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ISSUE 298 OCTOBER 2024

WOOD®

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MIXED MEDIA MARVEL

COMBINE CONCRETE AND WOOD TO CREATE A ONE-OF-A-KIND GARDEN BENCH p.70

Tool Test
LOW-ANGLE JACK PLANES
p.50

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GREAT PLANS

- Work-of-Art Wall Cabinet p.58
- Eye-Pleasing Plate Rack p.28
- Easy-to-Build Workbench p.38

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- Built-in storage shelf

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- 2¼" x 2¼" Wooden legs
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T34091 ONLY $870

$199 FREIGHT

HAPPY BIRTHDAY TO US

WITH THIS ISSUE, *WOOD*® MAGAZINE TURNS 40. DON'T EXPECT A MIDLIFE CRISIS.

October 1984—40 years ago—was a momentous month for me. My ninth birthday was approaching. Our family had recently moved across the state for my dad's new job as a foreman at a cabinet shop. With a steadier paycheck, we suddenly started seeing improvements to our lifestyle. Most notably for me, we got our first color television and a UHF antenna. Did you know that the *Smurfs* were blue? I'd only heard rumors to that point. Did you know there were seven channels, not just four?! And those extra channels brought *G.I. Joe* and the *Transformers* and the *Super Friends* right after school. I didn't even have to wait until Saturday morning!

My dad was occupied with other upgrades, namely to his garage shop. A longtime woodworker with plans to start a side hustle making small projects for local fairs, he bought a complete set of Craftsman benchtop power tools at an estate sale—a tablesaw, jointer, bandsaw, lathe, and drill press.

He also picked up the first issue of a new woodworking magazine from the newsstand named *WOOD*. In the pages of that inaugural issue, founding editor Larry Clayton introduced him to a head-to-head test of routers for his next tool purchase, six (*six!*) cutting-board designs for his next craft show, and a TV cart for our new color television.

More than 20 years later, Dad handed me another issue of *WOOD*, one with a bookmarked job listing for an editor that I'd missed in my copy. And now you're stuck with me.

But outside of this little self-congratulatory note, you won't see us crowing about our anniversary in these pages. There's no midlife-crisis reinvention on the horizon. (What's the magazine equivalent of a sports car and hair plugs?) Instead, our team of expert woodworkers and writers chooses to celebrate by simply continuing the tradition of supplying you with your favorite content and mine: inspiring projects (like the "Work-of-Art Wall Cabinet" on *page 58*), the most in-depth tool reviews (like the low-angle jack planes shop test on *page 50*), and the most useful techniques (like "10 Ways to Make Your Mark" on *page 34*).

Here in our shop, we'll have a small celebration.

But you should get out to your shop and build something.

As we have for the last 40 years, we'll help.

Lucas

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

WOOD®
Issue No. 298 | October 2024
Vol. 41, No. 5

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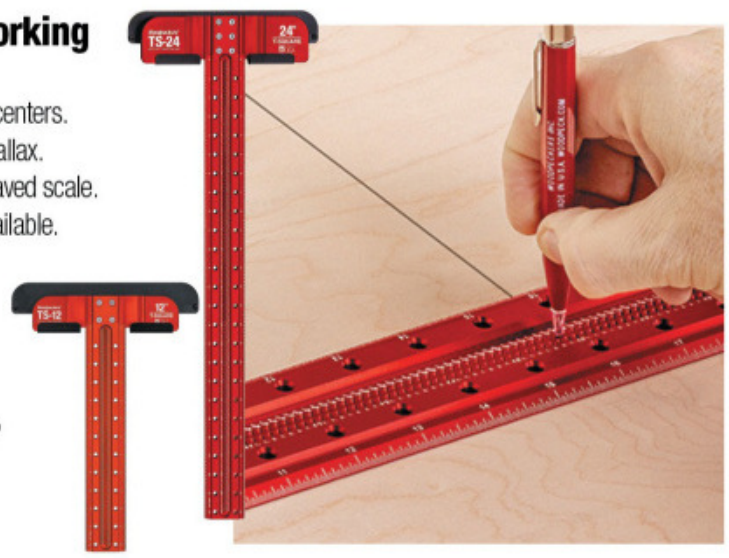

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WOOD®
Issue No. 298 | October 2024

PLANS

ON THE COVER

70

Put your project building skills to work in a new medium. We show you how to build an easy form to cast the concrete legs of this stunning and long-lasting garden bench.

TOOLS & TECHNIQUES

34

DEPARTMENTS

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TOYS BRING JOYS

Over the last eight years I have made all of your construction equipment series models for Christmas and birthday gifts for my grandsons. I have enjoyed working with your plans. I have just started your train series with the locomotive and coal car and I am looking forward to future train plans.

Carl Newcombe
Strasburg, Virginia

I made the engine, tender, and track patterns featured in *WOOD*® magazine. I designed and added a log carrier, a box car, a tanker, and a caboose, and added length to the track. Great project—a keepsake for our great-grandson.

Perry Tornquist
New Braunfels, Texas

Build these toys and many more with our great selection of plans at
woodstore.net/toysandgames

I wanted to let you know that my grandson and I are enjoying building the Timber Line Express train pieces. I hope you will publish many more plans.

John Bridgford
Joplin, Missouri

continued on page 8

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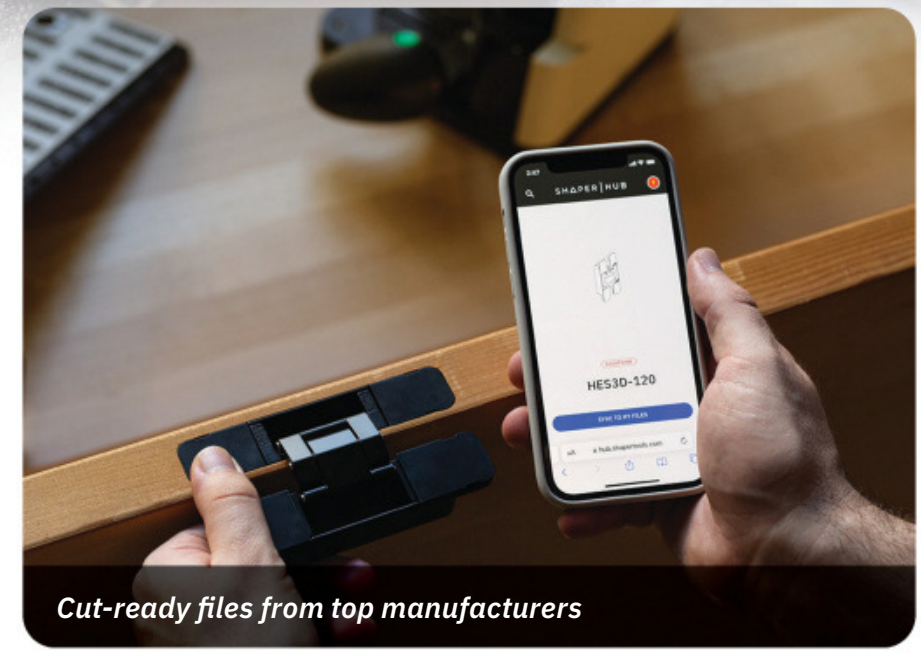
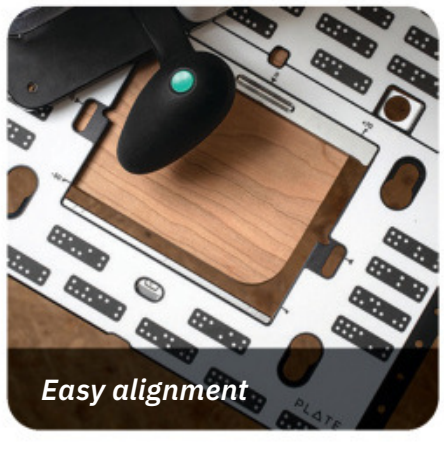


Cut-ready files from top manufacturers


Fixturing with Plate


Easy alignment

SHAPER

PRECISION CUTTING SIMPLIFIED

HORSING AROUND

The adjustable sawhorses from issue 290 (September 2023) are lightweight and easy to move around the shop. I used pine instead of oak, which kept the cost at around $50 for the two.

Magnus Holmstrom
via email

SAFETY SENSE

Many of the shops featured in the *Your Shop* column could improve their safety with a small layout change. Fire safety protocol dictates that fire extinguishers should be located beside an exit. This establishes a relatively secure location from which to decide whether or not to address a fire with the extinguisher before exiting the shop. Also, though it may not always be possible, there should be at least two exits from the shop. While we all hope that there will never be a need for fire response, it should always be part of our planning.

Bill Allen
Chase City, Virginia

Minimize fire risks in your shop with these tips.
woodmagazine.com/firesafety

ALTERNATE METHODS

My son asked me to build the vinyl record cabinet featured in issue 292 (November 2023). The finished project in your magazine looked really great, so I took it on. Little did I know that to build this project, I would need more advanced tools than I own.

I would have benefited from knowing alternate methods of joinery using the tools I already own. For example, rabbet joints for the box sides. Splines instead of biscuits. I suggest you provide sidebars in your articles featuring alternate methods for joinery in cases where expensive or specialized tools are required.

Joseph White
via email

Having multiple ways to build projects, depending on the tools and techniques you prefer, is a fun aspect of woodworking. Presenting all those ways in each project proves challenging with the limitations of page count. That's why we often vary our joinery and toolset between projects. Read enough—even the ones you don't plan to build—and soon you'll be able to substitute to suit your shop.

Dave Stone
Managing Editor

Find the clock plans Mark used at
woodstore.net/mantelclock

CLOCKED, AGAIN. AND AGAIN.

I built these mantel clocks based on the plans featured in issue 285 (November 2022). Instead of creating multiple parquet panels, I scrounged a couple of pieces of ambrosia maple. Thanks for the plans!

Mark Ross Kimsey
via email

VISIONS OF VIDEOS

I was wondering if you'll be adding any new YouTube projects. I find them very helpful and hope you don't abandon this valuable tool.

Chuck Scott
via email

As I write this, Design Editor John Olson is wrapping up a video for a cabinet build. Craftsman Jim Heavey's videos about proper glue use are in the editing bay. Managing Editor Dave Stone and Senior Design Editor Kevin Boyle are piloting a new "tool unboxing" series.

Lucas Peters
Editor-in-Chief

continued on page 10

Influenced by the works of James McNabb, **CLINT PETERSEN** of Ames, Iowa, salvaged part of his old redwood deck to make this 4'-diameter abstract cityscape. He spent a lot of time at the bandsaw to create 96 unique slices. After assembly, he sanded to 220 grit then applied satin Polycrylic sealer.

JIM SCHATZ of Gilbertsville, Pennsylvania, built this fun kids' bunk bed based on rough plans he found on instructables.com and modified to fit his needs. It even features an authentic, functional VW horn.

NICK VANARIA of Romeoville, Illinois, built this wine cellarette for his niece's wedding. It was used at the wedding with a temporary slotted lid as an envelope box. The cellarette has room for a dozen wine bottles. Nick built it from cherry and inlaid the couple's initials and tulips, the bride's favorite flower.

ROBERT BISHOP of Pittsburgh, Pennsylvania, made this keepsake box from hard maple with a *Eucalyptus coolabah* burl wrap and lid lift plus cherry for the legs. He applied several coats of Waterlox oil-varnish finish.

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.***

continued on page 12

HENRY SAWICKI built this illuminated display table for his nephew, an avid hockey player, to display pieces of his hockey stick collection, some of which have great sentimental value.

This child's art table designed by **RICK CAMPBELL** of Ames, Iowa, features solid maple with walnut accents. The legs resemble giant pencils, engraved around the ferrules with the words "Izzy Pencil Co." in honor of his granddaughter, Isabel. Rick constructed the stool to resemble a giant eraser supported by paint brush legs. "Izzy Paint Brush Co." engraved in the brush ferrules provides another nod to this clever project's recipient.

To house his collection of memorable fishing lures, **BASIL BORKERT** of Cameron Park, California, made this boat-shaped shadow box. He used beadboard for the back; aromatic cedar for the shelves; plywood for the sides; walnut for the scuppers, rails, and deck; and an alder stem edged with plywood.

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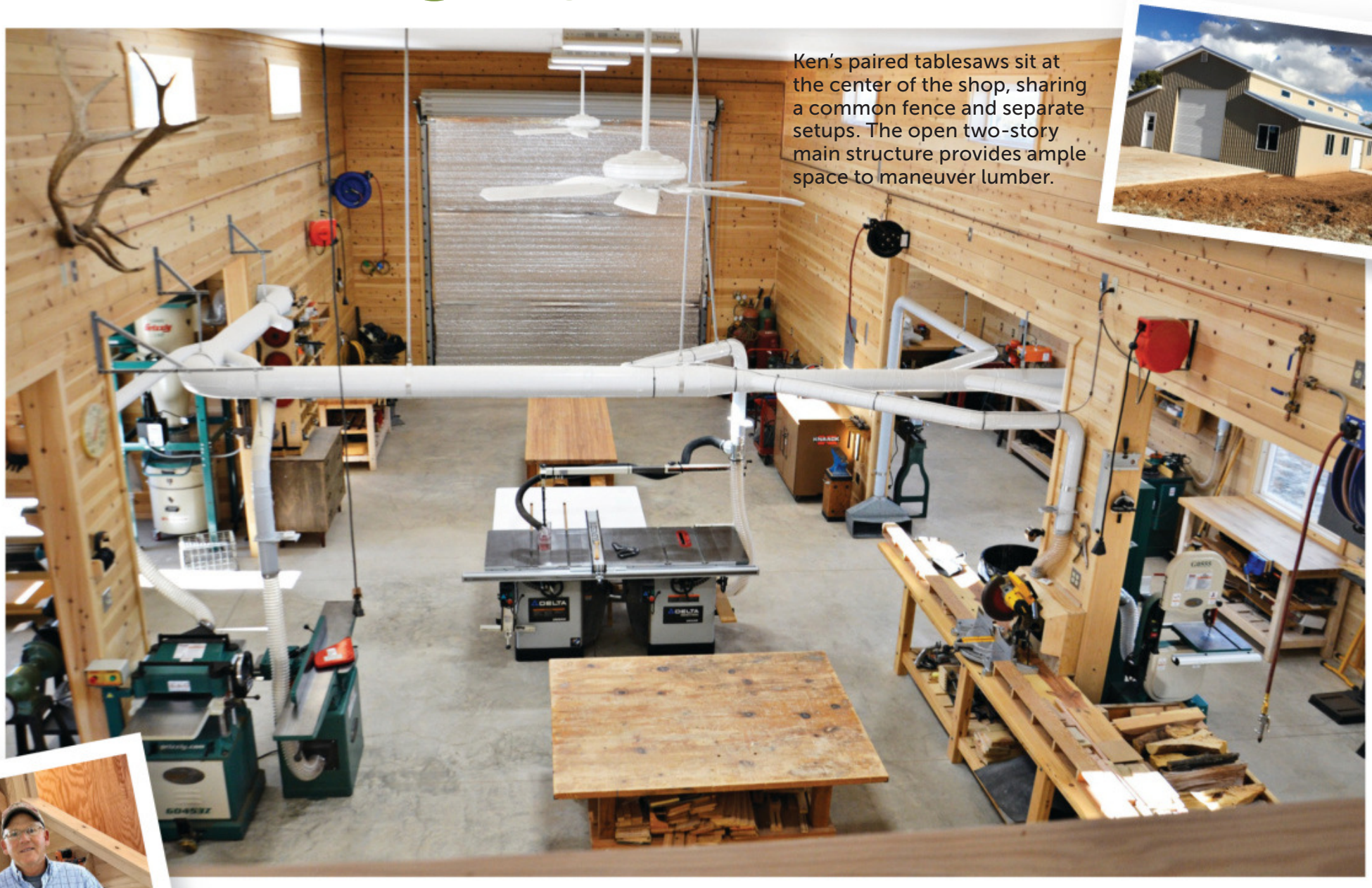
SHOP TEACHER'S DREAM SHOP

When you possess a lifetime accumulation of woodworking tools and experience, plus teach the craft for your entire career, you deserve the shop you've always wished for.

WRITER: RANDY MAXEY



Ken's paired tablesaws sit at the center of the shop, sharing a common fence and separate setups. The open two-story main structure provides ample space to maneuver lumber.

Always the educator, Ken tries to pass on to others the skills and craftsmanship that some amazing woodworkers shared with him during his lifetime.

SHOW US YOUR SHOP

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

Woodworking for most of his life, Ken Chancellor spent 35 years as a career and technical educator for architectural computer-aided design (CAD), building trades, and woodworking. With all that experience and knowledge, he went all-in to design, build, and outfit his new shop. Ken says, "My old shop was half the size of this one, with little or no room to work, making it difficult to store and finish cabinets once built."

The 40×60' wood-frame construction features walls and ceilings with R19 and R30 insulation. Ken's shop sits at 7,000' above sea level, so air conditioning is not necessary. The windows and large door allow for plenty of airflow. In the winter, a wood-burning stove easily keeps the temperature cozy, even at temperatures below zero.

For interior finishes, Ken installed sheet rock on the 15' ceilings in the main shop and the 8' to 11' vaulted ceilings in the side spaces. Solid pine tongue-and-groove siding lines all the walls making it easy to attach cabinets, tool racks, hose reels, and duct clamps. Metal siding and roofing complete the exterior.

When he had concrete poured for the shop floor, Ken included a 30×30' slab out front so he could work outside while sanding and applying finishes. The 22 insulated windows provide plenty of natural light plus offer a great view of the outdoors.

PHOTOGRAPHER: KEN CHANCELLOR; **ILLUSTRATORS:** ROXANNE LEMOINE, LORNA JOHNSON

continued on page 16

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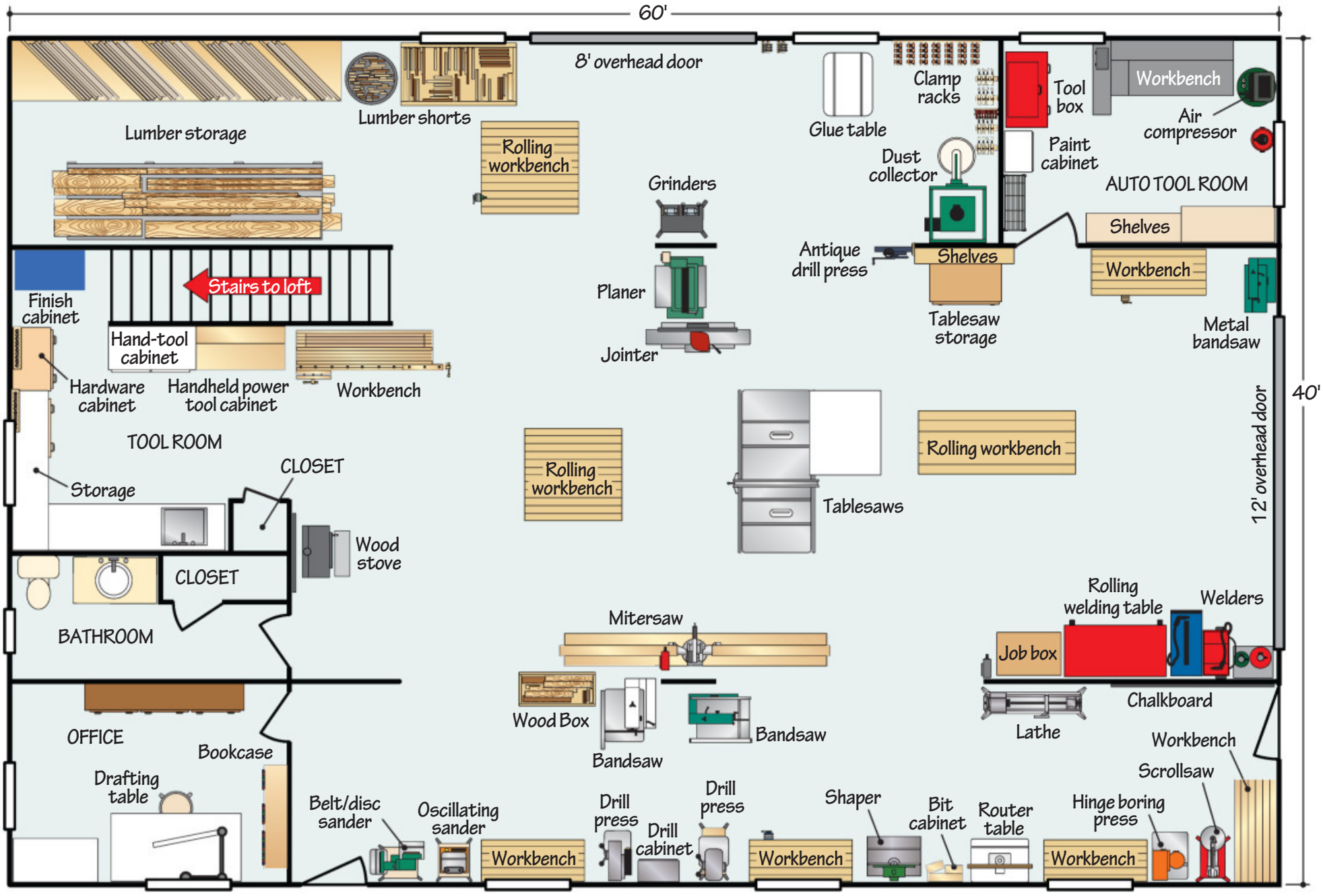

A gift from a woodworking neighbor, this traditional-style, vintage workbench—complete with face vise, tail vise, tool well, and sliding deadman—still sees use about every day.

The office space serves as a design and research haven for Ken to draw up ideas for his upcoming projects. The large window illuminates the desk area while providing Ken an inspiring outdoor view.

continued on page 18

See the Forest Through the Trees

Mighty Conifer Knife at an Impossible Price!

What Stauer Clients Are Saying About Our Knives

★★★★★

"Outstanding knife of high quality and a great price. I now have a number of your great cutlery in my growing collection!"

— Robert F., Richardson, TX

We know you. You're not interested in everyday, run-of-the-mill, common cutlery. You want something with a story, a unique feature that you can brag about. We've got just the thing for you. Our ***Mighty Conifer Knife*** is a unique tool with a Damascus steel blade and a handle crafted from an enhanced and stabilized natural pinecone. While our competitors are charging hundreds for similar knives, we're offering the Mighty Conifer for **JUST $99!** That's what we call our **Stauer Impossible Price.**

JOIN MORE THAN 389,000 SHARP PEOPLE WHO COLLECT STAUER KNIVES

Each pinecone — and therefore, each knife — has its own unique characteristics. And the back of the handle features hand tooling, a further demonstration of each piece's individual nature.

The blade is nothing to scoff at either. Constructed of Damascus steel, a modern reworking of the legendary steel forged by ancient swordsmiths, this nearly 5-inch blade features 256 layers of steel that have been folded on top of each other to increase its durability. Our competitors are charging hundreds for boring, run-of-the-mill knives with no features worth bragging about. We're asking JUST $99 for a knife unlike any you've seen before!

With its full-tang construction and high-quality genuine leather sheath, the Mighty Conifer Knife is the perfect blade for the person who wants to stand out. **CALL NOW!** If you're one of the first ~~700~~ 587 callers for this ad, we'll throw in a pair of ***Stauer 8x21 Compact Binoculars*** — a $99 value — **ABSOLUTELY FREE! Satisfaction guaranteed or your money back!**

Knife Specifications:

- 9 ½" overall length. Full-tang construction
- Damascus steel blade and natural pinecone handle
- Genuine leather sheath

Mighty Conifer Knife
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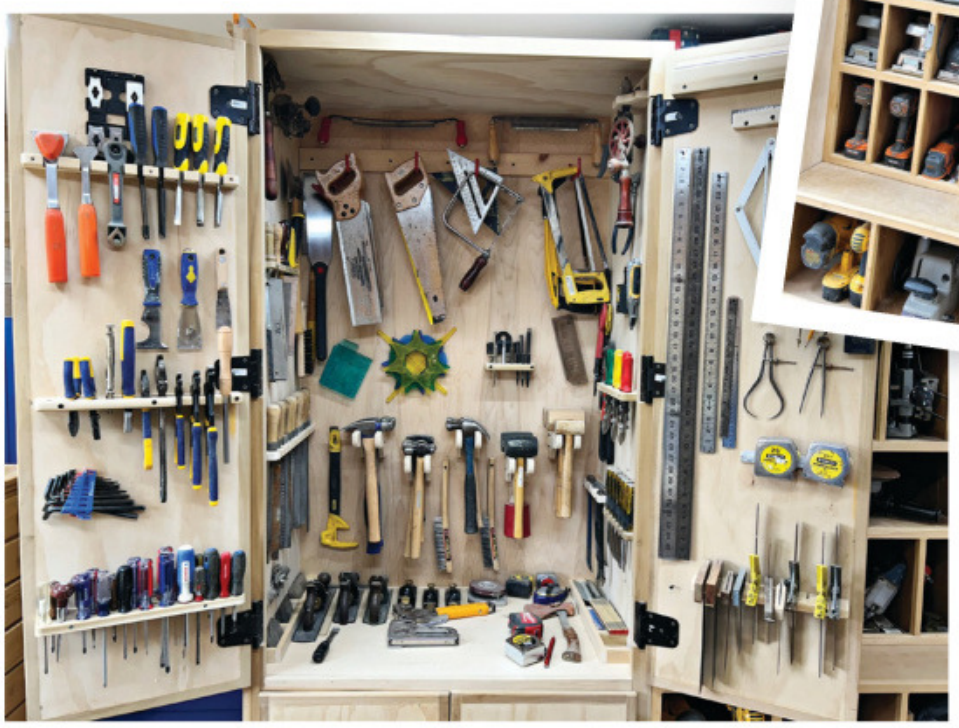
>
> ***-KEN CHANCELLOR, SHOP OWNER***

Ken's organizational skills aren't limited to tools. This cabinet of drawers, each with custom dividers, holds hardware like screws, shelf pins, and threaded inserts.

Custom-sized cubbies in this cabinet keep handheld power tools visible and readily accessible. Multiple routers, each with a different bit and setup, save time during project construction.



Cleverly designed racks and strategically placed hooks on the inside of the doors and walls of this cabinet keep common hand tools at the ready.

Ken's unique, dual tablesaw setup came about when his old saw died in the middle of a large project. He bought a new replacement. Later, while working on a large cabinet project, he was cutting a lot of dadoes and having to switch blades often. He purchased another matching tablesaw and decided to connect them side by side to save space. He has one set up for cutting dadoes and the other for ripping. "I'm not sure how I ever got by without it. It's a real time-saver," he says.

A 3-hp cyclone dust collector connects to spiral metal ductwork and metal fittings for tees, elbows, and reducers. The duct sizing starts at 8" and steps down to 6" then to 4" with 4" drops and blast gates at all machines. Ken was able to repurpose ductwork salvaged from old woodshops before they were torn down plus ducting from his original barn shop. A coat of fresh, gray paint covers all the old patina and worn coats of paint on the ductwork.

Ken plumbed his shop for compressed air using salvaged 1/2" and 3/4" copper pipe to connect to the 3-hp air compressor. He installed five air-hose reels at strategic locations throughout the shop. As a safety measure to avoid overheating, he installed a 220-volt lighted switch by the exit to turn off the compressor when he's not in the shop.

When asked about the vintage workbench sitting prominently in his shop, Ken had this to say: "Growing up, a very talented old gentleman down the road introduced me to woodworking. Several years later, I was discussing with him the classes I was taking in college and the skills the instructors were sharing. My woodworking neighbor smiled, asked me into his shop, and wanted me to have his workbench. I have had the bench for 40 years now, and still use it often."

Taking a look around Ken's shop, ideas from school workshops abound. One is safe storage of finishes. He picked up a steel flammables-storage cabinet at an auction and tucked it under the stairs that lead to the loft over the shop.

Shop organization carries over from Ken's teaching days, too. Custom-built racks and cabinets house power tools, hand tools, router bits, and other accessories. He's a stickler for neatness and returning tools to their proper place at the end of each day.

Since retiring, Ken spends his days building custom furniture. With lots of orders, he's never lacking a reason to enjoy his time in the shop.

SHOP SAFETY: A TOP PRIORITY

Safety in the shop was always the first thing Ken taught his students at the start of each year. He always put a major emphasis on safe shop practices. He is proud of the fact that, in his 35-year career teaching students, neither he nor any of his students ever suffered a major injury. That's quite an accomplishment with 150 students per day running through the shop.

Q: BANDSAW TIRES: RUBBER VS. URETHANE

I read your article in Issue 297 (September 2024) about tuning up a bandsaw for resawing. I've been thinking of replacing the rubber tires on my saw with a set of urethane tires. Do you think this upgrade is worth the cost and effort?

Robert Alford
Albuquerque, New Mexico

A: If your current rubber tires are in good condition, Robert, you're unlikely to notice much difference in performance by switching to urethane tires. Manufacturers have traditionally relied on rubber tires to cushion the blade from the wheel. When urethane tires came out several years ago, they were accompanied by a lot of hype over how much of an improvement they were over rubber tires. But there are pros and cons to each type and you'll find woodworkers in both camps.

The primary advantage of urethane tires is that they're easier and less messy to install. Unlike rubber tires, urethane tires don't require adhesive to hold them in place. You simply soak the tire in hot water for a few minutes to soften the urethane, then stretch it over the wheel.

Urethane tires are harder than rubber tires and less susceptible to dry-rot and cracking, so they last longer, especially in hot, dry climates. However, in a home shop environment, the difference may not be that significant. Depending on how frequently you use your saw and the climate conditions of your shop, a set of rubber tires can easily last 20 years or longer.

Urethane tires are not without their downsides. Sawdust tends to stick to them more than it does with rubber tires, which may throw off the blade tracking. They're also more prone to grooving and developing flat spots, so it's important to always detension the blade after using the saw.

Because they aren't glued in place, urethane tires can stretch through use. Over time, they may stretch to the point where they work their way off the wheels. This doesn't necessarily happen in every case, but there have been enough reports from users to indicate that it's more than just a random occurrence.

TIP!

To avoid sawdust buildup on urethane tires, cut the head off a toothbrush and mount it inside your bandsaw so the bristles rub against the tire.

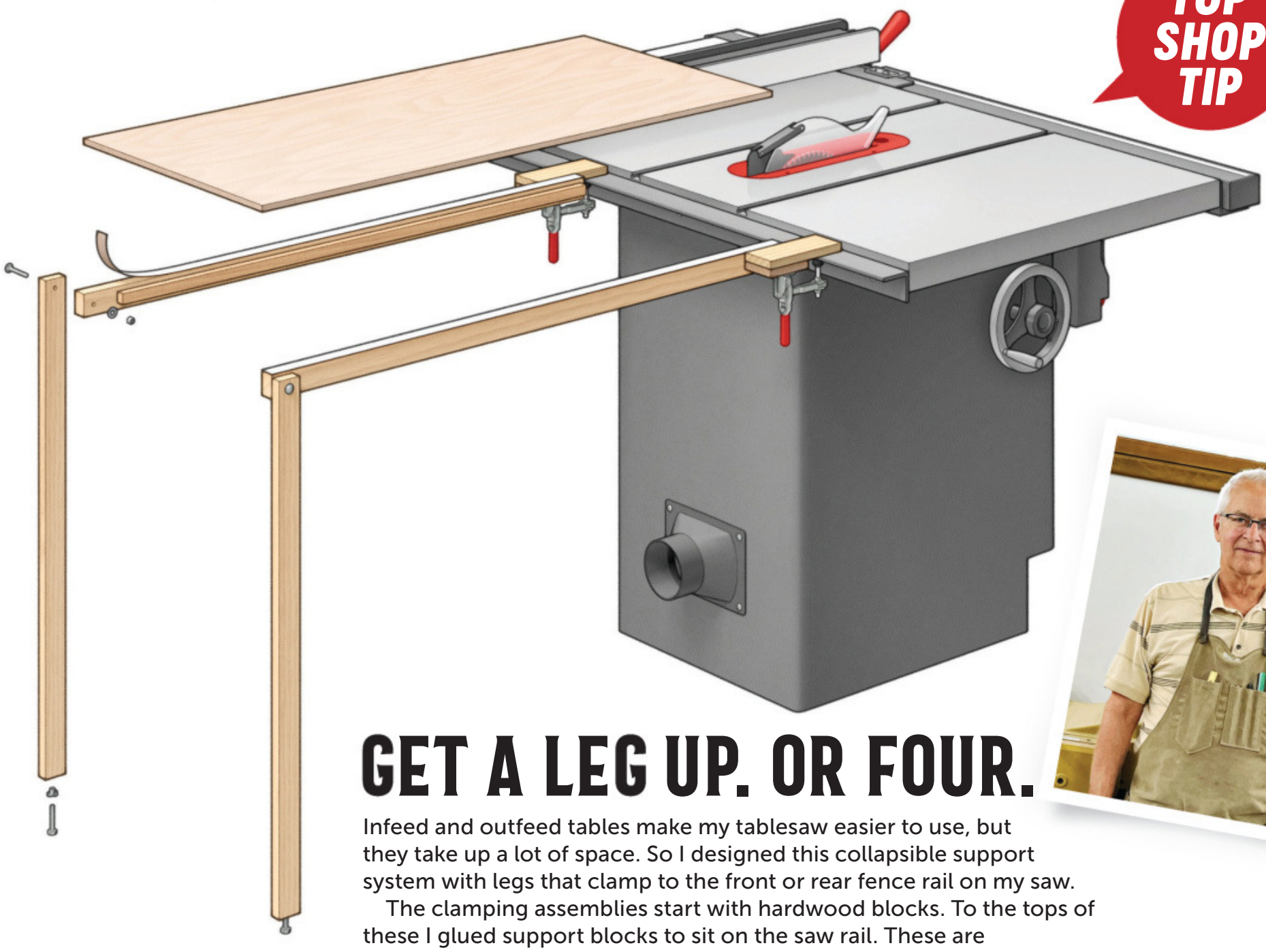
Lastly, be aware that urethane tires won't work with all bandsaws. If your saw has flat wheels that require you to crown the tires after mounting, stick with glued-on rubber tires. Most urethane tires are too thin to allow for crowning.

The cost of urethane tires is similar to rubber tires. If your existing tires are in good shape, you may just want to wait until it's time to replace them. However, if your tires are dried out and cracked, replacing them with new ones should give you a noticeable improvement in performance, regardless of whether you choose rubber or urethane.

TIP!

Avoid bargain-priced urethane tires from unfamiliar sources. Stick with known retailers who will stand behind the products they sell.

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



TOP SHOP TIP

GET A LEG UP. OR FOUR.

Infeed and outfeed tables make my tablesaw easier to use, but they take up a lot of space. So I designed this collapsible support system with legs that clamp to the front or rear fence rail on my saw.

The clamping assemblies start with hardwood blocks. To the tops of these I glued support blocks to sit on the saw rail. These are thicknessed to be nearly flush with the saw's table—1/16" higher for the infeed supports and 1/16" lower for the outfeed supports. A toggle clamp on the underside secures the assembly to the fence rail.

I made the horizontal rails and legs from 1×3s. A strip of plastic laminate on the top edge of the rails helps sheet goods slide more easily. Cleats on the inside of each rail support an optional panel flush with the top of the rails.

I glued and screwed the rails to the inside edge of the clamping blocks, keeping the top edge flush with the saw table. A bolt, washers, and nut connect the legs to form a hinge. A threaded insert and bolt at the bottom of each leg serve as levelers.

These supports work well, and easily collapse for storage on my wall.

Jeff Jackson
Elkhorn, Nebraska

For his tip, Jeff wins a Boom Arm Kit with High-Speed Cyclone from Mullet Tools worth $375.

TIPS EARN UP TO $150.

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

ILLUSTRATOR: CHRISTOPHER MILLS

continued on page 24

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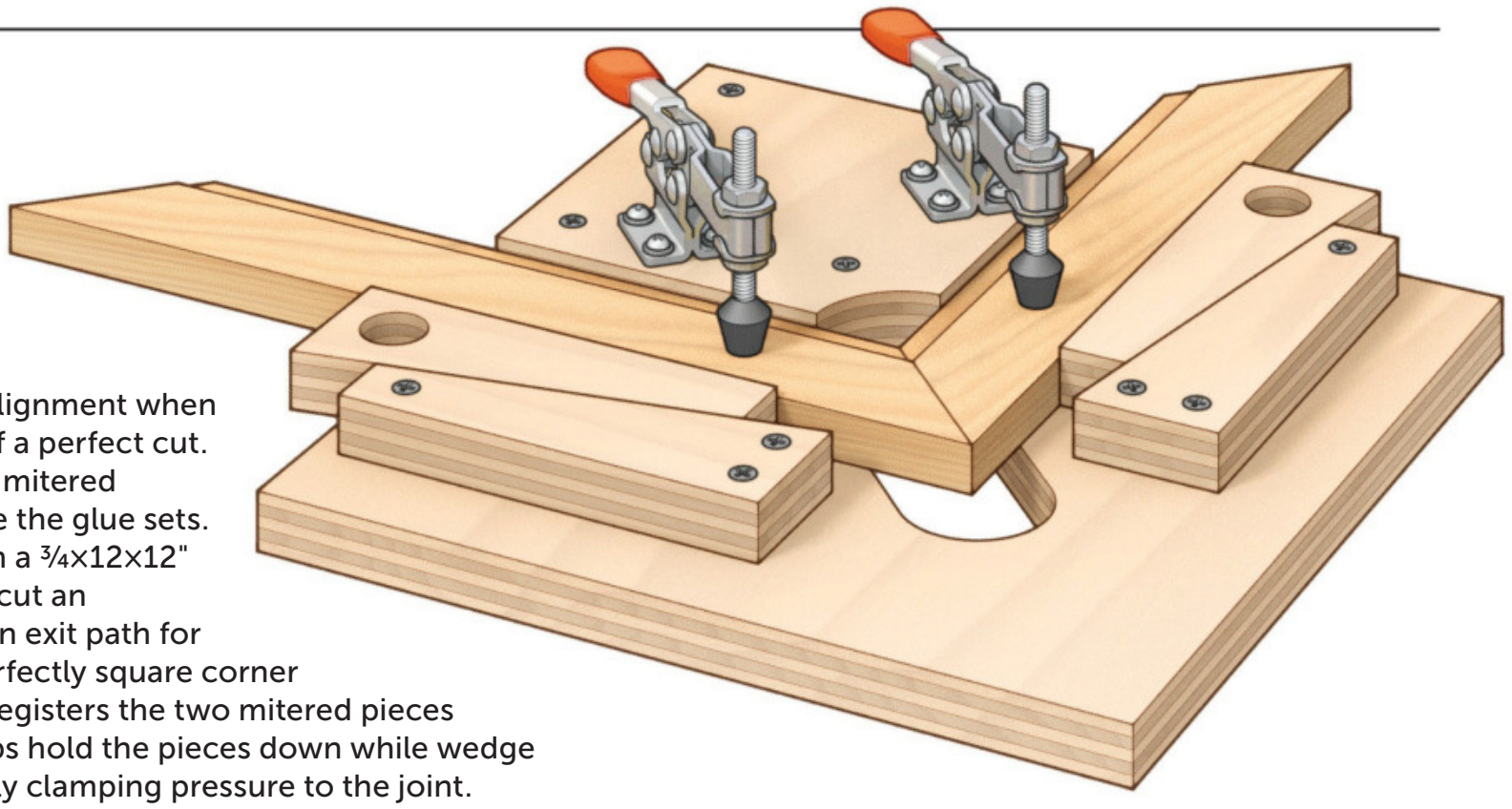


A NEW ANGLE ON MITER GLUE-UPS

Miter joints can get out of alignment when gluing, ruining the results of a perfect cut. This assembly jig holds two mitered pieces at a perfect 90° while the glue sets.

Building the jig starts with a ¾×12×12" plywood base. I drilled and cut an elongated hole to provide an exit path for any glue squeeze-out. A perfectly square corner block screwed to the base registers the two mitered pieces at exactly 90°. Toggle clamps hold the pieces down while wedge blocks get tapped in to apply clamping pressure to the joint.

Tony Rush
Springfield, Oregon

TOP POPPER

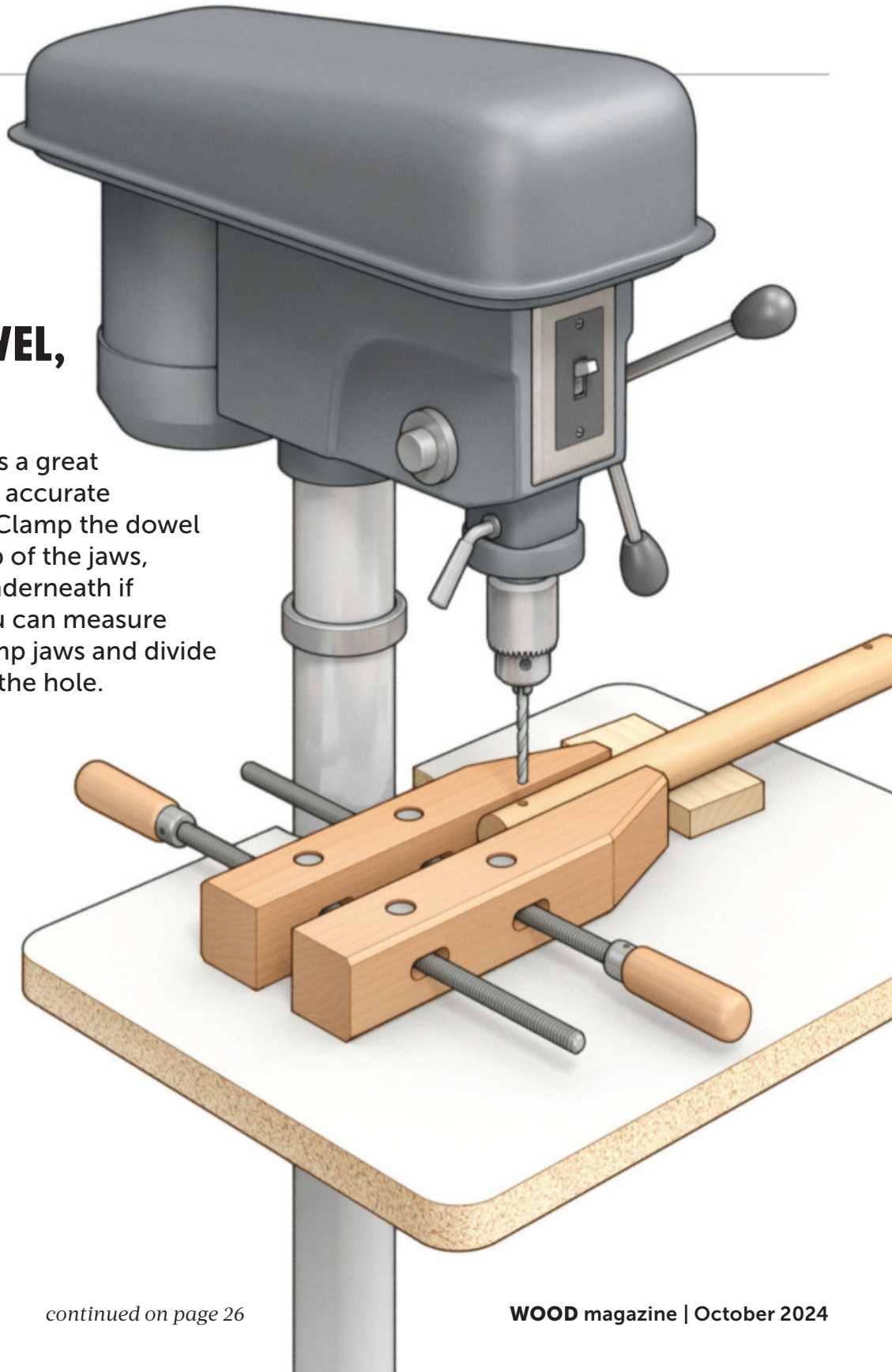
Here's my solution for making glue bottles easier to open. Grab a scrap of ⅛" hardboard. Drill through it using a 1¾" hole saw and smooth the edges, then redrill the pilot hole with a 19/32" or ⅝" bit to match the bottom diameter of the pop-up stopper. Pull off the stopper, slide the ring on its base, and reinstall the stopper.

Biff Crosley
Alloway, New Jersey

HOLEY DOWEL, BATMAN!

An old-fashioned handscrew makes a great clamp for drilling accurate holes in dowels. Clamp the dowel flush with the top of the jaws, using a spacer underneath if needed. Now you can measure between the clamp jaws and divide by two to center the hole.

Dan Martin
Galena, Ohio



continued on page 26

Throw Yourself a Bone

*Full tang stainless steel blade with natural bone handle —now **ONLY** $79!*

The very best hunting knives possess a perfect balance of form and function. They're carefully constructed from fine materials, but also have that little something extra to connect the owner with nature.

If you're on the hunt for a knife that combines impeccable craftsmanship with a sense of wonder, the **$79 *Huntsman Blade*** is the trophy you're looking for.

The blade is full tang, meaning it doesn't stop at the handle but extends to the length of the grip for the ultimate in strength. The blade is made from 420 surgical steel, famed for its sharpness and its resistance to corrosion.

The handle is made from genuine natural bone, and features decorative wood spacers and a hand-carved motif of two overlapping feathers— a reminder for you to respect and connect with the natural world.

This fusion of substance and style can garner a high price tag out in the marketplace. In fact, we found full tang, stainless steel blades with bone handles in excess of $2,000. Well, that won't cut it around here. We have mastered the hunt for the best deal, and in turn pass the spoils on to our customers.

But we don't stop there. While supplies last, we'll include a pair of $99 8x21 power compact binoculars *and* a genuine leather sheath **FREE** when you purchase the ***Huntsman Blade***.

Your satisfaction is 100% guaranteed. Feel the knife in your hands, wear it on your hip, inspect the impeccable craftsmanship. If you don't feel like we cut you a fair deal, send it back within 30 days for a complete refund of the item price.

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BONUS! Call today and you'll also receive this genuine leather sheath!

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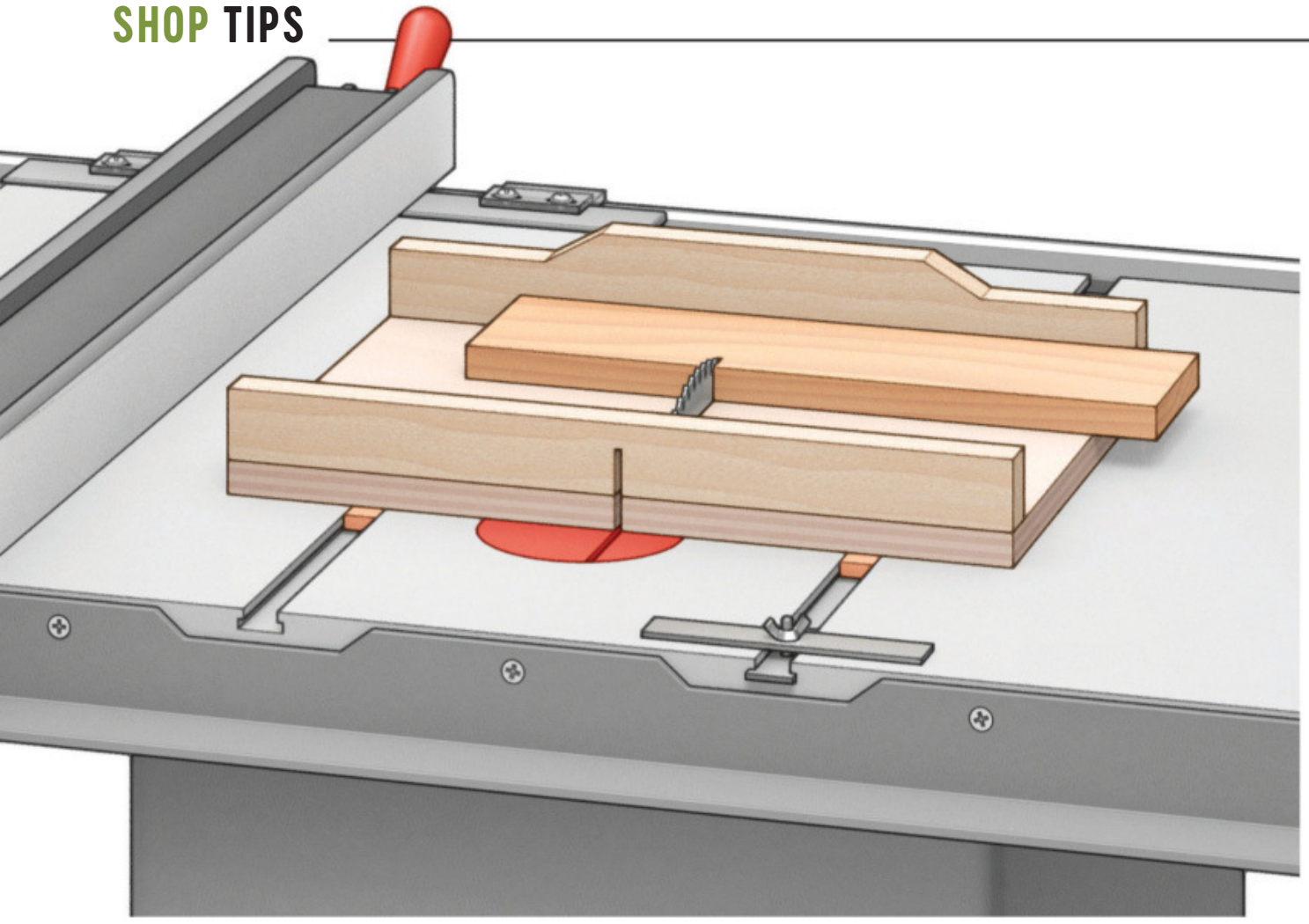
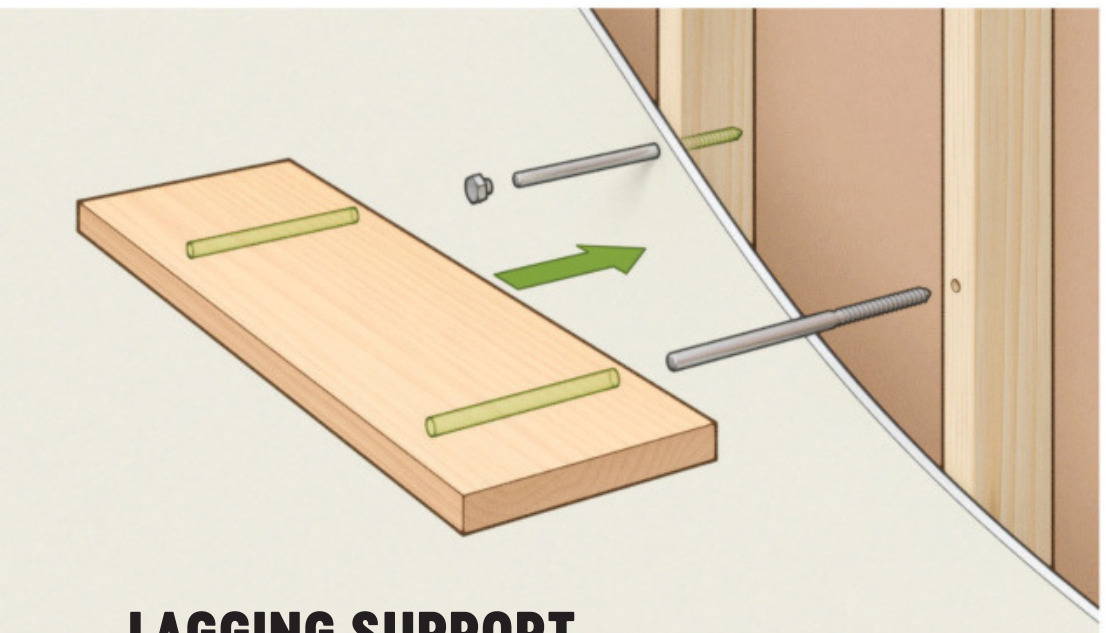


STOP IT!

One risk with using a shop-made tablesaw sled is exposing the saw blade as the sled slides forward. To eliminate this problem, I took advantage of my saw's T-style miter slot to make a simple stop. I cut two pieces of ⅛×1" steel: a short length to fit in the bottom, wider part of the miter slot and a longer one acting as a stop for the sled. I drilled a hole centered in each piece, countersinking the hole in the smaller piece. A flathead machine screw and wing nut secure the pieces in the miter slot. I position the stop in the miter slot so the sled stops just before the blade pops through the back side.

Gene Heimerman
Perry, Iowa



LAGGING SUPPORT

After reading the article on floating shelves in issue 290 (September 2023), I'd like to share my cost-effective solution for floating-shelf hardware: long, ½"-diameter lag screws.

I use a drill guide when drilling pilot holes into the wall studs to keep everything square. Next, I drive a lag screw into one of the holes to the target depth to tap the threads, then I back it out before repeating with the other holes.

Here's the trick: I cut the heads off of all of the lag screws, round over the cut ends with a file or grinder, and chuck them into my portable drill. They easily drive into the tapped holes. I size the matching shelf holes to slip snugly over the screws' shafts.

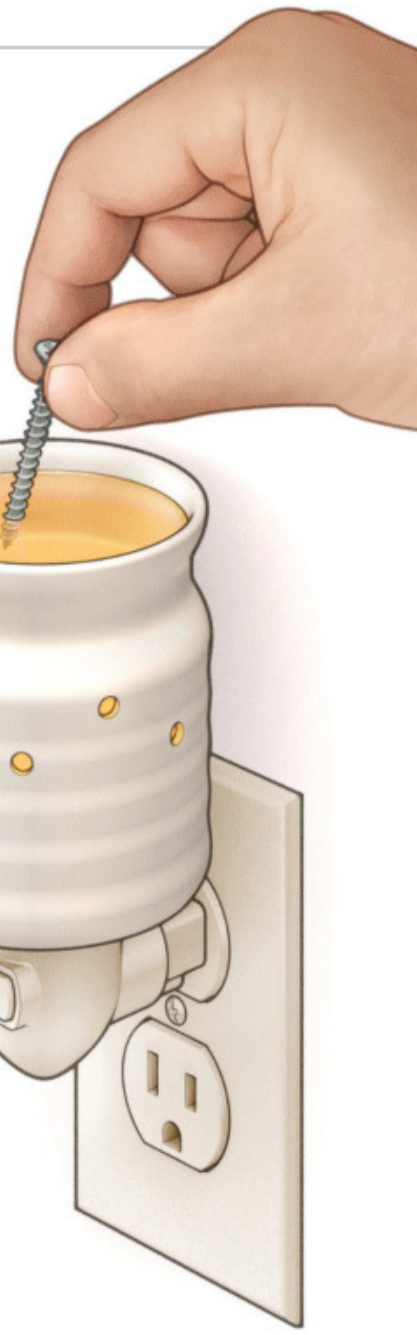
Shane Finneran
Hilliard, Ohio

WAXING ELOQUENT

Seeing the scented wax warmers my wife placed around our home gave me an idea. I discovered the melted wax is perfect for lubricating screw threads before driving them into wood.

Available in an endless variety of styles, these inexpensive wax warmers plug directly into a wall receptacle or feature a cord for tabletop use. If scented wax isn't your cup of tea, unscented paraffin wax makes a good substitute.

Allen Torkelson
Jackson, Ohio

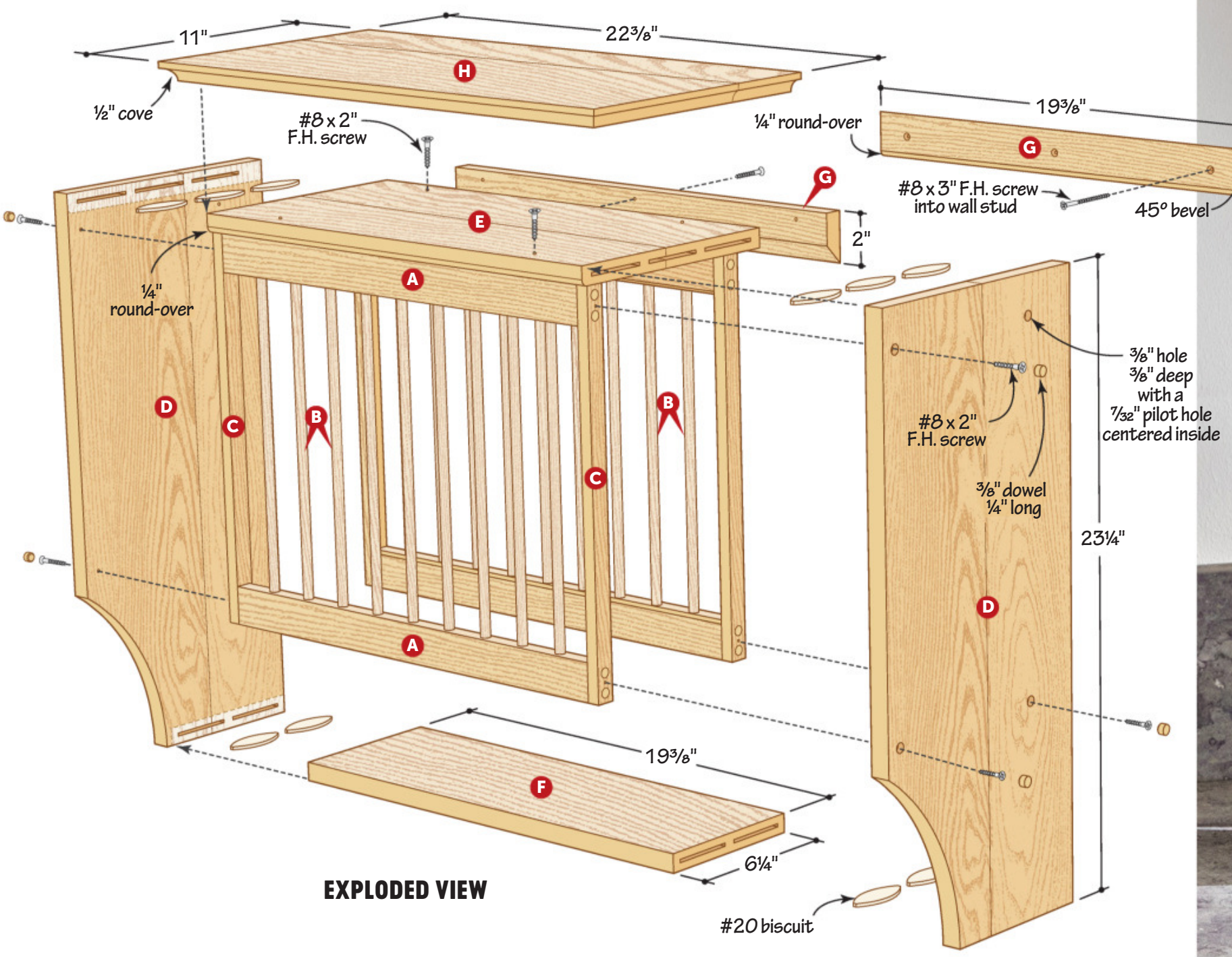


OFF-THE-WALL PLATE RACK

Whether it's practical storage for your everyday place settings or to show off your prized dinnerware, this cabinet is sure to draw attention.

WRITER: RANDY MAXEY
DESIGNER: JOHN OLSON
BUILDER: BRIAN BERGSTROM

Serving a meal usually requires digging plates out of a crowded cabinet. This two-tone plate rack with its oak dividers and painted cabinet looks great as it proudly displays your most-used place settings for handy access anytime. It's a quick build with long-lasting, practical benefits for your kitchen.



EXPLODED VIEW

PHOTOGRAPHER: CARSON DOWNING; **ILLUSTRATORS:** ROXANNE LEMOINE, LORNA JOHNSON

OVERALL DIMENSIONS
22⅜"W × 11"D × 24"H

CREATE A HOUSE DIVIDED

Start by building the pair of dividers that support the plates and keep them separated. You'll build the cabinet to fit around the assembled racks.

1 Cut the divider rails (A) to size **[Materials List, Drawing 1]**. Gang the rails together face-to-face with the ends flush and mark the hole locations for the 3/8" dowels. Drill the holes in all four rails **[Photo A]**.

2 Plane or rout a 1/8" chamfer on the inside drilled edge of each rail. Finish-sand the rails and set them aside.

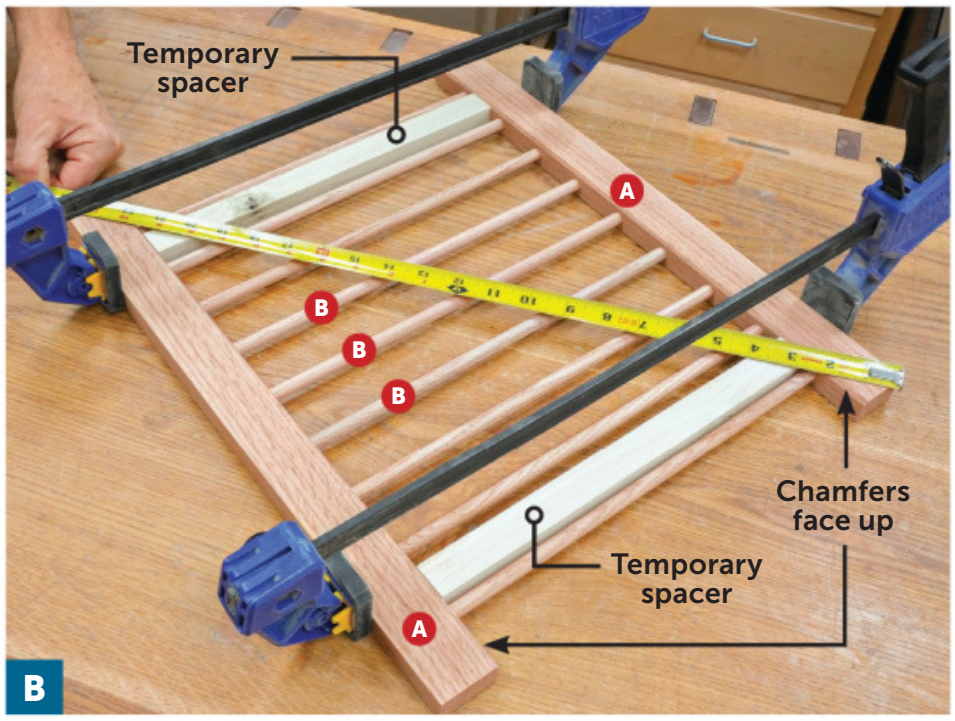
Position a fence on the drill press to center the drill bit on the workpiece thickness. Set the depth stop to drill the holes 1" deep. Raise the bit occasionally to clear the chips.

3 Cut the divider dowels to length and finish-sand them (B). Use scrapwood spacers to position the rails (A) as you glue in the dowels **[Photo B]**. Make sure to orient the chamfered edge of each rail facing up as you work.

4 Cut the divider stiles (C) to size, then glue and clamp them to the ends of the divider rails.

5 After the glue dries, drill holes and glue in dowels to reinforce the joints between the stiles and rails **[Drawing 1]**. Trim and sand the dowels flush **[Photo C]**, then set the divider assemblies aside.

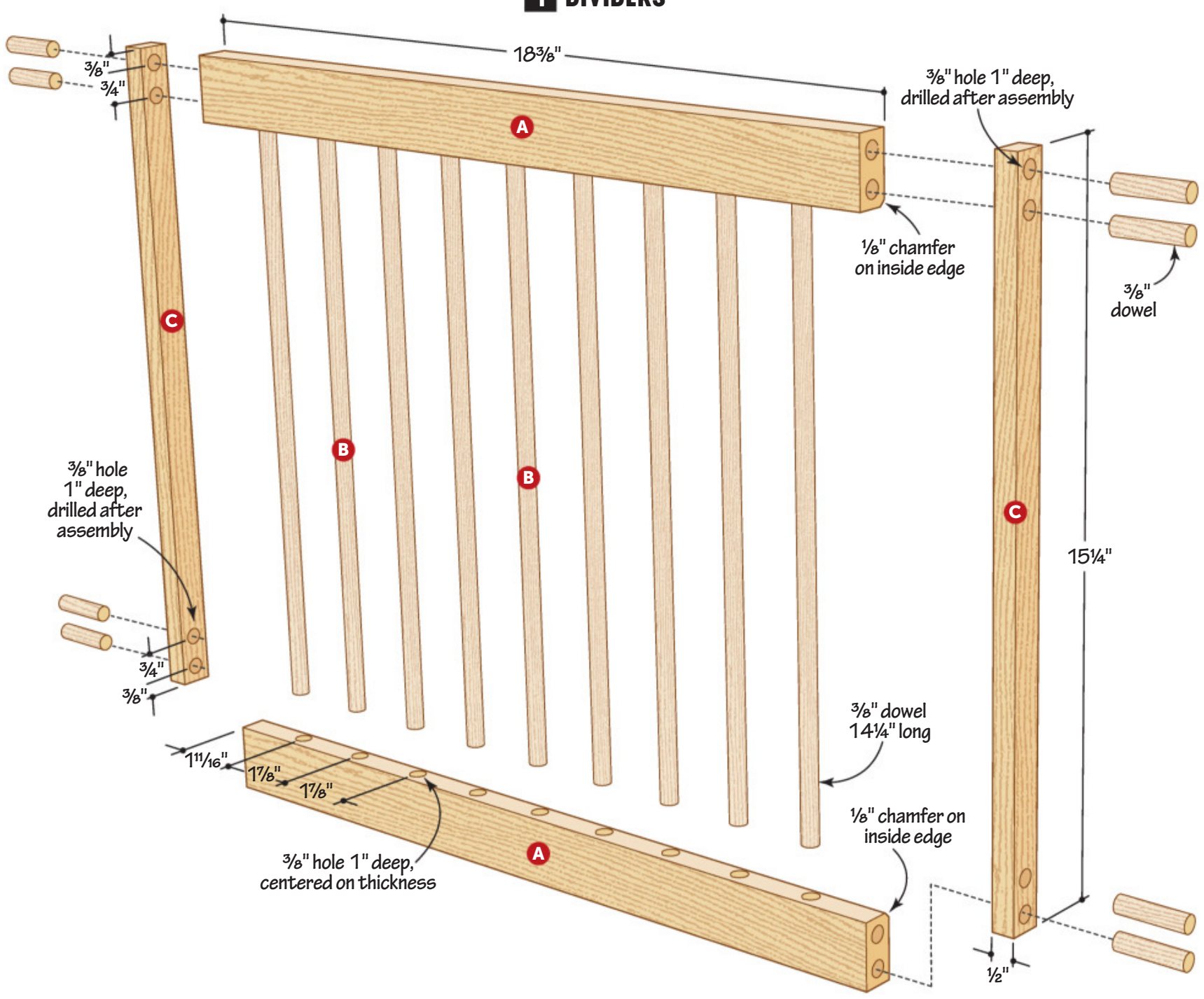
> **DON'T HAVE A BISCUIT JOINER? NO PROBLEM! USE COUNTERBORED SCREWS AND PLUGS FOR THE CASE ASSEMBLY.**
>
> ***-JOHN OLSON, DESIGN EDITOR***



Position 12¼"-long spacers between the rails to keep spacing consistent during glue-up. Tighten the clamps and measure diagonally to check for square.

Glue in extra-long dowels to reinforce the butt joint between the divider rails (A) and the divider stiles (C). Cut the dowels using a flush-trim saw. Sand the stiles smooth.

1 DIVIDERS



BUILD YOUR CASE

Simple joinery makes the case a quick build. Biscuits join the case top and bottom to the sides. Countersunk screws secure the divider assemblies, while plugs hide the screws from view. A cap completes the look, and a French cleat makes the plate rack easy to hang.

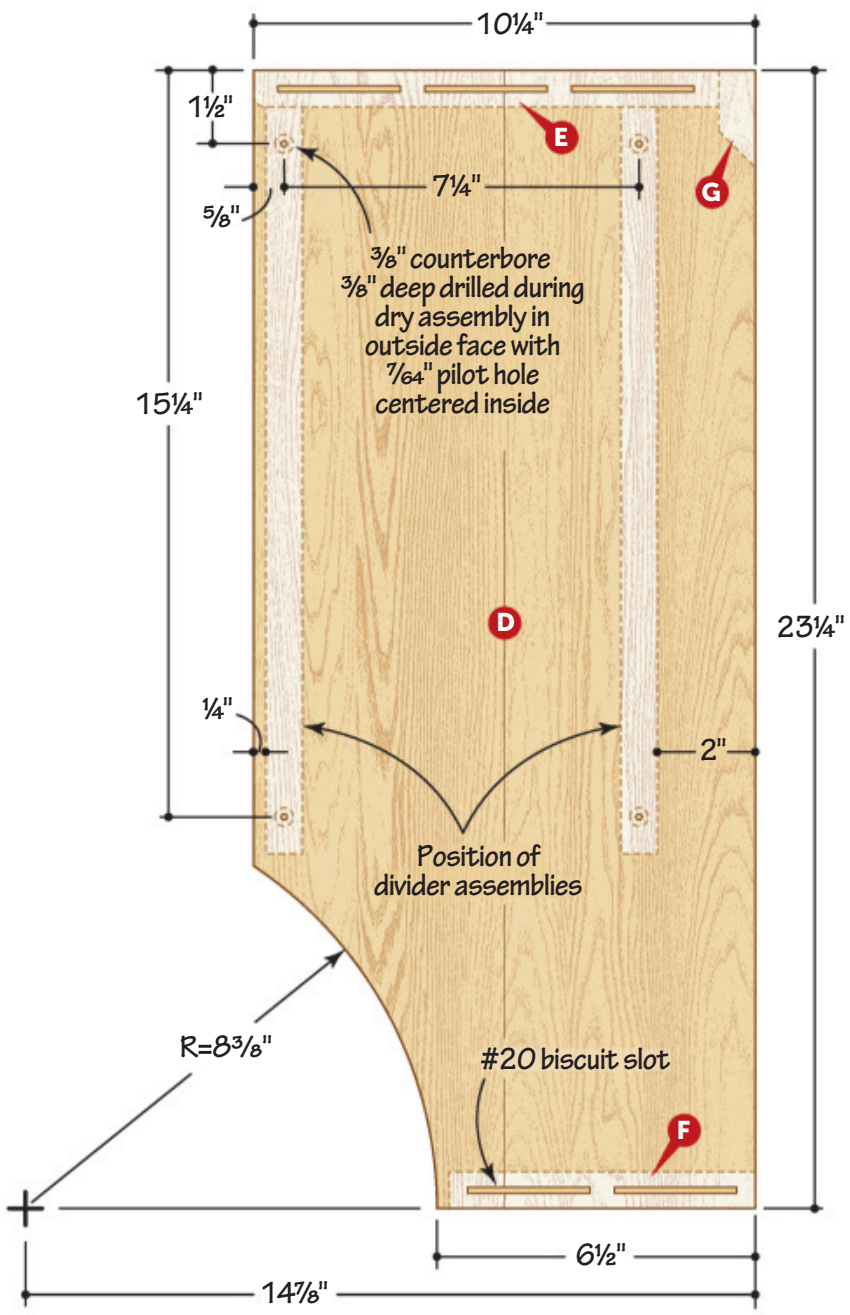
1 Cut the case sides (D) to final size **[Drawing 2]**. Then lay out the arc on each side, bandsaw or jigsaw the arcs to shape, and sand the cut edges smooth.

2 Cut the case top (E) and bottom (F) to size **[Materials List]**. Rout a 1/4" round-over on the front edge of the case top **[Exploded View]**.

3 Lay out and cut slots for #20 biscuits in the case sides, top, and bottom (D-F), taking care to position them on the inside faces of the sides **[Drawing 2, Photo D]**. Finish-sand the case sides, top, and bottom.

Lay out biscuit slots in the case sides (D), top (E), and bottom (F). Make sure to create mirror images for the sides, cutting the slots on the inside face of each piece.

2 CASE SIDE (left inside face shown)



DRY-ASSEMBLE, THEN FINISH

The paint and stain that give this plate rack striking looks are applied more easily before assembly. We used Balanced Beige #7037 trim enamel from Sherwin-Williams and semigloss Arm-R-Seal urethane topcoat from General Finishes. Before you get out the brushes, though, test-fit the case and cut the final parts.

1 Using biscuits for alignment, dry-assemble the case (D-F), tightening the clamps enough to hold the pieces together. Slip the divider assemblies (A-C) into position **[Exploded View]**. Clamp everything tight, check for square, and drill counterbored holes in the case sides (D) and into the dividers **[Photo E]**.

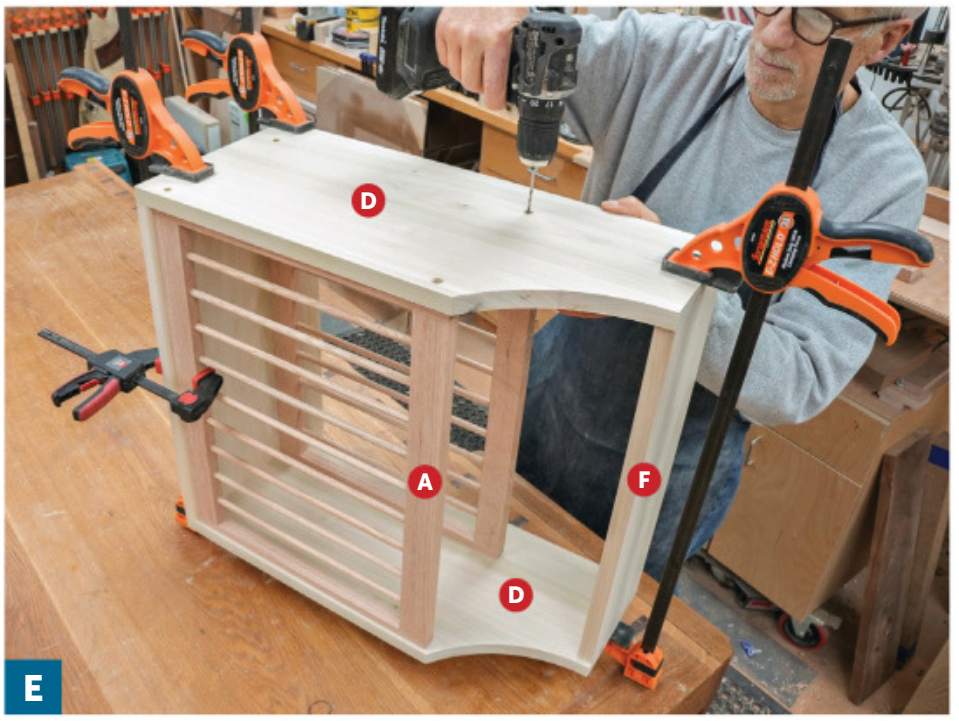
2 Measure between the case sides and cut the French cleats (G) to length and width, bevel-ripping one edge. Rout a ¼" round-over on the wide face of one cleat **[Exploded View]**.

3 Cut the cap (H) to size, then rout a ½" cove on the front edge and ends. Finish-sand the cleats and cap.

4 Remove the divider assemblies, disassemble the case, and apply a coat of paint to the inside faces of the case parts, as well as clear finish to the divider assemblies. For those, we wiped on two coats of General Finishes semigloss Arm-R-Seal.

5 After the paint dries, assemble the plate rack using glue and screws. Plug the holes in the sides, sand the plugs flush, and paint the exterior of the case. Glue and screw the French cleat to the case. Finally, drive screws through the case top (E) and into the underside of the cap (H).

6 Fasten the wall side of the French cleat (G) to the wall with fasteners appropriate for the rack's loaded weight. Hang the rack on the cleat, then load up the plates you want to show off or keep readily accessible.



Counterbore screw holes in the case sides to join the divider assemblies, paying careful attention to the offset distances of the dividers from the front and back edges of the case.

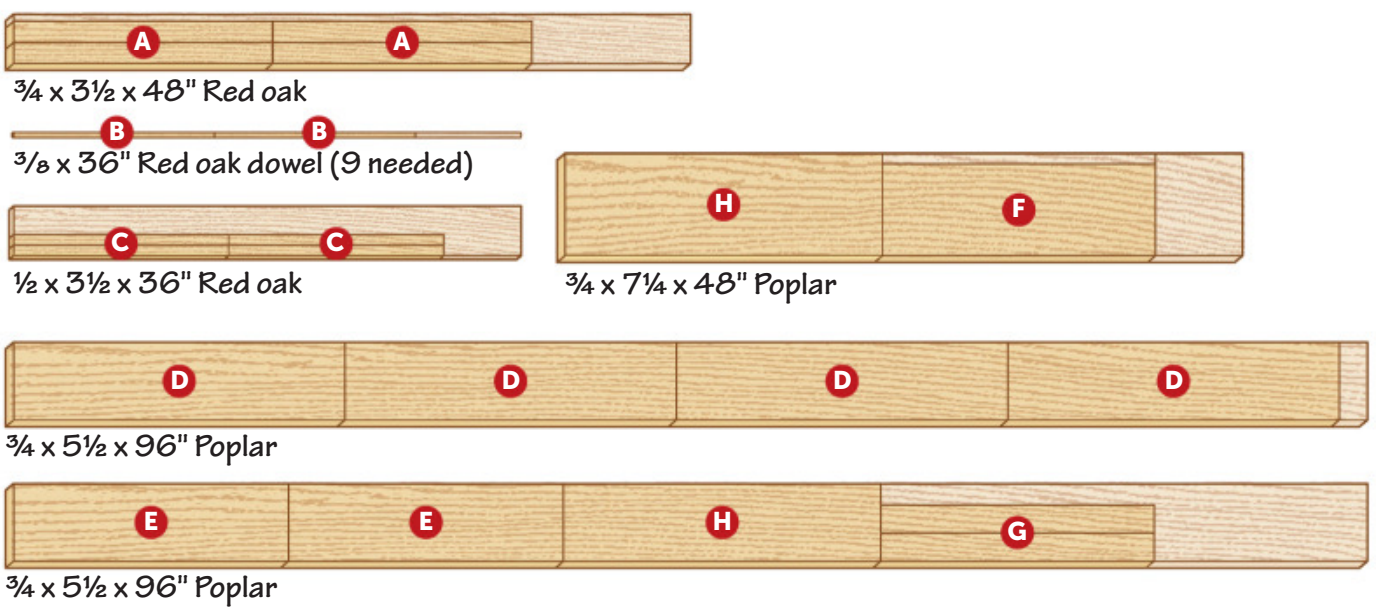
MATERIALS LIST

PART		FINISHED SIZE T	W	L	Matl.	Qty.
A	DIVIDER RAILS	¾"	1½"	18⅜"	RO	4
B	DIVIDER DOWELS	⅜" diameter		14¼"	RO	18
C	DIVIDER STILES	½"	¾"	15¼"	RO	4
D	CASE SIDES	¾"	10¼"	23¼"	P	2
E	CASE TOP	¾"	9½"	19⅜"	P	1
F	CASE BOTTOM	¾"	6¼"	19⅜"	P	1
G	FRENCH CLEAT	¾"	2"	19⅜"	P	2
H	CAP	¾"	11"	22⅜"	P	1

MATERIALS KEY: RO–red oak, P–poplar.
SUPPLIES: #20 biscuits, #8x2" flathead wood screws, #8x3" flathead wood screws, semi-gloss paint, clear urethane,
BITS: 45° chamfer, ¼" round-over, ½" cove router bits.
PROJECT COST: It cost us about $100 to build this project. Your cost will vary by region and source.

CUTTING DIAGRAM

This project requires 11 board feet of 4/4 poplar, 2 board feet of 4/4 red oak, and 1 square foot of ½" red oak based on example boards shown.



Torch Paste, ***torchpaste.com***
Woodburning paste

10 WAYS TO MAKE YOUR MARK

Give your woodworking a personal touch by adding a signature, logo, or hallmark to your projects.

WRITER: VINCE ANCONA with JESSICA ENO

Most woodworkers build projects with the hope that they will last for generations. So it's only natural to want to leave behind some sort of mark on a project as an indication of who made it. While the idea of signing or marking a project goes back hundreds of years, laser engravers, CNC routers, and digital printing devices have made marking your projects easier than ever. Even if you don't own one of these machines, there are scores of individuals on sites like Etsy that offer personalized tags and other products to give your woodworking projects a personal touch with a professional look. Here are some of our favorites.

Burn In Your Memory

Use an inexpensive woodburning tool, available in any craft-supply store, to burn your signature into the back or bottom of a project. Depending on the wattage of your woodburner, it can be a slow process. Duplicating a swooping signature requires patience and a steady hand. For the best results, sign in pencil first, then trace over the signature with the woodburning tool.

Medal-Winning Idea

Inlay a custom medallion into the surface of your project. Choose the size, design, and metal (copper, aluminum, or brass) and order from a laser engraving shop. A shallow hole and a drop or two of epoxy are all you need to attach the medallion.

Etsy, *etsy.com/shop/EABelts*
Medallions

Learn how to make your own etched brass medallions
woodmagazine.com/etchbrass

Brand Recognition

Unleash your inner cowboy by branding your projects with a custom brand. Brands screw onto the end of a handle. Choose from a plug-in electric version (recommended) or one you heat up with a propane torch. Practice on scrap first to get a feel for how hot to get the iron and how long to leave it on the wood. Use the brand on raw wood, before applying a finish.

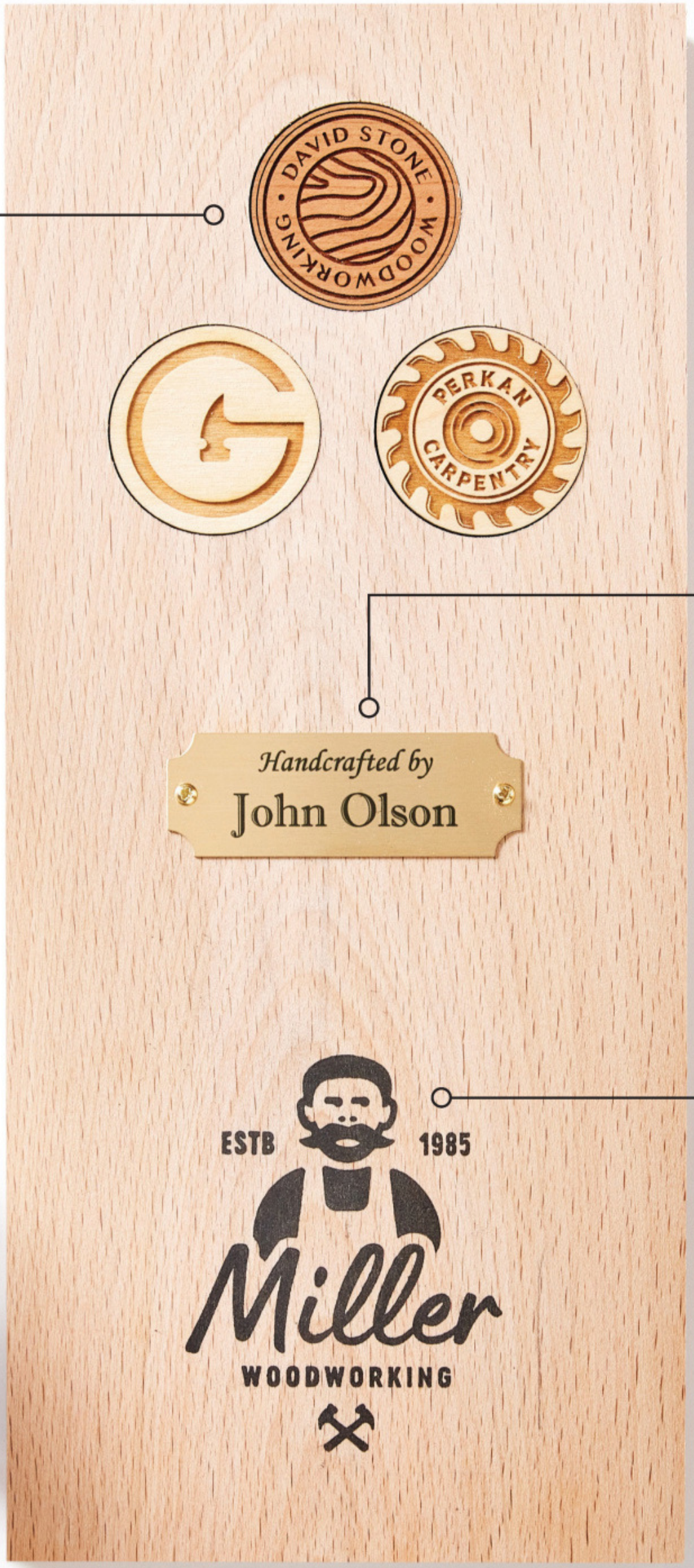
Custom Brand Shop, *custombrandshop.com*
Branding iron

TURN UP THE HEAT WITH WOODBURNING PASTE

Add a logo or custom design to a project using a stencil and a heat-activated woodburning paste (torchpaste.com). We created a vinyl stencil using a Cricut cutting machine (cricut.com), but you could also use contact paper and a craft (X-Acto) knife.

Affix the stencil to your project and peel off the backing. Using an artist's spatula, a small squeegee, or even an old credit card, spread the paste thinly and evenly over the stencil (*right*).

Allow the paste to dry for a few minutes, then remove the stencil. Use a heat gun to activate the paste and burn the image into the wood (*previous page*).



Wooden Nickels

Few things feel more fitting for a woodworking project than a laser-engraved wood token. Inlay the token by drilling a shallow hole and simply gluing it in place. We purchased these 1½"-diameter tokens from an Etsy shop. Use your own logo or choose from dozens of stock designs. Or if you own a laser engraver, make your own.

Laser Art Studio,
LaserArtStudioKY.com
Wood tokens

Add Class with Brass

Add a touch of elegance to your next project with a brass placard engraved with your name or special message. Attach the placard with brass screws or escutcheon pins.

Etsy
etsy.com/shop/YourEverydayNeeds
Brass plaques

Rubber Stamp

A custom-made rubber or acrylic rubber stamp is easy to apply and can be used over and over. Simply ink the stamp and press it onto the wood. Traditional rubber stamps last longer and create a sharper image; acrylic rubber stamps cost a bit less and because they are clear (see-through) are easier to position on your project. Test the compatibility of the ink with your finish on a sample board first.

StamPrints, *stamprints.com*
Rubber and acrylic rubber stamps

Stamp of Pride

For a less obtrusive mark, consider a metal stamp. When struck, a metal stamp leaves a light impression in the wood. For best results, choose a design with narrow, well-defined edges and little surface area. Strike the stamp with a hammer or small sledge. Hardwoods show fine details better than softwoods.

Brand-First, *brand-first.com*
Metal stamp

Pocket Change

Inlay a coin into the surface of a project. Use a coin-sized Forstner bit to drill the correct diameter hole, then epoxy the coin in place. Choose a current year coin to record when a project was built or use a coin minted in the year of a special event you wish to commemorate.

Peachtree Woodworking, *ptreeusa.com*
Coin Forstner bit set

Your Permanent Record

Keep it simple by grabbing a permanent marker and signing your name in an inconspicuous spot on the project. Signing with a felt marker works best on raw wood. Finish-sand the area where you intend to sign to create a smooth canvas. Test the compatibility of the marker ink with the finish you intend to use on some scrap first.

BOMBPROOF
BASIC BENCH

There's no reason your first workbench can't be as handsome and durable as any built by a seasoned pro. Build this rock-solid workstation with just a tablesaw and a drill.

WRITER: CRAIG RUEGSEGGER
DESIGNER: JOHN OLSON
BUILDER: BRIAN BERGSTROM

OVERALL DIMENSIONS
72"W × 26½"D × 34½"H

PHOTOGRAPHER: JACOB FOX; **ILLUSTRATORS:** ROXANNE LEMOINE, LORNA JOHNSON

Cut a 3½"-wide scrap to help position the upper leg spacer (C). Note that the legs mirror each other. Remove the scrap after clamping the spacer so the scrap doesn't get glued in place.

Make sure the bottom edges of the fillers and rails remain aligned as you clamp the pieces together. Holding the pieces by hand for a minute before clamping allows the glue to grab, reducing slippage.

Standing on stout, sturdy legs and dressed up with shiplap sides below a solid-wood top, this workbench can serve you well for decades. A divided plywood cabinet slides between the legs and houses four roomy drawers, keeping your most-needed tools and supplies close at hand.

To solve the conundrum of building a workbench without having a workbench to build it on, place a partial sheet of MDF on a portable workcenter, as we show, or on a pair of sawhorses to provide a flat worksurface.

For stock less likely to warp and cup, we ripped ordinary, wide Douglas fir boards from the home center into quartersawn and riftsawn stock. See more about this in the sidebar *Pith Is the Pits*, *page 41*. Shop-made soft maple shiplap dresses up the ends, while pine and plywood round out the main bench build.

MAKE LEGS AND FRAMES

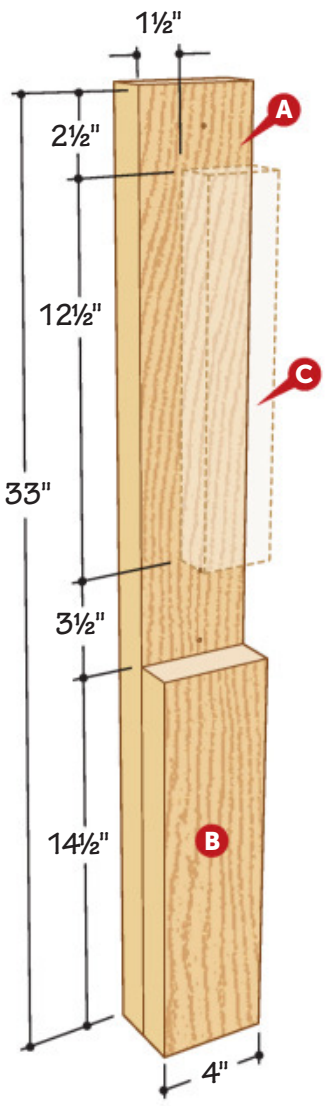
Build the beefy legs by laminating (gluing two pieces face to face) thinner stock. By laminating shorter spacers to a longer leg, you create gaps that accept the upper and lower frames, tying everything together.

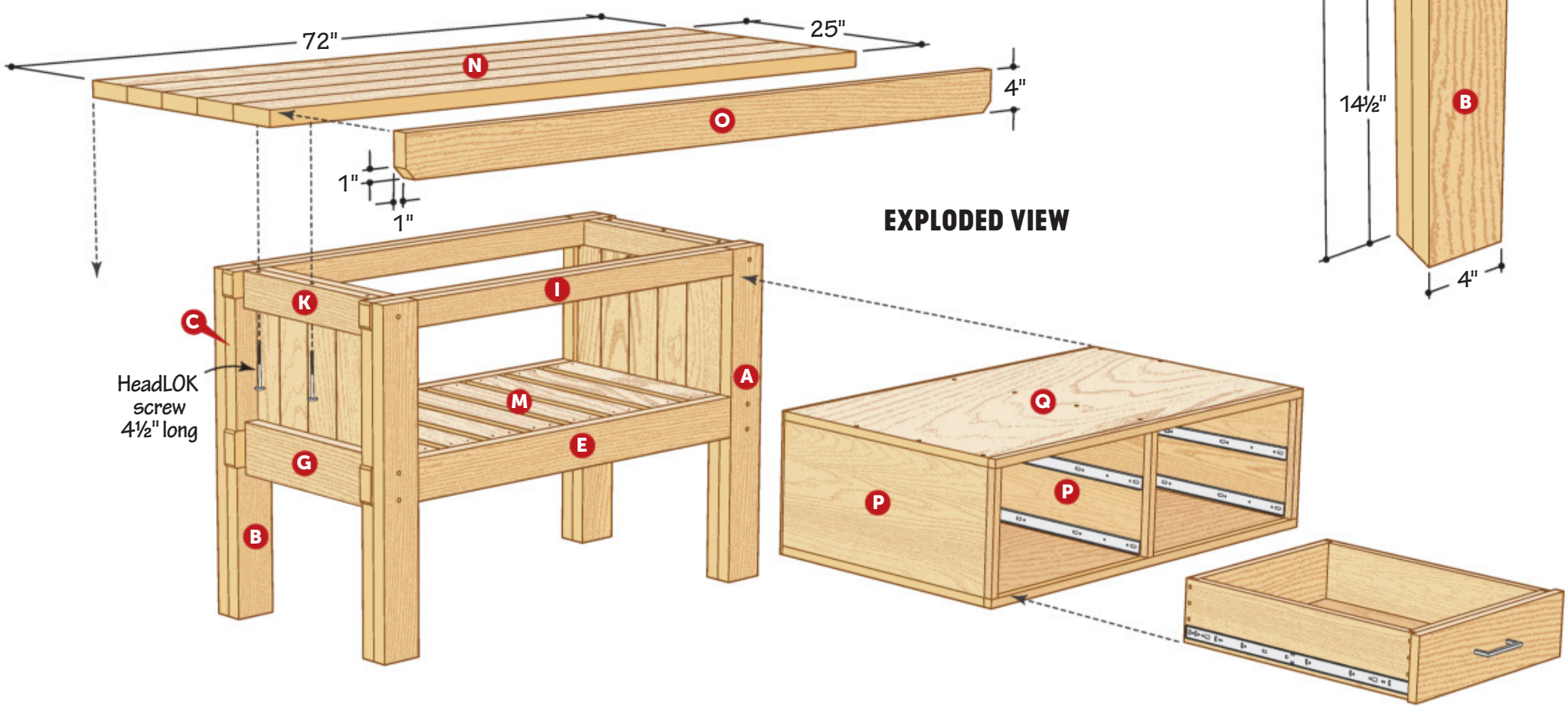
1 Cut the legs (A) and lower and upper leg spacers (B, C) to size **[Materials List]**. Glue and clamp a lower leg spacer (B) to each leg (A) **[Drawing 1]**.

2 Glue and clamp an upper leg spacer (C) to each leg (A) **[Photo A]**.

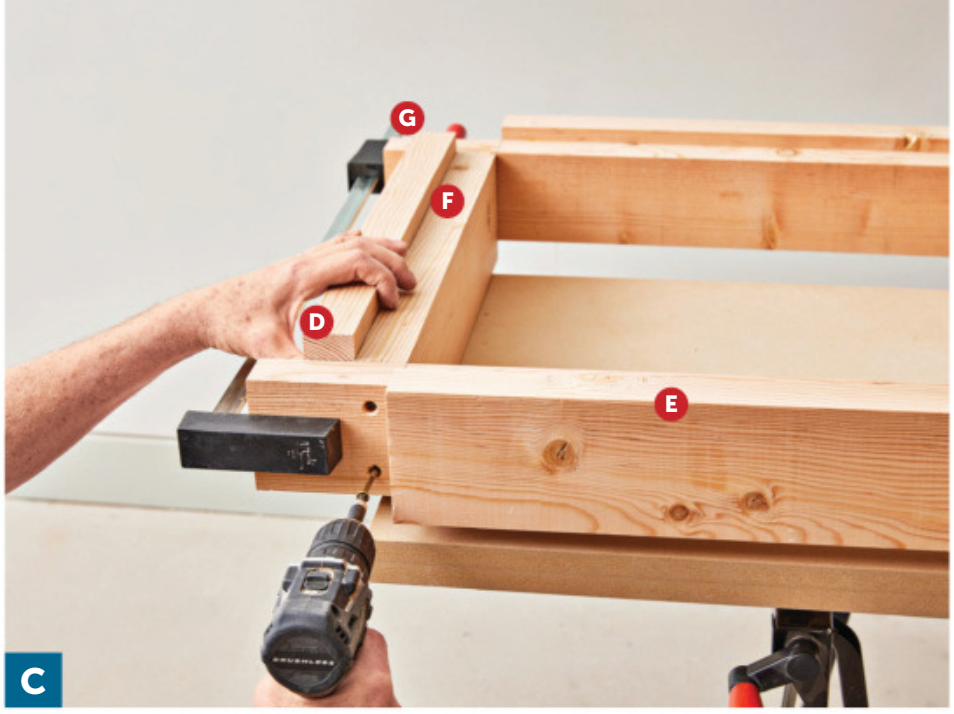
3 Cut the lower front and back rails, lower side rails, and lower fillers (D-G) to size. Glue and clamp a filler to each rail with their bottom edges flush **[Drawing 2, Photo B]**.

1 LEG (Right rear leg shown)

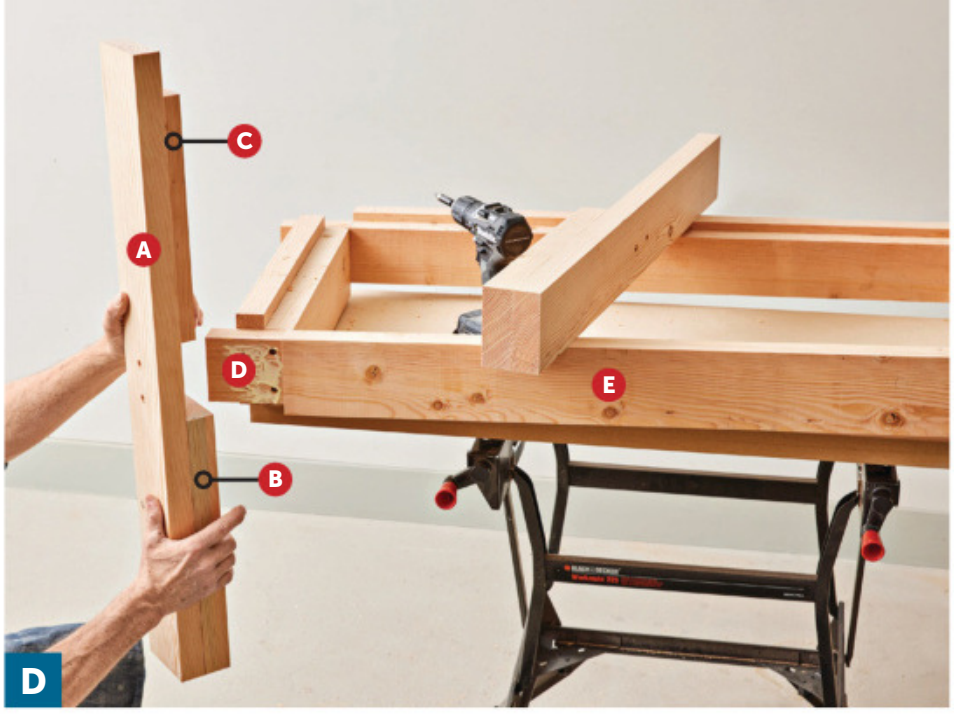




EXPLODED VIEW



Align the inside faces of the side rails (F) with the ends of the front/back fillers (E). Extend the shank holes in the front and back rails (D) into the side rails before driving the screws.

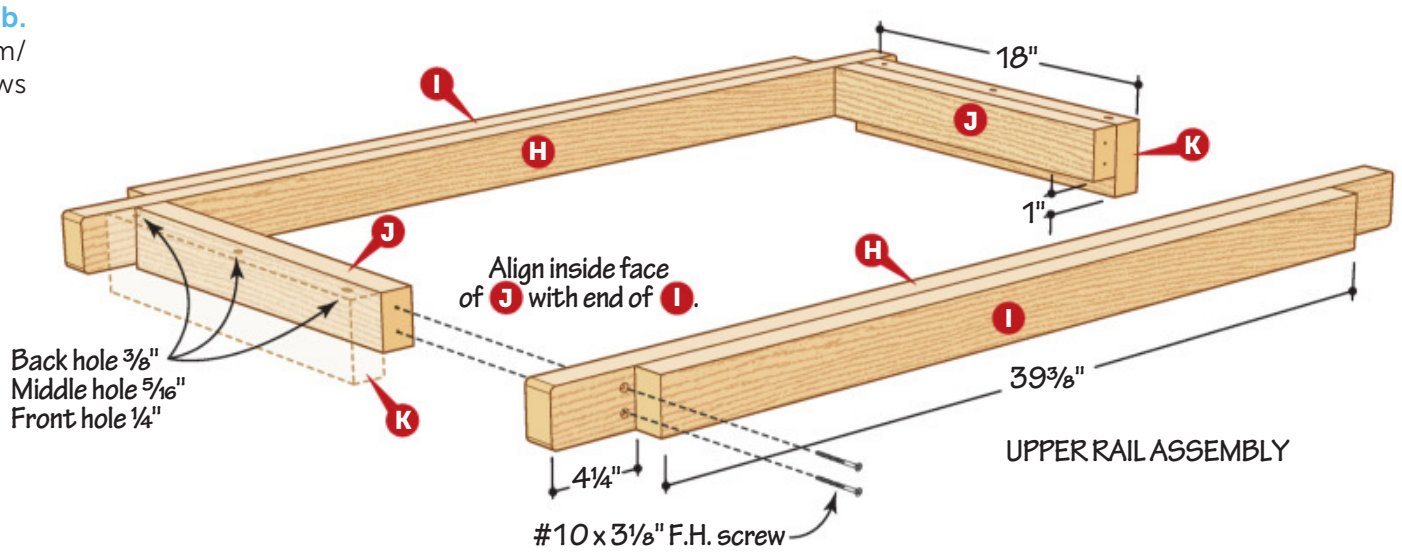


Orient each leg with the top spacer (C) to the outside. Clamp across the end of the assembly and check for square before driving #10×4" flathead screws to secure the legs.

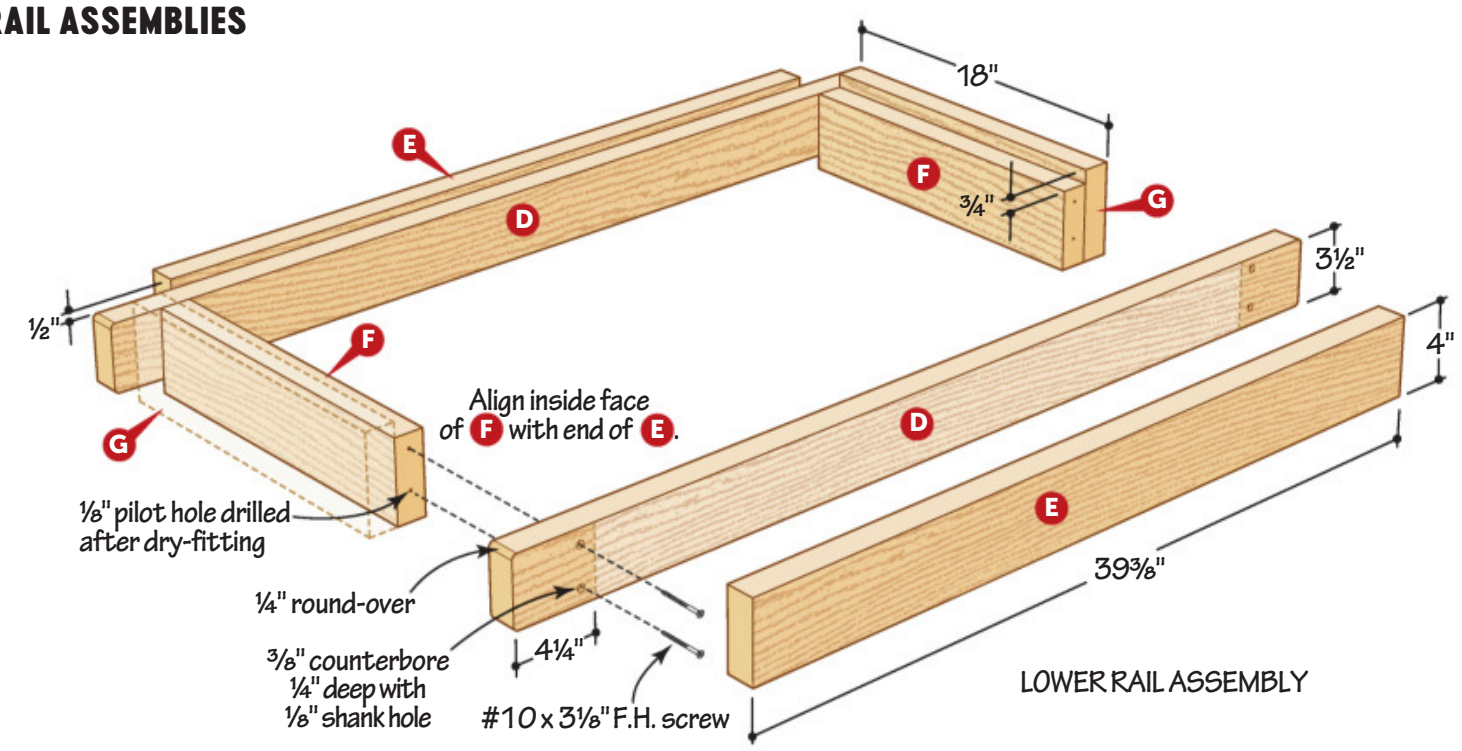
Get the lowdown on choosing and installing the right screw for the job.
woodmagazine.com/screws

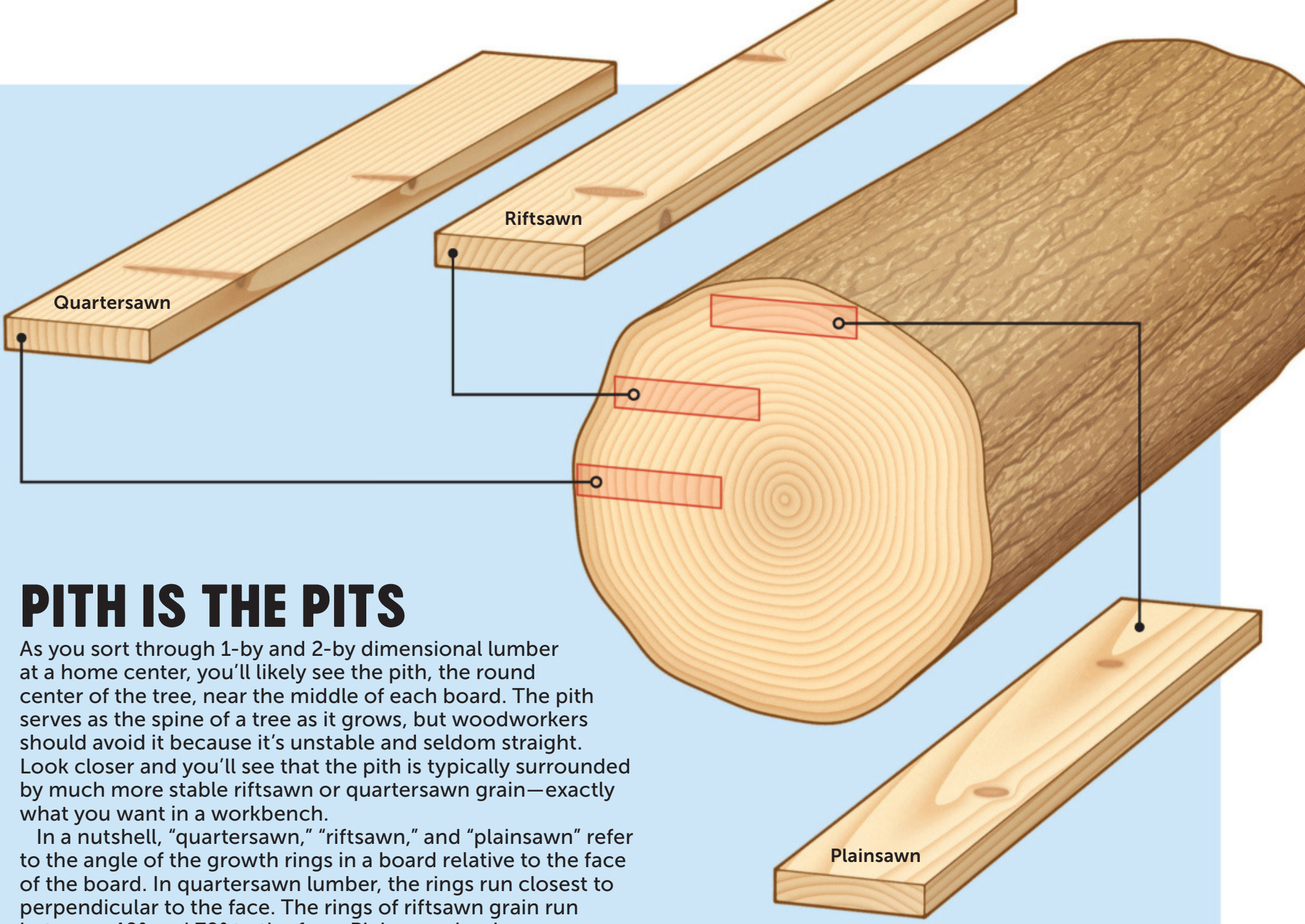
4 Dry-fit and clamp the lower rail/filler assemblies (D/E, F/G) to form a frame and drill counterbores and shank holes in the front and back rails (D) **[Drawing 2]**. Use these as a guide to drill pilot holes into the lower side rails (F), then screw the rail assemblies together before removing the clamps **[Photo C]**.

5 Dry-fit the legs to the rail assembly. Drill counterbores and shank holes in the legs **[Drawing 3]**, then extend 1/8" pilot holes through the shank holes into the front and back rails (D). Glue and screw the legs to the rail assembly **[Photo D]**.



2 RAIL ASSEMBLIES





PITH IS THE PITS

As you sort through 1-by and 2-by dimensional lumber at a home center, you'll likely see the pith, the round center of the tree, near the middle of each board. The pith serves as the spine of a tree as it grows, but woodworkers should avoid it because it's unstable and seldom straight. Look closer and you'll see that the pith is typically surrounded by much more stable riftsawn or quartersawn grain—exactly what you want in a workbench.

In a nutshell, "quartersawn," "riftsawn," and "plainsawn" refer to the angle of the growth rings in a board relative to the face of the board. In quartersawn lumber, the rings run closest to perpendicular to the face. The rings of riftsawn grain run between 40° and 70° to the face. Plainsawn lumber has rings between 40° and parallel to the face.

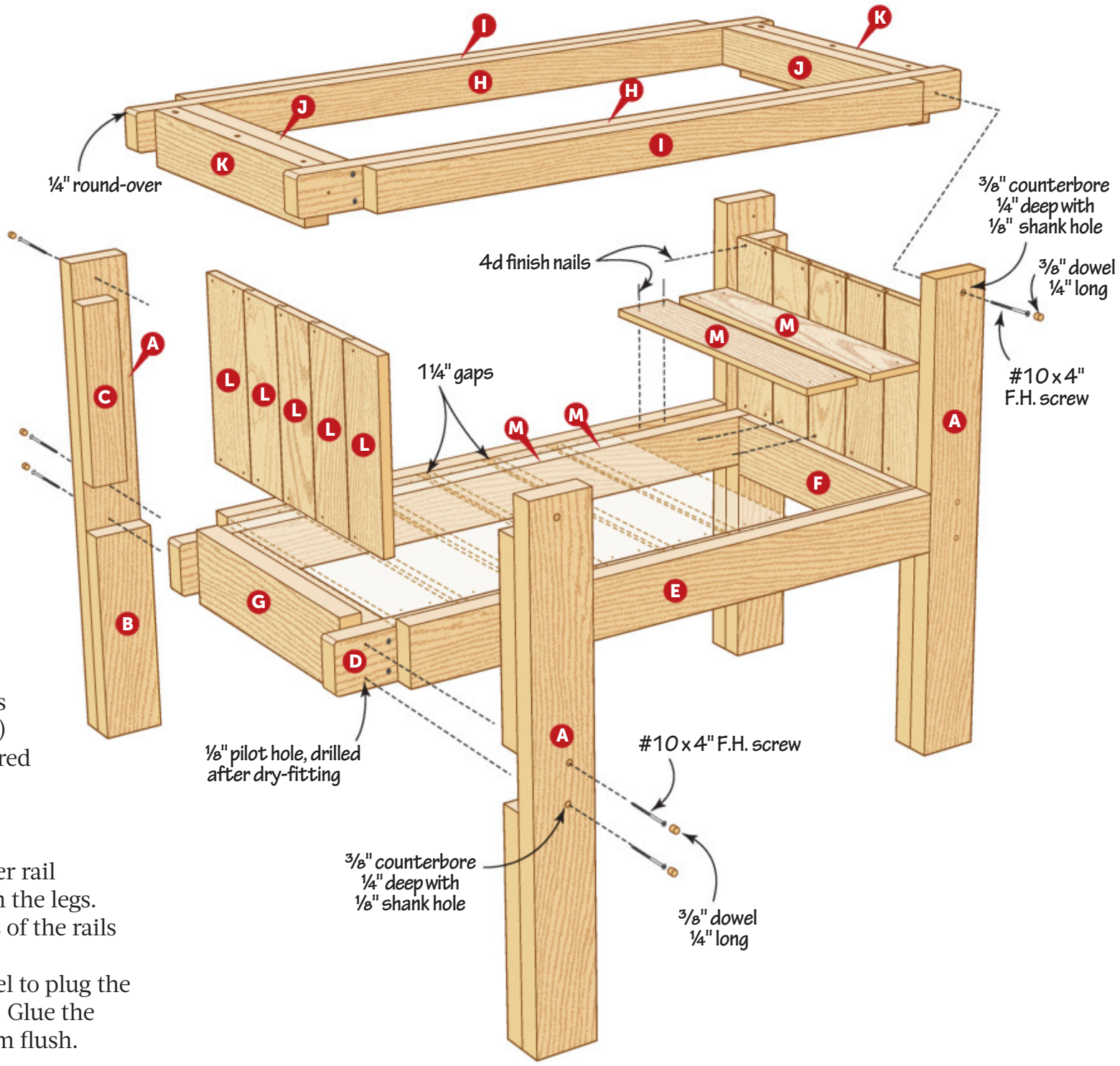
Why is this important? Because riftsawn and quartersawn boards cup less and expand less across their width than plainsawn. The drawback is that you pay more for these benefits because logs yield less when quartersawn and riftsawn compared to plain sawing. But you can game the system to create your own riftsawn and quartersawn lumber without paying a premium.

Invest some time sorting through 2×12s at the home center, looking for those with the pith centered on the thickness of the board, *right*. Back in the shop, rip the boards as shown *below* to create square-edged boards with the most desirable grain. For the wider boards needed for the lower side rails (F), lower side rail fillers (G), and top (N), look for boards with the pith offset to one side.

Look for boards like those outlined in blue with a pith near the center of the board's thickness, and quartersawn or riftsawn grain on each side of it. Avoid those such as the ones outlined in orange.

◀ To prep your boards, rip about 3/16" from each edge to remove the rounded corners. Then rip alongside the pith to remove it, leaving quartersawn stock.

3 BASE ASSEMBLY



6 Cut the upper rails (H, J) and fillers (I, K) to size. Glue the fillers to the rails with their upper edges flush **[Drawing 2]**.

7 Dry-fit the upper rail assemblies (H/I, J/K) as you did with the lower rails, aligning the inside faces of the side rails (J) with the ends of the front/back rail fillers (I) **[Drawing 3]**. Drill counterbored shank holes and pilot holes, then glue and screw the rail assemblies together.

8 Glue and screw the upper rail assembly (H–K) between the legs. Round over the exposed ends of the rails (D, H) with sandpaper.

9 Cut lengths of a 3⁄8" dowel to plug the counterbores in the legs. Glue the plugs in place, then sand them flush.

Raise the saw blade 3⁄8" above the table and set the fence 3⁄8" from the *outside* face of the blade. Cut a groove along one edge of four blanks and along both edges on the opposing faces of the other six.

SHIPLAP SHAPE-UP

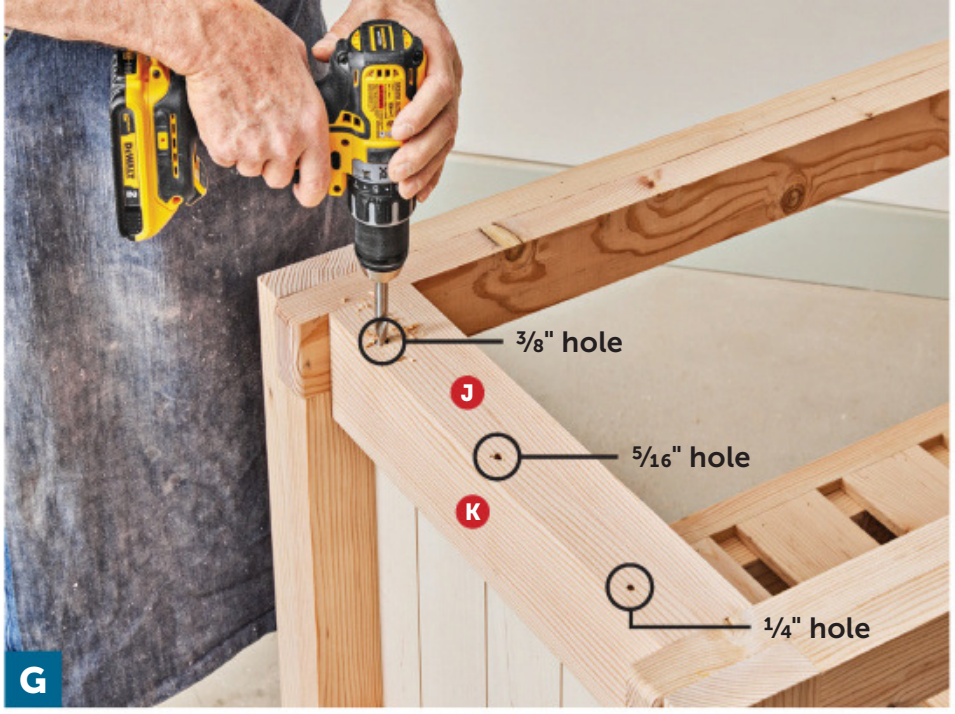
Shiplapped boards provide the look of solid wood while reducing the expansion and contraction that come with a glued-up, full-width panel.

1 From 3⁄4" soft maple, cut ten 4 1⁄2 × 12 1⁄2" blanks for the shiplap (L) **[Drawing 4]**.

2 Rabbet one edge of four blanks and both edges on the opposing faces of the remaining six **[Photos E, F]**.

3 Beginning at the front of the base, nail a shiplap with a single rabbet in place **[Drawings 3 and 4]**. Nail in place three double-rabbet shiplap, leaving a 1⁄16" gap between boards. Rip a single-rabbet shiplap to width to fit at the back end. Repeat for the other side.

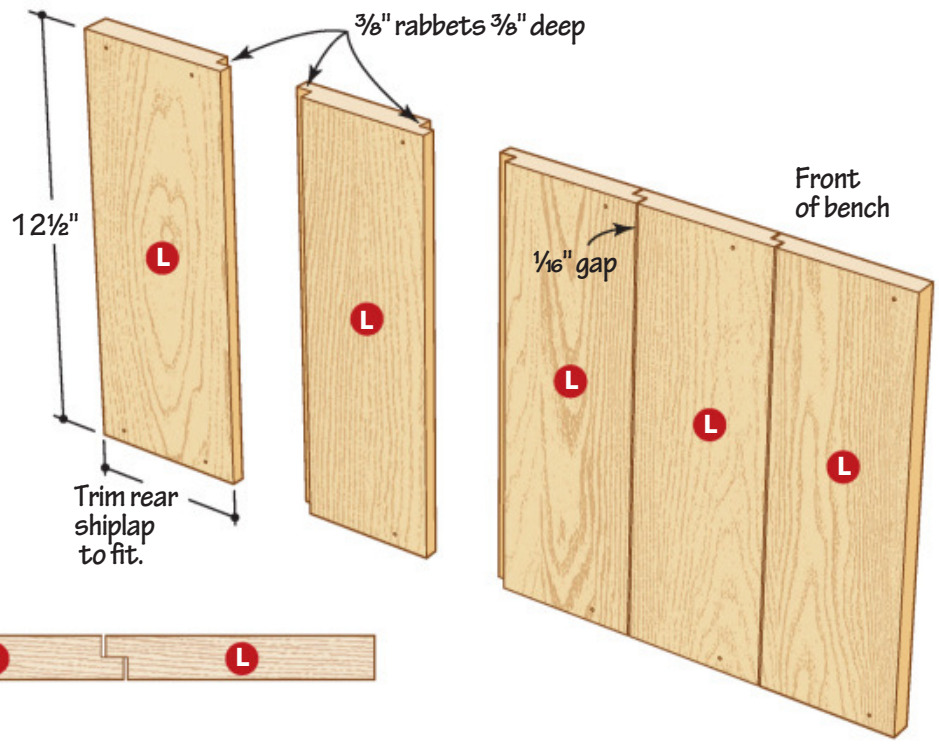
Reposition the fence so the inside face of the blade intersects the end of the groove. Lower the blade about 1/32". Cut away the waste to complete the rabbet.

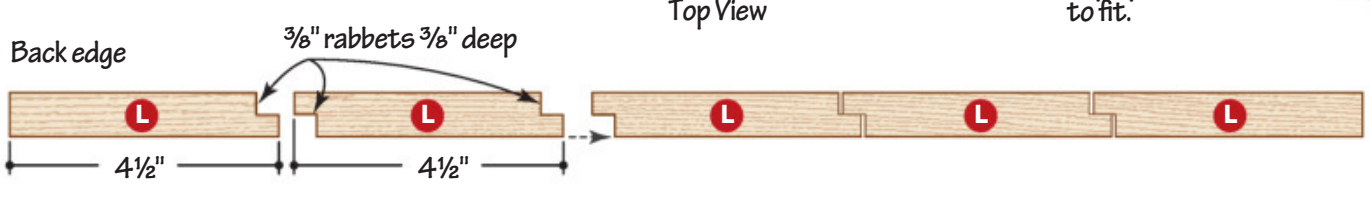


To allow for expansion and contraction of the benchtop, drill a 1/4" hole at the front, a 5/16" hole in the middle, and a 3/8" hole at the back of each upper side rail filler (K).

4 Cut the bottom slats (M) to size. Nail one to the front and back rails (D) against the shiplap (L), then nail in the remaining slats spaced 1 1/4" apart **[Drawing 3]**.

5 Drill holes through the upper side rail fillers (K) for securing the benchtop later **[Photo G]**.





TAKE IT TO THE TOP

See the tips in *A Ripping Good Time* on *page 46* to help you glue up a top that will stay flat.

TIP!

The number and exact width of each board isn't as important as having a panel at least 25" wide.

1 Cut five boards at least 5" wide and 2-3" overlong for the top (N) **[Exploded View]**. Lay out the boards for best appearance and mark them so you can arrange them correctly later.

2 Edge-glue each pair of outside boards together, keeping the faces flush. After the glue dries, glue the remaining board between these pairs **[Photo H]**. Allow the glue to dry, then cut the top to final size.

3 Cut the top trim (O) to size **[Exploded View]**. Miter the lower corners, then glue the trim to the top, flush at the top and ends.

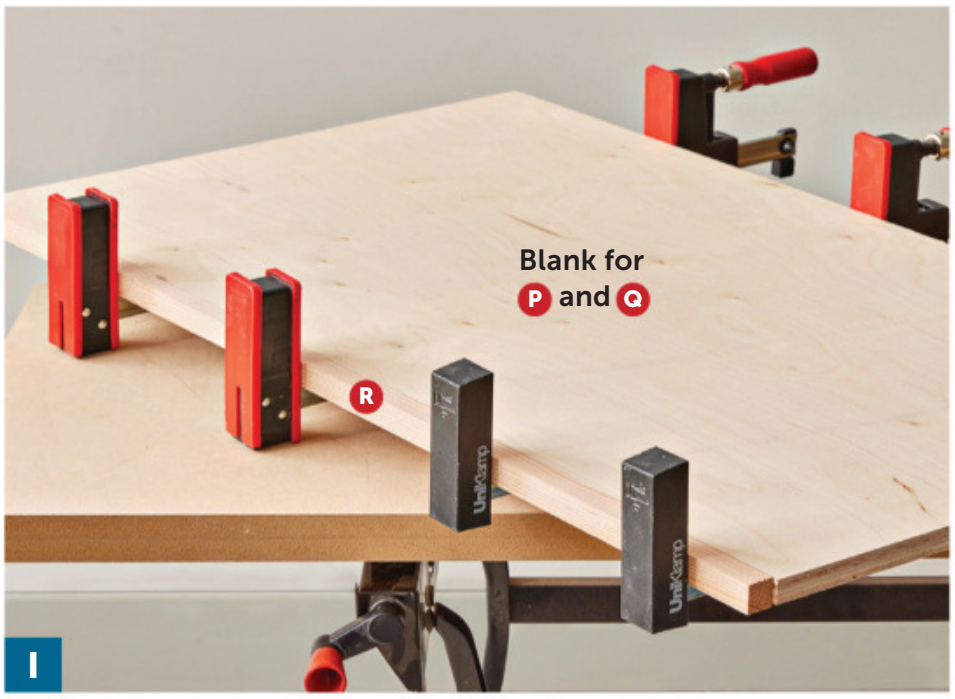
Use the workbench base as a support for the clamps as you glue up the top (N). Alternate clamps on the top and bottom faces to keep the panel flat.

STICK IN SOME STORAGE

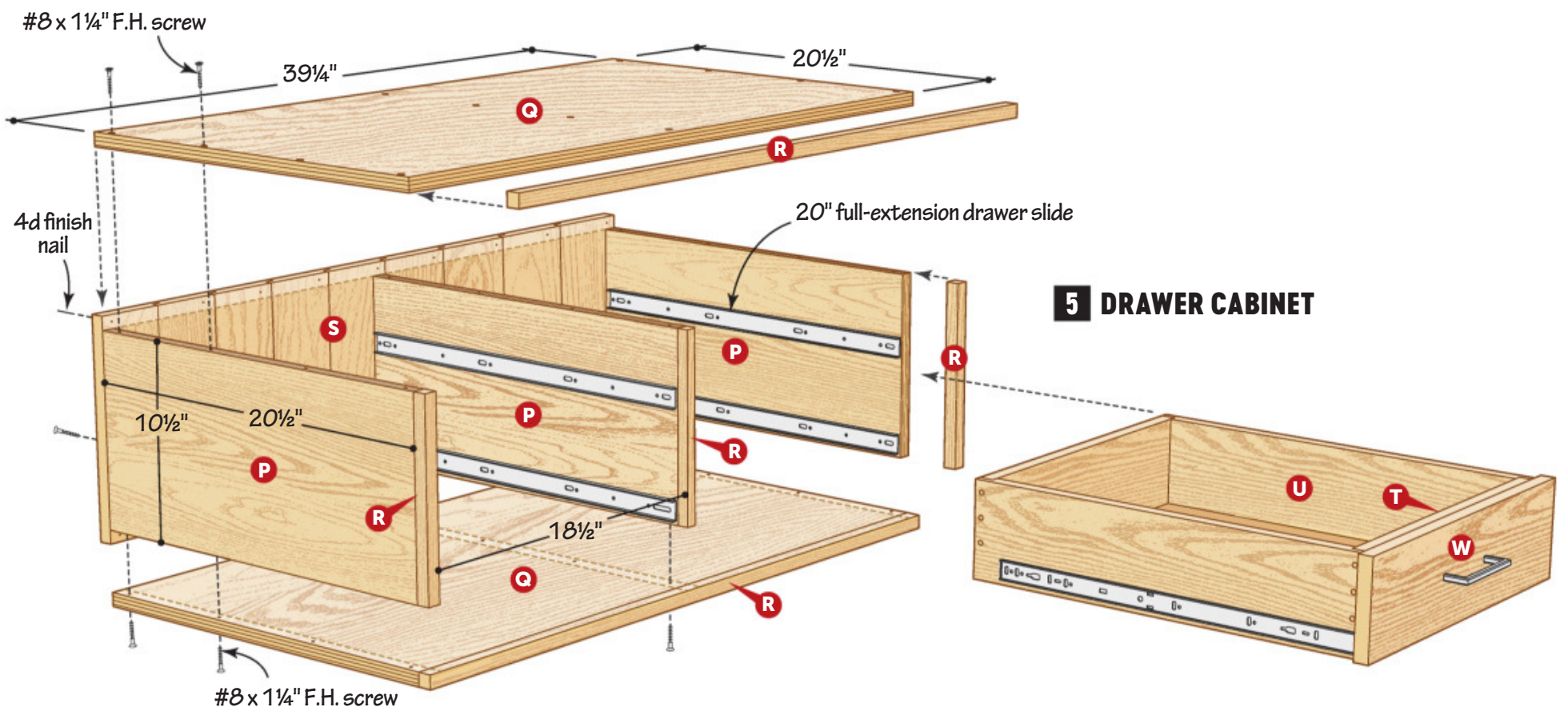
A cabinet between the legs houses four drawers on full-extension slides for easy access to frequently used tools and accessories.

1 From ¾" maple plywood, cut three blanks to 20½×40" for the cabinet sides and divider (P) and top and bottom (Q) **[Cutting Diagram]**.

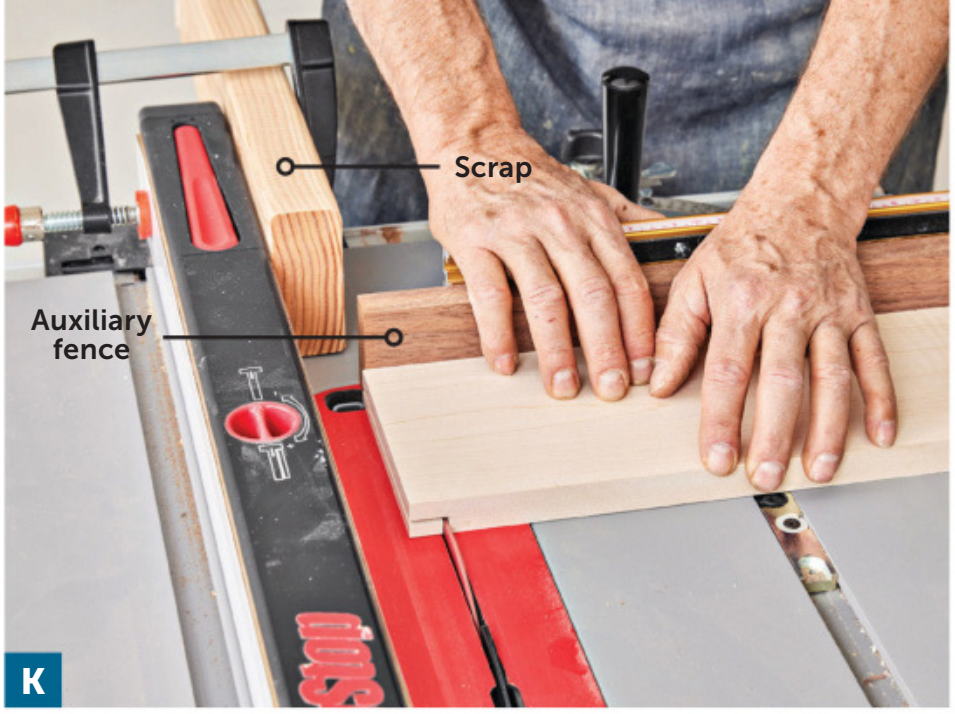
2 From Douglas fir, cut three ¾×¾×40" pieces for the cabinet trim (R). Glue the trim to the front edge of each plywood blank **[Photo I]**. After the glue dries, cut the top and bottom (Q) to finished length to fit between the legs (A). Cut the cabinet sides and divider (P) to length from the remaining blank **[Drawing 5]**.



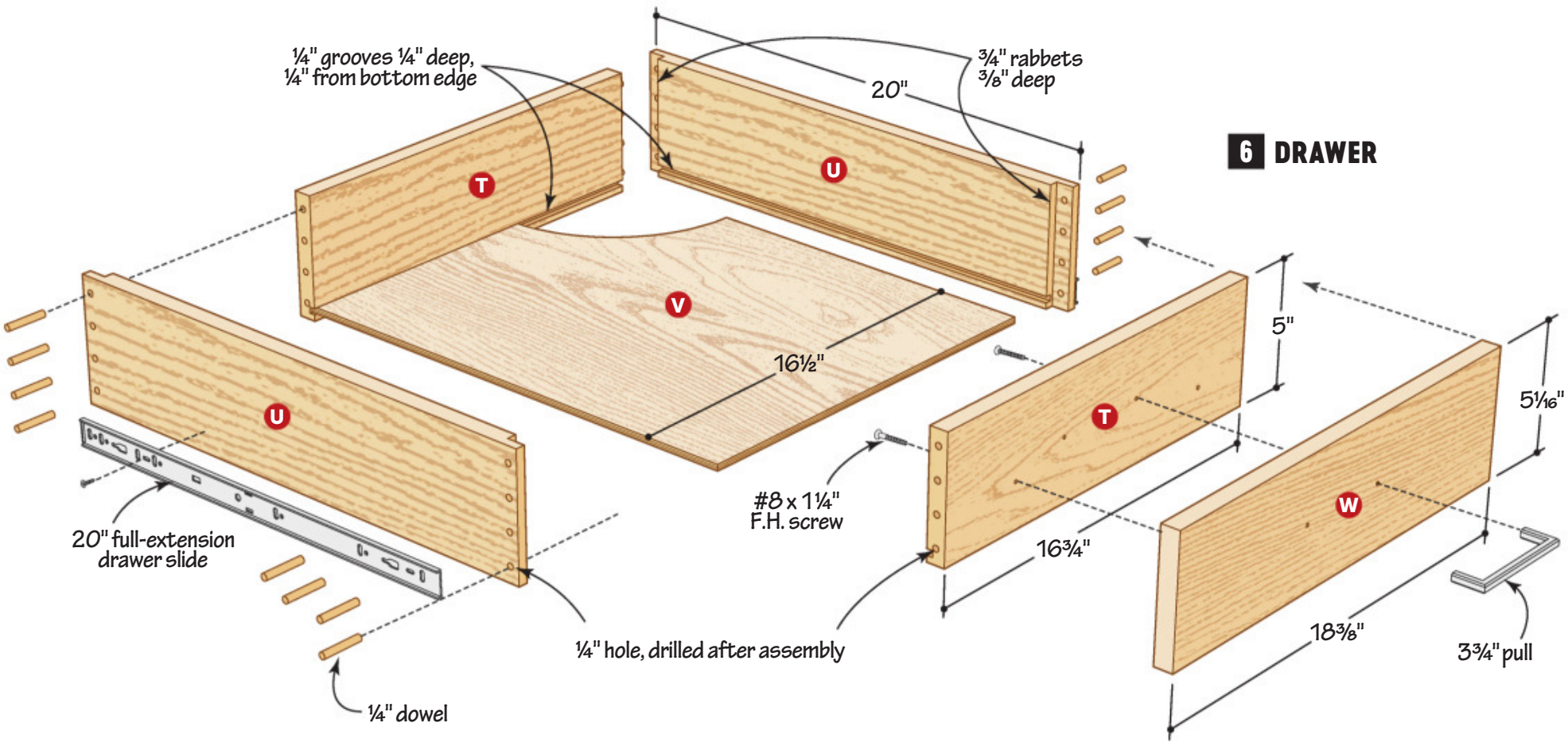
Glue the cabinet trim (R) to the front edge of each plywood blank, keeping the top edges flush.



Support the drawer sides (U) with a tablesaw saddle jig when making the first cut for the rabbets. Clamp the drawer side to the jig before making the cut.



To prevent the cutoff from being trapped and shooting back at you, clamp a scrap to the fence to create space. Screw an auxiliary fence to your miter gauge that stops just short of the scrap.



Get directions for making a saddle jig to support the drawer sides.
woodmagazine.com/saddlejig

3 Glue and clamp the sides and divider (P) to the bottom (Q), making sure they sit perpendicular **[Drawing 5]**. When the glue dries, glue the top (Q) to this assembly. Check the assembly for square, then reinforce the joints with screws.

4 From soft maple, cut nine pieces of cabinet shiplap (S) to size **[Materials List]**. As with the shiplap for the base, rabbet two edges of seven pieces and one edge of the other two **[Drawing 5]**. Nail the shiplap to the cabinet, spaced 1/16" apart. Trim the last piece to width, if needed.

5 Also from soft maple, cut the drawer fronts and backs (T) and sides (U) to size **[Drawing 6]**.

6 At the tablesaw, rabbet the ends of the sides to accept the fronts and backs **[Drawing 6, Photos J, K]**.

7 In the drawer fronts, backs, and sides, cut a 1/4"-deep groove to fit the plywood you'll use for the drawer bottoms (V) **[Drawing 6]**. To do this, make one pass over the tablesaw blade, first on a test scrap, then on all pieces. Nudge the fence to widen the grooves and make a second pass on the test scrap to check the fit, then on all pieces.

8 Cut the drawer bottoms (V) to size and dry-assemble each drawer. Check the fit in the cabinet; each one should be 1" narrower than the opening to allow for the drawer slides. Glue up the drawers.

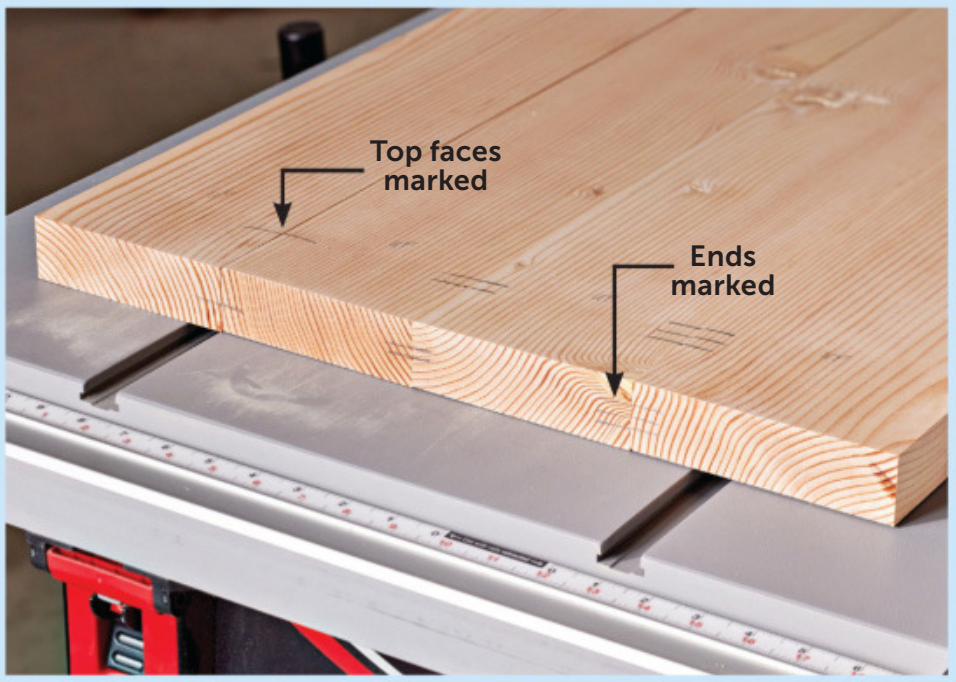
9 After the glue dries, drill 1/4" holes 1 1/2" deep through the drawer sides into the fronts and backs. Cut lengths of 1/4" dowel and glue them in the holes **[Drawing 6]**. Sand the dowels flush.

A RIPPING GOOD TIME

When edge-gluing boards to make a wider panel, smooth edges square to the faces are critical for strong glue joints and a flat panel. A sharp blade ensures smooth edges. But even if your tablesaw blade is not perfectly square to the table, this technique accounts for that.

To cancel out any deviation from 90° on the edges, lay out your boards as they will be glued up, *right*. Then, rip the mating edges as shown in the two photos, *below right* and *left*. This creates supplementary angles, as shown at *bottom*, helping your panel stay flat during glue-up. Repeat this process at each joint.

Watch a video on gluing up a flat panel.
woodmagazine.com/flatglueup



Mark across the joint line on the ends and the faces of the boards to help you orient the boards correctly during the cut sequence.

With the first board faceup, rip 1/16" from the edge to be glued. Maintain an even feed rate to avoid burning the edge.

Flip the mating board facedown, adjust the rip fence if needed, and rip 1/16" from the mating edge.

Even though we tilted the blade a few degrees to exaggerate the results, the angles cancel each other out, creating a tight joint and a flat panel.

Learn to install three common types of drawer slides.
woodmagazine.com/drawerslides

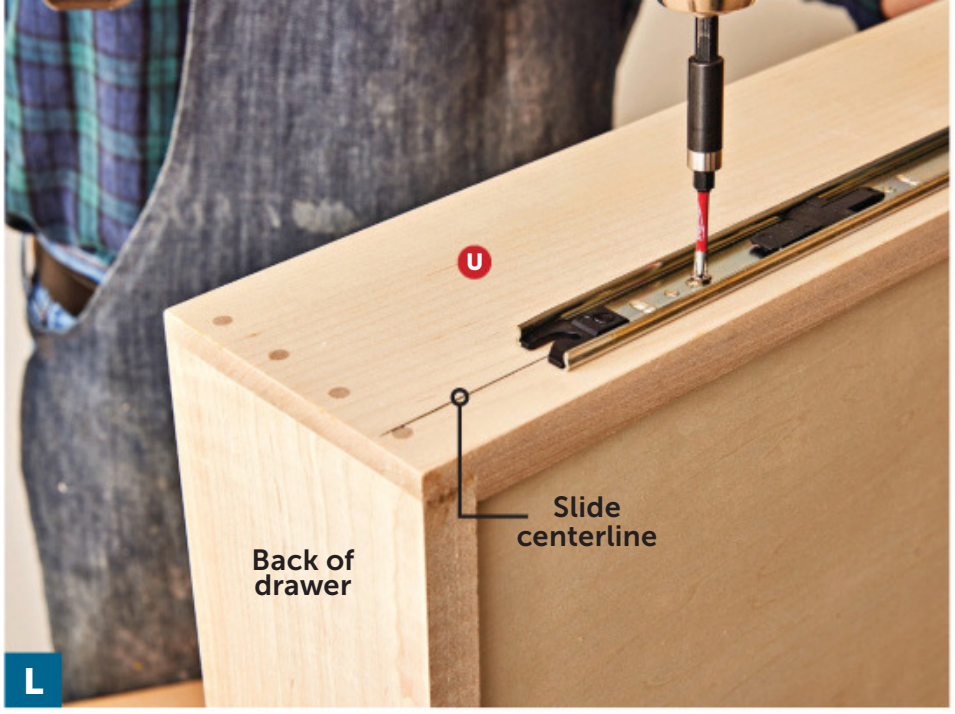
INSTALL THE DRAWERS

Installing ball-bearing slides is a two-step process. Each slide separates into halves. One half mounts to the drawer and the other half to the cabinet side or divider. Then the two halves fit back together. The slides come with their own mounting screws.

1 Start by separating the slide halves. Typically, this involves pressing a plastic release lever while pulling the drawer half of the slide (the narrower, interior component) out of the cabinet half (the wider, outside part). Check the instructions that come with your slides.

2 Measure the width of the cabinet half of the slide and draw a line along each drawer side (U) one-half of this distance from the bottom edge. Use this line to help mount the drawer half of the slide **[Photo L]**.

3 From scrap, cut a 5⅛"-wide spacer at least 16" long. Use this to help mount the cabinet half of each slide for the upper drawers **[Photo M]**. Repeat this process with a ⅛"-thick spacer for the cabinet halves of the lower slides **[Photo N]**.



Align the front of the slide with the front of the drawer and centered on the layout line. Drive one screw at the front and one at the back for now.

Rest the slide on the spacer and align the slide's front end with the joint line between the divider (P) and the trim (R). Secure the slide with a screw at the front and back.

◀ Full-extension drawer slides allow you to easily access items stored at the back of the four drawers.

A ⅛"-thick spacer positions the lower slides to prevent the drawer from dragging on the cabinet bottom. Alternatively, use two ⅛" drill bits to position the slide.

Place two shims on the bottom cabinet trim (R) and rest a false front (W) on them. Press the false front against the drawer with equal gaps at each end. Repeat with more shims for the top false front.

TIP!

Check the shim thickness by stacking three of them in the gap between the false fronts.

4 To help pull the drawers back out, apply a masking-tape pull to each one as seen in **Photo N**, then slide the drawers into place. Check for even spacing and smooth travel. When you're satisfied, remove the drawers and drive the remaining screws into each slide half.

5 Cut the false fronts (W) to size. Stack two false fronts on edge in one opening, and measure the gap above them. Rip stock to one-third this thickness for shims.

6 Apply a couple strips of double-faced tape to each drawer front and position each false front (W) **[Photo O]**. Gently pull out each drawer just enough to secure the false front with a clamp, then drive screws through the drawer fronts and into the false fronts **[Drawing 6]**.

7 Lay out and drill holes to center the pulls on each drawer. Don't mount the pulls yet.

> **SOURCING DIMENSIONAL LUMBER FROM THE HOME CENTER MAKES SENSE, BUT IF YOU CAN SURFACE BOARDS YOURSELF, SAVE MONEY ON THE MAPLE PARTS BY BUYING ROUGHSAWN 4/4 BOARDS.**
>
> ***-JOHN OLSON, DESIGN EDITOR***

SO CLOSE, SO LET'S FINISH

It's tempting to rush finishing so you can start using your new bench, but budget at least one day per coat of finish to allow plenty of time for application and drying. Especially when brushing, it takes time and care to cover all areas.

1 Remove the drawers from the cabinet, marking them with their positions. Remove the slides from the drawers and cabinet. Store the screws in a plastic bag.

2 Finish-sand all surfaces to 180 grit, easing any sharp edges. Brush and vacuum off all dust.

3 Apply a clear finish to all parts including both faces of the top. You can skip the interior of the cabinet if you want. We applied three coats of General Finishes Arm-R-Seal satin urethane.

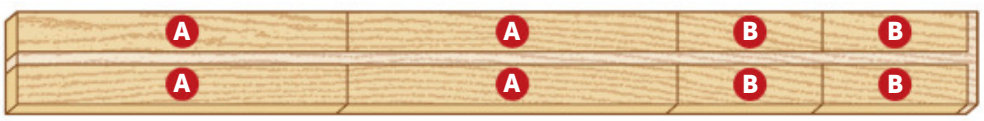
4 After the last coat of finish dries, attach the top with HeadLOK 4½" lag screws **[Exploded View, Sources]**. Slide the cabinet into place.

5 Screw the pulls to the drawers. (You may need longer screws than those supplied with the pulls.) Reinstall the slides and insert the drawers into the cabinet.

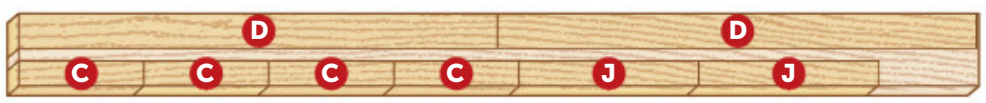
6 Place your new shop showpiece where you want it, rehome some tools and supplies in the drawers, and know that your next project will be extra special, being the first built on a bench that will serve you for years to come.

CUTTING DIAGRAM

This project requires the dimensional boards shown below and 31 board feet of 4/4 soft maple based on example boards shown.



1½ x 9¼ x 96" Douglas fir



1½ x 7¼ x 96" Douglas fir

1½ x 11¼ x 96" Douglas fir

1½ x 7¼ x 96" Douglas fir

1½ x 5½ x 84" Douglas fir (5 needed)

1½ x 5½ x 84" Douglas fir

¾ x 3½ x 48" Douglas fir

½ x 5½ x 96" Pine (2 needed)

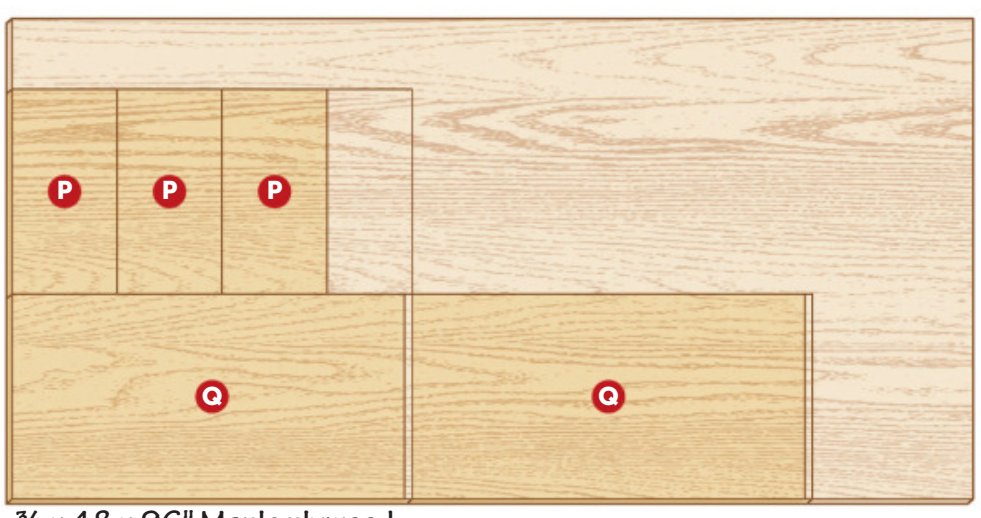
¾ x 5½ x 84" Maple

¾ x 5½ x 84" Maple (4 needed)

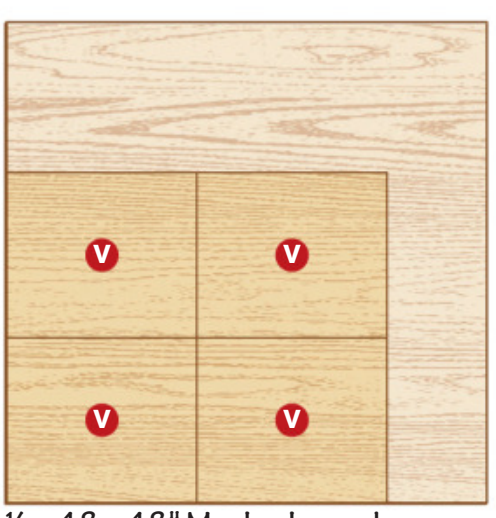
¾ x 5½ x 96" Maple

¾ x 5½ x 96" Maple

¾ x 5½ x 72" Maple



¾ x 48 x 96" Maple plywood



¼ x 48 x 48" Maple plywood

MATERIALS LIST

PART		FINISHED SIZE T	W	L	Matl.	Qty.
A	LEGS	1½"	4"	33"	DF	4
B	LOWER LEG SPACERS	1½"	4"	14½"	DF	4
C	UPPER LEG SPACERS	1½"	2½"	12½"	DF	4
D	LOWER FT/BK RAILS	1½"	3½"	47⅞"	DF	2
E	LOWER FT/BK RAIL FILLERS	1½"	4"	39⅜"	DF	2
F	LOWER SIDE RAILS	1½"	4¼"	18"	DF	2
G	LOWER SIDE RAIL FILLERS	1½"	5"	18"	DF	2
H	UPPER FT/BK RAILS	1½"	2½"	47⅞"	DF	2
I	UPPER FT/BK RAIL FILLERS	1½"	2½"	39⅜"	DF	2
J	UPPER SIDE RAILS	1½"	2½"	18"	DF	2
K	UPPER SIDE RAIL FILLERS	1½"	3½"	18"	DF	2
L	SHIPLAP	¾"	4½"	12½"	M	10
M	BOTTOM SLATS	½"	4"	21"	P	8
N	TOP	1½"	25"	72"	EDF	1
O	TOP TRIM	1½"	4"	72"	DF	1
P*	CABINET SIDES/DIVIDER	¾"	20½"	10½"	Ply	3
Q*	CABINET TOP/BOTTOM	¾"	20½"	39¼"	Ply	2
R	CABINET TRIM	¾"	¾"	40"	DF	3
S	CABINET SHIPLAP	¾"	4 11/16"	12"	M	9
T	DRAWER FRONTS/BACKS	¾"	5"	16¾"	M	8
U	DRAWER SIDES	¾"	5"	20"	M	8
V	DRAWER BOTTOMS	¼"	16½"	19"	Ply	4
W	FALSE FRONTS	¾"	5 1/16"	18⅜"	M	4

*Parts initially cut oversize. See the instructions.

MATERIALS KEY: DF–Douglas fir, M–soft maple, P–pine, EDF–edge-glued Douglas fir, Ply–maple plywood.
SUPPLIES: #8×1¼", #8×2½", #10×3⅛", #10×4" flathead screws, 4d finish nails, ¼" and ⅜" maple dowels, 20" full-extension drawer slides (4 pairs).
SOURCES: 3¾" drawer pulls (4) no. 2280088, $7 each, 4½" HeadLOK screws (6) no. 777203, $2 each, lowes.com.
PROJECT COST: It cost us about $525 to build this project. Your cost will vary by region and source.

• SHOP TESTED •

LOW-ANGLE JACK PLANES

Choose a bevel-up jack plane to level up your plane game. We put nine low-angle jack planes through their paces to see which models edged out the competition.

WRITER: VINCE ANCONA
TESTERS: KEVIN BOYLE and JOHN OLSON

If you're looking for a single plane that can do just about everything, look no further than a low-angle jack. This plane excels at cutting end grain, and its bevel-up design allows you to sharpen the blade at different bevel angles to handle whatever planing challenges come your way (*Benefits of Bevel-Up* on *page 53*). Even if you already own several bench planes, adding a low-angle jack to your lineup will increase your planing versatility.

Just a couple of generations ago, if you wanted to buy a low-angle jack plane, your only option was to hunt down an old Stanley No. 62. But a quick search today reveals lots of choices. To get the lowdown on these low-angle jacks, we compared new planes from nine manufacturers on a number of points. We looked at sole and blade flatness, adjustability, steel quality, performance, and overall fit and finish.

Despite the fact that all of these planes trace their roots back to the original Stanley version (and our test includes a modern iteration of that plane), that doesn't mean they are all the same. We discovered definite standouts in terms of features and performance, along with a couple of surprises. For the important plane specs, see the chart on *page 57*.

PREPARE FOR TAKEOFF

First impressions are important, and here the Veritas Low-Angle Jack Plane, Lie-Nielsen No. 62, Bridge City HP-12, Melbourne Tool Company Low Angle Jack Plane, and Stanley No. 62 Sweetheart all showed up at the gate well packaged, with polished and flattened blades that were ready to use right out of the box. (The tote on the Stanley was loose, but easily tightened.) All of the other planes required some degree of honing or flattening.

To level the playing field, we compared the performance of all the planes both straight out of the box and then again after honing the blades and flattening the soles. As you might expect, the performance increased significantly for the planes that did not come with blades already flattened and polished.

GOOD FOR THE SOLE

A plane with a twisted or warped sole, or with low spots around the mouth, won't give good results. To test for sole flatness, we drew lines across the bottom of each plane with a felt marker and then lapped each one on 400-grit sandpaper adhered to a granite surface plate to reveal any high or low spots. All the planes proved acceptably flat enough to start using immediately.

We also checked to see how square the sides of the plane are to the sole. Unless you intend to use your plane with a shooting board, side squareness isn't critical, but it indicates the overall care taken in machining. Here, all the planes except the Kunz Plus No. 62 and Stanley were square. Those two were only slightly out of square, necessitating time spent lapping should you wish to use them for shooting.

PHOTOGRAPHERS: CARSON DOWNING, KELSEY HANSEN; **ILLUSTRATOR:** LORNA JOHNSON


#62
grizzly.com

Most of the planes use a simple screw like that of the Stanley (*left*) to tighten the lever cap against the blade. But the lever cap screw on the Veritas (*right*) has a large pad to distribute clamping pressure without marring the blade.

STANLEY

VERITAS

LIFE ON THE EDGE

All of the planes in our test feature heavy-gauge blades, ranging from 1/8" to nearly 1/4" thick. All of the blades proved beefy enough to power through tough end-grain cuts with minimal chatter.

The Stanley, Lie-Nielsen, Melbourne, Bridge City, and WoodRiver No. 62 planes clearly state the steel alloy used in their blades. Veritas lets you choose O1, A2, or PM-V11 steel when ordering. The other manufacturers just referred to their blades as high-carbon steel or tool steel. The planes with A2 and PM-V11 steel took longer to hone because of the harder steel, but they also held their edge longer.

The blades on the Veritas, Lie-Nielsen, Bridge City, Melbourne, and Stanley planes all arrived with flattened backs. The Bridge City blade was also polished to a mirror finish. The blades of the other planes all required flattening, from a little to a lot.

All but one of the planes arrived with accurately ground, 25° bevels. The bevel on the Bench Dog No. 62 was closer to 30°, despite being advertised as having a 25° bevel. The edge was also not square with the sides of the blade, requiring a complete regrind of the bevel.

The Bridge City plane comes standard with two blades, each sharpened at both ends, giving you three bevel options (25°, 30°, and 42°) as well as a toothed edge for fast stock removal across the grain. Veritas and Melbourne offer optional blades with different bevel angles, sold separately.

On most of the planes, removing the blade is simply a matter of loosening the lever-cap screw, sliding off the lever cap (*above*), and lifting the blade out. Instead of a screw, the Bridge City plane uses a lever (*left*). Releasing the lever is easy, but because the lever cap is fixed to the plane and there's not much room for your fingers, you have to turn the plane upside down to let the blade drop out.

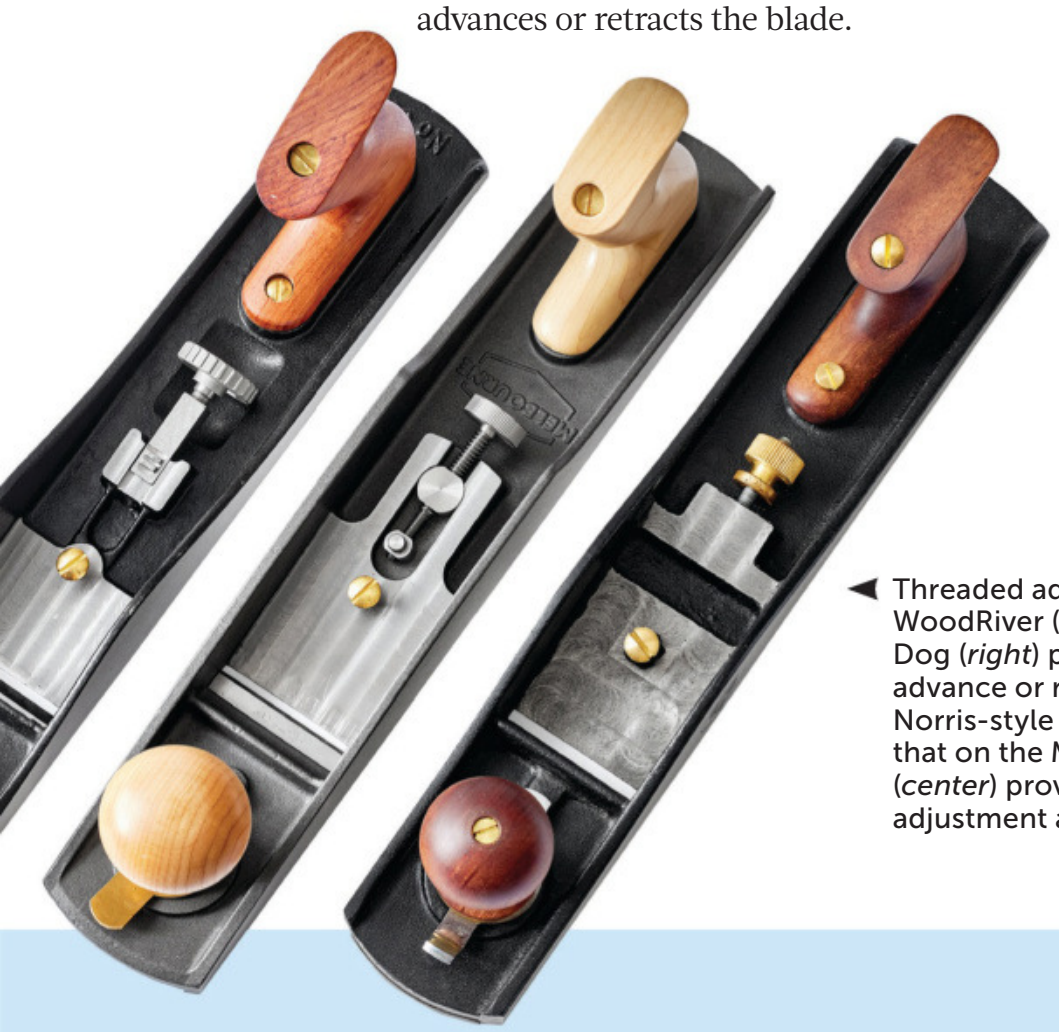
Lifting the lever of the Bridge City plane releases tension on the lever cap. But because there's so little clearance for your fingers, lifting the blade out is next to impossible. (Blade removed in photo.)

TURN THE SCREWS

All of the planes feature an adjuster for setting the blade depth, and these can be divided into two styles: single-screw adjusters and Norris-style adjusters (*below left*). The single-screw adjusters on the Bench Dog, Grizzly Premium No. 62, Lie-Nielsen, and WoodRiver planes feature a threaded rod with a flanged knob or small shoe that engages a notch in the back of the blade (*below right*). Turning the knob advances or retracts the blade.

The Norris-style adjusters use a more elaborate rod with dual screw threads, allowing for more precise depth control. This adjuster style also allows you to make lateral adjustments to the blade, while planes with single-screw adjusters require making lateral adjustments manually.

We prefer the Norris-style adjusters, but not having one isn't a deal-breaker. The single-screw adjuster on the Lie-Nielsen has a velvety smooth feel that rivals any of the planes in our test. Conversely, the Norris-style adjuster on the Kunz is a multi-part assembly that engages not only the blade but also the lever cap. It has a tendency to lift out of the plane entirely during blade removal and is difficult to put back in place.



◀ Threaded adjusters on the WoodRiver (*left*) and Bench Dog (*right*) planes quickly advance or retract the blade. Norris-style adjusters like that on the Melbourne plane (*center*) provide lateral adjustment as well.

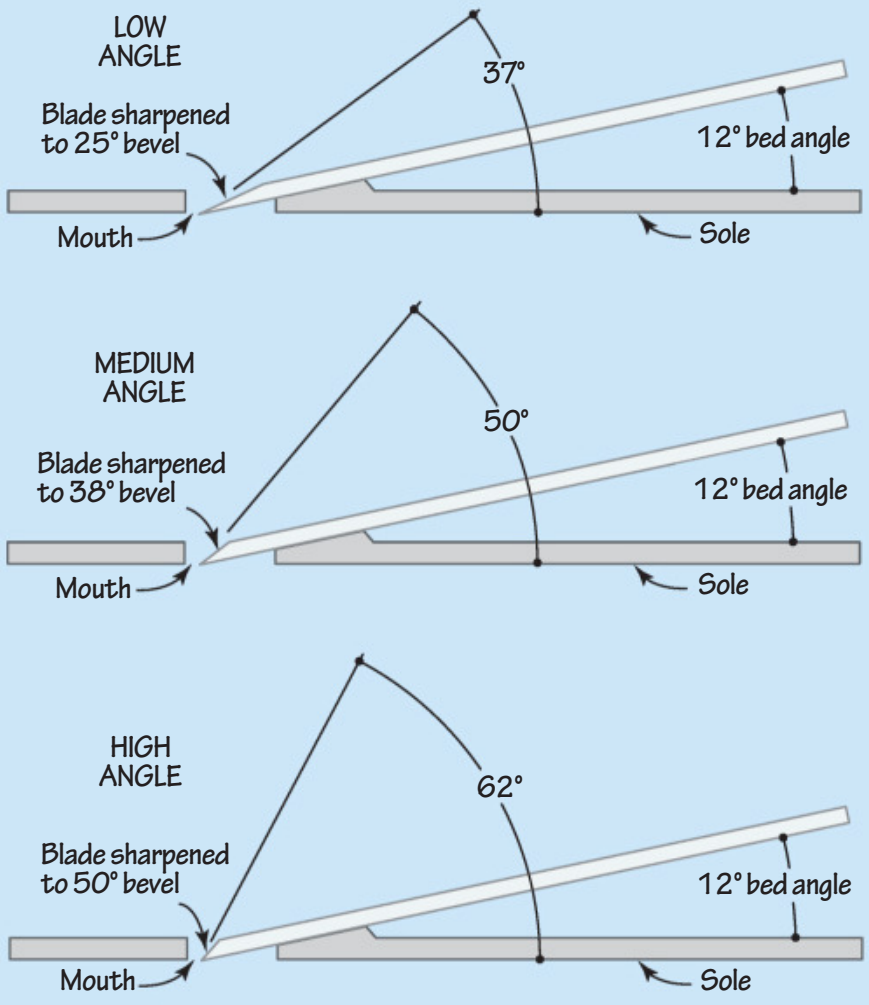
The blade of the Lie-Nielsen (*left*) has a single notch to engage the adjuster knob. The WoodRiver (*right*) has a series of (roughly) machined notches to engage a sliding shoe.

BENEFITS OF BEVEL-UP

Traditional bench planes feature a blade that rests with the bevel down on a bed, known as a frog, that sits at a fixed angle (usually around 45°) to the plane's sole. But the bed on a bevel-up plane is milled into the body of the plane, at a much lower 12° angle.

Eliminating the frog makes bevel-up planes easier to set up, adjust, and maintain. The lower bed angle also lowers the plane's center of gravity, giving many low-angle plane users a feeling of better control.

But the real benefit of bevel-up planes lies in the ability to change the cutting angle by means of the bevel angle on the blade (*right*). Use a low angle on end grain, a medium angle for routine planing, or a high angle when planing highly figured woods. We suggest purchasing optional blades with alternate bevel angles, if available, or buying extra standard blades and regrinding them yourself. Then you can swap blades to suit the job, giving you several planes in one.



On most of the planes, loosening the knob and pivoting an eccentric lever at the front of the plane moves the toe in or out to close or open the mouth.

The Veritas plane features an adjustment screw for fine-tuning the mouth opening. The adjustment screw also acts as a stop for the movable toe to prevent it from striking the blade edge.

Unlike bevel-down planes, bevel-up planes do not have a chipbreaker, or a cap iron. These planes rely instead on a tight mouth opening in front of the blade to break up the chips. All the planes we tested have an adjustable mouth. A sliding plate at the toe of the plane moves in or out to decrease or increase the mouth opening. Most of the planes use an eccentric lever to adjust the toe (*above left*).

The Bridge City and Veritas planes don't have an eccentric lever. On these planes, loosen the knob and slide it fore or aft to open or close the mouth (*above right*). The Veritas plane also features a fine-adjustment screw to make precise changes to the mouth.

All but one of the planes allow you to close the mouth down to nothing. The Kunz, even at its tightest setting, still had a 1/8" gap, way too large for planing woods prone to tear-out.

FIT AND FINISH

Like sole flatness, the fit and finish of a plane says a lot about the quality that goes into the manufacturing. The machining on the Lie-Nielsen, Veritas, and Bridge City planes is excellent, with the Bridge City having the best attention to detail (which it should, considering it costs twice as much as any other plane in our test). Just a notch below are the Stanley, Melbourne, and WoodRiver planes.

Aside from slight differences, such as the use of brass instead of steel for the lever cap, the Bench Dog (*left*) and Grizzly (*right*) planes look like they could have been made in the same factory.

The Bench Dog, Kunz, and Grizzly planes have noticeably rougher castings and coatings and poor fitting of parts compared to the others (*previous page, bottom*).

Comfort of the totes (handles) and knobs ended up not being a big differentiating factor in our tests. Most of the planes were comfortable to hold and use for long periods, and the subtle differences among them come down to personal preference. We could easily get used to the size and feel of most of the planes in the test.

The one exception is the Bridge City plane, with its all-metal tote and knob (*below*). The squarish tote is not very comfortable to grip, and overall we prefer the warm feel of wood over metal, especially when working in the shop on cold winter days.

The Bridge City HP-12 comes with a pair of adjustable skids that attach to the sides of the plane and allow you to plane stock to a precise thickness.

PLANING PERFORMANCE

In terms of sheer planing performance, the Lie-Nielsen, Veritas, and Bridge City all produced smooth, nearly flawless surfaces in face grain and end grain. We were pleasantly surprised to find that the Stanley (the least expensive in our test) and the newcomer Melbourne were not far behind. The other planes yielded acceptable results, but just not quite as smooth as the top-tier planes.

And while it may have been an issue just with the particular plane we tested, the Grizzly did not have enough lateral adjustment to square the blade within the mouth of the plane due to its rough casting. (You could fix this by filing the inside walls of the plane or grinding a slight skew on the blade.)

> **“THE BETTER PLANES PERFORMED GREAT RIGHT OUT OF THE BOX. THE OTHERS REQUIRED SHARPENING AND TUNING, BUT ONCE THAT WAS DONE, THEIR PERFORMANCE INCREASED SIGNIFICANTLY.”**
>
> ***-KEVIN BOYLE, SENIOR DESIGN EDITOR***

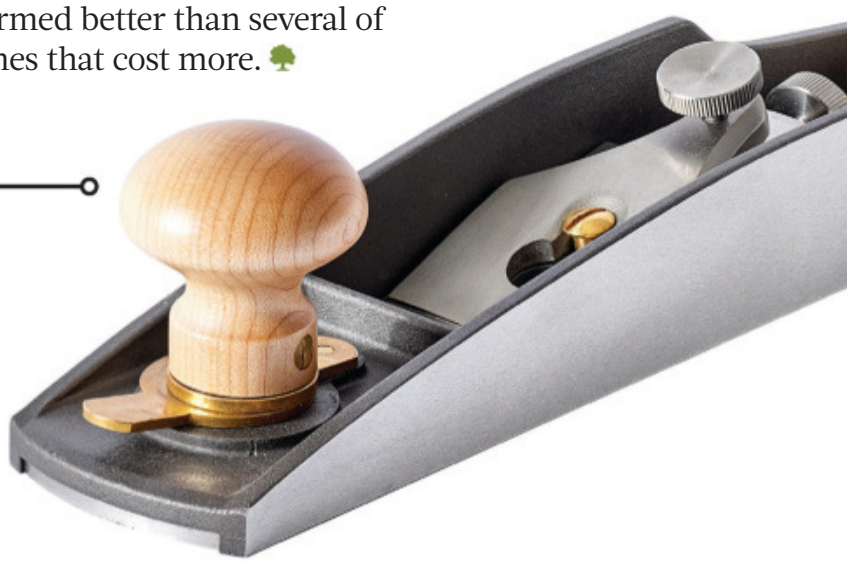
WHERE THE PLANES LAND

Choosing just one winner from the group is not an easy task. Nearly all of the planes we tested performed acceptably (after varying degrees of tuneup). The selection comes down to ease of use and smoothness of adjustment, as well as the time and effort required to bring each plane to peak performance. We ended up with a tie for Top Tool honors between the Veritas and Lie-Nielsen planes. We particularly like the ease of adjustments and the silky smooth surfaces left behind by the top-quality blades.

·2024· WOOD® TOP TOOLS LOW-ANGLE JACK PLANES

·2024· WOOD® TOP VALUE LOW-ANGLE JACK PLANES

Our Top Value award was also a tie and goes to the Melbourne and Stanley planes. Melbourne is a newcomer, but it pleasantly surprised us with an affordable price and performance just a shaving's thickness below the Veritas and Lie-Nielsen. And even though it's the lowest-priced plane in our test, the Stanley performed better than several of the other planes that cost more.



TRACKING THE PERFORMANCE

MODEL	OUT OF THE BOX		PREP WORK		ADJUSTMENTS			BLADE ADJUSTER STYLE (2)	MOUTH ADJUSTER STYLE (3)	BLADE SPECS			LENGTH	WEIGHT	SELLING PRICE (5)	ACCESSORIES (6)
	OVERALL CONDITION (1)	INITIAL PLANING PERFORMANCE	AMOUNT OF PREP WORK REQUIRED	POST-PREP PLANING PERFORMANCE	BLADE DEPTH	LATERAL ADJUSTMENT	MOUTH OPENING			BLADE WIDTH	BLADE THICKNESS	BLADE MATERIAL (4)				
BENCH DOG No. 62	B	C	B	B	B	B	B	S	E	2"	3/16"	U	13 3/4"	5 lbs 1 oz	$250	
BRIDGE CITY HP-12	A	A	A	A	C	B	A	N	K	2"	7/32"	A2	12"	4 lbs 12 oz	$529	
GRIZZLY Premium No. 62	C	C	B	B	B	D	B	S	E	2"	5/32"	U	14"	4 lbs 15 oz	$200	
KUNZ Plus No. 62	B	B	D	B	C	A	C	N	E	2"	3/16"	U	13 3/4"	5 lbs 0 oz	$325	T
LIE-NIELSEN No. 62	A	A	A	A	A	B	A	S	E	2"	3/16"	A2Cr	14"	4 lbs 10 oz	$295	H, T
MELBOURNE Low Angle Jack Plane	A	A-	A	A-	B	A	A	N	E	2"	1/8"	M	13 7/8"	5 lbs 1 oz	$199	A
STANLEY No. 62 Sweetheart	A	A-	A	A-	C	A	A	N	E	2"	3/16"	A2	13 3/4"	5 lbs 6 oz	$169	
VERITAS Low-Angle Jack Plane	A	B	A	A	A	A	A	N	K	2 1/4"	3/16"	P	15"	5 lbs 8 oz	$284	A, T
WOODRIVER No. 62	B	C	D	B	B	B	A	S	E	2"	1/8"	Mn	14"	4 lbs 10 oz	$250	A

1. A Excellent
   B Good
   C Fair
   D Poor

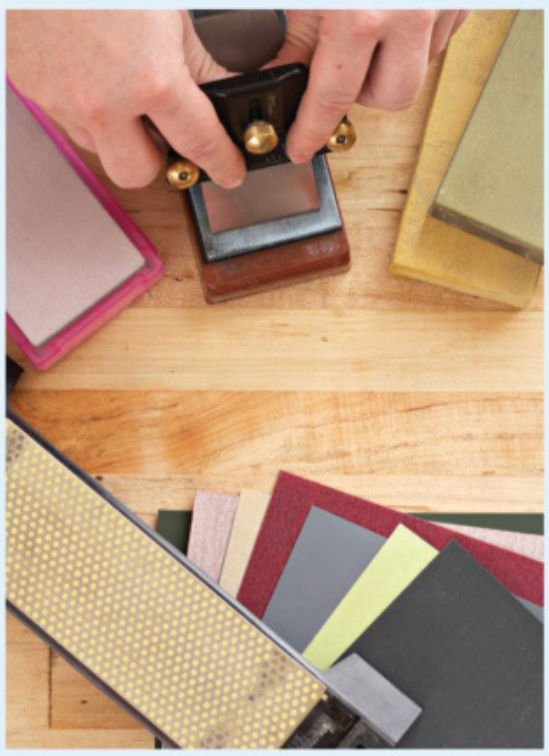
2. **(S)** Single-screw adjuster
   (N) Norris-style adjuster

3. **(E)** Eccentric lever
   (K) Sliding knob

4. **(U)** Unspecified carbon steel
   (A2) A2 air-hardening steel
   (A2Cr) A2 cryogenically treated steel
   (M) M2 high-speed steel
   (P) PM-V11 powdered metal steel
   (Mn) 65Mn spring steel

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

6. **(A)** Alternate-bevel-grind blades
   (H) Shooting handle
   (T) Toothed blade



STAY SHARP

When it comes to plane blades, a general rule of thumb is that the harder the steel, the longer the edge lasts. The trade-off is that a harder blade takes longer to sharpen than a softer one.

The secret is to not let your blade get too dull before you hit the sharpening stones. Quick and frequent blade touch-ups will prevent the blade from becoming so dull and worn that it requires a complete sharpening overhaul.

Watch a video on how to sharpen hand tools.
woodmagazine.com/staysharp

WORK-OF-ART
WALL CABINET

Clean lines and concealed hinges make this cabinet an understated beauty.

WRITER: ZACH BROWN
DESIGNER: KEVIN BOYLE
BUILDERS: BRIAN BERGSTROM with JOHN OLSON

PHOTOGRAPHER: JACOB FOX; **ILLUSTRATORS:** ROXANNE LEMOINE, LORNA JOHNSON

OVERALL DIMENSIONS
20½"W × 8"D × 25½"H

Taking its design inspiration from the cabinetmaking master James Krenov, this compact wall cabinet is a fitting home for storing something special. To put the beauty of the wood grain on full display, we selected a pair of book-matched boards for our doors, but you can choose your own door-making adventure.

Speaking of adventures, these knife hinges **[Sources]** require extra care to install, but we think it's well worth it for the clean final look. We'll take you through the process step by step.

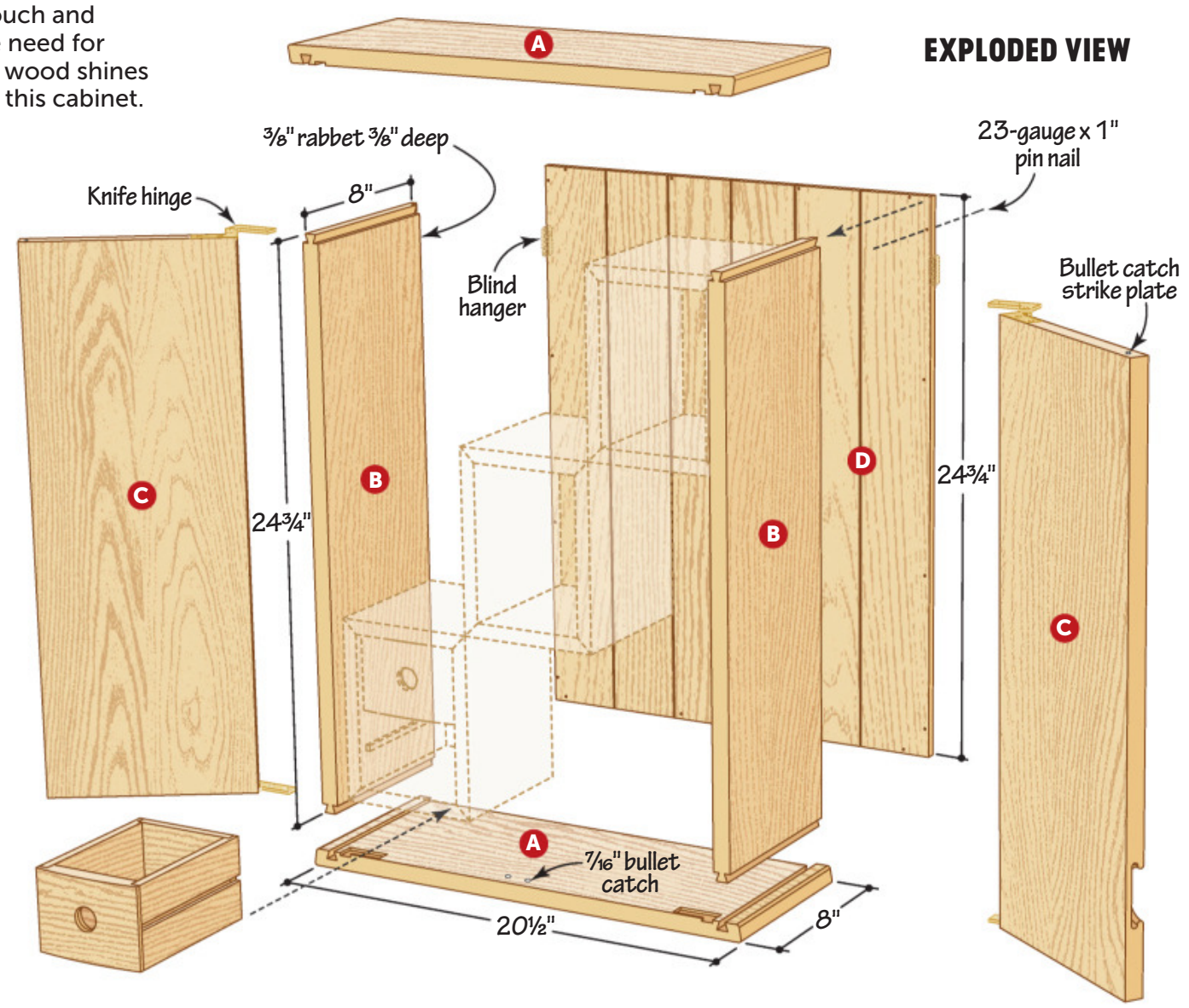
Adjust the tablesaw blade height to ⅜" and cut a ¼"-wide dado to remove the bulk of the waste for the dovetail socket.

Recessed door pulls add an elegant touch and eliminate the need for knobs so the wood shines as the star of this cabinet.

START WITH THE SKELETON

1 From ¾" cherry, cut the top, bottom, and sides (A, B) to size **[Materials List]**. Form the sockets for sliding dovetails in the top and bottom **[Drawing 1, Photos A, B]**, then rout the dovetails on the ends of the sides **[Photo C]**.

2 Dry-assemble the case **[Exploded View]** and scribe onto the top and bottom the location of the inside faces of the sides. You'll use these marks for the hinge mortise layout in the next step.



TIP!

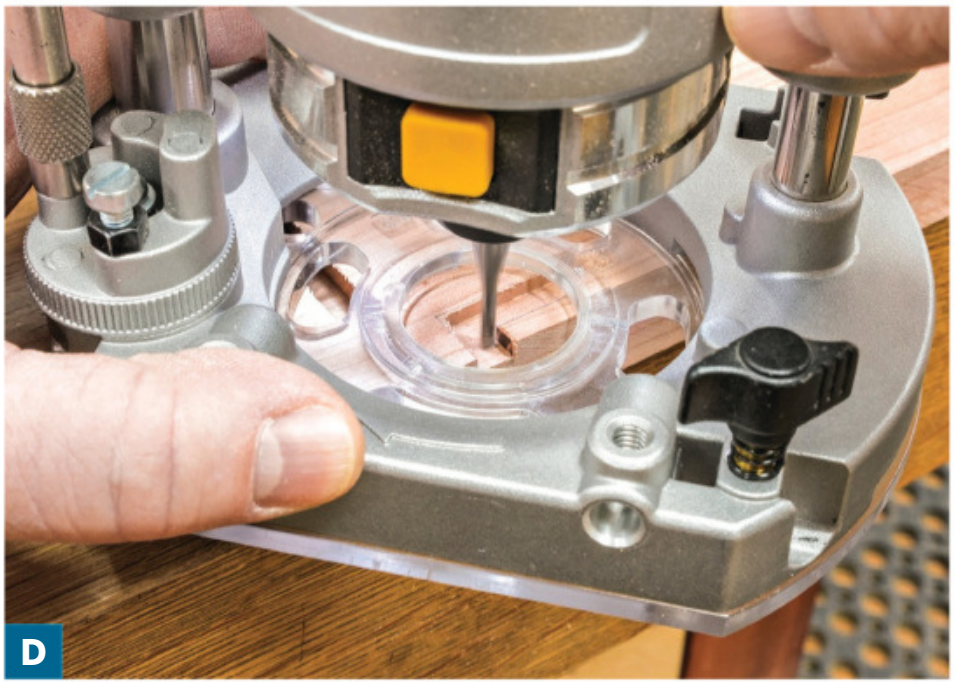
Try your hand forming a mortise in a piece of scrap before working on the top and bottom.

3 Take the case apart, then use a knife to scribe the hinges to the top and bottom, 1/16" from the side (B) marks and 3/16" from the front edge **[Drawing 1]**. Form the hinge mortises in the top and bottom **[Photo D]**.

4 Rabbet the inside back edges of the sides (B) **[Exploded View]** and form the stopped rabbets on the top and bottom (A) **[Drawing 1]**. Bevel-cut the ends of the top and bottom, sand slight round-overs on the bevels, then finish-sand the top, bottom, and sides. Glue and clamp the case together, checking for square.

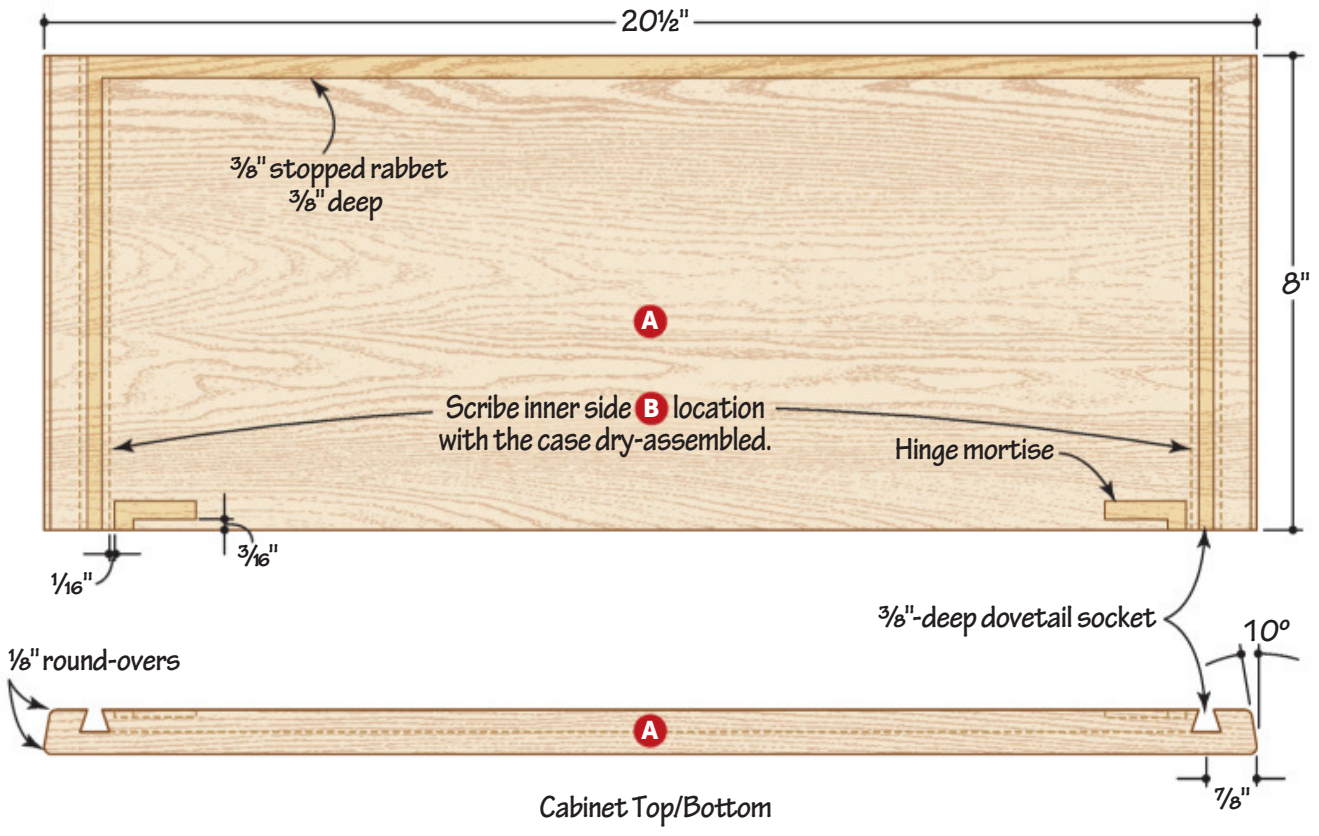
Install a ½"×14° dovetail bit in the router table, set the height to ⅜", and rout the dovetail sockets in a single pass. We used a pushblock with a cleat on the back end to hold the workpiece flat and to prevent tear-out.

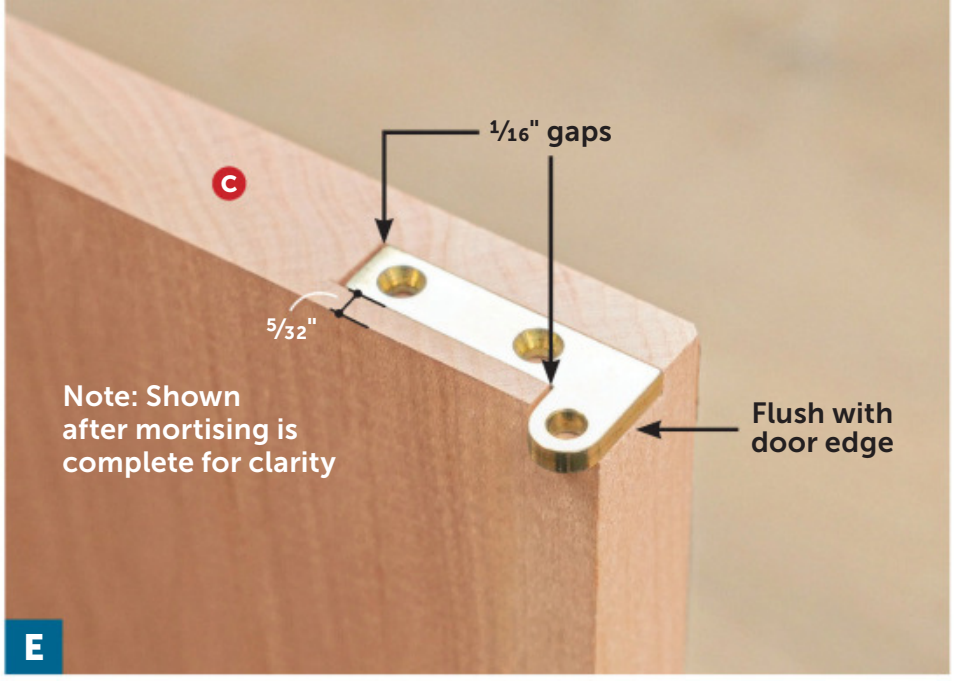
Without adjusting the height of the bit, install a tall auxiliary fence on the router table and rout the dovetails on the ends of the sides (B). Slowly remove material from both sides of the dovetails, checking the fit in the sockets as you progress.



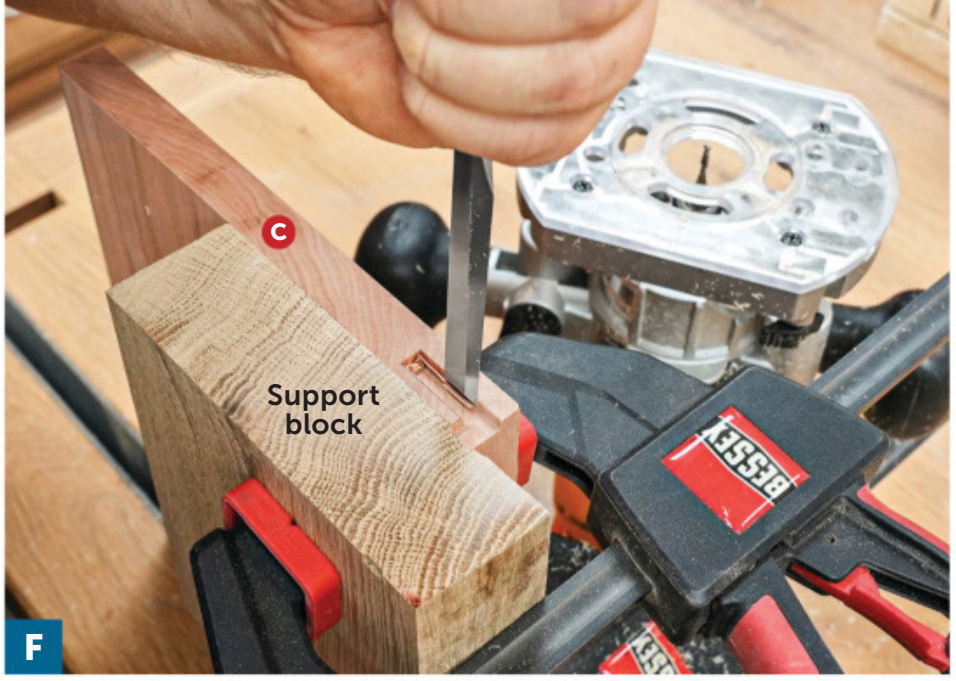
Install a ⅛" spiral upcut bit in your router and adjust the depth to match the hinge thickness. Carefully freehand rout away the bulk of the waste, then use a sharp chisel to pare to the line, checking the fit of the hinge as you go.

1 CABINET TOP & BOTTOM





Scribe the door (C) hinge mortises with the hinge flush to the outside edge of the door. Then, add about 1/16" to the mortise length to allow for adjustment when installing the doors.

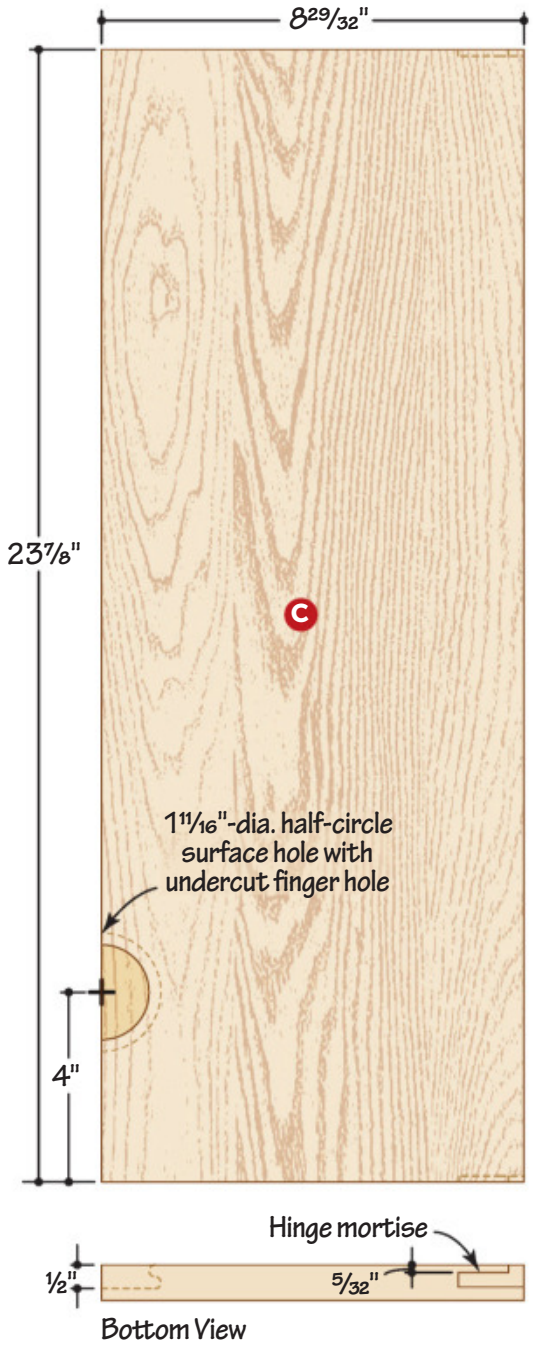


Clamp a support block flush with the end of the door to support the router as you remove most of the waste from the mortise. Use a chisel to clean up the walls and achieve a good fit for the hinge.

5 Cut the doors (C) to size **[Drawing 2]**. Scribe a hinge to the top and bottom end of each door **[Photo E]**, then form the mortises **[Photo F]**.

6 Build a routing template from 1/2" plywood and use it to rout the door pulls. (See *Routing Undercut Pulls*, *right*.) Finish-sand the doors.

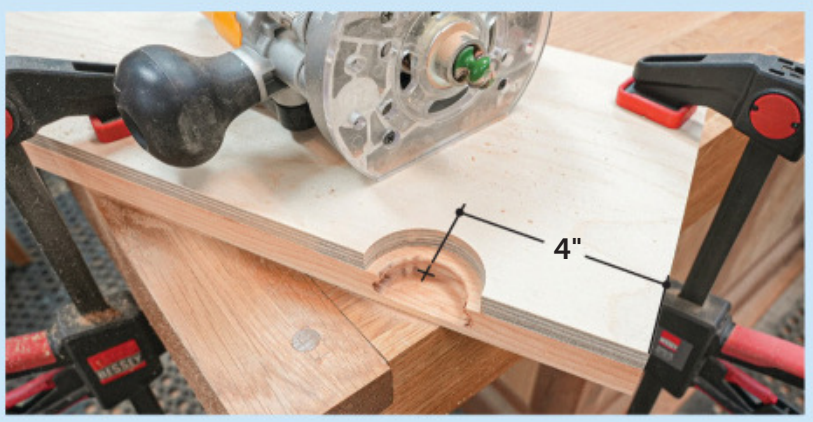
2 DOOR

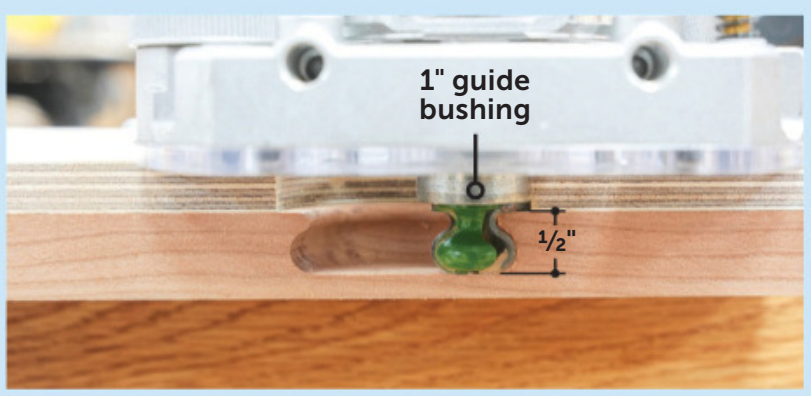


ROUTING UNDERCUT PULLS

A template and router guide bushing make forming these undercut door pulls a snap. Cut a piece of 1/2" plywood to the same size as a door (C). Lay out, cut, and sand a 1 1/8"-radius half circle on one edge of the plywood, 4" from the bottom **[Drawing 2]**.

Place the doors together, aligning their mating edges, and use the template to mark this half circle location on each door. Install a 1" guide bushing in your router and a 1/4" spiral upcut bit set for a 7/16"-deep cut. Clamp the template to one door and rout away the bulk of the waste. Repeat for the other door. Install the finger-pull bit **[Sources]** and set the bit to cut a 1/2"-deep finger pull. Clamp the template to a door and rout the finger pull, using the guide bushing to follow the half circle in the template and undercut the pull, *below*. Repeat for the other door.





G

Adjust the blade height to ⅜" and run both faces of five of the slats against the fence to cut a centered groove.

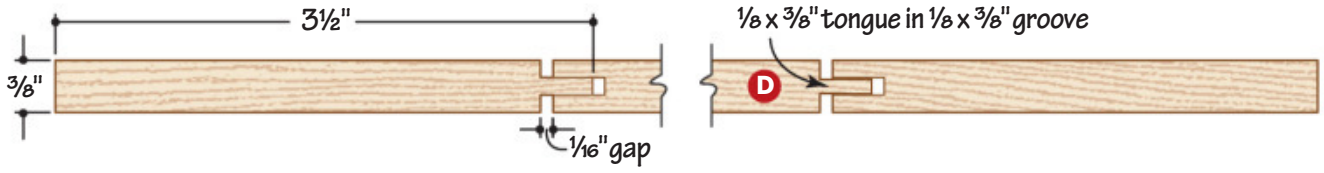
H

Install a straight bit in the router table and gradually remove material from both sides of each tongue until it fits well in a slat groove.

7 Measure the height of the rabbeted opening on the back of the case to verify the length of the back slats (D), then cut them to size. Cut all six slats 3½" wide; trim the two outer slats to width later, during assembly.

8 Cut a groove on one edge of five slats **[Drawing 3, Photo G]**. Then form a tongue on the opposite edge of four of these slats plus the ungrooved slat **[Photo H]**. Finish-sand the slats and set them aside.

3 BACK TOP VIEW DETAIL



"WHERE PAINT WOULD OBSCURE THE GRAIN, BLACK DYE LETS YOU CREATE A DRAMATIC CONTRAST THAT STILL REVEALS THE NATURAL BEAUTY OF THE WOOD."

-KEVIN BOYLE, SENIOR DESIGN EDITOR

ON TO THE INNARDS

Three mitered cubes fit diagonally inside the cabinet and partition the interior. Two cubes remain open, while the third one gets dadoed for drawer guides.

1 From ⅝" cherry, cut the cube sides (E) and tops/bottoms (F) to size, bevel-cutting the ends **[Drawing 4]**. Form the stopped dadoes in two of the sides **[Photo I]**, cut the drawer guides (G) to size, and glue them into the dadoes.

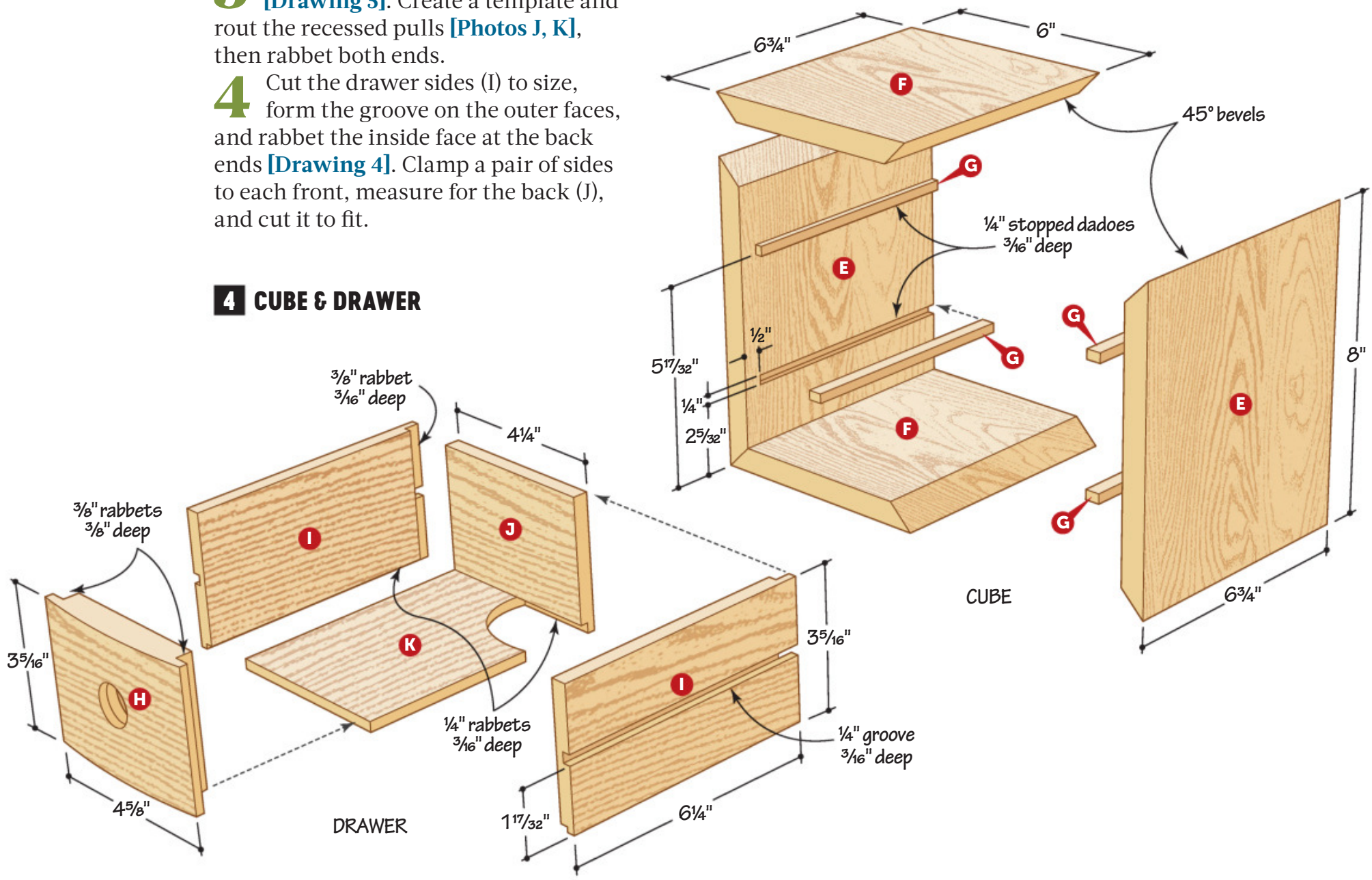
2 Glue and clamp the three cube assemblies **[Drawing 4]**. We used two strap clamps per cube. Once the glue dries, glue the drawer cube to the bottom and left side of the case, flush with the rabbets **[Exploded View]**. Glue an open cube into the opposite corner of the case, but leave the center cube unattached for now.

Note: **Measure the inside dimensions of the case to verify the length of the cube parts (E, F). The side (E) length equals one-third of the height, and the top/bottom (F) length equals one-third of the width.**

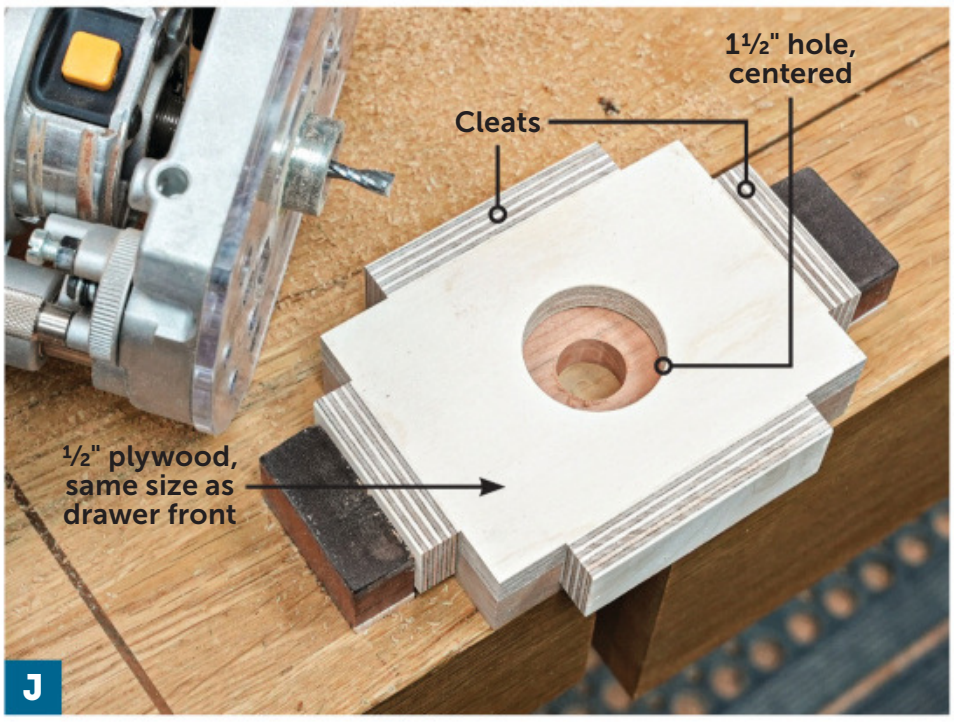
3 Cut the drawer fronts (H) to size **[Drawing 5]**. Create a template and rout the recessed pulls **[Photos J, K]**, then rabbet both ends.

4 Cut the drawer sides (I) to size, form the groove on the outer faces, and rabbet the inside face at the back ends **[Drawing 4]**. Clamp a pair of sides to each front, measure for the back (J), and cut it to fit.

4 CUBE & DRAWER



Install a ¼" straight bit in the router table, raise it to 3⁄16", and rout the stopped dadoes in the cube sides (E). Rout the lower groove in each cube side, then reset the fence for the upper groove. Square up the end of the dadoes with a chisel.



Build the router template and slide it onto a drawer front (H). Install a ¼" spiral upcut bit and 1" guide bushing in the router, adjust the bit to make a 7⁄16"-deep cut, and rout the waste from the center of the pull. Repeat for the other drawer front.

5 Rabbet the lower edge of the drawer fronts, sides, and backs **[Drawings 4, 5]**. Clamp the drawer parts together, measure for the bottom (K), and cut it to fit.

6 Finish-sand the drawer parts (H-K), then glue and clamp them, checking for square. Once the glue dries, bandsaw and sand the curve on the front of each drawer **[Drawing 5]**.

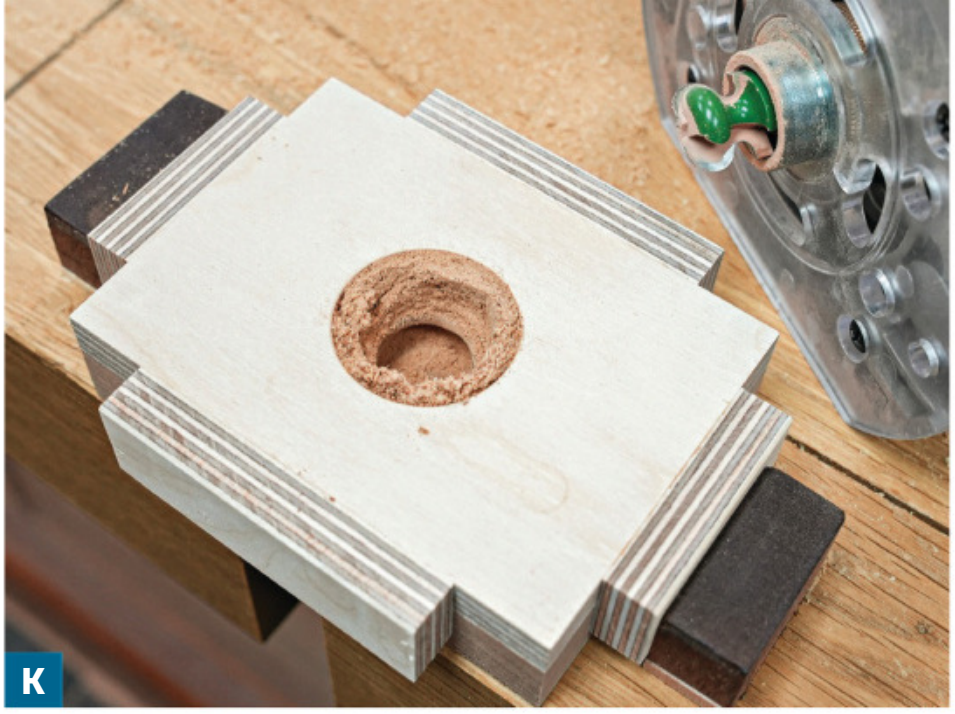
FINISH AND ASSEMBLY

1 Apply black dye **[Sources]** to the front face, edges, and tongues of the back slats (D) and to all surfaces of the drawers (H-K) **[Photo L]**. After the dye dries, top coat the back slats, drawers, doors, cubes, and case. We sprayed on three coats of matte lacquer, buffing between coats with a 1200-grit sanding sponge.

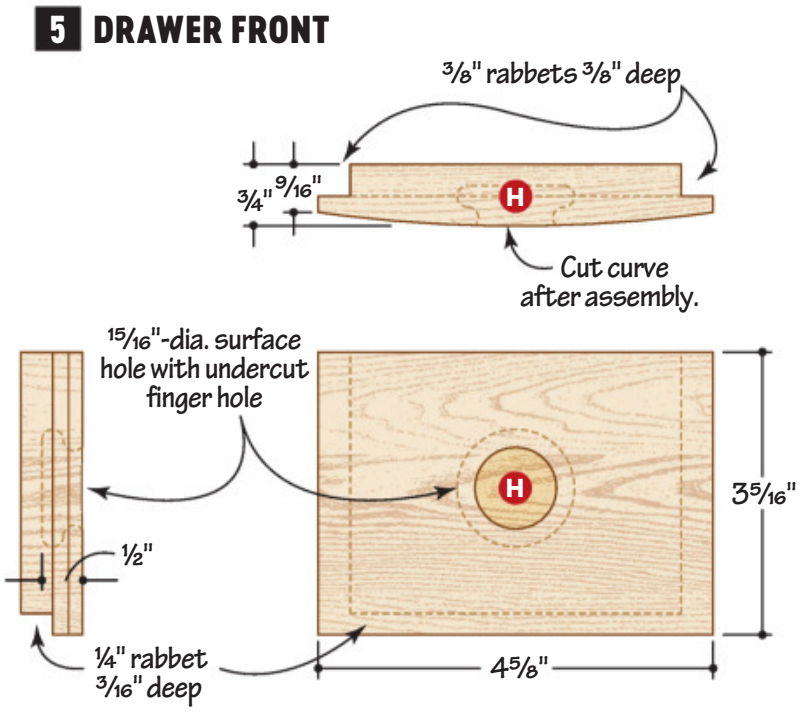
2 Lay the case on its face. Dry-fit the tongues in the grooves using 1/16" spacers to create equal spacing between the slats. Determine the overall back width and trim the outer slats to fit. Attach the back assembly in the rabbeted opening in the case using a 23-gauge pin nailer.

3 Lay out the positions of two hangers **[Sources]** on the back of the cabinet, 5" from the top and 1/8" from each side. Rout a 1/16"-deep mortise to inset each hanger, then drill overlapping 7/16" holes 3/16" deep inside each mortise to provide clearance for the screwheads. Screw the hangers in place.

4 Position the center cube in the cabinet **[Exploded View]** and temporarily hold it in place with a few drops of CA glue. Then, flip the cabinet over, drill pilot holes, and screw the back slats to the center cube.



Install the finger-pull bit in the router, drop it into the recess from the straight bit, and finish routing the pull. Slowly work from the inside out, pausing a few times to clear out the sawdust.



5 Drill pilot holes, then screw the hinges to the cabinet top and bottom. Slide the mortised end of each door onto a door hinge and check for fit in the cabinet, adjusting the hinges on the doors until you have even spacing. Mark the location of each hinge, then drill pilot holes and screw the hinges to the doors.

6 Lay out and drill the holes in the cabinet top and bottom for the bullet catches, then press them into place. Mark and drill the corresponding holes in the doors for the strike plates. Insert the drawers, hang the cabinet on a wall, and fill it with treasures.

In a glass jar, mix 1/4 oz of powdered water-soluble dye with 1 cup of hot tap water. Once the first coat dries, knock down the raised grain with 400-grit sandpaper, then apply a second coat.

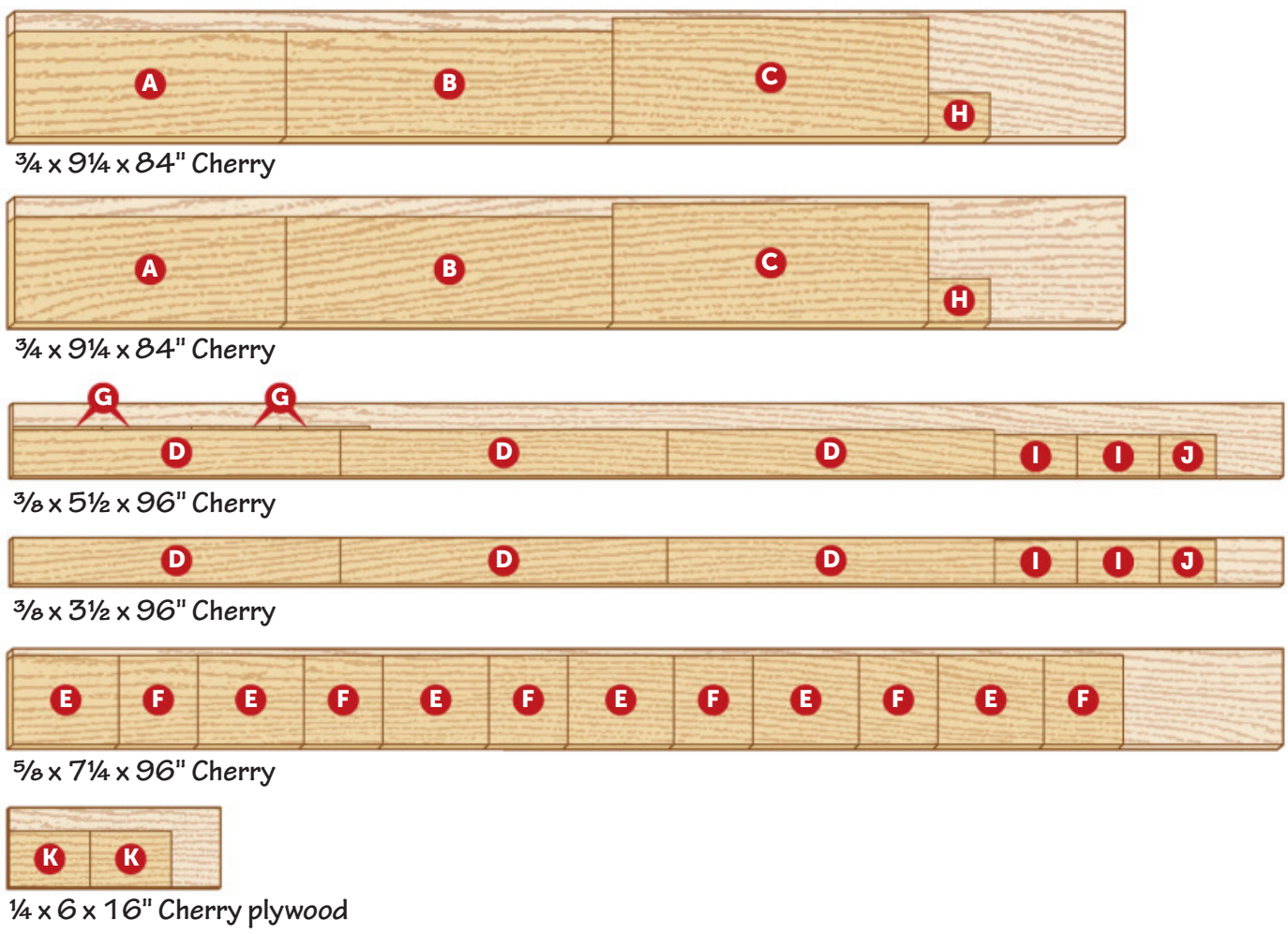
MATERIALS LIST

PART		FINISHED SIZE T	W	L	Matl.	Qty.
A	TOP/BOTTOM	¾"	8"	20½"	C	2
B	SIDES	¾"	8"	24¾"	C	2
C	DOORS	¾"	8 29/32"	23⅞"	C	2
D	BACK SLATS	⅜"	3½"	24¾"	C	6
E	CUBE SIDES	⅝"	6¾"	8"	C	6
F	CUBE TOPS/BOTTOMS	⅝"	6¾"	6"	C	6
G	DRAWER GUIDES	⅜"	¼"	6¼"	C	4
H	DRAWER FRONTS	¾"	3 5/16"	4⅝"	C	2
I	DRAWER SIDES	⅜"	3 5/16"	6¼"	C	4
J	DRAWER BACKS	⅜"	3 5/16"	4¼"	C	2
K	DRAWER BOTTOMS	¼"	4¼"	6 1/16"	CP	2

MATERIALS KEY: C–cherry, CP–cherry plywood.
SUPPLIES: 23-gauge 1" pin nails.
BITS: ¼" straight router bit, ¾" straight router bit, ½"x14° dovetail router bit, 1" router guide bushing.
SOURCES: ⅝x1⅜" double offset knife hinges no. 01B1405 (2 pairs), $36/pair; 7/16" bullet catches no.01B1014 (4), $18 each; 9/16x3" blind hangers no. 00S1075, $5 pack of 10; ¾"x11/16"x¼" finger grip router bit no. 16J7101, $39, leevalley.com; Water-soluble dye powder ebony black no. 327 (1 oz), $11, toolsforworkingwood.com.
PROJECT COST: It cost us about $385 to build this project. Your cost will vary by region and source.

CUTTING DIAGRAM

We started by purchasing 17 board feet of 4/4 cherry and 7 square feet of ½" cherry. Before cutting parts to size, we planed them to the thicknesses shown in these example boards.



CONCEALED HINGE JIGS

SIMPLY CLAMP AND DRILL TO MOUNT A HINGE

Quick, repeatable setups, precision boring, and affordability make concealed-hinge installation jigs a must-have tool for home workshop cabinetmakers.

WRITER: KERRY GIBSON

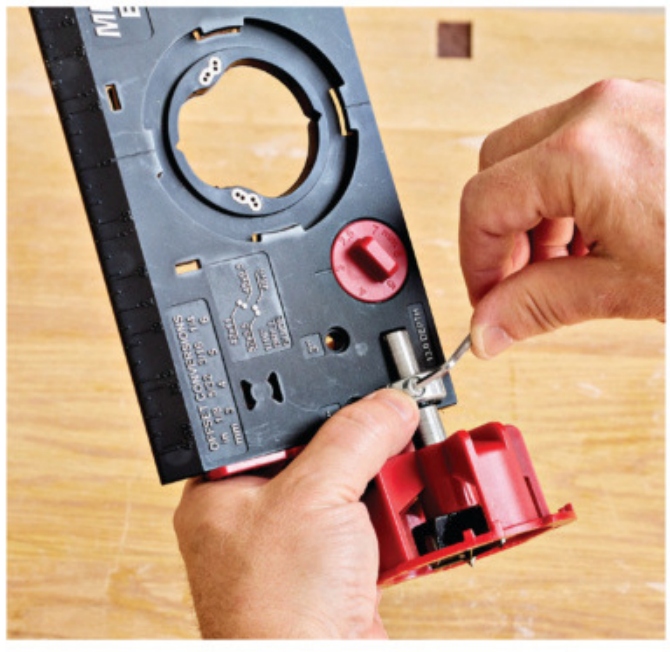
PHOTOGRAPHERS: BRIE GOLDMAN, CARSON DOWNING

Concealed hinges, also known as Euro-style or cup hinges, work great for cabinetry projects because they easily adjust for perfect-fitting doors and come in a variety of styles for both face-frame and frameless cabinets. As the name implies, they're hidden from view, mounting to the inside face of the door with a cup that fits into a 35mm hole. Screws flanking the cup hole secure the hinge, *right*.

Drilling the cup hole traditionally required using a drill press with fence stops to ensure the accuracy required for proper hinge positioning. Hinge-installation jigs allow you to skip the drill press setup and bore the cup and mounting-screw holes precisely using only a hand drill.

We wanted to put a few of these jigs to the test to see if they could deliver on their promise of precise, clean drilling. An internet search turned up dozens of jigs, but we stuck with familiar brands (Rockler, Kreg, Milescraft). We also ordered one (Veiko) that's a big seller on amazon.com. The jigs all come with the 35mm bit, except the Rockler, which sells the bit separately.

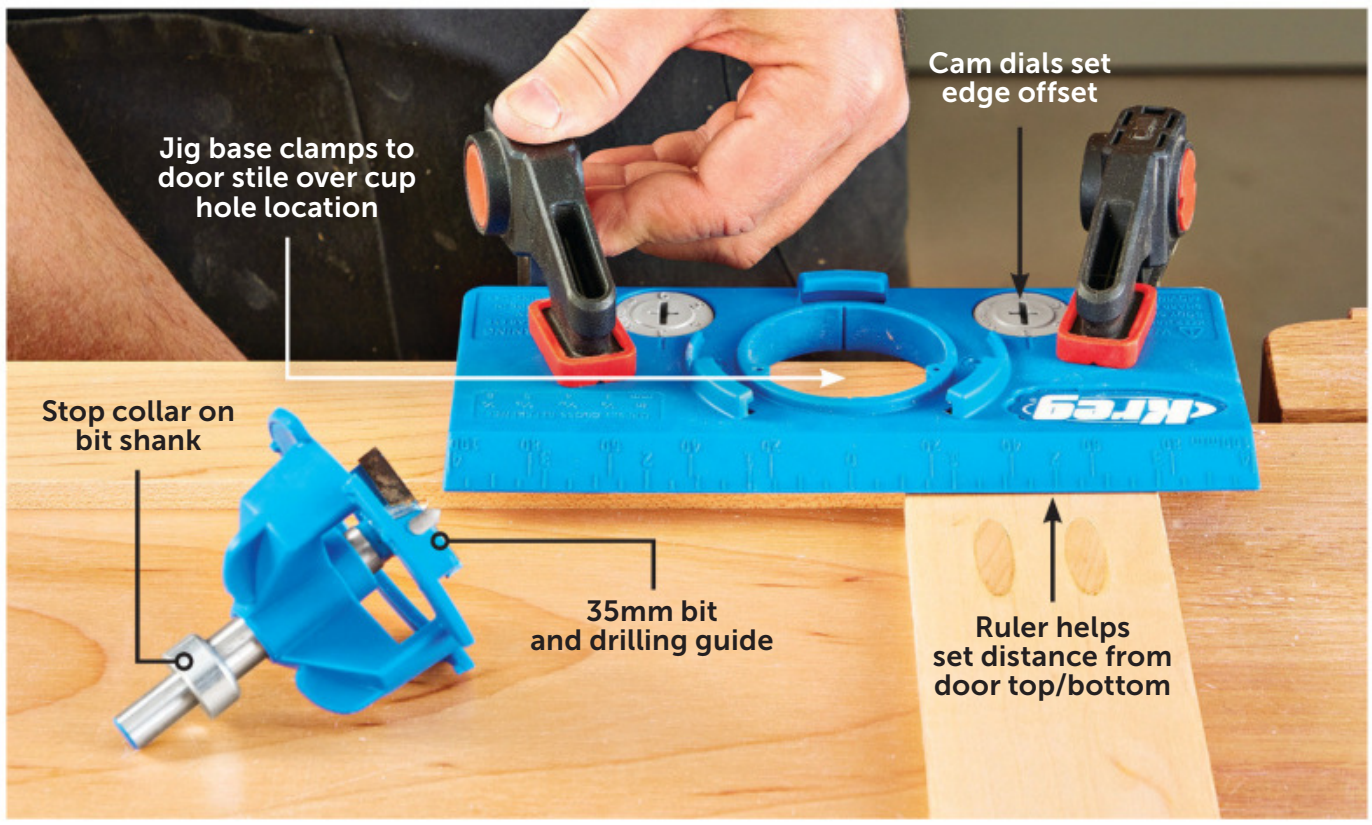
In order to remain hidden, most of the hinge's mechanism must tuck into the cup hole in the door stile. Precise placement allows it to both swing the door open as well as thrust it outward to clear the cabinet.



Milescraft provides a depth-stop groove in the base for setting the stop collar. Kreg uses a groove in the bit shank that the set screw aligns with to control boring depth.

ANATOMY OF A HINGE JIG

All four of the jigs we tried rely on similar designs to ensure accurate drilling, *below*, with a guide that holds the bit vertically over the cup location, but they vary in setup and usage. The Milescraft, Kreg, and Veiko guides twist and lock into the base while the Rockler guide fits over a raised rim on the base that you hold in place by hand. Stop collars on the bit shank control boring depth, but only the Milescraft and Kreg jigs provide a way to set the depth without manually measuring the distance that the bit extends below the base, *above*.



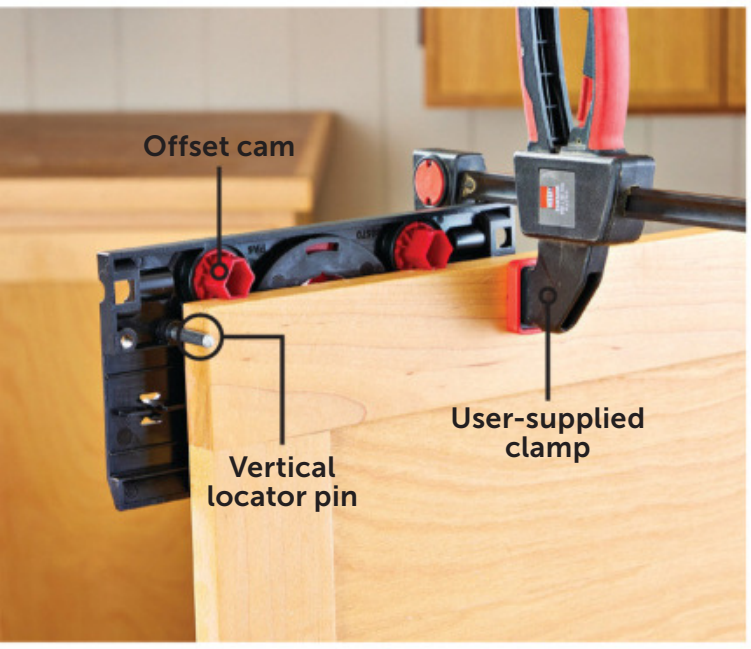
Hinge manufacturers specify the distance of the 35mm cup hole from the edge of the door stile. Typically, this offset puts the edge of the hole 3mm to 6mm from the outside edge of the door.

The Kreg and Milescraft jigs have similar cams that fit against the side of the door and rotate to provide the correct offset (*below left*). The Veiko jig features movable threaded pins to index the offset (*below center*). Rockler achieves the offsets by mounting a metal plate to the base using screws in paired holes for 3, 4, or 5mm, along with a pair of slots that allow for variable offsets (*below right*).

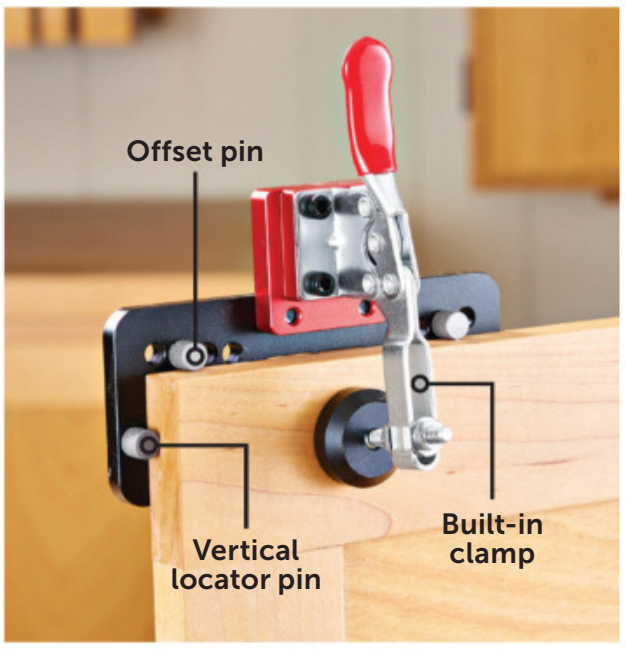
The vertical distance of the cup hole from the top and bottom of the door isn't as critical–typically 3 to 4 inches. To position the jig vertically on the door stile, both the Milescraft and Kreg jigs have a molded-in measuring scale along one edge as well as a handy millimeter-to-inch conversion table. The Milescraft and Veiko jigs use a movable pin to set the vertical position from the bottom and top of the door.

To position the Rockler jig from the top or bottom of the door, you need to measure and mark the centerline of the cup hole on the door stile, then align the jig with your centerline mark.

Finally, the Rockler and Veiko jigs have built-in clamps that firmly held the jigs in place. The Milescraft and Kreg jigs require you to provide clamps.



Milescraft uses cams to offset the jig from the edge of the door and a pin to position it vertically on the stile. Kreg uses a similar cam, but relies on a built-in ruler for vertical alignment.



Veiko's knurled pins thread into the bottom of the base to provide offsets of 3-6mm. A similar pin locates the jig vertically on the stile while the built-in clamp secures the jig firmly in position.

The Rockler jig requires you to measure and mark the location of the cup hole on the door stile, then align the jig with your mark and tighten the clamping knob. The drill guide fits over a raised rim on the base.

A separate mounting screw template comes with the Veiko jig and fits into the base. The drilling guide bushings help keep the drill bit vertical and provide four different spacing options.

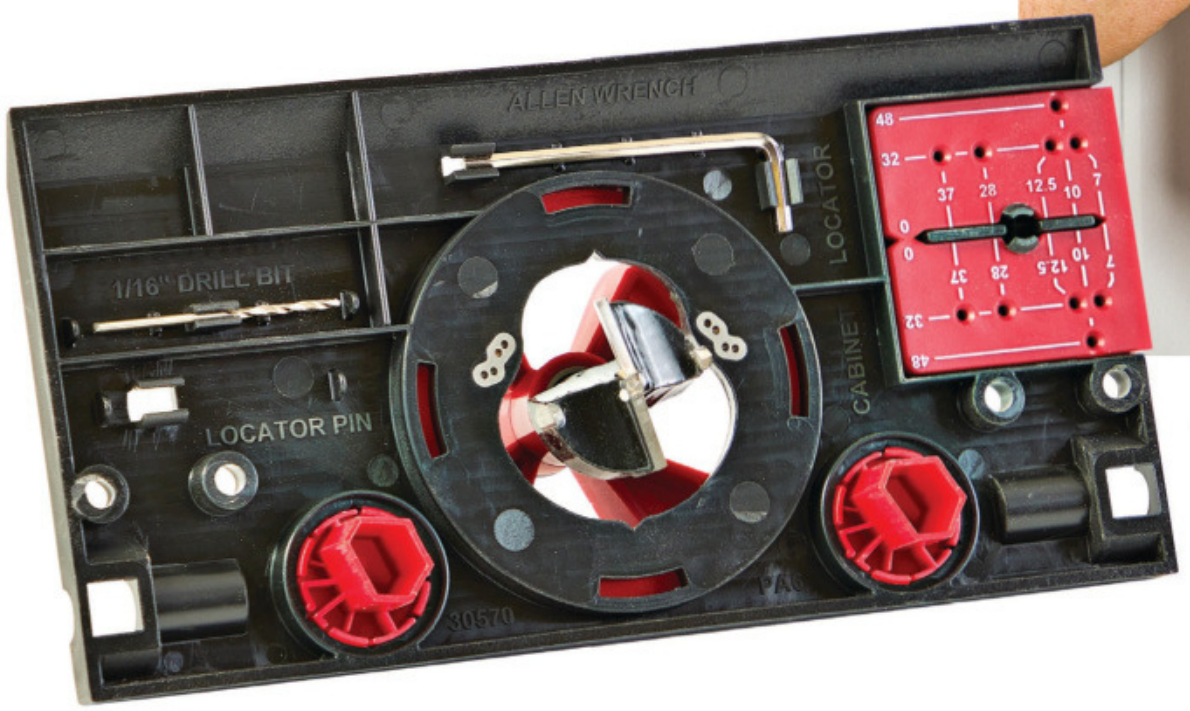
MOUNTING SCREW GUIDES

The location of the mounting screws varies depending on the hinge manufacturer's specifications. The Milescraft and Veiko offer options for drilling pilot holes in four different spacing patterns. Milescraft builds them into the base while Veiko uses a separate plate that drops into the base (*left*). The Kreg jig has a single, fixed set of screw-hole guides which may or may not match your hinge specifications. Milescraft and Veiko include a $1/16$" drill bit for drilling the pilot holes.

CONCLUSIONS

While any of these jigs will do the job, we'd choose the Milescraft for our shop based on all its thoughtful features that also include a marking template for locating the mounting screw holes on the cabinet (*right*). This template stores conveniently onboard the base along with other accessories (*below*). It was also the lowest priced jig we considered at just $25.

The Milescraft jig comes with a handy guide for marking the location of the mounting screws on the cabinet face frame or the cabinet's interior side.



◄ Milescraft keeps everything handy with on-board storage of the cabinet mounting hole guide, the stop collar Allen wrench, and mounting screw drill bit.

TIPS FOR HINGE JIG SUCCESS

- Have hinges on hand and verify mounting position requirements before drilling
- Double-check edge offset settings
- Clamp the jig securely to the door and support the door on a stable worksurface
- Start the drill and let it get to speed before touching the bit to wood
- Drill at a low speed and feed the bit slowly, backing out to clear chips as you go

1 **Milescraft EuroHingeJig**
milescraft.com
no. 1342, $25

2 **Kreg Concealed Hinge Jig**
kregtool.com
KHI-HINGE, $33

3 **Veiko Aluminum Alloy 35mm Hinge Boring Hole Drill Guide**
amazon.com
no. B0BCP3RZ82, $56

4 **Rockler Jig-It Concealed Hinge Drilling Guide**
rockler.com
no. 56778, $85, (long-shank 35mm Forstner bit, no. 10104, $37, sold separately)

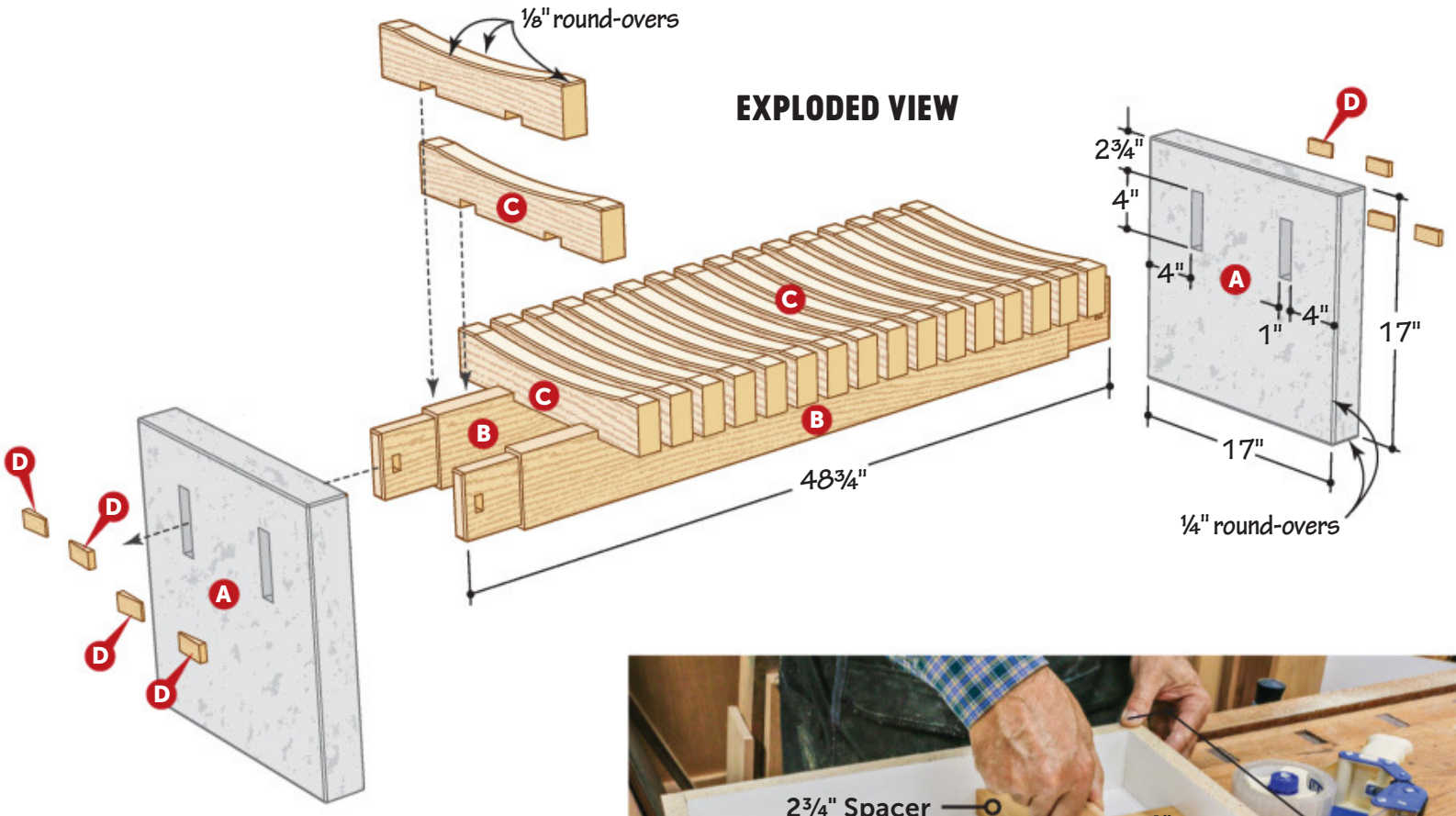
WOOD & CONCRETE BENCH

With custom-molded concrete supports, this rock-solid bench provides all-weather seating for your favorite garden spot.

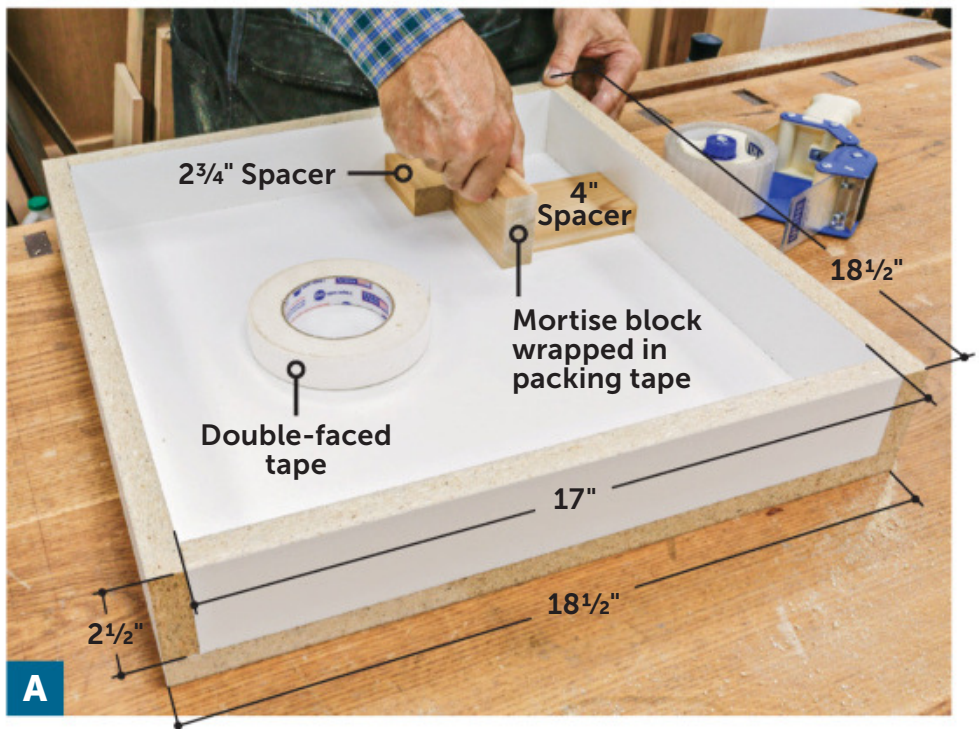
WRITER: KERRY GIBSON
DESIGNER/BUILDER: KEVIN BOYLE

OVERALL DIMENSIONS:
48¾"W x 17"D x 17"H

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



Concrete is the ultimate outdoor building material–you can easily form it into myriad shapes, and it doesn't rot or require any finish. So what better choice to create the bookend bases for a garden bench! Through-tenons, secured with wedges, fix the white oak stretchers to the concrete bases. The dished slats let water drain and air circulate through the comfortable seat. And the weight of the bases means the bench will stay parked where you put it.



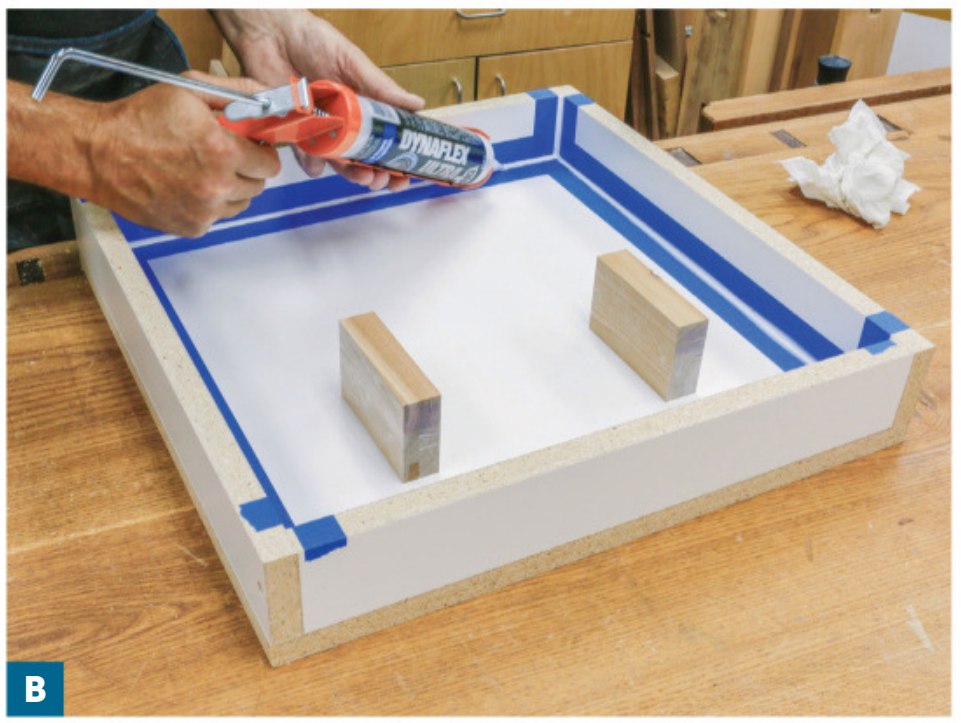
Wrap the mortise blocks in packing tape, apply double-faced tape to the bottoms and use spacers to position them in the mold. Drive screws from the underside to secure the mortise blocks.

CAST THE BASES

We built one form and used it to cast both bases in turn. Each base requires one 80-pound bag of concrete and we used Quikrete Profinish Crack Resistant mix for reasons implied by the name.

1 From ¾" melamine, cut two 2½×17" pieces, two 2½×18½" pieces, and one 18½×18½" piece. Assemble the form with screws. From 1×2½" stock, cut two mortise blocks 4" long and wrap the faces and ends with packing tape to prevent the concrete from sticking to the blocks. Apply double-faced tape to the bottom of the blocks and position them in the form using spacers **[Photo A, Exploded View]**.

2 Mask and caulk the corner seams inside the mold **[Photo B]**. When the caulk dries, remove the tape.



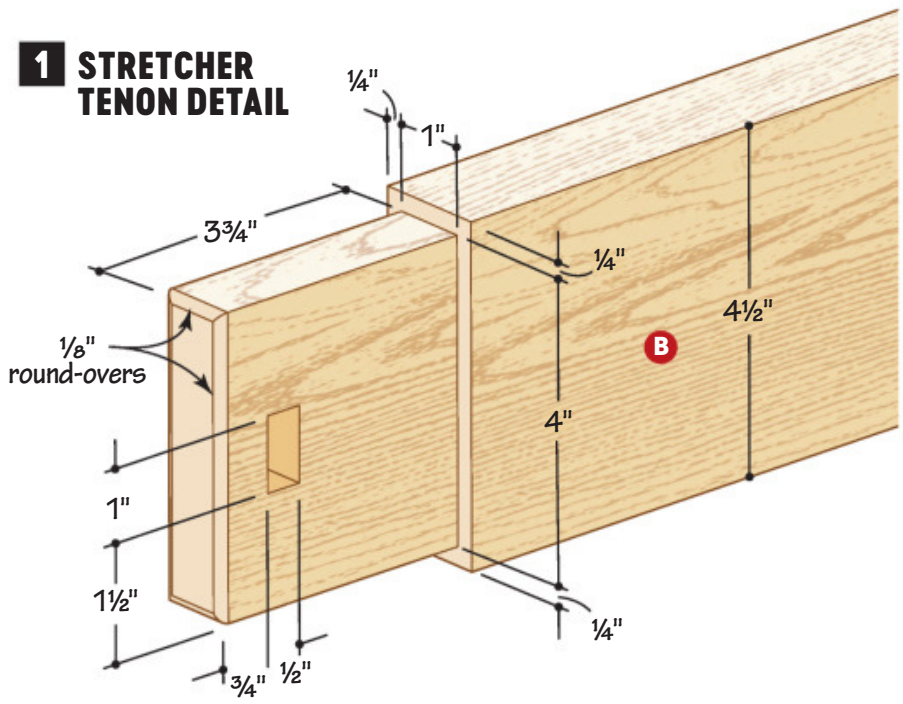
Border the seams with masking tape, leaving a ¼" gap between tape and seam. Apply a bead of silicone caulk along the seams, then use your finger to create a cove to form a round-over in the concrete.

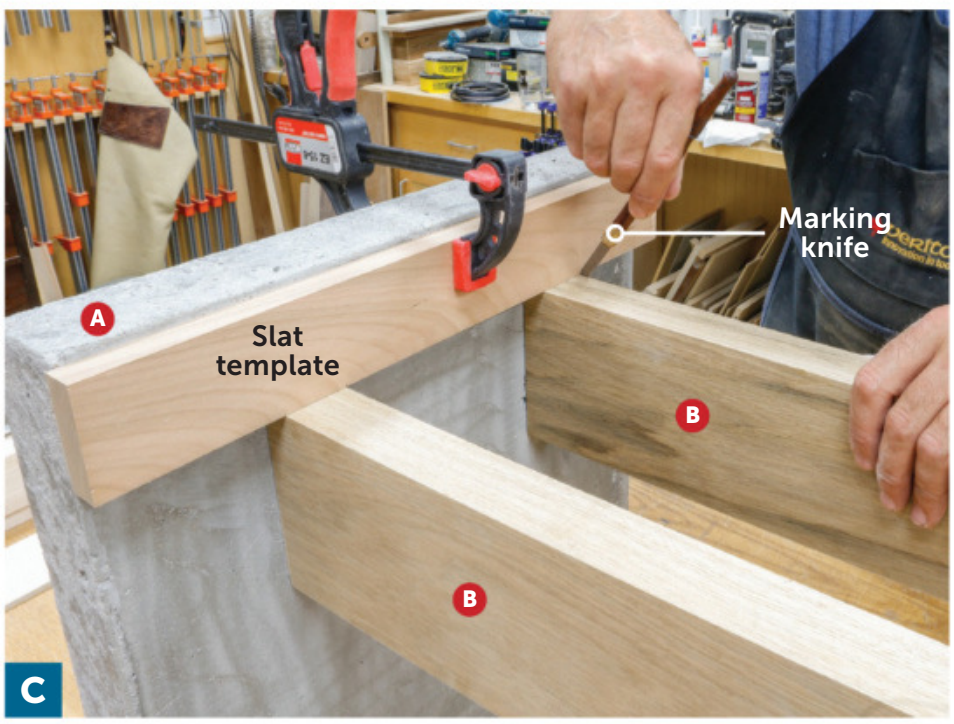
TIP!

As an extra measure to prevent the concrete from sticking to the melamine form, put a light coating of cooking spray on the inside of the form as a release agent.

3 Mix one bag of concrete in a wheelbarrow or plastic tub according to the instructions on the bag and pour it into the form. Tap the form on all sides with a hammer to eliminate any voids, then screed the concrete flush with the top of the form. After the concrete has set for 15 minutes, trowel it smooth. With a concrete edging tool, create a 1/4" round-over along the top edges.

4 Let the concrete set up for 24 hours, then remove the form by unscrewing the sides and the mortise blocks. Reassemble the form, caulk the seams and cast the second base.





Position and clamp the slat template to one of the bases, keeping the ends flush with the front and back edges of the concrete. Use a marking knife to mark the location of the stretchers on the template.

ADD THE BENCH SEAT

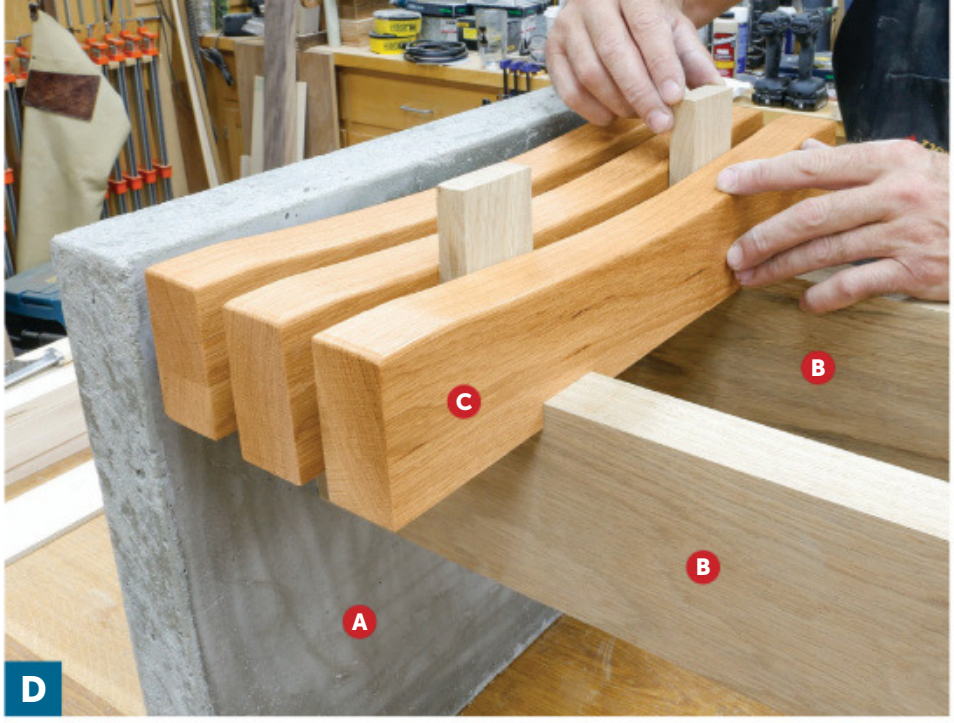
1 From 1½" stock, cut the stretchers (B) to size **[Materials List, Exploded View]**. Install a dado blade in the tablesaw and form tenons on both ends of the stretchers to fit in the mortises in the bases (A) **[Drawing 1]**.

2 Lay out the holes in the tenons for the wedges and use a ½" Forstner bit in the drill press to remove the bulk of the waste. Square up the holes with a chisel. Then sand or rout ⅛" round-overs on the ends of the tenons and finish-sand the stretchers.

3 From 1½" stock, cut the seat slats (C) and an additional piece of ¾" stock to use as a slat template **[Materials List]**.

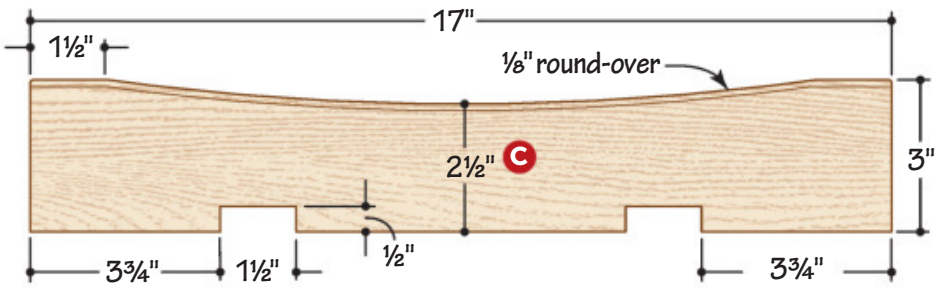
4 Place the stretchers (B) into the bases (A). Position the slat template against a base and mark the location of the stretchers where the slats receive notches **[Photo C]**.

5 Install a ¾" dado blade in the tablesaw with ½" blade height. Use the miter gauge and set the fence as a stop to make a cut on the inside shoulder of the first notch. Then sneak up on the final width of the notch, checking the fit on the stretchers. Then flip the template 180° and repeat the cutting steps to create the other stretcher notch. Using the template to set the fence location, make the notch cuts in the seat slats.



Apply waterproof glue to the notches of the seat slats (C) and use ¾" spacers to position them on the stretchers (B). Long spacers help to install the slats plumb and evenly across the bench.

2 SEAT SLAT

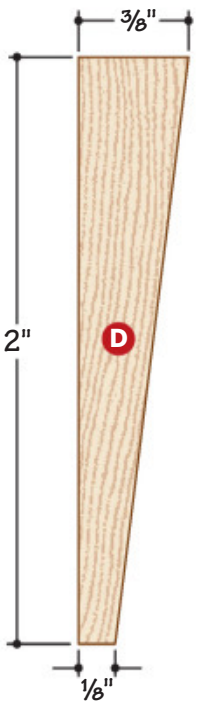


6 Lay out the curve on the top edge of the seat slat template **[Drawing 2]**. Cut and sand to the layout line, then use the template to mark all the seat slats. Rough cut, then sand or pattern-rout them to shape. Rout a ⅛" round-over on the top edges of the seat slats and finish-sand them. Apply a couple of coats of exterior finish, such as spar varnish, to the slats, avoiding the notches where they receive glue.

7 Using spacers and waterproof glue, install the seat slats on the stretchers **[Photo D]**. When the glue dries, remove the seat assembly (B-C) from the bases, clean up any excess glue on the stretchers and apply finish to them.

8 From 1" stock, cut the wedges (D) to shape **[Drawing 3]** and apply finish. Move the bench parts to the chosen location and insert the stretcher tenons into the bases. Secure the tenons with the wedges, but just tap them snug to avoid splitting the tenons. Then take a seat and enjoy the garden landscape!

3 WEDGE



> **IN ADDITION TO THE OPPORTUNITY TO LEARN NEW SKILLS, WORKING WITH NEW MEDIUMS LIKE CONCRETE REALLY GETS THE DESIGN IDEAS FLOWING.**
>
> ***KEVIN BOYLE, SENIOR DESIGN EDITOR***

MATERIALS LIST

PART		FINISHED SIZE T	W	L	Matl.	Qty.
A	BASE	2½"	17"	17"	CN	2
B	STRETCHERS	1½"	4½"	48¾"	WO	2
C	SEAT SLATS	1½"	3"	17"	WO	18
D	WEDGES	⅜"	1"	2"	WO	8

MATERIALS KEY: CN–concrete, WO–white oak.
SUPPLIES: Masking tape, silicone caulk, ¾" melamine, #8×1½" flathead screws, waterproof wood glue.
BLADES AND BITS: Dado blade, ½" Forstner drill bit, ⅛" round-over router bit.
PROJECT COST: It cost us about $390 to build this project. Your cost will vary by region and source.

UNFILTERED HEPA VACUUM VIEWS

Shop vacuums with high-efficiency particulate air (HEPA) filters suck up sawdust and shop debris without spitting fine dust back into the air. Today, cordless versions are more available and more affordable than ever. We fired up five 2- to 3-gallon models that all cost less than $200 (bare tool) to see how well they clean up.

Dual-source power at an attractive price

With 2 gallons of capacity, a 20-volt battery (sold separately), and 39 cubic feet per minute (CFM) of airflow, the Hercules portable vacuum provided plenty of power to pick up our combination of sawdust, Forstner bit shavings, and small wood chunks. The hose stretches easily to reach the mess using the crevice tool or wide nozzle. Should your mess be larger than the battery life, you can plug this vacuum into a 120-volt outlet. That doesn't charge the battery, but it offers a second power option that other vacuums in this category don't. It also doesn't hurt that it's the lowest priced vacuum in our group.

Hercules, *harborfreight.com*
20V/120V 2-gallon wet/dry vacuum, no. 56789, $90 (bare tool)

Big-box bargain vac

Ryobi's 3-gallon vacuum offers two speeds producing up to 46 CFM of airflow that sucked up our mixed debris with relative ease. You'll need to buy the $19 HEPA filter separately to keep fine dust at bay. If you're already in the company's One+ 18-volt battery system, this vacuum makes a nice addition to your arsenal at an attractive price. The vacuum is compatible with Ryobi's Link storage system.

Ryobi, *ryobi.com*
18-volt 3-gallon wet/dry vacuum kit, no. PCL734B, $129 (bare tool); HEPA filter, no. A32RF08, $19

Compact size yields lower power

Listed specifications, such as 38 CFM and 20-volt power, would seem to put the Worx 2.1-gallon vacuum on par with the others here, but this vac struggled to suck up the larger bits in our mixed debris. We suspect that's due to the flat filter that clogged more quickly and proved harder to clean than the canister filters used by the others. We like this vacuum's compact size, and it gets the job done, but it leaves us longing for more suction.

Worx, *worx.com*
Nitro 2.1-gallon cordless wet/dry vacuum, no. WX031L.9, $140 (bare tool)

High power in a larger package

Milwaukee's 2.5-gallon, 18-volt vacuum impressed us with power to rapidly suck up everything in our mixed debris, as well as small screws. At 13×11×17" and 11 pounds, it's the largest and heaviest of our group (as well as the most expensive), but it packs a heavyweight punch. The hose is flexible and easy to stretch, and it comes with an adapter to simplify connecting the hose to tools. The vac integrates with Milwaukee's Packout system for storage and transport.

Milwaukee, *milwaukeetool.com*
M18 Fuel Packout 2.5-gallon Vacuum, no. 0970-20, $199 (bare tool)

Max power for cordless cleanup

DeWalt's 2-gallon vacuum runs on the company's 18- or 20-volt Max batteries, making it usable if you're on either platform. We expected reduced power from this 31-CFM vac, but it easily consumed our mixed debris. We did find two minor annoyances. First, the tank design has an inward-turned lip that makes emptying it more difficult than necessary. Also, the air outlet is on the same side as the hose, where it tends to blow toward what you are vacuuming.

DeWalt, *dewalt.com*
18/20-volt Max wet-dry vacuum, no. DCV580, $159 (bare tool)

WHAT'SAHEAD

A GLIMPSE INSIDE THE NOVEMBER ISSUE (ON SALE OCTOBER 4)

HEIRLOOM JOINTER PLANE

Combine drop-in hardware and your favorite hardwoods to build this long-bed plane that's perfect for truing edges to glue-up readiness.

AVOID ROUTING MISTAKES

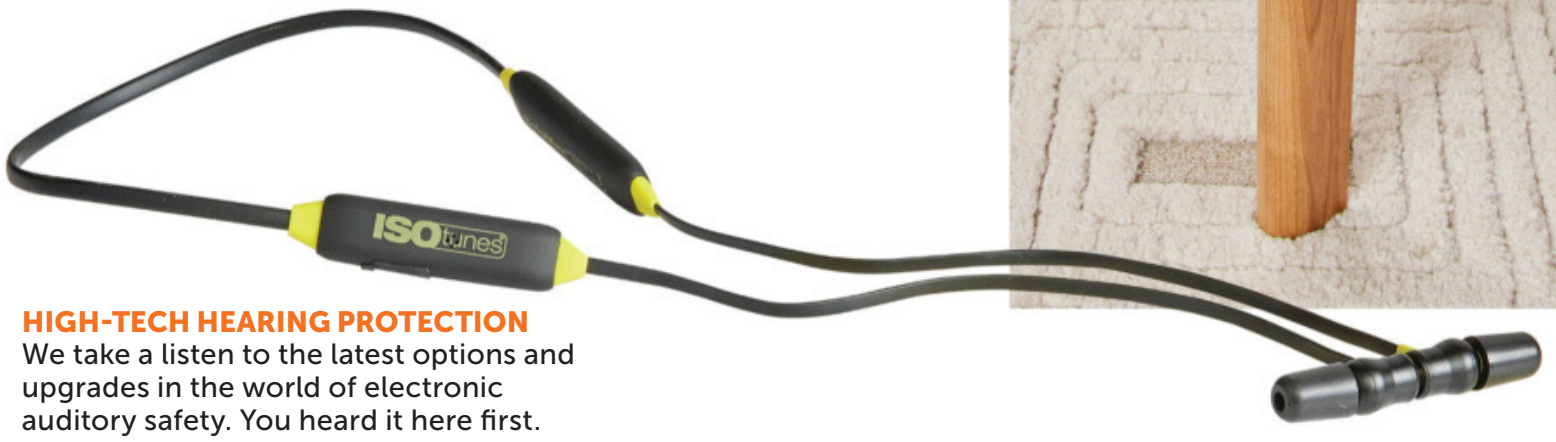
Routing success is in reach when you steer clear of these common missteps that confound with burning, gouging, and chip-out.

PERFECT-FIT INSET DOORS

Even spacing around inset doors is a mark of a careful craftsman. But it doesn't have to be a difficult feat. We show you how to get a perfect fit.

NO-HARDWARE EXPANDING TABLE

Thanks to ingenious cantilevered wings, this elegant Danish Modern dining table fits a small family or a large dinner party.



HIGH-TECH HEARING PROTECTION

We take a listen to the latest options and upgrades in the world of electronic auditory safety. You heard it here first.

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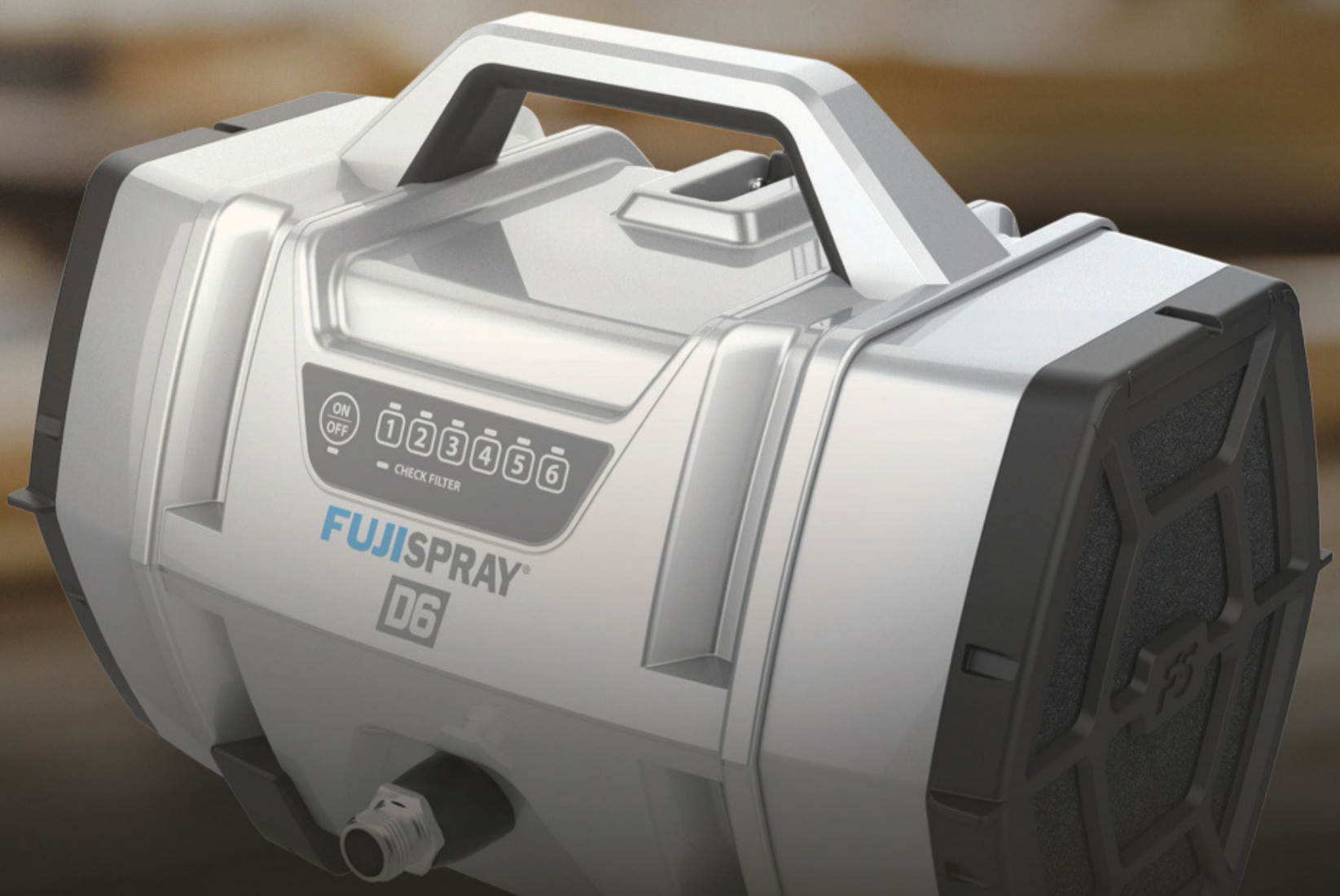

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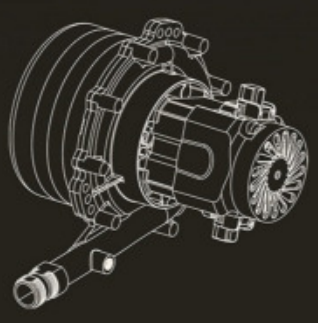

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