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WOOD®

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4" X 36" BELT / 6" DISC COMBO SANDER

- Motor: 1/2 HP, 120V single-phase, 4.3A
- Sanding belt size: 4" x 36"
- Sanding belt speed: 1320 FPM
- Sanding belt tilt: 0–90°
- Belt platen size: 4 3/4" x 11 1/2"
- Disc diameter: 6"
- Disc backing type: PSA
- Disc speed: 2200 RPM
- Table size: 5 3/8" x 7"
- Table tilt 0–45°
- Dust port size: 2"
- Footprint: 10" x 16 1/2"
- Overall dimensions: 20" W x 16 1/2" D x 25" H
- Approx. shipping weight: 36 lbs.



MADE IN AN ISO 9001 FACTORY

T33256 ONLY \$199

⚠ WARNING! †¹

17" FLOOR DRILL PRESS

- Motor: 1 1/2 HP, single-phase 120V/240V (prewired 120V), 15.8A/7.9A
- Swing: 17"
- Drill chuck: 3/64"–5/8"
- Drilling capacity: 1" steel
- Spindle taper: MT #3
- Spindle travel: 4 3/4"
- Number of speeds: 12, 180–3240
- Quill diameter: 2.85"
- Table T-slot size: 3/8" wide
- Table size: 13 5/8" x 13 5/8"
- Table swing: 360°
- Table tilts: 90° L/R
- Footprint: 22 1/2" x 14 1/2"
- Overall dimensions: 21" W x 30" D x 70" H
- Approx. shipping weight: 260 lbs.



MADE IN AN ISO 9001 FACTORY

G7947 ONLY \$795

⚠ WARNING! †¹

17" 2 HP BANDSAW 40TH ANNIVERSARY EDITION

- Motor: 2 HP, 110V/220V (prewired 220V), single-phase, 20A/10A
- Cutting capacity: 16 1/4" left of blade
- Max. cutting height: 12 1/8"
- Blade size: 131 1/2" long
- Blade width range: 1/8"–1" wide
- Blade speeds: 1700, 3500 FPM
- Table size: 17" x 17" x 1 1/2" thick
- Table tilt: 10° left, 45° right
- Fence size: 6" H x 23" L
- Floor to table height: 37 1/2"
- Footprint: 22 1/2" x 14 1/2"
- Overall dimensions: 32" W x 32" D x 73" H
- Approx. shipping weight: 364 lbs.



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G0513A40 ONLY \$1295

⚠ WARNING! †¹

3-SPEED HEPA HANGING AIR FILTER

- Motor: 1/6 HP, 110V single-phase, 2A
- Air flow: 400, 500, 620 CFM
- Timer settings: 2, 4, 6, 8 hours
- MERV rating: MERV-17
- Pre-filter: Nylon mesh screen
- Primary filter: 0.3-Micron, HEPA
- Secondary filter: Activated carbon
- Overall size is 17 1/2" W x 21 1/2" D x 12 1/2" H
- Approx. shipping weight: 36 lbs.

FEATURES:

- Remote-control adjusts speeds, timer, and on/off controls (pdp updated)
- Easy-to-replace filters, no tools required
- Three air flow speeds
- Eye bolts for hanging from the ceiling
- Rubber feet for use on a workbench



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T33150 ONLY \$495

⚠ WARNING! †¹

10" 2 HP HYBRID TABLE SAW 40TH ANNIVERSARY EDITION

- Motor: 2 HP, 120V/240V (prewired for 120V) single-phase, 15A/7.5A
- Rip capacity: 30" right 15" left of blade
- Max. depth of cut @ 90°: 3 1/4"
- Max. depth of cut @ 45°: 2 1/4"
• Table size: 40 1/4" W x 27" D
- Distance from front of table to center of blade: 15 1/2"
- Floor-to-table height: 35 3/4"
- Arbor: 5/8", 3450 RPM
- Max. width of dado: 1 3/16"
- Overall dimensions: 64" W x 40 1/2" D x 36" H
- Approx. shipping weight: 297 lbs.



MADE IN AN ISO 9001 FACTORY

G0962A40 ONLY \$995

⚠ WARNING! †¹

15" 3 HP HEAVY-DUTY PLANER

- Motor: 3 HP, 240V single-phase, 14A
- Max. stock width: 15"
- Max. stock thickness: 8 1/4"
- Min. stock thickness: 1/4"
- Min. stock length: 6 3/8"
- Max. cut depth full width: 1/8"
- Max. cut depth 6" wide: 3/16"
- Cutterhead diameter: 3"
- Cutterhead type: 3-knife
- Knife size, type: 15" x 1" x 1/8", HSS
- Cutterhead speed: 5000 RPM
- Feed rate: 16, 30 FPM
- Table size: 15" x 20 1/8"
- Dust port size: 4"
- Footprint: 20" x 20 1/2"
- Overall dimensions: 32" W x 28" D x 23 1/2" H
- Approx. shipping weight: 388 lbs.



MADE IN AN ISO 9001 FACTORY

G0815 ONLY \$1525

⚠ WARNING! †¹

14" X 37" WOOD LATHE WITH COPY ATTACHMENT

- Motor: 3/4 HP, 110V, single-phase, 11A
- Swing over bed: 14"
- Swing over tool rest base: 12"
- Distance between centers: 37"
- Distance between centers with copy device: 32"
- Spindle speeds: 10, 600–2400 RPM
- Spindle taper: MT#2
- Spindle thread size: 1" x 8 TPI
- Tailstock taper: MT#2
- Tool rest width: 12"
- Tool rest post diameter: 1"
- Overall dimensions: 62" W x 24" D x 48" H
- Approx. shipping weight: 164 lbs.



MADE IN AN ISO 9001 FACTORY

G0842 ONLY \$749

⚠ WARNING! †¹

6" JOINTER 40TH ANNIVERSARY EDITION

- Motor: 1 1/2 HP, 110/220V* (prewired 110V) single-phase, 18A
- Max. width of cut: 6"
- Max. depth of cut: 1/8"
- Max. rabbeting depth: 1/2"
- Min. stock length: 8"
- Cutterhead type: 4-row V-helical, 24 inserts
- Insert size, type: 15mm x 15mm x 2.5mm indexable carbide
- Table size: 7 1/4" x 60"
- Fence size: 29 1/4" L x 4" H
- Overall dimensions: 60" W x 20 1/2" D x 40 1/2" H
- Approx. shipping weight: 307 lbs.



MADE IN AN ISO 9001 FACTORY

G0526A40 ONLY \$1495

⚠ WARNING! †¹

ELECTRIC SAWMILL

- Motor: 2 HP, 110V/220V (prewired for 110V) single-phase, 14A/7A
- Max. log length: 43 5/16"
- Min. log length: 20"
- Max. log diameter: 13"
- Min. log diameter: 4"
- Max. cut width: 13"
- Max. cut thickness: 6 1/2"
- Min. cut thickness: 0.075"
- Max. cut height: 14 1/2"
- Blade size: 84 7/16" x 3/4"
- Blade speed: 2900 FPM
- Track length: 78 1/2"
- Overall dimensions: 44 1/2" W x 79" L x 64" H
- Approx. shipping weight: 585 lbs.

FEATURES:

- Two T33778 Carbide-Embedded Sawmill Blades
- Ceramic blade guides
- Manual lift system raises 0.2" per revolution
- Two adjustable log supports and two log clamps



G0960 ONLY \$2995

⚠ WARNING! †¹

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LEVELING UP

AGAINST WHAT TAPE MEASURE DO WE GAUGE WOODWORKING SKILL?

As I write this, we are preparing for our annual issue-planning process in which we roughly map out a year's worth of content. To keep that content well-balanced over the course of a year, we consider such things as project size and purpose, seasonality, hand/power tool mix, and many more.

One of the criteria that is a bit harder to pin down is skill level.

You see, we label and sort you, dear reader (and therefore our content), into one of three categories: Beginner, Intermediate, and Advanced. And we try to include magazine content in rough proportion to the number in our audience who identify themselves in each of those three categories.

But what is a beginner or intermediate or advanced woodworker? Over the years when we've asked you to self-identify as one of these, we've learned that answers range widely and wildly. We'd hesitate to label a reader who has been woodworking for 30 years a beginner ... until we see a project they've produced that could use some, ahem, help. Likewise, a reader who recently sent me photos of a gorgeous figured-maple pool-cue cabinet claimed that he was a beginner woodworker. (By the powers vested in me by WOOD® magazine, I officially promoted Dan, and ran his cabinet as the opening photo of the March 2023 *Your Projects* column.)

We've debated what else defines the lines between those three labels. What is a milestone that determines that a woodworker has graduated to the next level?

To me, one of those milestones is the purchase of a planer along with a jointer like the benchtop models we review on page 46. These machines add a transformative capability for the advancing woodworker in the form of lumber surfacing.

No longer are you stuck with a limited number of suppliers who deal in fully surfaced lumber, widening your retail options.

No longer are you limited to the selection of species that you find at the big-box store, opening up an entire world of woods.

No longer are you hostage to middleman price markups, granting you savings that you can pour back into your hobby.

I started that same transformation years ago with a jointer that looks very much like some of those in this review. I pushed that thing to its limits, employing it for everything from gift projects to a full room of cabinets—things I wouldn't have been able to accomplish without it. It was surprisingly capable for an “entry-level” tool.

After you read our tool review, send me a note at woodmail@woodmagazine.com. I want to know about a transformational moment in your woodworking journey—a time when you knew you had leveled up. Was it a certain project? A tool purchase? A skill mastered?

Then, get out to the shop and make something.

We'll help. 🌱

Lucas

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WOOD®

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PROVENANCE PROVES POPULAR

I thoroughly enjoyed your take on provenance in *Taking Measure* from issue 286 (December 2022/January 2023) and can say that after 30 years of woodworking, I have learned that gifts are much more meaningful when accompanied by a story.

In 2018, my family made the difficult decision to tear down my grandfather's 118-year-old farmhouse where my father and, later, I grew up. The dairy barn my grandfather built in 1931, the year my father was born, had also fallen into disrepair. I saved much of the barn siding and continue to use it in gifts for my family. My first was this replica of the barn itself to display in the kitchen bay window of my mother's house so she could still "enjoy the view of the barn."

Gerald Pavlik

Big Lake, Minnesota



Thanks, Anthony. The same suggestions that we mentioned in that article for purchasing would be great outlets for disposal: online marketplaces, local woodworking clubs, or yard sales. Reader Evangelist **McGowan** of West Point, New York, reminded us of one we missed: A pawn shop is another excellent way to buy or sell. For donation, search a nearby metro area for a Habitat for Humanity ReStore or a makerspace—a not-for-profit club with interests that range across many subjects, including woodworking.

Lucas Peters

Editor-in-Chief

I enjoyed your article on buying used machinery, but I'm approaching the other end of my woodworking hobby. My hands aren't as steady as they were and it will be time to close shop soon. No one among my friends and family is a woodworker. Outside of a yard sale or eBay, what are some easy ways to dispose of tools? Charities? Schools?

Anthony Spera

via email



Last year, I began accumulating regionally available woods (cedar from Michigan, red oak from Wisconsin, and walnut from Iowa) to turn into serving trays for gifts.

I customized the trays, and the gifts on them, for friends and family who were celebrating or enduring major life events and to match their favorites such as coffee, wine, or popcorn.

Nick Lakari

Crivitz, Wisconsin

TIME-TESTED TEDDY BEAR ROCKER

I built two Teddy Bear Rockers from issue 66 (December 1993), first in 1993 for my nephew, and again nearly 30 years later for my granddaughter. I built both from red oak using a Shopsmith Mark V manufactured in the early 1950s.

John Bonsma

Branchburg, New Jersey



woodmagazine.com



Find the plans and
kit that Tom used
for free at
woodmagazine.com/
tablelamp

THE OG A&C LAMP

Here's my version of the mica-shaded Arts & Crafts lamp from issue 148 (May 2003). I've made numerous projects from your plans, and I was going through my magazine collection to find something new to challenge myself when I saw this lamp. The challenge turned out to be not getting ahead of myself as I worked through the plans. Cutting the angles, checking the dimensions, and correcting a few of my mistakes were all educational experiences.

Tom Rein

Janesville, Wisconsin



Great job, Tom! That is a timeless project. It's so timeless, in fact, that 20 years later I designed the companion floor-standing version on page 38. Get ready for your next challenge.

Kevin Boyle

Senior Design Editor

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● **JAMIE SIMMONS** of Margate, Florida, transformed this unplayable 1885 Lindeman baby grand piano into a stunning bookcase with three shelves and movable hammers. He refinished the body and used the lid to make shelves and supports.

● In 2020, **ROBERT GATCHELL** of Oak Bluffs, Massachusetts, lost his wife of 46 years. Her favorite color was purple, so, to honor her memory, he built this purpleheart urn. All four sides feature raised-panel construction. The urn has a key lock on the front, and the key stores in a recessed compartment in the bottom.



● **GREG CHITWOOD** of Bay City, Texas, built this chess table with hand-carved ball-and-claw feet from African mahogany and maple. "I enjoy working with mahogany since it is soft enough to carve but hard enough to capture the details," he says. After raising the grain with water and sanding to 320 grit, Greg follows up a brushed-on coat of gloss polyurethane with two wiped-on coats, ending with a 600-grit wet sanding.

● **JIM KELLEY** of Cincinnati made this jewelry box for his aunt who lives in Australia. He used burl-figure walnut for the top and bottom along with pin oak for the sides. In order to get the inclusion to align as it wraps around the corner of the box, he cut the sides oversize, offset the corners to match, then recut the sides to finished height.



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.



• **DOUG FINDLEY** of Randle, Washington, was tired of prescription pill sorters with lids that were constantly breaking off. "So I made one that will last at least as long as I do," he says. Doug made one drawer of black walnut for evening medications and one of maple for morning medications.



• Pickleball is trendy at the local fitness center frequented by **DAVID DZIERSKI** of Houston. He decided to construct his own custom racket from teak that conforms to the official pickleball equipment standard specifications.



• When his daughter asked **MICHAEL PAVIA** of Monroe, Connecticut, to build a desk for her family's new home, she wanted something functional but heirloom-quality. Michael's solution: this gorgeous cherry drop-front desk with dovetail joinery. The bottom drawer hides a contemporary hanging file behind a doubled false drawer front to maintain the traditional look. 🌳



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To Learn More



NO POWER? NO PROBLEM!

This solar-powered shop breaks the mold when it comes to judicious use of power and workspace.

WRITER: RANDY MAXEY

Energy from the roof-mounted solar panels keeps the battery charged which, in turn, feeds the inverter that ultimately provides 120-volt AC current.



After spending the day at his optometry practice, Lee likes to relax in his workshop planning and building projects.



SHOW US YOUR SHOP

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

Lee Shuwarger's 60 sq. ft. shop in Colorado is, by necessity, the model of efficiency. The small space requires Lee to think through the workflow of a project from start to finish. More importantly, his shop requires him to carefully consider tool choices and usage because it doesn't use electricity from the power grid.

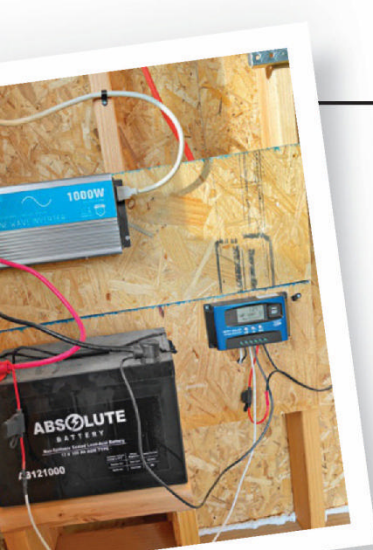
The shop occupies a concrete slab that originally supported a greenhouse, so the size of his shop was limited by the area of the slab. Lee framed the walls and roof himself, sheathing the exterior with T1-11 siding. In the temperate Colorado climate, Lee saved on construction costs by omitting insulation.

With no electrical power run to the shop, Lee designed and installed a system that generates electricity from the sun. Two 150-watt, 12-volt panels on the roof paired with a 100-amp, 12-volt deep-cycle battery make up the heart of the solar-energy system. A 120-volt inverter connected to the battery supplies a conventional power strip.

Almost all of Lee's tools rely on battery power. These include a 40-volt tablesaw and an 18-volt miter saw he stores in his garage to save space. When he's done for the day, he plugs the batteries into a charger that hangs beside the window, near the power inverter. The noticeable

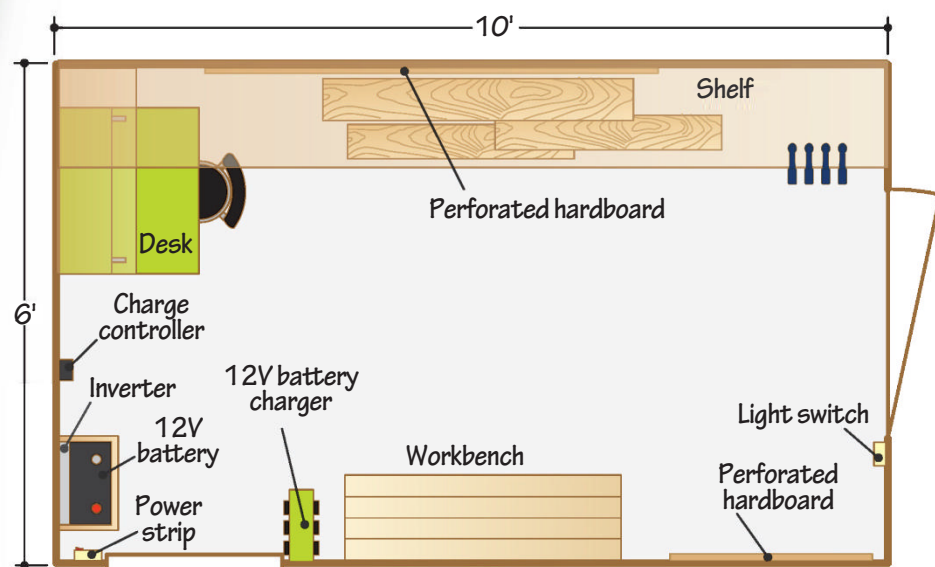


PHOTOGRAPHER: LEE SHUWARGER;
ILLUSTRATORS: ROXANNE LEMOINE, LORNA JOHNSON



lack of a bandsaw and drill press has never been a hindrance to building projects. “The tools I do have are perfect for what I need,” he says.

The only three AC-powered devices include the battery charger for the cordless tools, a Bluetooth speaker, and a 5000-BTU air conditioner. Lee says he has never depleted the 12-volt storage battery.



The cozy workspace fulfills all Lee’s woodworking needs, proving that it’s not the size of the space that matters—it’s how you use it.



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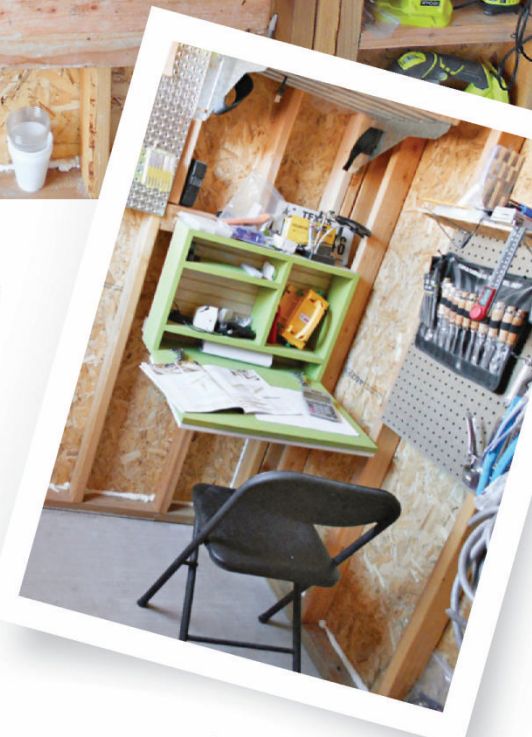
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YOUR SHOP



A benchtop on folding brackets shares wall space with the collection of cordless tools neatly organized in the stud cavities.



The main source of light comes from 12-volt flood lamps and an LED rope light strung across the rafters. A single window and the open door contribute some natural light.

Lee's knack for efficiency carries over into storage space and work areas. For example, the wall framing creates nooks and crannies for his collection of battery-powered tools.

A small cabinet with a drop-front door sits in one corner to serve as a desk where Lee can work on plans for his projects. He also installed a fold-up workbench made from 2-by material. When it's not needed, the bench folds neatly against the wall, saving precious floor space.

The wall adjacent to the desk houses a lumber rack. Below the lumber rack, a pegboard panel keeps a variety of tools and accessories at hand. Larger pieces, like sheet goods, reside outside the shed, stored along the back wall.

Lee is perfectly satisfied with his tiny workshop. It allows him to combine his two hobbies of woodworking and solar energy. 🌱

▲ The drop-front desk cabinet provides a quiet spot for Lee to contemplate his next project. Pegboard panels provide flexibility for keeping tools and accessories at hand.

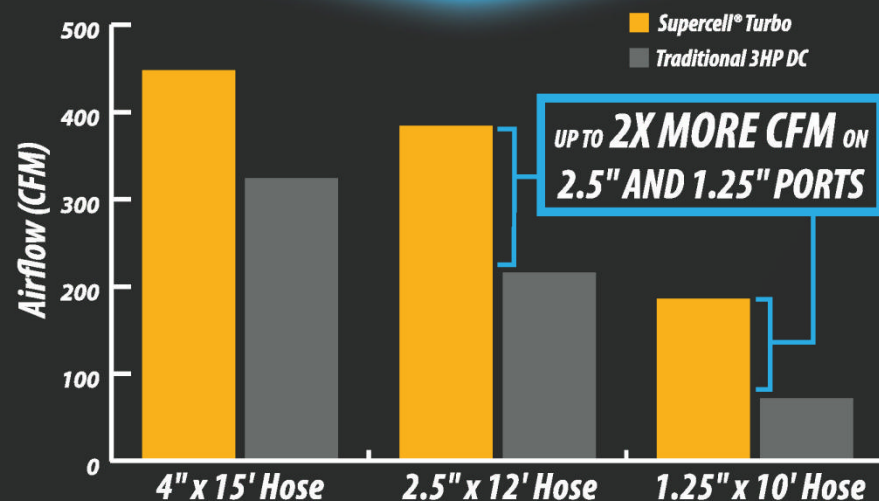


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Q: THE ALPHABET SOUP OF TOOL STEEL

I see various references to the steels used in woodworking tools such as O1, A2, etc. Is there a decoder ring that can help me figure out what these designations mean and which type is best?

Bud Pierce
Jamul, California

A: Tool steel, also known as high-carbon steel, is a generic term used to describe steel alloyed with 0.5% to 1.5% carbon. The addition of carbon allows the steel to be hardened so that it will better hold an edge. Tool steels may also contain small amounts of other alloying elements, such as vanadium, chromium, manganese, or molybdenum. These elements impart different properties such as increased hardness, greater toughness (making the metal less brittle), or more resistance to abrasion or rust.

O1, A2, D2, PM-V11, and M2 are the tool steels most commonly encountered by woodworkers. There really is no “best” here; each steel type has slightly different properties and what works in one application may not work as well in another.

O1 is one of the most basic tool steels, containing only carbon and manganese as its major alloying elements. The “O” in O1 stands for oil-hardening. This steel is hardened by heating to red hot and then quenching in oil. Oil quenches the steel more slowly than water, reducing the chance of cracks forming in the steel from thermal shock. O1 steel sharpens relatively easily and takes an extremely keen edge. On the downside, O1 steel doesn’t hold its edge as long as some of the other alloys.

A2 steel hardens in air (which is what the “A” stands for). Containing molybdenum as well as up to 5% chromium, A2 steel is tougher and more resistant to abrasion than O1 steel, so it holds an edge longer. This edge retention ability makes it a preferred choice for many woodworkers, particularly if you combine hand-tool work with a lot of dense hardwoods. The trade-off with A2 steel is that it takes longer to sharpen and it can’t be sharpened to as keen an edge as O1 steel.

D2 steel, which you’ll encounter less frequently, can be hardened in oil or air and contains 12% chromium. This high percentage of chromium gives the steel some rust-resistant properties. D2 steel resists wear and abrasion better than A2 or O1, but is not as tough as either. Increased wear-resistance makes D2 is more difficult to sharpen than O1 or A2 steel.

O1, A2, and D2 steel are made in traditional ways by melting and mixing various alloys. Powdered metal alloys use a different process where the melted metal is atomized into tiny powder-like particles. The particles are screened then fused into a billet using heat and pressure. Lee Valley uses a form of powdered metal known as PM-V11 to make many of their plane irons and chisels. The advantage of PM-V11 is that it has better edge-holding ability than O1 steel and sharpens faster than A2 or D2.

All of these steels are used for chisels, plane irons, and other woodworking hand tools. But for powered cutting tools, you’re likely to encounter a subset of tool steel known as high-speed steel. High-speed steel contains alloys that allow edge retention even at high temperatures. This makes it a good choice for powered cutting tools where the cutting edge is subjected to high heat from friction. M2 high-speed steel is one of the most common types and is used for drill bits, planer and jointer knives, lathe tools, and jigsaw and reciprocating saw blades. More often though, high-speed steel is listed without any letter or number designation. 🌱



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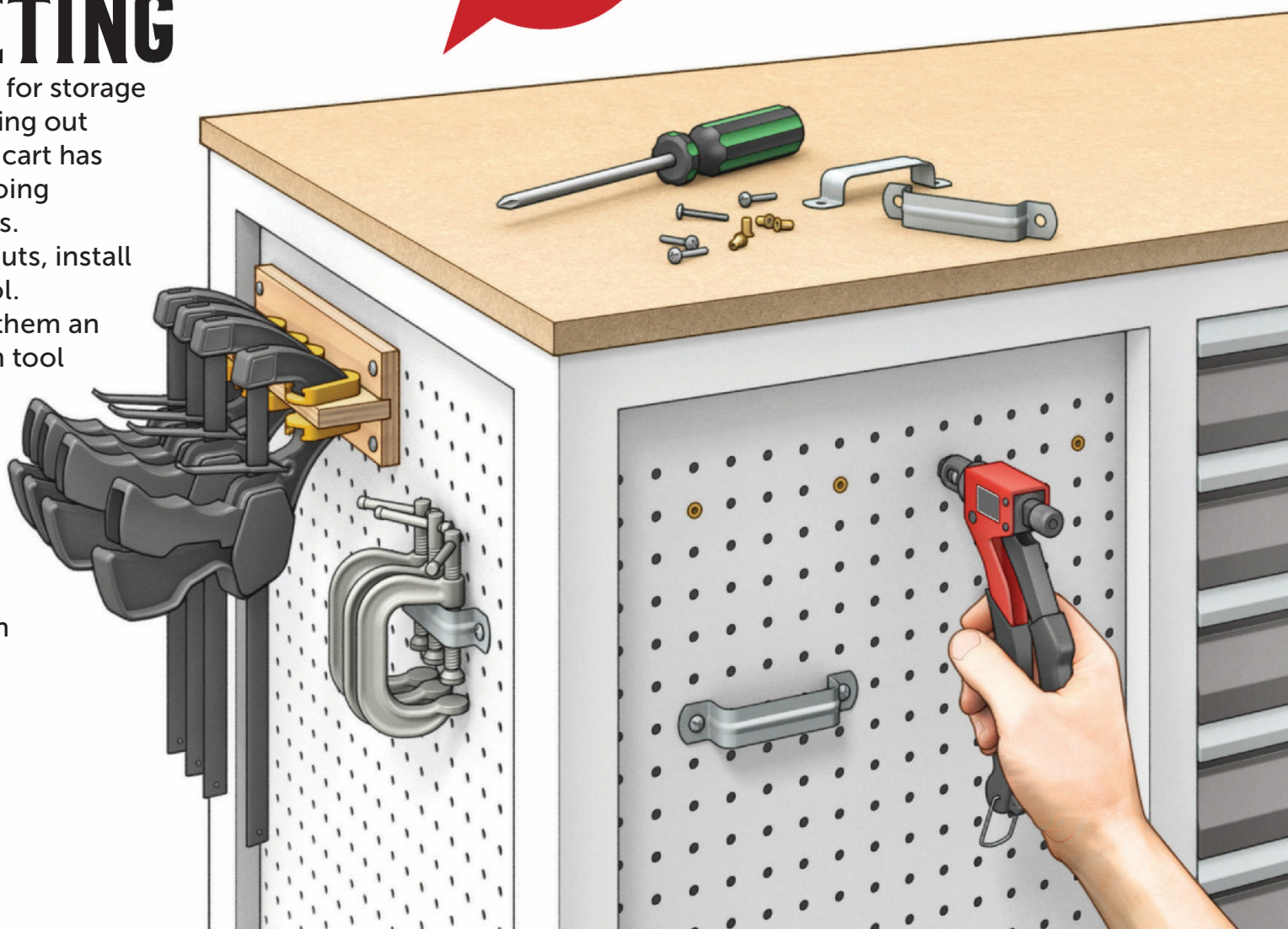
GO NUTS OVER STORAGE THAT'S SIMPLY RIVETING

I was never fond of using pegboard for storage because the hooks were always falling out when I removed a tool. My toolbox cart has three pegboard panels that were going unused. Then I thought of rivet nuts.

Rivet nuts, sometimes called rivnuts, install like a rivet using an inexpensive tool. Internal threads in the rivets make them an ideal solution for mounting custom tool racks to pegboard.

I found that metric M4x0.7 rivnuts are perfectly sized for standard pegboard. To mount custom tool racks made from 3/4"-thick material, M4x0.7x30 machine screws are ideal. Rivnuts provide a secure and flexible option for storing tools and accessories.

Nathan Walters
Anchorage, Alaska



For his tip, ▶
Nathan wins a
Leigh Super24
dovetail jig
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ILLUSTRATOR: CHRISTOPHER MILLS

THESE SLIDING RULES RULE

Getting an accurate dimension for an inside measurement is best done with a pair of measuring sticks. Two sticks slide over each another and lock in place with a clamping mechanism.

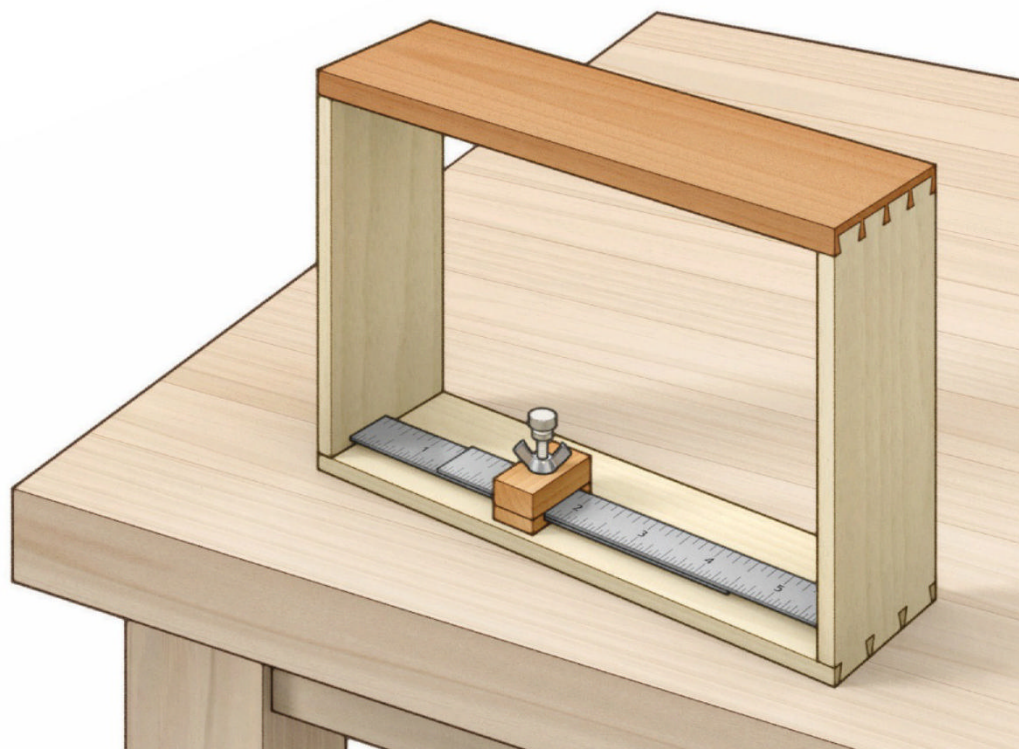
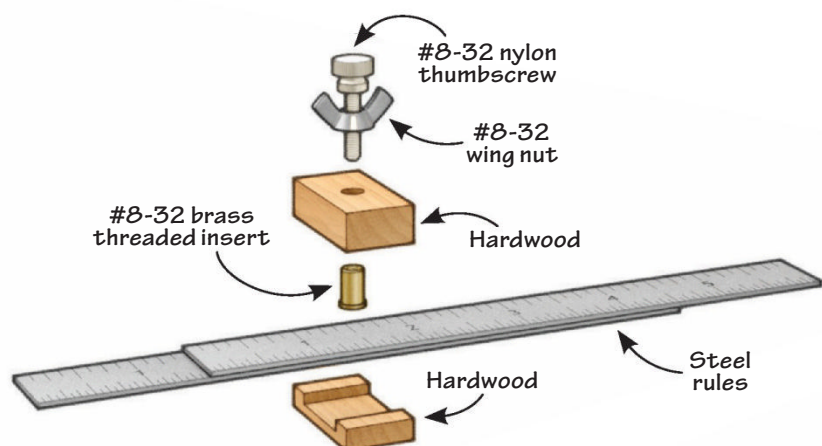
I made a set of measuring sticks from a pair of 6" steel rules and a shop-made clamp. The clamp starts with two pieces of hardwood. I cut a shallow dado in the bottom portion of the clamp with a depth equal to the thickness of the rules stacked.

The top portion of the clamp contains a #8-32 nylon knurled-head thumbscrew, wing nut, and brass threaded insert as shown. With these in place, I glued the two wood parts together.

The nylon screw clamps the rules together without marring them. The wing nut locks the screw in place. These measuring sticks proved so useful for tasks like taking internal measurements, transferring lengths of project parts, and squaring boxes and cases that I made others using 12" and 18" steel rules.

Steven Pietrowicz

Cresco, Pennsylvania



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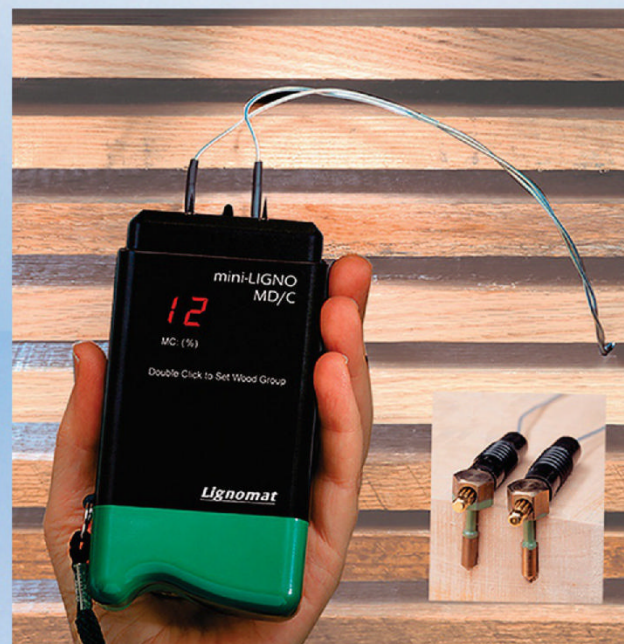


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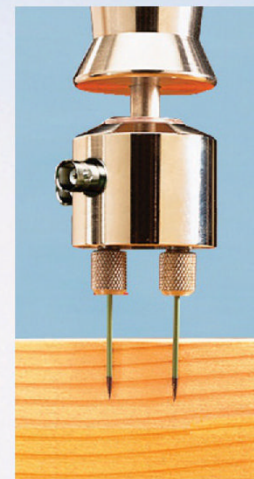
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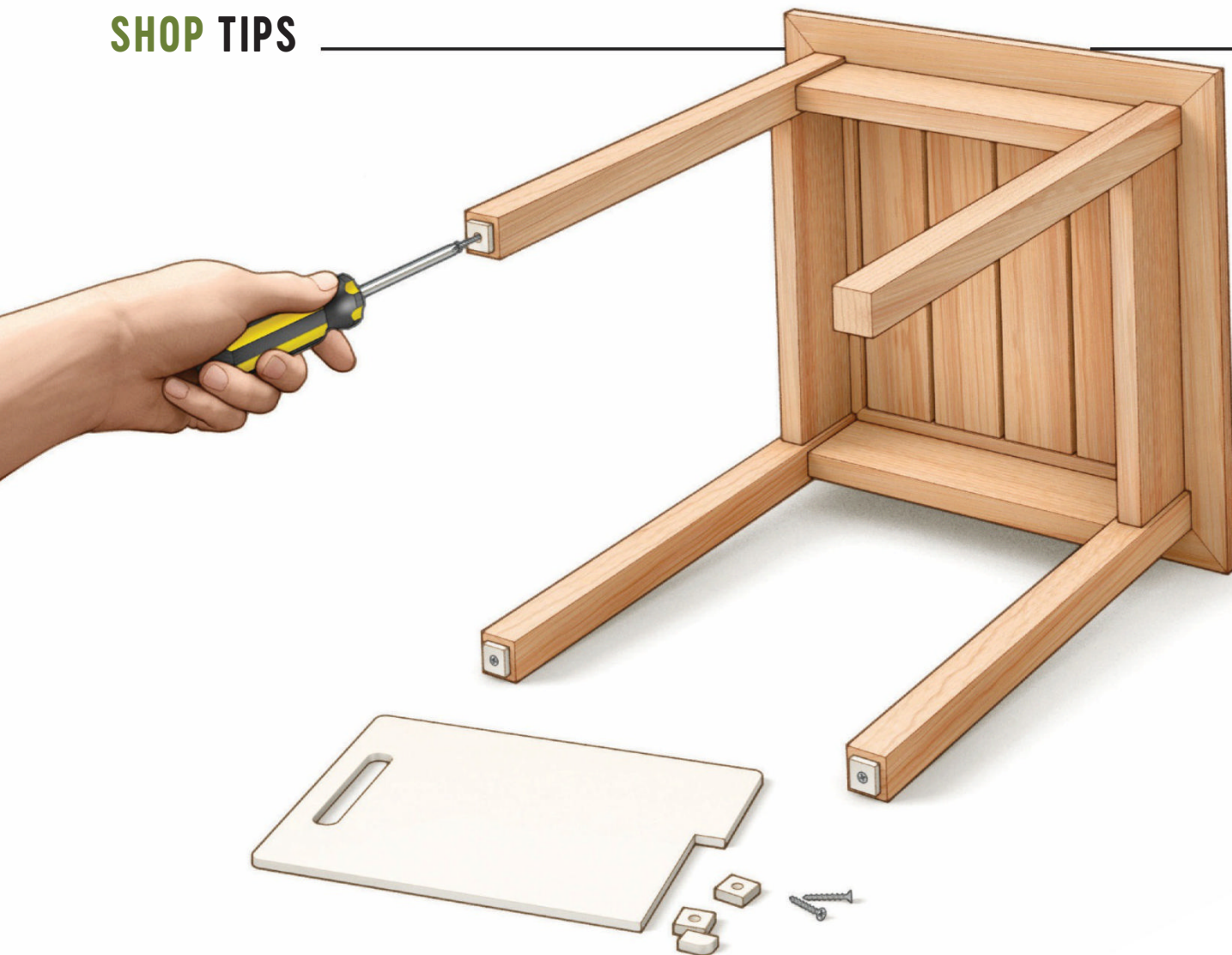
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BOARD UP YOUR LEGS

No matter what exterior finish I use on outdoor tables and chairs, the legs' end grain wicks up moisture from wet ground or decking. And if the furniture sits on concrete, the rough surface damages the finish, if not the wood.

To elevate the wood off the surface, away from moisture and wear, I made feet from an old plastic cutting board. I simply drilled a countersunk hole in each foot and fastened them to the legs with exterior-rated wood screws. As an unexpected benefit, the hard plastic acts as glides, making heavier items easier to move.

Ken Erickson

West Richland, Washington

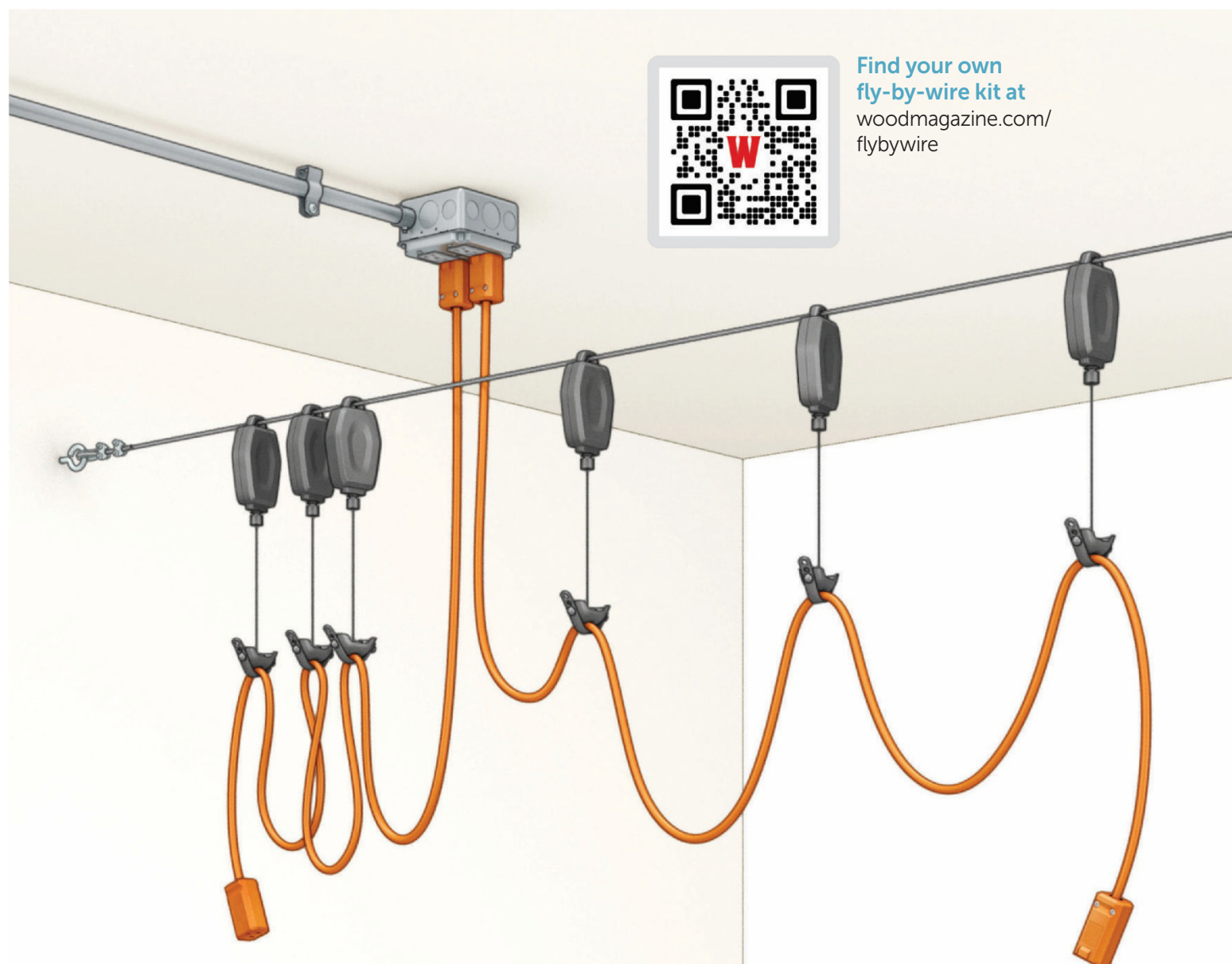
FLY BY WIRE

Tired of tripping over extension cords, I looked upward for guidance. I found a cable management system designed for virtual-reality gamers. It consists of a number of small cord reels, each with a retractable cable and rubber-coated cord clamp.

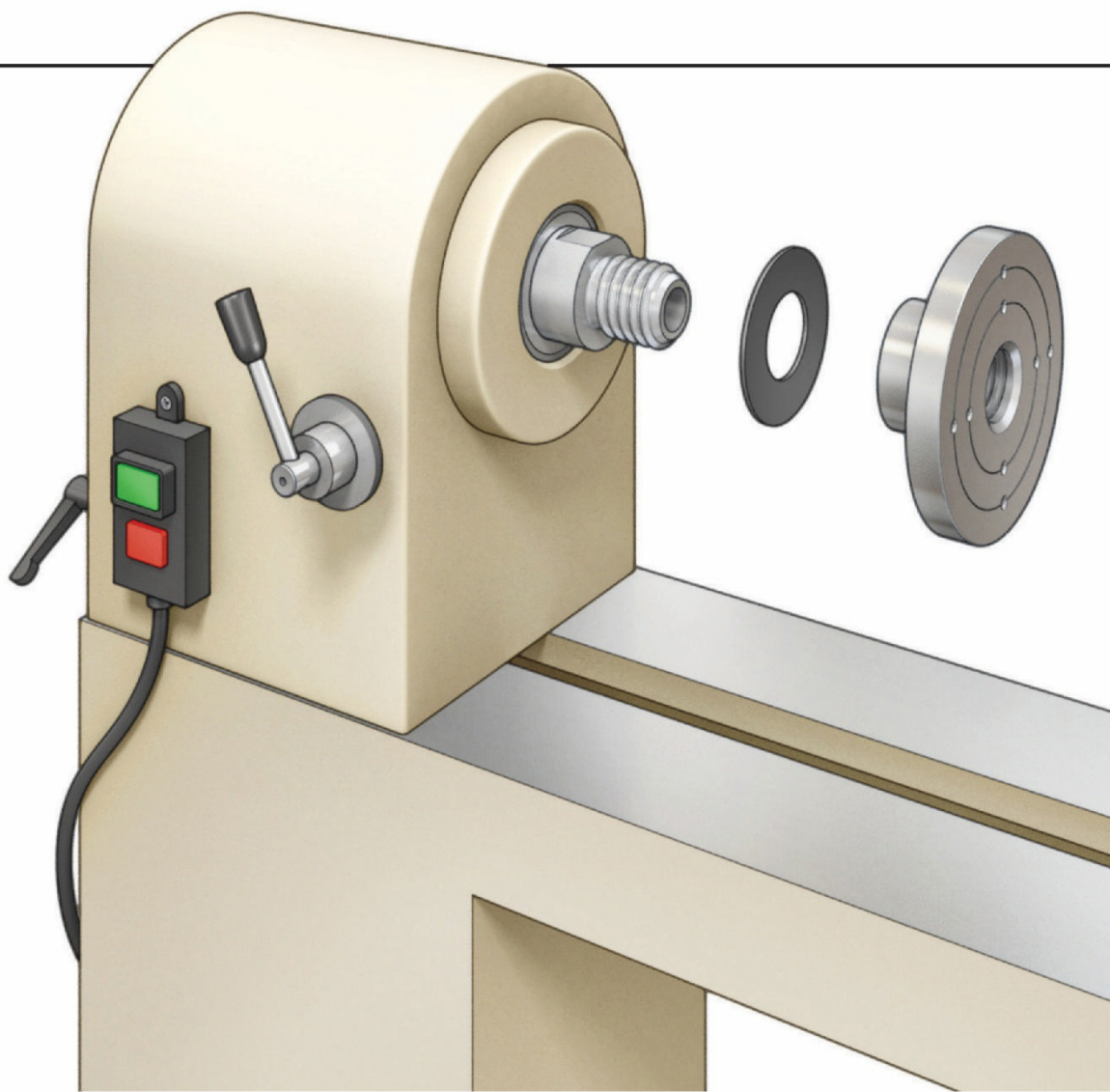
I strung a steel cable across the ceiling, threading it through the cable management devices before tightening and securing it to wall studs. I installed the extension cords using the clamps, plugging them into ceiling-mounted receptacles. Now I simply reach up when I need electrical power for a tool.

Dermot McCaul

Doylestown, Pennsylvania



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TAKE A TURN WITH THIS GO-BETWEEN

I use a faceplate or lathe chuck often when turning projects on my lathe. When it comes time to remove them, however, they can be difficult to twist off.

To solve this problem, I cut a shim from the lid of a plastic container. It fits over the spindle of the lathe before I attach the faceplate or chuck. The shim provides enough friction to secure the attachment yet makes removal easy.

Robert Bernhardt

North Conway, New Hampshire

WHEN IT COMES TO BLOWS

A dead-blow hammer is one of the most useful tools in the workshop, but sometimes they're too large for delicate tasks. Make your own downsized version using commonly available parts.

Start by inserting a Champagne cork into each side of a 1/2" PVC tee fitting. You might need to sand the corks to fit. Fill the tee fitting with BBs, leaving some air space to allow the BBs to move when using the hammer. I made handles from a discarded broomstick, but a 3/4" dowel works as well. File or turn grooves on the handle for added grip. Apply epoxy then insert the handle into the tee, making sure it fits tightly. For added insurance, install a small screw or finish nail to secure the handle. 🌲

Bob Irwin

North Conway, New Hampshire



SCULPTED BENCH

Gentle curves add comfort and make this seat a stunner. Just as stunning? The simple technique used to shape the seat.

WRITER: ZACH BROWN
DESIGNER/BUILDER: JOHN OLSON

OVERALL DIMENSIONS
72"W x 15³/₄"D x 17"H

WOOD magazine | July 2023

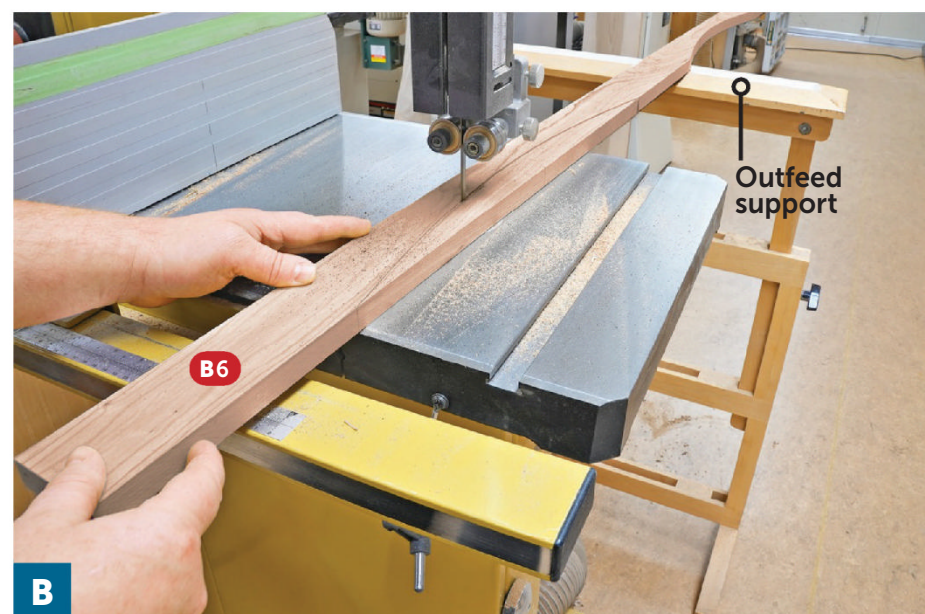
Shaping a dished seat from solid wood is usually a time-consuming task requiring special tools. This bench takes a different approach, because you'll bevel-cut the dished portion of each seat rail prior to assembly. And it's easier than it looks. We'll show you how.

START WITH THE SEAT

- 1 Cut the legs and seat rails (A, B) to size [Materials List], but don't miter the ends yet. Arrange the seat rails on your benchtop and number them 1-11 to keep them in order as you cut the seat curves.
- 2 Lay out the curves on the center seat rail (6) [Drawing 1, Photo A], then cut it to shape at the bandsaw [Photo B].
- 3 Trace the center seat rail curves onto the adjacent rails (5 and 7) [Photo C].

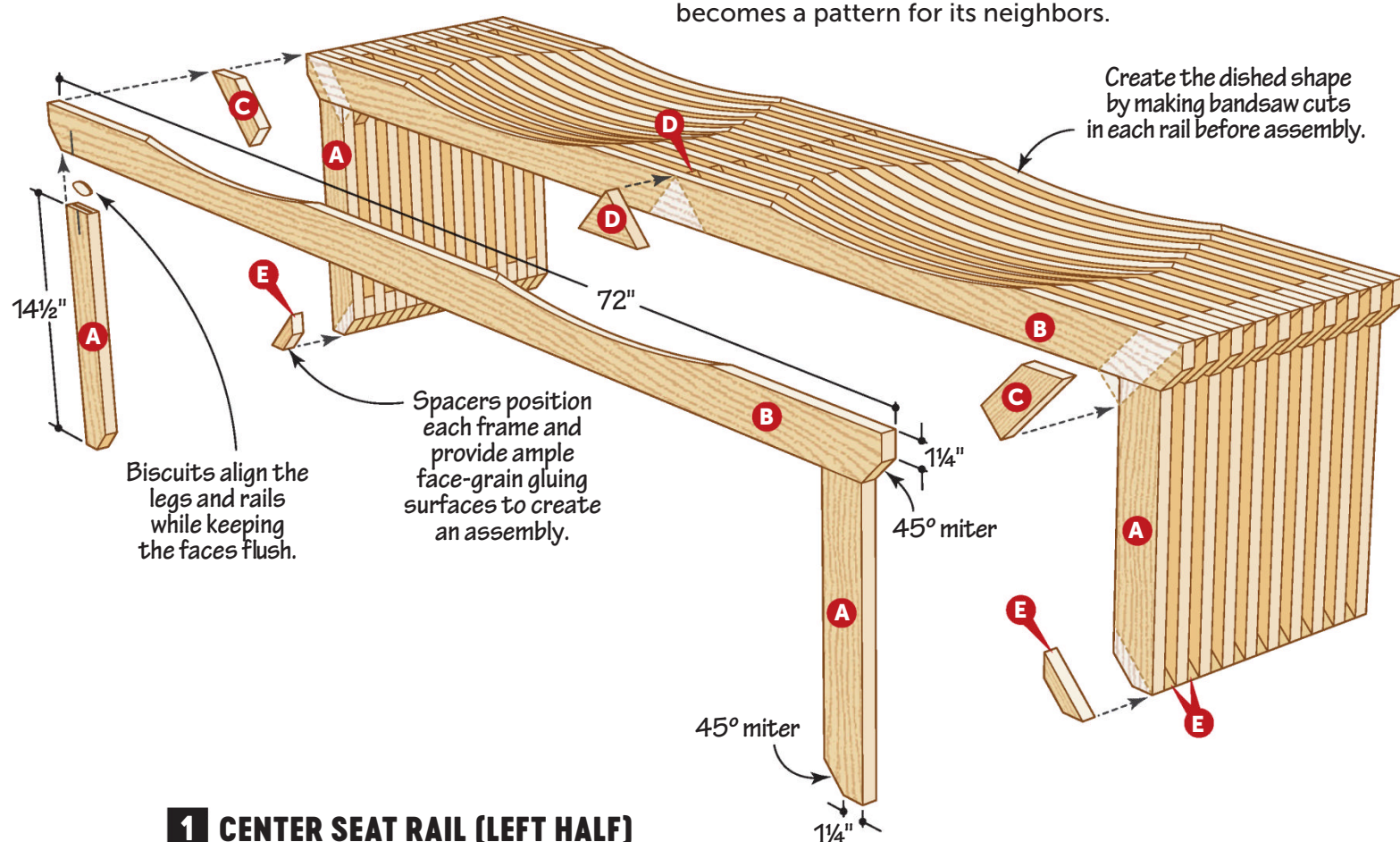


After marking reference points for both seat cutouts on the center seat rail (B), connect the dots by tracing along a fairing stick or steel ruler flexed in a clamp.

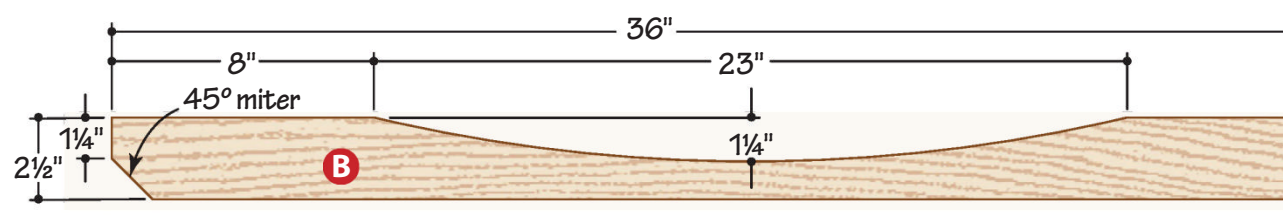


Set up an outfeed support and take your time as you cut the curves in the seat rails (B), because each cut piece becomes a pattern for its neighbors.

EXPLODED VIEW



1 CENTER SEAT RAIL (LEFT HALF)





C Align the ends of seat rail B6 with seat rail B5 and trace the cutouts. Then align B6 with B7 and trace again.

4 Tilt the bandsaw table to 10° and cut the curves in rails 5 and 7 (see *The Dish on Shaping Seat Rails*, below). Continue tracing and cutting the remaining seat rails, working your way from the center outward.

5 Once you've cut all 11 rails to shape, clamp them together and sand the sawn edges smooth [Photo D].



D Remove the saw marks with an orbital sander and 80-grit sandpaper, then sand up to 220 grit. We sanded the last few grits by hand.

BUILD THE FRAMES

1 Miter-cut both ends of the seat rails (B) and the bottom end of each leg (A) [Exploded View, Drawing 1].

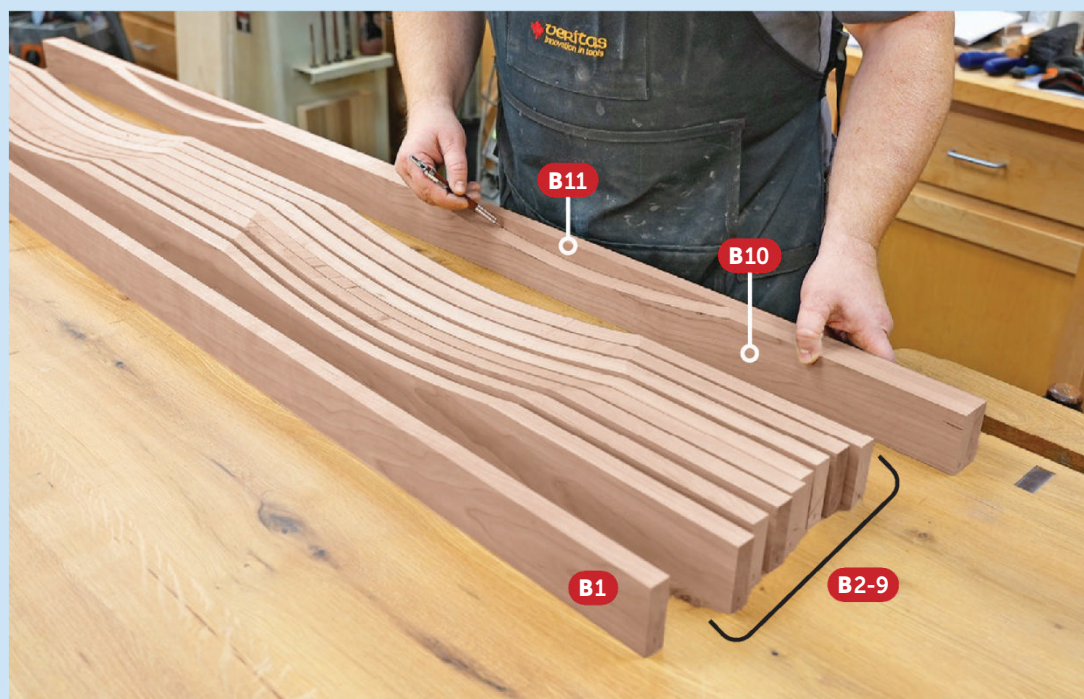
2 To mark the biscuit locations, add a line at the top (unmitered) end of each leg, centered on the face. Align the outside edge of each leg with the corner of the miter on a seat rail and transfer the leg

THE DISH ON SHAPING SEAT RAILS

Creating this dished seat requires cutting beveled curves in each rail that get progressively shallower as you work outward from the center. That sounds complicated, but we made the process easy.

With your bandsaw table at 90°, start by cutting the basic curve on the center rail (6). This establishes the deepest and widest points of the dished seat. Trace those curves onto the adjacent rails (5 and 7). Before you cut those (and all of the remaining seat rails), tilt your bandsaw table by 10°. Cut the curves and you'll see that the face of the rail you marked matches your traced line, but the curve on the other face is shallower. Use that shallower face to trace the next rail and cut on that line to again create a matching, but shallower, curve. Repeat the process as you work your way outward.

Be sure to keep all the rails in order and keep the ends flush as you trace, and you'll quickly have a dished seat that needs only sanding to complete.



line to the rail [Exploded View]. Cut slots for #10 biscuits at these marks in the bottom edge of the seat rails and top end of the legs.

3 While checking for square, glue and clamp the legs to the seat rails, using biscuits to keep them flush. Finish-sand the assemblies after the glue dries and lightly break the edges.

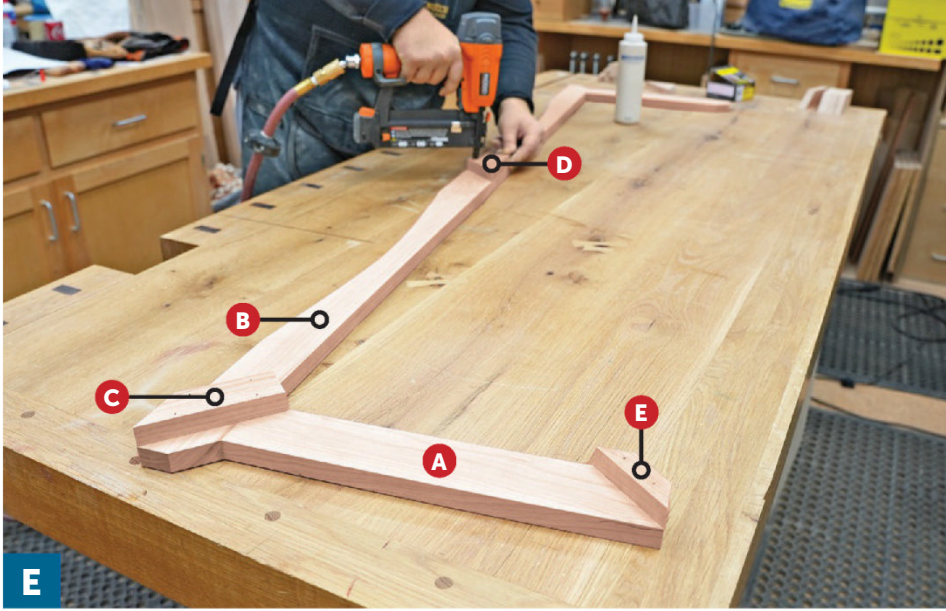
4 Cut the corner, center, and bottom spacers (C–E) to size and shape [Drawing 2]. Glue and nail them to 10 of the 11 frame assemblies [Exploded View, Photo E].

FINAL ASSEMBLY AND FINISHING

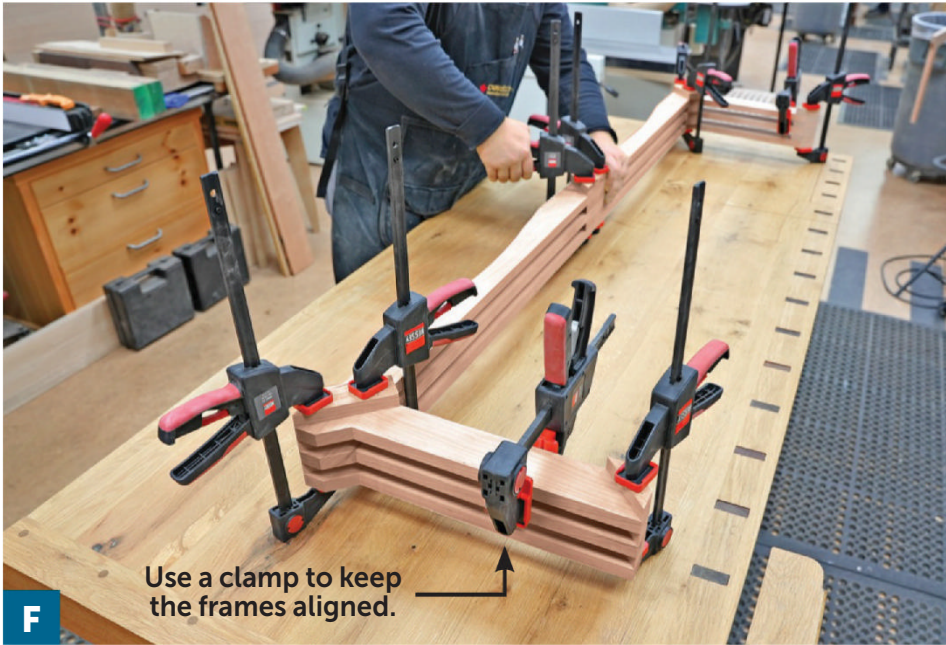
1 Glue and clamp together the frame/ spacer assemblies [Exploded View, Photo F].

2 Once the glue dries, finish-sand the bench and apply a finish. We wiped on three coats of Danish oil, buffing between coats with fine steel wool. Work from above and below to maximize your reach between rails.

3 Place the bench in your entryway, and it's sure to invite curious guests to take a seat. 🌳



Use 1¼"x18-gauge brad nails to hold the spacers (C–E) in place while the glue dries.

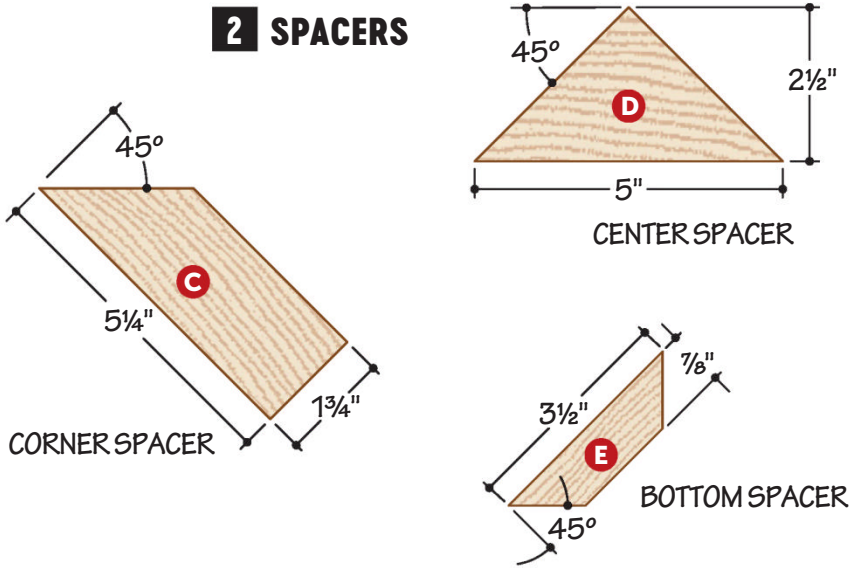


Use thin coats of glue to avoid excessive squeeze-out in the hard-to-reach surfaces between the frames.

MATERIALS LIST

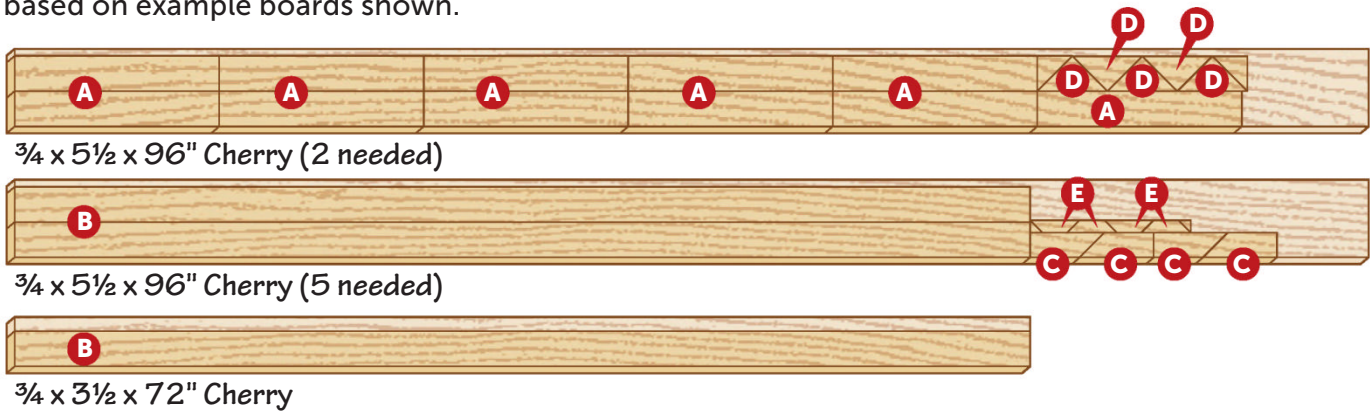
PART		FINISHED SIZE			Matl.	Qty.
		T	W	L		
A	LEGS	¾"	2½"	14½"	C	22
B	SEAT RAILS	¾"	2½"	72"	C	11
C	CORNER SPACERS	¾"	1¾"	5¼"	C	20
D	CENTER SPACERS	¾"	2½"	5"	C	10
E	BOTTOM SPACERS	¾"	7⁄8"	3½"	C	20

MATERIALS KEY: C–cherry.
SUPPLIES: #10 biscuits, 1¼"x18-gauge brad nails.
PROJECT COST: It cost us about \$200 to build this project. Your cost will vary by region and source.



CUTTING DIAGRAM

This project requires 30 board feet of 4/4 cherry based on example boards shown.



4 WAYS TO ATTACH TABLETOPS

Choosing one of these time-tested attachment methods will keep your tables from flipping their lids.

WRITER: VINCE ANCONA

When joining parts or assemblies in woodworking, the goal usually is to join the parts so securely that they won't work loose or come undone. But when attaching a tabletop, you're faced with two competing objectives – attaching the top securely, while allowing it to expand

and contract with seasonal changes in humidity levels. While this may seem contradictory, there are more ways than one to deal with this conundrum. Here are four methods we commonly use for fastening a solid-wood tabletop. We know one or more will serve you well.

TIP!

When attaching figure-eight connectors, drive the screws tight then back them out a quarter turn or so to allow the connectors to move.



After drilling the mortise with a Forstner bit, form it into a "U" shape by trimming off the points with a chisel. This gives the connector room to pivot in the mortise.

FIGURE-EIGHT CONNECTORS

Figure-eight connectors pivot in shallow, round mortises in the aprons at the ends of the table. As the tabletop expands and contracts, the connectors move with it. Figure-eight connectors are more discrete than wood blocks (*right*) or Z-shape clips (*next page*) and they don't require apron grooves. They can even be installed facing outward from the aprons, allowing you to attach a top to an enclosed base or cabinet without having to reach inside.

To make the circular mortises for figure-eight connectors, select a Forstner bit slightly larger than the diameter of the connector. Lay out the mortises on the top edge of the aprons, spacing them 12" to 18" apart. Drill the mortises just a hair deeper than the thickness of the connector. Check the fit by placing one of the connectors into the mortise. If it stands proud of the apron, drill the mortise a little deeper until the connector sits flush or slightly below the edge of the apron.

Using the centerpoint left behind by the Forstner bit, drill a pilot hole for the mounting screw. Then open up the inside edge of the mortise (*above*) and attach the connector to the apron. With the tabletop facedown, center the base on the top and use the holes in the connectors to mark the mounting screw locations. Remove the base and drill pilot holes for the screws, using a depth stop. Then reposition the base and screw the connectors to the underside of the tabletop. (Figure-Eight Connectors, Lee Valley 13K0150, leevalley.com, \$3.80 for pack of 20.)



Buttons holding the end aprons keep the top from cupping or shifting end-to-end while remaining free to slide in the grooves with side-to-side seasonal movement.

Slots in the side buttons allow the screw to slide past with seasonal movement.

WOOD BUTTONS

For a shop-made solution that accommodates tabletop wood movement, use wood buttons. A tongue on the end of the button fits into a groove in the apron of the table. This method has the benefit of being inexpensive—all you need are a few screws and some scrap wood to make the buttons. It's also a more appropriate method to use on period pieces. But it does require more time than using the button's hardware-store counterpart, the Z-shape clip, *page 27*.

To make buttons with strong tongues, start by rabbeting the end of a wide board, then crosscutting a blank from the rabbeted end to match the length of the buttons. Repeat this process as many times as needed until you have enough blanks for all the buttons you need. Rip the individual buttons from the blanks, sizing them according to the scale of your project (usually 1½" to 2" wide). Create a slot in each button by drilling overlapping holes using a brad-point bit slightly larger than your mounting screws. Smooth the edges of the slot with a chisel or small file.

To install the buttons, cut a groove on the inside face of the table aprons sized to match the tongues on the blocks. Lay the tabletop facedown and center the base assembly on the top. Then attach the buttons (*above*).

SLOTTED STRETCHERS

Incorporate allowance for wood movement into the design of the table by adding stretchers with expansion slots between the side aprons. Drill a standard hole for a mounting screw in the center of the stretcher and a $\frac{1}{2}$ "-long expansion slot near each end as we did with the wood buttons (*previous page*).

Attach the stretchers to the aprons using biscuits or pocket screws. Center the completed apron/base assembly on the underside of the tabletop and screw the top in place (*below*). Or, in place of stretchers, attach individual slotted blocks to the long aprons (*inset below*).

Drive a screw through the center hole in each stretcher and snug it down. Then drive a roundhead screw (with a washer) through each slotted hole, leaving the screw slightly loose.



TIP!

As an alternative to stretchers, attach individual blocks to the long aprons. Drill $\frac{1}{2}$ " slots, and then attach the tabletop using screws centered in the length of the slots.

Z-shape clips work great for solid-wood or plywood tops, like this one, where they can be used on the edges and ends. Place clips at the ends only on a solid-wood top.



Place the Z-shape clip on a flat surface and use a steel rule to measure to the underside of the opposite end.

Insert the Z-shape clips in the grooves in the aprons, placing one clip every 8" to 10".



Z-SHAPE CLIPS

In terms of ease, speed, and convenience, nothing beats Z-shape clips for attaching a tabletop. One end of the clip fits into a kerf cut on the inside face of the table aprons and the other end is screwed to the underside of the tabletop.

To use Z-shape clips, measure the height of the clip to determine the location of the kerf on the apron (*above*). Then, using a tablesaw, router, or biscuit jointer, cut a groove on the inside face of the aprons, at the correct distance from the top edge to match your clips, before assembling the base.

To install the clips, place the tabletop facedown on your bench, then position the assembled base on the top. Mark the location of the screw holes through the clips and drill pilot holes for the screws, using a depth stop to avoid drilling through the tabletop. (Tabletop Fasteners, Rockler 34215, rockler.com, \$4.99 for pack of 8.) 🌲



SMALL-SHOP ASSEMBLY TABLE

Add efficiency and purpose to your project builds with this dedicated assembly table. An ample worksurface, loads of storage, and custom racks for drills and clamps make this compact mobile center a must-have for any shop.

WRITER: BRYAN NELSON
PROJECT DESIGNER: KEVIN BOYLE
BUILDER: BRIAN BERGSTROM



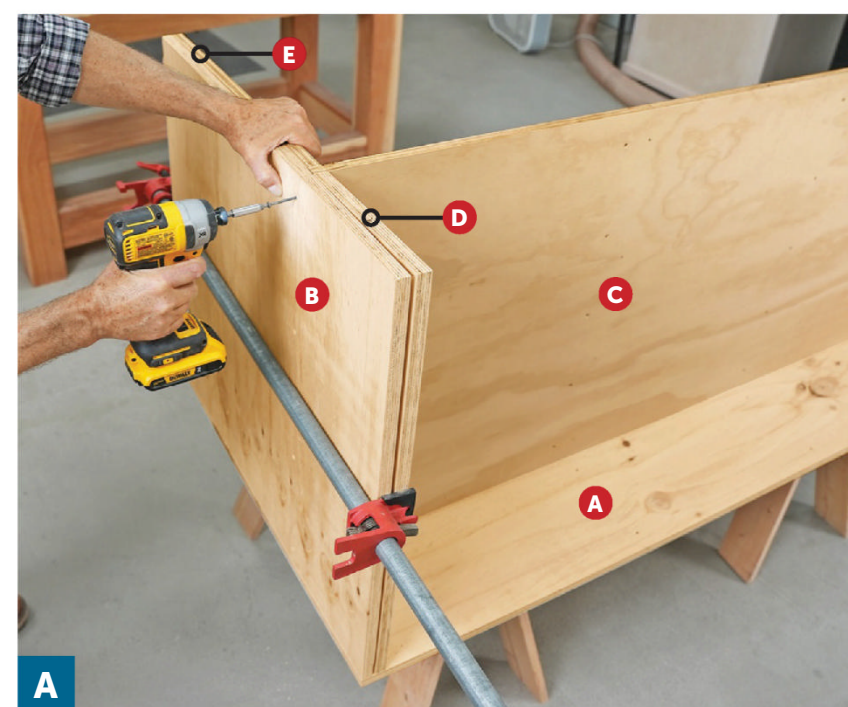
Does assembling a project often involve clearing off your workbench or slapping a piece of plywood onto a pair of sawhorses? Well, check out this dedicated assembly table. It offers enough square footage on the top for just about any project build. With drawers, shelves, and customized tool racks, this setup also stores everything you need for assembling a project close at hand. Plus, it's mobile, so you can set it up anywhere for use and tuck it out of the way when you're done.

This assembly table makes a super companion to the tablesaw/router table station and outfeed table in issue 288 (May 2023). If you haven't built them already, get started! All three will add versatility to any shop.

BUILD A BIG CASE

The actual thickness of plywood is often less than its stated value, so measure yours and account for this as you build, cutting parts to fit as you go.

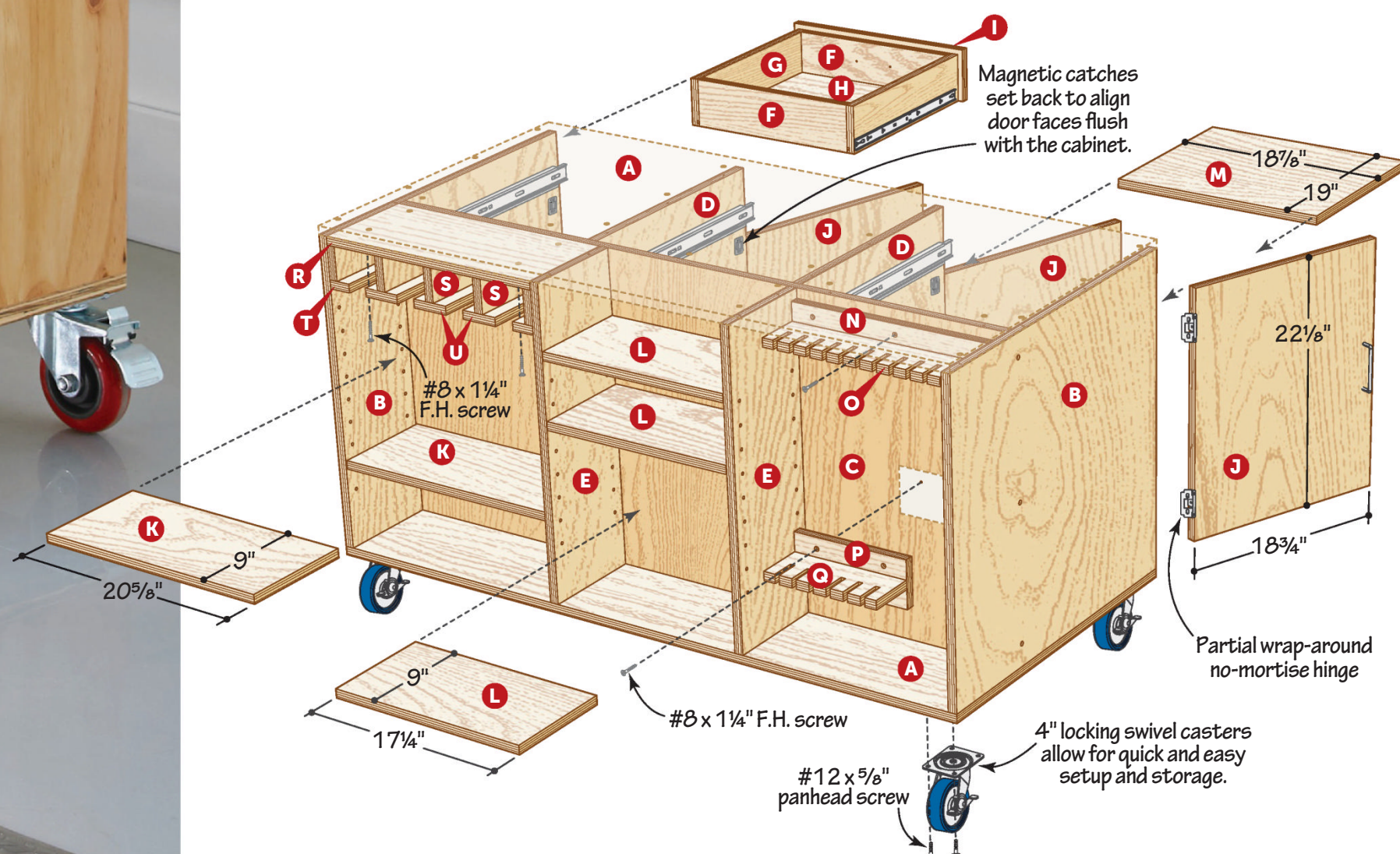
1 Cut the top/bottom (A), ends (B), and dividers (C, D, E) to size [Materials List, Drawing 1]. Drill shelf-pin holes in the ends and dividers [Drawing 1a], then finish-sand all the parts.



A clamp on the end (B) temporarily brackets the wide (D) and narrow (E) dividers. Use them to position the center divider (C) as you glue and screw it into place. Repeat with the opposite end.

2 Glue and screw the ends to the center divider [Photo A]. Then glue and screw the top and bottom (A) to the assembly, checking for flush edges all around the assembly.

EXPLODED VIEW



OVERALL DIMENSIONS
60"W x 30"D x 34 1/4"H (without vise)

3 Glue and screw the wide dividers (D) into place, checking for square, then repeat with the narrow dividers (E) [Drawing 1].

4 Finish-sand as needed, then apply a finish. We applied three coats of a satin polyurethane, a great choice for shop projects. Once the finish dries, flip the cabinet over and attach the casters [Exploded View].

MOVE ON TO STORAGE

1 Cut the drawer fronts/back (F) and the sides (G) to size [Drawing 2]. Then cut grooves for the drawer bottoms in all the parts.

2 Drill the pocket holes in the drawer fronts/back. Dry-assemble a drawer and cut the drawer bottoms (H) to fit in the grooves. Disassemble and then finish-sand all the drawer parts.

3 Glue and screw the drawers together while checking for square. Apply finish to all the drawers. Cut the false fronts (I) to size and set them aside.

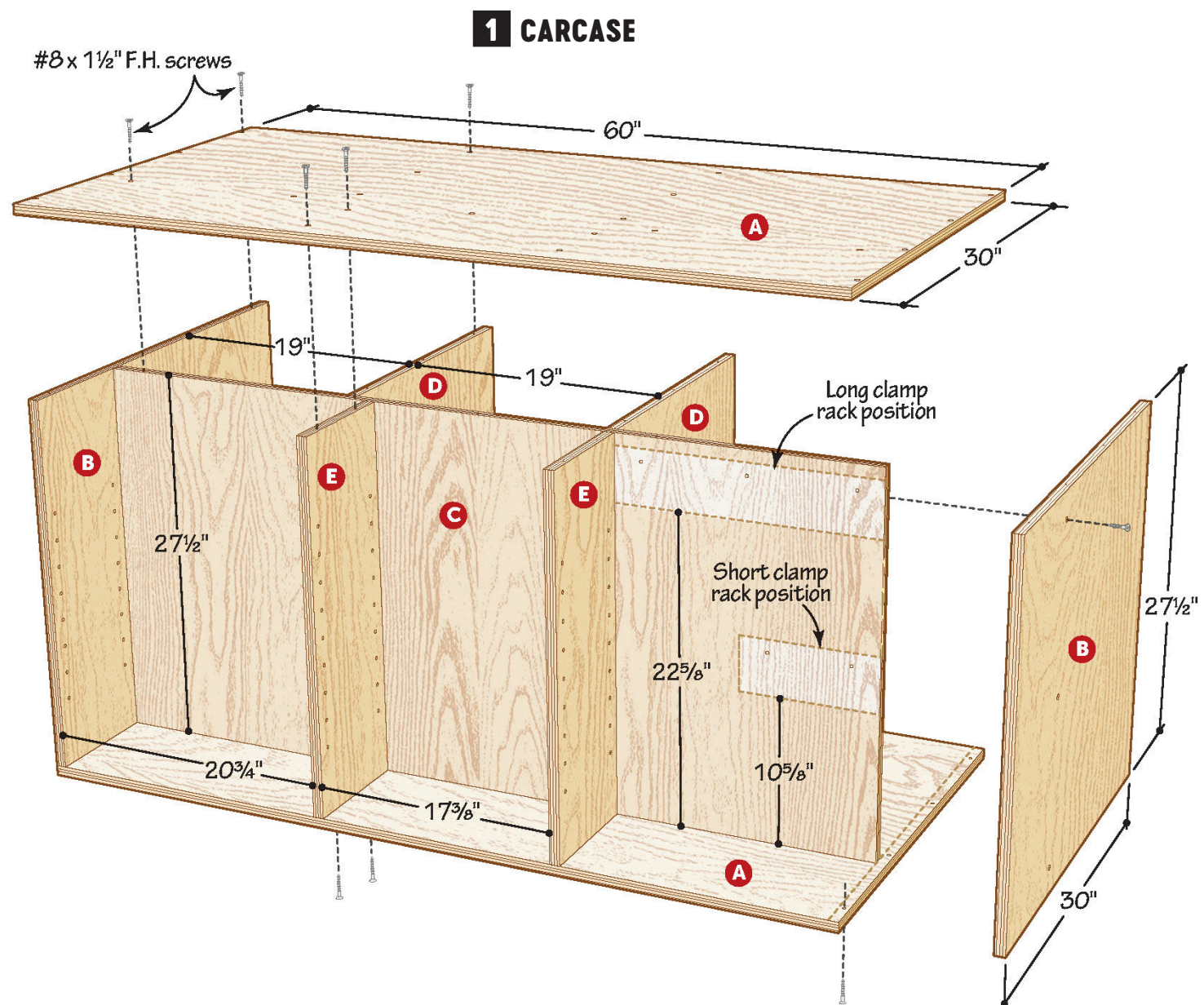
4 Position a drawer slide flush with the bottom and front edges of the drawer side. Extend the slide to expose



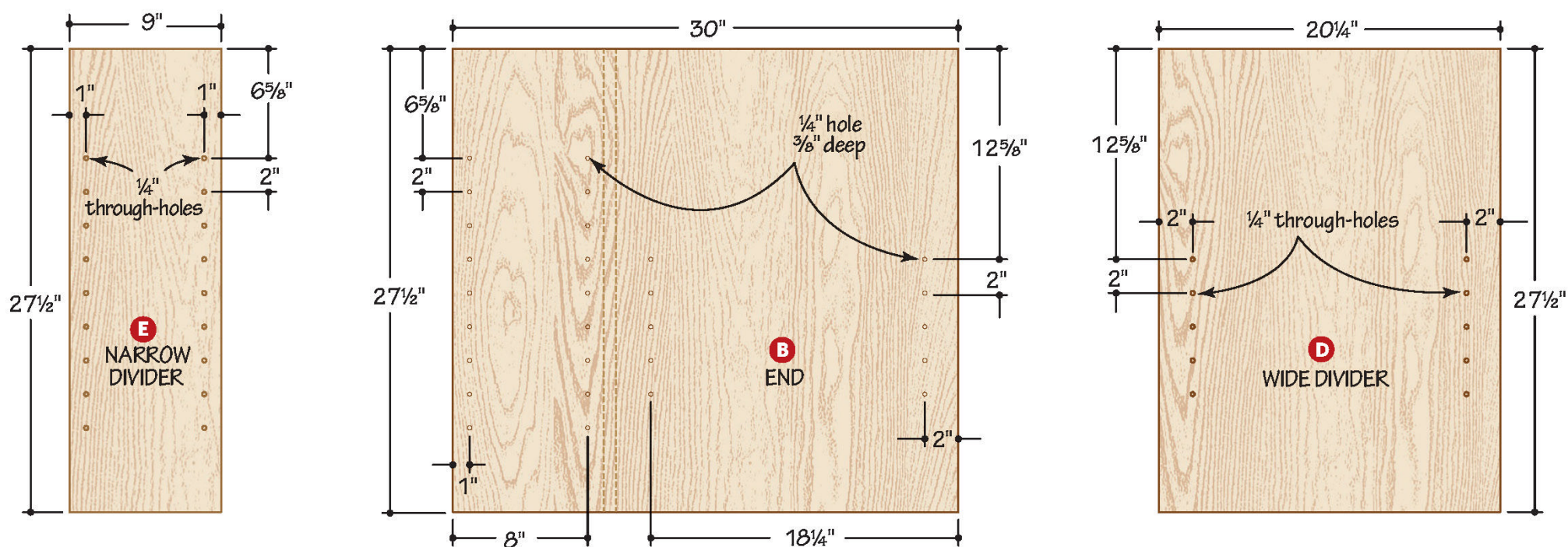
Position the cabinet member of the drawer slide by resting it on a 22³/₈" scrapwood spacer. Set the slide back the thickness of the false front (I) and then screw the slide into place.

the narrow part and screw it into place. Install the cabinet member of each drawer slide in the main cabinet [Exploded View, Photo B]. Finally, slide the drawers into the cabinet.

5 Cut doors (J) to size [Drawing 2, Exploded View] and retrieve the false fronts. Finish-sand the doors and false fronts, ease the edges, and apply a finish.



1a ENDS/DIVIDERS



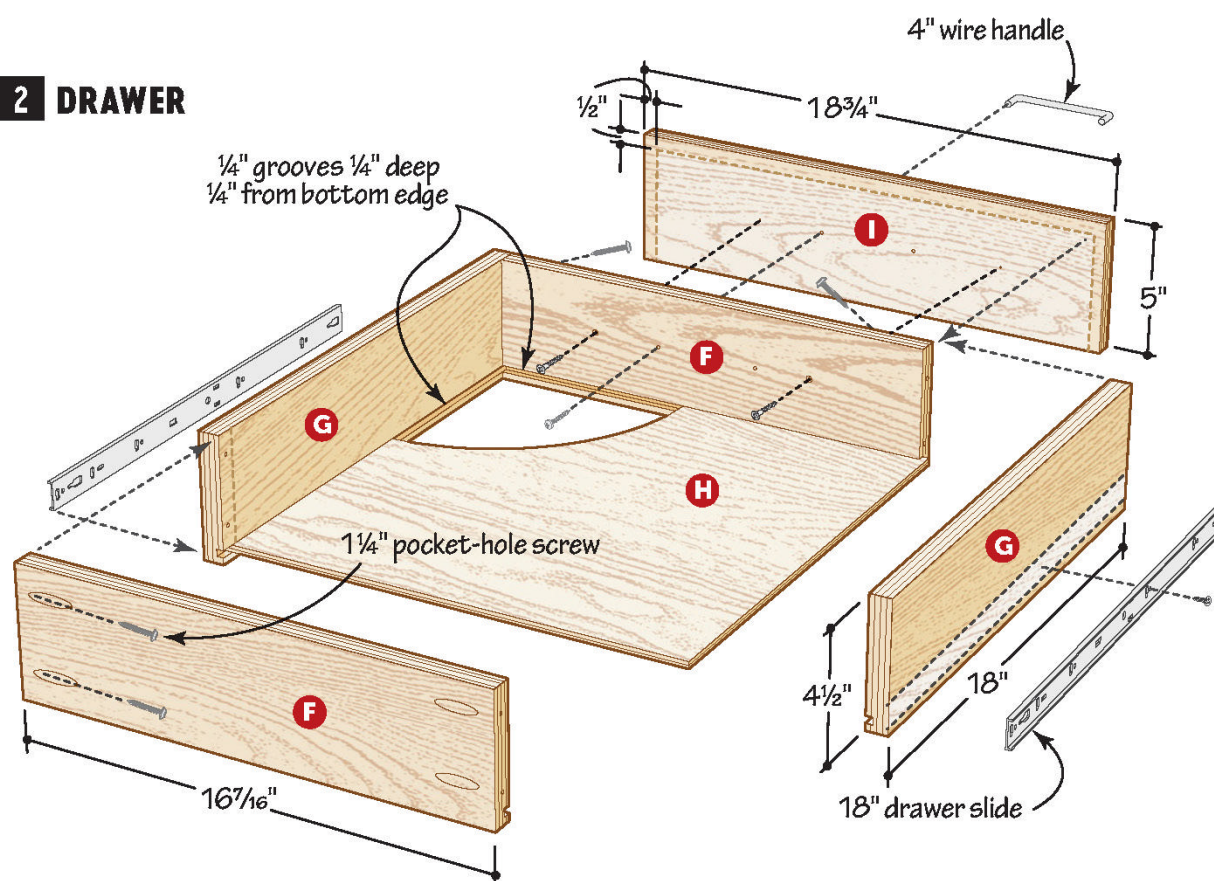
6 Install the doors using no-mortise hinges, spacing the doors 1/8" up from the bottom (A). Install the magnetic catches and door pulls.

7 Install each false front [Photo C] making sure it's centered side-to-side. Finally, screw the drawer pulls into place.

8 Cut the shelves (K, L, M) to size [Exploded View], finish-sand, apply a finish, and install.

Apply double-faced tape to the back face of the false front and press it into place on the drawer box. Then, carefully slide out the drawer and screw the false front into place through the drawer front.

2 DRAWER



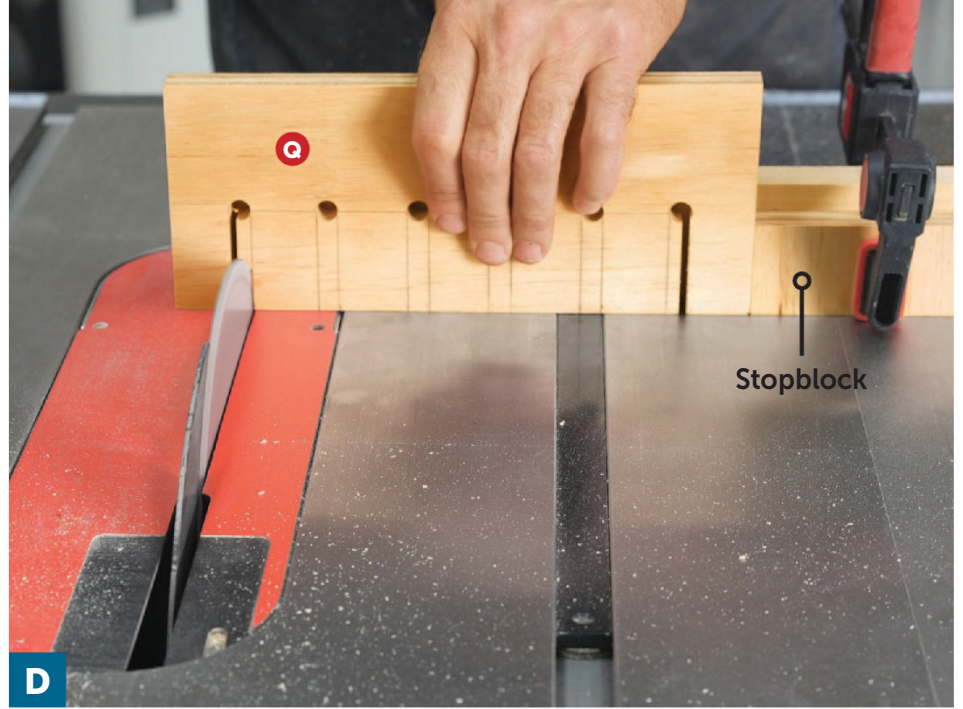
CUSTOM STORAGE OPTIONS

1 Cut the long (N, O) and short (P, Q) clamp rack parts to size [Drawing 3]. Finish-sand the backs and set aside.

2 Lay out the clamp slots on each clamp bar (O, Q) [Drawing 3a] and then drill a $\frac{3}{8}$ " hole to define the end of each slot. Complete the slots on the tablesaw [Photo D].

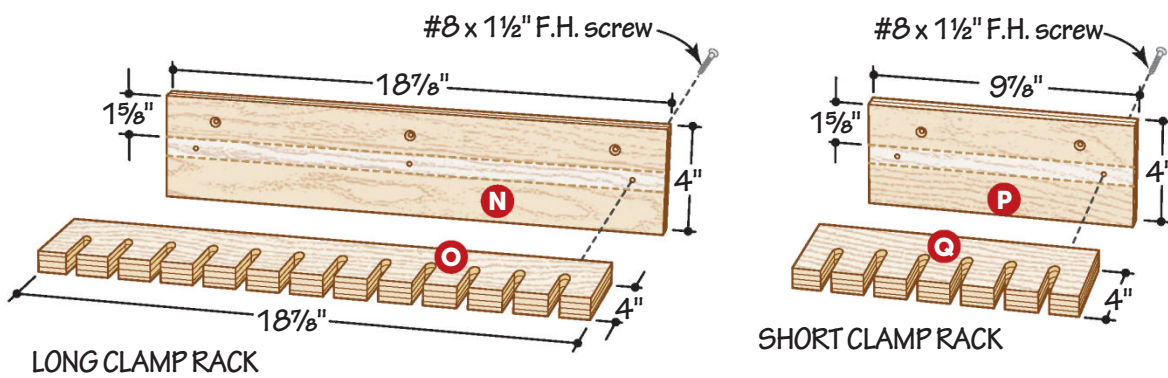
3 Finish-sand the clamp bars and then screw them to the clamp rack backs. Apply a finish and then screw the racks to the center divider (C) [Drawing 1].

4 Cut the drill rack parts (R–U) to size [Drawing 4] and finish-sand. Glue and screw the drill rack top (R) to the spacers (S), then glue and screw

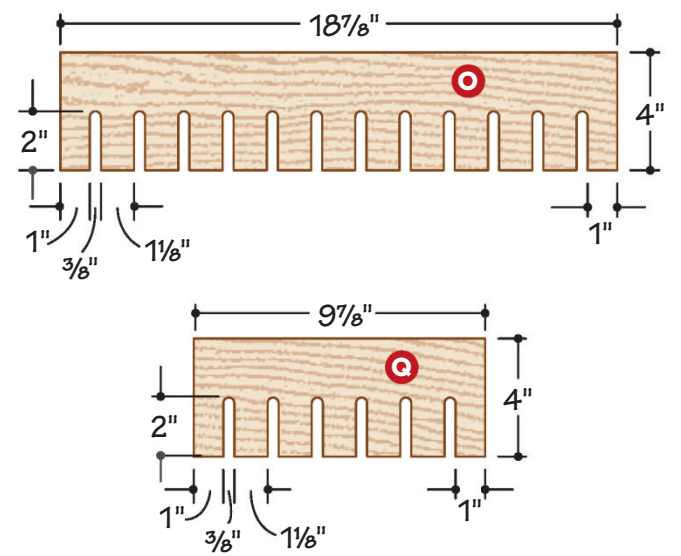


D Position the clamp bar on the layout line using a stopblock attached to an auxiliary miter-gauge fence. Make a cut, then flip the clamp bar to cut the opposite end. Repeat the process for the remaining slots.

3 CLAMP RACKS



3a CLAMP RACK BARS

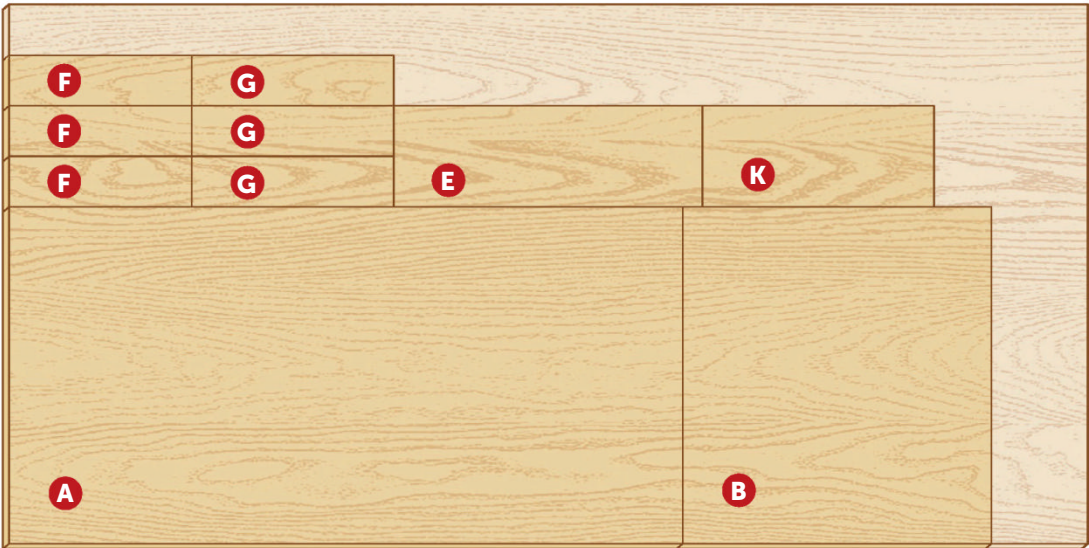


The assembly table pairs perfectly with the tablesaw/router table from issue 288 (May 2023) to form the core of a small-shop setup. Find the plans at woodstore.net/smallshop

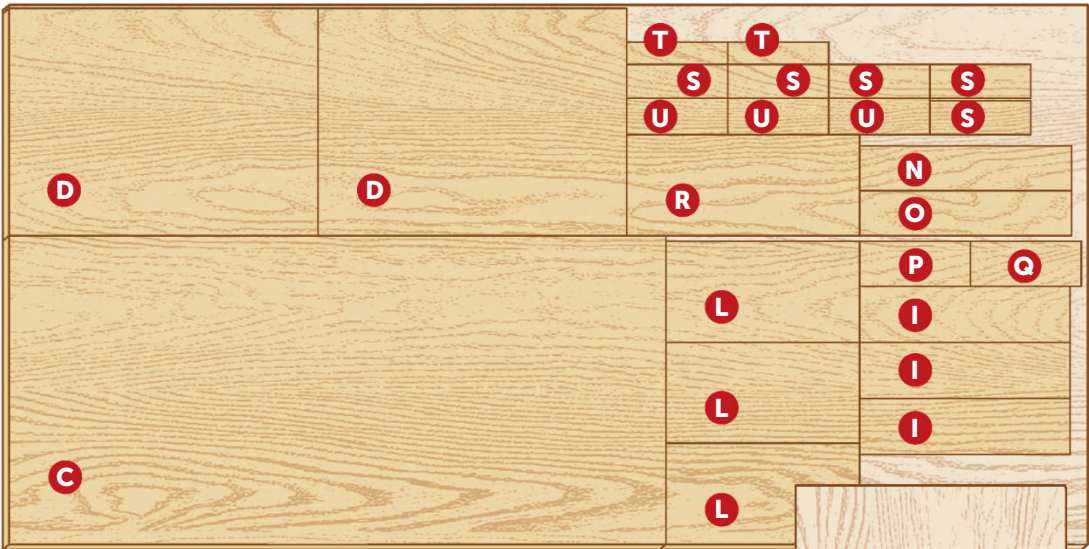
the drill rack ends (T) and centers (U) to the spacers. Apply a finish and once dry, screw the drill rack to the top (A) [\[Exploded View\]](#).

5 Depending on the types of work you do and the projects you build, the table is more than ready for use as is. Add more versatility by outfitting it with a vise like we did. Just drill a set of holes in a corner of the top and install threaded inserts to accept 3/8" hex bolts with washers. This way you can bolt the vise into place when you need it and then easily remove it when you don't. 🌲

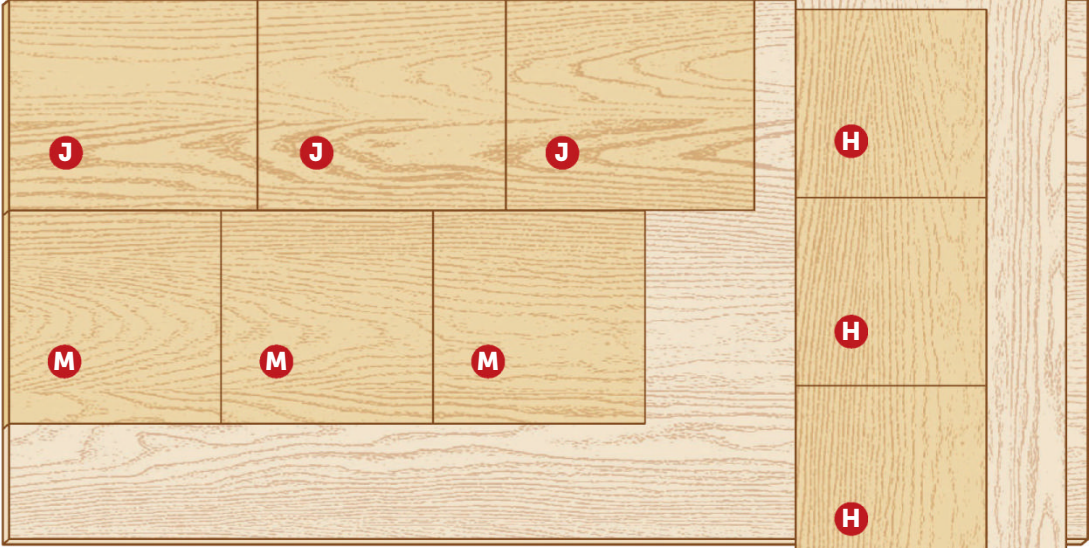
CUTTING DIAGRAM



3/4 x 48 x 96" Plywood (2 needed)



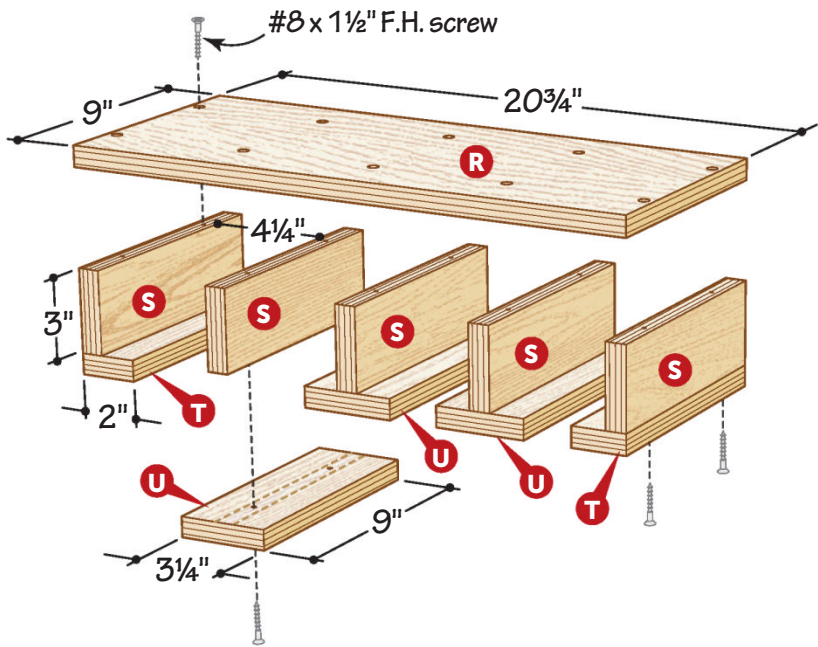
3/4 x 48 x 96" Plywood



3/4 x 48 x 96" Plywood

1/4 x 24 x 60" Plywood

4 DRILL RACK



MATERIALS LIST

PART		FINISHED SIZE			Matl.	Qty.
		T	W	L		
CASE						
A	TOP/BOTTOM	¾"	30"	60"	P	2
B	ENDS	¾"	30"	27½"	P	2
C	CENTER DIVIDER	¾"	27½"	58½"	P	1
D	WIDE DIVIDERS	¾"	20¼"	27½"	P	2
E	NARROW DIVIDERS	¾"	9"	27½"	P	2
DRAWERS, DOORS, & SHELVES						
F	DRAWER FRONTS/BACKS	¾"	4½"	167⁄16"	P	6
G	DRAWER SIDES	¾"	4½"	18"	P	6
H	DRAWER BOTTOMS	¼"	17"	1615⁄16"	P	3
I	FALSE FRONTS	¾"	5"	18¾"	P	3
J	DOORS	¾"	18¾"	221⁄8"	P	3
K	DRILL RACK SHELVES	¾"	9"	205⁄8"	P	2
L	HARDWARE SHELVES	¾"	9"	17¼"	P	3
M	DRAWER-SIDE SHELVES	¾"	19"	187⁄8"	P	3
DRILL & CLAMP RACKS						
N	LONG CLAMP RACK BACK	¾"	4"	187⁄8"	P	1
O	LONG CLAMP RACK BAR	¾"	4"	187⁄8"	P	1
P	SHORT CLAMP RACK BACK	¾"	4"	97⁄8"	P	1
Q	SHORT CLAMP RACK BAR	¾"	4"	97⁄8"	P	1
R	DRILL RACK TOP	¾"	9"	20¾"	P	1
S	DRILL RACK SPACERS	¾"	3"	9"	P	5
T	DRILL RACK ENDS	¾"	2"	9"	P	2
U	DRILL RACK CENTERS	¾"	3¼"	9"	P	3

MATERIALS KEY: P—Pine plywood.
SUPPLIES: #8x1 1/4" flathead screws, #8x1 1/2" flathead screws, #12x5/8" panhead screws, 3/8" threaded inserts, 3/8x1 1/2" hex bolts, 3/8" washers, 1 1/4" pocket-hole screws.
SOURCES: 4" heavy-duty polyurethane swivel locking casters no. 84718 (4), \$13.99 each; 18" full-extension drawer slides no. 63269 (3 pairs), \$24.99 each; narrow profile magnetic catch no. 26559 (3), \$4.49 each; satin nickel pull no. 1007320 (6), \$2.11 each; satin nickel ball-tip partial wrap-around hinges no. 27863 (3 pairs), \$10.99 each, Rockler, 800-279-4441, rockler.com. Wilton utility vise (4 1/2"-wide jaw) no. 674U, \$151.99, woodmagazine.com/vise.
PROJECT COST: It cost us about \$420 (without vise) to build this project. Your cost will vary by region and source.

USING A MOISTURE METER

This easy-to-use and affordable tool proves indispensable for knowing when wood is ready to use.

WRITER: BOB HUNTER

If you buy your lumber from a reliable hardwood retailer, or even a home center, moisture content (MC) might not be something you've ever had to worry about.

But once you start down the addictive path of less-expensive lumber sources, such as local sawyers or direct from the mill, you'll find you're stumbling into unknown territory with regard to drying. Use improperly or incompletely dried lumber in a project and you could be setting your future self up for a host of problems, such as warping or cracking, as the wood completes its acclimation. A moisture meter is your insurance against those problems, paying for itself by letting you know when that wood is ready to use.

If you're ready to take those first steps toward alternate lumber sources, read up on how to use this handy device. Then, check out *Six Favorite Lumber Sources* on page 36.



PHOTOGRAPHER: JACOB FOX; ILLUSTRATOR: LORNA JOHNSON

PIN OR PINLESS: TAKE YOUR PICK

The handheld moisture meters typically used in woodworking come in two varieties. Pin meters measure a wood's moisture by means of pins pushed into the wood, while pinless meters have a flat sensor on their back. Each requires that you first set it for the appropriate wood species to get accurate readings (*near right*). Some meters require a correction for temperature, while others use built-in temperature sensors.

Pin meters require you to push the metal pins as deep as possible into the wood (*far right*). Electrical current travels between the pins, measuring resistance and converting it to a percentage of moisture. These meters read only between the pins and only as deep as the length of the pins. Some meters have multiple depth-reading capabilities and come with short ($\frac{1}{4}$ ") and long pins ($\frac{7}{16}$ "– $\frac{1}{2}$ "), but pressing those pins into some wood species proves difficult. The pins leave holes but they're usually difficult to see after sanding and finishing.



Find the wood species you're measuring in the included booklet, and then calibrate your meter accordingly.

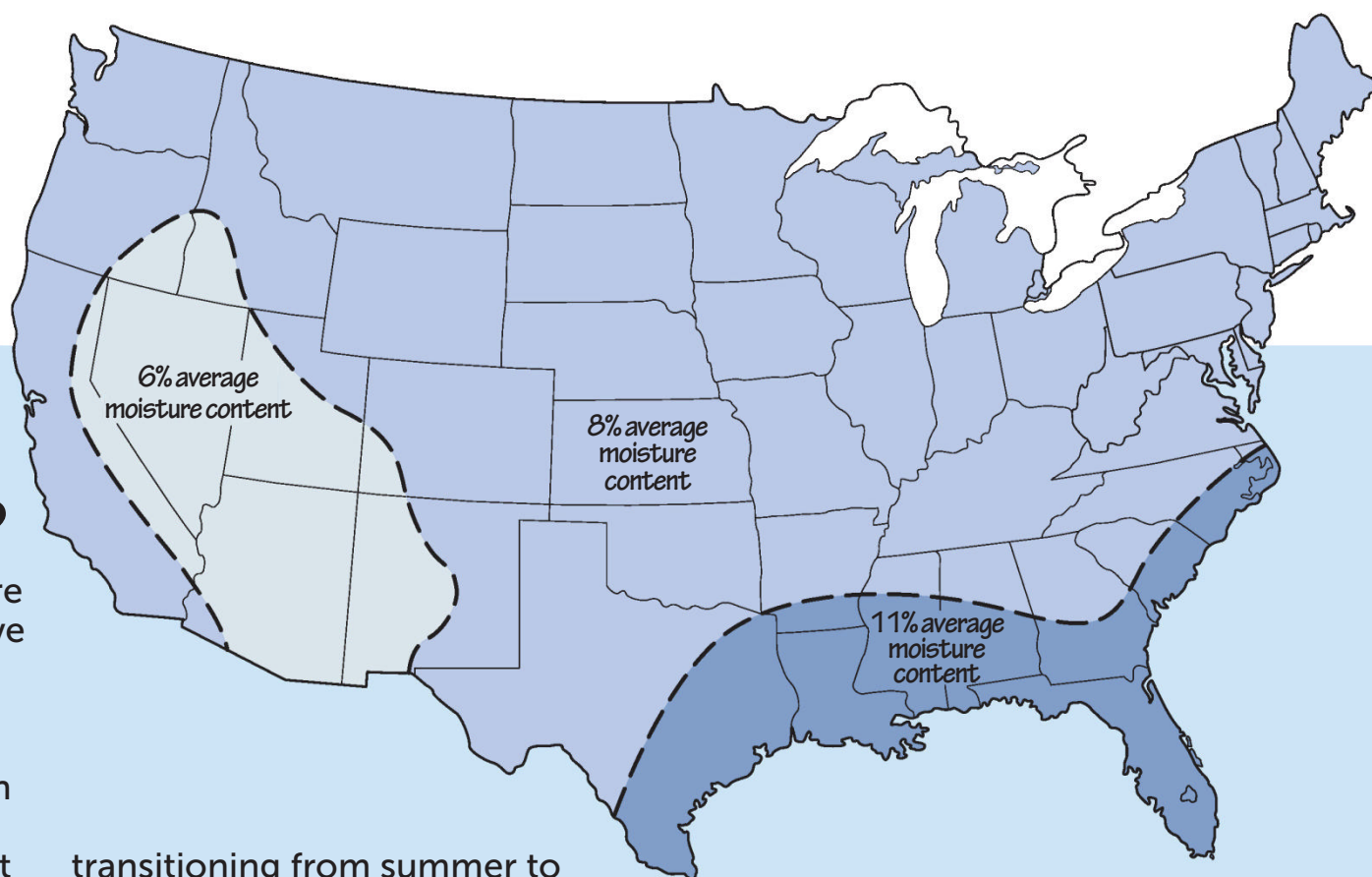
When measuring face grain, position the pins inline with the grain pattern to get the most accurate readings.



Push the pins fully into the wood and hold until the meter displays a consistent reading. The pins will leave tiny holes in the wood.

WHY DOES MOISTURE MATTER?

No matter when it was cut or where it came from, wood will always have a level of moisture (expressed by percentage) within its cells. Before you can use it without concerns, wood must be dried, either in a kiln or air-dried, or a combination of both. Once wood dries to the point that its moisture percentage "levels off" with the environment around it (humidity level and temperature are the biggest factors), it will have reached its equilibrium moisture content (EMC). This means it will stop losing or gaining moisture and will remain at that level until the environment changes, such as



transitioning from summer to winter; moving from one geographic region to another; or even moving from a space without climate control into a building that has heating and cooling.

The ideal moisture level of wood depends on where you live. As seen in the U.S. map above, the dry climate of the Southwest naturally

makes lumber dryer than it would be in the humid Southeast, while the rest of the country goes through similar seasonal changes. Ideally, lumber should measure 6–11% moisture content to avoid problems such as warping or shrinking as you begin milling it and building.

Pin meters don't require a smooth, flat surface, so they work better than pinless meters on irregular, wavy, or twisted boards. Meters with insulated pins (found on premium models) won't read surface moisture, while pins without insulation might, giving you an inflated reading. Some pin meters can be used with long probes or with probes attached

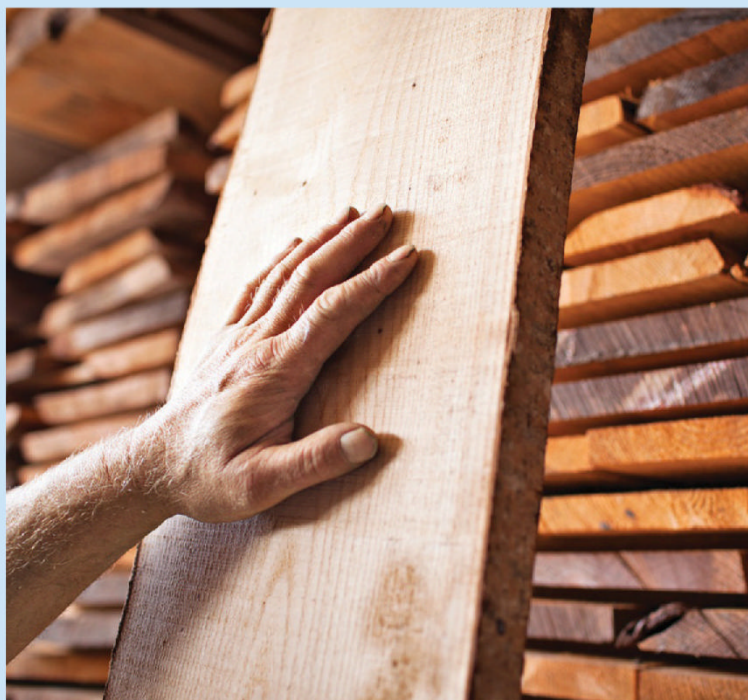


By sinking multiple sets of probes into boards in this solar kiln, we could attach the meter and get readings at different levels without having to unstack the boards.

to long wires for measuring moisture in a stack of lumber (*below left*).

A pinless meter, as shown on *page 34*, works best on flat boards because it needs the sensor plate on the back to rest fully on the wood. This meter uses electromagnetic waves to read the moisture level beneath that plate, typically deeper than a pin meter can, and scans more areas faster. A pinless meter leaves no marks on the wood. Dual-depth pinless meters test at two depths (often $\frac{1}{4}$ " and $\frac{3}{4}$ "), handy for use with thin and very thick boards. But a meter like this can also read through thinner boards into whatever is behind it, so elevate the board if it's not already on spacers. Surface moisture can prevent the meter from reading into the wood, so measure only where the surface is dry.

So which type should you buy? Both have advantages, and both work equally well when used correctly. The pin meter's ability to measure stacked lumber with multiple probes makes it more versatile, but the pinless meter works more quickly and without piercing the wood. Meters with more features often come with a premium price (up to \$500). Our advice: Don't skimp on a cheap meter that will likely be limited. Spending at least \$100 should get you a meter that works well and leaves your eyes free of excessive moisture in the form of tears of regret. 🌳



SIX FAVORITE LUMBER SOURCES BEYOND THE STORE

If you buy wood from any of these sources, you'll want to have a moisture meter to know what you're getting:

- 1** Local sawyers selling lumber that's freshly milled (high in moisture) or has been air-drying (unknown moisture)
- 2** Local sawyers or sawmills selling kiln-dried lumber
- 3** Facebook Marketplace, Craigslist, or other for-sale-by-owner websites
- 4** Online hardwood retailers that ship boards from one region to another where ideal MC may not be the same
- 5** Local auctions or estate sales, especially if the owner was a woodworker
- 6** Reclaimed or salvaged lumber

TIPS FOR USING A MOISTURE METER

As with any tool, a moisture meter works well only when used properly. Follow these tips to ensure you'll get reliable readings.



- Take readings in several places near the edges as well as the along the center of boards. Use the highest reading as the moisture level for the board.
- For boards thicker than $\frac{3}{4}$ " (or your meter's depth range), measure from both faces to get the most accurate overall reading.
- When using a pin meter, look for places to insert the pins that won't mar the best surfaces of the board.
- If you take the meter with you to your lumber source, bring along a spare set of batteries.
- When buying any lumber, especially dimensional spruce/pine/fir (SPF), stack it and let it acclimate to your shop's temperature and humidity for a week or two before working with it. Check the moisture level upon arrival and every 4-5 days until the EMC is acceptable.



- When using a pinless meter, sand or plane several flat spots on boards to ensure an accurate reading. If you're working away from home, bring along a small hand plane or a battery-powered belt sander or power planer to do this.

- When not in use, store your meter in its case or pouch to prevent damage. Store it in a cool, dry environment, away from extreme heat and cold that can damage it. Keep the owner's manual and species chart in the pouch as well.



- Readings around knots and interlocking grain will tend to be higher than regular grain until the wood reaches its EMC. So if the rest of the board is at an acceptable moisture level and you don't plan to use the knotty or figured grain, you can use those drier portions right away.
- Each meter is designed to read moisture within a given range. Most are about 6–30%, but more deluxe models can read higher. Most woodworkers can get by with the lower range.
- If you're checking on a stack of lumber that's still drying, log the readings to track the progress. High-end meters with Bluetooth can share this data with an app.
- Avoid setting wood directly on the floor, especially on concrete, because the wood will take on moisture. Instead, stack the wood on spacers.

ARTS & CRAFTS FLOOR LAMP

With its timeless design and period details, this handcrafted floor lamp really shines—whether it's on or off.

WRITER: VINCE ANCONA
DESIGNER/BUILDER: KEVIN BOYLE

OVERALL DIMENSIONS
21"W x 21"D x 61¼"H



Find FREE plans for the
table lamp version at:
[woodmagazine.com/
tablelamp](http://woodmagazine.com/tablelamp)

Mica panels and quartersawn oak transform this floor lamp into a focal point. And if the design looks vaguely familiar, that's because we featured a smaller tabletop version way back in issue 148 (May 2003). Together, they make a handsome pair that will light up any living space.

A STRONG SUPPORT SYSTEM

Building this lamp starts by creating a sturdy structure to support the lampshade. This consists of a lamppost, lampshade supports, and a base.

TIP!

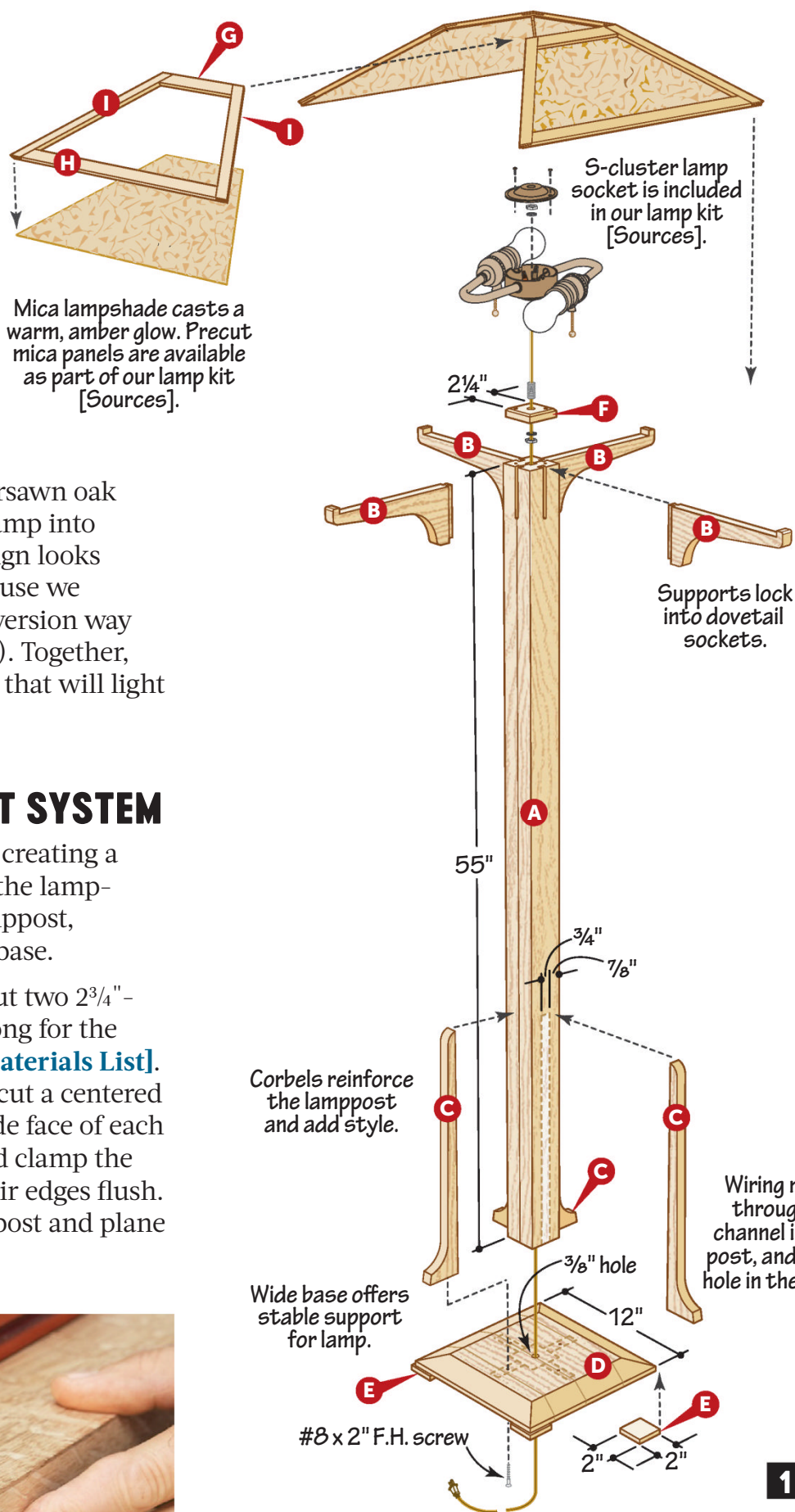
To achieve a quartersawn look on all four sides of the post, see *Put Your Best Face Forward* on page 41.

1 From $1\frac{1}{4}$ "-thick stock, cut two $2\frac{3}{4}$ "-wide blanks about 56" long for the post (A) [Exploded View, Materials List]. To create a wiring channel, cut a centered $\frac{1}{2}$ "-wide groove on the inside face of each blank [Drawing 1]. Glue and clamp the halves together, keeping their edges flush. Joint one glued edge of the post and plane

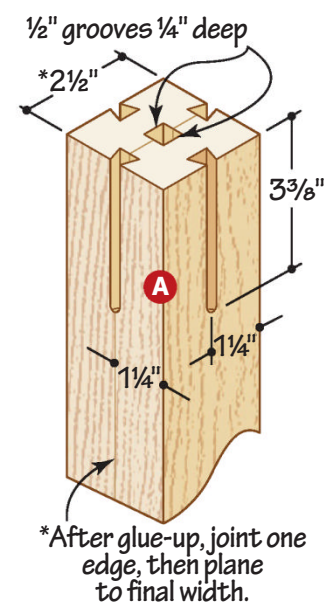


Before routing sockets in the post (A), draw a line on the router-table fence for stopping the cut. Leave the bit at the same height for routing the supports (B) next.

EXPLODED VIEW



1 POST DETAIL



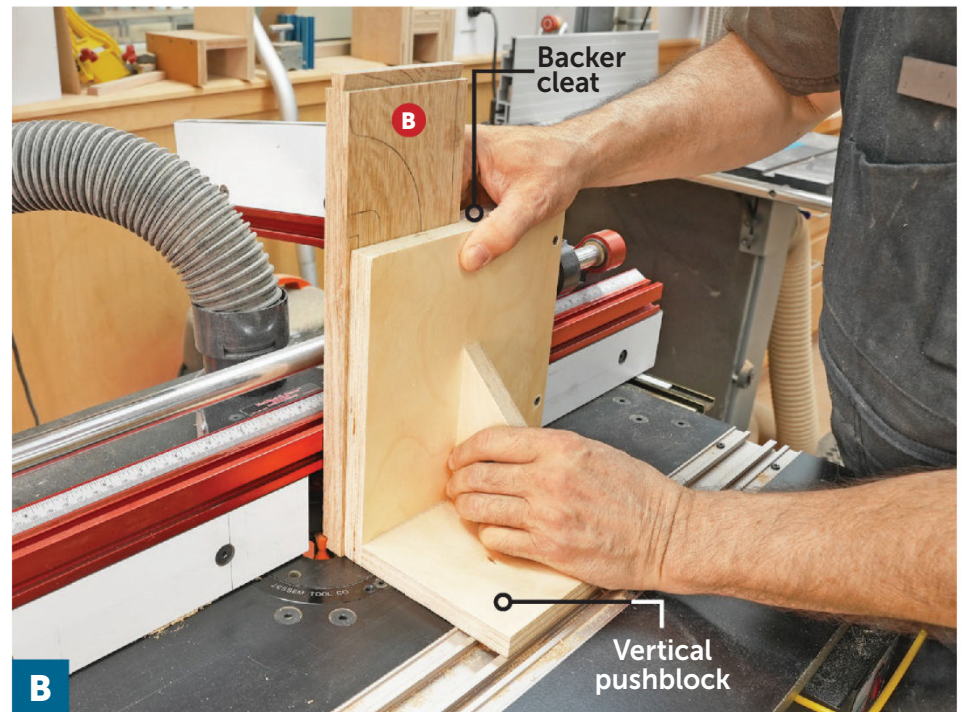
the post to final width of $2\frac{1}{2}$ ", removing equal amounts of material from both edges to keep the wiring channel centered in the post. Trim the post to final length.

2 Rout a stopped dovetail socket centered on each face of the post [Drawing 1, Photo A].

3 From $\frac{1}{4}$ " plywood or hardboard, make a template for the lampshade supports (B) [Drawing 2]. Cut two 4×14" blanks and, using the template, lay out the four supports, one on each end of both blanks [Cutting Diagram]. Rout a dovetail on each end of the two blanks [Photo B].

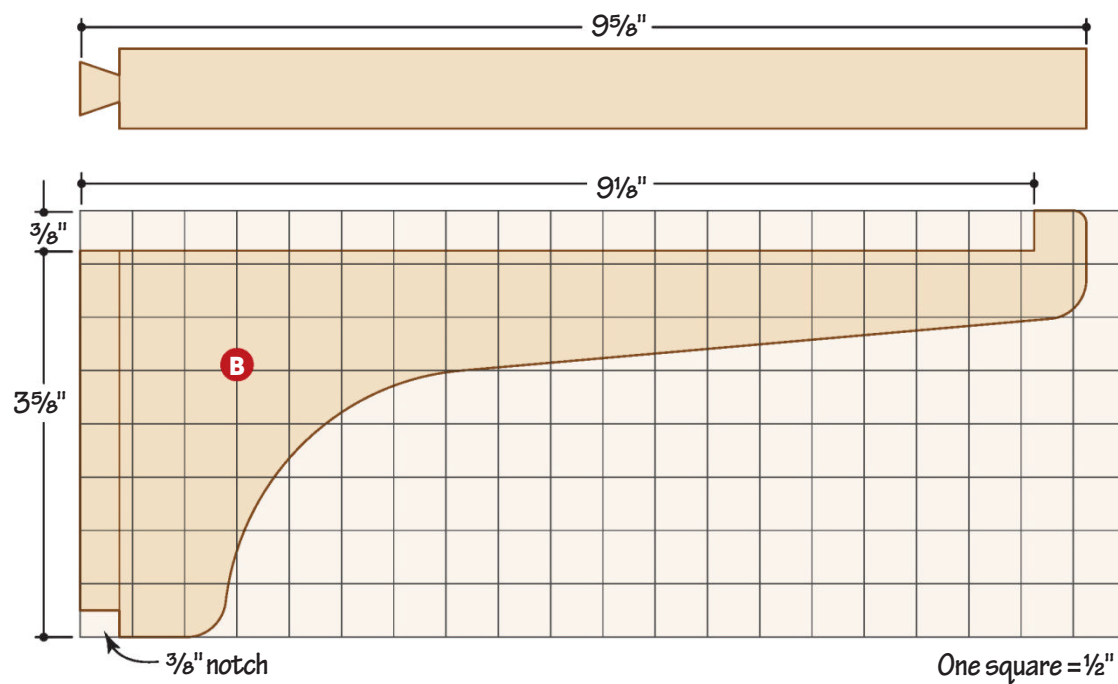
4 Bandsaw each support to rough shape, then adhere the template to each support with double-faced tape and rout with a flush-trim bit to final shape. Notch the bottom of the dovetails to allow the supports to seat fully into the dovetail sockets [Drawing 2]. Finish-sand the post and supports and glue the supports into place.

5 Make a template for the corbels (C) [Drawing 3]. Trace the profile onto four blanks. Bandsaw and flush-trim the corbels.

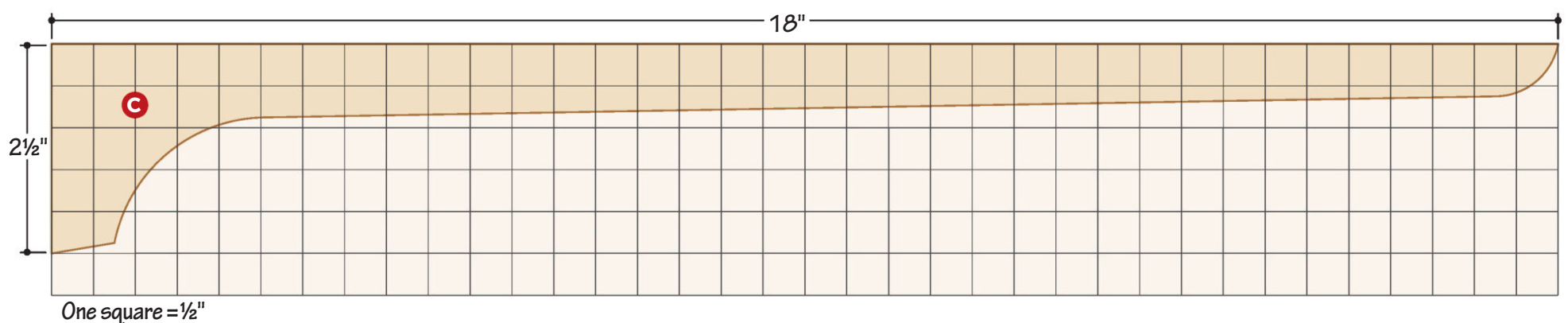


Reposition the fence to rout a dovetail on each end of both support (B) blanks. Use a vertical pushblock to support the workpiece, and aim for a sliding fit.

2 GRIDDED LAMPSHADE SUPPORT PATTERN



3 GRIDDED CORBEL PATTERN



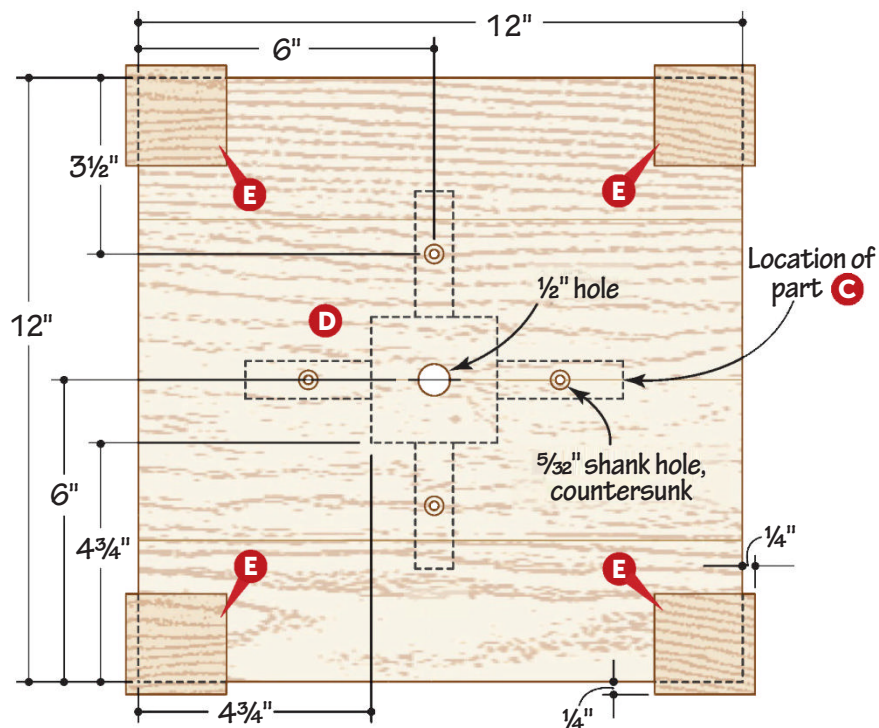
Finish-sand, then glue the corbels to the post flush with the bottom [Exploded View].

6 Glue up a blank for the base (D) and cut it to size [Drawing 4]. Using a tall auxiliary fence for support, bevel-cut all four top edges of the base at the tablesaw [Drawing 4a]. Drill a centered hole in the base along with holes, counterbored from underneath, for corbel-mounting screws. Finish-sand the base.

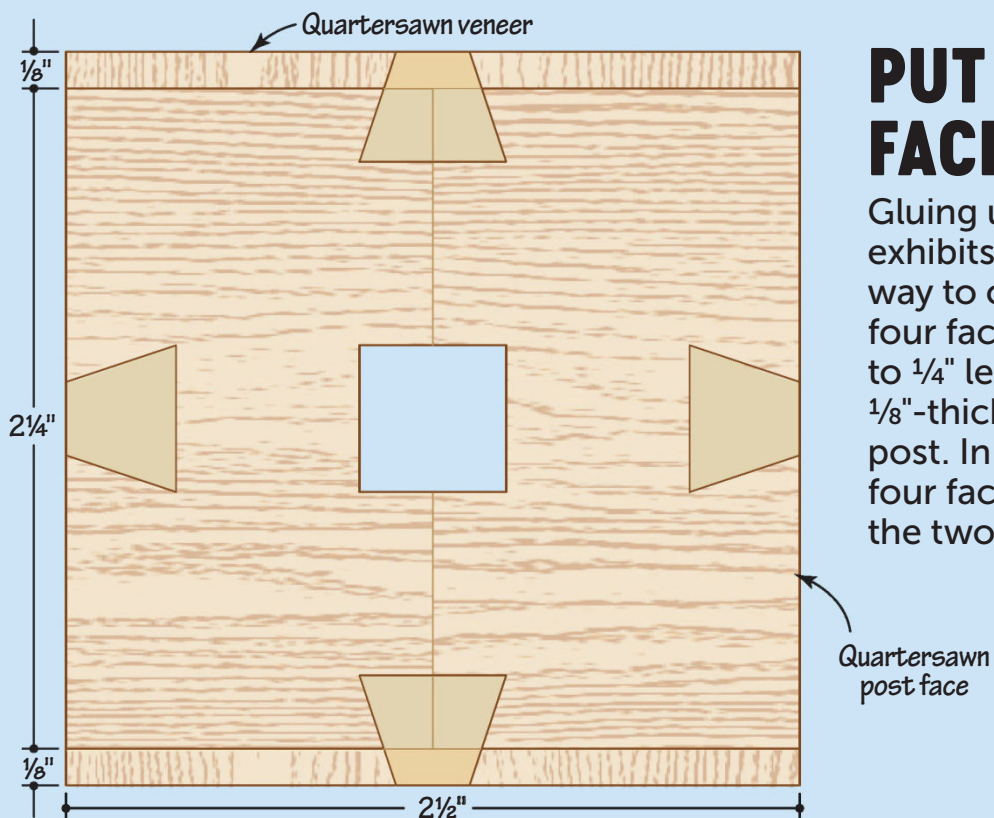
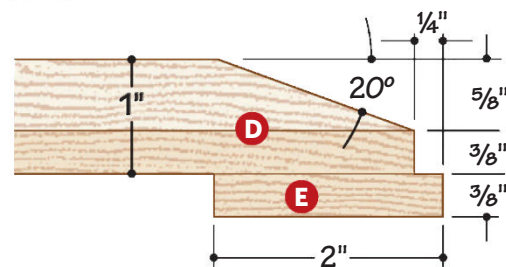
7 Cut the four feet (E) and cap (F) to size [Materials List]. Drill a centered counterbore on the bottom face of the cap, then drill a through-hole [Drawing 8]. Chamfer the top edges of the cap. Finish-sand the feet and cap and set the cap aside for now. Glue the feet to the base.

8 Center the base on the bottom of the post/corbel assembly (A-C) and screw the base into place (no glue).

4 BASE (VIEWED FROM BOTTOM)

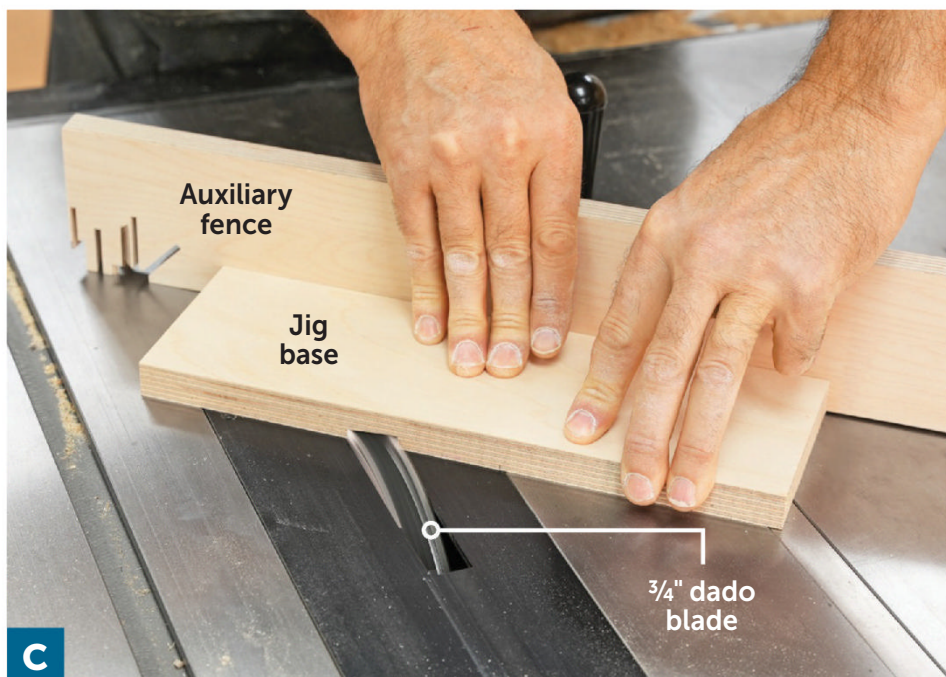


4a BASE DETAIL



PUT YOUR BEST FACE FORWARD

Gluing up a post from two halves yields a post that exhibits quartersawn grain on two faces only. An easy way to create a post with quartersawn grain on all four faces is to plane the width of the glued-up post to $\frac{1}{4}$ " less than the overall thickness (left). Then glue $\frac{1}{8}$ "-thick quartersawn veneers to the edges of the post. In addition to creating a quartersawn look on all four faces, this method covers the joint line between the two halves of the post.



C Angle the miter gauge to 39° and cut a dado in the jig base. Swing the miter gauge to the opposite 39° setting to cut the second dado.

D Using a shop-made auxiliary bed for thin stock, plane the stock for the frame rails and stiles (G–I) to final thickness (1/4").

THROWING SHADE

Four wood-framed mica panels make up the lampshade. A shop-made jig aids in cutting the angled half-laps that connect the frame pieces.

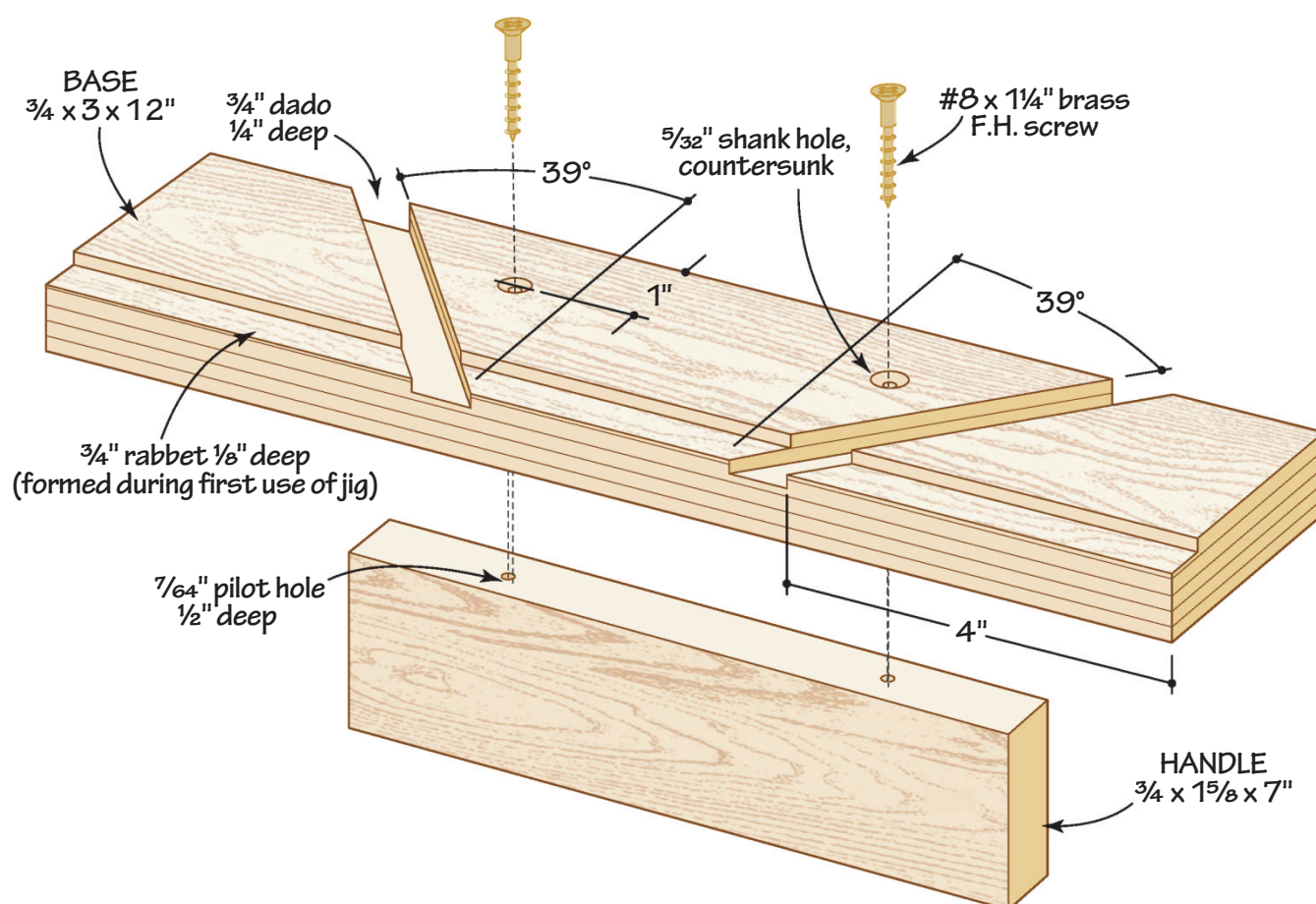
Note: Ripping the blanks for the frame rails and stiles from the edge of flatsawn stock yields quartersawn lumber.

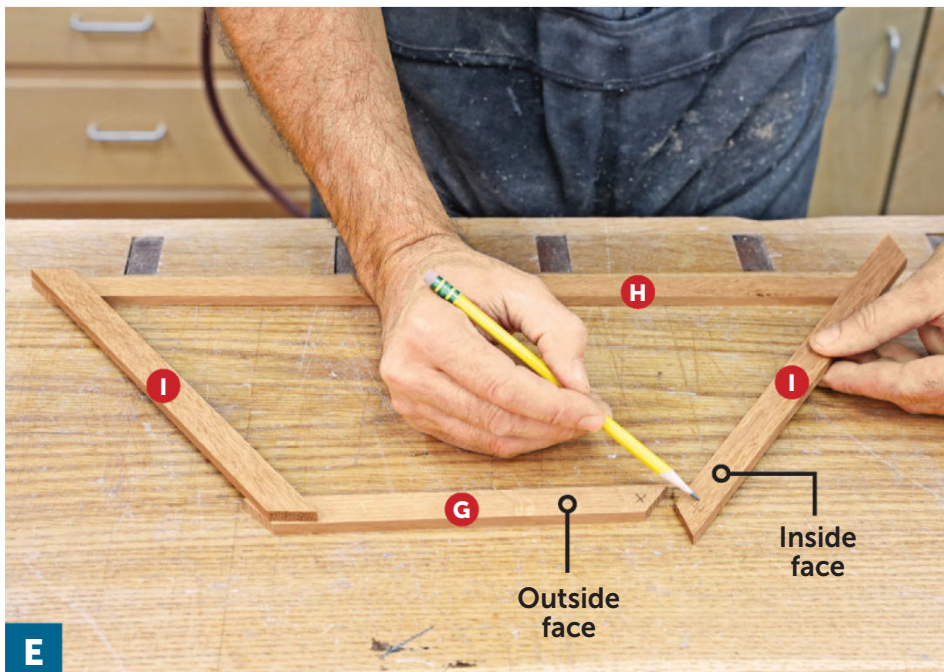
- 1** Build the half-lap jig [Drawing 5], using your miter gauge to cut the angled dados in the base [Photo C].
- 2** Mill the stock for the shade frames by planing 4/4 flatsawn white oak to 3/4". Rip enough 5/16"-wide strips from the board for all of the frame rails and stiles (G–I).

- 3** Using a planer or drum sander, mill the strips to a final thickness of 1/4" [Photo D].

- 4** With your miter gauge set to 39°, miter-cut the frame rails and stiles to length [Drawing 6] while looking for the best grain appearance. Lay out the parts for each frame on your bench and mark the half-lap locations [Photo E].

5 HALF-LAP JIG (Bottom View)





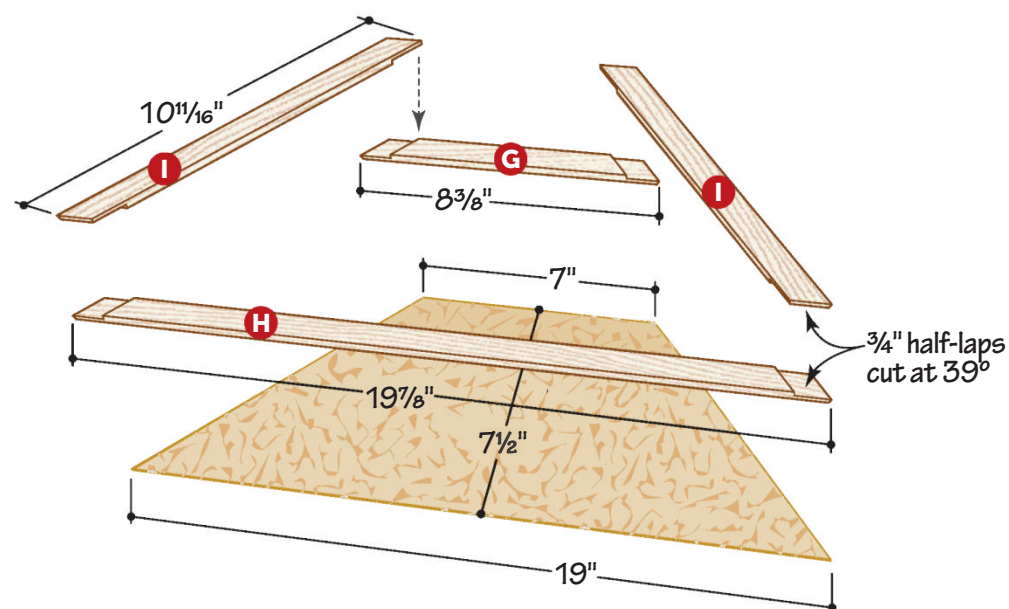
Lay out the rails (G, H) and stiles (I) for each frame on your bench and mark with an X the faces that will receive half-laps.

5 Using the jig and a dado blade, cut mitered half-laps in the frame pieces [Photo F]. Glue up the frames [Photo G]. Allow the glue to dry completely before moving on to the next step.

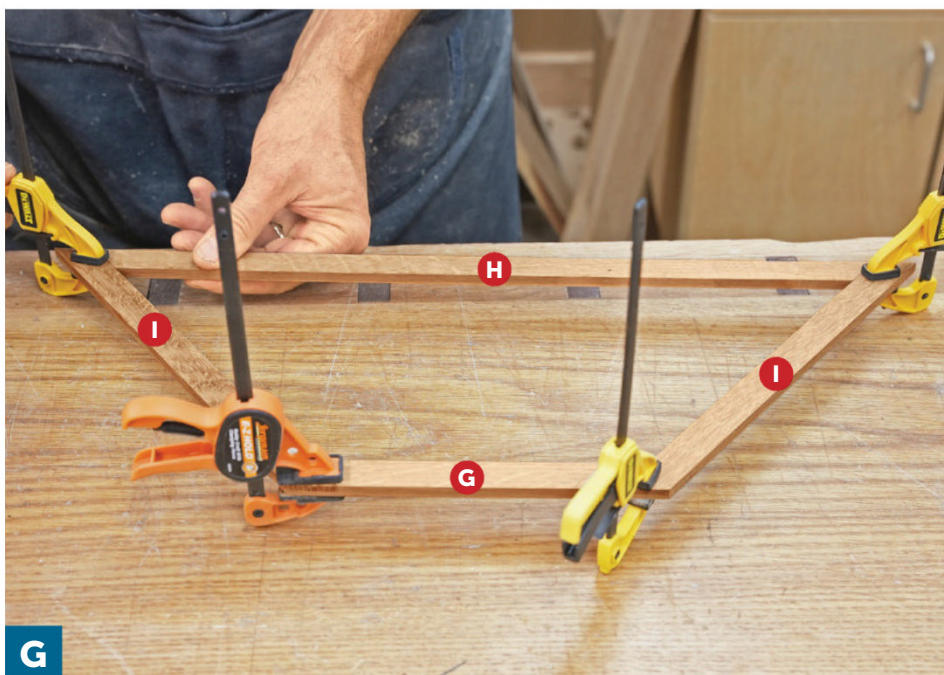
6 With a rip blade tilted to 24.5° and partially buried in an auxiliary fence [Drawings 7, 7a], bevel-rip the edges of the frame stiles (I) on the inside face [Photo H].

7 Finish-sand the frames, then glue up the shade [Photo I]. Complete any final sanding on the shade, base, and cap and apply a stain and finish. (We used Lockwood Early American Maple golden amber dye followed by Varathane Gunstock stain, then top-coated with General Finishes High Performance water-based satin finish.)

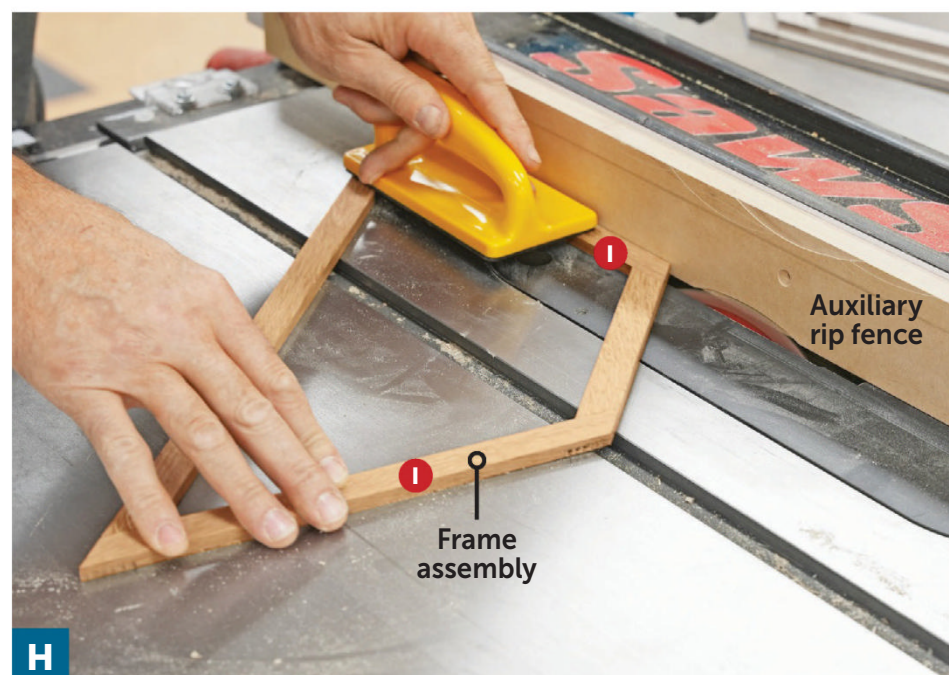
6 SHADE FRAME



With a dado blade partially buried in an auxiliary rip fence, use the jig to safely hold the frame rails and stiles at the correct angle while cutting the half-laps.



To assemble the frames, first clamp the rails and stiles together without glue. Remove one stile, add glue, and reclamp. Repeat the process for the other stile.

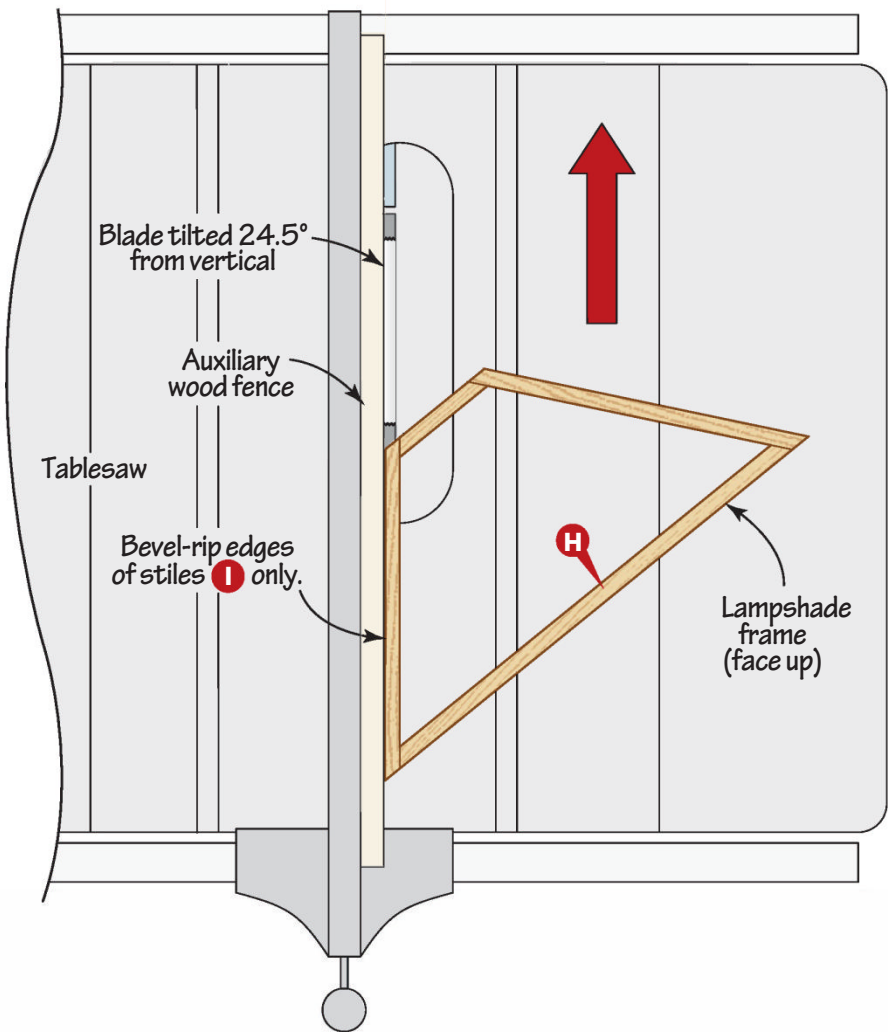


With the outside face of the frame up and the blade tilted to 24.5° and partially buried in an auxiliary fence, bevel-rip the edges of the frame stiles (I). Don't bevel-rip the rails (G,H).

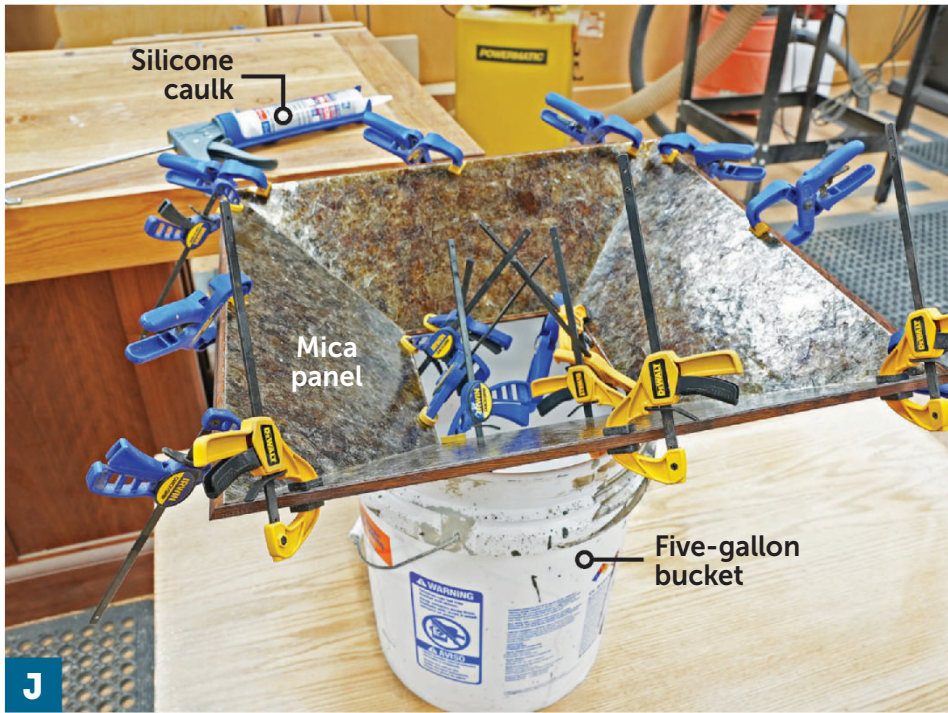
Note: Cut the mica panels to size at the bandsaw or tablesaw using a fine-tooth blade, or get precut panels in our kit [\[Sources\]](#).

8 Cut the mica panels to size and dry-fit them in the inverted shade [\[Photo J\]](#). Remove the panels and, working on one side at a time, run a small bead of clear silicone caulk along the inside face of the frame and drop the panel into place. Allow the caulk to cure overnight.

7 BEVEL-RIPPING THE LAMPSHADE

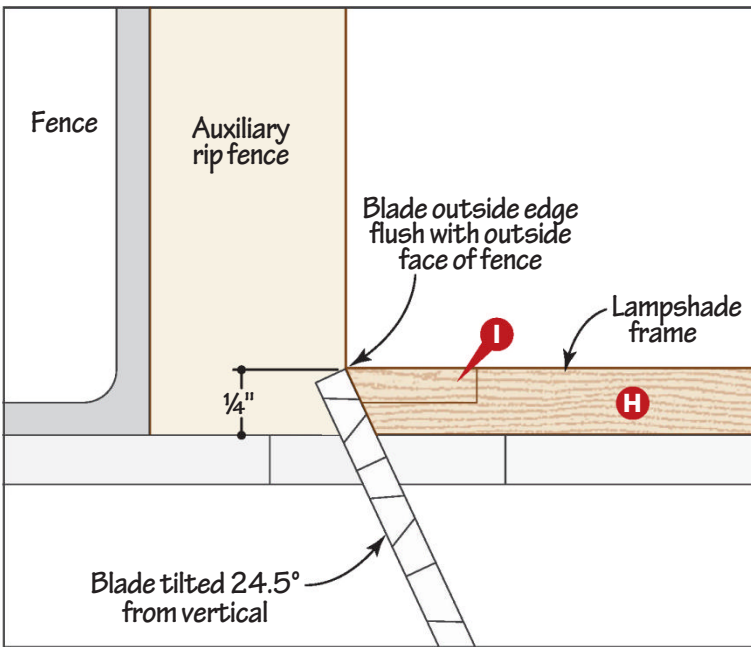


Keeping the top and bottom edges aligned, glue and clamp the frames, working on one corner at a time.



With the inverted shade sitting on top of a five-gallon bucket, run a bead of caulk on the inside of each frame and clamp the mica panels in place one at a time.

7a BEVEL-RIP SETUP



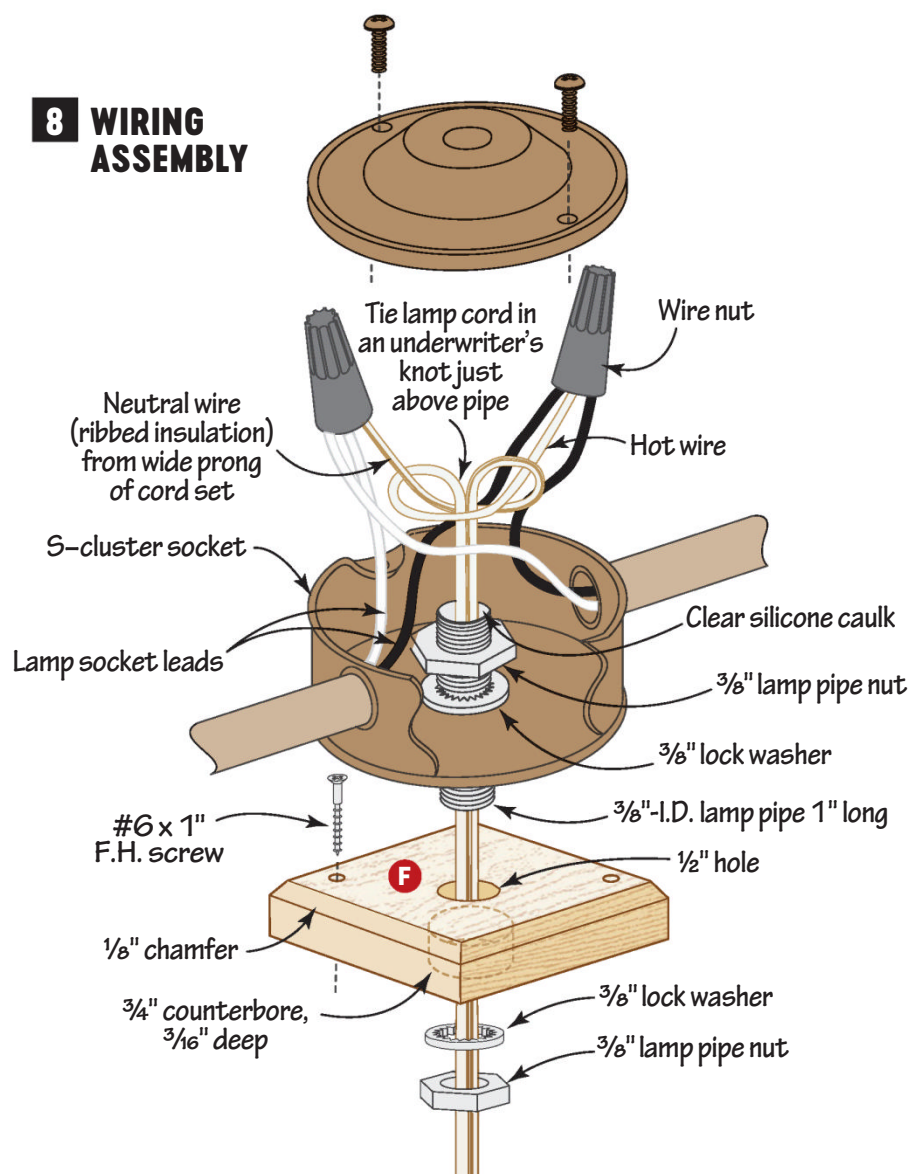
1 Remove the cover from an S-cluster socket. Install a $\frac{3}{8}$ " lock washer and $\frac{3}{8}$ " lamp pipe nut on the end of a 1"-long lamp pipe and thread it through the base of the socket, leaving enough protruding below to reach through the hole in the cap (F) **[Drawing 8]**. Secure the socket to the cap using another lock washer and lamp pipe nut.

3 Apply a dab of silicone caulk in each end of the lamp pipe to protect

the cord. After the caulk cures, glue and screw the cap to the top of the post (A) and replace the socket cover. Screw two light bulbs into the sockets and place the lampshade on the supports. Finally, place the lamp in your desired location, plug it in, and bask in the amber glow of a project well done. 🌿

PART		FINISHED SIZE			Matl.	Qty.
		T	W	L		
A*	POST	2½"	2½"	55"	LQWO	1
B*	LAMPSHADE SUPPORTS	¾"	4"	9⅝"	QWO	4
C*	CORBELS	¾"	2½"	18"	QWO	4
D	BASE	1"	12"	12"	QWO	1
E	FEET	⅜"	2"	2"	QWO	4
F	CAP	⅜"	2¼"	2¼"	QWO	1
G	FRAME UPPER RAILS	¾"	¼"	8⅜"	WO	4
H	FRAME LOWER RAILS	¾"	¼"	19⅞"	WO	4
I	FRAME STILES	¾"	¼"	10⅛"	WO	8

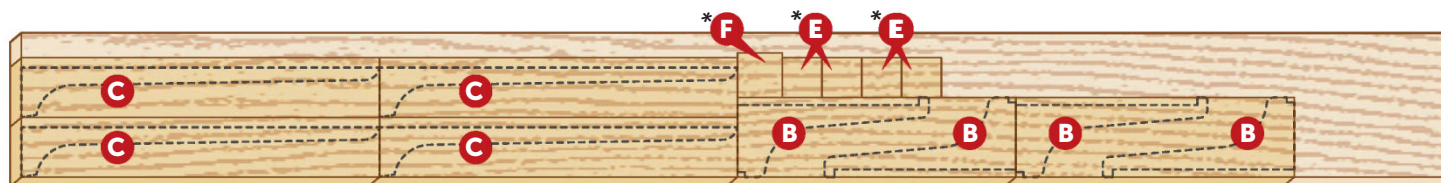
PROJECT COST: It cost us about \$400 to build this project. Your cost will vary by region and source.



This project requires 4 board feet of 4/4 quartersawn white oak, 9 board feet of 8/4 quartersawn white oak and 2 board feet of 4/4 white oak based on example boards shown.



*Plane or resaw to the thicknesses listed in the Materials List.



3/4 x 7 1/4 x 72" Quartersawn white oak



$\frac{3}{4} \times 3\frac{1}{2} \times 48"$ White oak



• SHOP TESTED •

BENCHTOP JOINTERS

Whether yours is a small shop or a new shop, set it up for big-league lumber surfacing at an entry-level price point with a benchtop jointer. Our head-to-head test points you to the right model.

WRITER: BOB HUNTER
TESTER: STEVE FEENEY



A jointer provides the best and fastest way to flatten the face of a board and square an edge to that flat face. Paired with a thickness planer, it quickly and reliably processes less-expensive roughsawn lumber into project-ready, surfaced boards, a capability that can pay for itself in short order.

Price increases have pushed even the value-priced 6" floor-standing jointers from the \$500 range up over \$1,000. So that makes a benchtop jointer—selling for as little as \$250—even more attractive if you're investing in your first jointer. And the small footprint and weight of these machines—about the same as a standard 10" mitersaw—make one ideal for a shop tight on space.

To find the best value-priced jointer for you, we tested 12 models in the WOOD® shop—models with either straight-knife or insert cutterheads in capacities of 6" or 8". Many of these machines are nearly identical, with only cosmetic and slight performance differences. Here's what we found.

THEY'RE POWERFUL, BUT DON'T PUSH IT

All 12 test jointers use 110-volt motors that are smaller than those you'll find on a floor-standing model. To measure each jointer's ability to handle full-capacity cuts, we face-jointed 6"×3' hard-maple boards, removing 1/16" per pass, and recorded the time it took. The Grizzly G0946 cut fastest at 1:03 (an average of three tests), with six other models taking 1:12 or less. The Delta 37-071 took the longest at 2:18. The three 8" jointers handled 6"-wide maple in 1:11 or 1:12; when using 8" maple, they needed just 3–5 seconds longer. (See the chart on page 50 for power grades for each unit.)

To really put them through their paces, we next set the jointers for the maximum 1/8"-deep cut and repeated the tests. The 8" jointers fared best here, requiring only a slightly slower feed rate. All 6" models, however, required a significantly slower feed rate to make the cut, with some bogging down even then. The Delta could not complete this demanding cut—but we don't recommend doing this with any of these jointers. Instead, limit full-width cuts to a shallower depth and reserve full-depth cuts for narrower boards or edge work.

HOW TO KNOW IF A BENCHTOP JOINTER IS RIGHT FOR YOU

PROS

- Ranging from \$250 to \$1,100, these are the lowest priced jointers to buy new.
- The small footprint (about 20×30") and light weight (35–70 pounds) allow you to easily lift and store it when not in use.
- The 6" and 8" board-width capacities of these machines match those of their more expensive floor-standing counterparts.
- Many models in our test include disposable or inexpensive cutters or knives making sharpening unnecessary or optional.
- You can place a benchtop jointer on a stand or workbench at a height comfortable to you.
- Chip collection proves excellent when using an appropriate shop vacuum or dust collector.

CONS

- The short infeed and outfeed tables make it difficult to work with boards longer than 5–6'; you'll need workpiece support stands for those.
- The small motors do well enough with shallow cuts (1/16" or less) but require a much slower feed rate when cutting up to the maximum 1/8" depth. Deep cuts could also overwork the motor.
- Long-wearing carbide knives and cutters are rare on benchtop models; you'll likely get steel cutters or knives, which dull faster.



Learn more about
how to use a jointer.
[woodmagazine.com/
jointertips](http://woodmagazine.com/jointertips)

CUT QUALITY CUTS LATER EFFORT

Ideally, a jointer would leave wood surfaces without any tooling marks that need to be sanded or planed away later. But since that is rarely the case with a jointer of any size, your tolerance for sanding or hand-planing after jointing might center your choice of jointers on cut quality.

To evaluate the quality of cut for each model, we face-jointed walnut boards with a $\frac{1}{32}$ "-deep cut, then rubbed white chalk on the surface to reveal high spots (tooling marks), as shown *below*. Four machines, the Grizzly G0945, Rikon 20-800H, Shop Fox W1876, and Wen JT3062, produced the cleanest surfaces.



The Rikon 8" jointer with insert cutterhead produced this clean cut, which needs only light sanding to make it ready for finish.



The Delta's two-knife cutterhead left consistent scallops and chatter marks across the board's width, requiring significant sanding.



▲ If you can't adjust away snipe on your jointer, then start with a longer board and cut away the snipe, or blend it by sanding, planing or scraping.

SNIP THE SNIPE

Snipe, a slightly deeper cut in the last 2-3" at the outfeed end of the board (shown at *left*), results when the cutters' peak arc exceeds the height of the outfeed table. Unlike many of their larger counterparts, the outfeed tables on the tested benchtop machines cannot be raised or lowered to eliminate snipe. For the straight-knife machines, eliminate snipe by lowering the knives to match the level of the outfeed table. Insert-cutterhead models have no adjustment for snipe. Only two test jointers produced measurable snipe, however: the Delta and Shop Fox at .03" deep, an amount that is visible but that takes only moderate effort to fix.

The length of a jointer's tables limits the length of board you can reasonably flatten. Each test model has paired infeed/outfeed tables that measure between 13" and 15". The 8" models include extensions on each end to make it easier to handle boards up to 8' long.



To use the table extensions on the 8" models, release the lock knobs below the tables, extend as needed, and relock.

CHANGE IS CERTAIN; NUISANCE IS NOT

The jointers in this test use three types of cutters: high-speed steel (HSS) straight knives, HSS inserts, or carbide inserts. Steel cutters dull more quickly than carbide and need to be changed more frequently, but eventually the time comes for all cutters. So choose a jointer that makes blade changes and adjustments easy.

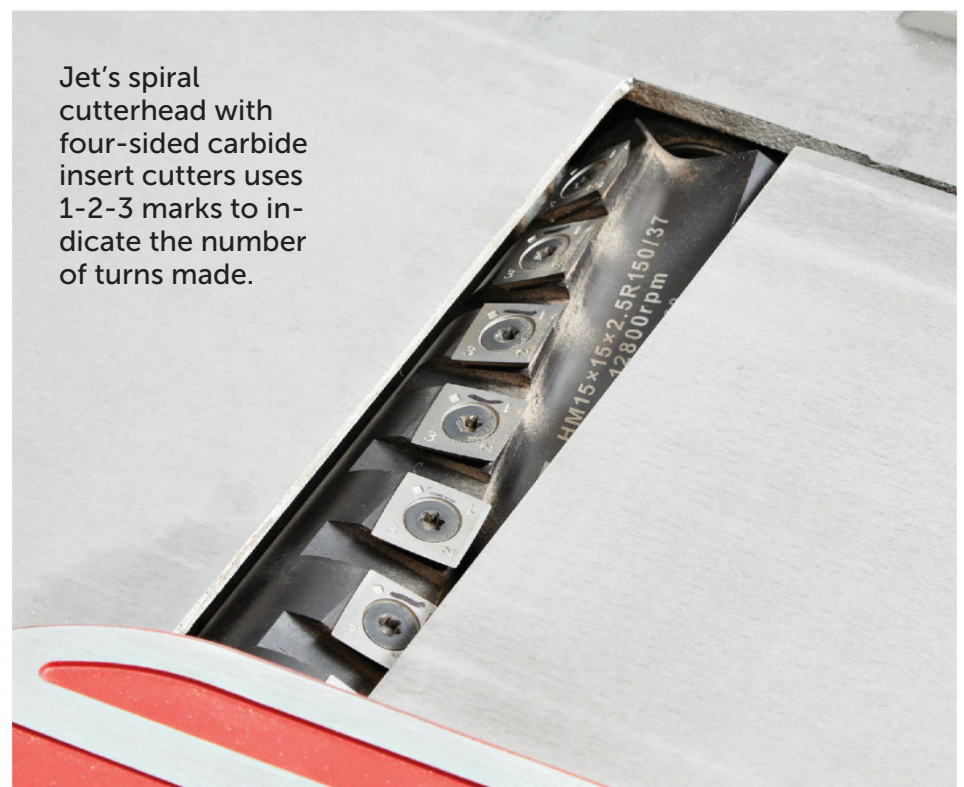
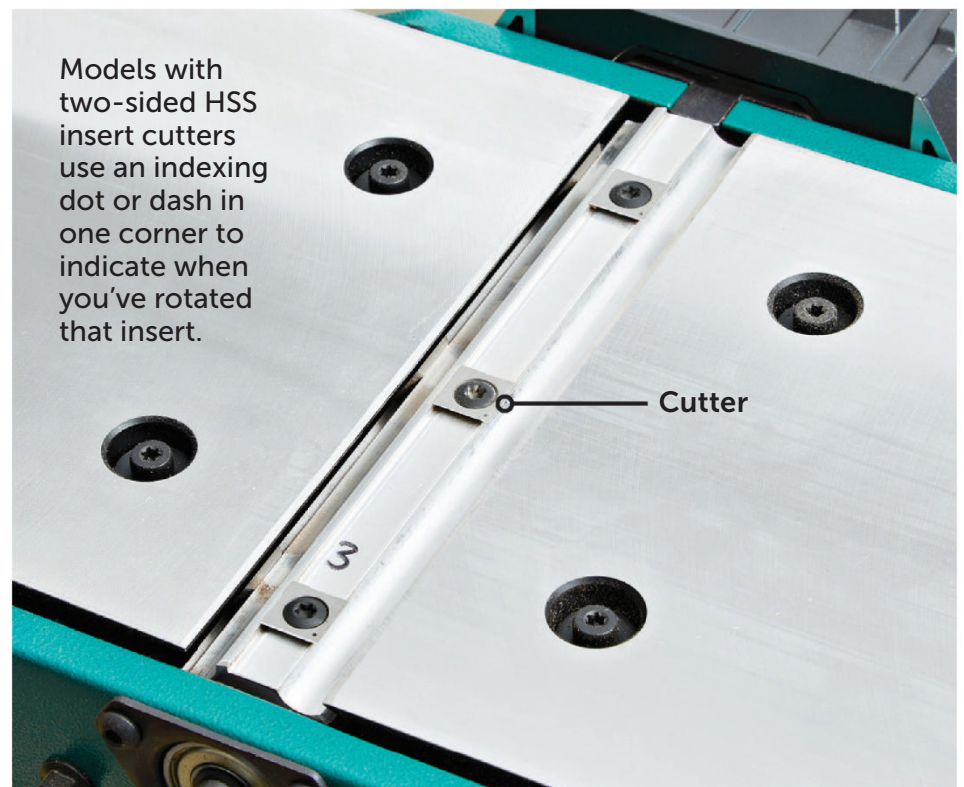
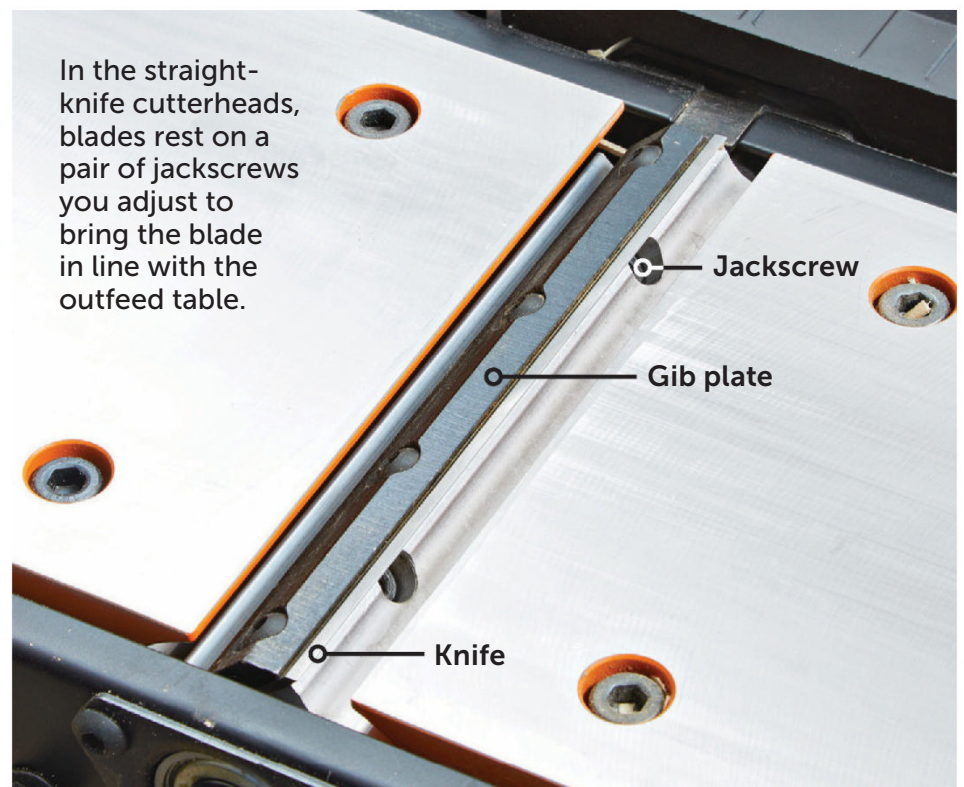
TIP!

Always wear work gloves when changing knives or cutters to avoid injury.

○ All five straight-knife machines use the same cutterhead design to hold a pair of full-capacity knives. Each knife rests on jackscrews that thread into the cutterhead; adjust these screws up or down to set the knife height, *top right*. Then secure each knife in place with a gib plate. With these models, changing knives and resetting the height proves tedious for two reasons: First, all models come with a right-angle hex wrench for the socket-head screws rather than a T-handle wrench, necessitating a lot of partial turns and wrench resets. Second, achieving the perfect knife height takes a lot of fussy trial-and-error work with a straightedge. Replacement knives cost from \$10 to \$44 per pair.

Three 6" jointers and all three 8" models use the same style cutterhead wrapped in offset groupings of $\frac{1}{2}$ "-square inserts with two cutting edges. To swap cutting edges, simply loosen an insert's screw with the included T-handle wrench (or remove it altogether for replacement), rotate the self-aligning insert to a sharp edge, and retighten, *middle right*. Replacement inserts sell only in 10-packs, costing from \$34 to \$66 per pack. Curiously, Grizzly and Shop Fox do not sell HSS replacement inserts, but only two-edge carbide versions. No manufacturer sells inserts in a quantity that matches the number on the cutterhead, so a full replacement requires purchasing multiple sets.

The 6" Jet JJ-6HHBT uses carbide inserts with four cutting edges, *bottom right*. These inserts spiral around the cutterhead, mounted so the cutting edges slice the wood at a slight angle rather than straight-on, as with the other insert machines. While we appreciate the longevity of the carbide along with twice as many cutting edges, this unit's cut quality was surpassed by nine other test jointers, and replacement inserts sell for \$100 per 10-pack.





Ten of the test jointers use this indicator that magnifies the 1/8" cut depth capacity across a much larger scale. Few people will likely need its difficult-to-distinguish 0.1 mm increments, though.



The Jet and Delta's depth gauges use 1/8" (actual-size) scales with few increments. They're tricky to set precisely, and there's no lock to ensure that the setting holds.

MORE JOINTER POINTS

- **Cutting depth.** All test models use one of two identical depth-adjustment systems that work okay but could be better. None has detent settings for common depths, such as 1/32" or 1/16", so you have to rely on your ability to align the pointer to a hard-to-read scale when you need a precise setting.
- **Fences.** Each model uses an aluminum fence about 4 1/4" tall and approximately two-thirds the length of the combined table. They all adjust front to back via a manual slide (no rack-and-pinion gears). The Delta and Jet tilt to 45° toward the front and back with stops for both as well as 90°; all others tilt from 90° to 45° toward the back only. All were accurate, and only the two 6" Wen models needed initial calibration for the tilt stops.
- **Chip collection.** All models worked very well when connected to a shop vacuum or dust collector. All but two 6" jointers use the same 2 1/2" O.D. dust port; some shop-vacuum hoses will require an

BRAND	PERFORMANCE RATINGS (1)							
	PRIMARY				SECONDARY			
	POWER / EFFICIENCY	CUT QUALITY	EASE OF CHANGING CUTTERS	EASE OF ELIMINATING SNIPE	EASE OF SETTING CUTTING DEPTH	EASE OF ADJUSTING FENCE	ACCURACY OF FENCE TILT STOPS	CHIP COLLECTION (2)
6" STRAIGHT-KNIFE CUTTERHEAD								
CRAFTSMAN CMEW020	A-	A-	B-	A	A-	A	A	A
DELTA 37-071	C	C	C	B	B	B	A	A
GRIZZLY G0945	B	A	B-	A	A-	A	A	A
PORTER-CABLE PC160JT	B+	B+	B-	A	A-	A	A	A
WEN JT3062	B	A	B-	A	A-	A	A	A
6" INSERT CUTTERHEAD								
GRIZZLY G0946	A	A-	A	A	A-	A	A	A
JET JJ-6HHBT	A	B-	A	A	B	B	A	A
SHOP FOX W1876	A	A	A	B	A-	A	A	A
WEN JT630H	B+	B+	A	A	A-	A	A	A
8" INSERT CUTTERHEAD								
GRIZZLY G0947	A	B	A	A	A-	A	A	A
RIKON 20-800H	A	A	A	A	A-	A	A	A
WEN JT833H	A	C	A	A	A-	A	A	A

adapter or duct tape. Delta and Jet have 2 3/8" ports that fit more of the hoses in our shop. Alternatively, these two come with dust bags, but we found them to be less effective than connecting a vacuum hose. All 8" machines have 4" ports and come with a 2 1/2" reducer. We got the best results with 4" hose and a dust collector.

- **Accessories.** All but one machine comes with two push pads. Strangely, Jet includes only one push pad, substituting a push stick for the second; we prefer two push pads.
- **Warranty.** We appreciate that the Delta and Rikon models come with a five-year warranty. Craftsman and Jet provide three years; all others are one or two.

TYPE AND NUMBER OF CUTTERS (3)	OVERALL DIMENSIONS, L×W×D	FENCE		DUST PORT DIAMETER	WEIGHT	CORD LENGTH	WARRANTY, YEARS	COUNTRY OF ASSEMBLY (4)	SELLING PRICE (5)	CUTTER REPLACEMENT COST (5)
		HEIGHT×LENGTH	TILT STOPS							
KN (2)	30 × 13 × 17"	4 1/4 × 19 3/4"	45°, 90°	2 1/2"	35 LBS.	6'	3	TW	\$400	\$21/2-PACK
KN (2)	28 1/2 × 8 × 10"	4 × 22 3/4"	45°, 90°, 45°	2 3/8"	76 LBS.	6'8"	5	TW	\$500	\$44/2-PACK
KN (2)	30 × 13 × 17"	4 1/4 × 19 3/4"	45°, 90°	2 1/2"	43 LBS.	6'	1	TW	\$295	\$20/2-PACK
KN (2)	30 × 13 × 17"	4 1/4 × 19 3/4"	45°, 90°	2 1/2"	35 LBS.	6'	1	CN	\$320	\$30/2-PACK
KN (2)	30 × 13 × 17"	4 1/4 × 19 3/4"	45°, 90°	2 1/2"	41 LBS.	6'	2	TW	\$250	\$32/6-PACK
2H (12)	30 × 13 × 17"	4 1/4 × 19 3/4"	45°, 90°	2 1/2"	50 LBS.	6'	1	TW	\$349	\$66/10-PACK (CARBIDE)
4C (14)	28 1/2 × 13 × 19"	4 1/4 × 23 3/4"	45°, 90°, 45°	2 3/8"	71 LBS.	6'	3	CN	\$1,100	\$100/10-PACK
2H (12)	30 × 13 × 17"	4 1/4 × 19 3/4"	45°, 90°	2 1/2"	43 LBS.	6'	2	TW	\$650	\$66/10-PACK (CARBIDE)
2H (12)	30 × 13 × 17"	4 1/4 × 19 3/4"	45°, 90°	2 1/2"	38 LBS.	6'	2	TW	\$280	\$34/10-PACK
2H (16)	30 3/4 × 12 × 20"	4 1/4 × 19 3/4"	45°, 90°	2 1/2", 4"	43 LBS.	6'	1	TW	\$495	\$66/10-PACK (CARBIDE)
2H (16)	30 3/4 × 12 × 20"	4 1/4 × 19 3/4"	45°, 90°	2 1/2", 4"	49 LBS.	6'	5	TW	\$550	\$60/10-PACK
2H (16)	30 3/4 × 12 × 20"	4 1/4 × 19 3/4"	45°, 90°	2 1/2", 4"	55 LBS.	6'	2	TW	\$450	\$34/10-PACK

1.

A

B

C

D

N/A

Excellent
Good
Fair
Poor
Not applicable
2.
Tested with a shop vacuum for jointers with 2 3/8" and 2 1/2" ports, and a dust collector for jointers with 4" ports.
3.

(KN)

High-speed steel straight knives

(4C)

Carbide inserts with four cutting edges

(2H)

High-speed steel inserts with two cutting edges
4.

(CN)

China

(TW)

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

WHERE TO BUY:

• Craftsman, Delta, Porter-Cable: lowes.com
• Grizzly, Shop Fox: grizzly.com
• Jet, Rikon, Wen: amazon.com

GO BIG WHEN EYEING A JOINTER

Any of the tested jointers can straighten and square a board’s edge, but flattening a face begins to reveal the differences between the models. Two models scored A’s across the board in our testing, but the 8" capacity, table extensions, and long warranty make the Rikon 20-800H (\$550) the clear winner of our Top Tool award. We give a nod to the Grizzly G0946 and G0947 machines for finishing closely.

For Top Value, we honor the Wen 6" JT630H. It costs just \$280 and performed well in all tests.



CUSTOMIZABLE STORAGE CABINET

Flexible configurations
make this simple cabinet a
master of storage versatility.

WRITER: VINCE ANCONA

DESIGNER/BUILDER: KEVIN BOYLE



OVERALL DIMENSIONS
18"W x 18"D x 48½"H



Our storage needs tend to change over time, so it makes sense when building a storage project to come up with a design that can change as well. This cabinet fills the bill. The modular design allows you to make as many shelves or drawers as you need, and rearrange them at any time.

A CASE THAT OFFERS SUPPORT

Note: We chose to build three shelves and three drawers for our cabinet, but you may want to adjust according to your storage needs.

1 Cut the sides (A), top and bottom (B), and shelves (C) to size [Materials List, Exploded View].

2 Using iron-on edge banding, cover the ends of the sides (A), then the front edges (see *Iron Out Ugly Plywood Edges* on page 54). Edge-band the front edges only of the top and bottom (B) and the shelves (C).

3 Using a dado blade partially buried in an auxiliary rip fence, rabbet the ends of the sides (A) [Drawing 1]. Then reposition the rip fence to cut a rabbet along the back edge of each side and the back edge of the top and bottom (B).

4 From 4/4 stock, rip enough $\frac{13}{16}$ "-wide strips for all the shelf supports (D), plus a few extra to use as assembly spacers. Plane the strips to $\frac{3}{4}$ " square, then cut the individual supports to length.



Hold a support in the rabbet as a temporary stop while attaching the first support.

A Using one of the shelf supports (D) as a stop, glue and nail the first shelf support to the side, flush with the top rabbet.

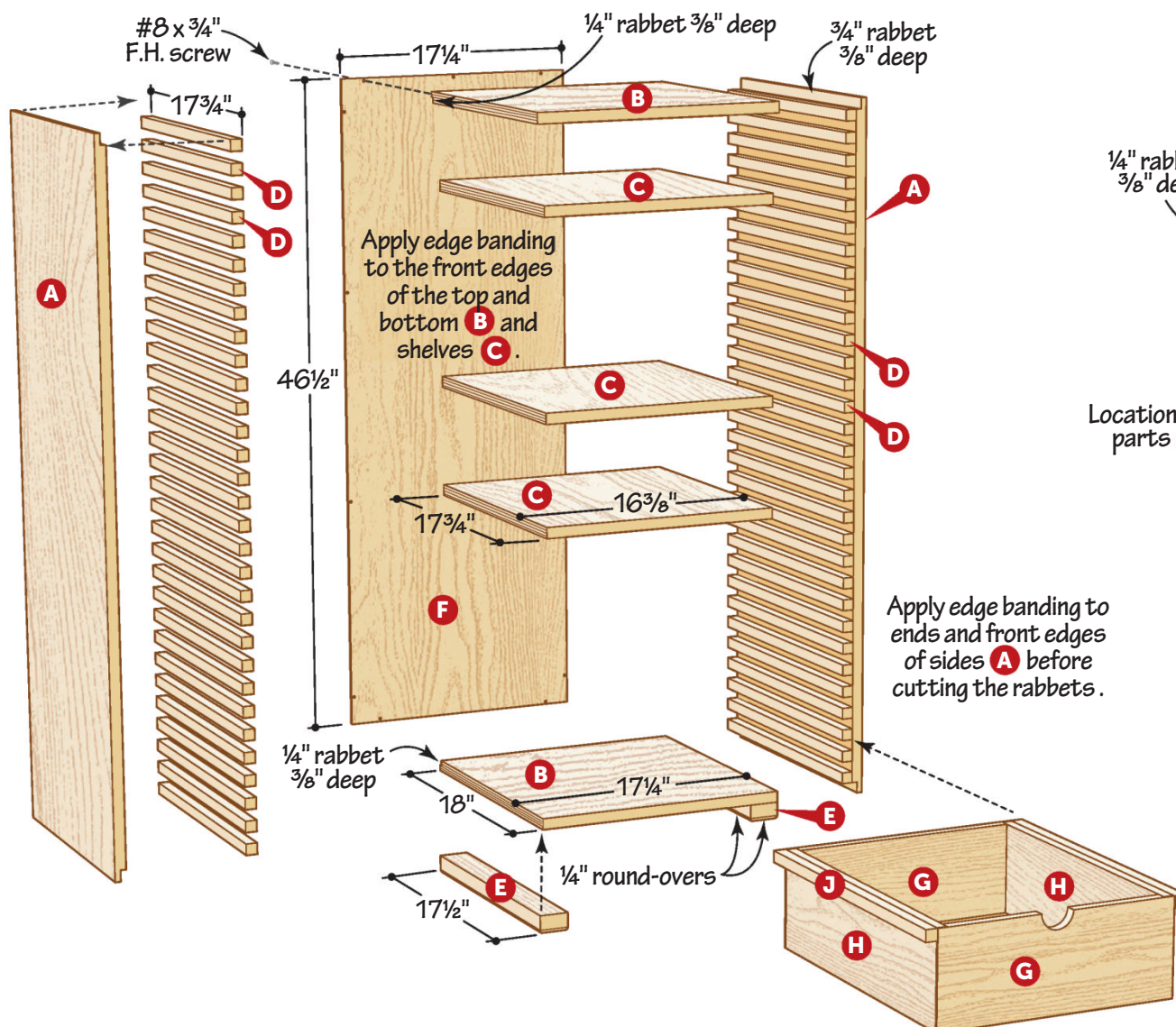
5 Lay one of the sides on your bench and temporarily place a shelf support into the top rabbet. Butt a second support against the first one, then glue and nail it to the side [Photo A].

6 Continue adding shelf supports, working your way down to the bottom of the side [Photo B, Drawing 1]. The last support should end up flush with the edge of the rabbet. Repeat the process for the other side, making sure that both sides are mirror images.

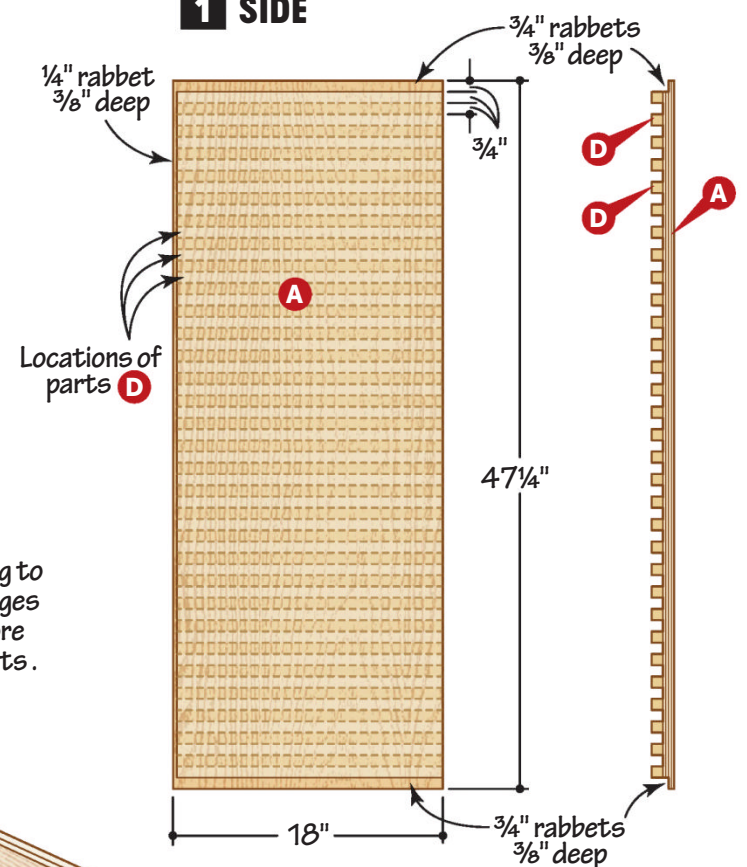
7 Glue up the sides, top, and bottom of the case, checking for square.

Note: Because the plywood we used was slightly under $\frac{3}{4}$ " thick, spacing the supports $\frac{3}{4}$ " apart created the perfect clearance when it came to installing the shelves. If your plywood is a full $\frac{3}{4}$ " thick, adjust the spacing of the supports accordingly.

EXPLODED VIEW



1 SIDE



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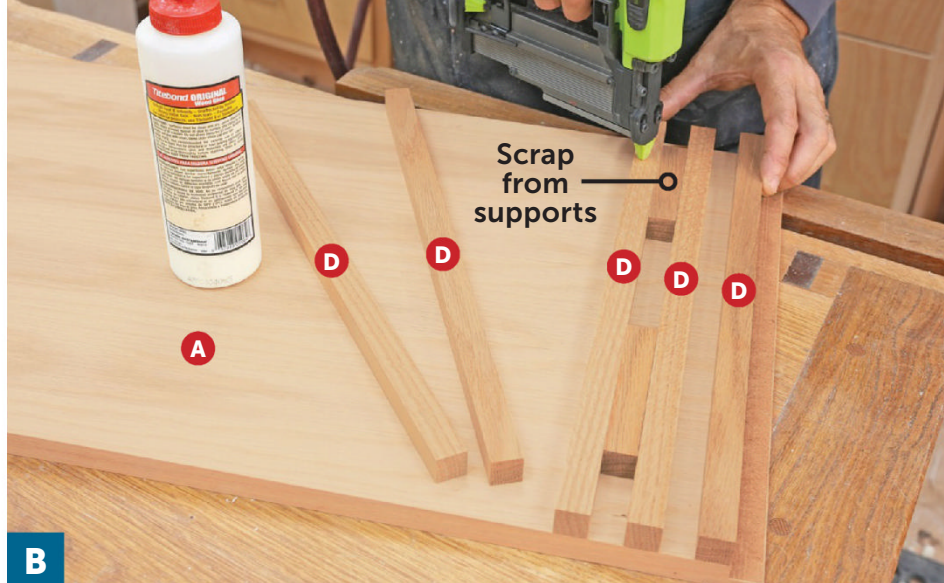
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Continue adding supports down the face of the side (A), using scraps left over from the supports as spacers. If the last support extends past the bottom edge of the rabbet, leave it out.



Clamp a piece of scrap to the top edge of the drawer front (G). Then, position the centerpoint of a 2"-diameter Forstner bit on the seam and drill the finger pull using a slow speed.

8 Cut the feet (E) to size. Round over the edges and ends on one face and glue the feet to the bottom of the case [Exploded View].

9 Cut the back (F) sized to fit in the opening of the case, then set it aside while you work on the drawers.

MODULAR DRAWERS

1 Plane enough stock to $\frac{5}{8}$ " thick for the drawer fronts and backs (G) and sides (H), then cut the parts to final size [Drawing 2].

2 Rabbet the ends of the drawer fronts and backs.

3 Cut a groove on the inside face of the drawer fronts, backs, and sides for the drawer bottoms.

4 Using a Forstner bit, form the finger pulls in the drawer fronts [Photo C].

5 Cut the drawer bottoms (I) to size and glue up the drawers. Cut the drawer cleats (J), sizing them to slide easily between the shelf supports, and glue them to the sides of the drawers, flush with the top edge [Drawing 2].

IRON OUT UGLY PLYWOOD EDGES

Iron-on banding covers plywood edges quickly and easily. Start by digging out the household iron from the back of the closet and turning it to the hottest setting (usually cotton or linen). Make sure the steam setting is turned off. While the iron is heating up, cut strips of banding about an inch longer than the panel edges you're covering. Center the banding on the plywood edge (adhesive side down) and work the hot iron from one end to the other (*below left*). Move the iron slowly

enough to activate the glue, but don't linger too long in one spot or you risk singeing the banding.

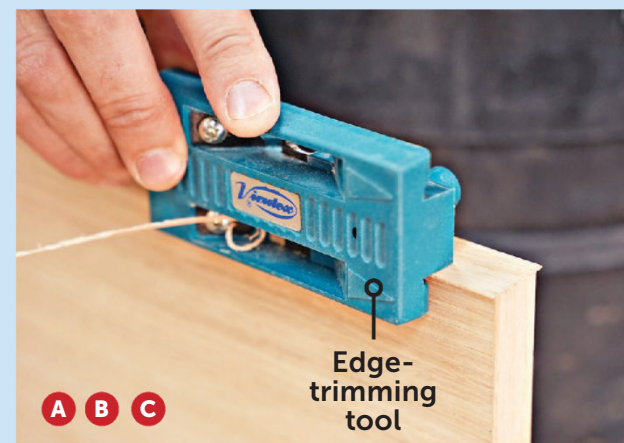
After allowing the adhesive a few minutes to cool and set up, use an end trimmer [Sources] to trim the banding flush with the ends of the panel (*below center*). Then use an edge-trimming tool to trim the banding flush with the faces of the panel (*below right*). Lightly sand the trimmed edges with 150-grit sandpaper to smooth out any rough spots.



Work the iron from one end to the other, using your free hand to keep the edge banding centered on the edge of the panel.



Press the end-trimming tool tight against the end of the panel and squeeze to trim the ends of the edge banding.



To avoid tear-out, separate the two halves of the edge-trimming tool and trim one edge at a time, following the grain direction.

- 6

Finish-sand the drawers, shelves, case, and back, easing the edges and adding slight chamfers to the front edges of the supports (D).
- 7

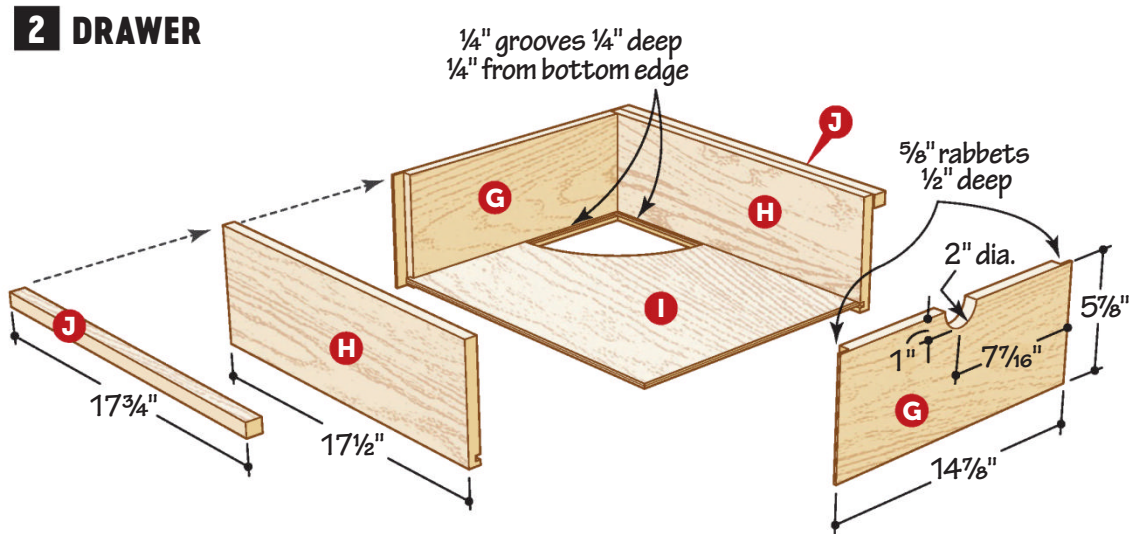
Apply a finish of your choice. We sprayed three coats of M.L. Campbell MagnaMax dull lacquer.
- 8

With the finish dry, screw the back (F) to the case and determine how you want to configure the shelves and drawers for maximum efficiency. Then load them up. 🌲

MATERIALS LIST

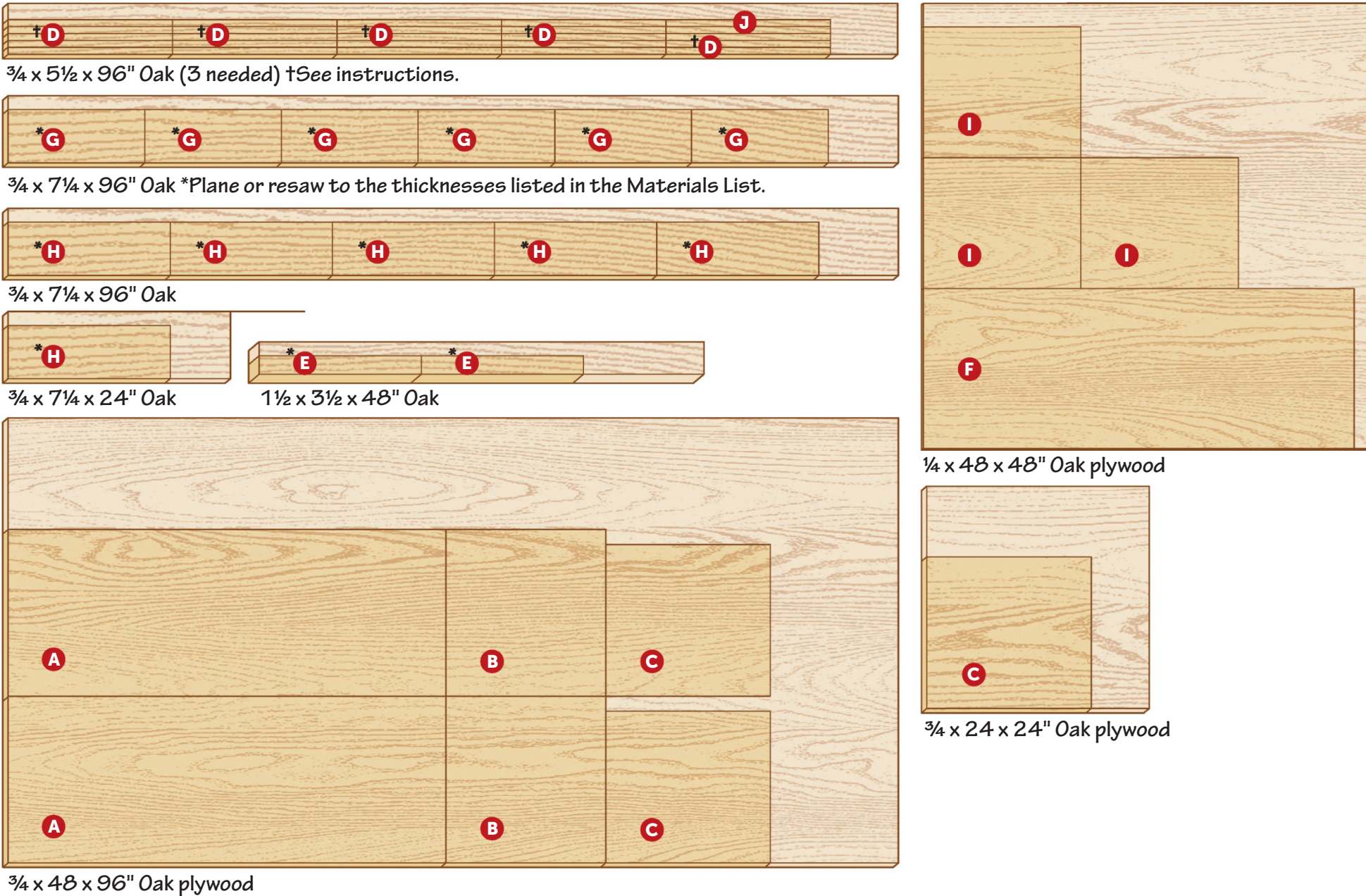
PART		FINISHED SIZE			Matl.	Qty.
		T	W	L		
A	CASE SIDES	¾"	18"	47¼"	OP	2
B	CASE TOP/BOTTOM	¾"	18"	17¼"	OP	2
C	SHELVES	¾"	16⅜"	17¾"	OP	3
D	SHELF SUPPORTS	¾"	¾"	17¾"	O	62
E	FEET	1¼"	2"	17½"	O	2
F	CASE BACK	¼"	17¼"	46½"	OP	1
G	DRAWER FRONTS/BACKS	⅝"	5⅞"	14⅞"	O	6
H	DRAWER SIDES	⅝"	5⅞"	17½"	O	6
I	DRAWER BOTTOMS	¼"	14⅛"	17"	OP	3
J	DRAWER CLEATS	¾"	¾"	17¾"	O	6

MATERIALS KEY: OP—oak plywood, O—oak.
SUPPLIES: #8x3/4" flathead screws, 1 1/4" brads, oak iron-on edge banding.
BLADE AND BITS: Dado set, 1/4" round-over router bit, 2" Forstner bit.
SOURCES: Virutex banding trimming tools, woodmagazine.com/bandingtools.
PROJECT COST: It cost us about \$350 to build this project. Your cost will vary by region and source.



CUTTING DIAGRAM

This project requires 24 board feet of 4/4 oak and 3 board feet of 8/4 oak based on example boards shown.



45 MUST-HAVE SHOP ACCESSORIES

In the shop, as in life, little things can make a big impact on the experience. Here are some small things we love.

WRITER: RANDY MAXEY



PHOTOGRAPHER: BRIE GOLDMAN

FOR YOUR SHOP APRON



Get one or all of these handy shop helpers with our shopping list. woodmagazine.com/shopessentials

A good shop apron [1] makes your shop time more efficient. It protects your clothing and, more importantly, keeps tools within easy reach so you won't have to play hide and seek. Here are a few things worthy of pocket space in any shop apron.

A pencil [2] or two should always occupy a readily accessible apron pocket. Sharp No. 2 pencils mark well without scoring the grain. Or choose a mechanical pencil to eliminate sharpening.

A construction calculator or phone app [3] takes the work out of workshop math. It makes adding, subtracting, and multiplying fractions easy, can calculate board feet, and a lot more.

A digital angle gauge [4] accurately sets or checks the angle of the blade in your tablesaw or miter saw. You're sure

to find dozens of other applications for this small electronic wonder.

Marking gauges [5] and knives [6] excel at scoring crisp, clean lines on the workpiece. They're the ultimate tools for laying out precise joinery. (Just be sure to use a blade cover or pocket protector for the knife blade.)

You'll reach for the 6" steel rule [7] more often than any other tool in your apron. It's ideal for tool setup and layout tasks. Of course, you'll also want a tape measure [8]. Invest in a 10- or 12-footer. That size provides more than adequate length for working with boards and sheet goods without being bulky.

Use a 4" or 6" double-square [9] for perfectly square tool setups and layout lines. Invest in quality here, and you'll get a lifetime of accuracy.

TOOL MAINTENANCE

Keeping your hand and power tools clean and in good working order takes time but has big benefits in safety and quality results.

Rust sometimes appears seemingly out of nowhere and removing it can be a challenge. Wire brushes [10] and non-woven abrasive pads [11], combined with a little elbow grease, go a long way toward removing the rust. A good soaking with liquid rust remover [12] takes care of more-severe rust easily.

Once the rust is removed, protect the surface of hand tools with a lightweight oil [13]. Use a paraffin wax [14] or metal-protecting coatings [15] to keep cast-iron surfaces of stationary tools such as your tablesaw rust-free without contaminating your wood.





I NEVER USE POWER TOOLS WITHOUT WEARING HEARING PROTECTION, BUT I ALSO LIKE TO LISTEN TO MUSIC AS I WORK. MY BLUETOOTH EARMUFFS REDUCE TOOL NOISE ENOUGH TO LISTEN AT A SAFE, LOW VOLUME, EVEN WHILE RUNNING NOISY TOOLS.

—JOHN OLSON,
DESIGN EDITOR



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COMFORT & SAFETY



You understand the importance of wearing safety glasses and hearing protection in the shop. For those of us with additional vision needs, some safety glasses [16] offer bifocal lenses to assist in close-up work. If you already wear prescription glasses, don't rely on those to be your sole eye protection. Instead, shop for safety glasses designed to fit over them.

Ample lighting is essential for any workshop. A variety of super-bright LED fixtures [17] screw into ceiling light sockets and direct light where needed.

When shopping for hearing protection, look for a noise reduction rating (NRR) of 20 decibels or higher. Some ear plugs and earmuffs [18] offer Bluetooth connectivity to pair with your phone so you can listen to music while protecting your hearing.

The importance of a well-stocked first-aid kit [19] can't be understated. Some kits include a special powder to stop bleeding in the event of a severe cut. BleedStop powder is also available separately.

Make yourself more comfortable while you work with an anti-fatigue floor mat [20]. You'll be surprised how much they reduce leg tiredness, foot fatigue, and back pain. A sturdy shop stool [21] also proves essential when you want to get off your feet.

Save your back when moving sheet goods with a panel carrier [22]. It securely clamps and provides a handle for easy lifting.

To keep dust at bay, connect your shop vacuum to a tool-activated outlet [23] that turns on the vac every time you turn on the tool.

ASSEMBLY & GLUE-UP

Make your glue-ups easier by having these supplies at hand and ready to go.

Start with a glue mat [24] that makes cleanup easy and protects your bench. Made of silicone, any traces of dried wood glue simply pop off. The same goes for the brush, tray, and spreader in a glue kit [25]. Use these to spread a consistent film of wood glue on a workpiece. Disposable acid brushes [26]

prove handy for messy glues such as polyurethane and epoxy.

A selection of glue bottles [27] provide helpful options for glue application. Some feature different caps for specific applications. Others boast a non-drip spout for less mess.

During assembly, clamping squares [28] work in tandem with clamps to keep workpieces square while the glue dries. For smaller assemblies, painters tape [29] lends a helping hand to hold joints together. Keep a spray bottle [30] filled with water nearby to assist with cleanup.



FINISHING

Applying a finish to your project becomes easier with the right supplies.

Start by protecting the worksurface with kraft paper [31]. It absorbs the inevitable drips and spills.

To prepare the project for finish, some sanding is in order. First, don a reusable dust mask [32] to protect your lungs from fine dust. Self-adhesive sandpaper on cork sanding blocks [33] eases the hassle when sanding by hand.

Before applying the finish, protect your hands with nitrile gloves [34]. These stand up to both solvent-based and water-based finishes.

Disposable foam brushes [35] help you apply everything from stain to paint to wipe-on topcoats. Keep a variety of sizes on hand.

No workshop is complete without shop towels. Disposable towels [36] come in rolls or pop-up boxes. Remember to use caution when disposing of rags used with oil-based finishes.



WHEN DISPOSABLE DUST MASKS BECAME HARD TO GET, I SWITCHED TO REUSABLE VERSIONS WITH REPLACEABLE INSERTS. NOW, I'LL NEVER GO BACK. THEY WORK GREAT AND ARE MORE COMFORTABLE.

-KEVIN BOYLE, DESIGN EDITOR



woodmagazine.com/
keepyournoseclean



AT THE WORKBENCH



Your workbench is the heart of the workshop and there are several items you'll want to keep nearby. For example, a good bench brush [37] and extra-large dustpan [38] make quick work of clearing off shavings and sawdust.

Protect the surface of your workbench from glue and finish drips with an inexpensive silicone mat [39]. The nonslip mat also keeps a workpiece in place for routing or hand tool work.

For measuring and layout work, there are several tools to keep within arms reach. A high-quality 6" or 12" combination square [40] facilitates accurate assemblies. Steel rules [41] assist with measuring

tasks and make great straightedges for checking the flatness of a workpiece. Flexible curves [42] bend into any profile and hold their shape for tracing curves. French curve templates [43] offer the ability to trace free-form shapes.

Double-sided tape [44] finds a myriad of uses in the shop. It holds a workpiece in place for turning or router work, for example. It's also great for securing templates or holding workpieces together for ganged machining.

Magnetic tool holders [45] mounted to a nearby wall or on the side of the workbench organize metal tools and keep them easily accessible. 🌳

4 CNC-MADE SHOP HELPERS

Two storage trays perfectly hold (and release) router bits and hex-shank bits, and a pair of handy pushsticks keep stock safely under control.

WRITER & PHOTOGRAPHER: GEORGE VONDRISKA



Over the years, I've created a bunch of ways to hold router bits and drill bits, and I've made more than a few pushsticks. My CNC proves the perfect tool for shop helpers like these, because I can easily pull up the saved files and make more any time I want. In addition to making these items for my own shop, I've made and given away a boatload to other woodworkers.

We're providing you with VCarve.crv files (Version 9.5) and DXF files, so you don't have to do any design work. You'll need to make test cuts and possibly tweak the toolpath to get a perfect fit for your router bits and hex drivers. I'll help you with that, and show you how to nest the pushsticks for good yield.

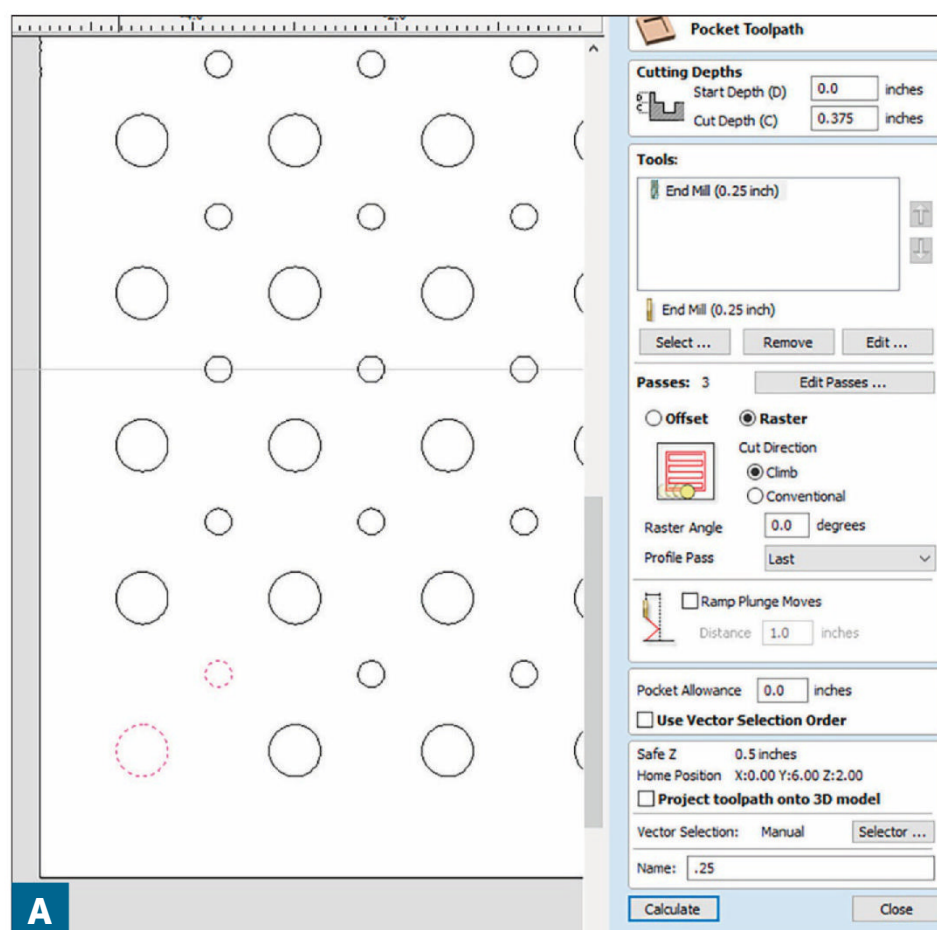
ROUTER-BIT STORAGE TRAY

A great-working router-bit tray features slightly oversized holes so it's easy to get the bits in and out. By slightly, I mean a few thousandths of an inch. That's difficult to do on a drill press, but easy on a CNC. I've found that oversizing the holes for $\frac{1}{4}$ " shanks by .007" and the holes for $\frac{1}{2}$ " shanks by .009" works well to provide clearance without slop.

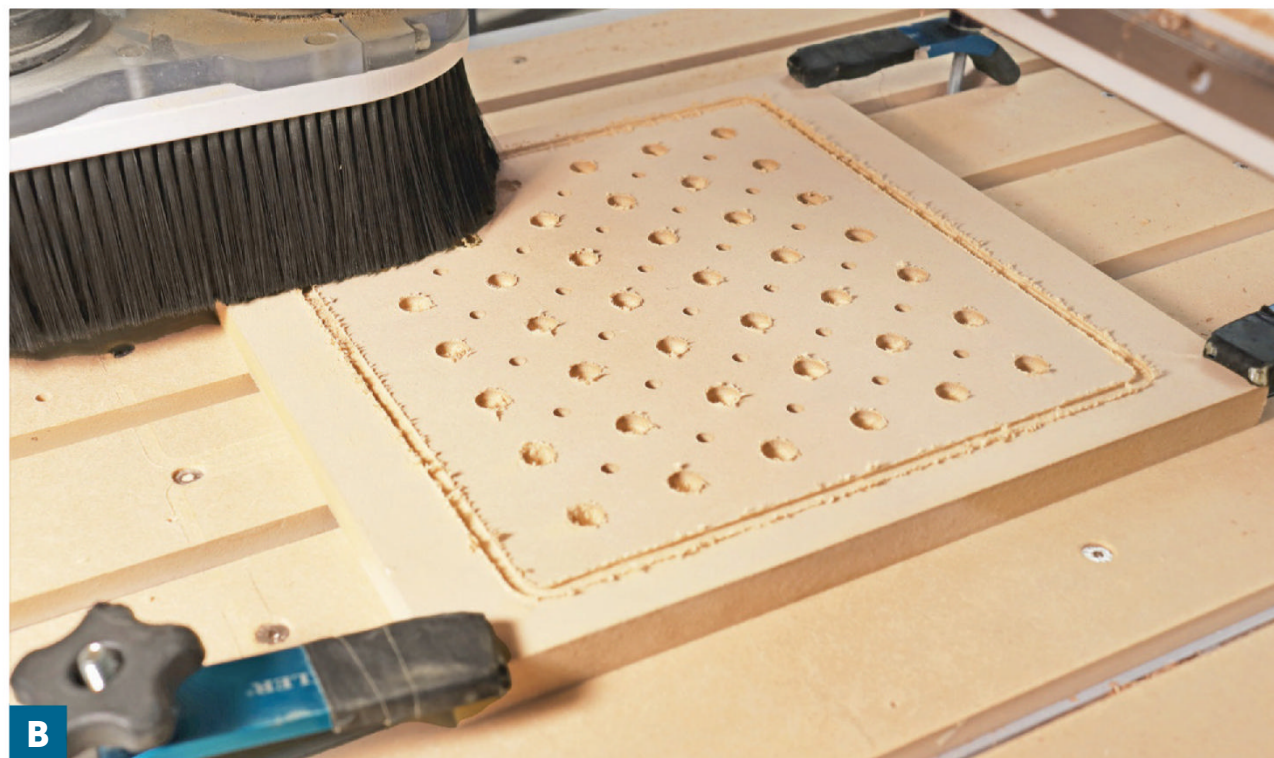
I've provided two sizes of trays. If those sizes aren't what you need, copy and paste holes onto a larger tray, or delete holes for a smaller tray. Load the file, select a hole of each size, and open the *Pocket Toolpath* [Photo A]. Specify a $\frac{1}{4}$ " upcut spiral router bit and $\frac{3}{8}$ " depth of cut. Save the toolpath and use your CNC to cut two test holes in scrap.

Check the fit using a router bit of each shank size. If your holes are too big or too small, adjust the size by cheating the software to edit the specs of the bit in your CNC. This is easier than changing the size of every hole on the tray.

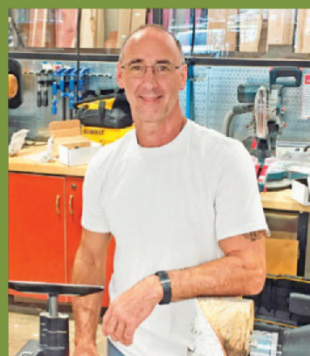
To do this, open the *Pocket Toolpath*, click the *Edit* button, and change the



You can use the downloadable files to customize your own router-bit tray. Select two holes. Use the *Pocket Toolpath* and a $\frac{1}{4}$ " bit to make $\frac{3}{8}$ "-deep holes. Save the toolpath and take it to your CNC for a test cut.



Machine your router-bit tray when you have the fit you want. A tray full of router bits can be heavy, so $\frac{3}{4}$ " MDF works well for these. MDF's stability also helps the holes hold their shape.



George Vondriska runs his woodworking school in Hammond, Wisconsin, and frequently teaches at other locations throughout the country. He is also the managing editor of the Woodworkers Guild of America. Learn more by visiting georgevondriska.com.

router-bit diameter. If the holes are too large, make the bit diameter larger. If the holes are too small, make the bit diameter smaller.

Remember that any change you make to bit diameter has twice that effect on the hole size, so be conservative. A few thousandths of an inch can create a significant change in hole size.

Save the toolpath and make new test cuts. Rinse and repeat until you're happy

with the fit. Then create a toolpath for the rest of the holes and outside shape (use a *Profile Toolpath* for that), and cut your tray [Photo B].

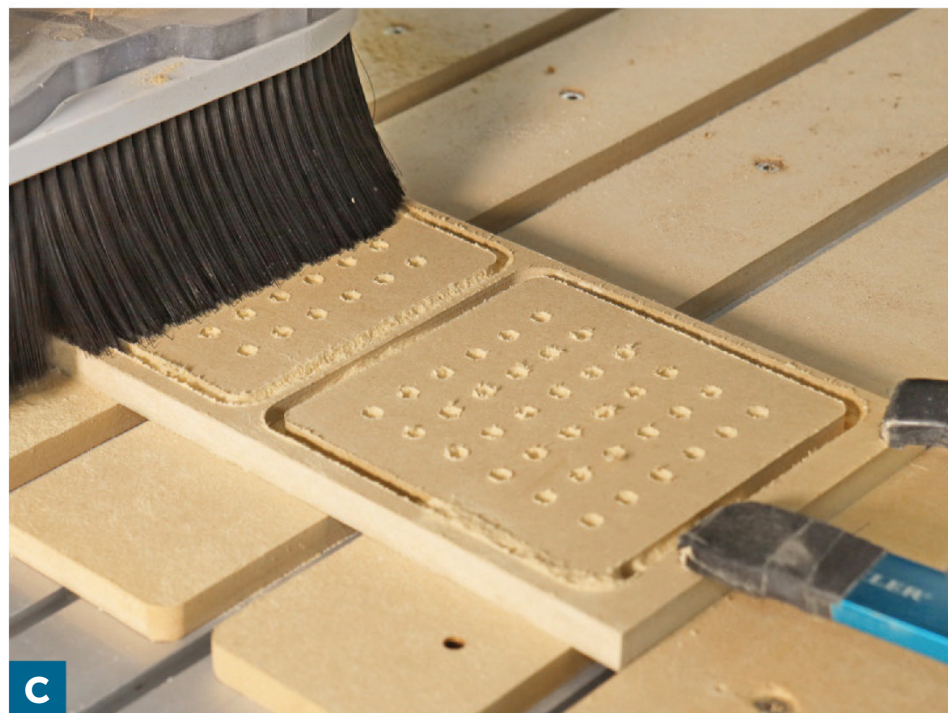
The files I've created for this article have tabs around the outside to hold the tray and waste together on the spoil-board. People often cut the tabs using a jigsaw and then sand, but I have an easier way. See *A Panel Trimmer Makes Quick Work of Tabs* on page 64.

Download the
VCarve and .dxf
files for these
shop helpers.
woodmagazine.com/
cncshophelpers

HEX-SHANK DRIVER TRAY

How many driver tips do you have floating around your shop? Phillips, star, square... Add in nut drivers and all the other stuff you routinely use in your cordless drill and impact driver, and you have a herd of hex drivers happy to hide from you. You need a storage tray with hex-shaped holes to hold them. Try that with a drill press.

Load the design and follow the same procedure as the router-bit tray. Use the *Pocket Toolpath* option, a $\frac{1}{8}$ " upcut spiral router bit and $\frac{3}{8}$ " depth of cut. Save the toolpath then cut one hex hole in scrap and test the fit. Edit the diameter of the router bit as needed to tweak the fit. With that, you're ready to cut your hex-shank driver tray [Photo C].



Use $\frac{1}{2}$ " MDF for your hex-shank driver trays, with a tabbed profile toolpath to create the final outside shape.

A PLETHORA OF PUSHSTICKS

There are plenty of times you need a pushstick in your shop to protect your digits. I have two stick styles for you. The slender one works great for making narrow rip cuts. The larger pushstick has a hand hole and long nose that help you keep consistent pressure during your cuts.

The provided file makes four of each style pushstick from a 24x24" piece of $\frac{1}{2}$ " plywood. If you're working with a different-size blank, you can easily nest the parts to fit your material.

To do that, open the file and enter your material size. Copy and paste one of each pushstick into your file. Select the two pushsticks. In VCarve Pro, click on the *Nesting* icon. Set the nesting parameters [Photo D]. *Clearance* is the space between parts. *Border Gap* is the amount of real estate you're leaving around the edges. Allow parts to rotate and mirror to give the software the maximum control over fitting the workpieces. Grain direction isn't critical on plywood pushsticks, so rotating to 45° works fine. Click *Preview*.

A PANEL TRIMMER MAKES QUICK WORK OF TABS.

Tabs are the little bridges that hold the project to the waste wood around it. Tabs provide an easy way to keep your work secure, but later need to be cut away.

I commonly use $\frac{1}{4}$ " bits to cut the profile toolpath, so not many flush-trim bits will fit in the resulting groove. But, a panel pilot bevel bit, commonly used to trim plastic laminate, fits fine and works great.

After you remove your workpiece from the spoilboard, just flip the workpiece facedown, mount the bit in your router, and flush trim right through those tabs.

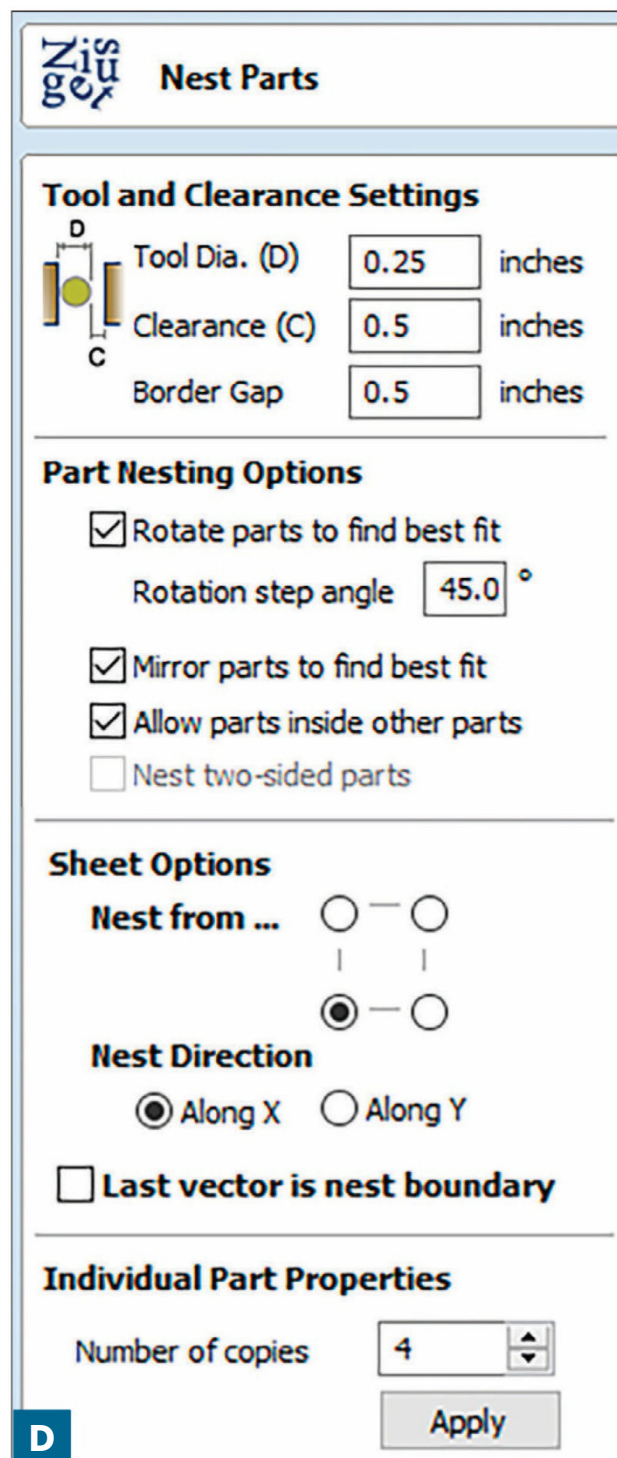


Software like VCarve Pro provides flexibility when nesting. If, the nested parts overflow onto another sheet you can reduce the number of copies you're making, reduce the border gap (leaving enough to accommodate hold-down devices), reduce the clearance, or do all three. Experiment until you get the best combination of fit and material usage.

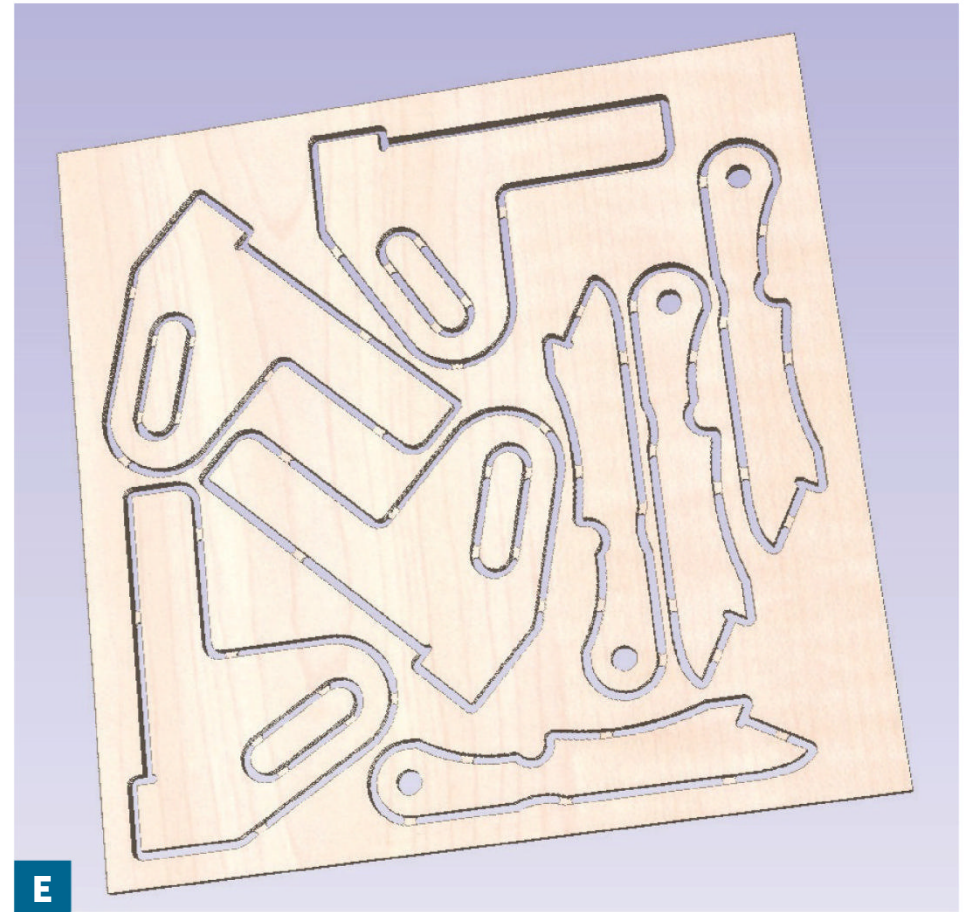
Use *Profile* and *Pocket Toolpaths* to create toolpaths for the pushsticks, and then check your work [Photo E]. Once satisfied, it's easy to cut your pushsticks [Photo F].

That's the beauty of creating projects like these using a CNC. You know you'll want more bit storage someday. Of course you'll wear out your pushsticks

and need more. With the files saved, all you have to do is mount the right bit, add your material, and then run the program to produce more. And you can help out all those friends who will want these shop helpers without a lot of hassle. Of course, they don't have to know how easy it was. I'll never tell. 🌲



To cut multiple parts in the smallest space, first establish the nesting parameters. Then set the number of copies you want. Try different numbers until you get the best layout.



You can view the layout of your nested parts in several ways, including viewing the full toolpath, as you work to effectively nest your parts to maximize material yield.



Routing on the CNC produces eight pushsticks faster and from less stock than you could about any other way. After a light sanding, they're ready to use—and use up—guilt free.

BEE HOTEL

Provide nesting habitat for native solitary bees that serve as important pollinators.

WRITER: ZACH BROWN
DESIGNER/BUILDER: JOHN OLSON



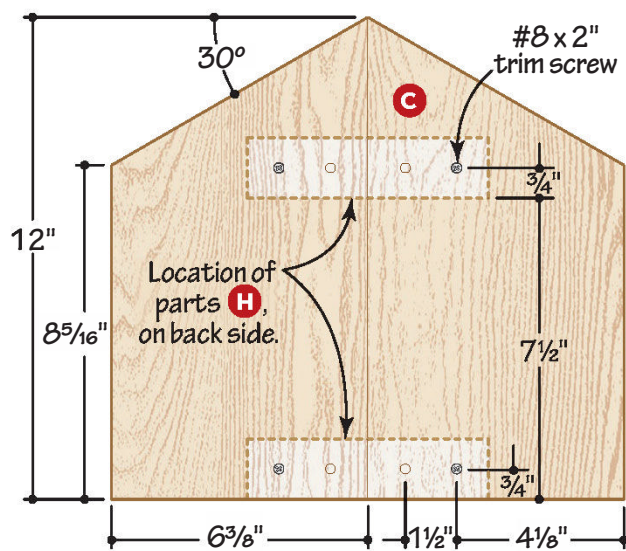
OVERALL DIMENSIONS
19½"W x 11¼"D x 14"H

PHOTOGRAPHER: MARTY BALDWIN; ILLUSTRATORS: ROXANNE LEMOINE, LORNA JOHNSON

Tunnel-nesting bees, unlike honey bees, build their nests in tunnel-like cavities found throughout nature and the built environment. Attract these pollinators to your garden, and give them 5-star accommodations, with this easy-to-build bee hotel.

The back of the hotel attaches to a post and the structure slides over it, making it easy to remove for routine cleaning and to replace the nesting material.

1 BACK



PREPARE THE PARTS

1 If necessary, edge-glue stock to width for parts A–G [Materials List]. Once the glue dries, rip each part to finished width and crosscut one end square.

2 Cut the shelves (A) and lower divider (B) to length. Miter-cut the top end of each back panel (C), then edge-glue them together [Drawing 1].

3 Tilt the tablesaw blade to 30° and bevel-cut both ends of the sides (D) and one end of the upper dividers (E), sub-roof panels (F), and roof panels (G) [Drawing 2].

4 Install a 3/4 inch straight router bit in the router table and rout the grooves in the sides (D) and the stopped grooves in the sub-roof panels (F) [Drawing 2].



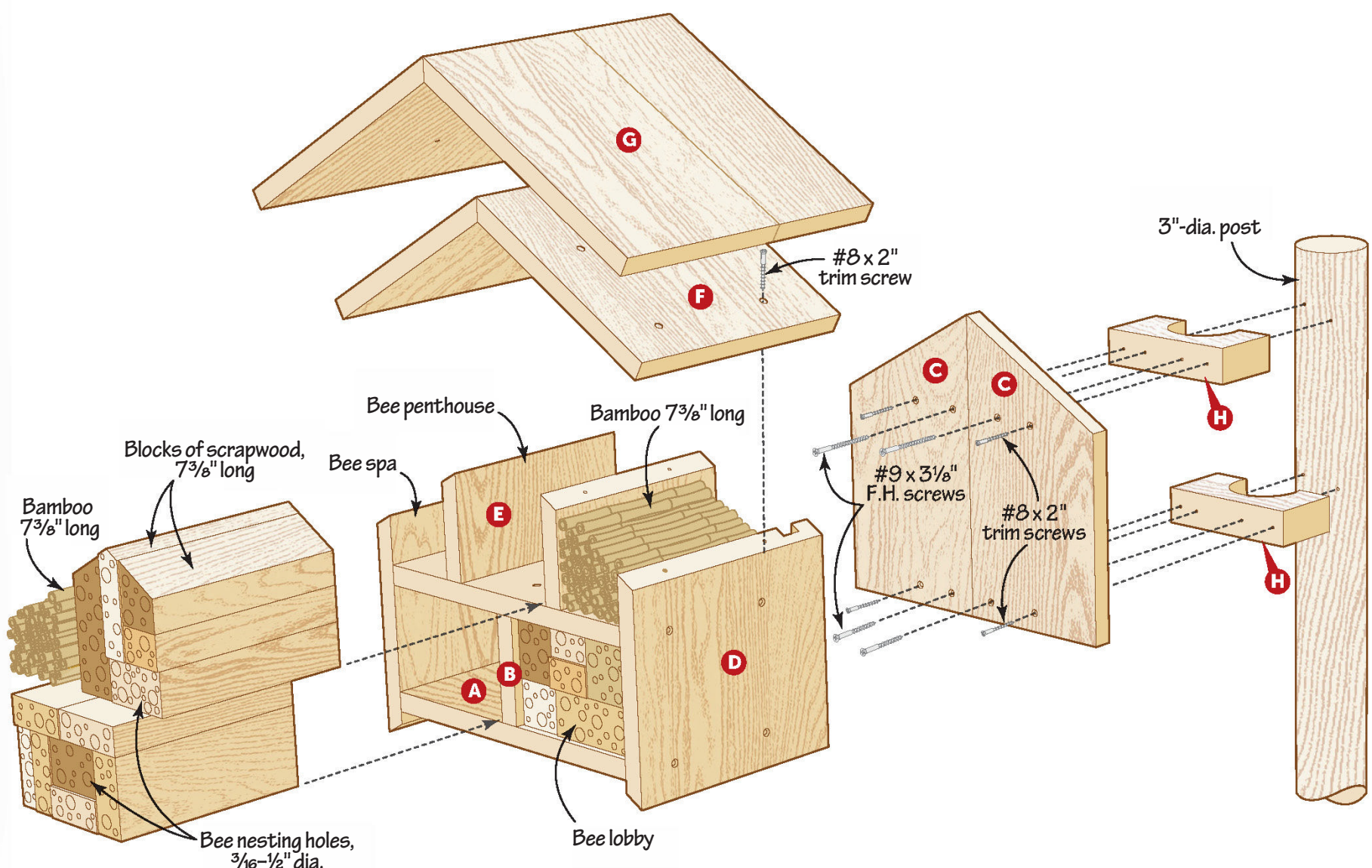
Learn all about tunnel-nesting bees and where to locate your bee hotel with this guide from Michigan State University Extension. woodmagazine.com/beehotel

IF YOU BUILD IT, THEY WILL BUZZ

1 Glue and screw the upper shelf (A) to the upper dividers (E) and the lower shelf to the lower divider (B) [Drawing 2].

2 Apply glue to the lower divider and screw the upper assembly to the lower assembly, flush on all sides [Drawing 2].

EXPLODED VIEW





Using biscuits to keep it aligned, clamp across the sub-roof assembly (F/F) with a pair of bar clamps until the bottom of the bevel just comes together. Then, add vertical clamps to press the joint closed.

Align the back edge of the dividers (E) with the front of the groove in the sub-roof (F/F). Check for square between the upper shelf (A) and dividers before fastening the sub-roof.

3 Cut biscuit slots in the beveled ends of the sub-roof panels (F) [Drawing 2], then glue and clamp them together [Photo A]. Repeat this step for the roof panels (G).

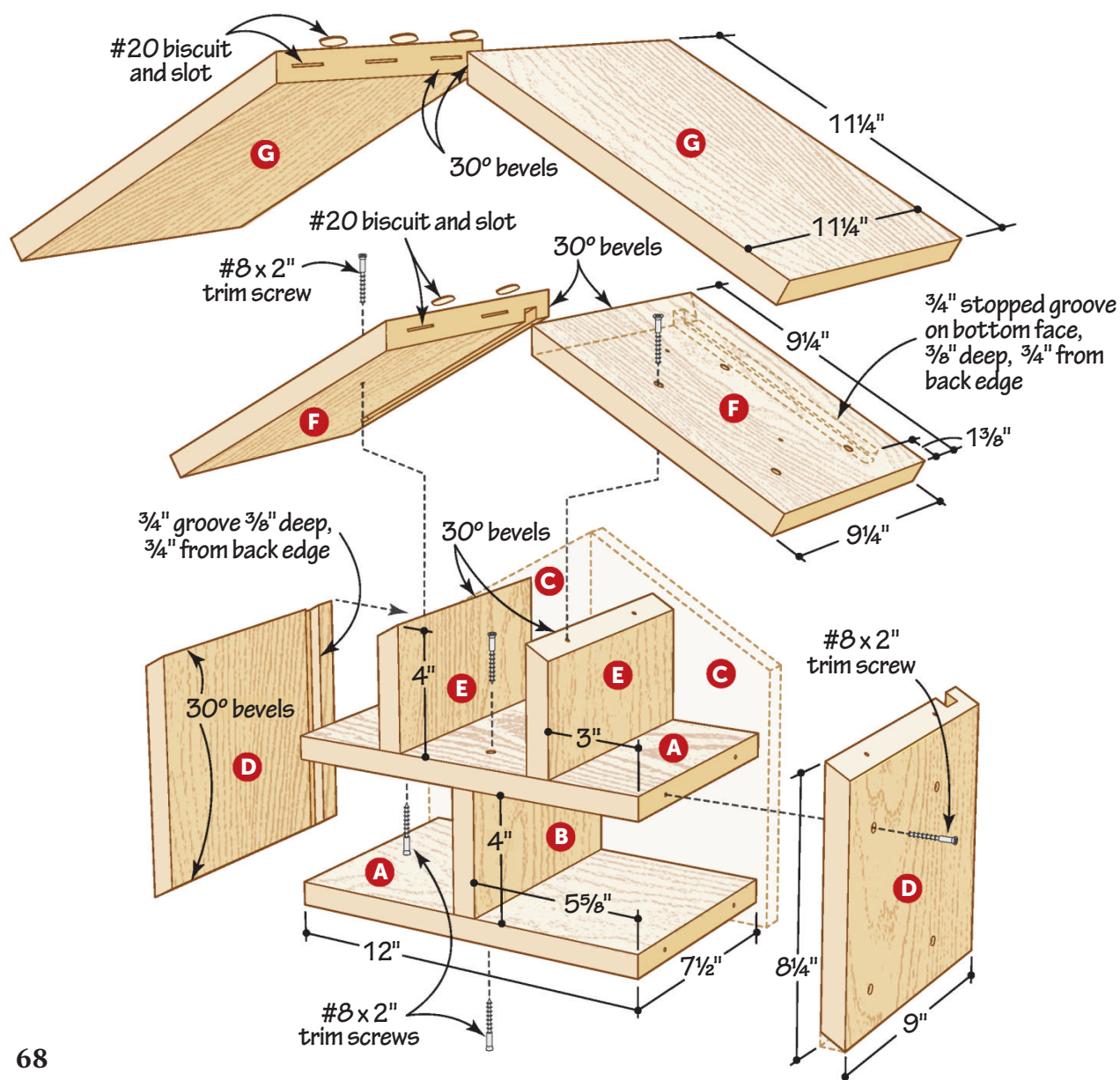
4 Glue and screw the sub-roof (F/F) to the upper dividers (E) [Drawing 2, Photo B].

5 Apply glue to the ends of the shelves (A) and the upper end of the sides (D), then screw the sides to the assembly, aligning the grooves with those on the bottom of the sub-roof [Drawing 2].

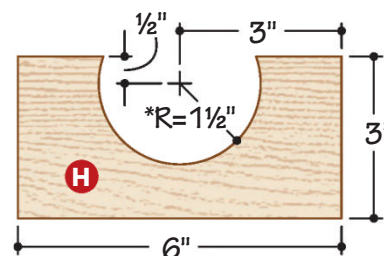
6 Glue and clamp the roof (G/G) to the sub-roof (F/F), flush at the back.

7 Cut the support cleats (H) to size and shape for your mounting post [Drawing 3]. Glue and screw them, centered, to the back (C/C) [Drawing 1].

2 FRONT VIEW



3 SUPPORT CLEAT



*Adjust as required for your own mounting post.

VACANCIES TO FILL

You can fill the openings with hollow stems like bamboo or reeds, or even straws, to create the smooth-walled nesting tunnels for the bees. We used a combination of bamboo and wood blocks with holes drilled into the end grain.

Note: To attract a range of bee species, we drilled holes from 3/16 to 1/2" in diameter in 1/16" increments and at least 5" deep. Learn more about species' hole-size preferences at the link at the beginning of this article.

- 1 Cut scraps of wood to 7 3/8" long and arrange and shape them to fit in the hotel openings [Exploded View]. Then, drill nesting holes in the end grain of each block. Use sharp brad-point bits at high speed to avoid rough edges that could damage the bee's wings. If using bamboo or another hollow plant stem, cut each segment below the node, then cut it to length, forming a closed end at the back of the tube and an open end at the front.
- 2 Slide the back (C/C) onto the hotel and make any adjustments needed to provide a smooth fit. Then, apply a finish to the hotel and back assembly. We sprayed everything except the roof with Rust-Oleum Strawflower, and brushed the roof with a medium-gray porch-floor paint.
- 3 Once the finish dries, screw the back to a post [Exploded View], facing the front of the hotel toward the rising sun and 4-5' off the ground.
- 4 Slide the hotel onto the back and fill the openings with your nesting material. Over the first few seasons, observe which holes the bees prefer and take notes for a future hotel renovation project. 🌿



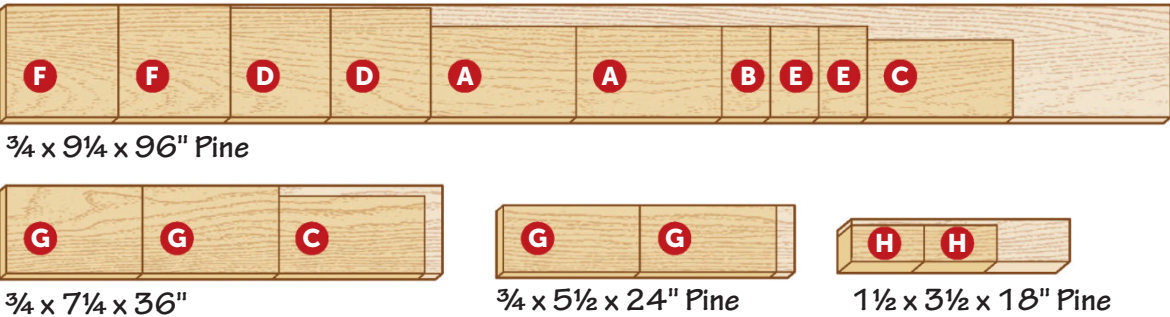
MATERIALS LIST

PART		FINISHED SIZE			Matl.	Qty.
		T	W	L		
A	SHELVES	¾"	7½"	12"	P	2
B	LOWER DIVIDER	¾"	7½"	4"	P	1
C	BACK PANELS	¾"	6⅜"	12"	P	2
D	SIDES	¾"	9"	8¼"	P	2
E	UPPER DIVIDERS	¾"	7½"	4"	P	2
F	SUB-ROOF PANELS	¾"	9¼"	9¼"	P	2
G	ROOF PANELS	¾"	11¼"	11¼"	P	2
H	SUPPORT CLEATS	1½"	3"	6"	P	2

MATERIALS KEY: P—pine.
SUPPLIES: #8x2" trim screws, #9x3 1/8" F.H. screws, #20 biscuits, scrapwood blocks or other nesting materials.
BIT: 3/4" straight router bit.
PROJECT COST: It cost us about \$50 to build this project. Your cost will vary by region and source.

CUTTING DIAGRAM

This project requires 10 board feet of 4/4 pine and one 2x4 based on the example boards shown.





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THE DOMINO EFFECT

Since Festool launched the Domino joinery tool in 2007, it has garnered wide respect for its ability to speed the creation of loose-tenon joints for many projects. A cross between a plunge router and biscuit joiner, the Domino uses a spiral bit to cut slotted mortises in a variety of sizes. You cut mating slots in workpieces, then glue in loose tenons that resemble dominoes. Lately, we've seen more and more accessories popping up for this tool (the original DF 500) as well as its larger sibling (the XL DF 700). We tested a variety and recommend the following for your Domino.

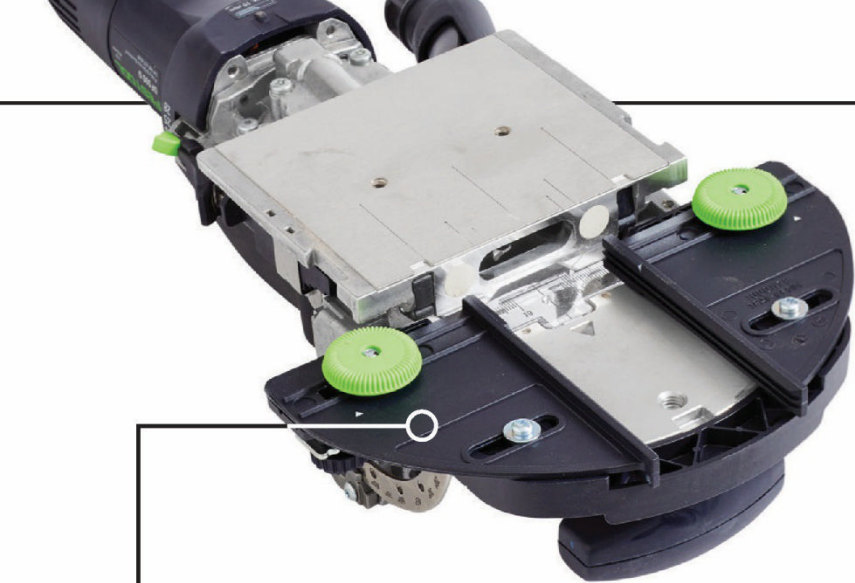


Veritas Domino Joinery Table

The Domino tool doesn't always work well with small workpieces because they're hard to hold securely. Cuts into miters are especially troublesome. That's where this table comes in, combining a clamping surface, a stationary fence, and a movable triangular guide to align workpieces for 45° and 90° joinery. You can also make custom guides for other angles. The Domino (only the DF 500) mounts to the table, and 6mm shims elevate it to center mortises in 3/4"-thick stock. Optional shims in 2mm, 4mm, and 8mm sizes (no. 05J1702, \$25) accommodate different offsets.

This table works perfectly for 90° joints, but 45° miters are fussier, requiring you to reposition the angled guide and hold-downs after cutting the mortises in half of the joints. Although the hold-downs work, we'd prefer quick-acting toggle clamps to speed up the process of clamping and unclamping each piece.

Lee Valley, leevalley.com
no. 05J1701, \$319



Trim Stop

This accessory clips onto the Domino fence (both models), allowing you to align narrow stock to the cutter. The fences adjust independently, so you can center or offset mortises in stock from $\frac{7}{8}$ " to $2\frac{3}{4}$ " wide. It works well but requires clamping workpieces to a workbench. Standard with both models now, it was originally an optional accessory, so earlier buyers might not have one.

Festool, festoolusa.com
no. LA-DF 500/700, \$87



BigFoot 2.0 Base System

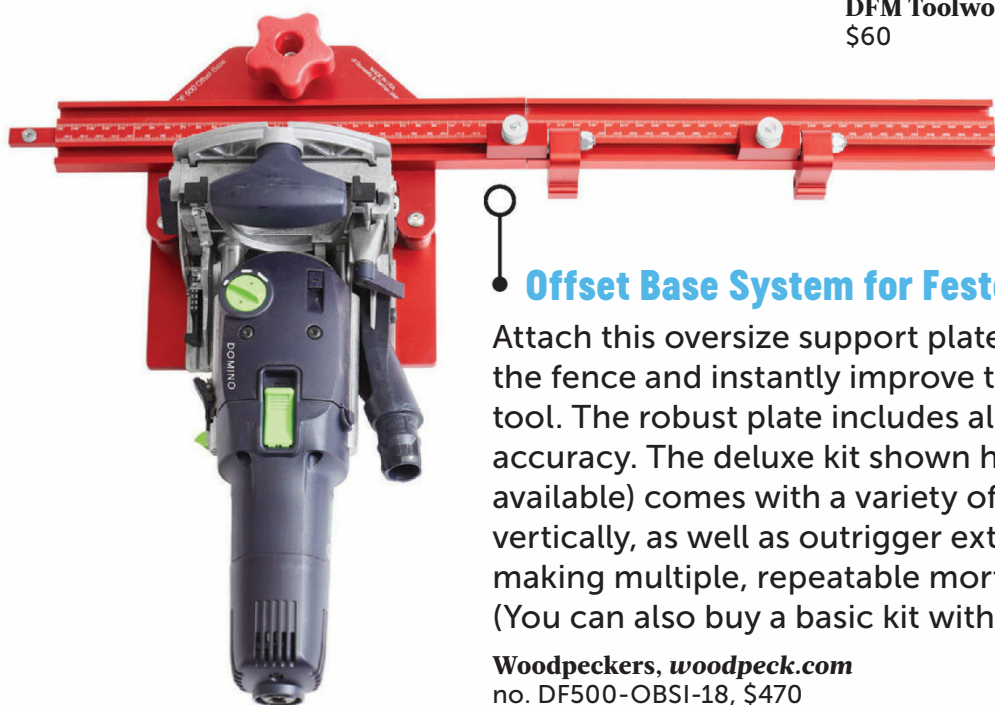
This right-angle plate fits both Domino tools, providing a welcome stability when using the tool vertically. The BigFoot can be mounted flush with the folded-up fence, or offset in mounting slots. If you don't already have Festool's Support Bracket, get this one instead.

TSO Products, tsoproducts.com
no. DBF-45 BigFoot v2.0, \$95

A2 Domino Trim Plate

Who else routinely sands each solid-wood Domino tenon just a bit when they're a little too tight in the mortise? With this plate, you instead drive tenons through the mating slots with a mallet to shave just enough material to loosen the fit ever so slightly. Anyone who's done a dry fit with Domino tenons—and struggled to remove them for gluing—will appreciate this accessory.

DFM Toolworks, dfmtoolworks.com
\$60



Offset Base System for Festool Domino

Attach this oversize support plate to your Domino to replace the fence and instantly improve the stability and support of the tool. The robust plate includes alignment markings for accuracy. The deluxe kit shown here (in inches; metric also available) comes with a variety of bushings to center mortises vertically, as well as outrigger extensions with flip-stops for making multiple, repeatable mortises along a workpiece's edge. (You can also buy a basic kit without the extensions for \$340.)

Woodpeckers, woodpeck.com
no. DF500-OBSI-18, \$470

Mortise Match

This table works like the Veritas version, but it accepts both Domino models. The spring-loaded mounting plate allows you to center mortises in stock vertically from $\frac{1}{4}$ " to $1\frac{3}{16}$ ". An adjustable guide fence aligns workpieces at 45° and 90° accurately and any angle in between (though there's no scale). The Mortise Match produces accurate joints easily and quickly, though it does require a substantial investment. You'll also need to supply your own clamps—an added expense—but the slotted table accepts most clamps suitable for T-track. Again, we'd opt for quick-acting toggle clamps.

Woodpeckers, woodpeck.com
no. MORTMATCH, \$700





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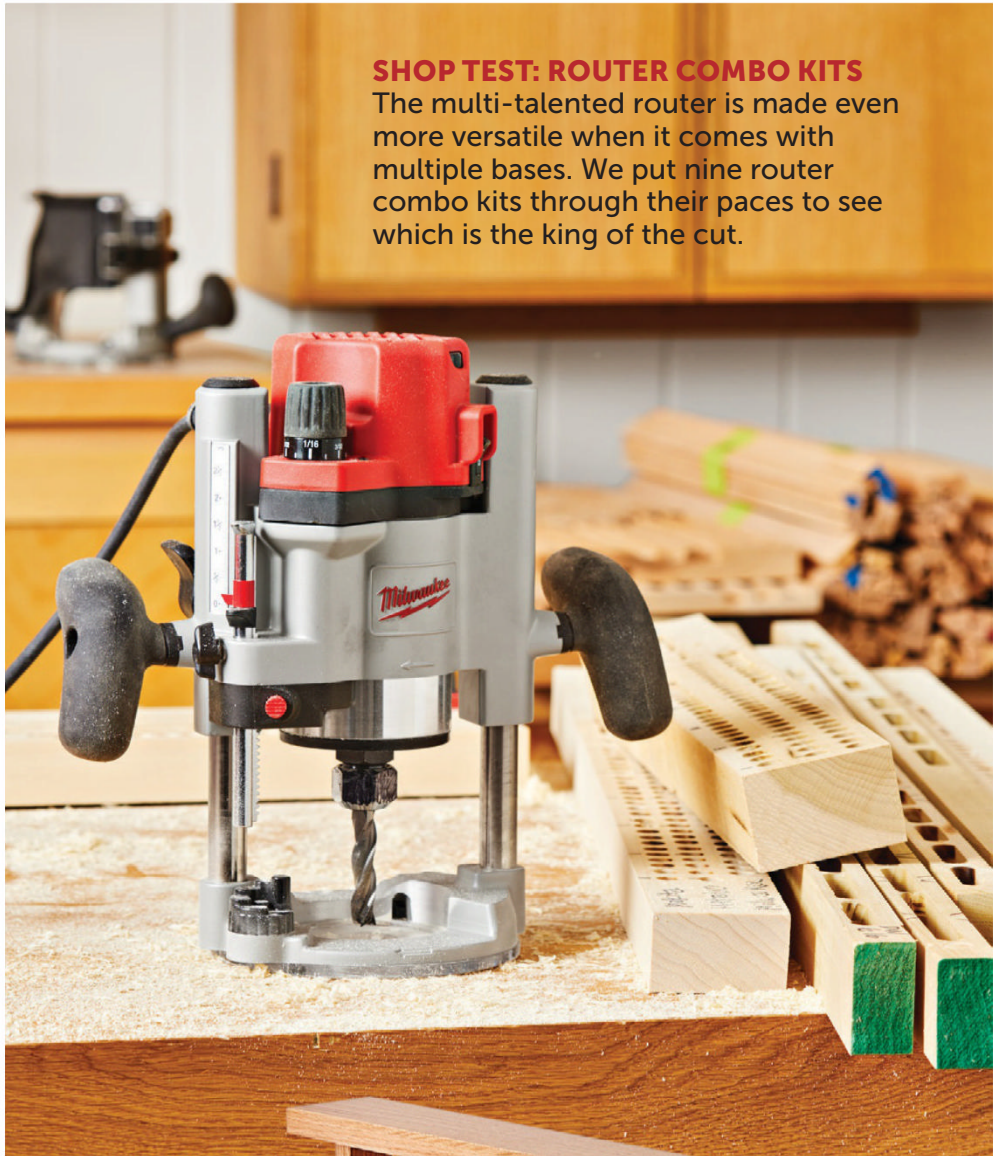
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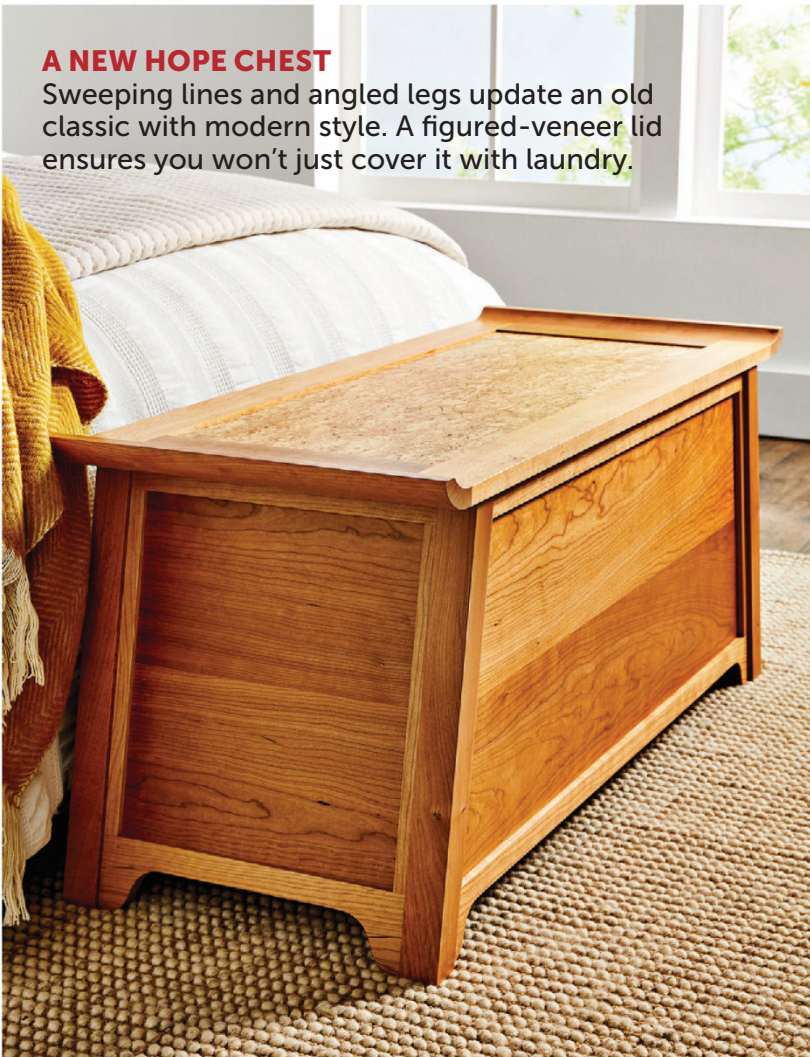


SHOP TEST: ROUTER COMBO KITS
The multi-talented router is made even more versatile when it comes with multiple bases. We put nine router combo kits through their paces to see which is the king of the cut.



ADJUSTABLE-HEIGHT SAWHORSES
These old-world-style supports will serve your shop for decades. Design Editor John Olson snatched them for a much more modern purpose: creating the base of his standing desk.

PICK-YOUR-STYLE PERGOLA
A pergola creates an outdoor “room” that’s perfect for relaxing or entertaining. Choose one of three bracket designs to make this one a perfect match for your style.



A NEW HOPE CHEST
Sweeping lines and angled legs update an old classic with modern style. A figured-veneer lid ensures you won’t just cover it with laundry.

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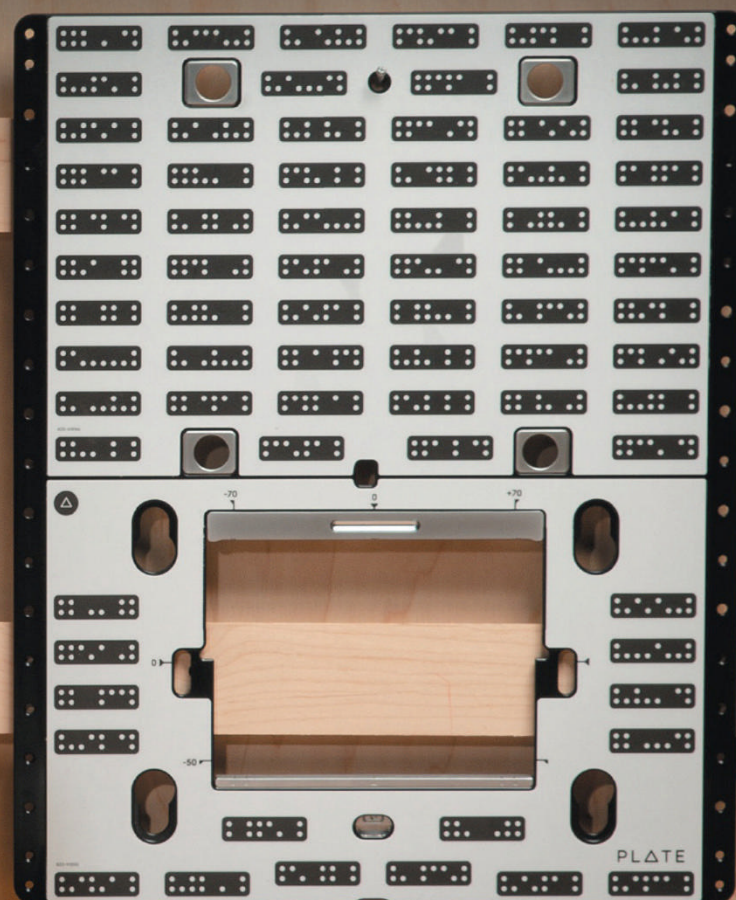
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