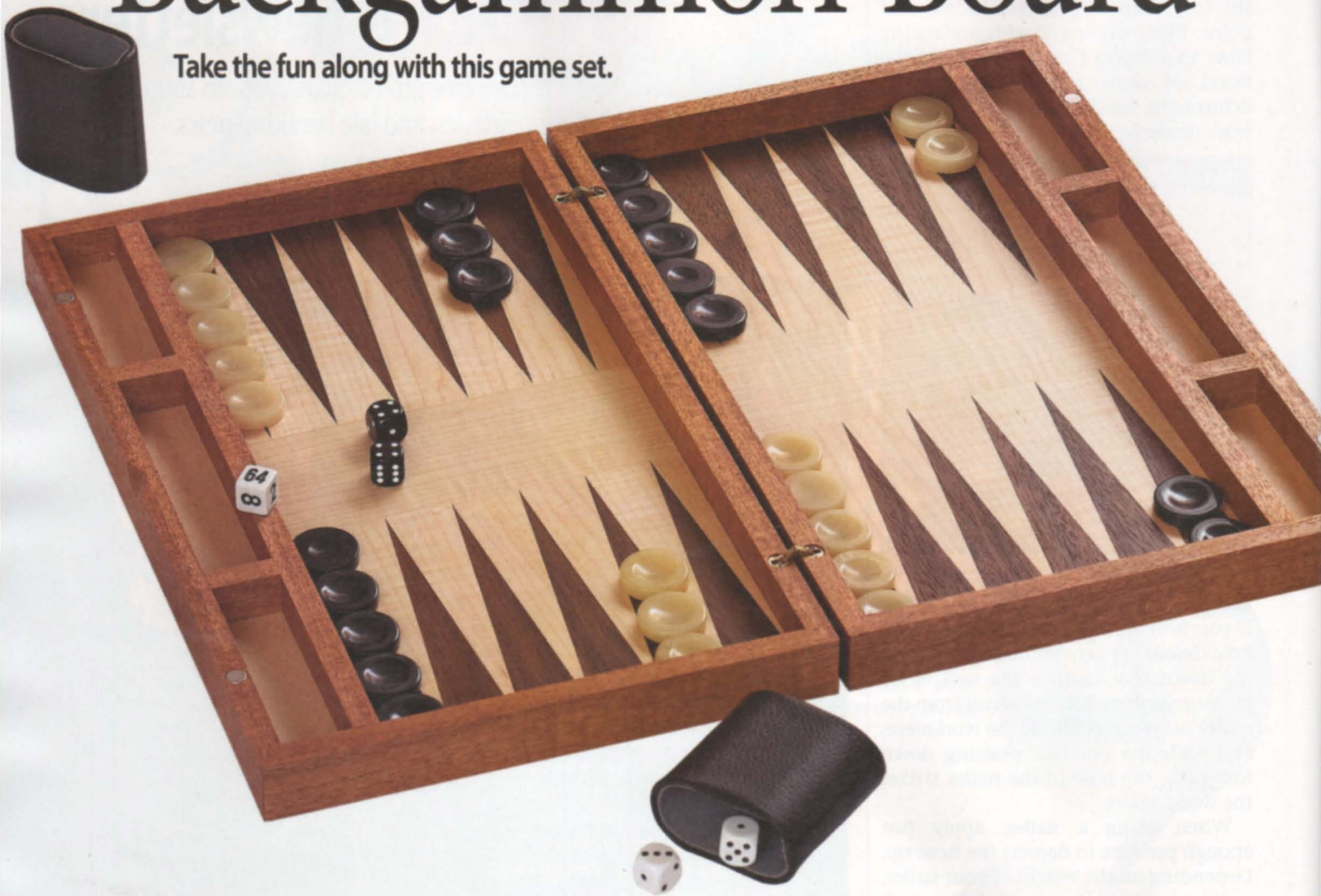
Old Masters...

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Boxed-up Backgammon Board

Take the fun along with this game set.



You'll want to incorporate geometric veneer patterns into more of your projects when you see how easy it is to cut, assemble and apply the crisp triangles in this board. Simple jigs and skills make it all fun and games.

Start with a stack of strips

1 To make the backgammon board points, start by cutting pieces of veneer to $1\frac{1}{2} \times 7\frac{1}{2}$ ", making 30 pieces from walnut and 30 from maple veneer.

Quick Tip! For best results, place the veneer on a sacrificial backer board or cutting mat and use a metal rule and crafts knife to cut the veneer.

2 From $\frac{1}{2}$ " hardwood scrap, cut four top platen $1\frac{1}{2} \times 10$ " and four bottom

platen 2×10 ". In the four top platens drill $\frac{5}{32}$ " shank holes centered 1" from both ends.

Create four veneer stacks by sandwiching 15 pieces of veneer between a bottom and top platen, aligning the edges [Photo A]. Screw the top in place with two #8 \times 1" brass wood screws. Using a 60- or 80-tooth plywood blade in your tablesaw, smooth one edge of each veneer sandwich [Photo B]. On the end of the platen, draw an arrow pointing to the just-smoothed edge. Then flip the stack so the smooth edge rides against the fence and rip it to the final width of $1\frac{1}{16}$ ". Repeat with the remaining stacks.

3 Tape the edges of the veneer/platen stacks. Cut the marked end of a

Project Highlights

- ▶ Overall dimensions—Open: $20\frac{7}{8}$ " wide \times 17" deep \times $1\frac{1}{4}$ " high; closed: $10\frac{3}{8}$ " wide \times 17" deep \times $2\frac{1}{2}$ " high.
- ▶ Materials: Mahogany, maple, and walnut veneer; $\frac{1}{4}$ " MDF; and mahogany.

Skill Builders

- ▶ Master stack-cutting veneer for repeated geometric patterns.
- ▶ Learn to joint veneer for perfectly straight, invisible glue lines.
- ▶ Create identical game-board halves by splitting an enclosed box.

stack, crosscutting it to 8" long and angling your miter gauge, as shown in Photo C. Place a stop on your miter-gauge

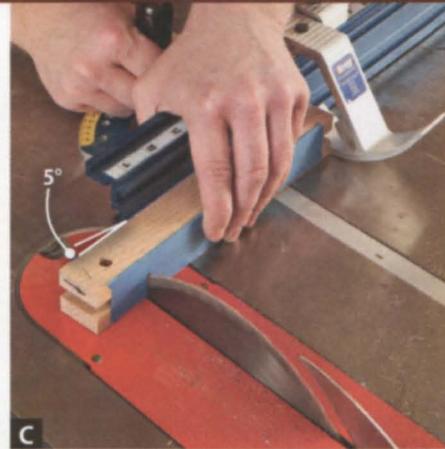
SORT, STACK, AND SLICE THE VENEER



A Orient veneer pieces displaying angled grain so they will be taper-cut along the grain (See Photo E). Think of petting a cat's fur for the correct direction.

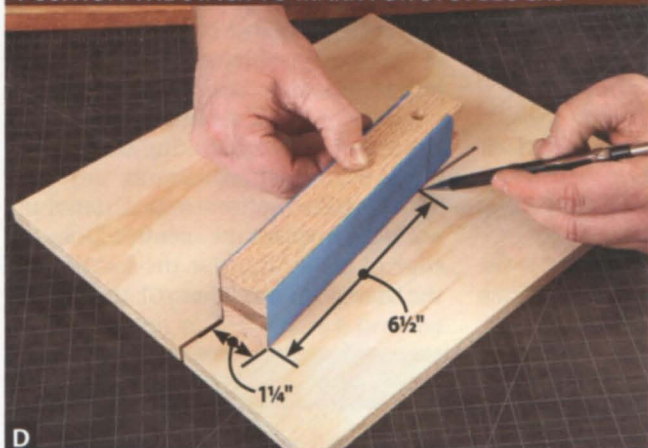


B With the wide platen against the fence, make nibbling passes on the tablesaw until the edge of the veneer stack is smooth.



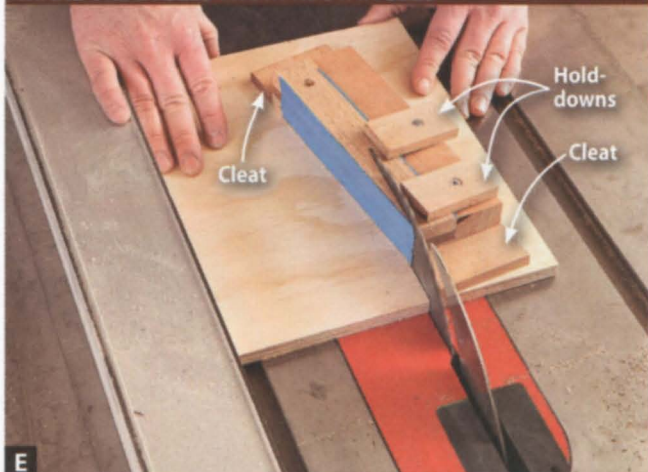
C Cutting to the left side of the blade, set your miter gauge to 5° counterclockwise. Cut the stacks 8" long, keeping the marked arrow pointing forward.

POSITION THE STACK TO MARK FOR STOPBLOCKS



D After aligning the stack's marks to the jig's kerf, trace the leading end and the edge of the veneer stack to locate the stopblock positions.

MAKE TRIANGLES FROM RECTANGLES



E Position the fence to line up the cut with the sled base's kerf. Then cut the veneer stack into a triangle. End the cut before cutting through the sled.

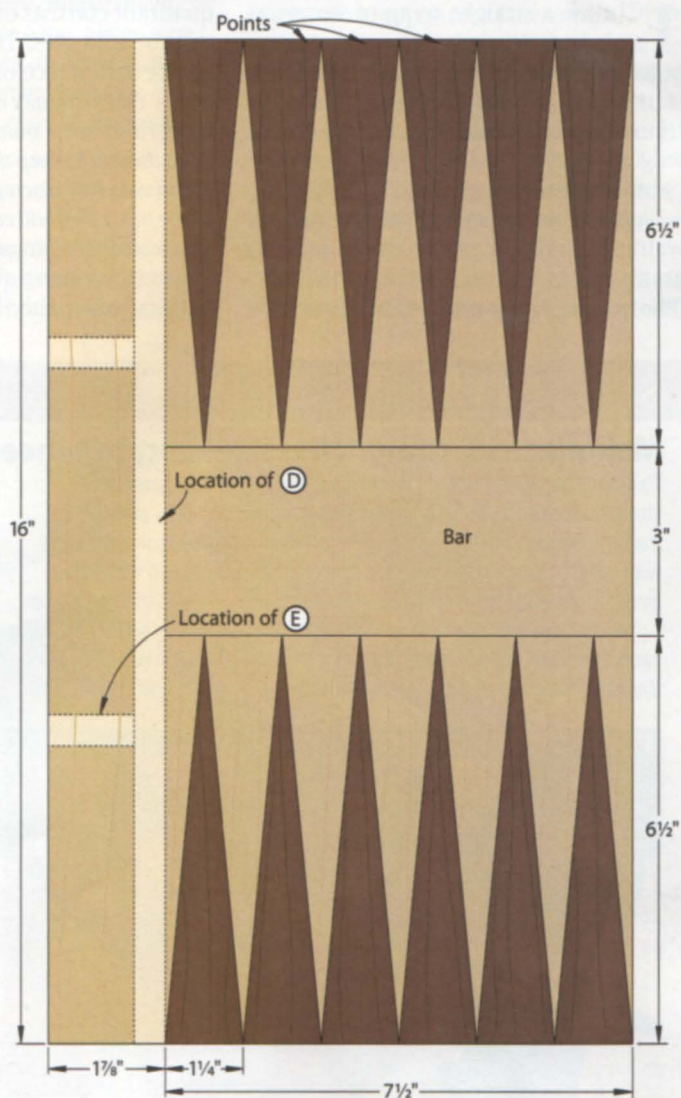
fence to repeat the crosscut on the remaining veneer stacks.

4 Follow the directions on *page 18* to construct an angle-cutting sled.

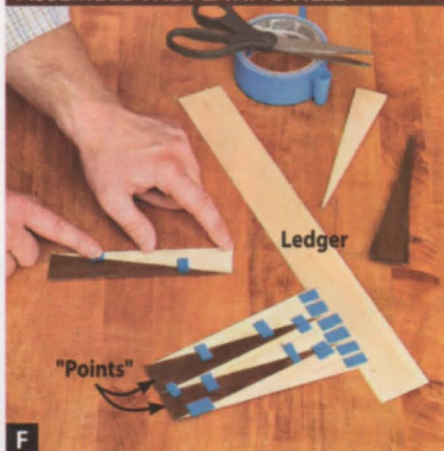
When you've completed the sled base, measure and mark 1 1/4" across the end of the veneer stack and 6 1/2" along the long edge. Align the marks with the offset

side of the kerf on the miter-sled base [Photo D] and trace the long edge and ends to locate the jig's stopblocks. Then, cut each veneer stack as shown [Photo E].

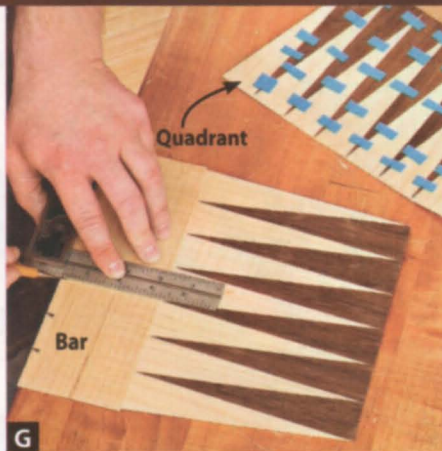
1 GAME-BOARD VENEER



ASSEMBLE THE PLAYING FIELD



F Take care to join the edges tightly and precisely, but only use small pieces of tape this round. It will be removed before glue-up.



G With the game-board veneer flush with your workbench edge, use a square to transfer the walnut point locations across the bar.



H Tape the entire surface of each game-board veneer, avoiding excessive overlaps that might cause uneven pressure during glue-up.

Put 'em back together

1 Choose a straight scrap of veneer as a ledger to assemble the veneer points against. To make each quadrant, start by taping the base of a single maple triangle point, good face down, to the ledger board, using delicate-surface painter's tape.

Now carefully tape together pairs of walnut and maple points into parallelograms. Tape these in line on the ledger [Photo F] before tying together the paral-

lelograms with tape. Continue until the quadrant consists of seven maple and six walnut triangles. The untaped side will be the actual face of the game field.

Quick Tip! Carefully maintain the orientation of the veneer points as you take them from the stack: Keep the top face up, bottom face down. Any discrepancies in the angles of the miter sled will cancel out when you assemble them into parallelograms.

Gently remove the tape holding the quadrant to the ledger board. Then

repeat the process to create three more quadrants.

2 To make the bar [Drawing 1], cut two pieces of maple veneer $3\frac{1}{8} \times 9$ ". Then follow the directions in the **Shop Tip**, below, to "joint" the edges. Use the same method to straighten up the joining maple edges of the quadrants.

3 With the bottom (taped) faces up, tape a quadrant, centered, to the edge of a bar. Transfer the locations of the triangle points [Photo G], then attach

SHOP TIP

Making dead-straight lines in delicate veneer

To create gap-free joints in veneer, the edges must be precisely straight. For the points, the pressure of the jig's platens and the backing of multiple layers allow the tablesaw to make joint-line cuts without tear-out. But for one-off pieces where such a jig would be overkill, platens, cauls, and a sanding block accomplish the task faster.

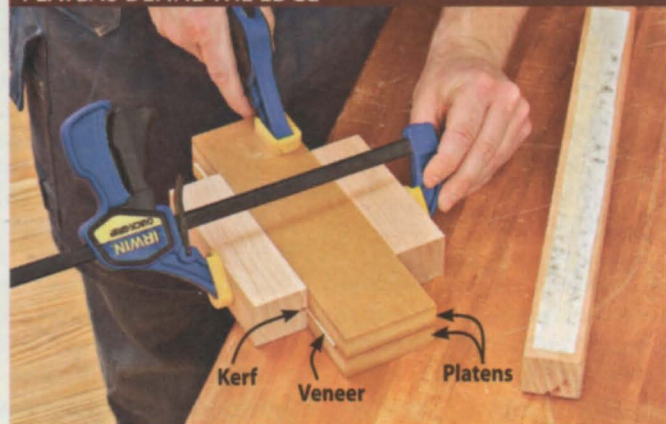
To joint the bars, cut two platens, 3×10 ", and a pair of scrap clamping cauls from $1\frac{1}{2}$ " stock. Center $\frac{1}{8}$ "-deep saw kerfs in the cauls. Sandwich the veneer between the platens with the edges protruding slightly.

Then clamp the cauls against the platen edges, as shown below left, before clamping the platens together. Remove the cauls.

Then, clamping the platens flat on your bench and riding the sanding block along the benchtop, sand the overhanging veneer using a sanding block with 150-grit sandpaper until it is flush with the platens on both edges as shown below.

This method can be used with any veneer edge that needs jointing, even those made of multiple parts like the quadrants.

PLATENS DEFINE THE EDGE



The kerfs protect the veneer while the clamping cauls align the platen edges, creating a flush edge to guide the sanding block.

LOW-POWERED JOINTING



The sanding block sizes the bar to its final width, parallels the edges and joints the edge for an airtight glue line.

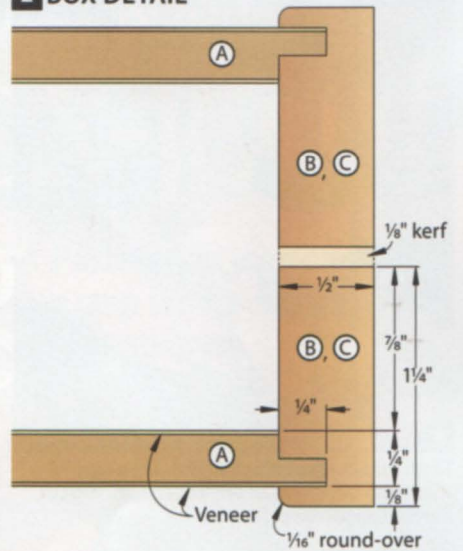


I Position a steel rule from point to point on the outermost maple triangles to cut the game-board veneer to size.



J Thin but thorough glue coverage is all that's needed for a veneer glue-up. Use plenty of clamps for even platen pressure.

2 BOX DETAIL



the opposite field, lining up the points.

Quick Tip! Check for a square game field by measuring from corner to corner. If the measurements don't match, try flipping one of the fields upside down, transferring the tape to the opposite side piece by piece.

Repeat with the remaining quadrants. Turn the game-board veneers faceup. Apply tape across the entire surface [Photo H] and remove the tape from the opposite side.

4 Trim each game-board veneer to the final width of 7½" [Photo I, Drawing 1]. Joint the newly cut edges. Then cut and joint two strips of maple veneer 1⅞×16" and tape them to one side of each game-board veneer where shown in Drawing 1.

Note: The maple veneer trim strip makes up the floor of the storage compartment for the game pieces. Our game pieces were 1¼" in diameter. If yours are sized differently, adjust the trim strip, the game-board substrate, and the box ends by the amount of the difference.

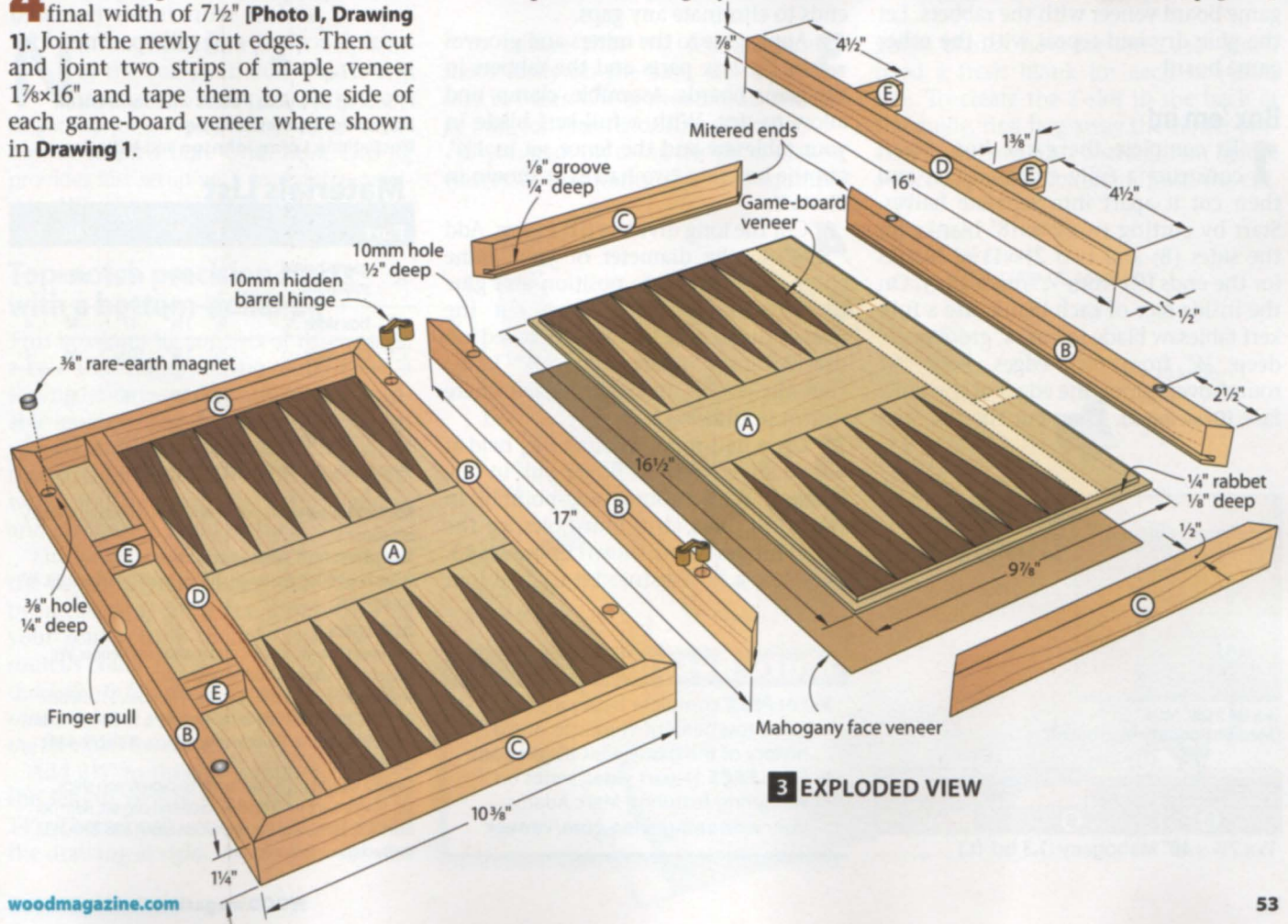
Glue 'em down!

1 Cut two game-board substrates (A) of ¼" MDF, four platens of ¾" MDF, and two pieces of mahogany face veneer

to 10×17". Spread white glue on the ¼" MDF before applying a face veneer. Place waxed paper over the veneer and clamp the stack between the two ¾" MDF platens. When the glue dries, remove the clamps and repeat with the remaining game board.

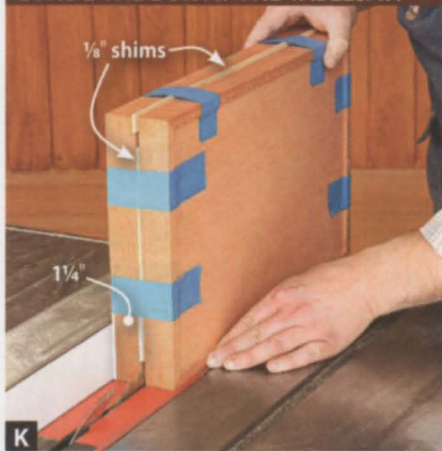
Quick Tip! A cheap paint roller makes quick work of spreading the glue into an even layer on the game board.

2 Use your tablesaw to cut the game boards to size [Materials List, page 54].



3 EXPLODED VIEW

DIVIDE THE BOX AT THE TABLESAW



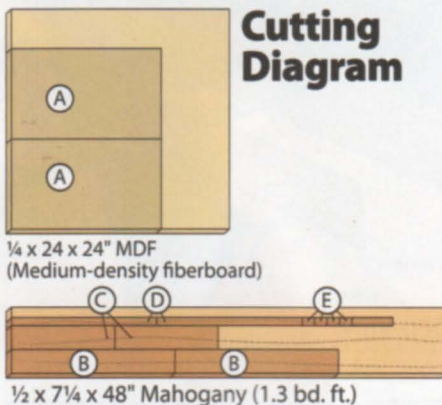
K To split the box, cut the ends first. Then tape $\frac{1}{8}$ " shims into the kerfs. Cut one edge, shim, and cut the final edge to separate the box.

With a rabbeting bit in your table-mounted router, rout a $\frac{1}{4}$ " rabbet along all edges of the unveneered side of both game boards, setting the depth to leave the tongue of the board $\frac{1}{8}$ " thick. (The exact depth will depend on the thickness of the veneer, but will be slightly more than $\frac{1}{8}$ " [Drawing 2].)

3 Repeat the veneer glue-up process, applying the game-board veneer to the rabbeted side of the game-board substrate (Photo J), carefully aligning the game board veneer with the rabbets. Let the glue dry and repeat with the other game board.

Box 'em in!

1 To complete the game box, you'll construct a fully enclosed box and then cut it apart into separate halves. Start by cutting two $2\frac{5}{8} \times 18$ " blanks for the sides (B) and two $2\frac{5}{8} \times 11\frac{3}{8}$ " blanks for the ends (C) from $\frac{1}{2}$ " mahogany. On the inside face of each blank, use a full-kerf table saw blade to cut $\frac{1}{8}$ " grooves, $\frac{1}{4}$ " deep, $\frac{1}{8}$ " from both edges. Rout $\frac{1}{16}$ " round-overs along the edges of the same face [Drawing 2]. Then cut the side and



Cutting Diagram

$\frac{1}{4}$ x 24 x 24" MDF
(Medium-density fiberboard)

$\frac{1}{2}$ x 7 $\frac{1}{4}$ x 48" Mahogany (1.3 bd. ft.)

PERFECTLY ALIGN BARREL HINGES



L Use a $\frac{1}{8}$ " shim and clamped cauls to space and align the box halves. Then install the hinges, tightening them with the setscrews.

end blanks to final length, mitering the ends [Drawing 3].

2 Dry-assemble the box, testing the fit of one game board at a time. Pay particular attention to the fit of the veneered game board against the box sides. If necessary, deepen the grooves and tweak the length of the sides and ends to eliminate any gaps.

3 Apply glue to the miters and grooves in the box parts and the rabbets in the game boards. Assemble, clamp, and allow to dry. With a full-kerf blade in your table saw and the fence set to $1\frac{1}{4}$ ", cut the box into two halves as shown in Photo K.

4 Cut the long dividers (D) to size. Add $\frac{1}{8}$ " to the diameter of your game chips (see Sources) to position and glue the dividers in place. Then cut the pocket dividers (E) to length based on that location. (Ours were $1\frac{3}{8}$ " long.) Glue the pocket dividers in place where shown in Drawing 3.

5 Use a half-round cabinet file, held at an angle, to file a finger pull in one box half. With a 10mm brad-point bit in your drill press, drill four holes for the barrel hinges where shown in Drawing 3. Then use a $\frac{3}{8}$ " Forstner bit to drill four

holes for the magnets. Sand the box halves to 220 grit.

6 Line up the box halves as shown in Photo L, and use a small amount of cyanoacrylate glue in the hinge holes to secure them in place. Glue in the magnet catches, orienting the polarity to ensure that they attract. Spray three coats of a clear satin finish (we used aerosol lacquer), and call up a friend for game night. ♣

Produced by Lucas Peters with John Olson
Project design: Kevin Boyle
Illustrations: Lorna Johnson and Mike Burns

Materials List

Part	FINISHED SIZE			Matl.	Qty.
	T	W	L		
A* game board substrate	$\frac{1}{4}$ "	9 $\frac{3}{4}$ "	16 $\frac{1}{2}$ "	MDF	2
B* box sides	$\frac{1}{2}$ "	1 $\frac{1}{4}$ "	17"	M	4
C* box ends	$\frac{1}{2}$ "	1 $\frac{1}{4}$ "	10 $\frac{3}{8}$ "	M	4
D long dividers	$\frac{1}{2}$ "	$\frac{7}{8}$ "	16"	M	2
E pocket dividers	$\frac{1}{2}$ "	$\frac{7}{8}$ "	1 $\frac{3}{8}$ "	M	4

*Parts initially cut oversize. See the instructions.

Materials key: M—mahogany, MDF—medium-density fiberboard.

Supplies: #8x1" brass wood screws.

Bits: Rabbeting router bit, 10mm brad-point drill bit, $\frac{3}{8}$ " Forstner bit.

Sources

Veneer: Maple, walnut, and mahogany veneer. We bought ours from wood-veneers.com.

Hardware: 10mm hidden barrel hinges, \$11.60/pair, item no. 28555; $\frac{3}{8}$ " rare-earth magnets, \$9.29 for 10, item no. 32907, Rockler Woodworking Tools, 800-279-4441, rockler.com.

Game pieces: $1\frac{1}{4}$ "-diameter backgammon chips, \$11.95/set, item no. S125BKC; dice and cup set, item no. CUPDBK, \$9.95, The Backgammon Store, 888-810-2437, thebackgammonstore.com

More Resources

- For **FREE** complete backgammon rules, tournament etiquette, and a history of the game, visit bkgm.com.
- For a **FREE** 11-part video series on veneering featuring Marc Adams, visit: woodmagazine.com/veneer.

The Fuss-free, Router-table, Box-joint Jig

Perfect box joints are just a step (and a cut and a repeat) away.



Nothing beats the elegant simplicity of the box joint. But because any inaccuracy multiplies with every finger, no joint tops a box joint for fussiness of construction. Until now. This jig provides fast setup with repeatable precision. What's more, a single jig can create a variety of joint sizes.

Top-notch precision starts with a bottom-dollar jig

This box-joint jig consists of three parts: a base that clamps to the router table, a sliding fence assembly, and interchangeable guides—one for each straight bit you want to use. We constructed all of the parts from scrap $\frac{3}{4}$ " Baltic-birch plywood and hardwood by simply gluing and clamping them together.

The length of the jig base depends on the depth of your router table. So start by measuring from the front edge of your router table to the center of the router's collet.

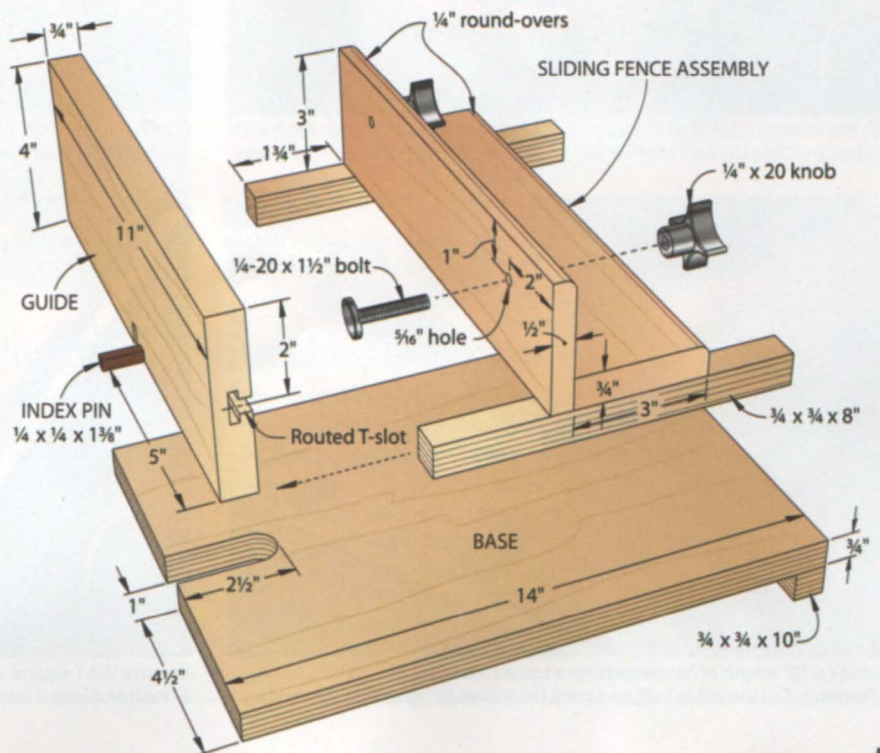
Quick tip: To find the center of your router's collet, chuck in a V-groove bit; the point of the bit marks the center.

Add $2\frac{3}{4}$ " to this measurement to find the length of the jig's base. (Ours was 14".) Then construct the jig as shown in the drawing at right.

To ensure that the fence assembly slides easily on the base, slip a playing card between one of the runners and the jig base for spacing during assembly.

If you plan on using the jig to make a variety of box joints, machine multiple

guide blanks now for later use. You'll need a fresh blank for each box-joint size. To create the T-slot in the back of the guide, first hog away the center portion of the slot with a straight bit before switching to a T-slot bit to finish the cut.



Time to build some boxes

The bit size will determine the width of the joint's fingers; but since each guide is customizable, you can use the bit size of your choosing. For the best look, plan the box height in increments of the fin-

ger size to eliminate partial fingers at the box's top and bottom. Then, machine two test blanks to the same thickness and length as the box sides, ripping them about $\frac{1}{8}$ " wider than the box's finished height. (Any tiny errors could

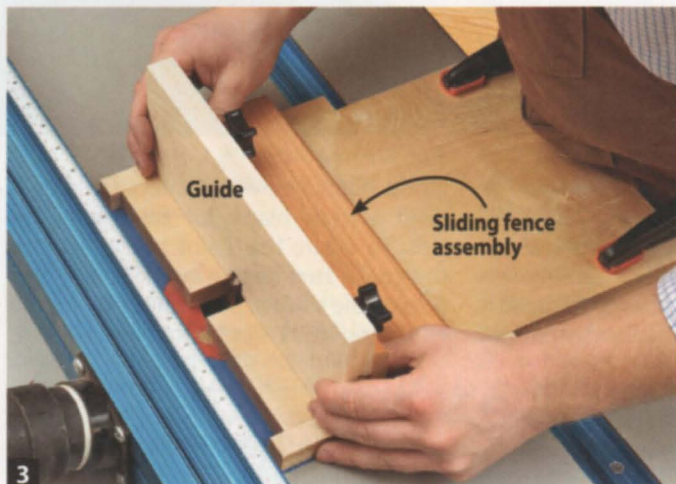
accumulate along the multiple cuts of a box joint. So leave extra width now to save frustration later. You will rip away any excess once the joint is complete.) Then set up the box-joint jig, dial it in, and create boxes in 12 easy steps:



1 Choose a bit to match your box thickness to create an even joint like these $\frac{1}{4}$ " fingers in $\frac{1}{4}$ " stock. But don't be afraid of different bit sizes for larger joint fingers.



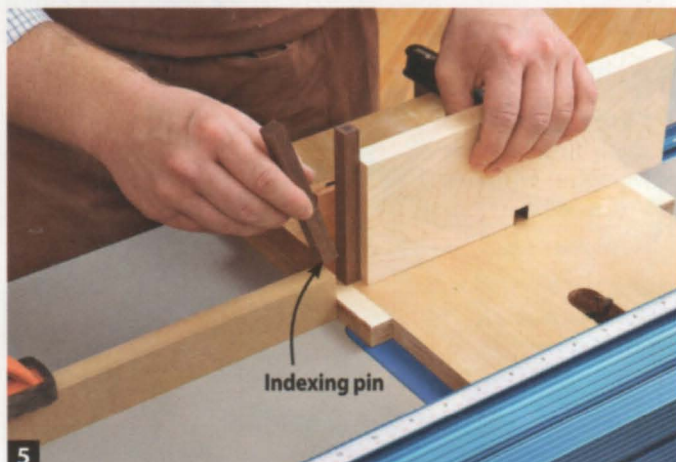
2 Clamp the jig base to your router table with the bit centered in its slot. With the box-side blank on the base, set the bit height just proud of the blank thickness.



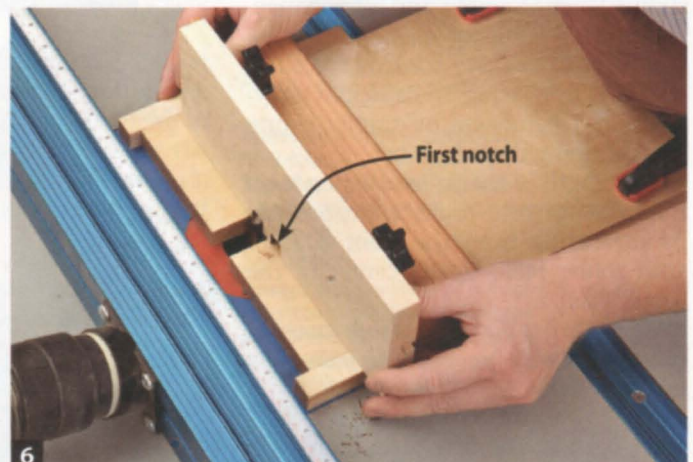
3 With the fence assembly on the base, lock a guide to it with the ends flush with the runners. Slide the fence forward to make a single notch through the guide.



4 Create a scrapwood T-square to fix the distance from the table edge to the guide. The T-square should be tall enough to clamp in place against the guide.



5 Machine a 10" length of hardwood into a square indexing pin that fits snugly in the notch. Cut the pin in half, and stack the halves to reposition the guide.



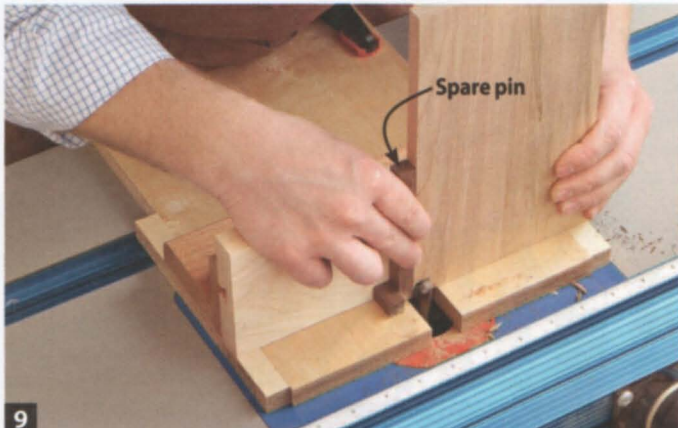
6 Remove the T-square and pins, and cut a second notch. Cut one indexing pin to 2" long and glue it into the new notch, flush with the back of the guide.



7 Test the setup by standing one test blank against the indexing pin. Slide the fence assembly forward to rout a socket through the blank.



8 Fit the first socket over the pin and cut the second socket. Continue cutting, placing each newly cut socket onto the indexing pin, to complete the joint.



9 On the mating test side, cut the first socket while holding a spare pin between the guide's indexing pin and the box side. Then set the spare pin aside.



10 Fit the socket on the pin to make the next cut. Step, cut, and repeat to complete the joint. Rip the box sides to final width, trimming away partial fingers.



11 Test-fit the joint. It should be easily hand-assembled, but snug enough that it doesn't fall apart under its own weight. Adjust the jig if necessary, as shown.



12 Rockler's box-joint-jig clamping cauls (item no. 42784, \$30, rockler.com) allow you to clamp proud box joints while placing pressure squarely on the joint.

Skip the screw-ups by following these pointers for perfect boxes

- ▶ Before cutting any joints, arrange the box sides as they will appear in the box and number the sides. Mark the face and tops to remind you of their orientation. Then, make sure opposing sides have matching finger patterns.
- ▶ An upcut spiral bit provides the most tear-out-free cut. Plus the geometry of the bit pulls the box down to the table rather than lifting it.
- ▶ For tear-out-prone wood, tape a sacrificial layer of scrapwood to the front of the box side, creating a tear-out-eliminating sandwich.
- ▶ Always leave fingers $\frac{1}{32}$ "– $\frac{1}{16}$ " proud; then trim them with a flush-cut bit in your router table. Use a backer board to support the final finger to avoid tear out.
- ▶ If the box design calls for a captured bottom, dry-assemble and clamp the

- box, and use a bearing-guided box-slotted bit to cut the grooves for the bottom. Then radius the corners of the box bottom to match the bit radius.
- ▶ Glue up the box within 24 hours of cutting the joints. If the pieces sit for several days, the fingers could shrink or swell, altering the fit.
- ▶ With four corners and dozens of fingers to glue up, your glue's open time comes into play. Beat the clock by spreading glue only on the top of each finger before assembly. 🌲

Produced by **Lucas Peters** with **John Olson**
Illustration: **Lorna Johnson**



Just as today's smaller car engines crank out more horsepower than their muscle-car-era ancestors, today's cordless drills squeeze more work out of smaller packages than their predecessors.

Lean and Mean 18-volt Drills

Though compact in size and low in weight (less than 9" long and tipping the scales at 4 lbs or less), these drills feature 1/2" chucks for big bits and brawny motors that power large spade and Forstner bits through hardwoods. For delicate jobs, such as driving brass hinge screws, multi-position clutches help you tame the twist. If you have a full

list of DIY projects around the house in addition to wood-shop projects, you'll find these drills serve as a one-tool-does-it-all solution for jobs from boring small pilot holes to erecting a new deck. So let's drill into the testing and find out how they performed.

Let's do the twist—hard

To quantify each drill's real-world torque (rotational force), we drove 3" lag screws

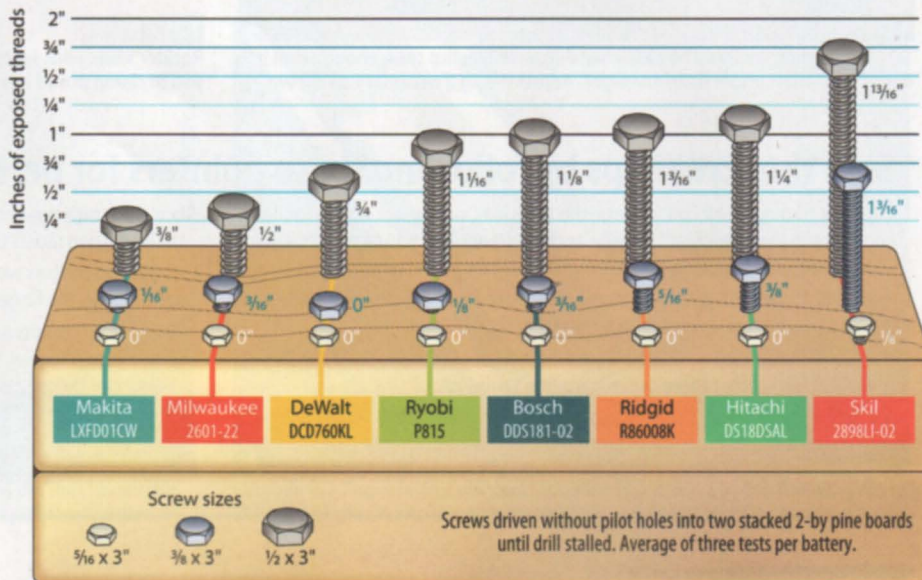
of increasing diameters into pine boards. (See **Lag-Screw Driving Power**, below.) The Makita LXFD01CW, Milwaukee 2601-22, and DeWalt DCD760KL topped this test, driving all but 3/4" or less of the largest screw. Four drills performed about the same as each other, leaving between 1 1/16" and 1 1/4" of the 1/2 x 3" lag screw exposed. The Skil 2898LI-02 struggled with the 3/8" screw and stopped after driving one-third of the 1/2" screw.



COMPACT AND REALLY COMPACT

At 9" long, the Skil 2898LI-02 (rear) is the longest of the drills in the test; the Bosch DDS181-02 (front) is the most compact.

LAG-SCREW DRIVING POWER



The pluses and minuses of rechargeable batteries

A cordless-tool battery should offer long run time and short recharge time. The 1.5-amp-hour lithium-ion batteries of these tools keep weight down while offering acceptable run times. (For longer run times, five manufacturers offer 3-amp-hour batteries for their drills. See **Bigger batteries and new drills**, page 62.)

To test battery run times, we drilled through 2-by lumber using a 1" spade bit until each battery was exhausted, then counted the holes. The Ridgid R86008K, Makita LXFD01CW, and Hitachi DS18DSAL led the pack, boring between 37 and 40 holes per charge. (See **The Hole Story**, right.) That's about 50 percent more than the DeWalt, Milwaukee, Ryobi P815, and Skil.

A battery with a short run time should recharge quickly so you can keep working. The Makita battery delivers at both ends, with the second-longest run time in the test and a short recharge time of just more than 19 minutes. The Hitachi and Skil both require more than 40 minutes to top off. (See **Some Drills Charge Faster Than Others**, right.)

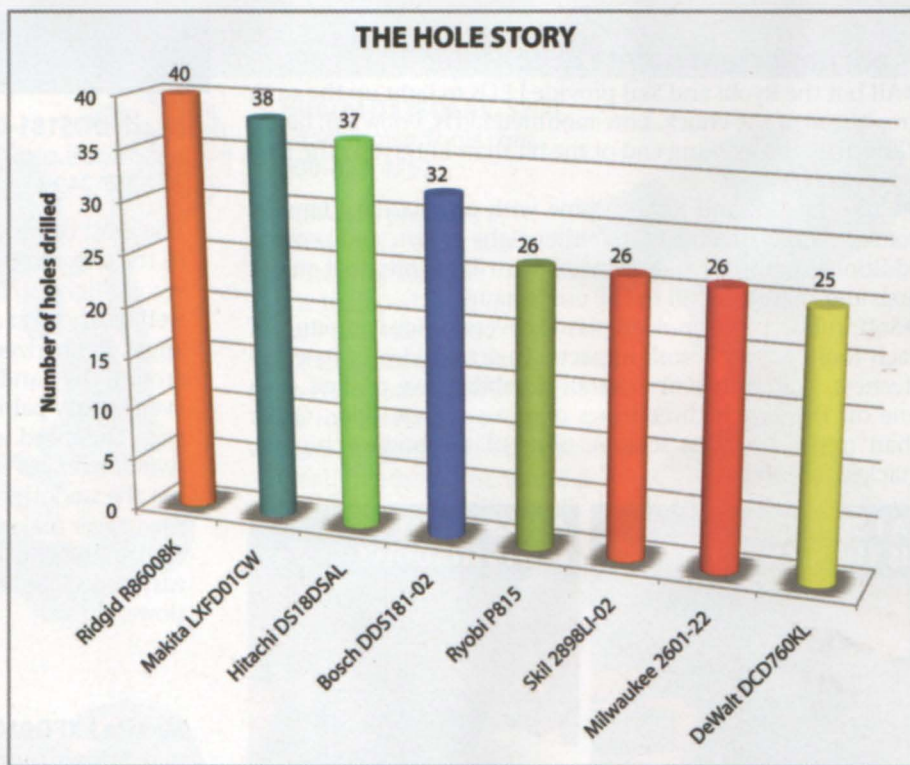
A check of the chucks

All the tested drills have serrated chuck jaws that grip bits better than smooth ones, but not all chucks gripped with equal tenacity. During our tests, the Ryobi and Skil—the only models without ratcheting chucks that provide extra grip on the bit—and the Ridgid each released a bit several times.

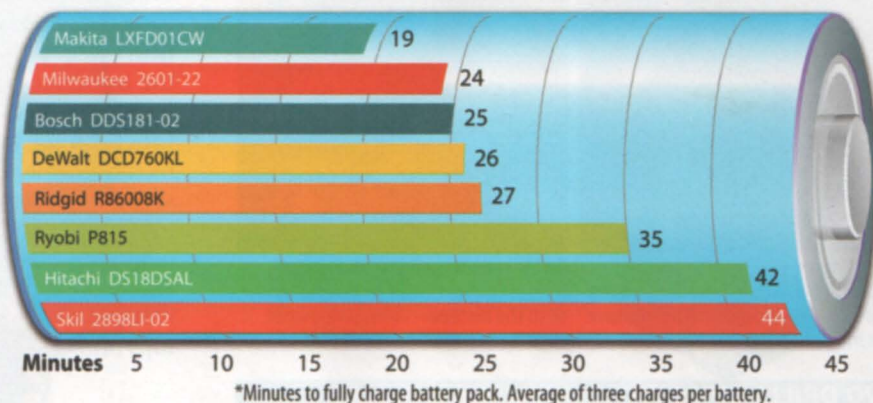
When tightening a bit into a chuck, sleeve texture affects comfort and grip. Hitachi's finely ribbed plastic sleeve, right, can burn your palm if it twists rapidly in your hand. The Milwaukee has a similar texture, but the metal sleeve is less likely to burn you. We got the best grip on sleeves with a deeply knurled pattern, such as those on the Bosch DDS181-02, DeWalt, and Skil.

Behind the chuck sleeve sits a ring for selecting clutch settings, which disengages the drive mechanism at a specific torque level to prevent breaking fasteners or driving them too deep. We rarely found an appreciable difference between adjacent settings. For example, one setting might leave 1/2" of a screw exposed, while the next higher setting might drive a screw to a near-identical depth or nearly sink it. Bottom line: Don't make the number of clutch settings a part of your buying decision.

The DeWalt chuck combines an easy-to-grip sleeve, like the Bosch's, and numbers on every other clutch setting, like the Hitachi.



SOME DRILLS CHARGE FASTER THAN OTHERS



GETTING A GRIP



More important points to consider

▶All but the Ryobi and Skil provide LEDs to light up the work area ahead of the chuck. Low-mounted LEDs, *below left*, better illuminate the working end of the bit than LEDs near the trigger, *below right*.

▶Only the Skil and Ridgid come with an auxiliary handle, *bottom*. These attach to face either right or left, and provide additional control when working with large bits that might grab and twist the drill in the user's hands.

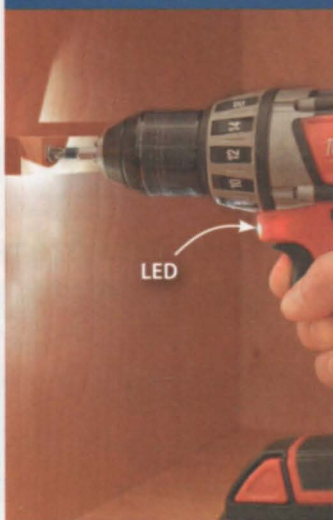
▶Soft, rubbery, overmolded plastic covers various amounts of each tool body to absorb impacts. To get an idea of its effectiveness, and each tool's overall durability, we pushed each one off the bench three times onto a concrete floor. Other than minor cosmetic scrapes, none of the bodies chipped, cracked, or lost parts.

A LOW LIGHT IS THE RIGHT LIGHT



An LED shining up from the foot of the drill provides the best light on the work area. The Ridgid and Bosch have LEDs in this location.

A HIGH LIGHT CASTS SHADOWS



An LED positioned just above the trigger causes the bit to cast a shadow onto the fastener—obscuring what you need to see.

TWO DRILLS COME WITH AUXILIARY HANDLES



A threaded stud on the Skil's handle screws into either side of the body. The Ridgid handle clamps around screw bosses on top of the body.

Bosch DDS181-02, \$200
boschtools.com
877-267-2499



The most compact drill in the test and tied for second-lightest, it feels well balanced at any angle. Rubberized areas around the handle give even sweaty palms a sure grip. The speed selection switch operates stiffly, but the smooth pull of the trigger makes controlling chuck speed easy, especially in the slower range.

Makita LXFD01CW, \$200
makitatools.com
800-462-5482



This test-lightest drill works as hard as a heavyweight. It topped the lag-screw driving test, had the second-highest run time, and the fastest battery recharge time. The clutch and speed selections click positively into place. (And the charger entertains you with strains of classical music when the battery tops off.)



Ryobi P815, \$150
ryobitools.com
800-525-2579



The body has a built-in spirit level at the rear and a magnetic tray on the base for holding bits or fasteners, but no LED. Black numbers on the silver speed switch read easily. The clutch turns stiffly, but locks solidly into each position. The charger tops off both Li-ion and NiCd batteries.

SOME BITS ABOUT EACH DRILL

DeWalt DCD760KL, \$200
dewalt.com
800-433-9258

While a solid performer, it had the shortest battery run time. The speed switch has a short throw distance and lacked a solid feel when changing from low speed to high speed. Widely spaced clutch settings click positively into place. But at one ounce short of 4 lbs, the weight can get tiresome. The charger handles NiCd, NiMH, and Li-ion batteries.



Hitachi DS18DSAL, \$200
hitachipowertools.com
800-829-4752

This drill provides a good value, especially when you consider the included flashlight that uses the same batteries, and its lifetime warranty on the drill (two years on the battery). The small-diameter grip fits well in even small hands and we found it the most comfortable of all the units. Although it lacks power for the biggest jobs, the clutch provides good control for seating fasteners precisely.



Milwaukee 2601-22, \$150
milwaukeetool.com
262-781-3600

This drill measured about equal to the Makita for driving lag screws, but next to last in run time. Speed and clutch settings both click solidly into place. A threaded insert on each side of the base accepts a belt hook, but none was provided. The compact case easily stores the drill, charger, and extra battery.



Ridgid 86008K, \$180
ridgid.com
866-539-1710

The heaviest drill tested still feels well balanced. Its switch in the handle under your pinkie finger turns on an LED to illuminate the work area before pulling the trigger. A soft rubbery covering with raised dimples provides a comfortable, solid grip. The battery charger can stand vertically, lie horizontally, or be hung on a wall.




Skil 2898LI-02, \$100
skiltools.com
877-754-5999

The longest and tallest drill in the test feels nose-heavy. The \$100 price reflects that it comes with only one battery, so it's best suited for small jobs that a single battery's run time can accommodate. The long chuck with fairly deep grooves provides a solid grip for your hand, but the jaws still allowed bits to slip during testing.



So which drill drives us?

Any tool here would serve well for most woodworking chores. But for the heavy use an 18V drill should be able to survive, we chose the Makita LXFD01CW as our Top Tool. It offers a trifecta of important features: long run time, short recharge time, and lots of torque. Its light weight makes it well-suited for jobs where you must hold a drill for an extended period. For Top Value, the Milwaukee 2601-22 gets the nod. It offers as much and, in some cases, more screw-driving power as drills costing 25 percent more. The battery offers decent run time and recharges quickly. And it's backed by a five-year warranty on the tool and three years on the batteries.

See full performance grades and drill specifications on the next page. 

Bigger batteries and new drills

Bosch, DeWalt, Milwaukee, Ridgid, and Ryobi each offer 3-amp-hour batteries that add a bit of weight, but offer about double the run time of the 1.5-amp-hour batteries tested here. Given the quick recharge time for most of the 1.5-amp-hour batteries, the larger packs are best suited for those who earn a living with their tools and need to minimize time spent running for a fresh battery.

Festool's T18 + 3, lower left, fits the compact category, but comes with only 3-amp-hour batteries that allowed us to drill, on average, 135 holes per charge. It cranks out more torque than the test-topping Makita, but it's also costly (\$500), and the battery takes almost 1¼ hours to recharge. The three-jaw chuck pops off so the tool can accept optional right-angle, close-quarter, and offset chucks (festoolusa.com, 888-337-8600).

Also, DeWalt just introduced a new compact drill/driver, the DCD780C2, far right, that uses a new 20V Max line of 1.5-amp-hour batteries. We were unable to test one before press time, but the new slide-style battery allows for a smaller-diameter, more comfortable grip. DeWalt claims faster speeds at each setting (600 and 2,000 rpm) and lists its weight as 3 lbs 7 oz—8 oz lighter than the DCD760KL.



3-amp-hour battery

1.5-amp-hour battery



Festool T18+3



DeWalt DCD780C2

Produced by **Craig Ruegsegger** with **Steve Feeney**
Illustrations: **Tim Cahill**

BIG TWISTS IN SMALL PACKAGES: THE SKINNY ON COMPACT 18V ½"-CHUCK DRILLS

BRAND	MODEL	PERFORMANCE RATINGS (1)								BATTERY PACK			INCLUDED ACCESSORIES (4)	OTHER FEATURES (5)	DIMENSIONS (LxWxH in inches)	WEIGHT, LBS-OZ (with battery)	WARRANTY, YEARS (Tool/Battery) (6)	COUNTRY OF ASSEMBLY (7)	SELLING PRICE (8)	
		PRIMARY				SECONDARY				NUMBER INCLUDED	MOUNTING STYLE (2)	FUEL GAUGE? (YES/NO)								
		TORQUE	RUN TIME	GRIP OF CHUCK ON BIT	BATTERY CHARGE TIME	Ease of changing battery pack	Clutch function	Tool balance	Grip comfort											
BOSCH	DDS181-02	B	A-	A-	B	A	B+	A	B+	2	F	Y	P	B	B, LB	7¼ x 3½ x 9	3-7	1/1	M	\$200
DEWALT	DCD760KL	A	B-	A	B	A	B+	A	A	2	P	N	P	B	LT, O	8¼ x 3½ x 9¾	3-15	3/3	X	\$200
HITACHI	DS18DSAL	B	A-	B+	C	A	A-	A	A	2	F	N	P	B, F	B, LT	7¼ x 3½ x 9	3-7	Lifetime/2	C	\$200
MAKITA	LXFD01CW	A	A	A	A	A	B+	A	A	2	F	N	P	B	B, LT	7¾ x 3½ x 8¾	3-6	3/1	C	\$200
MILWAUKEE	2601-22	A	B	A	B	A	B+	A	B+	2	F	Y	P	-	LT	7¼ x 3½ x 8¾	3-13	5/3	C	\$150
RIDGID	R86008K	B	A	B-	B	A	B+	A-	B	2	F	Y	C	B, H	B, LB, O	7¾ x 3½ x 8¾	4-0	3/3*	C	\$180
RYOBI	P815	B+	B	B-	B-	A	B	B+	B	2	P	N	C	B	M, O	8¾ x 3½ x 8¾	3-13	3/3	C	\$150
SKIL	2898LI-02	C	B	B-	C	B	B+	C	B	1	B	Y	C	B, H	O	9 x 3¾ x 9½	3-12	1/1	C	\$100

1. **A** Excellent
B Good
C Fair

2. (B) Slide from back
(F) Slide from front
(P) Post
3. (C) Cloth bag
(P) Molded plastic
4. (B) Bit driver
(F) Flashlight
(H) Handle

5. (B) Belt hook
(LB) LED light in base
(LT) LED light by trigger
(M) Magnetic tray
(O) Onboard bit storage
6. *Sign up for a lifetime service agreement within 90 days of purchase.

7. (C) China
(M) Malaysia
(X) Mexico
8. Prices current at time of article production and do not include shipping, where applicable.

Rocking Truck

Four-wheeling fun for the little ones.



Project Highlights

- ▶ **Approximate cost:** MDF—\$30; oak—\$25; trim screws—\$6; plus paint, finish, and optional decals.
- ▶ **Dimensions:** 45½"L x 21½"H x 22"W

Jeepers, will the kids love climbing up imaginary mountains and fording make-believe mud bogs in this rugged SUV. The smooth MDF surface makes the bodywork ready to paint, and the solid-oak rockers will endure thousands of miles of fun. We've even located a Web site where you can order decals for any branch of the service you like.

Build a better body

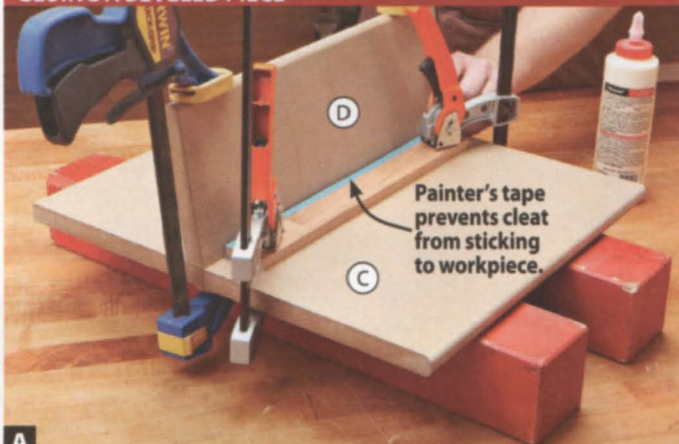
1 From ¾" MDF, cut the body sides (A), body front and back (B), seat base (C), and seat back (D) to size [Materials List, Cutting Diagram, page 67]. Tilt your table-saw blade to 10° and bevel the bottom edge of the seat back [Drawing 1].

2 Rout ⅜" round-overs on the front edges of the seat base (C) and top of the seat

back (D) [Drawing 1]. Glue the seat back to the seat base [Photo A].

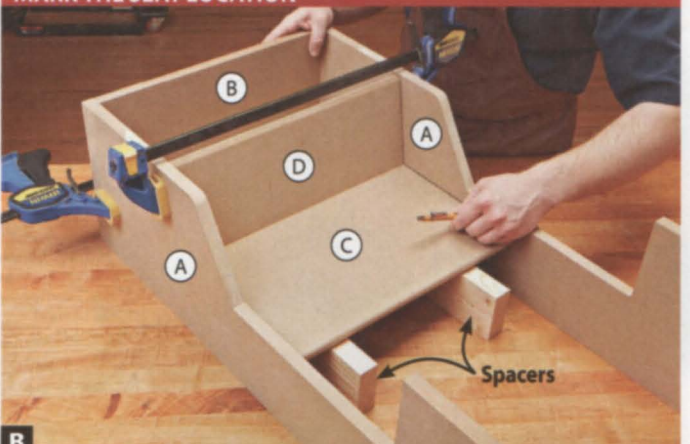
3 Lay out the door cutouts on the body sides (A) [Drawing 2] and jigsaw within ⅛" of the line.

GLUING A BEVELED PIECE



A A scrapwood cleat prevents the seat back (D) from sliding forward as you clamp it to the seat base (C) during glue-up.

MARK THE SEAT LOCATION



B Position the seat assembly (C/D) on spacers and tight to the body back (B), then trace around the seat assembly.

5 Laminate two $9\frac{1}{4} \times 18\frac{1}{4}$ " pieces of $\frac{3}{4}$ " MDF and, after the glue dries, cut the hood (E) to size from the blank [Drawing 1]. Rout $\frac{3}{4}$ " round-overs along the top short edges, and $\frac{1}{8}$ " round-overs along the top and bottom back edges, and the top front edge. Glue the hood in place, flush with the front of the body front (B) and the edges of the body sides (A).

6 Fill the screw holes with wood filler, allow it to dry, and sand the surface smooth with 220-grit sandpaper. Sand the edges of the MDF to 320 grit to even out paint absorption later.

The wheels on the truck go 'round and 'round

1 **Note:** To cut the wheels (F), hubcaps (G), steering wheel (H), and headlights (O) to shape, build a circle-cutting jig, right. Laminate two $8\frac{1}{4} \times 41\frac{3}{4}$ " pieces of $\frac{3}{4}$ " MDF for the wheels. Cut five $8\frac{1}{4}$ "-long blanks from the glue-up, then set them aside for the moment.

2 Cut square blanks for the hubcaps (G) and steering wheel (H) $\frac{1}{4}$ " larger than their finished diameters. Drill centered $\frac{1}{4}$ " holes through each wheel (F) blank, $\frac{1}{8}$ " deep in each hubcap, and $\frac{1}{2}$ " deep in the steering wheel [Drawing 1]. Bandsaw these parts to shape using the jig.

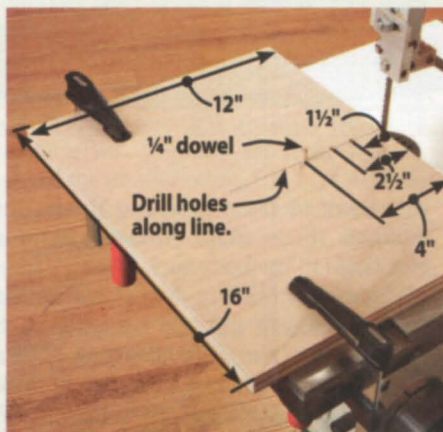
3 Rout $\frac{3}{8}$ " round-overs around both faces of the wheels (F) and steering wheel (H). Then sand the edges of the wheels, hubcaps (G), and steering wheel to 320 grit. Set the steering wheel aside.

4 Cut five $2\frac{3}{8}$ " lengths of $\frac{1}{4}$ " dowel. Insert one through each wheel (F) and use it to help align the hubcap (G) as you glue it in place. Then glue and clamp each wheel to the body sides (A) or back (B) [Photo D]. Drive three trim screws through the body sides and into each wheel.

Get around to making a circle-cutting jig

Build this simple bandsaw jig from $\frac{3}{4}$ " plywood to cut the circular parts for the truck. Drill $\frac{1}{4}$ " holes $\frac{1}{2}$ " deep in a line where shown. To cut a circle, place the edge of the jig next to your bandsaw blade and align the line running

through the holes with the front of the blade teeth. Clamp the jig to the bandsaw table. Place a $\frac{5}{8}$ " length of $\frac{1}{4}$ " dowel in the appropriate hole, place the hole in the part blank over the dowel, and cut the part round.



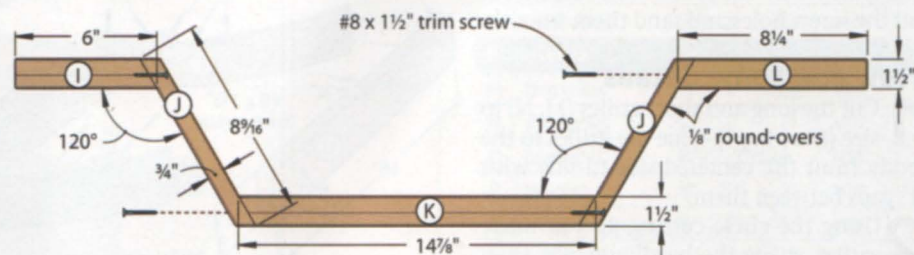
Fabricate the fenders

1 Laminate two $4\frac{1}{2} \times 30$ " strips of $\frac{3}{4}$ " MDF for the front fenders (I), running boards (K), and rear fenders (L). After the glue dries, rip the blank into 2"-wide strips. With the same tablesaw setup, rip the vertical fenders (J) to width.

2 Tilt your tablesaw blade to 30° and crosscut a front fender (I) and running board (K) from each blank [Drawing 3]. Leave the rear fenders (L) overlength, then bevel-cut the vertical fenders (J) to length.

3 To begin mounting the fenders and running boards, glue and screw a verti-

3 FENDERS AND RUNNING BOARDS SIDE VIEW

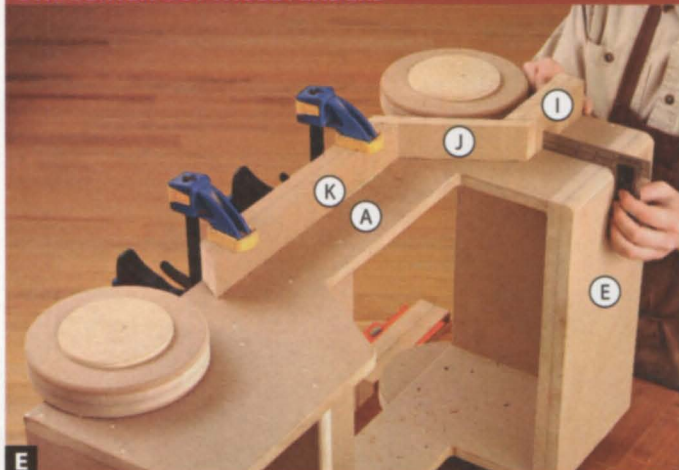


GLUE THE WHEELS IN PLACE



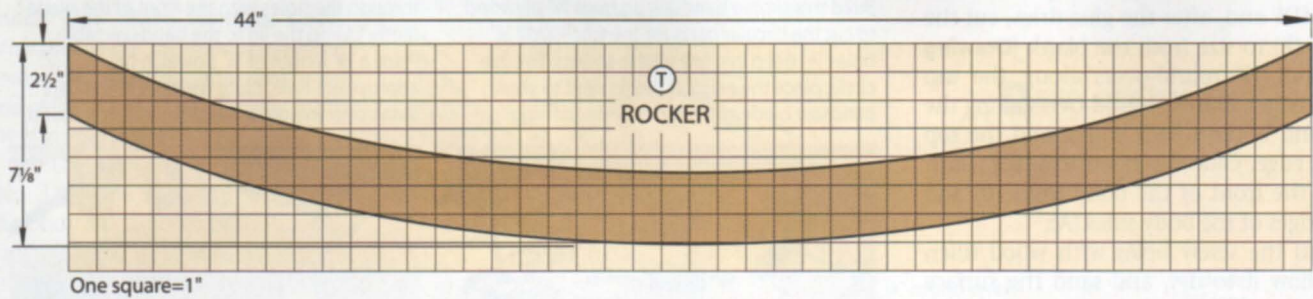
D Mark the edge of the body sides (A) onto the wheels (F). Apply glue above this line, then clamp the wheels in place.

STRAIGHTEN OUT THOSE FENDERS



E Clamp the running-board assembly (J/K) to hold it flush with the edge of the body side (A) while positioning the front fender (I).

4 ROCKER PATTERN



cal fender (J) to a running board (K) [Drawing 3]. Place a front fender (I) and the running-board assembly (J/K) on a body side (A) [Photo E]. Arrange them with the front fender sitting flush with the front of the body side (A) and parallel to the hood (E), the running board flush with the bottom of the body side, and the vertical fender resting against the rear end of the front fender. Glue and clamp the pieces in place, then drive screws from inside the body side [Drawing 1].

4 Position a second vertical fender (J) against the rear of the running board (K), and a rear fender (L) against the vertical fender. Mark the final length of the rear fender [Photo F], then crosscut it to length. Glue and screw the two pieces in place. Repeat the two above steps on the other side of the truck, then rout $\frac{1}{8}$ " round-overs on the fender edges, and sand the ends where the router won't reach. Fill all the screw holes and sand them smooth.

Now add some details

1 Cut the long and short grilles (M, N) to size [Drawing 1]. Glue the grilles to the body front (B), centered side-to-side with 1" gaps between them.

2 Using the circle-cutting jig you made earlier, shape the headlights (O), then

glue them in place [Drawing 1]. Cut the taillights (P) to shape [Drawing 2a] and glue them to the body back (B).

3 From $\frac{3}{4}$ " MDF, cut the windshield frame (Q) to size and rip a 10° bevel along the bottom edge [Drawing 1]. Cut the windshield brackets (R) to size from $\frac{3}{4}$ " oak, and the windshield (S) from $\frac{1}{4}$ " MDF. Glue and screw the brackets to the ends of the windshield frame, then center the windshield on the windshield frame and glue it in place.

Let's rock out

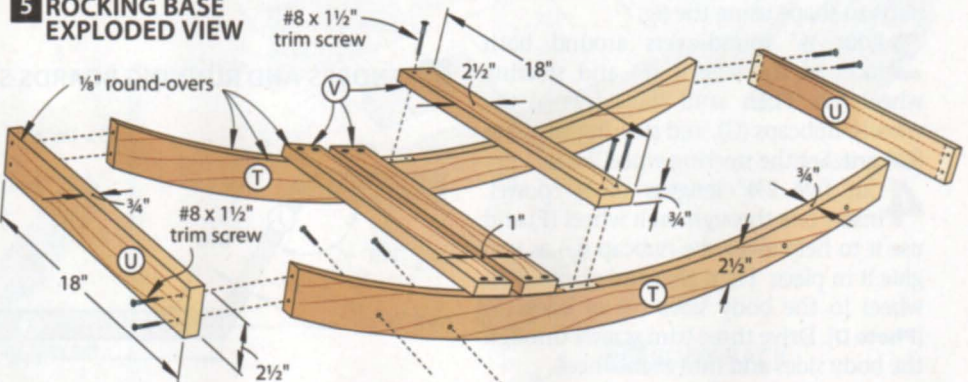
1 Lay out a 1×1 " grid on a $\frac{1}{4} \times 8 \times 44$ " piece of MDF. Transfer the rocker pat-

tern [Drawing 4] to the MDF, and bandsaw and sand it smooth. Trace this template onto two $\frac{3}{4} \times 7\frac{1}{4} \times 44$ " oak blanks. Stack the blanks together with double-faced tape, and bandsaw and sand the rockers (T) smooth. Label the front end of each rocker before separating them.

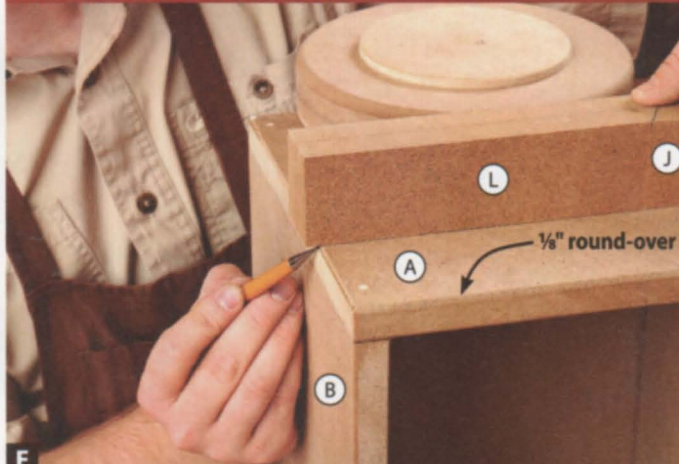
2 Cut the bumpers (U) and floorboards (V) to size [Drawing 5] and sand them to 220 grit. Glue and screw a bumper to each end of the rockers (T) [Photo G], driving the screwheads flush with the surface.

3 To position the floorboards (V), center the truck (A-S) front to back on the rockers (T). Place a floorboard on the rockers with the front edge touching the rear of the

5 ROCKING BASE EXPLODED VIEW

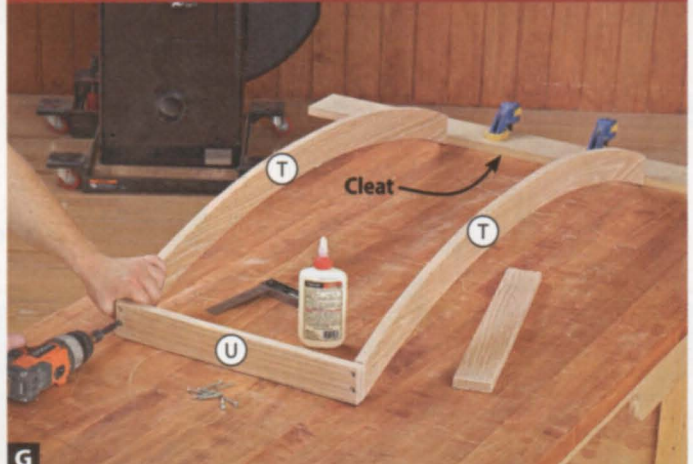


MARK THE FENDER FOR A FLUSH FIT



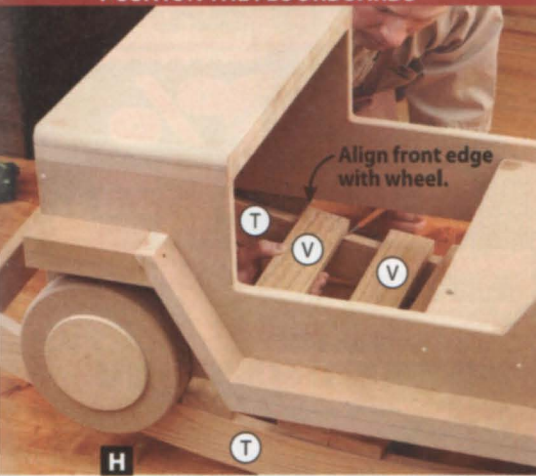
F Use a vertical fender (J) to help position the rear fender (L). Make sure the rear fender is parallel to the top edge of the body side (A).

ATTACH THE BUMPERS



G Steady the rockers (T) and even up the ends by pressing them against a cleat. Drill pilot holes, and screw the bumpers (U) in place.

POSITION THE FLOORBOARDS



H Mark the rear edge of the front floorboard (V). Drill pilot holes through the floorboards and into the rockers (T) before assembly.

front wheels [Photo H]. Mark the floorboard's location on each rocker, remove the truck, and glue and screw the floorboards in place, spaced 1" apart [Drawing 5].

4 Glue and screw the windshield assembly (Q/R/S) to the hood (E) and body sides (A) [Drawing 2].

5 Drill a $\frac{1}{4}$ " hole $\frac{1}{2}$ " deep in the hood centered on its rear edge. Retrieve the steering wheel (H), glue in a 1" length of $\frac{1}{4}$ " dowel, and glue and screw the steering wheel to the back of the hood. Fill any

remaining holes in the truck and sand them smooth.

6 Apply a finish to the rocker assembly (T-V). (We stained ours with Zar Salem Maple no. 110, followed by three coats of polyurethane.) Brush a latex primer onto the truck (A-S), allow it to dry, then paint as desired. We used colors from Sherwin-Williams (sherwin-williams.com), but note that the smallest quantity we could purchase was a quart—far more than is needed for smaller parts. You may want to consider other suppliers who sell smaller quantities. Our colors are: body, SW6418 Rural Green; wheels and grille, SW6258 Tricorn Black; windshield, SW6498 Byte Blue; taillights, SW6864 Cherry Tomato; headlights, SW6906 Citrus. We ordered decals from military-graphics.com.

7 After the paint and finish dry, position the truck (A-S) on the rocker assembly (T-V), aligning the rear of the front wheels with the front floorboard. Drill two pilot holes through the rockers into each wheel, and screw the truck in place. Let the kids have a seat, and know that they'll never get stuck in this four-wheeler; after all, they can just rock it back and forth. 🌲

Produced by **Craig Ruegsegger** with **John Olson**
Project design: **John Olson**
Illustrations: **Lorna Johnson**

More Resources

► Find plenty more kids' projects at woodmagazine.com/kidsfun. \$
(\$=Download these articles for a small fee.)



Materials List

Part	FINISHED SIZE			Matl.	Qty.	
	T	W	L			
Body						
A	body sides	$\frac{3}{4}$ "	10"	36"	MDF	2
B	body front/back	$\frac{3}{4}$ "	10"	16 $\frac{1}{2}$ "	MDF	2
C	seat base	$\frac{3}{4}$ "	16 $\frac{1}{2}$ "	18 $\frac{1}{4}$ "	MDF	1
D	seat back	$\frac{3}{4}$ "	16 $\frac{1}{2}$ "	6"	MDF	1
E*	hood	1 $\frac{1}{2}$ "	9"	18"	LMDF	1

Wheels and fenders

F*	wheels	1 $\frac{1}{2}$ "	8" diam.	LMDF	5	
G*	hubcaps	$\frac{1}{4}$ "	5" diam.	MDF	5	
H*	steering wheel	$\frac{3}{4}$ "	8" diam.	MDF	1	
I*	front fenders	1 $\frac{1}{2}$ "	2"	6"	LMDF	2
J	vertical fenders	$\frac{3}{4}$ "	2"	8 $\frac{3}{16}$ "	MDF	4
K*	running boards	1 $\frac{1}{2}$ "	2"	14 $\frac{7}{8}$ "	LMDF	2
L*	rear fenders	1 $\frac{1}{2}$ "	2"	8 $\frac{1}{4}$ "	LMDF	2

Bodywork

M	long grilles	$\frac{1}{4}$ "	1"	9 $\frac{1}{2}$ "	MDF	5
N	short grilles	$\frac{1}{4}$ "	1"	6"	MDF	2
O	headlights	$\frac{1}{4}$ "	3" diam.		MDF	2
P	taillights	$\frac{1}{4}$ "	2 $\frac{1}{2}$ "	3"	MDF	2
Q	windshield frame	$\frac{3}{4}$ "	5"	18"	MDF	1
R	windshield brackets	$\frac{3}{4}$ "	$\frac{3}{4}$ "	8"	O	2
S	windshield	$\frac{1}{4}$ "	4"	17"	MDF	1

Rocker

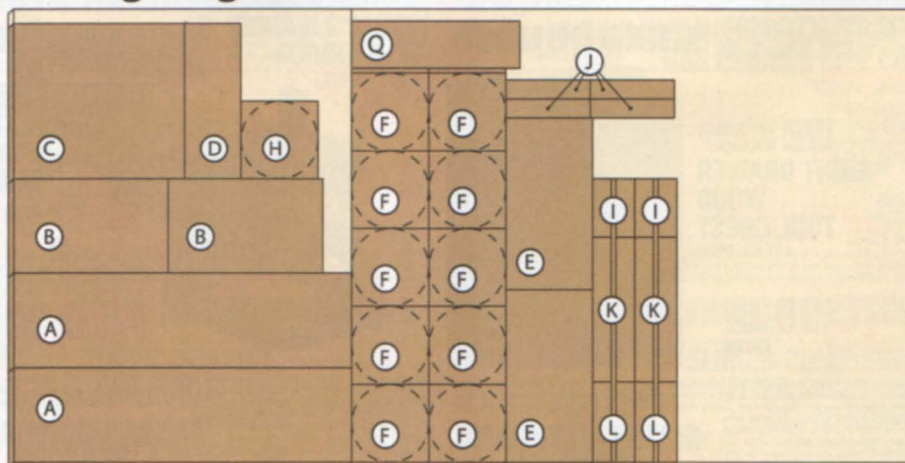
T*	rockers	$\frac{3}{4}$ "	7 $\frac{1}{8}$ "	44"	O	2
U	bumpers	$\frac{3}{4}$ "	2 $\frac{1}{2}$ "	18"	O	2
V	floorboards	$\frac{3}{4}$ "	2 $\frac{1}{2}$ "	18"	O	3

*Parts initially cut oversize. See the instructions.

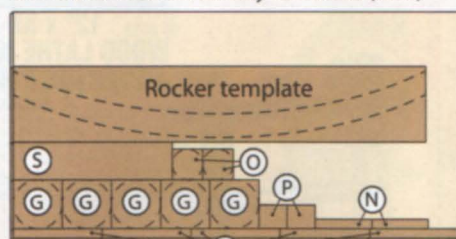
Materials key: MDF—medium-density fiberboard, LMDF—laminated medium-density fiberboard, O—oak.
Supplies: Double-faced tape, $\frac{1}{4}$ " x 12" dowel, #8 x 1 $\frac{1}{2}$ " trim screws, wood filler.

Bits: $\frac{1}{8}$ ", $\frac{3}{8}$ ", and $\frac{3}{4}$ " round-over router bits.

Cutting Diagram



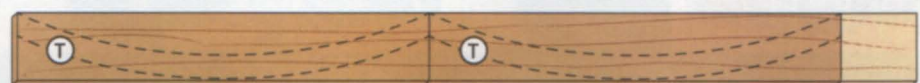
$\frac{3}{4}$ x 48 x 96" Medium-density fiberboard (MDF)



$\frac{1}{4}$ x 24 x 48" Medium-density fiberboard (MDF)



$\frac{3}{4}$ x 3 $\frac{1}{2}$ x 96" Oak (2.7 bd. ft.)



$\frac{3}{4}$ x 7 $\frac{1}{4}$ x 96" Oak (5.3 bd. ft.)

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SPLIT LEATHER WORK GLOVES 1 PAIR
ITEM 97115/67440

Item 97115 shown



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60003109

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11982404

SUPER COUPON!

6" DIGITAL CALIPER
PITTSBURGH
LOT NO. 47257

\$999 REG. PRICE \$29.99

Includes two 1.5V button cell batteries.

SAVE 66%



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18444647

SUPER COUPON!

12" RATCHET BAR CLAMP/SPREADER
PITTSBURGH
LOT NO. 46807

\$199 REG. PRICE \$8.99

SAVE 77%



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71360558

SUPER COUPON!

29 PIECE TITANIUM NITRIDE COATED DRILL BIT SET
drillmaster
LOT NO. 5899

\$999 REG. PRICE \$24.99

SAVE 60%



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97368629

SUPER COUPON!

1000 LB. CAPACITY MOVER'S DOLLY
HaulMaster
LOT NO. 93888

\$799 REG. PRICE \$14.99

SAVE 46%



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25058528

SUPER COUPON!

CHICAGO ELECTRIC POWER TOOLS
Item 68303 shown

OSCILLATING MULTIFUNCTION POWER TOOL
LOT NO. 68303/67256/68861

\$1999 REG. PRICE \$59.99

SAVE 66%

8 Functions: Sanding, Cut Flooring, Cut Metal, Scrape Concrete, Remove Grout, Cut Plastic, Scrape Flooring, Plunge Cut



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52718196

SUPER COUPON!

800 RATED WATTS/ 900 MAX. WATTS PORTABLE GENERATOR
CHICAGO Electric Generators
LOT NO. 66619

\$8999 REG. PRICE \$149.99

SAVE \$60



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39621815

SUPER COUPON!

Windsor Design® EIGHT DRAWER WOOD TOOL CHEST
LOT NO. 94538

\$5999 REG. PRICE \$99.99

SAVE \$40



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93661419

SUPER COUPON!

CENTRAL MACHINERY

OSCILLATING SPINDLE SANDER
LOT NO. 95088

\$8999 REG. PRICE \$149.99

SAVE \$60



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60175254

SUPER COUPON!

CENTRAL MACHINERY

4" x 36" BELT/ 6" DISC SANDER
LOT NO. 93981/97181

\$5499 REG. PRICE \$99.99

SAVE \$45

Item 93981 shown



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82587663

SUPER COUPON!

PITTSBURGH

NEW!

RAPID PUMP® 3 TON HEAVY DUTY FLOOR JACK
LOT NO. 68048

\$6499 REG. PRICE \$99.99

SAVE \$35

3-1/2 PUMPS LIFTS MOST VEHICLES



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47215130

SUPER COUPON!

CENTRAL MACHINERY

12" x 33-3/8" WOOD LATHE WITH REVERSIBLE HEAD
LOT NO. 34706

\$19999 REG. PRICE \$299.99

SAVE \$100



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67631076

SUPER COUPON!

CENTECH
12" COMBINATION SQUARE SET
 LOT NO. 92471

SAVE 60%

\$399 REG. PRICE \$9.99



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90422593

SUPER COUPON!

NEW!

CENTRALPNEUMATIC
18 GAUGE 2-IN-1 NAILER/STAPLER
 LOT NO. 68019

SAVE 46%

\$1599 REG. PRICE \$29.99



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42702382

SUPER COUPON!

4 PIECE CHISEL SET
 LOT NO. 42429

1/4"
1/2"
3/4"
1"

SAVE 56%

\$349 REG. PRICE \$7.99



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46539493

SUPER COUPON!

drillmaster
1500 WATT DUAL TEMPERATURE HEAT GUN (572°/1112°)
 LOT NO. 96289

SAVE 55%

\$899 REG. PRICE \$19.99



HARBOR FREIGHT TOOLS - LIMIT 7
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88648466

SUPER COUPON!

CENTRAL PNEUMATIC
HIGH SPEED METAL SAW
 Item 91753 shown

SAVE 66%

\$999 REG. PRICE \$29.99



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28587365

SUPER COUPON!

4 PIECE 1" x 15 FT. RATCHETING TIE DOWN SET
 LOT NO. 90984

SAVE 52%

\$799 REG. PRICE \$16.99



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86799445

SUPER COUPON!

BUNKER HILL SECURITY
WIRELESS DRIVEWAY ALERT SYSTEM
 LOT NO. 93068

Requires one 9 volt and three C batteries (sold separately).

SAVE 53%

\$1399 REG. PRICE \$29.99



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29277462

SUPER COUPON!

drillmaster
ORBITAL PALM SANDER
 LOT NO. 40070

SAVE 55%

\$899 REG. PRICE \$19.99



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24009255

SUPER COUPON!

CENTRALPNEUMATIC
3 GALLON, 100 PSI OILLESS PANCAKE AIR COMPRESSOR
 LOT NO. 95275

SAVE 46%

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69288785

SUPER COUPON!

CENTRAL MACHINERY
16" VARIABLE SPEED SCROLL SAW
 LOT NO. 93012

SAVE 25%

\$5999 REG. PRICE \$79.99



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66377575

SUPER COUPON!

PREDATOR ENGINES
6.5 HP OHV HORIZONTAL SHAFT GAS ENGINES (212 CC)
 LOT NO. 68120
 LOT NO. 68121, CALIFORNIA ONLY

SAVE \$80

NEW!

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35292809

SUPER COUPON!

CENTRAL MACHINERY
12 SPEED BENCHTOP DRILL PRESS
 LOT NO. 44836

SAVE \$70

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32082611

SUPER COUPON!

CENTRAL MACHINERY
2 HP INDUSTRIAL 5 MICRON DUST COLLECTOR
 LOT NO. 97869

SAVE \$100

\$14999 REG. PRICE \$249.99



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31706735

SUPER COUPON!

12" SLIDING COMPOUND MITER SAW WITH LASER GUIDE
 CHICAGO ELECTRIC POWER TOOLS
 LOT NO. 98194

SAVE \$80

SAW BLADE INCLUDED

\$11999 REG. PRICE \$199.99



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88791693

SUPER COUPON!

60" HARDWOOD WORKBENCH U.S. GENERAL
 LOT NO. 93454

Tools sold separately.

SAVE \$90

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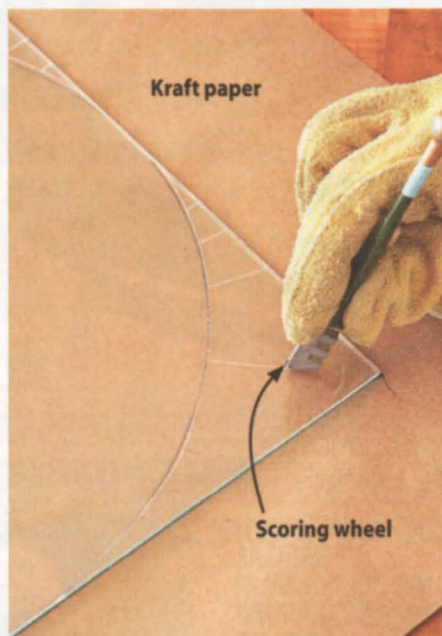
Cutting curves in glass

Thanks for the article on making arched raised panel doors (*WOOD* issue 208, Nov. 2011). I'm altering the design to use glass rather than panels. But how do I cut curves in glass?

—Ramon Gordon, Kemah, Texas

In a word, Ramon: carefully. Start by arming yourself with leather gloves, safety glasses, a glass cutting tool like the one shown at right (you'll find it in your local hardware or craft store), and spare pieces of glass in case you break one accidentally.

If you need to cut the glass to size first, place it on a flat surface and mark the desired dimensions with a fine, felt-tip marker. Coat the scoring wheel with a drop of machine oil. Hold a framing square or steel rule along the line and, with firm downward pressure, pull the scoring wheel across the glass against the rule. A continuous crackling sound indicates sufficient pressure. You get one shot at it; attempts at retracing the score line could shatter the glass. Align the score line with the edge of your bench, grip the protruding piece



Score the curved line first, following the pattern on the kraft paper below. Then score lines radiating from the curve to the edge of the glass.

with a gloved hand and quickly break the piece downward.

Now for the curves. Make a pattern by tracing the sized glass on kraft paper; then mark out the curve on the



Flip the glass over onto a flat surface. Make quick, light taps directly over the score lines. Follow the growing crack with your tapping.

pattern. Use masking tape to hold the glass in place on top of the pattern; then follow the steps, above, to cut the curve, pulling away and discarding the pieces as they break off.

Stop end-grain bowl blow-out

Your Three-point Lidded Bowl (Issue 197, May 2010) intrigued me enough to try turning again. Unfortunately, I ran into the same problem I had in the past: When shaping the bowl's exterior, the gouges catch and blow out the wood where they encounter end grain. My tools are sharp enough to shave with. What am I doing wrong?

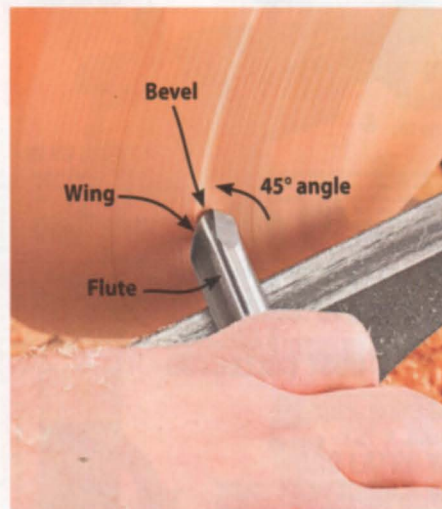
—Dan Greaves, Eastsound, Wash.

If your tools are sharp, then it could be your technique, Dan. When roughing out the exterior of the bowl, start with the tool rest slightly below the center of the bowl. With the lathe running and the tool on the rest, roll the flute about 45° counterclockwise, as shown far right, and secure the handle against your hip. Touch the bevel of the gouge to the bowl's bottom and pull it along the rest toward you and the



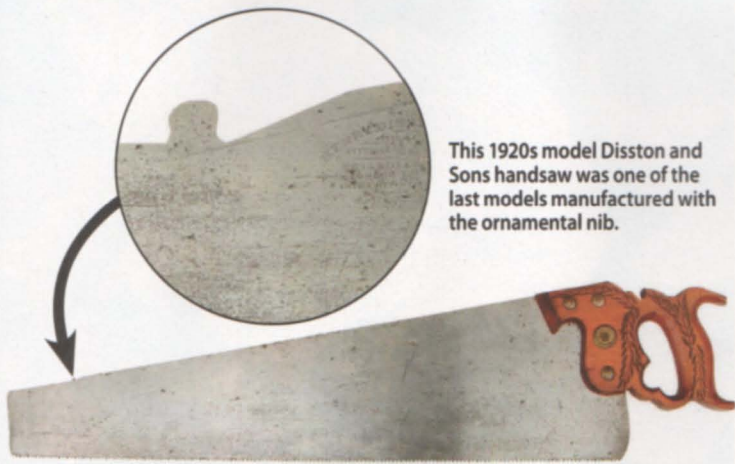
Brace the bowl gouge against your hip to give you firm control over the depth, speed, and motion of the cut.

bowl's rim. Continue to make successive cuts gradually swinging the tool handle to establish the curvature of the



The left-hand wing removes waste material while the bevel on the tip of the gouge rubs against the freshly cut bowl surface.

bowl. If you continue to experience catching, try taking shallower cuts where the gouge passes end grain.



This 1920s model Disston and Sons handsaw was one of the last models manufactured with the ornamental nib.

The enigmatic nib

A buddy showed me an old estate-sale handsaw that he bought to decorate his shop walls. The end of the blade featured a small protuberance. He didn't know its purpose, and to this day I puzzle over that handsaw bump. Any clues to its purpose?

—Shawn Farris, Needham, Mass.

A tiny bump—called a “nib”—near the front of old handsaw blades has, for decades, been a source of contention among antique-tool collectors, Shawn. A lack of firsthand info has bred many theories.

Erik von Sneidern, historic handsaw aficionado and curator of disstonianinstitute.com, has heard every theory imaginable. Some of the more amusing suggest that the nib was used as a gauge to tell you when to stop pulling the saw (though muscle-memory serves better), a scribe for starting a cut (though the teeth are far more suited to the task), or a tool to break through nails in recycled wood (which does not work, but might explain why you find so many saws with the nibs broken off).

Erik's pet theory relates to 17th-century Dutch saws that featured a knob-type handle in the same location. Modern, more-rigid steel eliminated the need for a stabilizing front handle, but the similarly shaped nib was added in its place to invoke a traditional look.

“Remember, back around the late 1800s and early 1900s, the appearance of the tool was as important as its function,” says Erik.

Disston and Sons, an early major manufacturer of handsaws in the United States, gives perhaps the final word on the matter, backing Erik's theory. According to Disston's *Lumberman Handbook*: “The ‘nib’ near the end of a hand saw has no practical use whatever, it merely serves to break the straight line of the back of the blade and is an ornamentation only.” 🌿

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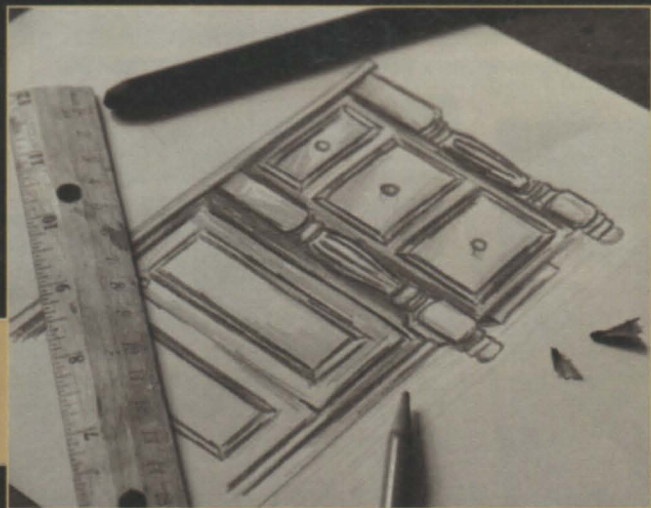
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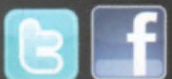
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"Glidersaw" snugs up neatly against a wall

Sliding mitersaws offer greater crosscut capacity, but those wide cuts come at the cost of benchtop real estate. Bosch's 12" Glide Miter saw solves that problem and more. Most notably, a rock-solid articulated arm replaces the traditional rails—which stick out a foot or so behind typical sliders—letting the saw fold up tightly behind the fence, saving 5" to 8" of rear footprint. And because the arm articulates so smoothly and solidly, the saw doesn't deflect as much as some sliders can, creating more accurate cuts.

Bosch achieved all this without sacrificing capacity: The saw crosscuts

14"-wide boards lying flat and 6½" stock standing on edge. With 10 miter and 5 bevel detents, this saw sets up quickly and accurately for the most common cuts, and it's easy to adjust should those detents get knocked out of kilter. I cut lots of hardwood, treated pine, and moldings with this saw, and it never bogged down. The belt-driven motor causes a little "kick" at startup and shutdown, but I didn't find it bothersome.

My only knock: It weighs a whopping 65 lbs! So it's not easily carried alone, especially up or down stairs or when lifting into a pickup bed.

—Tested by Jeff Hall,

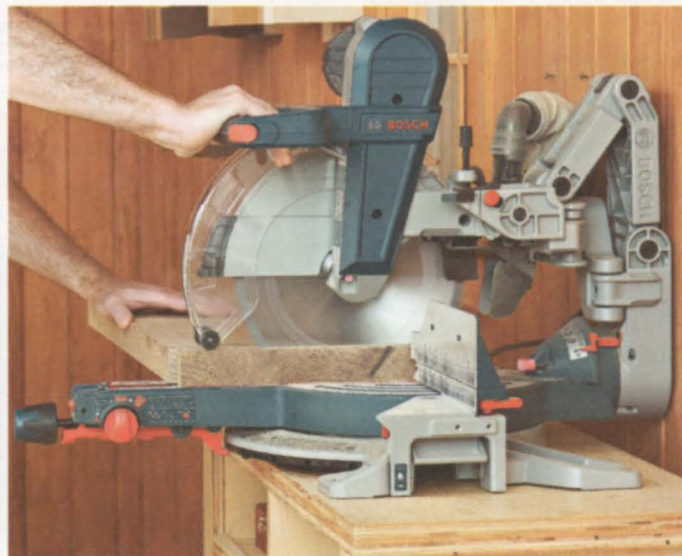
a high school woodshop teacher and longtime WOOD® magazine tool tester



12" Dual-Bevel Glide Miter saw, #GCM12SD

Performance ★★★★★
Price \$775

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No-nonsense mini-square earns a workbench spot

I like a combination square for measuring and marking project parts as well as machine setup, but sometimes the thickness of its head gets in the way. For example, the sliding head obscures part of the rule, and when coupled with the shadow it sometimes creates, you might struggle to see the rule increments when setting the height of a tablesaw blade or router bit. That's where the Veritas Precision Square really shines. Made of ¼"-thick chrome-plated steel, it's lightweight, glare-resistant, and I like it so much I now reach for it more than any other square in my tool cabinet.

This square proves spot-on accurate, both as a square and as a measuring rule. The 3"-long leg has markings in 1/32" increments, while the 6" leg measures in 1/16" increments—on both sides. And it's not cluttered with extraneous markings that I never need. Finally, a small cutout in the crook of the right angle lets you check boards for square even where there's a little fuzz or nib on the board edge.

—Tested by John Olson,

an expert on hand tools and a contributing project designer and builder



Veritas Precision Square, #05N35.01

Performance ★★★★★
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continued on page 76



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Nylon stop collars prevent damage to wood

To drill countersunk screw holes consistently with a handheld drill, I use a stop collar to limit the depth. Woodtek's CleanStop countersinks, outfitted with freewheeling nylon collars, won't burn or mar the wood, as metal stop collars can. I drilled hundreds of holes with these bits and never left a mark on the wood.

They also never clogged in my testing, thanks to twin flutes that run the length of the shank, including under the stop collar. Each countersink has separate setscrews to lock the twist bit and the stop-collar in place. So not only can you adjust the drill-bit depth, but you can also set the collar for deeper counterbores.

I had to file one of the bits in my set to remove a burr, but now it cuts cleanly. And after drilling some deep pilot holes, I was forced to reset the twist bits and remove the collars to fit them back into the foam cutouts in the box—an inconvenience if you plan to keep the bits in that box.

—Tested by Matt Seiler, a custom furnituremaker



CleanStop Countersinks, #151-337

Performance ★★★★★
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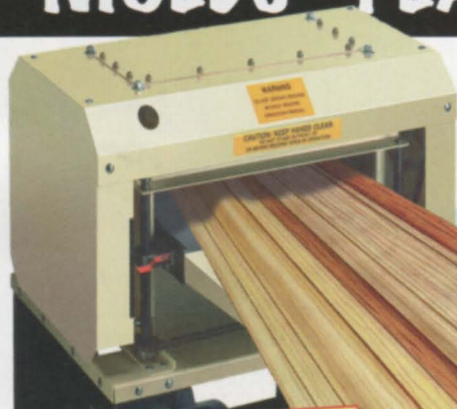
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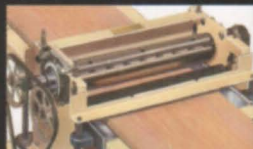
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This story breaks my heart every time. Allegedly, just two years after the discovery of tanzanite in 1967, a Maasai tribesman knocked on the door of a gem cutter's office in Nairobi. The Maasai had brought along an enormous chunk of tanzanite and he was looking to sell. His asking price? Fifty dollars. But the gem cutter was suspicious and assumed that a stone so large could only be glass. The cutter told the tribesman, no thanks, and sent him on his way. Huge mistake. It turns out that the gem was genuine and would have easily dwarfed the world's largest cut tanzanite at the time. Based on common pricing, that "chunk" could have been worth close to \$3,000,000!

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Get quick pocket holes with a Quik Jig

I've used a popular clamp-on pocket-hole jig for years, and never would have thought anyone could make a quicker way to drill pocket holes. But Porter-Cable's Quik Jig has done it. This burly unit comes fully assembled and ready to use, and although it looks intimidating, it's actually easy to figure out.

I drilled perfect pocket holes with the Quik Jig within minutes of opening the box. You simply place your workpiece in the front, push the jig mechanism down against it, lock it in place with a twist of the hand, and drill with the included bit. You set the bit's stop collar at one location for all board thicknesses (from 1/2" to 1 1/2") and the jig automatically adjusts to the correct depth. (With other pocket-hole jigs you have to reposition the stop collar whenever you change board thicknesses.)

The drilling guide block features one fixed hole and one adjustable, letting you set the spacing and drill both holes without readjusting the board. And I like the handy gauge on the side of the jig that, when clamped against your workpiece, tells you the correct screw length to use for that joint. The jig base measures 1 1/2" thick, enabling you to quickly use 2x4 cutoffs to support long workpieces.



—Tested by Randy Zimmerman, a cabinet- and furnituremaker for 15 years.



Quik Jig pocket-hole joinery system, #560

Performance	★★★★★
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Curved pullers make quick work of problem nails

I'm surprised nobody came up with these handy nail pullers long ago. A hybrid between spring-loaded side-cutters and linesman's pliers, the Nail Jack and shorter Nail Hunter use their pointy jaws to grab a protruding nail as I squeezed and rolled the jaws on their curved bottoms to pry the nail out. To get under the heads of imbedded nails, I simply tapped the anvils on the rear of the jaws with a hammer.

—Tested by Matt Seiler, a custom furnituremaker



Nail pullers

Performance	★★★★★
Price	8 1/2" Nail Hunter \$25 10" Nail Jack \$30
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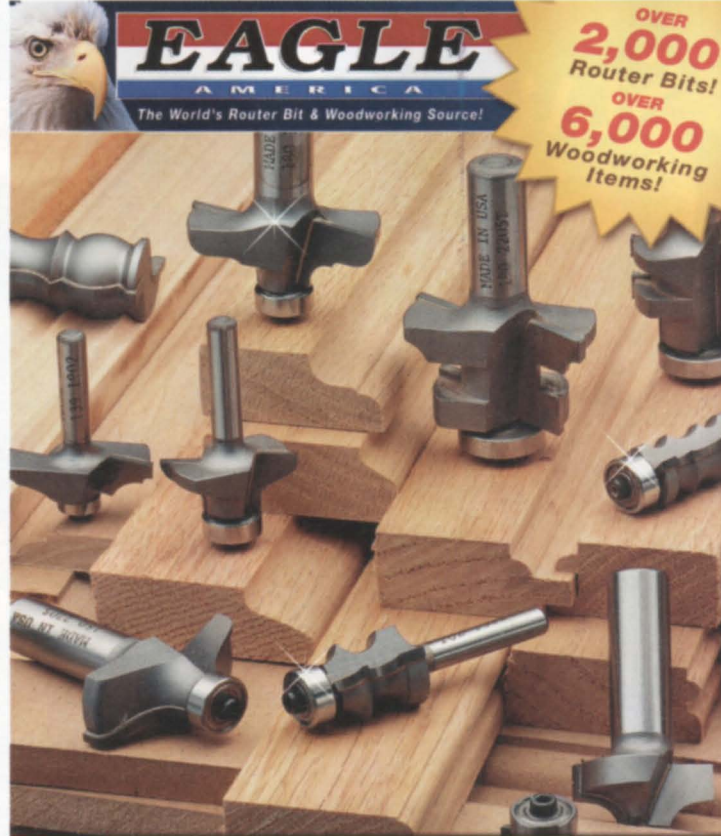
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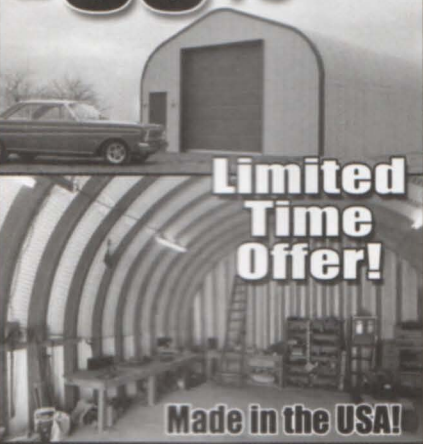
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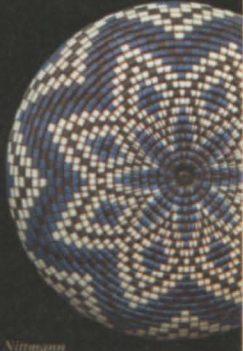
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