ISSUE 220 SEPTEMBER 2013

WIN JET'S $5,000 DREAM MACHINE GIVEAWAY p.6

Better Homes and Gardens®

WOOD®

The World's Leading Woodworking Resource

Super-easy Entry Bench

The secret is a store-bought door

Plus more great plans

Lingerie Chest p.36
Revolving Bookcase p.60
Flip-top Tool Bench p.50
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Hand Plane Rack p.14

14 Miter Gauges and Sleds Tested p.54

SketchUp Design Secrets Revealed!

Fast Fixes for Screwed-up Screws p.16

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INTRODUCTORY PRICES!

In celebration of our 30th Anniversary, we have taken two of our most popular saws and created a special edition color scheme that is sure to be the eye candy in workshops and small businesses nationwide. Both the G0555LANV and the G0513ANV are the exact same machines as our popular G0555LX and G0513 except for our anniversary special edition colors. Grab one quick, these are sure to sell out fast!

FEATURES:

- Deluxe extruded aluminum fence
- 4" dust port
- Deluxe heavy-duty stand
- Includes one ⅜" blade, fence, and miter gauge
- Rack-and-pinion guide post adjustment for upper blade guides
- Cast iron wheels

SPECIFICATIONS:

- Motor: 1 HP, TEFC, 110V/220V, single-phase (prewired 110V)
- Amps: 11 at 110V, 5.5 at 220V
- Cutting capacity/throat: 13½"
- Max. cutting height: 6"
- Footprint: 23½" x 16½"
- Table height above floor: 43"
- Table tilt: 45° right, 10° left
- Frame construction: cast iron
- Precision-ground cast iron table
- 2 blade speeds: 1800 & 3100 FPM
- Blade size: 93½" long
- Blade width rande: ⅛" – ¾" wide
- Table size: 14" x 14"
- Sturdy T-shape fence design
- Overall size: 67½" H x 27" W x 30" D
- Approx. shipping weight: 247 lbs.

CAST IRON WHEELS



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AVAILABLE JUNE, 2013!

G0555LANV

14" DELUXE BANDSAW

Reg. ~~$545.00~~ **$445.00**

MADE IN TAIWAN

$79 shipping

FEATURES:

- Deluxe extruded aluminum fence
- Includes miter gauge
- Two 4" dust ports
- Quick-change blade release/tensioner
- Blade tension indicator
- Micro-adjusting geared table
- Blade height scale measurement
- Blade tracking window
- Includes ½" blade

SPECIFICATIONS:

- Motor: 2 HP, 110V/220V, single-phase, TEFC capacitor start induction, 1725 RPM, 60 Hz, prewired 220V
- Amps: 20A at 110V, 10A at 220V
- Power transfer: Belt drive
- Precision-ground cast iron table
- Table size: 17" x 17" x 1½" thick
- Table tilt: 10° left, 45° right
- Floor to table height: 37½"
- Max. cutting height: 12⅛"
- Blade size: 131½" long
- Blade width range: ⅛" – 1" wide
- 2 blade speeds: 1700 and 3500 FPM
- Wheels: computer-balanced cast aluminum with polyurethane tires
- Wheel covers: pre-formed steel
- Blade guides: Euro-style roller disc with full enclosure protection
- Bearings: sealed and permanently lubricated
- Overall size: 73" H x 32" W x 32" D
- Approx. shipping weight: 342 lbs.



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G0513ANV

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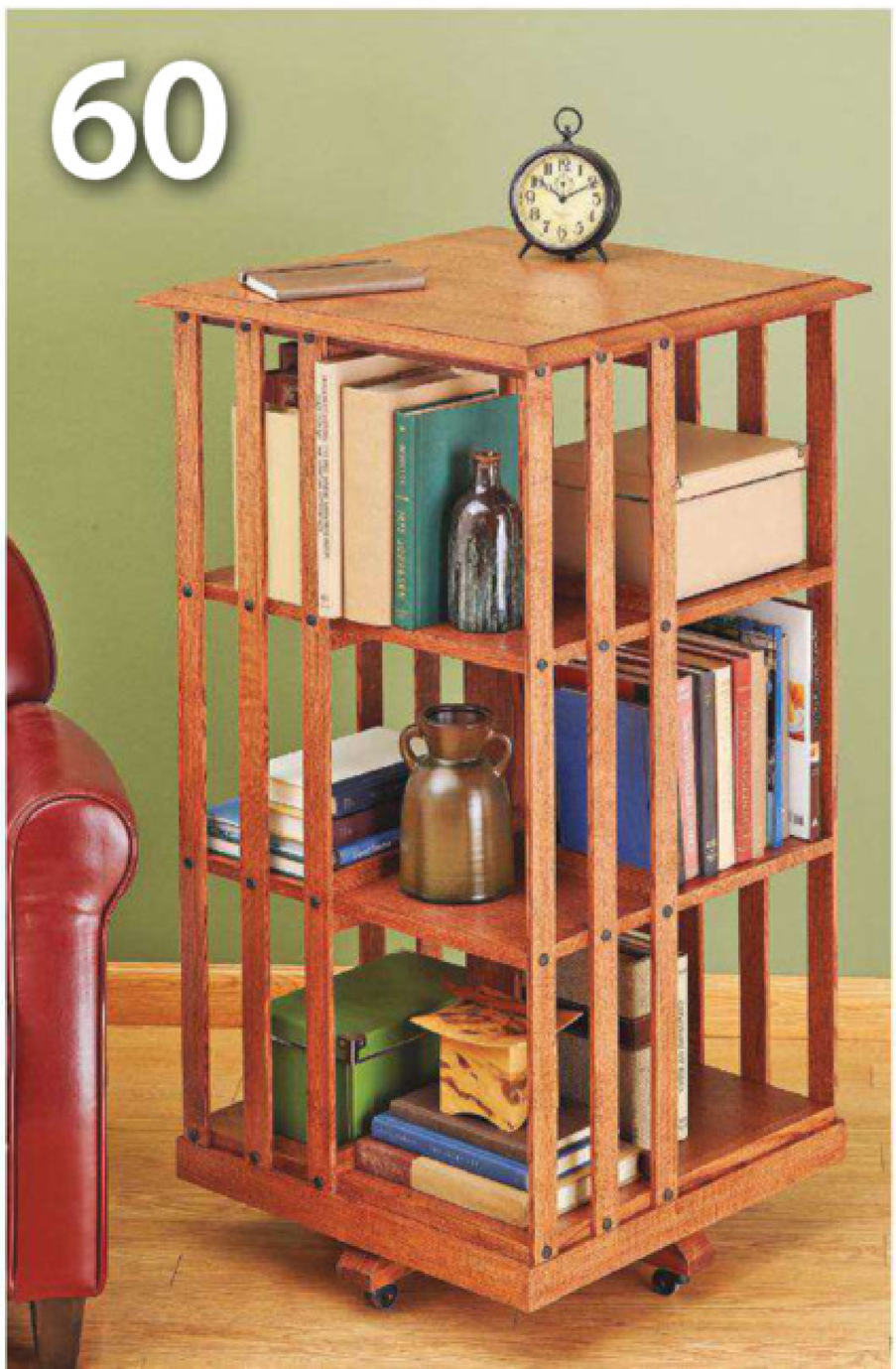
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The *WOOD*® magazine difference:
We build every project, verify every fact, and test every reviewed tool in our workshop to guarantee your success and complete satisfaction.

woodmagazine.com

On our website

woodmagazine.com

MUST-SEE TV ONLY A WOODWORKER COULD LOVE

This summer, skip the "America's Top Amish Hoarder Pawnshop" shows on cable and instead watch video that nourishes, not numbs, your brain. For example...



THE *REAL* REALITY TV

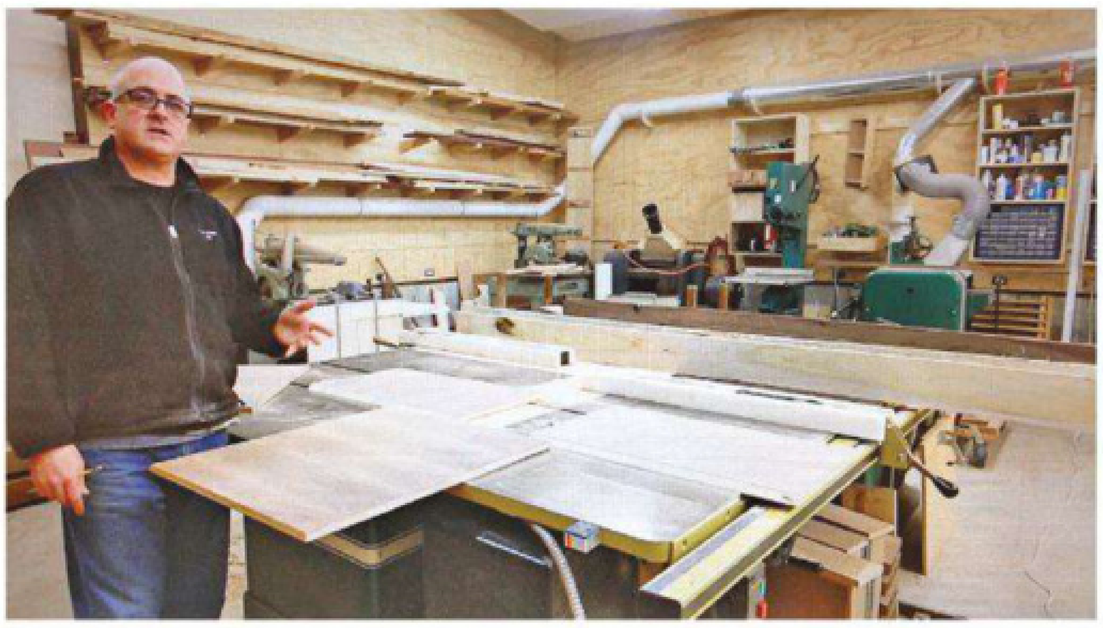
Check out free videos by *WOOD* editors, shot in *WOOD*'s own shop, that teach a wide variety of woodworking skills.

- Using a Dovetail Jig **woodmagazine.com/dtjig**
- Basic Stock Prep **woodmagazine.com/basicprep**
- Prevent and Fix Finish Drips **woodmagazine.com/drips**
- Simple Drawer Mounting **woodmagazine.com/drawmount**
- plus over 100 more videos at **woodmagazine.com/freevideos**

WOODWORKER'S GOT TALENT

Learn from some of America's most talented woodworkers in more than 800 self-produced videos at WOODTube (**woodmagazine.com/woodtube**).

- Make a Crosscut Sled **woodmagazine.com/WTsled**
- Clamping a Too-long Assembly **woodmagazine.com/WTlongclamp**
- Review of Micro-Jig Guide Bars **woodmagazine.com/WTbarreview**
- How to Break Down Sheet Goods **woodmagazine.com/WTsheetgoods**
- Calvin's Desk Project (*below*) **woodmagazine.com/WTCalvindesk**



AMERICAN (RARELY) IDLE

George Vondriska at *Woodworkers Guild of America* tirelessly produces about 10 videos each month to help you step up your shop skills. Check these out:



- Installing Crown Molding on a Cabinet **woodmagazine.com/crowncabinet**
- Random-Orbit Sander Tips and Tricks **woodmagazine.com/ROStips**
- Choosing the Right Tablesaw Blade **woodmagazine.com/chooseblade**
- Easy Iron-on Veneering **woodmagazine.com/irononveneer**

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- **To contact our editors:** E-mail **woodmail@woodmagazine.com**; post on our Facebook at **facebook.com/woodmagazine**, or write to *WOOD* magazine, 1716 Locust St., LS-221, Des Moines, IA 50309.
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- **Updates to previously published projects:** For an up-to-date listing of changes in dimensions and buying-guide sources from issue 1 through today, go to **woodmagazine.com/editorial**.

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Retail Sales: Retailers can order copies of WOOD for resale by e-mailing jennifer.buser@meredith.com

Editor's Angle

WWW: Wow, What a Weekend

As I write this, I'm basking in the afterglow of our first "Weekend With *WOOD*" event, where nearly 200 woodworkers came to the *WOOD* shops to hone their craft with world-class woodworkers that included Marc Adams, Tom McLaughlin, George Vondriska, and others. Those readers left just hours ago, carrying some great woodworking goodies, their heads swimming with new skills and time-saving tips. I left feeling like I'd just made 200 close, personal friends. It was *that* good.



As much as my new friends learned about woodworking, the *WOOD* staff learned even more about putting on an event of this magnitude. And we'll apply those lessons as we plan our next "Weekend With *WOOD*" for spring of 2014. Yup, we're doing it again and making it even better the second time around, bringing back your favorite instructors, as well as new top-of-their-game woodworking teachers to give you even more choices of classes. Watch for details in future issues and at weekendwithwood.com, and "like" the event's Facebook page at facebook.com/WeekendWithWOOD for the most up-to-date announcements.

Now, if you'll excuse me, I need to treat this three-day woodworking hangover with a little hair of the (bench) dog that bit me. That pivot-and-post bookcase on *page 60* looks like just the cure.

See you in the shop!











Dave Campbell
dave.campbell@meredith.com

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Pat. Pend.

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- New innovative cyclone design separates 99%+ of wood waste before the filter. Helps maintain consistent airflow.
- Retrofits to single stage 1/2hp to 3hp dust collectors.
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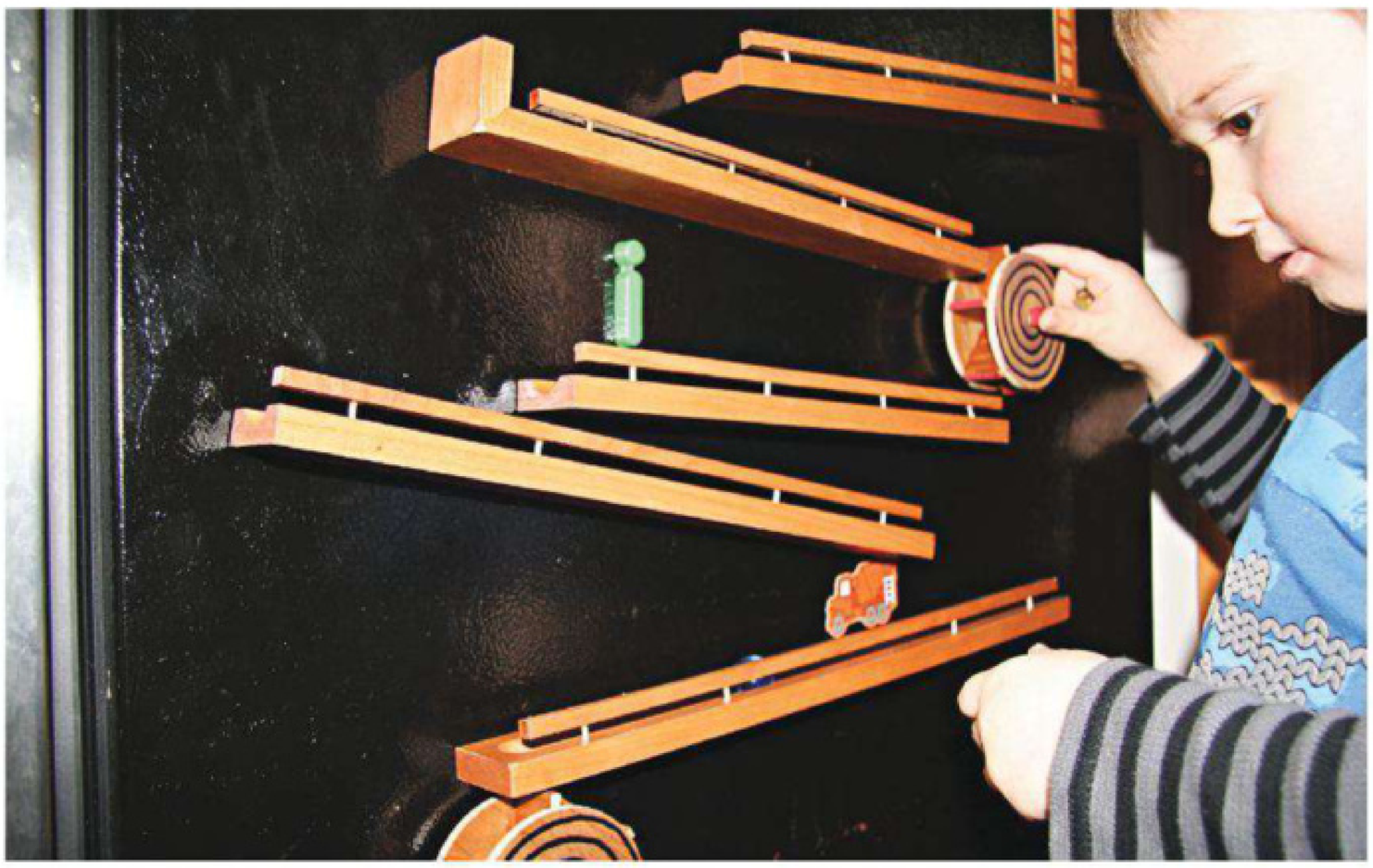
Sounding Board

Our bulletin board for letters, comments, and timely updates

Marble run railing restricts rebellious rollers

After seeing the Magnetic Marble Run plan in issue 216 (December/January 2012/2013), I set to work building multiple sets for nephews and friends. Upon completion, I found your warnings about the marbles jumping the track on too-steep runs or too-high drops to be spot on. But knowing kids and their need for speed, I modified the tracks by adding guard rails elevated on short lengths of dowel. No more marbles ending up under the fridge!

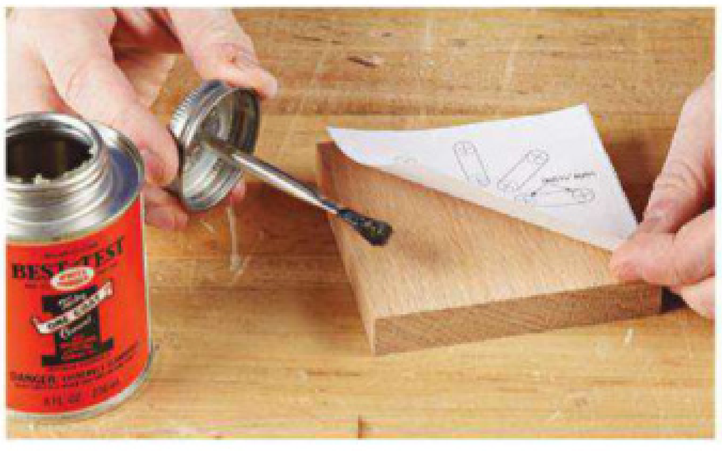
—Russ Walthers, Clifton Park, N.Y.



One more sticky solution

I enjoyed your article titled "Sticky Solutions" in issue 217 (March 2013), but noticed that you didn't mention what I've found to be the easiest method for attaching and removing a pattern: rubber cement. Apply it to the pattern and the wood; if you let it dry before joining them, you'll get an easy-to-remove pattern. Attach the pattern while the glue is still wet and you'll get a stickier bond. Either way, after cutting the piece to shape, you can just pull up the pattern and rub off any remaining cement without affecting finish.

—Thomas S. Luc, Laurel, Md.



More-project approach sparks reader responses

After receiving the March 2013 issue of *WOOD* magazine, I just want to say that I love the new format with all the projects! Fantastic—keep it up!

—Bill Reed, via email

I just read my March issue, and I loved the new and improved *WOOD* magazine. Being a charter and continuous subscriber to the magazine, I've seen all of the changes in the last 28 years. This one is a keeper. Bravo.

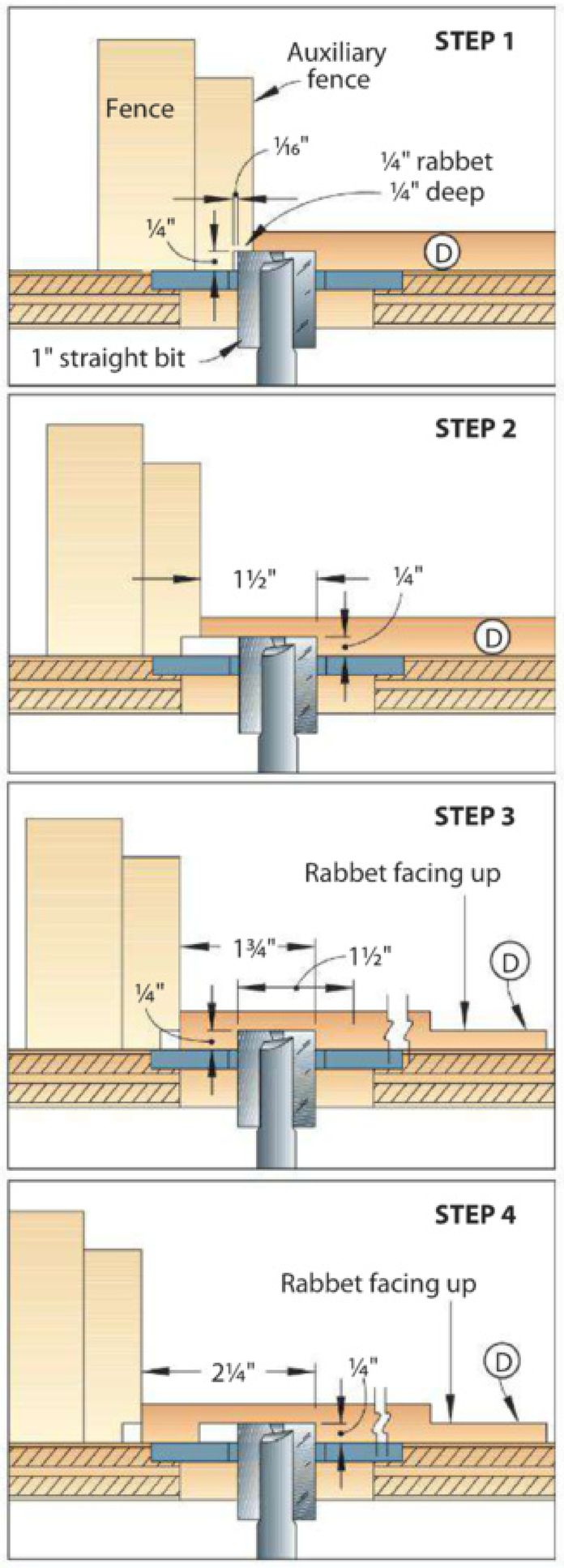
—Paul Brown, Alvin, Texas

I just finished reading the March 2013 issue of *WOOD* and I can say without a doubt, I do not like it. After reading the entire magazine cover to cover, I felt like I'd been reading "Woodworking for Dummies." I'm an intermediate woodworker and don't need a lot of step-by-step instructions at this point.

—Craig Parker, via email

▶ Architectural Box

In issue 217 (March 2013), Drawing 4 on page 61 shows Step 3 and Step 4 in reversed order. They are shown in the proper order below.



HOW TO REACH US

▶ **To contact our editors:** E-mail **woodmail@woodmagazinecom**; post on our Facebook at **facebook.com/woodmagazine**, or write to *WOOD* magazine, 1716 Locust St., LS-221, Des Moines, IA 50309.

▶ **Updates to previously published projects:** For an up-to-date listing of changes in dimensions and buying-guide sources from issue 1 through today, go to **woodmagazine.com/editorial**.

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TRACK SAW

- Motor: 120V, 9A, 1100 watt, 5500 RPM
- Blade diameter: 160mm (6¼")
- Cutting capacity:
  With track: 1 31/32" @ 90°, 1 7/16" @ 45°
  Without track: 2 5/32" @ 90°, 1 5/8" @ 45°



New

W1832
Track Saw Master Pack
Includes: Saw, Guide Rail, and Accessory Pack

W1835 Track Saw
D4363 Accessory Pack **D4362** Guide Rails

14" BANDSAW

- 1 HP, 110V/220V
- Precision ground cast iron table measures 14" x 14" x1½"
- Blade size: 93½" (⅛" to ¾" wide)
- Cutting capacity 13½" (throat)
- Cast iron frame and wheels
- Ball bearing blade guides
- Includes fence and mitre gauge



Feature packed, and an incredible value

W1706 14" Bandsaw

5 HP SPINDLE SHAPER

- Motor: 5 HP, 220V, single-phase, 25A, 3450 RPM
- Precision ground cast iron table measures 35½" x 28" x 2 5/16"
- Spindle travel: 3¼"
- Spindle sizes: ¾", 1", 1¼"
- Spindle capacity: 4¼", 4⅝", 5⅛"

New



W1827 5 HP Spindle Shaper

10" TABLE SAWS with Riving Knife

- 3 HP, 220V, single-phase motor
- Cast iron table size:
  27" x 40¼" (W1819) 53⅝" w/extension,
  (W1820) 74" w/extension)
- Max. rip capacity: (W1819) 29½",
  (W1820) 50"
- Camlock fence with HDPE face

Free 10" Carbide-Tipped Blade



W1819 10" Table Saw
W1820 10" Table Saw w/ Long Ext. Table

OSCILLATING BENCHTOP SPINDLE SANDER

- Motor: ½ HP (360W)
- Spindle Speed: 2500 RPM
- ½"-1½" material thickness range
- 12" aluminum fence
- 2-pc. back fence stop
- Two swing stops
- "No Adjust" hold-down clamp
- Drill 4 holes in a cabinet side in just 2 pulls of the handle

U.S. Patent No. 7,140,813



W1833 Pocket Hole Machine

OSCILLATING BENCHTOP SPINDLE SANDER

- ½ HP, 120V, single-phase, 3.5A
- Table size: 15" L x 11½" W
- 58 Oscillations per minute
- Stroke length: ⅝"
- 2000 RPM (½" spindle)

New



W1831 Oscillating Benchtop Spindle Sander

OUTSTANDING SHOP FOX® DUST COLLECTORS

PORTABLE CYCLONE

- Motor: 1½ HP, 110V/220V, pre-wired 110V, single-phase
- CFM: 806
- Filter: 2.0 micron, pleated
- 20 gal. steel collection drum with casters
- Inlet: 6" (or 4" x 2" with included Y)
- Maximum static pressure: 10.4"
- Includes remote control

New

Only 70½" Tall!



W1823 1½ HP Portable Cyclone Dust Collector

WALL DUST COLLECTOR

- Motor: 1 HP, 110V/220V, single-phase
- Air suction capacity: 537 CFM
- Bag capacity: 2 cubic feet
- Standard bag filtration: 2.5 micron
- Static pressure: 7.2"



New

W1826 Wall Dust Collector

3-SPEED HANGING AIR FILTER

- Motor: ⅛ HP, 120V, 60Hz, 1A single-phase
- Air flow: 260, 362, and 409 CFM
- Outer filter: 5.0 micron
- Inner filter: 1.0 micron

New



INCLUDES TIMER AND REMOTE!

W1830 Hanging Air Filter

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Rafter square adapts a sled to make miters

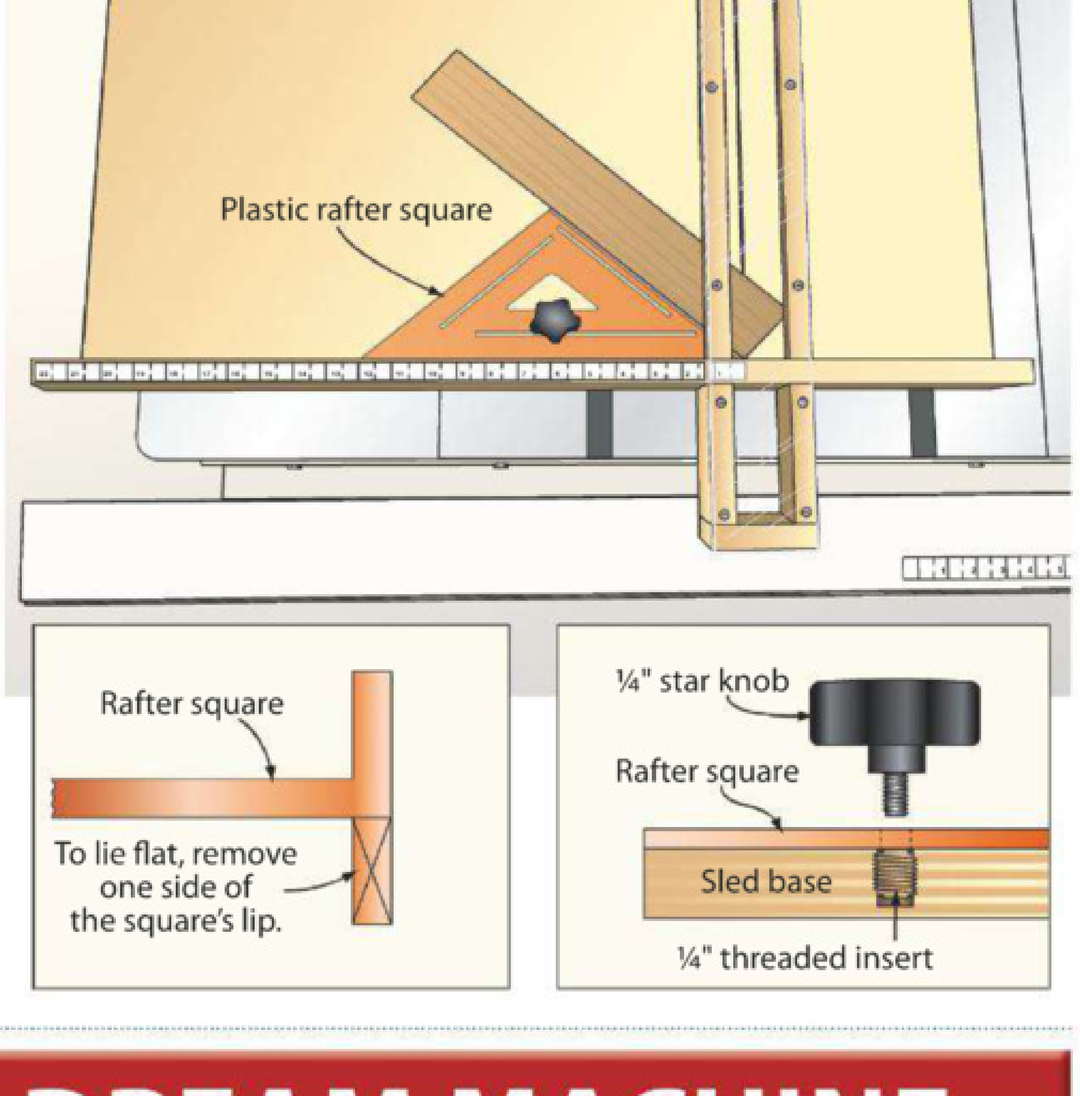
For accurate crosscuts on the tablesaw, I rely on a sled. I wanted that same precision for miters, but I didn't want to build another sled for 45° cuts. That's when I came up with this simple and inexpensive upgrade to my existing sled. All it takes is a plastic rafter square.

Begin by grinding or filing away one side of the square's lip so it lies flat. Align one corner of the square with the edge of the saw kerf in the sled, placing the square's longest side tightly against the sled's fence. Drill a ⅜" hole through the square and into the sled, and install a threaded insert in that hole. Now you can quickly install the rafter square for 45° cuts, and remove it by using a star knob.

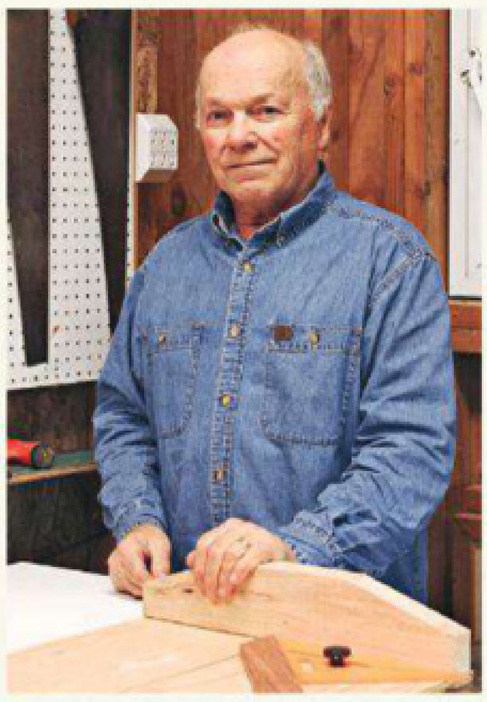
—Bill Wells, Olympia, Wash.

TOP SHOP TIP

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







Photograph by: Bill Wells

For sending this issue's Top Shop Tip, Bill receives a Jet 12" drill press with digital readout worth $375.

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.

JET

DREAM MACHINE GIVEAWAY!



Win woodworking machines worth more than $5,000 from Jet Tools!

Go online today, and you could be enjoying all of the Jet machines shown at *left* by the end of this summer! Visit **woodmagazine.com/jetdreammachines** to sign up. Enter every day, if you like, to increase your chances of winning!

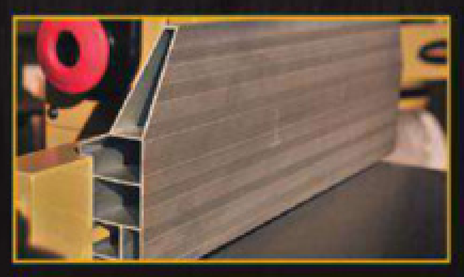
NO PURCHASE NECESSARY TO ENTER OR WIN. Subject to Official Rules at www.woodmagazine.com/jetdreammachines. The Jet Dream Machine Giveaway begins at 12:01 a.m. CT on 06/27/13 and ends at 11:59 p.m. CT on 12/31/13. Open to legal residents of the 50 United States, and the District of Columbia, 21 years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

 continued on page 8



IMAGINATION IN A CLASS OF ITS OWN

Introducing the all-new 15" bandsaw from Powermatic. The PM1500 packs all the features of a larger bandsaw into a size that is perfect for your workshop.



SIDE PLATE
Oversized side plate can be used in the horizontal or vertical position.



TENSION RELEASE
Blade tension release with electrical interlock prevents the bandsaw from starting when the blade is de-tensioned or released.

WHEELS
Solid cast iron upper and lower wheels create the momentum needed for heavy resaw.

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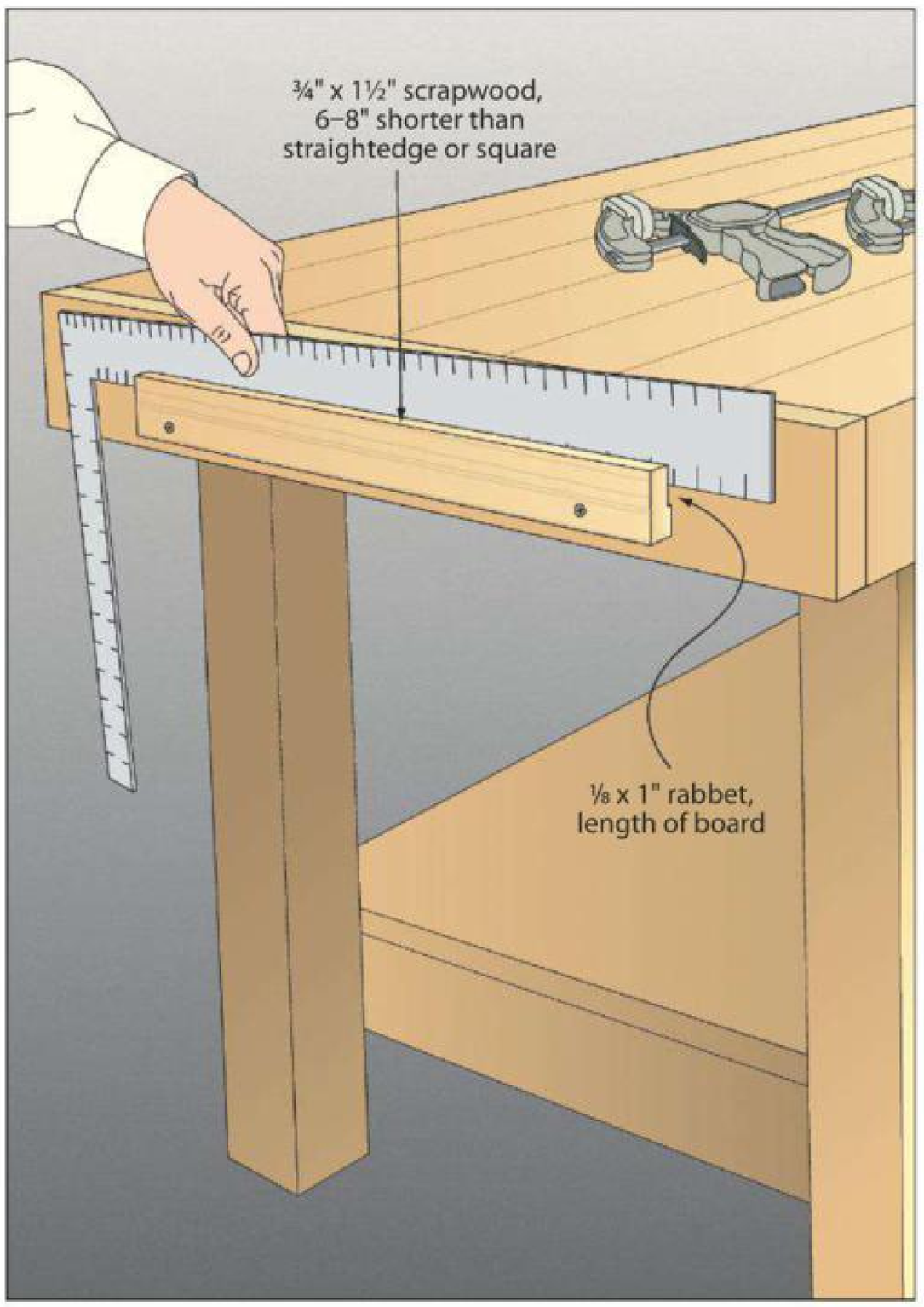
StoreMags

Shop Tips

Easy workbench add-on: Quick-draw square holder

To keep my framing square close at hand but still out of the way, I mounted this simple holder to the end of my workbench. You could do the same for straightedges and combination squares, too.

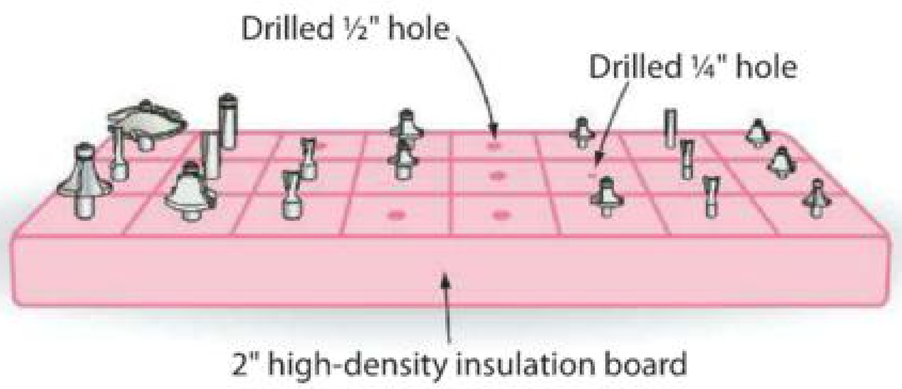
—Gene Dineralter, New London, Conn.



Think pink to insulate router bits from damage

To keep router bits organized and protected from damage, drill holes to plant them upright in a piece of 2" high-density insulation board. It costs less than plastic trays, and won't expand or contract like a wooden holder.

—Joe Osfar, Winchester, Wis.



continued on page 10

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So easy to on a lathe, no one will believe you made something of this quality in 15 minutes. Requires mandrel, bushings (Item #PKCP3000BU $5.95) & 3/8" drill bit (Item #PKEXEC-3/8 $3.95)

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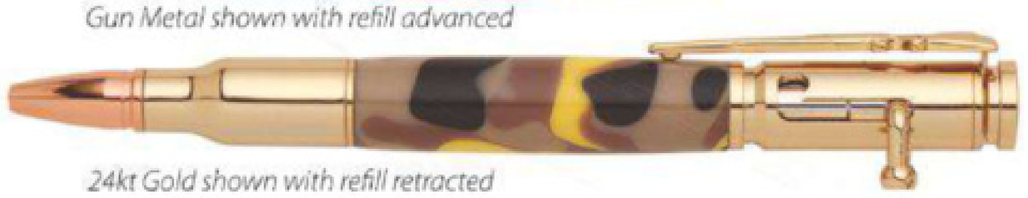
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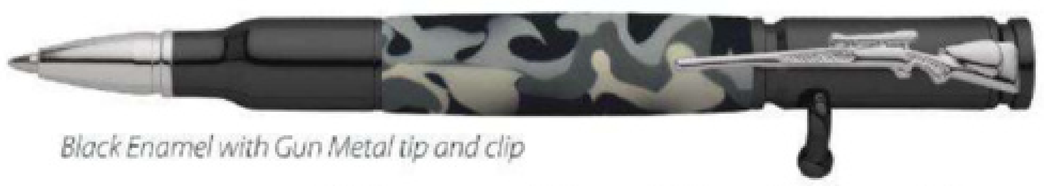
Original Bolt Action Pens



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
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Shop Tips

No-wrestle tire changer

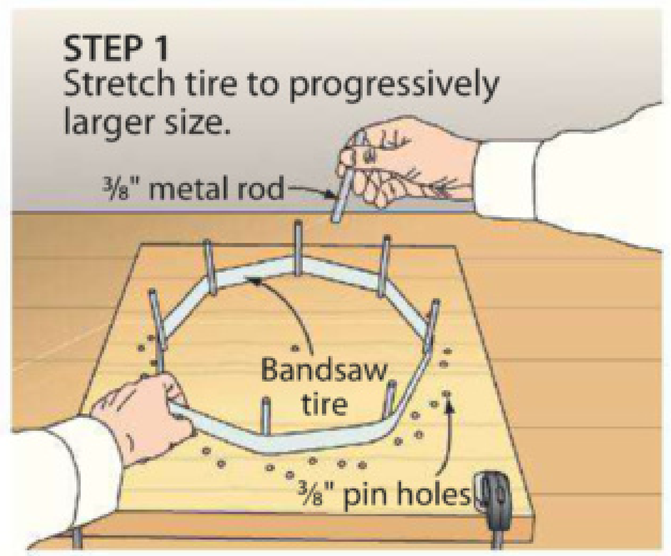
Replacing the tires on a bandsaw can turn into a real wrestling match. This jig simplifies the process.

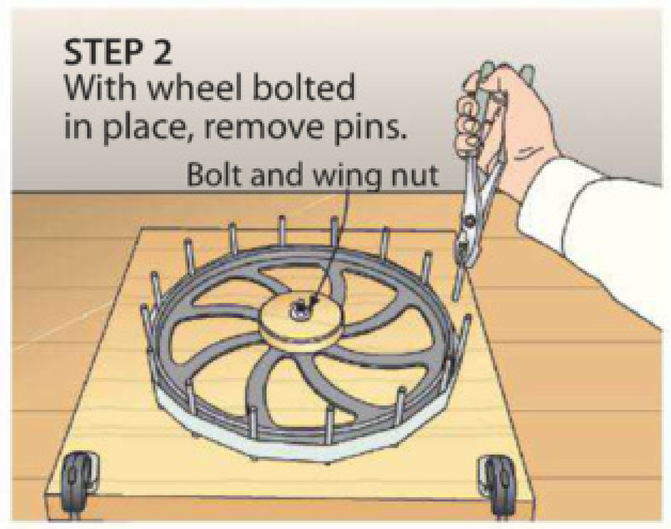
In the center of a piece of scrap at least 3" wider and longer than your bandsaw wheel's diameter, drill a hole to later fit a bolt. With the bandsaw wheel centered on the hole, mark the wheel's outline. Remove the wheel and drill a series of ⅜" pin holes in a concentric circle ¼" inside the marked circle.

Insert short lengths of metal rod into those holes, and loop the new tire around these metal rods [**Step 1**]. Then, drill another series of holes ⅜" outside the existing ones, tangent to the wheel's outline.

Slide one metal rod out from behind the tire and place it in an outside hole. Stretch the tire to that rod and repeat for all the rods around the circle. Drill additional holes on larger concentric circles as necessary until you can fit the bandsaw's wheel inside the stretched tire. Lock the bandsaw wheel in place with a bolt and wing nut, and remove the pins one at a time, letting the tire tighten onto the wheel [**Step 2**].

—Thomas Menn, Pearland, Texas





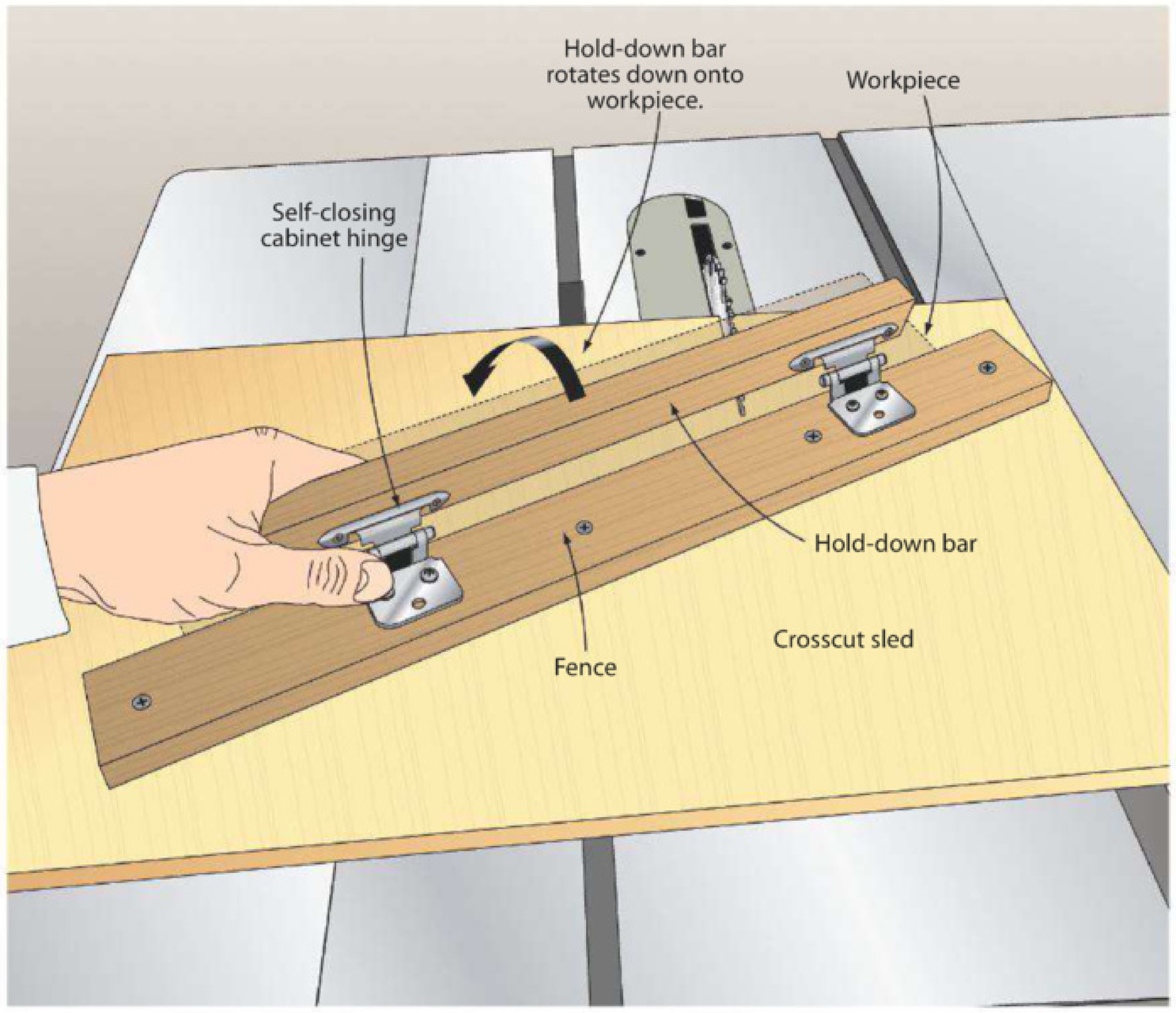
Hinged hold-down locks down small cutoffs

When miter-cutting multiple small pieces for a segmented turning, I needed a way to secure the workpiece without getting my fingers close to the blade. My solution is as simple as opening and closing a door.

First, connect two lengths of scrap of the same thickness with a pair of self-closing cabinet hinges. Transfer the miter angle to a basic crosscut sled (a piece of plywood with runners that fit the saw's miter channels), and mount the hinged fence to the sled with screws, leaving the hold-down bar free to pivot. The self-closing action of the hinges pushes down evenly on both sides of the blade, keeping the workpiece steady and the cutoff captured.

—Mike Harman, Beavercreek, Ohio

continued on page 12





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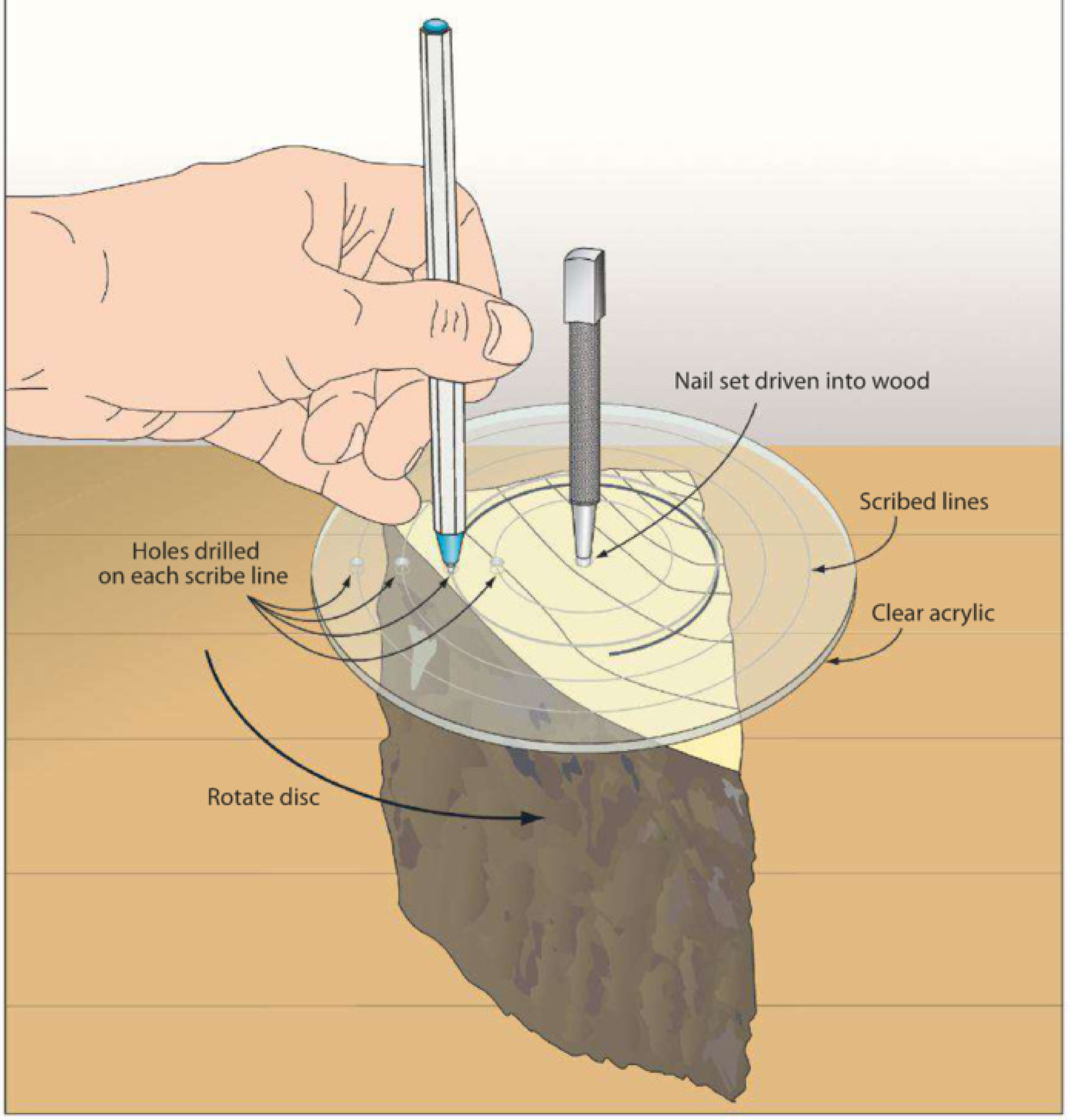
Shop Tips

Irregular piece? Cut out the waste before turning

I liked Dick Ayer's tip (December/January 2009/2010 issue) for using an acrylic disc to mark centers on odd-shaped turning blanks so much, I made one myself, and I added a few improvements.

Drill a hole large enough for a nail set or awl in the disc's center and on each of the concentric circles. Tap the nail set into the center and insert a pen or pencil through the hole of the circle that encompasses the largest area of fully workable wood. Rotate the disc, using it as a compass to mark the end of the blank. Cut off most of the waste wood on the bandsaw to save time on the lathe.

—Keith Jones, Epworth, Ga.

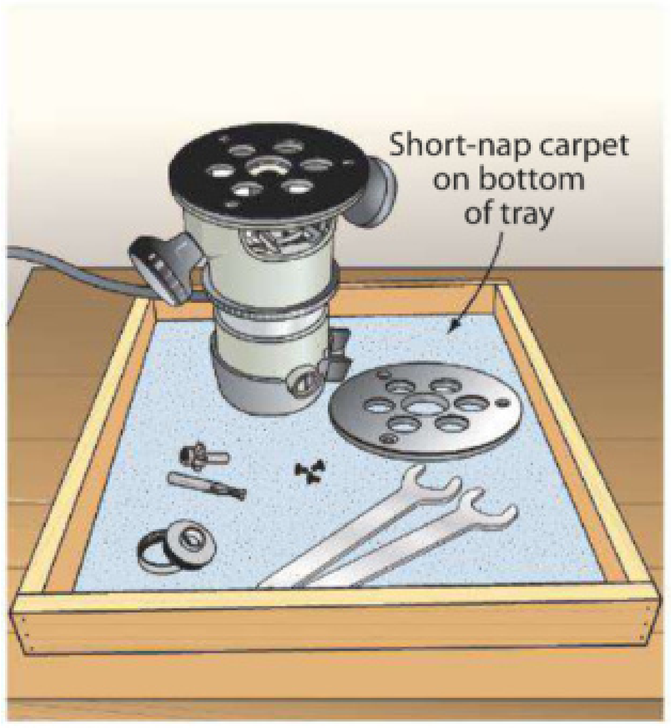




Parts corral captures runaway pieces

Ever disassemble a tool in your shop and, upon reassembly, found one or more of the parts missing? Prevent that from happening by building a shallow tray lined with short-nap carpet or a nonslip mat. That makes parts easy to spot and prevents them from bouncing away.

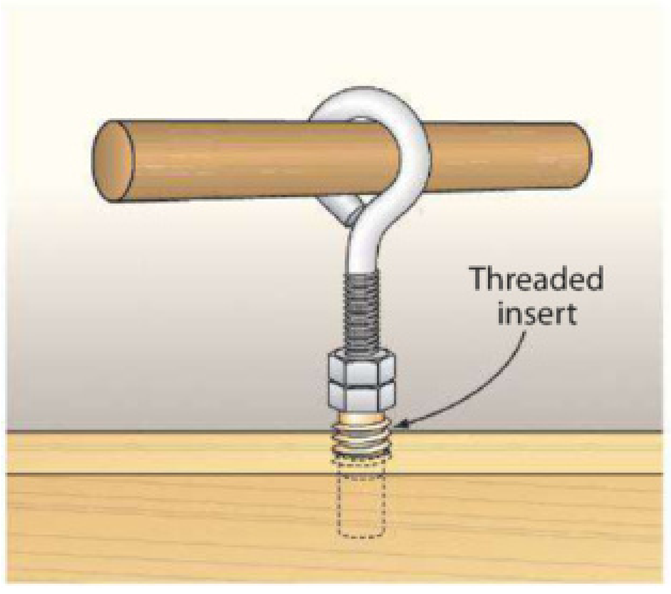
—Jerry Gibbs, Grand Haven, Mich.



Get a handle on driving threaded inserts

Anyone who's tried driving a threaded insert into a workpiece by hand knows the challenge of keeping it perpendicular to the surface. This handy trick makes it simple to do. Just thread a pair of nuts onto an eyebolt, and the bolt into your threaded insert. Snug the nuts against the insert and then each other to lock the eyebolt in place. Slide a length of dowel through the bolt's eye as a handle, and give it a few firm twists to drive the insert straight in.

—David Gruenhagen, Boise, Idaho



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Great Ideas For Your Shop

Hand-Plane Rack



Keep your collection close at hand, whether hanging on a wall or sitting on a benchtop.

Don't worry: Storing your hand planes blade-down on this all-wood rack won't dull them. It will, however, showcase them beautifully in a customized fixture you can build in just a couple of hours.

Before beginning construction, lay out your planes as shown *below*. ***Note:*** *If you intend to add planes in the future, build the rack with a few extra slots.* Measure the width and length of the collection to determine the size of the tray. Cut the tray to size from ¾" Baltic birch plywood with a 20° bevel along its bottom end.

Glue the bottom cleat flush with the tray's bottom, and then install the vertical cleats and dividers. When the glue holding the cleats in place dries completely, cut a 20° bevel along the tray's top. Glue and nail the sides, top, and back in place. The back should stand about 3" proud of the top to accommodate the mounting holes. Hang the rack on the wall from screws or place it on your benchtop.

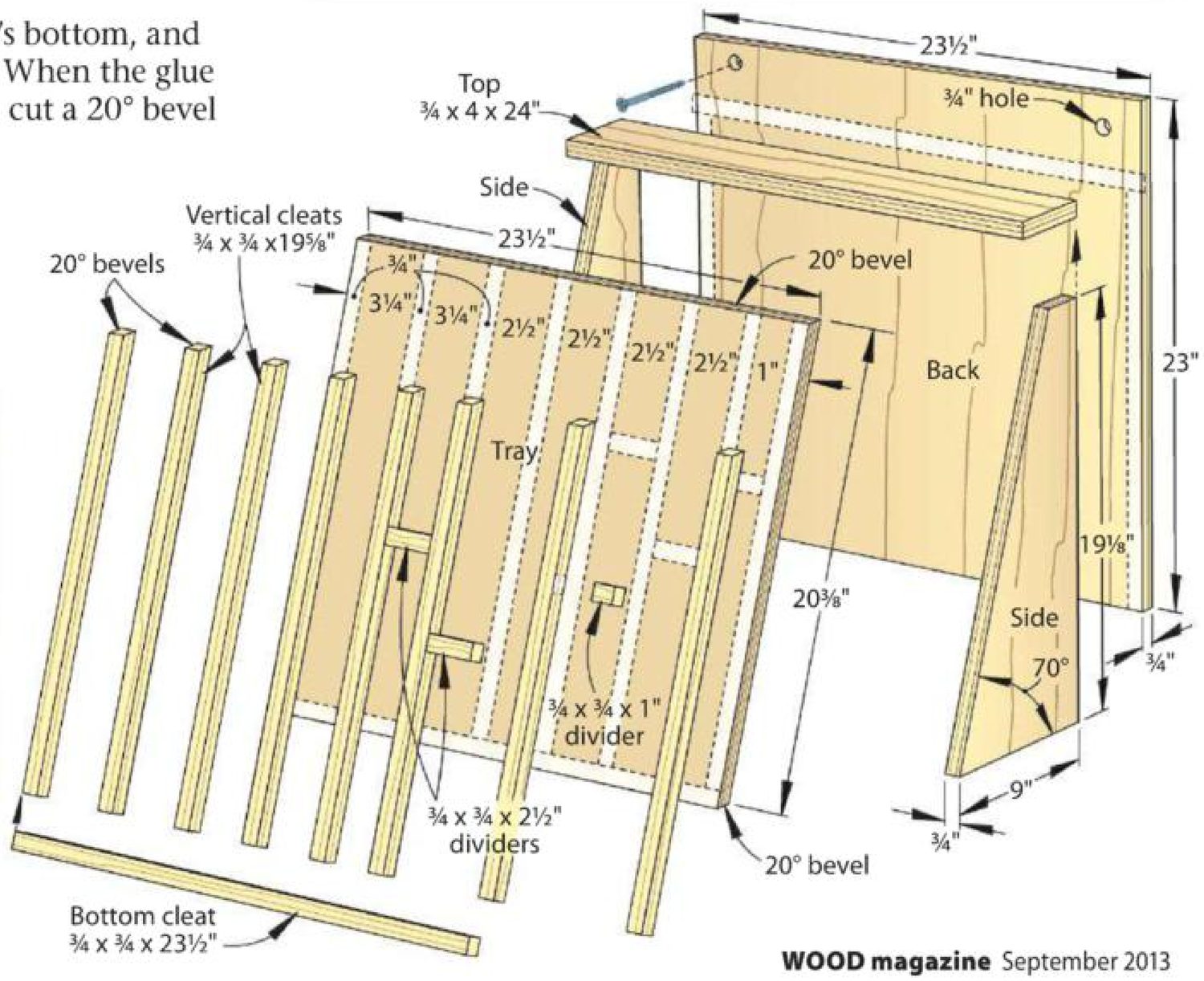


Leave room surrounding each plane for ¾"-wide solid wood cleats and dividers, plus ¼" of wiggle room.

More Resources

Watch and learn with these FREE videos:

- De-rust an old plane: **woodmagazine.com/electrolysis**
- Tune a hand plane: **woodmagazine.com/handplanetuneup**
- Flatten a board with hand tools: **woodmagazine.com/handplaneflat**



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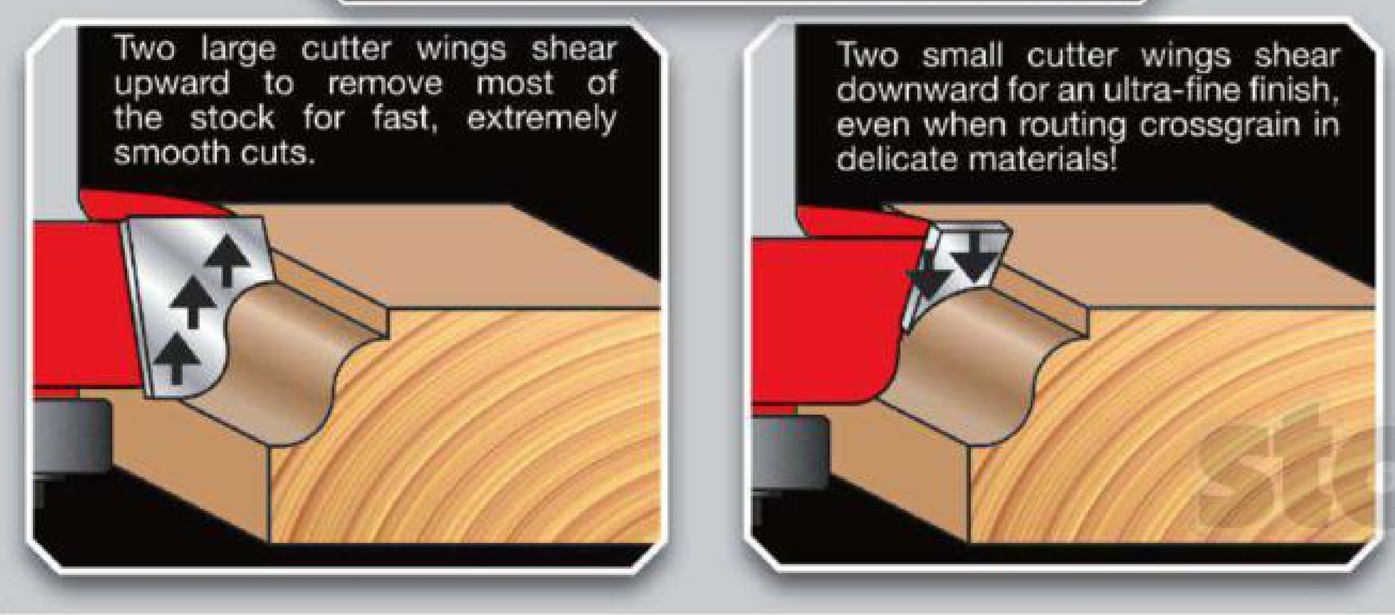
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Removing screwed-up screws

When you can neither finish driving nor back out a screw, these two options save the day.

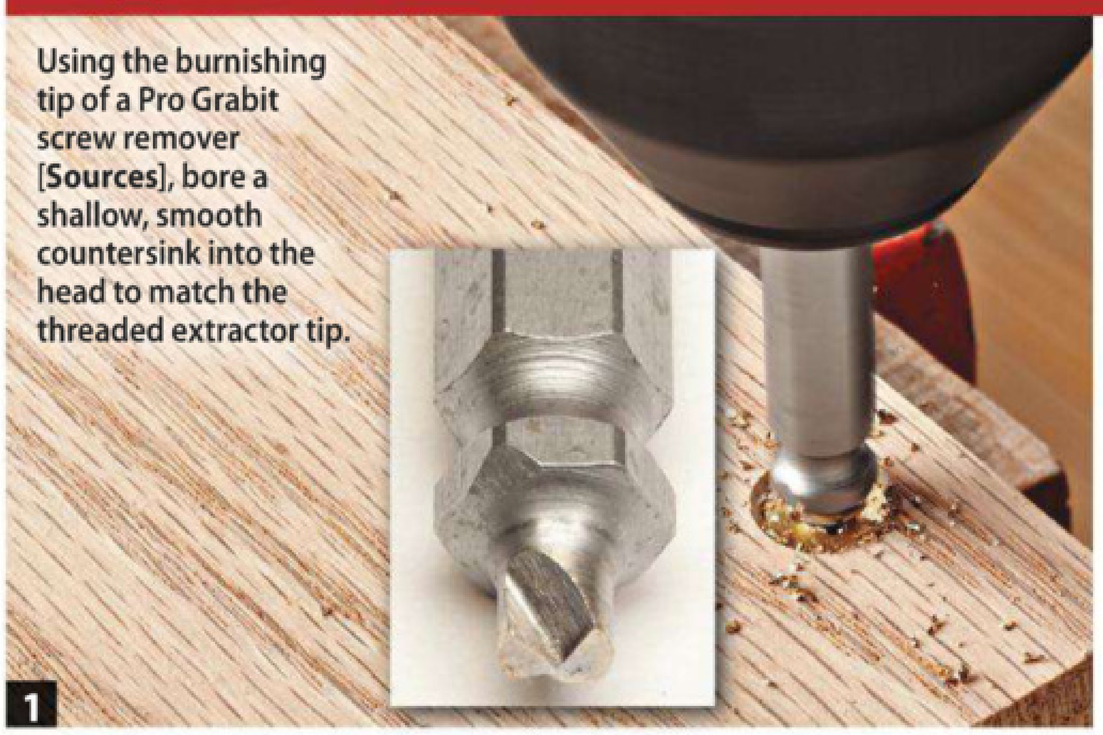




Stripped screw head: Burnish it and back it out

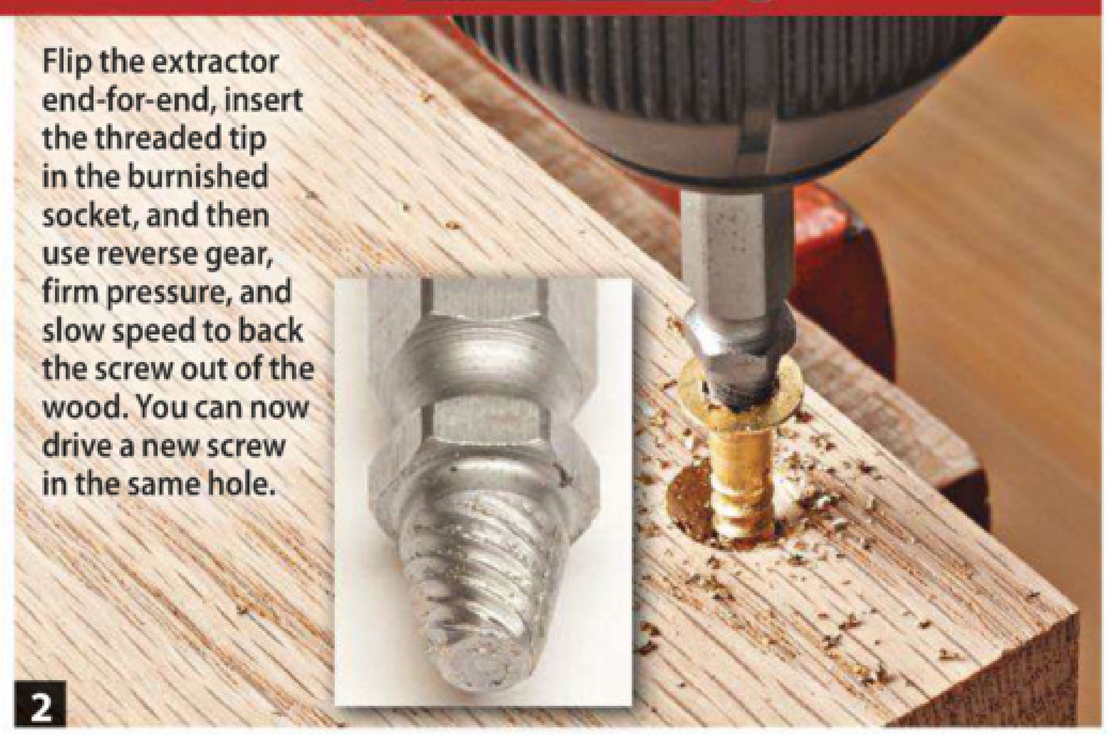


Using the burnishing tip of a Pro Grabit screw remover [**Sources**], bore a shallow, smooth countersink into the head to match the threaded extractor tip.



1

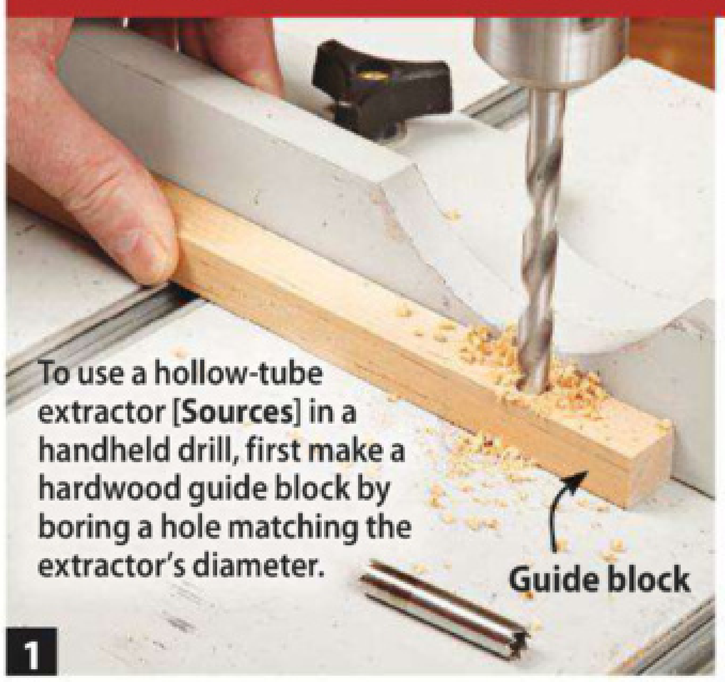
Flip the extractor end-for-end, insert the threaded tip in the burnished socket, and then use reverse gear, firm pressure, and slow speed to back the screw out of the wood. You can now drive a new screw in the same hole.



2

Broken screw: Bore around it, plug the hole, and start over

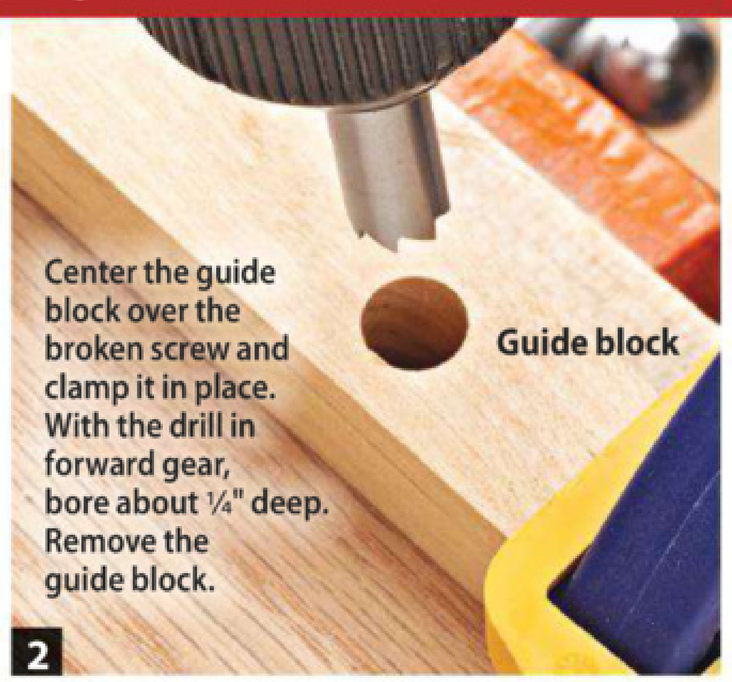




To use a hollow-tube extractor [**Sources**] in a handheld drill, first make a hardwood guide block by boring a hole matching the extractor's diameter.

Guide block

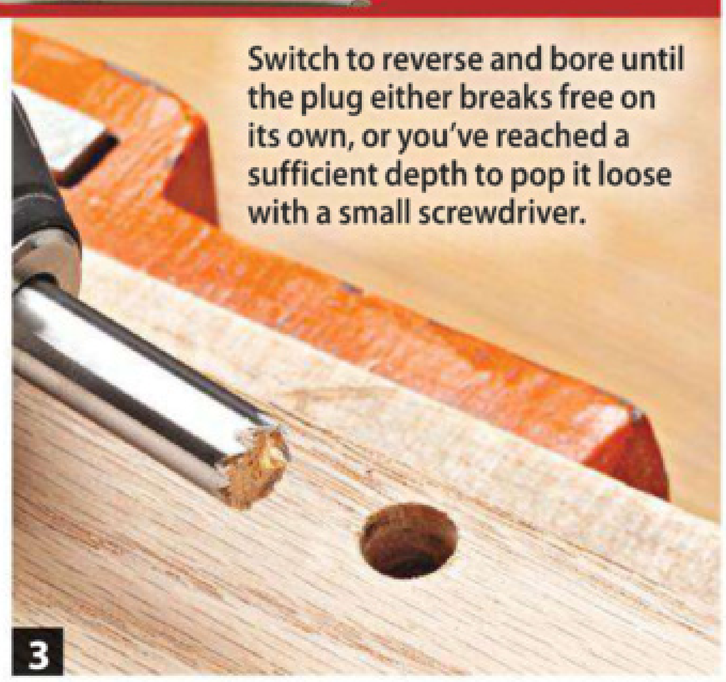
1



Center the guide block over the broken screw and clamp it in place. With the drill in forward gear, bore about ¼" deep. Remove the guide block.

Guide block

2



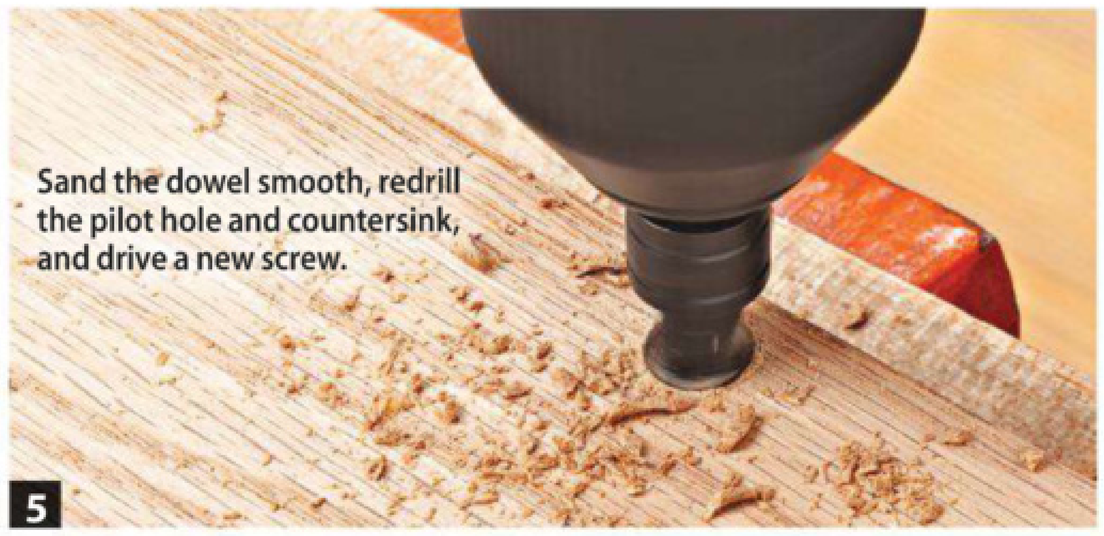
Switch to reverse and bore until the plug either breaks free on its own, or you've reached a sufficient depth to pop it loose with a small screwdriver.

3



Glue in a dowel to fill the hole, leaving it slightly proud of the surface. Allow it to dry.

4



Sand the dowel smooth, redrill the pilot hole and countersink, and drive a new screw.

5

Sources

Pro Grabit screw remover: 3-piece set, no. 148984, $22.50, Woodcraft, 800-225-1153, woodcraft.com.

Hollow-tube screw extractor: ¼" diameter, no. 124210, $10.99; 5/16" diameter, no. 124211, $12.99; ⅜" diameter, no. 124212, $12.99, Woodcraft.

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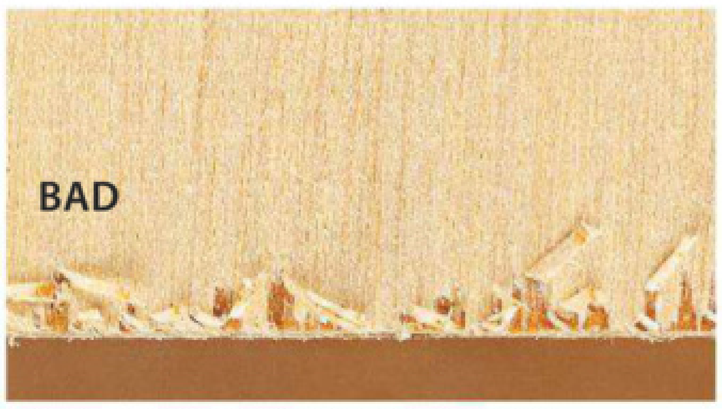
Yes, you can make cabinet-quality cuts with this much-maligned tool, by using these can't-miss tips.

Start with the right blade

Replace the 24-tooth blade that came with the saw with a 50- to 60-tooth blade for cleaner crosscuts in solid wood, veneered plywood, and other sheet goods. For general use when cut quality isn't critical, use a 40-tooth blade. If you're ripping solid wood, switch back to the 24-tooth blade.

Beat tear-out in 3 ways

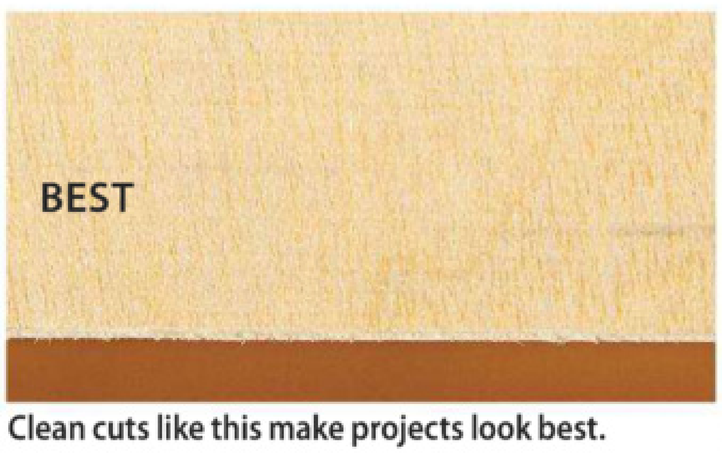
Because a circular-saw blade cuts on an upward rotation, the bottom face, in which the teeth enter the cut, will almost always have a clean, tear-out-free surface. Meanwhile, the top face suffers tear-out so bad it cannot be used in a visible area on a project. (See the three photos at *right* for different degrees of grain tear-out.) So whenever possible, put the best face down when cutting. When you must cut with the best face up, use one of these tips to make your workpiece edges look like the one in the best photo.



An unsupported cut incurs bad tear-out.



Covering the top face with masking tape helps.



Clean cuts like this make projects look best.

1. Score the cutline first

Make your cut in two passes instead of one. A shallow scoring pass cleanly shears the surface fibers rather than lifting them upward.


Make a scoring pass about ⅛" deep by lowering your saw's footplate. When done, raise the footplate and make the through cut.

continued on page 20

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2. Set clearance to zero

To support the wood fibers, especially plywood's thin veneers, where the blade exits the workpiece, attach an auxiliary subplate to your saw's footplate (also called a base or shoe). When you plunge-cut through this extra layer, you'll create a zero-clearance opening around the blade to eliminate tear-out.

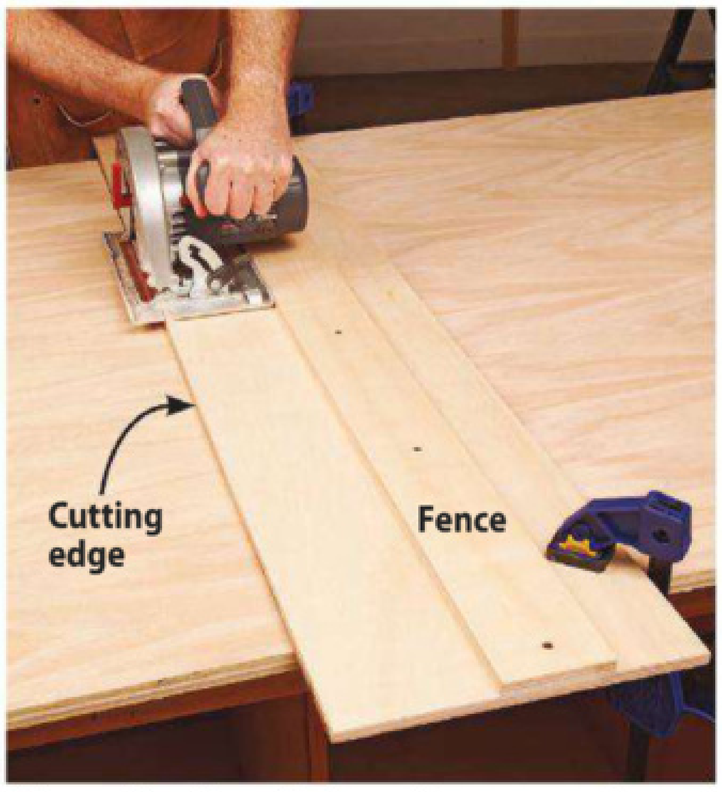
CAUTION: Be extra careful when using a saw this way because the blade guard cannot cover the blade below the auxiliary footplate.



Attach a ¼"-thick hardboard or MDF auxiliary subplate to your saw's footplate with countersunk machine screws. Plunge the blade through the blank for zero clearance.

3. Make your own guide

A custom edge guide for your saw not only beats tear-out, but also makes it easy to align cuts. Start by building a jig based on the drawing *below*; adjust the width as needed for your saw. We made ours long enough for crosscuts in 4'-wide sheet goods. Make the base's cutting side about ½" wider than the distance between your saw's blade and the footplate edge below the motor. Trim the guide to custom-fit your saw by running the footplate against the fence to create the zero-clearance support. Clamp the jig on the "keeper" piece when cutting because the jig does not provide zero-clearance for the cutoff.



After cutting the guide to match your saw, clamp that edge directly on your layout marks. Then cut while holding the saw against the fence.

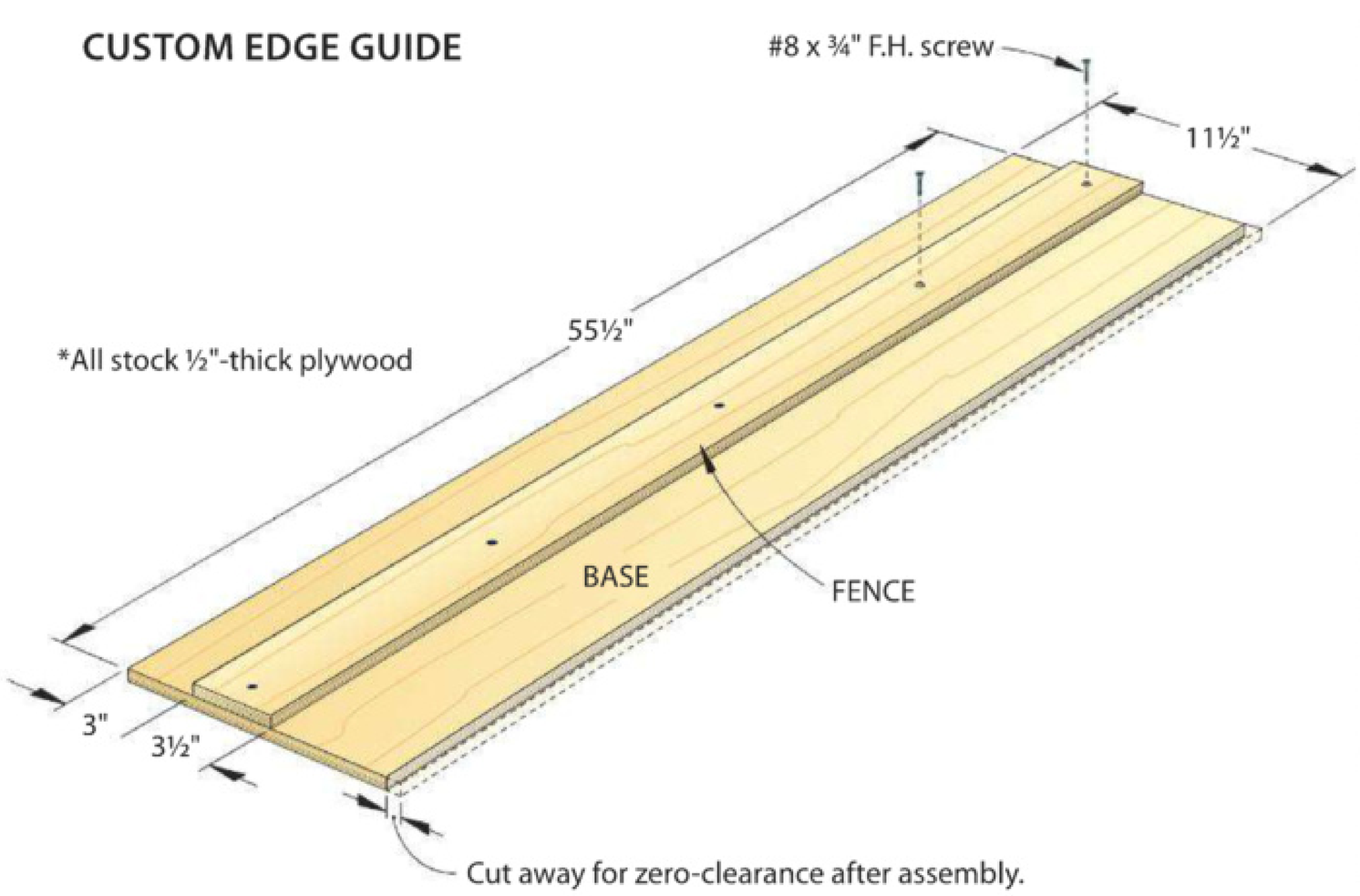
Prevent splintered cutoffs

If you crosscut solid wood or plywood without supporting both the keeper piece *and* the cutoff, you'll frequently get a splintery tear-out along the far edge when the cutoff drops away before you've finished the cut. To avoid this, dedicate two inexpensive boards as "sacrificial" supports, set in place on sawhorses or your workbench top.



When crosscutting a board, place it on a pair of 2×4s. Then, with the blade set to cut slightly into the supports, cut your workpiece to length.

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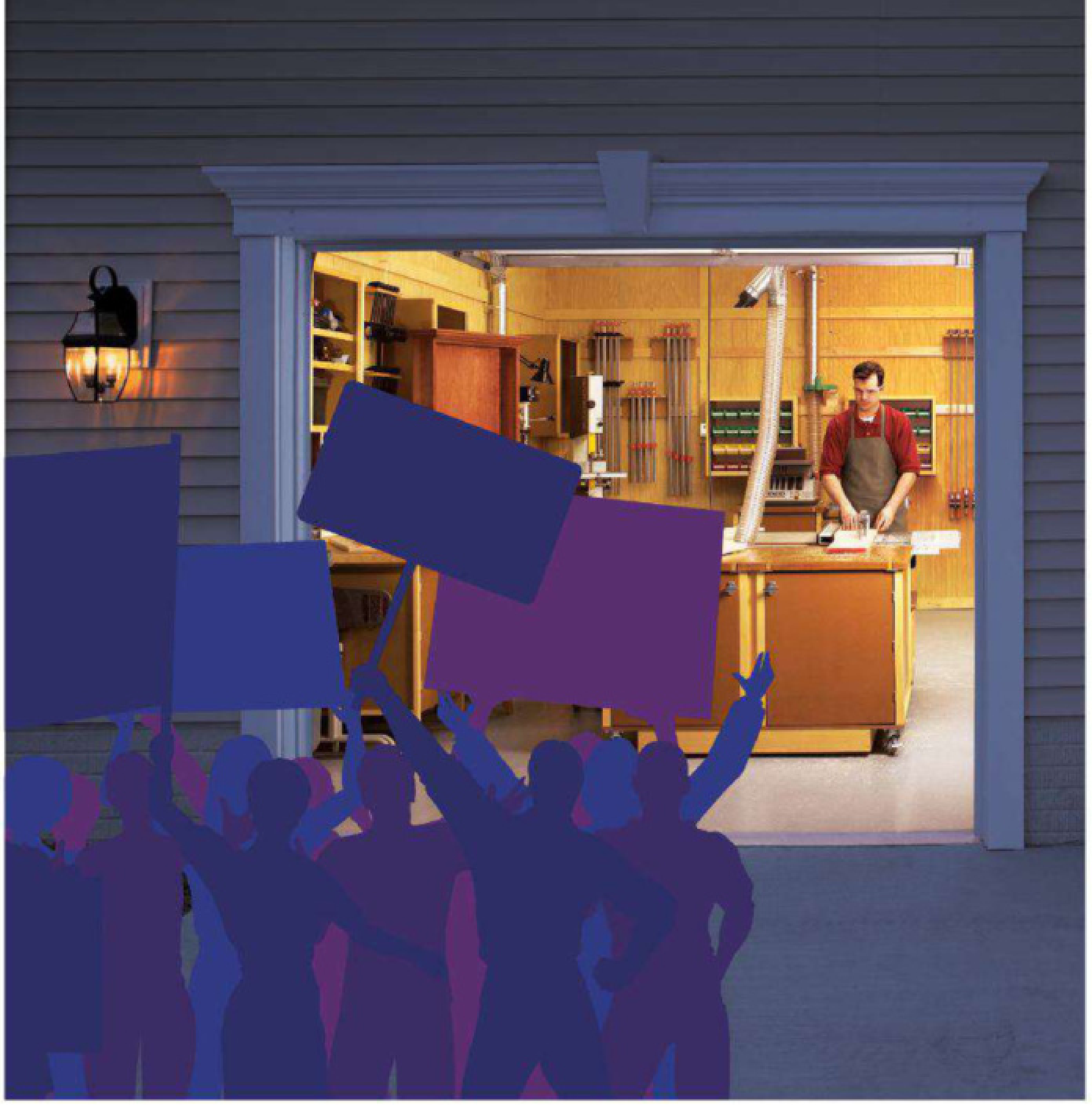
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Straight talk from the WOOD-wide web

Won't you be a good neighbor?



Whenever I escape to the workshop, I might as well be stranded on a (well-equipped) deserted island. Save for the occasional visit from my wife or one of my sons, I am a man unto himself.

In reality, though, my garage shop is surrounded on all sides not by white sand beaches but by neighbors. What I do in the shop—and when I do it—impacts the folks living around me, for better or worse.

That's why I chose to embrace my neighbors (no, not *that* way) by putting into place some friendly shop policies. After all, it makes more sense to prevent neighborly friction than to mend fences after the fact. Unless you have a basement shop, chances are good you can help keep the 'hood happier by following these simple recommendations.

▶ **Show consideration.** Ever get on such a roll in the shop that you miss meals, bed times, or the kids' birthdays? Working late in the evening (or wee hours of the morning) with a thickness planer, router, or other loud power tool can rattle the windows and jangle the nerves of the folks who live next door. To help keep the peace, wrap up your power tool operations early in the evening and save the after-dark hours for hand tool work, sharpening, clean-up, or planning for the next shop session. This will go a long way toward amicable relations.

▶ **Use your power (tools) for good, not evil.** Do the folks across the back fence need a door trimmed because they replaced their carpeting? Offer to tackle that chore for them. If someone on your block fancies himself a barbecue pit master, make a gift of your abundance of hardwood scraps for smoking meats. And, if your neighbor has a broken drawer runner, you'll be a hometown hero if you fix the old one or mill a new part.

▶ **Know Thy Neighbor.** A garage shop with an open door attracts neighbors like iron filings to a rare-earth magnet. Maybe they drop by and pepper you with "whaddaya doin'?" questions. Showing your nosy neighbor what's on the bench will give them a better understanding of what you do and just might lead to a paying commission to build a bookshelf. (If you feel awkward charging for your labor, consider pricing the job to just cover the cost of the project materials and that new cordless drill you've been eyeing.)

I'm not saying you should hang an "open for tours" sign on your shop, but taking a few simple steps to be open and friendly with your neighbors will make your life easier. At the very least, you'll have something to talk about at the next neighborhood get-together!

Tom Iovino of Tampa, Fla., is a founding member of the Modern Woodworkers Association. He blogs prolifically at tomsworkbench.com.

Tom's Top Five Shop Locations

From most- to least-neighborly:

#5 Basement
#4 Outbuilding
#3 Garage
#2 Your driveway
#1 Your neighbor's driveway



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The Stauer *1930s Dashtronic* deftly blends the modern functionality of a 21-jewel automatic movement and 3-ATM water resistance with the distinctive, retro look of a jumping display (not an actual jumping complication). The stainless steel 1 1/2" case is complemented with a black alligator-embossed leather band. The band is 9 1/2" long and will fit a 7–8 1/2" wrist.



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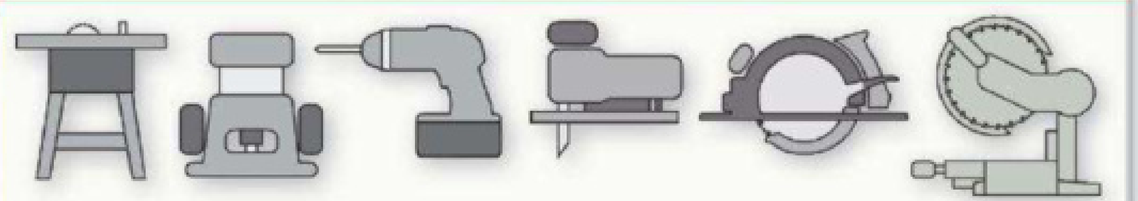
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Rating of A+

Paneled Entry Bench

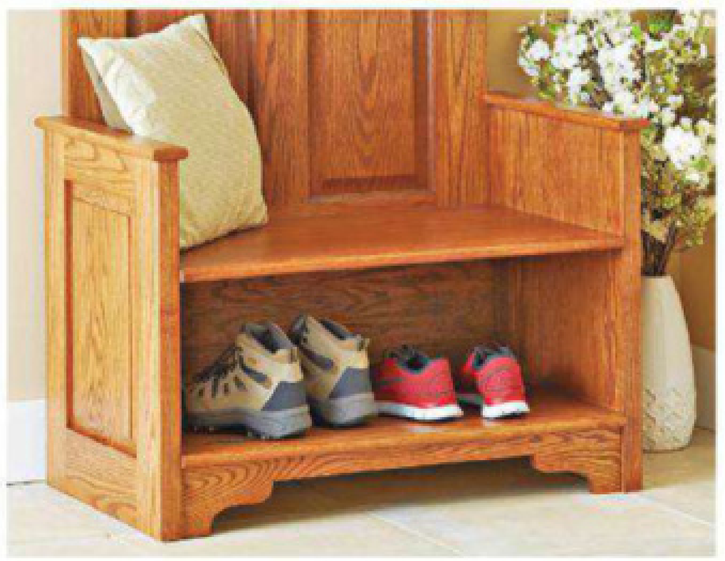
Repurpose a new or salvaged door for stylish storage where you need it most.

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TOOLS NEEDED



The classic raised panels on this tall-back bench help it fit into many decorating schemes. If you don't like the look of new construction—we bought our 32" oak door at a home center—you could build a pine bench with a recycled door from an architectural salvage dealer. Distressed and painted, it would fit styles from country to urban loft. Omit the drawer to create an open storage cubby, or forget the back/door completely and build just the bench.





Overall dimensions:
36⅛"W × 21⅝"D × 81¼"H
Approximate materials cost: $375

Begin with a box for the base

1 Cut ¾" plywood to size [**Materials List** and **Cutting Diagram** on *page 30*] for the shelves (A) and back (B) [**Drawing 1**]. Cut the shelf edging (C) to size from ¾" solid stock.

2 Glue and clamp one edging (C) to the front edge of each shelf (A), flush with the shelf on both faces and ends.

3 Rout a bullnose profile on the front edge of each shelf assembly (A/C). To do this, install a ⅜" round-over bit in your router. Set the bit depth so the guide bearing rides just below the center of the edge [**Photo A**], and round over one edge. Flip the shelf over and repeat.

4 With the best face of the bottom shelf (A/C) facing up, glue on the back (B) as shown in **Photo B**. Ensure the parts are at a right angle to each other, and clamp.

5 Cut two scrapwood spacers 11" long (the same length as the back width) to support the front edge of the remaining shelf (A/C) as you glue it to the top of the back (B) [**Photo C**]. Leave the spacers in place for the next step.

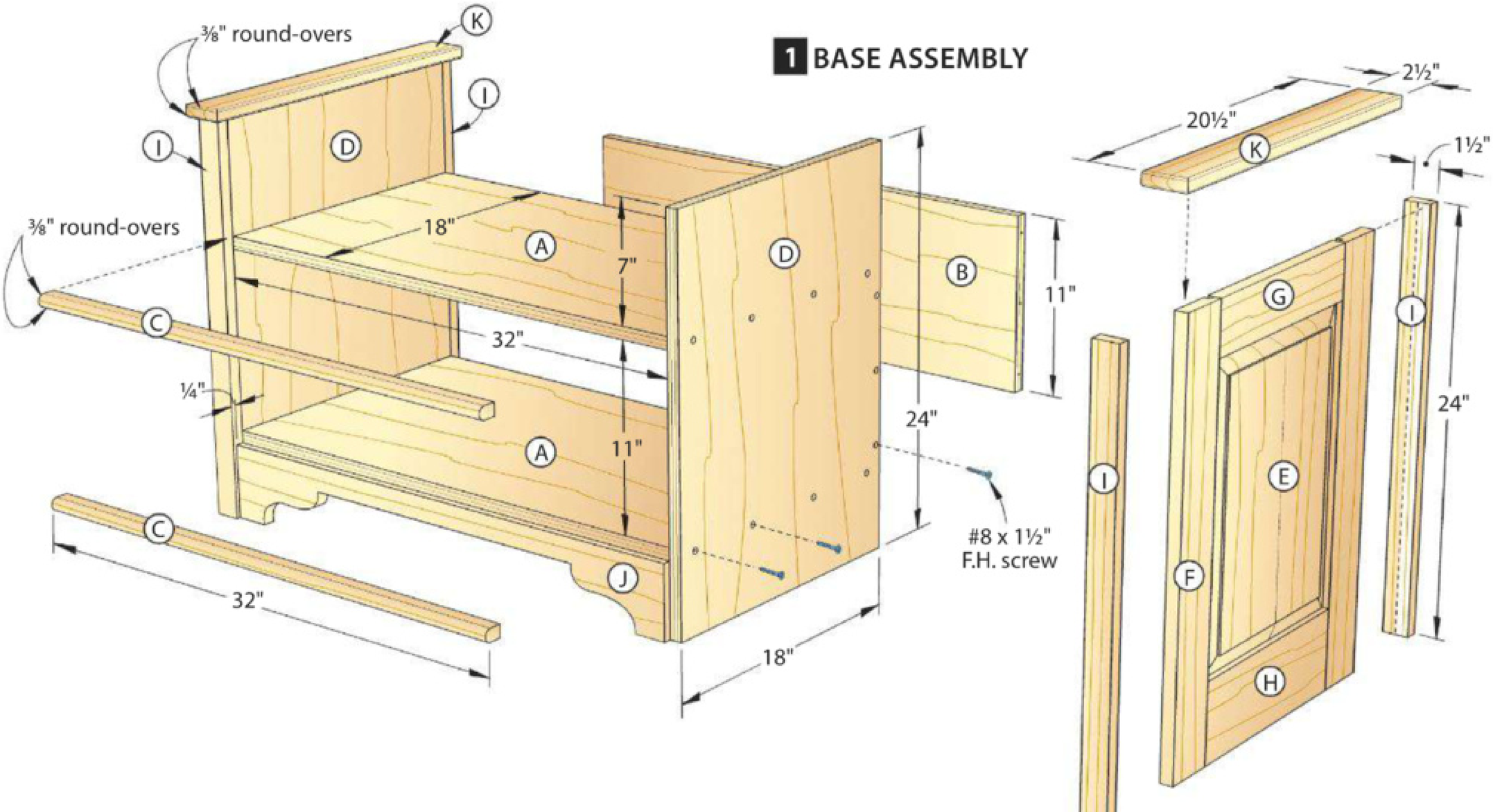
6 Cut the sides (D) to size [**Drawing 1**]. From scrap, cut four 4½"-tall supports, and place them under the shelves/back assembly (A/B/C) on the workbench. Attach the sides as shown in **Photo D**.

ROUT BULLNOSES ON THE SHELVES

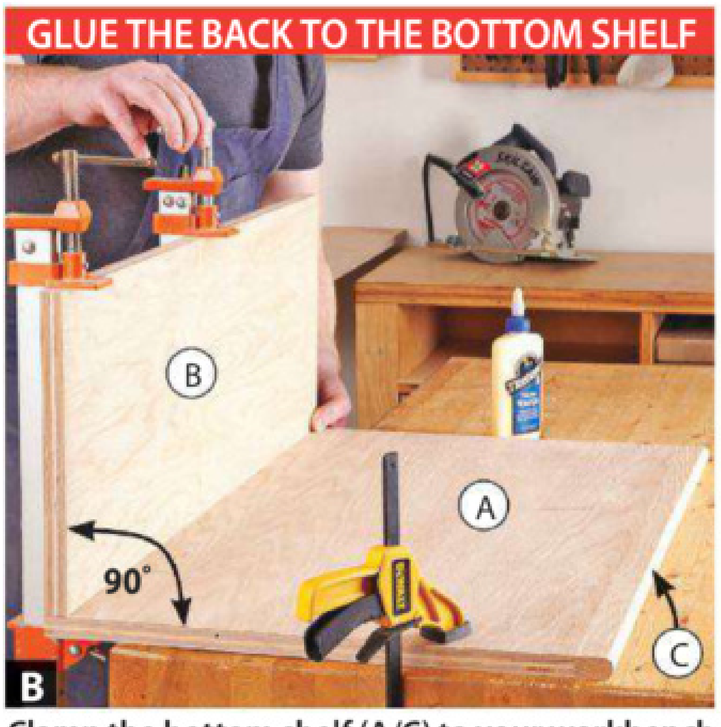


Before you rout the second face, ensure the bit's guide bearing rides on the flat portion of the edge, not on the previous round-over.

1 BASE ASSEMBLY

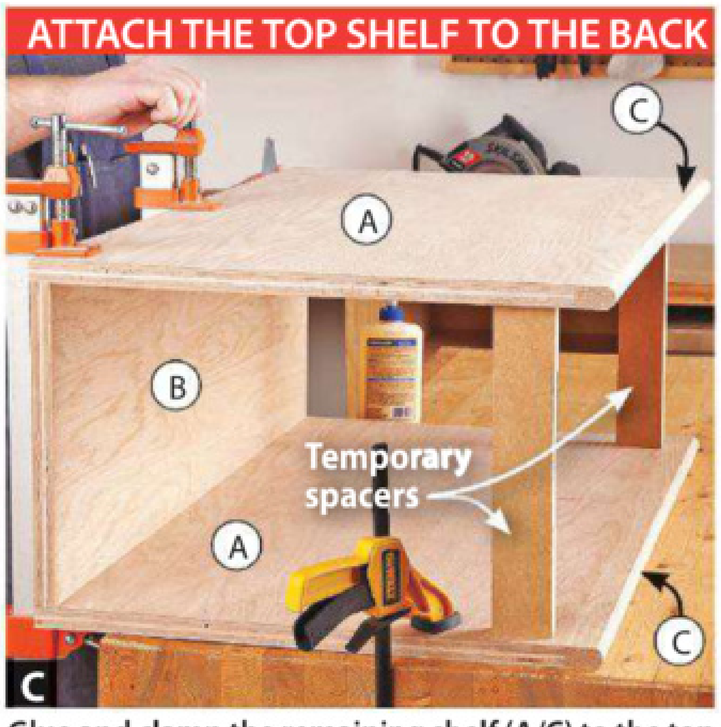


GLUE THE BACK TO THE BOTTOM SHELF



Clamp the bottom shelf (A/C) to your workbench for stability. Keep the back (B) perpendicular to the shelf and flush with the shelf's back edge.

ATTACH THE TOP SHELF TO THE BACK



Glue and clamp the remaining shelf (A/C) to the top edge of the back (B), with the best face of the shelf up. Make sure the assembly is square.

ADD THE SIDES TO THE SHELVES



Leave the spacers in place as you drill pilot holes, glue the bench sides (D) in place, and secure with screws. Remove the spacers and supports.

Dress it up with raised panels

1 Edge-glue ¾" stock and cut it to size for the side raised panels (E) [**Drawing 2**]. Select the stock for the glue-up carefully and arrange it for best appearance. If you plan to build the drawer, cut the drawer raised panel (R) to size now.

2 Follow the **Shop Tip,** *below right,* to raise the panels (E and R); then, square up the raised edge with a sanding block [**Photo E**]. Sand out the blade marks on the bevels using a block and 120-, 150-, 220-, and 320-grit abrasive.

3 Cut the side stiles (F), side top rails (G), and side bottom rails (H) to size [**Drawing 2**]. Cut a spare piece the same thickness to test the tablesaw setup later.

4 Follow the steps in **Photos F, G,** and **H** to cut the rabbets in the stiles (F) and rails (G, H) [**Drawing 2a**].

5 Finish-sand and stain the raised panels (E, R) and inside edges of the stiles (F) and rails (G, H); you'll get a better finish doing these parts now rather than after they are installed. (We used ZAR no. 120 Teak Natural oil-based wood stain.)

6 Glue and clamp the side bottom rail (H) and side stiles (F) to the bench sides (D) [**Drawing 1**]. Clamp the side top rail (G) in place for spacing, but do not glue it yet. Make tight joints between the stiles and rails. Remove the side top rail, and slide the side raised panel (E) into position. Then, glue the top rail in place. ***Quick Tip!*** ***If the rails or stiles hang over the plywood edges, trim them with a flush-trim router bit after the glue dries.***

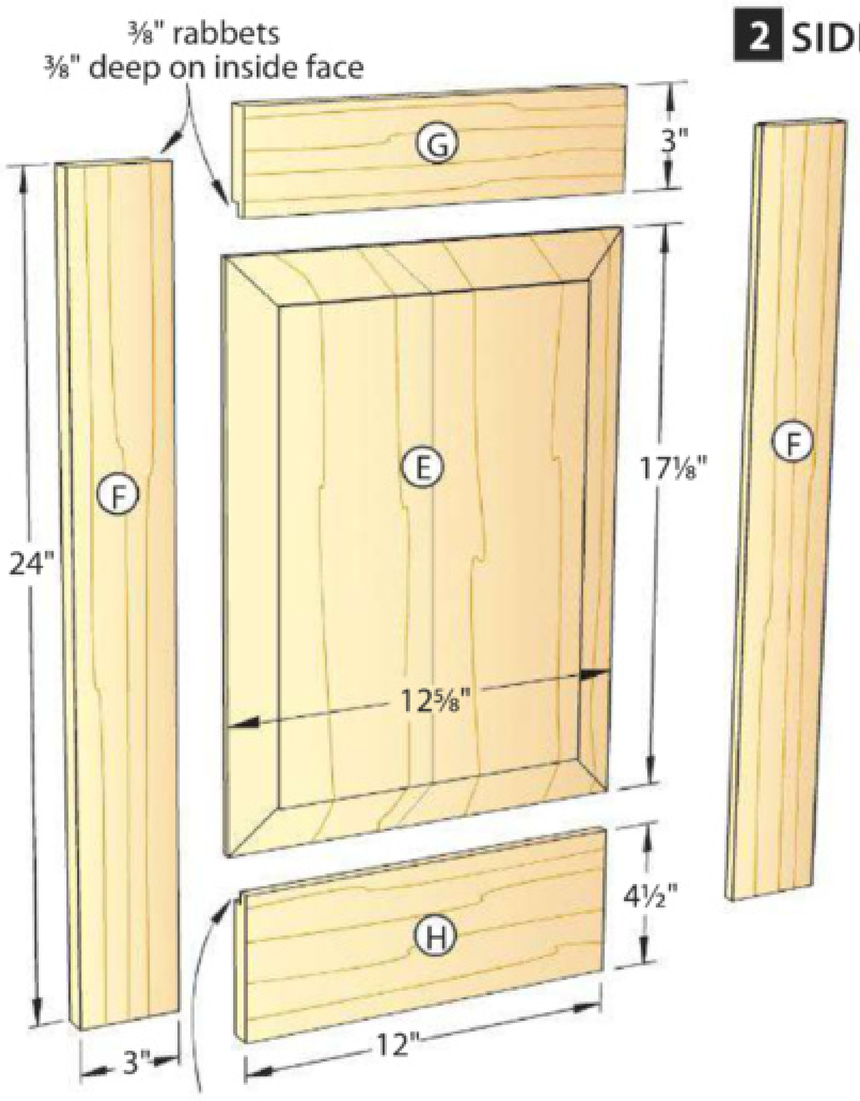
7 Cut the vertical trim pieces (I) to size [**Materials List**]. Measure between both sides (D) to find the base-trim (J) length, and cut it to size. Glue the vertical trim in place [**Drawing 1**]. Enlarge two copies of the **Base-Trim End Pattern** on

SIMPLE SANDING SQUARES SHOULDERS

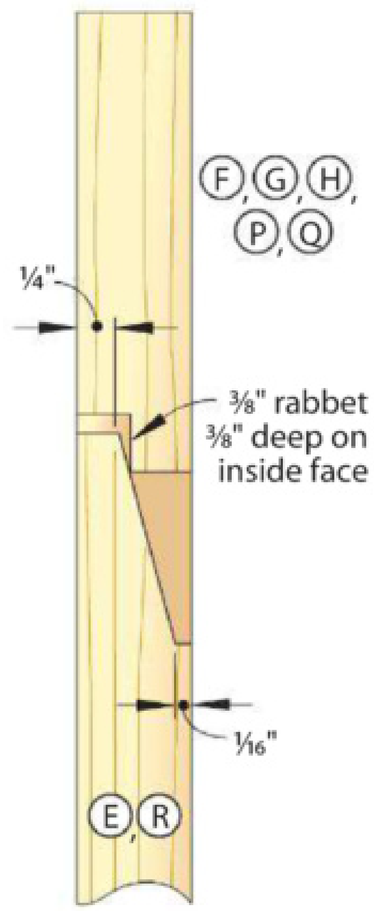


Wrap the square corner of a scrap with 220-grit sandpaper and use it to square the edge of the raised panel with the face of the panel.

2 SIDE PANEL



2a SIDE SECTION VIEW



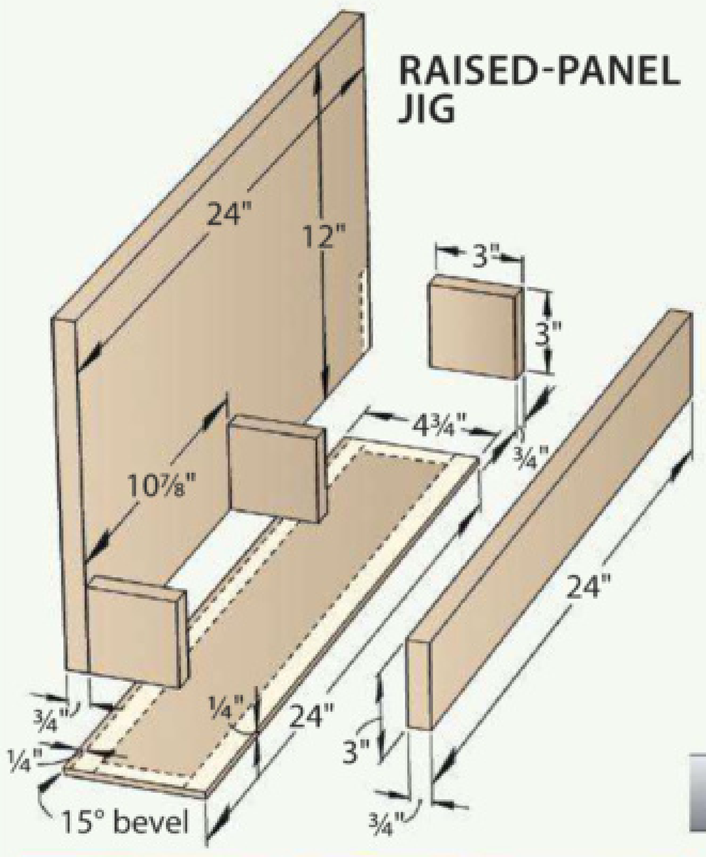
SHOP TIP

Simple jig makes beveling raised panels safe and easy

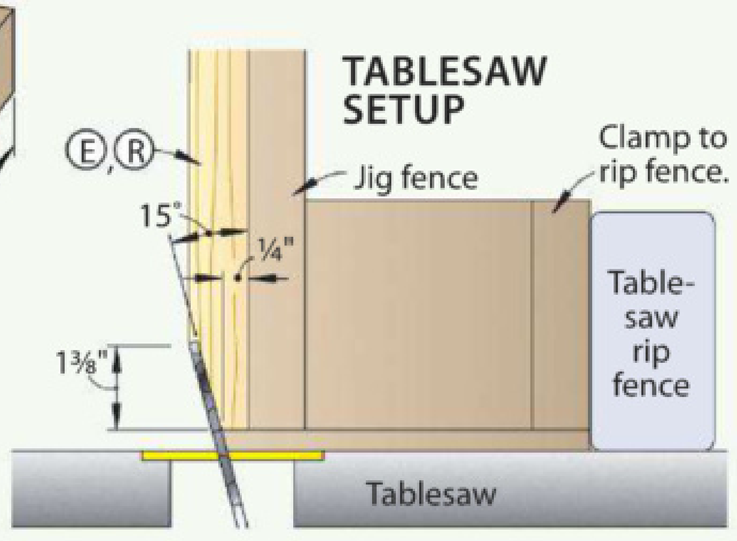
Build the raised-panel jig, *below,* from ¾" and ¼" medium-density fiberboard (MDF) or plywood. Tilt your tablesaw blade to 15°. Place the jig against the saw's rip fence, and position the fence so the blade will undercut the base's edge without reducing the 4¾" width of the top face. (See photo *bottom left.*) Clamp the jig to the saw fence.

To raise the panels (E, R) set the blade 1⅜" above the top of the jig base, *below.* Make sure only the outside edge of the blade cuts through the panel's surface, leaving a raised edge. Place the panel on the jig, keeping its inside face against the fence, and bevel-cut all four edges of each panel, *bottom.*

RAISED-PANEL JIG



TABLESAW SETUP



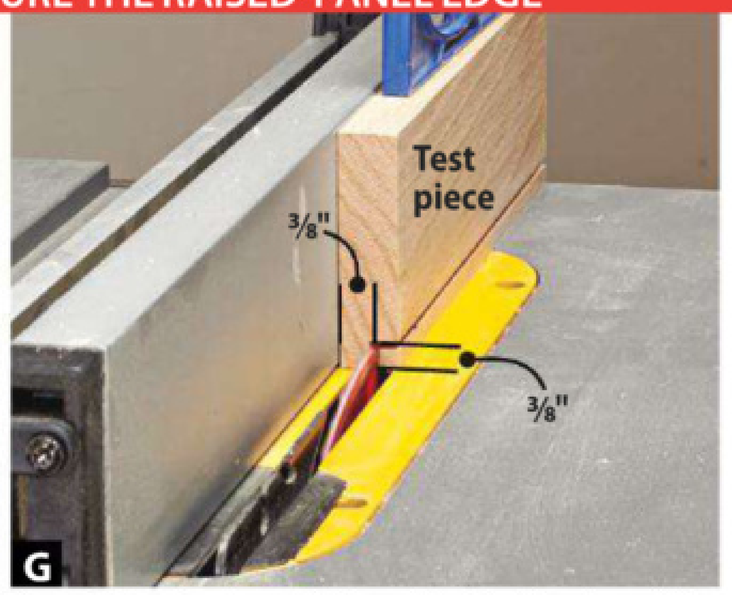




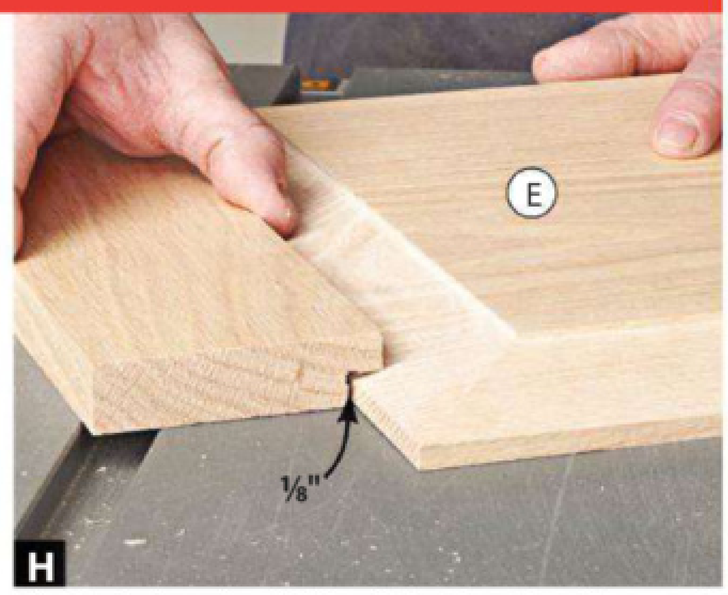
RABBET THE STILES AND RAILS TO CAPTURE THE RAISED-PANEL EDGE



With the *outside* edge of the blade set ⅜" from the fence, cut a kerf ⅜" deep in the inside faces of a test piece, the stiles (F), and the rails (G, H).



Reposition the fence ⅜" from the *inside* edge of the blade. Finish the rabbet in the test piece only with a cut made on the edge.



The test piece should touch the bevel on the panel face and leave a ⅛" gap between the panel edge and the back edge of the rabbet.

page 30 and transfer them onto the base trim (J). Jigsaw the part and sand the edges smooth. Glue the trim to the bottom shelf (A/C) and sides (D), set ¼" back from the face of the vertical trim.

8 Cut the armrests (K) to size. If you plan to install the door back, set the armrests aside. If you are building the bench without a door for a back, rout ⅜" round-overs (a bullnose) on the top and bottom edges of the armrests and glue them in place [**Drawing 1**], centered front-to-back and side-to-side.

Construct the drawer

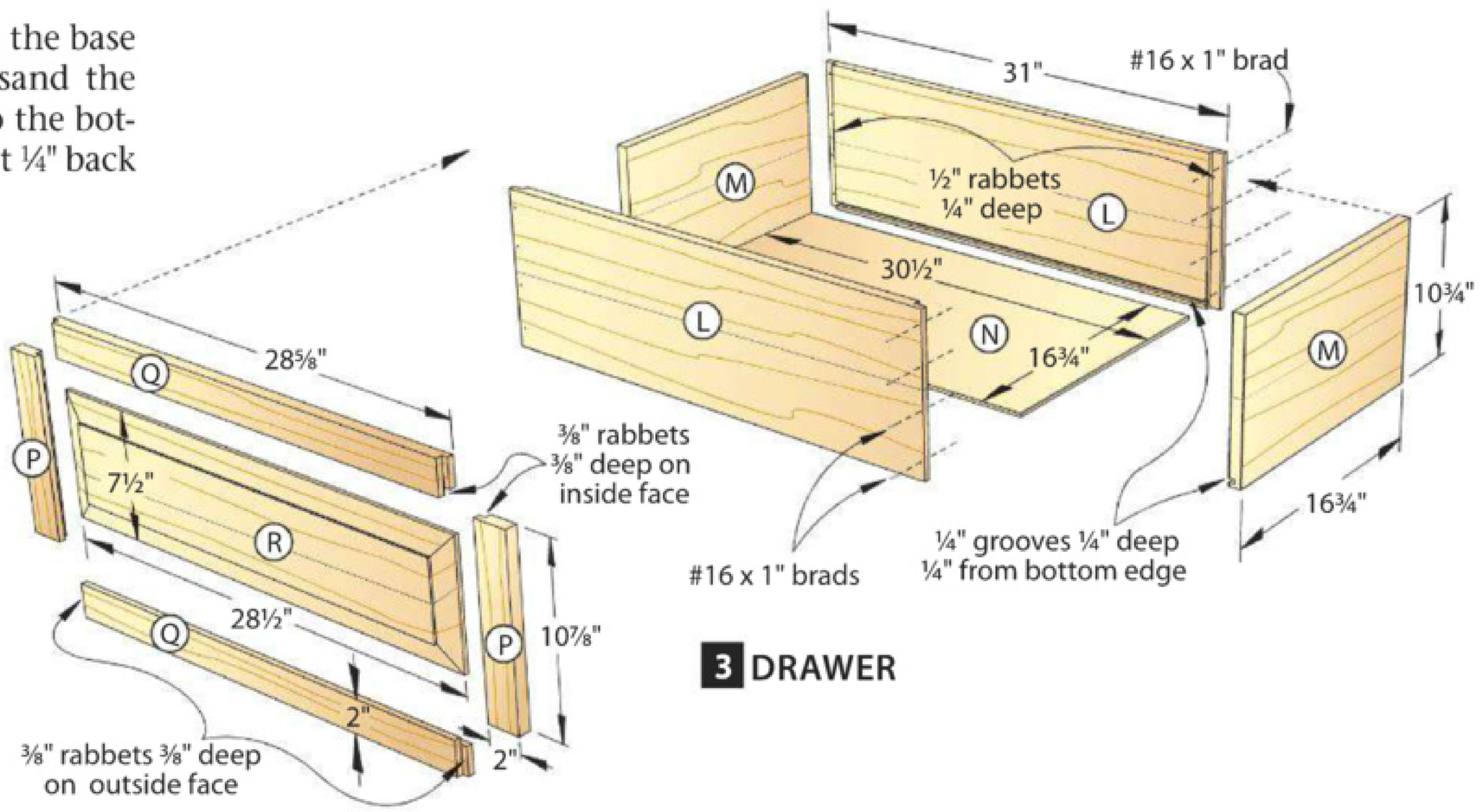
1 Edge-glue ½" stock for the drawer front/back (L) and drawer sides (M). Cut the front, back, and sides to size and cut the drawer bottom (N) from ¼" plywood [**Drawing 3**].

2 Lower your tablesaw blade to a cutting depth of ¼" and position the fence ¼" from the nearest blade edge. Saw a kerf near the bottom of each part L and M. Then, move the fence a little less than one blade thickness away from the blade and make another cut [**Photo I**]. See if the drawer bottom (N) fits into the grooves. If not, continue moving the fence slightly farther from the blade and making another cut until the bottom fits.

3 To rabbet the front and back (L) to accept the sides (M), position the fence ½" from the edge of the blade farthest from the fence. Saw the first kerf on each end of each drawer front/back; then, using a miter gauge to hold the stock square, move the end of the piece a little less than one blade thickness away from the fence, and make another pass. Continue until the rabbet is complete. Clean up the rabbet with a chisel or plane, if necessary.

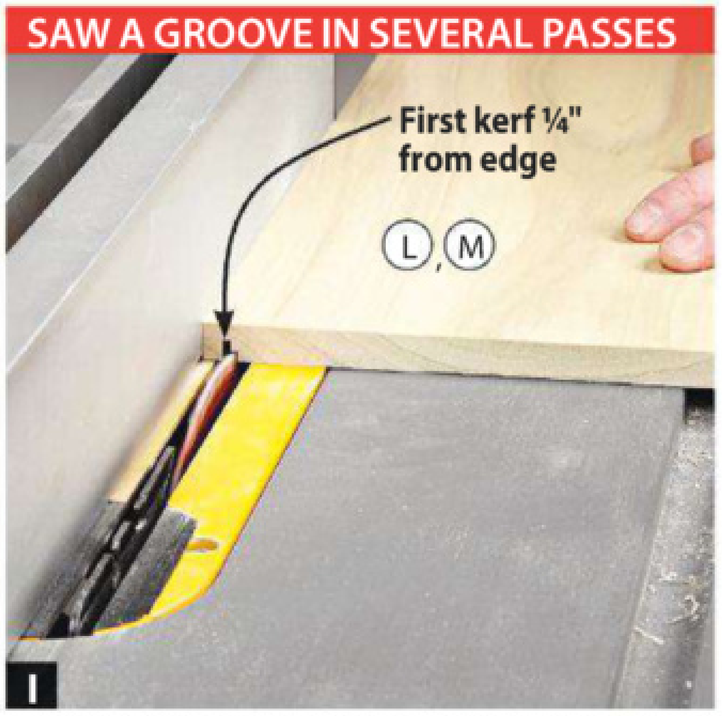
4 Glue the drawer bottom (N) into the groove in one drawer side (M). Then, glue and nail that assembly to the drawer front (L), fitting the bottom into the groove [**Photo J**]. Attach the remaining side and the back (L).

5 Cut the drawer guides (O) to size from ½" stock. Slide them into place on the bench shelf [**Drawing 4**] and push



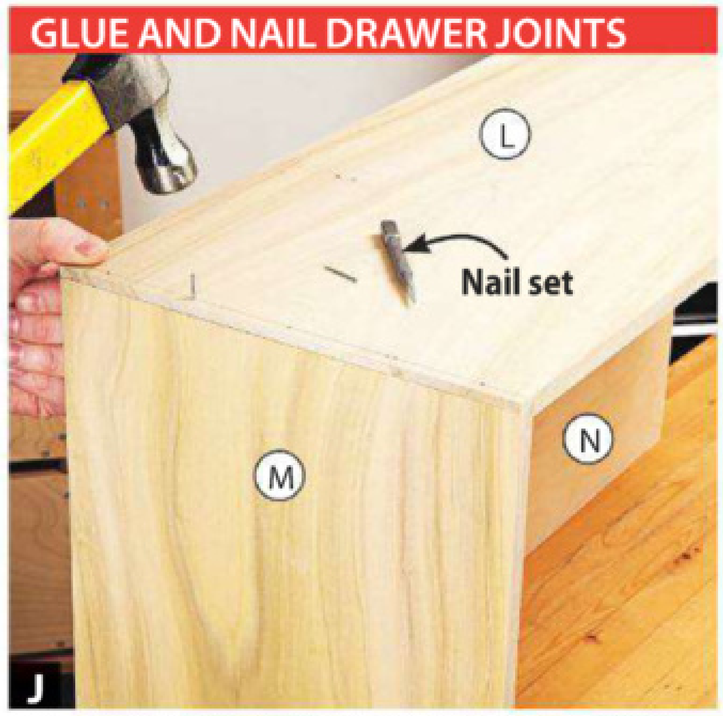
3 DRAWER

SAW A GROOVE IN SEVERAL PASSES



The first cut locates the groove ¼" from the edge of the part. Subsequent passes widen the groove to accept the ¼" plywood drawer bottom (N).

GLUE AND NAIL DRAWER JOINTS



Drive #16×1" brads into the L/M joints for added strength. Set the heads below the surface with a nail set.

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SET THE FENCE FOR THE END RABBETS

The length of the rail (Q) end rabbets must equal the width of the stile (P) rabbets. Gauge that distance using a stile.

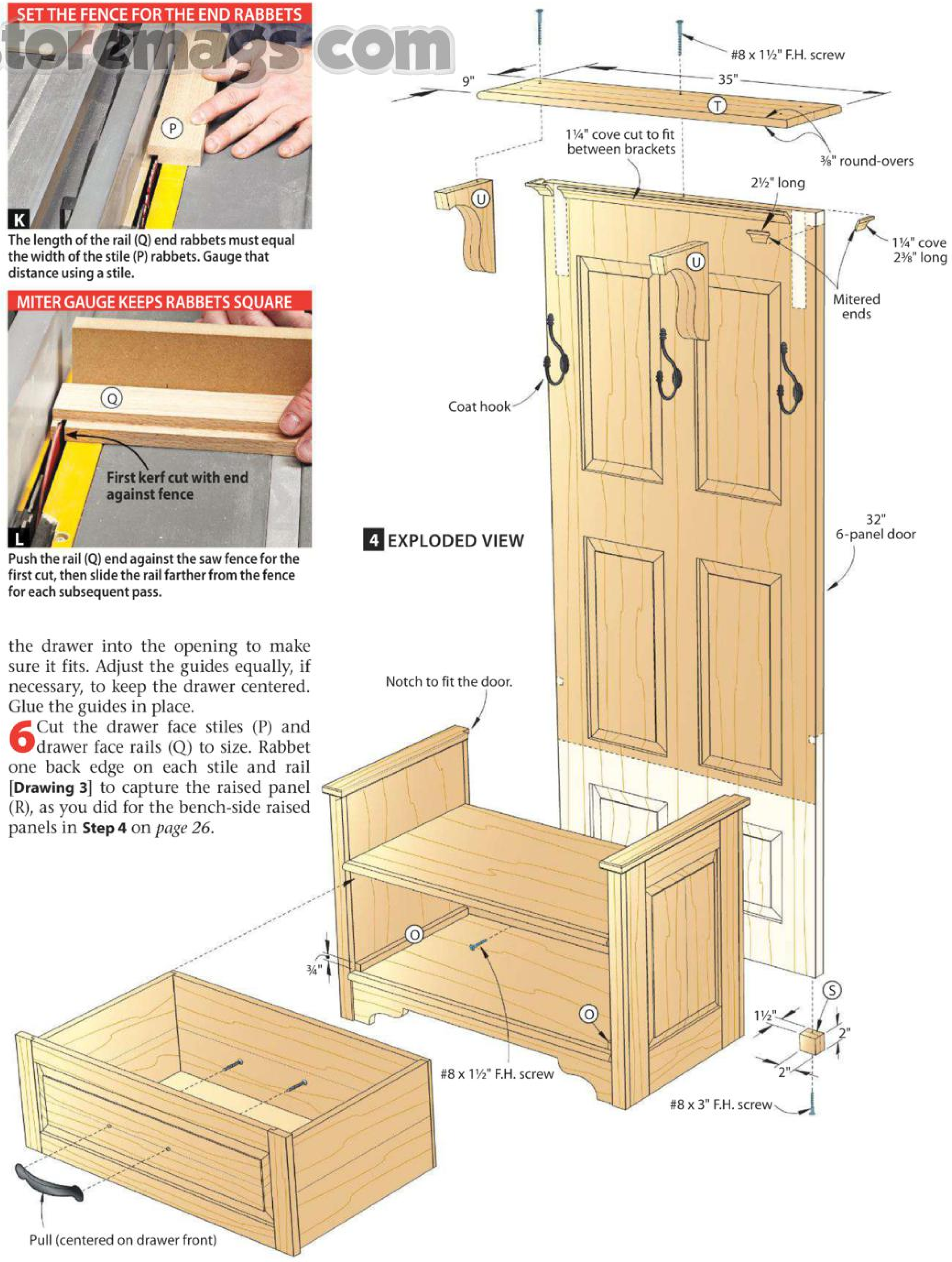
MITER GAUGE KEEPS RABBETS SQUARE

Push the rail (Q) end against the saw fence for the first cut, then slide the rail farther from the fence for each subsequent pass.

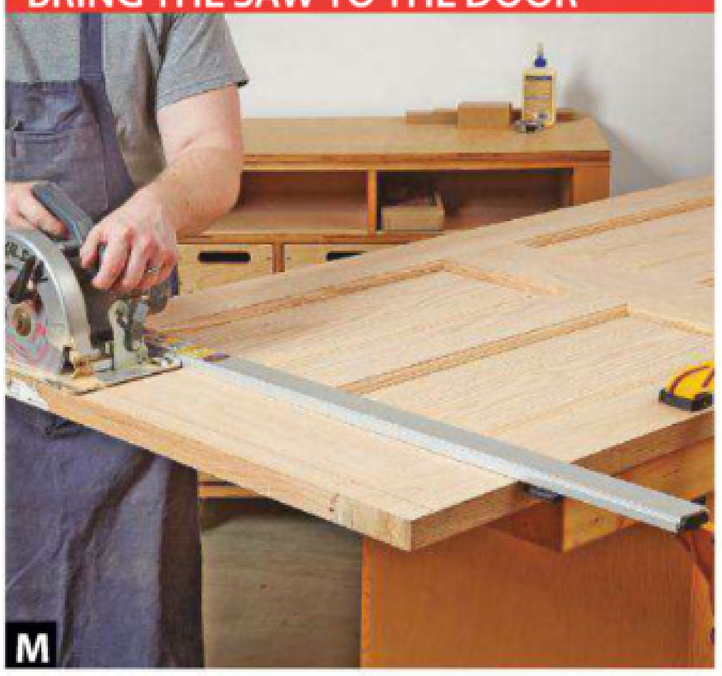
the drawer into the opening to make sure it fits. Adjust the guides equally, if necessary, to keep the drawer centered. Glue the guides in place.

6 Cut the drawer face stiles (P) and drawer face rails (Q) to size. Rabbet one back edge on each stile and rail [**Drawing 3**] to capture the raised panel (R), as you did for the bench-side raised panels in **Step 4** on *page 26*.

4 EXPLODED VIEW

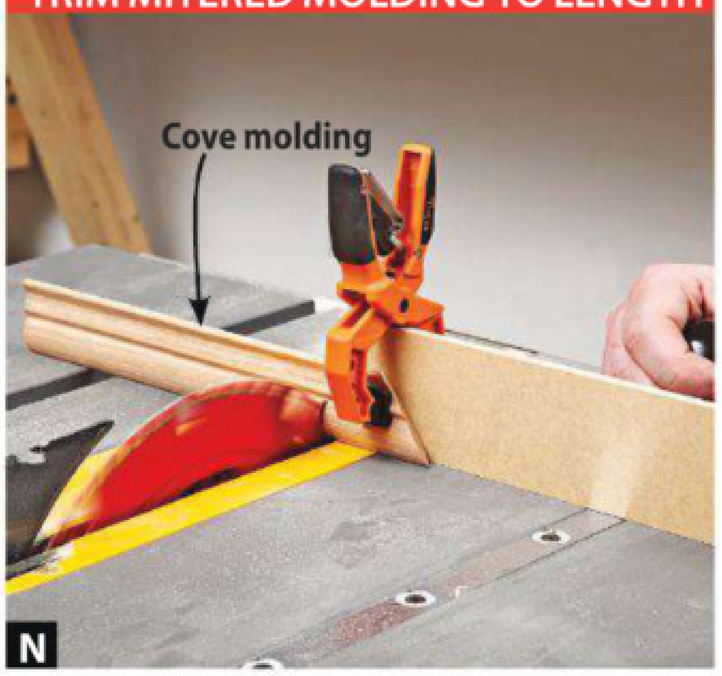


BRING THE SAW TO THE DOOR



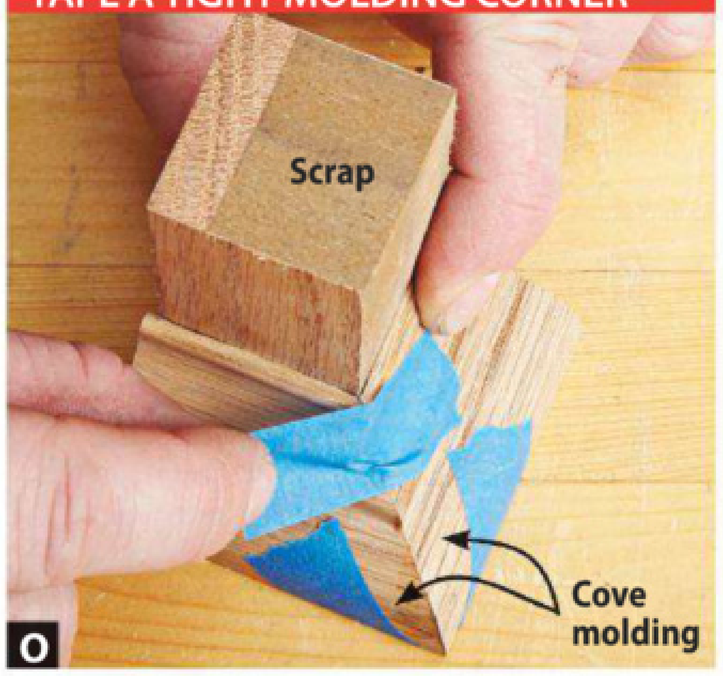
For convenience, cut the door to length with a circular saw. Mark the cutting line on the door, and attach a straightedge to guide the saw.

TRIM MITERED MOLDING TO LENGTH



To cut the cove trim to length on the tablesaw, clamp the piece to a miter-gauge extension for safety and accuracy.

TAPE A TIGHT MOLDING CORNER



Glue up the molding on a scrap block with square corners. Draw the two sides together with painter's tape. Remove the block so it won't stick to the trim.

7 To rabbet the ends of the rails (Q), hold the inside edge of a stile (P) rabbet against the side of the blade, and slide the saw fence up against the edge of the stile [**Photo K**]. With that setting for the first cut, saw a rabbet at each end of both rails [**Photo L**].

8 Finish-sand and stain the inside edges of the stiles (P) and rails (Q). Attach the panel (R), stiles, and rails to the drawer front as you did with the bench sides (D). ***Note:*** *The edges of the stiles (P) will overhang the drawer-front (L) ends. The bottom rail should be raised 1/16" above the drawer front's bottom edge to create a reveal when closed; the top rail will stand 3/16" above the drawer front.*

Attach the door and add trim

1 Trim the door to height, if needed [**Photo M**]. ***Note:*** *Our door has four large panels at the bottom and two small ones at the top. For best appearance, we flipped the door upside down, and trimmed the bottom rail (now the top of the bench back) to the same width as the rails between the pairs of panels.*

2 Lay the door on sawhorses and place the bench on it. We raised the bottom of the door 2" from the bottom of the bench [**Drawing 4**]. This raises the middle panels' lower edges above the top shelf of the bench, making a snug fit with the door rail rather than creating gaps. Drive screws through the bench back (B) into the door. If needed, laminate 3/4" stock and cut two support blocks (S) to size. Glue and screw the blocks to the bottom corners of the door.

3 Edge-glue 3/4"-thick stock for the top shelf (T), and cut it to length and 1/2" wider than shown. Rout 3/8" round-overs (a bullnose) on both faces along both ends and the front edge.

Quick Tip! ***Rout the shelf ends first; routing the front edge will then remove any tear-out at the corner. Ripping the shelf to width cuts away any tear-out at the back.***

Glue and screw the top shelf to the top of the door, centered side-to-side, and flush at the rear.

4 Cut four pieces of 1 1/4" cove molding about 12" long (so you can safely cut the short pieces). Miter-cut one end of each piece [**Drawing 4**]. (See the **Shop Tip**, *below.*) Cut the pieces to length on the tablesaw [**Photo N**] or with a mitersaw.

5 Glue up two corner pieces of cove molding, forming them around a square-cornered scrap block [**Photo O**]. After the glue dries, glue the cove molding around the edge of the door and tight against the shelf.

6 Laminate stock for the brackets (U) and cut the blanks to size. Enlarge two copies of the **Bracket Pattern** on *page 30*, and transfer them to the blanks. Cut out the brackets with a jigsaw and sand them smooth.

7 Glue the brackets to the door and shelf and against the cove moldings where shown in **Drawing 4**. Cut a piece of cove molding to fit between the brackets, and glue it in place.

8 Retrieve the armrests (K) and scribe the inside back corner of each to fit around the attached door. Cut the notches, and rout a 3/8" bullnose around the armrests. Glue the armrests to the side assemblies (D–I).

9 Finish-sand all parts, except for those stained earlier. Apply stain to match the panels; then, apply a clear finish overall. Attach coat hooks where shown [**Drawing 4**]. Install the drawer pull and slide the drawer into the base.

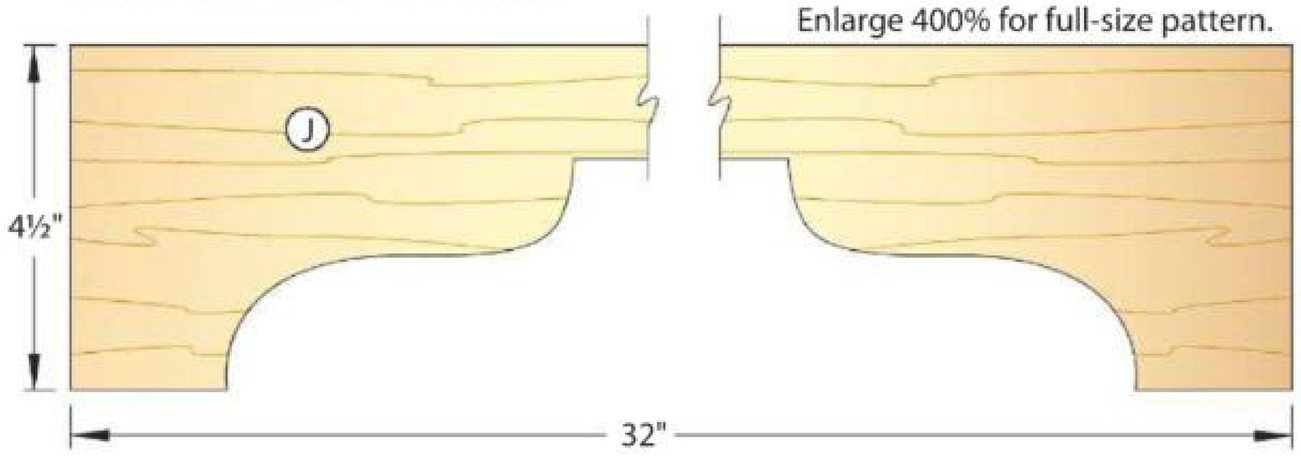
SHOP **TIP**

Miter cove molding without odd settings

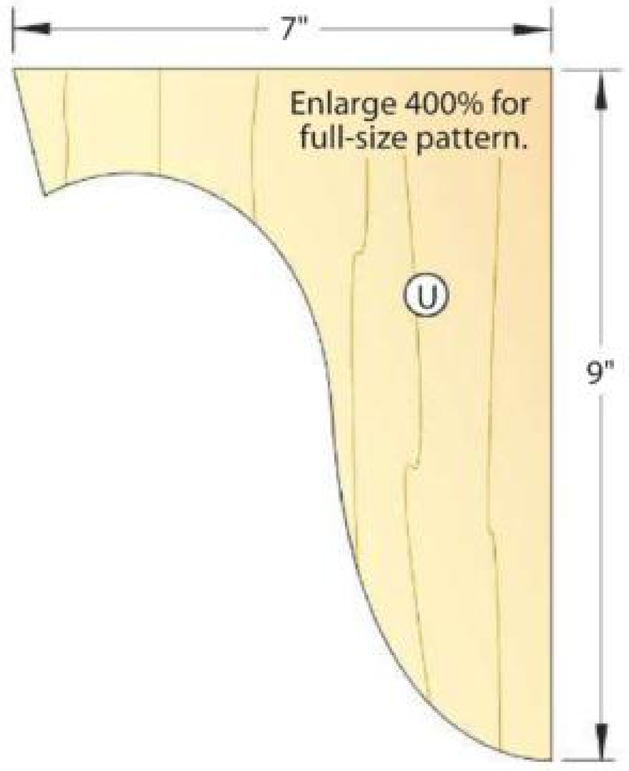
Because cove and crown moldings mount at an angle between two adjoining surfaces (in this case, the door and the top shelf), miter-cutting the moldings actually calls for a 45° compound cut, combining a miter and a bevel. To make this cut easily, hold the molding with its top edge resting on the saw table and its bottom edge against the fence. Cut one piece 45° to the right and one 45° to the left.



BASE-TRIM END PATTERN

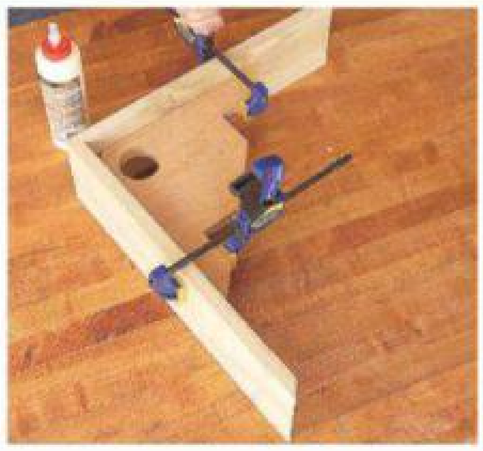


BRACKET PATTERN



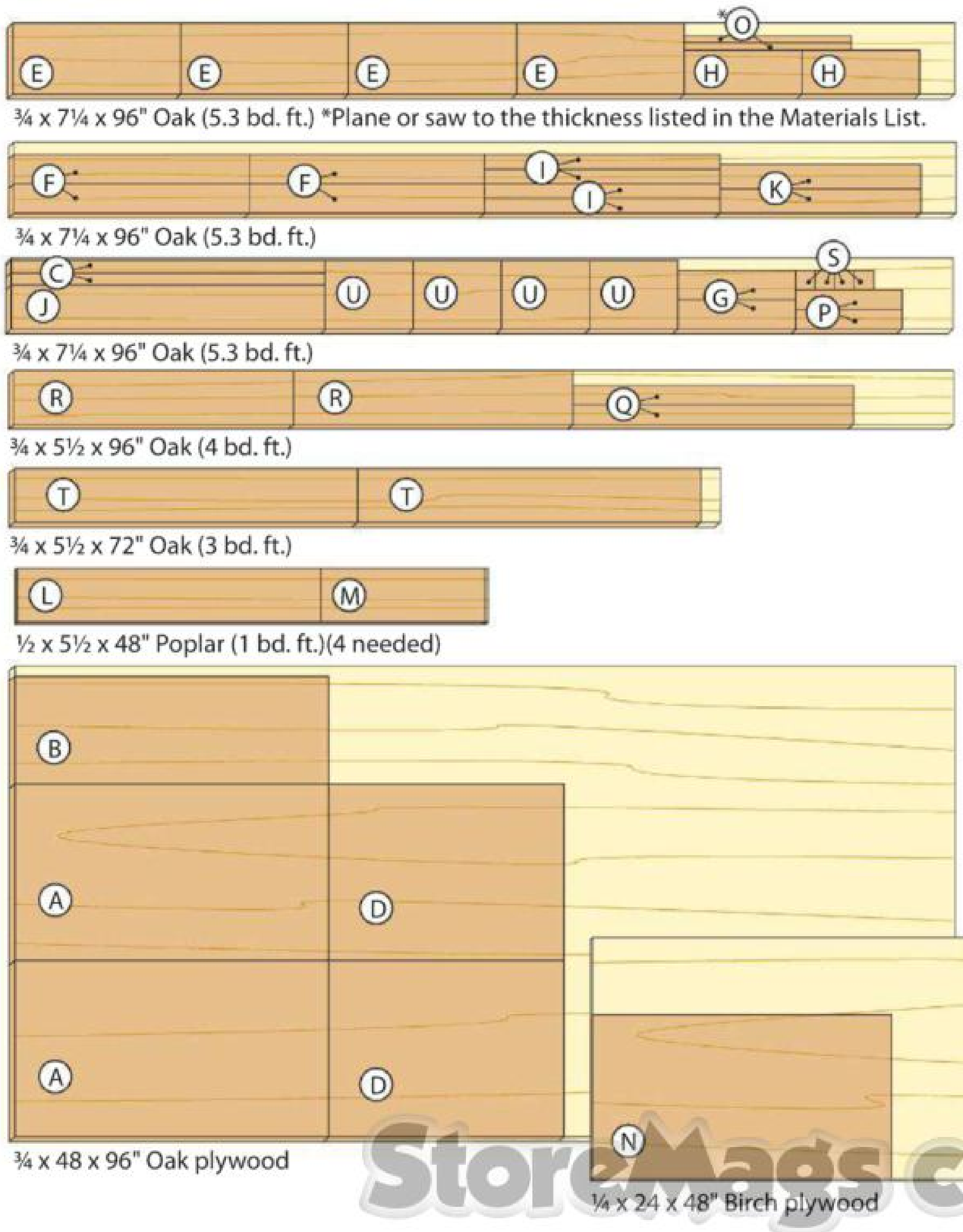
More Resources

- For a free right-angle clamping brace plan, see **woodmagazine.com/clampingbrace**
- For more Basic Built projects, see **woodmagazine.com/basicbuilt**
- Watch a free video on gluing up flat panels at **woodmagazine.com/flatpanels**



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

Cutting Diagram



Materials List

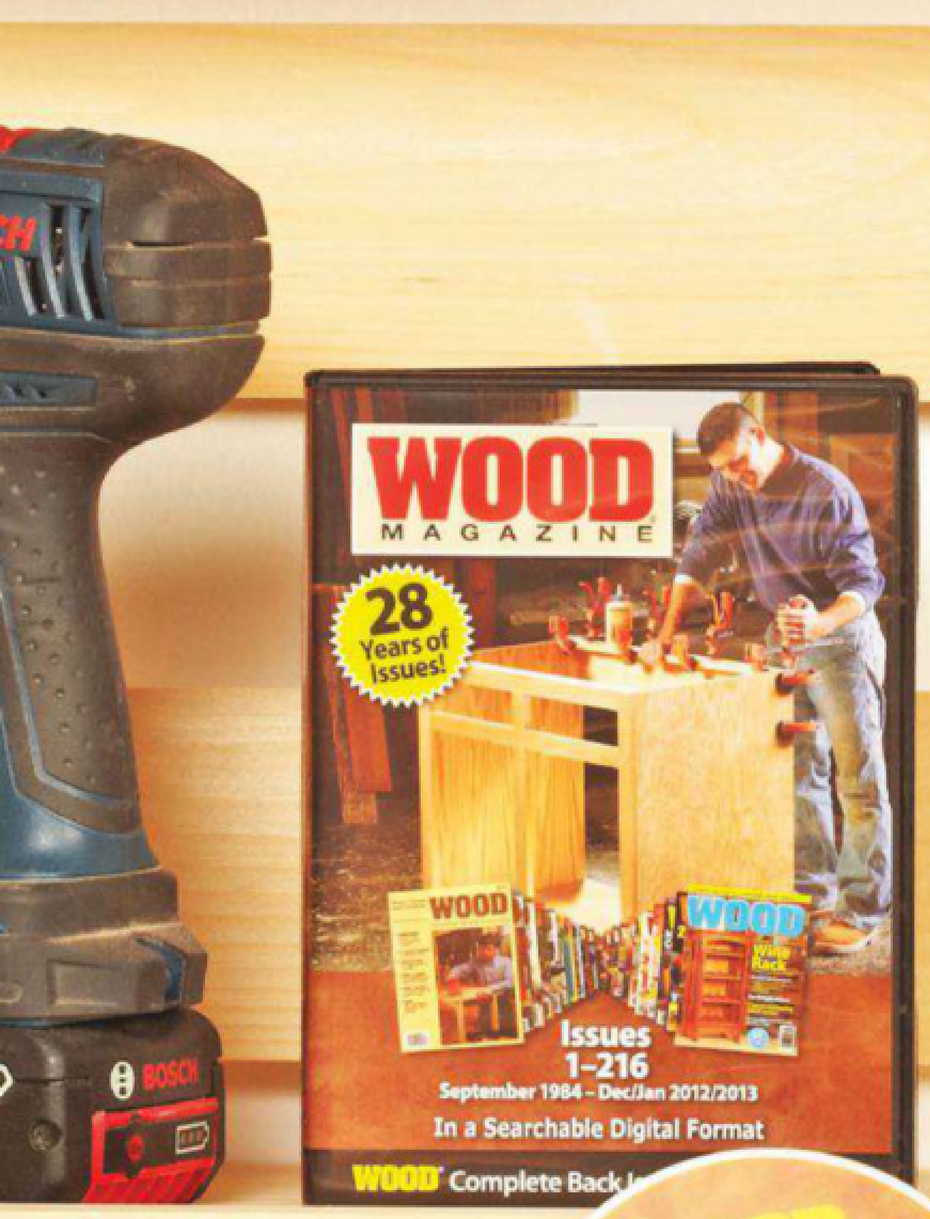
Part		FINISHED SIZE T	W	L	Matl.	Qty.
Bench						
A	shelves	¾"	18"	32"	OP	2
B	back	¾"	11"	32"	OP	1
C	shelf edging	¾"	1¼"	32"	O	2
D	sides	¾"	18"	24"	OP	2
E	side raised panels	¾"	12⅝"	17⅛"	EO	2
F	side stiles	¾"	3"	24"	O	4
G	side top rails	¾"	3"	12"	O	2
H	side bottom rails	¾"	4½"	12"	O	2
I	vertical trim	¾"	1½"	24"	O	4
J	base trim	¾"	4½"	32"	O	1
K	armrests	¾"	2½"	20½"	O	2
Drawer						
L	drawer front /back	½"	10¾"	31"	EP	2
M	drawer sides	½"	10¾"	16¾"	EP	2
N	drawer bottom	¼"	16¾"	30½"	BP	1
O	drawer guides	½"	¾"	17"	O	2
P	drawer face stiles	¾"	2"	10⅞"	O	2
Q	drawer face rails	¾"	2"	28⅝"	O	2
R	drawer raised panel	¾"	7½"	28½"	EO	1
Back						
S*	support blocks	1½"	2"	2"	LO	2
T*	top shelf	¾"	9"	35"	EO	1
U	brackets	1½"	7"	9"	LO	2

*Parts initially cut oversize. See the instructions.

Materials key: OP–oak plywood, O–oak, EO–edge-glued oak, EP–edge-glued poplar, BP–birch plywood, LO–laminated oak.
Supplies: 32×80" six-panel interior door (1⅜" thick), coat hooks (3), drawer pull (1), 1¼"×1¼"×8' cove molding, #16×1" brads (16), #8×1½" flathead screws (38), #8×3" flathead screws (2).
Bits: ⅜" round-over router bit.

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Beanbag Game Boards

For tailgating or backyard contests, get ready for a "hole" lot of fun.



With two playing boards that latch together and a convenient carrying handle, carting this game to the party is as easy as building it. Unlatch the boards, and find the bags stored inside. If you like, adorn the game boards with your favorite team's logo and paint colors as explained in **Show your true colors** on *page 35*.

Rules of the game

Known as "cornhole," "baggo," "bags," "beanbag toss," and other names, this game is so easy, you can play it without spilling your drink. That may be what makes it so popular at tailgaters and backyard parties.

Play is similar to horseshoes with two or four players. Set up the game boards 27' apart, front edge to front edge. One player stands to one side of each game board and tosses the 16-oz, 6×6" corn-filled bags at the other game board. (Order bags at woodmagazine.com/beanbags or make your own set of eight.) Players score three points for pitching a bag through the hole. A bag that lands on the game board, without touching the ground before or after it comes to rest, scores one point. First team to 21 wins. For a complete set of "official" rules, visit playcornhole.org/rules.shtml. Or just make up your own!

First up: the frames

Note: *To get both tops (C) from a half sheet of MDF, check that the sheet measures 49" wide. If you must use a 48"-wide sheet of material, reduce the lengths of parts A and B by ⅜" each.*

1 From ¾" stock, cut the frame sides (A) and frame rails (B) to size [**Materials List, Drawing 1**]. Remember that you're building two game boards that lock together, so cut enough components for two boards.

2 Install in your tablesaw a ¼" dado set adjusted for a ⅜"-deep cut. Clamp a stopblock to the rip fence directly across from the blade. Position the fence so that the stopblock is 17¼" from the face of the blade; then reposition the stopblock at the front end of the rip fence [**Photo A**]. Butt each frame side (A) against the stopblock; then cut the dado. Reset the fence and cut the dadoes near the ends of the frame sides [**Drawing 1**].

A STOPBLOCK PREVENTS BINDING

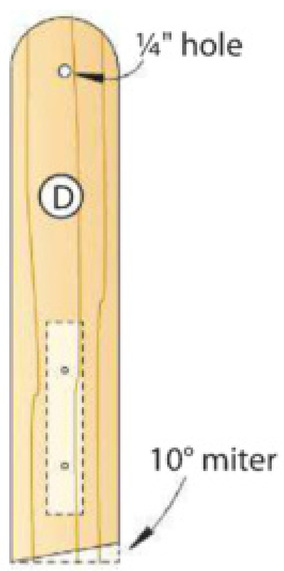


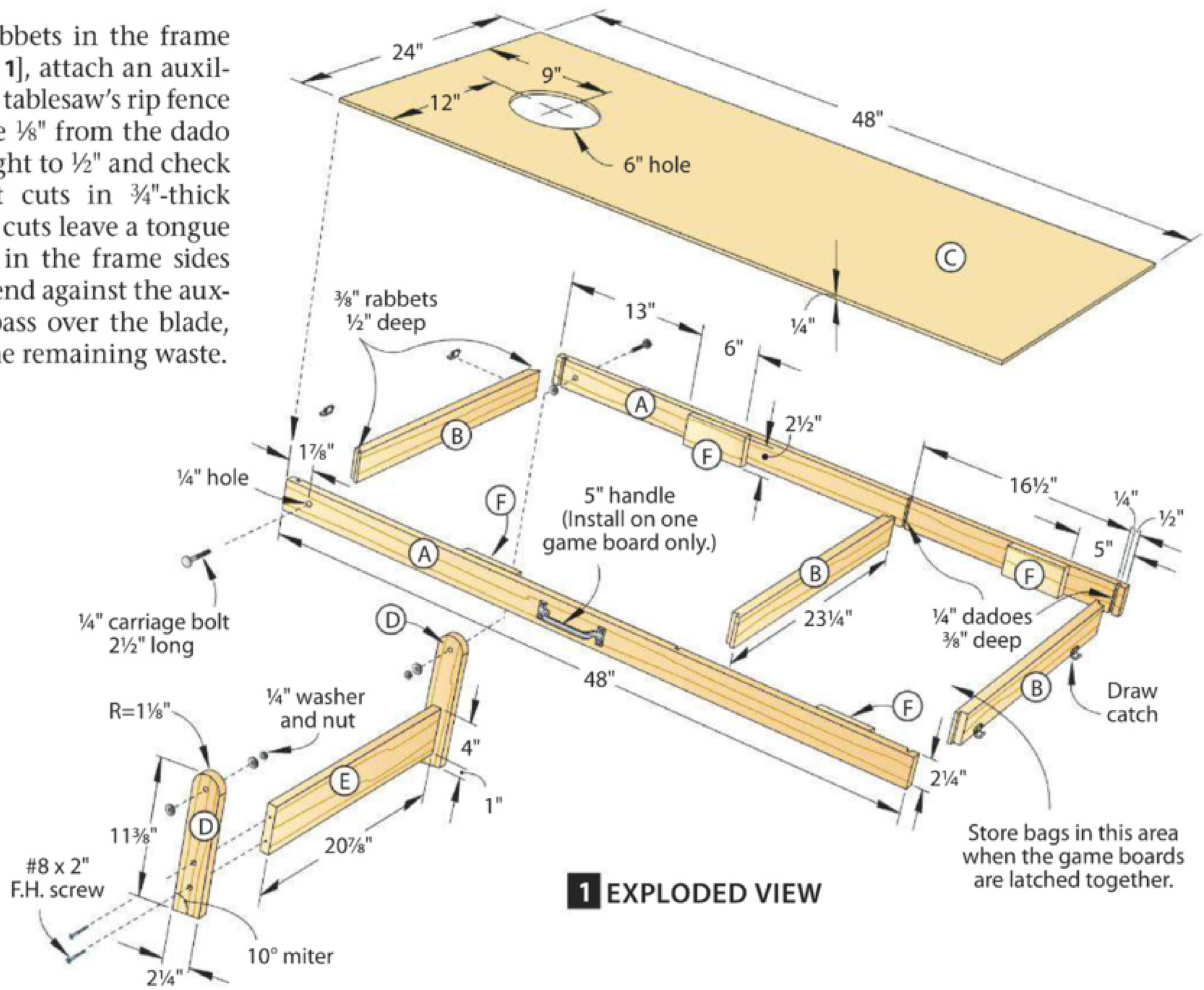
A stopblock creates space for the end of the frame side (A), preventing it from chattering along the rip fence when cutting the center dado.



3 To cut the ⅜" rabbets in the frame rails (B) [**Drawing 1**], attach an auxiliary wood face to the tablesaw's rip fence and position the face ⅛" from the dado set. Set the blade height to ½" and check the setup with test cuts in ¾"-thick scrap. When the test cuts leave a tongue that fits the dadoes in the frame sides (A), butt each frame end against the auxiliary face, make a pass over the blade, and then clean up the remaining waste.

1a LEG DETAIL





1 EXPLODED VIEW



4 Apply glue to the rabbets and clamp together the frame sides (A) and rails (B) to form two game-board frames. Check for square [**Photo B**]; then allow the glue to dry.

Take the frame and top it off

1 From ¼" MDF, cut the tops (C) ¼" wider and longer than shown [**Drawing 1**]. Apply glue to the top edges of one frame (A/B), center a top on it, then secure the top with #18×1" brads, setting the heads just below the surface. Repeat for the second frame and top.

2 After the glue dries, trim the edges of the tops (C) flush with the frame [**Photo C**].

3 Flip each game board (A/B/C) over, mark the centerpoint for the 6"-dia. beanbag hole [**Drawing 1**], and drill a ¼" hole through each top (C) at this point. Use double-faced tape to secure a scrap at least 7" wide to the underside of each top and centered on the hole [**Photo D**]; then flip the game boards right side up and drill ¼" holes through the scrap using your initial ¼" holes as guides.

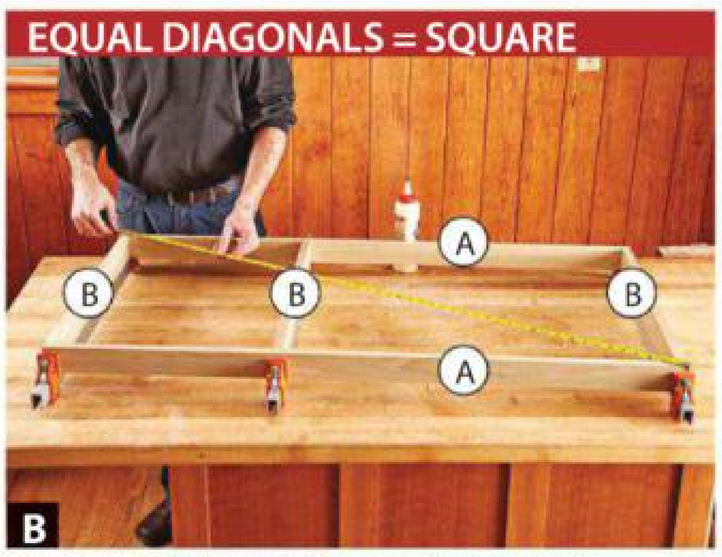
4 From scrapwood, make a trammel (see the sidebar, *below*) and mount it to your router. Install a ¼" straight bit, and set the bit to cut 5/16" deep. Insert a ¼"-diameter bolt through the trammel's pivot hole and the ¼" hole that you drilled in the top (C). Hold the router with the bit clear of the surface, power on the router, and carefully lower it into the top. Cut the hole as shown [**Photo E**]. After completing the cut, remove the cutout and the scrap backer.

Time to do your leg lifts

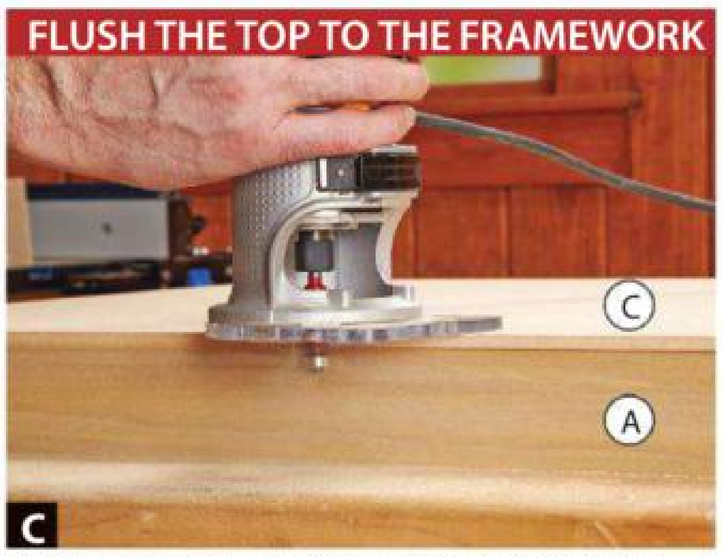
1 From ¾" stock, cut the legs (D) and stretchers (E) to size. On one end of the legs, cut a 10° miter [**Drawing 1a**]; use a jigsaw to radius the opposite ends.

2 Drill ⅛" pilot holes through the legs (D) and into the stretchers (E) [**Drawing 1**]. Screw the legs to the stretchers.

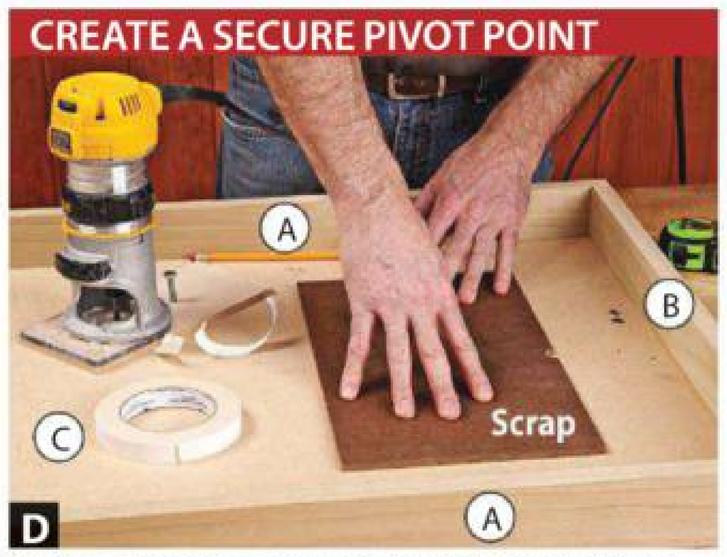
3 Drill a ¼" hole near the end of each frame side (A) where shown [**Drawing 1**]. Lay the two game boards (A/B/C) on their faces and lay a leg assembly (D/E) inside, with the longest edge of the leg (D) facing up, and the radiused end 1/32" from the end frame rail (B).



After clamping each frame together, verify square by measuring the diagonals. Identical measurements confirm a square assembly.



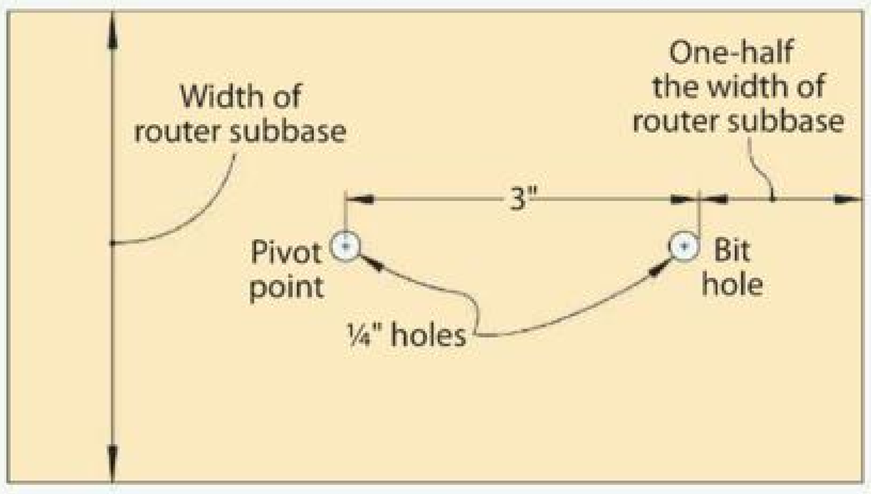
Mount a flush-trim bit in a handheld router and guide the bearing along the frame sides (A) and rails (B) to trim the top (C).



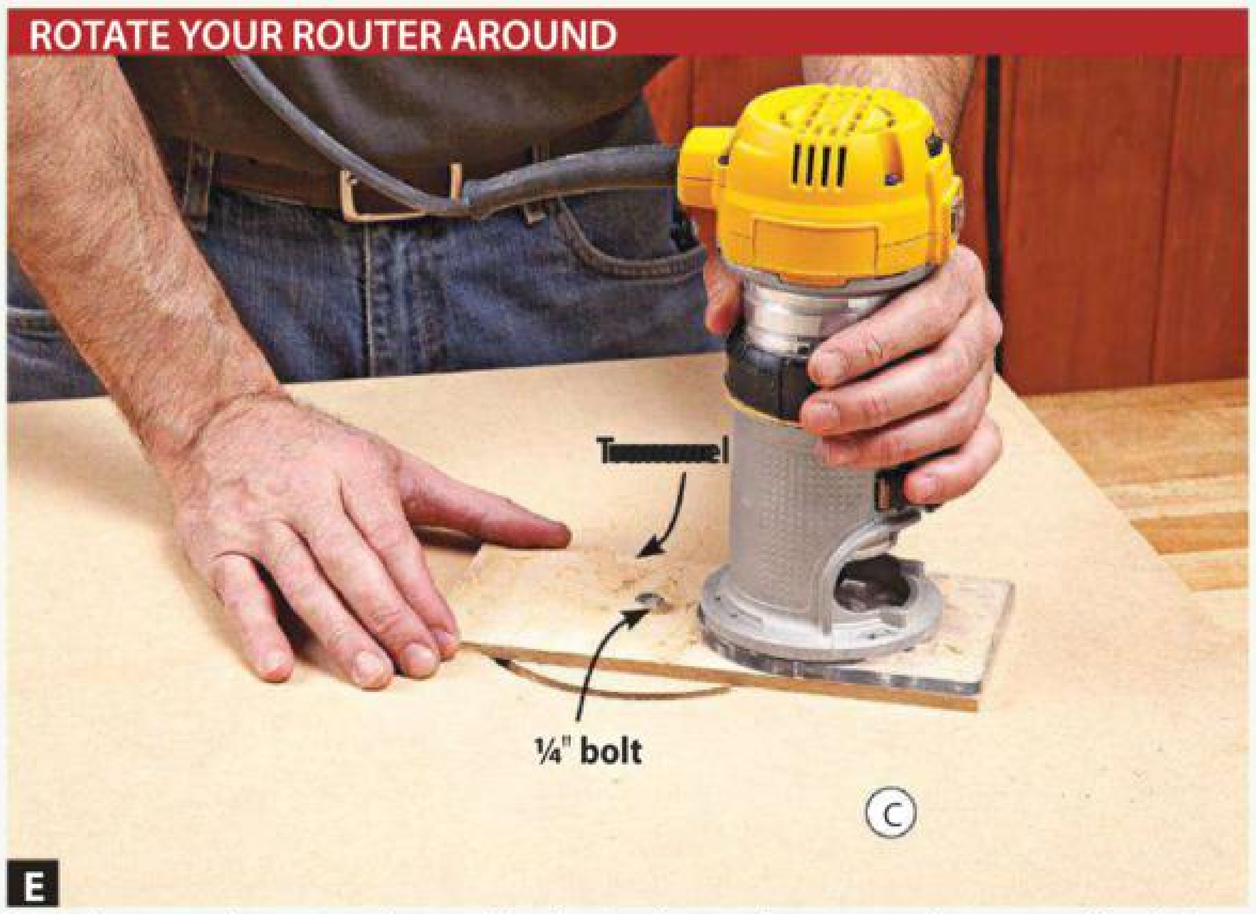
A piece of scrap secured to the underside of the top (C) with double-faced tape provides a solid mounting point for a trammel used to cut the hole.

Simple jig cuts perfect circles

Similar to a grade-school compass, a trammel enables you to rout perfect circles with a router and a straight bit. To make this trammel, *below*, first drill the bit hole through a piece of ¼" plywood, where shown. Install a ¼" straight bit into your router, and, using double-faced tape, attach the trammel base to the router subbase with the bit extending through the hole. Measure 3" from the outside of the bit, mark that location, and drill the ¼" pivot hole on the mark. That will serve as a pivot point when cutting the circle.



TRAMMEL



Ease the router down into the top (C) to begin the cut; then rotate the trammel slowly in a counterclockwise direction to avoid tear-out.

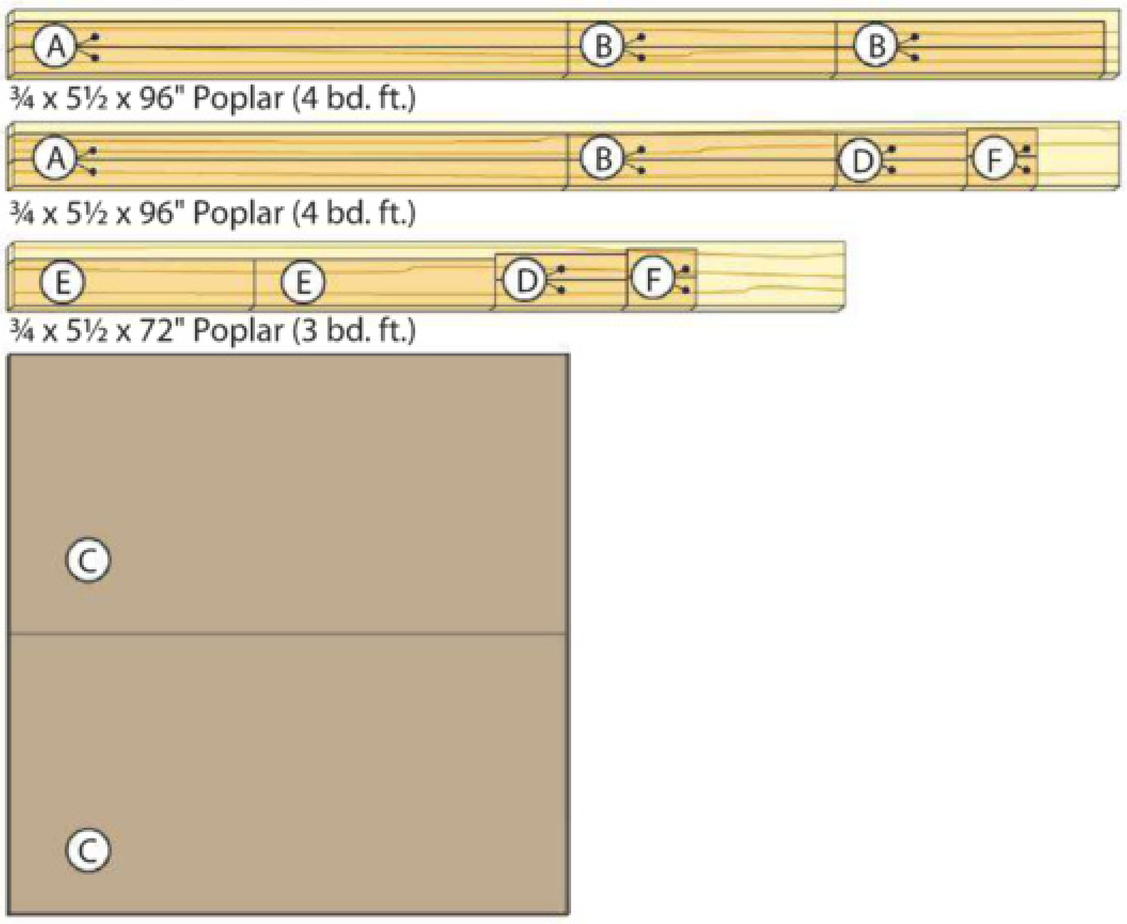
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KEEP THE CATCHES TIGHT



First screw the bail side of the catch in place; then place the bail over the catch side. Lift the bail handle about halfway and screw the catch in place.

Cutting Diagram



Quick Tip! *To get this spacing, place a couple of business cards between each leg and the frame rail.*

Using the holes in the frame sides as guides, drill a ¼" hole through each leg. Then, secure the legs with ¼×2½" carriage bolts, washers, and nuts as shown, tightening the nuts just enough so that the legs pivot with slight friction.

Assemble the game boards

1 Four cleats (F) align the game boards and prevent them from shifting against each other when they are locked together. Cut the cleats to size and glue them to the inside of the sides (A) and snug against the top (C) of one game board only [**Drawing 1**]. The cleats should extend ¼" below the sides.

2 To ensure that the draw catches pull tight and securely hold the boards together, install them as shown in **Photo F**. Test the catch by closing the bail fully—you want the catch to snap down tight. Now attach the handle to one frame side (A), centered on its length.

3 Remove the hardware and leg assemblies (D/E). Paint all parts to dress up the game boards and provide protection (**Show your true colors**, *left*). After the paint dries, reinstall the handle, catches, and legs, and gather your friends and family for a round or two of friendly competition.

Produced by **Craig Ruegsegger** with **Kevin Boyle**
Project design: **Kevin Boyle**
Illustrations: **Lorna Johnson**

Show your true colors

This game fits right in at tailgate parties, so dress up the game boards with your favorite team colors and officially licensed team logo. If you decide to add a logo decal, get it first (fathead.com is a good source); then have a paint store match the colors of the decal in an exterior-grade latex paint. If you just want official team colors without a logo, Home Depot provides them for many college, NFL, NHL, NASCAR, and pro soccer teams.



Before painting, fill the nail holes in the top (C) with nonshrinking spackle, available at hardware stores and home centers. Sand the top smooth with 150-grit sandpaper after the spackle dries; then apply a primer to all inside and outside surfaces. For a smooth top surface, roll on the primer (and later, the paint) with a mohair roller. Use a brush to reach the interior corners and to cover the leg assemblies.

Next, apply the base color to all surfaces and allow the paint to dry for at least 48 hours. Then, mask the edges for the accent stripe, *left*. Firmly press the tape edges down to prevent bleeding under the tape.

Quick Tip! ***Use a low-adhesive tape, such as Frog tape (available at home centers and hardware stores), to prevent peeling off the base layer when removing the tape.***

Roll on the stripe color. Allow the paint to dry fully before peeling off the tape and applying any decals.

For crisp edges and true lines, lay a straightedge (a straight board will work) on the game board to serve as a guide for the painter's tape.

Materials List

Part		FINISHED SIZE T	W	L	Matl.	Qty.
A	frame sides	¾"	2¼"	48"	P	4
B	frame rails	¾"	2¼"	23¼"	P	6
C*	tops	¼"	24"	48"	M	2
D	legs	¾"	2¼"	11⅜"	P	4
E	stretchers	¾"	4"	20⅞"	P	2
F	cleats	¾"	2½"	6"	P	4

*Part initially cut oversize. See the instructions.

Materials key: P–poplar, M–medium-density fiberboard.
Supplies: ¼×2½" carriage bolts (4), ¼" washers (8), ¼" nuts (4), #8×2" F.H. screws (8), 5" handle (1), draw catches (4), double-faced tape, #18×1" brads (20).
Blade and bits: Dado set; flush-trim, ¼" straight router bits; ⅛", ¼" drill bits.

Tall yet small Lingerie chest

This slender little project fits most anywhere.

Here's the fourth member of the simple- and affordable-to-build bedroom set that began in issue 218 (May 2013) with a bed and continued in issue 219 (July 2013) with a dresser and nightstand. If you built any of those pieces, you'll breeze through the similar construction of this project. (If you don't have those issues, see **More Resources** on *page 42*.) In issue 221 (October 2013) we'll present the fifth and final piece in the set, a blanket chest. (See *page 84*.)





Approximate materials cost: $220
Dimensions: 55¾"H × 22⅞"W × 21½"D

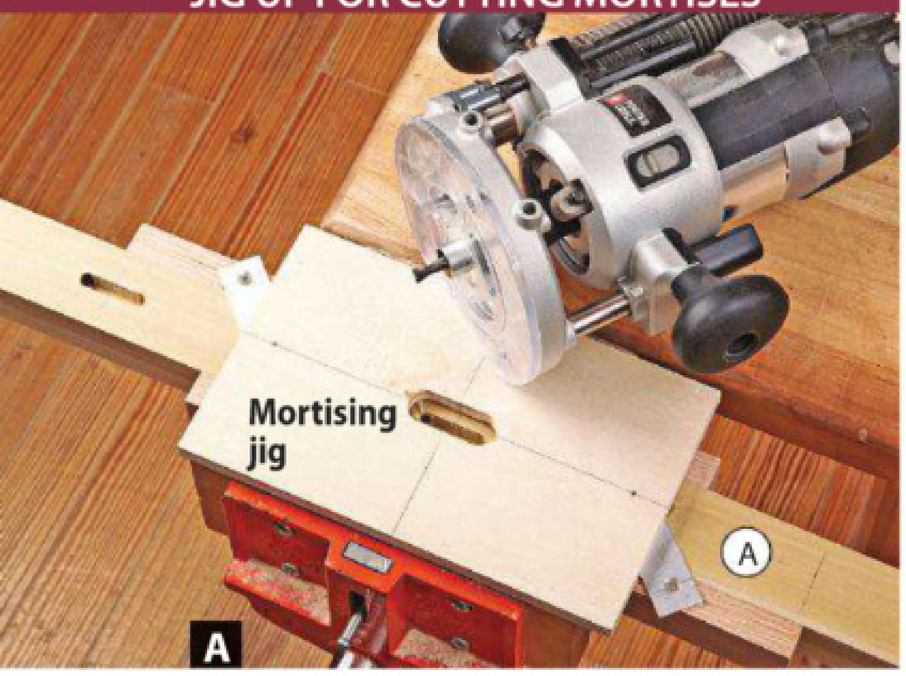
First up, the sides

1 Laminate blanks for four legs (A) slightly wider and longer than the finished sizes shown in the **Materials List**, *page 42*. Saw and plane the legs to finished size.

2 Arrange the legs so the best face grain faces front and the best edge grain faces outward. Label the top ends of the legs to keep them properly oriented during construction. Bandsaw the tapers [**Drawing 1**] and sand them flat.

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JIG UP FOR CUTTING MORTISES



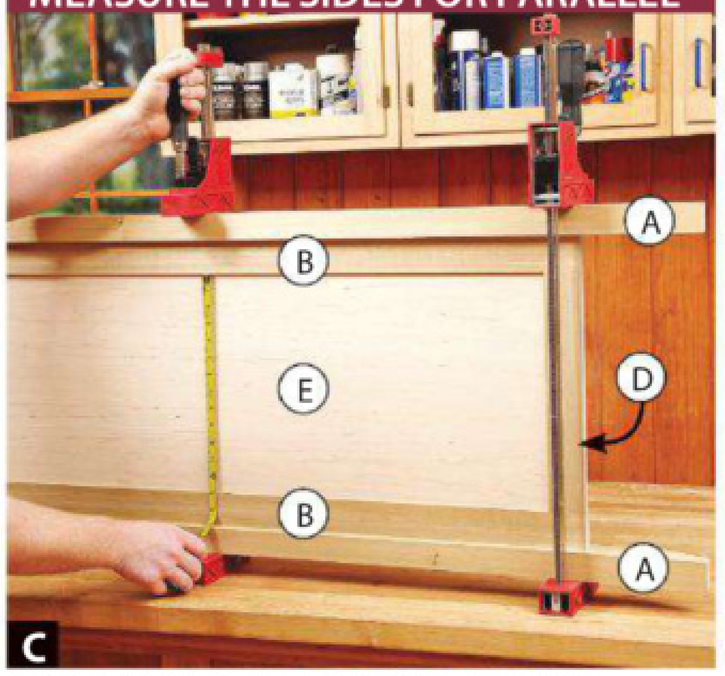
Use the self-centering jig with a ¾ × 2" cutout, plunge router, 5/16" upcut spiral bit, and ¾" guide bushing to cut mortises in the legs (A) and side stiles (B).

GLUE THE RAILS TO THE PANELS



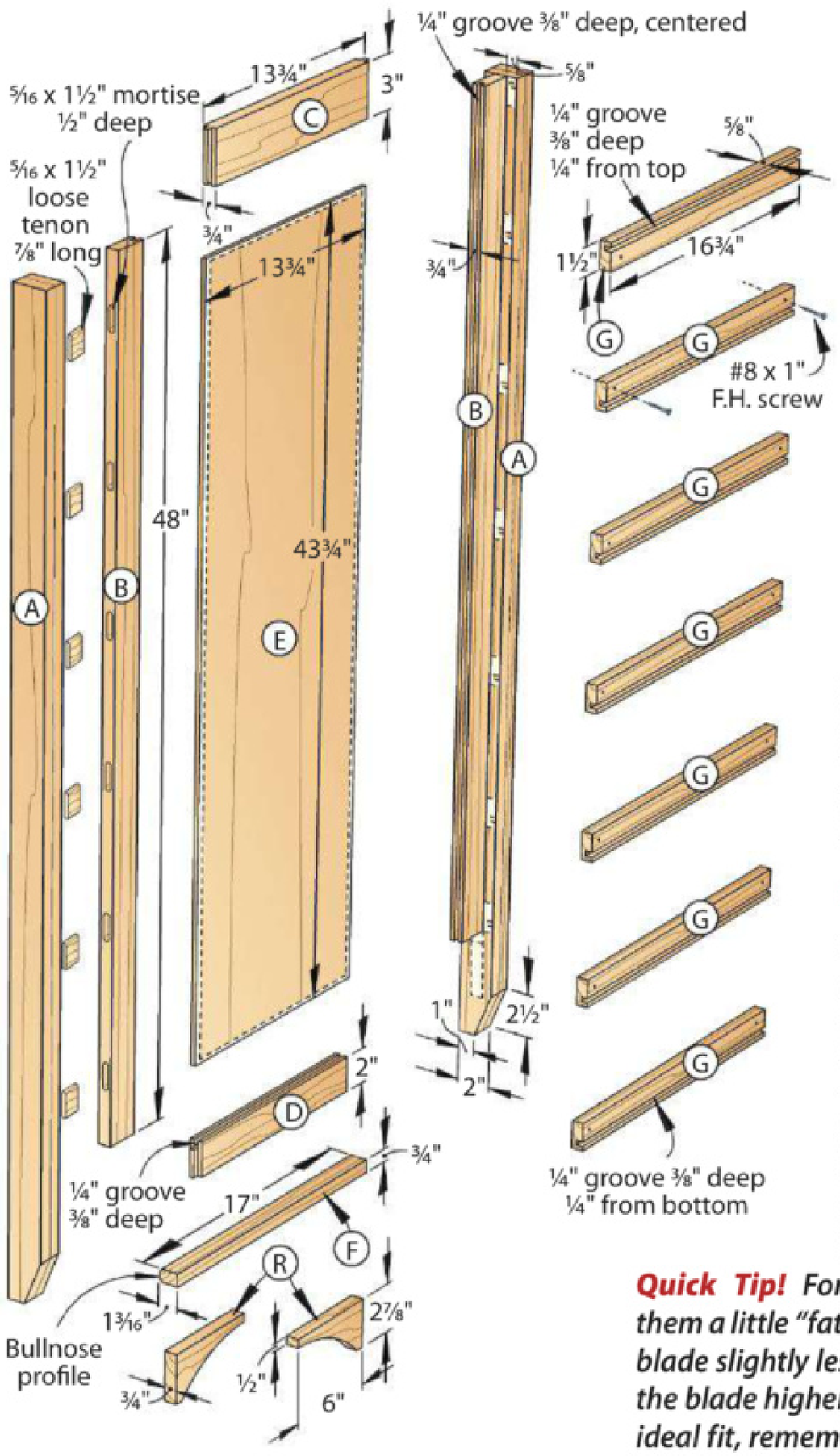
Add glue to the rail grooves, align the tenon ends of the rails (C, D) with the edges of the panel (E), and clamp the pieces together.

MEASURE THE SIDES FOR PARALLEL

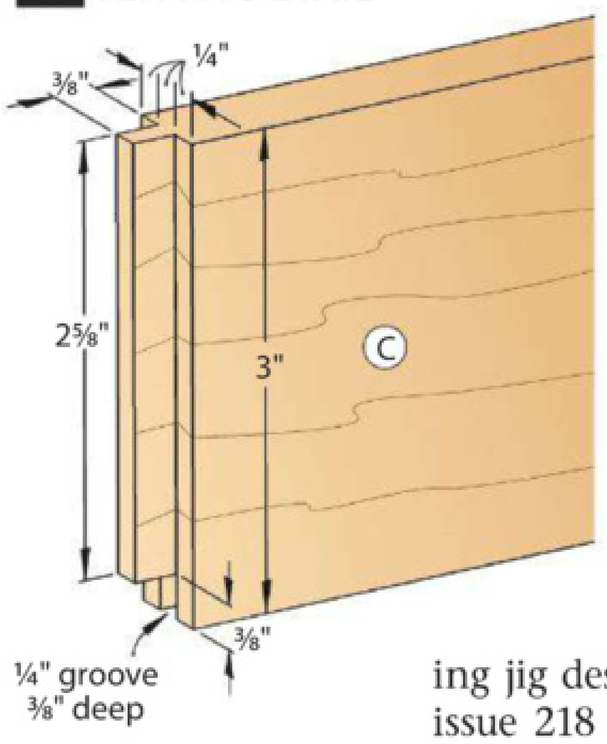


After clamping across both rails on the side assembly, clamp and measure the middle to ensure the legs don't bow out.

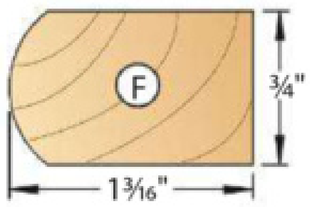
1 SIDE ASSEMBLY (Right inside face)



1a TENON DETAIL



1b BOTTOM-TRIM PROFILE



3 Cut to size the side stiles (B), side top rails (C), and side bottom rails (D) according to the **Materials List**. Cut the centered grooves in the edges of the rails and stiles [**Drawing 1**]. The groove should snugly hold the ¼" plywood you'll use later for the side panels (E).

4 Set a ¼" dado blade to ¼" high and set the rip fence ⅛" from the right edge of the blade. Using a miter gauge with an auxiliary face to back up the workpiece, cut centered tenons on the ends of all four rails to fit the panel grooves you cut in **Step 3** above [**Drawing 1a**].

Quick Tip! ***For perfect-fitting tenons, cut them a little "fat" initially by setting the dado blade slightly less than ¼" high. Then, tweak the blade higher with subsequent cuts for an ideal fit, remembering that each adjustment doubles the difference because you cut from both sides.***

5 Cut centered mortises in the legs (A) and side stiles (B) using the mortising jig described on *page 52* of *WOOD®* issue 218 (May 2013) [**Drawing 2, Photo A**]. (Find a free copy of the article at woodmagazine.com/218loosetenon.)

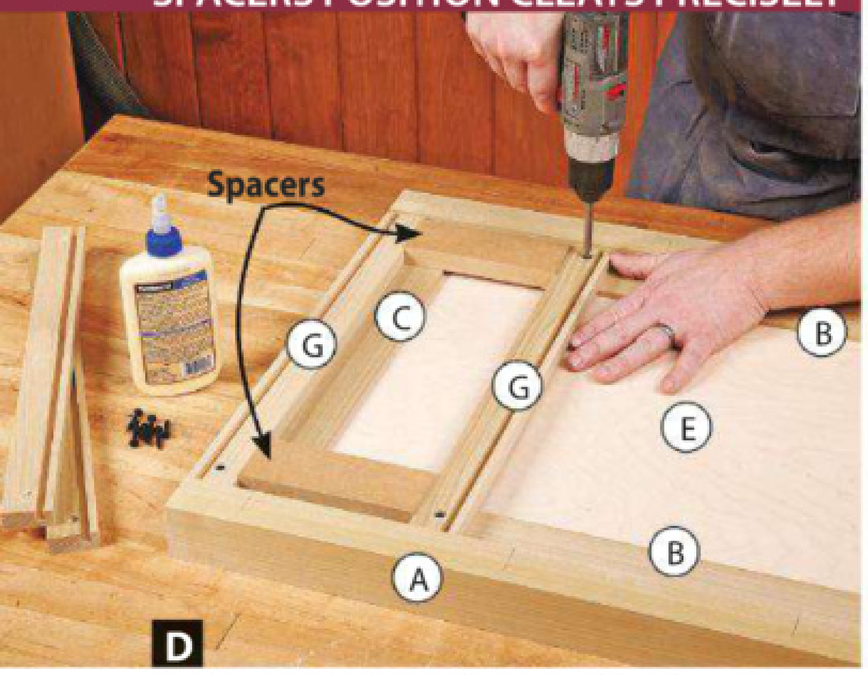
6 Now, make 24 loose tenons using the methods also described in that article. Glue loose tenons in the leg (A) mortises; then glue and clamp the legs to the stiles (B).

7 Cut to size two side panels (E). Then glue and clamp the side top rails (C) and side bottom rails (D) to the side panels [**Drawing 1, Photo B**].

8 Glue and clamp the leg/side-stile assemblies (A/B) to the rail/panel assemblies (C/D/E) [**Photo C**].

9 Cut a ¾ × 3 13/16 × 17½" poplar blank. With a ½" round-over bit extended 5/16" above your router-table top, rout a bullnose profile [**Drawing 1b**] on both faces and along both edges. Rip a 1 3/16"-wide piece off one edge to make a bottom trim piece (F) and set it aside. Repeat this process to make two more bottom trim pieces. Cut two pieces to fit between the legs (A) [**Drawing 1**] and glue and clamp them to the bottom edges of the side assemblies (A–E), aligning the back

SPACERS POSITION CLEATS PRECISELY



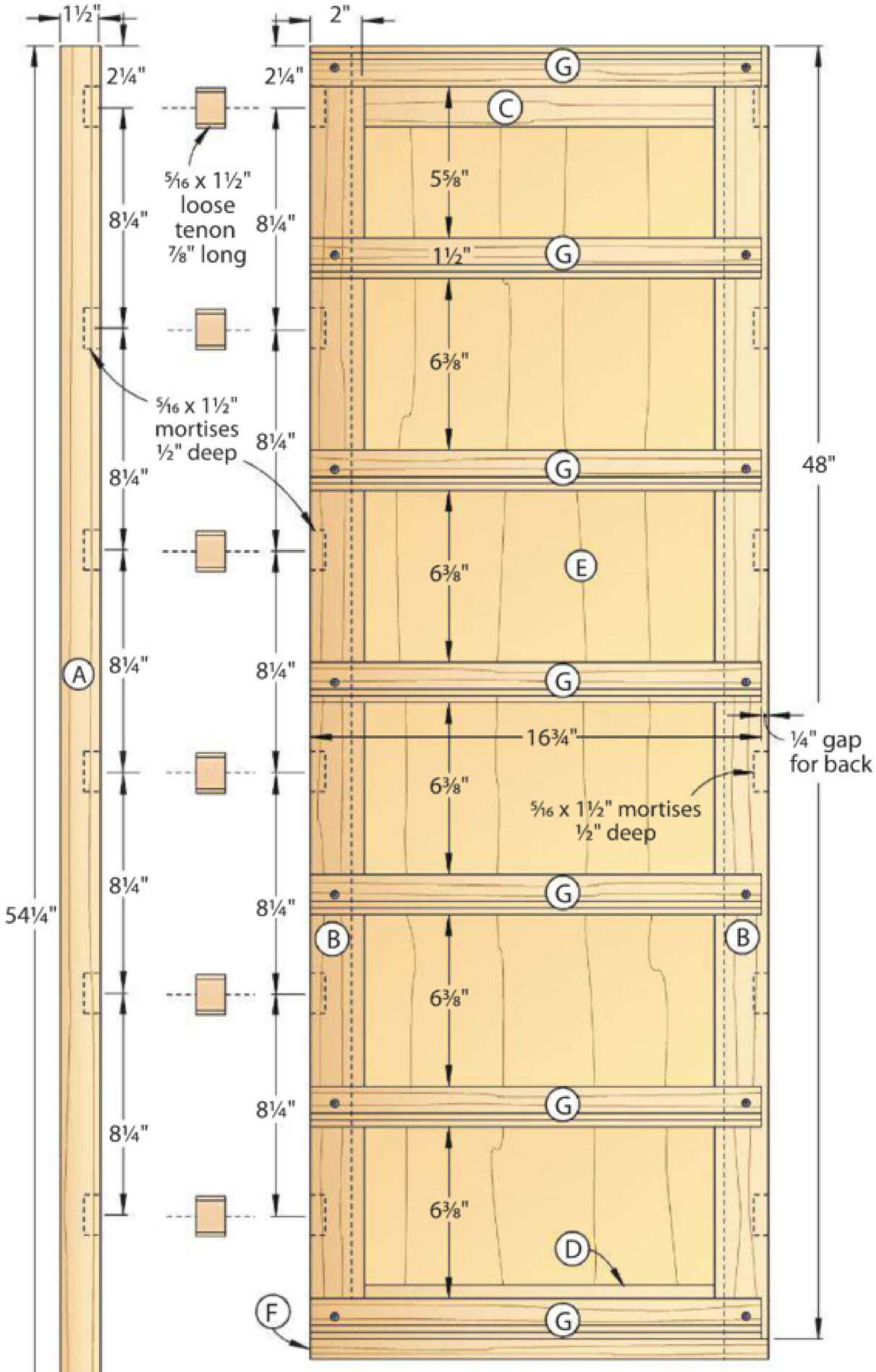
Working from the top down, position the cleats using spacers and attach them with glue and countersunk #8×1" flathead screws.

CUT TONGUES AND TRIM THE ENDS OF EDGING WITH ONE SAW SETUP





With a ⅜" dado set raised ¼", cut tongues on the ends of the dust-panel assemblies (H/I), *left*. To trim the edging flush with the shoulders of the tongues, raise the dado set to ⅞" high, stand the panels on edge, and clamp them to a tall auxiliary miter-gauge fence. Run the edging through the dado set, *above*.



2 SIDE ASSEMBLY (Left inside view)

edge of the trim with the inside face of the bottom rail (D). Save the other bottom trim piece for attaching to the front of the chest later.

Add the dust panels

1 Cut to size the dust-panel cleats (G) [**Materials List**] and in each mill a ¼" groove [**Drawing 1**]. Drill and countersink 5⁄32" shank holes in each cleat [**Drawing 2**]. Glue and screw a dust-panel cleat flush with the top of each side assembly (A–F), butted against the front leg (A), and with the groove toward the *top*. Leave a ¼" gap between the cleat and back leg to accept the back later. Use scrapwood spacers to position the rest of the cleats [**Photo D, Drawing 2**], positioning the groove toward the *bottom* on the remaining cleats.

2 From ¾" plywood, cut to size the dust panels (H) [**Materials List, Drawing 3**].

3 Cut the dust-panel edging (I) to width but ½" longer than listed [**Materials List**]. Glue the ¾"-wide edge of the dust-panel edging to the dust panels (H). Leave the edging ends just short of the ends of the panels. Sand or rout the edging flush with the faces of the panels.

4 Attach an auxiliary wood face to your saw's rip fence and adjust the fence so the auxiliary face just touches a ⅜" dado blade. Cut tongues on the dust panels (H/I) and trim the edging [**Photos E, F**].

5 To assemble the lingerie carcase, glue and clamp the seven dust-panel assemblies (H/I) to one of the side assemblies (A–G) [**Photo G**]. Then attach the remaining side assembly.

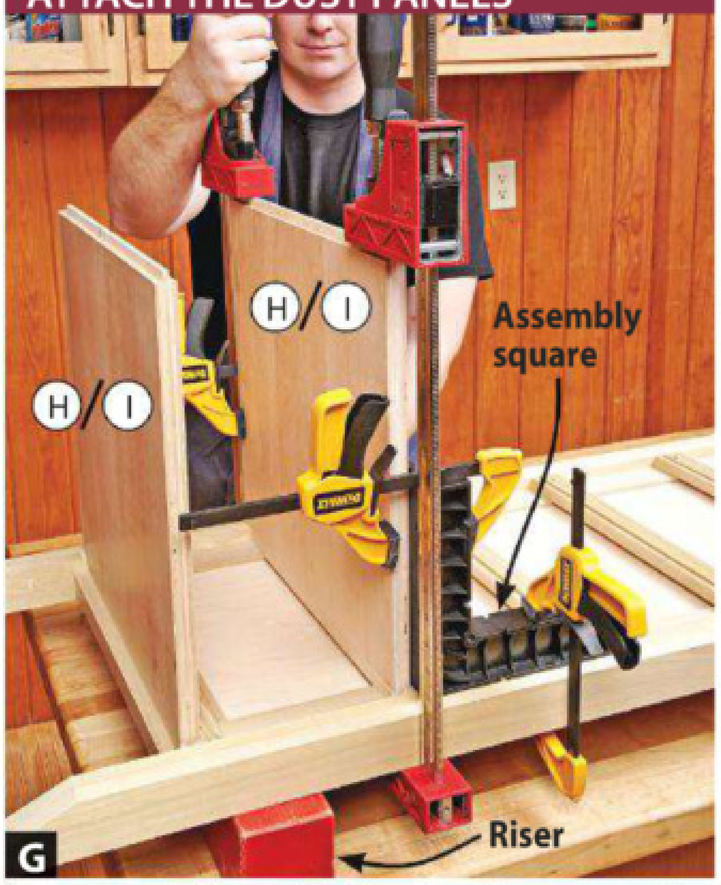
6 Cut to finished length the remaining piece of bottom trim (F) that you milled previously and glue it to the bottom front edge of the bottom dust panel (H/I).

Next, the drawers

1 From ½"-thick poplar, cut to size the drawer fronts (J), backs (K), and sides (L) [**Materials List, Drawing 4**].

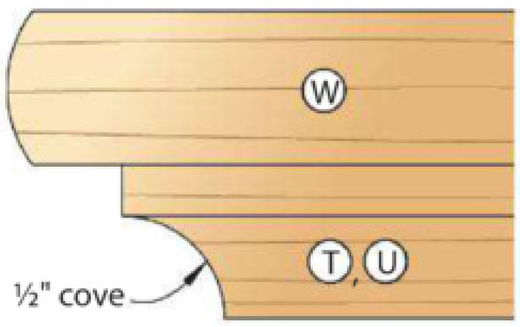
2 Install in your tablesaw a ¼"-wide dado blade set for a ¼"-deep cut; then, follow "**Making Drawer Boxes as Easy as 1-2-3**" on the *opposite page*.

ATTACH THE DUST PANELS

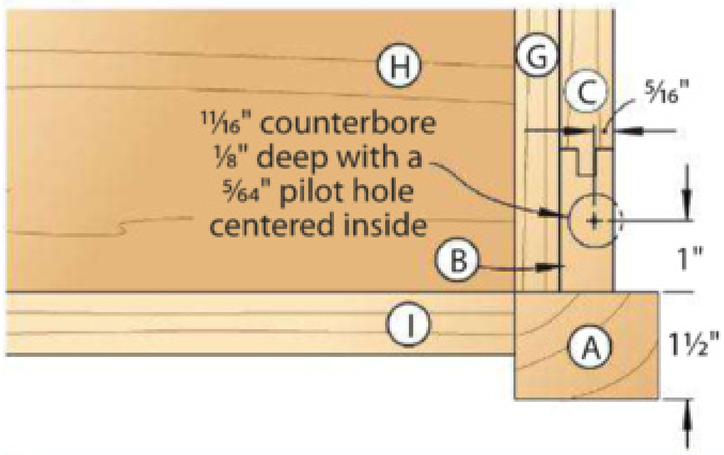


For convenient and effective clamping, elevate the side assembly (A–G) on risers and hold the dust panels (H/I) upright with assembly squares.

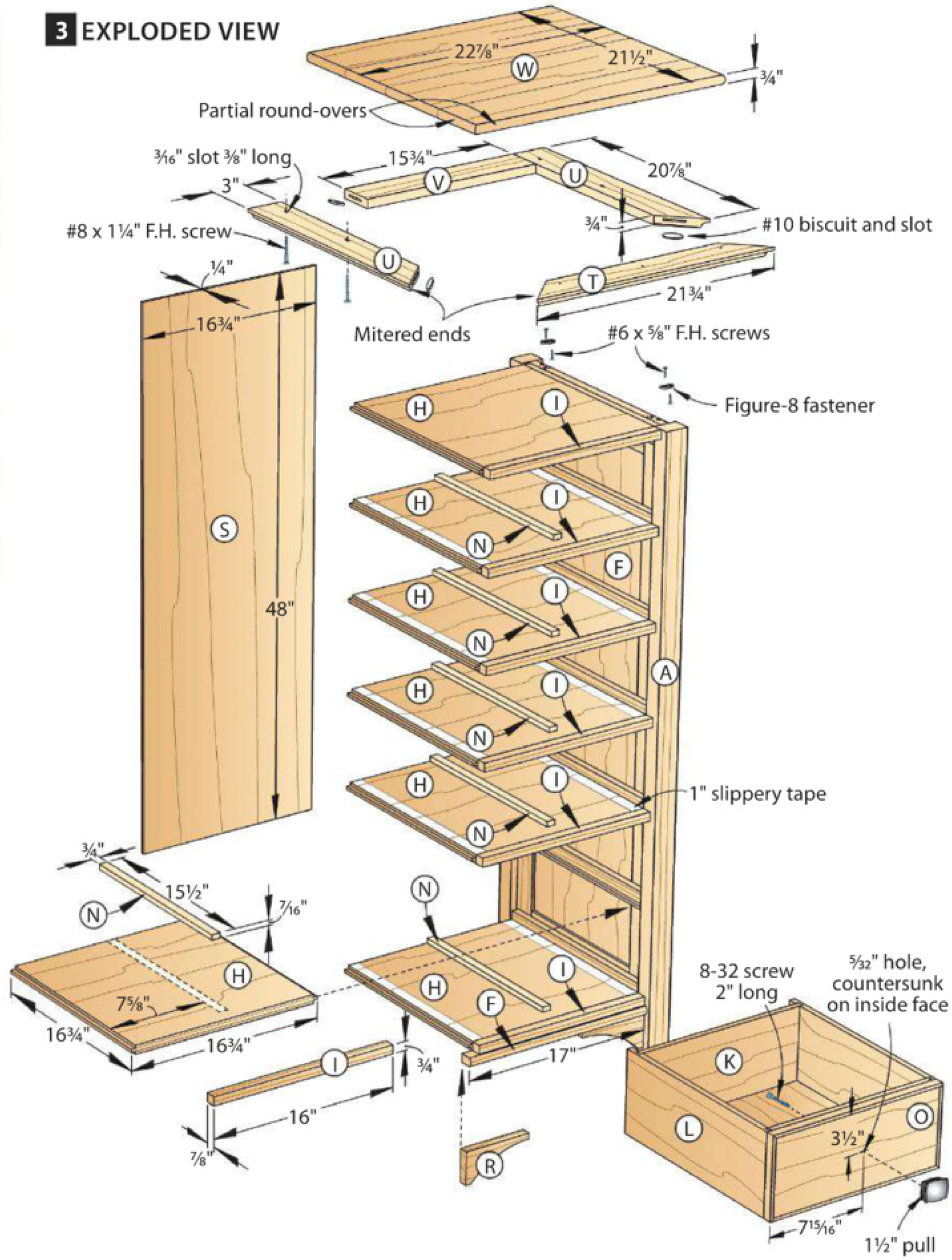
3a TOP AND TOP TRIM PROFILES



3b MOUNTING TOP DETAIL



3 EXPLODED VIEW



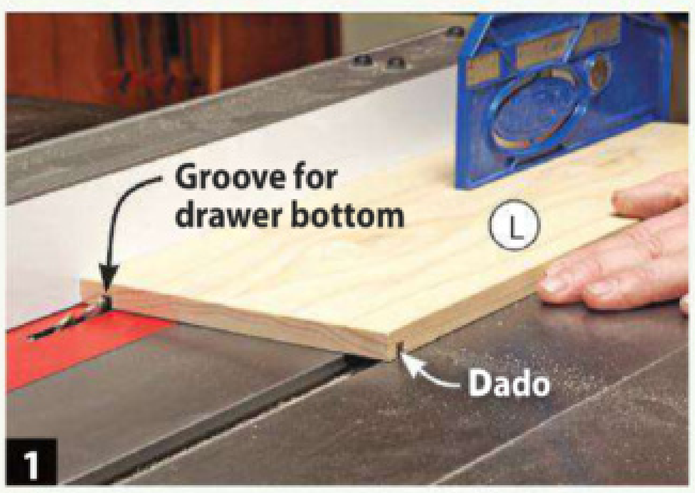
Making drawer boxes as easy as 1-2-3

You'll breeze through making the simple drawer joinery. Just move your tablesaw's rip fence to make the dadoes, grooves, and rabbets.

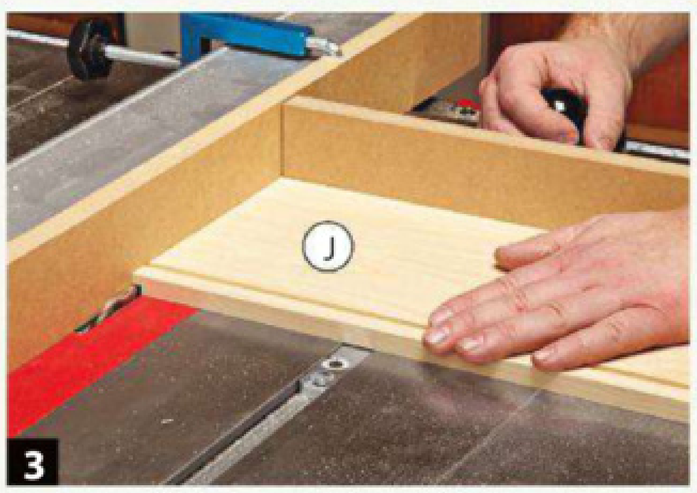
Step 1: Set the rip fence ¼" from the blade and cut dadoes near the front ends of the drawer sides (L). Move the fence to ½" from the blade and cut the grooves to accept the drawer bottom (M) in the inside faces of the drawer sides and fronts (J).

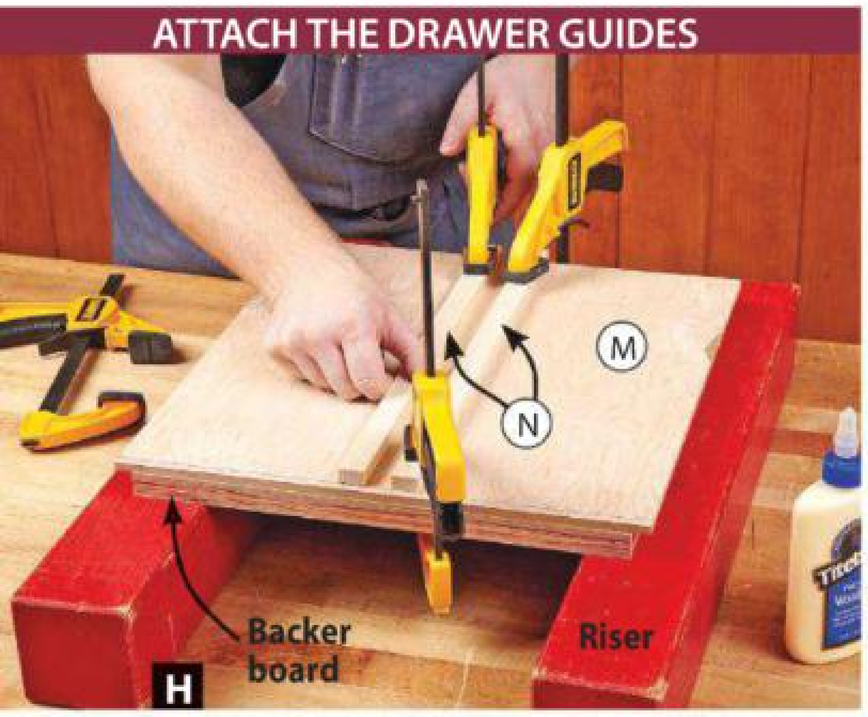
Step 2: To cut the ½" dadoes in the drawer sides to accept the drawer back (K), move the fence ¾" from the blade, and make a cut. Move it another ¼" away from the blade and make a second cut.

Step 3: Finally, attach an auxiliary face to the rip fence, and position it against the dado blade to cut the rabbets on the outside faces of the drawer fronts.

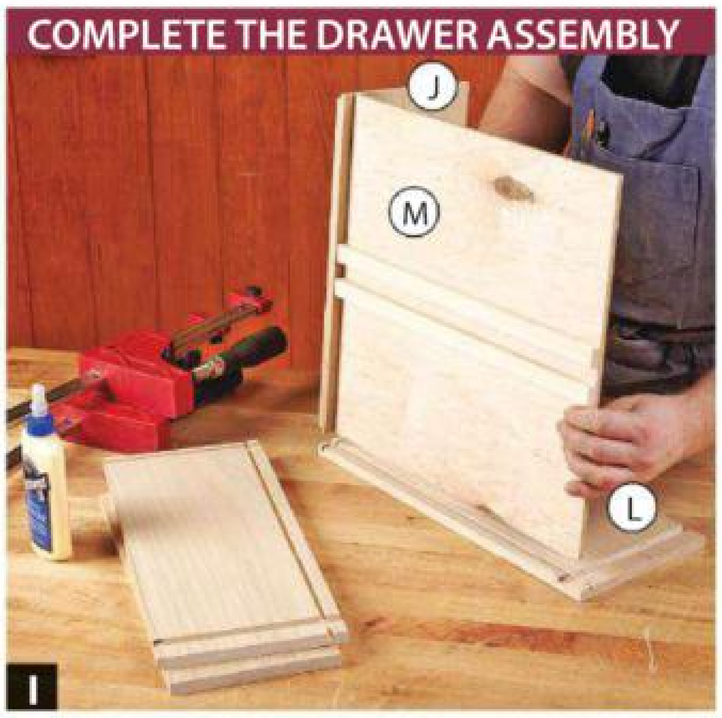




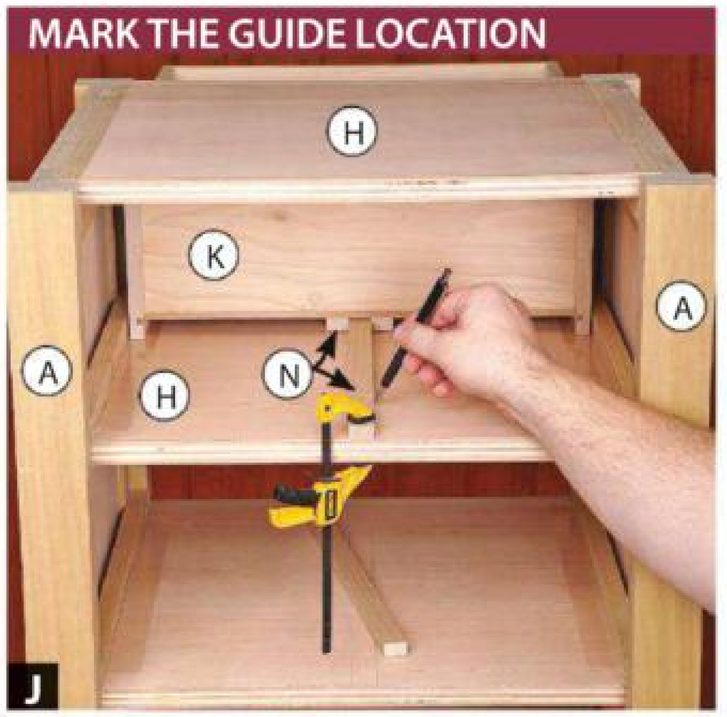




Place a backer board atop risers to help distribute clamping pressure. Be sure the guides (N) are square to the ends of the drawer bottom (M).



As you glue and clamp the drawer sides and backs, carefully check and adjust for square to ensure smooth-sliding drawers.



Slide a drawer guide (N) between the drawer's guides from the rear. Push the drawer forward, clamp the guide, and mark its location.

3 From ¼" plywood, cut the drawer bottoms (M).

4 Cut 18 drawer guides (N) [**Materials List**] and set six aside for later use. Glue a pair of drawer guides to the bottom of each drawer bottom (M) [**Photo H, Drawing 4**]. Position them flush with the back edge, allowing space for another guide to slide smoothly between them.

5 Glue a drawer bottom/guides assembly (M/N) to each drawer front (J), aligning their edges. Then attach the drawer sides (L) [**Photo I**] and backs (K).

6 To mount the drawer guides (N) to the dust panels (H) [**Drawing 3**], slide a drawer into an opening, centered side-to-side, and mark the guide's location [**Photo J**]. Identify the drawer to keep it matched with the opening. Try the **Shop Tip** *below right*; then, glue and clamp the guides to the panels.

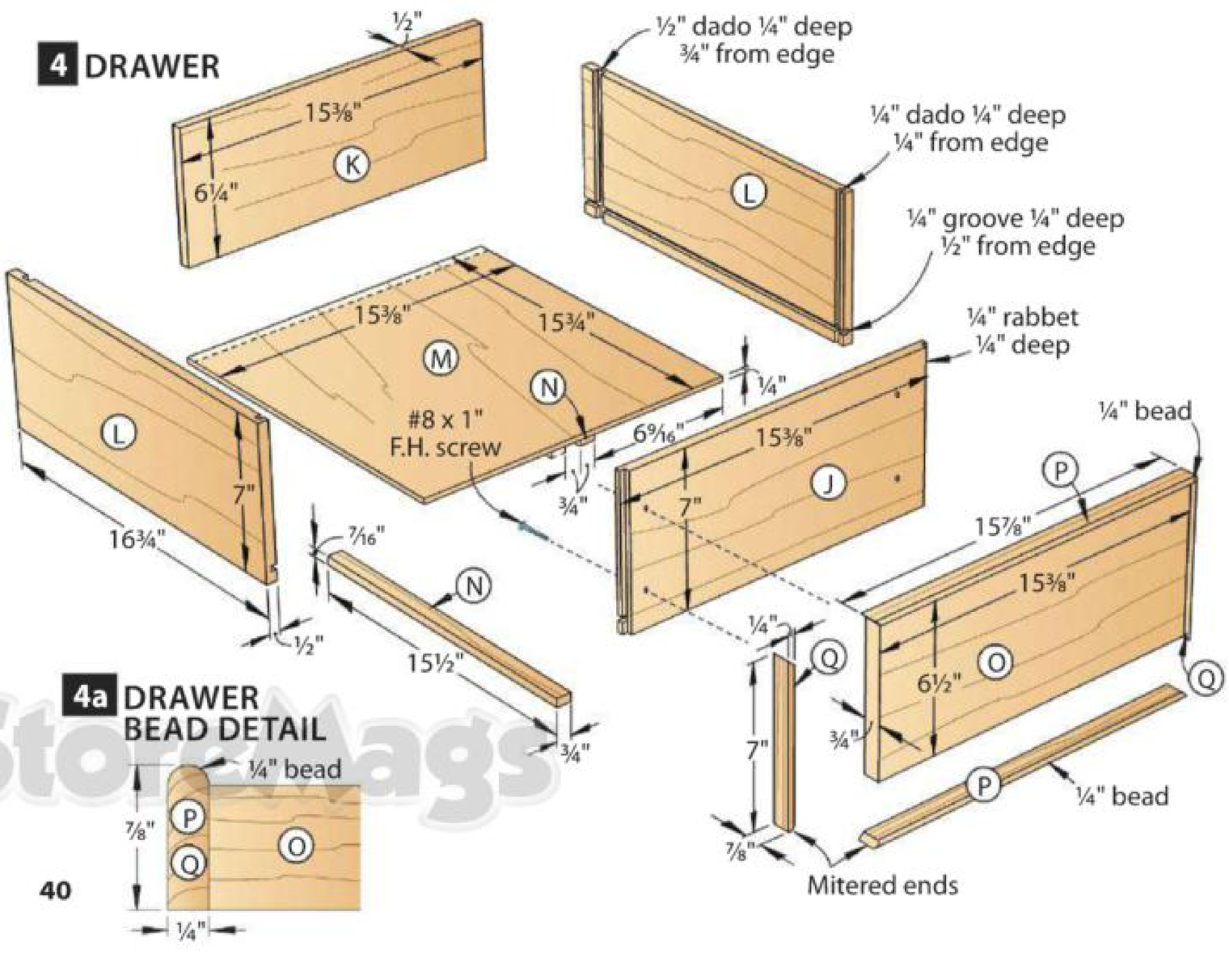
7 Cut to size the drawer faces (O) [**Materials List**]. Cut enough ¼" poplar to make drawer top, bottom, and side beads (P, Q). Round over the top and bottom faces of one edge of the beads using a ⅛" round-over bit [**Drawing 4a**].

8 Build and attach to your miter gauge an L-shaped miter cradle like the one shown in **Photo K**. Working on each drawer face (O) in turn, miter-cut an end of a piece of bead at least 17" long and mark its other end as shown in the **Shop Tip,** *opposite page*. Use the cradle to miter-cut on your mark. Temporarily fasten that piece to the drawer face with masking tape and repeat these steps for the three remaining bead pieces. Number each bead piece and the adjoining edges of the drawer face. Lay the bead pieces in a line, in numbered order with the "heels" of their miters down, and tape them together at their "toes." Glue and clamp the bead in place [**Photo L**].

9 To position and mount the drawer faces (O/P/Q) to the drawers (J–N), slide the drawers into the openings and temporarily attach the drawer faces with double-faced tape [**Photo M**]. Remove the drawers. Drill and countersink ⅛" pilot holes through the inside faces of the drawer fronts (J) and ½" deep into the faces (O) [**Drawing 4**]. Drill 5/32" holes for the pulls. Separate the drawer fronts and faces, and remove the tape.

Make the last few pieces

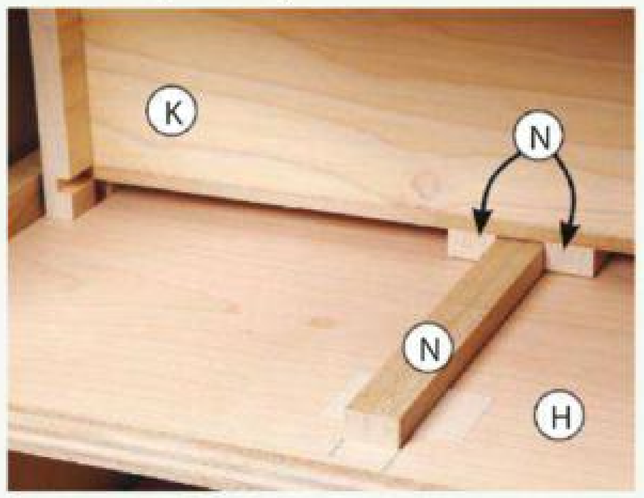
1 Make six photocopies of the **Bracket Pattern**, *opposite page*, and use them to help bandsaw and sand the brackets (R) to shape. Remove the patterns and glue the brackets to the bottom trim (F) [**Drawing 3**].



SHOP TIP

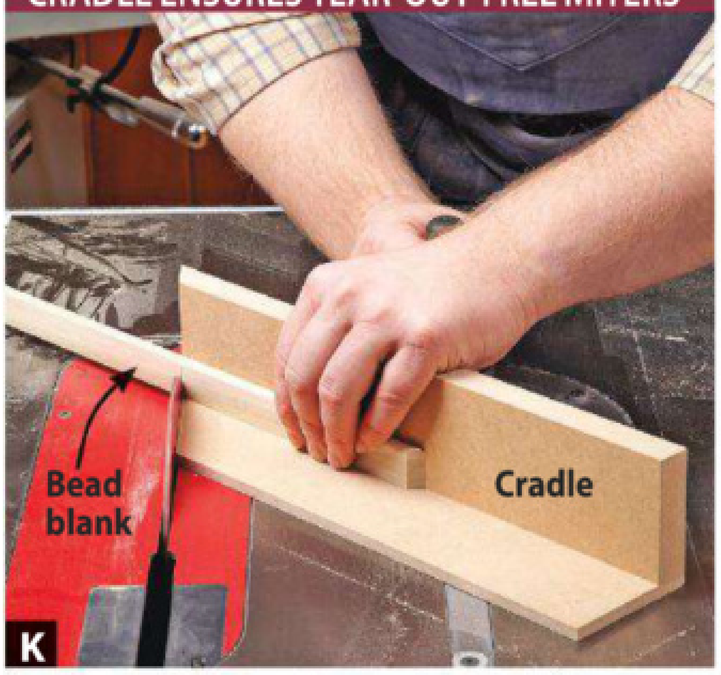
Doubled-faced tape aids precise guide placement

Before gluing the guides to the dust panels, attach them on your marks using double-faced tape. Then, check if the drawer slides correctly. Glue down the guide only after you're certain its position is marked precisely.



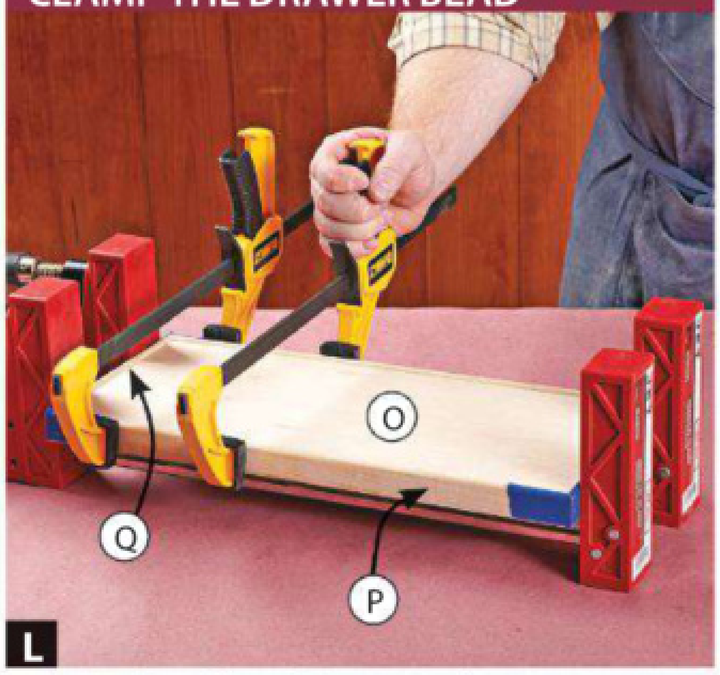
StoreMags

CRADLE ENSURES TEAR-OUT-FREE MITERS



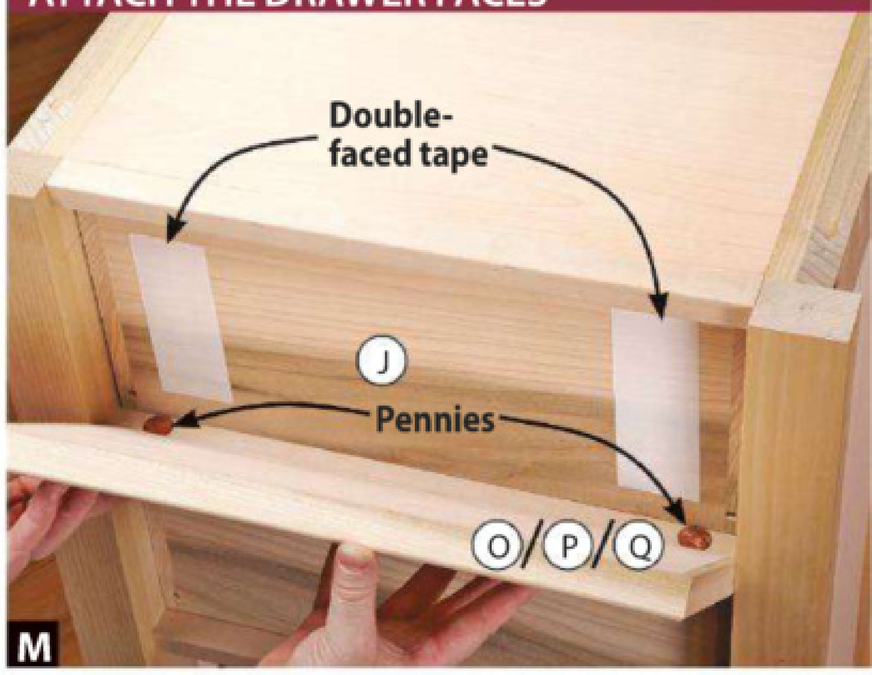
Cut the cradle to length to make a zero-clearance platform. Then use a 60-tooth blade and a slow feed rate to ensure clean, on-the-money miters.

CLAMP THE DRAWER BEAD



With the front face of the drawer face (O) up, wrap the bead around the drawer face. Secure the open corner with tape, keeping the rear faces flush.

ATTACH THE DRAWER FACES



Place two pennies under the drawer face (O/P/Q) for equal up-down spacing, position the face for even side-to-side spacing, and press it in place.

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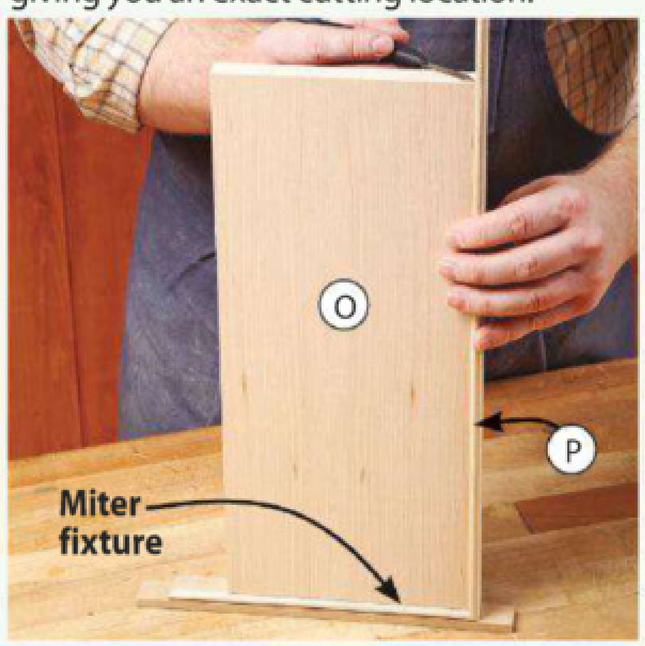
N

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

SHOP TIP

Super-simple fixture helps you mark miters

Before you can cut precise miters you need to mark them precisely. That's where this handy fixture helps. Simply miter-cut both ends of a piece of bead about 8" long. Then, glue that bead atop a piece of ¼" hardboard about 1" wide and 10" long. Now, set a drawer end on the fixture and use it to register and mark a piece of bead as shown. A marking knife works best for giving you an exact cutting location.



2 Cut to size the back (S) [**Materials List**]. Slide it into the gap between the back legs (A) and the dust-panel cleats (G), then secure it with brads.

3 Cut the top front trim (T) and the top side trim (U) to 23" long. Then, cut the top back trim (V) to finished size [**Materials List, Drawing 3**].

4 Rout a ½" cove in the edges of the top front (T) and top side trim (U) [**Drawing 3a**]. Miter both ends of the top front trim and one end of the top side trim. Dry-fit the front and side trim, fit the back trim (V), and check for square. Unclamp, cut #10 biscuit slots, and drill the slots toward the back end of the side trim [**Drawing 3**]. Apply glue and biscuits and clamp together on a flat surface.

5 Edge-join a ¾×22×24" blank for the top (W). After the glue dries, cut it to final size, then rout a bullnose on its front and side edges as you did on the bottom trim (F) [**Drawing 3a**].

6 Screw the top trim assembly (T/U/V) to the top (W). Be sure to place the side trim's back screw in the center of the slot to allow the top to expand and contract across its width with seasonal changes in humidity.

7 With an 11/16" Forstner bit drill ⅛"-deep counterbores in the tops of the side stiles (B) [**Drawing 3b**]. Later, these accept figure-8 fasteners [**Sources**] for attaching the top (T–W).

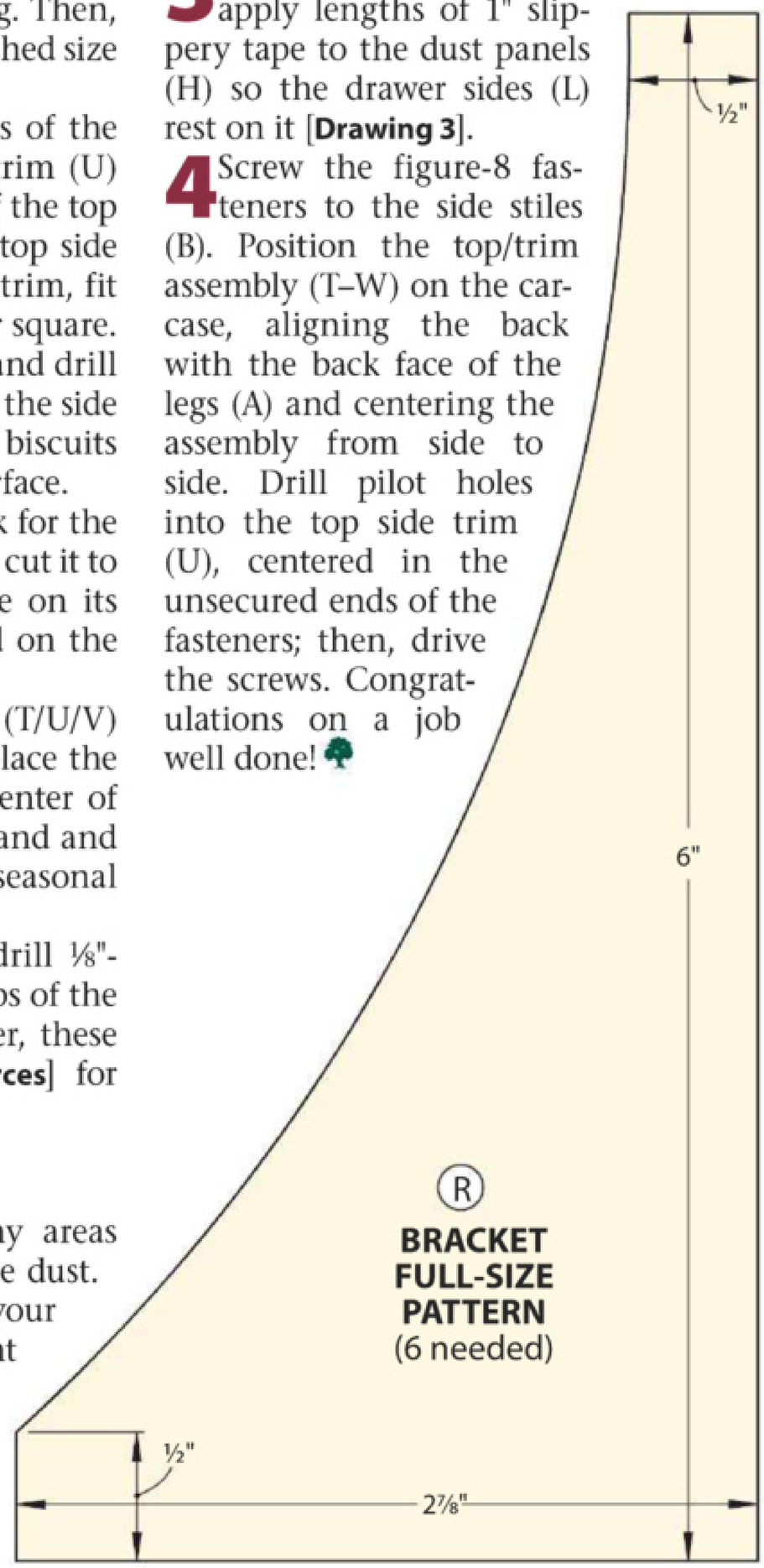
Now finish up

1 Finish-sand to 220 grit any areas that need it, and remove the dust. Apply a stain and finish of your choice. We used a custom tint from Sherwin-Williams [**Photo N**] and top coated with three coats of a satin-finish lacquer.

2 Screw the drawer faces (O) to the drawer fronts (J) and, using 2"-long machine screws, install the drawer pulls [**Sources**].

3 To ensure smooth-gliding drawers, apply lengths of 1" slippery tape to the dust panels (H) so the drawer sides (L) rest on it [**Drawing 3**].

4 Screw the figure-8 fasteners to the side stiles (B). Position the top/trim assembly (T–W) on the carcase, aligning the back with the back face of the legs (A) and centering the assembly from side to side. Drill pilot holes into the top side trim (U), centered in the unsecured ends of the fasteners; then, drive the screws. Congratulations on a job well done!



Materials List

Part		FINISHED SIZE T	W	L	Matl.	Qty.
Carcase						
A*	legs	1½"	2"	54¼"	LP	4
B	side stiles	¾"	2"	48"	P	4
C	side top rails	¾"	3"	13¾"	P	2
D	side bottom rails	¾"	2"	13¾"	P	2
E	side panels	¼"	13¾"	43¾"	MP	2
F*	bottom trim	¾"	1³⁄₁₆"	17"	P	3
G	dust-panel cleats	⅝"	1½"	16¾"	P	14
H	dust panels	¾"	16¾"	16¾"	MP	7
I*	dust-panel edging	¾"	⅞"	16"	P	7
Drawers						
J	fronts	½"	7"	15⅜"	P	6
K	backs	½"	6¼"	15⅜"	P	6
L	sides	½"	7"	16¾"	P	12
M	bottoms	¼"	15⅜"	15¾"	MP	6
N	guides	¾"	7⁄16"	15½"	P	18
O	faces	¾"	6½"	15⅜"	P	6
P*	top and bottom bead	¼"	⅞"	15⅞"	P	12
Q*	side bead	¼"	⅞"	7"	P	12
Trim, back, and top						
R	brackets	¾"	2⅞"	6"	P	6
S	back	¼"	16¾"	48"	MP	1
T*	top front trim	¾"	3"	21¾"	P	1
U*	top side trim	¾"	3"	20⅞"	P	2
V	top back trim	¾"	3"	15¾"	P	1
W*	top	¾"	21½"	22⅞"	EP	1

*Parts initially cut oversize. See the instructions.

Materials key: LP–laminated poplar, P–poplar, MP–maple plywood, EP–edge-joined poplar.
Supplies: Double-faced tape, #6×⅝" flathead screws (8), #8×1" flathead screws (52), #8×1¼" flathead screws (7), 8-32×2" machine screws (6), #10 biscuits (4), figure-8 fasteners (4), #17×1" brads.
Blade and bits: Dado set; 1³⁄₁₆" Forstner bit; ⅛", 5⁄32", 3⁄16", 5⁄64" drill bits; 5⁄16" upcut spiral, ⅛" and ½" round-over, flush-trim, and ½" cove router bits.

Sources

Drawer pulls: 1½" knobs (6), no. P2163, $5.19 each, $4.73 each for 10 or more, Woodworker's Hardware, 800-383-0130, wwhardware.com.
Clamp-It assembly square: no. 29190, $12.99, Rockler, 800-279-4441, rockler.com.
UHMW ("slick") tape: 1"×18 yards, part no. HTT-190516-18, $18.10, amazon.com.

Written by **Bill Krier**
Produced by **Craig Ruegsegger** and **John Olson**
Project design: **Kevin Boyle**
Illustrations: **Lorna Johnson**

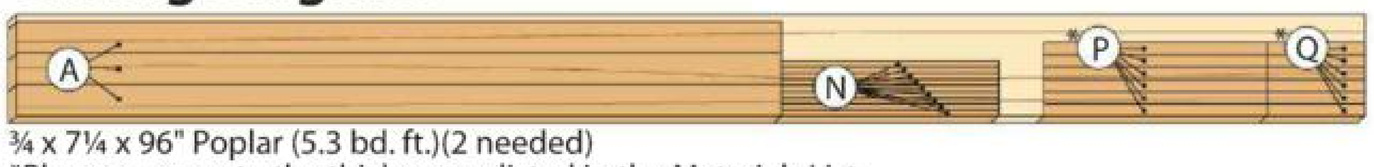
More Resources

▶ To buy issue 218 (May 2013) with plans for building the bed, or issue 219 (July 2013) for the dresser and nightstand, go to: woodmagazine.com/2013.

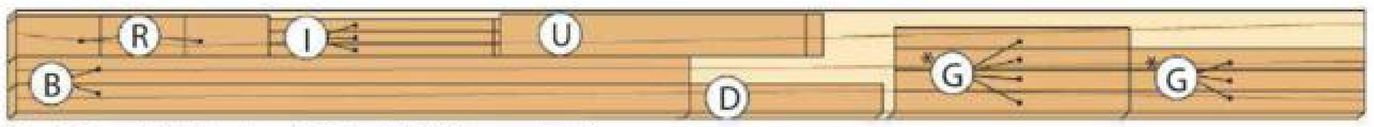
▶ To purchase a download of just the dresser/nightstand or bed articles, go to: woodmagazine.com/traditionalbedroom.

Stockings

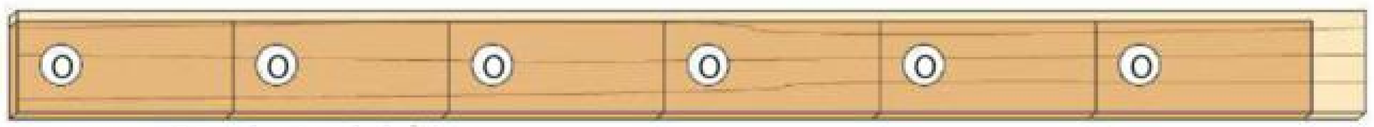
Cutting Diagram



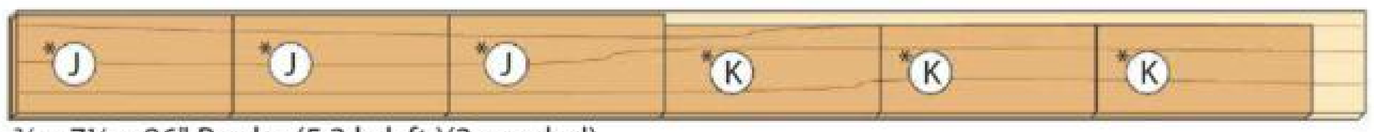
¾ x 7¼ x 96" Poplar (5.3 bd. ft.)(2 needed)
*Plane or resaw to the thicknesses listed in the Materials List.



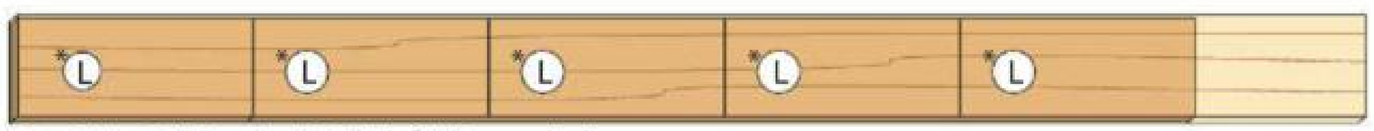
¾ x 7¼ x 96" Poplar (5.3 bd. ft.)(2 needed)



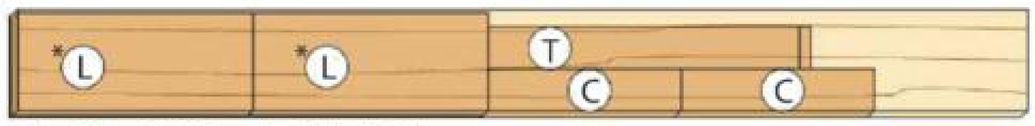
¾ x 7¼ x 96" Poplar (5.3 bd. ft.)



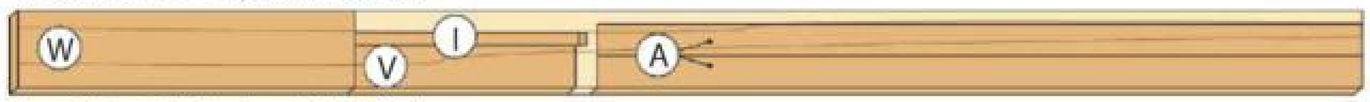
¾ x 7¼ x 96" Poplar (5.3 bd. ft.)(2 needed)



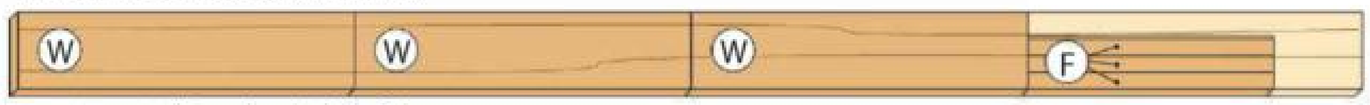
¾ x 7¼ x 96" Poplar (5.3 bd. ft.)(2 needed)



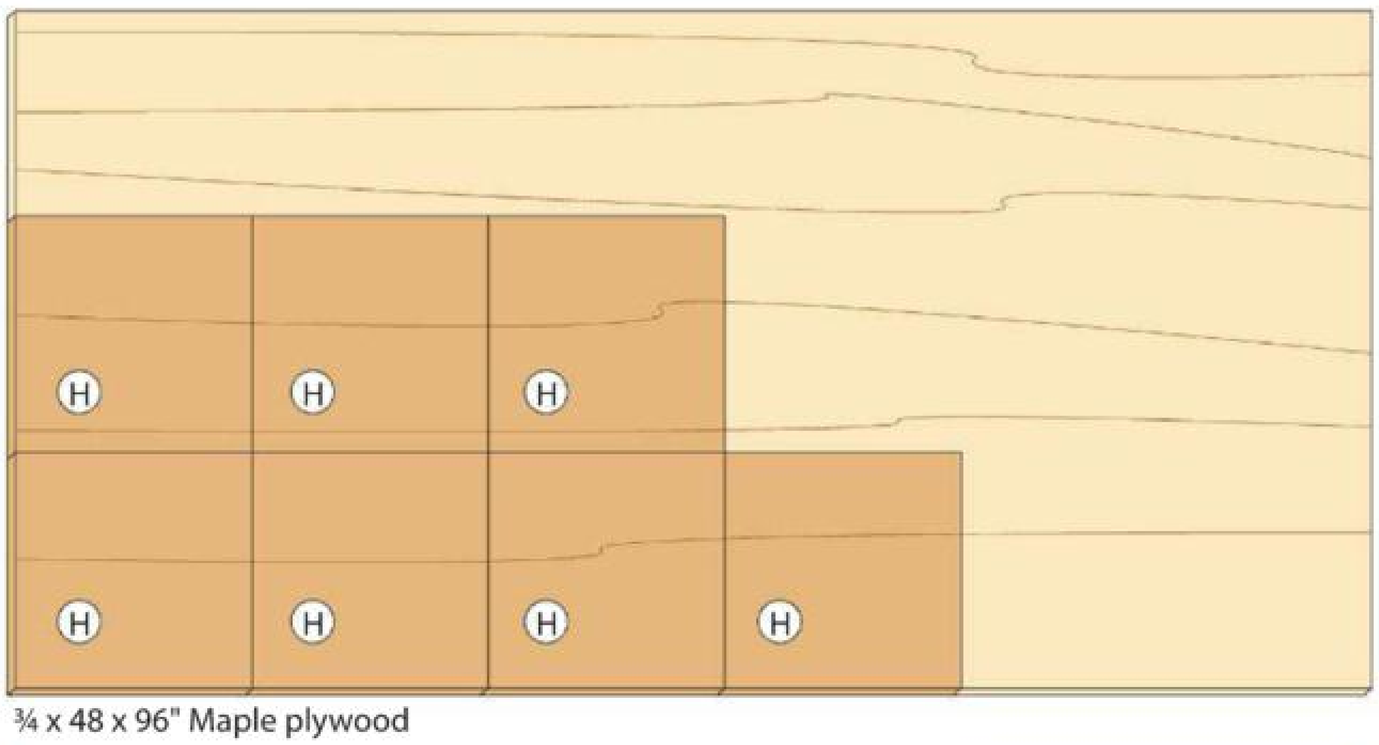
¾ x 7¼ x 72" Poplar (4 bd. ft.)



¾ x 5½ x 96" Poplar (4 bd. ft.)



¾ x 5½ x 96" Poplar (4 bd. ft.)



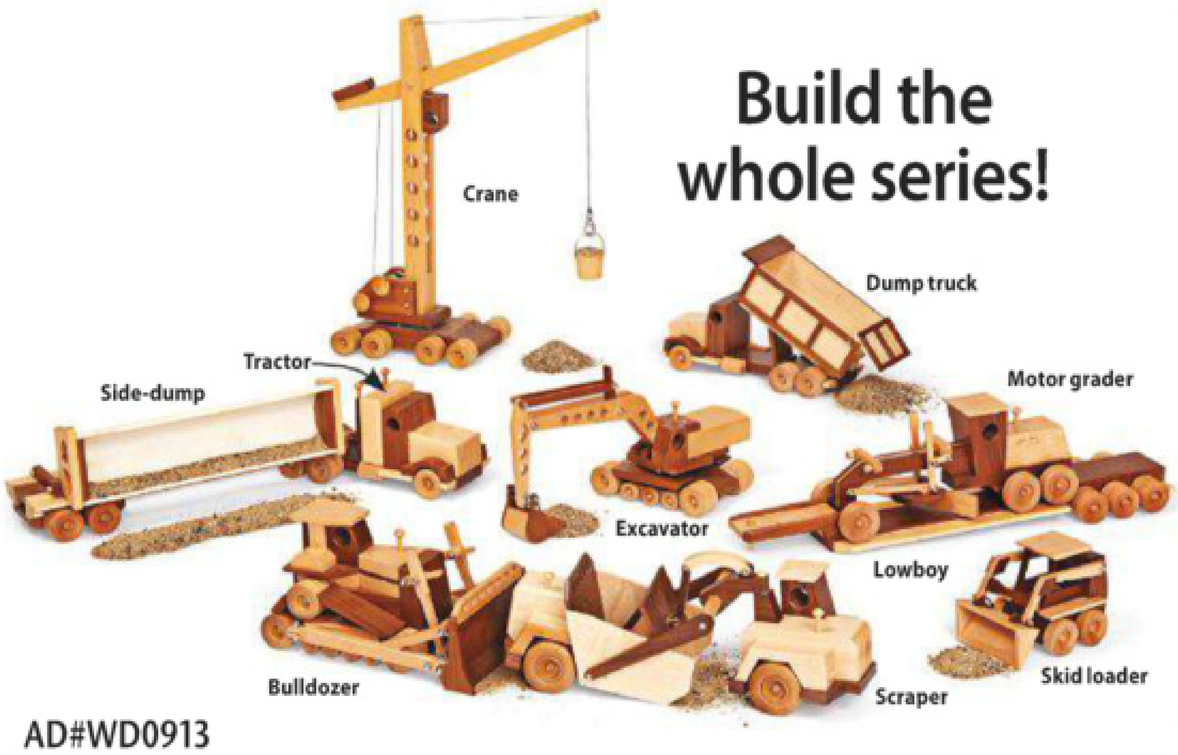
¾ x 48 x 96" Maple plywood



¼ x 48 x 96" Maple plywood

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SketchUp Simplified



The world's most accessible design software lets you plan your woodworking projects with confidence and realism.

As both the staff nerd and a laughably poor design doodler, I was thrilled when Trimble SketchUp (formerly Google SketchUp) was released for free to the public in 2006. (Download it at sketchup.com.) Since that time, a project rarely passes through my shop that isn't first designed in the 3D modeling software. Why? You can visualize a project far better, getting a sense of its size and proportions. You can test and prove various aspects of the project: for example, the clearance for the rotation of the flip-top bench on page 50. *And you'll feel far more confident putting blade to wood after modeling in SketchUp—as if you've built the project once already before even setting foot in the shop. Because you can get started with knowledge of only a handful of its tools, SketchUp is one of the least intimidating CAD tools around. But the depth beyond those basics is what makes it a particularly nice design tool for woodworkers.*

Lucas

Lucas Peters
Digital Content Manager

Most of SketchUp's basic functions can be handled with just a few tools. Learn these basic tools first; then, add to your repertoire as you grow more confident. Reference the refresher on the *next page* as you practice with specific tools. The following tips work with many of the tools.

▶Keyboard shortcuts (hitting a letter instead of clicking on a tool's icon) speed sketching. As you practice and improve, you'll waste less time hunting for the icons.

▶Many of the tools display "axis inference hints"—colored lines that indicate the direction of the tool action, such as when you move a part across the workspace. When the inference turns red, green, or blue, it means you're moving parallel to an axis. Your keyboard's arrow keys lock the movement parallel to an axis direction: right to the red axis, left to green, and up or down to the blue axis.

▶Most tools for creating or manipulating geometry accept numerical input for precise measurements. For example, with the line tool, click to start a line, drag in the desired direction and type in a number in inches (along with fractions or decimals); then, hit "Enter" for a precise line length. The rotate tool accepts degrees; the scale tool accepts a ratio (1.5 = 150%); the rectangle tool accepts coordinates in the form of "x,y" (ex. 1.5,6 for a 1½×6" rectangle), etc.

▶Often you'll find yourself using a tool to the extreme edge of the window (for example, when measuring an edge that extends off the screen). Many of the tools for creating or manipulating shapes can be interrupted mid-use to pan, orbit, or zoom as necessary for a better view. Then simply switch back to the previous tool to continue your already-in-progress operation.

SketchUp refresher

Storemags

Note: *Keyboard shortcuts are noted in parentheses.*

Tools for creating shapes

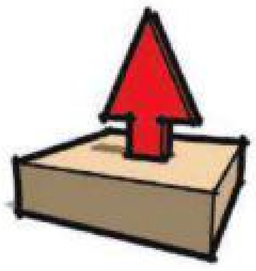
Quickly go from marking points, to drawing lines, to creating polygons (2D "faces"), to extruding 3D shapes using these tools.



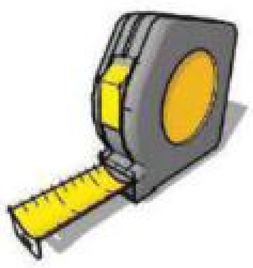
Line tool (L): Click between two points to form a line. Drawing a polygon with multiple lines closes the shape, creating a 2D face.



Rectangle tool (R): Click between two points to create a rectangle. Or type in precise "x,y" dimensions.



Push/Pull tool (P): Click and drag to extrude a 2D face into a 3D shape. The push/pull tool extrudes in a direction at a right angle to the face.



Tape Measure (T): Drag guides to precise locations and shapes snap to them. Or click between points to reveal the distance in the measurement field.

Tools for manipulating shapes

Once you've created shapes, these tools let you position and manipulate them.



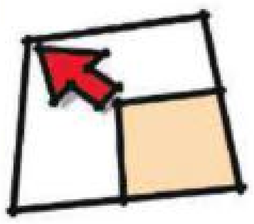
Select tool (Space Bar): Click or drag a box around items to select components or geometry. Multiple clicks open up "grouped" components. Shift-click to add to—or subtract from—your selection.



Move/copy tool (M): Click and drag to move a selected object to a new location. Press the Ctrl key to move a *copy* of the object to a new location.



Rotate tool (Q): Click and drag to rotate the selected object. Press the Ctrl key to rotate a *copy* of the object into a new orientation.



Scale tool (S): With this tool, the selected object sprouts "handles" for resizing the object's length, width, or depth. Holding the shift key scales all three proportionally.

Tools for moving around 3D space

SketchUp creates the illusion that you are viewing a virtual 3D scene through the lens of an imaginary camera. These tools let you control that camera:



Pan tool (H): Click and drag to move the camera (your viewpoint) horizontally and vertically to focus on a project part or area.



Orbit tool (O): Click and drag to rotate the camera around the scene for viewing various sides of objects.



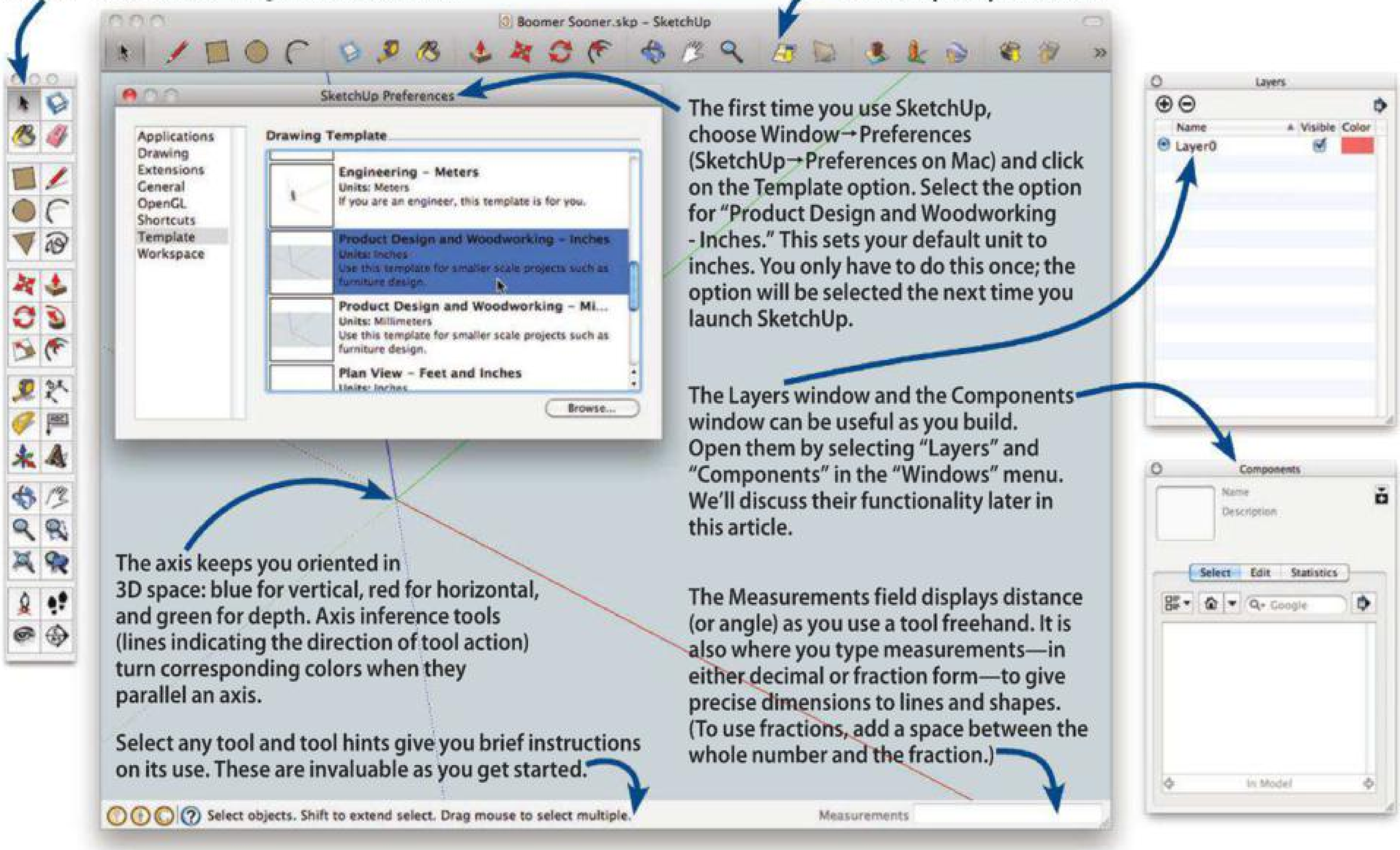
Zoom tool (Z): Click and drag up to zoom closer or down to zoom farther away. This proves useful for focusing on small details.



Zoom Extents tool: You'll sometimes find yourself lost inside an object, blocking your view. This tool rescues you. Click it to make the entire project visible again.

The "Large Tool Set" offers several essential-to-woodworking tool options not found in the default basic toolbar. Open it from View→Toolbars→Large Tool Set (or View→Tool Palettes→Large Tool Set, on Mac).

Customize the basic toolbar with your most frequently used tools.



The first time you use SketchUp, choose Window→Preferences (SketchUp→Preferences on Mac) and click on the Template option. Select the option for "Product Design and Woodworking - Inches." This sets your default unit to inches. You only have to do this once; the option will be selected the next time you launch SketchUp.

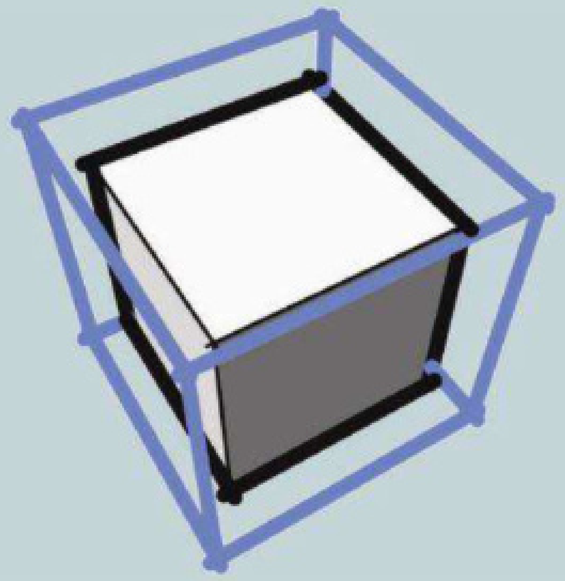
The Layers window and the Components window can be useful as you build. Open them by selecting "Layers" and "Components" in the "Windows" menu. We'll discuss their functionality later in this article.

The axis keeps you oriented in 3D space: blue for vertical, red for horizontal, and green for depth. Axis inference tools (lines indicating the direction of tool action) turn corresponding colors when they parallel an axis.

Select any tool and tool hints give you brief instructions on its use. These are invaluable as you get started.

The Measurements field displays distance (or angle) as you use a tool freehand. It is also where you type measurements—in either decimal or fraction form—to give precise dimensions to lines and shapes. (To use fractions, add a space between the whole number and the fraction.)

Parts are parts, especially when they're components



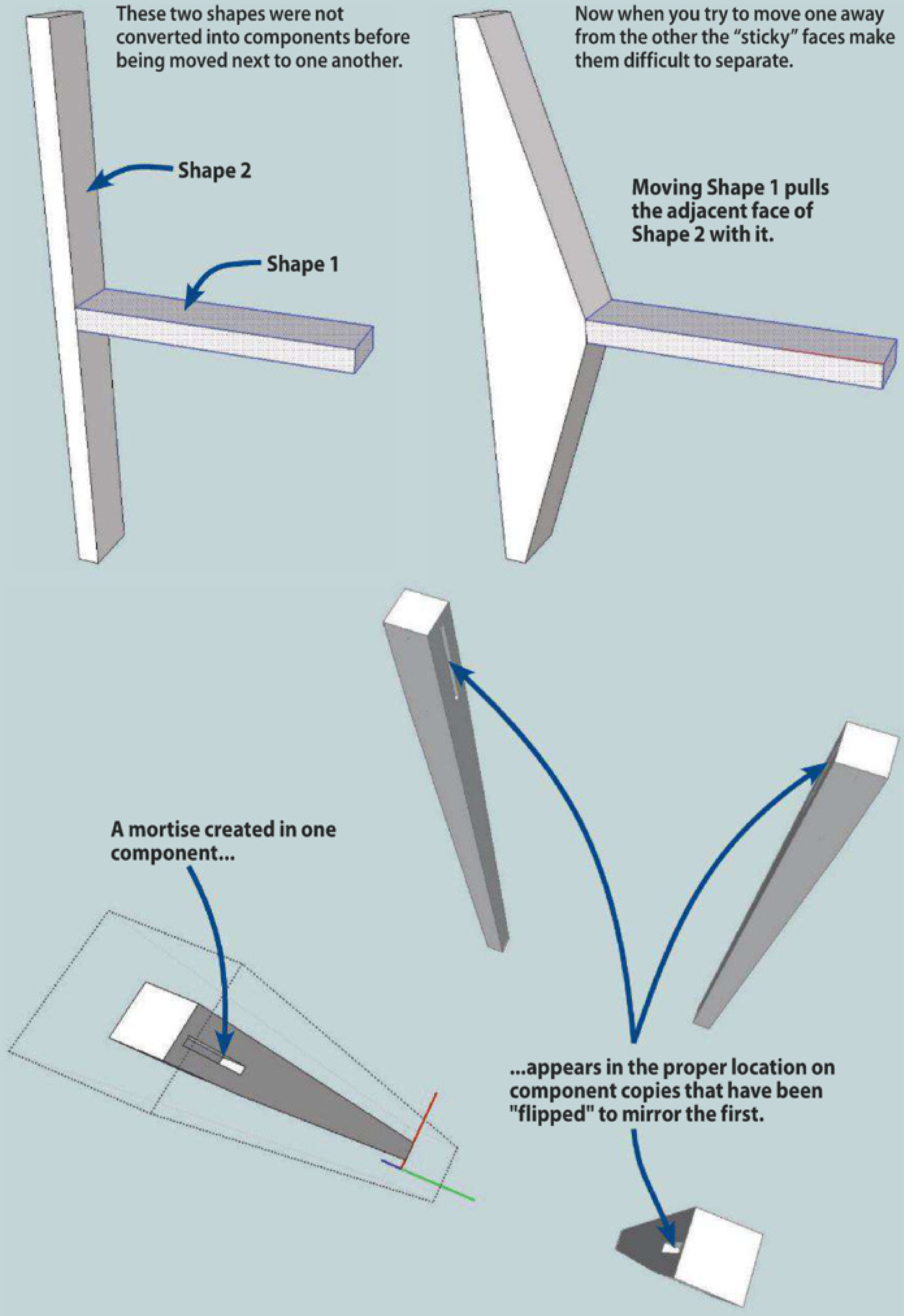
The **Make Component tool (G)** groups selected shapes into a discrete part called a "component." Make a change on one component and that change propagates to all copies of that component.

The equivalent of a project part is a "component" in SketchUp. When you first draw any shape in SketchUp, it is "sticky," meaning that two shapes placed adjacent to one another, as shown at *right*, meld together—often in ways that make further editing difficult, if not impossible.

To combat stickiness, convert a shape into a component as soon as possible. Generally this means as soon as it is three-dimensional (for example, just after you've used the push/pull tool to extrude a rectangle into a block). To do this, right-click on a face of the geometry and choose "Select→All Connected. "Then click on the component icon, *above*. It's a good idea to name and describe the component; then, click "Create" to add it to the list. Double-click a component to focus on it and unlock it for editing.

Aside from shedding their stickiness, components come with one extremely handy property for designing woodworking projects: Changes made to one component are reflected on all copies of that component.

For example, rather than separately creating four table legs, tapering the outer faces of each, and adding mortises to the inner faces, you can create one leg-sized component and duplicate it three times. Flip each component along the red and green axes as necessary by right-clicking and choosing "Flip Along." Then double-click one of the legs (to open the component for editing) and add the tapers and mortises to that leg, *right*; the three others update automatically. Click anywhere outside of the component to close it.

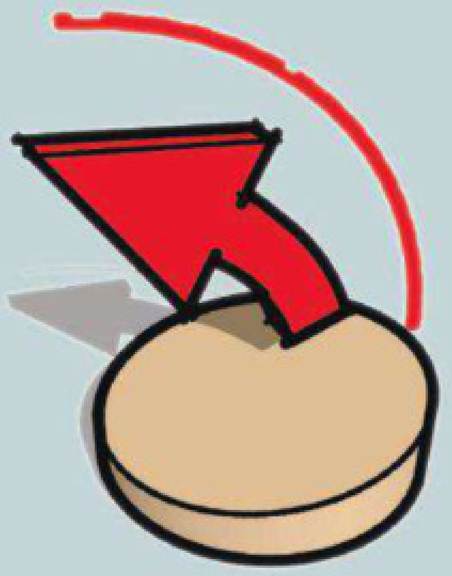


To add details to one of the components without changing the others, simply right-click the component, and choose "Make Unique." The part becomes a distinct component, and changes made to it are no longer reflected in its former siblings.

Components collect in the components panel. Even when you delete a component from the screen, you can still recover it from there. You can also use the panel to select all instances of a component or replace selected components with a different component.

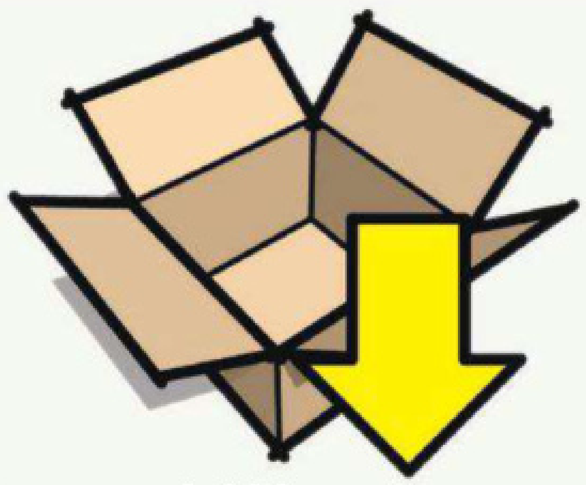
Group components into subassemblies by selecting related components and choosing "Edit→Make Group." This is useful as you begin to complete sections of your drawing that you'd like to move or rotate together (like a drawer or door). Triple-click an individual component that is part of a group to edit it.

SketchUp's built-in router and lathe



The **Follow-me tool** acts like the Push/Pull tool except that it pushes complex geometries around corners and along curves.

Woodworking is not all square edges and angles. And your 3D drawings don't have to be either. It's easy enough to create curved or circular parts using the Arc and Circle tools. But one of the more powerful curve-making SketchUp tools is the Follow-me tool, found in the large tool set. With a little setup, this tool acts as either router, *right*—creating profiles along an edge—or lathe, *below*—turning profiles in the round.



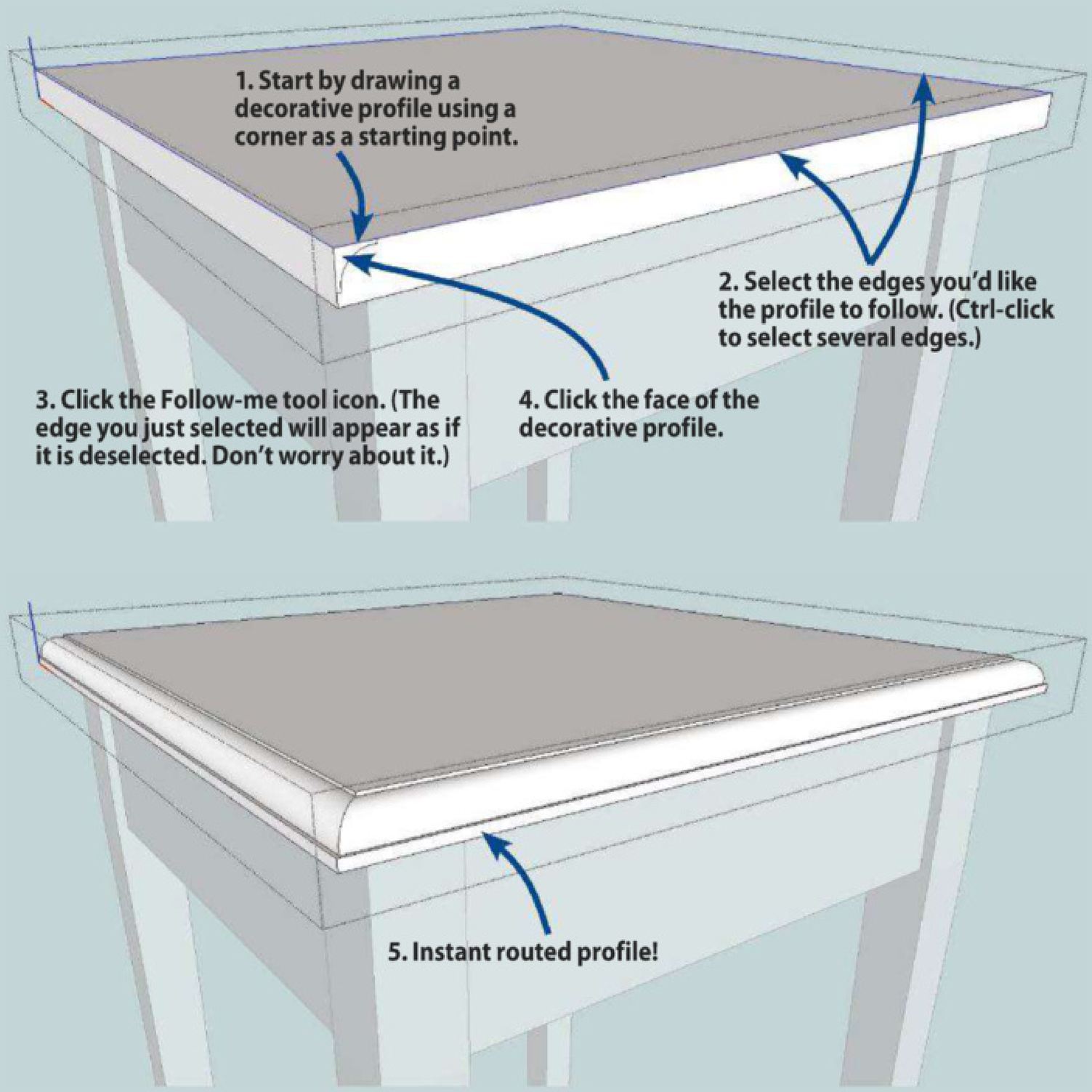
Free model library: No drawing required

Trimble maintains a huge library of free SketchUp models in its online 3D warehouse. These can be useful as starting points, or for practice at manipulating models. They can also be useful for laying out your shop, *below*. Click the Get Models tool, *above*, to start browsing free models. When you find one you like, download it to your computer or directly into your current project.

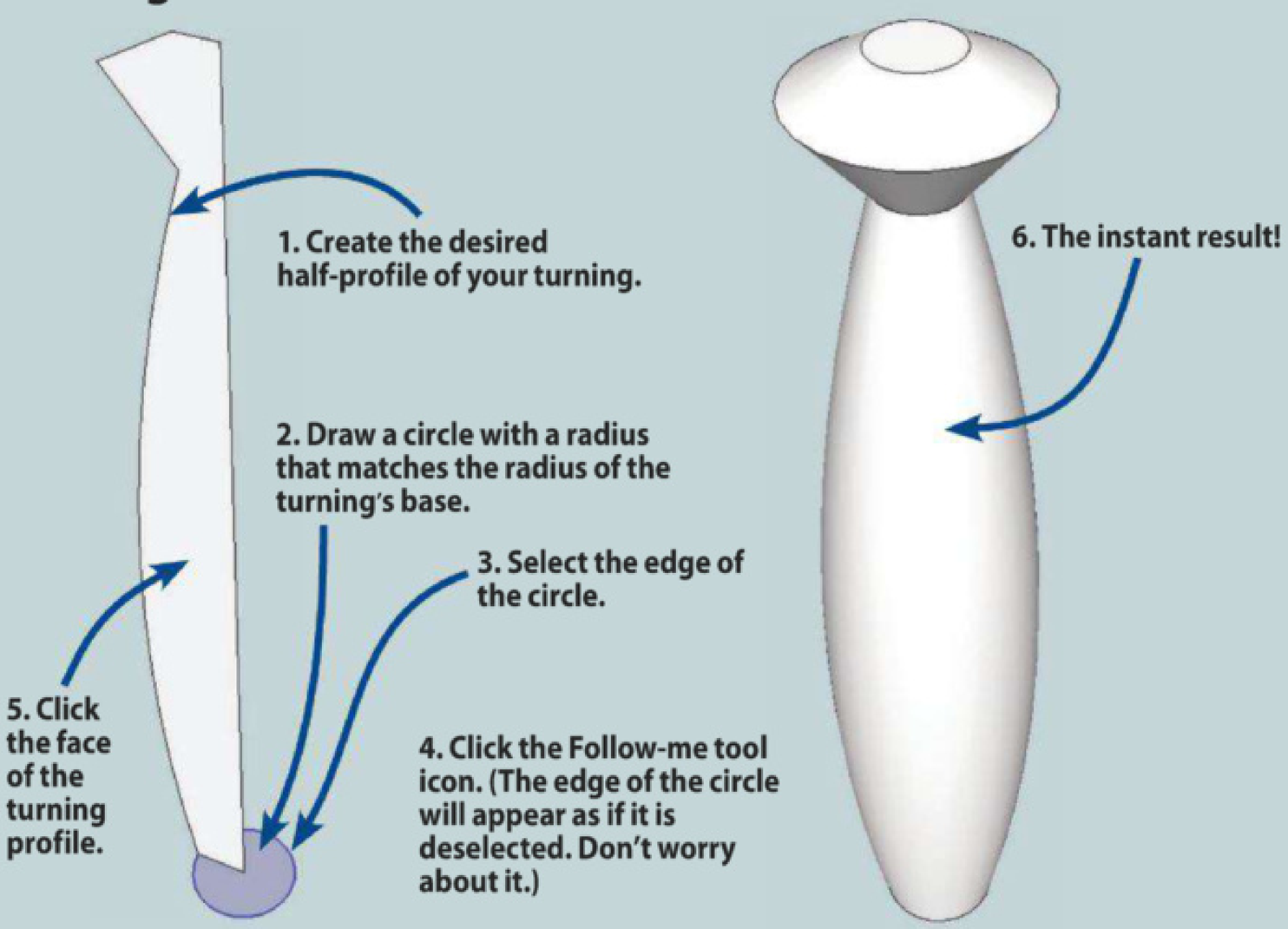


Download models with a set of common power tools and rearrange them to fit your ideal shop layout. (Don't forget to download an ideal car while you're there!)

Routing with the Follow-me tool



Turning with the Follow-me tool

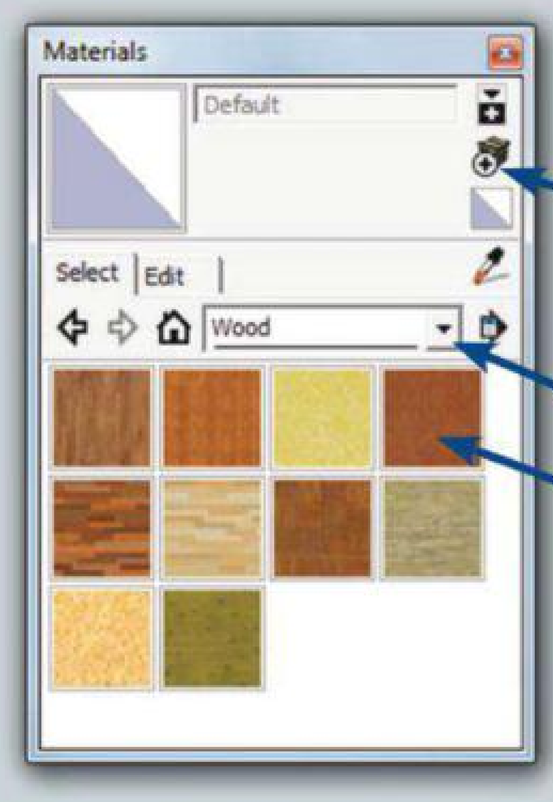


Textures and photos add (virtual) realism



For a "real-life" sense of your project's look, color in, or "fill," its components using the **Paint Bucket tool (B).**

You'll likely exhaust SketchUp's limited library of built-in wood-grain textures quickly. Fortunately you can add wood grains from your own digital photos. (Or search for "seamless wood texture" on google.com to find free-to-use or for-sale textures that "tile"—or repeat—smoothly.) Follow the steps *top right* and you'll be prompted to choose an image on your computer. Once you've selected a wood-grain image it acts like any other color fill option.



Choosing the Paint Bucket tool opens the Materials panel. Simply choose your color or texture and click on the component or face of an open component to color it.

To add your own image as a texture, click the "Create Material..." button here and select "Use texture image" (or choose "New..." from the "List" drop-down, then "New Texture" from the "Color" drop-down menu on Mac).

Choose "Wood" from the drop-down menu.

Choose the texture you'd like to use here.

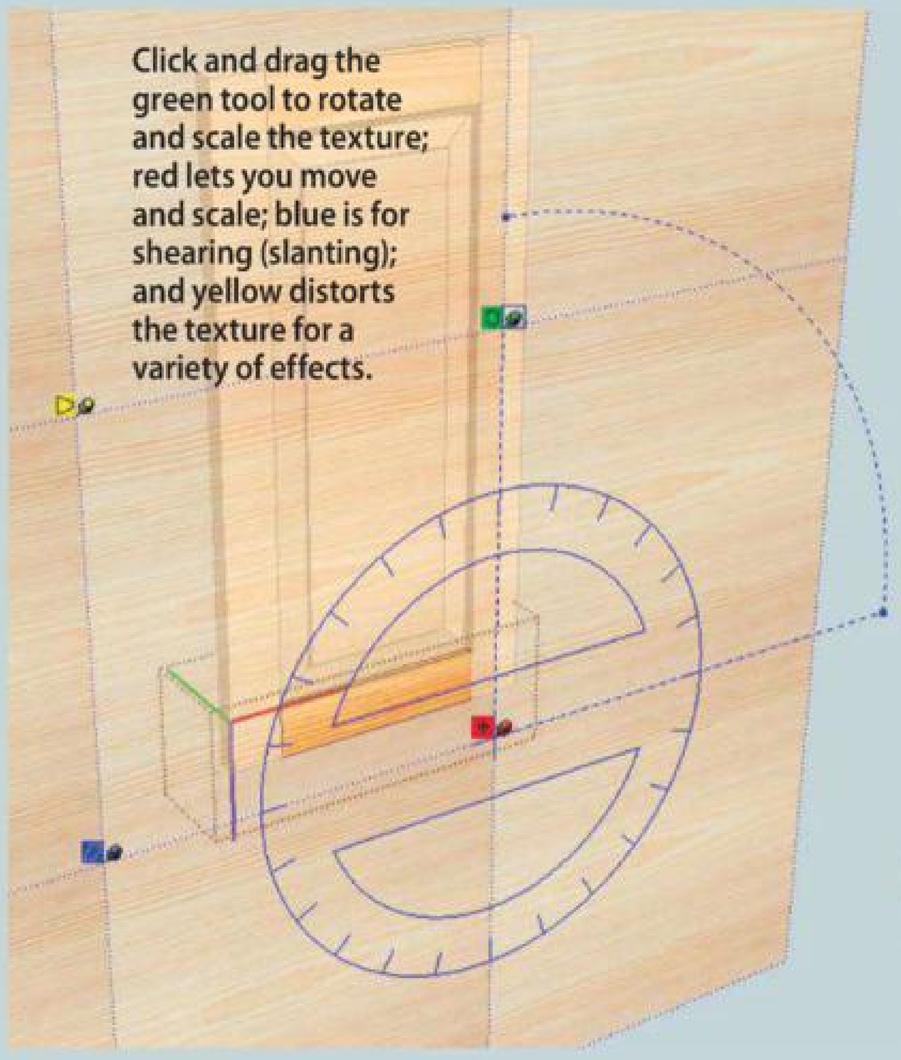
Often, you'll need to scale or reposition textures to suit your project as with the rail-and-stile door shown *below*.

Use photos of real-world objects as "one-off" textures (those that don't permanently reside in your materials library). This can be useful for quickly creating an environment for your project, *bottom right*, or for reproducing projects from pictures, *bottom*. Choose photos that have been taken from an angle that is as straight-on as possible.

To apply a one-off texture, choose "File→Import." Navigate to the desired image, choose the "Use as Texture" option from the drop-down menu, and click "Open" ("Import" on Mac). The texture will appear attached to the Paint Bucket tool. Click on diagonally opposite corners on the desired face to place the texture. Reposition as you would any other texture.



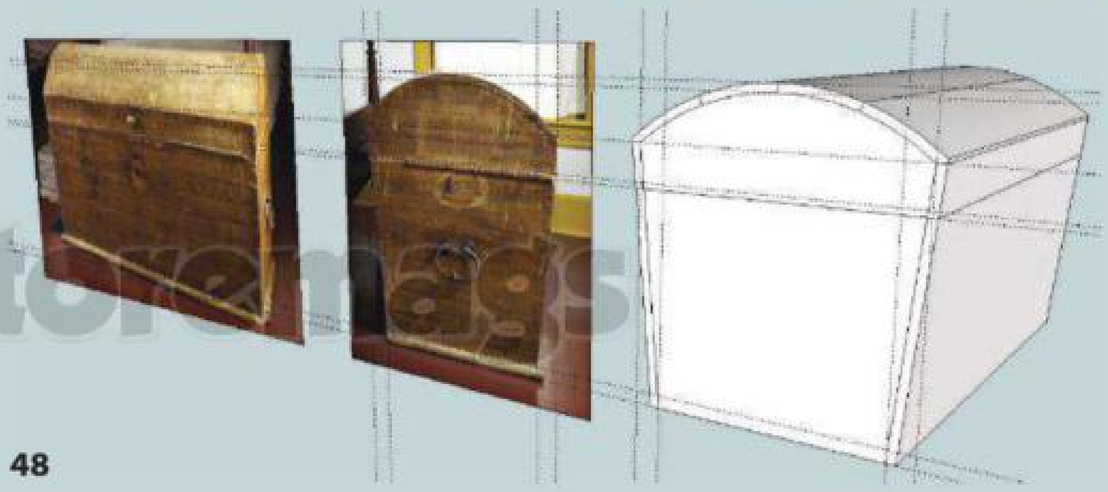
The default, vertical orientation of the texture makes the rails of this cabinet door unrealistic. Within the component, right-click on the rail face and choose "Texture→ Position."



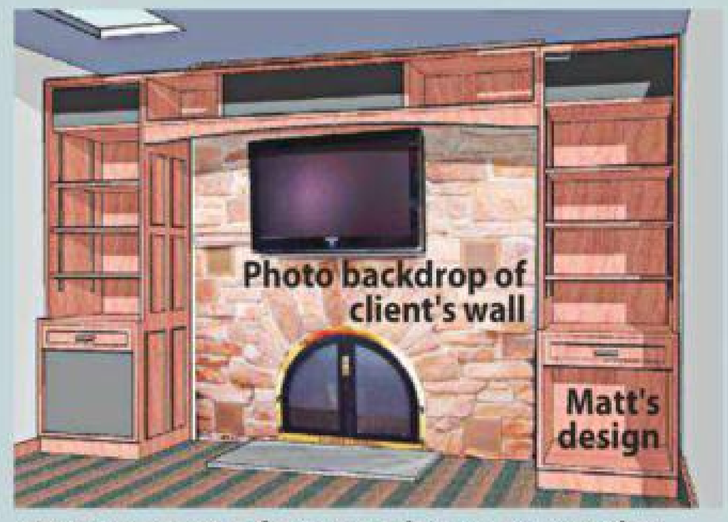
Click and drag the green tool to rotate and scale the texture; red lets you move and scale; blue is for shearing (slanting); and yellow distorts the texture for a variety of effects.

When you're satisfied with the new position of the texture, click outside of the texture to exit the Texture Position tool.





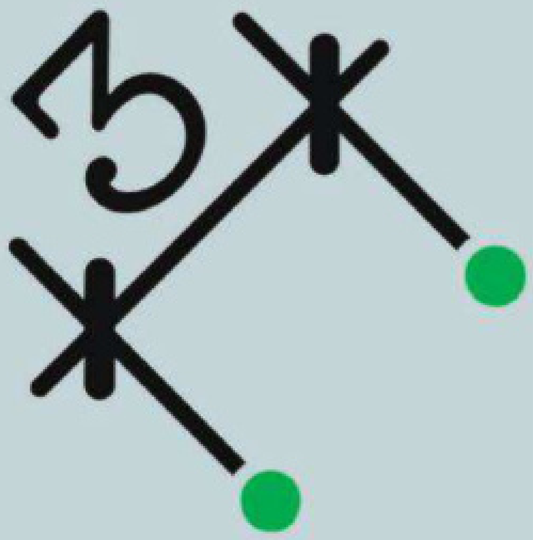
Photos applied to appropriately sized rectangles become "story stick" references for a reproduction. Use the tape measure tool to project critical dimensions for a working model.



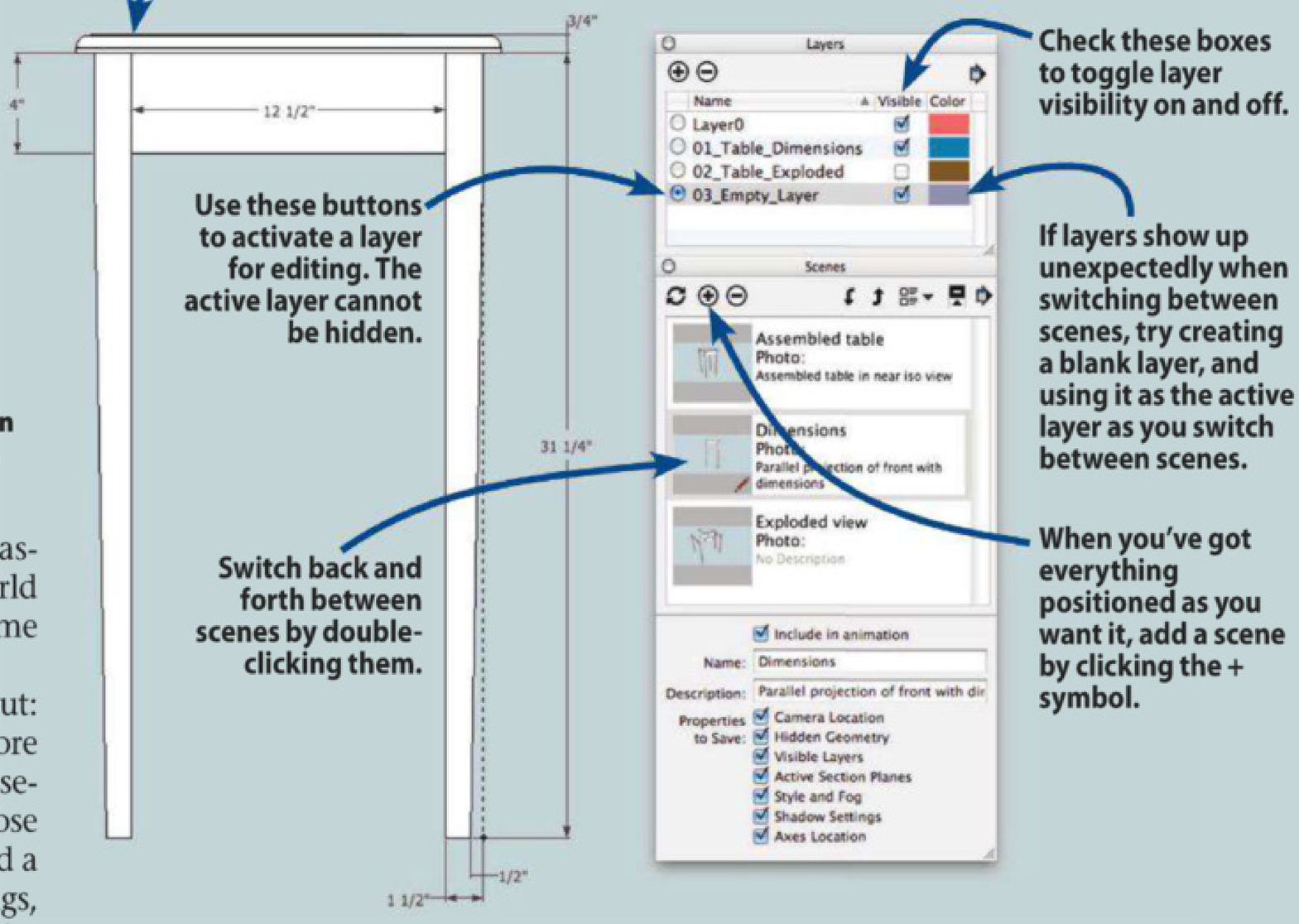
WOOD **magazine forum moderator Matt Seiler uses photos to help clients visualize his furniture designs in their actual settings.**

Storemags

Prep your design for the build



Add detailed measurements with the **Dimension tool** by simply clicking one end of an edge, then the other, and dragging away the dimension.



Now it's time to turn your digital masterpiece design into a real-world masterpiece project. SketchUp has some tools that assist with that transition.

The first you'll want to know about: layers. Think of layers as places to store specific parts of your project. They're useful for controlling the visibility of those parts en masse. If you've just completed a model with SketchUp's default settings, you've been designing your project in the default layer: Layer 0. It's a good place to do your initial design work because Layer 0 can't be deleted, meaning less chance of accidentally losing work.

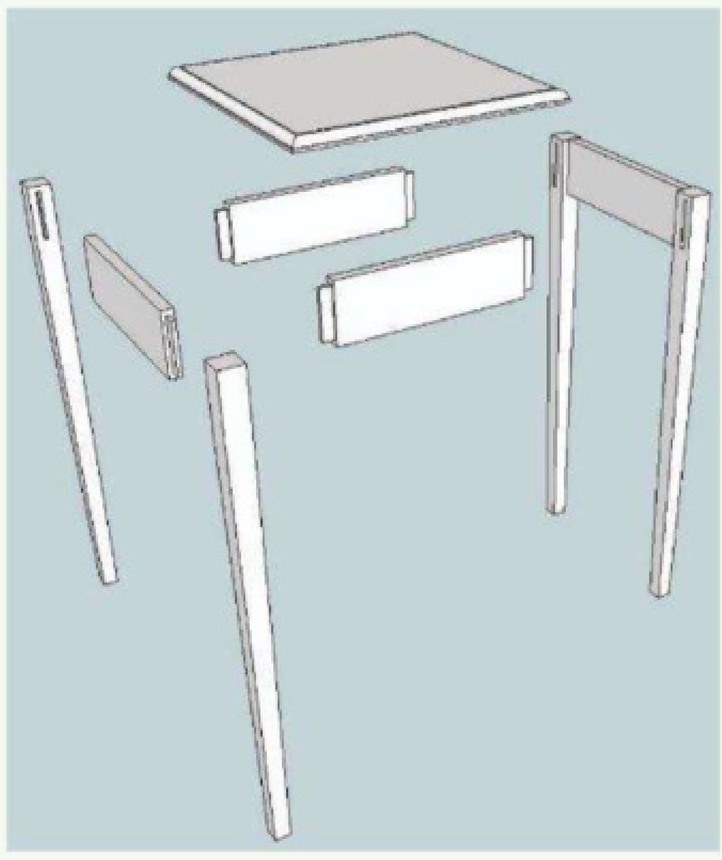
Now suppose you want to add dimensions to your project. You don't want these cluttering the screen all the time, but they're useful for the build. That's where the power of layers comes in. Create a new layer, label it "Dimensions," select it as the current layer, and add dimensions with the Dimension tool. Because you're working only on the Dimensions layer, you can turn their visibility on and off as needed in the Layers panel.

To print dimensioned drawings for the shop, change the view of the project. Choose "Parallel Projection" from the "Camera" menu, and then select "Standard Views→Front" from the "Camera" menu. The result is a flat, front-on view of the drawing useful for printing.

Think of scenes ("Window→Scenes") as snapshots of your project from different perspectives. Create scenes of often-used perspectives for quick switching, as shown *above*.

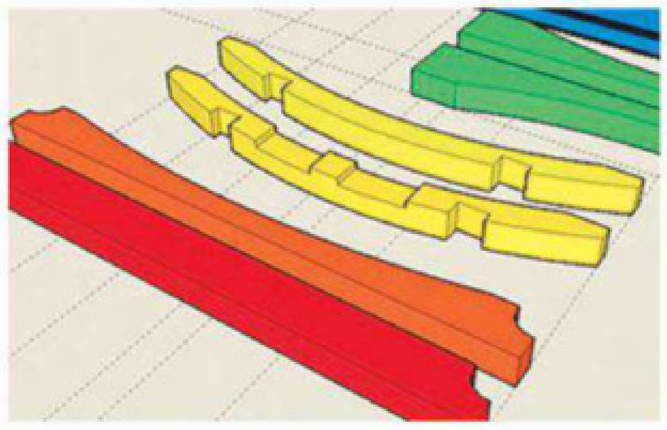
Exploded layer = easy editing

Another useful layer for tweaking project parts is an exploded-view layer. Copy and paste your entire project into a new layer called "Exploded View" and begin pulling parts away for easy viewing. Create a scene with only the exploded-view layer visible for easy switching. This layer also makes tweaking easy as your project nears completion. You'll have easy access to components normally hidden from view. And since edits to one component propagate to all instances of that component, any tweaks will carry over to the assembled project on Layer 0. Remember to double-check any dimensions you previously added. Most of them will change along with any alterations, but in some cases, they could get left behind.



More Resources

- You'll find tons of detailed SketchUp help at Trimble's website, sketchup.com.
- Get answers to your questions from veteran SketchUp users in the *WOOD* Online forums at **woodmagazine.com/software**.
- For a complete SketchUp project walk-through, visit **woodmagazine.com/napkinholder**.



Space-saving Flip-top Tool Bench



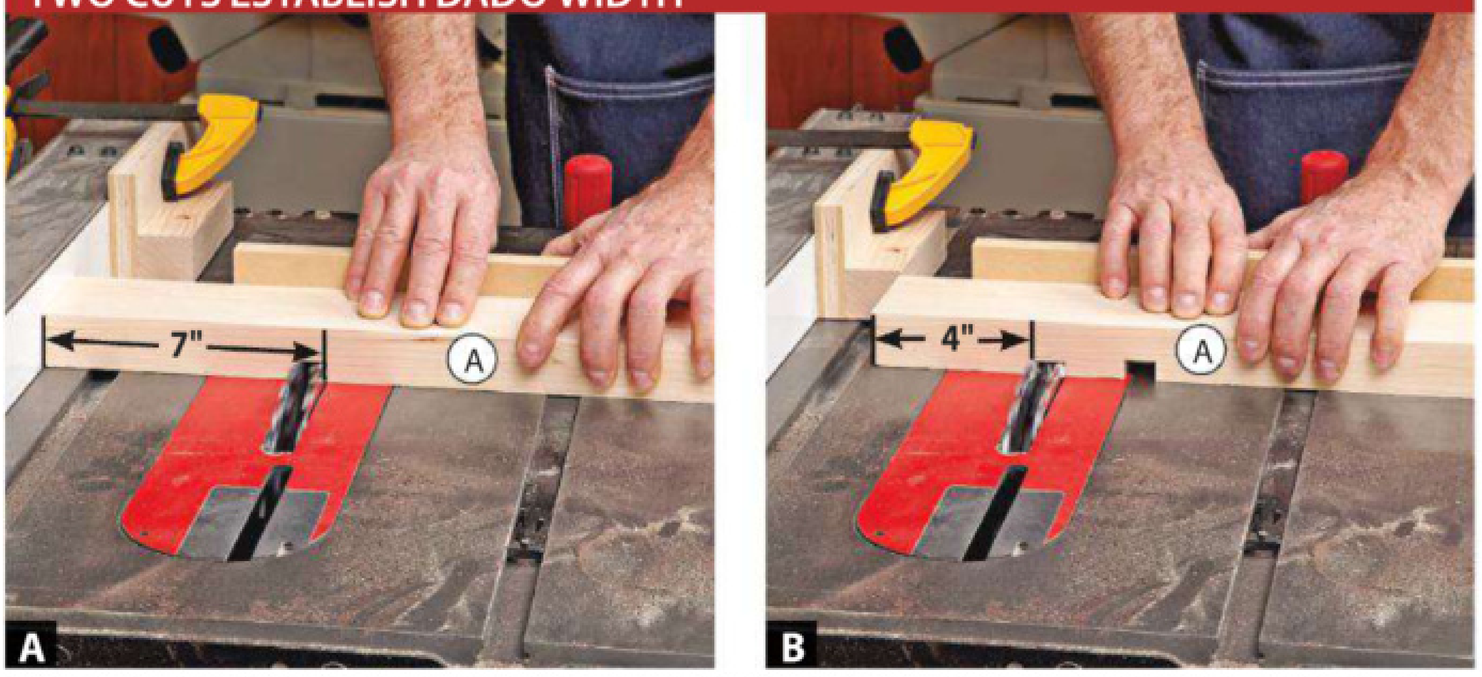
Overall dimensions:
63"L × 30"D × 34"H
Materials cost: $200

Like many others, I do my woodworking in the garage. But for some reason my wife expects to park her car in there, so keeping my benchtop tools readily accessible—yet quickly stowed away—had become a challenge. This bench keeps us both happy. It holds twice as many machines as I could pack on a typical worksurface, saves me from lifting and lugging them about, and rolls out of the way when the car rolls in.

Lucas

Lucas Peters
Digital Content Manager

TWO CUTS ESTABLISH DADO WIDTH



Set your fence 7" from the blade's outside edge. Make the first cut with the end rail (A) butted against the fence. Because the cut doesn't go fully through the workpiece, it's safe to use the miter gauge and fence in tandem. Without moving the fence, butt the end rail against the spacer block and make the second cut.

MOUNT THE CENTER STRETCHER



Place the center stretcher (D) so it spans the two ends (A/B), its rabbeted ends in the end rails' (A) dadoes. Drill pilot holes and drive the screws.

First, make the sides

1 Purchase five 8'-long 2×4s that are dry and straight as you can find, and mostly free of defects. Cut the three straightest ones to 64" long, and save the cutoffs. Cut six more pieces 31" long. Joint, plane, and rip these 12 pieces to 1⅜" thick and 3" wide. From this stock, cut the end rails (A), end stiles (B), side stretchers (C), center stretcher (D), and caster blocks (F) to length [**Materials List**]. Set the caster blocks aside for now.

2 Install a ¾" dado set in your tablesaw, and raise it to 11⁄16". Clamp a 2¼"-wide spacer block to your tablesaw's fence as shown in **Photo A**. To cut the dadoes in the end rails (A) where shown in **Drawing 1**, first cut their outside edges [**Photos A** and **B**]. Then, make additional passes to remove the waste material between the outside cuts.

3 Now, reposition the fence so the spacer block is 3" from the outside edge of the blade. Cut the rabbets in the ends of the end stiles (B) [**Drawing 1**].

4 Cut a centered 3"-wide dado in the top edge of the two bottom end rails (A) [**Drawing 1**]. Then, reposition the fence and spacer block and cut the rabbets on both ends of the center stretcher (D) [**Drawing 2**].

Assemble the base

1 Glue and clamp two end rails (A) and two end stiles (B) [**Drawing 1**], remembering to place the end rails with the center dado facing up on the bottom of the assembly. Repeat for the other end assembly and allow the glue to dry.

2 Bore the ¾", ¼", and ⅞" holes in the top end rails (A) where shown [**Drawing 1**]. Sand the end assemblies (A/B) to 150 grit.

3 Glue and screw the side stretchers (C) and center stretcher (D) [**Photo C**] to the ends (A/B) [**Drawing 2**].

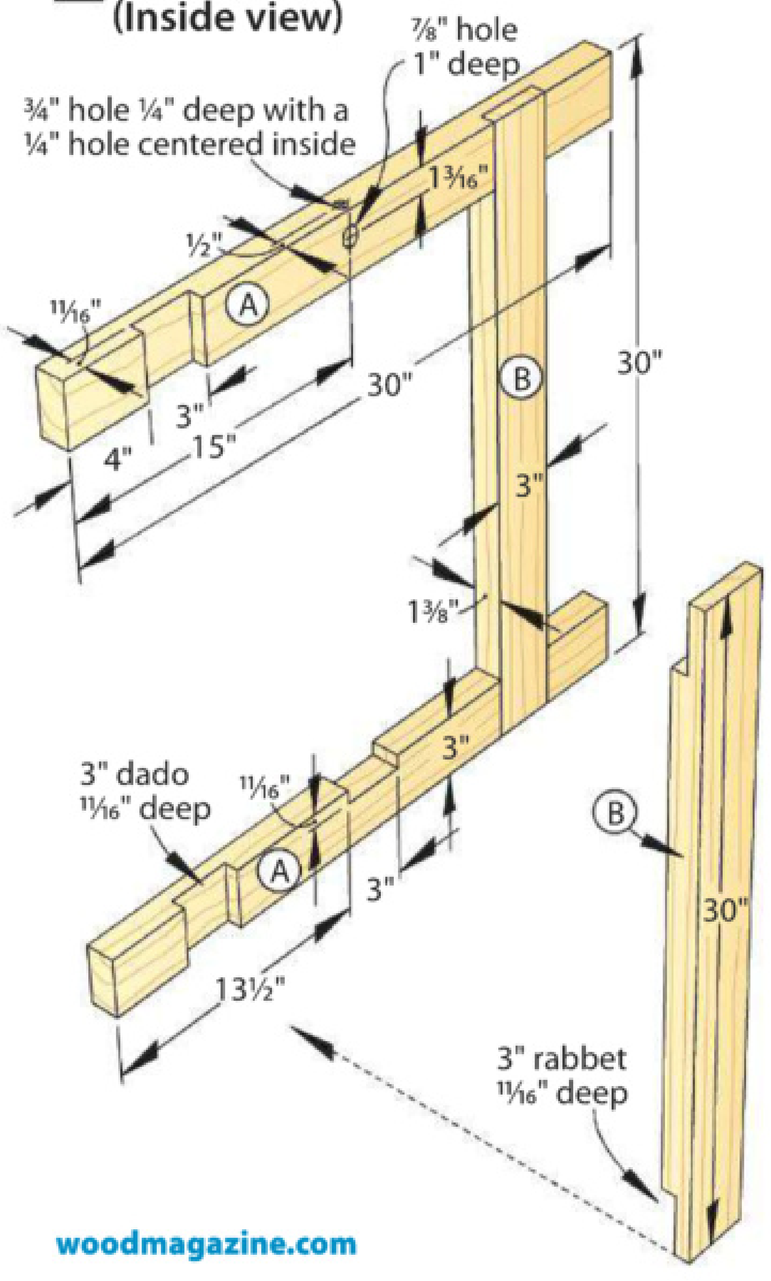
4 To get the best yield from two sheets of plywood, cut one base panel (E) to size from each sheet [**Materials List, Cutting Diagram**]. Lay out and cut 1⅜"-long, 3"-wide notches where shown [**Drawing 2**].

***Quick Tip!** Use a 10-tpi wood-cutting blade in your jigsaw to minimize tear-out.*

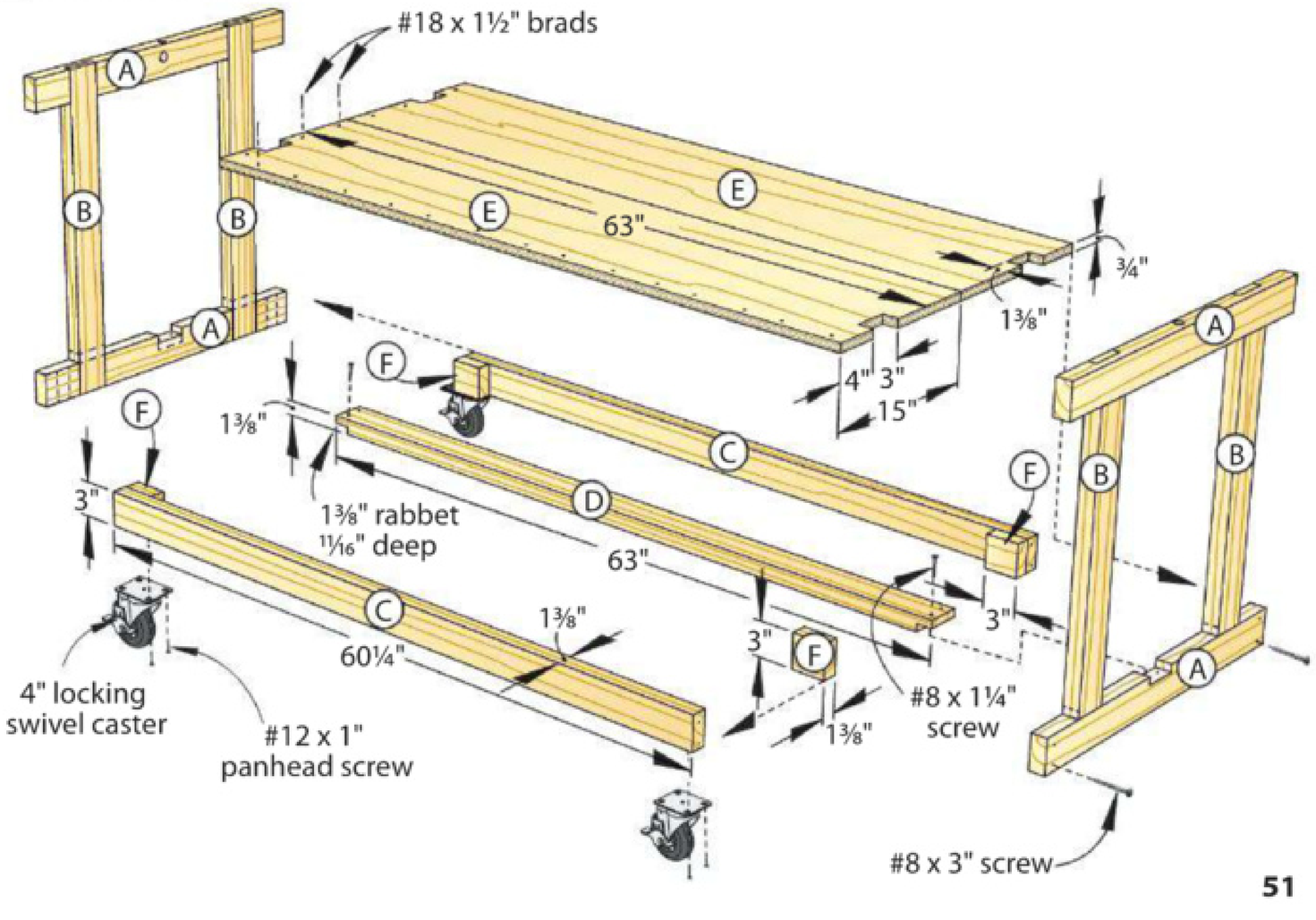
Mount the base panels [**Photo D**].

5 Retrieve the caster blocks (F) and glue them to the inside corners of the base [**Drawing 2**].

1 SIDE ASSEMBLY (Inside view)



2 BASE ASSEMBLY

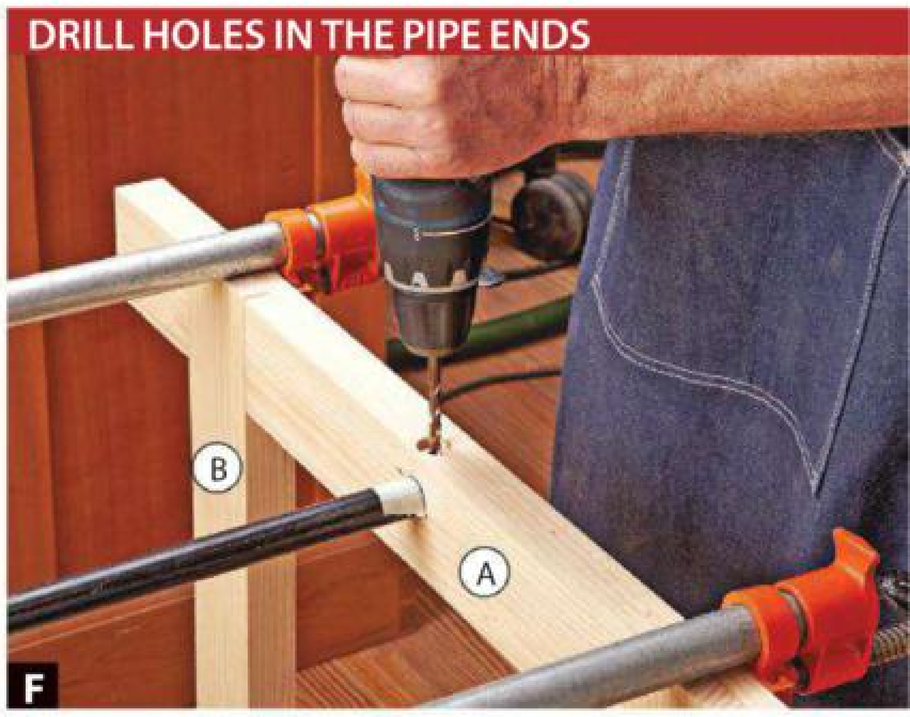




Check the base panels' (E) fit on the base stretchers (C, D) and rails (A) before running a bead of glue on their top edges and nailing the panels in place.



Apply glue to the bottom of one of the spacers and nail it in place. Repeat for the other side, keeping the spacers tight to the pipe.



Clamp the assembly together to keep the pipe bottomed in each ⅞" hole. Drill the pipe through the ¼" hole in the end rails (A).

Build a spinning top

1 Cut the top panels (G), long spacers (H), and short spacers (I) to size [**Materials List**]. Lay out the location of the spacers on the inside face of a top panel [**Drawing 3**].

2 Situate two long spacers (H) on the layout lines found near the center of the top panel (G), and ¾" from both ends of the panel to leave room for the ends (J). Place a 62¼" length of ½" black pipe between the long spacers; then, glue and nail the spacers in place [**Photo E**].

3 Glue and nail the remaining two long spacers (H) flush with the outside edges of the top panel (G). Then, glue and nail the short spacers (I) in place [**Drawing 3**].

4 From 1½"-thick stock, cut the ends (J) to size [**Materials List**]. Rip the ¾" rabbets in two long edges of each end [**Drawing 3**]; then, drill centered ⅞" through holes where shown. Glue and nail the ends to the top assembly (G/H/I). Use the pipe ends to align the holes with the centered long spacers (H).

5 Remove the pipe. Apply glue to the top edges of the spacers (H, I) and ends (J). Lay the remaining top panel (G) on the spacers and nail it in place.

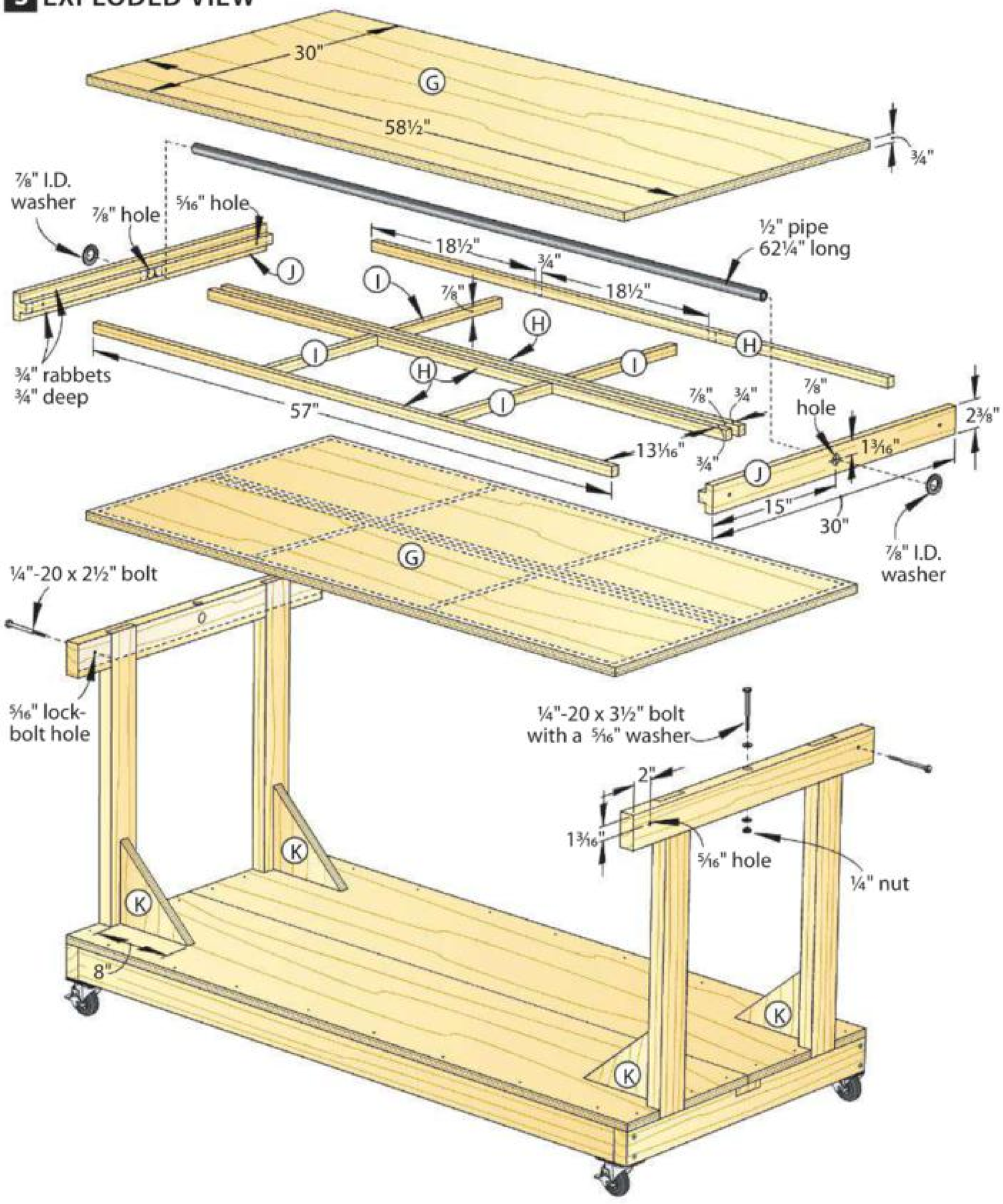
Now, put it all together

1 Slide the ½" black pipe into the ⅞" holes in the top end rails (A). (You may need to push the ends away from each other slightly to accomplish this.) Drill 17⁄64" holes through the pipe to accept a ¼" bolt [**Photo F**].

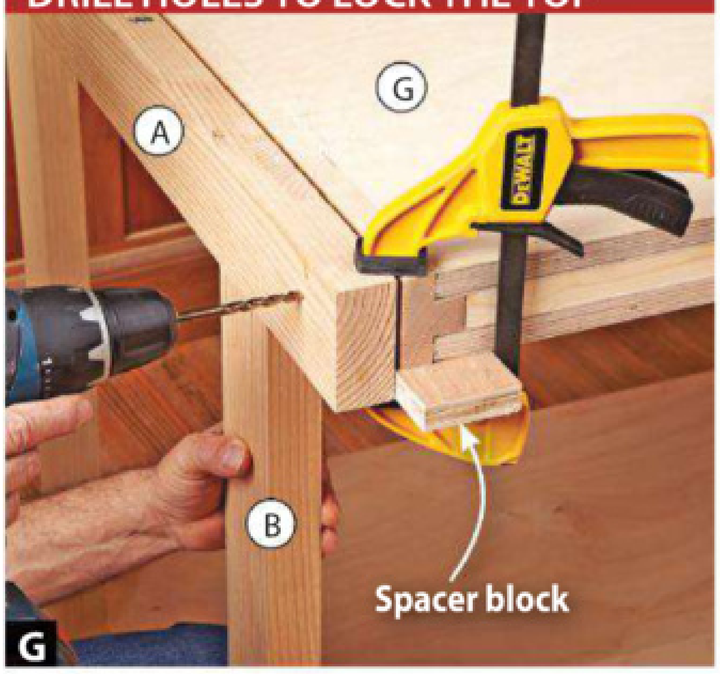
***Quick Tip!** Drill the first hole and drop in a bolt before drilling the pipe's other end. This ensures bolt-hole alignment.*

2 Remove the pipe from the base and slide it back through the top assembly (G–J). Place a ⅞" I.D. washer on each end of the pipe before inserting the top assembly between the top end rails (A). Secure the pipe with bolts through the top end rails. Mark and drill the lock-bolt holes [**Drawing 3, Photo G**].

3 EXPLODED VIEW



DRILL HOLES TO LOCK THE TOP



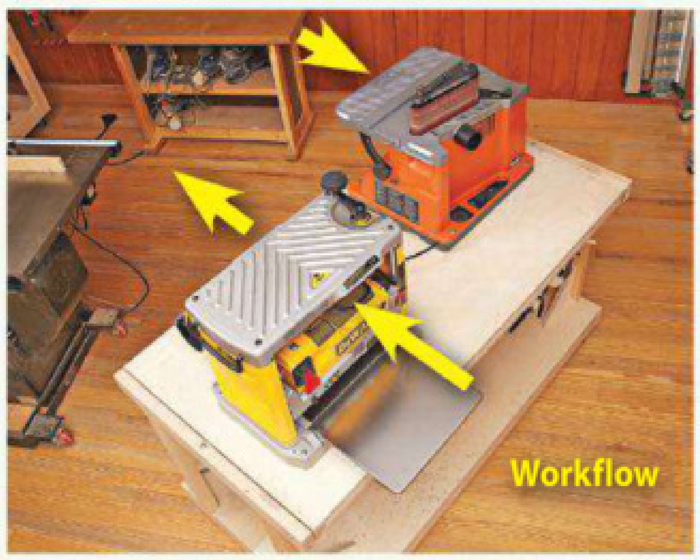
Drill four 5⁄16" holes through the upper end rails (A) for the lock bolts. Use a clamp and spacer block to keep the top (G–J) aligned with the end rails.

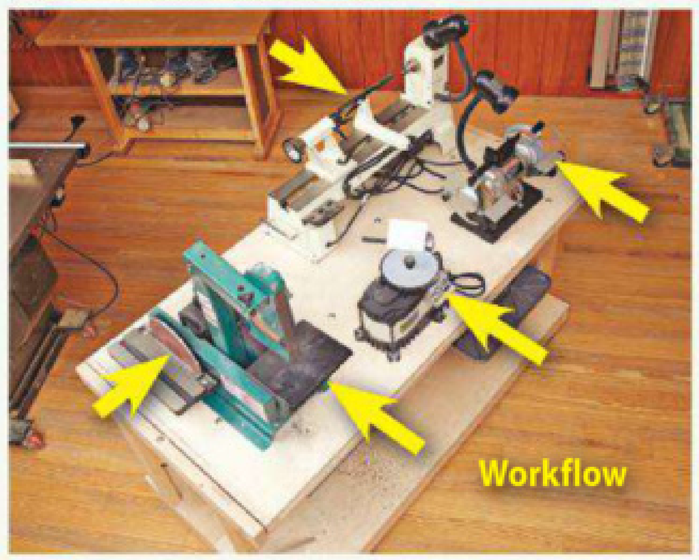
3 Cut the braces (K) to size and glue them in place [**Drawing 3**]. To keep them from moving as they dry, shoot a few brads or pins through them into the end stiles (B) and base panels (E). Mount a 4" locking caster on all four corners of the workbench. Then, secure benchtop tools to the bench as desired using through bolts for heavier tools and lag screws for lighter ones.

Produced by **Nate Granzow** with **Kevin Boyle**
Project design: **Lucas Peters**
Illustrations: **Lorna Johnson**

When setting up your bench, consider workflow

It's easy to get carried away when mounting tools to your flip-top tool bench: The more tools you can fit, the less clutter you'll have around your shop, right? But attaching too many tools may not leave adequate working room around each of them. Instead, lay your tools out on the bench, keeping workflow and spacing in mind. Some tools, such as jointers and planers, require additional space on both the infeed and outfeed side of the tool. Others, such as sanding wheels or sharpeners, can function near each other. Also consider weight distribution and balance; too many heavy tools on one side can make rotating the tabletop difficult. For instance, we mounted only a portable planer and oscillating spindle sander on one side because those two tools weigh about as much as the four tools on the opposite side.



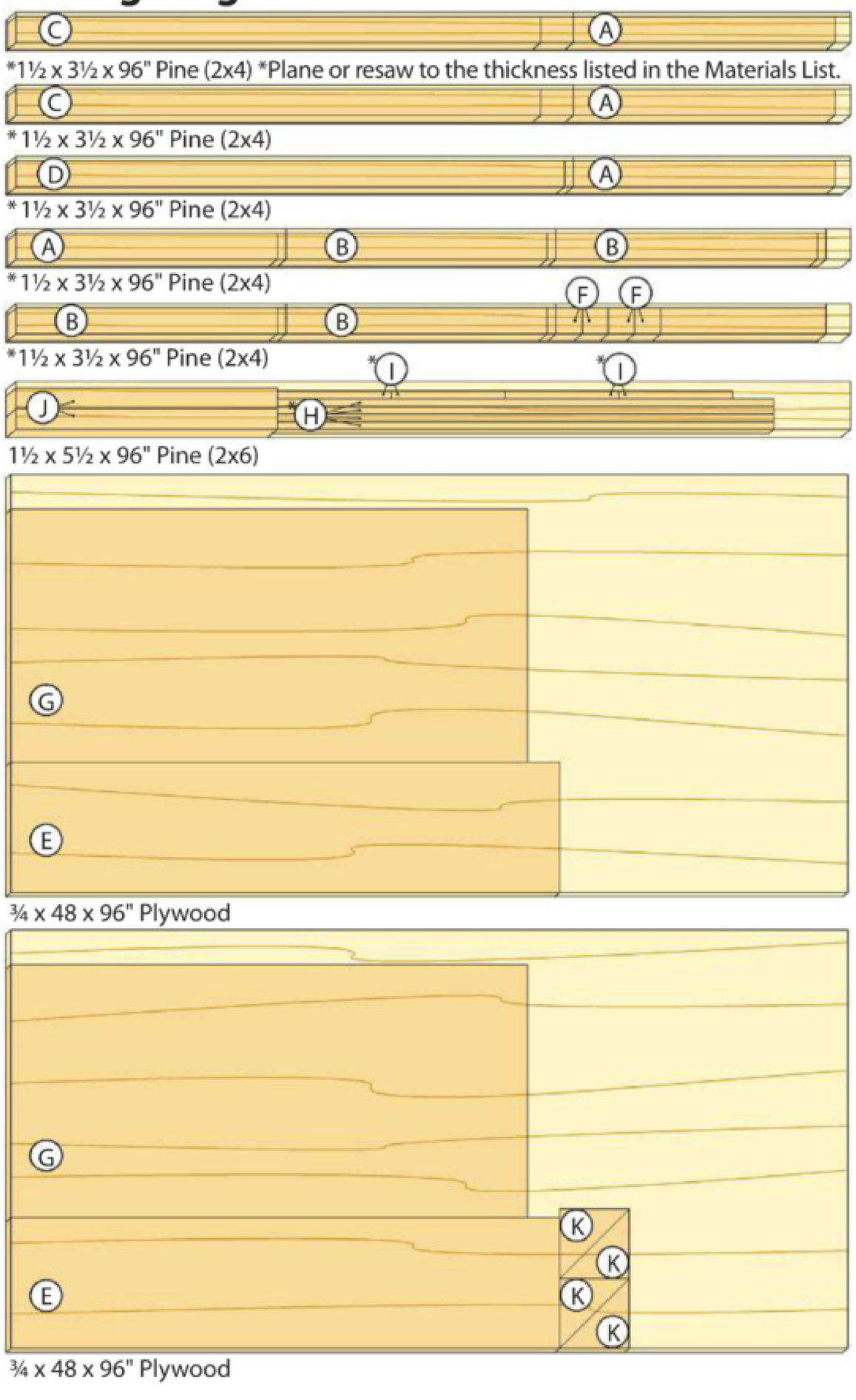


Materials List

Part		FINISHED SIZE T	W	L	Matl.	Qty.
A	end rails	1⅜"	3"	30"	P	4
B	end stiles	1⅜"	3"	30"	P	4
C	side stretchers	1⅜"	3"	60¼"	P	2
D	center stretcher	1⅜"	3"	63"	P	1
E	base panels	¾"	15"	63"	PLY	2
F	caster blocks	1⅜"	3"	3"	P	4
G	top panels	¾"	30"	58½"	PLY	2
H	long spacers	¾"	⅞"	57"	P	4
I	short spacers	¾"	⅞"	13 1⁄16"	P	4
J	ends	1½"	2⅜"	30"	P	2
K	braces	¾"	8"	8"	PLY	4

Materials key: P–pine, PLY–plywood.
Supplies: ½" black pipe 62¼" long, ¼"-20×2½" lock bolts (4), ¼"-20×3½" bolts (2), ⅞" I.D. washers (2), 5⁄16" washers (4), 4" locking swivel casters (4), ¼" nuts (2), #8×3" screws (8), #8×1¼" screws (4), #12x1" panhead screws (16), #18×1½" brads.
Blade and bits: Dado blade; ¼", 17⁄64", 5⁄16", ¾", ⅞" drill bits.

Cutting Diagram



More Resources

- Learn to select benchtop tools that work as hard as full-size ones here: **woodmagazine.com/benchtoptools**
- For more space-saving shop plans, visit **woodmagazine.com/foldflat**

Miter Gauges and Sleds

Ramp up your tablesaw's accuracy with one (or maybe two?) of these aftermarket accessories.

If you're struggling with your tablesaw's factory-supplied three-stop gauge, you'll be amazed at the ease of use and accuracy available to you with an aftermarket miter gauge or sled. Precision manufacturing of these accessories produces spot-on angle settings, scales on some models allow for fine-tuning angles to ⅒°, and the fences and length stops make it a snap to cut multiple parts to equal length. But with dozens of these accessories on the market, how do you know which to buy? We rounded up 14 top sellers to find out.

Miter gauge, sled...or both?

Miter gauges and sleds essentially do the same thing—guide or hold a workpiece for spot-on crosscuts and miters—but each has advantages and disadvantages.

▶**Crosscut capacity.** With most miter gauges you can safely crosscut stock about 12" wide; wider than that and the gauge's head can catch on the table edge during the cut. (All the miter gauges and two sleds we tested come with a key or washer to retain the bar in the saw's T-shaped miter slot when you extend the head off the table, but they can't eliminate catches.) Sleds offer twice the cutting-width capacity of gauges, making them the best choice for crosscutting wide panels.

▶**Size and weight.** Like a miter gauge, a sled can also be used to miter-cut stock, such as for picture frames. However, a sled's size (about 2' square and weighing 9–24 pounds) can make it cumbersome to use, especially when lifting it on and off the saw.

▶**Depth of cut.** A sled *carries* the workpiece through the blade, whereas a miter gauge *pushes* stock resting on the saw's tabletop. So a sled costs you about ¾" of the blade's thickness capacity—but that's not a big deal if you work with 2" or thinner boards.

▶**Tear-out prevention.** Because you custom-cut a sled to fit your saw, it supports the cut edge of a workpiece to limit grain tear-out. To achieve that with a miter gauge you must install a zero-clearance throat insert on the saw.

So gauge or sled? A miter gauge capable of accurately cutting more than a few angles will prove much more useful and valuable than a sled, so get one of these first. If you work a lot with sheet goods or edge-glued solid-wood panels, then you'll want a sled. (But if you need one for making only 90° crosscuts, save $100 or more and make your own; see our plans in **More Resources** on *page 59*.)

Job one: Repeatable accuracy

Most factory-supplied miter gauges can be fine-tuned to help you cut 90° and 45° angles accurately, but they offer little else. When you invest in an aftermarket miter gauge or sled, expect to be able to precisely cut *any* angle with confidence. Look for these key features:

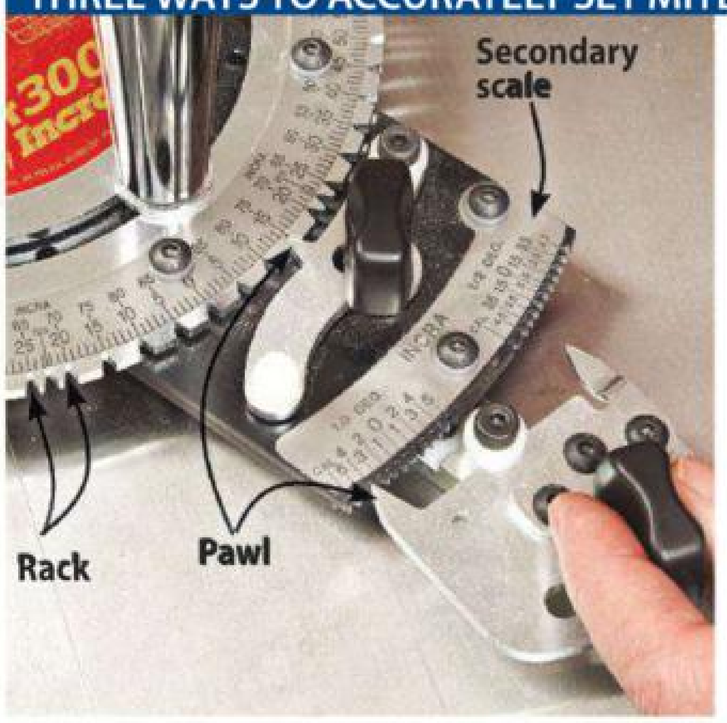
▶**Easy setup.** First, you snug up the fit of the miter bar in the tablesaw's slots by tweaking the built-in adjusters. It should slide easily front to back without any side-to-side play. We find this setting easiest with adjusters accessible on top of the bar.

Next, ensure your saw's miter slots are parallel to the blade within .002" front to back; if needed, adjust your saw according to its owner's manual. Then, calibrate the head or fence of the miter gauge or sled to the blade as explained in the owner's manual. (All the tested models except Woodhaven's 4965 Super

Storemags.com



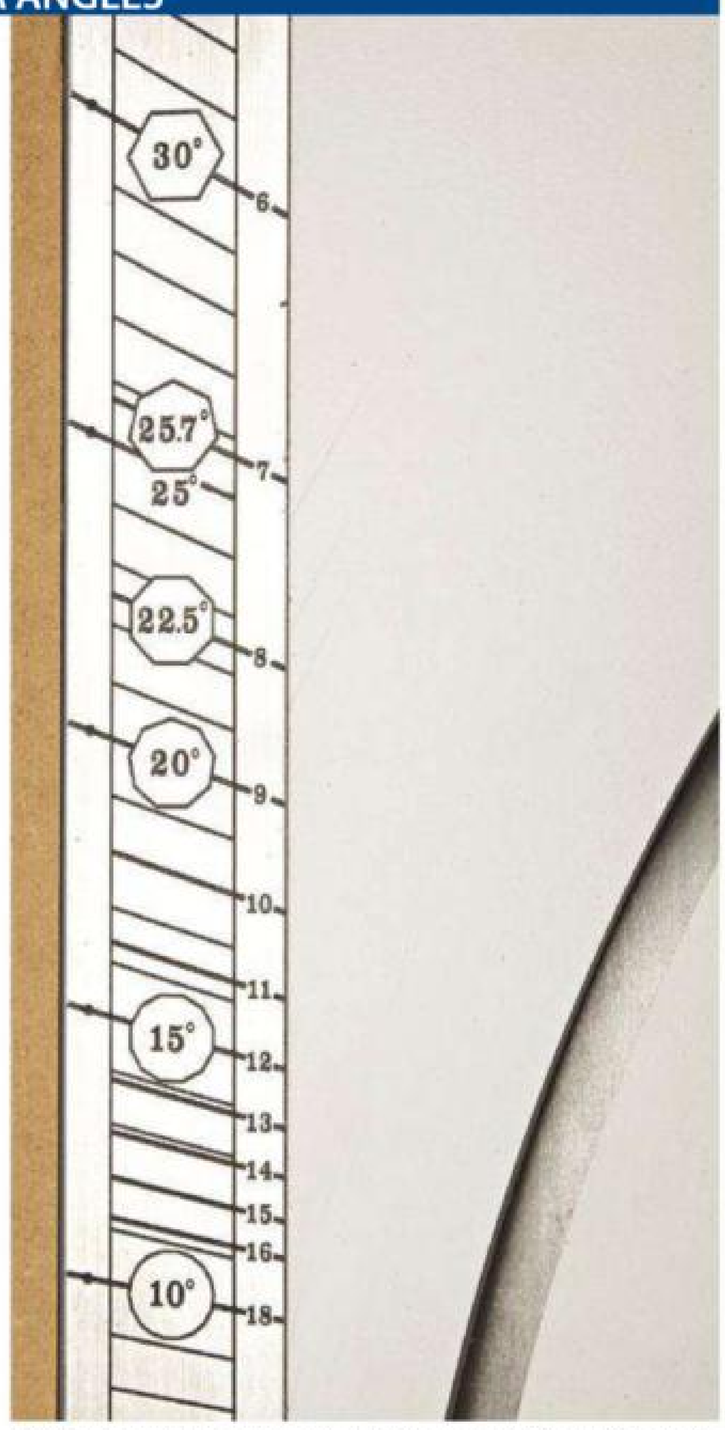
THREE WAYS TO ACCURATELY SET MITER ANGLES



To set the miter angle on Incra's gauges, insert the toothed pawl into one of the rack notches. On the Miter 3000SE (shown) you do this in two locations.



A threaded pin on the Woodhaven miter gauges ensures spot-on angles. Kreg's non-threaded pin functions in a similar manner.



Dubby's miter scale not only has markings for each degree, but also quick references for determining the miter angle for various multisided projects.

Sled can be calibrated to your tablesaw; this model requires the saw to be aligned perfectly.) After this calibration, all cuts will be accurate at any miter angle.

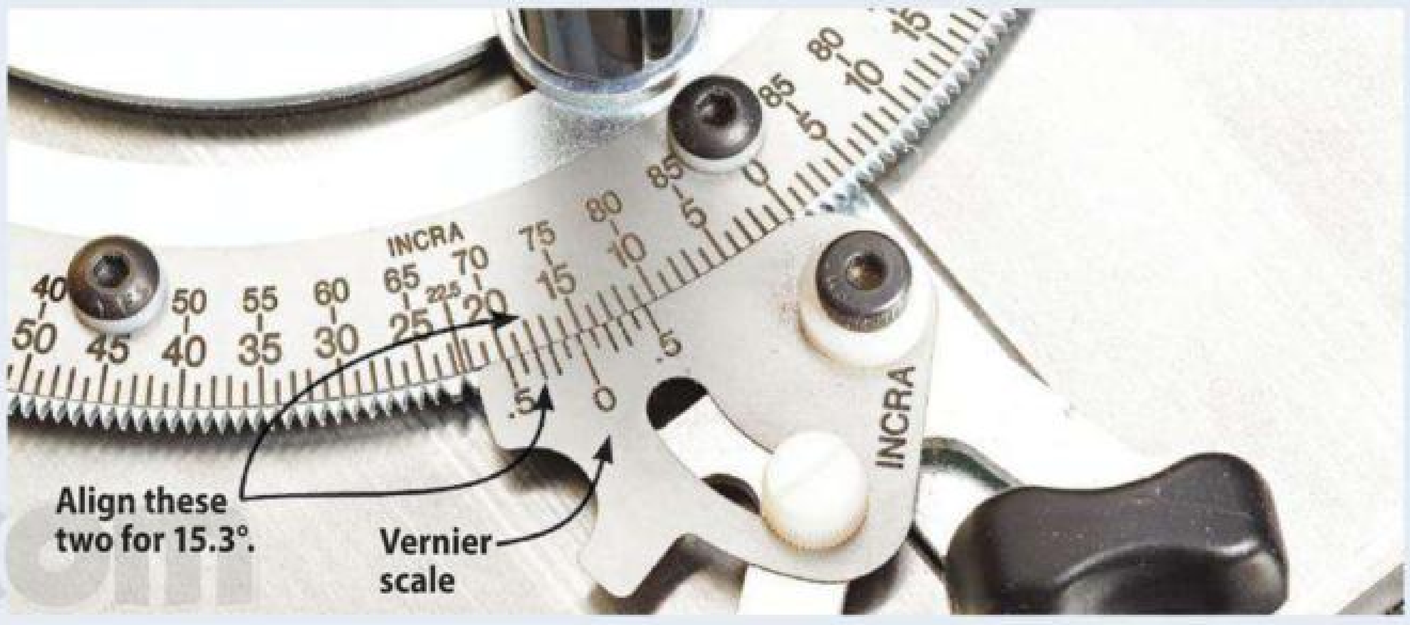
▶Can't-miss angle settings. All eight of the miter gauges we tested have positive stops (known as detents) for 0°, 22½°, 30°, and 45°, plus at least two additional angles, making it virtually foolproof to cut those angles accurately. (For non-detent angles you align the pointer to a corresponding mark on the scale.) The three Incra models we tested have more than 100 detents each, led by the Miter 3000SE with a test-best 365 in ½° increments. We liked Incra's rack-and-pawl detent system, shown at *top*, and the drop-in pin of the Kreg KMS7102 best.

You might never need more than the 0° and 45° stops. But if you build projects with joints other than 90°, such as flag cases, octagonal boxes, or segmented turnings, a model with detents at the angles you need gives you accuracy and peace of mind.

Incra's Miter 5000 sled has the Miter 3000SE miter gauge built into its base, giving you the same 365 can't-miss detent settings. Woodhaven's sled has 12 detents. The Dubby sleds don't have detents, but rather a single stop at 0°. To set other angles, you align the fence face with markings on an etched scale, shown *above right*; we found them equally accurate. Rockler's sled uses a scale similar to the Dubby models but with a plastic cursor behind the fence to line up the angle.

One-tenth-of-a-degree precision awaits you

A vernier scale lets you fine-tune a miter angle to ⅒° (.1°), giving you the ability to cut parts to fit joints that don't quite come together as planned. To set your miter gauge this way, you align the primary angle pointer on the miter gauge with the nearest whole number you want (but not dropped into a detent). Then you rotate the head slightly until the needed vernier mark lines up with the nearest whole-angle mark on the main scale. For example, in the photo *below*, this gauge is set to cut a miter at 15.3°.



stevenmace.com

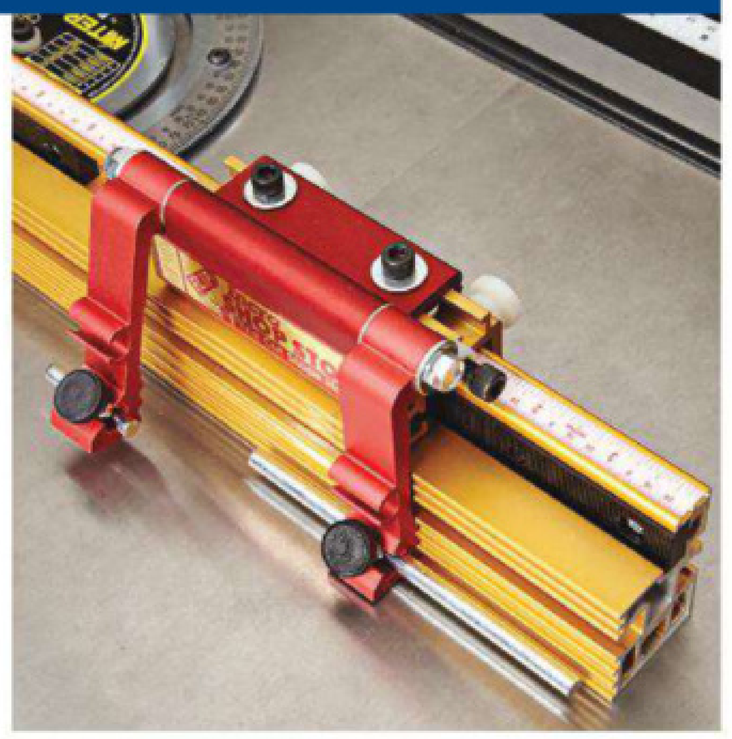
▶**Length-setting fence.** Six of the eight tested miter gauges and all but one sled come with a fence that not only secures and orients the workpiece, but also helps make repeated cuts of identical length when using an adjustable stop. All the miter-gauge fences have accurate scales, but we found it easiest to set the length stops on the Kreg and JDS Accu-Miter 24-46. The Incra Miter 5000 is the only sled with a fence scale; with the others you must measure from the blade.

We like having the ability to extend the fence and stop to more than 30" for cutting long project parts, such as table legs. The Incra Miter 1000HD, Incra Miter 3000SE, JDS, and Osborne EB-3 gauges and the Incra Miter 5000, Woodhaven, and Dubby sleds have that capacity.

FENCE STOPS WITH ADDED FUNCTIONS



The breakaway tab on the Kreg fence flip-stop, when removed, lets you use the stop accurately with an attached auxiliary face.



Included on three of the Incra products we tested, the flip-stop's two arms can be used independently or linked together with the long rod.

Meet the miter-makers and supporting sleds

Incra V120, $80

972-242-9975, incra.com

▲**High points:** With 121 miter detents in 1° increments (60° right and left), this gauge proved reliably accurate once calibrated to the saw. It's lightweight, requires no assembly, and its miter-slot adjusters can be finessed while resting in the miter slot.

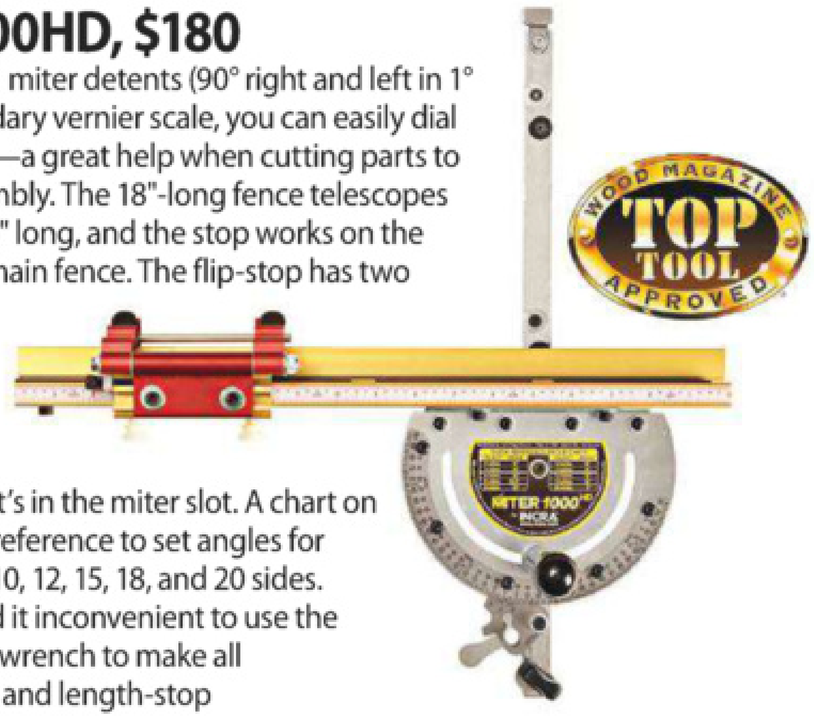
▼**Low points:** It doesn't come with a fence, but it does have slots on the head to add your own.



Incra Miter 1000HD, $180

▲**High points:** With 181 miter detents (90° right and left in 1° increments) and a secondary vernier scale, you can easily dial in angles as precise as .1°—a great help when cutting parts to fit an out-of-square assembly. The 18"-long fence telescopes out for crosscuts up to 34" long, and the stop works on the extension as well as the main fence. The flip-stop has two independent, adjustable steps for cutting two different lengths in the same setup. As with the V120, you can fit the bar while it's in the miter slot. A chart on the head provides quick reference to set angles for projects with 4, 5, 6, 8, 9, 10, 12, 15, 18, and 20 sides.

▼**Low points:** We found it inconvenient to use the included ball-tipped hex wrench to make all adjustments to the fence and length-stop microadjuster.

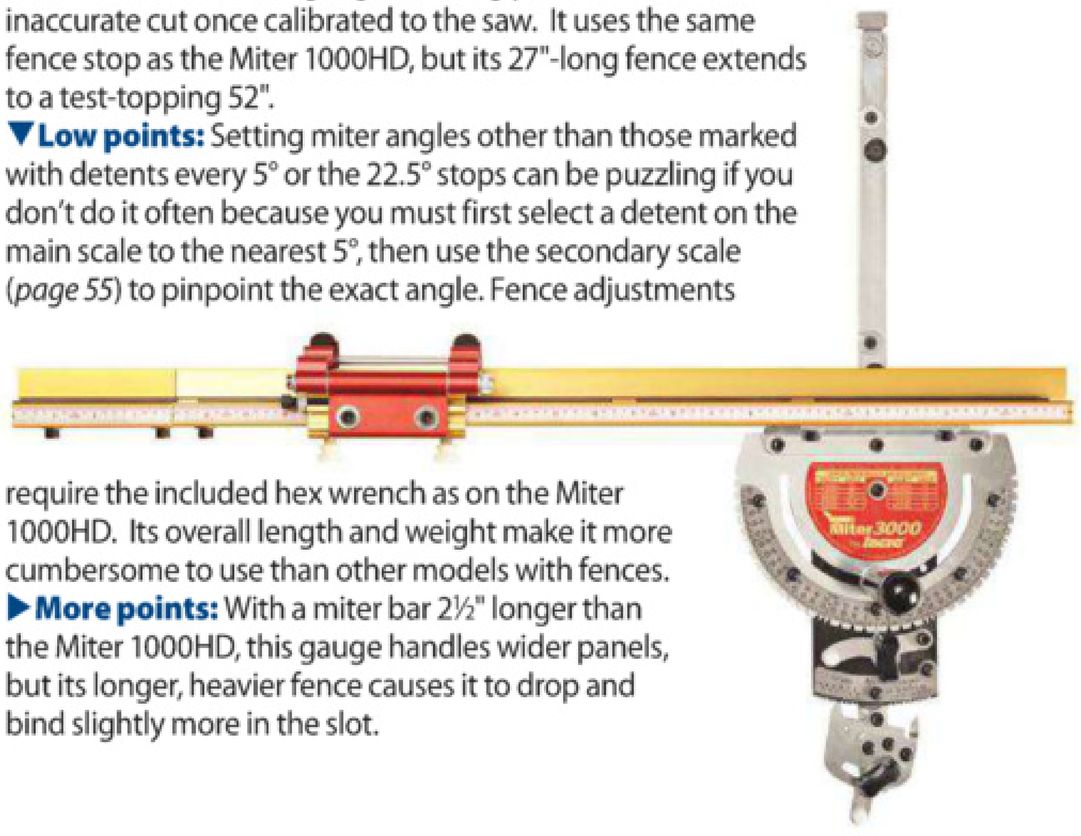


Incra Miter 3000SE, $270

▲**High points:** Capable of setting 365 miter angles with detents (every ½° from 90° side-to-side, using a combination of two detent scales), this gauge seemingly can't make an inaccurate cut once calibrated to the saw. It uses the same fence stop as the Miter 1000HD, but its 27"-long fence extends to a test-topping 52".

▼**Low points:** Setting miter angles other than those marked with detents every 5° or the 22.5° stops can be puzzling if you don't do it often because you must first select a detent on the main scale to the nearest 5°, then use the secondary scale (*page 55*) to pinpoint the exact angle. Fence adjustments require the included hex wrench as on the Miter 1000HD. Its overall length and weight make it more cumbersome to use than other models with fences.

▶**More points:** With a miter bar 2½" longer than the Miter 1000HD, this gauge handles wider panels, but its longer, heavier fence causes it to drop and bind slightly more in the slot.



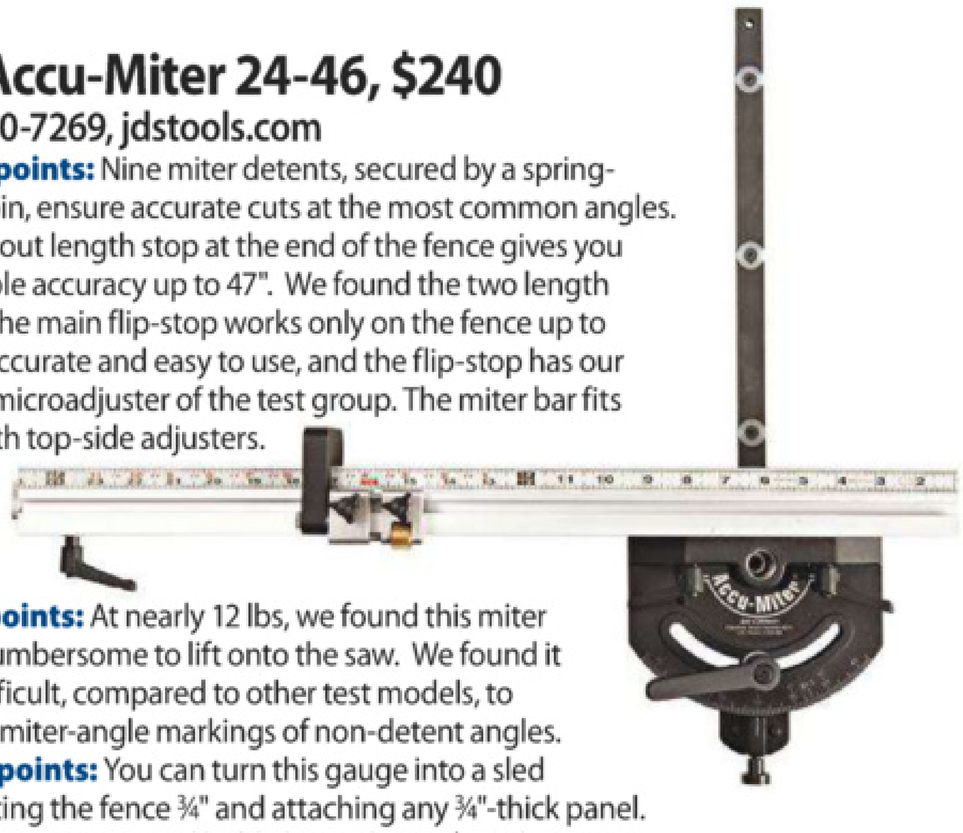
JDS Accu-Miter 24-46, $240

800-480-7269, jdstools.com

▲**High points:** Nine miter detents, secured by a spring-loaded pin, ensure accurate cuts at the most common angles. A swing-out length stop at the end of the fence gives you repeatable accuracy up to 47". We found the two length stops—the main flip-stop works only on the fence up to 24½"—accurate and easy to use, and the flip-stop has our favorite microadjuster of the test group. The miter bar fits easily with top-side adjusters.

▼**Low points:** At nearly 12 lbs, we found this miter gauge cumbersome to lift onto the saw. We found it more difficult, compared to other test models, to read the miter-angle markings of non-detent angles.

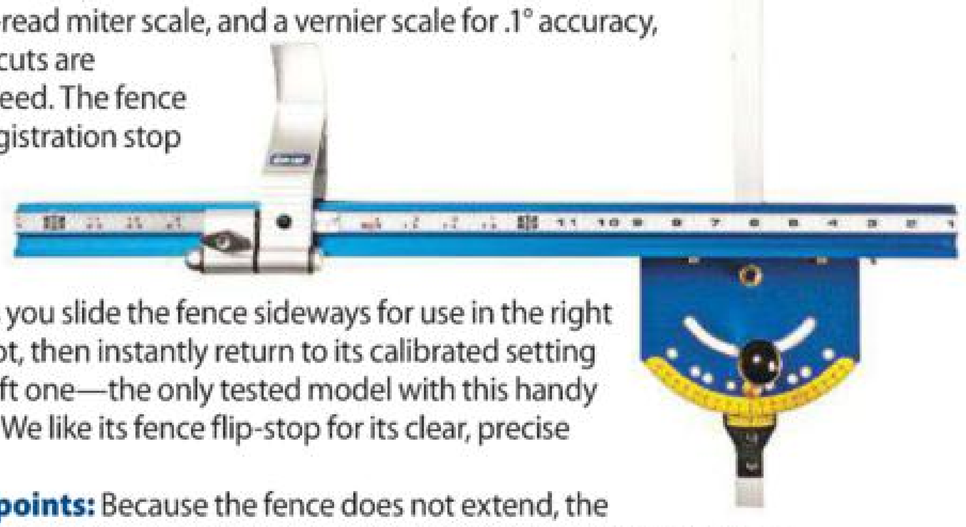
▶**More points:** You can turn this gauge into a sled by elevating the fence ¾" and attaching any ¾"-thick panel. You can buy an optional hold-down clamp ($59) that mounts to the Accu-Miter head.



Kreg KMS7102, $160

800-447-8638, kregtool.com

▲ **High points:** Made mostly of aluminum, this model's light weight (under 5 lbs, including the fence) makes it easy to handle. Still, it proved robust. With nine miter detents, an easy-to-read miter scale, and a vernier scale for .1° accuracy, precise cuts are guaranteed. The fence has a registration stop



that lets you slide the fence sideways for use in the right miter slot, then instantly return to its calibrated setting in the left one—the only tested model with this handy feature. We like its fence flip-stop for its clear, precise cursor.

▼ **Low points:** Because the fence does not extend, the longest crosscut you can make with the stop is 22¼". If you make a cut without using one of the drop-in detents, there's no place to store the brass registration pin on the tool. When fitting the bar to the miter slot, you must remove it from the slot to adjust the horizontal nylon screws, then return it to recheck the fit.

▶ **More points:** A breakaway tab on the flip-stop lets you use it with an auxiliary face attached to the fence. However, once removed, you'll always need an auxiliary face to use the stop.

Woodhaven 4910, $145

800-344-6657, woodhaven.com

▲ **High points:** Fifteen miter detents let you easily and accurately make common-angle cuts, and for non-detent angles we found it simple to line up the pointer to the etched markings. There's also a vernier scale for fine-tuning angles to .1°. The threaded pin for setting detent angles stores on the miter gauge when not in use, a handy feature.

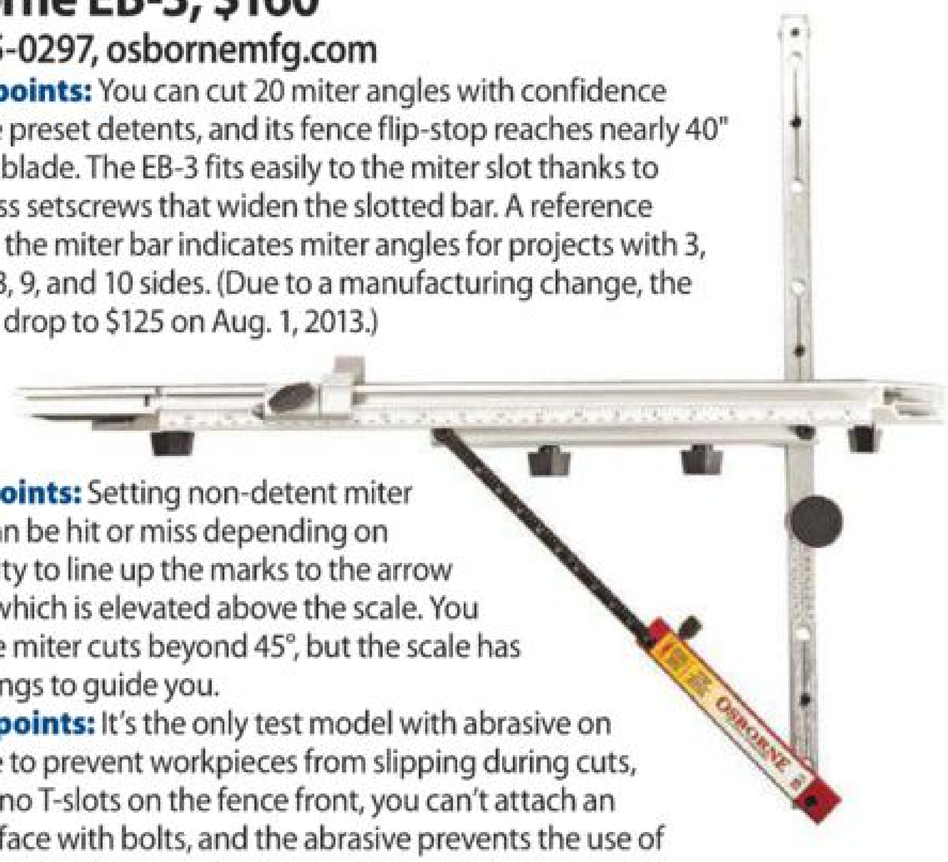
▼ **Low points:** Without a fence, this gauge doesn't have the quick, reliable length-stop positioning of models with fences, but you can screw one to the head through predrilled holes. Setting an angle with this model's vernier scale is less intuitive than with other miter gauges. When fitting the bar to the miter slot, you must lift it from the slot to adjust the horizontal nylon screws one at a time and recheck until snug.



Osborne EB-3, $160

252-715-0297, osbornemfg.com

▲ **High points:** You can cut 20 miter angles with confidence using the preset detents, and its fence flip-stop reaches nearly 40" from the blade. The EB-3 fits easily to the miter slot thanks to top-access setscrews that widen the slotted bar. A reference guide on the miter bar indicates miter angles for projects with 3, 4, 5, 6, 7, 8, 9, and 10 sides. (Due to a manufacturing change, the price will drop to $125 on Aug. 1, 2013.)



▼ **Low points:** Setting non-detent miter angles can be hit or miss depending on your ability to line up the marks to the arrow pointer, which is elevated above the scale. You can make miter cuts beyond 45°, but the scale has no markings to guide you.

▶ **More points:** It's the only test model with abrasive on the fence to prevent workpieces from slipping during cuts, but with no T-slots on the fence front, you can't attach an auxiliary face with bolts, and the abrasive prevents the use of double-faced tape.

Woodhaven 4911K, $250

▲ **High points:** This model is identical to the 4910 except for two features: a 23¾" miter bar and a fence. The 24"-long fence has three length stops that can be used in multiple ways, a microadjuster that works well for fine-tuning lengths, and eight T-slots for attaching an auxiliary face and hold-downs.

▼ **Low points:** In addition to those mentioned for the 4910, this model has a lot of small parts for the fence and stops that could easily get misplaced when not in use.



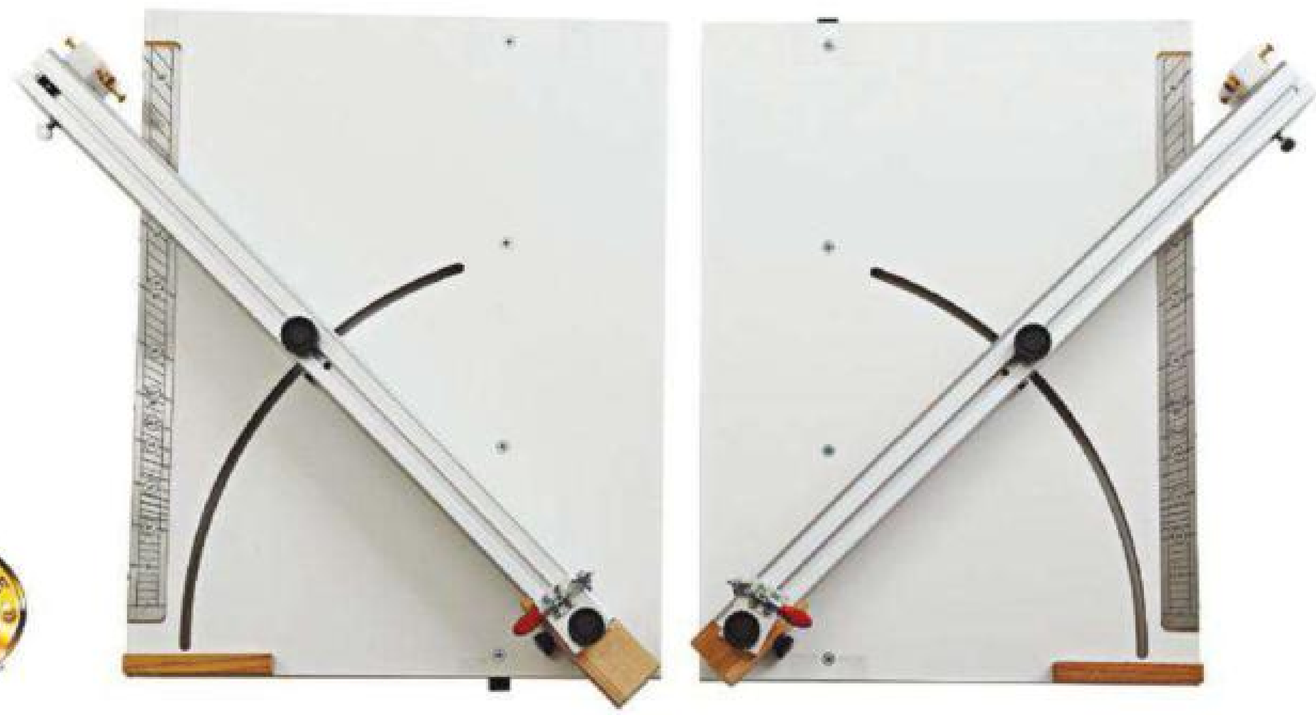
Dubby Left or Right, $180 each, $320 for the pair

508-949-2968, in-lineindustries.com

▲ **High points:** Whether you get a left or right sled—each works on only one side of the blade—or both, they make accurate cutting easy and intuitive. Despite having just one positive stop (at 0° for a right-angle cut), the Dubby fence was simple to align accurately with etched markings on its aluminum scale. The fence and stop extend for up to a 51"-long crosscut, and the microadjuster was easy to use. The replaceable L-shaped zero-clearance block attaches to T-track on the back of the fence to prevent workpiece tear-out.

▼ **Low points:** We'd like to see a beefier hold-down clamp with a little more adjustability than the one included with each sled.

▶ **More points:** These sleds are made in different sizes to fit different tablesaws, so be sure to specify which saw you will use it on when ordering.



Left Right

Incra Miter Express, $150

972-242-9975, incra.com

▲**High points:** The best of both worlds: You can quickly turn your miter gauge into an effective sled by simply clipping it into this sled's miter slot. When you cut the sled to fit your tablesaw, the offcut becomes a nonsliding, slot-anchored platform for workpiece cutoffs, reducing the chances of their getting ejected by the spinning blade. Access the miter-slot adjusters easily from above with the sled resting in the slot. The Miter Express comes with a handy hold-down clamp.

▼**Low points:** If you pair this with a sub-$100 miter gauge, you still lack a fence with scale and stop. This sled is only as good as the miter gauge you use.



Rockler 33113, $140

800-279-4441, rockler.com

▲**High points:** Once calibrated to the blade, we found the 0° stop and angle scale reliable. The sliding auxiliary fence face gives you zero-clearance support at the cutline, and replaces easily when "used up."

▼**Low points:** Without a scale for the 25"-long fence, you have to measure with a separate ruler to set the flip-stop. We tightened the miter bar's fit in the slot as much as we could, but it was still a touch looser than we like. The included hold-down clamp sometimes pulled workpieces away from the fence when tightening.

▶**More points:** You can buy an optional cutoff-support platform (no. 37541) for $35.

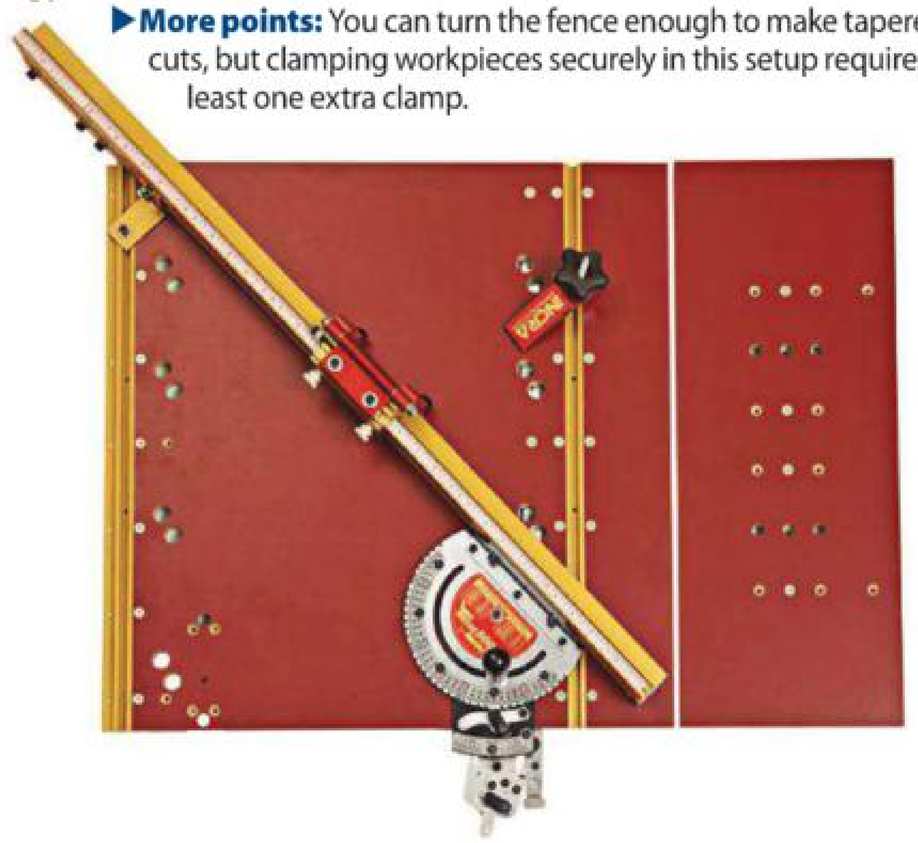


Incra Miter 5000, $300

▲**High points:** This sled uses Incra's Miter 3000SE head assembly, and shares its high and low points. It also has a 36"-long fence with the same flip-stop that extends to 68". After cutting to fit your saw, the nonsliding cutoff platform helps keep workpiece cutoffs from dropping into the blade and ejecting toward you.

▼**Low points:** This is the only sled that did not include nylon glide strips for easier sliding on the saw top. As a result, the Miter 5000 frequently caught on the edge of our saw's outfeed table. The included hold-down clamp sometimes pulled workpieces away from the fence when tightening. At just under 24" square and weighing just over 24 lbs, this sled can be a chore to lift and use.

▶**More points:** You can turn the fence enough to make tapered rip cuts, but clamping workpieces securely in this setup requires at least one extra clamp.



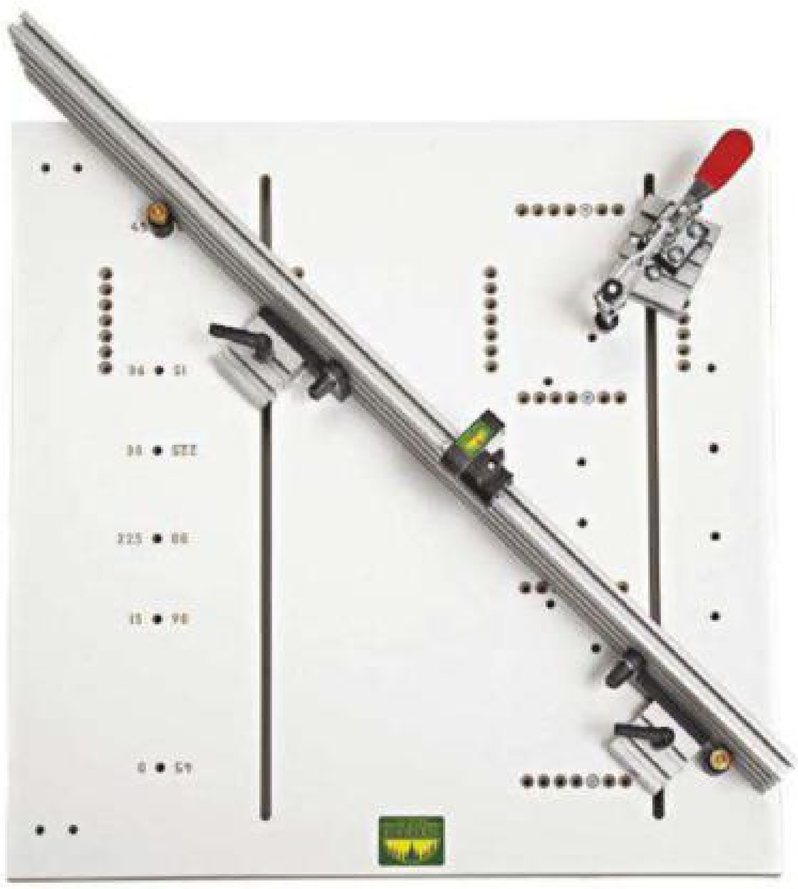
Woodhaven 4965 Super Sled, $270

800-344-6657, woodhaven.com

▲**High points:** The Super Sled has multiple rows of predrilled mounting holes for the miter bar so you can ensure zero-clearance support for almost any tablesaw after trimming it to size. You can cut up to 32"-long workpieces using the fence's flip-stop. We liked Woodhaven's two hefty toggle clamps best among the sleds. The eight-slotted fence can be positioned on edge or its face (letting you use toggle clamps to secure the front and rear of a workpiece), and pivots far enough to make tapered ripcuts.

▼**Low points:** Because this sled cannot be calibrated, your tablesaw's miter slot must be *precisely* aligned with the blade. And there's no scale on the fence, so you must use a ruler to set the flip-stop's distance from the blade.

▶**More points:** With 12 miter-detent settings, you drop pins in corresponding holes, slide the fence against them, and then tighten it in place. But to cut miter angles other than the detent settings, you must use a protractor or precut gauge block to set the fence.



StoreMags

And the cutting awards go to...

Each of the miter gauges and sleds we tested will make accurate cuts, so you won't go wrong with any of them. But if we had to buy a miter gauge, we'd get the Incra Miter 1000HD. It delivers everything we want from a miter gauge: can't-miss miter-angle settings for accurate cuts, a good-size fence with a reliable flip-stop, and a miter bar that adjusts easily to the slot. And it does this without being cumbersome.

For a sled, we'd take one of the Dubby models anytime. Because we rarely use a sled for anything other than wide panels, we'd get the Dubby Left. But you could also get both sleds and make all your angled cuts as well as panel cuts, and never need a miter gauge.

Produced by **Bob Hunter** with **Bob Baker**

ATTAIN PRECISE CUTS WITH AFTERMARKET MITER GAUGES & SLEDS

		PERFORMANCE RATINGS (1)						MITER SCALES			MITER BAR		FENCE					
		PRIMARY			SECONDARY													
BRAND	MODEL	EASE OF CALIBRATING MITER SCALE TO BLADE (2)	EASE OF SETTING MITER ANGLES	READABILITY OF MITER SCALE (3)	EASE OF FITTING MITER BAR(S) TO SLOT	READABILITY OF FENCE SCALE	EASE OF USING FENCE STOP	MAXIMUM MITER ANGLE (RIGHT AND LEFT), DEGREES	NUMBER OF MITER DETENTS	STYLE OF MITER DETENTS/STOPS (4)	LENGTH, INCHES	WIDTH ADJUSTMENT STYLE (5)	LENGTH, INCHES	LENGTH FULLY EXTENDED, INCHES (6)	MAXIMUM CROSSCUT USING LENGTH STOP	MICROADJUSTER ON FENCE STOP? YES/NO	WEIGHT, LBS-OZ	SELLING PRICE (7)
MITER GAUGES																		
INCRA	V120	A	A	A-	A	N/A		61	121	R	15¾	T	N/A	N/A	N/A	N/A	2–3	$80
	MITER 1000HD	A	A	A	A	A-	B+	91	181	R	17¾	T	18	34	34	Y	6–5	180
	MITER 3000SE	A	A-	A	A	A-	B+	95	365	R	20¼	T	27	52	52	Y	9–2	270
JDS	ACCU-MITER 24-46	A-	B	B-	A	A	A	50	9	S	20	T	24	47	47	Y	11–13	240
KREG	KMS7102	A-	A	A	B	A	A	50	9	P	24	H	24	N/A	22¼	N	4–12	160
OSBORNE	EB-3	A	B	A	A	A	A-	45	20	S	21½	S	24	42	39¾	N	6–15	160*
WOODHAVEN	4910	A	B	B	B	N/A		90	15	T	17¾	H	N/A	N/A	N/A	N/A	2–10	145
	4911K	A	B	B	B	A	A-	90	15	T	23¾	H	24	N/A	24	Y	7–8	250
SLEDS																		
DUBBY	LEFT	A	A	A	B	N/A	B-	53	1	N/A	24	B	27½	N/A*	51	Y	10–8	180
	RIGHT	A	A	A	B	N/A	B-	53	1	N/A	24	B	27½	N/A*	51	Y	10–8	180
INCRA	MITER EXPRESS	CBC	N/A		A	N/A		N/A	N/A	N/A	23½	T	N/A	N/A	N/A	N/A	9–2	150
	MITER 5000	A	A-	A	A	A-	B+	95	365	R	25½	T	36	68	68	Y	24–2	300
ROCKLER	33113	A	A	A	B-	N/A	B-	50	1	N/A	24½	B	25	N/A	26	N	13–2	140
WOODHAVEN	4965 SUPER SLED	CBC	B	A*	B	N/A	B-	90	12	P	23¾	H	32	N/A	32	N/A	19–8	270

1. A Excellent; B Good; N/A Not applicable
2. (CBC) Cannot be calibrated
3. (*) No miter scale, but six preset stops are easy to read. (N/A) Not applicable
4. (P) Tapered pin (R) Rack and pawl (S) Spring-loaded pin (T) Threaded pin
5. (B) Spring-loaded balls in bar edge (H) Horizontal setscrews (S) Expandable, slotted bar (T) Expandable washers on top of bar
6. (N/A*) Fence does not extend; length stop extends on rails within the fence
7. Prices current at time of article production and do not include shipping, where applicable. (*) Price will drop to $125 as of Aug. 1, 2013, according to Osborne president David Osborne.

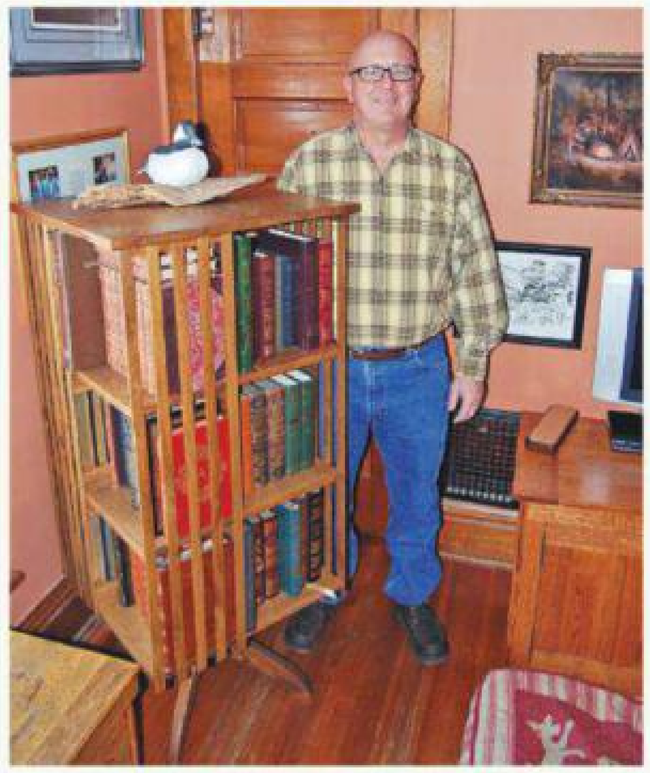
More Resources

- Build your own tablesaw sled from our plans, available for a small fee: **woodmagazine.com/tssleds**.
- Tune up your tablesaw using our free methods: **woodmagazine.com/tstuneup**.
- Read reviews of these tools and others from fellow woodworkers, and add your own reviews at **toolreviews.woodmagazine.com**.

Revolving Danner-inspired Bookcase

Storemags.com

Overall dimensions:
23⅝"W × 23⅝"D × 45"H
Materials cost: $150



While shooting the breeze at my buddy Mike Fletcher's house, he showed me one of his latest projects—a bookcase styled like the Danner revolving bookcases popular in the late 19th century. I knew immediately that WOOD® *readers would love this piece. A classic design born of a need for quick access to reference books (before the days of Google!), its small footprint and revolving action make it an ideal storage solution for a study or den.*

Kevin Boyle
Senior Design Editor

First, make the shelves

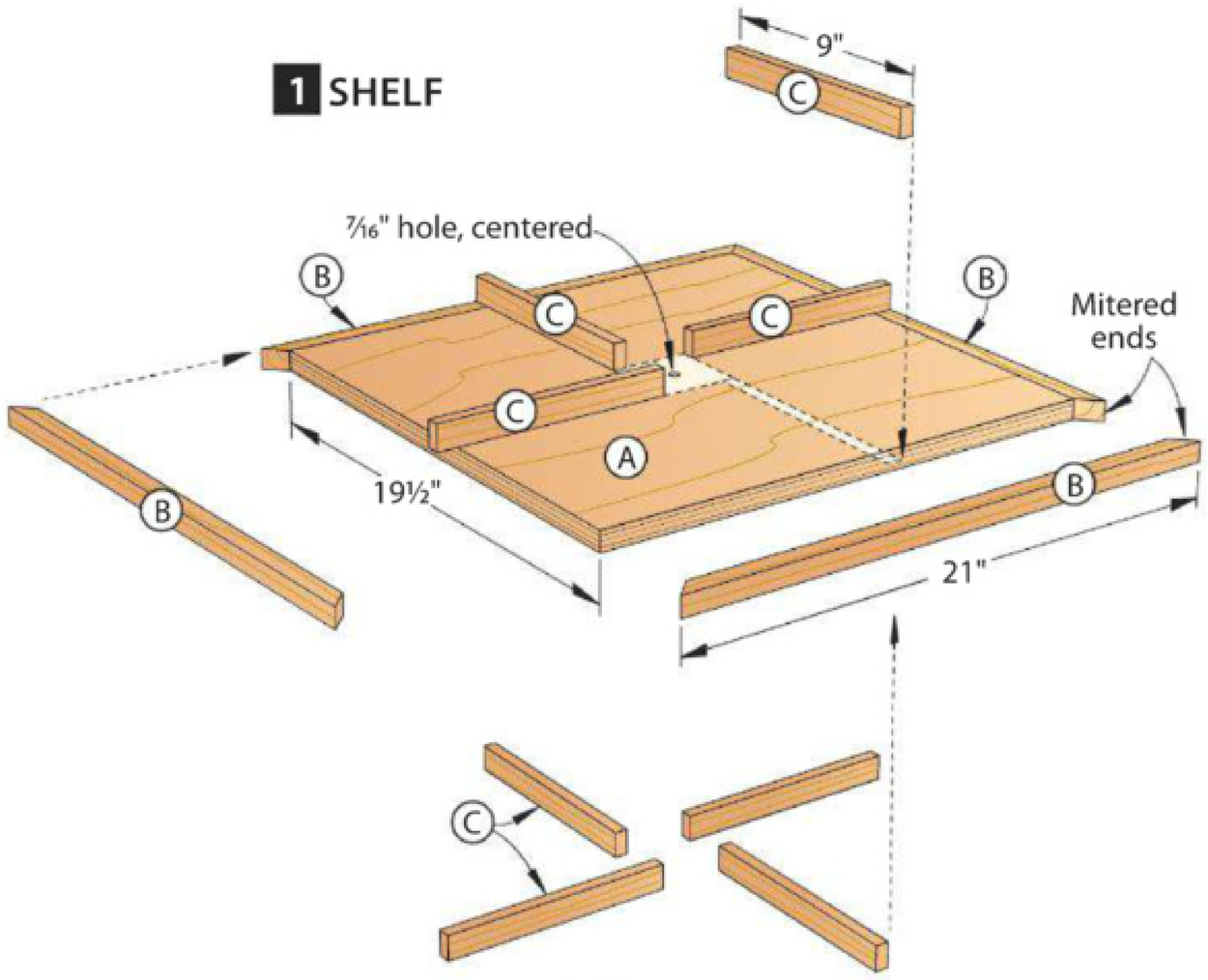
1 From ¾" oak plywood, cut the shelves (A) to size [**Materials List**]. From ¾" stock, cut the shelf edging (B) oversize to 22" long. Make 45° miters on both ends to bring the edging to final length. Glue it to the shelves [**Drawing 1**].

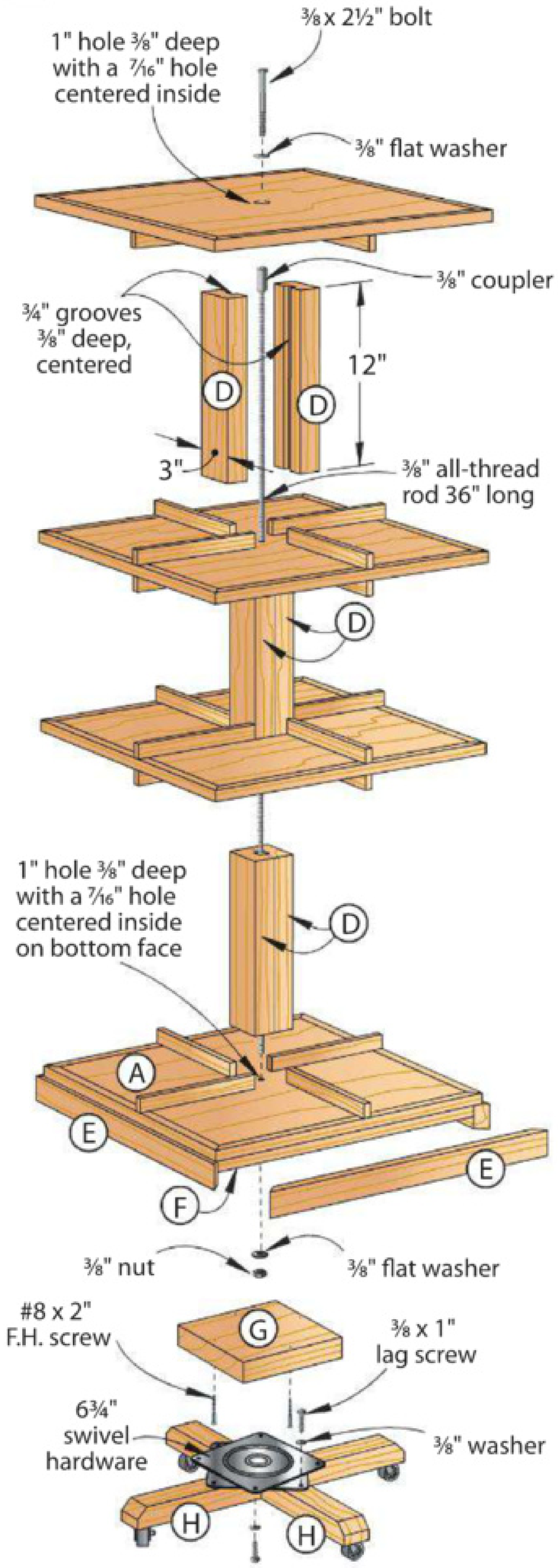
2 In the center of two of the shelf assemblies (A/B), bore a 1" counterbore ⅜" deep; then, drill a 7/16" through hole centered inside [**Drawing 2**]. On the remaining two shelf assemblies, drill only a centered 7/16" through hole.

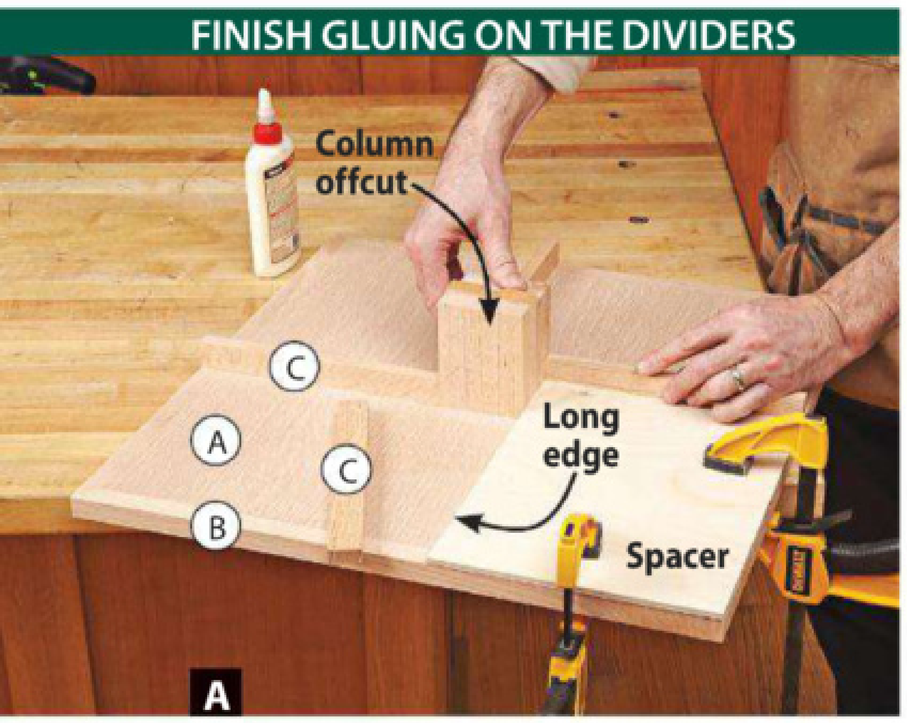
3 Cut the shelf dividers (C) to size. To make the columns (D), cut two 1½×3×40" blanks.

***Quick Tip!** If you don't have 8/4 lumber, laminate two pieces of ¾"-thick stock instead.*

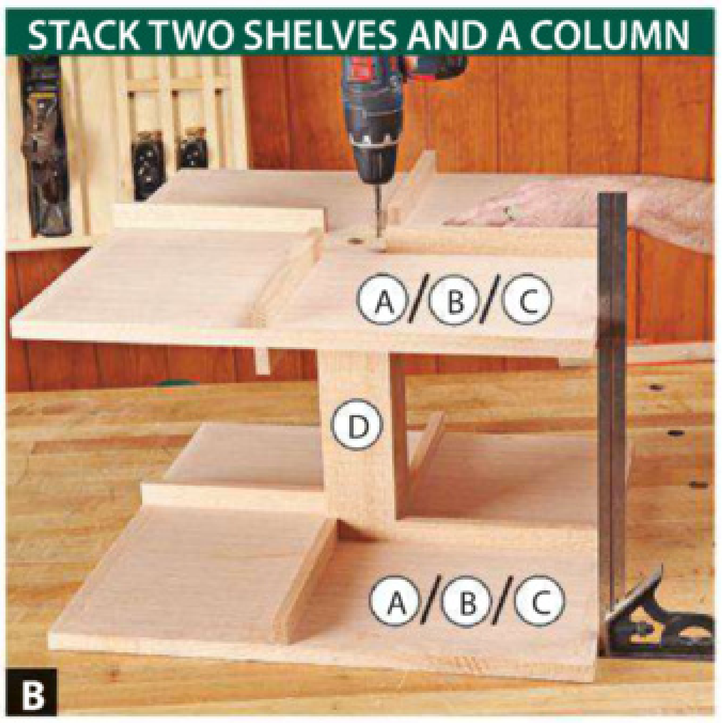
With a dado set, cut a ¾" groove centered on the wide face of each blank







After gluing on the first two shelf dividers (C), move the spacer to the diagonally opposite corner and glue down the remaining two dividers.



Use a combination square with a long blade or a carpenter's square to align the shelves before screwing them in place.

[**Drawing 2**]. Apply glue to the grooved faces of both blanks and clamp them together.

***Quick Tip!** Add a few clamps across the joint line to help align the edges.*

After the glue dries, cut the columns to final length. Save the offcut.

4 For best appearance, keep the grain direction of the shelves parallel. Cut a 9×11½" spacer from scrap. Clamp this spacer to the corner of one of the two shelf assemblies (A/B) without a counterbore, aligning the edges. Then, place one of the shelf dividers (C) and the column offcut along the spacer's long edge. Place another divider along the spacer's short edge. Glue the shelf dividers in place, snug to the spacer.

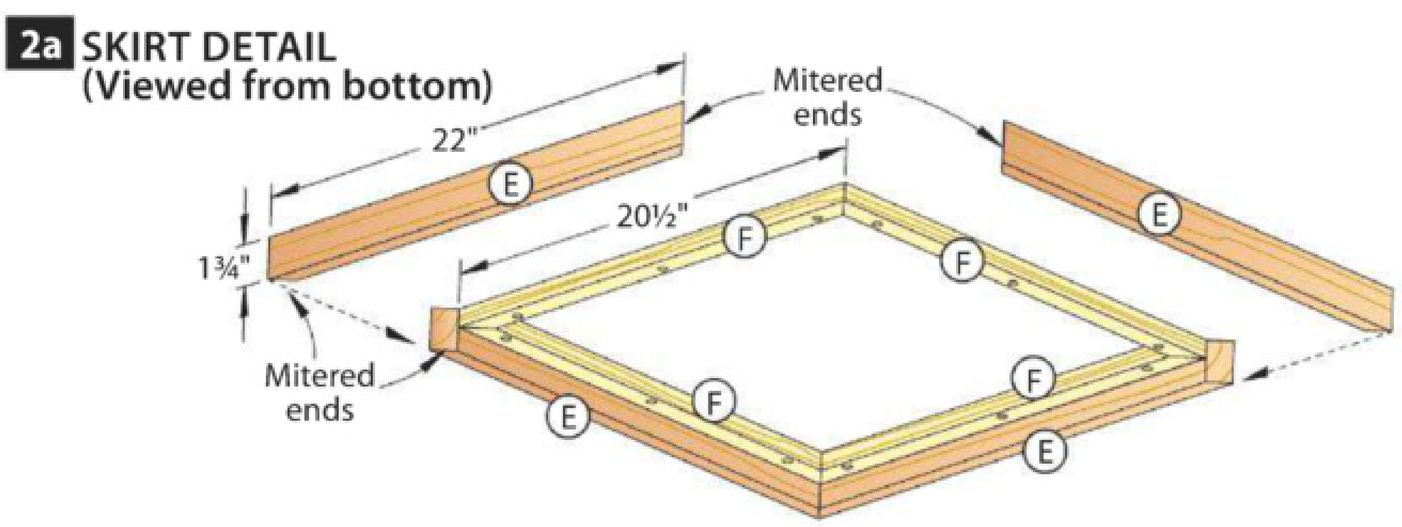
***Quick Tip!** Apply glue to the shelf dividers sparingly; then, rub the joint back and forth to ensure the glue spreads evenly.*

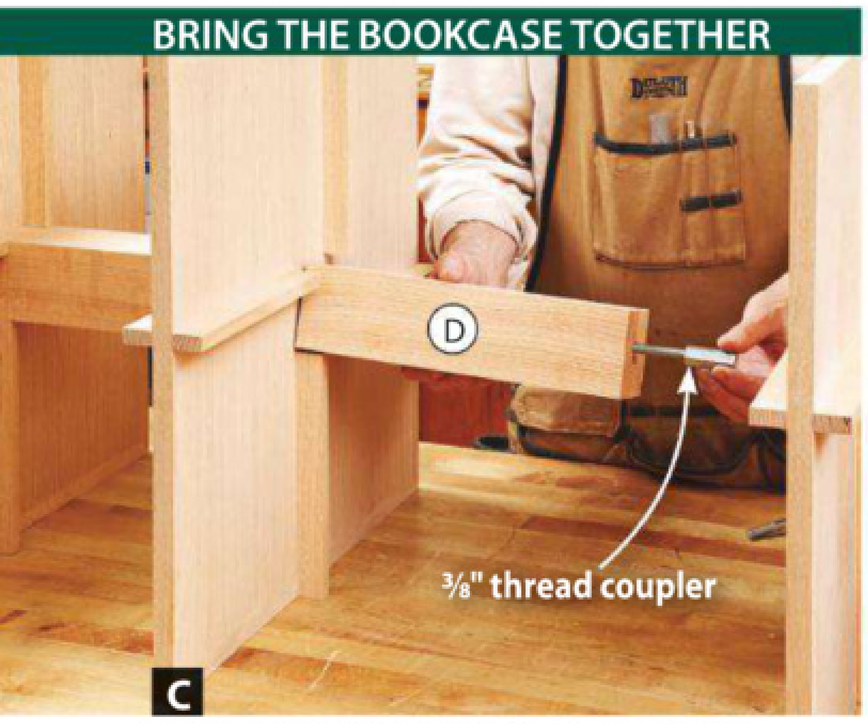
Glue on the other two dividers [**Photo A**]. Repeat for the opposite shelf face, and then for the other shelf assembly without a counterbore.

5 Repeat **Step 4** for the two counterbored shelf assemblies (A/B), gluing the shelf dividers (C) only to the non-counterbored faces.

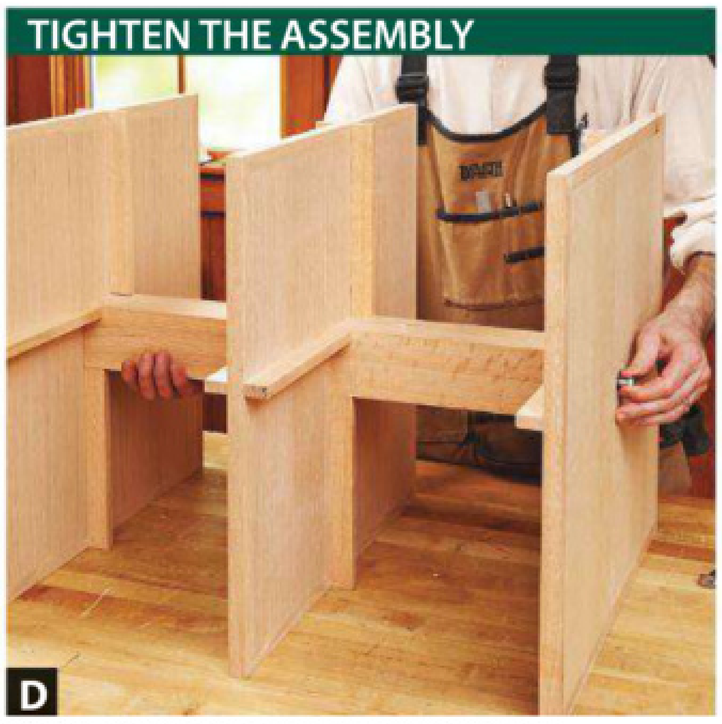
Assemble the bookcase

1 Place one of the counterbored shelf assemblies (A/B/C) on your bench, the face with shelf dividers glued on facing up. Position one of the columns (D) in the center, and then place one of the double-sided shelf assemblies over the column. Glue and screw the shelves to the column [**Drawing 2, Photo B**]. Repeat for the other two shelf assemblies.

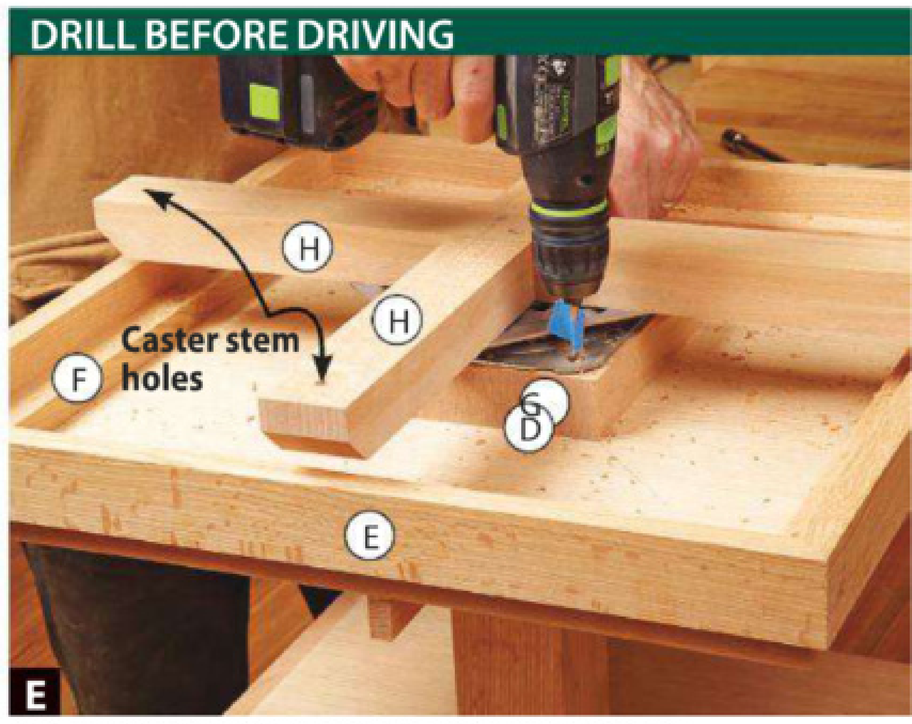




Twist a coupler onto the threaded rod before pushing the rod through the second shelf/column assembly (A–D).



Insert a ⅜×2½" bolt and washer into the counterbore in the bookcase's top and into the ⅜" coupler. Tighten to pull the assembly together.



Before mounting the swivel hardware to the base arms (H) or the pivot block (G), drill 5⁄16" pilot holes to prevent the lag screws from splitting the wood.

2 Place the two shelf assemblies (A–D) on their sides. Cap a ⅜×36" threaded rod with a ⅜" washer and nut, thread a ⅜" coupler onto the opposite end, and then slide it through the bottom shelf assembly and the last remaining free column (D) [**Photo C**]. Apply glue to both ends of the free column, slide on the second assembly, and tighten the assembly together by applying a bolt and washer [**Photo D**].

3 Cut the base skirt (E) and base skirt cleats (F) to length and miter the ends. Glue and assemble the base skirt and the base skirt cleats [**Drawing 2a**]. Allow this to dry; then, sand to 150 grit. Screw the skirt to the bottom of the shelf assembly (A–D), leaving an equal reveal on all sides.

4 Cut the pivot block (G) to size. Glue and screw the block, centered, on the bottom of the bottom shelf.

5 Cut the base arms (H) to size. Then, cut a half-lap joint in their center [**Drawings 3, 3a**] using a dado blade. Chamfer the ends of the base arms before gluing the two arms together.

6 Drill the holes for the casters' stems and sand the base assembly (H) to 150 grit. Using ⅜×1" lag screws, attach the swivel hardware to the base assembly and to the pivot block (G) [**Drawing 3, Photo E**].

Top it off and wall it in

1 Glue up a blank for the top (I), cut it to size, and rip bevels on all four edges [**Drawing 4a, Photo F**]. Square off the top's beveled shoulders [**Photo G**].

2 Cut the side slats (J) and sand them to 150 grit. Wipe clean; then, apply a stain to the slats and the rest of the bookcase. We used a blend of oil-based Varathane stains: 10 percent Cabernet and 90 percent Dark Walnut. Then, we applied three coats of waterbased polyurethane, sanding between each coat with a 320-grit sanding sponge.

3 After the finish cures, nail on the slats (J) using decorative nails [**Drawing 4, Photo H**]. (See "**Two options for decorative nails**," *opposite page*.) Reattach the base and mount the casters.

4 Drill elongated ⅛" holes through each corner of the top shelf (A/B). (Slightly rock the drill back and forth while drilling.)

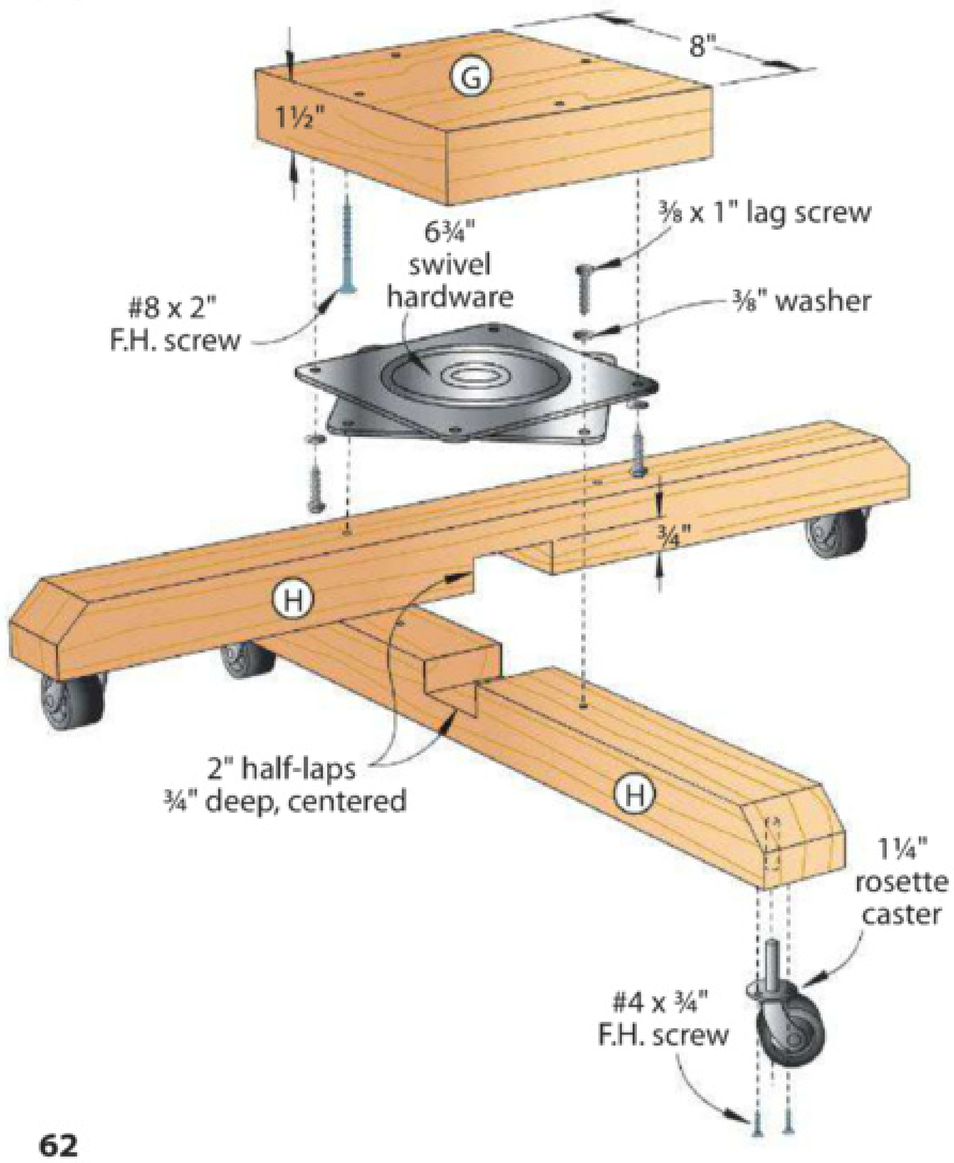
***Quick Tip!** Elongate the screw holes perpendicular to the direction of the top's grain direction, as wood shrinks and swells most along its width.*

Center the top (I) on the bookcase and clamp it in place. Attach the top with screws driven through the holes.

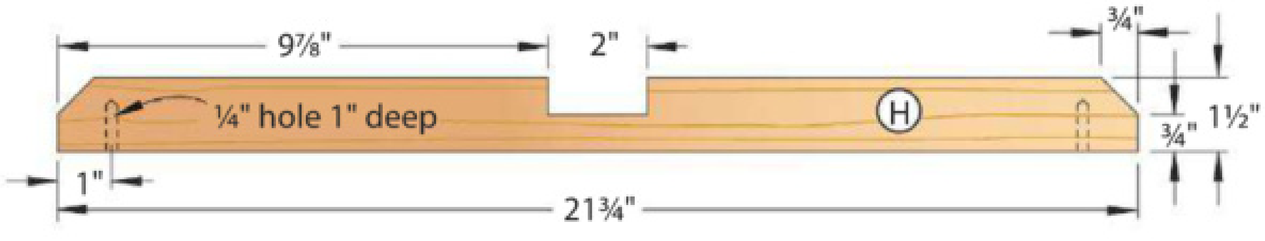


Build a tall fence that straddles your tablesaw's rip fence and supports the top (I) during bevel cuts on the top's four edges.

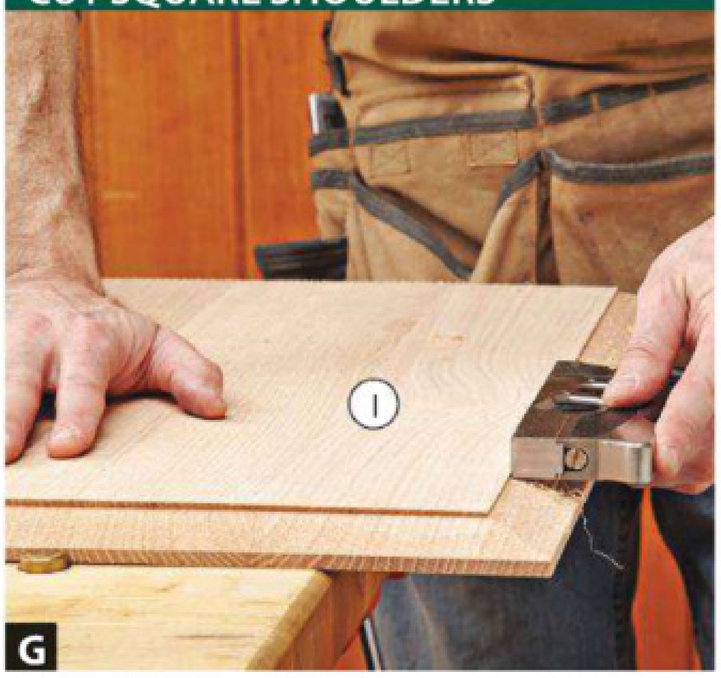
3 BASE EXPLODED VIEW



3a BASE-ARM CROSS SECTION



CUT SQUARE SHOULDERS



Use a rabbeting plane or a square sanding block with 150-grit sandpaper to square the top's beveled shoulders and give it a crisp edge.

DRILL, THEN DRIVE DECORATIVE FASTENERS



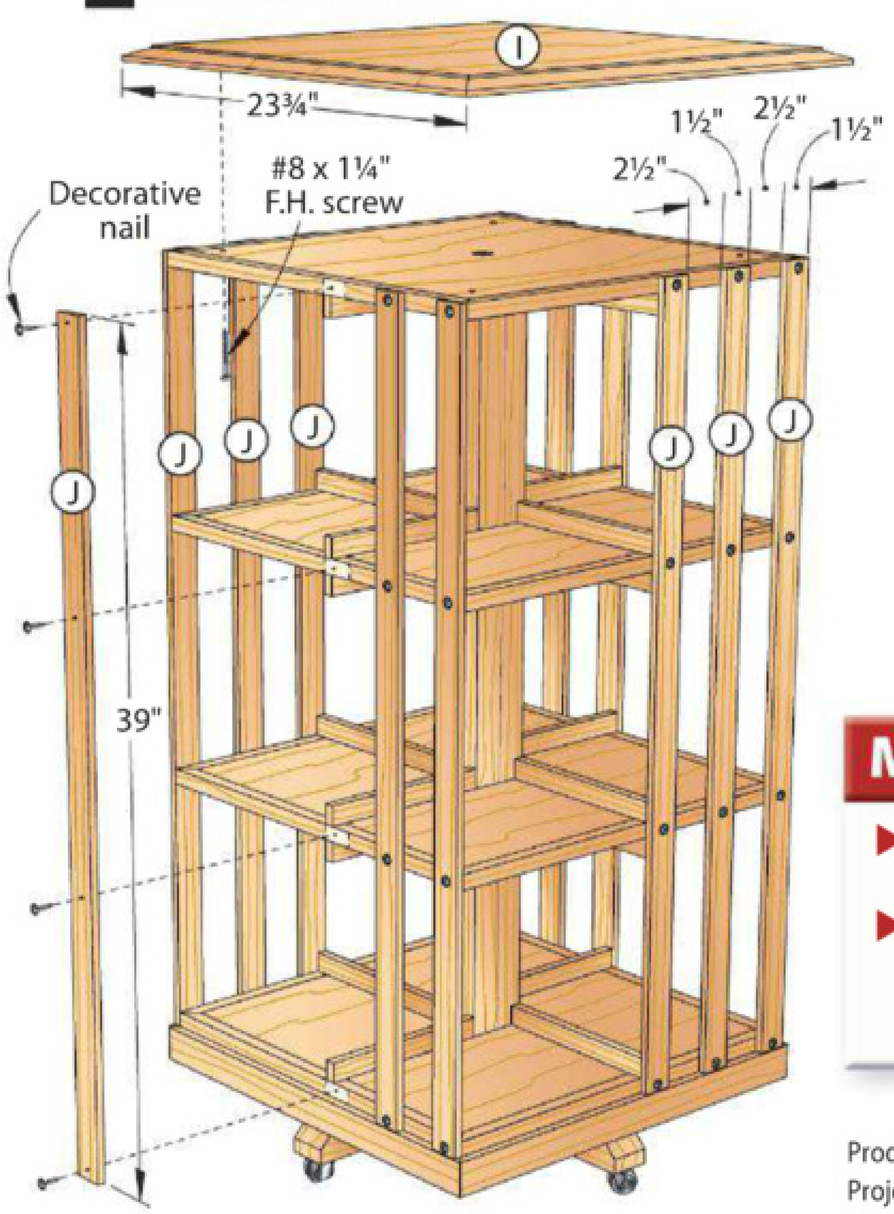
To avoid splitting the slats (J) or the shelf edging (B), drill 1/16" holes for the decorative nails. Use a spacer block for consistent spacing between slats.

Two options for decorative nails

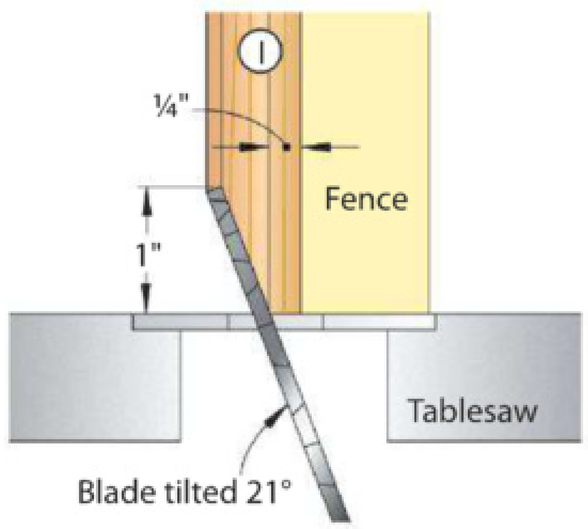
Add a dramatic finishing element to your bookcase with decorative nails. We used black hammer-finish, ½" roundhead clavos (nails) available from Lee Valley, *below left*. For a less-expensive alternative, you can use Lee Valley's 1" wrought-head nails, *below right*. In both cases, drive the nails into the slats using a plastic-head hammer to avoid damaging the nails' finish.



4 EXPLODED VIEW



4a TOP BEVEL DETAIL



More Resources

- Try a fumeless Arts & Crafts finish: **woodmagazine.com/artscraftsfinish**
- For more office furniture plans, visit **woodmagazine.com/officefurniture**

Produced by **Nate Granzow** with **Kevin Boyle**
Project design: **Kevin Boyle** with **Mike Fletcher**
Illustrations: **Lorna Johnson**

Materials List

Part		FINISHED SIZE T	W	L	Matl.	Qty.
A	shelves	¾"	19½"	19½"	OP	4
B*	shelf edging	¾"	¾"	21"	O	16
C*	shelf dividers	½"	1"	9"	O	24
D*	columns	1½"	3"	12"	O	6
E	base skirt	¾"	1¾"	22"	O	4
F	base skirt cleats	¾"	1"	20½"	O	4
G	pivot block	1½"	8"	8"	O	1
H	base arms	1½"	2"	21¾"	O	2
I	top	¾"	23¾"	23¾"	O	1
J	side slats	1½"	⅜"	39"	O	12

*Parts initially cut oversize. See the instructions.
Materials key: OP–oak plywood, O–oak.
Supplies: ⅜" all-thread rod 36" long, ⅜" flat washers (10), ⅜" threaded coupler (1), ⅜" nut (1), ⅜×2½" bolt (1), ⅜×1" lag screws (8), #8×2" screws (4), #8×1¼" screws (24), 1" decorative nails (48), 6¾" swivel hardware (1), 1¼" rosette casters (4).
Bits and blade: 1" Forstner bit, 1/16", ⅛", 7/16" bits, dado set.

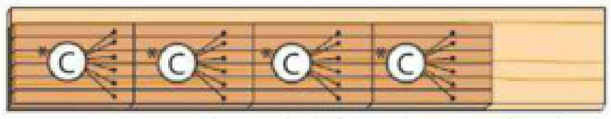
Source

Casters: 1¼" rosette caster, #00W9861, $13.60 each, Lee Valley, 800-871-8158, leevalley.com.
Swivel hardware: #12K0202, $13.50, Lee Valley.
Decorative nails: Black hammer-finish, ½" roundhead clavos (nails), #00T0900, $.95 each, Lee Valley; or 1" wrought-head nails, #91Z4002, $13.60 per pound, Lee Valley.

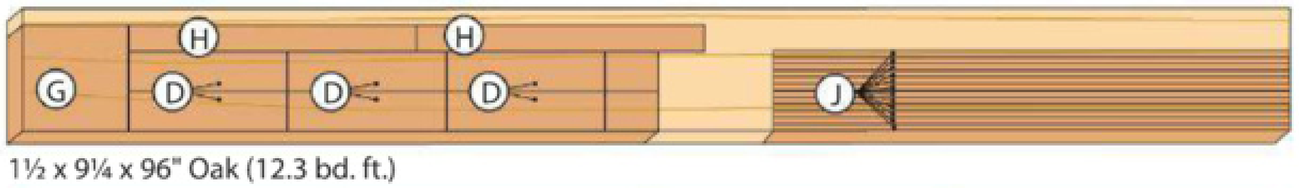
Cutting Diagram



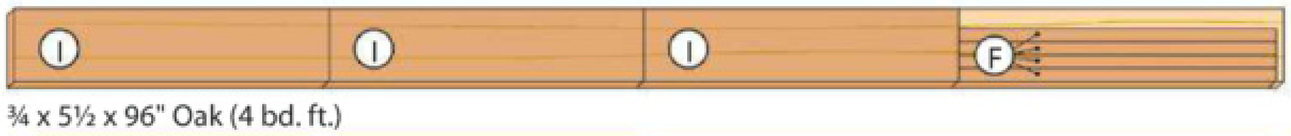
¾ x 3½ x 96" Oak (2.7 bd. ft.)



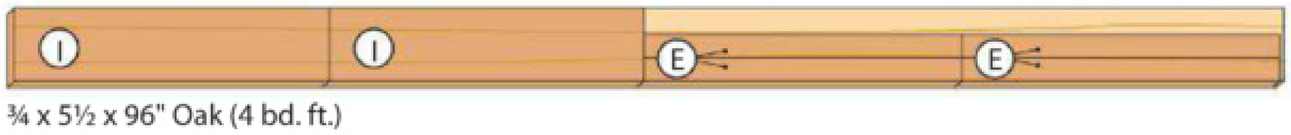
¾ x 7¼ x 48" Oak (2.7 bd. ft.) *Plane to the thicknesses listed in the Material List.



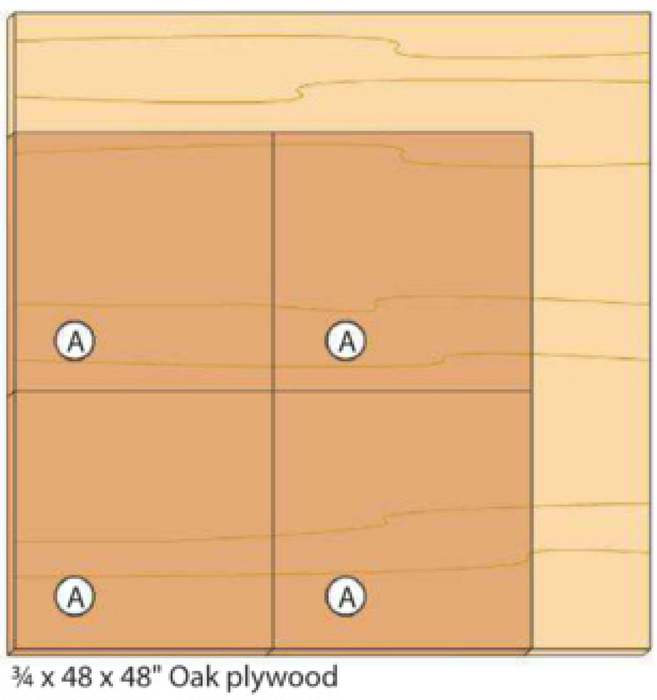
1½ x 9¼ x 96" Oak (12.3 bd. ft.)



¾ x 5½ x 96" Oak (4 bd. ft.)



¾ x 5½ x 96" Oak (4 bd. ft.)



¾ x 48 x 48" Oak plywood

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Bamboo looks nice, but take care cutting it

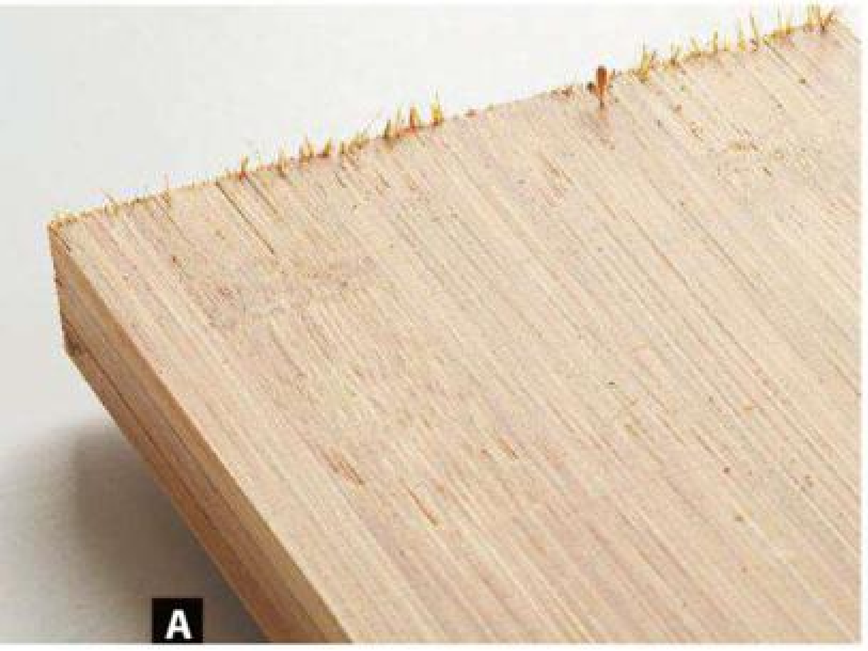
I'd like to build some small projects from bamboo, but I've heard it's difficult to work with. Do I need special cutters for sawing and routing bamboo?

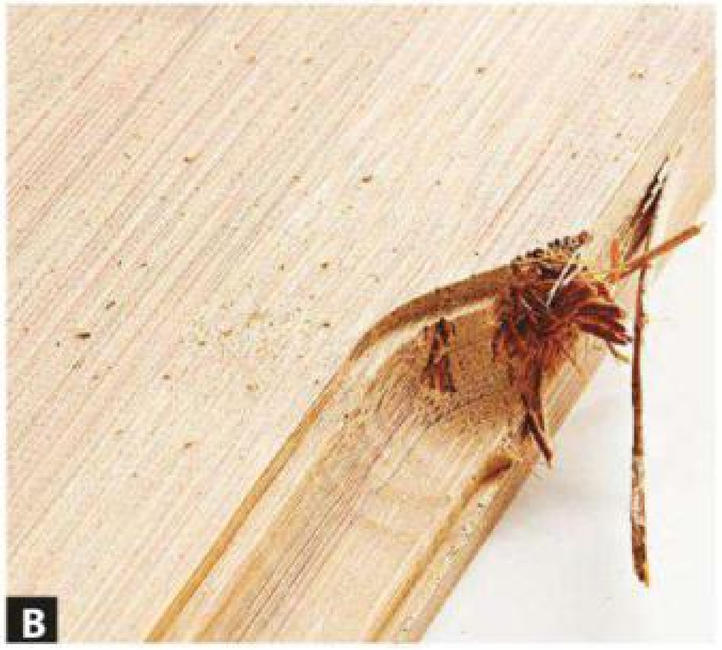
—Andy Gomez, Norcross, Ga.

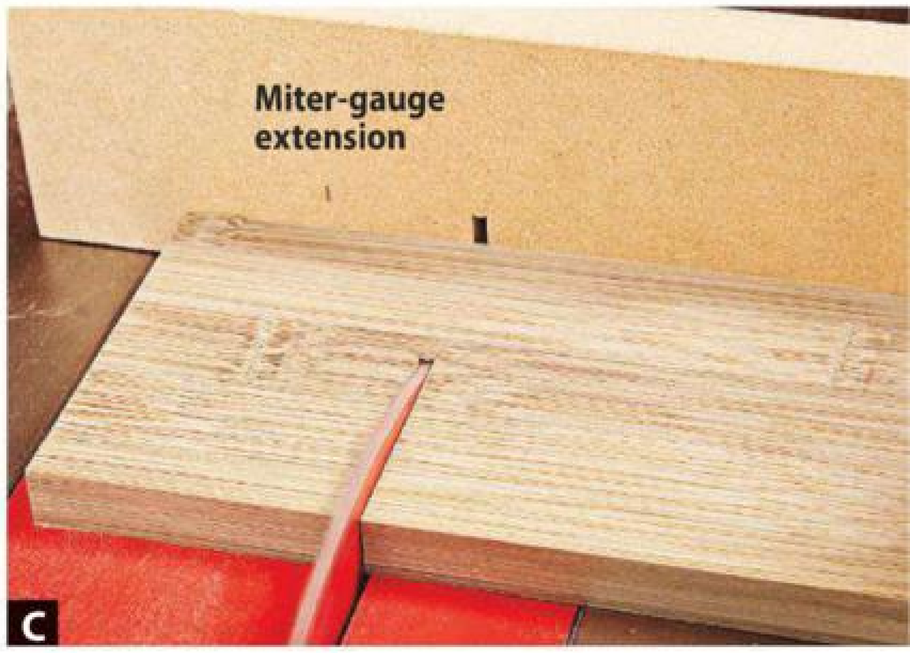
You can use your regular blades and bits, Andy, provided they have sharp carbide tips. Although technically a grass, dried bamboo cuts much like a dense hardwood. There are a few things to be aware of, though, before working with the stuff.

First, because of its long, stringy grain, bamboo splinters easily, especially when cutting or routing across the grain [**Photo A**] or when routing edge profiles [**Photo B**]. To minimize this, rout with sharp, clean bits in shallow increments (⅛" or less). When crosscutting, use blades with 80 or more teeth and back up the exit point with a miter-gauge extension to prevent grain tear-out [**Photo C**].

Also, similar to dense-grain hardwoods, bamboo burns easily from friction, so maintain steady, almost brisk, feed rates. Finally, fresh-cut edges on bamboo can be razor sharp: Ease them with 180-grit sandpaper to avoid cutting yourself.


A


B



C

Is a wood stove a good source for workshop heat?

Thanks to the brutal winters here along the Canadian border, I'm considering adding a wood-burning stove to heat my shop. I have access to plenty of firewood and a lot of scrap from the shop. Any advice before I buy one?

—Steve Phillips, Plattsburgh, N.Y.

A wood-burning stove seems like a great idea, Steve, for the reasons you mentioned. A good one generates nice heat, and it creates a comforting, almost nostalgic experience. Besides eating up your scraps, it also consumes a good deal of space, due to the required clearances. Before you commit to it, consider the following:

- Check building and zoning codes in your local community because they might prohibit a wood-burner or require significant restrictions.
- Talk with your insurance agent. Some homeowner's policies (which cover attached and free-standing shops) will not cover fire damages if you use a wood-burning stove.
- If you've made it over the first two hurdles, install the stove according to the manufacturer's instructions, and vent it to a flue or chimney built in strict compliance with local codes.
- Wood-burning stoves and flues need to be inspected by a licensed expert annually, preferably in late summer or early fall before cold weather sets in and you build the first fire of the season. (Some insurance companies require this inspection.) Search locally for a professional chimney sweep, or contact the Chimney Safety Institute of America (317-837-5362, csia.org) to find a qualified inspector.
- Once your stove's installed, burn nothing but wood. Wood-composite materials, such as plywood, MDF, particleboard, and decking, contain glue, finish, paint, plastics, or other substances that can gum up a flue.
- Finally, keep an A-B-C fire extinguisher within easy reach in your shop. Talk to your local fire department about a model that meets your needs.



This stove requires a 3' setback from walls (measured here with a yardstick); keep all tools and combustible materials away as well.

continued on page 68

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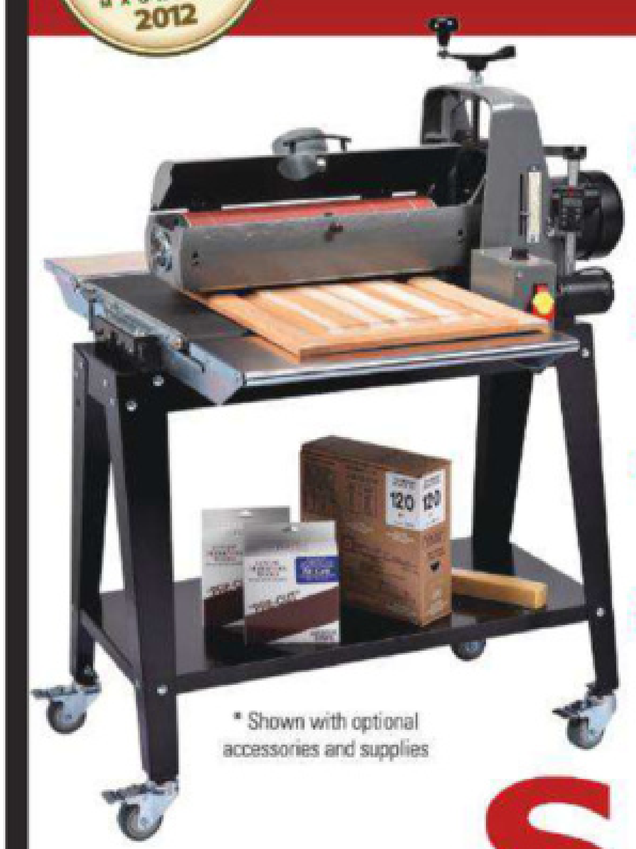
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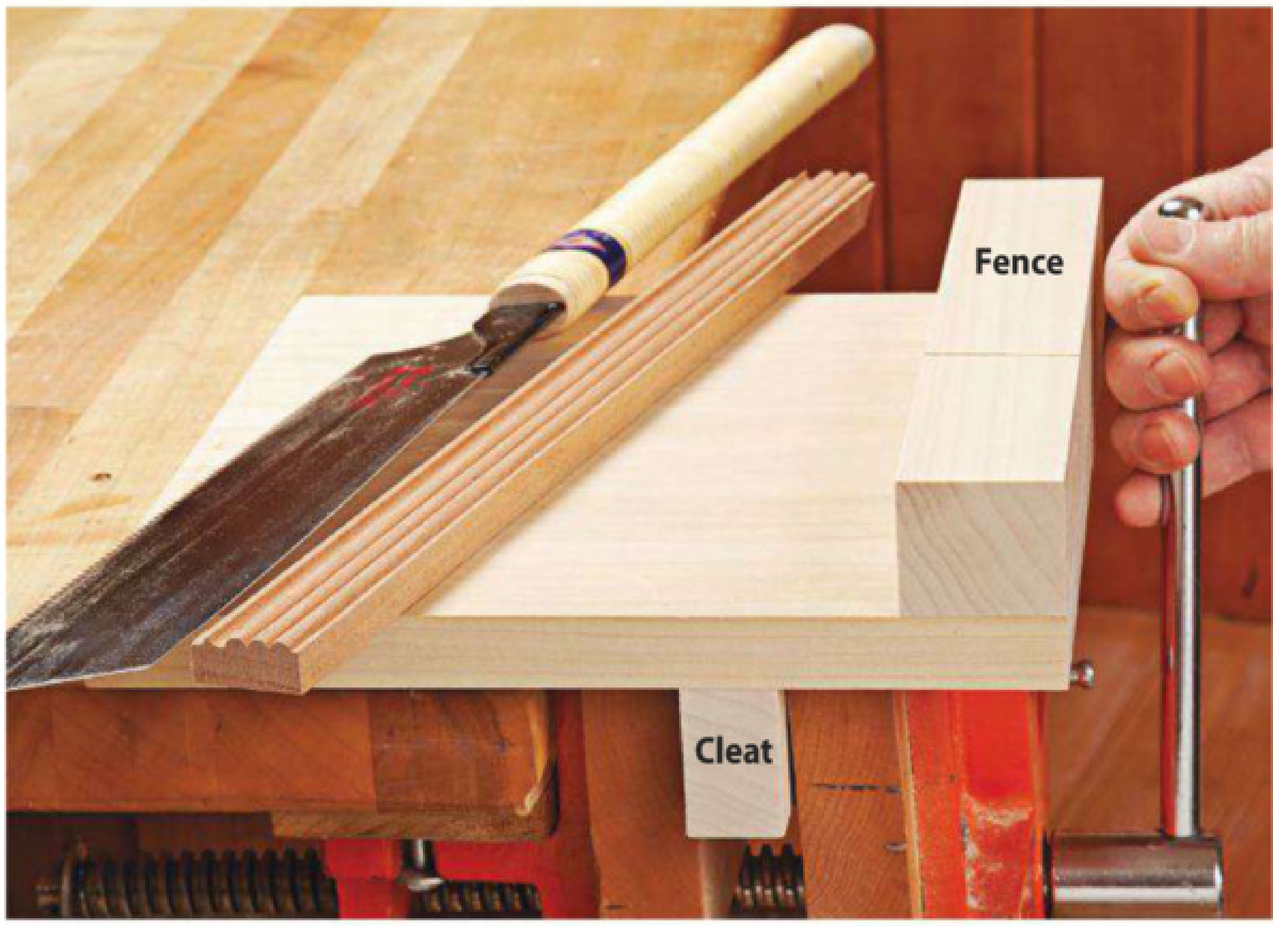
Make a bench hook for Japanese handsaws

I'd like to make a miter-cutting bench hook similar to the one you featured in issue 216 (Dec./Jan. 2012/2013). But I use Japanese handsaws that cut on the pull stroke, rather than the push of the Western saw you showed. How can I adapt this project to work with my saws?

—Chad Cowle, Tucson, Ariz.

Rather than making one that hooks on a workbench's edge, Chad, build a bench hook with a cleat that clamps in a vise, as shown *below*. Locate the cleat on the base so you have room to turn the vise handle without banging your knuckles.

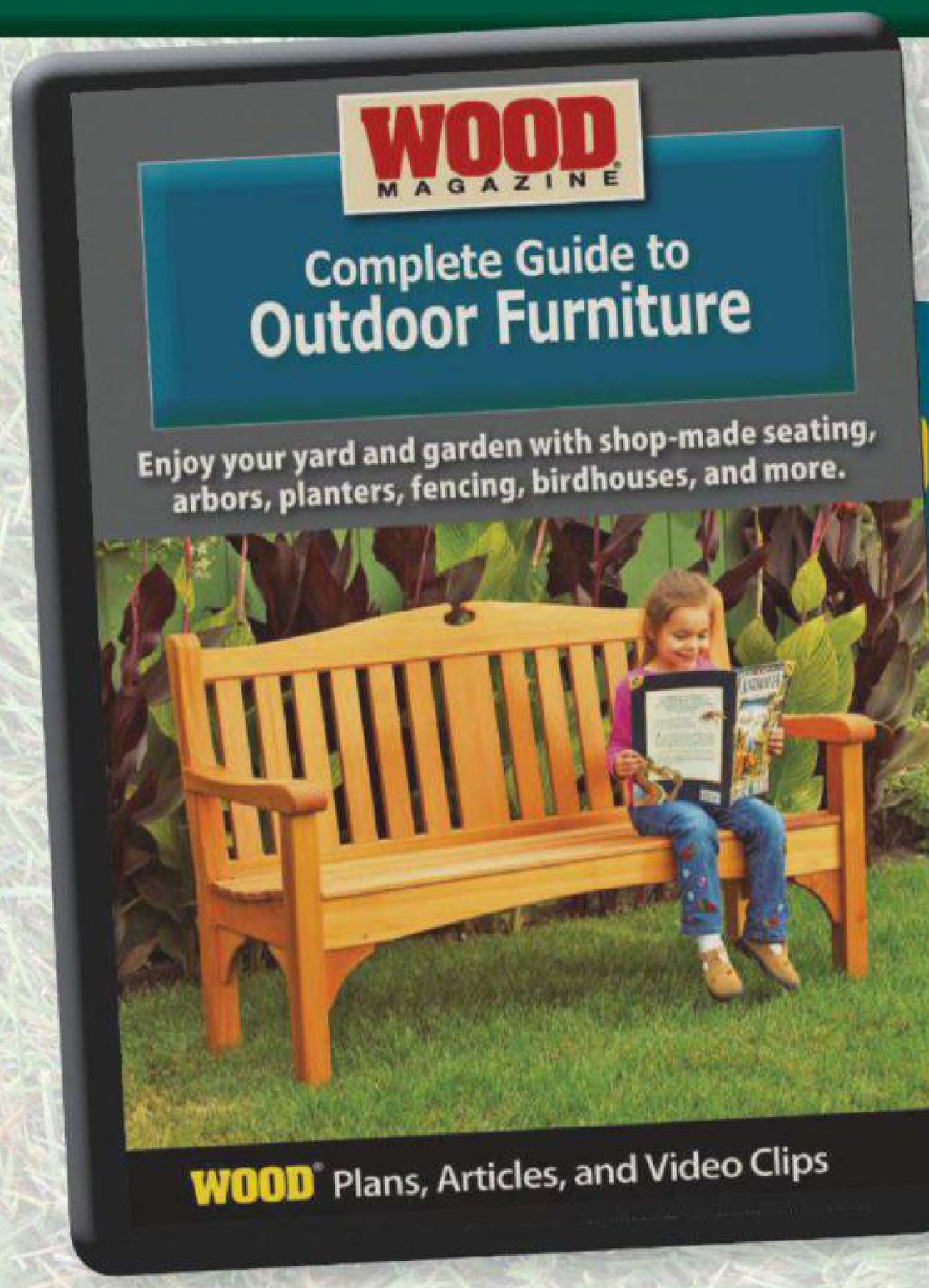
Because Japanese handsaws have thinner blades than Western saws, make the fence about 1½" wide and just as tall to ensure straight cuts without deflection. (Note: A spine along the back of some saws might limit the fence height.) Then, simply cut the guide slots as the original article showed, using mating guide blocks to capture the blade as you cut.





continued on page 70

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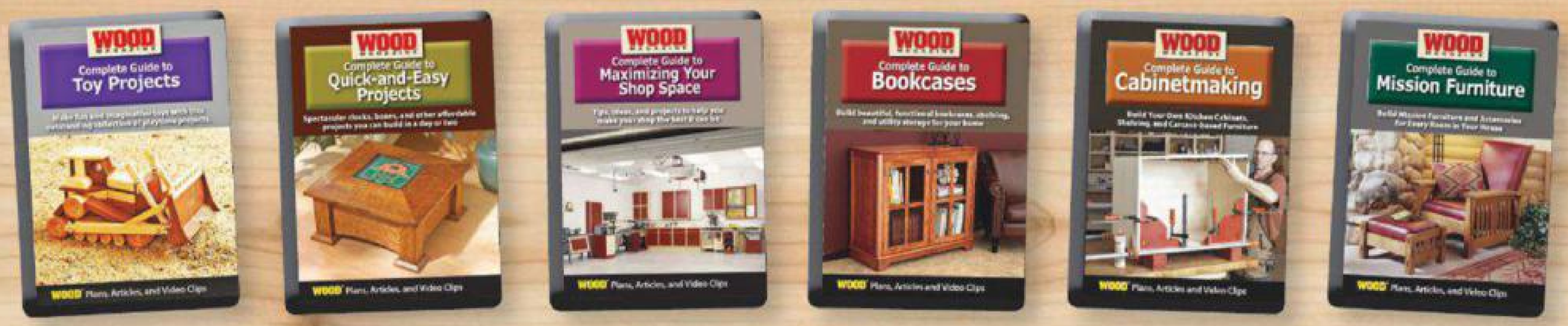






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Ask WOOD

Block blowout without a backer board

I have to drill a large access hole in a cabinet. Unfortunately, my clamps won't reach to secure a backer board. How do I prevent the plywood from blowing out?

—David Wise, Fresno, Calif.

A If you can't clamp on a backer board, David, instead create two clean fronts by drilling from both directions using a starter hole to guide you, as shown *below.*



First, mark and drill a small pilot hole in the desired location. Don't worry about backside blowout, here. It will vanish when you drill the larger hole.



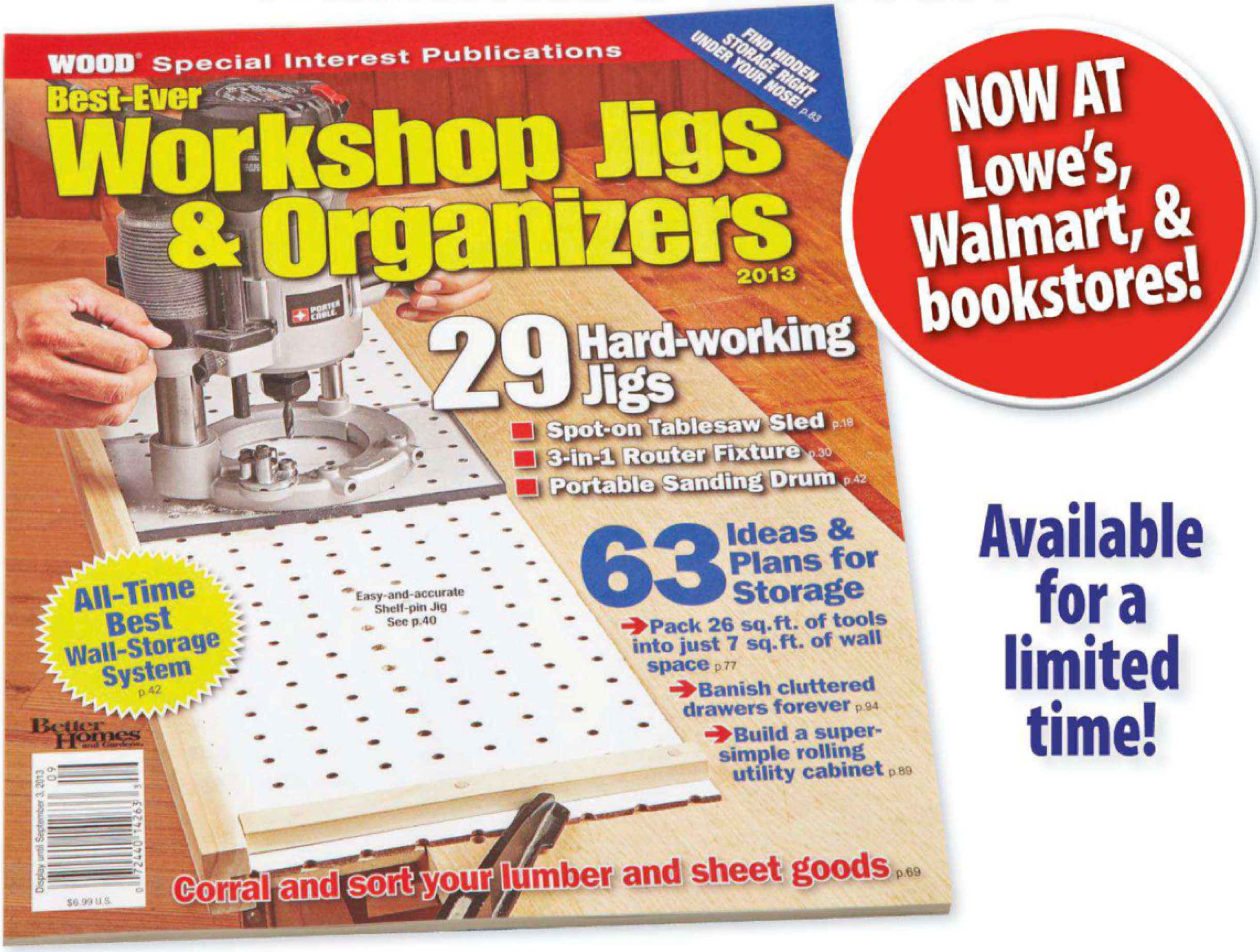
For the large hole, choose a bit with a spur, such as a Forstner bit. Drill about halfway through the plywood. The pilot hole guides the spur.



Finally, use the pilot hole to drill from the other direction, easing your feed rate as you complete the hole.

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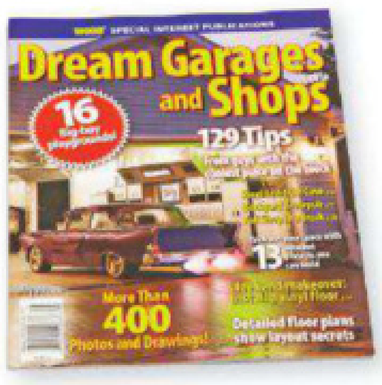


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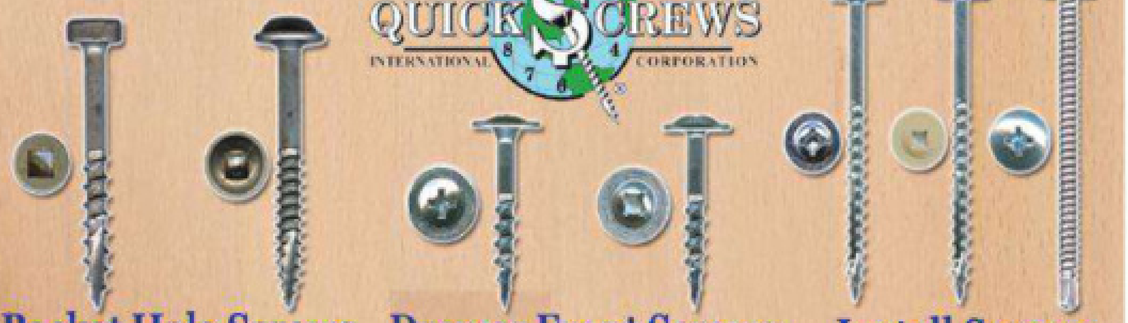


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We test hundreds of tools and accessories, but only those that earn at least three stars for performance make the final cut and appear in this section. The products shown here, and those that don't make the cut, are also reviewed at toolreviews.woodmagazine.com. Prices shown are current at the time of article production and do not include shipping, where applicable.

Vacuum gobbles dust and seals it away

It's easy to suck up dust from big, stationary machines using a powerful collector, but not always so easy to capture the fine dust and debris created by portable power tools, such as a sander, router, or circular saw. DeWalt's DWV012 10-gallon wet/dry shop vacuum solved that problem in my shop. This vacuum has enough suction to keep up with those tools, while capturing even the finest dust in the included prefiltering felt bag. It also has HEPA filters to trap dust particles as fine as .3 micron that escape the bag—but even after sanding mahogany I couldn't find any sign of it on the white filters. Impressive.

A tool-actuated switch turns the vac on and off with the tool, and the motor runs so quietly, I couldn't hear it over the tool's noise. However, every 30 seconds the built-in filter cleaner pulses, and that noise can be annoying. Other great features: variable suction, a 1¼"×15' hose, easy-rolling casters (lockable in the front), and a telescoping handle for easy storage and transport.

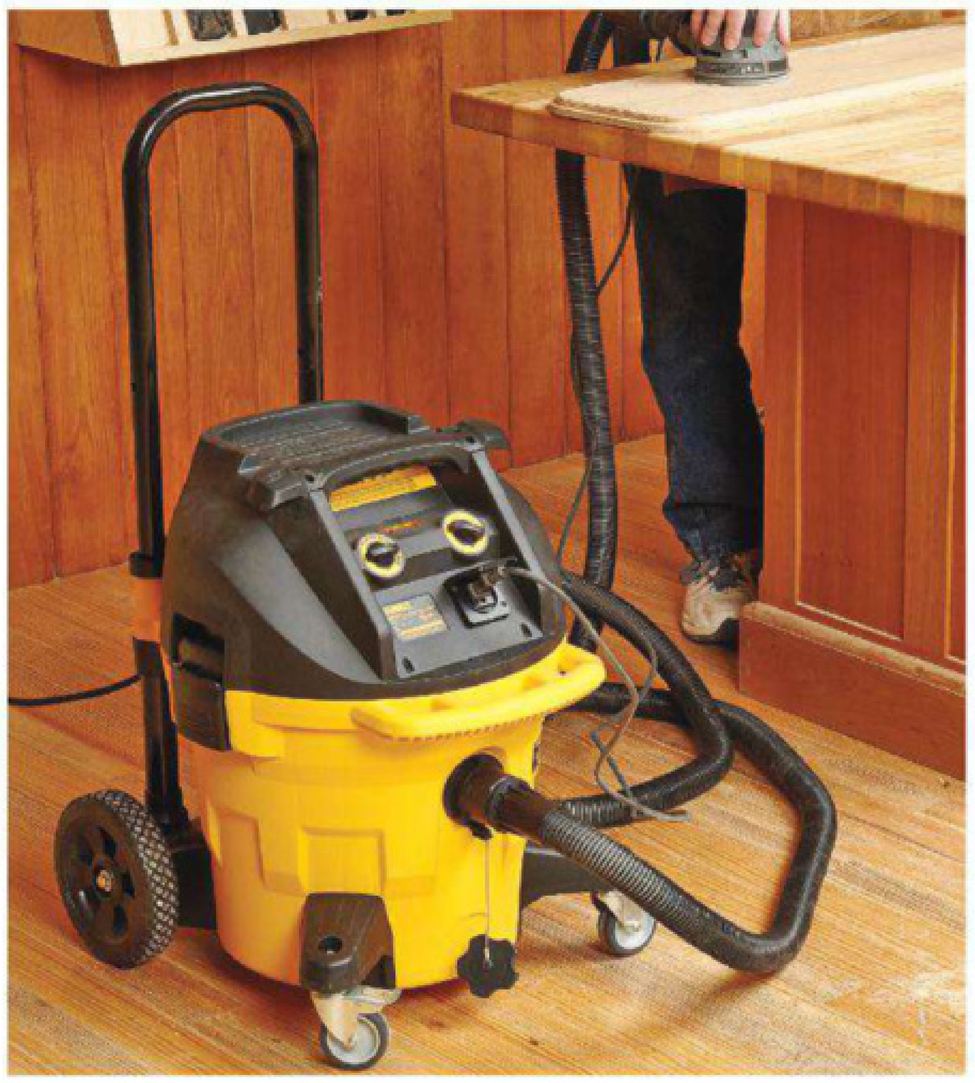


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The bargain heavyweight

Grizzly G0725, $235
800-523-4777, grizzly.com

So long as we took 1/16" or shallower cuts and used a steady feed rate, the G0725 produced surfaces free of chatter marks and tear-out. The two straight knives adjust easily by loosening the gib screws and rotating the jackscrews. The cast-iron body on this 95-lb machine virtually eliminated vibration, and when we jointed 6'-long boards, that heft kept it from tipping, even without being clamped or bolted down. A nice little perk: The G0725 comes with a huge chip-collection bag that empties easily.



The cutting-edge middleweight

Steel City 40610CH, $300
888-304-8840, steelcitytoolworks.com

The 40610CH boasts a feature not found on any other jointer in this class: a segmented insert cutterhead (*inset*). The replaceable high-speed-steel inserts—each with two cutting edges—can be rotated to a fresh edge should one get nicked. We found its cut quality good if we limited cuts to less than 1/8" deep. The quietest among these units, it lacks the high-pitched whine common to many universal motors. With a cast-iron table and aluminum fence, the 40610CH weighs 50 lbs.



The powerful lightweight

Porter-Cable PC160JT, $250
888-678-7278, portercable.com

The PC160JT had plenty of power to face-joint 6"-wide hard maple. Its two straight knives adjust easily with a simple lock and jackscrew leveling system: Loosen the blade a little, then turn the screws to adjust the height up or down. The aluminum bed and fence make this 35-lb tool easy to stow and carry, but we had to clamp it to a benchtop to prevent tipping when jointing boards longer than 4'. Although it has a variable-speed motor, we never found a good reason to run it slower than the highest speed.

 continued on page 76

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Shop Proven Products

Dry-fire lockout protects pinner and your wood

I love a pin nailer for securing boards and trim because the tiny pins leave almost no visible holes in the wood, especially in coarse-grain species such as oak, ash, or mahogany. And Bosch's pinner does something that few can: It stops firing when out of pins. This dry-fire lockout prevents damage to the driving mechanism and keeps you from poking empty holes in your projects. To warn you when the pins are getting low in the gun, a red indicator shows in its view window.

The FNS138-23 punches pins from ½" to 1⅜" long, and uses all brands of fasteners. (Despite making a full line of pneumatic nailers and staplers, Bosch does not make fasteners.)



—Tested by Dave Campbell, Editorial Content Chief



23-gauge pin nailer, #FNS138-23

Performance	★★★★★
Price	$160

Bosch
877-267-2499; boschtools.com

A cool breeze always at the ready, anywhere

Although not a hard-core woodworking tool, this Ryobi fan proves handy and effective at keeping you cool, especially when an AC-powered fan isn't practical. During the blisteringly hot summer, I used this fan in my shop, moving it between machines and my workbench. I even used it in the attic while making a repair, and it made the sweltering heat tolerable.

Powered by an 18-volt Ryobi One-Plus battery—lithium-ion or nickel-cadmium—the P3310 runs for nearly 10 hours on a 3-amp-hour battery pack and about half that with a 1.5-amp-hour pack. It also has two speed settings. The fan rests on its battery pack and tilts to suit your situation; it also has a hook for hanging.



—Tested by Bob Hunter, Tools Editor



18-Volt portable fan, #P3310

Performance	★★★★★
Price	$30

Ryobi
800-525-2579; ryobitools.com

Steel-frame bandsaw loaded with useful features

I like 14" bandsaws because they provide a good combination of curve-cutting and resawing (ripping on edge) capabilities. The steel-frame General International 90-170B does a great job cutting curves down to a ¼" radius. And, out of the box, you can resaw up to 12" with no need to install a riser block (as you'd do on a C-frame bandsaw). I had to feed hard species (oak, ash, hickory) slowly, though, when resawing to avoid tripping the saw's protective internal overload switch.

I like the foot-pedal brake for stopping the blade quickly, because the cast-iron wheels coast nearly 30 seconds before stopping. The rip fence has scales left and right of the blade; the seldom-used right-side scale helps greatly when ripping with the table tilted. You also get a 3½"-tall resaw pivot extension that attaches to the fence. A quick-release tension lever makes for easy blade changes. But I had to run ¼" blades on the front half of both wheels to keep the teeth from catching on the ball-bearing blade guides.



—Tested by Bob Saunders

14" bandsaw (90-170B M1)

Performance	★★★☆☆
Price	$1,595

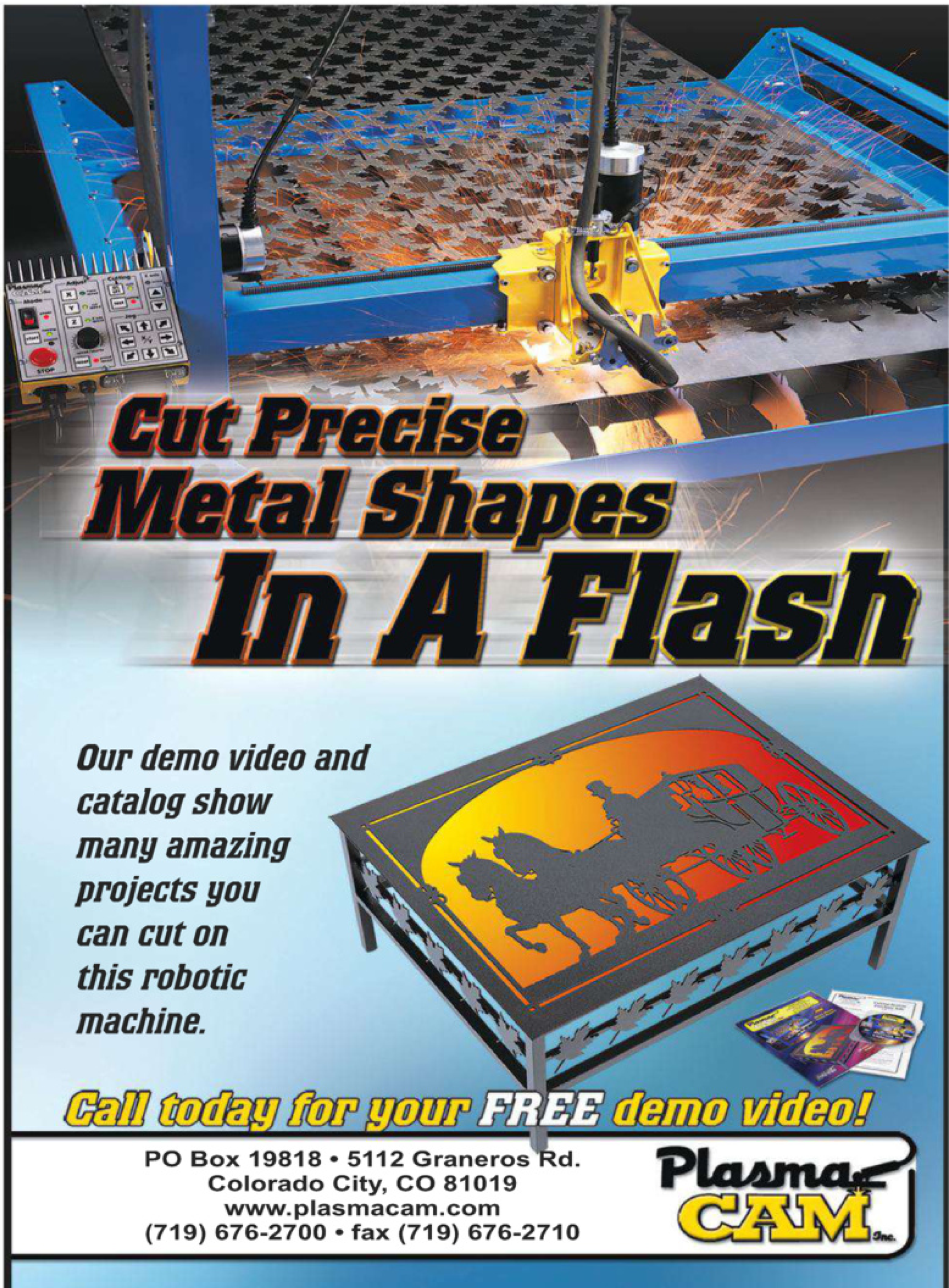
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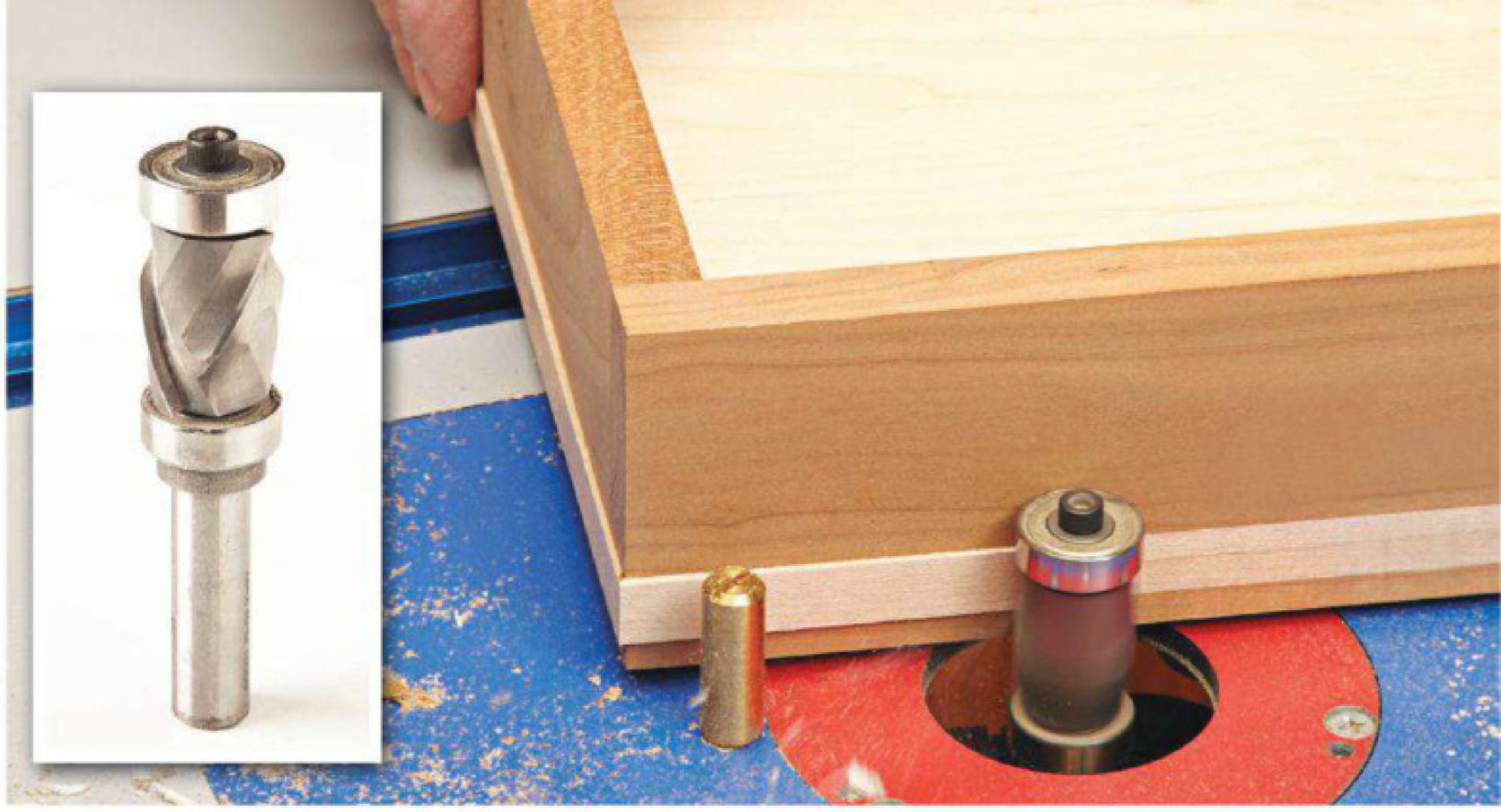


Shop Proven Products

Oversize spiral bits eliminate flush-trimming tear-out

In my shop, flush-trim router bits see lots of action. They get called on to rout rough-cut curved workpieces to identically match a template, trim inlays or solid-wood plywood edging flush, and make proud box joints and dovetails flush. But the small diameter of most trim bits can tear out wood fibers occasionally. The ⅞" diameter of Whiteside's solid-carbide Ultimate Trim Bits creates a shallower shear angle than ½" bits, netting a cleaner cut. It also allows Whiteside to install a bearing above the cutters on its pattern bit without reducing the ½" shank—the first bit to do this—maintaining maximum strength and preventing chatter.

These compression-spiral bits use upward and downward cutting angles to simultaneously rout edges from the top and bottom faces toward the middle, eliminating tear-out.



I trimmed numerous edges with these bits, from proud dovetails and box joints to plywood edging to curvy shelf brackets, and never once suffered grain tear-out. Whiteside offers these bits in three configurations, but if you can buy just one, get the combination bit with both top and bottom bearings.

—Tested by Bob Hunter, Tools Editor



Solid-carbide Ultimate Trim Bits

Performance ★★★★★

Bottom-bearing flush-trim bit (UDFT9112) $140
Top-bearing pattern bit (UDP9112) $150
Double-bearing combination bit (UDC9112) $150

Whiteside Machine Co.
800-225-3982; whitesiderouterbits.com

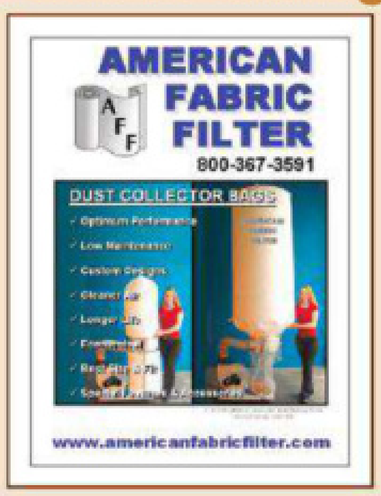
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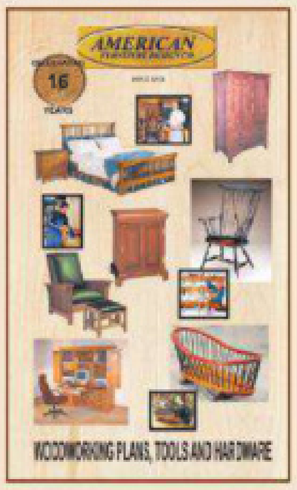
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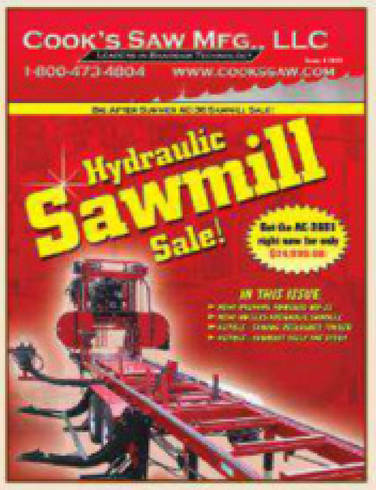
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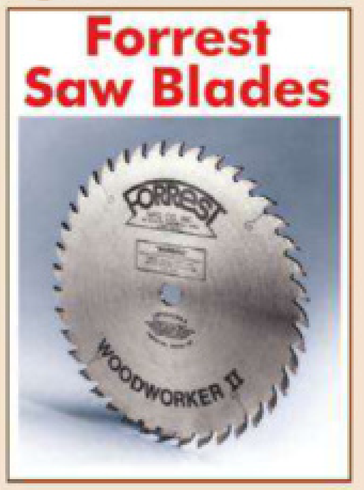
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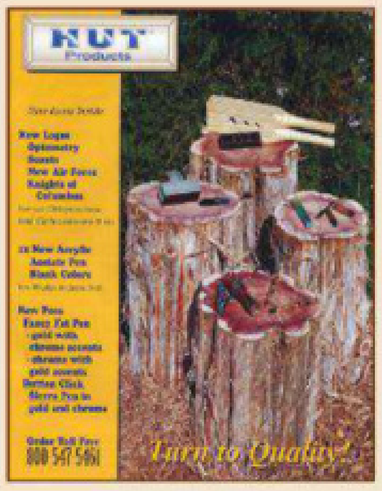
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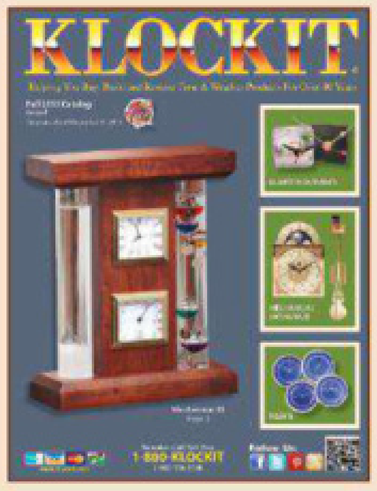
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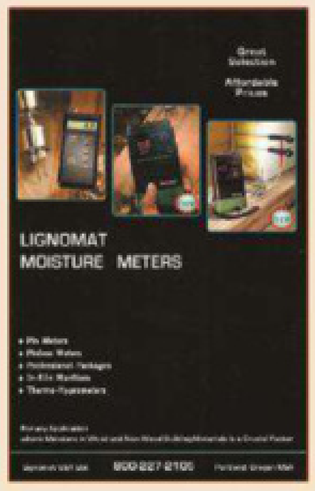
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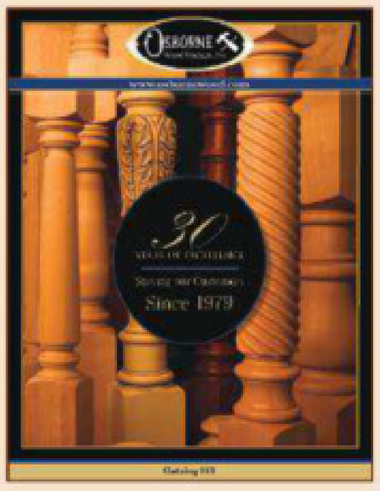
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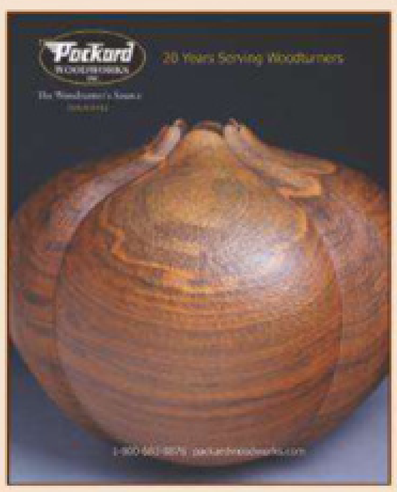
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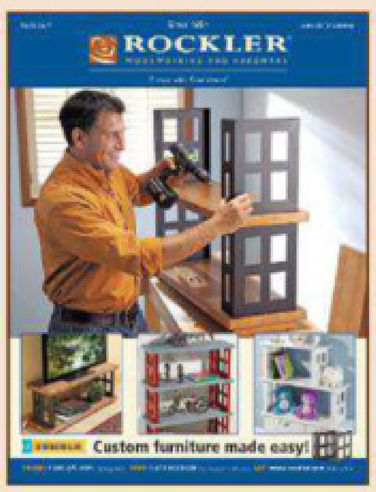
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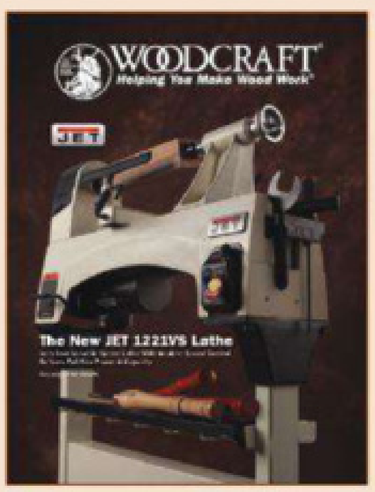
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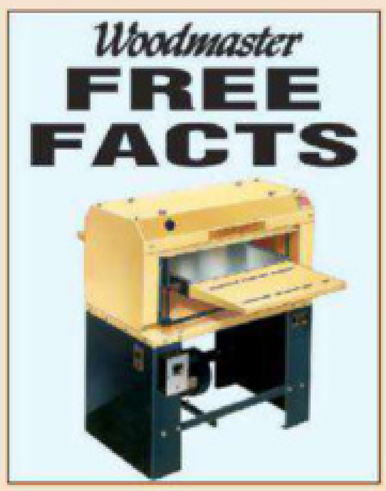
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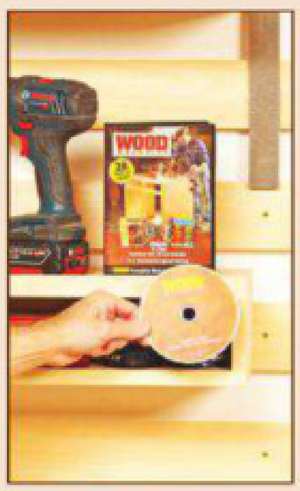
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Shop Proven Products

Slide over for big capacities and accurate cuts

Ridgid's newest mitersaw, a 12" dual-beveling slider, is a solidly built brute that should stand up just fine to years of use. But it's also a precision saw capable of delivering furniture-quality cuts—when outfitted with an 80-tooth or higher blade. (The included 60-tooth blade is better suited to cutting construction and decking materials where cut quality proves less important.)

I like being able to crosscut 13½"-wide boards without flipping them and making two cuts, as I had to do in the past with my standard compound mitersaw. The MS1290LZA miters 61° left and right, and bevels up to 47° each side. Those capacities prove helpful when making cuts to compensate for out-of-square corners.

Still, this large saw weighs 70 lbs, and can be awkward for one person to carry. And the line projected by the arbor-mounted laser changes position with different workpiece thicknesses and as you bring the saw head down to cut. I found it more frustrating than helpful.

—Tested by Bill Krier



12" Sliding compound mitersaw (MS1290LZA)

Performance	★★★★½
Price	$550

Ridgid
866-539-1710; ridgid.com



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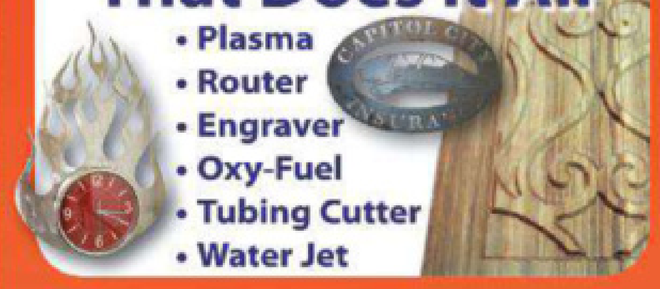
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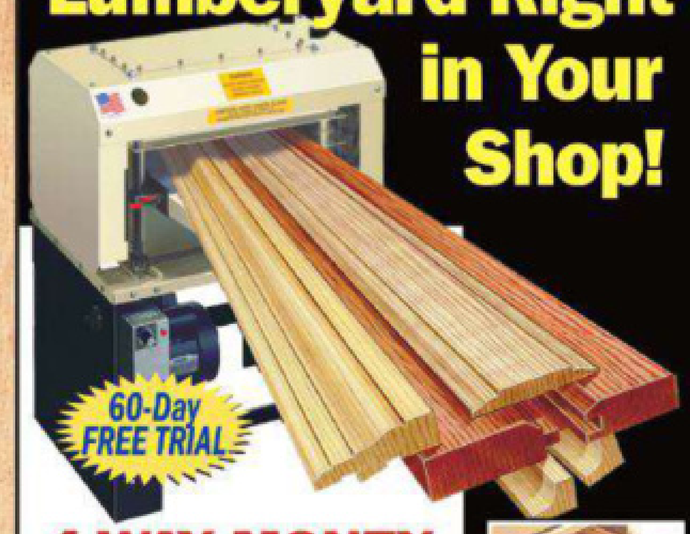
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What's Ahead

A glimpse inside the October issue (on sale August 20)



Frame-and-panel blanket chest

The final installment in our handsome five-piece bedroom set complements the lingerie dresser on *page 36* and its companion pieces.



Tools for easier cabinetmaking

Before you build your next case or cabinet, check out these 11 helpful tools and accessories that speed the process.

Instant music. Just add kid.

You'll have these musical blocks knocked out in nothing flat. And your favorite kid will be tap-tap-tapping out tones for a long time.





Elegant accent table

Looking for something eye-catching, but classic, to add to your home's decor? This English Arts and Crafts-style accent table delivers. The best part: It's easier to build than you might think.



Workbench with wall storage

Build this simple and effective worksurface and tool organizer with materials from the home center.

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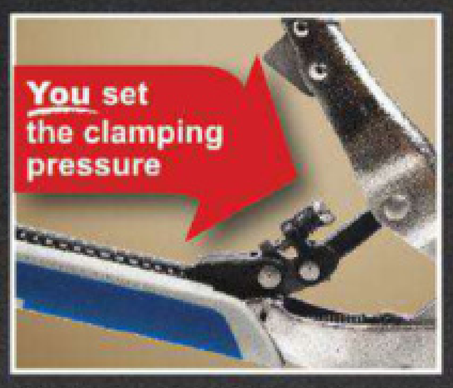
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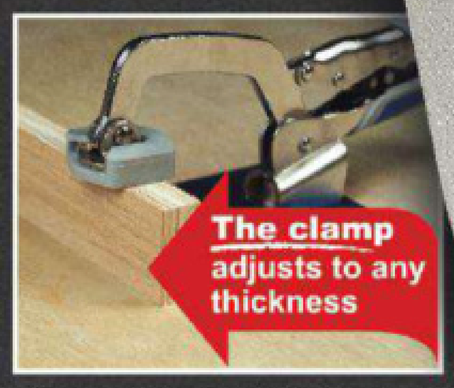
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