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ISSUE 296 JULY 2024

WOOD®

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WHAT TO HOW TO WHY

ONCE YOU UNDERSTAND *WHY*, YOU'RE THE MASTER OF *HOW* AND *WHAT*.

It takes only a microsecond for a social-media algorithm to pop a 30-second jump-cut-laden video into your feed showing you how easy it is to get a traditional breadboard-capped, harvest-table look by slathering glue along end grain and slapping on a perpendicular strip of wood. But in the span of about a year, that table will work ponderously through its expansion/contraction cycle, and changes in seasonal humidity will catastrophically split the tabletop. In that microsecond when you discover the wood failure, the instant digital gratification transforms into expensive, hard-won experience.

Let's call it the *What to How to Why* cycle. You knew *What* you wanted. You thought you were learning *How* to do it. Now you need to know *Why* this disaster happened so you can avoid it in the future.

True understanding requires all three. But the *Why*–the knowledge that wood expands and contracts more quickly laterally than longitudinally and therefore splits when constrained across the grain–that's the important one. That's the one you can apply to other projects, use to prevent other problems, or even better, pass along as *Hows* that aren't so costly to the next learner.

Packing the *Whys* into the *Whats* and *Hows* isn't the quickest way for us to create content or for you to absorb that knowledge. The three elements can't always be contained by a 30-second social video. So, you won't satisfy your rapid-fire dopamine addiction by "scrolling" through our magazine pages packed with disassembled illustrations and project steps that you have to complete yourself. And after putting weeks into finishing a project, the only "like" you receive might be from the person you gift it to.

All this explains why, whether it's in a *How* article like "Breadboard Ends Done Right" on *page 50*, or a *What* video like the cutting board project build you can view using the link *below*, it is our constant goal to hand you the deep-knowledge *Whys* about things like grain orientation that transcend the current technique or project; and to just maybe make that knowledge a bit less hard-won and expensive for you. After that, you can invert the *What to How to Why* cycle. Because once you understand the *Why*, you know *How* to get out to the shop and build some *Whats*.

So get out to the shop and build some. We'll help.

Lucas

LUCAS PETERS
lucas.peters@woodmagazine.com
@peters.lucas

Watch a video on building a basket-weave end-grain cutting board.
woodmagazine.com/basketweave

◄ The offset in the end of Design Editor John Olson's workbench represents the size the crack would have been last winter had he not allowed for wood movement.

WOOD®
Issue No. 296 | July 2024
Vol. 41, No. 3

To download patterns from this issue, visit *woodmagazine.com/296patterns*

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PLANS

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Build this handsome cherry cupboard to store and display your plates and cutlery.

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Combine your tablesaw miter gauge with some scrapwood for a versatile shooting board.

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This modern picnic table becomes its own centerpiece at your next backyard party.

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The striking appearance of this desk lamp belies its easy-to-build nature. Pick your favorite veneer figure and we'll walk you through applying it to acrylic to cast a warm wood-tinted glow.

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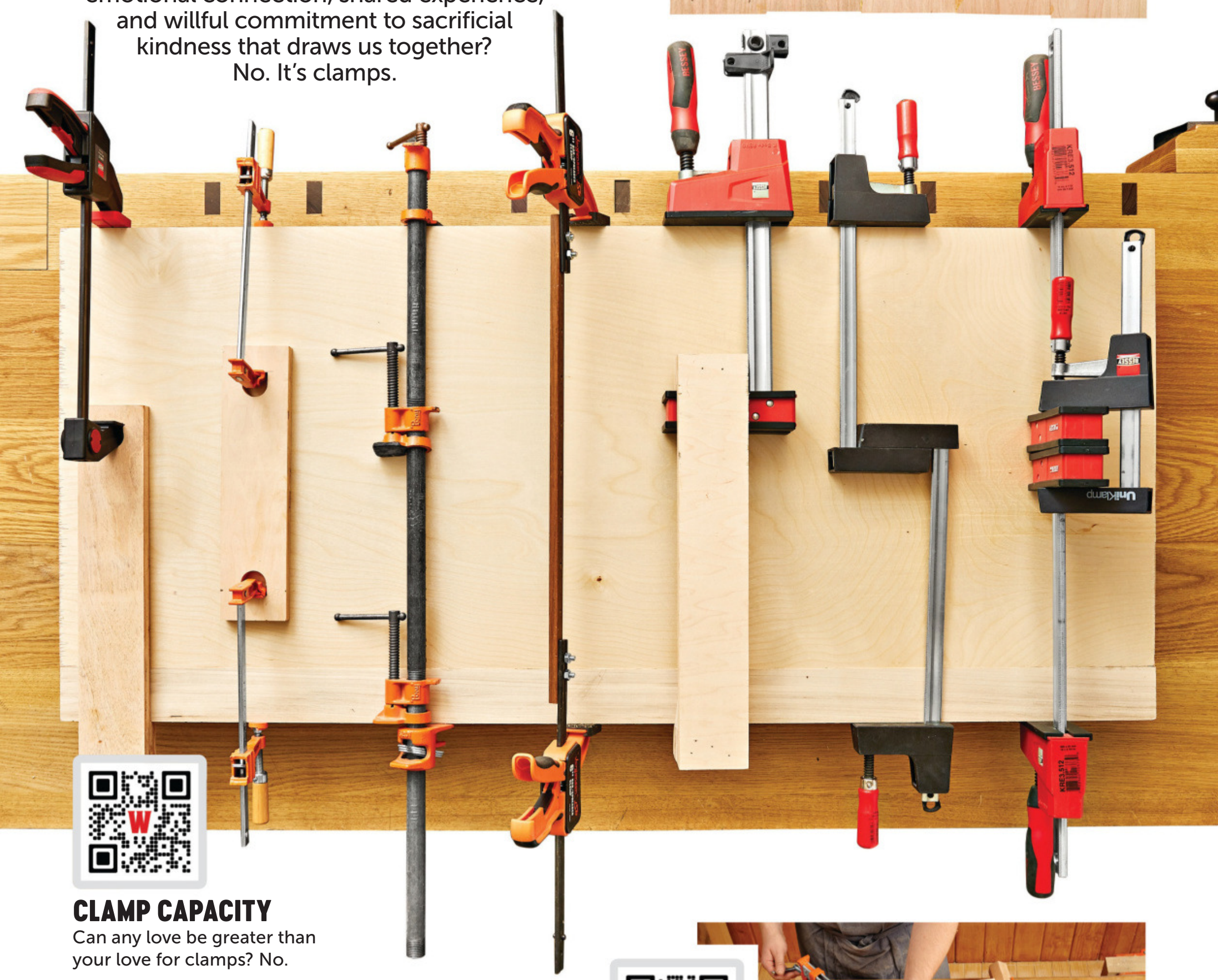
I LOVE CLAMP

What is love? Is it an ineffable combination of brain chemistry, emotional connection, shared experience, and willful commitment to sacrificial kindness that draws us together? No. It's clamps.

CLAMPING PANELS

If you love something, let it go. But if you really love something, glue it up and clamp it tight.

That's what we do in this panel glue-up video walk-through:
woodmagazine.com/clampingpanels



CLAMP CAPACITY

Can any love be greater than your love for clamps? No.

Extend the capacity of your clamps with these tips:
woodmagazine.com/clampcapacity

CLAMP-UP TRICKS

Do your assemblies not always go together like a horse and carriage?

These tricks are the clamp-up matchmakers
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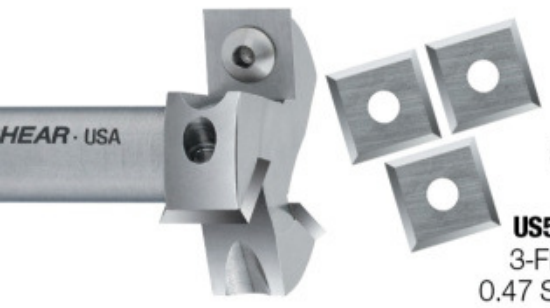

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ALL LAMPED UP

I built the lamp from issue 148 (May 2003) with some modifications, but your plans were essential. I made the post from four pieces of quartersawn cherry joined with lock miters to display the grain on all sides and to create a ⅛" reveal running along each edge. I reinforced the base with splines at each corner and modified the geometry of the mica shade.

Roger Wallace
Okemos, Michigan

Here is my version of the lamp featured in issue 148. I made it from cherry and incorporated rock scavenged from the yard. I had trouble building the shade so I designed the horns you see on top.

William Heil
Rio Rancho, New Mexico

I also made a floor-standing variation of the desk lamp from issue 148. I wanted my floor lamp to show off handmade paper in a six-sided shade, so I called on a geometry-inclined friend to help me alter the jigs for handling the frame. It worked like a charm. I now have five of these lamps in the house.

David Fouts
Gualala, California

AM I OFF MY ROCKER?

I have been making children's rocking chairs from the article in issue 236 (November 2015). I have donated chairs to fundraisers and have given others to family members and friends.

Then I saw the new children's rocker in issue 283 (September 2022). I really liked the curves in the early design and the slats in the seat and back of the new design. So I decided to combine the two designs into one.

Jeff H.
Dodgeville, Wisconsin

TOOLS OR TALENT?

For the past four years, I've been teaching wood shop at our local high school. We teach everything from woodturning to furniture building to luthiery. We have a well-equipped shop in which to work. It is so well equipped that I feel I can eliminate the quality of the tools from the equation as a factor in my students' outcomes. Instead, I've identified four abilities that, when mastered, make much better predictors of woodworking success:

1. The ability to measure and mill accurately.

2. The ability to plan a project's progression.

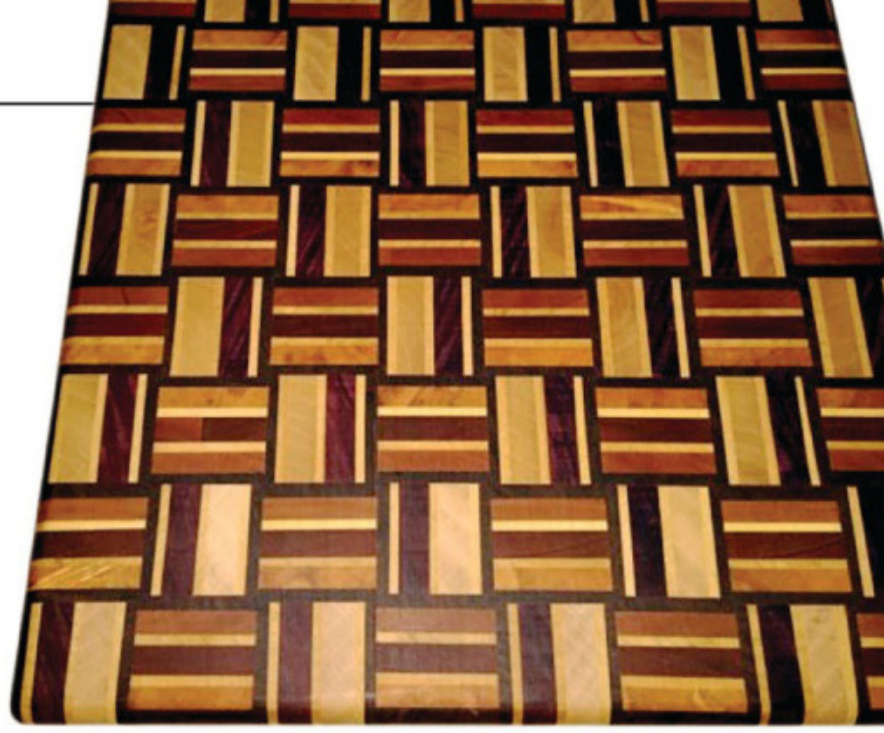
3. The ability to attend to details from materials selection through assembly and finishing.

4. The ability, as well as the motivation, to recognize and correct the inevitable mistakes.

Jim Anderson
via email

Very well said, Jim. Thanks for teaching kids and for keeping your high-school woodworking program going. Whether the kids realize it or not, you're helping them learn about attention to detail, performance management, as well as adapting and overcoming obstacles. All are skills that will serve them well beyond the workshop.

Lucas Peters
Editor-in-Chief



A CUT ABOVE

I made my first edge-grain cutting board following the instructions for the "Basket-Weave Cutting Board" in issue 284 (October 2022). It was a challenge, but my wife is very happy with her new cutting board. Thanks for having such inspirational articles that push us woodworkers to new challenges.

Charles Steinmetz
Corvallis, Oregon

After his daughter bought a 1967 Ford Econoline to promote her flower arrangements at events, **MARK BEACHY** of Sugarcreek, Ohio, built out the cap on the back as a display area. White oak construction and several coats of spar varnish make the rack beautiful and durable.

Kristin Sees, of Irene, South Dakota, had a big surprise for her 25th wedding anniversary. Her husband, **MIKE SEES**, made this table while she was on vacation with friends. Upon her return, she was surprised and elated to see this black walnut lava table in their dining room.

JOSEPH DERSCH of Saint Charles, Missouri, made this soccer ball from oak and walnut for his father, a former soccer coach. Joseph challenged himself to do the required calculations and fine tuning to make the geometry work.

SEND US A PHOTO OF YOUR WORK

Want to see your work showcased in *WOOD*® magazine? Send a high-resolution digital photo of your completed project to ***woodmail@woodmagazine.com.***

Build your own Blacker House bench with built-in storage
woodstore.net/blackerhousebench

Though it took many years to build due to illness, **JIM VANEK** of Chicago, Illinois, finally finished this Blacker House bench. He referenced the version in issue 235 (October 2015) incorporating the back-slat design and the Blacker House indents in the legs, then modified the bench for use outdoors on his covered front porch. He used white oak with ebony accents. Jim omitted a finish in favor of allowing the raw white oak (which is well suited for use outdoors) to develop a natural patina as it weathers.

MARK CORSO of Plant City, Florida, made this tool chest from walnut, curly maple, and butternut. Red cedar makes up the drawers and dividers.

Mark constructed the case with hand-cut dovetails, machine-cut sliding dovetails, and mortise-and-tenon joints. He hand-carved the eagle into the front and painted it with artist oils. He also incorporated a secret compartment and a box inside with a carved eagle talon. Mark finished the tool chest with an oil and urethane blend. He is proud that his project won Best of Show at the Florida State Fair in 2023, judged by furniture maker Frank Strazza.

The handsome shed belies the woodworking haven inside. Its design is a focal point of the landscape, which pleases Ed's wife immensely.

STUDIO? WOOD SHOP? YES!

Don't mistake this backyard shed as a high-end home for garden tools. Instead, you'll find an efficient, well-lit, and comfortable workshop inside.

WRITER: RANDY MAXEY

After serving 27 years in the Navy as an electrical engineer, Ed eventually retired and spends many hours in his "Woodio." He particularly enjoys honing his fine woodworking skills.

Ed Brady wanted to move his shop out of the basement, so he proposed the idea of a backyard-shed shop to his wife, Kathy. She agreed, on two conditions: it had to be cute and it had to include an antique window salvaged from a neighbor's 1930s-vintage house.

Yard space for Ed's shed only allowed for a maximum of 12×12', but Ed didn't build just a square. He designed a 5-sided building that tucks into a corner of the back yard. It features straight 12'-long walls along the back, but in front has three shorter walls, with the angled one showcasing that salvaged antique window.

Ed built the shed himself, only calling in help when lifting the main roof truss and drywall panels. A neighbor did the roofing. During construction, another neighbor commented, "Oh, you're building a studio." When Ed corrected him that it was just a wood shop, his wife suggested they combine the two and call the space his "Woodio." The name stuck and she had the sign made for the entrance.

In his small shop, Ed relies heavily on the space-saving Shopsmith he purchased in 1983. He's used it ever since and doesn't miss having a full-size, dedicated tablesaw. He recently upgraded the headstock and shortened it by 11" to better fit his shop. The Shopsmith powers the bandsaw, drill press, disc sander, jointer, and tablesaw attachments.

A wall-mounted Router Boss 3D router provides precision, three-axis routing capability. Ed uses his tracksaw station often for easier and safer cuts, particularly in sheet goods. Its table does double-duty for project assembly. A benchtop router table tucks underneath and sets up easily when needed.

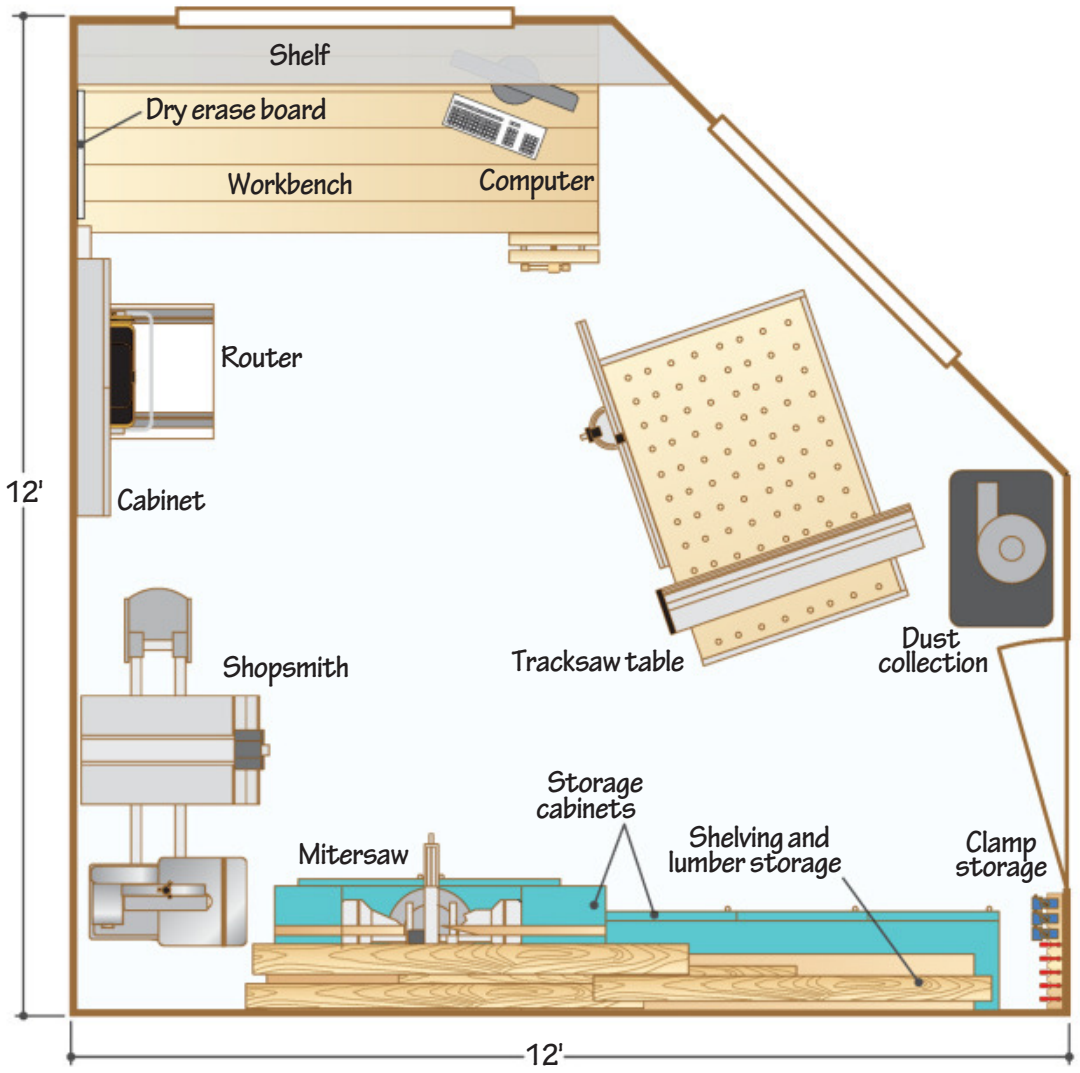
His dad's 1935-vintage, hand-made workbench resides under the small window. Ed says the workbench, cabinet tops, and tracksaw table provide plenty of horizontal surfaces for layout, drawing, and organizing tools.

To fit everything in, Ed uses every remaining square inch of space for storage. He has a surprising number of

PHOTOGRAPHER: EDWARD BRADY
ILLUSTRATORS: ROXANNE LEMOINE, LORNA JOHNSON

SHOW US YOUR SHOP!

Send high-resolution digital photos of your shop to ***woodmail@woodmagazine.com*** and we may showcase it in the magazine!



Ed has made an art out of maximizing space for storage. Large cabinets keep smaller tools, accessories, and supplies out of the way yet readily accessible.

hand and power tools tucked away for making furniture, boxes, display cabinets, and other projects.

WiFi access keeps Ed connected in his woodio for watching how-to videos and doing research. For power, he installed 220V, 30A service underground. With fully insulated walls, 220V baseboard heaters warm the space nicely. A bathroom exhaust fan in the ceiling exhausts fumes when applying finishes.

Most of the equipment is mobile which offers flexibility during the build process. But Ed's small shop admittedly presents some challenges. "What makes it interesting is the extra mental effort to consider each step in the process of building," he says. Thinking ahead is most important to ensure he'll have access to the correct tool or machine when needed. For example, after setting up the Shopsmith for sawing, it's important to finish all the cuts before changing the tool setup for use as a drill press.

Another lesson Ed learned is that it is imperative to keep things clean and to put away tools when finished. "This may sound arduous, but for me it is another part of my hobby."

Ed says, "I love my Woodio. I love the organization of it and all the natural light that pours in. It's a place where I like to be–moving slowly and carefully–while enjoying all the elements of the work."

"I LOVE MY WOODIO. I LOVE THE ORGANIZATION OF IT AND ALL THE NATURAL LIGHT THAT POURS IN. IT'S A PLACE WHERE I LIKE TO BE–MOVING SLOWLY AND CAREFULLY–WHILE ENJOYING ALL THE ELEMENTS OF THE WORK."

The mitersaw station and Shopsmith, with all its accessories, get plenty of use in Ed's shop. He has learned to adapt to their strengths and limitations to produce quality work.

Ed had a few choice words to say about the difficulty in constructing the ceiling in his shop. The LED fixtures augment the natural light coming in through the large windows.

A vintage window forms the centerpiece of the shop from the inside and out. The tracksaw table and compact dust collector reside just inside the door.

Tucked under a window, the workbench made by Ed's dad provides a comfortable work area. The Router Boss sees a lot of use but takes up only a little space.

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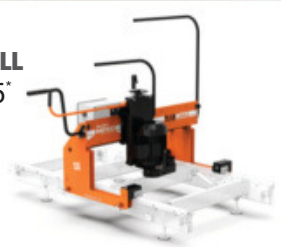

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Q: ROUTER LIFT VS. THROUGH-BASE ADJUSTMENT

I'm considering upgrading my router table by adding a router lift, but the price of even a basic lift is a stretch for my budget. I've been looking instead at routers that have a built-in height adjustment mechanism that you can access through the top of the router table. Is this a viable alternative to a router lift?

Brent Claxton
Santa Fe, New Mexico

A: Adding a router lift to your router table is a huge upgrade not only in convenience, but in accuracy and safety as well, Brent. Most lifts feature a precision screw mechanism that raises and lowers the router on a pair of columns. Combined with a dial scale, this mechanism allows you to make precise adjustments to the bit height in fine increments. You can also lock the height of the router as well as make bit changes, all from above the table. Because you no longer have a reason to be fumbling under the table to make adjustments, you don't have to worry about accidentally hitting the power switch and starting the router inadvertently.

As an alternative to a router lift, many manufacturers offer plunge routers that feature through-the-base height adjustment. With this setup, you simply drill an access hole in the top of your router table for a crank that raises and lowers your router via a leadscrew. This offers many of the advantages of a router lift, but there are some trade-offs. The first of these has to do with precision.

Through-the-base adjusters are often coarser and may have more backlash in the mechanism than router lifts. And typically the scale to indicate the bit height is not visible above the table. When you do get the bit adjusted to where you want it, you'll still have to reach under the table to lock the height. And this may cause the bit to move up or down slightly, making precise adjustments more difficult.

Depending on your router, bit changes can be difficult with a through-the-base router table. Some routers can't raise the collet high enough to make bit changes above the table, so you're forced to wrestle with wrenches from below or lift the entire router and insert out of the table to change bits. (A pair of offset wrenches can solve this problem.)

Speaking of bit changes, if the leadscrew of your through-the-base adjuster is finely-threaded, raising the router from its lowest point to its highest will require an arm-numbing number of turns. In contrast, many router lifts have a quick-adjust mechanism in addition to the fine-adjustment screw.

Where through-the-base adjusters really shine is in terms of price. Because the adjuster is built in to the router, you don't have to make any further investment. In contrast, even the lowest-price router lifts are over $200 and they can quickly climb to $500. And this doesn't include the router.

Ultimately, the decision comes down to how often and for what purposes you use your router table. For simple edge profiles and basic operations, a through-the-base system will probably do everything you need it to. But if you routinely use your router for joinery and precision work, it's worth saving up for a dedicated router lift.

Have a question? Drop us an e-mail.
askwood@woodmagazine.com

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— Robert F., Richardson, TX

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TOP SHOP TIP

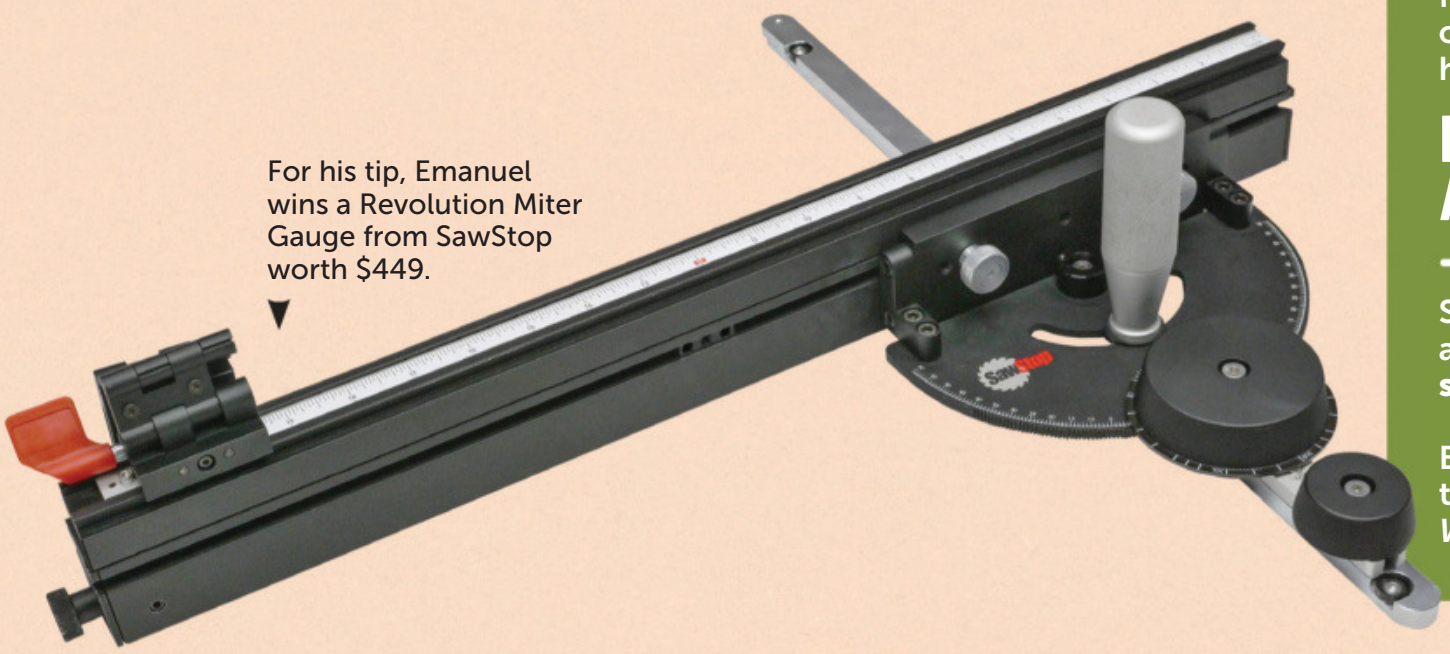
GET A GRIP!

To accurately place slots for biscuit joinery in the edge of a workpiece, I like to apply plenty of downward pressure on the joiner fence. Unfortunately, the stock handle on the biscuit joiner isn't ideally located for this.

That's why I fashioned a removable auxiliary handle that fits on top of the fence, allowing me to apply more downward and forward pressure precisely where the cutter enters the workpiece when cutting slots.

My biscuit joiner has an opening in the fence, so I shaped a key at the bottom of the handle to fit snugly in it. Screws secure the key to a shaped handle and base that overlaps the opening.

Emanuel Ringel
Ambler, Pennsylvania



For his tip, Emanuel wins a Revolution Miter Gauge from SawStop worth $449.

TIPS EARN UP TO $150.

If your tip is the best submission of the issue, it wins Top Shop Tip honors, and you receive a

PRIZE PACKAGE WORTH AT LEAST $300.

Send your tip, photos or drawings, and contact info to **shoptips@woodmagazine.com**

Because we try to publish original tips, please send yours only to *WOOD*® magazine.

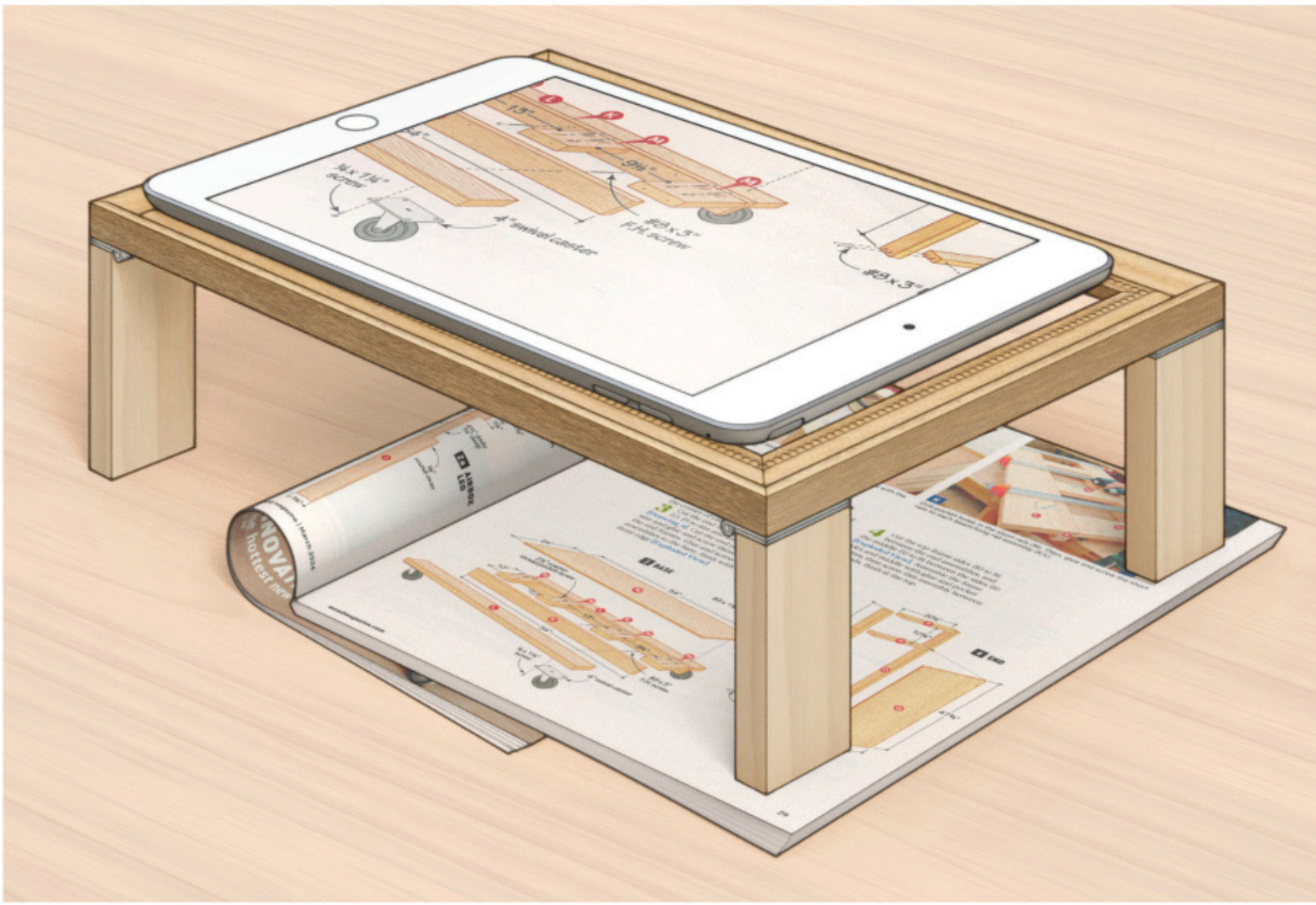
ILLUSTRATOR: CHRISTOPHER MILLS

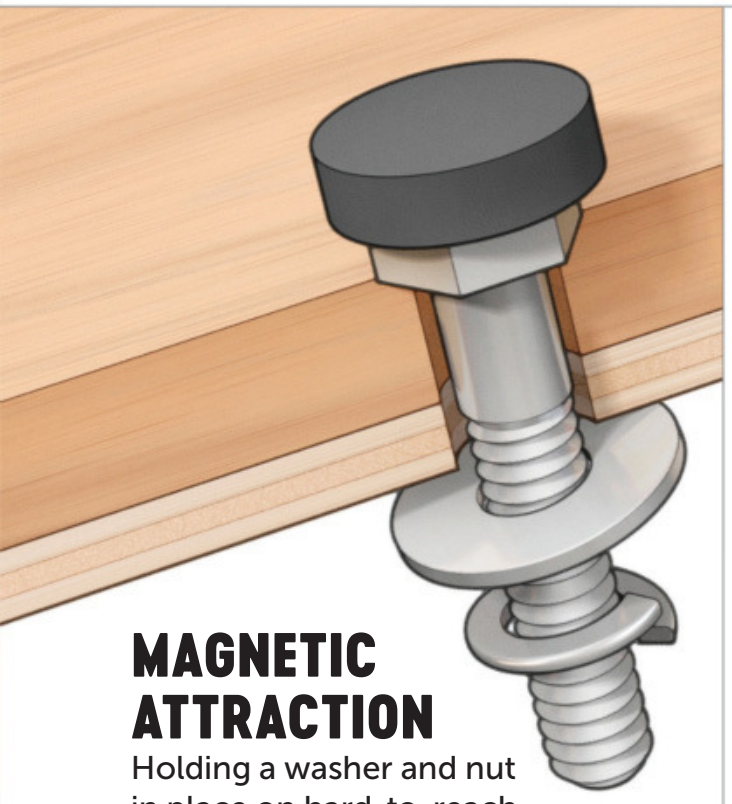
DIGITAL MAGNIFICATION

Wanting a better way to see fine details in magazine project plans, I fashioned a stand for my tablet from an old picture frame, wood scraps for the legs, and hinges. The hinges allow the legs to fold up for easier storage.

Placing the tablet on the stand above the magazine with the camera app open, I can zoom in as much as I need to see all the details.

Laura Taylor
Goddard, Kansas





MAGNETIC ATTRACTION

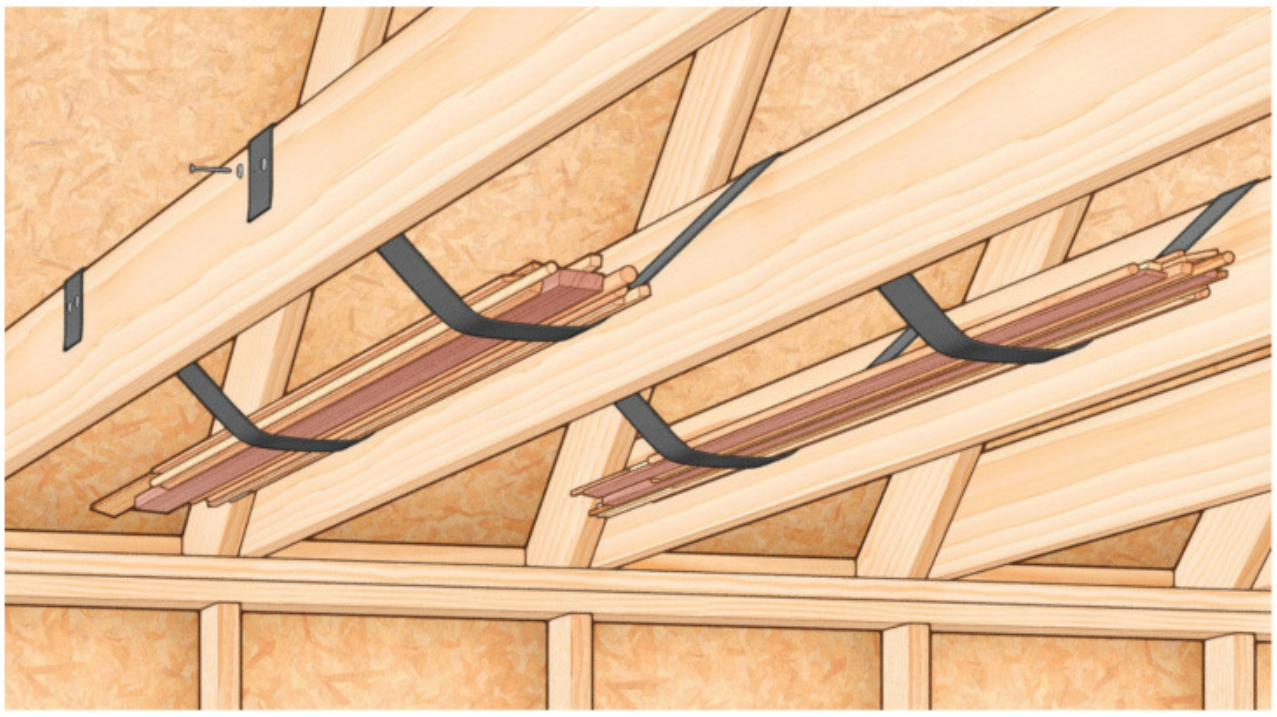
Holding a washer and nut in place on hard-to-reach bolts can be challenging. They often fall off as you try to start them. My solution is to snap a magnet to the head of the bolt. This helps hold the washers and nut in place as you get them started.

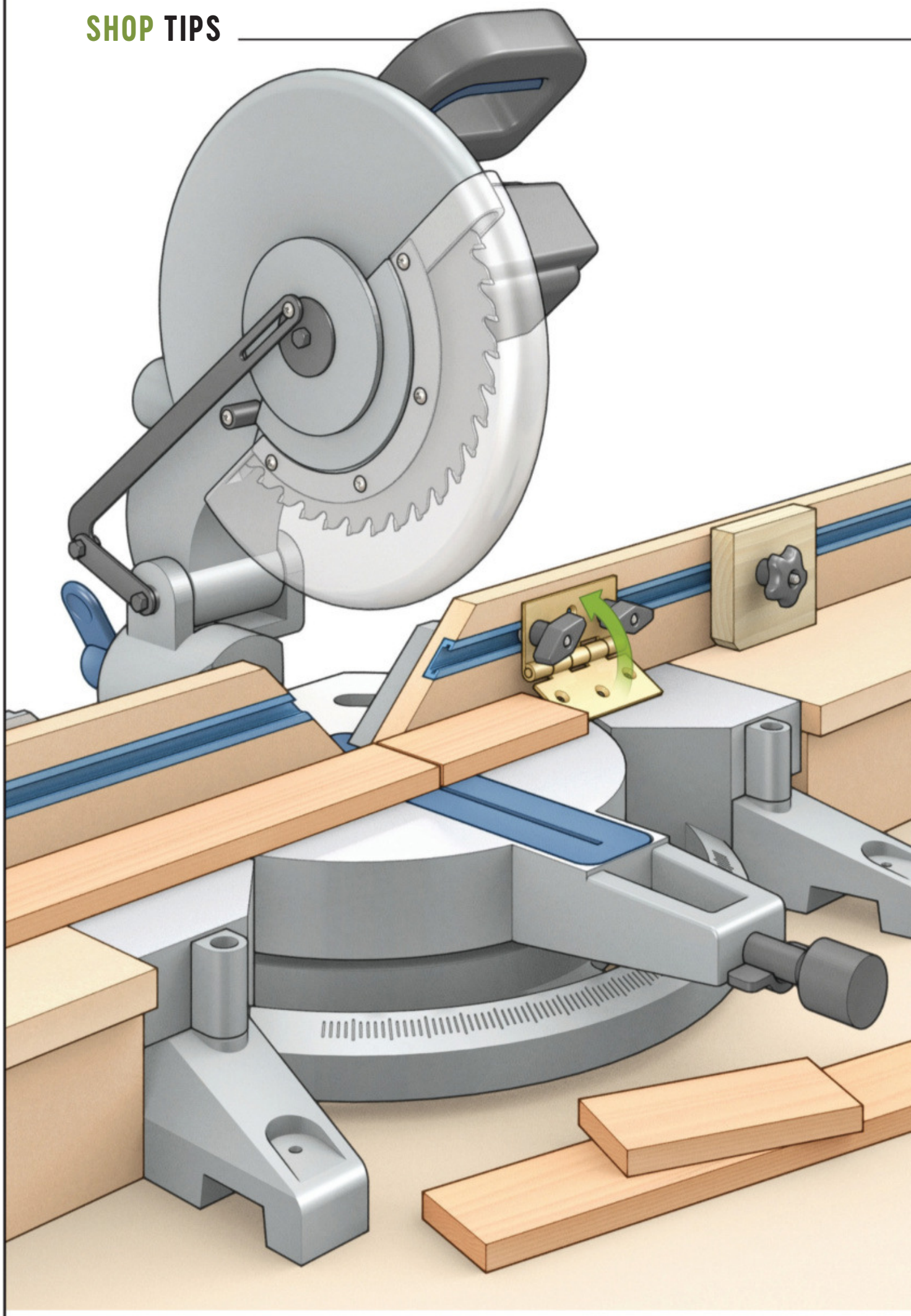
John Younger
Ashburn, Virginia

AN UNTANGLED WEB

In my never-ending quest for more storage space, I realized my ceiling was an untapped resource. Using 2"-wide nylon webbing fastened across the ceiling joists, I created an abundance of storage for cutoffs and other items. Screws with washers fasten the webbing to the joists, with hammock-like slack that creates more space. In my open-ceiling garage, I can still store other items on top of the joists, as well.

Bob Doublebower
Hilliard, Ohio





THOSE FLIPPIN' STOPS!

I outfitted my shop-made mitersaw fence with T-track and an adjustable stop, but wanted a way to add a flip stop to lock in shorter settings as I cut box sides. Reaching into my hardware bin, I found a large door hinge and spare T-knobs to mount it to the track. It locks in tight for short cuts, then flips out of the way for longer cuts without setup changes.

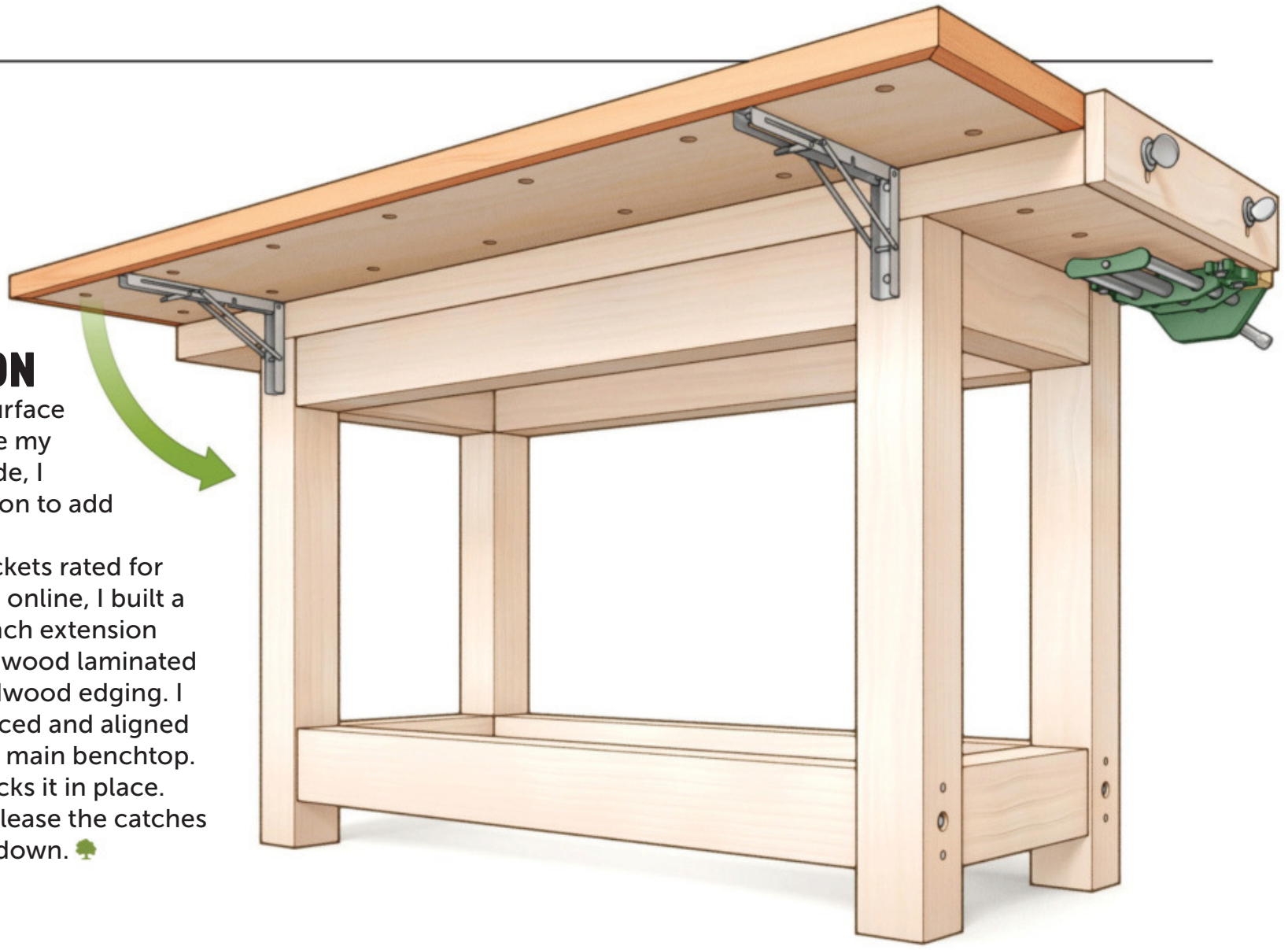
Joe Eide
Eau Claire, Wisconsin

SURFACE TENSION

I often need more worksurface in my small shop. Because my workbench is only 23" wide, I installed a folding extension to add surface area.

Using folding shelf brackets rated for 500 pounds and available online, I built a 12"-wide folding workbench extension using two layers of ¾" plywood laminated together then added hardwood edging. I also drilled dog holes spaced and aligned to work with those on my main benchtop.

Lifting the extension locks it in place. When it's not needed, I release the catches on the brackets to fold it down.



Curtis Clark
Elk Grove, California

OVERALL DIMENSIONS
64½"W x 19¾"D x 37½"H

CLASSIC CHERRY SIDEBOARD

A plywood carcase provides a quick-to-build foundation for the dovetailed drawers and mortise-and-tenon doors.

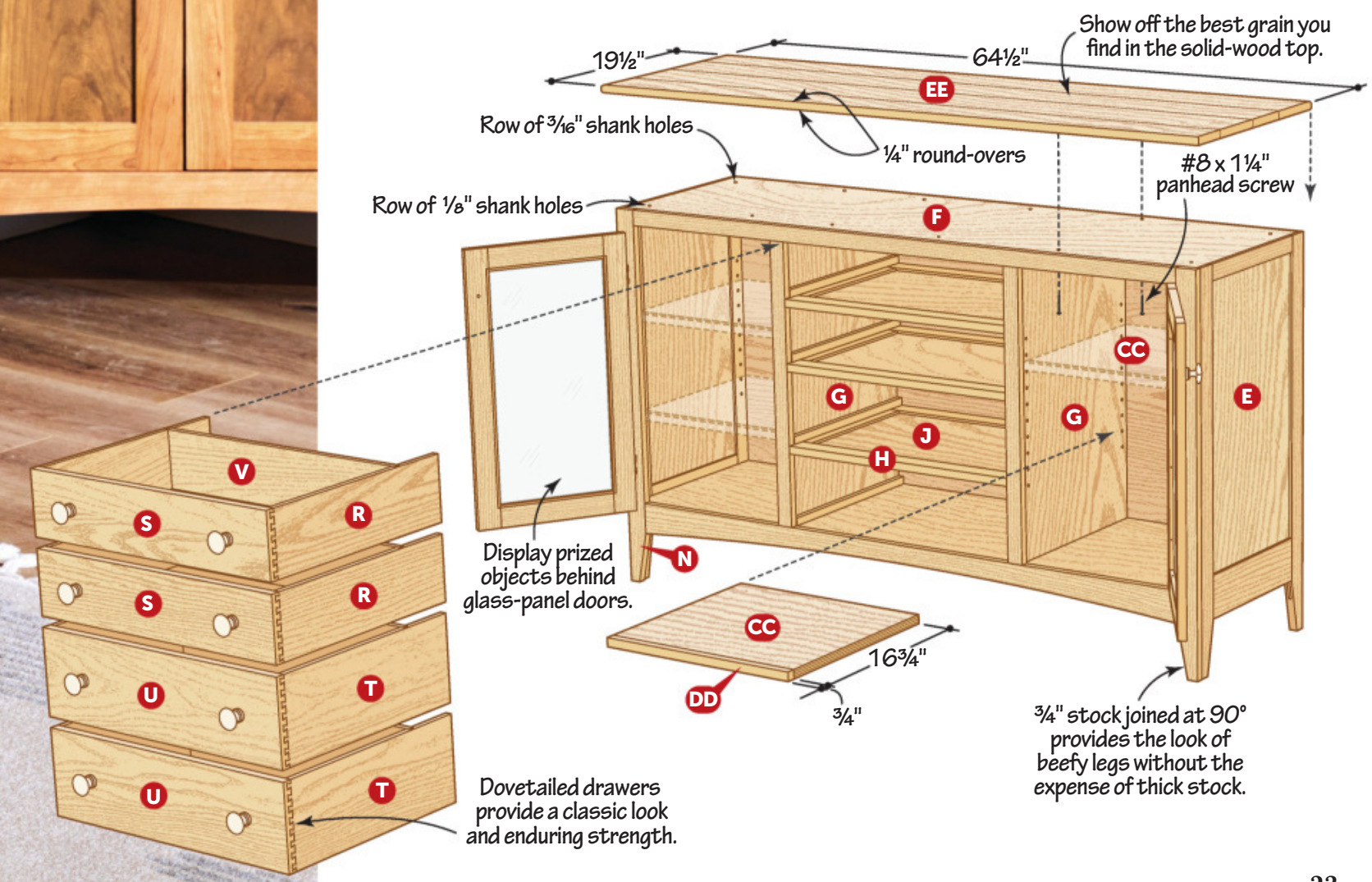
WRITER: CRAIG RUEGSEGGER
DESIGNER: KEVIN BOYLE
BUILDER: BRIAN BERGSTROM

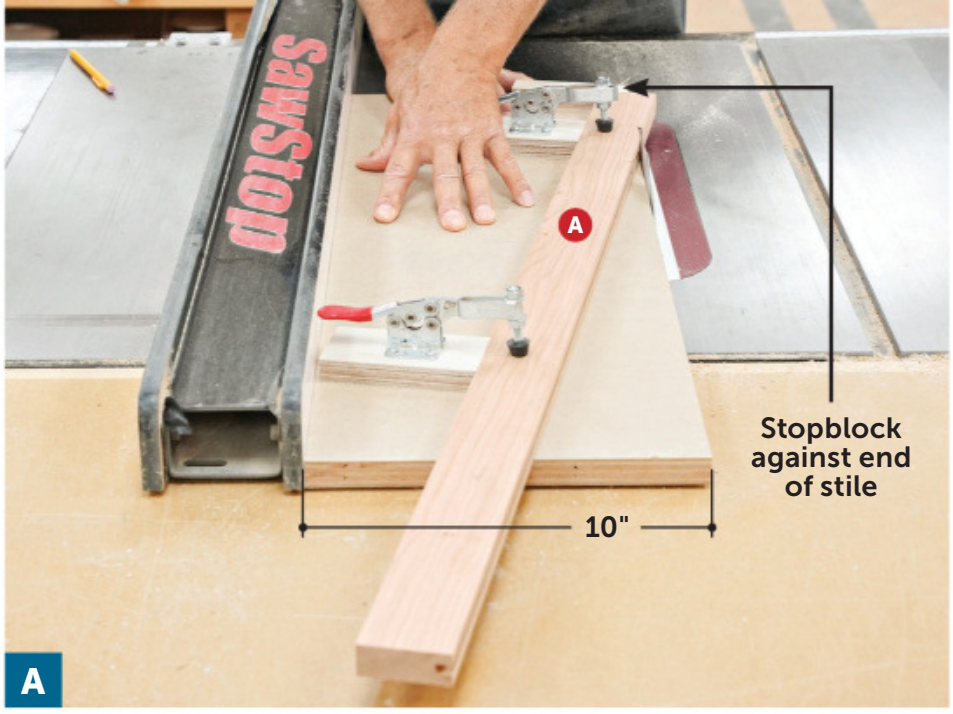
This project provides opportunities to practice many of your joinery skills, or to learn a new one. But don't worry: we walk you through them all. The plywood carcase goes together with simple dado and rabbet joinery. Tongues and grooves make the frames for the side panels. Routed dovetails create durable drawers, and mortise-and-tenon joints keep the doors sag-free.

This piece was designed to look great on its own, or as a companion to the "Classic Corner Cabinet" in issue 287 (March 2023), see *page 29*.

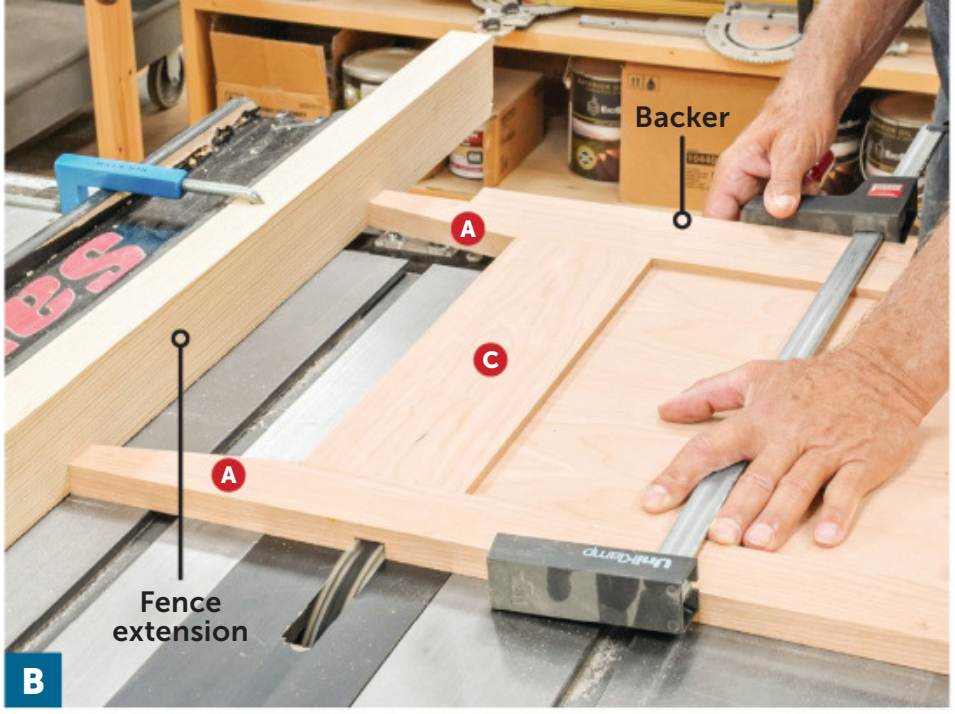
PHOTOGRAPHER: JASON DONNELLY
ILLUSTRATORS: ROXANNE LEMOINE, LORNA JOHNSON

EXPLODED VIEW





A plywood scrap serves as a simple tapering jig. Align the taper layout marks on the side stile (A) with the jig's edge. Butt the toggle-clamp mounting blocks against the stile and screw the blocks down.



A fence extension provides a bearing surface for both stiles as you start cutting the dado. Clamp a backer to the assembly to prevent chip-out as the blade exits the cut.

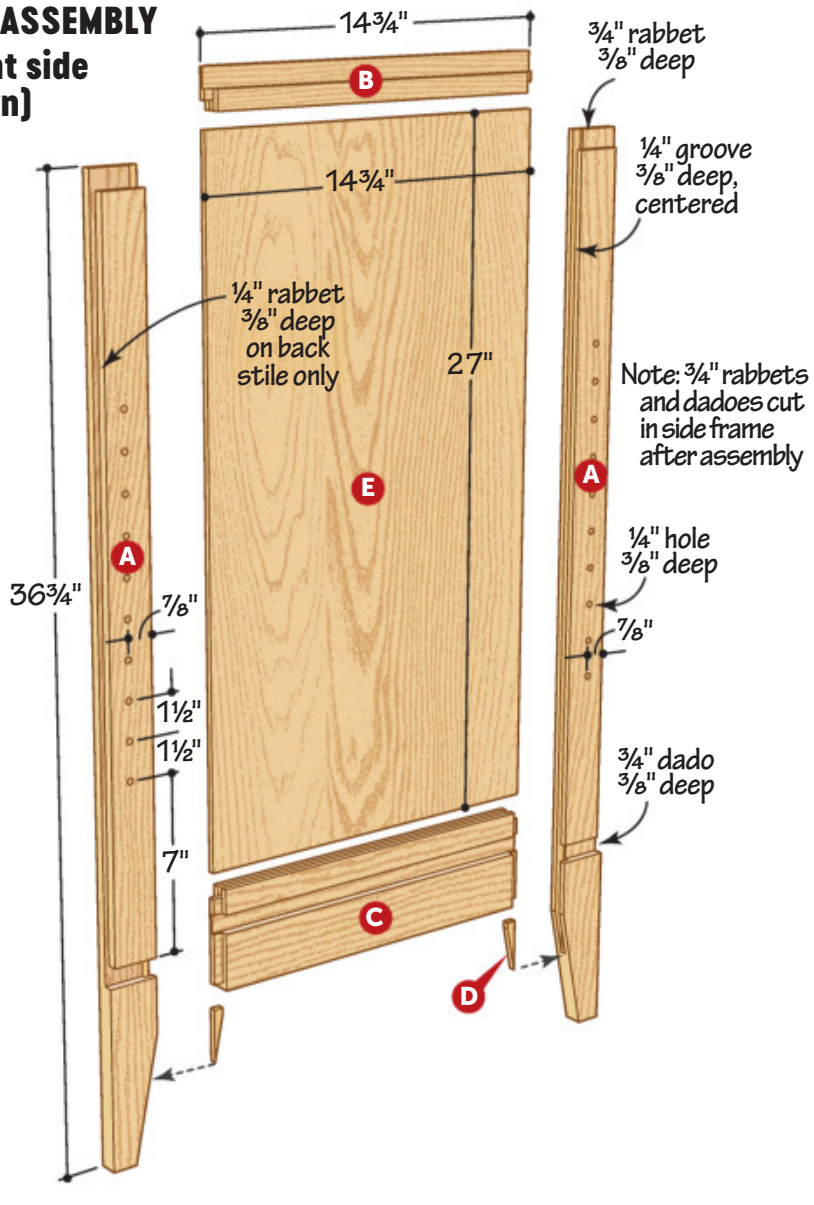
Get step-by-step tips on cutting stub tenons and grooves.
woodmagazine.com/stubtenon

CHOOSE SIDES TO START

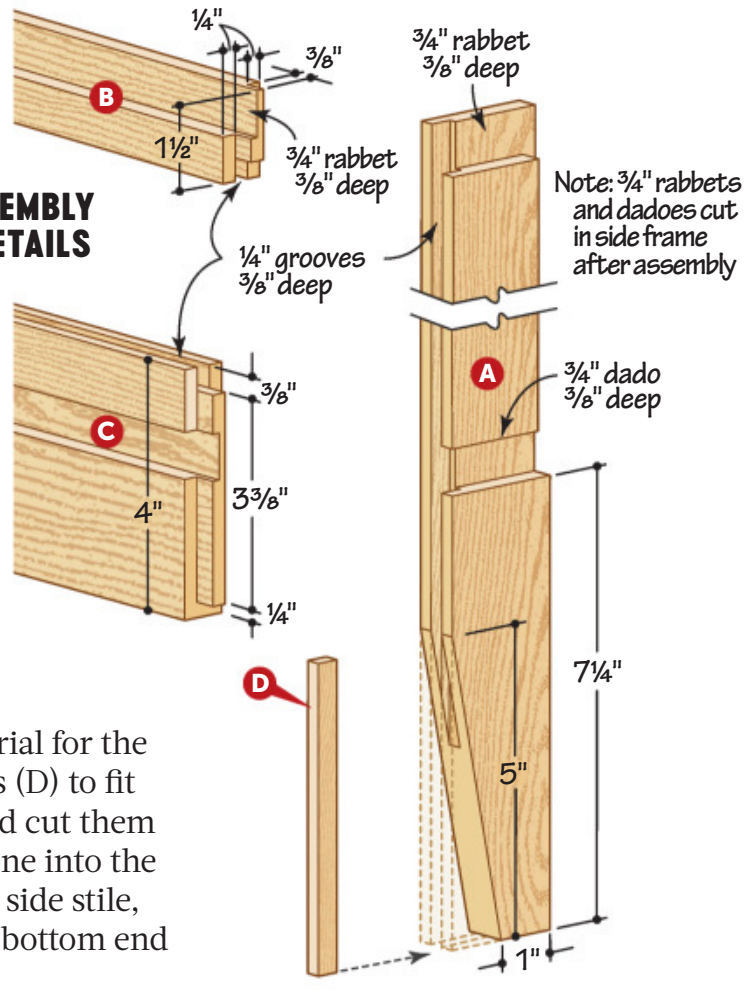
The first step is making two frame-and-panel side assemblies. Then you'll join them with a plywood carcase and strengthen that with a face frame that defines the openings for the drawers and doors.

1 Cut the side stiles (A) and the top and bottom rails (B, C) to size **[Materials List]**. Mark the inside edge of each and cut a centered groove to fit your ¼" plywood on this edge **[Drawing 1]**. Form stub tenons on the ends of the rails to fit the grooves **[Drawing 1a]**.

1 SIDE ASSEMBLY (Right side shown)



1a SIDE ASSEMBLY TENON DETAILS



2 Mill material for the side fillers (D) to fit the grooves and cut them 5" long. Glue one into the groove in each side stile, flush with the bottom end **[Drawing 1a]**.

3 Make a tapering sled as shown in **Photo A** and taper the bottom inside edge of each side stile (A). Save the sled for use again later.

4 Dry-fit the rails and stiles and cut the side panels (E) to fit in the grooves. Glue up the side assemblies, gluing the panels into the grooves, and check the assemblies for square.

5 Set up a dado stack to match the thickness of your ¾" plywood. Cut the dado and rabbet across each side assembly **[Drawing 1, Photo B]**.

6 Mark one assembly as the right, the other as the left. Rout a stopped rabbet on the back stile of each assembly between the dado and the rabbet **[Drawing 1]**.

TIP!

Make note of the chippers and shims used here as you'll need them again later.

MAKE YOUR CASE

1 From ¾" plywood, cut the case top and bottom (F) and dividers (G) to size **[Drawings 2 and 2a]**.

2 Dado the top and bottom to accept the dividers. Shim the dado stack to cut a full ¾" and cut the dadoes in the dividers.

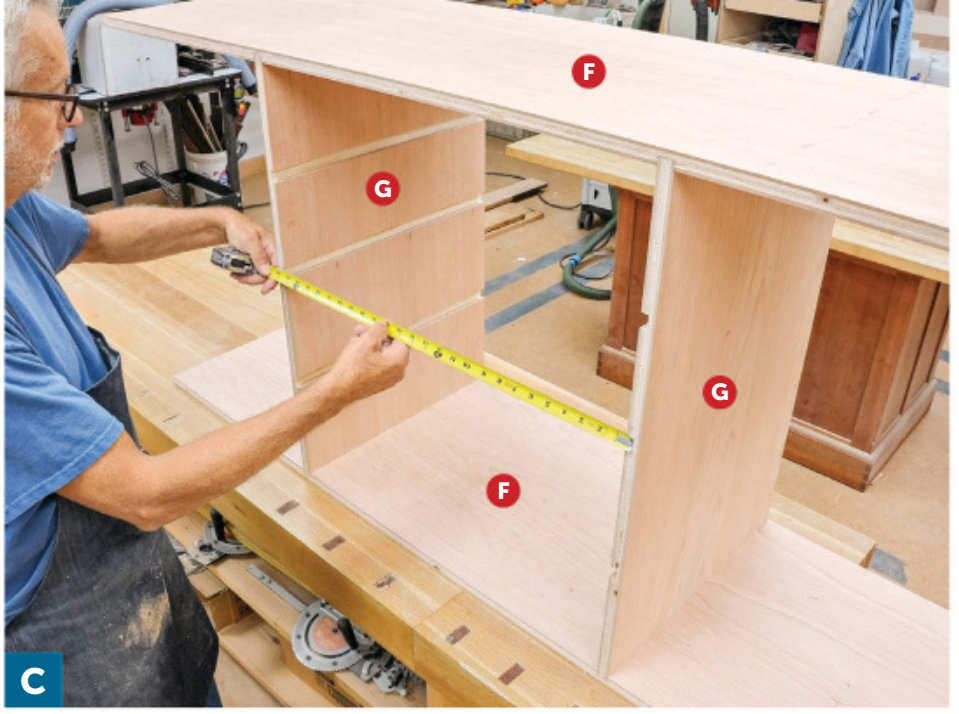
TIP!

This is also a good time to check the fit of the side assemblies to the carcase assembly.

3 Dry-fit the dividers between the top and bottom and measure the opening **[Photo C]**. Cut the dust panel fronts and backs (H) to fit, then cut the dust panel sides (I) to size **[Drawing 3, Materials List]**.

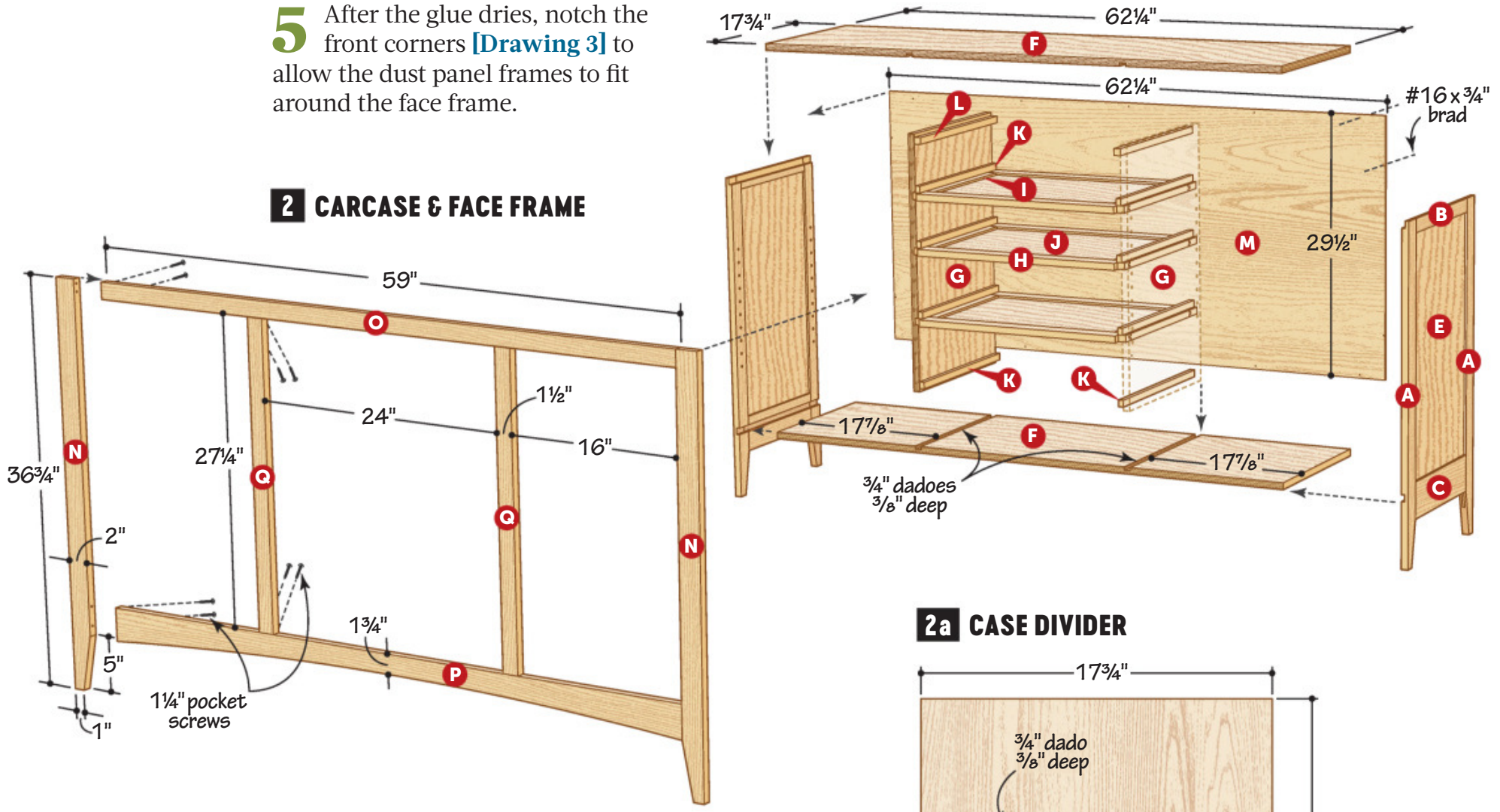
4 Cut a centered groove in the dust panel fronts, backs, and sides (H, I) **[Drawing 3]**. Then mill stub tenons on the sides (I) to fit the grooves. Dry-fit the pieces, measure for the panels (J), and cut them to size. Glue up the dust panel assemblies.

5 After the glue dries, notch the front corners **[Drawing 3]** to allow the dust panel frames to fit around the face frame.

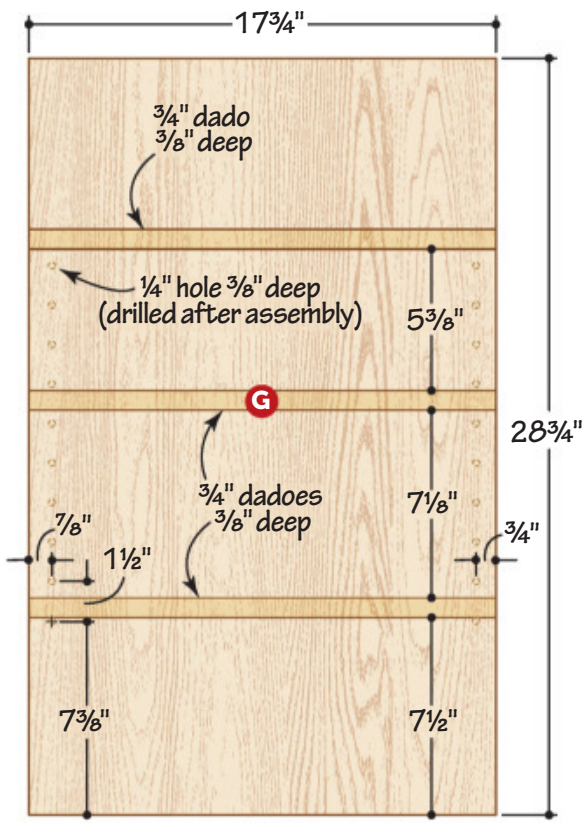


Make sure the assembly is square, then carefully measure between the dadoes to determine the finished length of the dust panel fronts and backs (H).

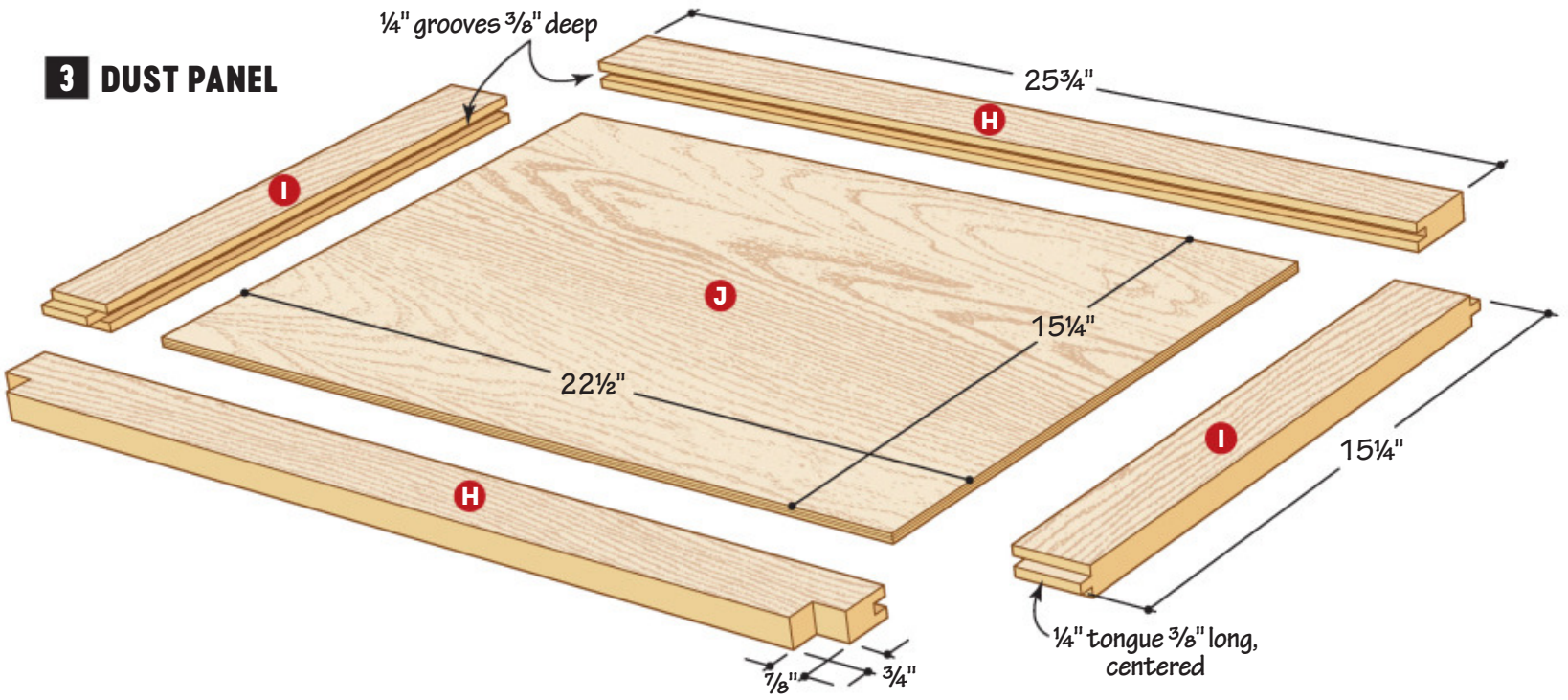
2 CARCASE & FACE FRAME



2a CASE DIVIDER



> **THE CORNER CABINET FROM ISSUE 287 DREW SO MUCH ATTENTION IN THE *WOOD* GALLERY THAT WE KNEW WE NEEDED TO DESIGN THIS COMPANION PIECE FOR IT.**
>
> ***-KEVIN BOYLE, DESIGN EDITOR***



6 Glue and clamp the dust panels between the dividers, aligning the rear of the notch flush with the front edge of the dividers. Check for square. Allow the glue to dry, then glue this assembly between the case top and bottom (F). Check for square again.

7 Cut the drawer guides (K) and top drawer fillers (L) to size. Glue the 9/16" face of each guide to the bottom of each drawer opening **[Drawing 2]** and the fillers to the top of the upper drawer opening.

8 Glue and clamp the side assemblies to the carcase, flush at the front. After the glue dries, drill the shelf-pin holes **[Photo D]**. Take care not to drill through the dividers or stiles.

9 Measure the carcase for the case back (M) and cut it to size. Test the fit, then set it aside.

FABRICATE THE FACE FRAME

1 Cut the face-frame rails and stiles (N–Q) to size. Taper the bottom of the end stiles (N) as you did with the side stiles (A) **[Drawing 2]**.

2 Lay out the curve on the bottom rail (P) **[Photo E]**. Bandsaw and sand the curve smooth.

3 Drill pocket holes in the center stiles (Q) and the rails (O, P). Glue and pocket-screw the rails to the end stiles, dry-fitting the center stiles as spacers. Dry-fit the N/O/P assembly to the carcase to determine the positions of the center stiles. Glue and pocket-screw the center stiles in place.

4 Finish-sand the completed face frame, then glue it to the carcase.

Note: **Position the center stiles so the drawer guides (K) stand 1/16" proud of the stile edges.**

Make a drilling guide from ¼" plywood, spacing the holes as shown in **Drawing 1**. Clamp it flush with the edges of the dividers (G) and side stiles (A) before you drill the holes.

To create the curve for the face-frame bottom rail (P), flex a piece of ¼" plywood or hardboard between the layout points, or squeeze a piece of ½" or ¾" MDF in a long bar clamp.

The drawer widths accommodate ½" half-blind routed dovetails. A jig makes easy work of routing the mating halves of each joint in the same operation.

SLIDE INTO THE DRAWERS

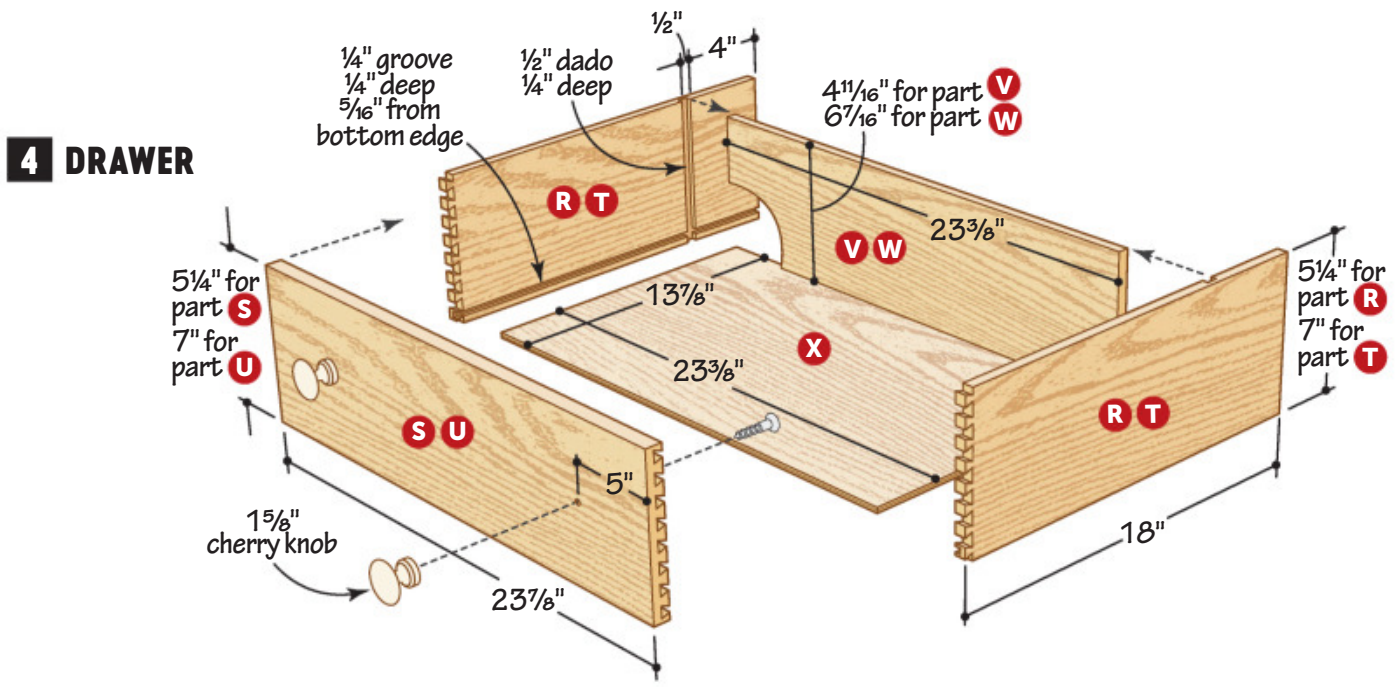
1 Cut the drawer sides (R, T) and fronts (S, U) to size **[Drawing 4]**. Note that the sides are ½" thick and the fronts are ¾" thick.

2 Using a jig, rout the ½" half-blind dovetails in the fronts and sides **[Photo F]**.

3 Cut a dado in each of the drawer sides (R, T) for the backs (V, W). Cut a groove in the sides and fronts (R–U) for the drawer bottom (X). Dry-fit the fronts and sides, measure for the backs and bottoms, and cut the backs and bottoms to size. Finish-sand the inside faces of the drawer parts.

4 Glue the drawers together. After the glue dries, finish-sand the outside faces and check the fit in the carcase. Label each with its position. Drill holes for the pulls, but don't install them yet.

Watch a video on using a dovetail jig.
woodmagazine.com/dovetailjig



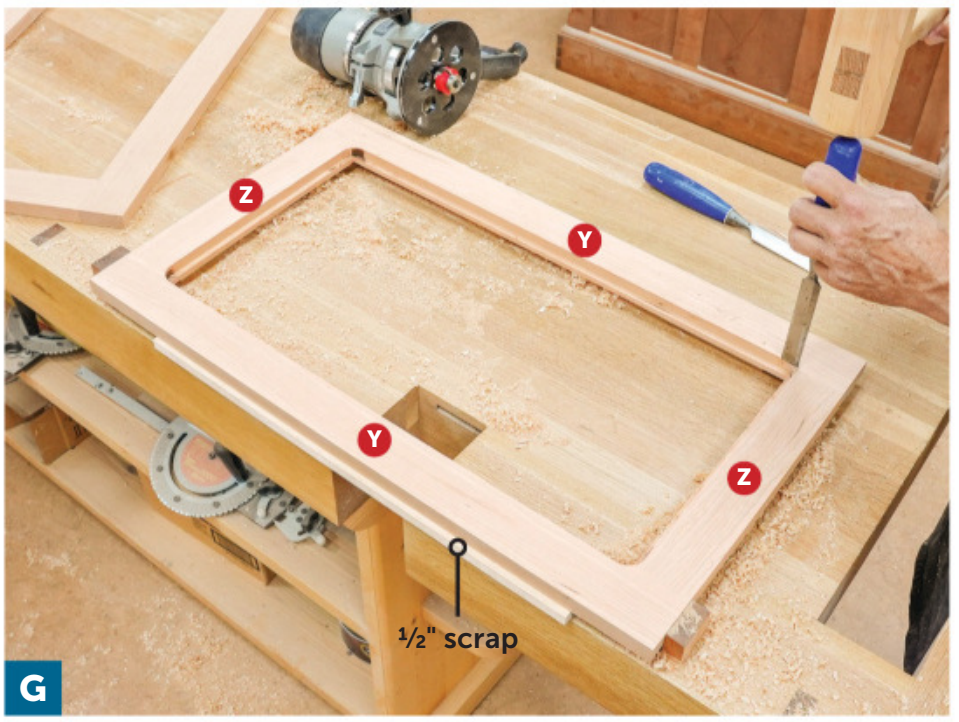
Learn several ways to cut mortise-and-tenon joints.
woodmagazine.com/mt4ways

SWING ON TO THE DOORS

1 Cut the door stiles and rails (Y, Z) to size **[Drawing 5]**. Form mortises in the stiles and cut tenons on the rails **[Drawing 5a]**.

2 Glue the doors together. After the glue dries, rout a rabbet around the inside face and square up the corners **[Photo G]**.

3 Screw the no-mortise hinges to the doors **[Drawing 5]**, then mount the doors to the face-frame end stiles (N) **[Exploded View]**. Check for an even reveal and plane the door rails or stiles, if needed. Remove the doors and hinges. Drill the holes for the door pulls, but don't install them yet.

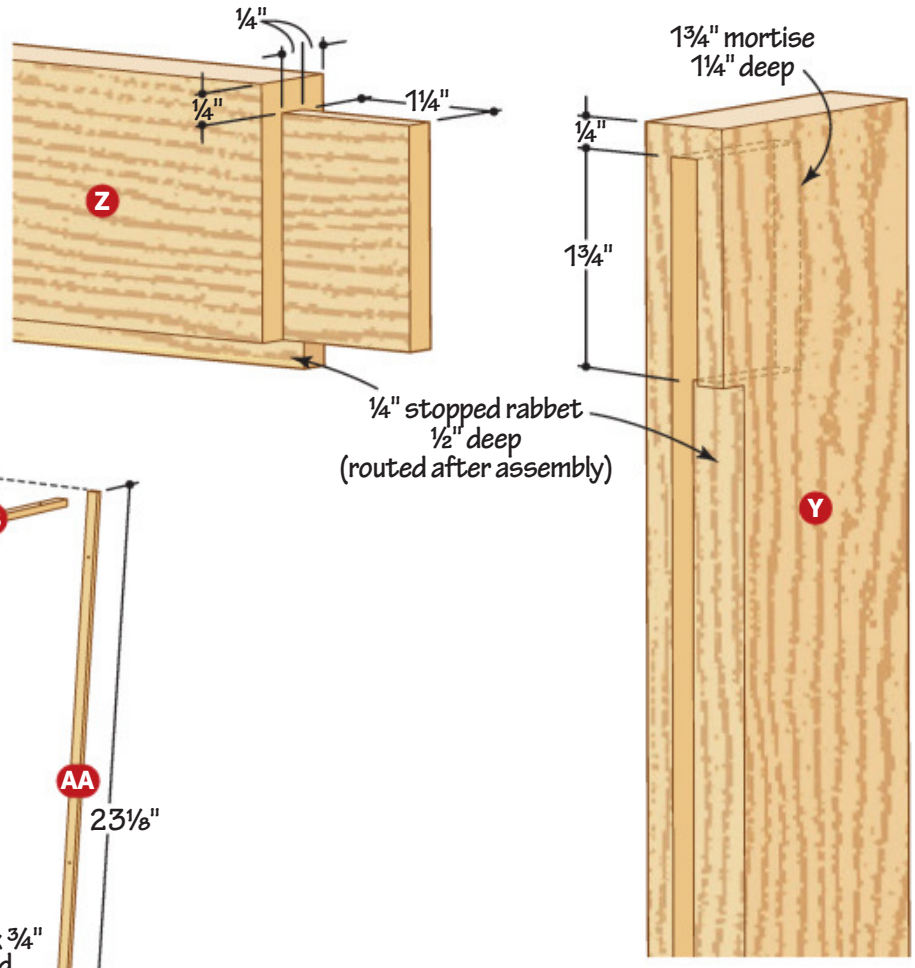


Elevate the door frames on ½" scrap to provide clearance for the rabbeting bit. After routing, square up the corners of the rabbets to accept the glass panels and glass stops.

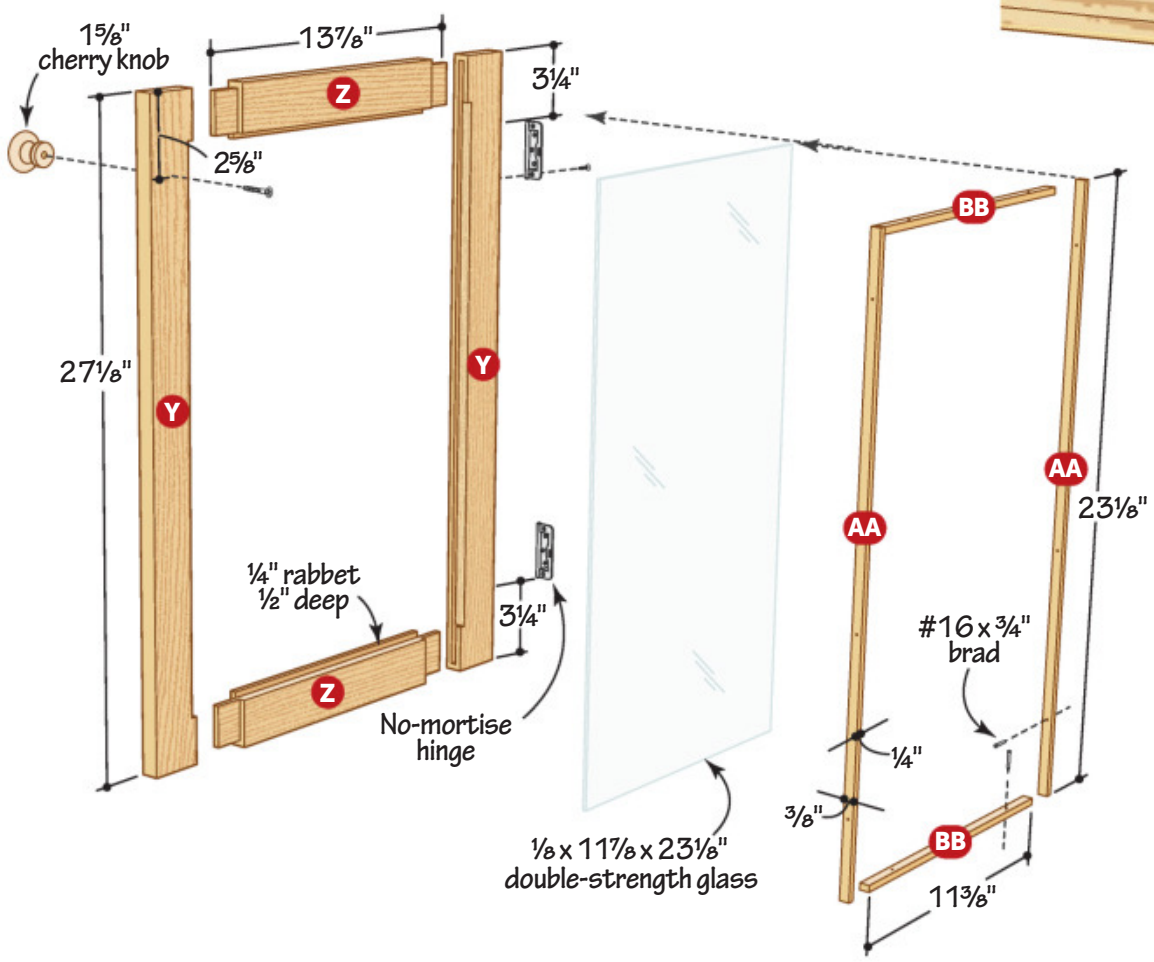
4 Cut the glass stops (AA, BB) to fit in the doors and set them aside. Finish-sand the doors.

5 Cut the shelves (CC) and shelf edging (DD) to size **[Exploded View]**. Glue the edging to the shelves. Finish-sand the assemblies after the glue dries.

5a DOOR MORTISE & TENON DETAILS



5 DOOR (Viewed from back)



MATERIALS LIST

PART		FINISHED SIZE T	W	L	Matl.	Qty.
A	SIDE STILES	¾"	2"	36¾"	C	4
B	SIDE TOP RAILS	¾"	1½"	14¾"	C	2
C	SIDE BOTTOM RAILS	¾"	4"	14¾"	C	2
D*	FILLERS	¼"	⅜"	2⅛"	C	4
E	SIDE PANELS	¼"	14¾"	27"	CP	2
F	CARCASE TOP/BOTTOM	¾"	17¾"	62¼"	CP	2
G	CARCASE DIVIDERS	¾"	17¾"	28¾"	CP	2
H	DUST PANEL FTS/BACKS	¾"	2"	25¾"	C	6
I	DUST PANEL SIDES	¾"	2"	15¼"	C	6
J	DUST PANELS	¼"	15¼"	22½"	CP	3
K	DRAWER GUIDES	¾"	9/16"	17¾"	C	8
L	TOP DRAWER FILLERS	¾"	¾"	17¾"	C	2
M	CARCASE BACK	¼"	29½"	62¼"	CP	1
N	FACE-FRAME END STILES	¾"	2"	36¾"	C	2
O	FACE-FRAME TOP RAIL	¾"	1½"	59"	C	1
P	FACE-FRAME BTM RAIL	¾"	3"	59"	C	1
Q	FACE-FRAME CTR STILES	¾"	1½"	27¼"	C	2
R	SHORT DRAWER SIDES	½"	5¼"	18"	C	4
S	SHORT DRAWER FRONTS	¾"	5¼"	23⅞"	C	2
T	TALL DRAWER SIDES	½"	7"	18"	C	4

PART		FINISHED SIZE T	W	L	Matl.	Qty.
U	TALL DRAWER FRONTS	¾"	7"	23⅞"	C	2
V	SHORT DRAWER BACKS	½"	4 11/16"	23⅜"	C	2
W	TALL DRAWER BACKS	½"	6 7/16"	23⅜"	C	2
X	DRAWER BOTTOMS	¼"	13⅞"	23⅜"	CP	4
Y	DOOR STILES	¾"	2¼"	27⅛"	C	4
Z	DOOR RAILS	¾"	2¼"	13⅞"	C	4
AA	VERTICAL GLASS STOPS	¼"	⅜"	23⅛"	C	4
BB	HORIZ. GLASS STOPS	¼"	⅜"	11⅜"	C	4
CC	SHELVES	¾"	16¾"	17⅜"	CP	4
DD	SHELF EDGING	¾"	¾"	17⅜"	C	4
EE	CASE TOP	¾"	19½"	64½"	EC	1

*Parts initially cut oversize. See the instructions.

MATERIALS KEY: C–cherry, CP–cherry plywood, EC–edge-glued cherry.
SUPPLIES: #8×1¼" panhead screws, 1¼" pocket screws, #16×¾" brads, ⅛×11⅞×23⅛" glass (2).
BLADE AND BITS: Dado blade, ¼" rabbeting, ½" dovetail, ¼" round-over bits.
SOURCES: No-mortise hinges (4) no. SHC-1100B-10B, $17; shelf pins no. FUT-72111-52-004 (pack of 100), $6, cabinetparts.com; cherry knobs no. 15265 (10), $13/pair, rockler.com.
PROJECT COST: It cost us about $650 to build this project. Your cost will vary by region and source.

TOP IT OFF AND A BIG FINISH

Note: **The different shank hole sizes anchor the top at the front while allowing it to expand toward the back.**

1 Edge-glue a blank for the top (EE) and trim it to size. Round over the ends and front edge on the top and bottom faces **[Exploded View]**. Drill shank holes in the carcase top (F), but don't screw the top in place yet.

2 Finish-sand all parts. Apply a finish. (We sprayed on three coats of matte lacquer.)

3 Nail the carcase back (M) to the carcase. Screw the top (EE) in place, centering the screws in the shank holes. Do not overtighten the screws in the rear row so that the panel can expand. A right-angle driver will help you drive the screws above the dust panel.

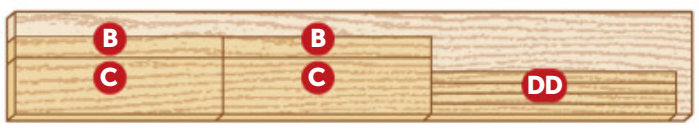
4 Install the glass in the doors and nail the glass stops in place **[Drawing 5]**. Screw the hinges to the doors. Mount the pulls to the drawers and doors, screw the doors in place, and slide the drawers and shelves in.

Build the classic corner cabinet as a companion.
woodstore.net/cornercabinet

CUTTING DIAGRAM

This project requires 39 board feet of 4/4 cherry, 14 square feet of ½" cherry, and 1 square foot of ¼" cherry based on example boards shown.

¾ x 5½ x 96" Cherry



¾ x 7¼ x 48" Cherry

¾ x 5½ x 72" Cherry

¾ x 7¼ x 96" Cherry

¾ x 5½ x 96" Cherry

¾ x 5½ x 96" Cherry

¾ x 5½ x 96" Cherry (4 needed)

½ x 7¼ x 96" Cherry

½ x 5½ x 96" Cherry

½ x 7¼ x 96" Cherry

¼ x 3½ x 48" Cherry

• SHOP TESTED •

BENCHTOP ROUTER TABLES

Can compact tables deliver big-time routing features and performance? We tested 11 benchtop models to find out.

WRITER: DAVE STONE
TESTER: WOOD STAFF

PHOTOGRAPHER: CARSON DOWNING

Router tables stand as one of the must-have tools in any shop for creating joinery, adding profiles, duplicating parts using templates, and so much more. But full-size router tables eat a lot of space.

Benchtop tables strive to offer those same capabilities in a portable package you can deploy when needed and stow out of the way when not. We took a look at 11 to see if they present viable alternatives to full-size tables or if their smaller sizes reduce routing capability.

The small Rockler insert plate hole wouldn't accept our Bosch test router with non-removable handles. We were able to fit another midsize router only after removing the handles to create clearance.

THE TALE OF THE TABLETOPS

The tops on nine of our 11 tables are made from medium-density fiberboard (MDF) covered with plastic laminate or melamine (see *Routing Results Roundup* on *page 35*). Bosch uses cast aluminum for its RA1181, while the Woodstock W2000 is cast iron.

MDF gets a bad rap for flatness among some router-table users, but all the tables impressed us by being flat within a few thousandths of an inch, which isn't enough to inhibit performance. The cast iron top was flattest of all, but the cast aluminum fared no better than MDF. Mounting the same Bosch 2½-hp router in each table produced no appreciable sag, regardless of its material.

All the tables except the Ryobi A25RT03 feature a miter-gauge slot that accepts a standard ⅜×¾" miter-gauge bar. The Ryobi's slot is ¾" wide, but too shallow for a standard bar.

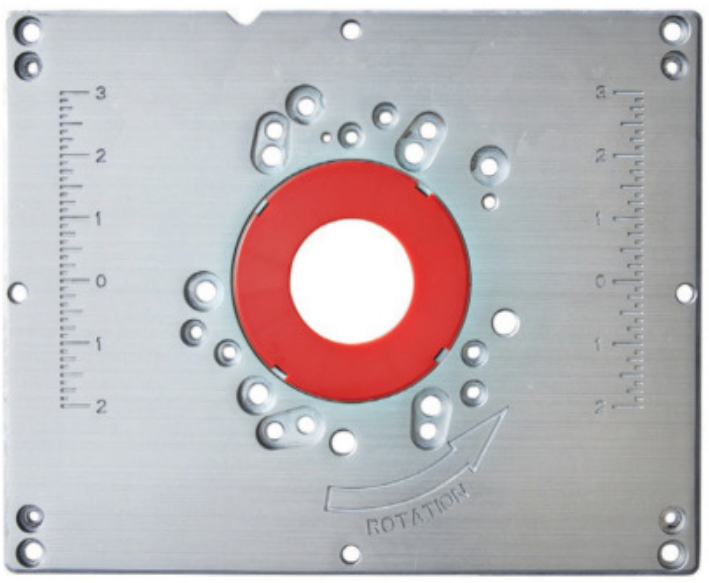
INSERT PLATE HERE

The Bosch RA1141 and the Skil SRT1039 mount the router on a steel plate underneath the table, while the other tested tables hang the router from a drop-in insert plate made from plastic, phenolic, or aluminum.

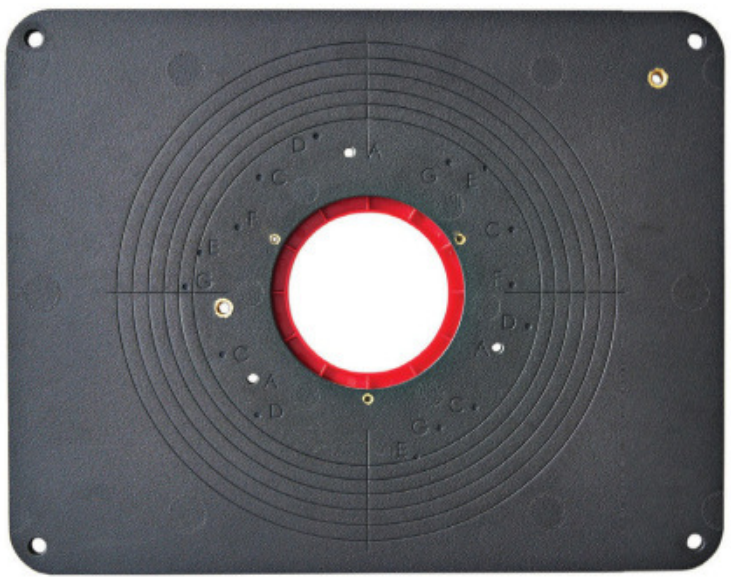
The Bosch RA1171 and RA1181, Ryobi, and Rockler BDL7893 simplify router mounting with hole patterns that fit a variety of popular routers (*below left*). Indentations molded into the underside of the Kreg PRS2100 and Powertec 71402 plates make it easy to drill only the holes you need, a solution we highly prefer (*below right*). The Woodstock and both Grizzly insert plates leave accurately positioning and drilling the holes entirely up to you.

Plate levelers on all 11 tables adjust the plate flush with the table surface. Some are more cumbersome than others, but all get the job done.

The Ryobi and the Rockler are the only tested tables using non-rectangular inserts. Rockler touts its as compact enough to remain attached to your router if you want to remove it from the table for handheld use, but the matching small hole in the tabletop limits your router options (*above*).



While you're likely to find a mounting option to match your router's hole pattern, universal plates like this Bosch leave unneeded holes that gather dust and could snag workpieces.



Molded indentations in Kreg and Powertec insert plates match common router-mounting hole configurations and center your drill bit so you can drill only the mounting holes you need.

ON TO THE FENCE

Good fences make good router tables, and we were pleased that all 11 proved acceptably flat along their length and square to the table. All are equipped with sliding faces as well as tracks for attaching accessories (*below*), and all the fences allow offsetting the outfeed face for router-table jointing.

Bolts passing through the fence base allow you to secure it into slots in the table, except the Grizzly T31636 and the Woodstock tops, which use T-tracks. The Bosch RA1181, Grizzly T28048, and Ryobi slots have no bolt-clearance hole for the bolt head. So, any time you want to remove the fence (such as for routing with a bearing-guided bit or to lift out the insert plate during bit changes) you have to reach under the table and remove the bolt or nut from the knob that tightens it (*right*). Slots on the remaining tables have a bolt-clearance hole on one end that allows the clamping bolts to pass through without requiring disassembly.

Tightening the knobs locks the fences in position on all except the Kreg table. It's equipped with unique cam levers that require only a quarter-turn to lock or unlock the fence (*below right*).

Slots in the tabletop allow positioning the fence and then locking it in position using, in most cases, knobs. Removing the fence from tables with straight slots requires disassembling the bolts and knobs.

Sliding faces improve workpiece support by reducing the gap around the bit. Tracks accept accessories like stops and featherboards that increase safety and accuracy. (Guard removed for increased visibility.)

Quarter-turn locking levers on the Kreg fence greatly simplify accurately locking in the fence. This fence also proved easiest to remove and reinstall.

EXCLUSIVE ACCESS

Changing bits in a table-mounted router can be challenging. The Bosch RA1141 and RA1181, Rockler, Ryobi, and Skil tables all require either sliding the router motor out of its base, which can be challenging due to the low height of these tables, or removing the router and insert plate from above as a unit. For most, the latter requires also removing the fence, making bit changes even more of a hassle.

The other six tables, thankfully, minimize obstructions under the front of the table, providing adequate access to fit collet wrenches under the table (*right*), with Kreg, Powertec, Rockler, and Woodstock all earning an A grade.

Tables that provide wide-open access underneath allow bit changes without removing the router, which means you'll spend less time on setup changes.

A 2½" port in the removable bag on the Grizzly T28048 couples with a matching port in the fence to collect dust underneath and above the tabletop, creating the most effective system of all the tables.

DEALING WITH DUST

All the tested tables address collecting dust except one: The Woodstock has no dust-collection port. The 10 remaining are equipped with a dust port on the fence that connects to a 2½" hose.

Two tables take dust collection a step further. The Bosch RA1171 enclosed cabinet has a second port in the back to collect dust under the table. Grizzly takes the most comprehensive approach on the T28048 with a bag that attaches to the base and surrounds the router completely (*left*). A zippered flap in front provides router access.

ON (AND OFF) GUARD

Safety regulations mandate bit guards on all router tables. Eight of our tested tables use removable guards that mount to the fence, while the Woodstock guard mounts to the table. All are effective when used, which we encourage, and relatively easy to remove and install.

Ryobi and Skil bit guards mount permanently to the fence and rest against the table surface. A hinge mechanism allows upward travel as a board passes under and lifts the guard. Unfortunately, these guards are clunky, they get in the way, and they can't be securely disabled when necessary, which makes them, to us, a safety hindrance rather than an enhancement (*right*). Instead of relying on these guards, we'd recommend replacing them with an aftermarket guard that mounts to the fence T-track, such as the simple, inexpensive one from Powertec (no. 71538, powertecproducts.com, $11).

Ryobi's double-hinged guard gets in the way on all but the widest boards and tends to bind rather than to lift upward under side-load pressure from the board (or hand).

STAND AND DELIVER

Materials and styles vary for the stands that support our tested tables. The Bosch RA1171 is the only enclosed cabinet, made from melamine-coated particleboard. Others are made entirely from plastic composite, steel, or a combination of the two, except for the Woodstock, which features cast-aluminum legs.

Pedestals on the Bosch RA1141 fold under the table for compact storing and transport. The Rockler stand folds as well, and can be configured to create a wall mount for the table.

A few bases integrate storage. Zippered bags flank the Grizzly T28048 base, while the Bosch RA1141 has lidded wells

in its hollow pedestals. Skil builds storage into both pedestals (*right*).

Base stability and vibration dampening proved adequate on most of the tables. The Bosch RA1141 folding pedestals wobbled excessively unless clamped to the worksurface, however, and the plastic Skil pedestals tended to slide around. Other table bases provided dependable support without clamping.

Curious whether the stand makes a difference in noise, as manufacturers sometimes claim, we ran our test router in each and measured noise levels at the operator's position. We found little difference in volume, with all registering between 86 and 89 decibels. Sound quality remained consistent, too.

Comprehensive storage built into each pedestal on the Skil includes hangers for the included featherboards and insert rings, plus a shelf in each side with shank holes for storing router bits.

THE ROUT TO VICTORY

When the routers wound down and the dust settled, two benchtop tables rose to the top in our tests, largely because they sacrifice little compared to full-size versions other than a slightly smaller table. We award both Top Tool honors.

First, the Kreg PRS2100 earns its honors thanks to the best fence in our test. The quarter-turn cam levers make it by far the easiest to adjust and lock in position. And the fence sits on a high-quality tabletop and insert plate, all on a sturdy steel stand.

The Powertec 71402 also ranks as a Top Tool. It's remarkably similar to the Kreg table in both design and execution. The fence is almost on par with the Kreg, but lacks its slick cam levers. On the bonus side, Powertec includes a featherboard and a well-made swing stop.

Both award winners will easily accept the largest router you care to mount, as well as a router lift, if you choose. If your shop offers limited space or you want a second table for worksite use, either can handle your routing needs. We'd love it if both tables came with a switched outlet (found on some other tested models) to power up the router and a vacuum simultaneously, but both companies offer them as an optional accessory.

·2024· WOOD® TOP TOOLS BENCHTOP ROUTER TABLES

Kreg PRS2100

ROUTING RESULTS ROUNDUP

MODEL	PERFORMANCE (1)							TABLE DIMENSIONS (DEPTH × WIDTH)	TABLE HEIGHT	TABLE MATERIAL (2)	STAND MATERIAL (3)	FRONT EDGE TO BIT CENTER DISTANCE	MITER SLOT CENTER TO BIT CENTER DISTANCE	MAX. FENCE DISTANCE BEHIND BIT	INSERT PLATE DIMENSIONS (T × W × L)	INSERT RING QUANTITY	ACCESSORIES (4)		WEIGHT, LBS (without router)	WARRANTY, YEARS	PRICE (5)
	PRIMARY				SECONDARY												INCLUDED	OPTIONAL			
	BIT CHANGING ACCESS	FENCE LOCKING	FENCE FUNCTIONALITY	DUST COLLECTION EFFECTIVENESS	ROUTER MOUNTING EASE	STABILITY	EASE OF ASSEMBLY														
BOSCH RA1141	C	B	C	C	D	D	A	16½×26"	14"	M	S/P	9⅛"	5¾"	2½"	NA	3	F, G, H, O	NA	25	1	$179
BOSCH RA1171	C	C	B	C	A	B	C	15½×25"	14⅜"	M	M	9⅝"	5 15⁄16"	1⅜"	⅜×9¼×11⅜"	3	F, G, H, O	NA	45	1	$225
BOSCH RA1181	B	C	C	C	A	A	B	18×27"	14¾"	A	P	10¾"	5⅜"	3 9⁄16"	⅜×9¼×11⅜"	3	G, H, O	NA	34	1	$249
GRIZZLY T31636	B	C	B	A	C	A	B	15¾×23¾"	16½"	M	S	9 7⁄16"	5⅝"	4"	⅜×9¼×11¾"	1	NA	NA	29	1	$247
GRIZZLY T28048	B	B	B	A	C	A	C	15¾×23½"	18"	M	S/P	9 9⁄16"	6¼"	3"	⅜×9¼×11¾"	3	B, G, M, O	NA	30	1	$284
KREG PRS2100	A	A	A	B	A	A	B	15¾×23¾"	15⅝"	M	S	9 9⁄16"	6½"	2¼"	⅜×9¼×11¾"	3	I	F, O, SS	29	3	$250
POWERTEC 71402	A	B	B	B	A	A	B	15¾×23⅝"	15½"	M	S	9⅜"	6⅝"	2⅛"	⅜×9¼×11¾"	3	F, I, SS	O	28	1	$249
ROCKLER BDL7893	A	B	B	C	D	B	B	16⅜×18½"	14⅜"	M	S	8"	6½"	5⅝"	⅜×7½×9"	1	H	T	18	1	$220
RYOBI A25RT03	C	C	D	C	A	B	A	16×32"	14¼"	M	S	8⅛"	5⅜"	4 5⁄16"	⅜×8×12"	5	G, O	NA	28	3	$169
SKIL SRT1039	D	C	D	C	D	C	A	16×26"	14⅛"	M	P	8⅝"	5⅜"	3⅜"	NA	3	F, O	NA	25	1	$119
WOODSTOCK INTL W2000	A	C	C	D	C	A	C	18×24"	17⅛"	C	A	11 11⁄16"	6¾"	4"	¼×11×11"	2	G	NA	67	1	$600

Powertec 71402

1. A Excellent
   B Good
   C Fair
   D Poor

2. **(A)** Aluminum
   (C) Cast iron
   (M) MDF

3. **(A)** Aluminum
   (M) MDF
   (P) Plastic
   (S) Steel
   (S/P) Steel and plastic

4. **(B)** Bit centering cone
   (F) Featherboard
   (G) Miter gauge
   (H) Predrilled insert plate
   (I) Marked insert plate
   (O) Switched outlet
   (SS) Fence swing stop
   (T) Trim router plate
   (NA) Not applicable

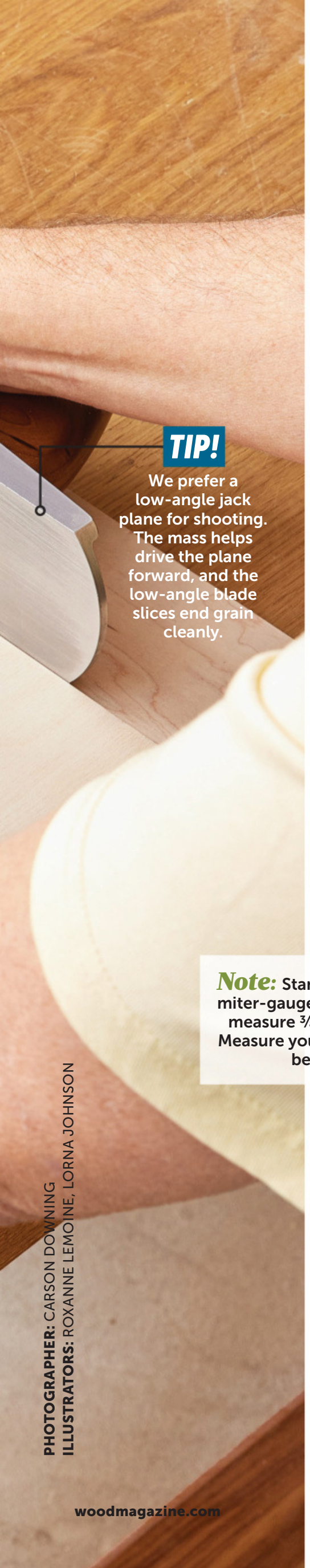
5. Prices current at time of article production and do not include shipping, where applicable.

MITER-GAUGE SHOOTING BOARD

Build this shooting board in an afternoon; use it for a lifetime to produce gap-free joinery with just a few strokes of a hand plane.

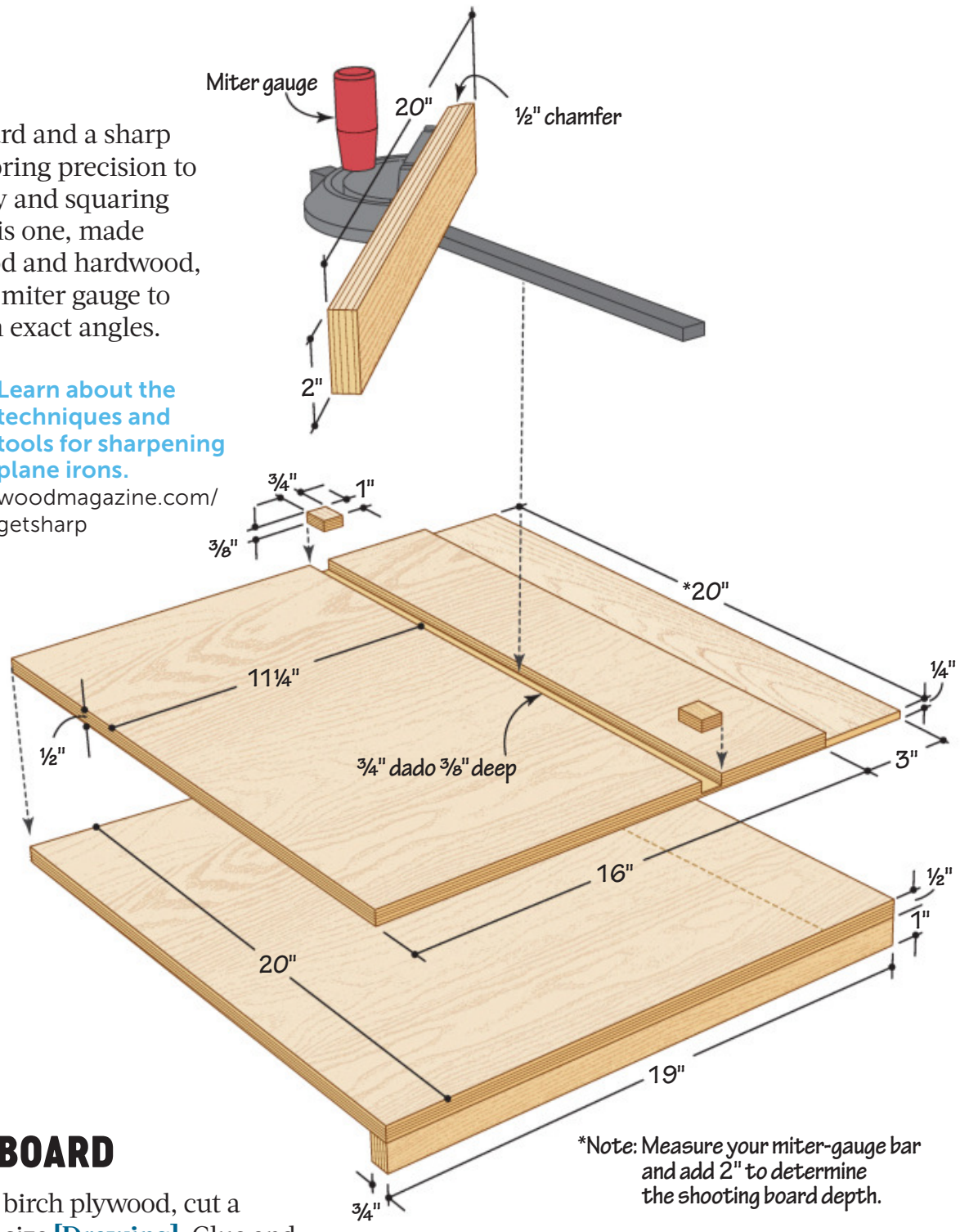
WRITER: RANDY MAXEY

OVERALL DIMENSIONS
19"W × 20"D × 4"H



A shooting board and a sharp hand plane bring precision to fine-tuning joinery and squaring up workpieces. This one, made from scrap plywood and hardwood, holds a removable miter gauge to simplify locking in exact angles.

Learn about the techniques and tools for sharpening plane irons.
woodmagazine.com/getsharp



*Note: Measure your miter-gauge bar and add 2" to determine the shooting board depth.

BUILD YOUR BOARD

1 From ½" Baltic birch plywood, cut a base and top to size **[Drawing]**. Glue and clamp them together keeping one edge and the ends flush.

2 Cut a groove in the top to fit your miter-gauge bar snugly, and position the bar flush with or just a hair below the surface of the top. Cut a pair of stops and glue them into the groove, positioning them tight against the ends of the miter-gauge bar.

3 Next, add a thin hardwood guide strip for the plane to ride on. Glue and clamp the guide in place on the base.

4 From ¾" Baltic birch, cut a cleat and glue it under the front edge of the base. This hooks over your benchtop to steady the shooting board while you work.

5 To support your workpieces, cut an auxiliary fence sized to fit the miter gauge. We chamfered ours on one end and mounted it with screws, making two sets of mounting holes. One set aligns the end of the fence to the edge of the top at 90°, the other at 45°. We left the shooting board unfinished except for waxing the hardwood guide strip to ease the plane's travel.

Note: **Standard miter-gauge bars measure ⅜×¾". Measure yours to be sure.**

SHOOT FOR SUCCESS

To use your shooting board, set your well-sharpened plane iron for a very light cut, making sure the blade protrudes evenly from the plane's mouth. Lay the plane on its side on the plane guide with the sole tight against the edge of the top. Hold your workpiece against the auxiliary fence, set to the angle you need, and slide it over until it touches the toe of the plane. Slide the plane forward to make your cut, keeping the plane's side flat against the guide and the sole tight to the top's edge. With a pass or two, you'll have a perfectly planed end at the exact angle you need.

PHOTOGRAPHER: CARSON DOWNING
ILLUSTRATORS: ROXANNE LEMOINE, LORNA JOHNSON

MODERN PICNIC TABLE

Serve up some style at your next cookout or outdoor party with this eye-catching table and bench combo.

WRITER: VINCE ANCONA
DESIGNER: JOHN OLSON
BUILDER: BRIAN BERGSTROM

OVERALL DIMENSIONS
75"L × 68"W × 29½"H

PHOTOGRAPHER: JASON DONNELLY
ILLUSTRATORS: ROXANNE LEMOINE, LORNA JOHNSON

Kick your next picnic up a notch with this handsome table and bench. End frames joined with pocket screws and laminated together give the bench strength, while the opposing angles give it grace. This solid design provides a great look and ensures years of service.

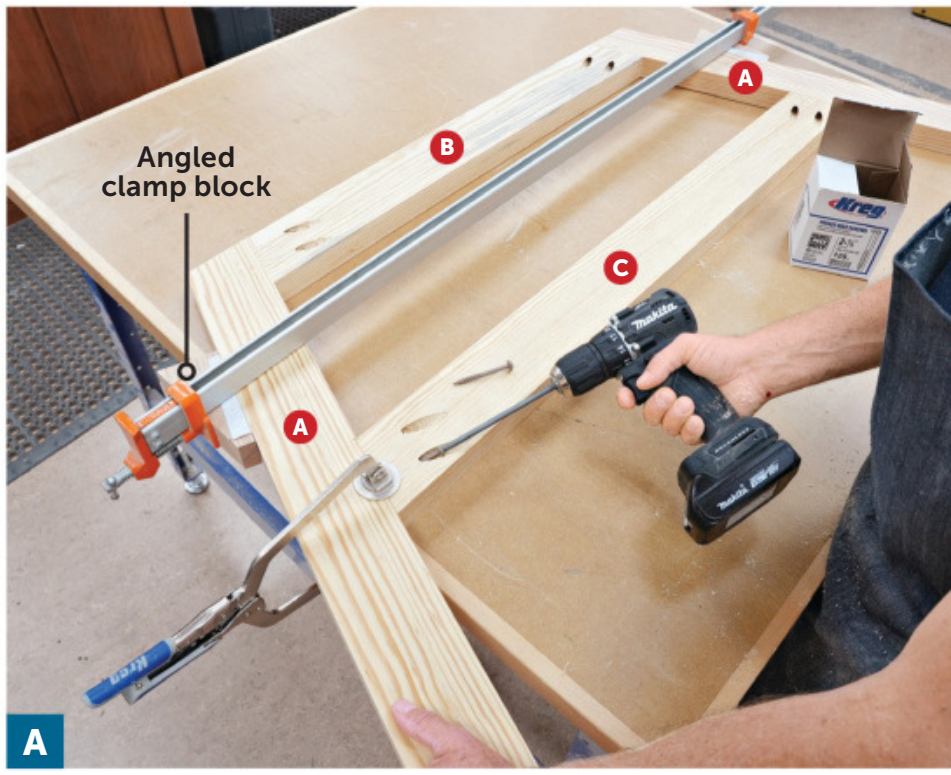
OUTER FRAME ASSEMBLY

A laminated pair of outer and inner frames make up each end assembly of the table. Start by building the outer frames. To make the table base, we milled stock from roughsawn 8/4 Southern yellow pine. If you choose to use construction lumber, consider ripping the parts from the edges of 2×10 and 2×12 boards, keeping the rift- and quartersawn grain sections and avoiding the piths.

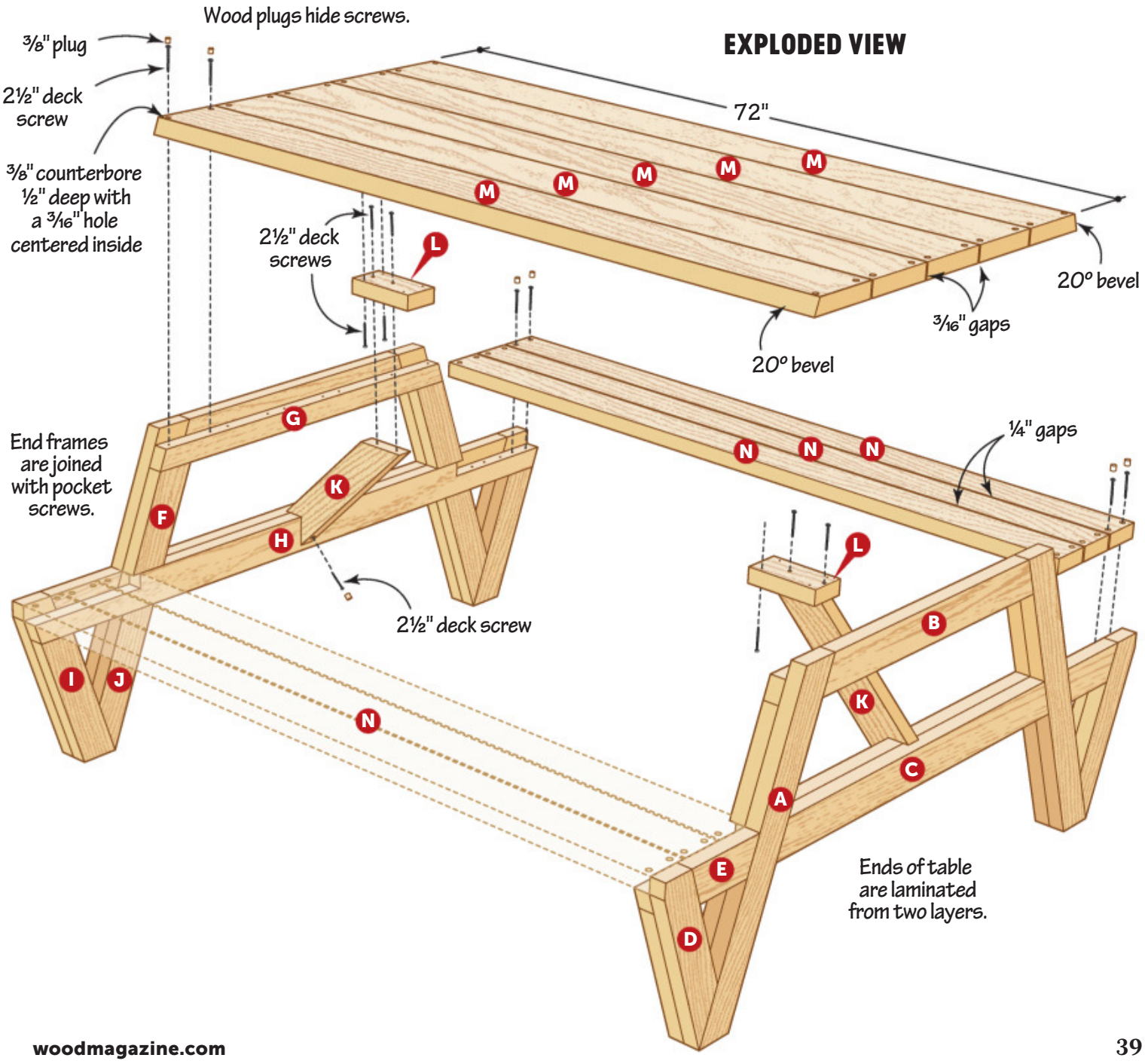
TIP!

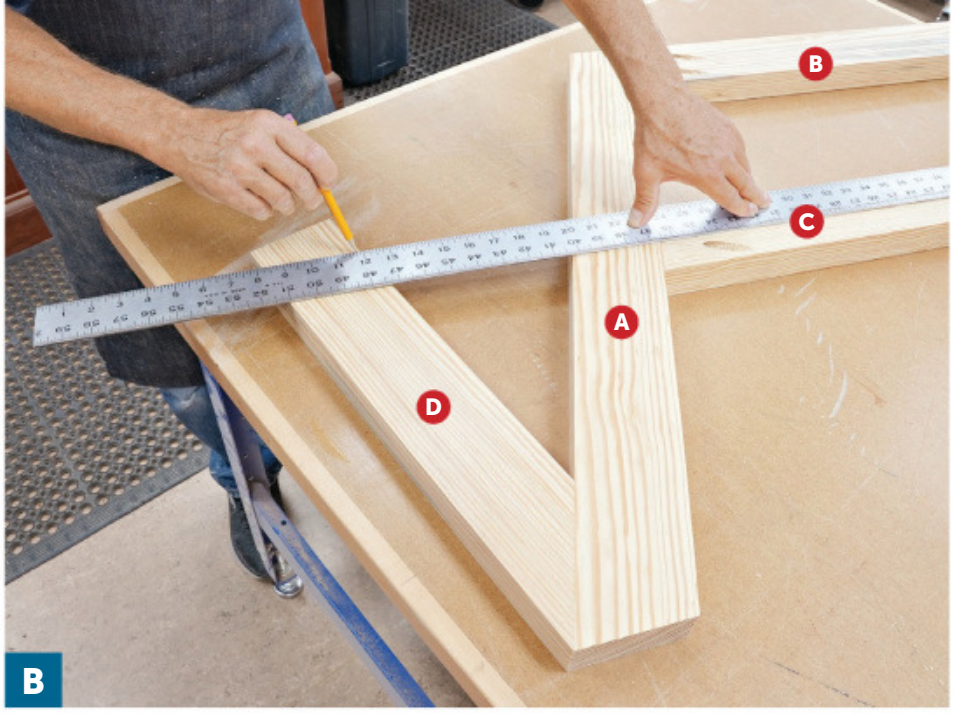
We used Kreg's XL pocket hole jig to drill the oversize pocket holes in the thick stock of this picnic table.

1 Cut to width and miter-cut to length the outer frame legs (A) and upper and lower rails (B, C) **[Drawings 1 and 2, Materials List]**. Drill pocket holes at the ends of the rails. Glue and screw the rails to the legs **[Photo A]**.



Glue and screw the upper rail (B) flush with the ends of the legs (A). Then slide the lower rail (C) into position, using a clamp and angled clamp blocks to draw the legs tight while driving the screws.



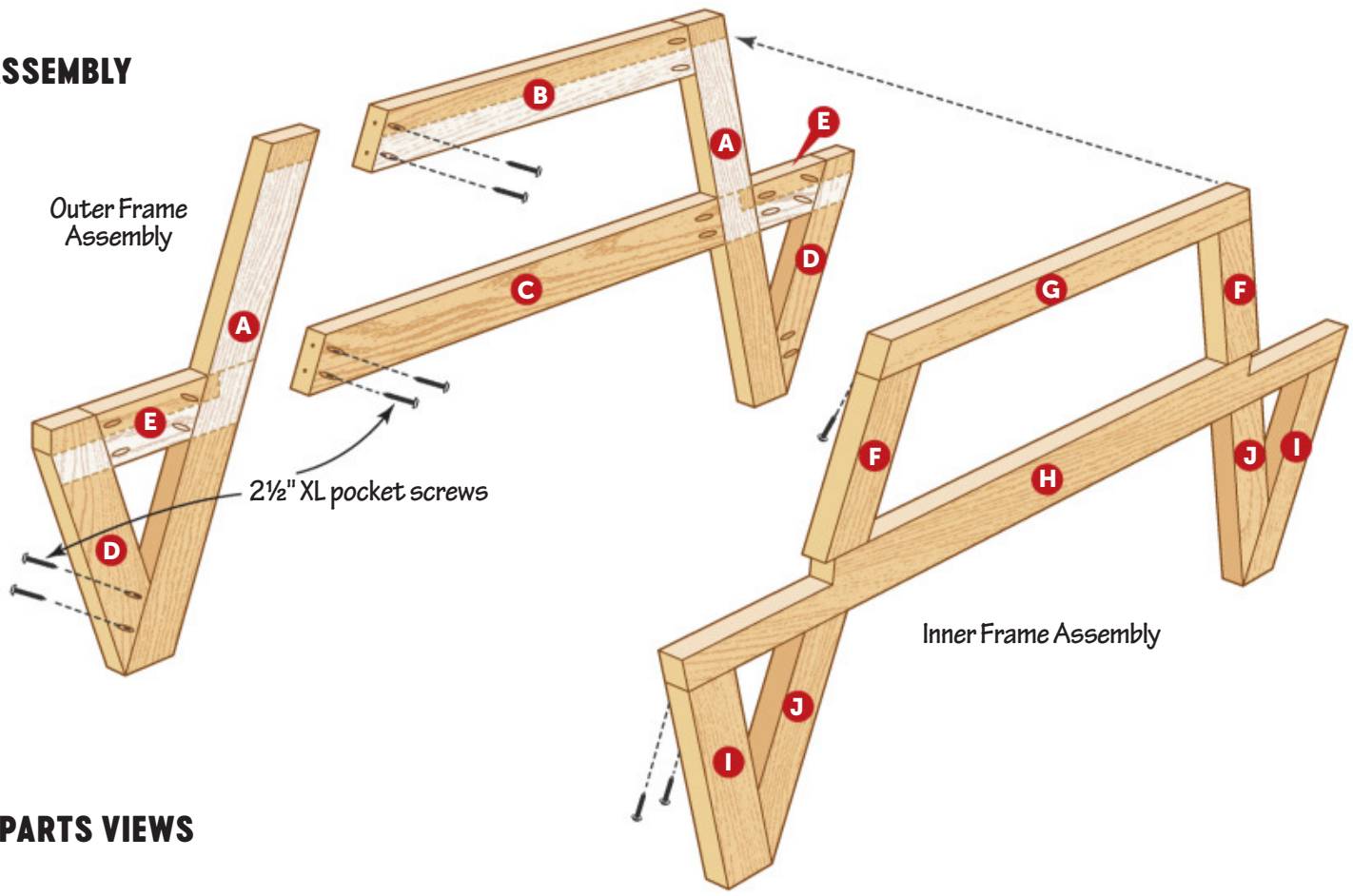


Dry-fit the seat legs (D) to the outer frame legs (A) and use a straightedge to extend the top edge of the lower rail (C) to mark the seat legs to length.

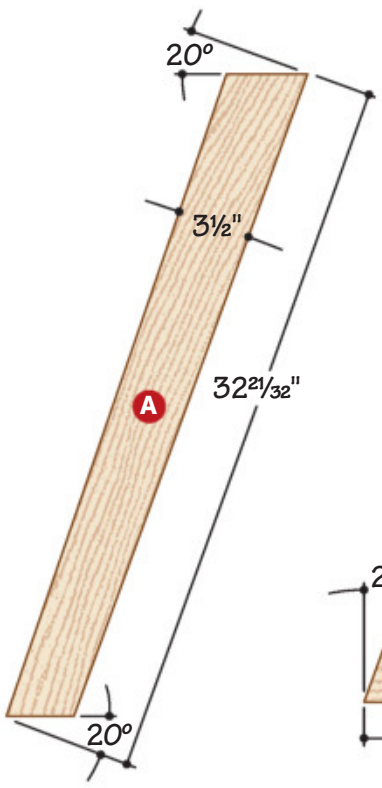
2 Miter-cut the lower ends of the outer frame seat legs (D) and use the outer frame assembly (A–C) to mark them to length **[Drawing 2, Photo B]**. Miter-cut the seat legs to length, then to shape by mitering the top outer corners. Drill pocket holes in each leg then glue and screw them to the frames (A–C).

3 Miter-cut the outer frame seat rails (E) to fit between the outer frame legs (A) and seat legs (D) **[Drawings 1 and 2]**. Glue and pocket-screw these pieces in place to complete the outer frames.

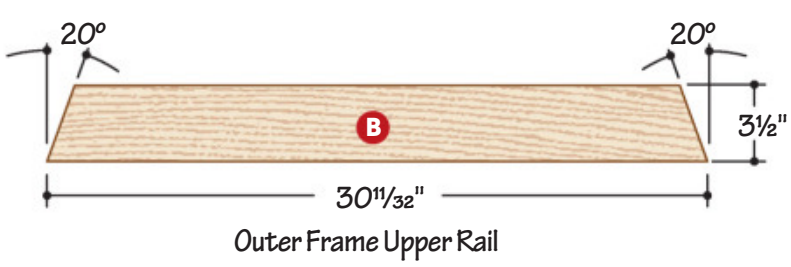
1 END ASSEMBLY



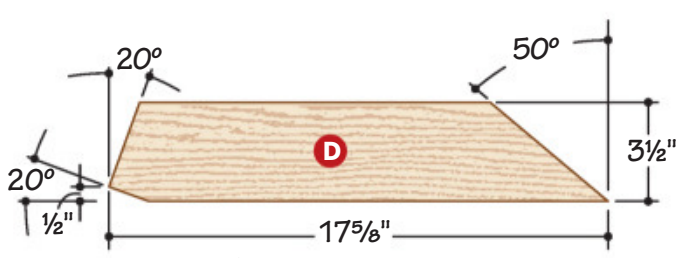
2 OUTER FRAME PARTS VIEWS



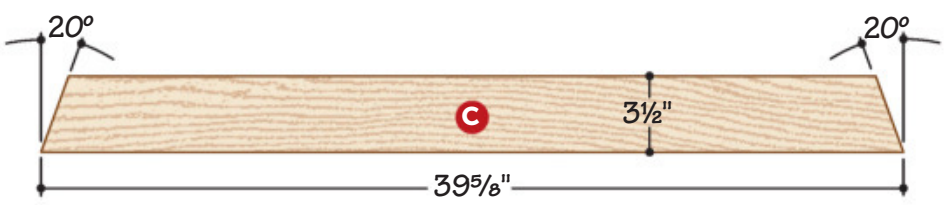
Outer Frame Leg



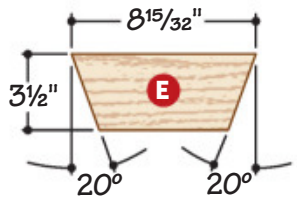
Outer Frame Upper Rail



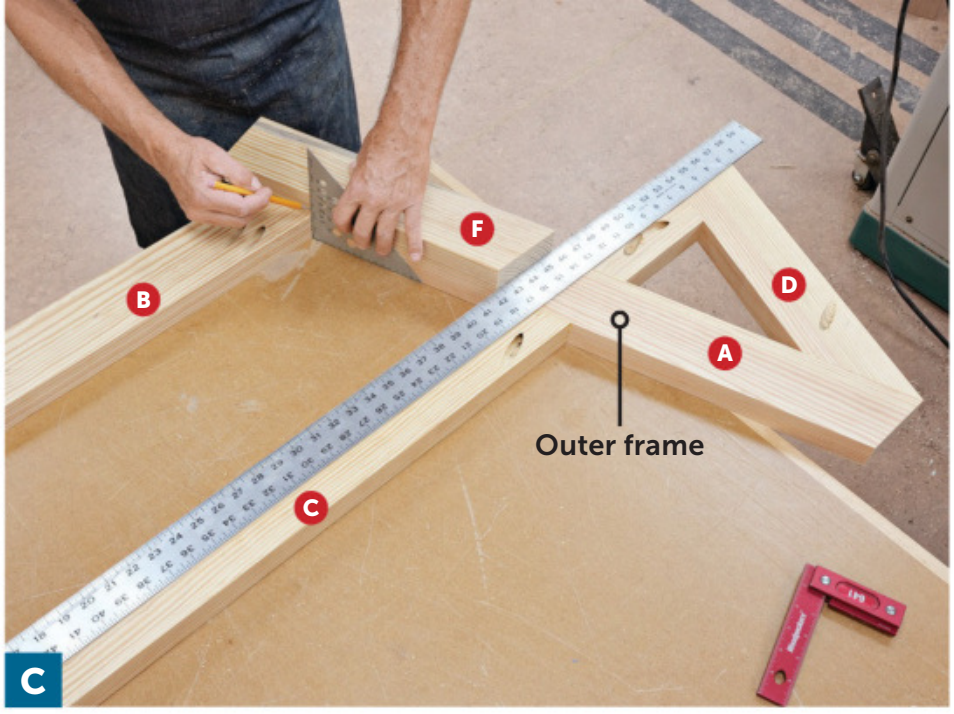
Outer Frame Seat Leg



Outer Frame Lower Rail



Outer Frame Seat Rail



Align a straightedge with the top edge of the lower rail (C), then use a square to mark the inner frame upper legs (F) to length.

Miter one end of the inner frame seat leg (I) and butt it against a straightedge in order to mark the part for length.

INNER FRAME ASSEMBLY

Rather than relying on the **Materials List**, use the outer frames as templates for sizing and laying out the inner frame parts. This ensures you end up with identically sized inner and outer frames.

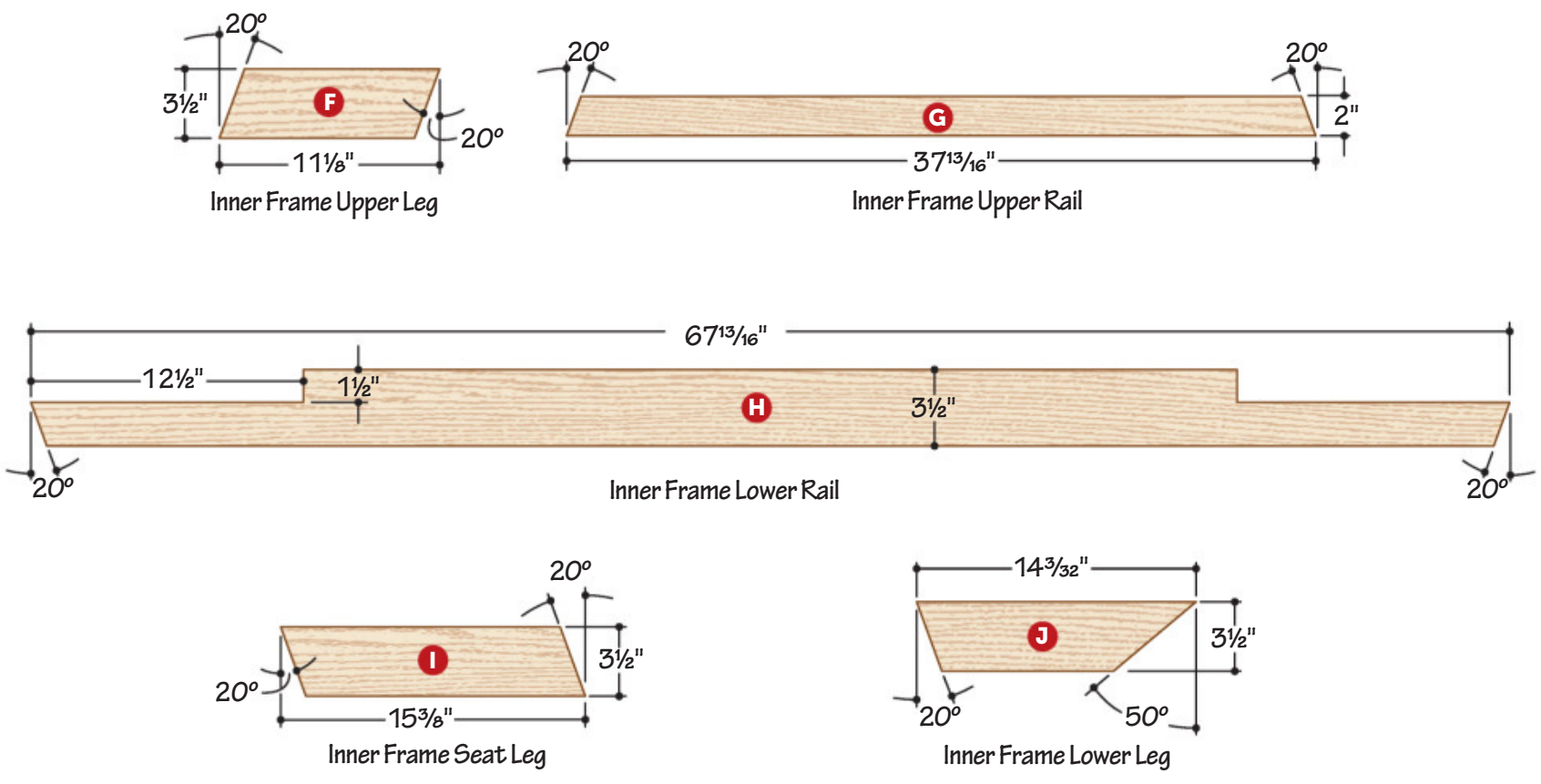
1 Miter one end of the inner frame upper legs (F) and use the outer frame to mark the upper legs to length **[Photo C, Drawing 3]**. Miter-cut the upper legs to length. Drill pocket holes at both ends of the upper legs.

2 Cut the inner frame upper and lower rails (G, H) to width and then use the outer frame to mark them to length **[Drawing 3]**. Miter-cut the rails to length. Using a jigsaw, cut the notches in the lower rails (H) for the seat. Glue and screw the upper legs (F) to the rails.

3 Mark and cut to length the inner frame seat legs (I) **[Photo D]**. Glue and screw these to the lower rail of the inner frame assembly (F–H).

4 Mark and cut the inner frame lower legs (J) to length. Glue and screw each one between a seat leg and the lower rail of the inner frame assembly.

3 INNER FRAME PARTS VIEWS



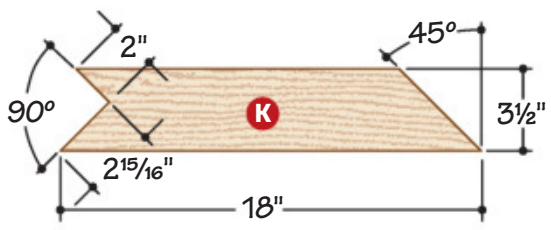
LAMINATE THE FRAMES

1 Glue each pair of outer and inner frames together, with the pocket screws facing each other and aligning all the edges as closely as possible **[Photo E]**. After the glue dries, remove the clamps and sand the laminated edges flush. Ease the edges with a 1/8" round-over bit and finish-sand all the surfaces.

2 Cut the braces (K) **[Drawing 4]** and brace cleats (L) to size. Use a jigsaw to cut the notch at the end of each brace. Glue and screw the cleats to the braces **[Exploded View]**. Finish-sand the brace assemblies and set them aside.

Apply glue to the inner frame and laminate the outer and inner frames. Avoid getting glue squeeze-out in the pocketed area for the seat slats.

4 BRACE

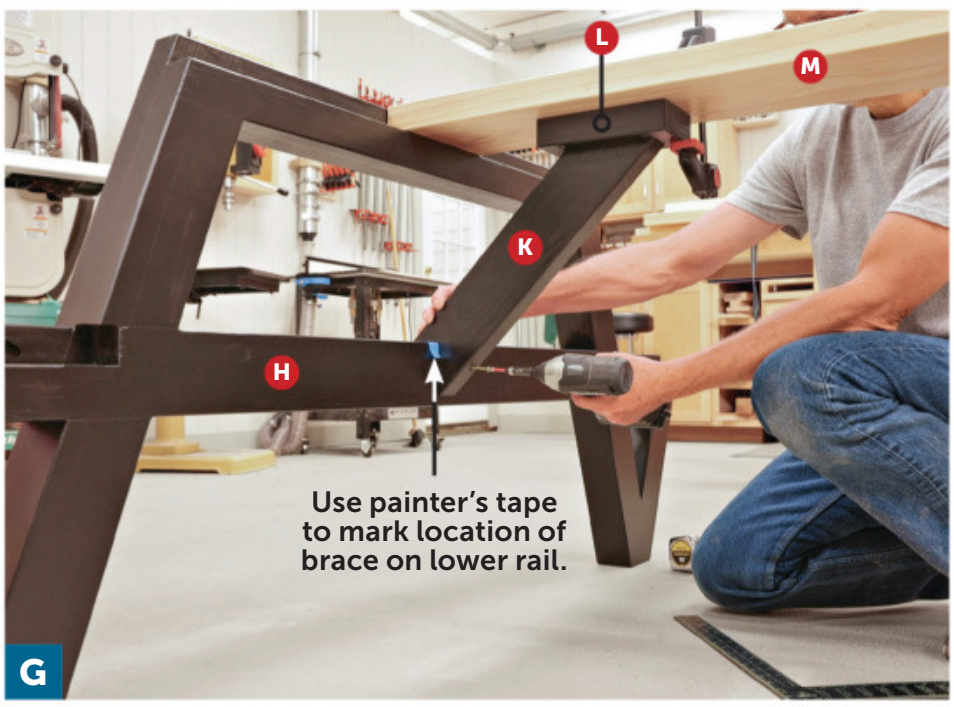


ADD A SEAT AT THE TABLE

1 Cut five table slats (M) and six seat slats (N) to size. Tilt your tablesaw blade 20° and bevel-rip one edge of the outer two table slats.

2 Drill counterbored pilot holes near the ends of the table and seat slats. Ease the edges and sand the bottom face of each board.

Center a table slat (M) on the end assemblies, using a clamp to pull the pieces together. Drive deck screws through the counterbored pilot holes in the slat and into the end assemblies.



Center the brace assembly on the lower rail (H), clamp it to the table slat (M), and screw it in place. Then drive screws through the brace cleat (L) and into the table slat.

FINISH AND ASSEMBLY

1 Stain the frame and brace assemblies. We used Minwax gel stain in black.

2 With the stain dry, apply three coats of spar varnish to the frame and brace assemblies as well as the bottom faces, edges, and ends of the table and seat slats.

3 Clamp the center table slat between the two frame assemblies and screw it in place **[Photo F]**.

4 Drill countersunk pilot holes and screw the brace assemblies to the center table slat and lower rails **[Photo G]**.

5 Position the outer table slats so the beveled edges are flush with the edges of the frame assemblies. Equally space the remaining slats and then screw the slats in place. Next, attach the seat slats **[Photo H]**.

Screw the inner and outer seat slats (N) to the end assemblies, again using a clamp to pull everything tight. Then center the remaining slat between the other two and screw it in place.

TIP!

Mask off the end assembly rails so you don't accidentally sand them.

6 Using a 3/8" plug cutter, make matching wood plugs and glue them into the counterbores. Sand the top face of the table and seat slats.

7 Apply three coats of spar varnish to the top of the table and seat slats. When the final coat is dry, break out the grill and enjoy your new table.

MATERIALS LIST

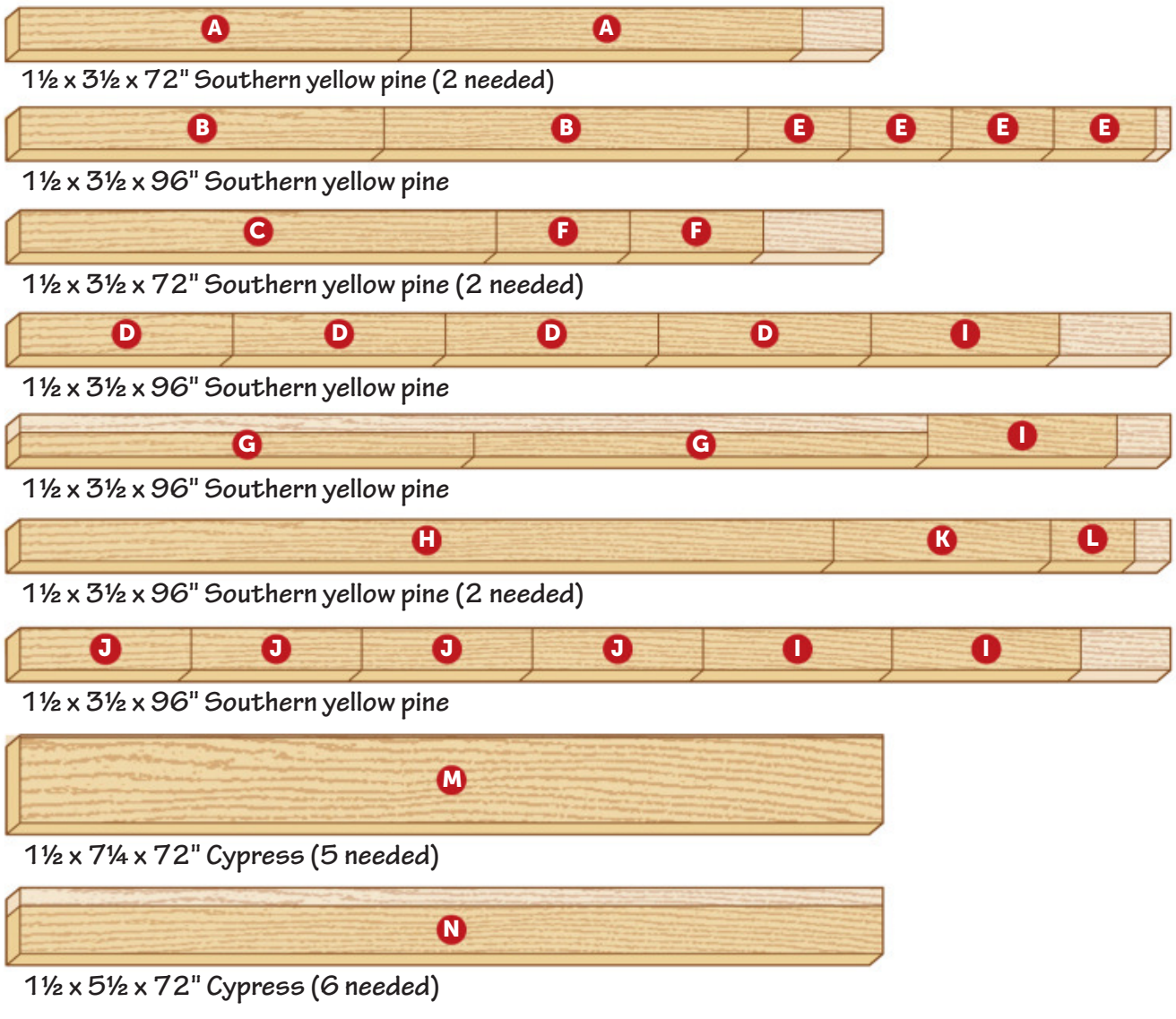
PART		FINISHED SIZE T	W	L	Matl.	Qty.
A	OUTER FRAME LEGS	1½"	3½"	32 21/32"	SYP	4
B	OUTER FRAME UPPER RAILS	1½"	3½"	30 11/32"	SYP	2
C	OUTER FRAME LOWER RAILS	1½"	3½"	39 5/8"	SYP	2
D*	OUTER FRAME SEAT LEGS	1½"	3½"	17 5/8"	SYP	4
E*	OUTER FRAME SEAT RAILS	1½"	3½"	8 15/32"	SYP	4
F*	INNER FRAME UPPER LEGS	1½"	3½"	11 1/8"	SYP	4
G	INNER FRAME UPPER RAILS	1½"	2"	37 13/16"	SYP	2
H	INNER FRAME LOWER RAILS	1½"	3½"	67 13/16"	SYP	2
I*	INNER FRAME SEAT LEGS	1½"	3½"	15 3/8"	SYP	4
J	INNER FRAME LOWER LEGS	1½"	3½"	14 3/32"	SYP	4
K	BRACES	1½"	3½"	18"	SYP	2
L	BRACE CLEATS	1½"	3½"	7"	SYP	2
M	TABLE SLATS	1½"	7⅛"	72"	C	5
N	SEAT SLATS	1½"	4"	72"	C	6

*Parts initially cut oversize. See the instructions.

MATERIALS KEY: SYP–Southern yellow pine, C–cypress.
SUPPLIES: 2½" deck screws, 2½" XL pocket screws.
BITS: 3/8" plug cutter, 1/8" round-over router bit.
PROJECT COST: It cost us about $675 to build this project. Your cost will vary by region and source.

CUTTING DIAGRAM

This project requires 43 board feet of 8/4 Southern yellow pine and 76 board feet of 8/4 cypress based on example boards shown.



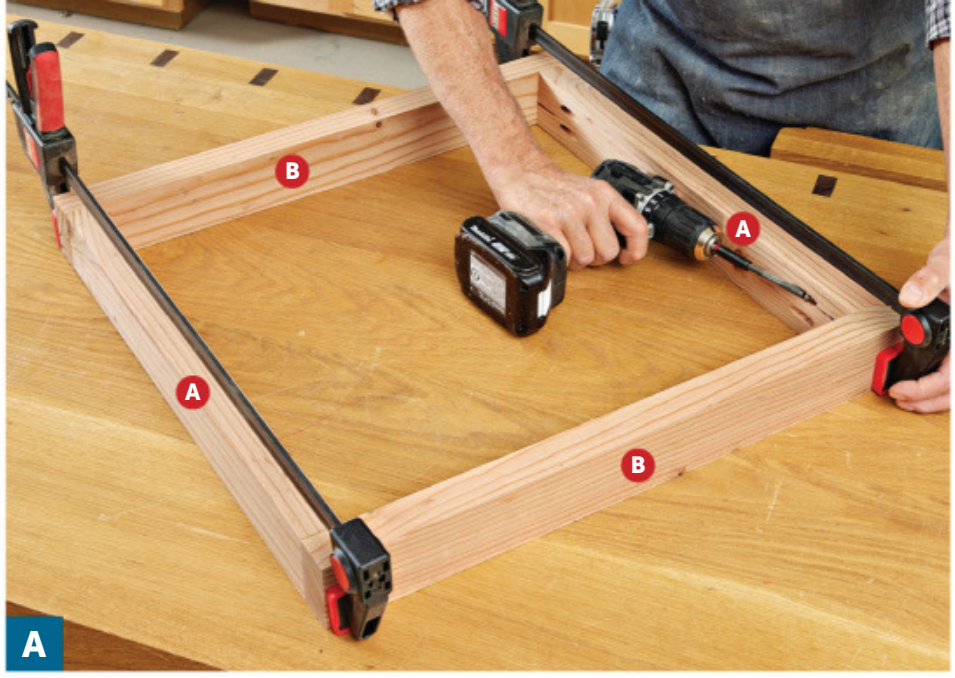
TRANSFORMABLE TOOL STAND

Simple but sturdy, this mobile stand can hold a benchtop power tool. Build two stands and you can stack them or pair them as pedestals for an add-on workbench top.

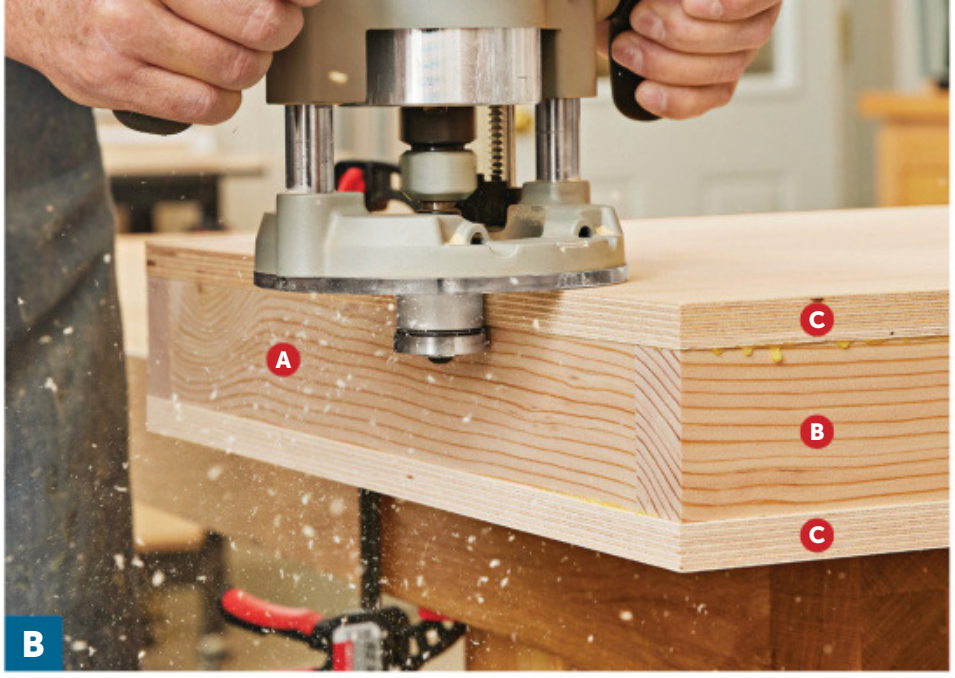
WRITER: KERRY GIBSON
DESIGNER: JOHN OLSON
BUILDER: BRIAN BERGSTROM

Benchtop tools may come in compact sizes, but you don't necessarily want them taking up valuable workbench real estate. This heavy-duty tool stand provides a mobile alternative to park those tools with onboard storage options of drawers or shelves. Build a pair of them and add the sturdy MDF top, and you've created a heavy-duty, mobile workbench.

PHOTOGRAPHERS: JASON DONNELLY, JACOB FOX
ILLUSTRATORS: ROXANNE LEMOINE, LORNA JOHNSON



Assemble the side rails (A) and stiles (B) with glue and pocket screws, then measure diagonally to check the frame assemblies for square.



Use a flush-trim router bit to cut both side panels (C) flush with the frame assemblies (A-B)

STOUT SIDES FOR STRENGTH

A pair of dimensional lumber frames skinned with plywood give the sides strength without complicated joinery.

1 From 2×4 stock, rip the side rails (A) and stiles (B) to width and cut them to length **[Drawing 1, Materials List]**. Drill pocket holes in both ends of the rails, then glue, clamp, and screw the frames together **[Photo A]**.

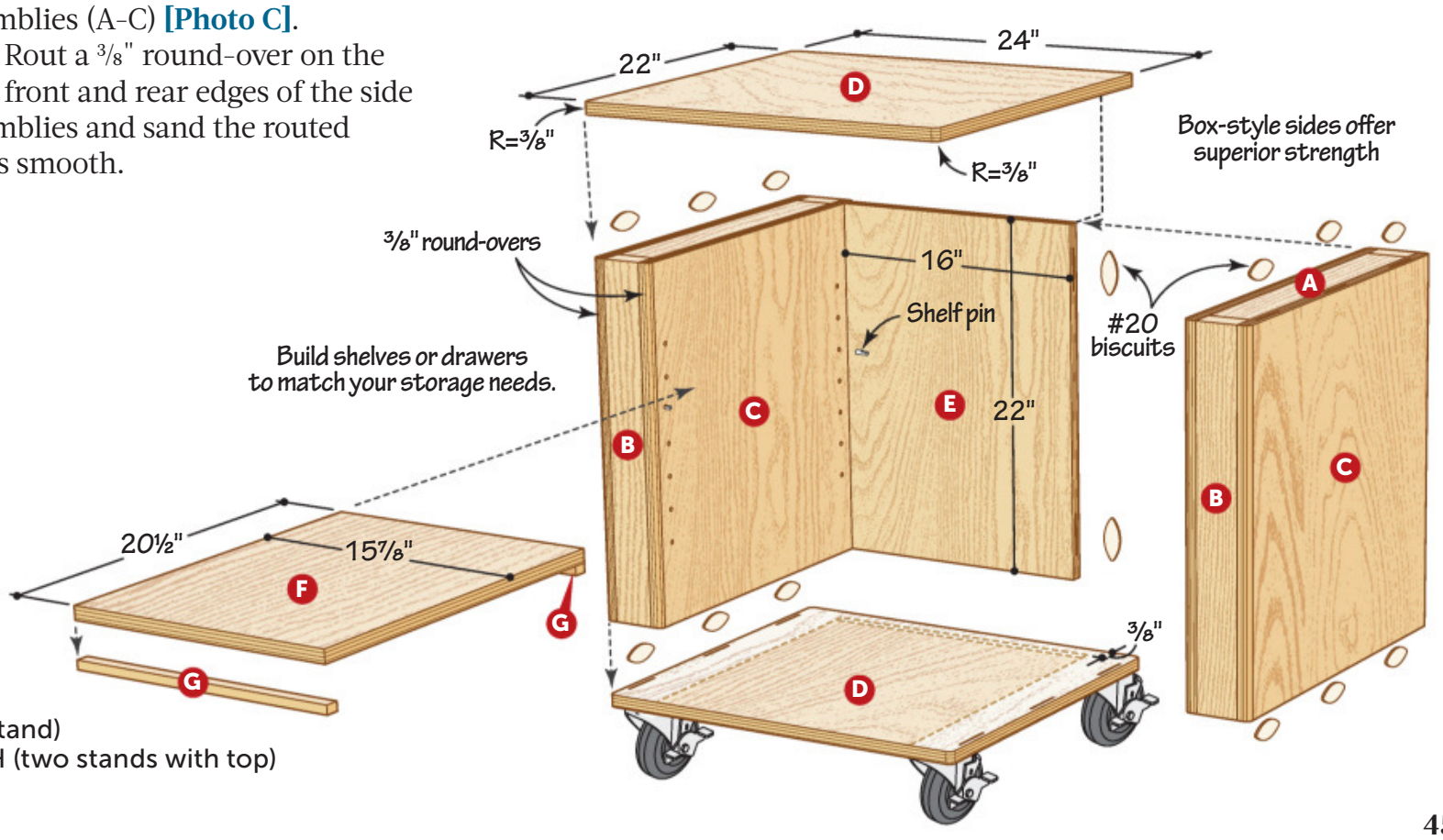
2 Cut the plywood side panels (C) **[Drawing 2]** slightly oversize, then glue and clamp them to the frame assemblies **[Drawing 1]**. When the glue dries, rout the panels flush with the frames **[Photo B]**.

3 From ¼" hardboard, cut a shelf-pin drilling template 3½×22". Mark a line 1⅜" from one edge along its length, then lay out and drill shelf-pin guide holes in the template. The self-centering bit **[Sources]** we used required ⅜" guide holes. Use the template as a guide to drill shelf-pin holes in the interior side panels of the side assemblies (A-C) **[Photo C]**.

4 Rout a ⅜" round-over on the front and rear edges of the side assemblies and sand the routed edges smooth.

Aligned flush to the edges, the template provides the differing offsets for drilling the front and back shelf-pin holes. We added tape as a reminder that "blue means back" and used a ¼" self-centering bit.

EXPLODED VIEW



OVERALL DIMENSIONS
24"W × 22"D × 27⁹⁄₁₆"H (stand)
72"W × 23¾"D × 29¹³⁄₁₆"H (two stands with top)

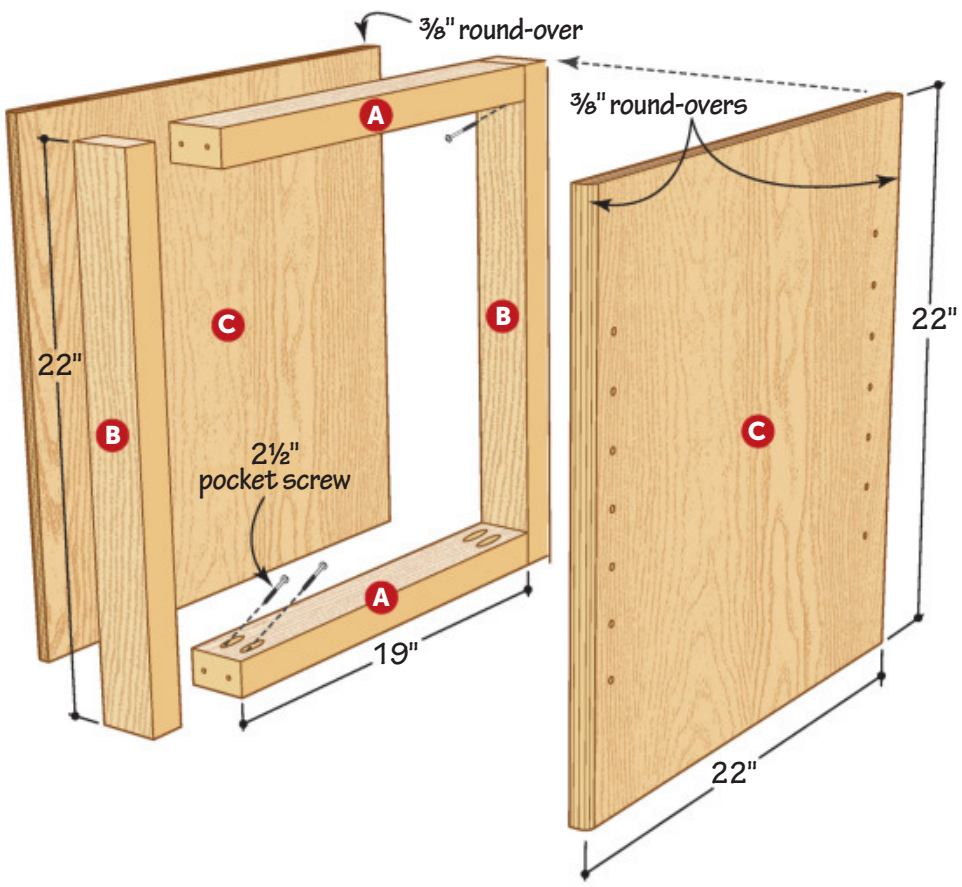
CONNECT THE SIDES

1 Cut the top and bottom (D) to size **[Exploded View, Materials List]**. Set the side assemblies in place on the bottom and measure the width for the back (E), then cut the back to size.

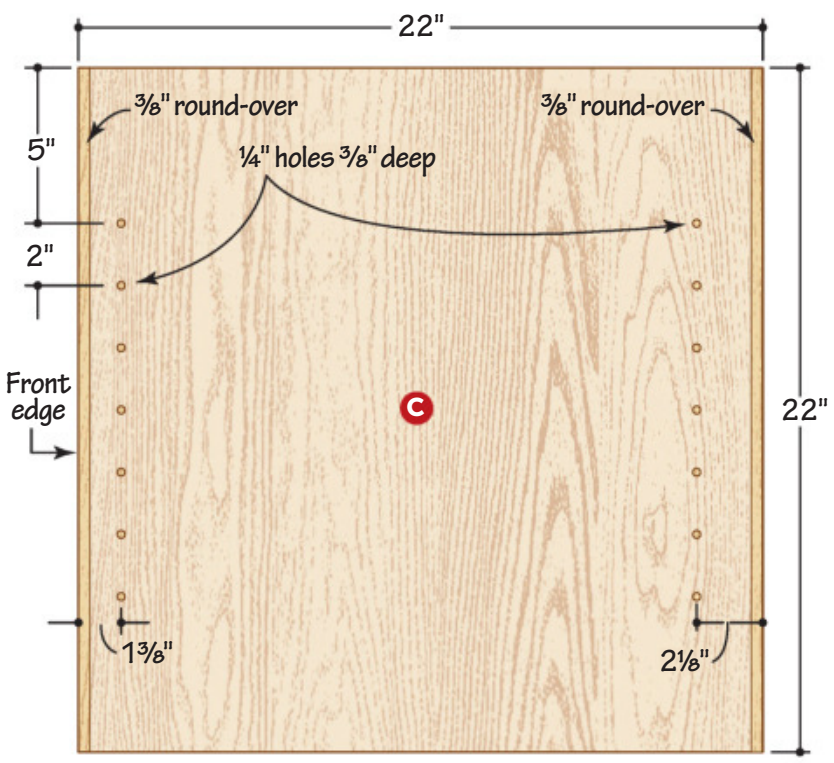
2 Cut biscuit slots in the edges of the back and transfer the location of the slots to the side assemblies. Cut slots in the side assemblies **[Photo D]**. Reset your biscuit joiner fence and cut slots in the top and bottom edges of the outer side panels (C) and mating slots in the top and bottom (D).

Because the back (E) is inset from the rear edge of the sides (C), set your biscuit joiner to cut the slots for the back ¾" from the rear edge. That will result in a ⅜" inset from the rear edge of the sides.

1 SIDE ASSEMBLY



2 INNER SIDE PANEL



3 Apply glue to the edges of the back (E) and in the biscuit slots in the back and side assemblies, then clamp the back between the side assemblies. Glue and clamp the top and bottom in place using the biscuits to keep everything aligned.

4 When the glue dries, sand the corners of the top and bottom to match the round-over on the sides.

5 Cut the shelf (F) and shelf trim (G) to size **[Materials List]**, then glue and clamp the trim to the underside of the shelf so the trim is flush with the front and rear edges of the shelf.

6 Finish-sand the assembled stand and shelf and apply the finish of your choice. Add swivel casters for mobility and to raise the stand to a more optimal working height.

TIP!

Shop projects are a great place to use up partial cans of finish.

ADD OPTIONAL DRAWERS

Drawers with full-extension slides provide secure storage and easy access for large and small items.

1 Cut the drawer sides (H) and fronts and backs (I) to size. **[Drawing 3]**. Mill a ¼" groove, ¼" deep on the inside face of each drawer side, front, and back.

2 Cut the drawer edging (J) to size, then glue and clamp it to the drawer sides.

3 Cut the drawer bottom (K) to size. Drill pocket holes in each end of the drawer fronts and backs (I). Then glue and clamp the drawers together and drive in the pocket-hole screws.

4 Cut the drawer false fronts (L) to size and glue and clamp them to the assembled drawers. Finish-sand the drawers and apply a finish. Then install the drawer pulls and slides. See *Simple Slide Installation* on the *next page*.

SIMPLE SLIDE INSTALLATION

Follow these simple steps to position slides consistently for drawers that fit right and move without binding. All you need are a few measurements and a scrapwood spacer.

We used full-extension, side-mounted slides, but the technique works for other types of slides, as well.

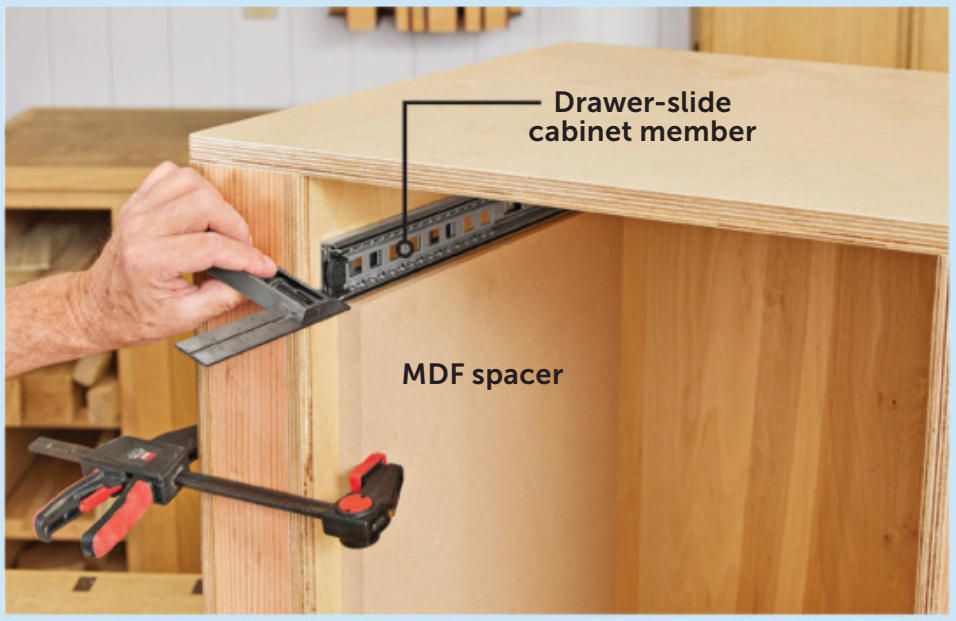
Each slide should have a plastic lever near the middle that, when tripped, allows the drawer member to be separated from the cabinet member. Separate the two components of each slide and set the drawer members aside for now.

First, figure out where you want to position the drawers. We wanted the upper drawer to sit ⅛" below the case top. Measure the drawer height, 3½" in our case, and add the ⅛" gap, for a total of 3⅝". Subtracting this from the 22" height of the case opening leaves a spacer height of 18⅜".

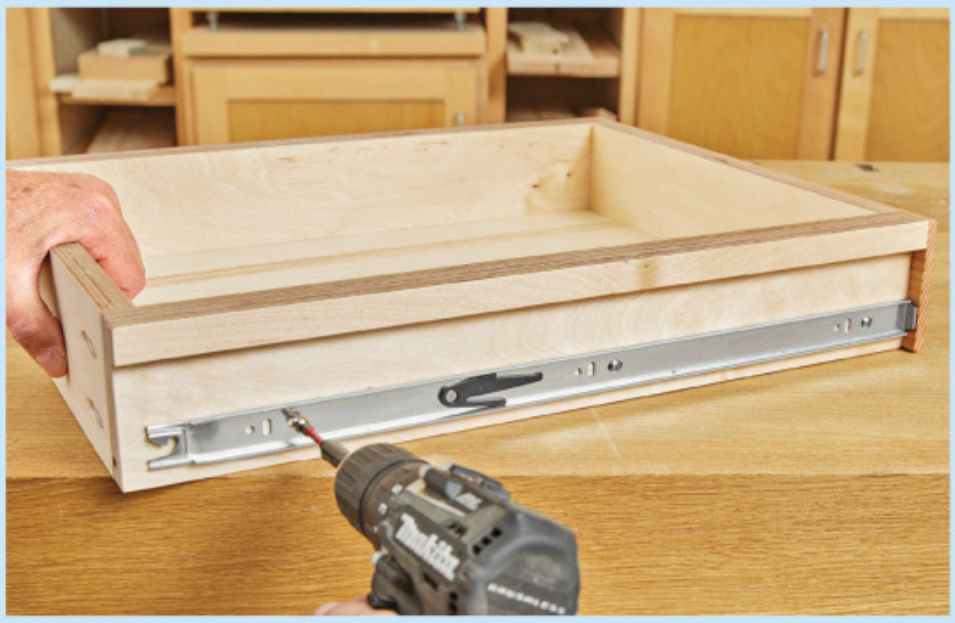
Cut a spacer to your determined height from scrap plywood or MDF and clamp it inside the case. Rest a drawer-slide cabinet member on top of the spacer. Screw the slide in place, positioning it at the appropriate setback *below, left*, typically the thickness of the drawer front. Move the spacer to the other cabinet side and repeat the slide mounting process.

Use the height of the cabinet member to determine the slide's centerline, which you can use to position the frames on the drawer sides *below, right*.

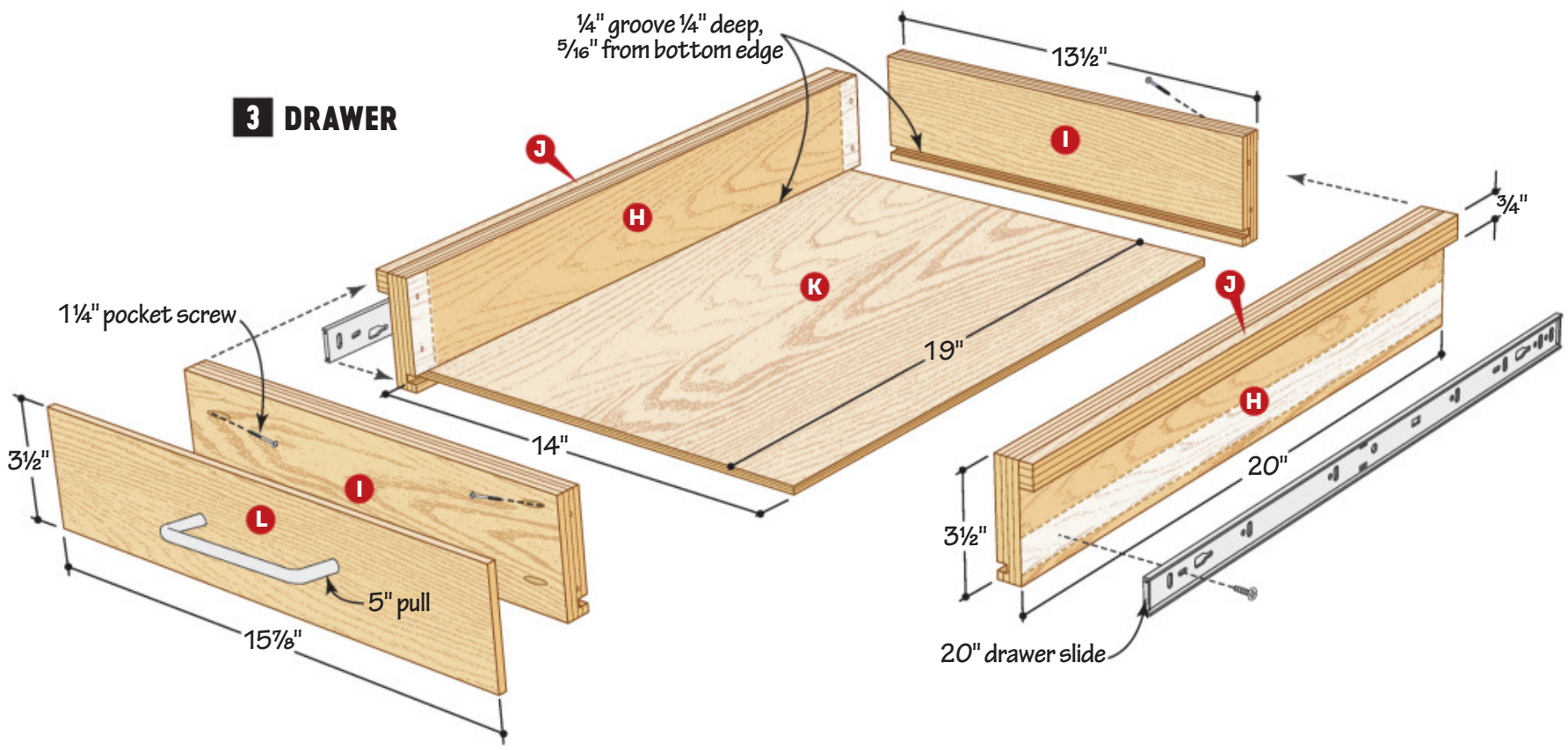
Use this same process to position and install the remaining drawers. We added one more at the bottom, resting the cabinet members on ⅛"-thick spacers.



Rest the cabinet member on the spacer and use an adjustable square to gauge the setback. In our case, there's a ⅜" round-over plus a ¼" false front, for a total setback of ⅝".



Total slide height is 1¾", so the centerline is ⅞". Mark a line on the drawer side ⅞" from the bottom edge. Butt the front of the slide against the false front and drive screws on the line you marked.



TOP IT OFF

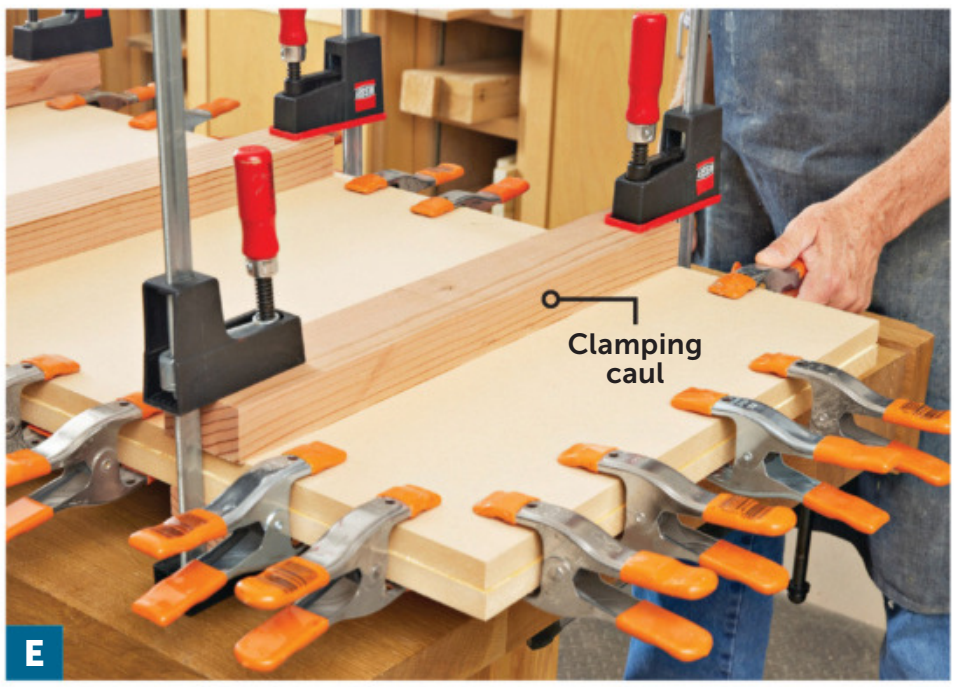
A removable benchtop provides bonus workspace. The frame locks together two pedestals to create a sturdy assembly. We drilled ¾" bench-dog holes in the top for flexible work-holding.

1 Cut two oversize MDF blanks to form the benchtop (M). Glue and clamp the blanks together **[Photo E]**. When the glue dries, cut the top to finished size **[Drawing 4]**.

2 Lay out the bench-dog holes on the top, drill the ¾" holes **[Photo F]**, and radius the corners of the top.

3 Cut the long and short edging (N, O), and spacers (P) to size **[Materials List]**. Glue and clamp the spacers to the short edging. When the glue dries, glue and screw the short edging assemblies (O-P) between the long edging. Glue and clamp the edging framework centered on the underside of the top, making sure not to block bench-dog holes.

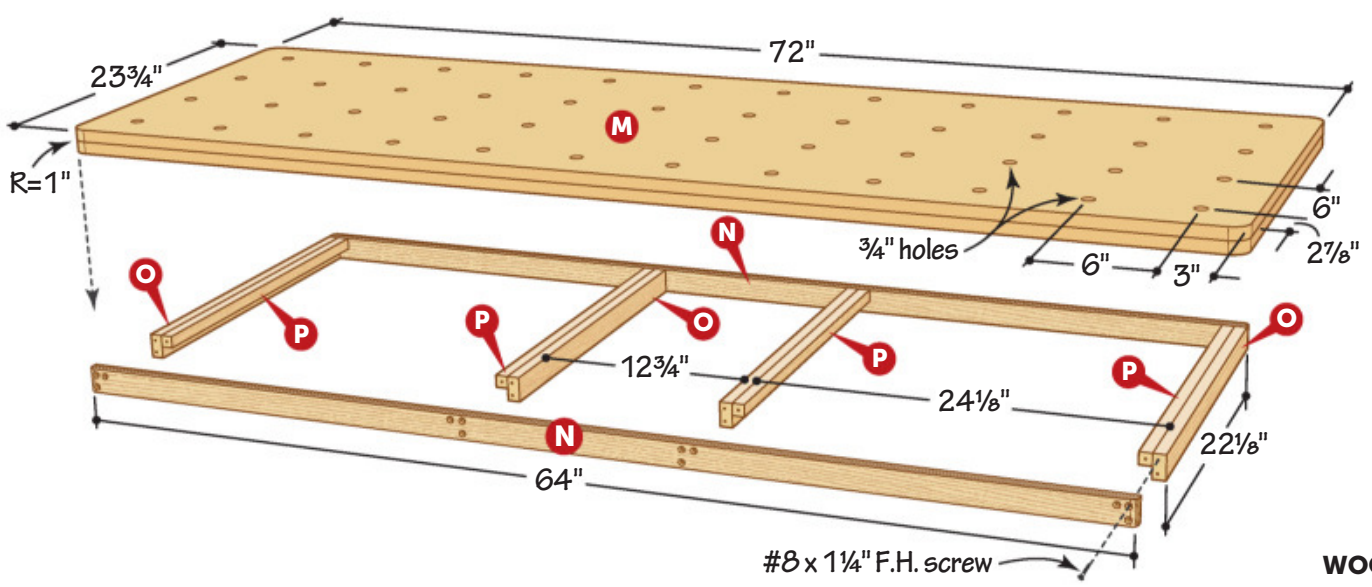
4 Finish-sand the assembled top and apply the finish of your choice. Then set the top in place on the stands and get to work on your next project.



Use a roller to spread glue evenly on the face of one MDF blank, then clamp the two blanks together to form the benchtop (M). Clamping cauls apply pressure to the center of the panels.

A portable drilling guide makes drilling perpendicular bench-dog holes quick and accurate. We used a ¾" brad-point bit from Lee Valley that cut more quickly and cleanly than others we tried.

4 BENCHTOP ASSEMBLY



MATERIALS LIST

PART		FINISHED SIZE T	W	L	Matl.	Qty.
STAND						
A	SIDE RAILS	1½"	2½"	19"	DF	4
B	SIDE STILES	1½"	2½"	22"	DF	4
C*	SIDE PANELS	¾"	22"	22"	BP	4
D	TOP/BOTTOM	¾"	22"	24"	BP	2
E	BACK	¾"	16"	22"	BP	1
F	SHELF	¾"	15⅞"	20½"	BP	1
G	SHELF TRIM	½"	¾"	15⅞"	DF	2
DRAWER						
H	DRAWER SIDE	¾"	3½"	20"	BP	4
I	DRAWER FRONT/BACK	¾"	3½"	13½"	BP	4
J	DRAWER EDGING	¾"	7/16"	20"	BP	4
K	DRAWER BOTTOM	¼"	14"	19"	BP	2
L	DRAWER FALSE FRONT	¼"	3½"	15⅞"	DF	2

PART		FINISHED SIZE T	W	L	Matl.	Qty.
BENCHTOP						
M*	BENCHTOP	1½"	23¾"	72"	MDF	1
N	LONG BENCH EDGING	¾"	1½"	64"	BP	2
O	SHORT BENCH EDGING	¾"	1½"	22⅛"	BP	4
P	BENCH SPACERS	¾"	¾"	22⅛"	BP	4

*Parts initially cut oversize. See the instructions.

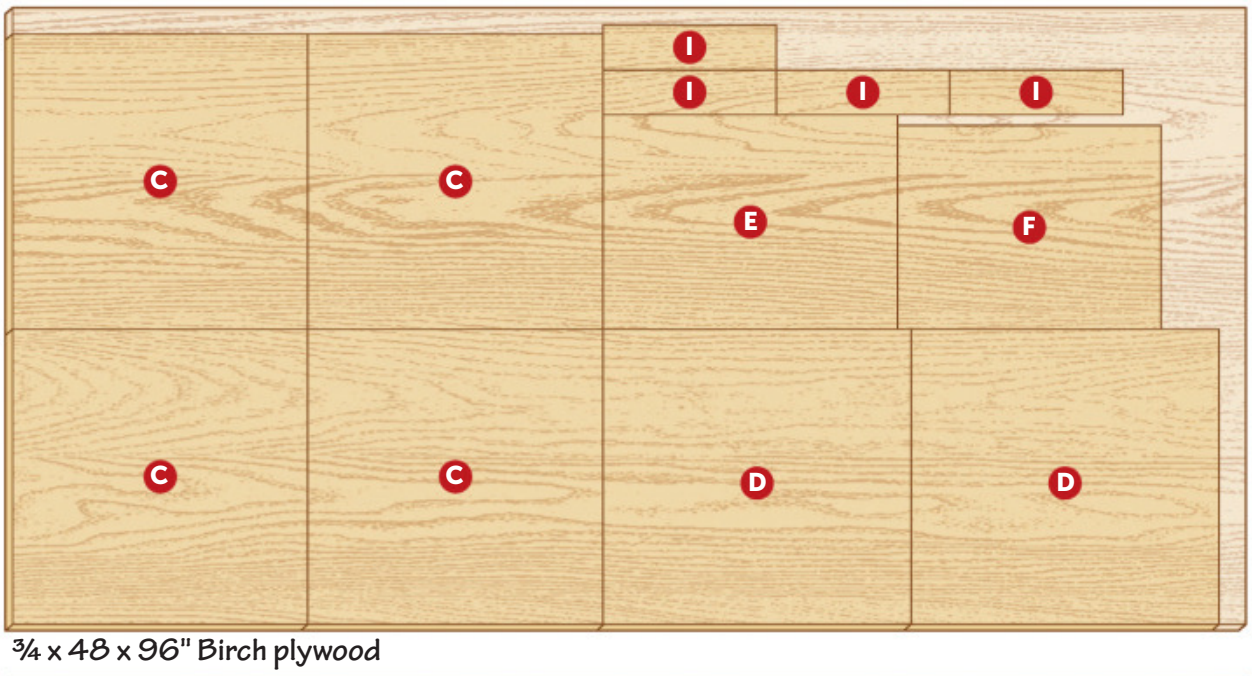
MATERIALS KEY: DF–Douglas fir, BP–birch plywood.
SUPPLIES: 1¼" and 2½" coarse-thread pocket-hole screws, #8×1¼" wood screws, ¼" shelf pins, #20 biscuits.
BLADE AND BITS: Flush-trim and ⅜" round-over router bits, ⅜" drill bit, ¼" self-centering drill bit, ¼" straight router bit or dado blade, ¾" brad-point drill bit.
SOURCE: Casters, no. 84082 (4), $8; 20" drawer slides, no. 44437 (2 pairs), $30; drawer pulls, no. 1007320 (2), $3, Rockler, rockler.com.
PROJECT COST: It cost us about $275 to build this project (one stand including shelf and two drawers, plus benchtop). Your cost will vary by region and source as well as by how many units you choose to build.

CUTTING DIAGRAM

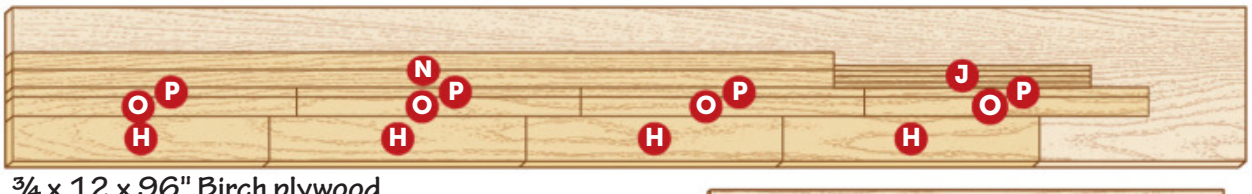
This project requires two 8' fir 2×4s, one 2' fir 1×4, and one ¼×3½" fir board based on example boards shown.

1½ x 3½ x 96" Fir

1½ x 3½ x 96" Fir



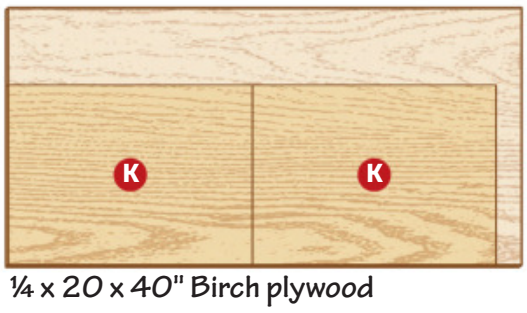
¾ x 48 x 96" Birch plywood



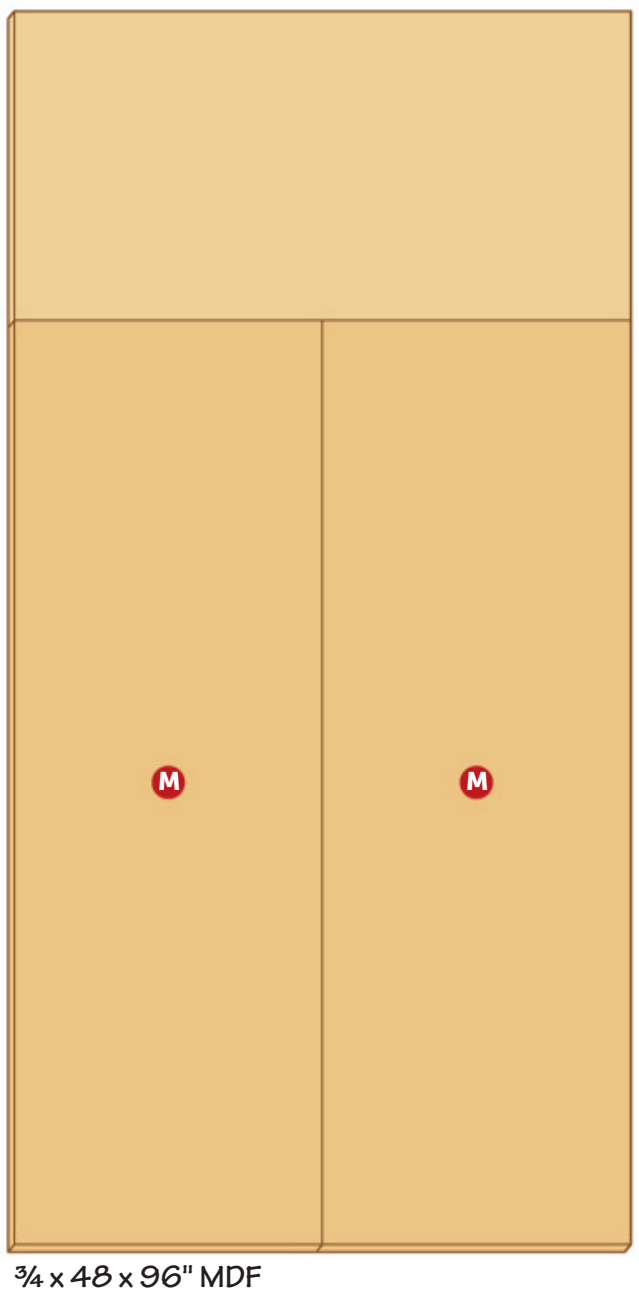
¾ x 12 x 96" Birch plywood

½ x 3½ x 24" Fir

¼ x 3½ x 48" Fir



¼ x 20 x 40" Birch plywood



¾ x 48 x 96" MDF

BREADBOARD ENDS DONE RIGHT

This traditional method for concealing end grain relies on a hidden trick to work properly. Find out the "hole" story behind breadboard ends with this time-tested method.

WRITER: KERRY GIBSON with JOHN OLSON

Adding breadboard ends certainly dresses up a project whether it's a cutting board or a tabletop. A tongue on the panel fits into the grooved end cap, neatly concealing the panel's end grain. But because the wood grain of the two pieces runs perpendicular, the panel's side-to-side expansion far exceeds the longitudinal expansion of the cap. Try gluing the joint and this wood movement will inevitably break the glue bond, cause splits in the main panel, or cracks in the breadboard end cap.

The solution you'll learn here uses drawbore pegs to hold the cap tightly against the shoulders of the tenon. But what you don't see is that the outer pegs pass through slots cut in the panel's tenon, allowing the pegs to maintain their grip, even as the panel expands and contracts.

We'll show you how to handle breadboard ends with a simple cutting board, but this technique can be adapted to work with large tabletops as well.

PHOTOGRAPHER: JASON DONNELLY

GET YOUR GROOVE ON

Start by planing the stock for the panel and the breadboard end caps to the same thickness. Edge-glue the panel to be slightly wider than finished size. For our cutting board example, we used ¾" maple.

The first trick to this technique requires cutting the groove in the end caps just slightly deeper–about 1/32"–than the length of the tenon **[Photo A]**. This provides just enough play for the drawbore pegs to work without having the tenon bottom out in the groove.

For our cutting board, we made the tenons ¼×1¼", and the groove in the end caps ¼×19/32". For a snug fit, cut a test tenon in scrap, raising or lowering the dado blade slightly to adjust the tenon's thickness **[Photo B]**.

Center a ¼" stacked dado blade on the end cap stock and cut the groove. For our dense maple, we made a pass with a regular blade first to remove some waste and make it easier to complete the groove.

Set your fence to cut the tenon to proper length. Cut the cheek on one side, making multiple passes. Then flip the panel over and cut the cheek on the other side.

DRILL THE END CAPS

With the grooves and tenons cut, lay out and drill the holes for the drawbore pegs in the end caps. We measured and marked the hole locations, then used a scratch awl to create a dimpled starting point for the brad-point bit **[Photo C]**.

Use a drill press to keep the bit perpendicular to the workpiece and for drilling accuracy. A brad-point bit won't slip or deflect and cuts clean, splinter-free holes **[Photo D]**.

Lay out the location of the drawbore pegs on the end caps and mark them with an awl. Center them on the depth of the groove so the end caps or tenon won't split when you drive the drawbore pegs.

Use a ¼" brad-point bit to drill the peg holes in the end caps. Insert a piece of scrap into the groove to help prevent blowouts and maintain alignment as the bit passes through the groove.

Position the end cap on the tenon, then use the same ¼" brad-point bit to transfer the hole locations from the end cap to the tenon. Spin the bit or tap it so the point leaves a mark.

Set a marking gauge slightly closer to the shoulder than the marked centerpoints. Then make new centerpoint marks on the scribed line at the location of each of the previously marked hole centers.

OFFSET THE TENON HOLES

To allow the pegs to draw the end caps tight, you'll need to offset the holes in the tenon slightly closer to the tenon shoulder. The pegs will force the offset holes to line up, drawing the breadboard end caps tight against the shoulder.

Start by slipping the end caps in place on the tenon, then use the same brad-point bit to mark the hole locations on the tenon **[Photo E]**.

Remove the end caps and set a marking gauge slightly–$^{1}/_{32}$" to $^{1}/_{16}$"–closer to the tenon shoulder **[Photo F]**. Use an awl to mark the hole locations on the offset line, then drill the holes in the tenon **[Photo G]**.

TIP!

Make your awl marks easier to see by inserting a sharp pencil in the indentation.

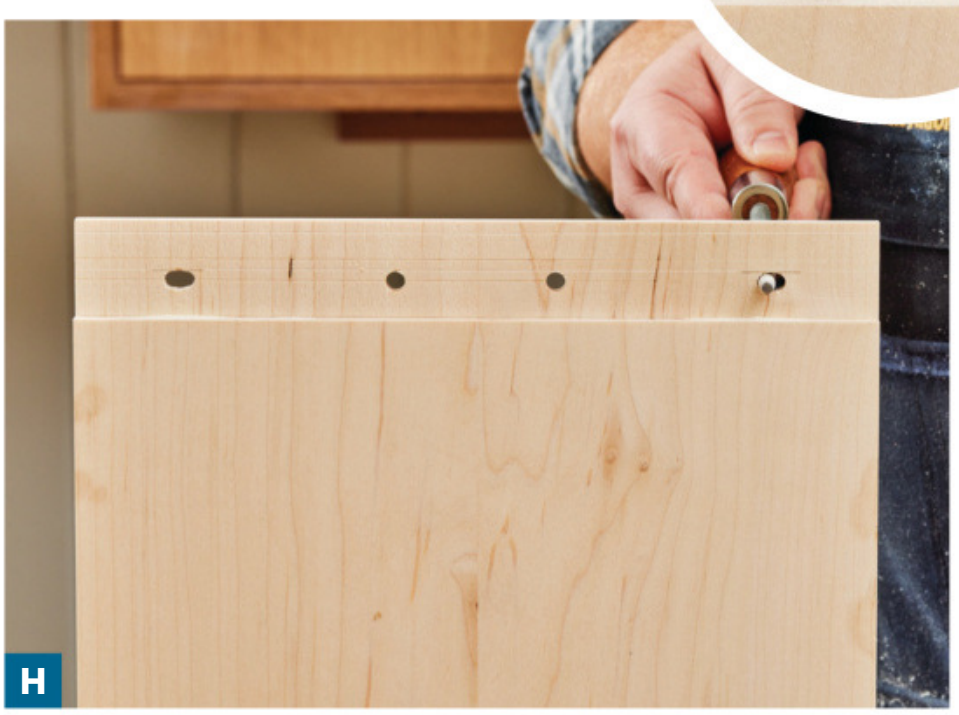
G

Using the same bit as before, drill the peg holes in the tenon on the offset centerpoints you just marked. Place a piece of scrap under the tenon to prevent blowouts.

> **THERE'S MORE TO A BREADBOARD END THAN MEETS THE EYE, BUT AVOIDING A WOOD-SPLITTING CATASTROPHE IS WORTH THE EASY ADDITIONAL EFFORT.**
>
> *-JOHN OLSON, DESIGN EDITOR*

PROVIDE ROOM TO MOVE

The real key to breadboard end success requires lengthening the outer holes slightly so the panel can expand and contract across its width. To do this, use a small round file to expand the outer holes slightly across the panel's width, being careful to keep on the same line as the original hole **[Photo H]**.



H

Enlarge the outer holes with a round file, being careful to expand the holes only across the panel's width. This ensures that the drawbore pegs will hold, yet allow the panel to expand and contract.

GO EASY ON THE GLUE

To attach the breadboard end caps, apply glue sparingly to the center portion of the tenons, then install the caps so the holes in the end caps align with the offset holes in the tenons. Clamp the end caps in place to help draw them tightly against the tenon shoulder.

Cut your dowel pegs extra long and sand a bevel on one end of each. Apply glue to the center holes and drive those dowels into place.

Tap the outer pegs until the taper is all the way through the end cap. Then apply a small amount of glue around each peg and tap them in no more than another $\frac{1}{8}$–$\frac{1}{4}$" **[Photo I]**. This keeps glue out of the slotted holes in the tenon so side-to-side motion won't be hindered.

Use a flush-trim saw to cut off the excess pegs and sand them flush. Finally, trim both edges so the panel and end caps are perfectly flush. Now you'll have breadboard ends that look great and will stand the test of time.

TIP!

For small dowels, use a pencil sharpener to quickly taper one end to a blunt point.

I

Insert the tapered end of extra-long dowel pegs into the holes and drive them so they protrude on both sides. Apply glue so that the pegs are glued to just the end caps and not the tenon.

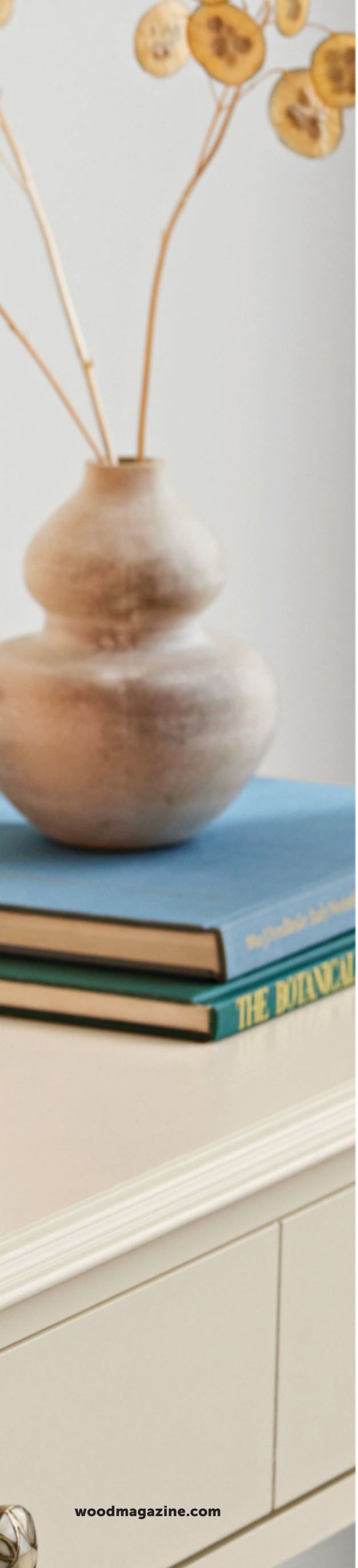
VENEER-SHADE LAMP

Get ready for warm and glowing reactions to this lamp. It makes sheets of veneer and bits from your scrap bin really shine.

WRITER: CRAIG RUEGSEGGER
DESIGNER/BUILDER: KEVIN BOYLE

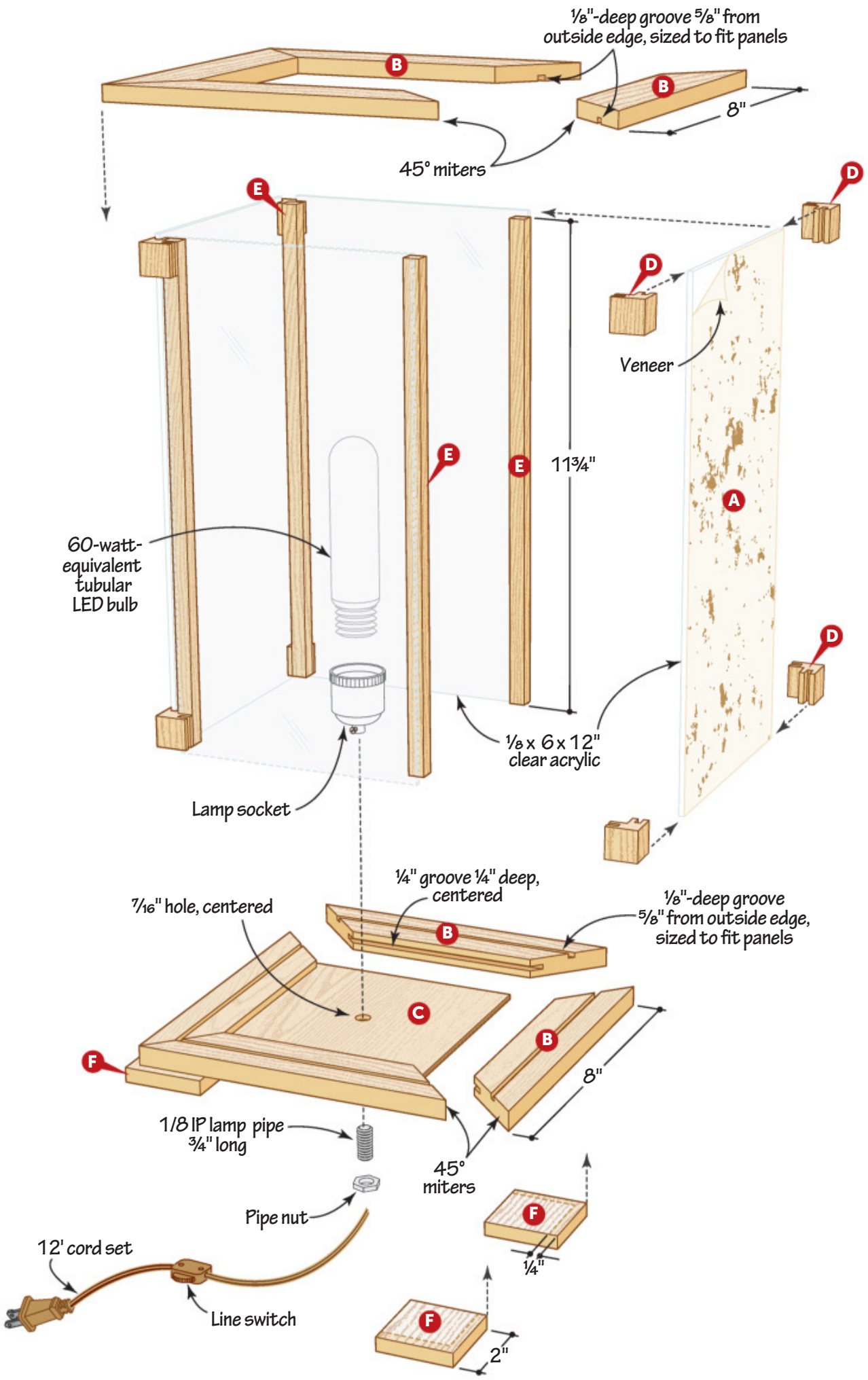
OVERALL DIMENSIONS
8½"W × 8½"D × 13⅛"H

PHOTOGRAPHER: JASON DONNELLY
ILLUSTRATORS: ROXANNE LEMOINE, LORNA JOHNSON



After applying a finish, we often say that wood has a "glow." This project takes that to another level. The glow comes from within–a light bulb shines through veneer adhered to clear acrylic panels. The polished edges of the acrylic also create striking illuminated vertical accents at each corner. Tablesaw joinery makes this a simple project you can complete in a few evenings.

EXPLODED VIEW



A

Fill one circle with resin, the other with hardener. Mix the two thoroughly. Repeat this for each panel as you prepare them.

B

Cover the acrylic with a thin, even layer of epoxy, ensuring it reaches to the edges and avoiding pools that could bleed through the veneer.

GET CLEAR ON THE VENEER

Clear epoxy adheres the veneer to the acrylic without diminishing any light. A lighter-colored veneer, such as the birch we used, lets more light through. A burl pattern adds character and looks great with a little prep. See *Veneering? Relax.* on the *next page.*

TIP!

Leave the protective film on the acrylic while making cuts to prevent scratches.

1 For the panels (A), cut four pieces of 1/8" acrylic to 6 1/4×12 1/4". A 60- or 80-tooth blade in the tablesaw works well. Lightly sand the cut edges with 220-grit sandpaper to remove burrs.

2 Cut four 6 1/4×12 1/4" pieces of veneer. From scraps of 3/4" sheet goods, cut two 6 1/2×12 1/2" pieces to use as clamping cauls. Tear four 7" lengths of waxed paper from a roll and remove the protective film from one face of each piece of acrylic. Lay a piece of acrylic on one of the cauls, film side down.

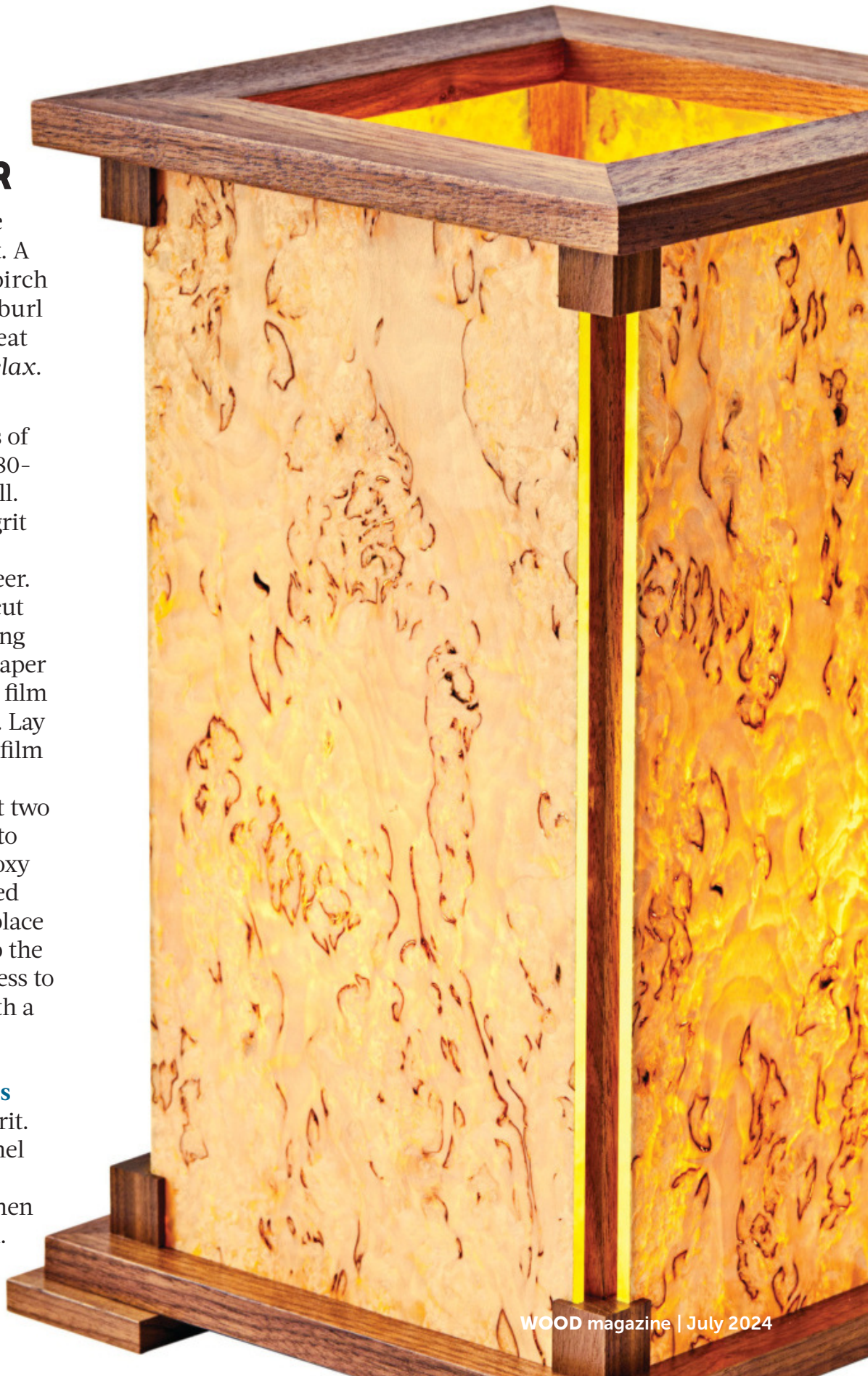
TIP!

Five-minute epoxy should provide plenty of open time, but work quickly once you begin mixing.

3 On a clean piece of scrap, lay out two 1 1/2"-diameter circles. Use these to evenly dispense and then mix the epoxy **[Photo A]**. Apply the thoroughly mixed epoxy to an acrylic panel **[Photo B]**, place the veneer on it **[Photo C]**, and clamp the assembly **[Photo D]**. Repeat this process to make the four panels (A), starting with a fresh mix of epoxy for each.

4 After the epoxy cures, trim the panels to finished size **[Materials List]**. Finish-sand the veneer to 220 grit.

5 Polish the long edges of each panel by sanding with 150-, 220-, and then 320-grit sandpaper **[Photo E]**. Then remove the remaining protective film.



C

Position the veneer on the epoxied acrylic, cover the veneer with a piece of waxed paper, and then add the second caul.

D

Make sure the cauls overhang all edges of the panel (A), and clamp the assembly firmly around all four sides.

E

Use sanding blocks to keep the acrylic edges as square as possible as you work through the grits.

VENEERING? RELAX.

Because veneer is only about 1/40" thick, it tends to wrinkle and warp as it dries. That's especially true with figured veneers—the type that looks great on this lamp. Trying to force the veneer flat results in cracks and splits. Fortunately, you can make it relax and become easier to work with by giving it a nice soaking and a few absorbent towels. (Similar methods also work on the *WOOD*® magazine staff after deadline.)

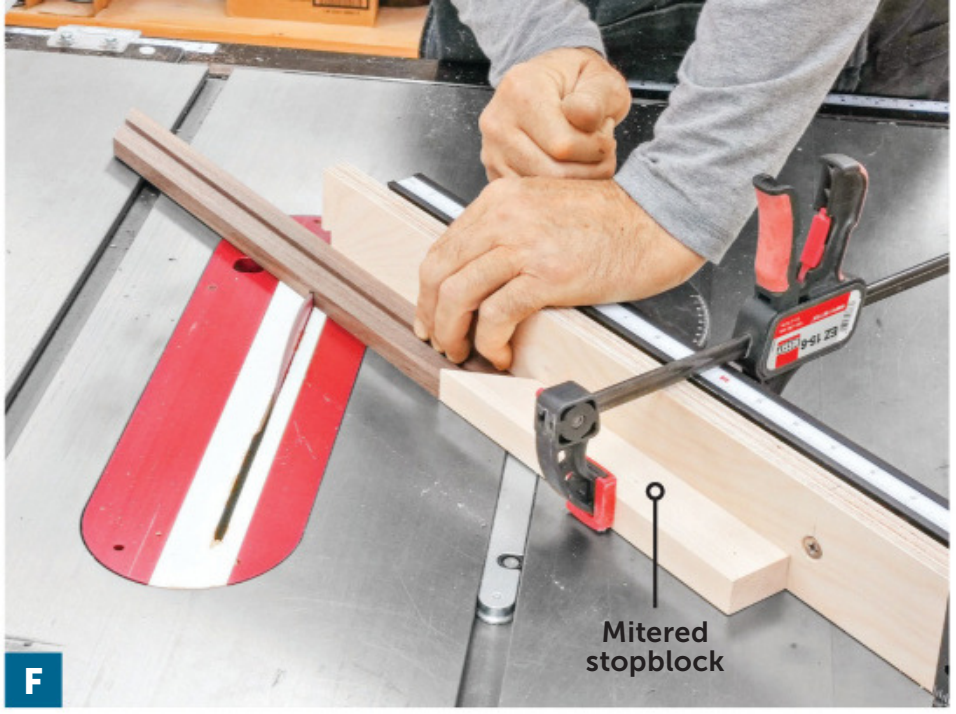
Veneer softening solutions [**Sources**] are a mix of water, glycerin, and alcohol. Spraying the veneer with the solution and then clamping it between cauls will make it pliable. Here's how.

Cover your workbench with a towel or drop cloth to catch any overspray. For each sheet of veneer, prepare a pair of cauls from ¾" sheet goods slightly larger than the veneer sheet. You'll also need a roll of paper towels.

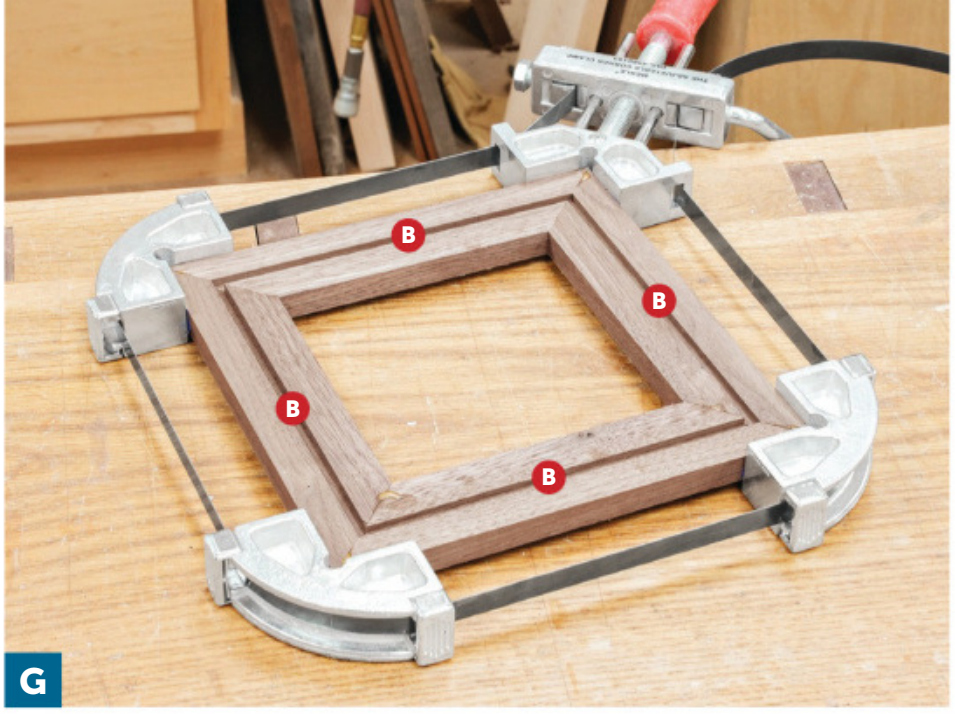
Place a caul on your bench and cover it with a layer of paper towels. Lay a sheet of veneer on the towels, then spray it with the softening solution just enough to dampen the sheet [top photo, *below*]. Cover the veneer with another layer of paper towels, place the second caul on top, and lightly clamp the stack together [bottom photo]. Then repeat for the remaining pieces of veneer. Let these sit overnight, and the next morning, the veneer should be pliable, not damp, and ready to use.

Lightly mist the veneer sheet. You want even coverage over the sheet, but not puddles of liquid.

Lightly clamp at each corner of the cauls to apply even pressure. The idea is to press, not crush, the fragile veneer.



Clamp a stopblock to your miter-gauge auxiliary fence and cut the frame sides (B) to finished length.



A band clamp applies even pressure at each corner, keeping all four pieces aligned.

FRAME UP THE PANELS

1 Cut four ½×1½×18" blanks for the top and bottom frame sides (B). Mark the outside edge of each blank; then cut a groove on one face of each blank sized to accept the panels (A) **[Exploded View]**. Cut a ¼" groove in the inside edge of two of the blanks. These blanks will be used for the bottom frame.

2 Cut opposing miters on the ends of each blank. Then cut the frame sides (B) to finished length **[Photo F]**. Glue up the top frame only **[Photo G]**.

3 Dry-fit the pieces for the bottom frame and cut the bottom panel (C) to fit in the grooves **[Exploded View]**. Drill the hole in the center of the panel, then glue up the frame around the panel.

4 To make the clips (D), cut a ¾×¾×12" blank. Cut grooves in adjacent edges to accept the panels (A) **[Drawing 1]**. Then rabbet one edge. Cut the clips to length.

5 Mill stock for the posts (E) and cut them to finished length. Glue a clip (D) flush with each end of the posts **[Exploded View]**.

Align a post/clip assembly (D/D/E) by dry-fitting two panels (A) in the bottom frame. Clamp the clip and carefully remove the panels.

6 Dry-fit two panels (A) in the bottom frame and use them to position a post/clip assembly at the corner as you glue the post in place **[Photo H]**. Work your way around the base to glue the remaining posts/clips in place **[Photo I]**.

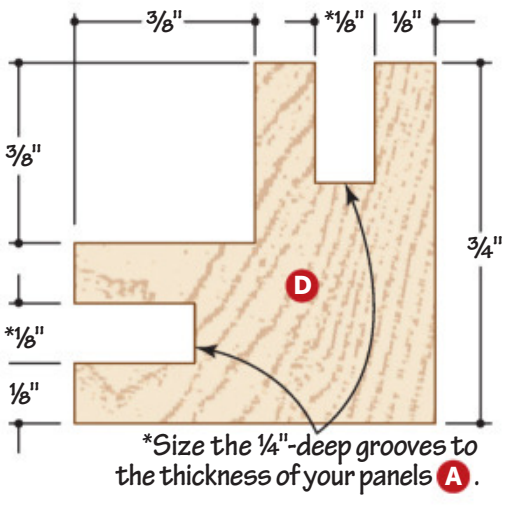
7 After the glue dries, glue the panels (A) to the bottom clips (D) and the bottom frame **[Photo J]**. After all four panels are in place, apply glue to the groove in the top frame and to the top of the posts and clips. Clamp the top frame in place.

8 Cut the feet (F) to size and glue them to the corners of the bottom frame. After the glue dries, finish-sand and apply a finish. (We sprayed on two coats of lacquer.)

9 Install the lamp parts as shown in **Drawing 2** or have a qualified electrician wire the lamp. Switch on the light and bask in the warm glow of a beautiful project.

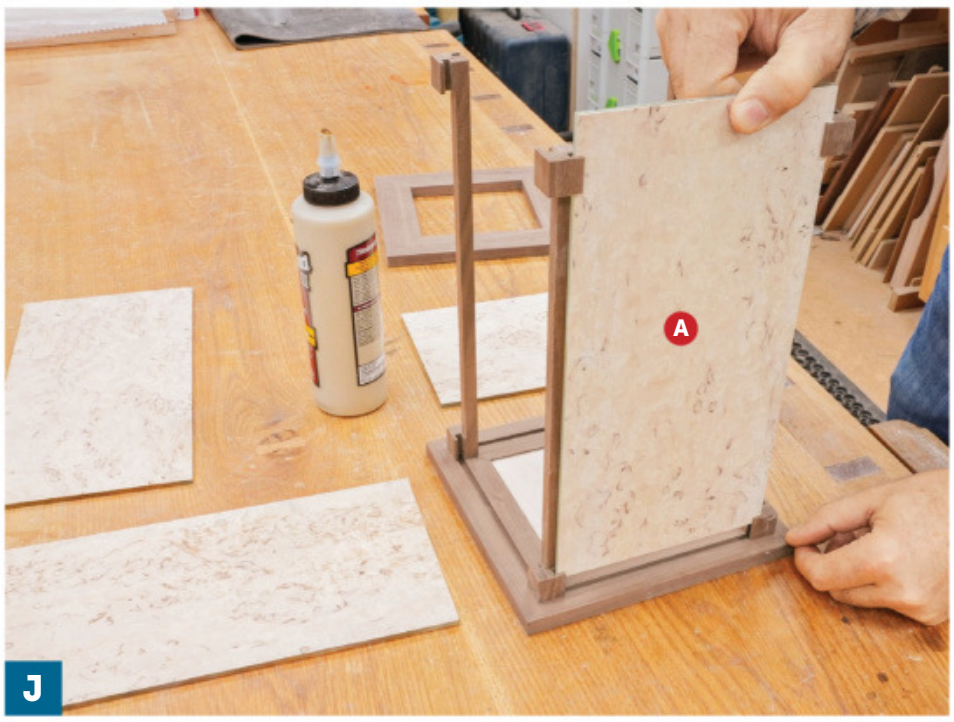
Cut small parts to length safely with this tablesaw sled.
woodstore.net/smallpartsled

1 CLIP DETAIL



I

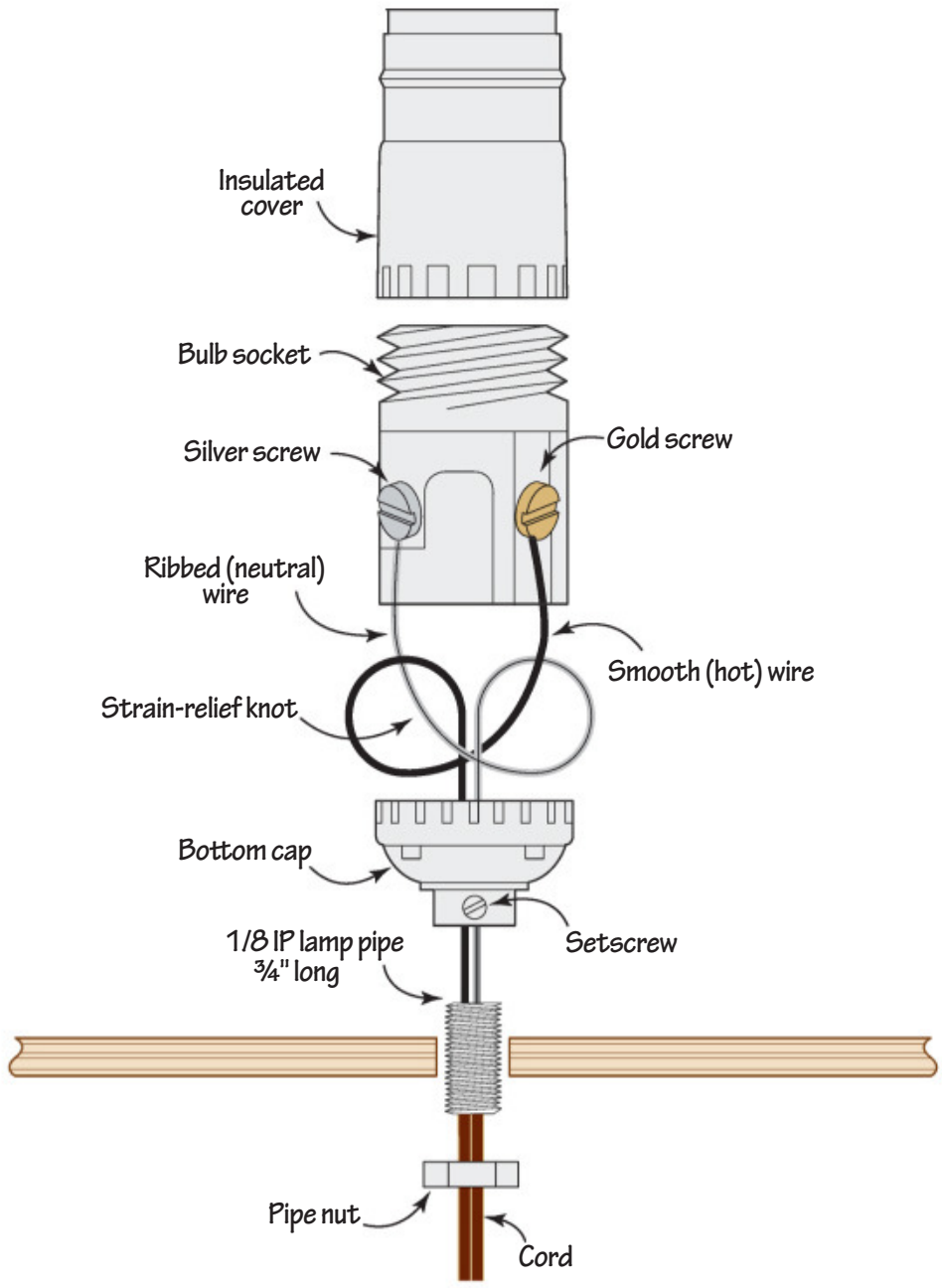
Check that the posts remain perpendicular to the base and parallel to one other.



J

Apply glue only to the outside wall of the grooves in the bottom frame and the grooves in the bottom clips. Do not put glue in the top clips, as it would smear along the exposed panel edges.

2 WIRING DIAGRAM



MATERIALS LIST

PART		FINISHED SIZE T	W	L	Matl.	Qty.
A*	PANELS	⅛"	6 "	12"	VA	4
B*	FRAME SIDES	½"	1½"	8"	W	8
C	BOTTOM PANEL	¼"	5½"	5½"	P	1
D*	CLIPS	¾"	¾"	¾"	W	8
E	POSTS	⅜"	⅜"	11¾"	W	4
F	FEET	⅜"	2"	2"	W	4

*Parts initially cut oversize. See the instructions.

MATERIALS KEY: VA–veneered acrylic, W–walnut, P–plywood.
SUPPLIES: Veneer, waxed paper.
SOURCES: ⅛×30×36" acrylic no. 11233, $39; 12' 18-2 lamp cord no. 40273, $12; lamp switch no. 77568, $4; keyless lamp socket no. 75111, $6; lamp pipe 1/8 IP no. 46797, $4; lamp pipe nuts (pack of 16) no. 47808, $3; LED bulb (2-pack) no. 5190583, $15, epoxy no. 50240H $22, Lowe's, lowes.com. Super-Soft 2 veneer softener 16 oz, $15, veneersupplies.com.
PROJECT COST: It cost us about $180 to build this project. Your cost will vary by region and source.

CUTTING DIAGRAM

This project requires 2 board feet of 4/4 walnut based on example board shown.

¾ x 3½ x 72" Walnut †Plane or resaw to the thicknesses listed in the Materials List.

¼ x 12 x 12" Plywood

SLED INTO SUCCESS WITH SEGMENTED BOWLS

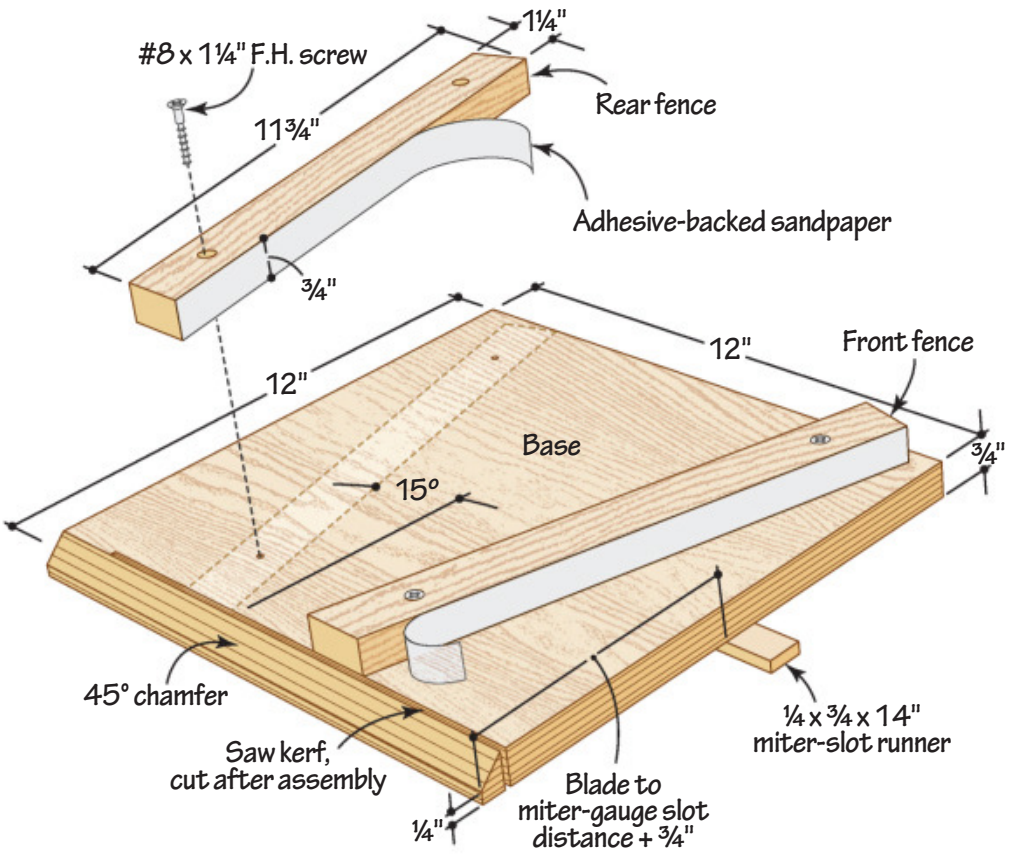
Start your journey toward creating beautiful bowls with the first critical step: accurately cutting and assembling the angled segments.

WRITER: TOM WHALLEY with DAVE STONE
DESIGNER: TOM WHALLEY

PHOTOGRAPHER: JASON DONNELLY; **ILLUSTRATORS:** ROXANNE LEMOINE, LORNA JOHNSON

Making segmented bowls starts with cutting strips of wood into small pieces, then gluing those pieces together to form rings. Stack the rings, and you can create bowls and vessels with striking appearances. Forming rings with tight-fitting joints requires accurately cutting those segments with consistent lengths and angles. The key to success: a tablesaw sled with two fences. We'll show you how to calculate the correct angles for a basic bowl, build the sled, cut segments, and glue them into rings.

SEGMENTED BOWL JIG



IT'S ALL IN THE ANGLES

Creating rings starts with determining how many pieces (segments) you want in each ring, using simple math. Start with 360, the number of degrees in a complete circle. Then divide by the number of segments you want. For simplicity, choose an even number that divides easily into 360.

A basic bowl made up of rings with 12 segments offers an easy way to get started. Divide 360° by the number of segments to determine the overall angle formed by their intersection (360°/12=30°). Dividing that number by 2 determines the angle to cut on each end of every segment (30°/2=15°). The chart on *page 63* shows angles for rings with different numbers of segments.

Lay out the fence locations at opposing 15° angles from one edge of the base. A digital angle finder provides accurate measurement.

LET'S GO SLEDDING

With your angles determined, build a tablesaw sled to cut the segments. Before you begin, make sure that your blade sits at 90° to the saw table, and that the blade is parallel to the miter gauge slot.

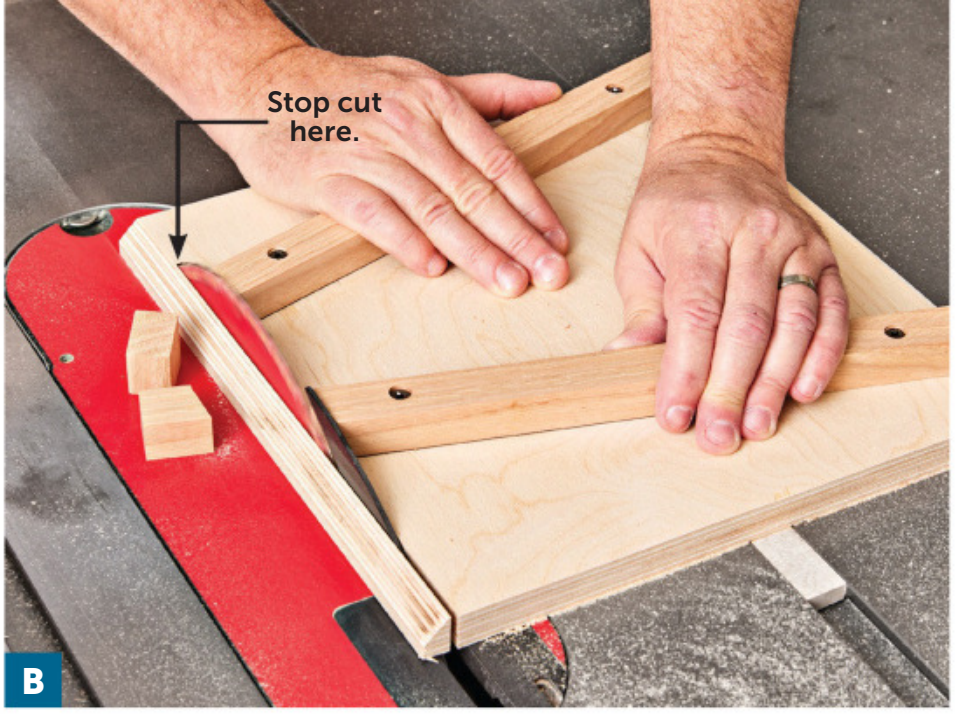
From ¾" plywood, cut the base to size **[Drawing]**. For these 12-segment rings, mark two 15° angles across the face **[Photo A]**. Then cut a 45° chamfer on this same edge.

From scrap hardwood, make a runner to fit the width of your miter-gauge slot. Measure from your saw blade to the miter-gauge slot, add ¾", and then screw the runner to the underside of the base at this location, taking care to position the runner parallel to the chamfered edge.

Tune up your tablesaw for accurate cuts with this FREE video
woodmagazine.com/tablesawtuneup

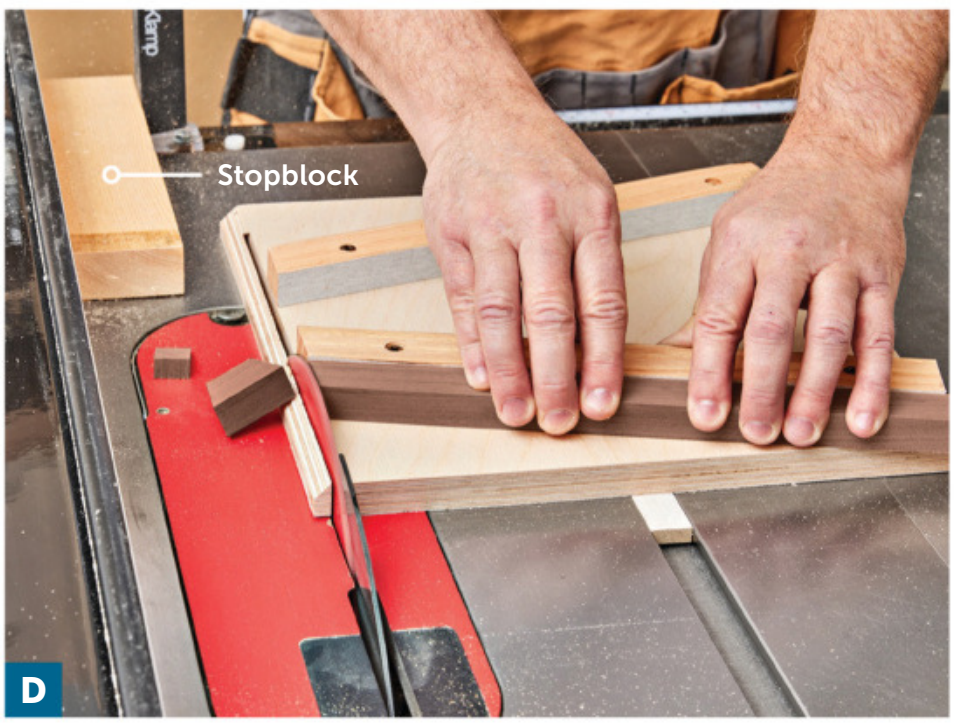
Cut a pair of fences, leaving them about 1" overlong. Screw them to the base, carefully aligning them with the 15° layout lines and overhanging the chamfered base edge.

Cut a stopped kerf in the base, simultaneously trimming the fences to length **[Photo B]**. The stopped cut leaves the chamfered edge of the base attached, creating an offramp that allows the segments to fall away from the blade as you cut them. Finally, to help hold your segment blanks in place, adhere sandpaper to the fence faces. Stop the sandpaper just shy of the cut-off ends so your blade won't contact the abrasive.



Raise the blade to cut through the fences, and then cut a kerf in the base. Stop the cut just beyond the rear fence.

Trim your first segment blank using the rear sled fence. This cuts the end at 15°. This first cut doesn't require the stopblock.



Use the stopblock to position the workpiece on the front fence for the opposite 15° cut. The offramp pushes the segment away from the blade.

START CUTTING SEGMENTS

Now you can cut segments using the sled to cut both ends accurately without any setup changes.

Cut blanks to width from contrasting or complementary species, making sure they are the same thickness. Then determine how long you want your segments. To make a bowl approximately 6" in diameter at its rim, we cut segments ranging from $^{7}/_{8}$" to $1^{1}/_{2}$" long, increasing length about $^{1}/_{8}$" for each layer. (You'll add a solid base to enclose the bottom of the bowl later.)

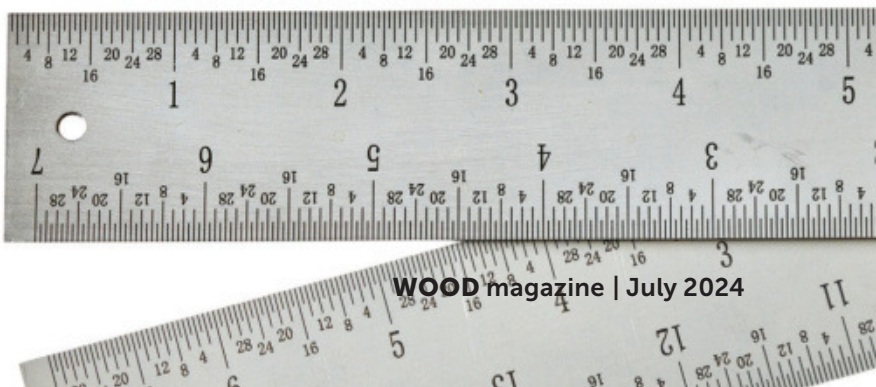
Make a 3"-wide stopblock thick enough to butt the segment blanks against. Clamp the stopblock to the rip fence on the infeed side of the blade and set the fence so that the distance between the stopblock and the sled's kerf matches your desired segment length.

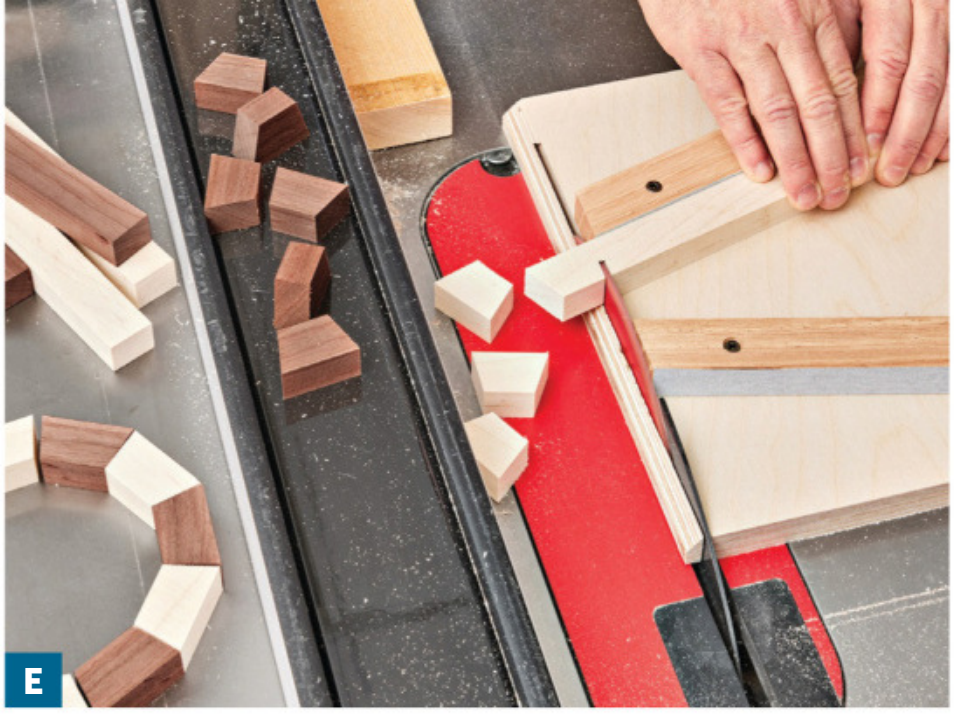
Using the rear fence, trim the end of one blank **[Photo C]**. Pull the sled back as soon as the trimmed end falls away so you don't cut off the chamfered edge of the base.

Move the blank to the front fence, keeping the same face of the blank against the sled. Butt the end against the stop-block, and then push the sled forward to cut the first segment free **[Photo D]**.

TIP!

If you're worried about cutting off the chamfered edge, mount a stopblock to the saw table using double-faced tape to stop the sled short of a full cut.





Make repeat cuts in the contrasting blank, moving between the front and back fences, to cut as many identical segments as you need.

With the first segment cut, retract the sled, move the blank back to the rear fence, butt it against the stop block, and make another pass with the sled to cut the next segment. Repeat this back-and-forth process until you've cut six segments–enough for half of a ring. Then switch to your contrasting blank and repeat the process, starting with trimming the end then making cuts using each fence **[Photo E]**.

Adjust your tablesaw fence to cut the next length and repeat the process to cut the next ring's segments.

GATHER UP FOR THE GLUE-UP

TIP!

Because the ends of the segments are end grain, they will soak up more glue. Be sure to apply enough to create a strong bond.

Lay out the blanks for one layer and glue them together by spreading glue on the angled end of one piece and joining it to its neighbor. To keep the pieces from slipping, rub them together a few times to create tack. Glue on one segment at a time to build your ring. Add masking tape to the outer edges to hold the joints **[Photo F]**. Work quickly but deliberately to complete a ring before the glue starts to dry.

After the glue sets, remove the tape and sand to remove squeeze-out and flatten the ring faces. Stack the rings and dry-fit your bowl **[Photo G]**. Then offset the joints and glue-up your bowl.

Once the glue dries, cut a bottom to fit, glue it on, and then head to the lathe to turn your segmented rings into a beautiful bowl. With the basics mastered, we bet your first one won't be your last.

Glue one segment at a time to your ring, adding tape every few segments. Then wrap the entire ring tightly while the glue sets.

Before gluing up your bowl, stack the rings and check to ensure no gaps exist between layers. Plywood cauls distribute clamping pressure.

KNOW ALL THE ANGLES

SEGMENTS	CUT ANGLE
10	18°
12	15°
18	10°
20	9°
30	6°
36	5°

SOCK-LEG TABLE

Build this accent table and try your hand at an uncommon technique for dressing up tapered legs.

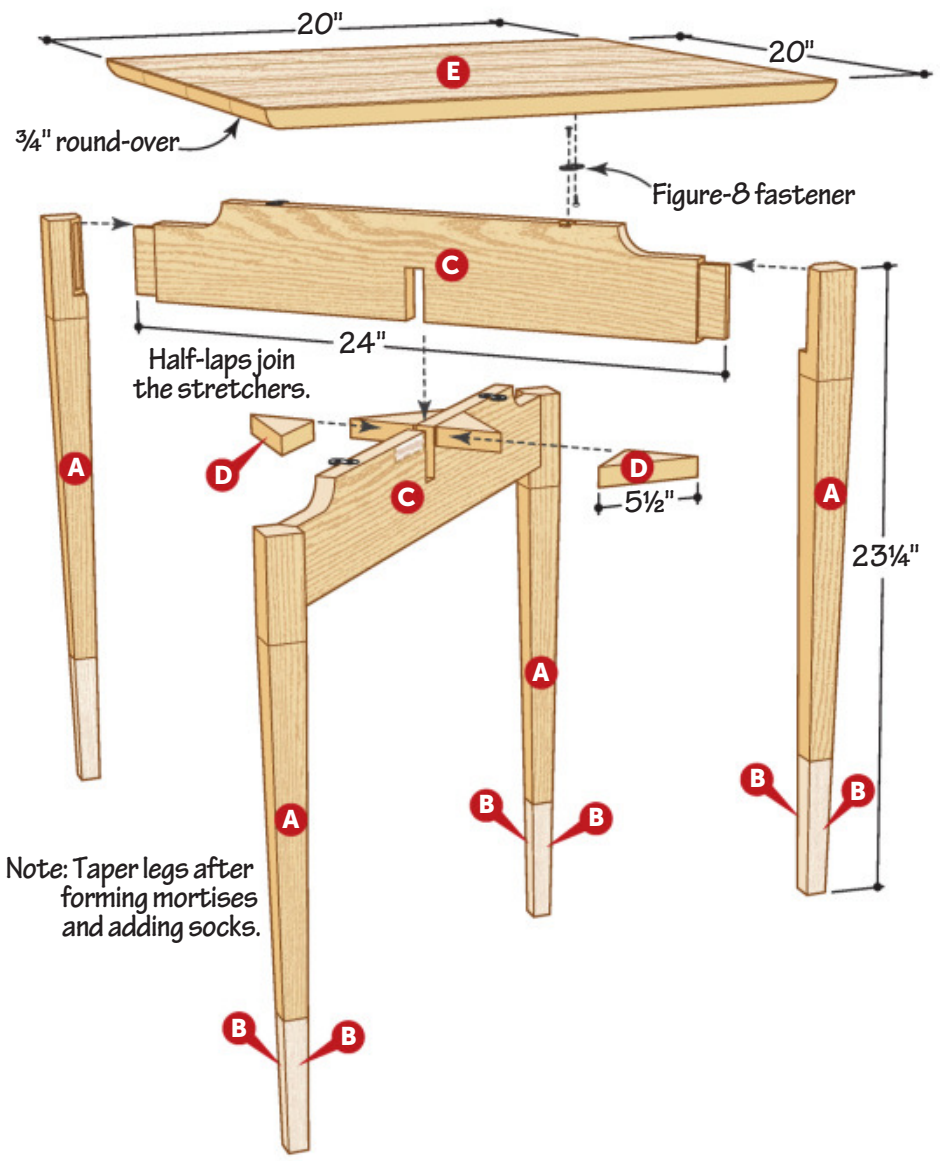
WRITER: VINCE ANCONA
DESIGNER/BUILDER: KEVIN BOYLE

OVERALL DIMENSIONS
20"W × 20"D × 25"H

PHOTOGRAPHER: JASON DONNELLY; **ILLUSTRATORS:** ROXANNE LEMOINE, LORNA JOHNSON

Side tables with tapered legs are nothing new. But this one has a twist. Contrasting woods make up the legs, giving them the appearance of wearing socks. Creating this look seems complicated, and it requires careful fitting, but we'll help you put your best foot forward.

EXPLODED VIEW



Using your rip fence as a stop and an auxiliary miter-gauge fence to minimize chip-out, cut a ⅜"-deep dado on all four faces of each leg blank (A). Leave the dado blade set up for a later step.

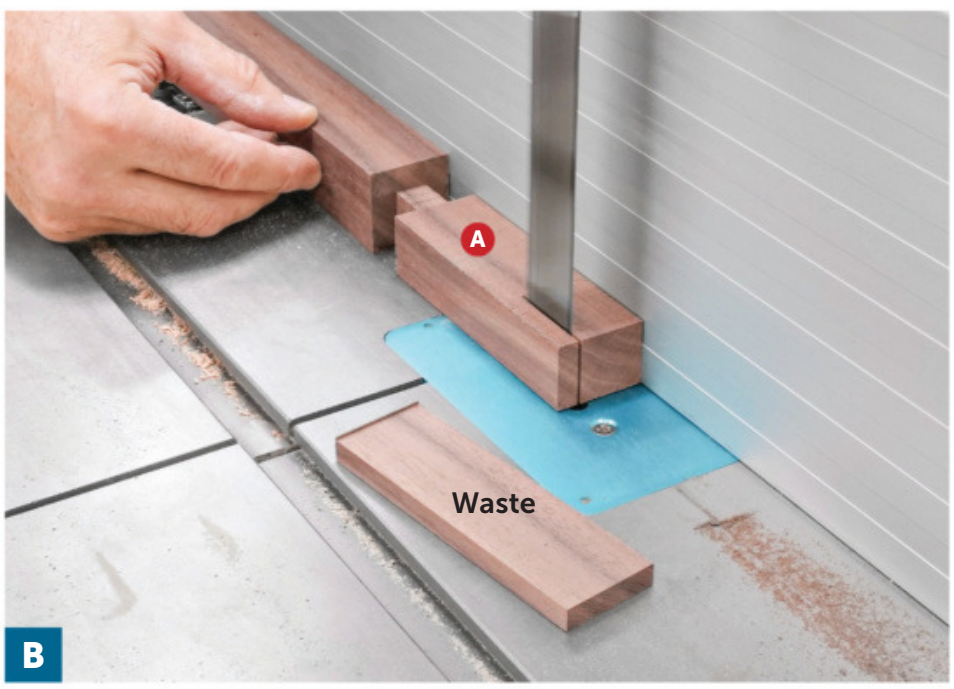
SOCK IT TO ME

Create the socks by cutting a long, skinny core at the end of each leg and wrapping that with contrasting wood before tapering the legs at the tablesaw.

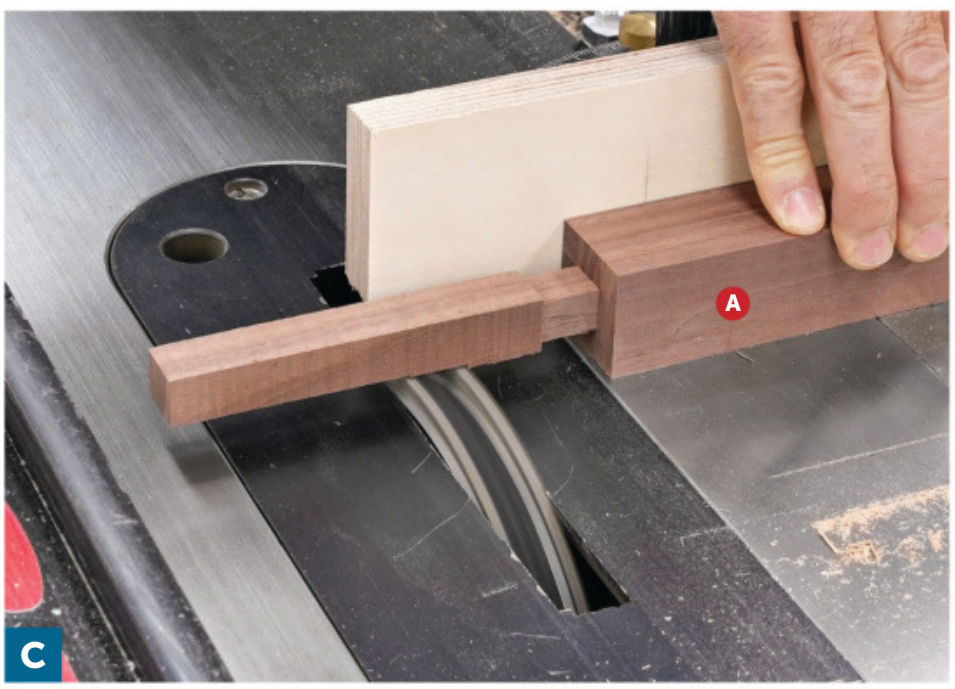
1 Cut the leg blanks (A) to size **[Materials List, Exploded View, Drawing 1]**.

2 Lay out the waste areas on the faces and end of each leg. Cut a dado on all four sides of each leg to establish the shoulder of the foot **[Photo A]**.

3 Bandsaw away the bulk of the waste around the core of each leg, staying on the waste side of the layout lines **[Photo B]**. Then return to the tablesaw to bring the core to final size **[Photo C]**.

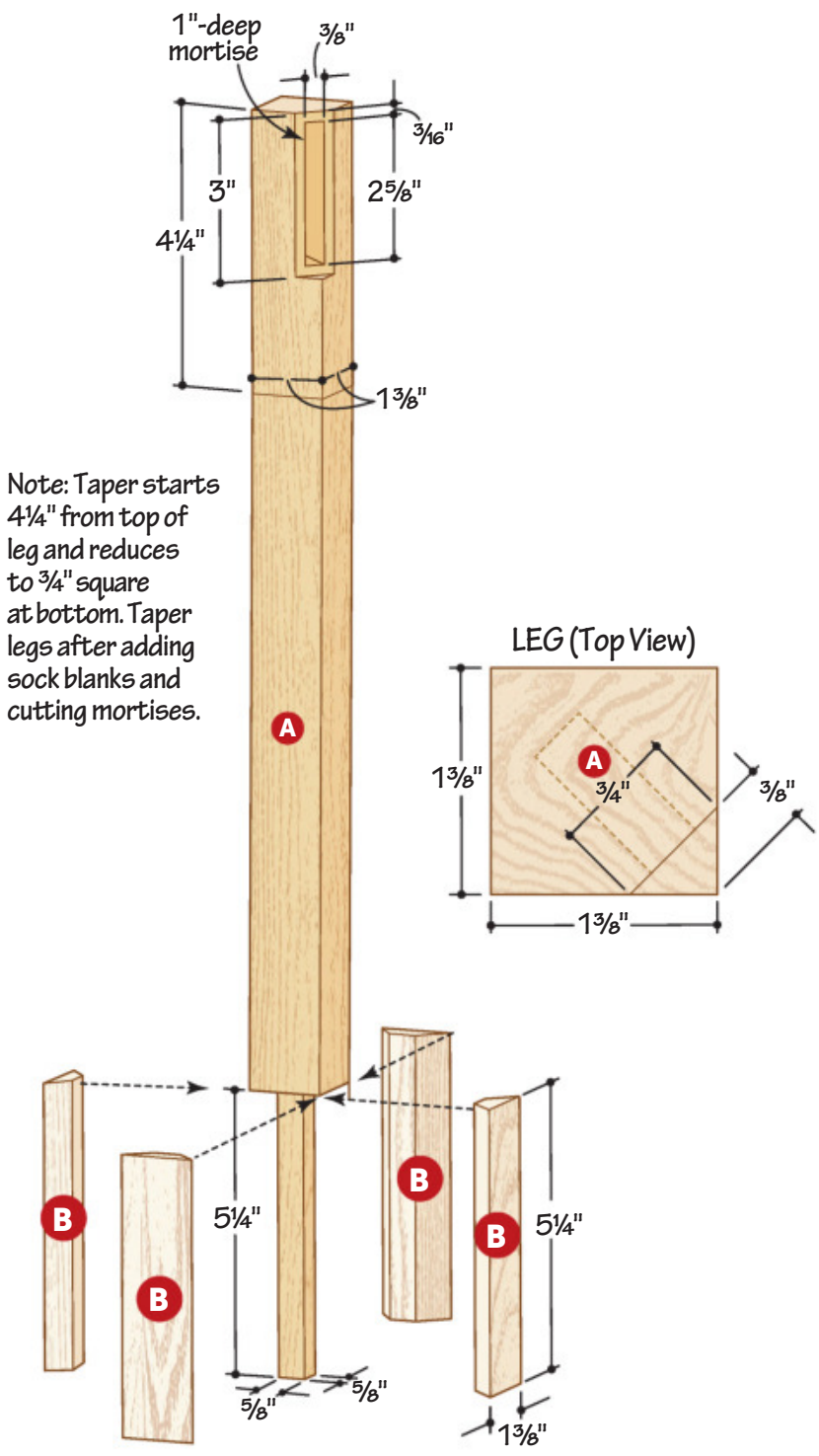


Staying on the waste side of the layout lines, remove most of the remaining waste on each leg. A rip fence helps guide the workpiece for straight, square cuts.



Using the same dado-blade setup, make overlapping cuts on all four sides of the leg, centering the core and bringing it to final size. The goal is to end up with a core that is ⅝" square.

1 LEG/SOCK ASSEMBLY



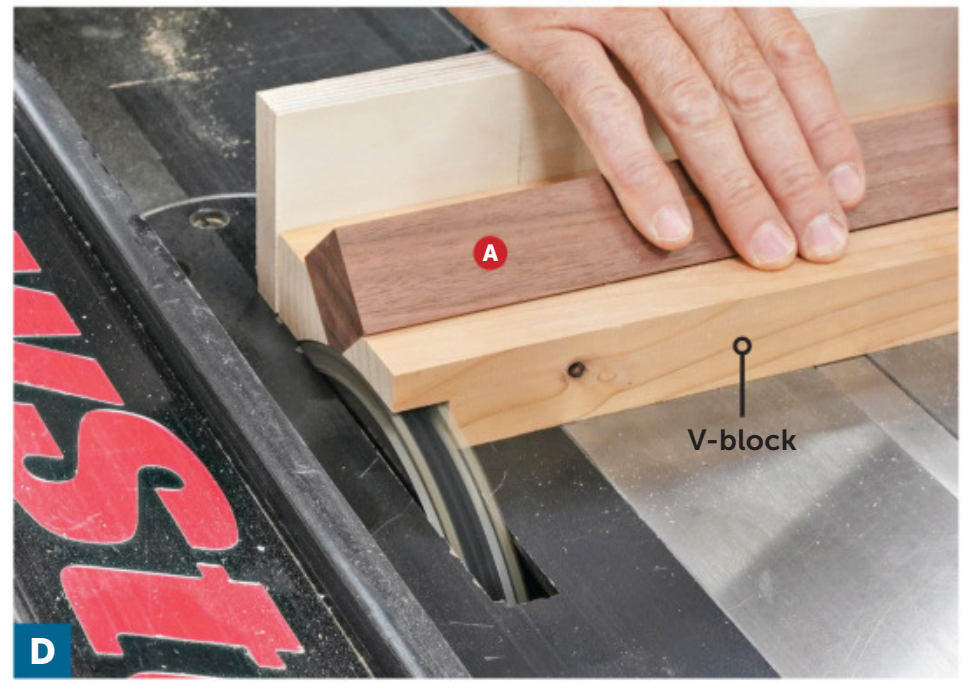
4 Using a shop-made V-block to support the leg, cut a notch at the top end of each leg **[Photo D, Drawing 1]**.

5 Using the same V-block for support, form a mortise in each leg **[Photo E, Drawing 1]**.

6 From ⅜" stock, cut four 1½×24" blanks for the sock sides (B). Bevel-rip the edges of each blank to 1⅜" to match the legs (A).

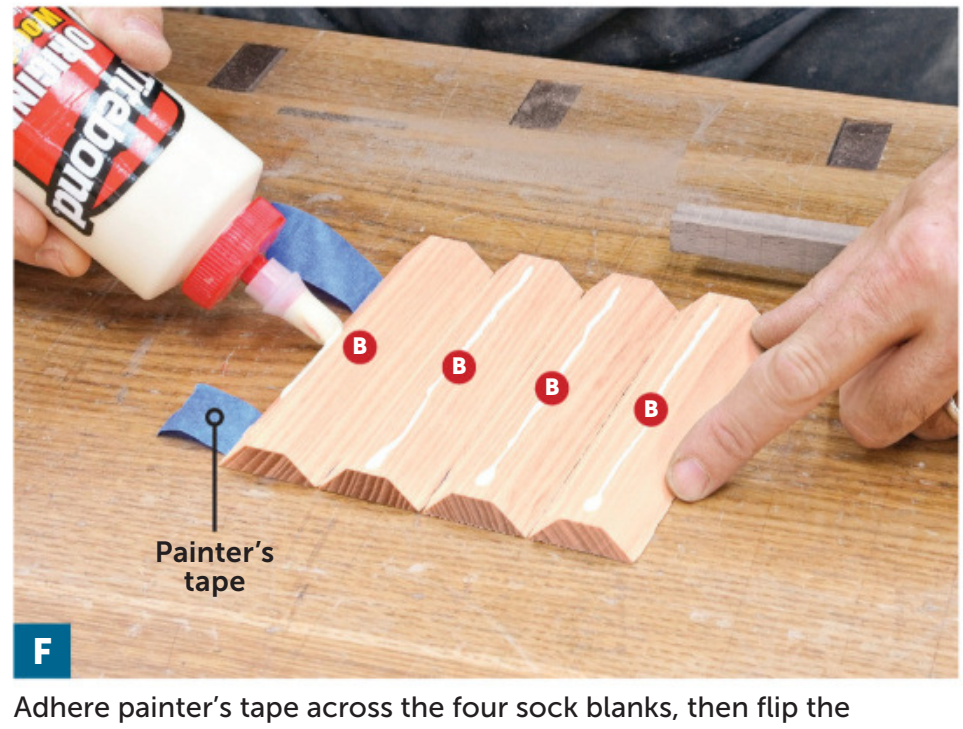
7 Cut the sock sides to rough length of 5½". Lay four of the blanks facedown, side-by-side with the ends flush. Place strips of tape across the blanks and roll them into a square tube, making sure the bevels are tight. Square one end of the assembly and cut the other end to final length at the tablesaw. (For an alternate sock design, see *Dress Socks* on *page 68*.)

Learn three ways to craft mortise-and-tenon joints.
woodmagazine.com/3mortisemethods

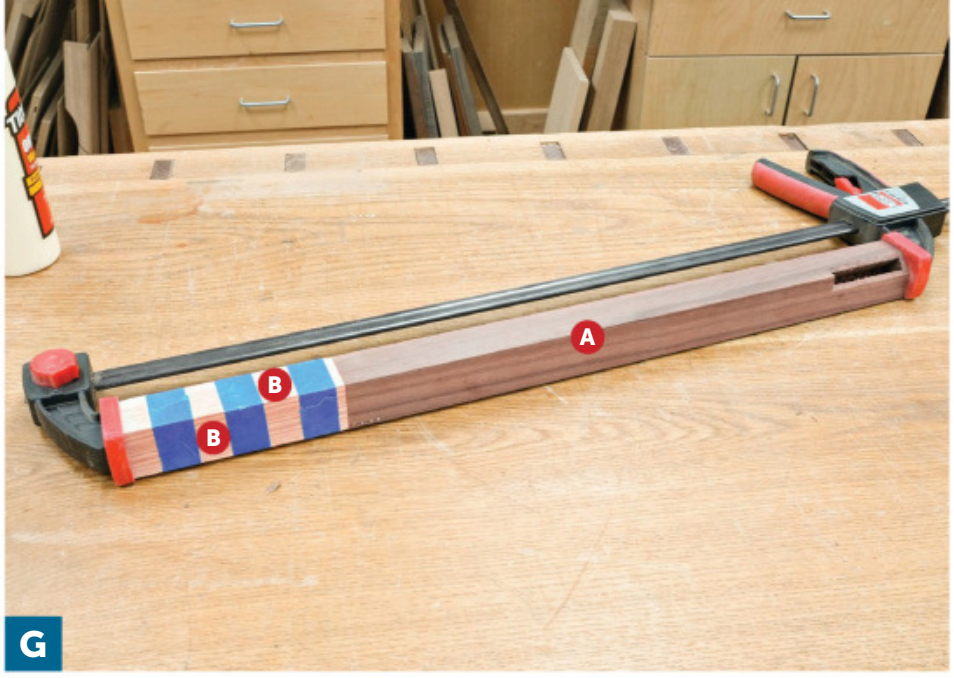


With the leg blank supported in a V-block, raise the dado blade to cut a ⅜"-deep notch at the top end of each leg. Guide the cut with your miter gauge and use the fence as a stop to control the notch length.

Use the V-block to support each leg while cutting the mortises. Center the mortising bit on the width of the notch as you create a 1"-deep mortise.



Adhere painter's tape across the four sock blanks, then flip the assembly over to apply glue to the bevels, upper ends, and inside faces of the blanks before wrapping them around the leg tenon.



G

Use several strips of painter's tape to hold the sock assembly against the faces of the core and light pressure from a bar clamp to hold it against the shoulders while the glue sets up.

H

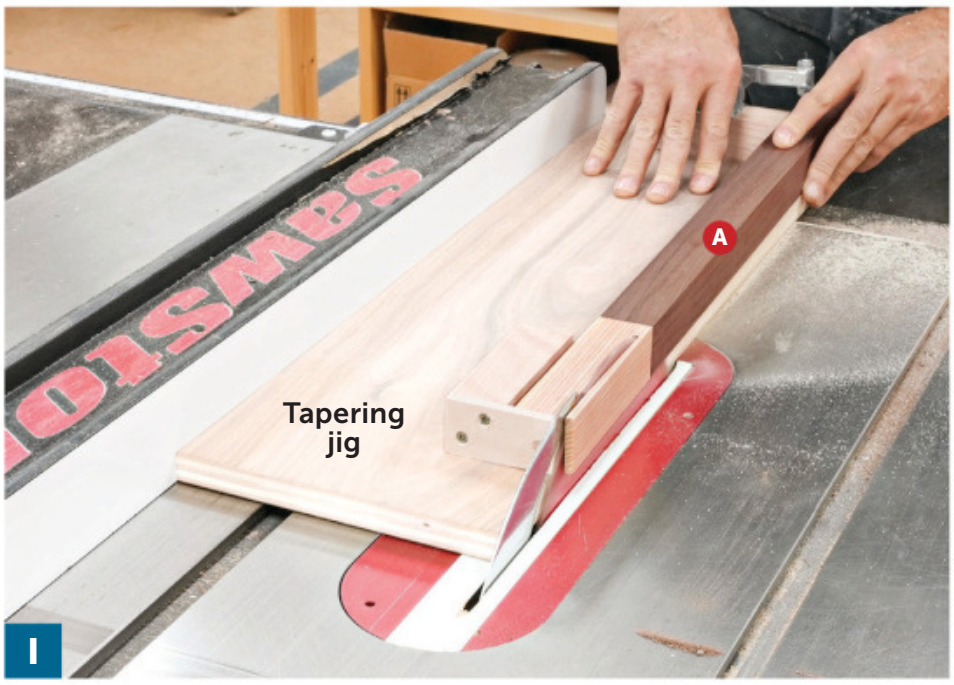
At the drill press, make a drill guide by drilling a ¼" centered hole through a block of scrap sized to match the leg. Add a cleat to align the guide with the leg. Then drill a centered hole in the end of each leg.

8 Slide the assembly over one of the legs to check the fit. If it's too tight, unroll the sock and lightly sand the inside face of each sock side (B). If too loose, remove the tape and trim the width of each sock side. Once you're satisfied with the fit, retape the roll if necessary and apply glue **[Photo F]**. Clamp the assembly to the leg **[Photo G]** and repeat the process for the other three legs.

9 After the glue has dried, remove the clamps and tape, then sand the socks flush with the faces of the legs.

10 Using a shop-made jig sized to fit the leg, drill a hole centered on the bottom of each leg **[Photo H]**.

11 Build a tapering jig (see *Simple Tablesaw Tapering Jig, below*) and taper all four sides of each leg **[Photo I]**.

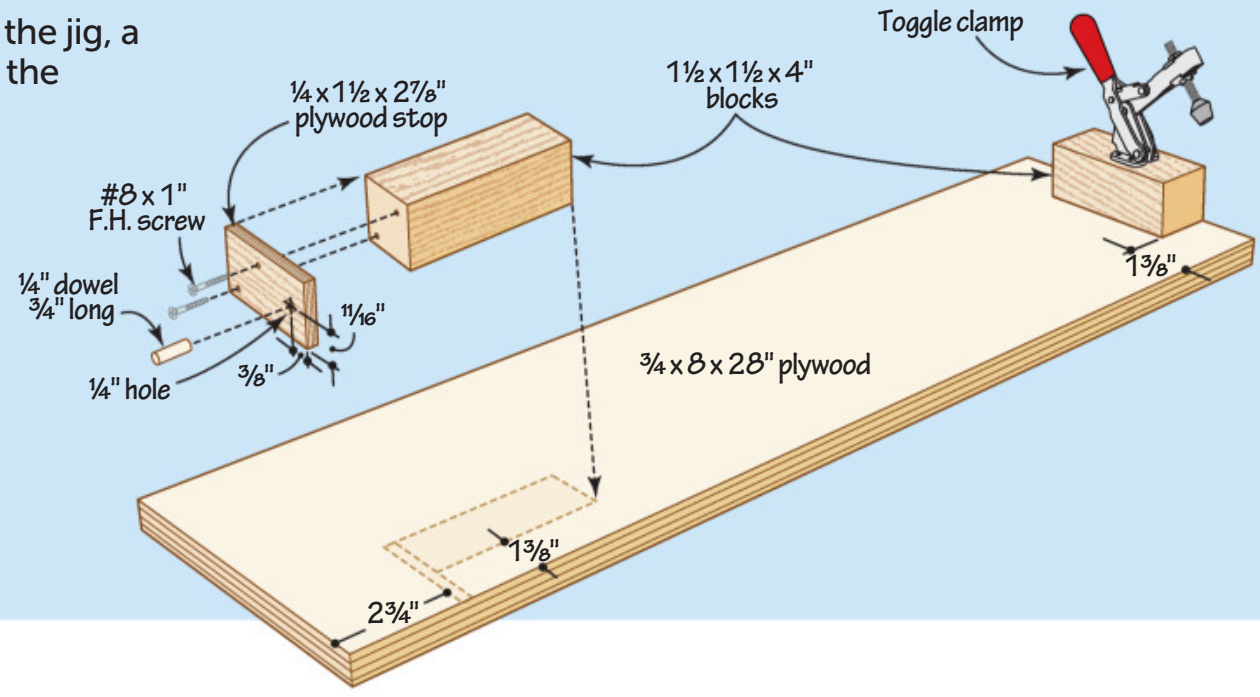


I

Using the tapering jig, taper all four sides of each leg, rotating the leg after each cut. Finish-sand the legs after tapering to remove any saw blade marks.

SIMPLE TABLESAW TAPERING JIG

Taper the legs using this jig. At one end of the jig, a block with a pivot pin allows you to rotate the leg to taper all four sides. A toggle clamp secures the other end. To position the pivot block and the clamp block, lay out the ends of the taper on one of your leg blanks and line these up with the edge of the jig base. Insert the pivot block into the hole in the leg blank and butt the clamp block against the face of the leg near the opposite end. Mark the location of both blocks and glue them in place.



DRESS SOCKS

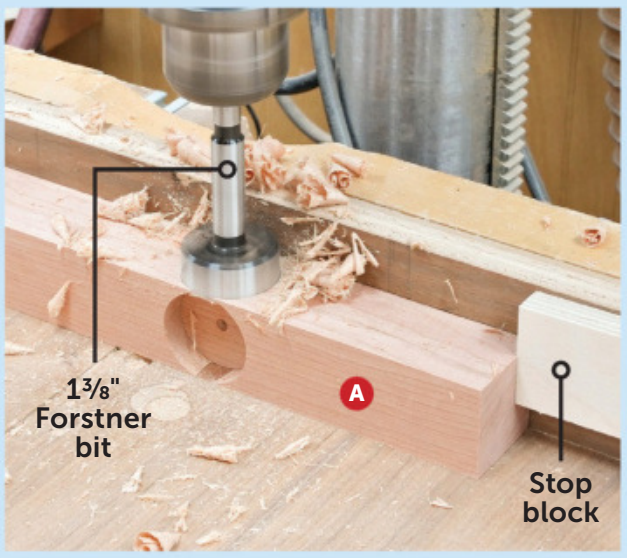
Create a fancier look by changing the shape of the socks. This example features rounded tops for an arched appearance.

Create the core by first drilling out the top of the waste area using a 1⅜" Forstner bit and a stop block to position the holes, *below left*. Then at the bandsaw, cut away the bulk of the remaining waste. Finally, use a dado set to bring the ⅝"-square core to final size.

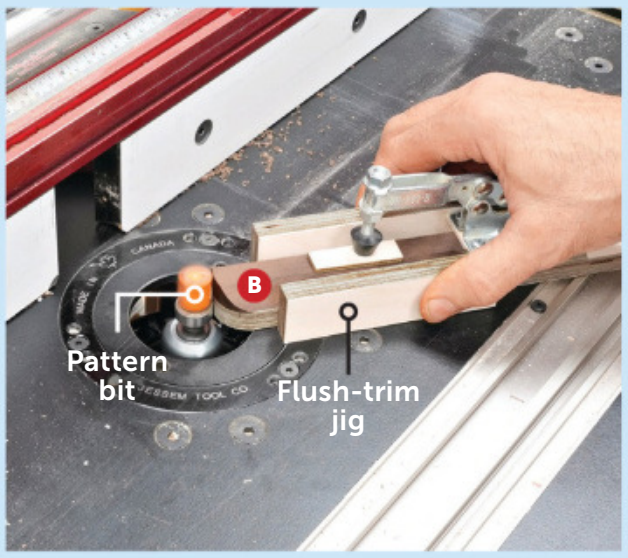
To make the socks, start by cutting four 1½×24" blanks from ⅜" stock. Bevel rip the blanks to a final width of 1⅜", then crosscut the individual sock side blanks to rough length of 5½".

To round the ends of the sock sides, make a jig from ½" plywood. Start by drawing the radius on the jig base, then cutting and sanding to the line, checking the fit of the profile against the leg. Once you're satisfied with the fit, add a couple of sides and a toggle clamp to hold the workpieces. Butt each sock side blank in the jig against the clamp block and trace the radius. Rough-cut the waste at the bandsaw, then trim the profiles with the jig and a pattern bit, *below center*.

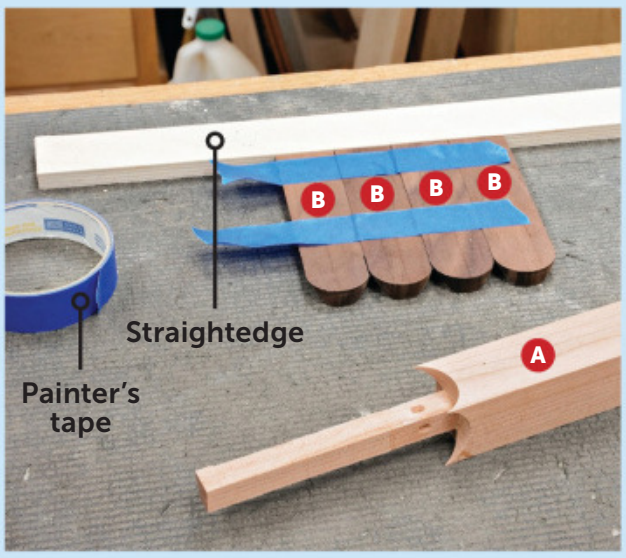
Apply painter's tape to the outside face of each set of sock blanks, using a straightedge to keep the bottom ends of the blanks aligned, *below right*. Roll the blanks up into a square and test the fit on one of the legs, sanding where necessary. Once you're satisfied with the fit, trim the sock sides to final length, apply glue, and glue them to the leg, *bottom left.* After the glue dries, sand the socks flush with the legs and then taper the legs at the tablesaw.



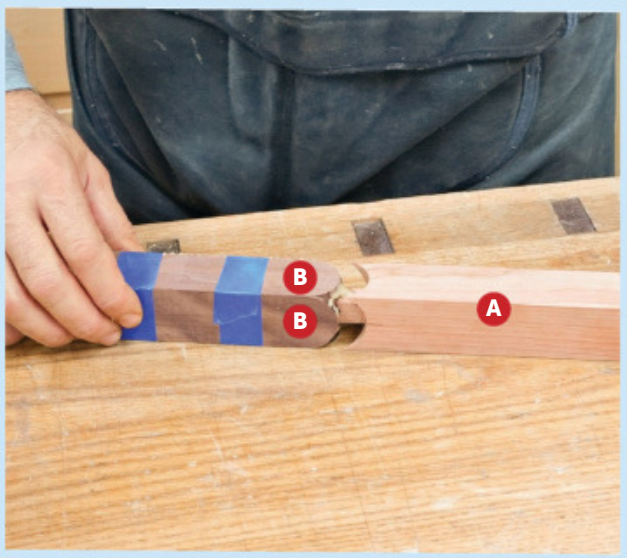
Create the arcs by drilling centered, ⅜"-deep holes on the faces of the leg. Use a stop block to center the holes 4⅝" from the end.



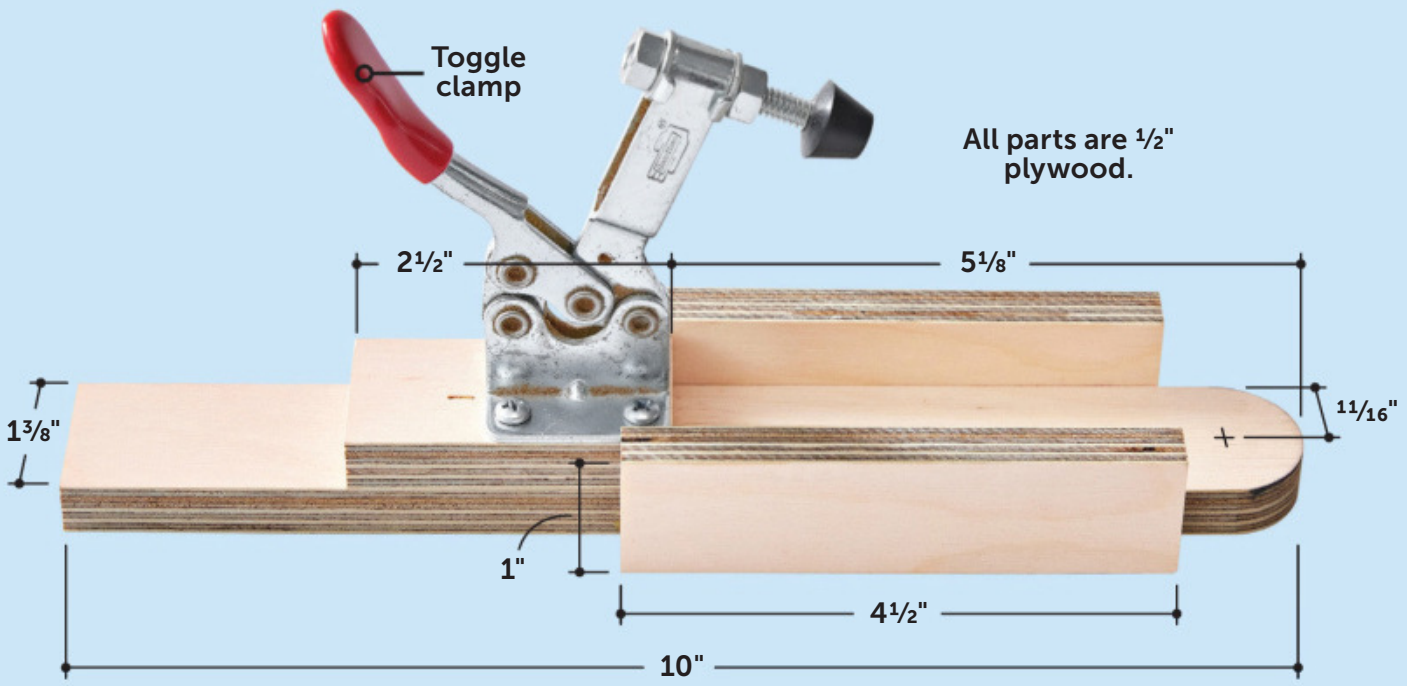
A jig keeps your hands a safe distance from the bit as you shape the ends of the sock sides with a pattern bit.



Use a straightedge to align the sock side blanks, then apply painter's tape to the outside faces to hold the blanks together.



Glue the sock assembly together around the tenon. Then slide the assembly into place.



Cut the cheeks and bottom shoulders of the tenons on all the stretchers (C) first, using the fence as a stop. Then raise the dado blade to 1³⁄₁₆" to cut the top shoulders of the tenons.

To cut the half-laps in the stretchers (C), use your rip fence as a stop to cut the shoulders first, flipping the workpiece end-for-end between passes. Then cut away the waste in the center.

ADD A TOP THAT FLOATS

Create a tabletop that appears to float in midair by starting with a pair of half-lapped stretchers that connect the legs.

1 Cut the stretchers (C) to size **[Drawing 2]**. Using a dado blade, cut tenons on the ends of the stretchers **[Drawing 3, Photo J]**.

2 Lay out the half-laps on the stretchers, making sure to offset the tenons so you create a top and bottom stretcher **[Drawing 3]**. Cut the half-laps at the tablesaw using a dado blade **[Photo K]**.

3 Lay out the curved profile on the ends of the stretchers. Cut the profiles at the bandsaw and sand the edges smooth. Drill counterbores in the top edges of the stretchers for figure-8 fasteners.

Note: **If your dado blade is too small to cut the 2"-deep half-laps, switch to a standard saw blade.**

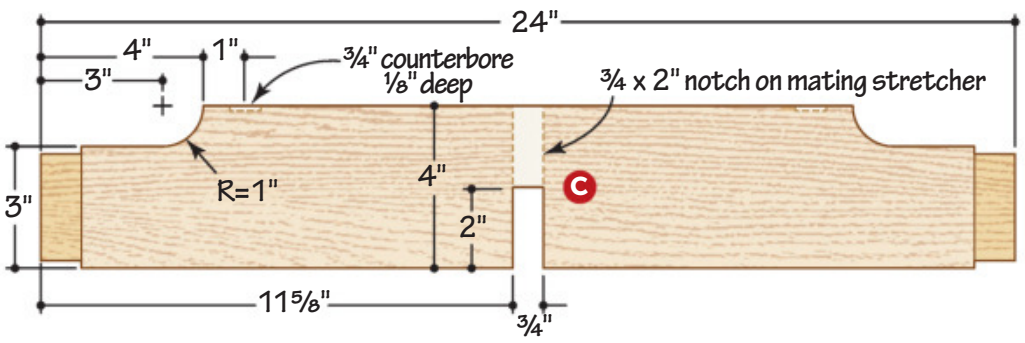
4 Finish-sand the legs and stretchers. Glue and clamp each stretcher between a pair of legs, using V-notched clamp blocks to avoid bruising the corners of the legs.

5 Cut the corner blocks (D) to size **[Materials List, Exploded View]**. Slide the two leg/stretcher assemblies (A–C) together and glue two of the corner blocks into opposing corners. After the glue dries, glue the remaining corner blocks in place.

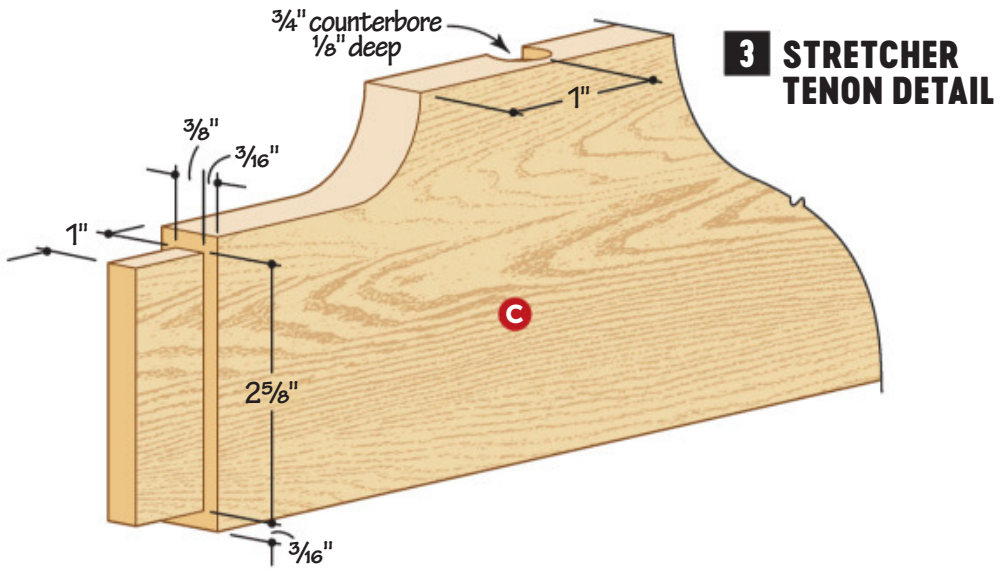
6 Glue up a blank for the top (E). Cut the top to size and rout a round-over along the bottom edges. Finish-sand the top.

7 Apply a finish. (We sprayed three coats of matte lacquer.) Install the top using figure-8 fasteners.

2 STRETCHER



3 STRETCHER TENON DETAIL



MATERIALS LIST

PART		FINISHED SIZE T	W	L	Matl.	Qty.
A	LEGS	1⅜"	1⅜"	23¼"	W	4
B*	SOCK SIDES	⅜"	1⅜"	5¼"	A	16
C	STRETCHERS	¾"	4"	24"	W	2
D	CORNER BLOCKS	¾"	2¾"	5½"	W	4
E	TOP	¾"	20"	20"	A	1

*Parts initially cut oversize. See the instructions.

MATERIALS KEY: W–walnut, A–ash.
SUPPLIES: Figure-8 fasteners, #8×¾" flathead screws.
BLADE AND BITS: Dado blade, ¾" round-over bit, ¾" Forstner bit. (1⅜" Forstner bit and ½" pattern bit needed for rounded socks.)
SOURCES: Toggle clamps, no. GH-201-B (1 pair), $13, Amazon.com.
PROJECT COST: It cost us about $150 to build this project. Your cost will vary by region and source.

ROLL OUT THE BARREL-GRIPS

Jigsaws and multi-tools both prove useful for making odd-shaped cuts, working with non-wood materials, and more. Let's take a look at two new tools in each category that all share a common feature: a barrel-style grip designed to position your hand closer to the cutting line for greater control.

Two barrels of cutting capability

The Bosch GST18V-50B and the Ridgid R86346 both offer the power needed to cut through 2-by material plus the finesse for fine scroll cuts in ¼" plywood. Both feature adjustable speed, three-position orbital settings to dial in cutting aggressiveness, plus switchable dust blowers and dust-collection attachments. On-board lights illuminate both saws' cutting paths, and included plastic base covers snap on to protect scratch-prone materials. Bosch adds a removable dust shield and anti-splinter insert.

The Bosch saw runs smoothly and quietly. The barrel grip is a bit large for smaller hands, but remains easy to hold and control. This saw dampens vibration very effectively. Thoughtful design puts all the controls within easy reach.

A smaller-diameter barrel makes the Ridgid easy to grip, while the kicked-up area in front of the battery creates a convenient resting place for the heel of your hand. Lighter weight makes this saw maneuver easily, but vibration and noise are more evident.

Bosch, ***boschtools.com***
18-volt barrel-grip jigsaw, no. GST18V-50B, $159 (bare tool)

Ridgid, ***ridgid.com***
18-volt barrel-grip jigsaw, no. R86346, $180 (bare tool)

PHOTOGRAPHER: CARSON DOWNING

continued on page 72

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Bosch multi-tool is a star(locking) performer

Pick up the Bosch GOP18V-34B12 and you immediately notice its bulk. This tool feels substantial and solid, but the large 2⅛"-diameter grip contributes to hand fatigue during extended cuts.

Buying this multi-tool consigns you to using only Bosch Starlock accessories (or purchasing an aftermarket adapter to use the more-common universal-fit blades). With this innovative attachment mechanism, a star-shaped hole in the blades and sanding pad snap onto a pair of small jaws on the tool with no tools required. A release lever pops the pad or blade free—a nice touch when a blade is hot after extended use. Once you're accustomed to the force required to snap the accessories in place, the process is fast and easy.

The 2-position power switch lights a work-illuminating LED in the head at the first detent. Another push forward turns on the brushless motor. A soft-start motor prevents a sudden jerk when starting the tool. The stiff on/off switch requires a firm push and pull. Working one-handed in tight quarters required us to remove the tool from the area for sufficient leverage to switch it off.

The tool comes with a 4 amp-hour battery, charger, soft case, a selection of blades and a sanding pad, plus some sanding sheets. Optional depth-stop and dust collection attachments are available, with the dust attachment requiring an additional adapter to connect with either a 1¼" or 1½" hose.

Bosch, *boschtool.com*
18-volt oscillating multi-tool, no. GOP18V-34B14, $250

Ryobi packs multipurpose capability into a compact package

The Ryobi PBLMT51B proves a solid performer, and we appreciate that it accepts pretty much any manufacturer's blades or sanding pads. A pair of magnets in the base hold the accessory in place as you mount it until it's secured with the pin and locking lever; no tools are required.

The brushless motor affords a slender body that allows the tool to squeeze into spaces as narrow as 2¼". The rear of the body angles up for an easy, comfortable grip while positioning the fairly long 18-volt battery above the blade position for unobstructed flush cutting. Rubber over-molding provides a nonslip grip and feels good in your hand. The power trigger squeezes easily with a conveniently located lock-on button, but ridges around that button make it unnecessarily difficult to operate. The variable-speed dial, marked from 0-6, actually provides 25 rates of oscillation, with the 0 position serving as a lock-out.

An LED lights up the area in front of the body when you squeeze the trigger, but if you mount a blade at an angle to the body, the LED won't shine toward your work area. And the LED works best with longer blades; it falls short when using a sanding pad or a semi-circular blade.

The tool comes with a plunge blade, flush-cut blade and a sanding pad with sandpaper. Sold as a bare tool, it works with any Ryobi One+ 18-volt battery.

Ryobi, *ryobitools.com*
18-volt brushless multi-tool,
no. PBLMT51B, $129 (bare tool)

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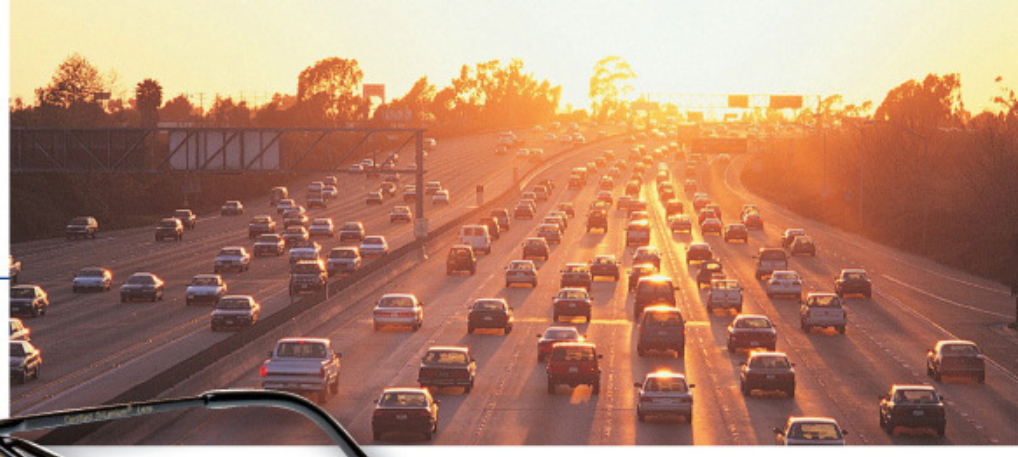

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Trick out and tune up your bandsaw for perfectly resawn panels.

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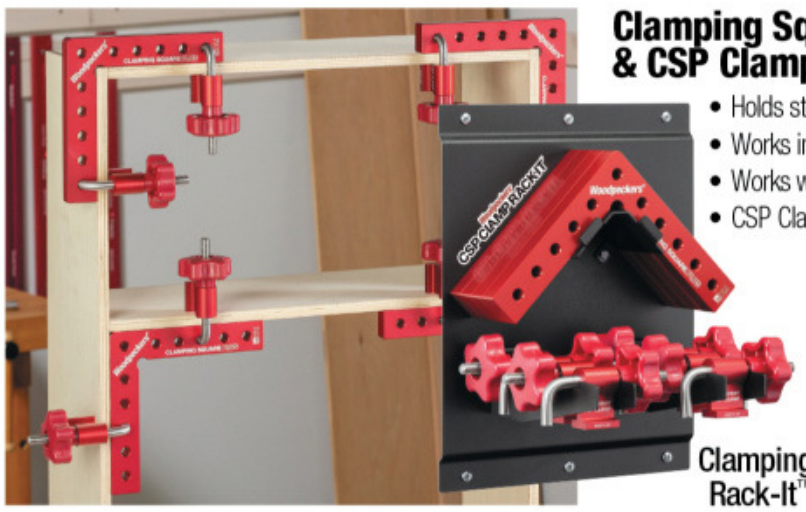

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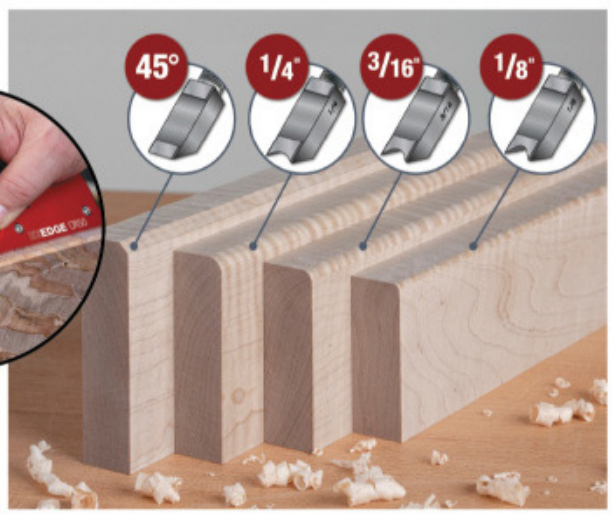

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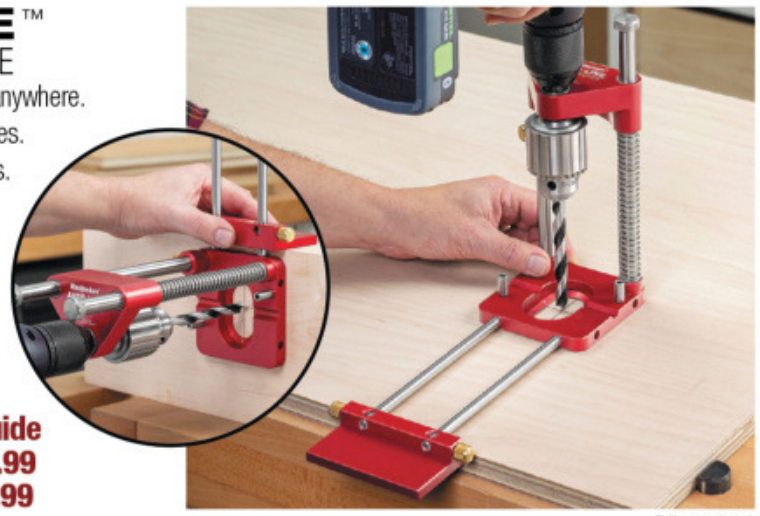

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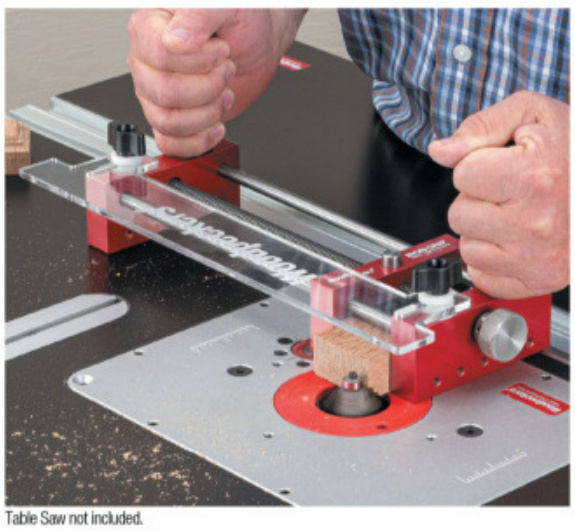

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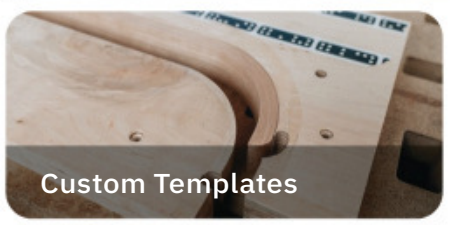
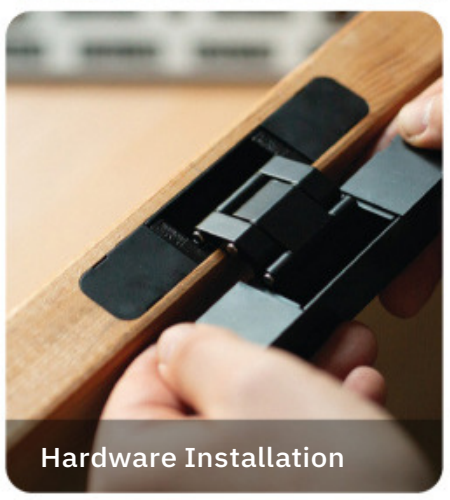
- **No computer programming required**
- **Works alongside other shop tools**
- **Portable and easy to store**

Shaper Origin brings best-in-class portability and precision to any job. Create tight fitting joinery, custom inlays, install hardware, make custom templates and more.





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PRECISION CUTTING SIMPLIFIED