

11 TOOLS THAT SIMPLIFY CABINETMAKING p.56

ISSUE 221 OCTOBER 2013

Better Homes and Gardens®

WOOD®

The World's Leading Woodworking Resource

Pro Tips for Better Built-In Cabinets

p.50

Super-Simple Workbench with Wall Storage

p.24

Plus more great plans

Stylish Blanket Chest p.36

Architectural Shelf Brackets p.60

Elegant Accent Table p.30

Cordless-Drill Station p.18

10 Shop-Tested Pocket-Hole Jigs

p.45

plus 12 Tips for Better Pocket-Hole Joints p.14

Save
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p.20



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With Riving Knife

- Motor: 2 HP, 110V/220V, single-phase
- Precision-ground cast iron table size with wings: 40" W x 27" D
- Arbor: 3/8"
- Arbor speed: 3850 RPM
- Capacity: 3 1/8" @ 90°, 2 1/8" @ 45°
- Rip capacity: 30" R, 12" L
- Cast iron trunnions
- Approximate shipping weight: 404 lbs.

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12" BABY DRUM SANDERS

- Sanding motor: 1 1/2 HP, 110V, single-phase
- Conveyor motor: 1/2 HP, 110V, single-phase, variable speed 5-35 FPM
- Max. stock thickness: 3 1/2"
- Min. stock length: 8"
- Sanding drum size: 4"
- Sanding belt: 3" x 70" hook & loop
- Dust collection port: 2 1/2"
- Approximate shipping weight: 160 lbs.



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8" JOINTERS

- Motor: 3 HP, 220V, single-phase, TEFC
- Precision-ground cast iron table size: 9" x 72 1/2"
- Max. depth of cut: 1/8" • Max. rabbeting depth: 1/2"
- Cutterhead diameter: 3"
- Cutterhead speed: 5000 RPM (G0656P); 5350 RPM (G0656PX)
- Cuts per minute: 20,000 (G0656P)
- Cuts per minute: 21,400 (G0656PX)
- Approximate shipping weight: 500 lbs.

FREE SAFETY PUSH BLOCKS



BUILT-IN MOBILE BASE

WITH 4 KNIFE CUTTERHEAD

G0656P ONLY \$825.00

WITH SPIRAL CUTTERHEAD

G0656PX ONLY \$1225.00

\$150

15" PLANERS

- Motor: 3 HP, 220V, single-phase
- Precision-ground cast iron table size: 15" x 20"
- Min. stock thickness: 3/16"
- Min. stock length: 8"
- Max. cutting depth: 1/8"
- Feed rate: 16 FPM & 30 FPM
- Cutterhead speed: 5000 RPM
- Approximate shipping weight: 662 lbs. (G0453P); 666 lbs. (G0453PX)

PRECISION-GROUND CAST IRON BED & INFEED/OUTFEED TABLES

WITH 3 KNIFE CUTTERHEAD

G0453P ~~\$1095.00~~ SALE \$1050.00

WITH SPIRAL CUTTERHEAD

G0453PX ONLY \$1695.00

BUILT-IN MOBILE BASE



\$150

20" PLANER

- Motor: 5 HP, 240V, single-phase
- Max. cutting width: 20"
- Max. cutting height: 8"
- Min. stock thickness: 3/16"
- Min. stock length: 8"
- Max. cutting depth: 1/8"
- Feed rate: 16 FPM & 20 FPM
- Cutterhead diameter: 3 3/8"
- Cutterhead speed: 4800 RPM
- Feed rolls: solid serrated steel
- Overall dimensions: 55 1/2" L x 39 1/2" W x 45 5/8" H
- Approximate shipping weight: 920 lbs.



BUILT-IN MOBILE BASE

G0454 ~~\$1650.00~~ SALE \$1595.00

\$179

14" DELUXE BANDSAW

- Motor: 1 HP, TEFC, 110V/220V, single-phase (prewired 110V)
- Amps: 11 at 110V, 5.5 at 220V
- Blade size: 93 1/2" long (1/8"-3/4" wide)
- Cutting capacity/throat: 13 1/2"
- Max. cutting height: 6"
- Overall size: 27" W x 67 1/2" H x 30" D
- Footprint: 23 1/2" x 16 1/2"
- Table height above floor: 43"
- Table tilt: 45° right, 10° left
- Approximate shipping weight: 247 lbs.

CAST IRON WHEELS

MADE IN AN ISO 9001 FACTORY



G0555LX ONLY \$545.00

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14" ULTIMATE BANDSAW

- Motor: 1 HP, TEFC, 110V/220V, single-phase, 1725 RPM
- 4" Dust port
- Cutting capacity/throat: 13 1/2"
- Max. cutting height: 6"
- Overall size: 27" W x 67 1/2" H x 30" D
- Precision-ground cast iron table size 14" x 14"
- Table height: 43 1/8"
- Tilt: 45° R, 15° L
- Fence construction: Deluxe extruded aluminum
- Blade speeds: 1500 & 3200 FPM
- Blade size: 92 1/2"-93 1/2" (1/8" to 3/4" wide)
- Approximate shipping weight: 205 lbs.

New!

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G0555LANV ~~\$545.00~~ SALE \$445.00

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2 HP DUST COLLECTOR

With Aluminum Impeller

- Motor: 2 HP, 240V, single-phase, 9A, 3450 RPM
- Air suction capacity: 1550 CFM
- Max. static pressure: 11"
- Bag capacity: 5.7 cu. ft.
- Impeller: 12 1/4" balanced cast aluminum
- Height with bags inflated 78"
- Portable base: 21 1/4" x 33 1/2"
- Approximate shipping weight: 122 lbs.



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TRICKS AND TREATS TO GET YOUR SHOP SHIPSHAPE

We're giving away downloadable plans for jigs and organizers to make your shop a safer, more efficient place to work. Plus, you'll get dozens of free tips, videos, and tool reviews. Visit woodmagazine.com/greatshop every week from August 20 to October 2, 2013, for fresh new info and plans!



Download free plans for this versatile tuck-under tablesaw organizer through August 28, 2013.

WIN A SHOP'S WORTH OF JET MACHINES

We had such fun giving away \$5,000 worth of machines from Jet Tools last summer, we decided to do it again. You can enter every day to win a tablesaw, bandsaw, drill press, jointer, drum sander, and dust collector at woodmagazine.com/jetdreammachines.



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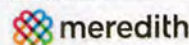
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Editor's Angle

Get the fit without the hissy

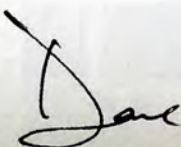
A fair number of woodworkers, myself included, came to the craft after a healthy dose of do-it-yourself home-improvement experience. It's as if one morning, after years of adding (and removing) walls, installing windows, and trimming out rooms, we suddenly woke up and realized, "Gee, I have all of these skills and tools... what else can I do with them?"

The difference between building walls and constructing the furniture that goes within them boils down to scale and tolerances: Most people would never notice a 1/4" error in a wall, but they'll cringe at *half* that error in a drawer reveal. These mentalities collide in the world of built-in cabinetry.

My first attempt at a built-in was a simple computer desk in an alcove. After carefully measuring the opening where the front edge of the desk would be, I built the desktop to fit it perfectly. During installation, though, I discovered that the alcove narrowed at the back, and the desktop was hopelessly stuck 3" from the back wall. I ended up "persuading" it the rest of the way with a mallet, digging a nice channel into the drywall in the process. For your next built-in, don't be a Dave: Follow the terrific advice from a couple of cabinetmaking pros on *page 50*.

And on the subject of waking up with a bunch of tools, we just awarded more than \$5,000 worth of machinery from Jet Tools to one lucky *WOOD* reader (see *page 6*). We had such a great response to that sweepstakes, we decided to give you another chance to win the same prize! Enter daily, if you like, at woodmagazine.com/jetdreammachines.

See you in the shop! 🌲



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**WATCH
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Hold the phone! Young entrepreneur makes a case for his business

In a display of remarkable drive and determination, teenager Steven Oleksak of Phoenix, Arizona, has generated funds for his college education by crafting protective wooden smartphone cases (*right*) using eye-catching exotic and domestic hardwood veneers. He shapes, sands, and finishes each case by hand before wrapping them with leather lace and sealing the package with a custom melted-wax seal. He's established his own website (woodphonecase.com) and has begun supplying his cases to local boutiques.

A prolific woodworker, Steven also crafts mother-of-pearl inlaid ping-pong paddles (*far right*) and has built a Les Paul-style guitar using only a how-to luthiery book and guidance from his woodworker uncle. With plans to continue woodworking as he attends college, Steven says his dream is to one

day own his own shop—instead of sharing the garage with his parents' cars. Hopefully Steven's work will inspire others his age to follow his example.



Woodworking classes: The tradition continues

Although woodworkers lament the loss of school shop programs, as a high school shop teacher, I can only say that those classes still exist, and the kids who take them are as zealous as ever. With just a little guidance and instruction, my students have achieved some very impressive results.

For example, my class of juniors built these simple deck chairs I designed from inexpensive 2x4 and 2x6 stock (*below*), and my freshmen class used the juniors' cutoffs to make a model of a Stearman biplane—a great way to learn safe use of the shop tools and cut down on waste.

—Julie Lemire, Regina, Sask.



Article Updates

► SketchUp Simplified

Just after we went to press with the article "SketchUp Simplified" in issue 220 (September 2013), Trimble released a new version of SketchUp with some minor changes. The free version of the software is now called "SketchUp Make." (The paid version retains the "SketchUp Pro" moniker.) Upon download, users are given access to the Pro version on a 30 day trial basis, after which it will revert to SketchUp Make. Some of the icons now look different than those shown in the article, but retain their keyboard shortcuts and functionality. Toolbars and toolsets have also been modified to make them easier to customize. Find more details about the changes at sketchup.com.

► Construction-grade Scraper

In issue 219 (July 2013), Drawing 2 on page 28, Drawing 3 on page 29, and the sourced hardware kit list a $\frac{5}{32}$ " axle peg $\frac{1}{2}$ " long. The axle peg should be $\frac{7}{32}$ " in diameter. The kits available at WOODStore.net come with the correctly sized axle pegs, and the patterns have the correct axle peg locations. 🌲

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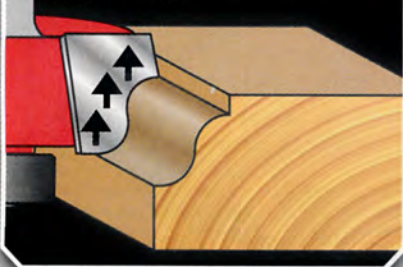
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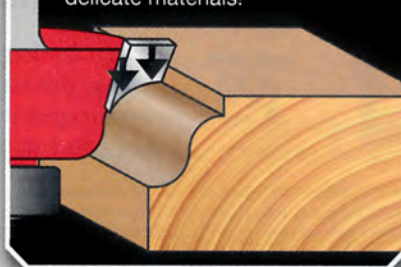
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Gauge shows reduction in dust-collection suction

I tend to leave dust-collection blast gates open after using a machine, and that reduces suction at the next tool used. To provide instant visual indication of a drop in suction, I came up with this handy gauge.

To make one, attach a length of $\frac{3}{4}$ " clear vinyl tubing to the dust collector's pipe within a few feet of the dust collector and mount it as shown. Pour a small amount of water (adding a few drops of food coloring makes it easier to see) into the tubing and mark the resting level of the liquid. With one blast gate open and a clean filter in the dust collector, turn on the dust collector and mark the maximum suction level next to the tubing. Now, you can spot a drop in suction—caused by extra blast gates open, leaks in the system, clogged filter media, or full bags—just by looking at the gauge to see if the water level has fallen.

—Ken Wadsworth, Sedalia, Colo.

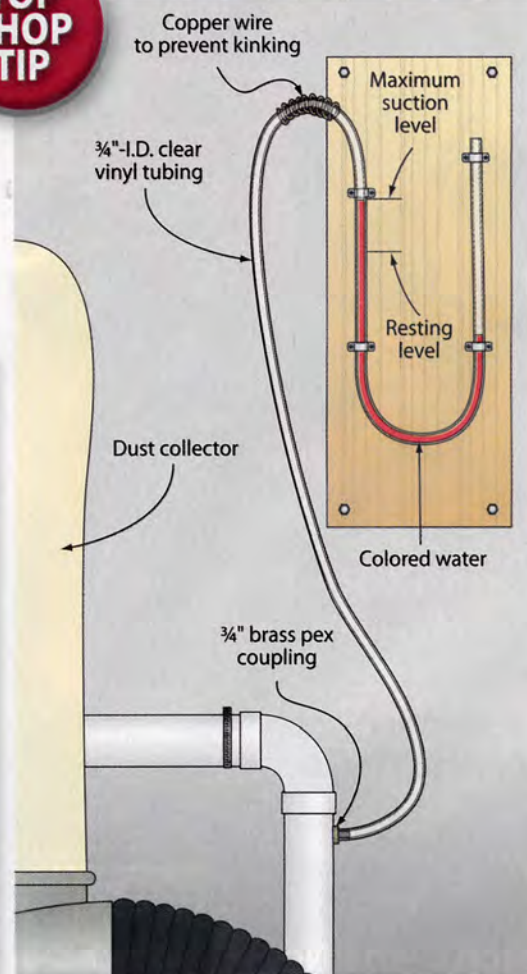
**TOP
SHOP
TIP**

We chose our favorite Shop Tip—
now choose yours! Vote online now at
woodmagazine.com/shoptipoftheyear.



Photograph by Ken Wadsworth

For sending this issue's Top Shop Tip, Ken receives a Jet 10" Sliding Dual Bevel Compound Mittersaw worth \$550.



HAVE A WOOD-WORTHY TIP?

Tell us how you've solved a workshop stumper. If we print your tip, you'll receive up to \$150. And, if the idea garners Top Shop Tip honors, we'll also reward you with a tool prize from Jet Tools worth at least \$300!

Send your best ideas, along with photos or drawings and contact info, to shoptips@woodmagazine.com or Shop Tips, WOOD magazine, 1716 Locust St., LS-221, Des Moines, IA 50309-3023.

Because we try to publish original tips, please send yours only to WOOD® magazine. Sorry, submitted materials can't be returned.



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NO PURCHASE NECESSARY TO ENTER OR WIN. Subject to Official Rules at www.woodmagazine.com/jetdreammachines. The Jet Dream Machine Giveaway begins at 12:01 a.m. CT on 06/27/13 and ends at 11:59 p.m. CT on 12/31/13. Open to legal residents of the 50 United States, and the District of Columbia, 21 years or older. Limit one (1) entry per person and per e-mail address per day. Void where prohibited. Sponsor: Meredith Corporation.



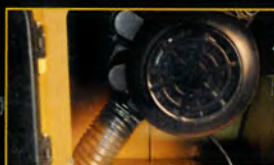
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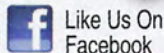
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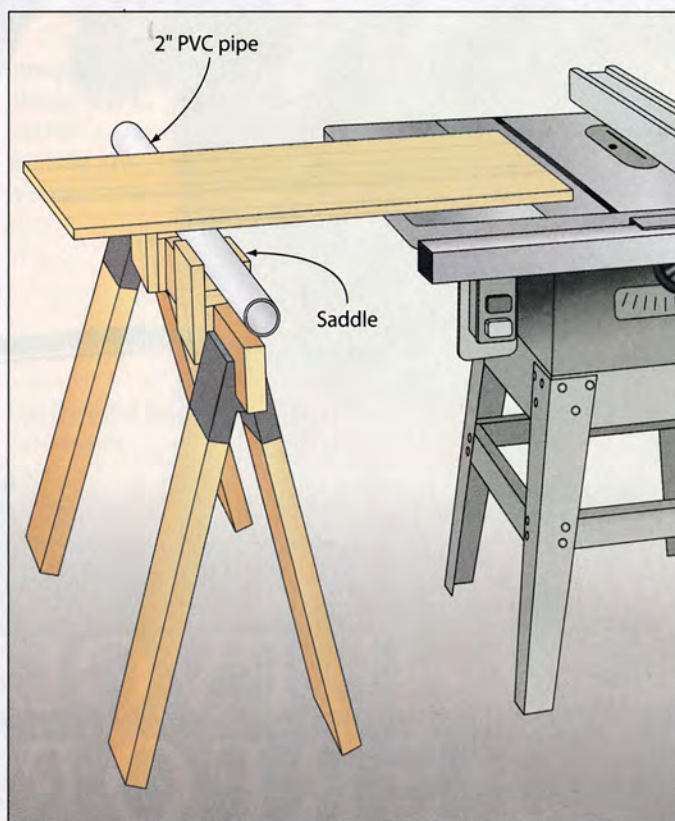
Shop Tips

Saddle that horse for slick support

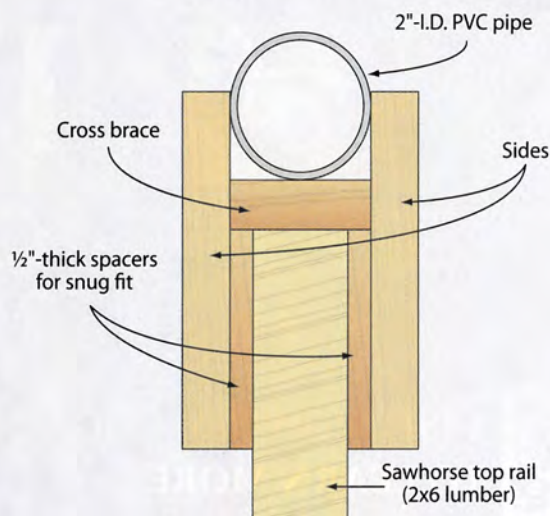
When cutting especially wide or long pieces, a support on the side of the tablesaw helps make safe, struggle-free cuts. Here's an inexpensive and effective support requiring just a length of PVC pipe, a few wood scraps, and a sawhorse.

From the scrap, fashion two H-shaped saddles—capable of holding a length of 2" I.D. PVC pipe firmly in place—that fit snugly over your sawhorse's top rail. Size the saddles so that the PVC pipe stands flush with the top of your tablesaw.

—Gil Peck, Pillager, Minn.



SADDLE CROSS SECTION

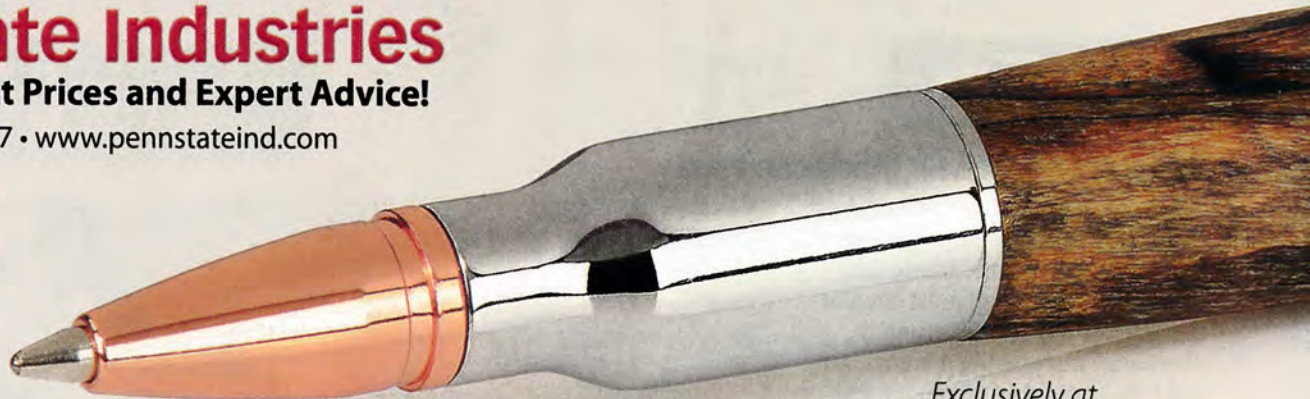


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Original Bolt Action Pens



Gun Metal shown with refill advanced



24kt Gold shown with refill retracted



Black Enamel with Gun Metal tip and clip

	Item #	1-4	5-24	25-49	50+
Chrome	#PKCP8010	\$12.95	\$12.05	\$11.15	\$10.25
Gun Metal	#PKCP8020	\$12.95	\$12.05	\$11.15	\$10.25
24kt Gold	#PKCP8000	\$14.95	\$13.95	\$12.95	\$11.95
Black Enamel	#PKCP8030	\$13.95	\$13.05	\$12.15	\$11.25

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24kt Gold

	Item #	1-4	5-24	25-49	50+
Gun Metal	#PKCP8220	\$10.95	\$9.95	\$9.45	\$8.75
24kt Gold	#PKCP8200	\$12.95	\$11.95	\$11.15	\$10.25

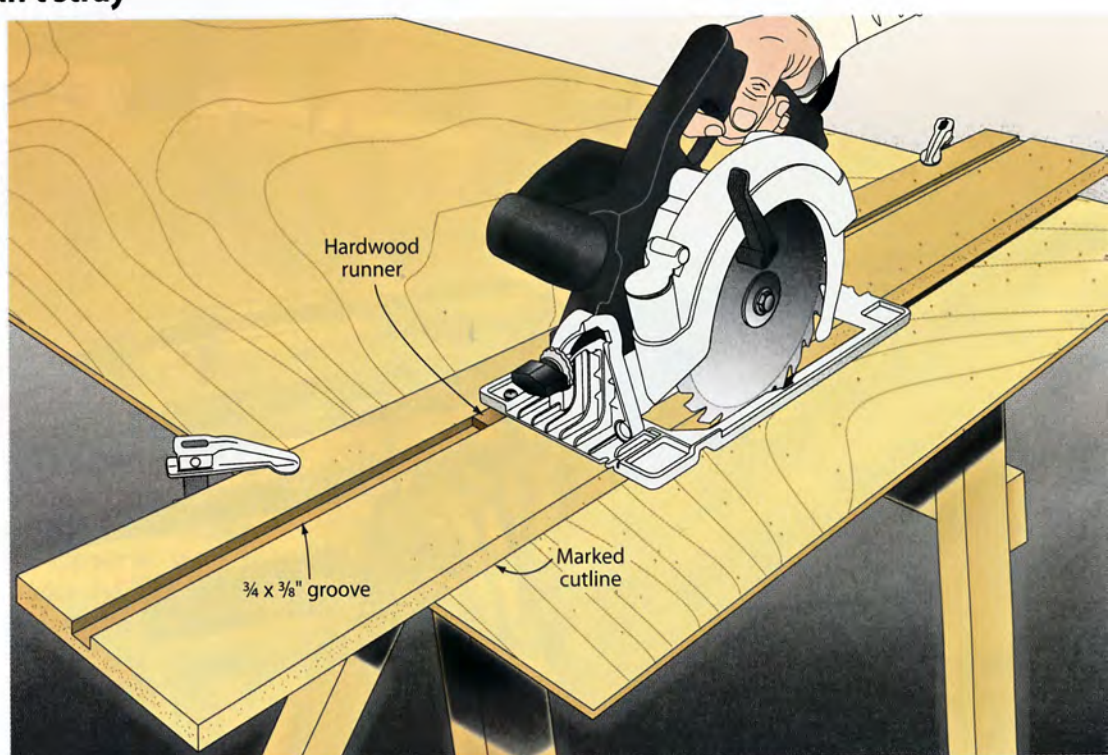
Shop Tips

Shop-made circ-saw guide can't stray

While I don't care for wrestling sheet goods atop my tablesaw to cut them, I dislike even more the hassle that comes with setting up most circular-saw guides: all that measuring, offsetting, and praying it comes out right. So I built this simple tracked guide that puts the blade in line with the cutline every time.

To build one, cut a piece of MDF wider than your saw's base and as long as you'll need to span your sheet goods. Then, cut a $\frac{3}{4}$ "-wide groove $\frac{3}{8}$ "-deep the length of the MDF. Mount a $\frac{3}{4}$ "-wide hardwood runner to your saw base (to match the groove in the MDF) and wax it with paraffin. Place the runner in the groove, turn the saw on and cut the full length of the MDF. Now, simply align the edge of the guide with any cutline, clamp it in place, and run the saw in the groove for an accurate cut.

—Lonnie Holbrook, Kannapolis, N.C.



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✓Yes



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✓Yes



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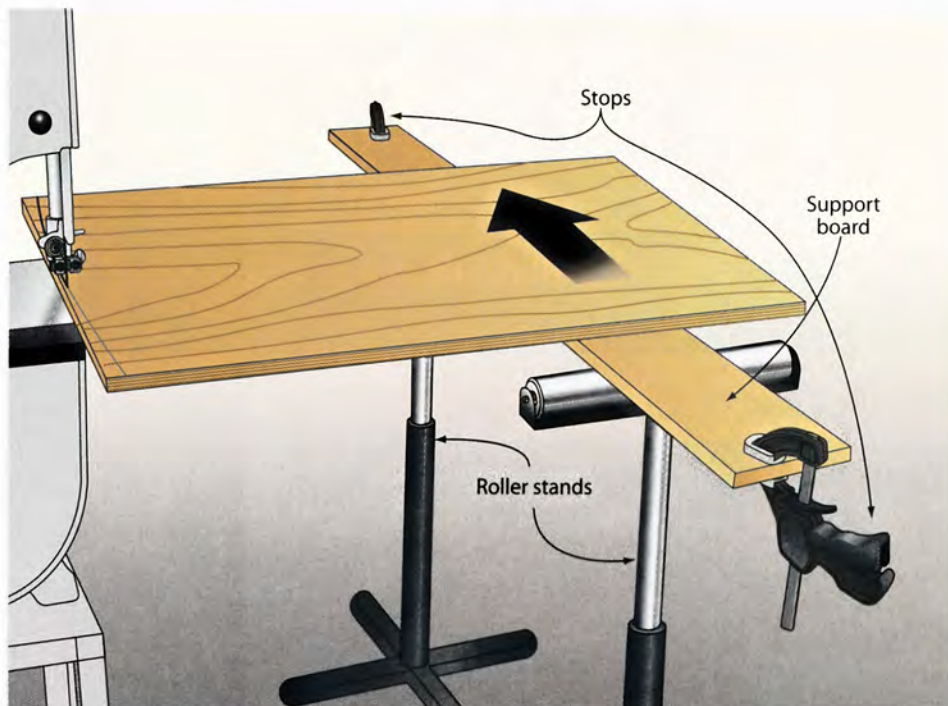
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Sliding bandsaw support makes cutting large curves easy

To shape a curved tabletop I made recently, I could have used a jigsaw that made less-than-furniture-quality cuts, or my bandsaw with its tiny table. I opted for the bandsaw, but only after coming up with the outboard support system shown.

The support board glides easily on the roller stands so I was able to focus on the accuracy of the cut instead of overcoming the board-on-board friction. A clamp at each end of the support board keeps the whole thing from accidentally rolling too far and toppling.

—J. David Carlson, Cary, N.C.



continued on page 12

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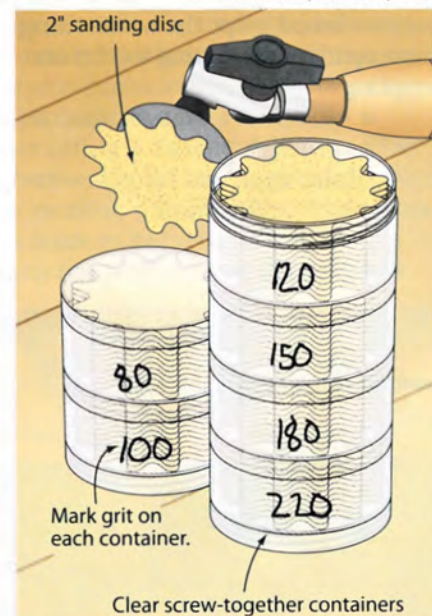
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Shop Tips

A screw-together storage strategy for sanding discs

Here's the perfect solution for storing 2" sanding discs used for turning. Clear screw-together containers used for sewing supplies and fishing tackle (50mm clear stackable jars, no. 93-200-122, \$4.98/five, 877-820-2088, ahbeads.com) hold stacks of sanding discs perfectly, and can be stacked and sorted easily. Just write the grit number on the side of the container with permanent marker.

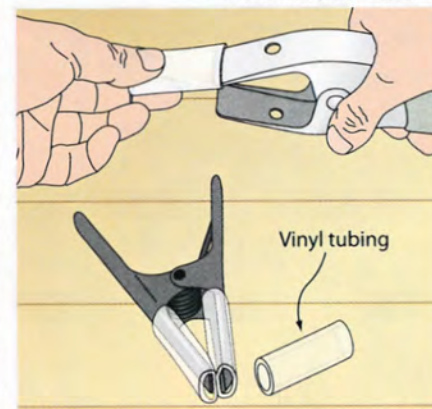
—Bob Horn, Vacaville, Calif.



Soften the bite of steel spring clamps

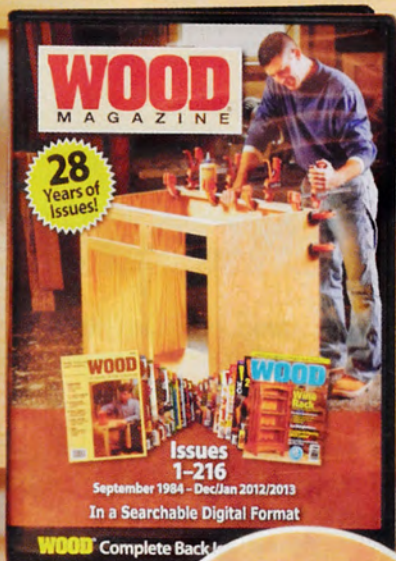
Having lost or misplaced a few of the protective plastic ends on my steel spring clamps, I replaced them with short lengths of flexible vinyl tubing (found at home centers) slipped over the clamp jaws. 🌱

—Jeff Carlson, Mancos, Colo.





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Pocket-hole Pointers

Develop Your
Shop Skills

Whether you own a pocket-hole jig or are considering buying one based on our review on *page 45*, these shop-won insights will help you get more from your jig.

Prepping the stock

► **Make precise, square cuts.** When making projects with right angles, such as cabinets or face frames, square cuts ensure square assemblies. Set your tablesaw's blade precisely 90° to the tabletop before cutting parts to size, and make sure your miter gauge is exactly 90° to the blade. Anything less will result in gaps or unsquare joints. If you cut stock on a miter saw, tune it up as well.

► **Plan your work, work your plan.** After cutting but before drilling, lay out project parts in the orientation you

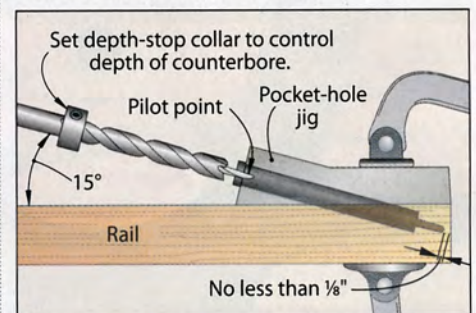
want, and then mark the *back* faces, as shown *below left*. Be sure to also draw other layout marks, such as where a middle rail lines up with the stiles. Then drill pocket holes into the marked faces to prevent accidentally drilling into the best face.

► **Grab the best grain.** Drill pocket holes so screws thread into edge or face grain

for maximum purchase; avoid screwing into end grain, as shown *below center*.

Drilling the holes

► **Set the correct pocket depth.** For strongest joints, set the stop collar according to your jig's instructions. The pilot point should stop 1/8" from the workpiece's end or edge, as shown *below*. Check this each time you use the jig to avoid accidentally drilling too deep.



► **High speed = cleaner holes.** A corded drill bores a cleaner hole than a cordless one because of its faster bit speed.

continued on page 16



These screws won't hold as well threaded into end grain. Instead, drill the pockets on the rail and drive screws into edge grain of the stile (*top photo*).

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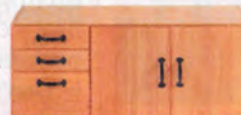


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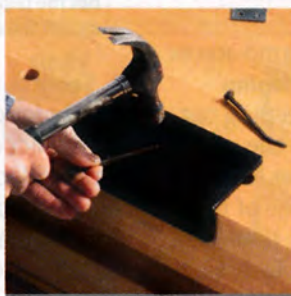
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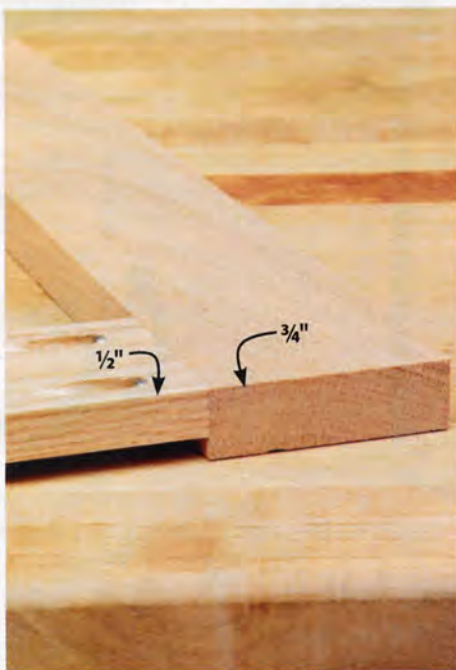
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range and specifications

Excessive tear-out around the pocket could indicate a dull bit. Keep a second bit on hand so you can switch to it when the first begins to dull.

► **Smooth the way.** Before drilling, spray the bit with a dry lubricant, such as Bostik DriCote, to reduce drilling friction and prolong sharpness. Repeat after every 20 or so holes.

► **Clear chips frequently.** Pull the bit out when you've reached about half depth to clear the chips; then finish drilling. This reduces friction and bit dulling.

► **Match up different thicknesses.** When joining boards of two different thicknesses edge-to-edge or end-to-edge, as shown *below*, set the pocket-hole depth for the thinner board. If joining boards end-to-face or edge-to-face, such as the table apron to the top, shown *far right*, set the depth for the thickness of the board with the pockets, regardless of which is thinner, and then use a shorter screw if necessary.



Assembling the joints

► **Choose the right screws.** Coarse-thread pocket screws hold best in softer woods, such as pine, cedar, and poplar, as well as plywood; use fine-thread screws for hardwoods. Choose the length based on the workpiece thickness, as shown in the chart *above right*.

Most pocket-hole screws come with an oversized washer head for increased contact with the pocket shoulder, but you can also get screws with a smaller pan head for use with shallow pockets where a washer head would protrude

Pocket-Hole Screw Guide

Material Thickness	Screw Length
1/2"	1"
5/8"	1"
3/4"	1 1/4"
7/8"	1 1/2"
1"	1 1/2"
1 1/8"	1 1/2"
1 1/4"	2"
1 3/8"	2"
1 1/2"	2 1/2"

Fine thread with pan head



Fine thread with washer head



Coarse thread with washer head



Use fine-thread screws for hardwoods. Use coarse-thread screws for softwoods, MDF, particleboard, and plywood.

above the workpiece surface. For outdoor applications, choose stainless steel or coated screws. Never use drywall screws—they break easily while driving, and their tapered ("bugle") heads can split the bottoms of the pocket shoulders.

► **Don't forget the glue.** Screws alone make a plenty-strong pocket-hole joint, but adding glue helps prevent a joint from opening up due to seasonal shrinking and swelling.

► **Clamp before screwing.** Clamp across a joint whenever possible [*opening photo*], to avoid the parts creeping out of alignment as you snug up the screws. Clamp parts to a perfectly flat surface so the front faces align. (If one of the parts is offset, shim below it, if needed.) When screwing an edge to a face, such as the table shown at *right*, always clamp the assembly securely before driving screws.



When attaching table aprons to a top, allow room for the screws to move in their pilot holes as the top expands and shrinks with humidity changes. To do this, drill the pocket as normal; then drive a screw through as shown (*top*). Remove the screw and drill out the pilot hole about 1/8" larger in diameter. Finally, mount the apron-and-leg assembly to the top.

► **Learn to drive a clutch.** Although handy for driving fasteners, avoid using an impact driver for driving pocket screws. Because you can't see the screw snug up against the pocket's shoulder, the tool's high torque can easily strip out the screw hole. Instead, use a drill or cordless screwdriver with an adjustable clutch, set to pull together joints without stripping out the holes. 🌲



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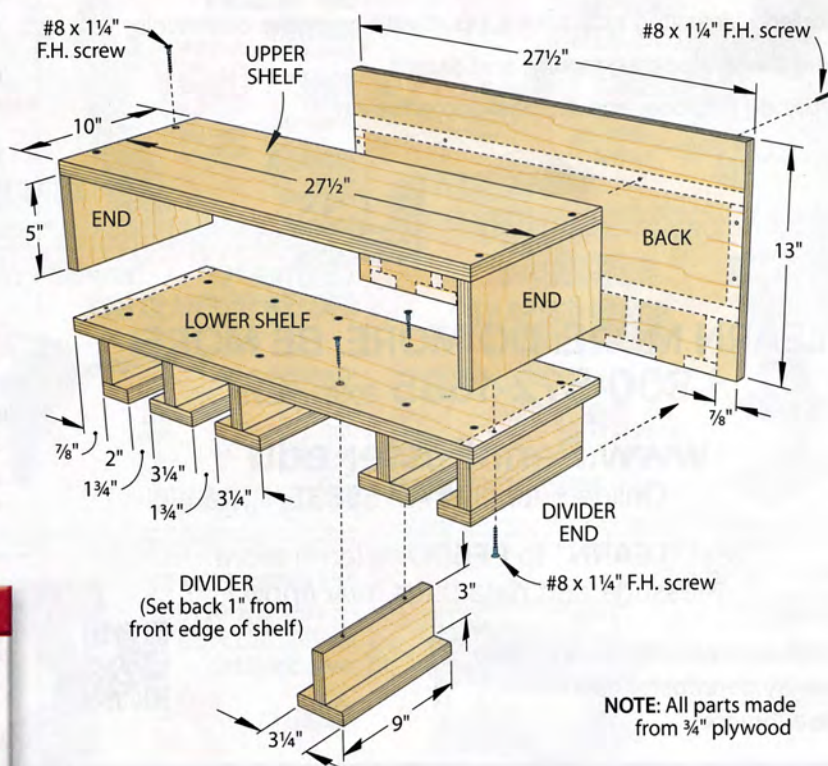
Great Ideas For Your Shop



Cordless Tool Station

This handy wall-hung holster stores your cordless drills, impact drivers, and nailers, while keeping accessories—especially those pesky battery chargers—contained and close at hand. Our design holds five tools, but can be easily extended to fit a larger tool collection. Before building, make certain your tool handles will fit between the station's dividers and adjust if necessary.

Using $\frac{3}{4}$ " Baltic birch plywood, first glue and screw together four T-shaped dividers and two L-shaped divider ends. Glue and screw these to the $10 \times 27\frac{1}{2}$ " lower shelf, leaving a $\frac{7}{8}$ " reveal around the ends and 1" on the front edge. Glue and screw the upper shelf assembly atop the lower shelf and attach the back. Finally, screw the station to the wall, being sure to hit two wall studs. For extra convenience, place a power strip on the upper shelf and coil up the charger cords before plugging them in. 🌲



More Resources

FREE reviews to help you choose tools to equip your station:

- ▶ Cordless drills: woodmagazine.com/drilldriverreviews
- ▶ Impact drivers: woodmagazine.com/driverreviews
- ▶ Nailers and staplers: woodmagazine.com/nailerreviews

NOTE: All parts made from $\frac{3}{4}$ " plywood

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Tools & Materials

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FIND A LOCAL MILL



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TURN TO THE WEB



A Google alert (see **More Resources**, below) scans the web 24/7 for any item you name and sends you an email when it's found. Set alerts to look for mentions about lumber, auctions, estate sales, and yard sales that may include woodworking supplies and lumber.

JOIN FORCES, SAVE MONEY



Hardwood lumber dealers typically give price reductions for high-volume purchases—usually beginning at 100 board feet. Don't need that much lumber? Combine your order with friends or fellow woodworking club members to take advantage of volume discounts. 🌲

More Resources

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Surrounded by Design

Develop a few simple habits that attune you to design in the world around you.

The question I get the most from my online audience: "Where do you get your project ideas?"

Fortunately, in my job as a remodeling contractor and professional woodworker, I am exposed to all manner of designs, which allows me to soak up creativity from other professionals. But I believe that inspiration and answers to our design challenges are all around us. So even if you are not in the trades, here are some things you can do to sharpen your own design senses.

Always carry a camera

If you have a cell phone, you're already doing this. If not, today's point-and-shoot digital cameras are powerful, inexpensive, and very portable. Take one along at all times to record forms and elements that inspire, such as the parking structure shown at *right*. Then, organize your photos by category, such as "architectural," "nature," etc., on your computer so you're not left straining your brain searching for a vaguely recalled image.

Start a sketchbook

As inspiration hits you, get it on paper as soon as possible. Don't get hung up on details, or worry that you can't draw well; just get the basic geometric forms scratched out and work on details later. Let the ideas flow without self-critique or editing. Allow one idea to beget another. Variations on a theme may ultimately lead to a left-field design that surprises you. Be sure to revisit your photos and sketches occasionally. Often new ideas arise out of old ones.

Get out and explore

I find that both nature and the man-made world provide lots of inspiration. My wife and I enjoy going for hikes, and we often find a natural, abstract arrangement of trees or rock formations interesting. Or we'll go walking in different neighborhoods or other parts of town and just absorb the details of the architecture.

Attend open houses

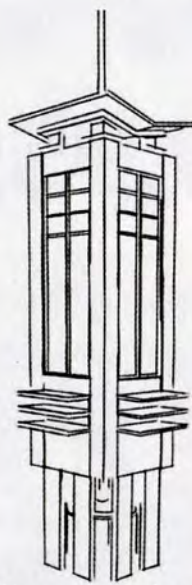
Many towns have a "parade" of new or vintage homes. Attend these to familiarize yourself with various styles of architecture and home decor. At the very least, you will discover which elements you like and don't like. Actively spark design ideas by asking

yourself which furniture or built-ins would work well in the settings.

Seek out more art and artists

Today's art culture is less pretentious and more accessible than ever. Studying the work of other artists—painters, sculptors, architects, even other woodworkers—will both challenge and energize your design senses. Remember, most disciplines of art and design are related because they all exercise arrangements of balance, proportion, color, and texture. 🌳

Though he's had no formal training, professional woodworker Todd Clippinger (*below*) attributes his success to a lifelong learning spree. Fortunately for the rest of us, he also shares what he learns at americancraftsmanworkshop.com.



Inspired in part by the shape of a parking garage he photographed, Todd's Prairie Chandelier was featured in the Museum of the Rockies in Bozeman, Montana.



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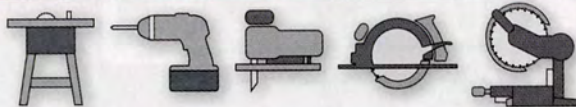
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Overall dimensions:

Workbench: 66"W x 24"D x 34½"H

Wall storage unit: 72"W x 9"D x 83¾"H

Approximate materials cost:

Workbench \$100; Wall storage unit \$50

Two easy-to-build components—a sturdy workbench and a versatile tool-storage wall complete with custom tool racks—will make your workspace the envy of your friends. The durable MDF benchtop provides a solid, stable work surface, and an ingenious set of blocks behind the rails turns an ordinary one-hand clamp into a vise, as shown *right*.

Laminate the bench's top

1 Cut the tops (A) from $\frac{3}{4}$ " MDF, making them 1" longer and wider than specified in **Drawing 1**. From $\frac{3}{4}$ " pine, cut sixteen $2\frac{1}{4}\times 34$ " blanks. These will later become the leg components (B, C, D, E), but will first be used as clamping cauls to laminate the top.

2 Place one of the tops (A) on sawhorses and use a glue spreader (a cardboard scrap or an old credit card) to evenly distribute glue over its surface. Set the other top panel onto the first, clamp the panels together [**Photo A**], and allow to dry. Move quickly during this step so the glue doesn't set up before you get the assembly clamped.

3 Use a circular saw and straightedge to trim one edge of the laminated top straight and smooth [**Photo B**]; then, use the same setup to rip the top to final width. Next, trim one end square to the edge, and then cut the top to final length.

Build the legs and rails

1 From the pine blanks used earlier, cut each of the leg components (B–E) to length [**Drawing 2, Materials List**] on the miter saw. Also, cut a spacer at least 4" long from a 5"-wide scrap piece.

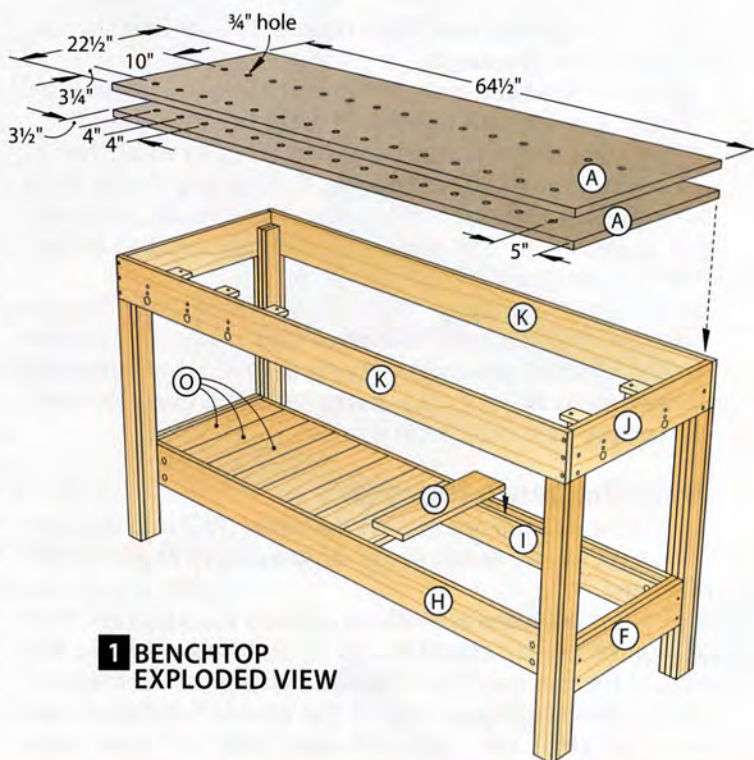
2 Begin assembling a leg by covering the top (A) with kraft paper; this keeps glue-ups from sticking to the top. Next, stand an inner leg face (E) on edge on the paper. Glue and clamp an upper leg core (C) and lower leg core (D) to the inner leg with a spacer between them to create the mortise that will hold the end rails [**Photo C**]. Remove the spacer when the leg has been securely clamped, and wipe away any glue squeeze-out with a damp rag. After about 30 minutes, the glue-up can be removed from the clamps and set aside. Repeat the process for the remaining legs.

3 When all leg assemblies (C/D/E) have dried, glue and clamp the outside leg faces (B) to them, again using the

EASY VISELIKE WORKHOLDING WITH A COMMON CLAMP



Clamp a board in place against a bench dog (**Shop Tip**, page 28) for easy face-planing, chiseling, or sanding. See page 27 for details on the clamping blocks, mounted beneath the benchtop.



1 BENCHTOP EXPLODED VIEW

LEG BLANKS DOUBLE AS CAULS



Distribute clamping force evenly across the tops (A) by clamping pairs of leg blanks side by side and spaced evenly along the MDF panels.

CUT THE TOP TO ITS FINAL WIDTH



A straight board guides your circular saw when trimming the top (A) to width. Clamp the board firmly to the top to prevent it from slipping.

USE THE TOP AS AN ASSEMBLY TABLE



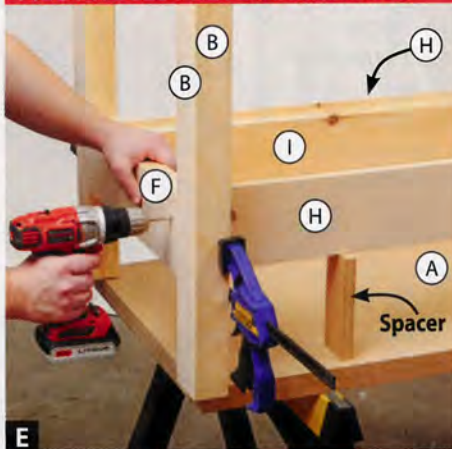
Assembling the leg pieces (C, D, E) on edge keeps one edge aligned. Clamp the parts to the top (A) and to each other.

CHAMFER THE DOWELS



To make the dowels easier to insert, use sandpaper to slightly chamfer their edges before inserting them into the holes in the stretchers (H/I).

PILOT HOLES PREVENT SPLITTING



When drilling the pilot holes, extend a $\frac{3}{16}$ " drill bit as far as possible from the drill chuck while still maintaining a solid grip.

SCRIBING ENSURES ACCURACY



By allowing 1" extra in length at each end of the upper front/back aprons (K), you can set them in position and scribe their final dimensions.

top (A) to keep edges and faces aligned. Be sure to make two mirrored pairs [Drawing 2].

4 Cut the outer and inner end rails (F, G) to size [Drawing 2]; then, glue the rails together to make two assemblies.

5 Cut the outer and inner stretchers (H, I) to width, but 2" longer than specified [Drawing 3]. Glue and clamp these parts together with the bottom edges flush, wiping away any glue squeeze-out. Cut these stretchers to finished length when dry. Discard the kraft paper.

6 Use a $\frac{3}{4}$ " spade bit to drill two holes where shown in each end of the stretchers (H/I) [Drawing 3]. Cut a $\frac{3}{4}$ "-diameter hardwood dowel into eight 1 $\frac{1}{2}$ " lengths and chamfer one end of each [Photo D]. Apply glue in the holes and insert the dowels, tapping them flush with a mallet.

Bring the bench together

1 Glue and clamp one end-rail assembly (F/G) into the mortises of two leg assemblies (B–E) [Drawing 2]. Repeat for the other end.

2 Use 6 $\frac{1}{2}$ "-long spacer blocks to position the stretchers (H/I) against the leg assemblies (B–G) and flush with the top edge of the end rails (F/G) [Photo E]; clamp the stretchers in place. Transfer the locations of the dowels installed in the stretchers (H/I) onto the end rails. Drill $\frac{3}{16}$ " pilot holes through the end rails, centered on the dowels. The cross grain of the dowels gives the screws better purchase than the end grain of the stretchers. Next, drive 4 $\frac{1}{2}$ " structural wood screws [Source] through the pilot holes to secure the base assembly together.

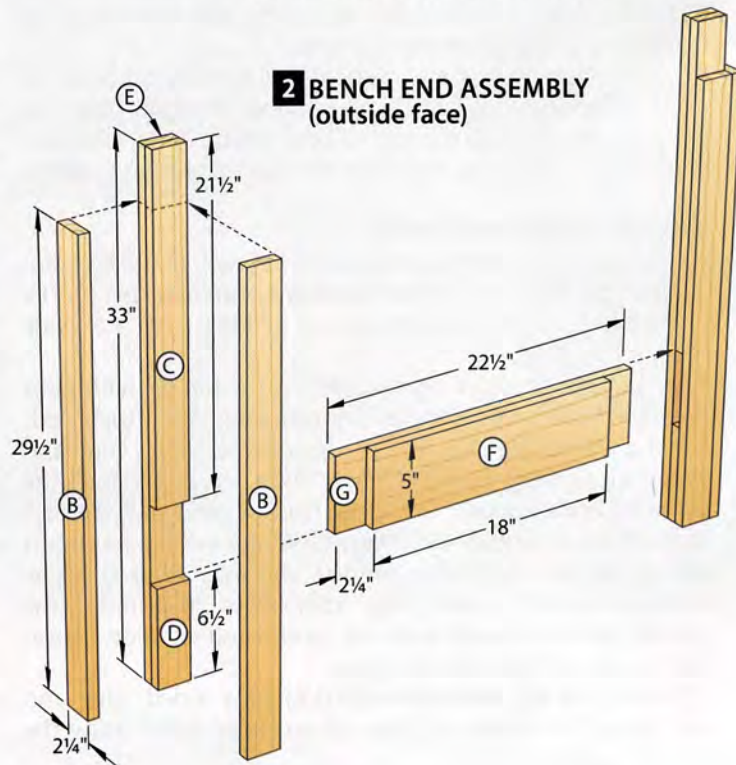
3 Cut the end aprons (J) to size, and glue them to the ends of the top (A) flush with the top face. After the glue dries, set the top assembly (A/J) on the base.

4 Cut the front/back aprons (K) to final width but 2" longer than shown [Drawing 3]. Rest them in place on the base, scribe the ends [Photo F], and cut the front/back aprons to final length. Glue the aprons to the top, and glue and screw the aprons (J, K) to each other and the base.

5 Lay out the dog-hole locations on the top (A) [Drawing 1], and use a $\frac{3}{4}$ " spade or Forstner bit to drill the holes.

Quick Tip: Use two squares as visual guides to keep the drill perpendicular as you drill [Photo G]. Mark the $\frac{7}{8}$ " hole locations on one end apron (J) and the front apron (K) [Drawing 3] and drill them with a spade bit.

2 BENCH END ASSEMBLY (outside face)



Add the clamp blocks

1 From $\frac{3}{4}$ "-thick hard maple, cut one 2 $\frac{3}{16}$ "x14" blank for the front clamp blocks (L) and a 1 $\frac{5}{8}$ "x10" blank for the end clamp blocks (M). **Note:** Avoid using pine here because the slots you cut for the clamps will wear out in softer woods.

Rip a $\frac{1}{4}$ " centered groove 1" deep along one edge of both blanks [Drawing 4].

2 Lay out three front clamp blocks (L) on the wider blank and two end clamp blocks (M) on the narrow one [Drawing 4]. Mark the location of the $\frac{1}{4}$ " dado on each of the five blocks. Clamp an auxiliary fence to your tablesaw's miter gauge, line up a dado layout line with the blade, and crosscut the dados with two or three passes. Repeat for each clamp block.

3 Cut the taper on each clamp block (L, M) with a jigsaw. Then, crosscut the clamp blocks to final length.

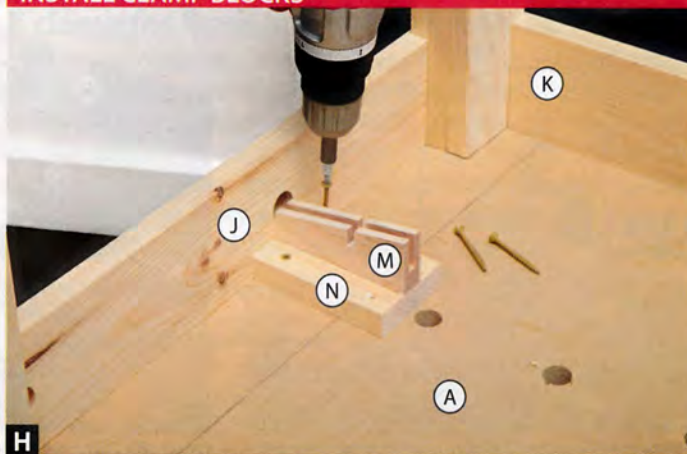
4 Cut the clamp block mounting cleats (N) to size [Drawing 4] and glue and screw them to the clamp blocks (L, M).

BORE STRAIGHT BENCH-DOG HOLES



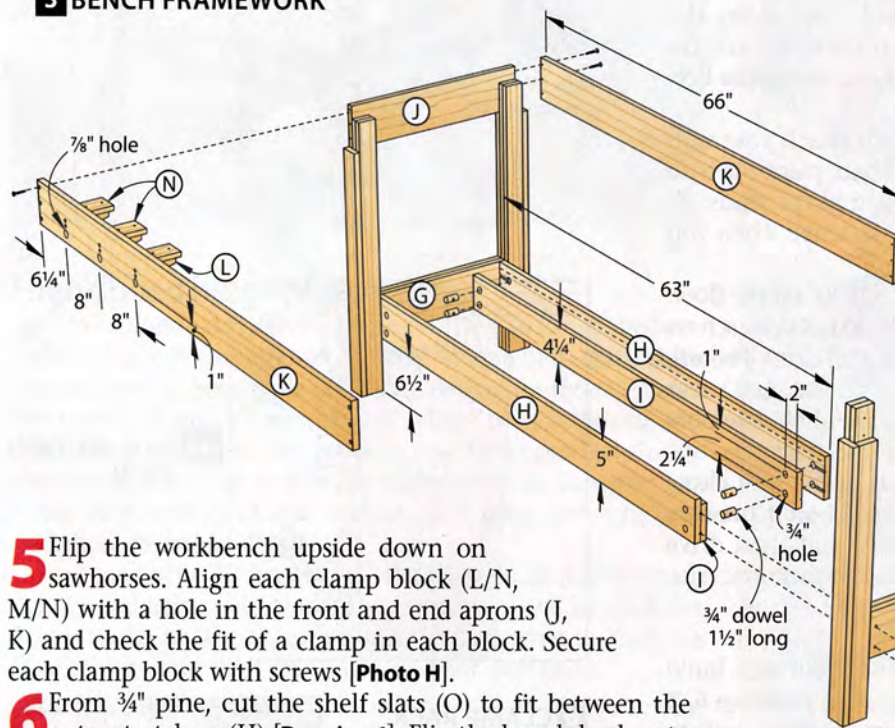
G To drill perpendicular bench-dog holes in the top (A), have a helper assist you in keeping the drill aligned with one square while you watch the other.

INSTALL CLAMP BLOCKS



H Center a clamp block (M/N) to a hole in the upper end apron (J), then attach the block to the underside of the benchtop (A).

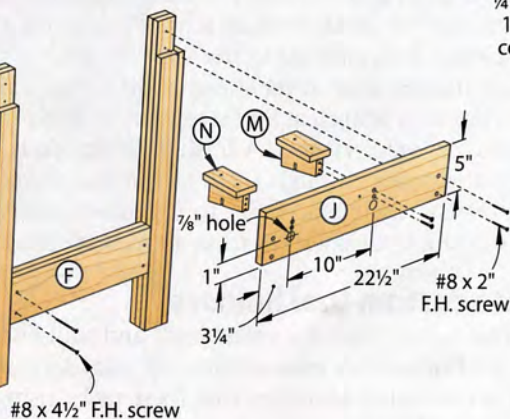
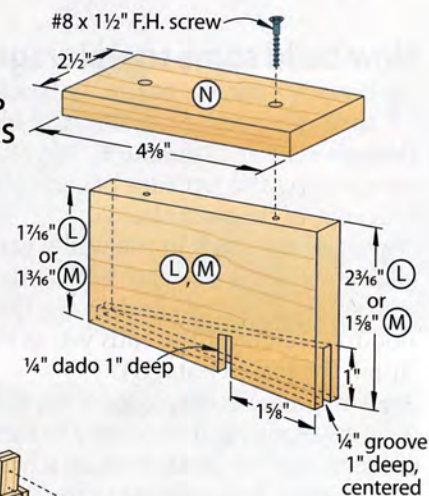
3 BENCH FRAMEWORK



5 Flip the workbench upside down on sawhorses. Align each clamp block (L/N, M/N) with a hole in the front and end aprons (J, K) and check the fit of a clamp in each block. Secure each clamp block with screws [Photo H].

6 From $\frac{3}{4}$ " pine, cut the shelf slats (O) to fit between the outer stretchers (H) [Drawing 1]. Flip the bench back onto its legs; then glue the slats to the inner stretchers (I).

4 CLAMP BLOCKS

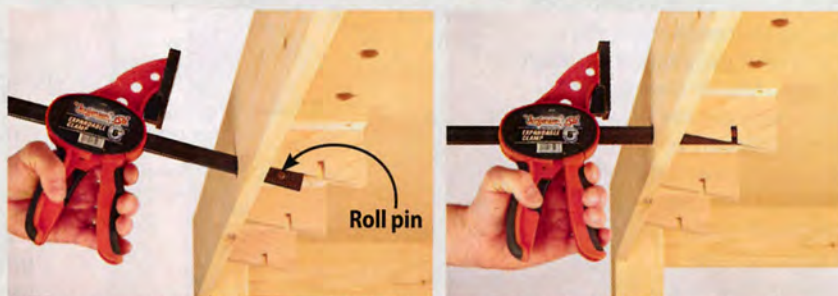


SHOP TIP

Turn a bar clamp into a vise

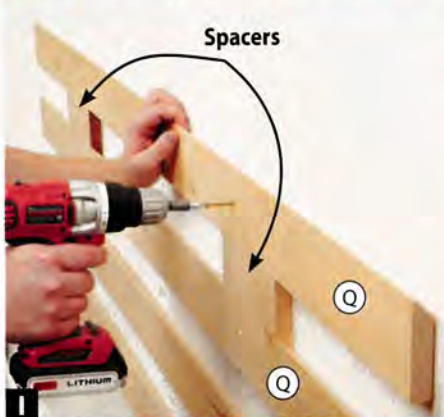
Instead of a pricey vise, this bench uses shop-made clamp blocks that hold typical one-hand ratcheting bar clamps inserted through holes in the bench's front and end aprons, *right*. After removing the fixed jaw, the bar fits into the groove of the clamp block, and the bar's roll pin holds the clamp in place once inserted, *far right*.

These clamp blocks are designed to work with Irwin SL300 and Jorgensen ISD 3 expandable bar clamps. If you have a different clamp, test its fit in the blocks and make modifications to the grooves as needed, or install a larger roll pin in the clamp bar.



By anchoring a ratcheting bar clamp's roll pin in the clamp block, you can then squeeze a workpiece between the moving jaw and a bench dog.

SPACERS ENSURE PROPER PLACEMENT



Beveled $\frac{3}{4}$ "-wide spacers ripped from scrap cleat material consistently space each subsequent wall cleat (Q) as you screw it to the wall.

ATTACH THE BRACE CLEATS



Drive #8x3" screws through the brace cleat (U) and the ends of the wall cleats (Q) and into the underlying wall stud.

Now build some tool storage

1 From $\frac{3}{4}$ " pine, cut to size the base wall support (P), wall cleats (Q), shelf (R), shelf cleat (S), shelf braces (T), and brace cleats (U) [Materials List and Drawing 5]. Tilt your table saw blade to 45° and rip bevels along the top edge of each wall cleat (Q) and along the bottom edge of the shelf cleat (S).

2 Locate the studs in the wall where you want to attach your wall unit, making sure each end lands on a stud. Then, place the base wall support (P) flush against the floor and screw it to the studs; do not drive screws at the ends yet, as these will be fastened when you install the brace cleats (U).

3 Position the bottom edge of the first wall cleat (Q) 30" off the floor. Check for level; then screw it to the studs. Again, do not drive screws at the ends of the cleats. Then, attach the remaining wall cleats [Photo I].

4 Glue the shelf cleat (S) to the shelf (R) flush with the shelf's rear edge [Drawing 5a]. After the glue dries, hang the shelf assembly on the topmost wall cleat and screw the shelf cleat to the studs.

5 Hold the brace cleats (U) flush with the ends of the wall cleats (Q) and screw through them to the wall studs [Photo J, Drawing 5]. Screw the shelf braces (T) to the brace cleats, and then drive screws through the shelf (R) from above and into the shelf braces.

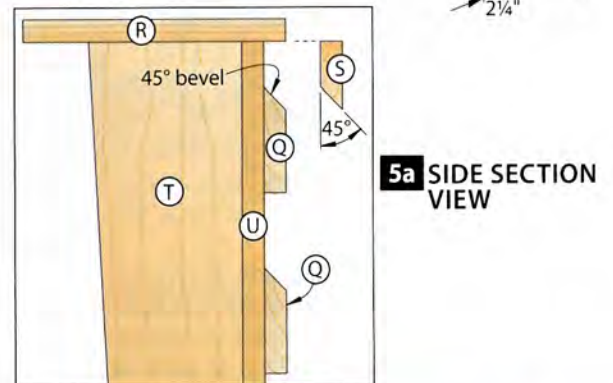
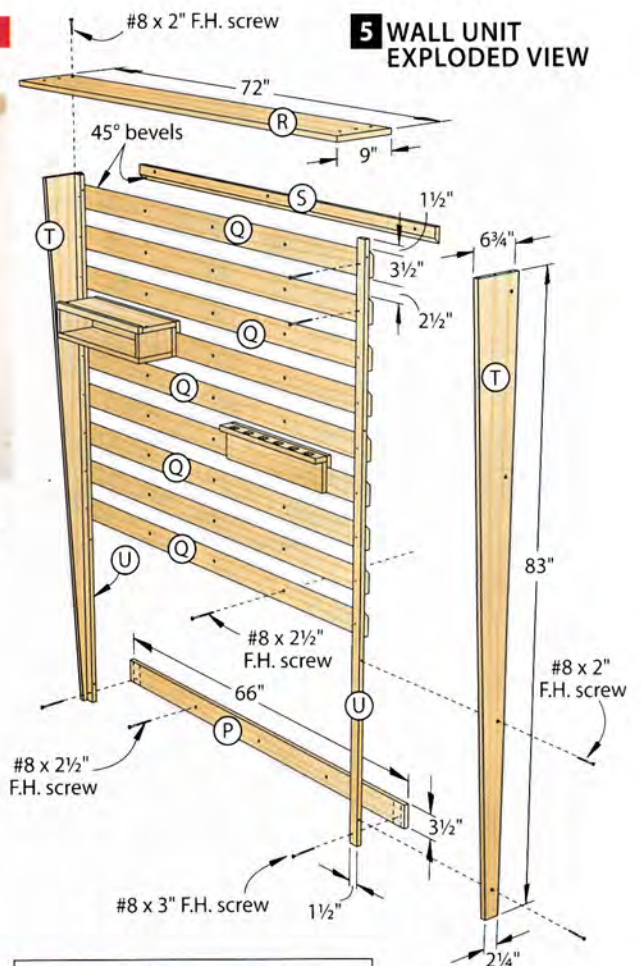
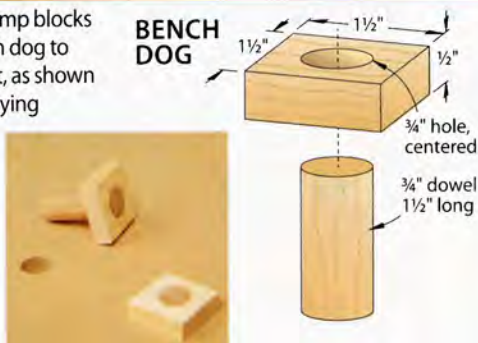
Create custom tool holders

Now that you've built the workbench and wall-hung tool rack, build individual organizers customizable for your tools. Use Drawings 6, 7, and 8 as the basis for constructing these racks, using beveled cleats to hang them from the mating wall cleats. Find more tool racks in the WOOD Patterns® insert on page 42.

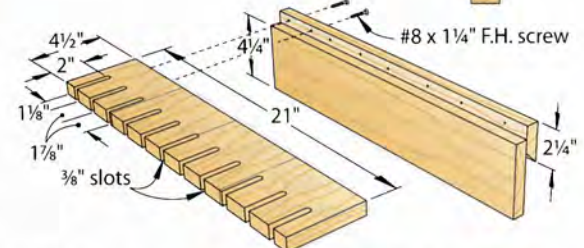
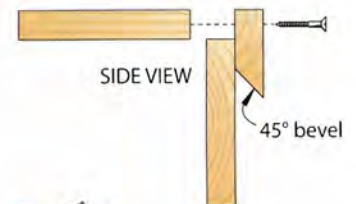
SHOP TIP

To use the clamp in the clamp blocks as a vise, you need a bench dog to trap the workpiece against, as shown on page 27. Rather than buying bench dogs, consider making your own, as shown. If the dowels fit too snugly in the dog holes in the top (A), simply sand them until they slip in and out easily.

BENCH DOG

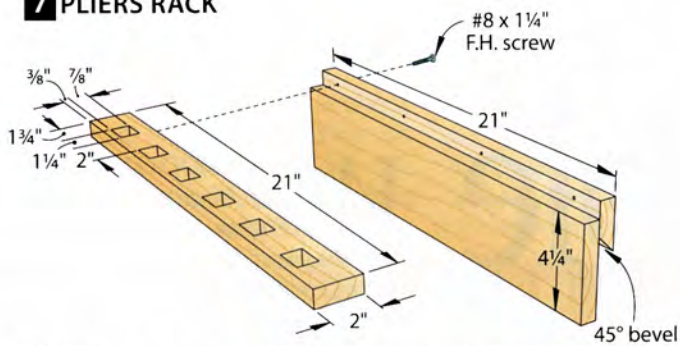


6 CLAMP RACK



NOTE: If using pine (or any other softwood) for this clamp rack, glue together four $5\frac{1}{4} \times 4\frac{1}{2}$ " segments edge to edge, so the grain runs front to back for maximum strength. When dry, sand it smooth, then drill $\frac{3}{8}$ " holes at the back of the slots. Cut the slots with a jigsaw, then glue and screw together as shown.

7 PLIERS RACK



NOTE: Create the mortises for the pliers handles by first drilling $\frac{7}{8}$ " holes, and then jigsawing them to rectangular shape. Adapt the spacing to suit your tools.

Cutting Diagram



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



$\frac{3}{4}$ x 5½ x 96" Pine (4 bd. ft.) (2 needed)



$\frac{3}{4}$ x 5½ x 96" Pine (4 bd. ft.) (2 needed)



3/4 x 5 1/2 x 96" Pine (4 bd. ft.) (2 needed)



$\frac{3}{4}$ x 5 $\frac{1}{2}$ x 72" Pine (3 bd. ft.) (2 needed)



$\frac{3}{4}$ x 5 $\frac{1}{2}$ x 72" Pine (3 bd. ft.) (2 needed)



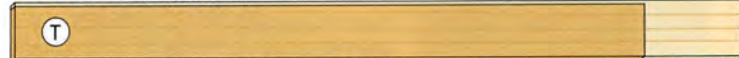
$\frac{3}{4}$ x 7 $\frac{1}{4}$ x 96" Pine (5.3 bd. ft.)



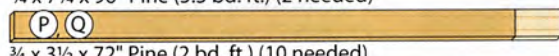
$\frac{3}{4}$ x $9\frac{1}{4}$ x 96" Pine (6.7 bd. ft.)



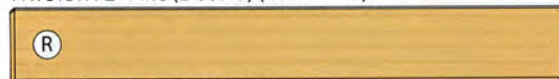
$\frac{3}{4}$ x 5 $\frac{1}{2}$ x 72" Pine (3 bd. ft.)



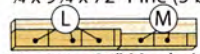
$\frac{3}{4}$ x $7\frac{1}{4}$ x 96" Pine (5.3 bd. ft.) (2 needed)



$\frac{3}{4}$ x 3 $\frac{1}{2}$ x 72" Pine (2 bd. ft.) (10 needed)

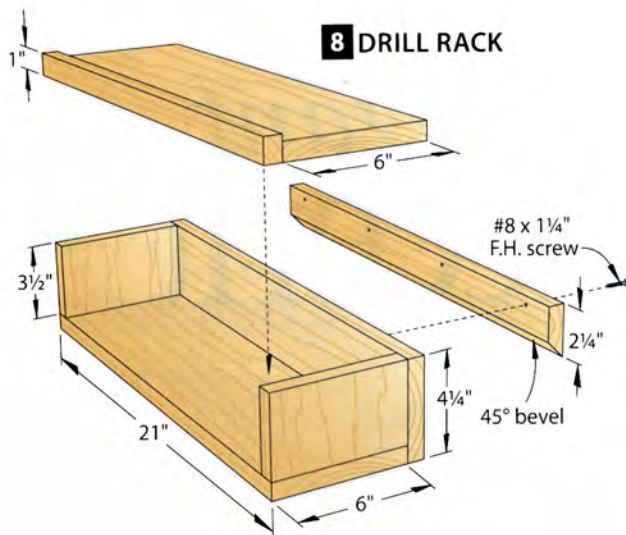


$\frac{3}{4}$ x 9 $\frac{1}{4}$ x 72" Pine (5 bd. ft.)



$\frac{3}{4}$ x $3\frac{1}{2}$ x 24" Maple (.7 bd. ft.)

8 DRILL RACK



Materials List

Part Bench	FINISHED SIZE			Matl.	Qty.
	T	W	L		
A* tops	¾"	22½"	64½"	MDF	2
B outer leg faces	¾"	2¼"	29½"	P	8
C upper leg cores	¾"	2¼"	21½"	P	4
D lower leg cores	¾"	2¼"	6½"	P	4
E inner leg faces	¾"	2¼"	33"	P	4
F outer end rails	¾"	5"	18"	P	2
G inner end rails	¾"	5"	22½"	P	2
H* outer stretchers	¾"	5"	63"	P	2
I* inner stretchers	¾"	4¼"	63"	P	2
J end aprons	¾"	5"	22½"	P	2
K* front/back aprons	¾"	5"	66"	P	2
L* front clamp blocks	¾"	2¾"	4¾"	M	3
M* end clamp blocks	¾"	1¾"	4¾"	M	2
N clamp block cleats	¾"	2½"	4¾"	P	5
O shelf slats	¾"	4½"	16½"	P	14
Wall Unit					
P base wall support	¾"	3½"	66"	P	1
Q wall cleats	¾"	3½"	66"	P	9
R shelf	¾"	9"	72"	P	1
S shelf cleat	¾"	2¼"	66"	P	1
T shelf braces	¾"	6¾"	83"	P	2
U brace cleats	¾"	1½"	83"	P	2

*Parts initially cut oversize. See the instructions.

Materials key: MDF—medium-density fiberboard, P—pine, M—maple.

Supplies: #8x1½" F.H. screws (10), #8x2" F.H. screws (54), #8x2½" F.H. screws (33), #8x3" F.H. screws (20), ¾" dowel 36" long.

Bits: 3/4" spade bit, 7/8" spade bit, 3/16" brad-point bit.

Source

Fasteners: FastenMaster 4½" structural wood screws (lowes.com, no. 194827, 12 per pack, driver bit included).

Written by **Mike Berger**
Produced by **Bob Hunter** with **John Olson**
Project design: **John Olson**
Illustrations: **Roxanne LeMoine;**
Lorna Johnson

Elegant Accent Table

When WOOD® Design Editor John Olson first showed me this English Arts and Crafts-style table, the gracefully curved leg rails, tapered legs, and wedged top had me thinking it would be complicated to build. But great looks don't always mean difficult construction: After John showed me his simple methods for shaping the rails and legs, and how to join the top to the leg assembly, I was ready to dive in. I think you will be, too.

Nate



Nate Granzow
General-Interest Editor

Overall dimensions:
27" W × 27" D × 27¾" H
Materials cost: \$58

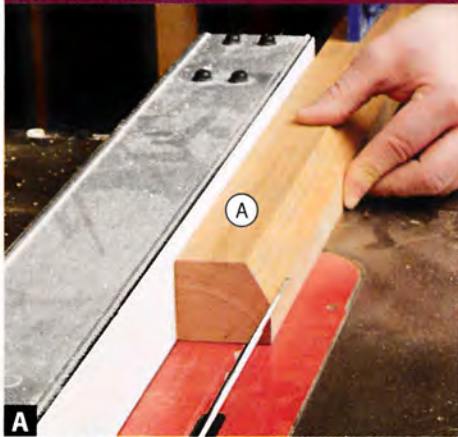
First, make three legs

1 From 1¾" cherry (if you can't find cherry of this thickness, glue up blanks from thinner stock), cut the legs (A) to size [Materials List]. With the legs' 2"-wide face down on the table-saw's top, rip bevels where shown to form a hexagonal leg [Drawing 1, Photo A]. Lay out the tapers on the top end of each leg [Drawing 2, Photo B].

2 Lay out mortises on the inside faces of each leg (A) [Drawing 3]. Cut the 1"-deep mortises with a mortiser, or use a drill press and chisels. (See **More Resources** for free videos on making the legs.)

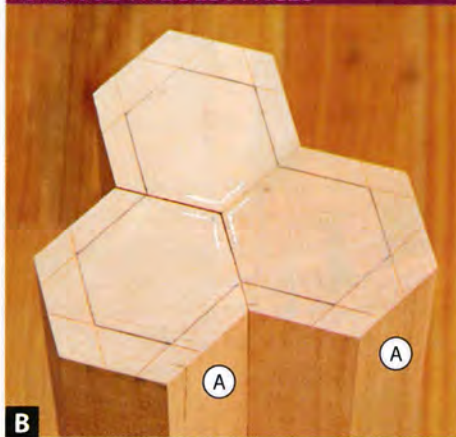
3 Draw a taper line on one inside face of a leg (A) linking the bottom to a corner of the hexagonal outline on the leg's top. Cut the marked taper on the bandsaw [Photo C]. Plane or sand the band-sawn taper flat and smooth. Then, repeat for the remaining tapers. Do this for each leg.

BEVEL THE LEGS



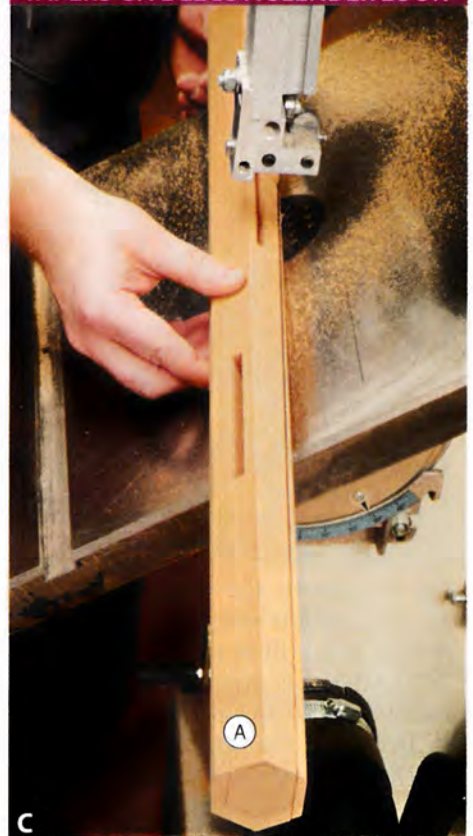
A After marking the beveled cuts on the bottom of each leg, tilt your tablesaw blade to 30° and cut them. Flip the piece end for end after each cut.

CHOOSE THE BEST FACES



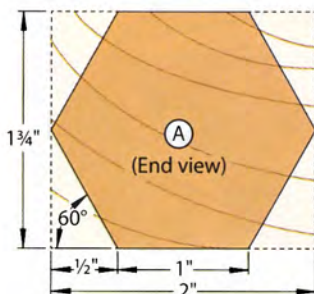
B Before marking the tapers on the legs (A), orient the best-looking faces outward. Mark an arrow indicating the inside face to serve as a reminder.

TAPERS GIVE LEGS A SLENDER LOOK

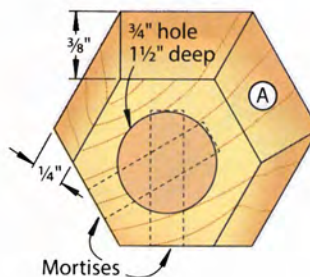


C Tilt your bandsaw's table so the blade aligns with the outline on the leg's top. Cut each leg's taper. Draw a line for the adjacent taper and cut again.

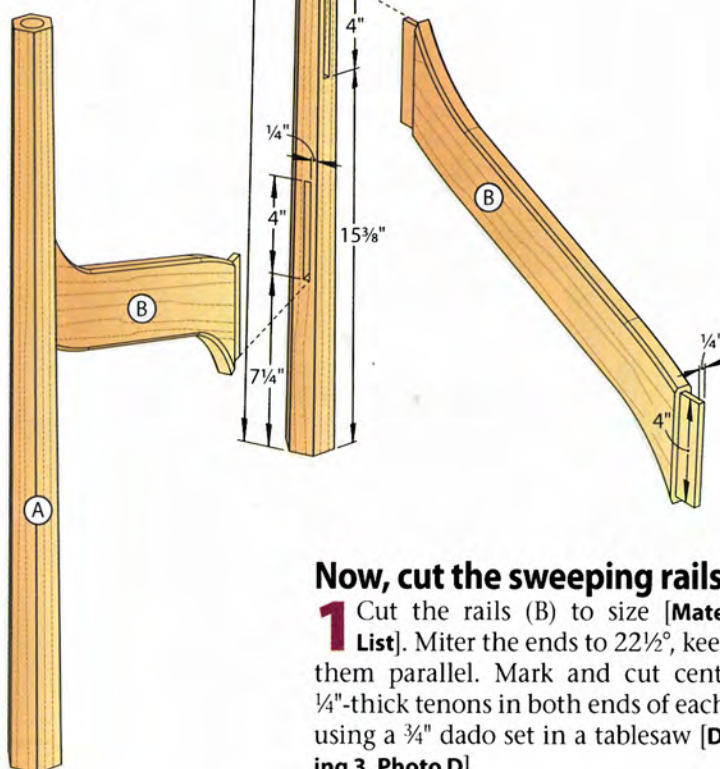
1 LEG BEVELS



2 LEG DETAIL



3 LEG AND RAIL ASSEMBLY



Now, cut the sweeping rails

1 Cut the rails (B) to size [Materials List]. Miter the ends to 22½°, keeping them parallel. Mark and cut centered ¼"-thick tenons in both ends of each rail using a ¾" dado set in a tablesaw [Drawing 3, Photo D].

CUT THE TENON CHEEKS



D Set your miter gauge to 22½° and cut one cheek of the rail's (B) tenons. Adjust the gauge to the opposite 22½° and cut the other cheeks.

2 Mark the rail (B) tenons' width (see Rail Pattern in the *WOOD Patterns*® insert on page 41), and then bandsaw along the lines. Dry-assemble the legs and rails to check the tenons' fit in the legs' (A) mortises. Make adjustments as necessary—lightly sanding the tenon faces if the fit is too snug, for example.

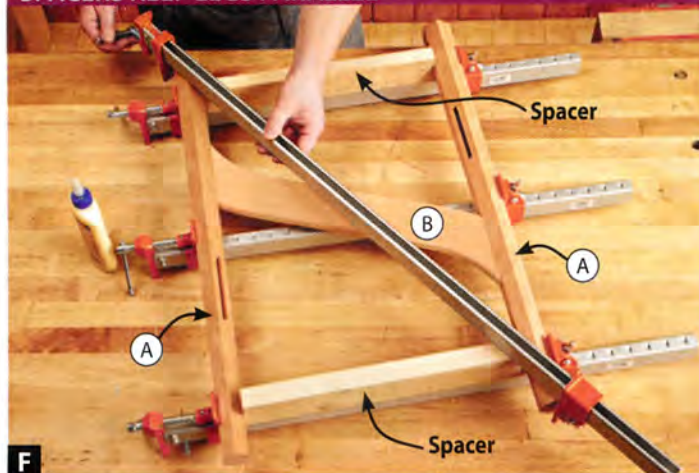
3 Following the Rail Pattern, make a template from poster board. Use the template to lay out the shape of each rail (B). Bandsaw the rails to shape [Photo E],

BANDSAW THE CURVES



E When bandsawing the rails' (B) curves, cut $\frac{1}{16}$ " outside the layout line. Then, tape the rails face-to-face and stack-sand for identical pieces.

SPACERS KEEP LEGS PARALLEL



F Place two scrapwood spacers between the legs (A) and run a clamp diagonally across the assembly to keep everything square during clamp-up.

sand to smooth the curves, and then rout $\frac{1}{8}$ " chamfers along the rail edges.

4 Glue a rail (B) to two legs (A) [Photo F]. After this assembly dries, glue a second rail and third leg to the assembly. Installing the last rail may require gently stretching the legs apart.

Add a classy circular top

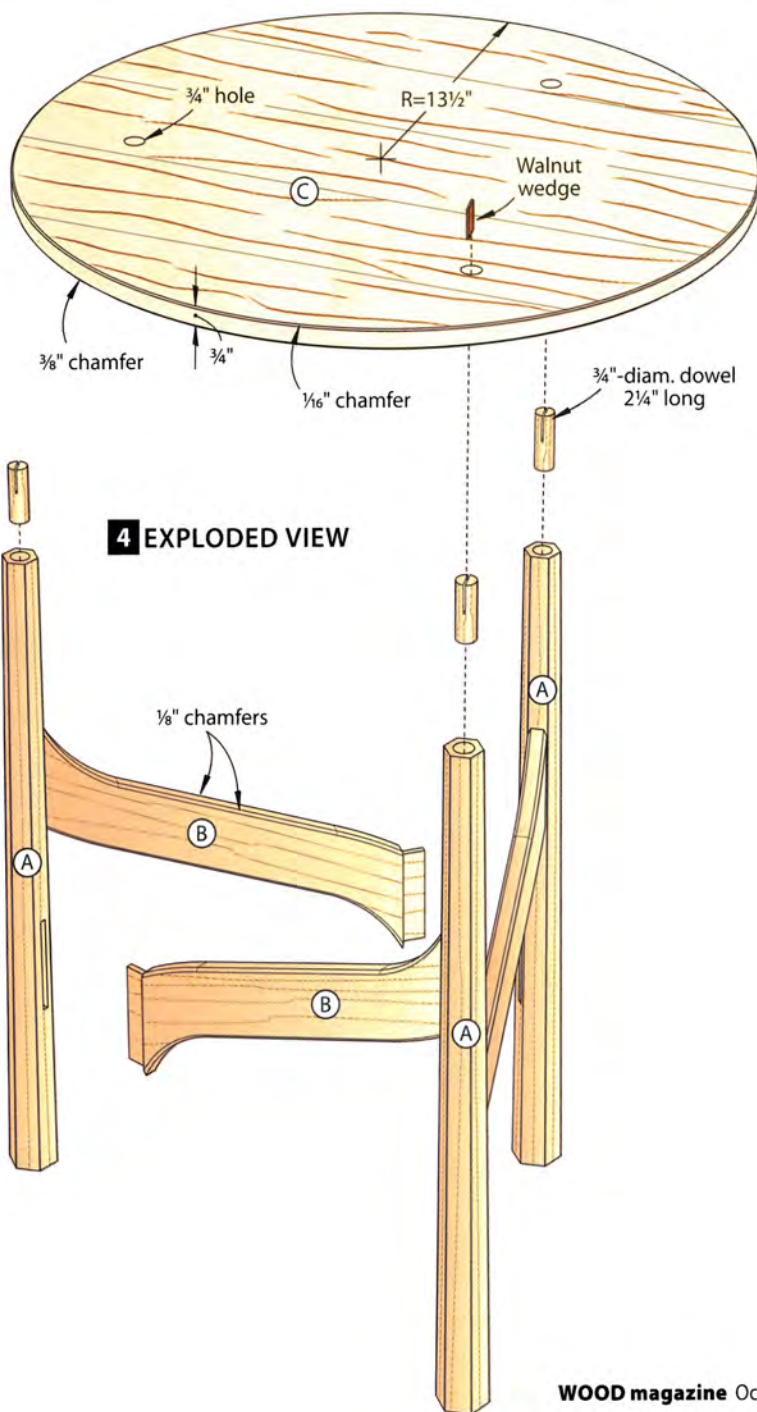
1 Bore $\frac{3}{4}$ " holes $1\frac{1}{2}$ " deep in the top of each leg (A) [Drawing 2, Photo G], keeping the bit centered on the leg.

2 Cut three $2\frac{3}{8}$ " lengths of $\frac{3}{4}$ " dowel. Bandsaw a $\frac{3}{4}$ "-long slot centered in one end of each dowel. Glue the dowels, slotted end up, into the $\frac{3}{4}$ " holes in the table legs (A), as shown in Drawing 4, aligning the dowels' slots parallel with one another. (See "The no-fastener way to secure a tabletop" on the next page.)

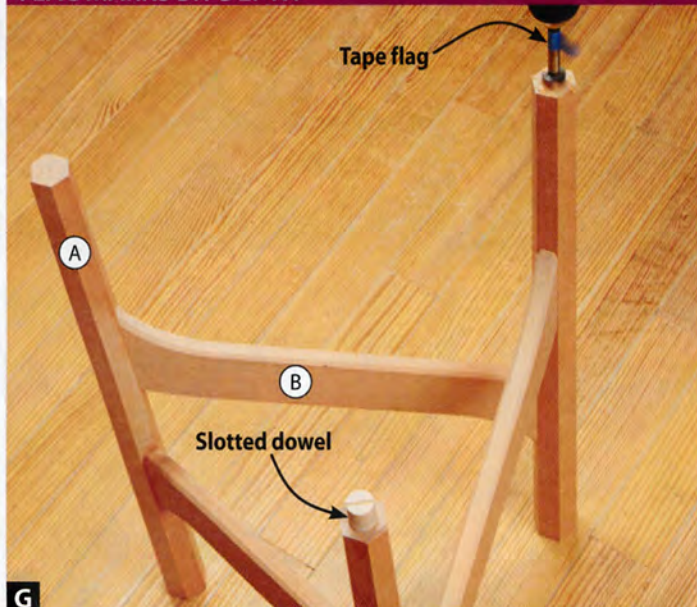
3 Glue up a top (C) of a contrasting wood [Materials List]. (We used spalted maple.) With a beam compass, lay out a 27" circle on the top [Drawing 4]. Cut the top to rough shape with a jigsaw, and clean the edge using a router, straight bit, and trammel. (See More Resources to learn how to build and use a router trammel.) Center the leg/rail assembly (A/B) on the top and trace around the dowels [Photo H]. Bore $\frac{3}{4}$ " through holes in the marked locations.

Quick Tip! Clamp a scrap backer behind each hole to prevent unsightly chip-out.

4 Chamfer the top and bottom edges of the top (C) [Drawing 4]. Place the top on the leg assembly (A/B), tapping it down until it seats on top of the legs (A). Secure the top with walnut wedges glued and lightly hammered into place. After the glue dries, trim the wedges and protruding dowels flush with the top, and finish-sand the table to 220 grit.

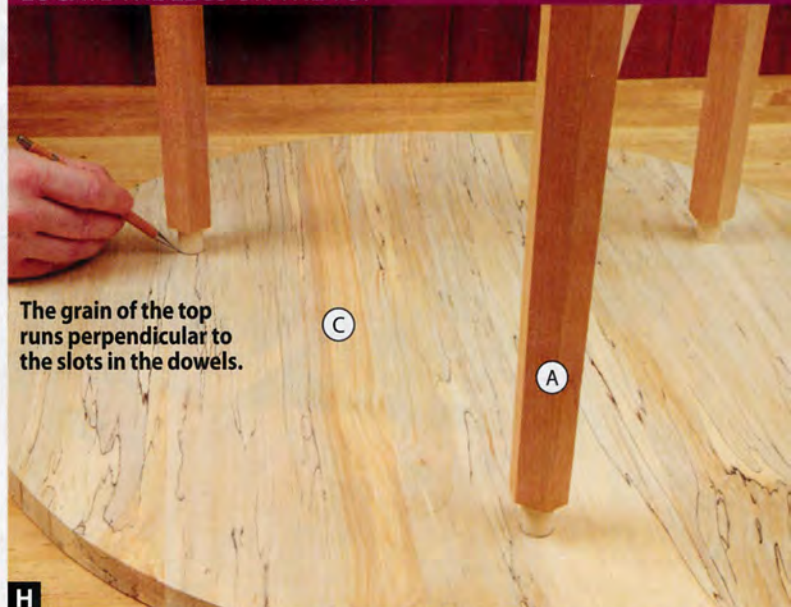


FLAG MARKS BIT DEPTH



G When boring the centered hole in the top of each leg, mark the 1½" hole depth on the bit shank using a piece of masking tape.

LOCATE THE LEGS ON THE TOP



H Place the leg assembly (A/B) dowel side down on the underside of the top (C). Then, mark the leg locations by tracing around the dowel ends.

5 Apply a clear finish. We brushed on three coats of shellac, sanding between coats with a 320-grit sponge.

Produced by **Nate Granzow** with **John Olson**

Project design: **John Olson**

Illustrations: **Lorna Johnson**

Materials List

Part	FINISHED SIZE			Matl.	Qty.
	T	W	L		
A legs	1¾"	2"	27"	C	3
B rails	¾"	6"	20¾"	C	3
C top	¾"	27" diam.	ESM		1

*Parts initially cut oversize. See the instructions.

Materials key: C—cherry, ESM—edge-glued spalted maple.

Supplies: ¾x12" cherry dowel.

Bits and blade: ¾" Forstner bit; 45° chamfer, ½" or ¾" straight router bits; dado set.

Cutting Diagram



1¾ x 7¼ x 36" Cherry (4 bd. ft.)



¾ x 7¼ x 72" Cherry (4 bd. ft.)



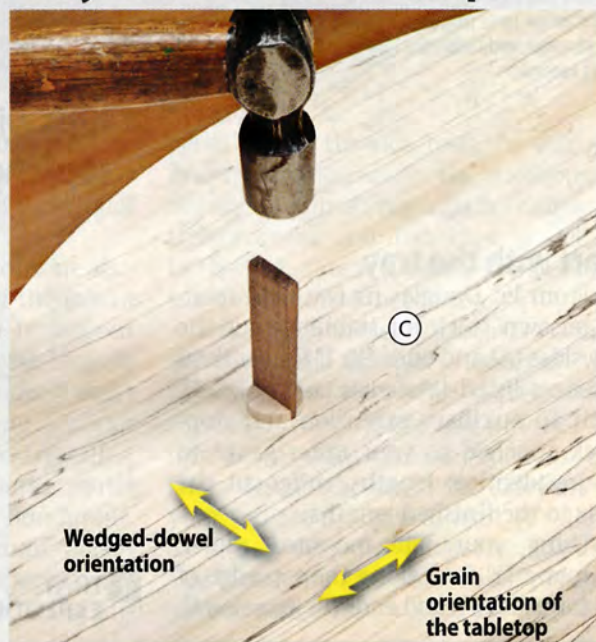
¾ x 5½ x 96" Spalted maple (4 bd. ft.)



¾ x 7¼ x 72" Spalted maple (4 bd. ft.)

The no-fastener way to secure a tabletop

To ensure your table's top (C) stays firmly fastened to the leg assembly (A/B) even with seasonal changes in humidity, first align the dowel slots so they face the same direction prior to gluing the dowels into the legs. Then, when transferring the dowel locations onto the tabletop, align the leg assembly so the dowel slots are perpendicular to the tabletop's grain. Expansion and contraction in the tabletop will occur much more across its width than its length, and in this arrangement, that expansion will push equally against the two legs set furthest apart (relative to the tabletop width), distributing the wood movement and reducing the possibility of the legs' joints breaking apart.



More Resources

- For a FREE video on making the mortises in the table's legs, visit woodmagazine.com/accentmortises
- For a FREE video on tapering the table's legs, see woodmagazine.com/accenttablelegs
- For free instruction on how to build and use a router trammel, visit woodmagazine.com/cutlargecircles

Off-the-fun-scale Musical Blocks



Overall dimensions:
13½" W × 17¼" L × 3¼" H

The tray keeps the blocks together for easy playing and storage and helps the tones resonate.

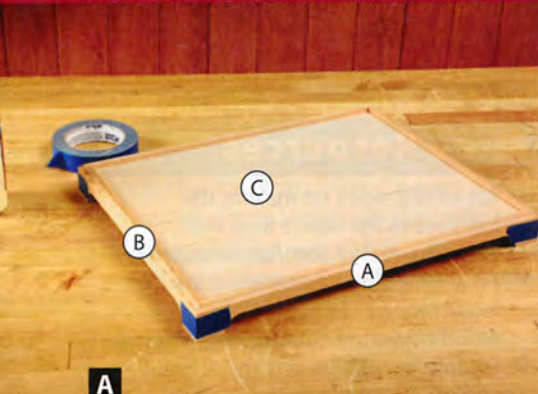
Kids will enjoy hours of excitement and musical growth tapping out tones on this easy-to-build project.

Start with the tray

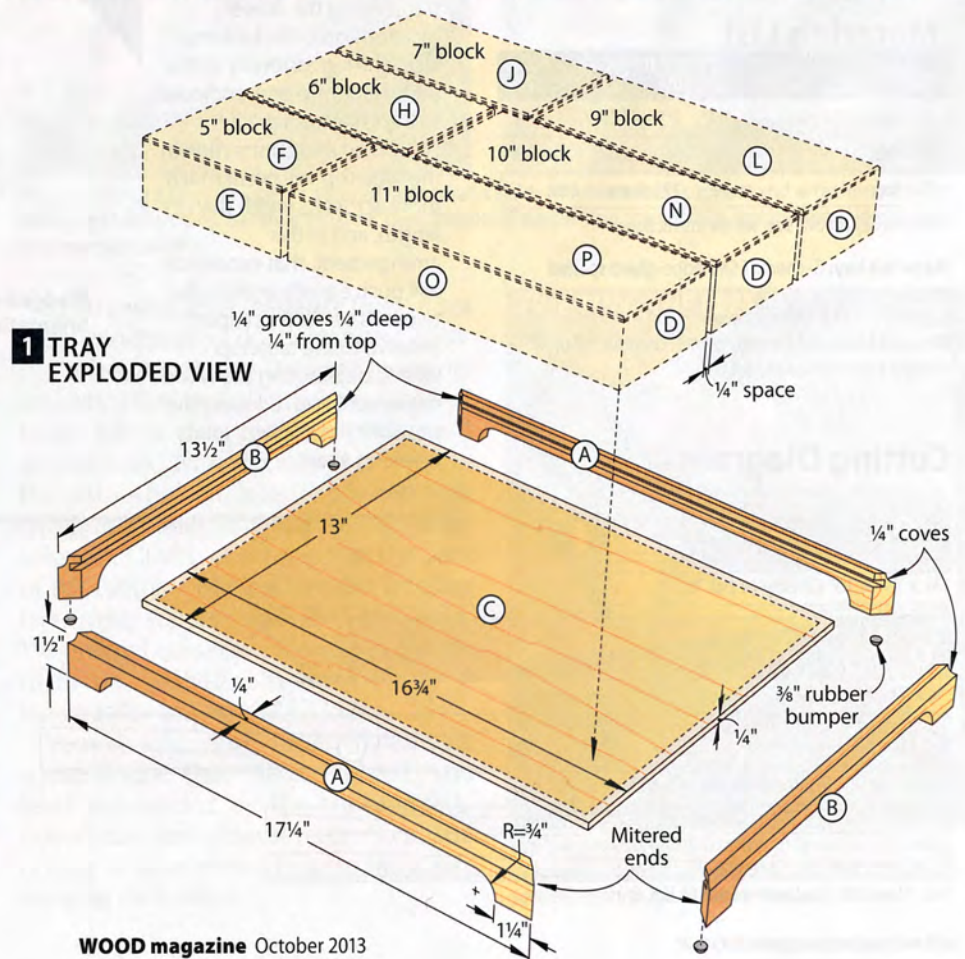
1 From ½" Douglas fir (we used quartersawn stock for stability), cut the tray sides (A) and ends (B) 1" longer than the sizes listed [Materials List, page 35]. With an auxiliary extension and stop-block attached to your miter gauge to ensure identical lengths, miter-cut the parts to the finished lengths.

2 Using your table-mounted router, rout a ¼" cove along the top edge of the tray sides (A) and ends (B) [Drawing 1].

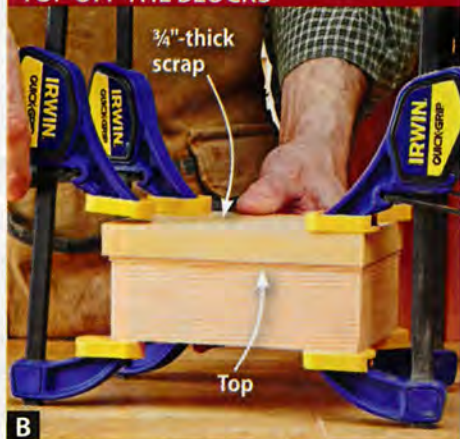
GLUE AND TAPE THE TRAY TOGETHER



A Apply glue in the grooves in the tray sides (A) and ends (B) and to the mitered ends. Assemble the tray, taping the corners tight.



TOP OFF THE BLOCKS



B Center the oversize top on the glued top edges of the musical block. Clamp together, adding a 3/4" piece of scrap to distribute the pressure.

3 Lay out the cutouts along the bottom edge of the sides (A) and ends (B) [Drawing 1]. Bandsaw just outside the lines; then, sand to the lines.

4 Using a dado blade in your tablesaw, cut the grooves on the inside faces of the tray sides (A) and ends (B) [Drawing 1].

5 From 1/4" plywood, cut the bottom (C) to size. Then, sand the tray parts to 220 grit, and assemble the tray [Photo A].

Now knock out the blocks

1 From 3/8" stock, cut four 1 7/8x15" blanks for the musical block ends (D) and six 1 7/8x18" blanks for the block sides (E, G, I, K, M, and O) [Cutting Diagram, Drawing 2].

2 Now miter-cut three 4"-long ends (D) from each 15"-long blank. Pair off the 18"-long blanks. Then, miter-cut the 5" sides (E) and 11" sides (O) from the first pair, the 6" sides (G) and 10" sides (M) from the second pair, and the 7" sides (I) and 9" sides (K) from the remaining pair.

3 Assemble the 5" musical block using two ends (D) and 5" sides (E) as shown in the **Shop Tip**, above right. Repeat to assemble the ends and sides for the 6" block (D, G), 7" block (D, I), 9" block (D, K), 10" block (D, M), and 11" block (D, O).

4 From 1/8" stock, cut the tops (F, H, J, L, N, and P) 1/8" wider and longer than the sizes listed in the **Materials List**.

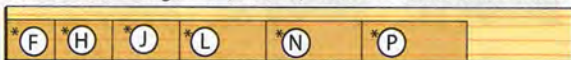
Cutting Diagram



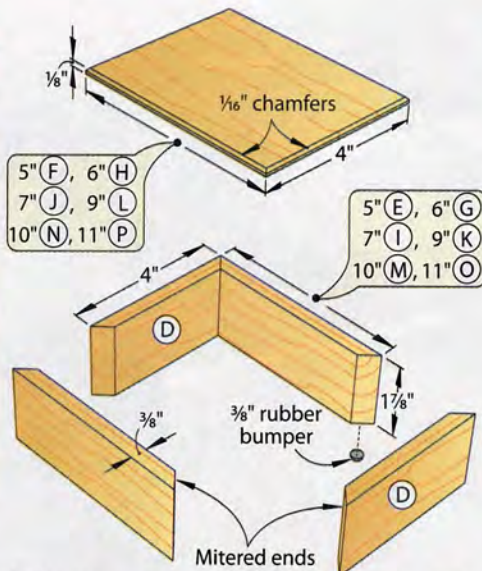
1/2 x 3 1/2 x 36" Douglas fir (.5 bd. ft.)



1/2 x 5 1/2 x 96" Douglas fir (2 bd. ft.) *Plane or resaw to the thicknesses listed in the Materials List.



1/2 x 5 1/2 x 60" Douglas fir (1.3 bd. ft.)



2 MUSICAL BLOCK EXPLODED VIEW

Safety Tip: To safely plane stock less than 1/4" thick, adhere it to a flat 3/4"-thick carrier board with double-faced tape.

5 Apply glue to the top edges of the 5" block (D/E). Glue the oversize 5" top (F) to the block with an equal overhang all around [Photo B]. Glue the remaining tops (H, J, L, N, and P) to their blocks. After the glue dries, sand the ends and edges of the tops flush with the blocks. Sand 1/16" chamfers around the tops.

The grand finale

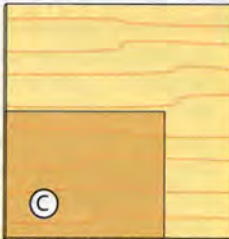
1 To make "drumsticks" for playing the blocks, cut two 10"-long pieces from a 3/8"-diameter dowel.

2 Finish-sand all parts to 220 grit and remove the dust. Then, apply a finish. We sprayed on three coats of satin aerosol polyurethane.

3 After the finish dries, apply a 3/8"-diameter cabinet-door bumper under each corner of the tray and musical blocks [Drawings 1 and 2]. (Raising the blocks slightly above the tray with the bumpers enhances the sound.)

4 Finally, place the blocks on the tray, hand the sticks to a child, and let the excited rapping begin. 🌲

Written by **Owen Duvall**
Produced by **Lucas Peters**
with **Kevin Boyle**
Project design: **Kevin Boyle**
Illustrations: **Lorna Johnson**

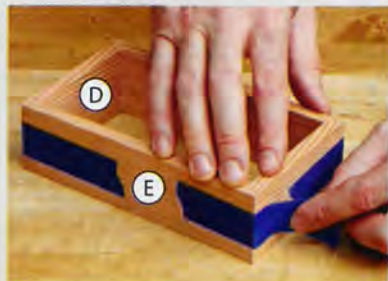


1/4 x 24 x 24" Plywood

SHOP TIP

Small box glue-up made easy

Gluing and clamping small boxes with tight mitered corners can be tricky. Here's a simple, fast, and clamp-free way to get it done. Using the 5" musical block, for example, lay end to end an end (D), 5" side (E), another end (D), and the remaining 5" side (E) with their inside faces down. Apply masking tape across the snug joints. Flip the parts over, then apply glue to the mitered ends. Now close up the block and tape the remaining corner.



Materials List

Part Tray	FINISHED SIZE			Matl.	Qty.
	T	W	L		
A* sides	½"	1½"	17¼"	F	2
B* ends	½"	1½"	13½"	F	2
C bottom	¼"	13"	16¾"	P	1
Musical blocks					
D* ends	⅜"	1⅞"	4"	F	12
E* 5" sides	⅜"	1⅞"	5"	F	2
F* 5" top	⅛"	4"	5"	F	1
G* 6" sides	⅜"	1⅞"	6"	F	2
H* 6" top	⅛"	4"	6"	F	1
I* 7" sides	⅜"	1⅞"	7"	F	2
J* 7" top	⅛"	4"	7"	F	1
K* 9" sides	⅜"	1⅞"	9"	F	2
L* 9" top	⅛"	4"	9"	F	1
M* 10" sides	⅜"	1⅞"	10"	F	2
N* 10" top	⅛"	4"	10"	F	1
O* 11" sides	⅜"	1⅞"	11"	F	2
P* 11" top	⅛"	4"	11"	F	1

*Parts initially cut oversize. See the instructions.

Materials key: F—Douglas fir, P—plywood.

Supplies: Double-faced tape; 3/8"-diameter dowel, 36" long; 3/8"-diameter cabinet-door bumpers (28).

Blade and bit: Dado blade set; 1/4" cove router bit.

More Resources

- Learn how to make a cheap and portable drum sander for sanding curves at: woodmagazine.com/drillsand
- Find more fun toys for kids at: woodmagazine.com/toysandgames



Bedroom set finale

Blanket chest

A family heirloom for decades to come

Approximate materials cost: \$125
Dimensions: 25½"H × 46½"W × 25½"D

This cinch-to-build, budget-friendly project completes the bedroom set shown *top right* that includes a bed in issue 218 (May 2013), nightstand and dresser (issue 219, July 2013), and lingerie chest (issue 220, September 2013). (If you don't have those issues, see **More Resources** on *page 40* to obtain plans.) All the pieces share similar construction methods to simplify building two or more of them.

First, make the legs, rails, and stiles

1 Laminate blanks for four legs (A) slightly wider and longer than the finished sizes shown in the **Materials List**, *page 40*. Trim them to size, select the best faces to face out, and mark the tops of the legs to show their orientation in the project. Bandsaw the tapers [**Drawing 1**] and sand them flat.

2 From ¾" stock, cut to size the stiles (B), side top rails (C), side bottom

rails (D), front/back top rails (E), front/back bottom rails (F), and front/back center stiles (G) [**Materials List**].

Quick Tip! Plane a 12"-long piece to the same thickness as these parts to use later when setting up to cut tenons.

In one edge of each piece, mill a centered groove to fit the ¼" plywood panels [**Photo A, Drawing 1**]. The center

stiles require grooves in both edges [**Drawing 2**].

Quick Tip! Use a featherboard to ensure clean and consistent-width grooves. Buy a commercially made one or make your own as shown at woodmagazine.com/featherboard.

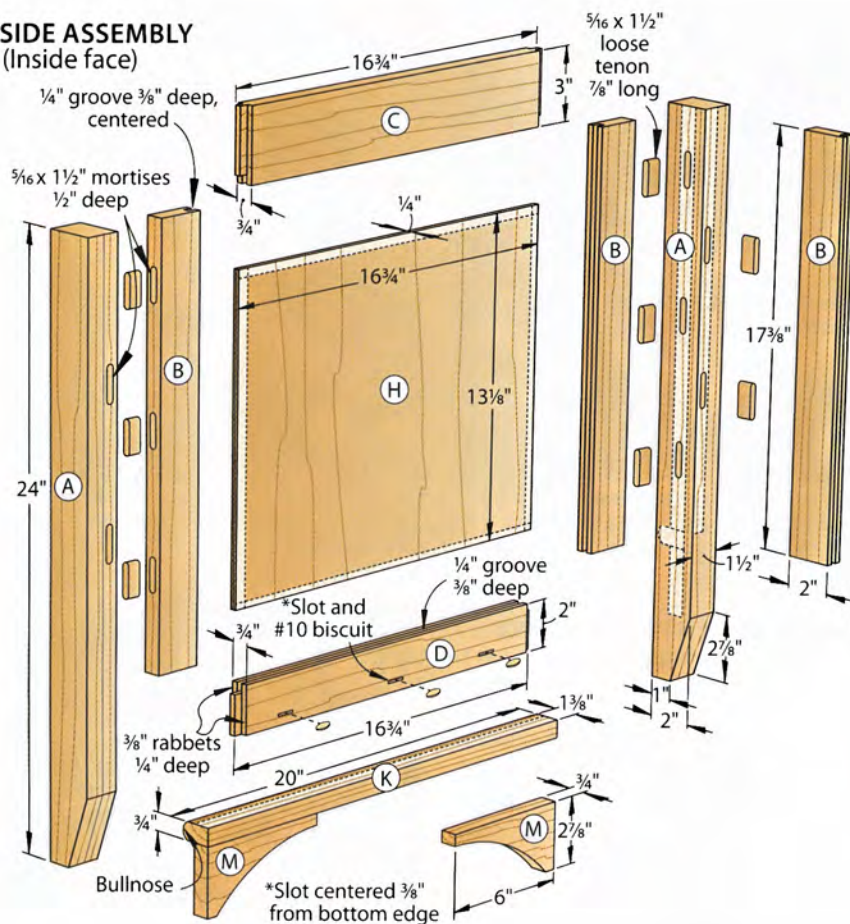
3 In your tablesaw, set up a ⅜" dado blade ¼" above the saw table, and attach an auxiliary face to the rip fence.

Go green when choosing poplar

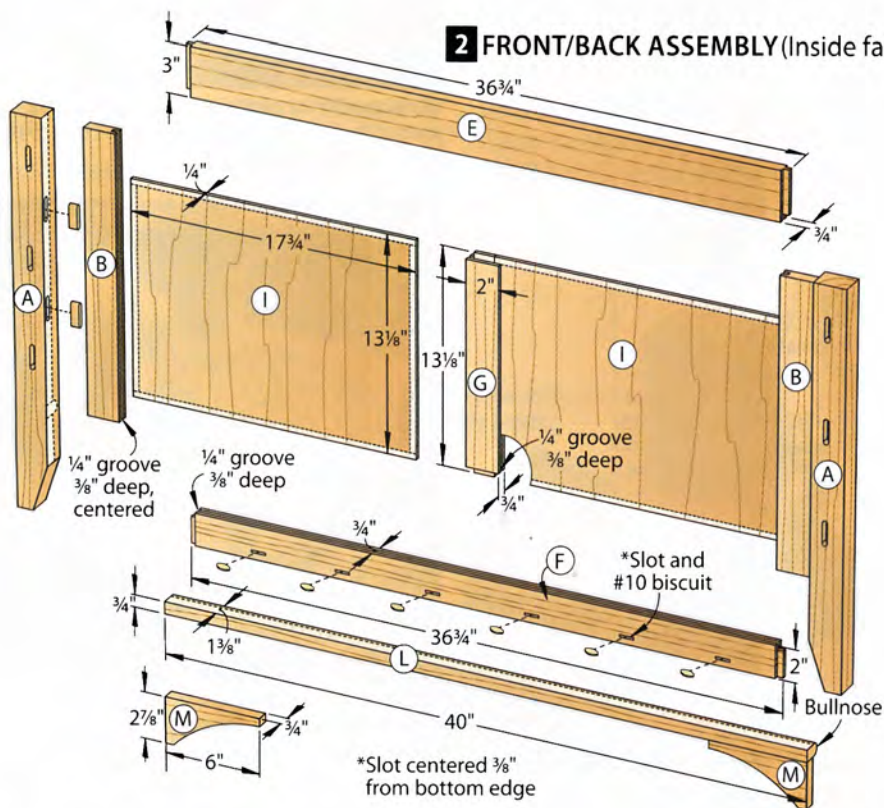
Poplar boards vary greatly in the amount of green-tinted heartwood and white-tinted sapwood they contain. For stained projects, such as this blanket chest, choose heartwood boards. In our shop trials—see the results at *right*—we found that green boards stained more evenly with less blotching than the white ones, making it easier to match the color of the green boards to the maple-plywood panels.



1 SIDE ASSEMBLY (Inside face)



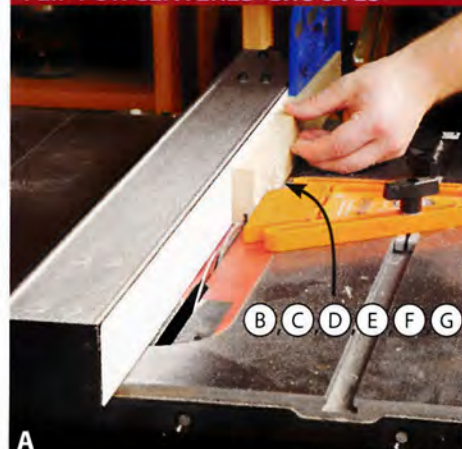
2 FRONT/BACK ASSEMBLY (Inside face)



Retrieve the scrap you planed earlier with the rails and stiles, and cut a 3/8"-long tenon on one end and test the fit in a stile. Make any needed adjustments;

then cut tenons on the ends of the rails (C, A, E, F) and front/back center stiles (G) to fit the grooves you previously cut [Photo B, Drawing 3].

FLIP FOR CENTERED GROOVES

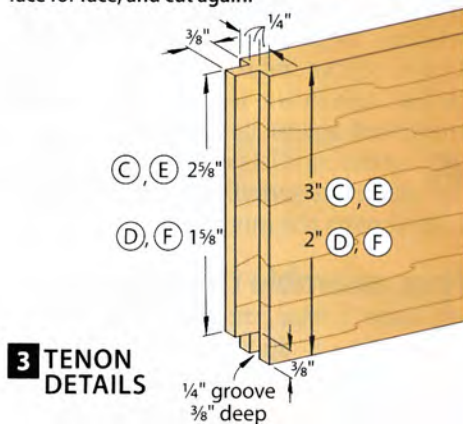


Cut grooves in the rails and stiles by making a 3/8"-deep ripcut to either side of center. Flip the piece end for end and make a second rip.

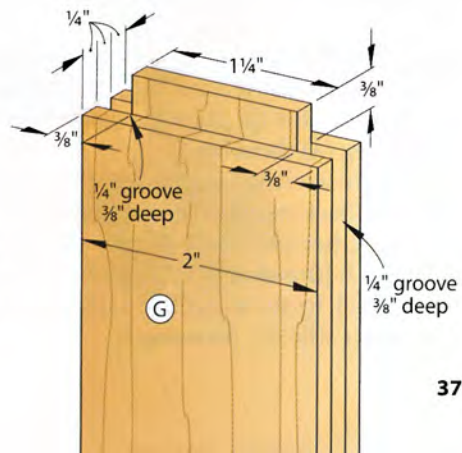
DO THE TENON TWO-STEP



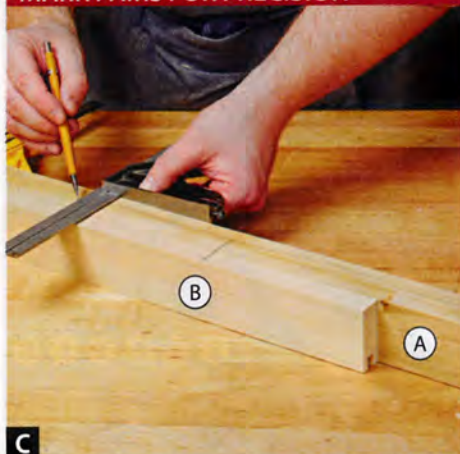
Adjust an auxiliary wood rip fence to just touch the dado set. Cut one side of the tenon, flip the piece face for face, and cut again.



3 TENON DETAILS



MARK PAIRS FOR PRECISION



C Clamp together adjacent legs and stiles with their tops flush; then, use a square to mark the centerlines of mating mortises.

4 Position on your bench the legs (A) and stiles (B) in their ultimate orientation. Mark mortise locations on these pieces [Drawing 4].

Quick Tip! To ensure that the mortises in the legs and stiles line up precisely, mark mating pieces at the same time [Photo C].

5 Build the self-centering loose-tenon-joinery jig described on page 52 in *WOOD*® issue 218 (May 2013) (download the free article at woodmagazine.com/218loosetenon). Cut a $\frac{3}{4} \times 1\frac{1}{2} \times \frac{1}{16}$ " opening in its top. Outfit your plunge router with a $\frac{5}{16}$ " upcut spiral bit and $\frac{3}{4}$ " guide bushing. Modify the jig with a $\frac{1}{4}$ " spacer as shown in **Photo D**, and cut the three mortises in the face of the legs (A) that will face the side assemblies. Then, swap in a $\frac{3}{4}$ " spacer and rout the two mortises in the faces of the legs (A) that face the front/back assemblies [Photo E].

6 Cut the mortises in the stiles (B)—no spacers required; the jig automatically centers the mortises.

Now assemble the carcase

1 From poplar cutoffs, make twenty $\frac{3}{16} \times 1\frac{1}{2} \times \frac{7}{8}$ " loose tenons using the methods described in the jig article mentioned in **Step 5** above. Make the tenons a hair thick and sand them for a snug fit.

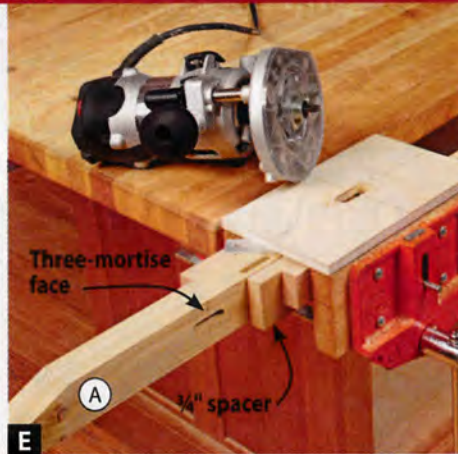
2 After dry-assembling to check the fit, glue loose tenons into the mortises in each stile (B), then glue two stiles to each leg (A) [Drawing 1].

3 Cut to size the side panels (H) and front/back panels (I) [Materials List]. Glue together each side panel with its rails (C, D) [Drawing 1]. Glue each front/back panel to its adjoining rails (E, F) and center stile (G) [Drawing 2].

SPACERS HELP ROUT OFF-CENTER MORTISES

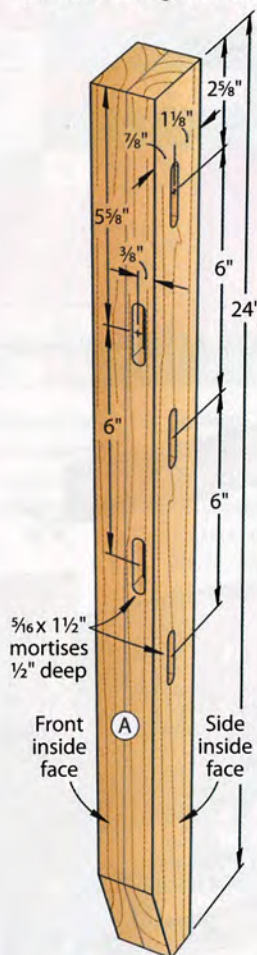


D To offset from center the mortises on the three-mortise face of each leg, position a $\frac{1}{4}$ " spacer against the tapered face of the leg.

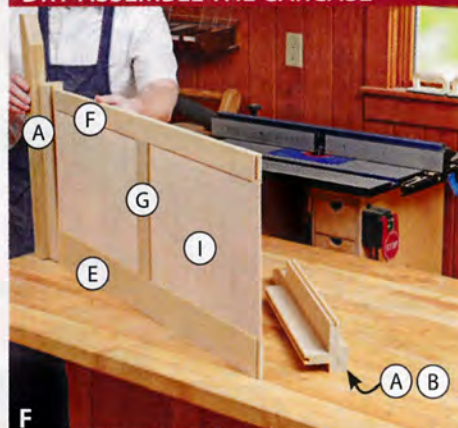


E For the mortises in the adjacent faces, secure the jig to the leg with a $\frac{3}{4}$ "-thick spacer against the three-mortise face.

4 LEG MORTISE LOCATIONS (Front left leg shown)



DRY-ASSEMBLE THE CARCASE



F Working with the parts upside down keeps the top ends of the legs (A) and the edge of the top rail (E) flush during assembly.

MARK BOTTOMS-UP BISCUIT SPOTS



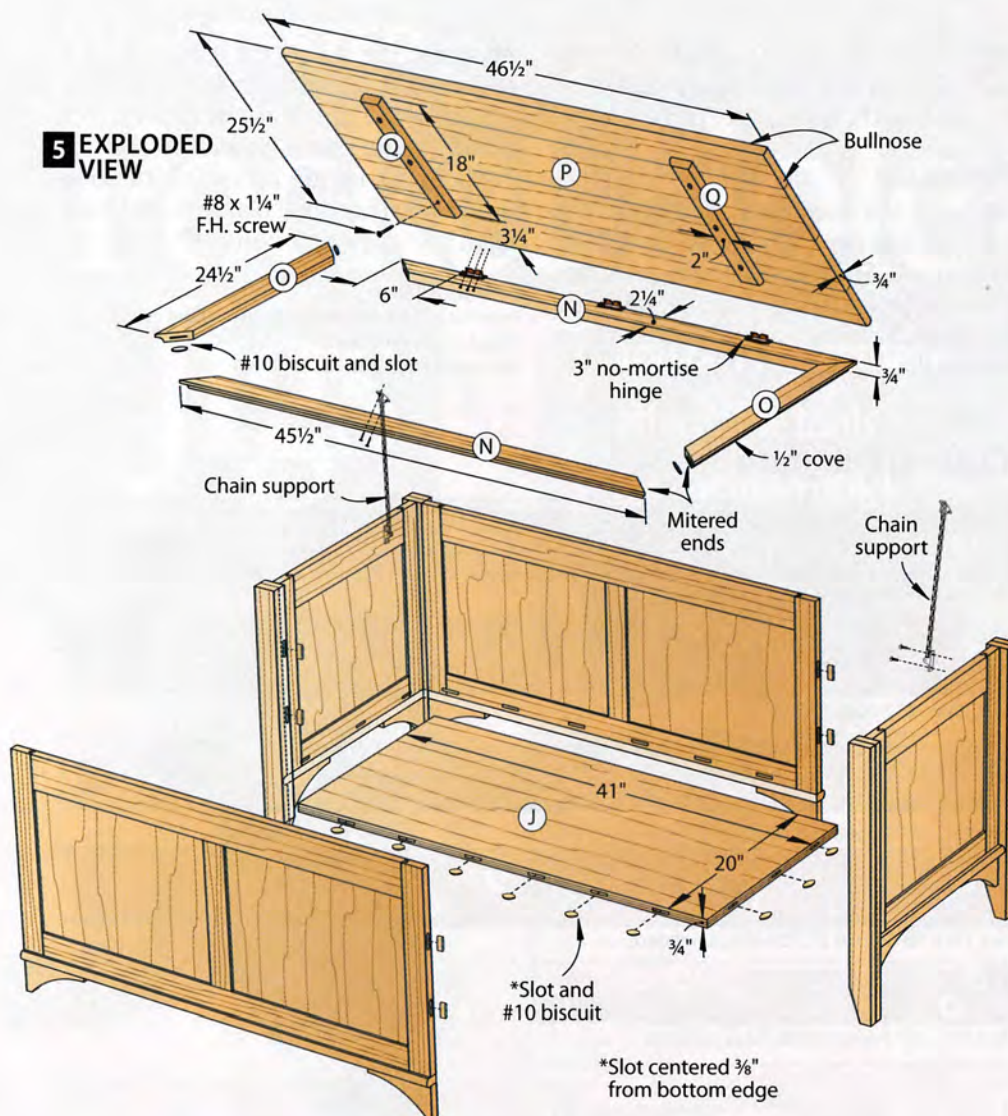
G With a square and pencil, mark across the bottom (J) and adjoining rails about every 6" to locate biscuit cuts.

4 Dry-fit the leg/stile assemblies (A/B) to the front/back assemblies (E/F/G/I) [Photo F]. Tie the front/back assemblies together with the side assemblies (C/D/H), clamp the fit-up, and check it for square. Then, measure the opening for an exact fit of the bottom (J).

5 Cut the bottom (J) to size. Set it in place, using spacers to support it

flush with the bottom rails (D, F). Then mark the bottom and bottom rails for biscuit locations [Photo G, Drawing 5].

6 Disassemble the chest and cut slots in the bottom and rails for #10



COVE-CUT THE LID TRIM



Using pushblocks for safety, cut the cove to within $\frac{1}{16}$ " of full depth. You'll clean up the remaining material after gluing up the trim assembly.

MITER THE LID TRIM



To ensure opposing lid trim pieces are the same length, for the second cut use a stopblock clamped to a miter-gauge extension.

biscuits. **Note:** If you've not already sanded the panels to 220 grit (it's always a good idea to finish-sand parts as you make them), now's the time to tackle that task.

Quick Tip! Practice a dry-fit with biscuits in the slots before assembling the chest with glue. This helps you figure out how many clamps you'll need in what lengths, and how to work most efficiently.

After your practice run, reassemble the carcase with glue and biscuits.

7 To make the side bottom trim (K) and front/back bottom trim (L), start with a $\frac{3}{4} \times 4\frac{3}{8} \times 41$ " poplar blank. With a $\frac{1}{2}$ " round-over bit extended $\frac{5}{16}$ " above your router-table top, rout a bullnose profile on both edges. Rip a $1\frac{3}{8}$ "-wide strip off one edge and crosscut that piece to make two side bottom trim (K) pieces. Rout a bullnose profile on the just-sawn edge of the blank, then rip the blank to produce two front/back bottom trim (L) pieces. Glue these pieces to the bottom rails (D, F), trimming them for exact fit [Drawings 1, 2].

8 Make copies of the **Bracket Pattern**, page 41, and use them in cutting eight brackets (M) to shape. Remove the patterns, finish-sand the brackets, and glue them to the bottom trim (K, L) [Drawings 1 and 2].

Time to top it off

1 Cut the lid front/back trim (N) and lid side trim (O) 2" longer than listed [Materials List, Drawing 5]. Rout a partial

$\frac{1}{2}$ " cove profile along one edge of each trim piece [Photo H].

2 Cut miters on the ends of the lid trim pieces (N, O) [Photo I]. Then, cut #10 biscuit slots in the miters and glue together the lid trim assembly [Drawing 5]. Complete the assembly as described in the **Shop Tip**, below.

3 Glue the lid trim assembly (N/O) to the carcase, being careful to align it evenly on all sides.

SHOP TIP

For the lid trim pieces (N, O) rout the cove profile to slightly less than full depth when you make the pieces. Then, after you assemble the trim, complete the cove to full depth with a handheld router, as shown at right. That will cut away any mismatch where the profile meets at mitered corners.



4 From at least four boards, edge-glue the lid (P) about 1" wider and longer than specified in the **Materials List**. Cut the lid to size and rout a bullnose profile along its edges as done earlier on the bottom trim (K, L).

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CHESTNUT
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J Here's the pigment mix for the custom stain color based on a sample we created.

Materials List

Part	FINISHED SIZE			Matl.	Qty.
	T	W	L		
A legs	1½"	2"	24"	LP	4
B stiles	¾"	2"	17½"	P	8
C side top rails	¾"	3"	16¾"	P	2
D side bottom rails	¾"	2"	16¾"	P	2
E front/back top rails	¾"	3"	36¾"	P	2
F front/back bottom rails	¾"	2"	36¾"	P	2
G front/back center stiles	¾"	2"	13½"	P	2
H side panels	¼"	16¾"	13½"	PL	2
I front/back panels	¼"	17¾"	13½"	PL	4
J bottom	¾"	20"	41"	PL	1
K* side bottom trim	¾"	1⅝"	20"	P	2
L* front/back bottom trim	¾"	1⅝"	40"	P	2
M brackets	¾"	2⅞"	6"	P	8
N* lid front/back trim	¾"	2¼"	45½"	P	2
O* lid side trim	¾"	2¼"	24½"	P	2
P* lid	¾"	25½"	46½"	EP	1
Q lid cleats	¾"	2"	18"	P	2

*Parts initially cut oversize. See the instructions.

Materials key: LP-laminated poplar, P-poplar, PL-maple plywood, EP-edge-joined poplar.

Supplies: #10 biscuits (22), #8×1¼" flathead screws (6).

Blade and bits: Dado set, ⅝" upcut spiral, ½" cove, and ½" round-over router bits.

Source

3" non-mortise hinges (3), no. 28704, \$4.59/pair; Chain (2), no. 30663, \$15.39, Rockler, 800-279-4441, rockler.com.

5 Cut the lid cleats (Q) to size. Drill the holes and slots where shown, and screw the cleats to the bottom face of the lid.

Finish up

1 Sand any areas that need it to 220 grit. Remove dust and apply a stain. We used Sherwin-Williams custom-tinted Chestnut BAC Wiping Stain and top-coated with satin-finish lacquer [Photo J].

2 Install the hinges on the lid. Have a helper hold the lid in position while you screw the hinges to the lid trim (N). Install the lid chain [Source] to prevent the lid from falling backward [Drawing 5]. Now, gather your blankets and tuck them into their new home. 🌳

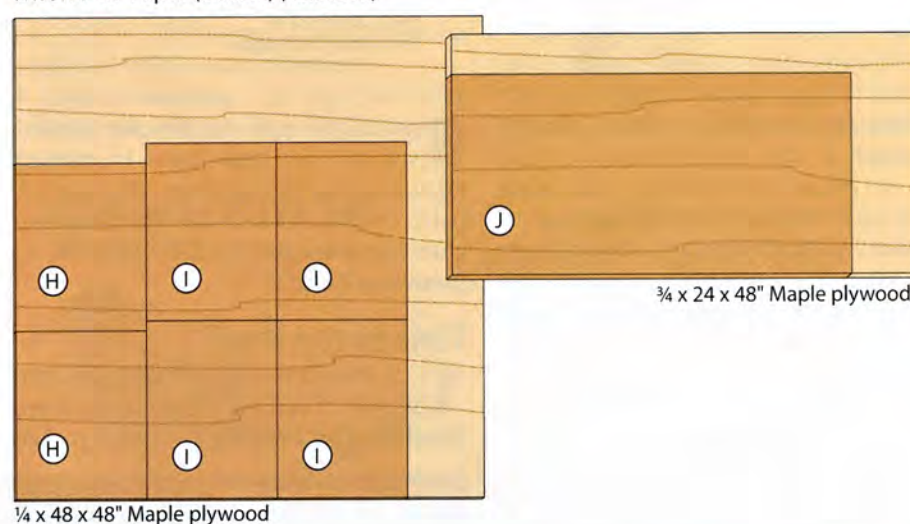
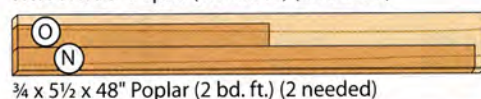
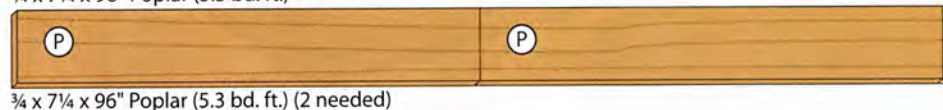
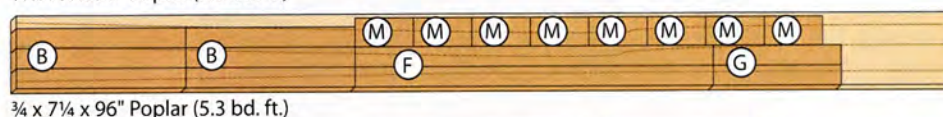
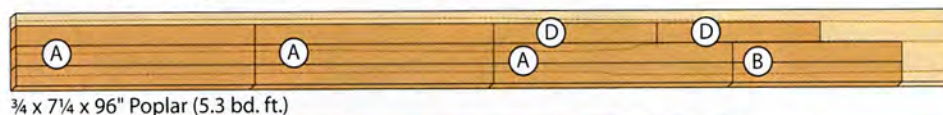
Written by **Bill Krier**

Produced by **Craig Ruegsegger** and **John Olson**

Project design: **Kevin Boyle**

Illustrations: **Lorna Johnson**

Cutting Diagram



More Resources

► To purchase issues 218 (May 2013), 219 (July 2013), or 220 (September 2013) of *WOOD* containing the articles on building the bed, dresser, nightstand, and lingerie chest that match this blanket chest, go to woodmagazine.com/2013issues.

► To purchase a download of just the bed, dresser/nightstand, or lingerie chest articles, go to woodmagazine.com/traditionalbedroom.

► Thinking about lining your chest with cedar? Read this first: woodmagazine.com/aromatic.

► For more bedroom furniture inspiration, visit our reader's gallery at woodmagazine.com/bedrooms.

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October 2013

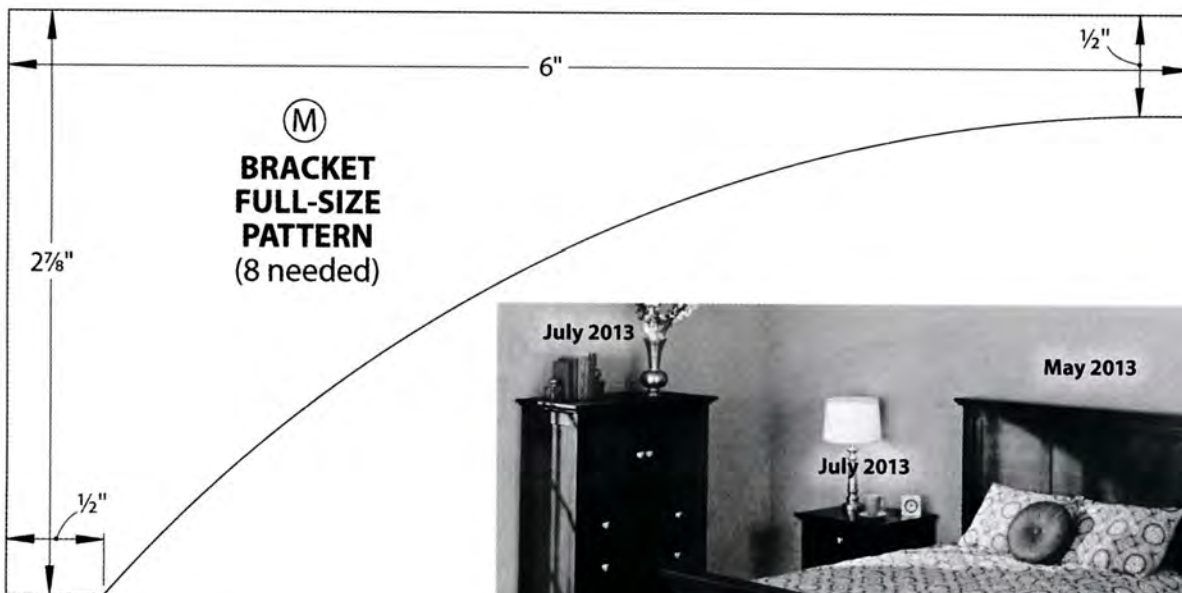
Issue 221

Dear Reader: As a service to you, we've included full-size patterns on this insert for irregular-shaped and intricate project parts. You can machine all other project parts using the Materials List and the drawings accompanying the project you're building.

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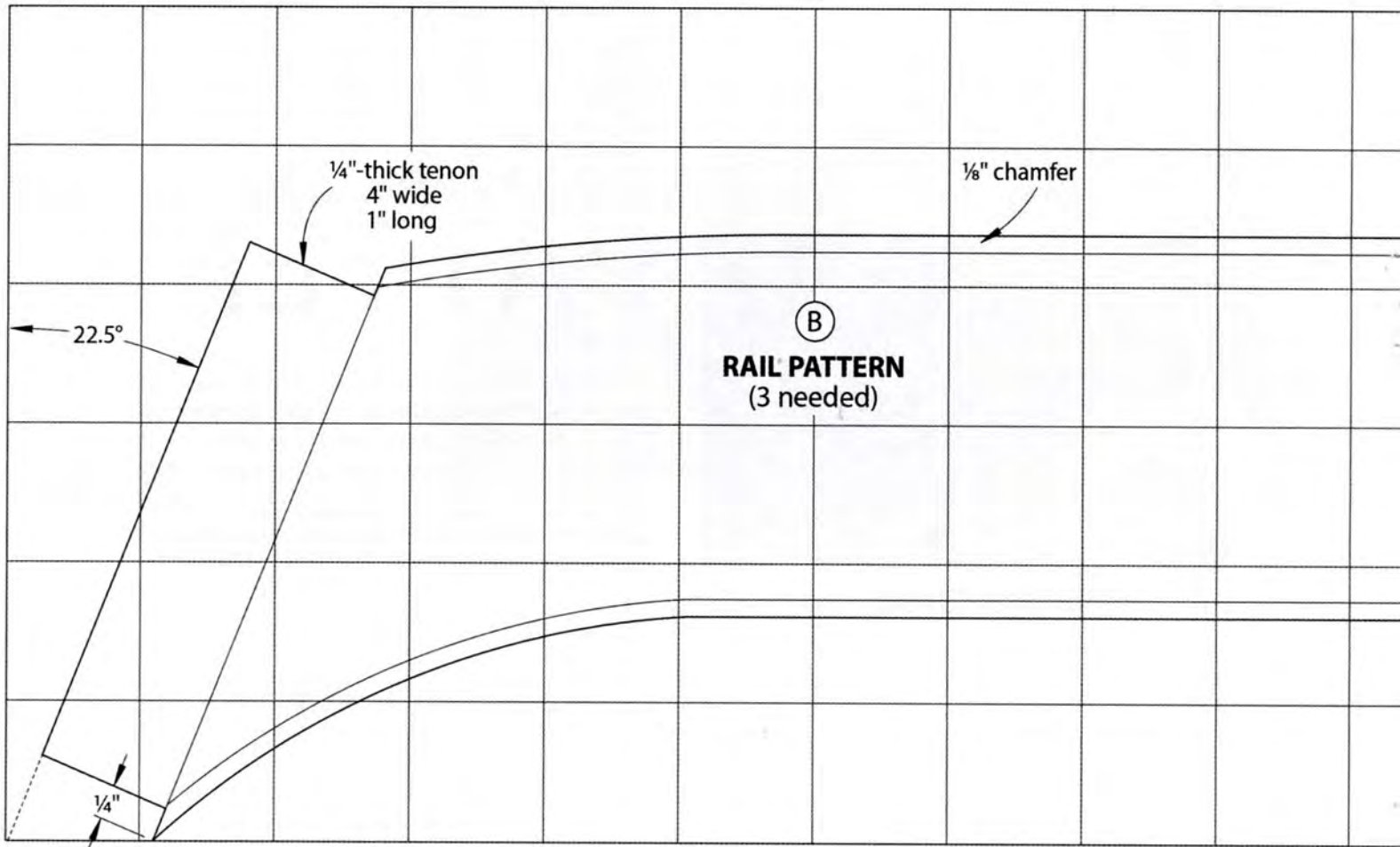


Blanket Chest
Page 36



To purchase WOOD issues 218 (May 2013), 219 (July 2013), or 220 (September 2013) containing the articles on building the bed, dresser, nightstand, and lingerie chest that match the blanket chest, go to woodmagazine.com/2013issues.

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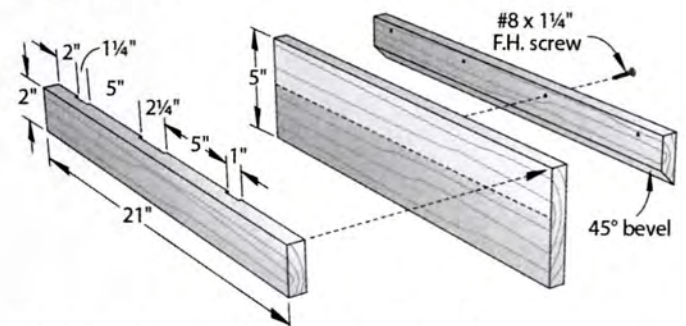


Accent Table
Page 30

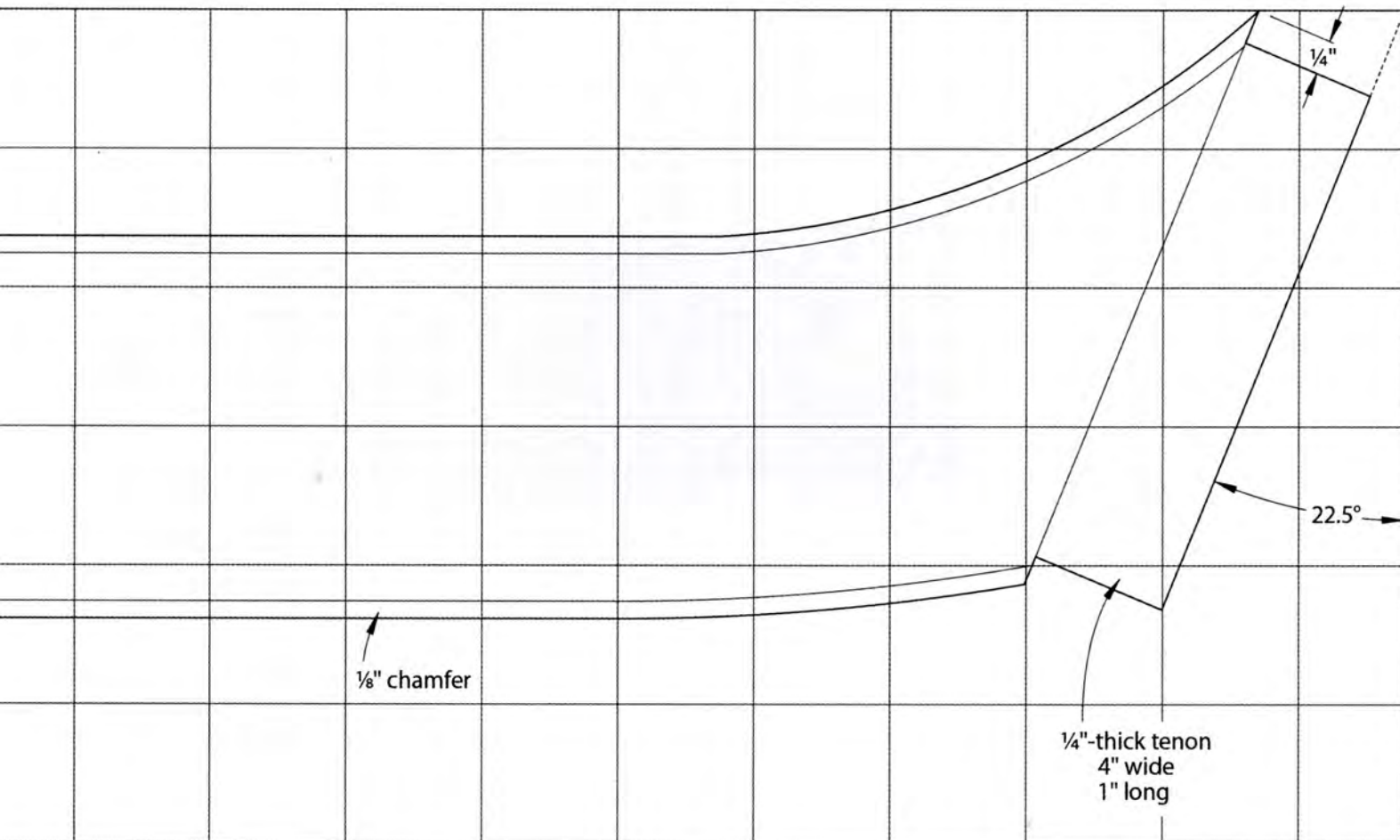


Additional Tool Rack Plans for the Workcenter

SQUARE RACK

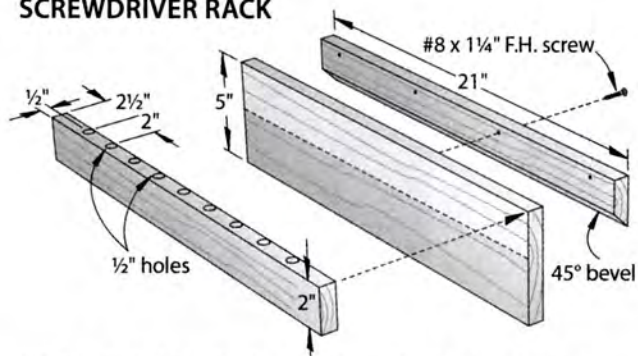


NOTE: Cut the square-holding dadoes on your tablesaw before gluing the parts together. Vary the dado width and spacing to suit your squares.



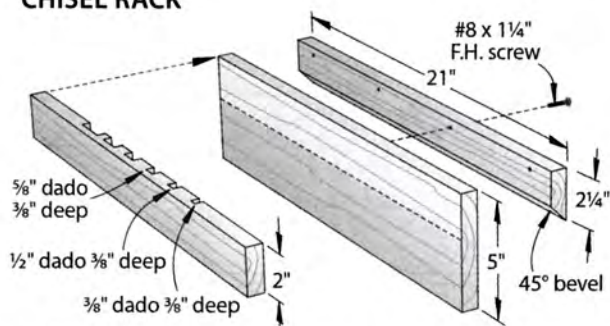
Square=1"
Scale 130% for
Full-Size Pattern.

SCREWDRIVER RACK



NOTE: Drill the holes for the screwdriver shanks after gluing up the three boards. Vary the hole size and spacing to suit your screwdrivers.

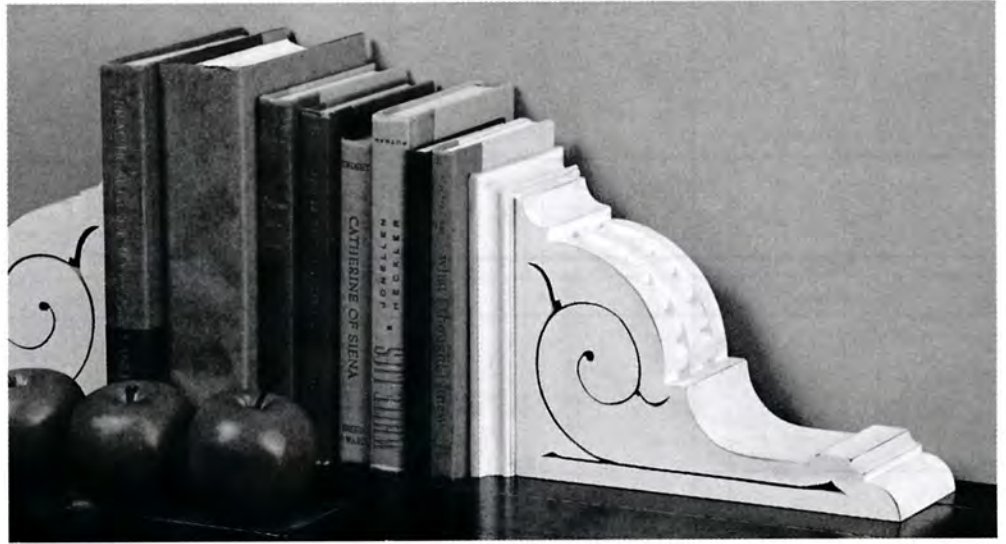
CHISEL RACK



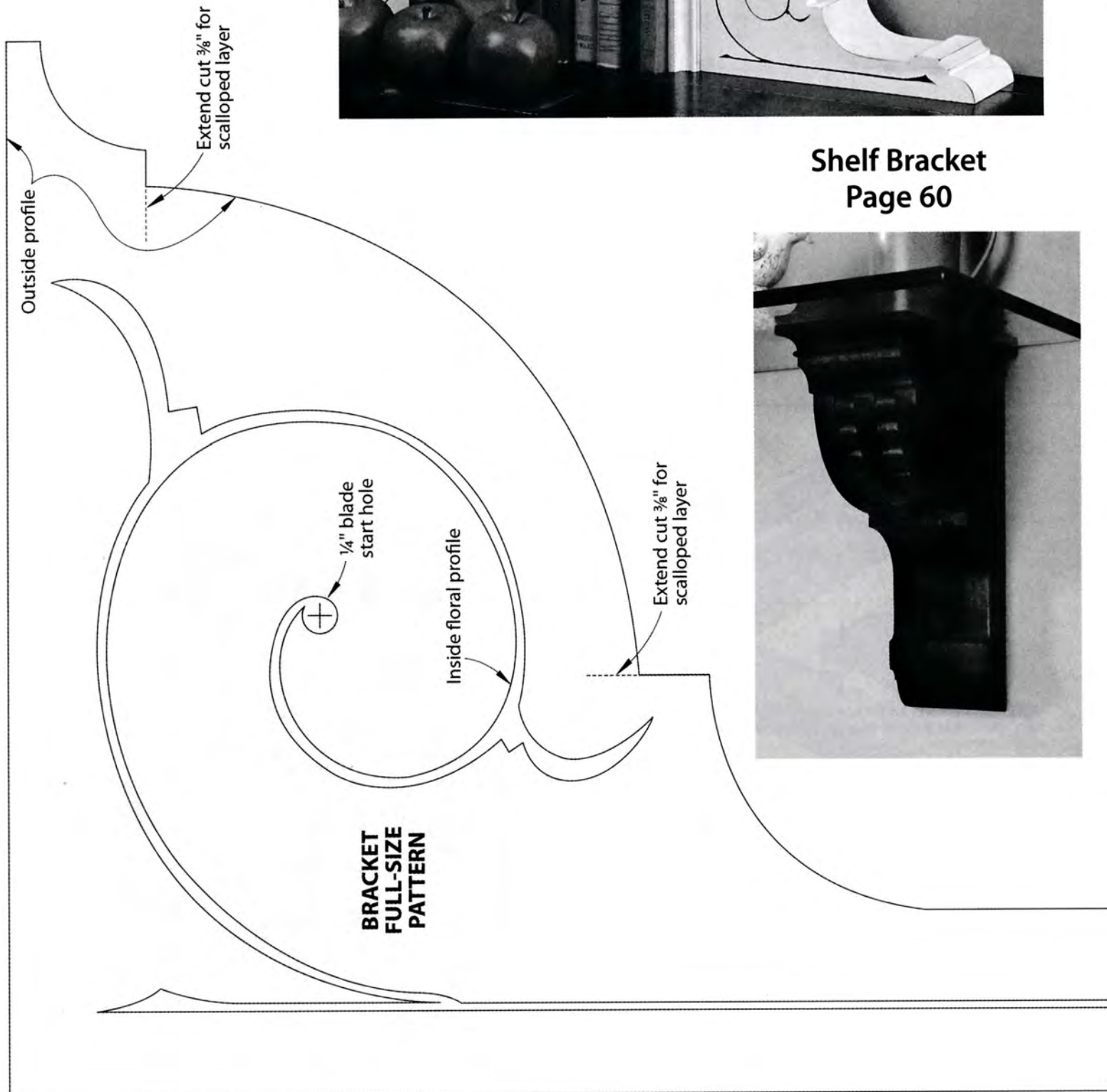
NOTE: Cut the chisel-holder dadoes on your tablesaw before gluing the parts together. Vary the dado width and spacing to suit your chisels.



Built-to-last Workcenter
Page 24



Shelf Bracket
Page 60



SHOP TESTED

Pocket-Hole Jigs

You can't beat these affordable tools for creating quick, rock-solid joints.



Three "S" words describe pocket-hole joinery: simple, speedy, and strong. After using a jig, such as the one shown at *left*, to bore angled holes, you drive screws to join the mating pieces. That's it! (For more details on how a pocket-hole jig works and tips for using one, read the article on *page 14*.) The screws and the holes that house them typically hide on the inside or back side of a project. Pocket-hole joints excel on cabinet face frames, and they're also a great choice for carcass assemblies, dust-panel frames, drawer boxes, and picture frames.

The jigs for making pocket holes with a drill range in price from \$15 to \$200, so you might wonder how much jig you really need and which ones work best. We tested 10 widely available jigs, and here's what we learned.

What to look for in a jig

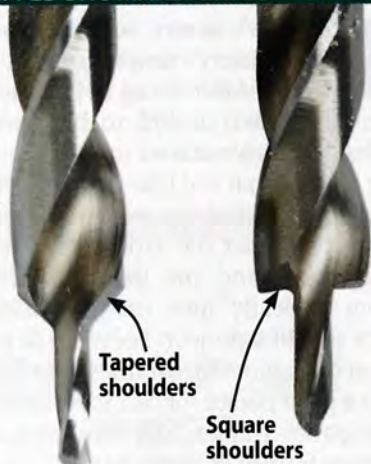
► **Dependable drill guides.** The heart of each jig is one or more tubes that guide the bit for drilling holes at about a 15° angle. Most jigs use steel guides for long life, but aluminum guides in the Craftsman 29133 and essentially identical General Tools E-Z Pro Deluxe 850 wore away during testing, as evidenced by metal shavings in the wood dust, even after boring multiple holes. The Drill Master 96264, despite having steel guides, also continued to produce fine shavings.

All but the Kreg Mini jig have at least two drill guides, allowing you to bore more than one hole without repositioning the jig. The Drill Master, Porter-Cable 560 Quik-Jig, and Steelex D1060 have variable spacing, letting you adjust the guides to best suit your workpiece's width. Three fixed guides on Kreg's K4MS give you three spacing options with each placement of the jig. All the jigs except Kreg's Mini let you drill two pocket holes in 1½"- and 2"-wide stock—the two most common widths for cabinet face frames—without repositioning the jig.

We prefer jigs with centerlines marked on the guides for quickly aligning workpieces before clamping and drilling. All but the CMT PPJ-002, Craftsman, and General Tools jigs have this feature.

► **Clean-cutting bits.** All the tested jigs use a stepped drill bit, similar to those shown on *page 46*, that bores both a pocket for the screwhead and a smaller pilot hole for the shank, leaving a shoulder for the screwhead to snug against. A stop collar, secured by a setscrew, limits

STEPPED BITS MAKE PERFECT POCKETS



Craftsman's tapered bit works best with flathead screws. All the other jigs use a bit that bores a square shoulder for the washer-head screws.

the bit's drilling depth based on the workpiece thickness. All the provided stop collars maintained depth without slipping, but the Kreg and Porter-Cable models were easiest to set.

In our testing, the supplied bits from Kreg, Porter-Cable, and Sommerfeld Tools cut cleanest over the greatest number of holes. The Craftsman, General Tools, and Drill Master bits dulled noticeably while drilling 40 holes, causing workpiece tear-out, shown at *top right*. Only the Steelex jig comes without a bit; buy one separately for \$11, but it does not include a stop collar. (Any bit from the other jig-makers would also work.)

► **Simple thickness adjustments.** Most woodworkers use pocket-hole screws

CAN'T-MISS BIT-DEPTH SETTING



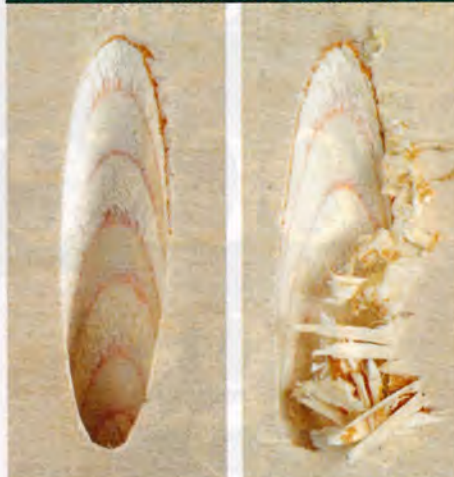
To precisely set the stop collar for the Kreg R3 jig, place the bit in the case's holder, slide the collar to the workpiece thickness, and tighten the setscrew.

primarily with $\frac{3}{4}$ "-thick material, and we were able to create tight joints in $\frac{3}{4}$ " stock with all the test models. Six models, though, can make pocket holes in $\frac{1}{2}$ " stock. All tested jigs make pocket holes in $1\frac{1}{2}$ "-thick material as well, but with the Craftsman and General Tools jigs you can't center the screw's exit point on the workpiece's thickness, resulting in weaker joints.

Porter-Cable's jig has a unique, goof-proof adjustment for workpiece thickness, shown on the *next page*. With the Sommerfeld 31PC jig, you swap the $\frac{3}{4}$ " drill guide for a $1\frac{1}{2}$ " guide; there's no adjustment for workpiece thicknesses inbetween.

► **Ease of clamping.** The jigs that come with a built-in clamp—Drill Master,

BETTER BITS MAKE CLEANER HOLES



After 40 holes, a Kreg bit made the left pocket hole in veneered plywood. But after equal testing, the Drill Master bit caused substantial tear-out (right).

Kreg K4MS, Porter-Cable, and Sommerfeld—work best as benchtop jigs where you bring the workpiece to the jig. CMT's jig comes in two parts (drill guide and clamp) that must be mounted to a board. Among those five better-for-benchtop jigs, all but the Porter-Cable require loosening a jam nut before threading the clamp face in or out—a fussy, trial-and-error process. All clamp securely once adjusted. Workpiece supports on the Kreg and Porter-Cable jigs have stops for repeatable workpiece positioning.

Should you ever need to drill pocket holes in an assembled or built-in project, the Kreg R3 and K4MS and Sommerfeld jigs work best. The K4MS comes with a

CMT PPJ-002, \$90

888-268-2487, cmtusa.com



Craftsman 29133, \$40

800-549-4505, craftsman.com



General Tools E-Z Pro 850, \$50

800-697-8665, generaltools.com



Drill Master 96264, \$70

800-444-3353, harborfreight.com



PUSH TO ADJUST, TWIST TO LOCK, DONE!



With the Porter-Cable Quik-Jig's clamp locked, you insert your workpiece, push down on the adjustment knob until the drill guide contacts the board, and then twist the knob to lock in the setting. After drilling, release the clamp lock to change workpieces.

holder into which you slip the drill guide, effectively making it a larger version of the R3 jig. The Kreg R3 does not come with a clamp, but secures to a workpiece easily with a common one-hand bar clamp or Kreg's locking-pliers clamp. Sommerfeld's drill guides also work like the R3 when removed from the jig.

More difference-makers

► **Driver bits.** We prefer a 6"-long bit for driving the square-drive screws in pocket holes, because 3" driver bits can cause the drill's chuck to contact and mar the workpiece. A 3" bit does prove

handy, though, for driving screws in tight surroundings. The Kreg K4MS, Porter-Cable, and Sommerfeld jigs come with both bits; the CMT, General Tools, and Kreg R3 jigs have just a 6" bit. The other jigs come without a driver bit.

► **Optional drill guides.** Kreg sells specialized drill guides that fit into the K4MS jig so you can better match the pocket-hole and screw size to the material thickness. For example, the Micro guide works with 1/2"-thick stock and comes with a smaller drill bit and screws. And the HD guide works with 1 1/2"-thick stock, using a larger-diameter bit and screw. (See the photo at right.)

MATCH THE SCREW TO THE JOB

Micro screw (1/2" stock)



Regular screw (3/4-1 1/2" stock)



HD screw (1 1/2" stock)



Kreg Mini, \$20

800-447-8638, kregtool.com



Kreg R3, \$40

800-447-8638, kregtool.com



Kreg K4MS Master System, \$140

800-447-8638, kregtool.com



PICK A POCKET-HOLE JIG FOR PRECISE, QUICK JOINERY

BRAND	MODEL	PERFORMANCE RATINGS (1)										JIG BODY MATERIAL (3)	WORKPIECE THICKNESS RANGE, INCHES	CLAMP STYLE (4)	DRILL GUIDES			
		PRIMARY								SECONDARY					NUMBER OF GUIDE HOLES	MATERIAL (3)		
		EASE OF ADJUSTING DRILL GUIDE FOR WORKPIECE THICKNESS	EASE OF ALIGNING WORKPIECE	QUALITY OF CUT		DURABILITY		EASE OF CLAMPING		EASE OF CLEARING CHIPS WHILE DRILLING	EASE OF STORING JIG AND ACCESSORIES							EASE OF PLUGGING DRILLED HOLES
				WITH GRAIN	ACROSS GRAIN	DRILL GUIDES	DRILL BIT (2)	TO INDIVIDUAL WORKPIECE	TO ASSEMBLED PROJECT									
CMT	PPJ-002	A-	C	A	A	A	B+	B	NR	A	C	B	C	½-1¾	R	2	S	
CRAFTSMAN	29133	NA	D	C+	C-	C	D	C	C	C	C	C	A	¾-1½	T	2	A	
DRILL MASTER	96264	B+	A	B-	B	B-	D	B	B-	C+	C	B	A	½-1½	R	4	S	
GENERAL TOOLS	E-Z PRO DELUXE 850	NA	D	C+	C-	C	D	C	C	C	A-	C	A	¾-1½	T	2	A	
KREG	MKJKIT MINI	C	B	A	A	A	A	B	B	A	B	A-	C	½-1½	N	1	S	
	R3	A-	A	A	A	A	A	B+	A-	A	A	A-	C	½-1½	N	2	S	
	K4MS MASTER SYSTEM	A-	A	A	A	A	A	B	A-	A	B+	A-	C	½-1½	R	3	S	
PORTER-CABLE	560 QUIK-JIG	A	A	A	A	A	A	A	NR	A	C	A	A, C	½-1½	F	2	S	
SOMMERFELD TOOLS	31PC	B	B+	A	A	A	A	B	A-	B+	C	C	A	¾ and 1½	R	2	S	
STEELEX	D1060	NA	A	C+	C-	C	D*	B	B	C	B	C	S	¾-plus	N	2	S	

1. **A** Excellent
B Good
C Fair
D Poor
 NA Not applicable
 NR Not recommended
2. (*) Optional bit
3. (A) Aluminum
 (C) Plastic or nylon composite
 (S) Steel
4. (F) Front lever clamp
 (R) Rear toggle clamp
 (T) Thumbscrew
 (N) No clamp included
5. (B) Round-shank drill bit with stop collar
 (C) Storage case
 (D) Dust-collection attachment
 (G) Drill guides and bits for smaller- and larger-diameter screws
 (H) Hex-shank drill bit with stop collar
 (L) Locking-pliers clamp
- (M) Material support/stop
 (P) Plugs
 (R) Portable drill-guide holder
 (S) Screws
 (3) 3"-long #2 square-drive bit
 (6) 6"-long #2 square-drive bit
 (*) Stop collar sold separately



Porter-Cable 560 Quik-Jig, \$200

888-848-5175, portercable.com



ACCESSORIES (5)			
HOLE SPACING, INCHES	STANDARD	OPTIONAL	SELLING PRICE (6)
1	B,S,6		\$90
1	B		40
1 1/16 - 3 1/2	B,S		70
1	B,C,P,S,6		50
NA	B	H,L,P,S,3,6	20
1 1/4	B,C,P,S,6	H,L,3	40
7/8, 9/16, 1 1/8	B,C,D,L,M,P,R,S,3,6	G,H	140
3/4 - 1 3/8	B,D,M,S,3,6		200
5/8, 1	B,L,S,3,6		90
7/8 - 2 1/4		B*	15

6. Prices current at time of article production and do not include shipping, where applicable.

We found winners at 3 price points

The heavy-duty and feature-laden Porter-Cable 560 Quik-Jig (\$200) sets itself apart with the quickest, easiest clamping and adjustments for workpiece thickness, one-time depth setting on the drill bit, adjustable guide-hole spacing, a vacuum attachment and chip tray. Those features earn it a Top Tool award. But it's strictly for benchtop use.

The Kreg K4MS Master System (\$140) does all that the Quik-Jig does (with slightly less convenient adjustments), works easily on built-ins and assemblies, and sells for \$60 less, so it shares Top Tool honors. The K4MS creates clean pocket holes accurately and consistently, and comes with more accessories than any other jig. Save even more by buying just the K4 jig (\$100) with a drill bit, 6" driver bit, screw and plug assortment, and case.

Kreg's R3 jig, despite its smaller size, makes pocket holes just as well as the Top Tool jigs, and sells for only \$40. You don't get a clamp, but it works well with most one-hand bar clamps. It's our Top Value.

Produced by **Bob Hunter** with **Steve Feeney**

What comes after the K4? The K5, of course

Kreg will launch its newest pocket-hole jig, the K5, later this year. Among the upgrades from the K4:

- A front-mounted clamp lever and quick-positioning clamp.
- Accessory-storage space in the support extensions.

The K5 will sell for \$140 as shown in the photo at right, excluding the AutoMaxx locking-pliers clamp, a \$30 accessory. We'll test the K5 and report our findings in a future issue of *WOOD*. 🌲



Sommerfeld Tools 31PC, \$90

888-228-9268, sommerfeldtools.com



Steelex D1060, \$15

800-840-8420, woodstockint.com



Built-ins That Blend In

Part furniture, part trim carpentry, built-in cabinets require that you fit square projects into an unsquare world where walls bulge, floors tilt, and ceilings slope. We shadowed two experienced makers and installers of custom cabinetry to bring you simple tips and tricks that will keep your built-in projects (and your sanity) "on the bubble."



CRITICAL DIMENSION: COMFORT



Builder Nelson Hawbaker uses his own sitting position to determine the critical dimension for the height of the knee space in a planned desktop.

Before you build

The design possibilities for built-ins are endless—from bookcases in the den, to a living-room entertainment center, to a set of kitchen cabinets. But even if you know the approximate shape and style of your project, you need to thoroughly survey the built-in's future home before you touch blade to wood in the shop to ensure a perfect fit.

For the initial site survey, you need only a tape measure, pencil, and paper. Your built-in must be designed within the constraints of its location, so your first priority is thoroughly documenting the “critical dimensions”—those inflexible measurements that dictate the shape of the project. In most cases, that means knowing the minimum (narrowest, shortest, shallowest) dimensions. Even the best-built homes are rarely square, level, and plumb to the tolerances you might be used to in woodworking, so take measurements at multiple spots: A wall could present the same measurement at the ceiling and floor level but bulge in the center, surprising you with a narrower-than-expected critical dimension.

Critical dimensions include the locations of windows, outlets, vents, sinks, appliances, and other obstacles. But they can also include design standards for

DESIGN AND BUILD LARGE UNITS IN SMALLER MODULES



Nelson constructed this floor-to-ceiling built-in in eight units to enable delivery through a small entryway as well as onsite assembly. Constructed separately as single units, the face frames hide the seams between the carcasses, unifying the separate components.

desk, seating, and countertop heights, says Nelson Hawbaker, *above left*, owner of Nelson Hawbaker Building of Dallas Center, Iowa.

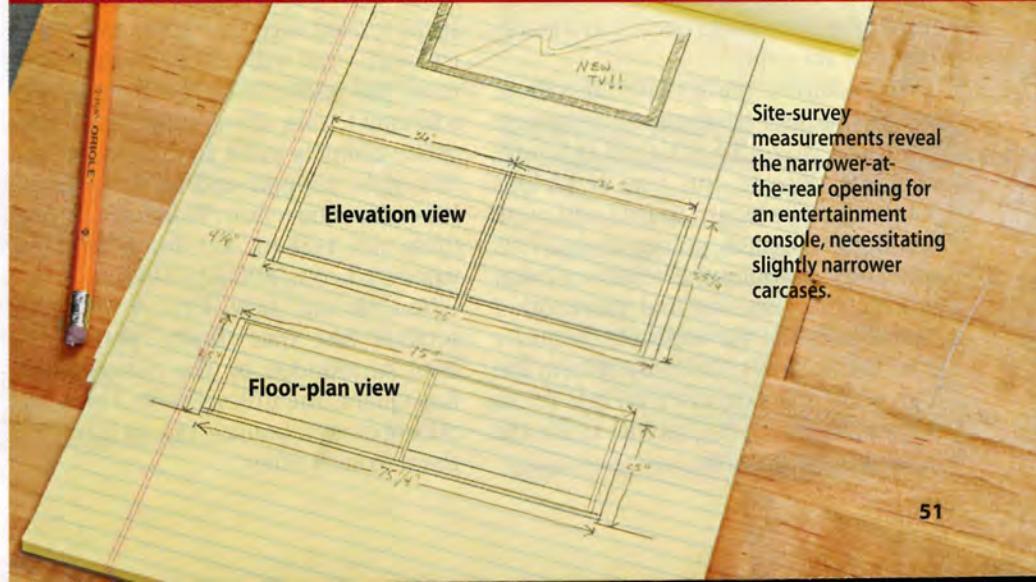
The final critical dimensions are dictated by the overall space of the install location and the path to it from your shop. Although an 8' bookcase may fit through a 7' doorway on its side, it won't stand up under an 8' ceiling without punching a hole through the drywall.

When in doubt, Dave McGrath, owner of Fine Line Woodworks of Bondurant, Iowa (finelinecustomwood.com), makes cardboard mockups that approximate the proposed size and shape of the fin-

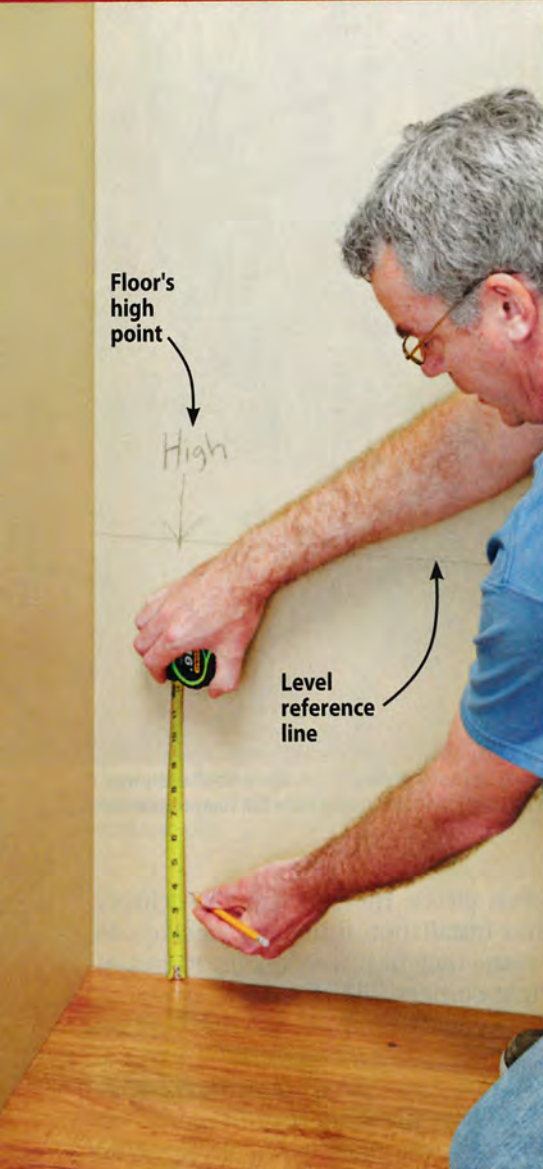
ished pieces. He then tests the delivery and installation using the mockups to ensure they fit through halls, stairways, tight corners, and doorways, as well as in the installation location itself, adjusting dimensions if necessary.

Write your critical dimensions on a sketch of the built-in's location. You should come away with an elevation (front-on) view sketch and a floor-plan (top-down) view sketch. Back in the shop, design and build the casework of your project to leave at least ¼" allowance between the project and walls. You'll use trim and tricks to fill the gaps after installation.

DOCUMENT WITH A FIELD DRAWING



THE HIGH POINT OF THE INSTALLATION



After determining the floor's high point, measure the remaining height dimensions at that point before extending level lines across the wall.

Level the base

Countertops, shelves, and worksurfaces must be level to prevent pencils or eggs from rolling off. This means finding a way to level the base of your built-in, even if the floor could qualify as a black-diamond ski slope.

To get started, mark a level line about 18" off the floor on the rear wall where the built-ins will be installed. Measure from the floor to this line at various points along its length to find and mark the floor's highest point, *above*. This point now becomes the reference point at which to measure and mark other critical heights; for example, measure from the floor to countertop level at the high point and extend a level line across the wall to ensure the cabinet sits at the highest point possible.

A "LADDER" HANDLES LEVELING

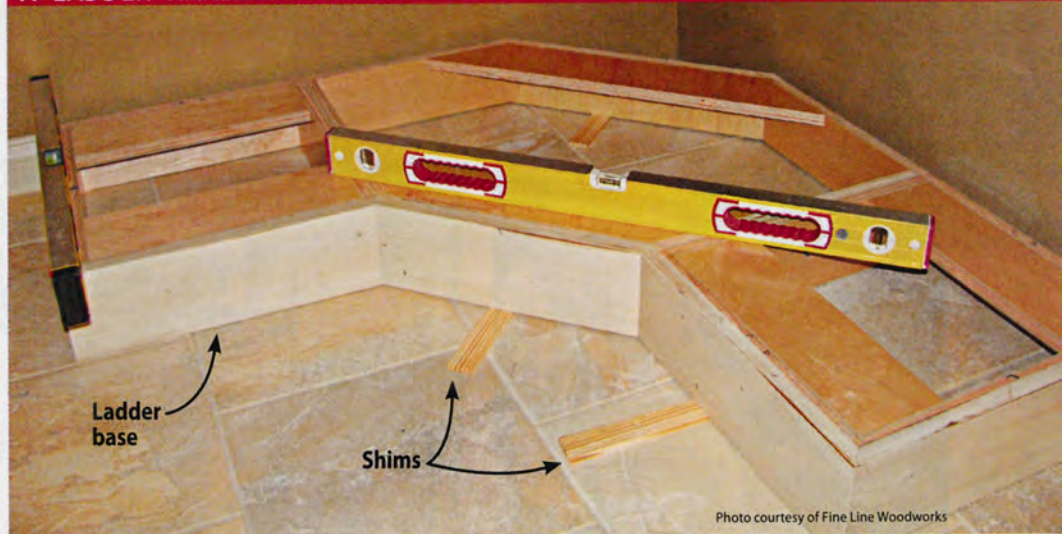


Photo courtesy of Fine Line Woodworks

Leveling and attaching a scrapwood ladder base provides a solid foundation for a built-in despite any inconsistencies in the floor.

QUICK CLEATS LEND REAR SUPPORT



Installed along a level line, cleats secured to the wall's studs provide a solid support and attachment point for the rear of carcasses. Because the cleat does the job of supporting the cabinet, installation becomes a one-man operation.



Armed with level reference lines, most pro cabinetmakers don't even rest built-ins on the floor, strictly speaking. Instead, they install a simple "ladder" base, *top*—a framework of plywood strips leveled with shims and secured to the wall—that will later be covered with trim. An easier but slightly spendier solution: Cleats, *above*, support the back of the cabinets while adjustable leveling feet, *right*, support and level the front. We ordered ours from Woodcraft Supply (item no. 145840, \$21 for a set of 4, woodcraft.com, 800-225-1153).

You should now have a perfectly squared case that "floats" plumb and level surrounded by the out-of-plumb, not-square, and unlevel walls, floor, and ceiling of your house. Time to introduce them to each other.

FINE-TUNE THE FEET



Use the provided hex wrench to level the carcass. Eventually hidden by base trim, the feet remain accessible through holes in the case bottom.

Meeting the wall

You hide most built-ins' sins with trim, says Dave. Where built-ins meet walls, cabinetmakers add "scribes." Any part of the built-in that meets a wall—such as stiles or trim—is designed with extra material to be shaped to fit the wall.

This requires tracing or "scribing" the contours of the wall onto the project part using either a specialty scribing tool such as the AccuScribe Pro on page 56, or a simple compass, *below*. Rabbet or bevel the hidden back side of the material. The reduced material thickness makes it easier to shape with a belt sander or block plane.

A small trim piece, *bottom left*, conforms more readily to wall contours

than the thick face frame, concealing gaps that broadcast imperfections.

You can also minimize discrepancies between the built-in and a wall by transitioning with a reveal, *bottom right*. Leaving a gap between the wall and face frame forces the eye to jump that gap, making it difficult to compare the two.

In instances where imperfections in the walls are extreme, or where cabinet installations are unusually large, it may be more convenient to build the wall out with trim to give the built-in a plumb installation location, *right*.

Easier to customize than the bulky cabinets, the columns surrounding this fireplace were scribed so one face hugs the wall while the opposite face provides a straight and plumb "wall" for the cabinets.

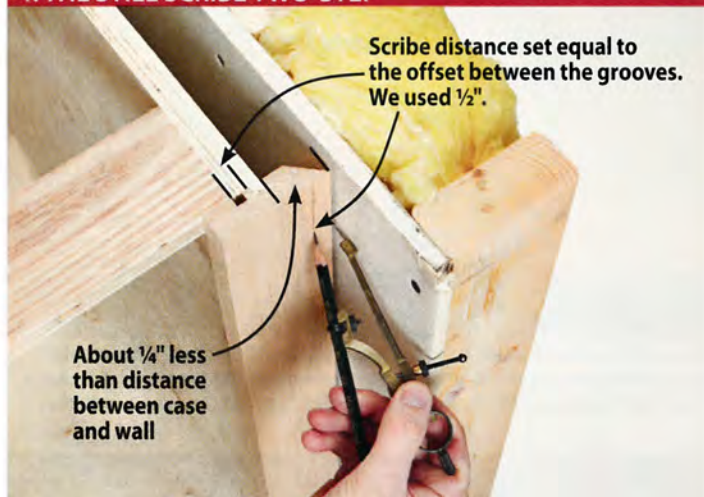
MAKE THE WALL FIT THE CABINETS



Photo courtesy of Fine Line Woodworks

3 stile styles that blend into walls

1. THE STILE SCRIBE TWO-STEP



One of the $\frac{1}{4} \times \frac{1}{4}$ " grooves in the back face of the stile positions it on the matching rabbeted case for scribing. The bevel eases waste removal.



After trimming away most of the waste and sanding to the line, shifting the stile to the other groove positions it seamlessly against the wall.

2. BEND TRIM TO YOUR WILL



The simplest gap-concealing option: purposefully leave a small gap between wall and stile. Then conceal it with a narrow trim piece, pin-nailed in place. The thin trim is easy to flex, concealing wall imperfections.

3. CONCEAL WITH A REVEAL



The reveal between frame and wall draws the eye away from imperfections, and a close look will show only wood behind it. Useful where defects are minimal, the L-shaped cleat also serves as a stop for the face frame.

Countertops that fit contours

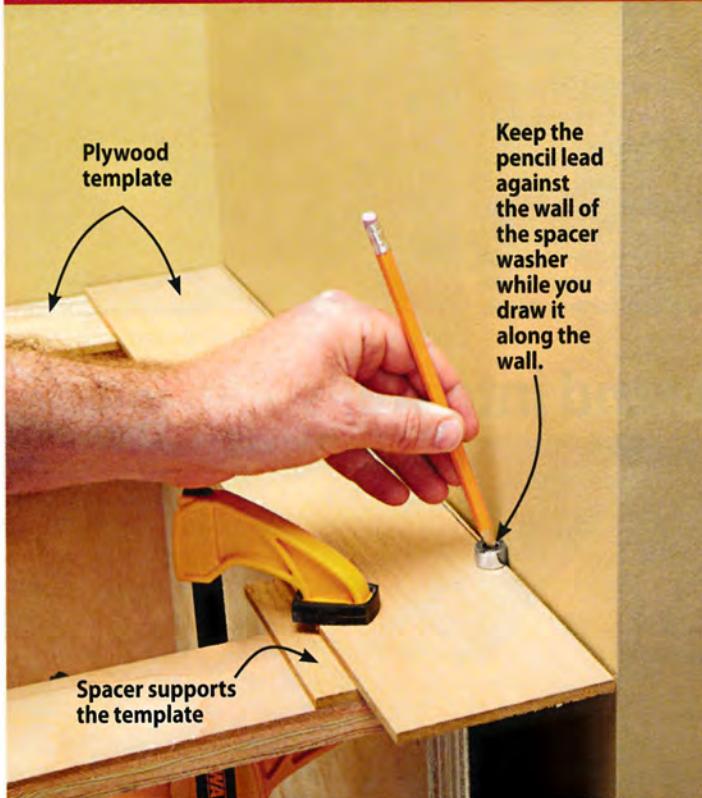
Countertops trapped between three walls present a unique challenge. Where two sheets of drywall meet in an inside corner, drywallers layer joint compound to hide the seam. This virtually guaran-

tees a tapered, out-of-square corner, even on even the most exacting framed construction.

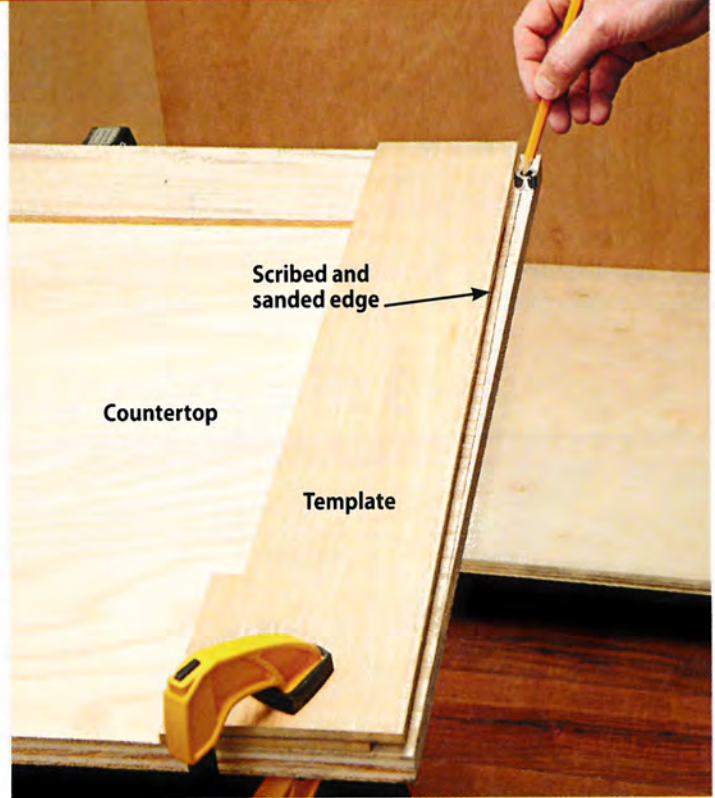
For walls that are nearly square—especially those that form openings narrower at the rear than the front—

create a template for scribing from scraps of thin plywood, as shown *below*. For countertops surrounded by walls with more severe aberrations, you will often have no choice but to leave a gap. That's when trim comes to the rescue, *bottom*.

FORM A TOP WITH A TEMPLATE

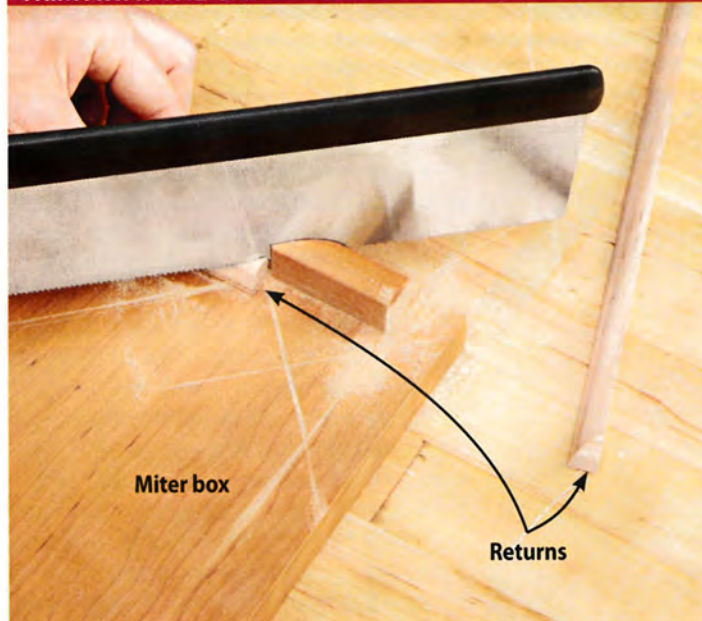


Hot-glue three strips of $\frac{1}{8}$ " or $\frac{1}{4}$ " plywood around the wall perimeter, leaving a small gap between wall and plywood. Use a bushing or spacer washer to scribe around the wall.



Use a belt sander to sand to the template's scribed line. Clamp the template on an oversize countertop, and use the washer to scribe the template's shape. Sand the countertop to the line, beveling the underside to ease installation.

TRIM AWAY THE GAP



A return terminates into the wall at 90° to cap trim attractively, hiding end grain. Cut the small return first and glue it in place on an over-length piece that can then be more easily sized to fit.



Once cut to length and nailed into place, this slender quarter-round trim flexes easily to conform to the wall while concealing the gaps between the wall and the countertop.

Don't look down!

The last bit of blending to do: floors and ceilings. "Nobody looks down," says Dave. They just don't bend over to check baseboards and toe kicks. But they do look up. So while you can fudge the base—slightly angling trim to average out out-of-level floors—you'll have to be

more creative where the top transitions into an out-of-level ceiling.

Dave employs eye-tricking transitions. Multiple layers of trim, *below*, alternating colors, and shadow-line reveals all create transitions that draw the eye rather than highlighting the discrepancies between case and ceiling.

In extreme cases, where the ceiling slopes dramatically, design the built-in with a dead space between the case and ceiling. The eye has difficulty comparing level lines when they're crowned with trim that doesn't touch the ceiling. 🌲

Produced by Lucas Peters

LAYER AWAY IMPERFECTION WITH TRIM



More Resources

- ▶ Find FREE step-by-step instructions for a built-in bookcase/window seat combo at: woodmagazine.com/builtin



- ▶ Learn to build super-simple drawers with a FREE video at: woodmagazine.com/simpledrawers
- ▶ Watch this FREE video to learn about easy drawer installation: woodmagazine.com/drawermount
- ▶ Find 13 pointers for perfect plywood cuts at: woodmagazine.com/plywoodcuts
- ▶ Learn how to stain plywood and hardwood to match: woodmagazine.com/colormatching
- ▶ For a small fee, download an article on easy face-frame cabinetry: woodmagazine.com/easycab
- ▶ Or go frameless when you purchase this downloadable article: woodmagazine.com/framelesscab
- ▶ Find dozens of cabinetmaking articles on a single disc at woodmagazine.com/cabinetry
- ▶ One WOOD Editor is a little too in love with his built-ins at: woodmagazine.com/byebyebuiltins

11 Must-have Cabinetmaking Tools

From the first cut to the final knob, these tools make building cabinets easier, faster, and more accurate.

Get clean carcass cuts from a toothy blade

1 Few materials prove as finicky or frustrating to cut as splinter-prone hardwood plywood or melamine-coated particleboard. Rather than sand, patch, or hide tear-out, pick up a Freud Ultimate Plywood & Melamine Blade (thin and standard kerf models available). The 40° alternate top bevel (ATB) angle on the teeth—twice as steep as most crosscutting blades—shears the wood cleanly, leaving splinter-free cuts. And the high tooth count (96 teeth for 12"-diameter blades, 80 for 10", and 60 for 7¼") means each tooth takes a tiny bite.

Ultimate Plywood & Melamine Blade
Thin kerf: LU79R, 7¼", \$55; 10", \$80; 12", \$105
Standard kerf: LU80R, 10", \$95; 12", \$135
Freud Tools
800-334-4107, freudtools.com

Adjustable shelves in a jiffy

2 A low-dough shelf-pin drilling jig gives you fast, no-measure accuracy for stable adjustable shelves. Use the DrillRite jig and its ¼" self-centering bit (5-mm version sold separately) to drill the first shelf-pin hole; then peg the jig in place through the indexing hole with a dowel or shelf pin and drill away. No muss. No fuss. No-brainer.

DrillRite Shelf-Pin Drilling Jig, #853, \$32
Peachtree Woodworking Supply, Inc.
888-512-9069, ptreusa.com



Scriber draws circles around compasses

3 A compass dragged along the wall transfers (or "scribes") wall irregularities onto the face frame, countertop, and backsplash where they can be belt-sanded for a perfect fit. The AccuScribe Pro from FastCap graduates you from the second-grade compass, adding multiple articulation points that allow you to squeeze it into tighter spots. The flat base prevents rocking as you draw it along a surface. And a built-in sharpener means you'll never have to search for a pointier pencil. All that and it can still draw circles and arcs.

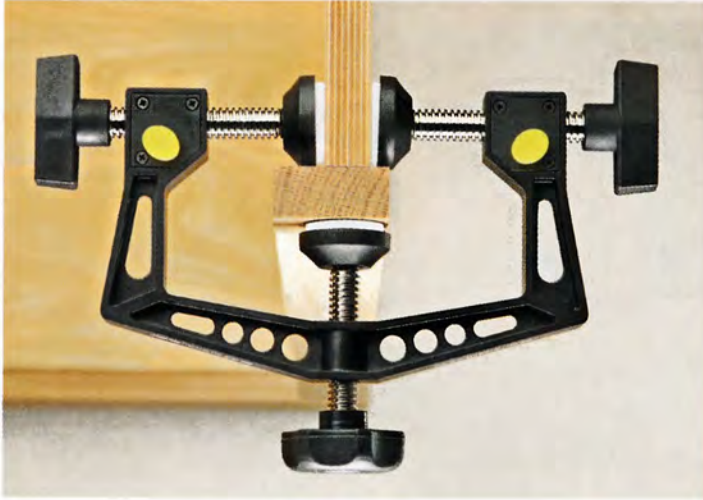
AccuScribe Pro, \$18
FastCap
888-443-3748, fastcap.com



Attack clamping tasks from three sides

4 Custom cabinet jobs often come with custom clamping conundrums. Where bar and pipe clamps can't easily reach (such as a center face-frame stile), turn to Rockler's 3-Way Face Clamp. This unconventional clamp grasps the carcass to gain leverage for securing the face frame to the cabinet. You won't turn to this specialist often, but when you need it, there's no substitute.

3-Way Face Clamp, #39062, \$35
Rockler Woodworking & Hardware
800-279-4441, rockler.com



A clamp for flush and flat face frames

5 In a perfect world, your dead-square cabinets slip into place like they're greased, adjoining face frames aligning seamlessly. In *our* world, bulging walls, out-of-level floors, and moisture-induced wood movement make that a fantasy. The Cabinet Claw draws together the face frames of two cabinets while simultaneously aligning their faces flush, making it a simple matter to join the cabinets with screws.

Cabinet Claw, #8510, \$69 per pair
Pony Tools
312-666-0640, adjustableclamp.com



High-speed hinge placements

6 Pro cabinetmakers love European-style cup hinges because they include enough post-install adjustment to make them ultra-forgiving. Sommerfeld's Hinge Boring Jig (*below*) makes the preinstall process just as easy. Three built-in boring bits connected to hexhead drivers on top of the jig precisely locate the 35mm cup hole and 8mm bushing holes. Turn the hex heads with your drill and a socket and press down to bore each hole to perfect depth.

For a lower-cost alternative, try the Hingemark (*right*), which simply and accurately marks the location of the hinge holes. Align the jig, tap the three spring-loaded punches to mark the hole centers, and then drill them on your drill press.

Hinge Boring Jig, #SHB, \$180
Sommerfeld Tools for Wood
888-228-9268, sommerfeldtools.com

Hingemark, \$23
hingemark@sympatico.ca
hingemark.com



Self-centering bits eliminate hinge hassles

7 Tiny screws and hard wood make a bad recipe for precise hinge placement—errant grain can cause the bit to slip off course while drilling the screw holes. If you plan to install butt, barrel, or wrap hinges, pick up a self-centering bit for the sake of your hardware-mounting sanity. The chamfered, spring-loaded sheath on a self-centering bit (commonly called a Vix bit) eliminates hinge creep by locking in the precise center of the hinge's screw hole while the bit punches a perfectly sized pilot hole.

Vix Bits, set of three hex-drive bits, \$32

JRs Woodworking
vixbitsonline.com



Thin-kerf dado set for undersized plywood

8 If you use 1/4" plywood for drawer bottoms and case backs, you know those undersized sheets require two passes (and thus two setups) of a full-kerf blade to cut a rattle-free groove. The outer blades of Forrest's Special-Width Dado King cut that work in half by stacking together for a perfect 3/16"-wide groove. Add any combination of the six magnetic shims or the 1/8" chipper for grooves ranging up to slightly wider than 1/4".

Special-Width Dado King #DK02414, \$221

Forrest Manufacturing Company, Inc.
800-733-7111, forrestblades.com



Drawer- and slide-mounting made easy

9 & 10 When mounting drawer slides, one hand holds the slide, one hand holds the screw, and one hand holds the drill. If you're a hand short, pick up Kreg's Magnetic Drawer Slide Mounting Tool. Clamped or held against the face frame, the jig's magnets secure and position metal slides leaving your hands free to screw them in place. The companion product for mounting full-extension drawers, shown on page 56, provides a convenient resting place for the drawer box while you secure the drawer-side slide.

Magnetic Drawer Slide Mounting Tool, #NZ03, \$30

Full Extension Drawer Mounting Brackets, #NZ03-B, \$10

Kreg Tool Company

800-447-8638, kregtool.com



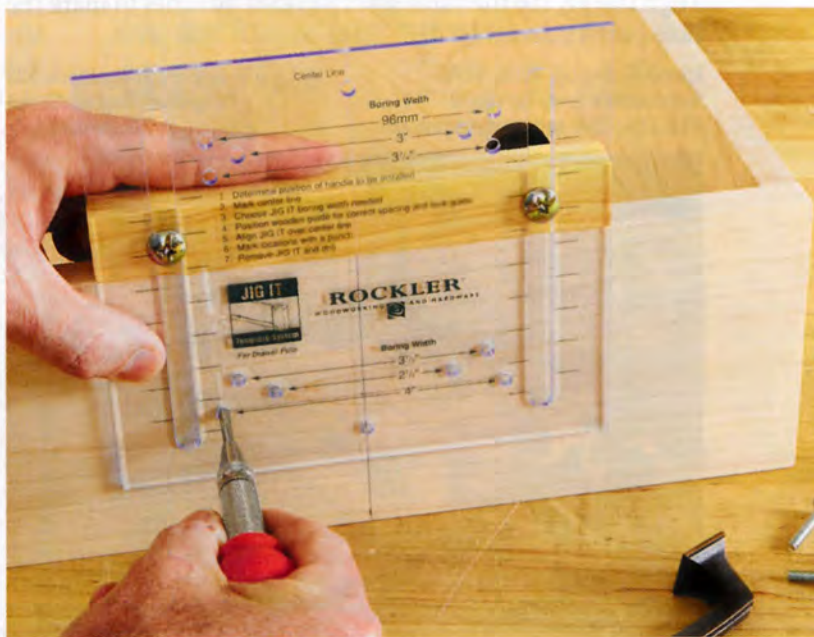
Proper pull placement begins with a jig

11 With your drawers and doors complete, don't blow it now with poor pull placement. Rockler's Drawer Pull Jig It adjustable drawer-pull template lines up on your center mark to precisely locate handle screw holes in six standard spacings, as well as centered.

Drawer Pull Jig It Template, #35172, \$20

Rockler Woodworking & Hardware

800-279-4441, rockler.com



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- ▶ Tell us what makes your Family Fun Room great!

Email materials to funrooms@woodmagazine.com



Stately Shelf Brackets



A five-layer lamination of $\frac{3}{4}$ " stock gives these easy-to-make scrollsawn brackets a classic carved appearance.



Overall dimensions of one bracket: $5\frac{1}{8}$ " wide $\times$ 8" deep $\times$ 12" high.

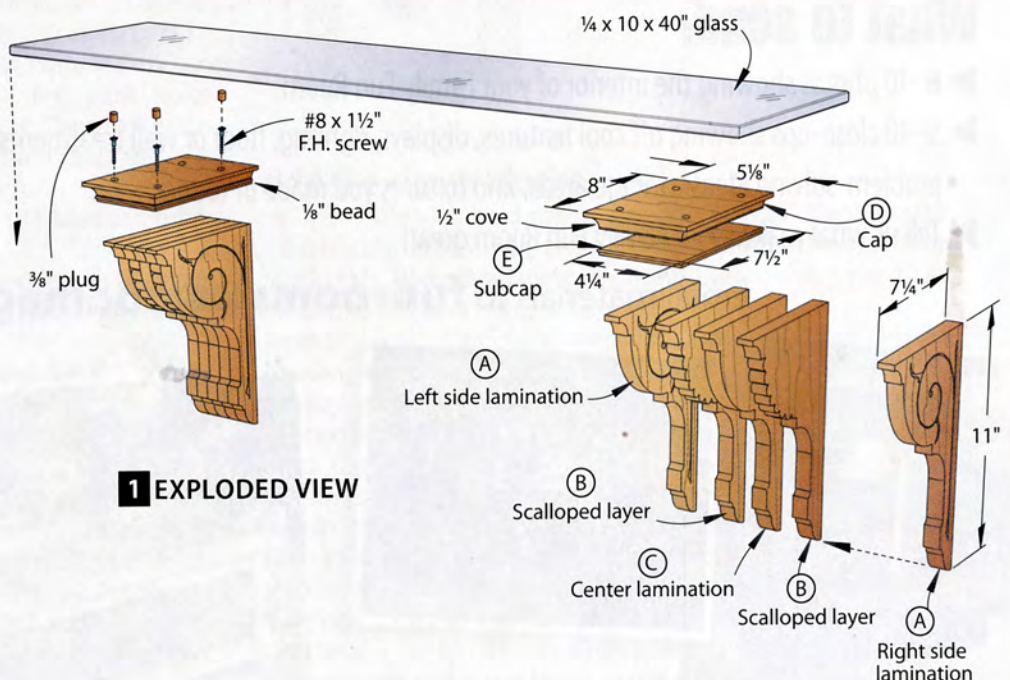
Though the ornate scrollwork on these architectural shelf brackets looks tricky, you'll be pleasantly surprised at how easy it is to cut. Only seven simple parts make up each bracket [Drawing 1], so you can build them quickly.

Start with a template

1 Cut an 8 $\times$ 12" piece of $\frac{1}{8}$ " hardboard or plywood to make a template blank. The template saves making and mounting multiple copies of the pattern to the workpieces.

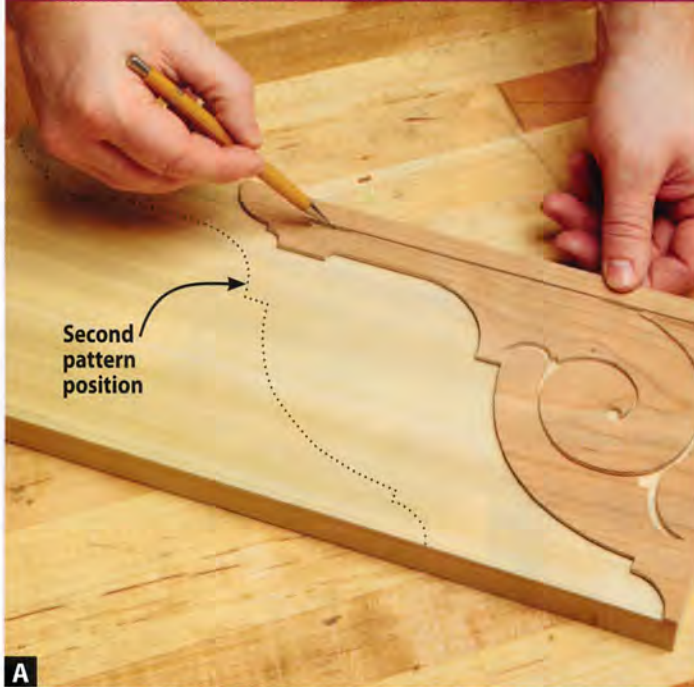
2 Copy the **Bracket Pattern** in the *WOOD Patterns*® insert on page 41 and spray-adhere it to the template blank. (We used 3M Spray Mount Artist's Adhesive.)

Quick Tip! Apply a light coating of spray adhesive to the back of the pattern and let it dry for 30 seconds before sticking the pattern on the workpiece to allow for repositioning.



1 EXPLODED VIEW

TRACE THE PATTERN ON THE BOARD



A Place the template flush along the edge and end of the board to trace the pattern. Minimize waste by tracing another pattern at the board's other end.

SCROLLSAW THE SWIRLY PATTERN



B Keep steady, moderate pressure on the workpiece to prevent burning. Forcing the work flexes the blade, causing a less-than-square cut.

3 Drill a $\frac{1}{4}$ " hole where shown at the center of the scroll and thread a no. 2 skip-tooth scrollsaw blade through it. (Skip-tooth blades have wider gaps between teeth, which helps reduce friction and keep the blade cooler.) Install the blade in your saw.

4 Cut out the inside scroll, keeping the blade on the line. Release the blade from the saw's upper clamp, remove the template, and reinstall the blade to scrollsaw the outside profile.

Cut out the bracket parts

1 Begin by cutting five $\frac{3}{4} \times 7\frac{1}{4} \times 16$ " boards to size. Use the template to trace a bracket's outside profile and inside scroll at one end of a board as shown in **Photo A**. Rotate the template to the diagonally opposite corner of the board and trace the outside profile only. Mark a second board in the same way. These will become the left sides (A) and scalloped layers (B).

Quick Tip! Trace the template with a thin-lead mechanical pencil, holding it at a slight angle so the pencil point follows the template exactly.

2 Flip the template over and trace the inside and outside profiles at one end of the third and fourth boards. As in **Step 1**, above, rotate the pattern to the other end of the board and trace the outside profile. These become the right sides (A) and two scalloped layers (B).

3 On the fifth board, trace two outside bracket profiles. These will become the centers (C) for the two brackets.

4 To cut the $\frac{3}{4}$ " stock, install a no. 12 skip-tooth scrollsaw blade; then cut all ten bracket layers (A, B, C) along the outside pattern lines. Sand the edges until smooth.

5 On each of the left and right sides (A), drill a $\frac{1}{4}$ " hole at the scroll center. Match the sides into two pairs with the pattern tracings facing out, and label them as matching sides.

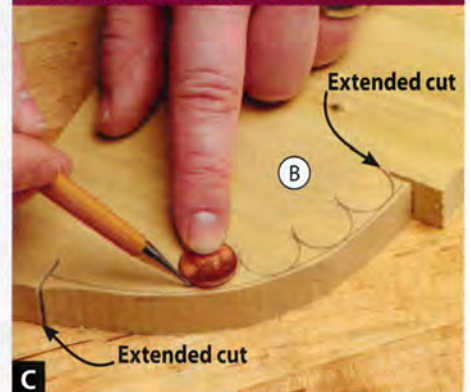
6 Thread a no. 9 skip-tooth blade through the hole in one side (A), clamp it in the saw, and adjust the tension. Cut the curves [**Photo B**]. Cut out the pattern in the other three sides and set all four aside.

7 On the four scalloped layers (B), extend the cut at each end of the large convex curve where shown on the pattern. Then, lay out the scalloped edge using a penny [**Photo C**]. Scrollsaw the scalloped edges, starting at the outside and sawing into the point from each side. Sand the scallops to 220 grit and set the four pieces aside.

Join the layers

1 Refer to the arrangement of layers in **Drawing 1**. Apply glue to the inside face of each side (A), keeping it $\frac{1}{4}$ " away from the edges of the cutout pattern to prevent squeeze-out into the cutouts.

LAY OUT THE SCALLOPS



C Mark the scallops with a penny touching the extended cut and slightly inside the bracket curve. Trace adjoining arcs along the edge.

Glue a scalloped layer (B) to each side, creating two left- and two right-side pairs. Remove any squeeze-out in the cutouts and scallops with a toothpick.

2 Glue a left- and right-side pair (A/B) to each side of each center (C). Remove glue squeeze-out in the scallops.

3 Sand or file the edges of the bracket bodies smooth [**Photo D**], keeping the edge of the bracket perpendicular to the sides as you work. Make sure the brackets match closely in thickness and contour.

4 Install a keyhole-slot bit in your table-mounted router, adjusting the router table's fence so the bit is centered on the thickness of the bracket. Clamp one stopblock on the router table's

infeed fence 10¼" from the edge of the bit, and another on the table's outfeed fence 3" from the edge of the bit. Make the cut [Photo E]. Once you've reached the outfeed-side stopblock, turn off the router and slide the bracket off the bit along the freshly cut slot. Repeat this process for the other bracket. Then, unclamp the stopblocks and reposition them to cut the second pair of slots: Clamp the infeed stopblock 3" from the edge of the bit and the outfeed 10¼" from the edge of the bit.

Top off the brackets

1 For each bracket, cut a ¾×8×5⅛" cap (D) and a ¼×7½×4¼" subcap (E).

2 Rout a ½" cove profile on both ends and the front edge of each cap (D). Switch to a ⅛" beading router bit and profile both ends and the front edge of each subcap (E) [Drawing 2].

3 Glue the cap (D) and subcap (E) together with the back edges flush, centering the subcap on the bottom of the cap.

4 Glue a cap assembly (D/E) to each bracket body, centered side-to-side and flush at the back. Drill and counter-bore holes for #8×1½" screws where shown, and drive the screws. Plug the screw holes with wood filler or poplar dowels, and sand the cap surface smooth. Finish-sand the brackets to 220 grit. Prime and apply a semigloss paint for a soft, aged look (sidebar at right), or apply a stain. We used a custom tint from Sherwin-Williams [Photo F], and top-coated with three coats of a satin-finish lacquer.

5 Attach the brackets to a wall, sliding the keyhole slots over screws driven into wall studs or suitable anchors. Lay a shelf across the brackets, as shown in Drawing 1. Secure a glass shelf with double-faced tape. Or, install a wood shelf by screwing it to the brackets instead. 🌲

Written by **Larry Johnston**
Produced by **Nate Granzow** with **John Olson**
Project design: **John Olson**
Illustrations: **Lorna Johnson**

SMOOTH THE BRACKET EDGES

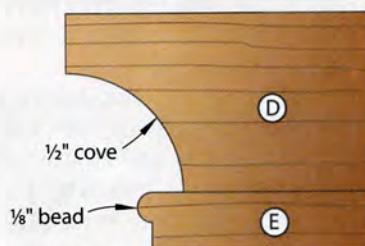


D Speed up the smoothing process by using more than sandpaper. Try hogging away waste with a rasp or file.

ROUT A PAIR OF HANGING SLOTS



E Begin the cut with the top of the bracket against the infeed fence stopblock and finish the slot against the outfeed-side stopblock.



2 CAP AND SUBCAP

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F

Give newly painted brackets an old look



If you chose to paint your brackets, but would like them to have a worn, classic appearance, lightly break spots along the edges with 220-grit sandpaper—careful not to overdo the distressing—and accent the distressed spots with dark stain. Apply it lightly to just the bare wood with a small applicator, and then wipe it off. To enhance the effect, leave traces of stain in crevices to simulate patina. Though we painted our brackets one color, you could apply multiple coats of different colors. Sanding the edges would then reveal layered colors instead of bare wood.

Materials List

Part*	FINISHED SIZE				Matl.	Qty.
	T	W	L			
A sides	¾"	7¼"	11"	P		4
B scalloped layers	¾"	7¼"	11"	P		4
C center	¾"	7¼"	11"	P		2
D cap	¾"	8"	5⅞"	P		2
E subcap	¼"	7½"	4¼"	P		2

*Quantities needed to build a pair of brackets.

Material key: P—poplar.

Supplies: ¼×10×40" glass, #8×1½" screws (8), #8×1" screws (4), wall anchors (4), double-faced tape, spray adhesive.

Blades and bits: No. 2, no. 9, and no. 12 skip-tooth scroll-saw blades; ½" cove, ⅛" beading, keyhole router bits.

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Cantilevered Candlesticks

**Get a quick lesson
in offset turning.**

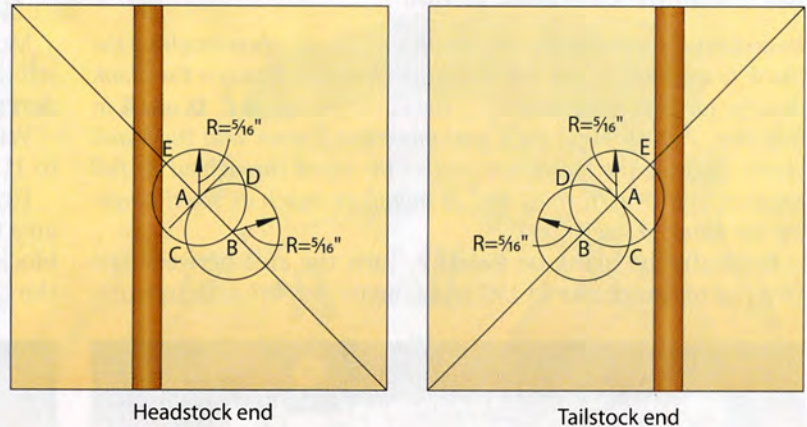
With just a roughing gouge, a squarenose scraper, and a parting tool you can create these eye-catching, off-kilter candleholders. The secret to the out-of-the-ordinary profile is turning several cylinders on a single blank, each on a different axis. If that sounds tricky, follow along as we show how quick and easy it is.

Watch a free video of Brian Simmons
turning this project at
woodmagazine.com/candlesticks.

Prepare the blank

For each candlestick, glue up and trim to size a $2\frac{3}{8} \times 2\frac{3}{8} \times 5\frac{1}{4}$ " blank. (Ours sandwiched a $\frac{1}{8}$ "-thick strip of wenge between $\frac{1}{2}$ "- and $\frac{3}{4}$ "-thick strips of maple.)

On each end of the blank, locate the center and mark it as **Point A**. Draw a $\frac{5}{8}$ "-diameter circle from this point. Then, mark a diagonal, another $\frac{5}{8}$ "-diameter circle, and letter the intersections, as shown at *right*.

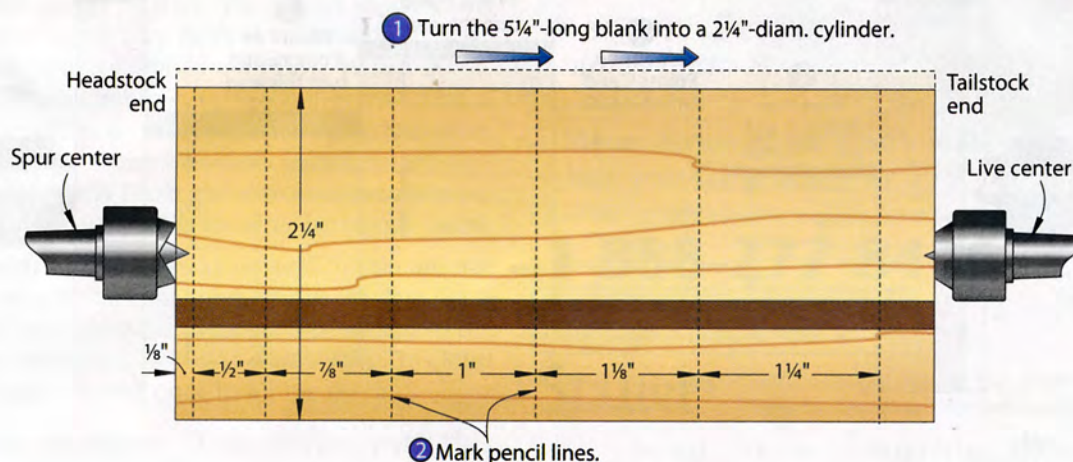
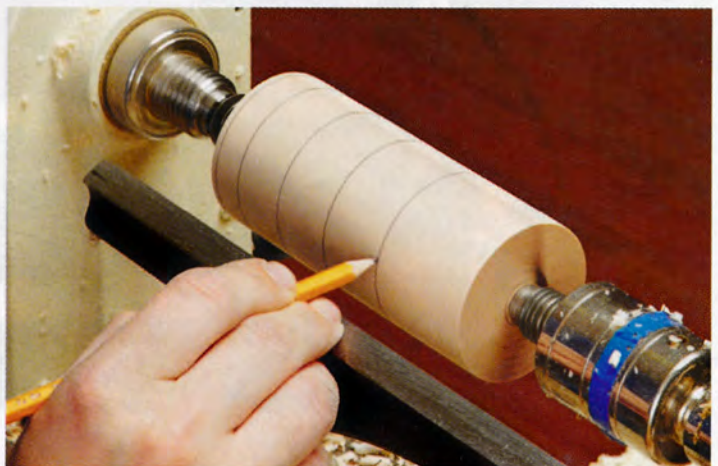


Turn the blank round and lay out the segments

Tool: Roughing gouge **Speed:** 1,200 rpm

Mount the blank between centers, with the centers on **Points A**, below. **Note:** The left candlestick in the photo on the previous page was mounted as indicated in the drawing below. It has no wenge stripe in the second cylinder from the base. The right candlestick, mounted the reverse of the first, shows a broad stripe of wenge on the cylinder next to the top.

With your roughing gouge, turn the blank to a $2\frac{1}{4}$ "-diameter cylinder. Stop the lathe and, measuring from the left end of the blank, make six pencil marks where shown in the drawing. Place your pencil on each mark in turn and flip the lathe on, then quickly off, to extend the marks around the blank, as shown below.



Now things get wobbly

Tool: ½" squarenose scraper **Speed:** 1,200 rpm

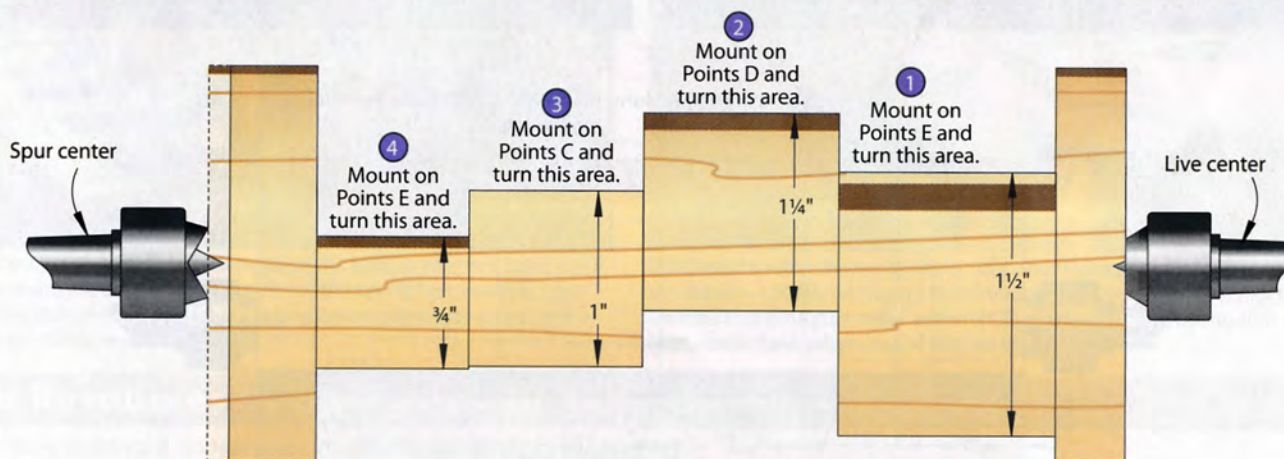
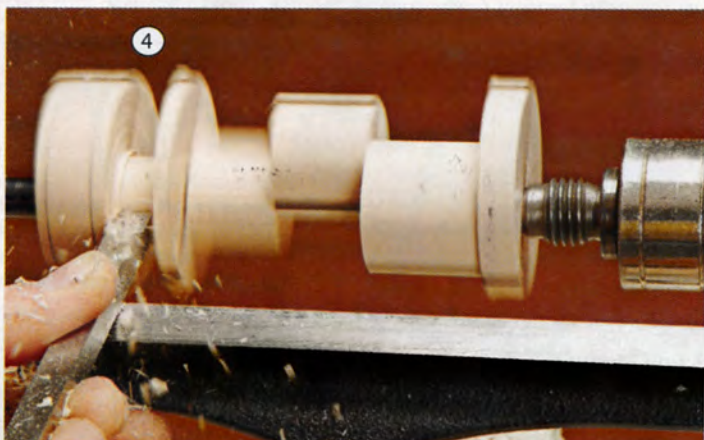
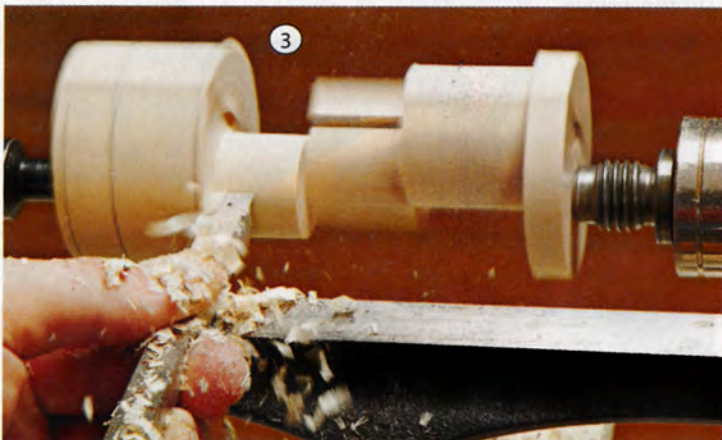
Note: Leave the tool rest in the same position as when roughing the blank to a cylinder. You will still have clearance between the blank and the tool rest when mounting the blank on **Points C, D, and E** in this step. As you begin each cut, move the scraper into the blank slowly. Because the tool won't contact the blank throughout its full rotation, you'll be "turning air" at moments, much as when roughing the blank to size.

Remount the blank on **Points E**. Turn the area between the two right-most marks to 1½" in diameter, *top left* and drawing.

Mount the blank on **Points D** and turn the next area to the left to 1¼" diameter, *top right*. Keep the shoulders of the cylinders perpendicular to the rounded surfaces.

With the blank mounted on **Points C**, turn the next section to 1" diameter, *bottom left*.

Finally, remount the blank on **Points E**, and turn the next area to the left to ¾" in diameter, *bottom right*. The remaining block of material next to the headstock becomes the base of the candlestick.



A bit of work on each end

Tool: Parting tool **Speed:** 1,200 rpm

At the right end of the blank, adjacent to the 1½"-diameter section, make a parting cut, turning down to about a ⅞" diameter, *top left*.

Remount the blank on **Points A** and remove the waste on the bottom of the base (left end) leaving a ½"-thick base. Turn a slight concavity on the bottom so the candlestick rests only on the outside rim, *top right*. Sand the bottom to 150 grit; then, remove the candlestick from the lathe.

At the drill press, drill a ⅛" hole ½" deep into **Point E** on the top, *bottom left*. Complete the parting cut at the top using a

handsaw. Then centered on the ⅛" guide hole you just drilled, bore a 1" hole ⅞" deep into the top, *bottom right*.

Sand the candlestick to 220 grit and apply a finish. To cover all areas evenly, we sprayed on three coats of aerosol satin lacquer. To hold ⅞"-diameter candles, insert a ¾" copper pipe cap in the top of each candlestick. Light the candles and get ready for glowing reviews of your work. 🌿

Produced by **Craig Ruegsegger** with **Brian Simmons**

Project design: **Brian Simmons**; Illustrations: **Lorna Johnson**



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Item 95272 shown

SAVE \$135

LOT NO. 95272/69397/61427

\$164.99 REG. PRICE \$299.99

• "Impressed with the Quality Construction and Ease of Use" - Hot Bike Magazine

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SUPER COUPON!

POWDER-FREE NITRILE GLOVES

Item 68498 shown

SAVE 45%

LOT NO. 68498/97582

\$5.99 REG. PRICE \$10.99

5 MIL. THICKNESS

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SUPER COUPON!

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SAVE 66%

LOT NO. 46807/68975/69221/69222

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SUPER COUPON!

18 VOLT CORDLESS 3/8" DRILL/DRIVER WITH KEYLESS CHUCK drillmaster

Includes one 18V NiCd battery and charger.

Item 68239 shown

SAVE 54%

LOT NO. 68239/69651

\$15.99 REG. PRICE \$34.99

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3 PIECE TITANIUM NITRIDE COATED HIGH SPEED STEEL STEP DRILLS

Item 91616 shown

SAVE 60%

LOT NO. 91616/69087/60379

\$7.99 REG. PRICE \$19.99

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SUPER COUPON!

CHICAGO ELECTRIC 10" SLIDING COMPOUND MITER SAW

Item 98199 shown

SAVE \$120

FREE 60 Tooth Carbide Blade A \$19.99 Value

LOT NO. 98199

\$79.99 REG. PRICE \$199.99

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SUPER COUPON!

12 SPEED BENCH DRILL PRESS

Item 60237 shown

SAVE \$70

LOT NO. 60237/44836

\$99.99 REG. PRICE \$169.99

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SUPER COUPON!

2.5 HP 12" PLANER

Item 95082 shown

SAVE \$80

LOT NO. 95082

\$219.99 REG. PRICE \$299.99

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SUPER COUPON!

LOT NO. 93888/60497

Item 93888 shown

MOVER'S DOLLY

HaulMaster

SAVE 46%

\$799 REG. PRICE \$14.99

1000 LB. CAPACITY

30133393

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SUPER COUPON!

60" WORKBENCH WITH FOUR DRAWERS

WINDSOR DESIGN

LOT NO. 93454/69054/61488

Item 93454 shown

SAVE \$110

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Item 68053 shown

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85701165

WEIGHS 27 LBS.

LOT NO. 68053/69252/60569

"The Undisputed King of the Garage" - Four Wheeler Magazine

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SUPER COUPON!

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Item 93897 shown

SAVE \$70

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SUPER COUPON!

drillmaster ORBITAL HAND SANDER

LOT NO. 40070/61311/61509

Item 40070 shown

SAVE 59%

\$899 REG. PRICE \$21.99

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SUPER COUPON!

CENTRAL MACHINERY

2 HP INDUSTRIAL 5 MICRON DUST COLLECTOR

LOT NO. 97869

SAVE \$100

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SUPER COUPON!

CENTRAL PNEUMATIC HIGH SPEED METAL SAW

LOT NO. 91753/60568/113

Item 91753 shown

SAVE 68%

\$999 REG. PRICE \$31.99

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SUPER COUPON!

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SUPER COUPON!

12" x 33-3/8" WOOD LATHE WITH REVERSIBLE HEAD

CENTRAL MACHINERY

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SAVE \$150

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SUPER COUPON!

1/4" TRIM ROUTER

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SAVE 42%

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SAVE 41%

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Item 67421 shown

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HaulMaster 12 VOLT MAGNETIC TOWING LIGHT KIT

LOT NO. 67455/69626/69925/96933

Item 67455 shown

SAVE 66%

\$999 REG. PRICE \$29.99

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SUPER COUPON!

4" x 36" BELT/6" DISC SANDER

CENTRAL MACHINERY

LOT NO. 97181/93981

Item 97181 shown

SAVE \$45

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SUPER COUPON!

CENTRAL PNEUMATIC 17 PIECE AIR TOOL ACCESSORY KIT

LOT NO. 68236/61449

Item 68236 shown

SAVE 50%

\$499 REG. PRICE \$9.99

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10 FT. x 10 FT. POPUP CANOPY

LOT NO. 68216/69456

Item 68216 shown

SAVE \$45

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SUPER COUPON!

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CENTRAL MACHINERY

LOT NO. 46075/69805

Item 46075 shown

SAVE 37%

\$2499 REG. PRICE \$39.99

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500 LB. CAPACITY

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Item 90154 shown

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\$24999 REG. PRICE \$399.99

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How to get started in carving? A little "Bird" has the answer

While visiting several museums that showcase Early American furniture, much of what I saw had ornate carvings. I'd like to replicate those elements on my furniture pieces, but I don't have the tools for this. Can you provide me with a "get-started" list of carving tools?

—Craig Shaw, Baltimore

Craig, carving tools are classified as knives, chisels, and gouges. The first two compare somewhat to common paring knives and bench chisels, although many carving chisels have dual-beveled cutting edges. For the type of work you want to do, you likely won't need knives, and you can get by with your bench chisels until you become more accomplished or want to expand your work. Gouges come in two basic shapes: vee and semicircular. The width of each gouge is measured in millimeters at the cutting tip, and the shape of a semicircular gouge, known as the "sweep," is designated with a "#" symbol and number. The smaller the number, the greater the radius of the circular shape. Curved, or backbent, shanks on some gouges give you better access for carving concave and convex shapes compared with straight-shank tools.

To get a list of the most-needed carving tools for a beginner, we posed



your question to acclaimed furniture-maker, author, and educator Lonnie Bird, who teaches carving among many hand-tool classes at his woodworking school in Tennessee. (Find it at lonniebird.com.) Lonnie suggests the gouges shown below for carving furniture elements, such as the shell above. You

can buy these 10 carving gouges in a set (part no. 05I14) from Woodcraft for \$340: 800-535-4482 or woodcraft.com.

As you get more into carving, you'll probably want to expand with double-edged chisels and more gouges. Most carvers, Lonnie says, have dozens of chisels to create specific sizes and shapes.



#2 12mm Gouge	—
#2 25mm Gouge	—
#5 8mm Gouge	—
#5 12mm Gouge	—
#7 6mm Gouge	—
#7 10mm Gouge	—
#11 1.5mm Gouge	—
#12 6mm Vee Gouge	—
#25 6mm Backbent Gouge	—
#25 10mm Backbent Gouge	—

continued on page 72

The facts are hard to ignore.

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Reference Guide

Glue comparison

What woodworkers **need to know!**

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Shorter Clamp Time	✓	
No Foam – Less Mess	✓	
Shorter Open Time	✓	✓
Doesn't Stain Skin	✓	✓
Bonds Most Materials	✓	
Bonds Oily / Exotic Woods	✓	
Lower Cost – Better Value	✓	
Longer Usable Shelf Life	✓	

Woodworking Handbook 2007



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WOOD® Magazine - May 2013

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Ask WOOD

An Adirondack by any other name is still sweet

After seeing the Adirondack chair plans in WOOD® issue 219 (July 2013), I got to wondering why it's called that? Can you fill me in on the history of this iconic chair?

—Steve Rogers, Reno, Nev.

Oddly enough, Steve, the original chair was not called an Adirondack, but a Westport chair. According to the Adirondack Museum in Blue Mountain Lake, N.Y., Thomas Lee created the chair around 1900. A Bostonian who summered in Westport on the shores of Lake Champlain, Lee nailed together the outdoor chair from wide planks, incorporating wide arms to hold drinks and plates (*bottom photo*).

A few years later, Lee shared his chair with Harry Bunnell, a Westport carpenter and hunting friend, suggesting he make some to sell. Without Lee's knowledge, Bunnell filed for and received a patent for the Westport chair in 1905. And according to the museum's records, Lee did not contest the patent. Over the next two decades, Bunnell built these chairs using knot-free planks of local hemlock and basswood. Most were painted green, brown, or white to provide resistance against the weather. Eventually, other craftsmen began making chairs similar to the Westport.

Around the Great Depression, these clear, wide planks became costly and hard to find, so builders started making the chairs from narrower slats, while maintaining the same basic design principles: tilted back and seat; fan-topped back; and wide, flat arms parallel to the ground. Because these chairs were most popular at resorts and vacation homes in and around the Adirondack Mountains, the name evolved to simply Adirondack chairs.



WOOD magazine
Adirondack chair

Westport chair
(Photo courtesy of the Adirondack Museum)



The inside scoop on infill planes

What is an infill plane? They're beautiful, but do they work differently than other planes? Is it a type of tool that a hobby woodworker like me should own?

—Marvin Black, Memphis

At its core, Marvin, an infill plane consists of a metal body with wood components tightly fit ("infilled") into the interior voids. These handmade tools come in different styles (smoother, shoulder, miter, and panel), and perform essentially the same functions as antique and modern cast planes.

Because most infills, especially pre-World-War-II models, use dense, heavy wood species, such as rosewood or ebony, they have greater mass to help power through cuts. But that's the only advantage an infill has over a "hollow" cast-iron plane. With limited, fussy blade adjustments, an infill can be frustrating to use until you become experienced with it.

And because you'll pay two to three times more for an infill plane than for a new or antique cast model, we'd have a hard time recommending you get one. We suspect that many people who buy infills treat them as collectibles rather than working tools.



Infill smoothing plane



Infill shoulder plane

continued on page 74

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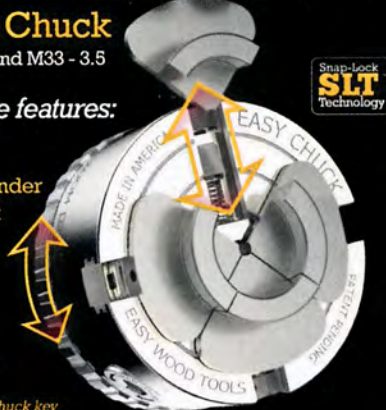
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Ask WOOD

Simple support helps mortise turned or tapered stock

I bought pretuned legs from an online company to make a table. But I've altered my original plans: Now I want to add lower stretchers between the legs. How can I bore sockets into these tapered segments so the stretchers will be parallel with the upper aprons?

—James Garrison, Pensacola, Fla.

To keep the stretchers parallel with your upper aprons, James, you need a simple jig to support the leg so it lies flat on its square, upper section while drilling the sockets.

Start with a base of 3/4" plywood or solid wood slightly wider and longer than the leg, and attach a pair of short cleats to the edge and end of one corner, where shown below. Place the leg's square section against the cleats and clamp it in place. Next, make a V-shaped block to support the leg beneath your layout marks for the stretcher socket. Attach it to the base with brads or screws so the block supports the leg without lifting it. Finally, drill the socket on your drill press, at bottom. Repeat for the remaining legs. (To make a rectangular mortise, simply drill multiple holes of equal depth, using a fence to keep the jig in a straight line. Chisel out the waste between overlapping holes.)



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We made multiple stands for the *WOOD*® magazine shop and love them. A 44×44" stand with a laminated MDF top doubles as a secondary workbench and tablesaw outfeed stand. A 28×44" bench with short legs, locking 3" casters (\$60 for a set of four, part no. PRS3090), and ¾" sealed plywood top serves as an assembly and finishing table and nests under the larger bench. We also made a portable table with tall legs for finishing small projects. (No stooping for us tall guys!)

—Tested by Kevin Boyle,
Senior Design Editor



Universal Bench system

Performance	★★★★★
Price	Legs (set of 4) \$60–80
Price	Rails (set of 4) \$20–80

Kreg Tool
800-447-8638; kregtool.com



Carbide-tipped turning tools start sharp, stay sharp

I've always preferred using high-speed steel turning tools that I could shape and sharpen as needed. But Easy Wood Tools' carbide-tipped turning chisels impressed me: The insert tips are sharper than I expected, and they held that edge a long time, even when turning dense white oak and maple into heaping piles of shavings. For once, it was nice to not have to stop and sharpen the tools—I could just enjoy turning. And when the cutting edge eventually did dull, I simply rotated the cutter to expose a pristine edge.

But it's important to keep in mind that the Easy Wood Tools chisels (like all other carbide-insert tools) are scrapers and, as with any scraper, seldom yield turnings as smooth as those created with sharp traditional gouges and skews. So they won't completely replace those tools. Still, there's almost no learning curve, and they'll make a great addition to any turner's collection.

Easy Wood Tools makes chisels with square, round, and diamond-shape replaceable tips. They come in three lengths, and the handles are color coded to the shape of the cutter for quick reference.

—Tested by Brian Simmons



Carbide-tipped turning tools

Performance	★★★★☆
Price	\$90–140 each

Easy Wood Tools
866-963-0294
easywoodtools.com



Leigh dovetails at a value price

I've used Leigh dovetail jigs for years with great success, but the knock on them has always been the premium price. So I was glad to test the R9 jig, simply a template you mount to a thick backer board (that you supply). With this setup, you can rout through-dovetail and box joints with a hand-held router, as shown at *right*, or template-down with a table-mounted router; both work great.

The R9 comes with two adjustable side stops for registering the workpiece's edge, and three pin plates that mount to the top of the backer board for positioning the machined aluminum template. You can slide it down after routing one set of pins or tails to effectively double the jig's width capacity without losing registration. The jig makes three sizes of through dovetails ($\frac{3}{8}$ ", $\frac{7}{16}$ ", and $\frac{1}{2}$ " pin widths) in boards up to $\frac{13}{16}$ " thick, as well as three sizes of box joints ($\frac{3}{16}$ ", $\frac{3}{8}$ ", and $\frac{3}{4}$ " finger widths) in boards up to $\frac{7}{8}$ " thick.

As usual, Leigh provides an exceptional owner's manual, clearly written



with illustrated steps. After setting up the jig, I routed a through-dovetail joint—a two-bit setup cut on each side of the jig—that was just a little tight. A slight turn of the guide bushing in your router's subbase (its slightly elliptical shape lets you adjust the router's position between the guide fingers, as long as you hold the router the same each time) produced a perfect-fitting joint the second time.

Next, I routed box joints. My first attempt was a tad loose, but again, an

adjustment of the guide bushing tightened up the next joint perfectly.

—Tested by Pat Lowry



Dovetail jig, R9 Plus

Performance	★★★★★
Price	\$160
Leigh Industries 800-663-8932; leighjigs.com	



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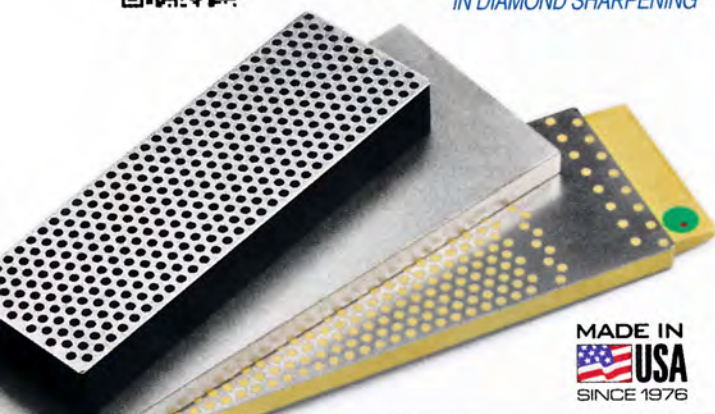
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Shop Proven Products

It's not big, but wow, does it ever work!

Shop-Vac's compact Tool Mate toolbox/vacuum combo continues to exceed my expectations as I use it more and more while remodeling an old house. With a 2½-gallon capacity, it's handy for portable use where a larger vacuum proves cumbersome. Despite its size, this unit has surprisingly powerful suction, but not enough to sufficiently collect dust from a shop machine, such as a bandsaw or router table.

The vac attaches to the toolbox, and can be used separately, too. The stout and roomy toolbox has adjustable tray dividers to fit small tools and supplies, and when attached to the vacuum, makes a compact, carryable kit for punch-list jobs around the house. The 1¼"×4' hose and three nozzles store inside the toolbox lid.

—Tested by Nate Granzow,
General Interest Editor



Tool Mate tool box/shop vacuum, #388-02-00

Performance

★★★★☆

Price

\$100

Shop-Vac
570-326-0502; shopvac.com



Compact collector tackles one machine at a time

If you crossed a dust collector with a shop vacuum, you'd get Rikon's 12-gallon dust extractor. The 63-100 has a small motor and fan mounted to a steel drum, so you get durability, decent dust and chip capacity, and adequate suction for one machine when hooked up with 6' or less of 4" flex-hose. It performs best when hooked to a tablesaw or bandsaw, machines that make tiny chips and less fine dust. The unit filled quickly with chips from my jointer and planer, and the paper filter builds up with fine dust quickly when used with a drum sander.

I see this extractor as an economical solution when you must dedicate a dust collector to a single machine with a 4" outlet, especially one that's inconvenient to hook up to a ducted system. But at about 90 decibels, it's loud! 🌲

—Tested by Pat Lowry



12-gallon dust extractor (63-100)

Performance ★★★★★
Price \$200

Rikon Power Tools
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