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Better Homes & Gardens

WOOD®

The World's Most Trusted Woodworking Resource

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- Approx. shipping weight: 68 lbs.



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⚠ WARNING! †1

6" X 48" BELT/9" DISC COMBO SANDER

WITH CABINET STAND

- Motor: ¾ HP, 110V/220V (prewired for 110V), single-phase, 12A/6A
- Sanding belt size: 6" x 48"
- Sanding belt speed: 2300 FPM
- Platen size: 6 ¼" x 17"
- Belt sanding head tilt: 0–90°
- Sanding disc diameter: 9"
- Sanding disc speed: 3450 RPM
- Sanding disc type: PSA
- Disc sanding table size: 6" W x 12 ¼" L
- Disc sanding table tilt: 0°–45°
- Overall size: 30" W x 24" D x 56" H
- Approx. shipping weight: 158 lbs.



MADE IN TAIWAN | ISO 9001 FACTORY

$179 SHIPPING

G1014ZX ONLY $795

⚠ WARNING! †1

12" 1 ½ HP BABY DRUM SANDER

- Sanding motor: 1 ½ HP, 115V, single-phase, 13A
- Conveyor motor: ⅛ HP, 0.3A
- Sanding drum size: 4"
- Drum surface speed: 2127 FPM
- Max. stock dimensions: 12" W x 3 ½" T
- Min. stock dimensions: 8" L x ⅛" T
- Conveyor feed rate: variable, 2.5–17.3 FPM
- Conveyor belt dimensions: 12 ¼" W x 49 ¾" L
- Sanding belt size: 3" x 70" hook and loop
- Overall dimensions: 27" W x 24" D x 27" H
- Approx. shipping weight: 166 lbs.



MADE IN TAIWAN | ISO 9001 FACTORY

CSA C US 177335

$179 SHIPPING

G0459 ONLY $1195

⚠ WARNING! †1

6" JOINTER

WITH STAND & V-HELICAL CUTTERHEAD

- Motor: 1 HP, 110V/220V prewired 110V), single-phase, 14/7A
- Max. cut depth: ⅛"
- Max. rabbeting depth: ½"
- Table size: 6 ⅝" x 47 ⅜"
- Fence size: 29 ⅛" x 4"
- Cutterhead type: 4-row V-helical
- Cutterhead speed: 5000 RPM
- Cutterhead diameter: 2 ½"
- Footprint: 13 ½" x 18"
- Overall dimensions: 47 ½" W x 20" D x 42" H
- Approx. shipping weight: 260 lbs.



MADE IN TAIWAN | ISO 9001 FACTORY

$179 SHIPPING

G0814X ONLY $1475

⚠ WARNING! †1

19" 3 HP EXTREME-SERIES BANDSAW

- Motor: 3 HP, 220V, single-phase, 12A
- Max. cutting width left of blade: 18 ¼"
- Max. cutting height (resaw capacity): 12"
- Table size: 26 ¾" W x 19" D x 1 ½" T
- Table tilt: 5° left, 45° right
- Floor to table height: 37 ½"
- Blade size: 141 ¼"–143" (⅛"–1 ¼" wide)
- Blade speeds: 1700, 3500 FPM
- Footprint: 17 ¾" x 29 ½"
- Overall dimensions: 36" W x 32" D x 76" H
- Approx. shipping weight: 460 lbs.



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CSA C US 252923

$239 SHIPPING

G0514X ONLY $2195

⚠ WARNING! †1

3 HP PORTABLE CYCLONE DUST COLLECTOR

- Motor: 3 HP, 220V, single-phase, 15A
- Intake hole size: 8
- Impeller: 16" aluminum
- Airflow capacity: 1941 CFM @ 2.9" SP
- Max static pressure: 11"
- Filtration: 1 micron
- Filter surface area: 45.2 sq. ft.
- Collection capacity: 45-gallon drum
- Sound rating: 79 dB
- Overall dimensions: 31" W x 54" D x 82" H
- Approx. shipping weight: 376 lbs.



MADE IN TAIWAN | ISO 9001 FACTORY

$239 SHIPPING

G0862 ONLY $2095

⚠ WARNING! †1

3 HP SHAPER

- Motor: 3 HP, 220V, single-phase, 12A
- Max. cutter height: 2"
- Max. cutter diameter: 5 ½"
- Spindles: ½", ¾", 1"
- Spindle lengths: 2 ¾", 3", 3 ½"
- Spindle capacity under nut: 2", 2 ¼", 2 ½"
- Spindle travel: 3"
- Spindle speeds: 7000, 10,000 RPM
- Spindle openings: 1 ⅜", 2 ¾", 4", 5 ½"
- Max. Table size: 28 ¼" W x 30 ½" D
- Floor-to-table height: 34"
- Footprint: 20" x 21"
- Overall dimensions: 30 ½" W x 28 ¼" D x 39 ½" H
- Approx. shipping weight: 353 lbs.



SHOP FOX

MADE IN TAIWAN | ISO 9001 FACTORY

CSA C US 177335

$239 SHIPPING

W1702 ONLY $2700

⚠ WARNING! †1

10" 3 HP 240V HEAVY-DUTY CABINET TABLE SAW

- Motor: 3 HP, 240V, single-phase, 14A
- Rip capacity: 60" right, 14" left of blade
- Max. depth of cut @ 90°: 3"
- Max. depth of cut @ 45°: 2 ⅛"
- Table size with extension: 74" W x 27" D
- Arbor diameter: ⅝"
- Arbor speed: 4200 RPM
- Max. width of dado: 13/16"
- Floor-to-table height: 34"
- Overall dimensions: 84" W x 47" D x 40" H
- Approx. shipping weight: 558 lbs.



CSA C US 177335

MADE IN TAIWAN | ISO 9001 FACTORY

$299 SHIPPING

G1023RLX ONLY $2495

⚠ WARNING! †1

24" X 36" CNC ROUTER

- Motor: 3 HP, 220V, 3-phase (with inverter), 8A
- X-, Y-, Z-axis motors: Stepper, 4.3A
- Cutting area: 23 ⅝" x 35 ⅜
- Cutting accuracy: +/-0.005"
- Max. distance spindle to table: 6 ½"
- Spindle Speed: 0–24,000 RPM
- X-axis travel: 35 ⅜"
- Y-axis travel: 23 ⅝"
- Z-axis travel: 5"
- X-, Y- travel speed: 32 FPM
- Z-travel speed: 16 FPM
- Collet Size: ⅛", ¼", ½"
- Collet Type: ER20
- Footprint: 47 ¼" x 28 ½"
- Overall dimensions: 45" W x 56 ½" D x 62" H
- Approx. shipping weight: 882 lbs.



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22422

Driving Lessons

My teenage son, Parker, is learning to drive, and I honestly don't know how he's going to do it.

The two of us were talking about how different the experience is for him—a suburb-raised city boy—than it was for me—a middle-of-nowhere-Oklahoma farm kid. By the time I took driver's ed, I'd been running riding lawn mowers on acreages, operating combine harvesters in my uncle's fields, and hauling loads of wheat to the grain elevator in a late-'50s, tilt-cab dump truck with a problematic transmission and leaky air brakes. The nearest town had no police force to challenge an underage driver. And even if a sheriff wandered by, they turned a blind eye during harvest season. Automatic transmission, FM radio, and paved roads were the things I had to brush up on before my driver's test.

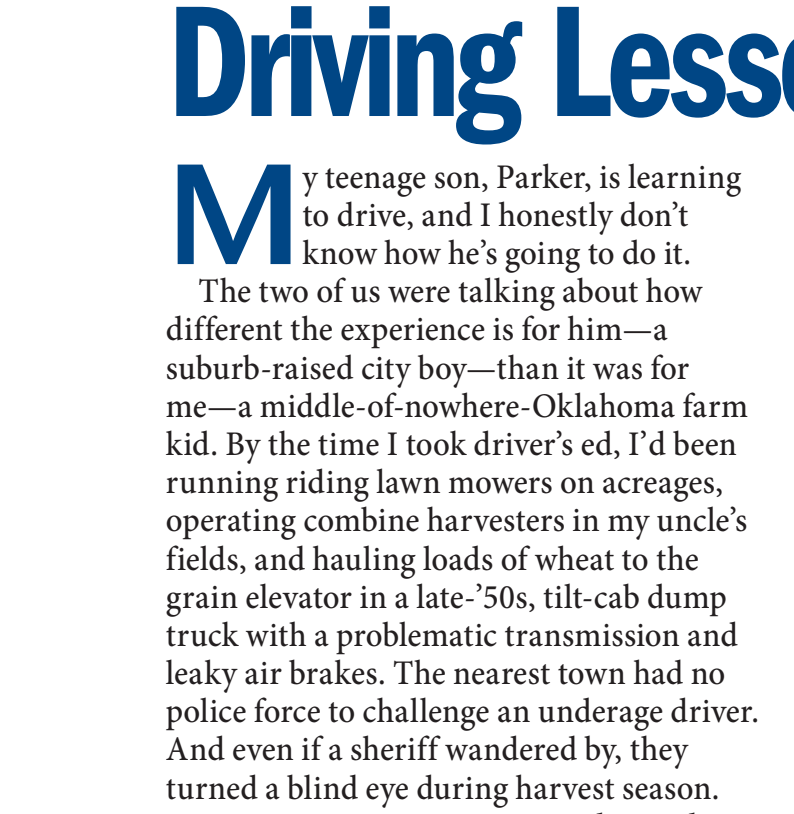
Parker, on the other hand, is being thrown into on-ramps, one-way streets, plus all the distractions of a modern vehicle, a modern city, and modern electronic gadgets. I do not envy his learning curve. It intimidates me just thinking about it. And I find myself procrastinating practice drives … until I realize that those are all of the things that I encountered on my commute yesterday—a commute I barely remember.

Parker will also eventually arrive at the ability to commute. And, while empowering, that's where the story also gets a little boring, isn't it? I would never wish anything to go wrong while my son is driving. But I'll happily tell you about the time when a hydraulic hose on the tractor burst as I was moving it between fields, dropping a five-bottom plow right into the dirt county road. That day, I learned how fast I could bring a tractor to a halt. (The plow barely left a rut!) Challenging? Yes. Exhilarating? Yes. Memorable? You bet your soiled underwear. And though I do not look fondly back at any commute to the office, pushing through my own challenges (and any fear of them) was what empowered the ability. And I can't, in good conscience or common sense, withhold lessons from my son.

And here's where, as it so often does, life imitates woodworking: It's the lessons that drive the stories—that keep the rest of the journey (and joinery) from becoming just a commute. Isn't it ironic that it's often the fear of those lessons that gives me the most pause—that can often stop a project dead in its tracks? Or prevent me from starting one altogether? I proudly display the hall table that contains the first set of mortise-and-tenon joints I made. I'll tell you all about it. What might not make it into the story is how long I hesitated to cut the cheeks on those tenons because I was afraid of ruining the legs and aprons I had so carefully crafted. But I lately find myself with less and less time to procrastinate (Isn't that the direction life goes?), so now I try to start my working week and my shop time by asking, "What am I procrastinating?" Then, I do my best to make that the first lesson I turn into a story, today.

So, what are you procrastinating? A project like the shop-made jack plane on *page 40*? A skill like chip-carving on *page 31*? A honey-do task with a long list of excuses? A bucket-list project that is forever scheduled for "one these days?" Confess it to woodmail@woodmagazine.com. I'll commiserate and encourage. And you can call it the first step toward completion!

Now get out there and make something. We'll help.



▲ The Ford C series of trucks were jack-of-all-trades workers that saw use in farms, fleets, and firehouses around the world. Pictured is the first vehicle that I was entrusted to drive (semi-legally) on the roads of rural Grant County, Okla. My uncle tells me that he recently got the engine started, but hasn't returned it to running condition, yet.

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NO-FEAR FINISHING

Woodworkers, like nice guys, finish last. Why? Most would say it's because that is the final step in the process. Those people are probably right. But I say it's because finishing represents the last opportunity to mess up the perfect project on which you've worked so hard. These articles are here to help you push through that fear and niceness to finally finish first! (Metaphorically, that is. You technically still want to save it for last.)







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Sounding Board

YOUR VOICE

Home-study hammock

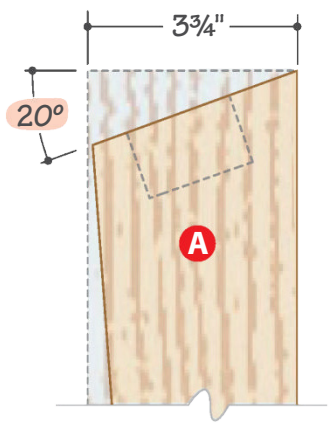
I began building several projects with my grandsons as part of their independent study elective class when their school implemented COVID-19 restrictions. Together we have built a complete bedroom set, a children's craft table with chairs, a storage cabinet for a pre-school, and a Murphy bed, to name a few.

Kaden and I made the Dream-time Hammock from issue 280 (March 2022). He was assigned the task of drilling all the holes and rounding the edges at the router table. Then, he threaded the rope to complete it.





—Tommy Thompson
Ukiah, Calif.



We can't cant

I am starting to build "One Cherry Rocker" from issue 283 (Sept 2022). After making the templates, I found a mistake in the parts view illustration. The angle on the top end of the front leg (A) should be 20° instead of 30°. I thought I'd warn others before they start chopping up 5/4 lumber.

—Jim Thompson
Kaufman, Texas

Retirement congrats to Dave



From a fellow retiree: Congratulations…and how dare you, Dave! I have subscribed to several magazines over the years, and you are the only writer whose column I seek out first. You're leaving Lucas with a pretty BIG toolbox to fill!

I'm often asked the question, "How will you fill all that free time?" Thanks to you, WOOD *magazine, three married kids, and eight grandchildren under the age of five, the answer is easy: "You can find me in the shop."*

My advice:

1. Maintain your health.
2. Give back from your blessings.
3. Enjoy what you have worked so hard for.

—Gerry Pavlik
Big Lake, Minn.

Dave, your "Then and Now" photos brought a smile to my face because I have nearly identical photos of myself. I went to work for Popular Woodworking *in 1991 as an Assistant Editor. A little over a year later I took over the helm as Editor and Art Director. It was the best job that I ever had. From one retired editor to another: Good luck in your retirement. Every day is Saturday, and I spend every one of them in my shop.*

—Rob Cook
via email

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Two more tape tips

I enjoyed the article "32 Uses for Masking Tape" in issue 283 (September 2022). Another important use is to affix a personalized list of all noteworthy articles and tips alongside their page numbers to each issue of WOOD.

I also like to use it to note the dimensions on cutoffs. I make sure to put it in an easy-to-read location before I drop it in my scrap bin. With as much leftover wood as I keep, that at least gives me a fighting chance of finding the right piece for a project.

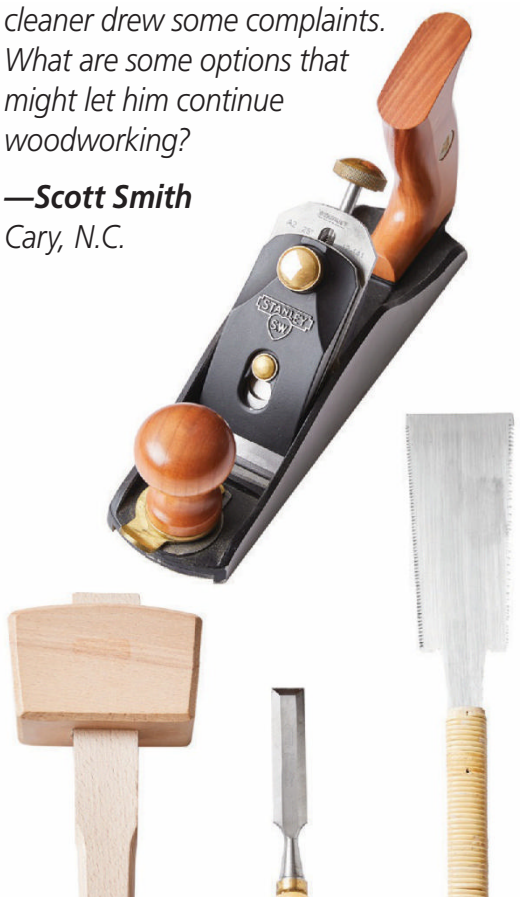
—Len Werner
Mt. Horeb, Wis.



Apartment woodworking?

My 89-year-old father is a lifelong hobbyist woodworker who now lives in a senior residential community. He wants to continue to build, but needs to be mindful of noise and dust. We tried a scrollsaw, but both it and the vacuum cleaner drew some complaints. What are some options that might let him continue woodworking?

—Scott Smith
Cary, N.C.



Let's crowd-source this one, Scott. *WOOD* readers, send your advice for Scott's father to **woodmail@woodmagazine.com.** In the meantime, Design Editor, John Olson, had this to offer:

For dust, a tool-triggered HEPA vacuum with variable speed could collect the bulk while allowing you dial down the sound a bit. You could build an insulated box around it to deaden the noise further. Sheets or shower curtains hung from doorways will minimize dust's spread. Attach furnace filters to a box fan to catch any that tries to escape.

Carving is an obvious low-noise option, but consider knife work such as chip-carving (page 31) rather than relief carving that might require mallet strikes. Hand planes are quiet, but require a substantial workbench that won't scrape along the floor or squeak. Fine-toothed saws will work, but heavy ripping with a full-size saw is louder than most people realize. Egg-beater drills and bit braces are also quiet, but you also won't make much noise with a compact 12-volt cordless drill running at low speeds.

Also take into account finishing fumes. Look to shellac and water-based acrylics. They produce the least obnoxious off-gassing.

Finally, partner with another woodworker or a local club that can hand the project parts off after tackling the louder tasks, allowing your father to take on the final assembly and finishing.

I concur on composite

I read, with interest, your response to a reader question regarding the use of composite decking in place of wood for projects (Ask WOOD, July 2022). I've been blessed with access to cutoffs from a local decking company that uses high-end decking made of cellular PVC and had great success working with the material in creating many long-lasting outdoor projects.

I've found that clear PVC cement like you'd use in plumbing or electrical conduit applications works great for glueups. In addition to tables, I've made canoe supports that are continuously water-immersed, replaced teak dive platforms on boats, and constructed surrounds for landscaping.

—Harold Pinder
Key Largo, Fla.



Sounding Board

YOUR PROJECTS



*This is the fourth cradle lifelong woodworker, **Charles Traupmann** of San Pedro, Calif., has built, but the first he's made for a great grandchild (Kennedy). His most complex design yet, the white oak and ambrosia maple cradle swings in its stand or, removed, rocks on its curved base, maintaining the same gentle arc in either configuration.*



***Bob and Mary Lehman**, of Palmyra, Pa., decided to give cutting boards a try this past year. Bob does the machining and Mary helps with the glueups. They liked this walnut version with bookmatched sapwood inclusions so much that they decided they'd keep it for themselves.*



***George Seifert**, of Port Townsend, Wash., used his scrollsaw to create a double-bevel-marquetry likeness of his sister's lovebird, Parsley. To match the colors on Parsley's head and chest, George stained sycamore veneer.*



***Harland Lee** assembles quilt-block patterns from a variety of wood species for friends and family around his small Lowville, N.Y. community. No two works of art are alike, but they're all conversation starters, prompting viewers to ask, "Where can I get my hands on one?" Recently, Harley's friend, **Dorothy Zehr**, has started enhancing the pieces with paintings of landscapes and wildlife.*

continued on page 10

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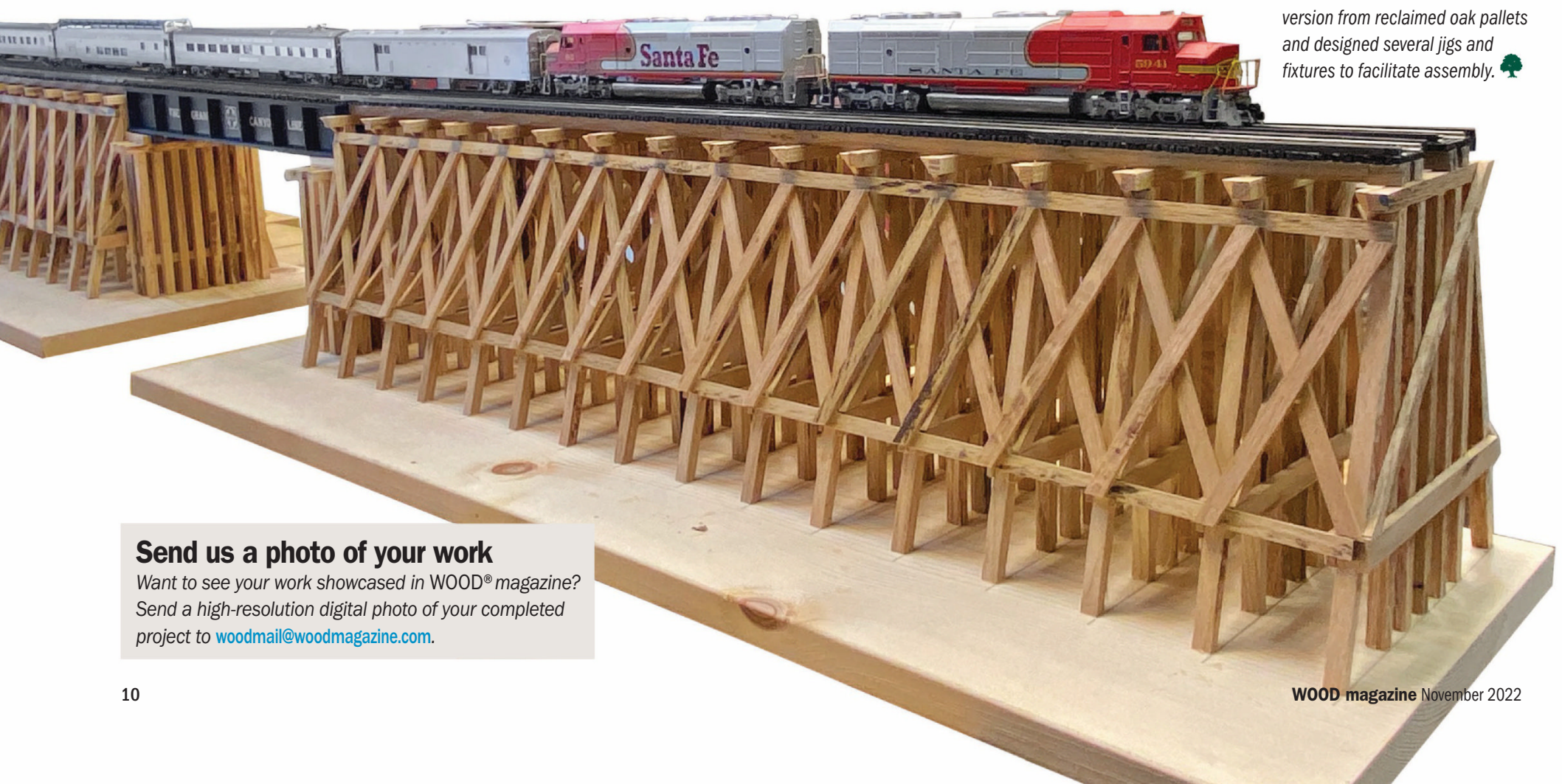
25 years ago, ***Scott Eggebrecht,*** *of Lakeville, Ind., promised his wife that he would build her a hope chest. As life continued to get in the way, his wife nicknamed the perpetually back-burnered project the "hopeless chest." When Scott was finally able to return to the project, his wife chose the blanket chest from issue 210 (March 2012 and at woodstore.net/blanketchest), which he constructed from walnut.*





Len Kasang*, of Long Beach, Calif., built his version of a Parsons table and chairs from figured maple and white oak. Those candle holders you see on the table were made from leg cutoffs, with added grooves to provide more detail.*

Were it full size, this double-track wooden trestle bridge, built by ***Alan Meinholdt*** *of Emporia, Kan., would measure 600 feet long and 60 feet tall. He built his HO-scale version from reclaimed oak pallets and designed several jigs and fixtures to facilitate assembly.*



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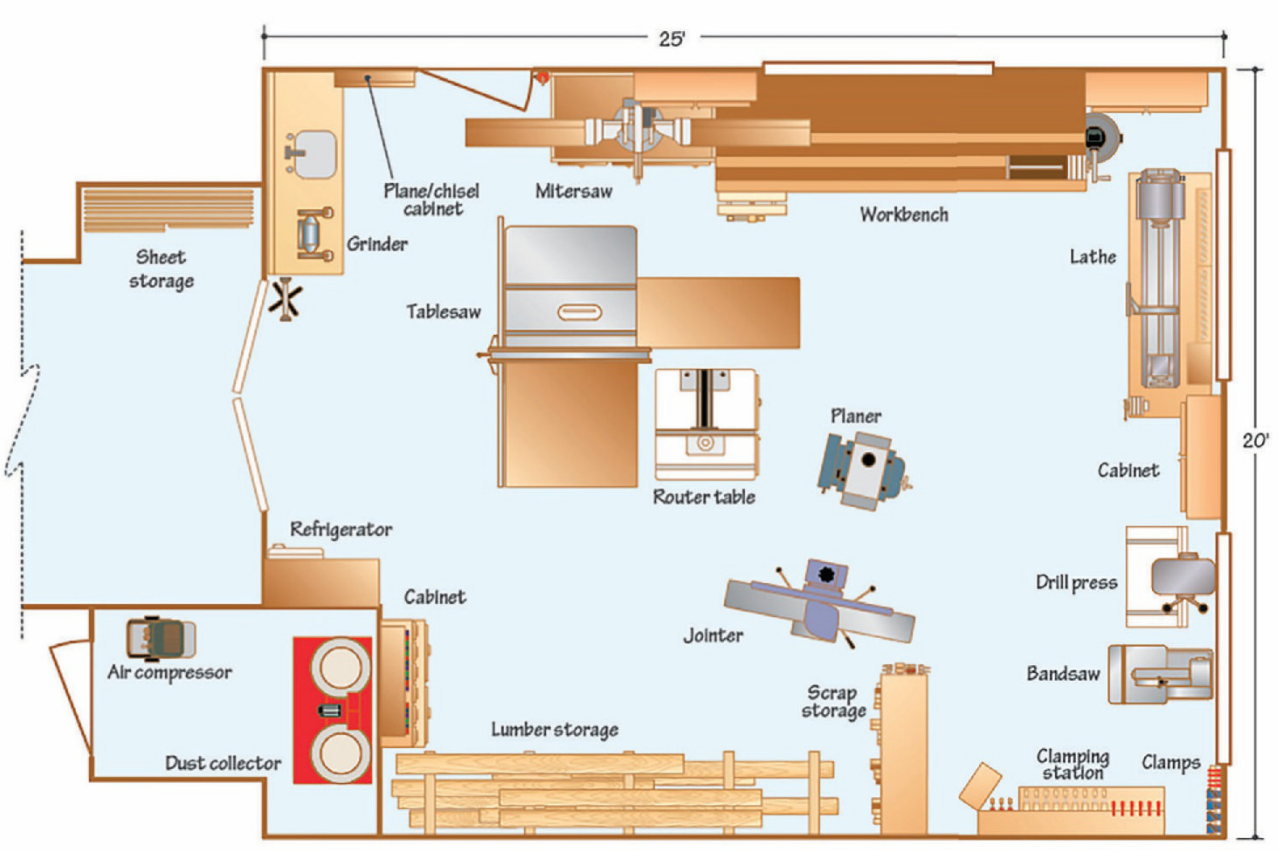
Fourth-generation Legacy Shop



With an engineering mind, John designed the shop, made all of the cabinets and tool stands, and built the lumber rack with adjacent cubbies for storing cutoffs.



Walking into John Hill's workshop is like walking into a museum. You won't find many shiny, new stationary tools. Instead, scattered around the shop is old, gray Delta iron. Three prior generations of woodworkers have left their mark. John's great-grandfather and grandfather were professional carpenters. His father joined the ranks later as an accomplished woodworker. John took a different path. He became a physician specializing in sports medicine. But a strong background in engineering and construction helped him to design his new shop. His father, Sonny, once said to him, "Aw, John, you're wasting your time in medicine. You would have been a good carpenter."

John cherishes the memories of working alongside his grandfather, Jim Hill Sr., in his shop. "My job for as long as I could remember was to clean the shop with a steel dustpan and a hand broom. I still use them." His grandfather purchased the vintage Delta tools in used condition.

Grandpa Jim passed away in 1969, but Sonny continued to use the shop. Eventually, he spent much less time in the shop, so the family sold the property. With so much woodworking in the family tree, it was only natural that John move the tools into his new shop.

Along with the tools came a workbench built by grandfather Jim. It's tucked under one of several large windows that provide plenty of natural light. Grandpa built the workbench around 1951 out of Douglas fir 2×6s, back when a 2×6 was really 2×6". The face of the bench, the doghole strip, and the back of the workbench are made of hard maple. He built the bench before he owned power tools, so he sawed every board by hand. Each board and the assembled top were hand-planed with a 21" jointer plane, which John owns and still uses on occasion.

When a cabinetmaker friend snagged a deal on a railroad car full of quartersawn white oak, John used it to build all the cabinets in the shop, including dovetail joinery



This multifunctional cabinet features a hinged wing along one side for storing C-clamps, glue, dowels, and other accessories. A fold-out clamping station fronts the main cabinet.

Show us your shop

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

on every drawer. "I am a doctor with a tendency toward perfectionism," he admits.

Perfectionism also benefits John in shop organization. He takes advantage of every cubic inch of that cabinet space. He uses cabinets to store clamps, finishes, and hand tools like chisels, spokeshaves, and vintage hand planes. A sink cabinet in the corner houses a low-speed grinder bolted to the countertop—an ideal setup for a sharpening station. Grandpa Jim built the hardware storage cabinet of drawers on top of yet another cabinet near the lumber rack. Jim, Sr. also built the base for the lathe. It's still rock-solid even after falling off Grandpa's truck during a move.

John's self-diagnosed obsession for organization carries over to other areas. Magnetic bars make ideal holders for hand tools near the workbench and above the lathe. Space beneath the tablesaw outfeed table keeps saw blades and accessories in order and readily accessible. Custom-welded brackets serve as a heavy-duty lumber rack for storing hardwoods. Softwoods and dimensional lumber reside in a



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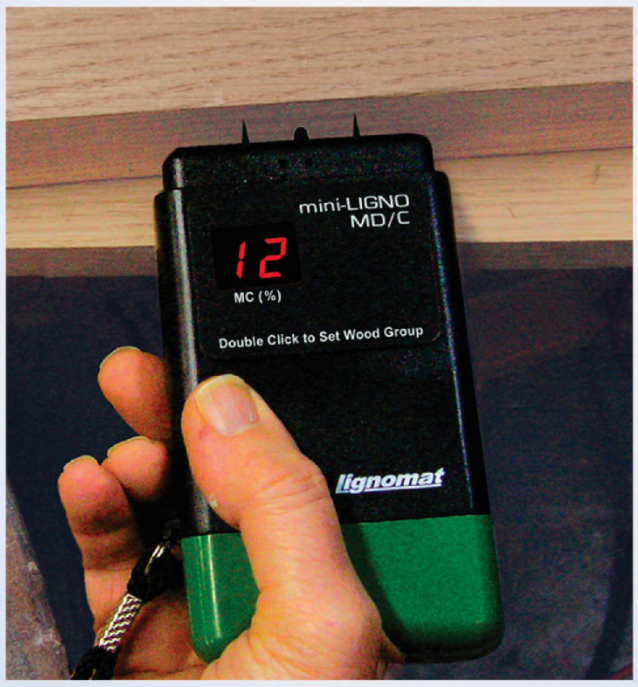

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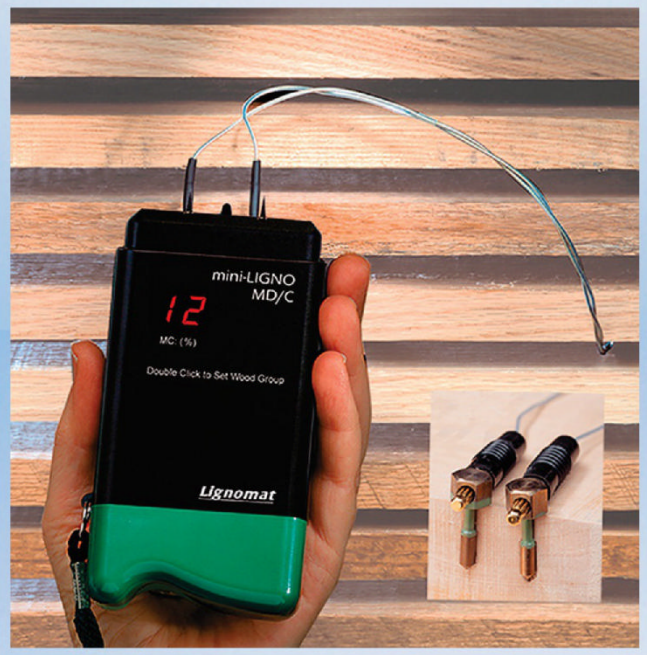

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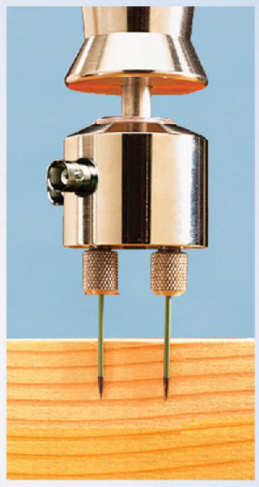

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YOUR SHOP



Vintage hand tools passed down from John's grandfather and dad maintain their edge in this handmade cabinet.



As a medical doctor, John relishes the times he can spend in the shop putting his creative skills to work.

covered rack outside. Cubbies provide a home for cutoffs. On the end of the cubbies, John added pegboard to hold mallets, hammers, saws, and other accessories.

The shop draws power from a 100-amp subpanel connected to the 200-amp main house service. Dust collection ductwork connects to a 12-amp, 220-volt double-bag collector residing in a separate room. John relied on an electrician to configure the circuits so the dust collector automatically switches on when a stationary tool is powered up.

John says that over the years he has built things as small as cutting boards, but prefers building large pieces of furniture like chairs, cabinets of every shape and size, and entire rooms. When using all those vintage tools, John often reminisces about the times spent in the shop with Grandpa and Dad. He strives to put the magic of those memories into every project he builds.



Grandpa's handmade workbench resides in a prominent spot in John's shop and childhood memories.



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Q Why all the stink about formaldehyde in plywood?

My wife and I are remodeling our kitchen and I'm planning to build the cabinets. Because of her sensitivity to many chemical odors, I worry the formaldehyde in the plywood will be a problem for her. Am I worrying over nothing?

—Craig Millman, Temecula, Calif.

A Formaldehyde, a colorless and pungent-smelling gas commonly used in adhesive and resin production, can be found in many building products, such as plywood, particleboard, MDF, insulation, and carpeting. Due to the off-gassing of these products, nearly all homes contain some level of formaldehyde.

In small concentrations (100 parts per billion or less), formaldehyde does not pose a significant health risk for most people. At higher levels, it may cause headaches, nausea, and respiratory problems. Extremely sensitive people may experience these symptoms even at lower levels.

In the United States, the Environmental Protection Agency (EPA) classifies formaldehyde as a "probable human carcinogen" and in 2018 lowered the acceptable levels of formaldehyde in plywood, MDF, and particleboard to make them safer. Today, all plywood sold in the U.S. should meet these standards and not pose a health risk. But you can further minimize your exposure by taking additional steps.

Formaldehyde in sheet goods and other products begins to off-gas at relatively high levels immediately after production, and the level of formaldehyde drops quickly. Storing plywood in a covered outdoor area, such as a garage or shed, for two to three weeks before bringing it indoors allows much of the formaldehyde to dissipate. Heating the area accelerates off-gassing, but be cautious of excess humidity warping the plywood.

Tip! *Safecoat Hard Seal and Safecoat Polyureseal BP are eco-friendly options for sealing and finishing plywood.* *afmsafecoat.com*

Once indoors, you can then slow the rate of formaldehyde off-gassing by sealing the plywood. Two or more coats of paint, shellac, or polyurethane will seal the surface. Or use a sealer designed specifically for formaldehyde and other volatile organic compounds (VOCs). Make sure to seal all surfaces, including the edges. The sealer won't prevent off-gassing entirely, but will slow the process considerably.

If these precautions don't give you peace of mind, consider purchasing formaldehyde-free plywood. Although it costs a bit more than conventional plywood, it's made using soy-based adhesives.

If you or someone in your family is experiencing symptoms of formaldehyde exposure, purchase a home test kit to check your home's formaldehyde level so you can take any necessary remediation steps. Adequate ventilation goes a long way to reducing formaldehyde concentrations. Using an air conditioner, dehumidifier, or HEPA filtration fan can reduce emission levels.

Tip! *Find formaldehyde-free plywood by searching for "green" building-material suppliers in your area.*

▶ Point your smartphone at the code above to find a formaldehyde home test kit.



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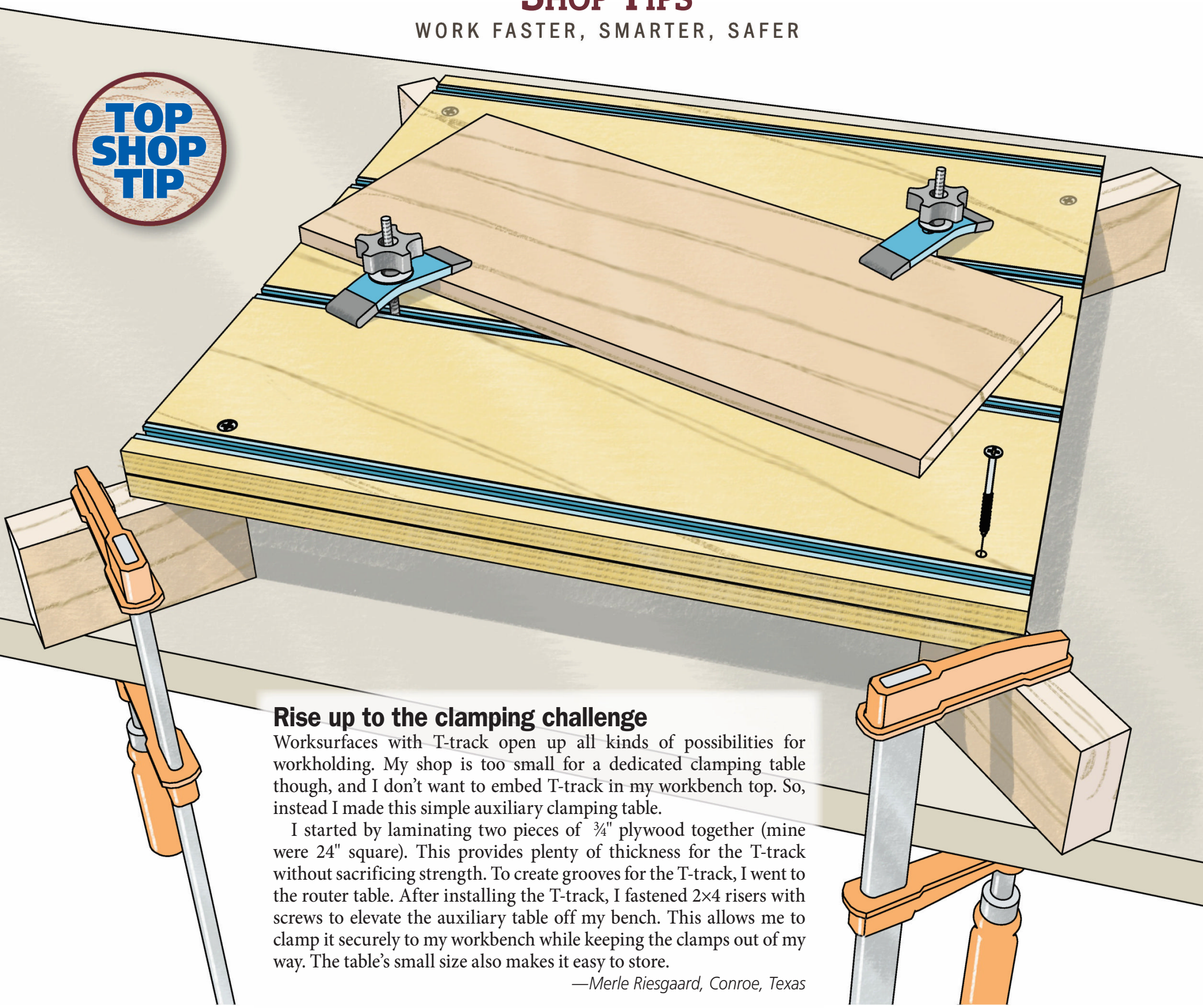

Rise up to the clamping challenge

Worksurfaces with T-track open up all kinds of possibilities for workholding. My shop is too small for a dedicated clamping table though, and I don't want to embed T-track in my workbench top. So, instead I made this simple auxiliary clamping table.

I started by laminating two pieces of ¾" plywood together (mine were 24" square). This provides plenty of thickness for the T-track without sacrificing strength. To create grooves for the T-track, I went to the router table. After installing the T-track, I fastened 2×4 risers with screws to elevate the auxiliary table off my bench. This allows me to clamp it securely to my workbench while keeping the clamps out of my way. The table's small size also makes it easy to store.

—Merle Riesgaard, Conroe, Texas

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For sending this issue's Top Shop Tip, Merle receives a spray system from Apollo worth $500.



continued on page 20



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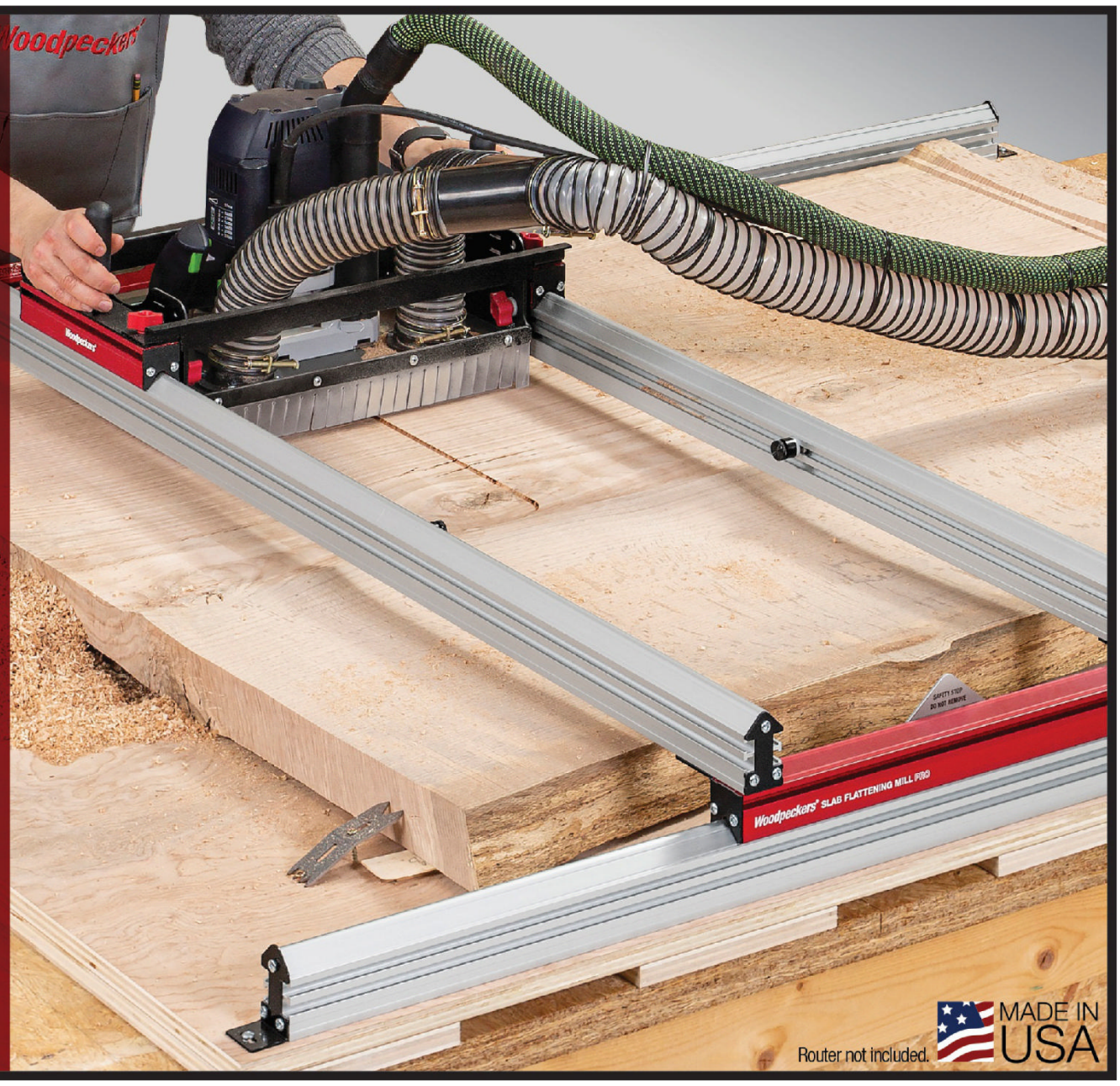

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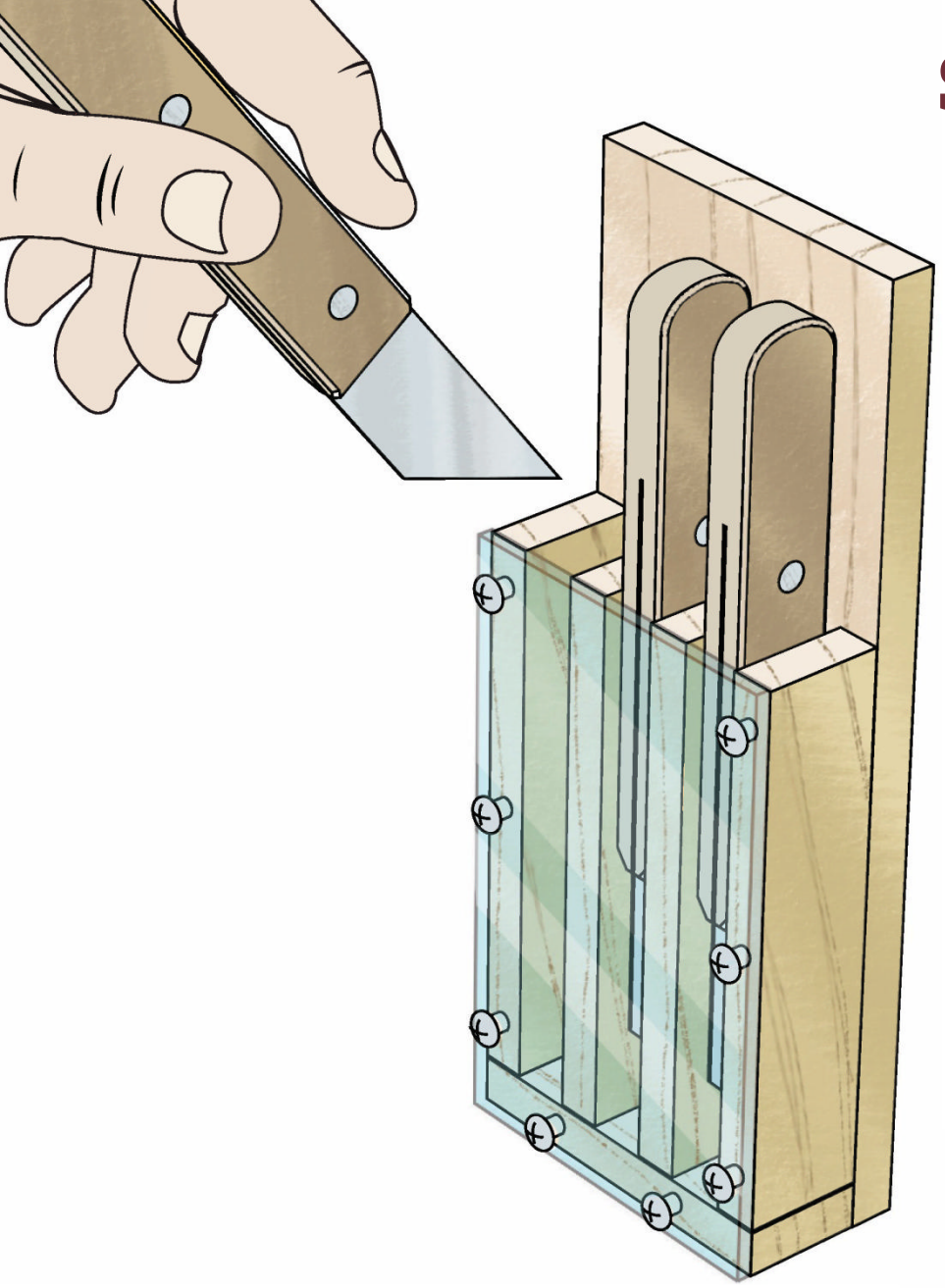


A point in case

Storing and handling a marking knife can be a challenge. If you've long lost the blade guard (if there ever was one), you're left with a sharp, exposed blade.

To solve this problem, I made this simple knife rack. It's nothing more than a hardwood or plywood back with two sides, a bottom, and vertical dividers. I spaced the dividers to accommodate the marking knives I use on a regular basis. A clear acrylic panel fastened with screws makes it easy to see and select the proper knife. The rack is small enough to stay on my workbench for ready access.

—Richard Stinson, Washington, Ill.

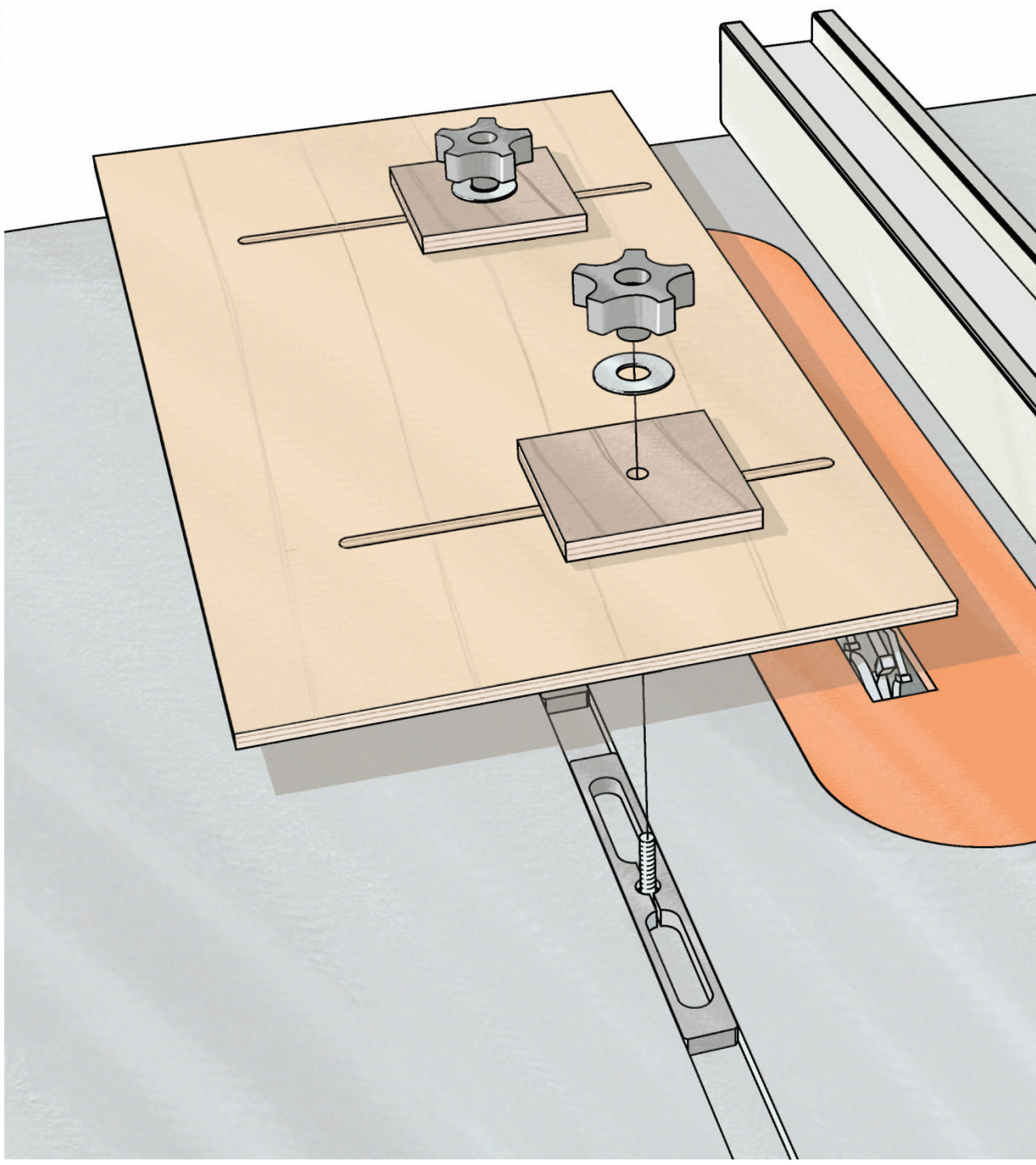
A groovy guide for consistent cuts

To cut consistent, straight grooves at the table saw, it's important to keep the workpiece tight against the rip fence for the entire cut. Traditional featherboards aren't long enough to support the piece before and after the saw blade. The guide shown here is my solution.

I made the stock guide from ¼" plywood, 10×22". At the router table, I routed a pair of grooves to accommodate the miter slot hardware. The grooves also allow adjustment for workpieces of varying widths.

To make mounting and adjustment easy, I used a miter-slot hardware kit and ½" plywood clamping blocks. I position the guide to contact the workpiece before and after the blade. With the workpiece against the rip fence and the blade lowered, I push the guide against the workpiece for a sliding fit and tighten the knobs before cutting the grooves. NOTE: To prevent kickback, do not use this guide for through cuts.

—Dan Martin, Galena, Ohio



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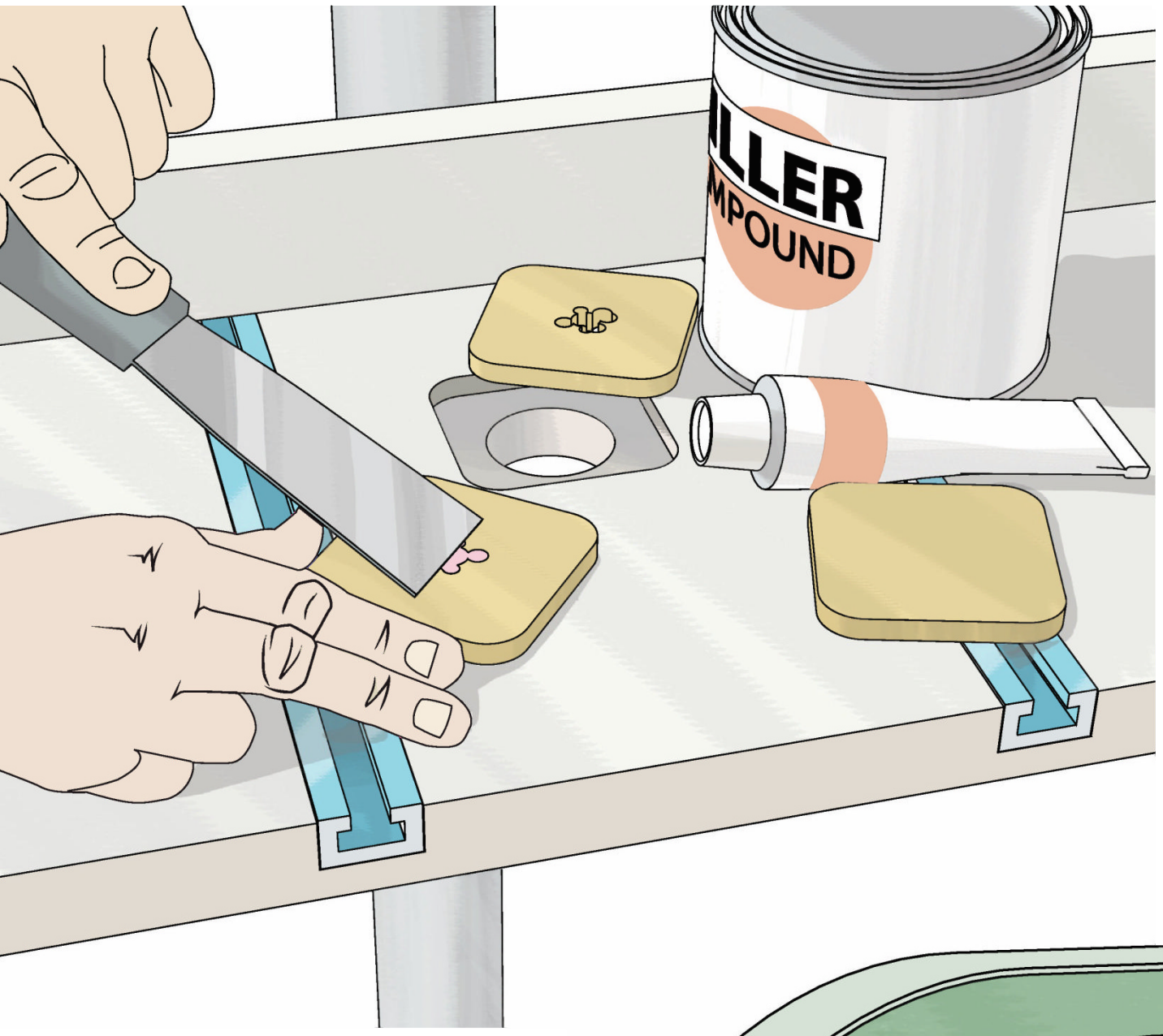


Zero-clearance: It's like putty in your hands

My drill press table has replaceable inserts. To get more life out of them, I use auto body filler to fill in the holes and restore a flat surface. After mixing the components according to the manufacturer's instructions, I apply it to the insert using a putty knife. Once the filler dries, I sand it smooth. I've found this also works for my table saw inserts to maintain their zero-clearance characteristic.

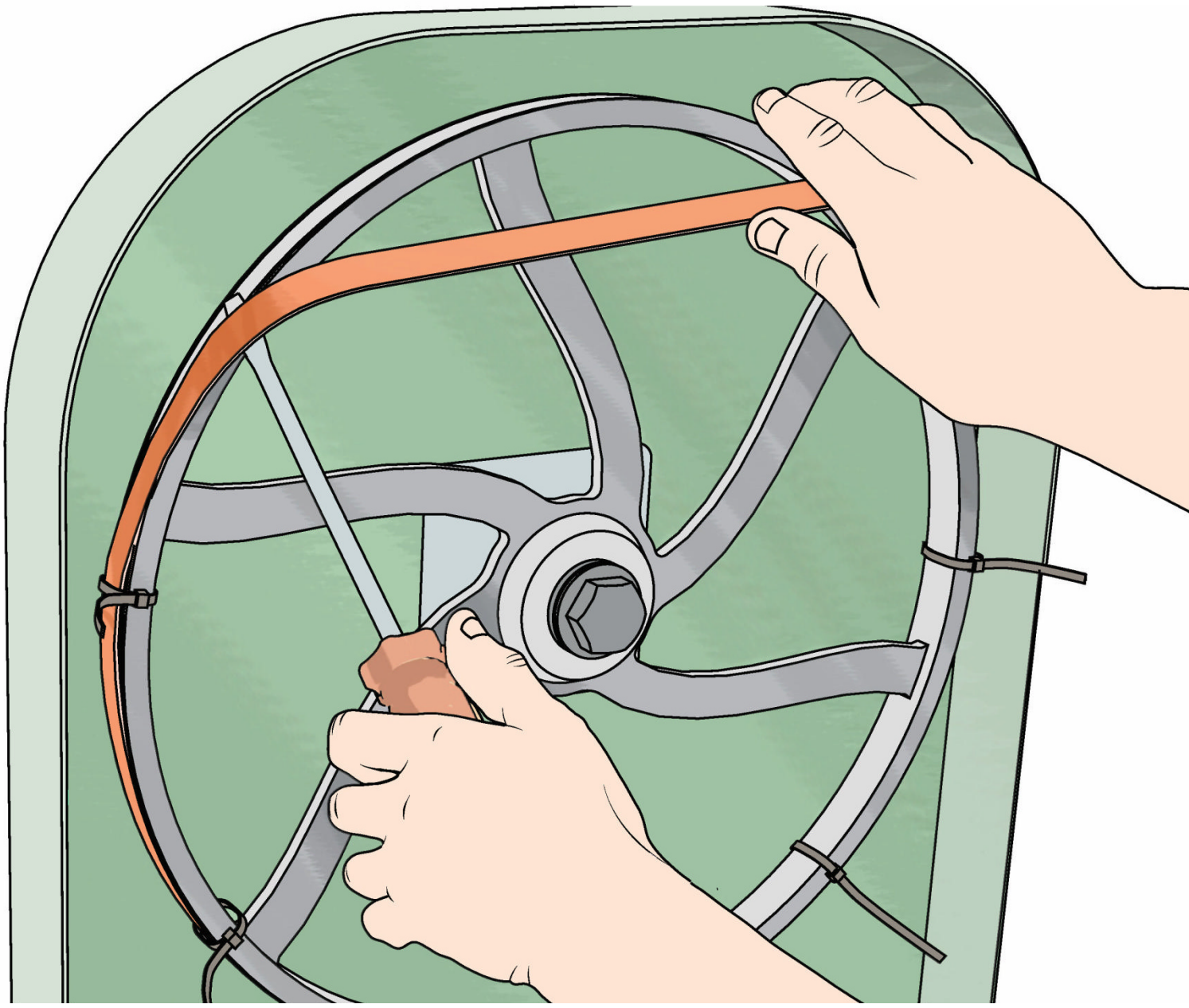
—Charles Mak, Calgary, Alta.

A zippy solution for tire changes

If you've ever changed the tires on your bandsaw, you know what a challenge it can be. It always seems the tires are too small to fit over the wheel.

Enter zip ties. They hold the tire in place as you work your way around the wheel. When you get around to the starting point, I've found a round-shank screwdriver provides the leverage needed for the final stretch. Carefully snip the zip ties to remove them before installing the blade.

—Allen Gardenghi, Catonsville, Md.







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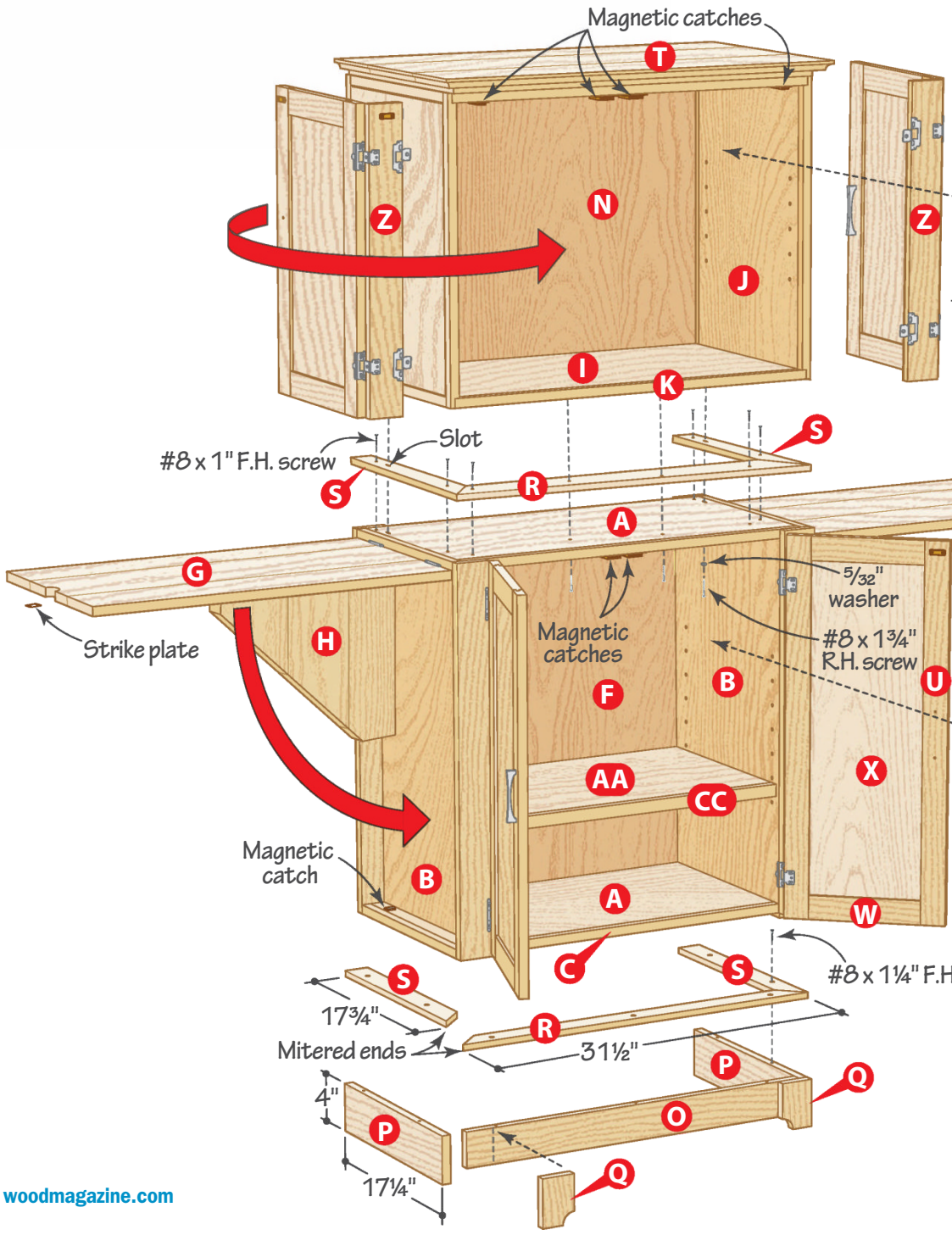
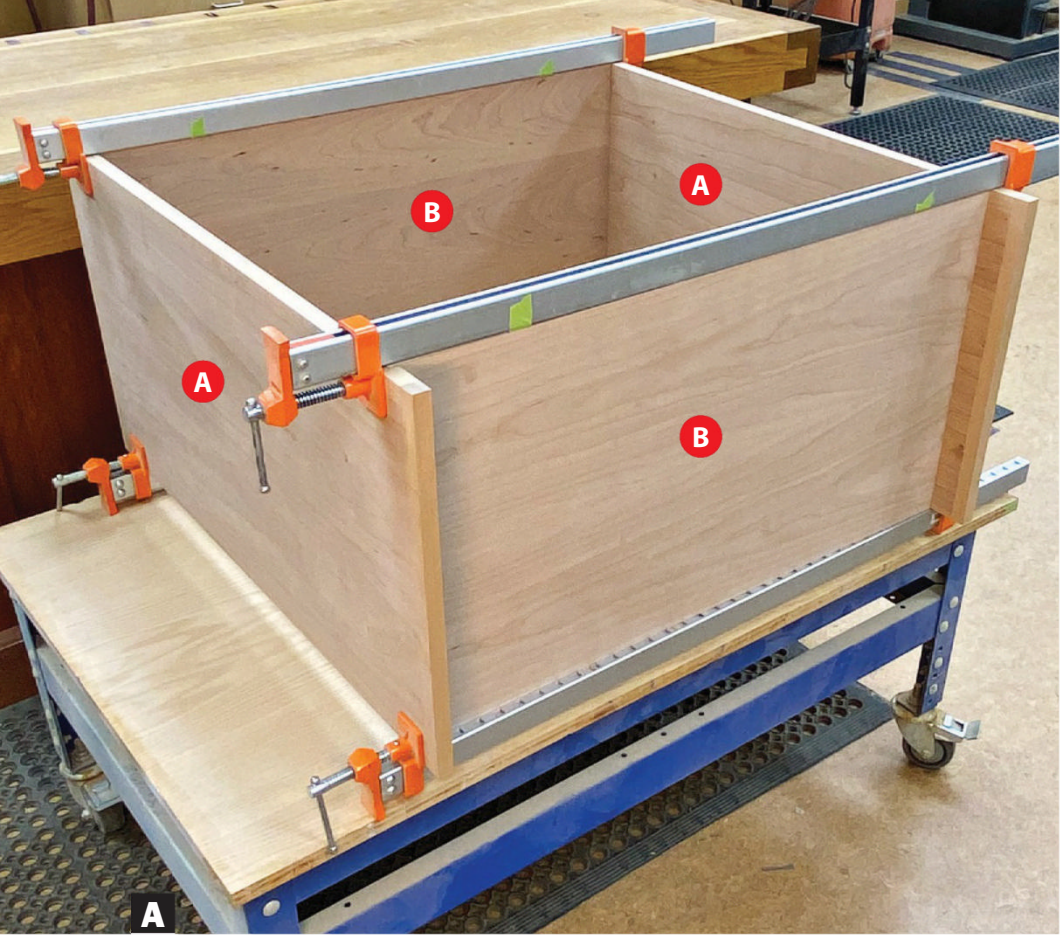
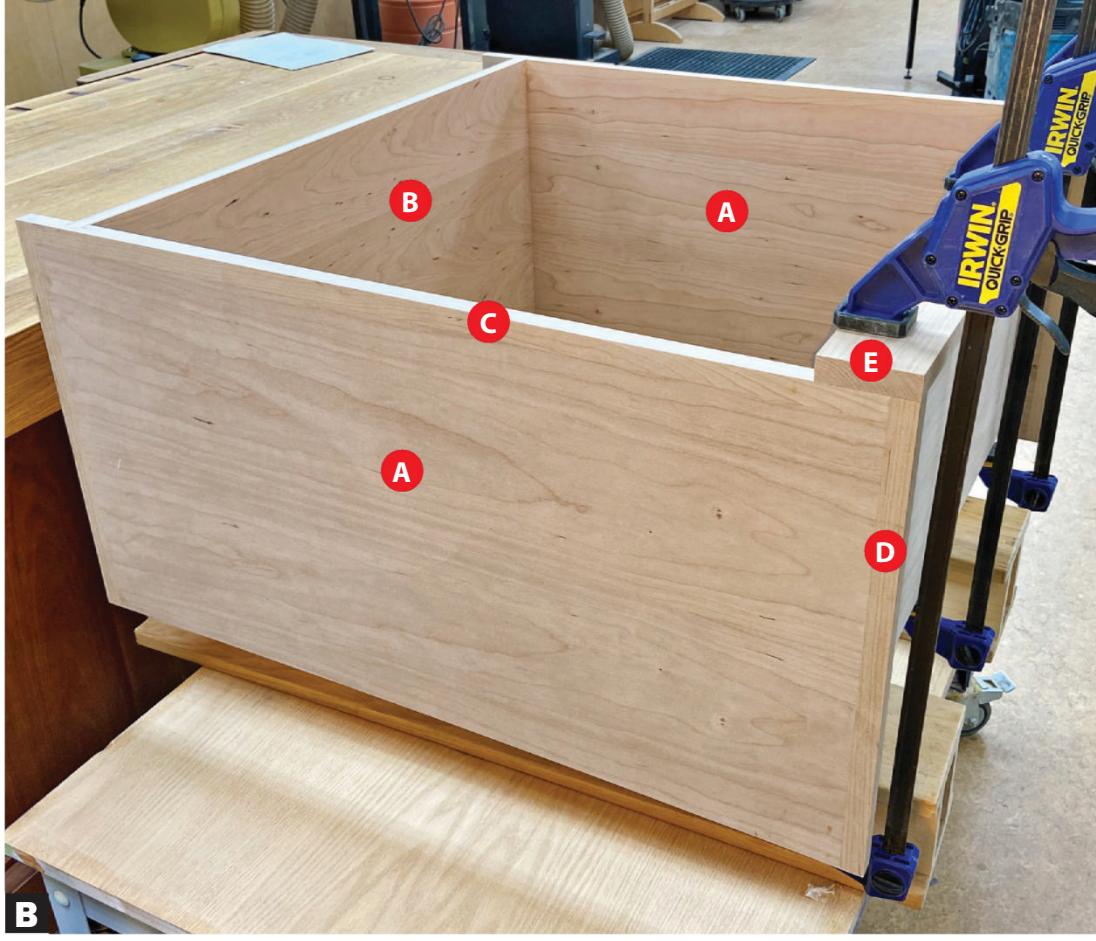




Glue and clamp the sides (B) to the top/bottom (A) flush at the rear. Check the assembly for square.



Glue and clamp the front stiles (E) to the lower cabinet flush with the faces and ends of the assemblies (A/C/D). Repeat for the rabbeted stiles at the back.

Box up the lower cabinet

1 From ¾" plywood, cut the lower cabinet top/bottom (A) and sides (B) to size [**Materials List, Drawing 1**].

▶ Drill dead-on shelf-pin holes. woodmagazine.com/fastshelfpins

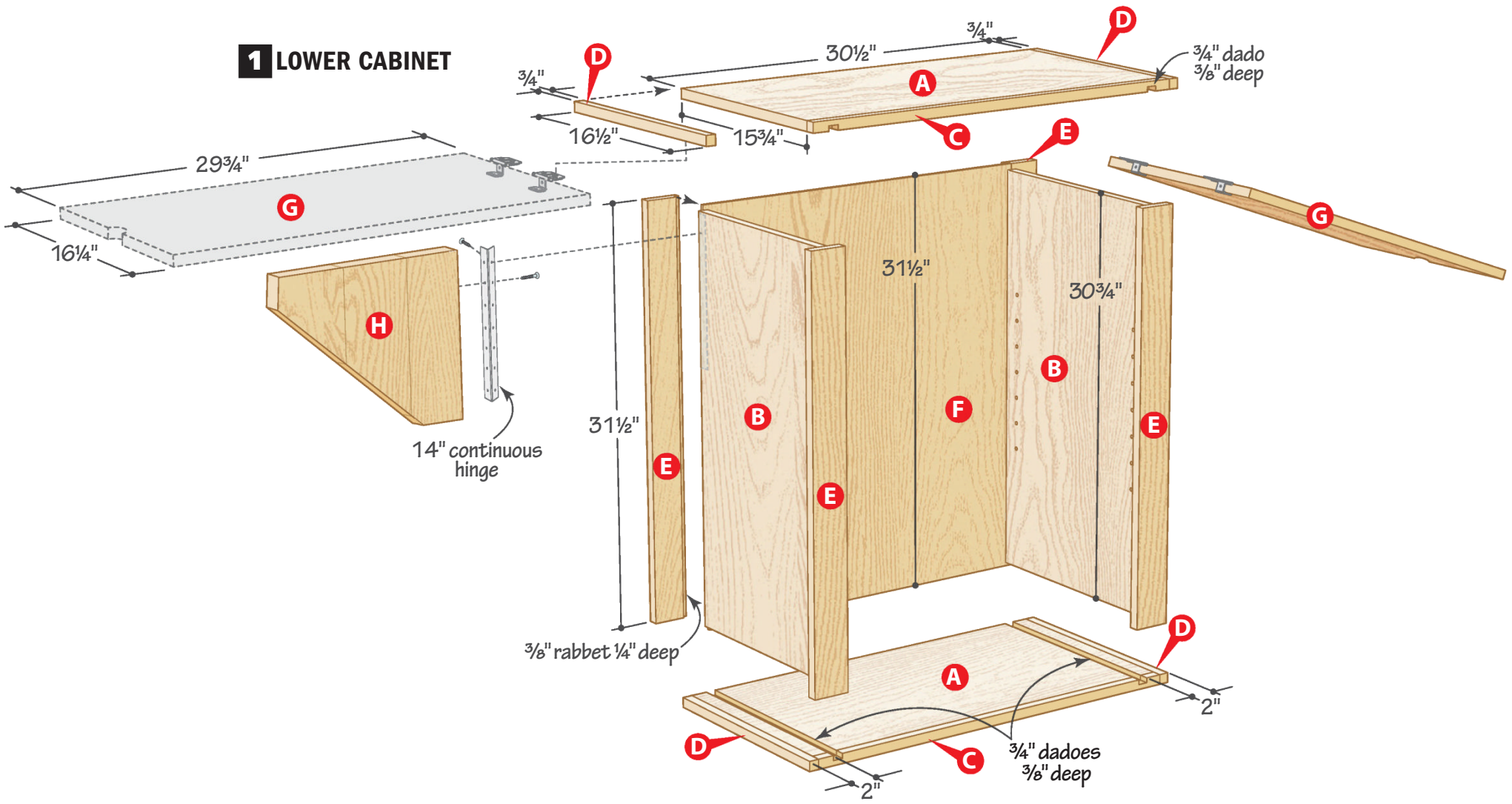
2 Lay out and drill the shelf-pin holes in the sides [**Drawing 1a**].

3 Cut the edging (C, D) to size, then glue the front edging (C) to the top/bottom flush with the ends [**Drawing 1**]. Glue the end edging (D) to the top/bottom. Finish-sand all the panels.

4 Dado the top and bottom to accept the sides [**Drawing 1**], then assemble [**Photo A**].

5 Cut the four stiles (E) to size, then rabbet one edge of two stiles [**Drawing 1**]. Glue the stiles in place [**Photo B**].

6 Size the back (F) [**Drawing 1**], finish-sand it, and set it aside for now.





Rest the lower cabinet upside down on a bench and screw the partial-wrap hinges to the wings (G) and end edging (D) to position the outside face of each wing flush with the outside edges of the end edging (D) and stiles (E).



Measure the distance from the bottom of the wing (G) to the underside of the top (A), then cut a temporary spacer to match.

▶ Glue up perfect panels. woodmagazine.com/perfectpanels

Now, give it wings

1 Glue up solid-wood panels for the wings (G) and supports (H), then cut them to size [**Drawings 1, 1b**].

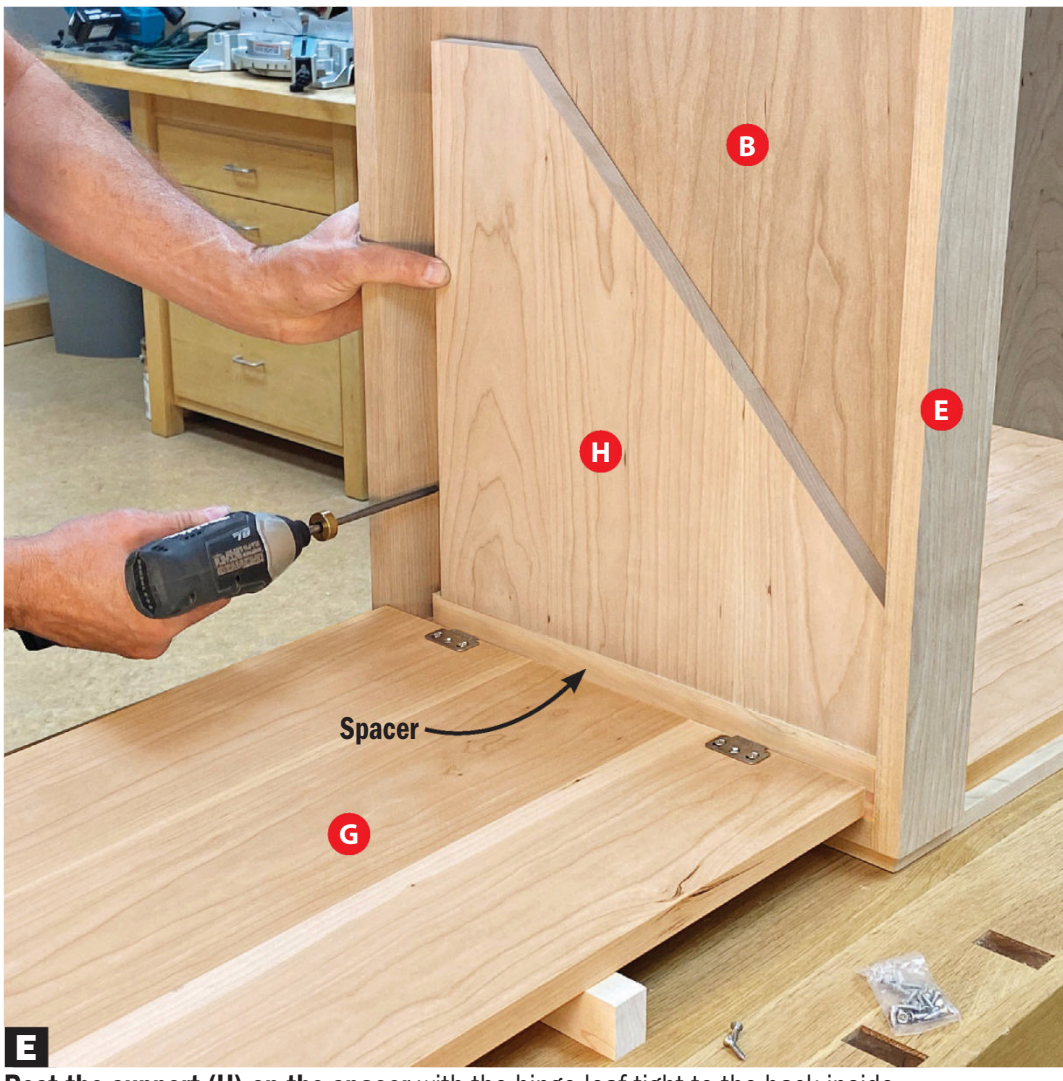
2 Drill the finger holes [**Drawing 1c**], butting a scrap against the bottom edge for support. Finish-sand the wings and supports.

3 Attach the wings to the lower cabinet, centered in the opening [**Photo C, Drawing 1**].

4 Cut a pair of continuous hinges [**Sources**] to length and attach them to the back edge of the supports (H) [**Drawing 1**].

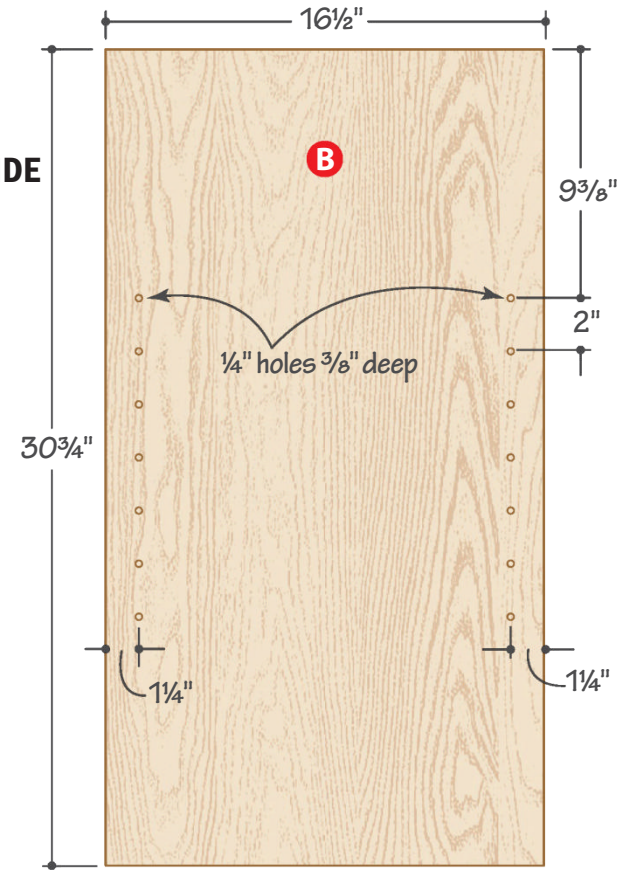
5 Install the supports using a temporary spacer for positioning [**Photos D, E**].

6 Screw a magnetic catch to the bottom (A) [**Exploded View**] and a matching strike plate on each wing (G) to hold the wing closed when not in use.

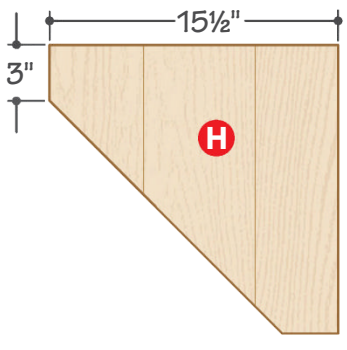


Rest the support (H) on the spacer with the hinge leaf tight to the back inside corner. Screw the hinge leaf to the side (B).

1a LOWER CABINET SIDE (Inside face)

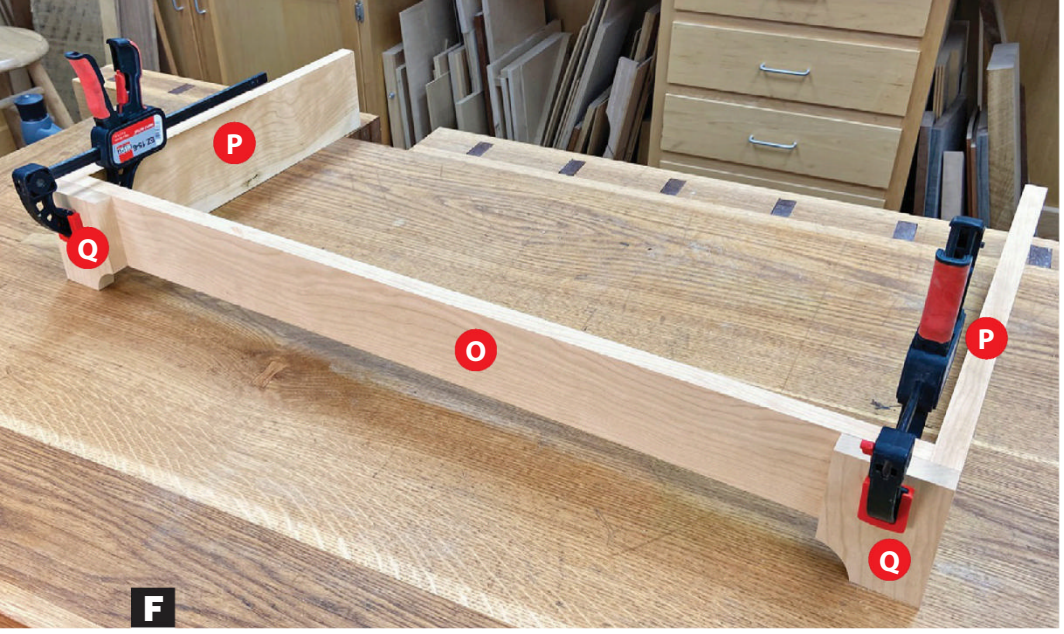


1b SUPPORT



1c WING





F

Glue and clamp the blocking (Q) to the base assembly (O/P) flush at the top and outside faces.



G

Center the front filler (R) on the cabinet width and overhanging the cabinet front by ½". Then, glue and screw the fillers to the tops of the upper cabinet, lower cabinet, and base assembly.

On to the upper

1 Cut the top/bottom (I) and sides (J) to size [**Drawings 2, 2a**].

2 Drill the shelf-pin holes in the sides, then rabbet around the outside face of the sides [**Drawing 2a**].

3 Cut the edging (K–M) to size [**Drawing 2**] and glue it to the top/bottom (I) and sides (J). Finish-sand the panels.

4 Rabbet the ends and back edges of the side assemblies (J/L/M) [**Drawing 2**], then assemble the upper cabinet.

5 Cut the back (N) to size, finish-sand it, and set it aside for now.

Build up the base

1 Cut the base front (O), sides (P), and blocking (Q) to size [**Exploded View**]. Shape the blocking as shown.

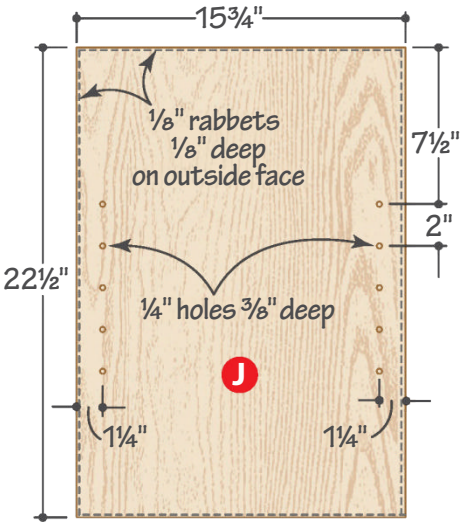
2 Glue the front between the sides flush at the front end and top [**Exploded View**]. After the glue dries, add the blocking [**Photo F**].

3 Cut the three sets of front (R) and side fillers (S) to size but 1" overlength [**Drawing 2**]. Miter-cut them to final length and install [**Photo G, Drawing 2, Exploded View**].

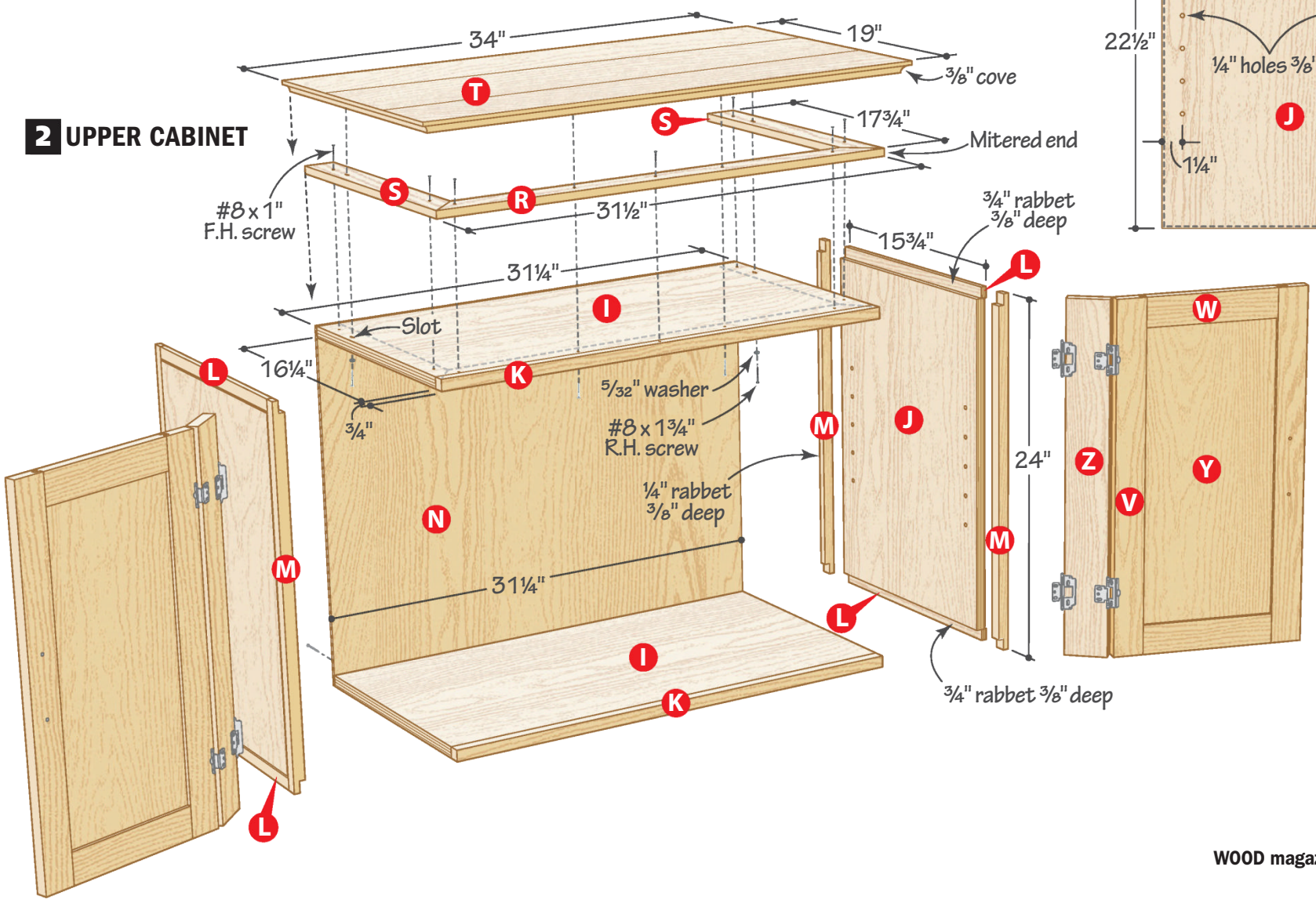
4 Glue the base assembly (O–Q) to the bottom of the lower cabinet, centered side-to-side and flush with the back edge.

5 Glue up a panel for the top (T), then cut it to size [**Drawing 2**]. Rout a cove on the bottom front edge and sides. Finish-sand the panel and set it aside.

2a UPPER CABINET SIDE (Inside face)



2 UPPER CABINET



▶Learn more about simple frame-and-panel door construction. woodmagazine.com/frameandpanel

Hide the insides

1 Cut the door stiles (U, V), rails (W), and panels (X, Y) to size [**Drawings 3, 4**].

2 Groove the inside edges of the stiles and rails, then cut tenons on the ends of the rails [**Drawings 3, 3a, 4**].

3 Finish-sand the panels, then glue up the doors. After the glue dries, finish-sand the door frames.

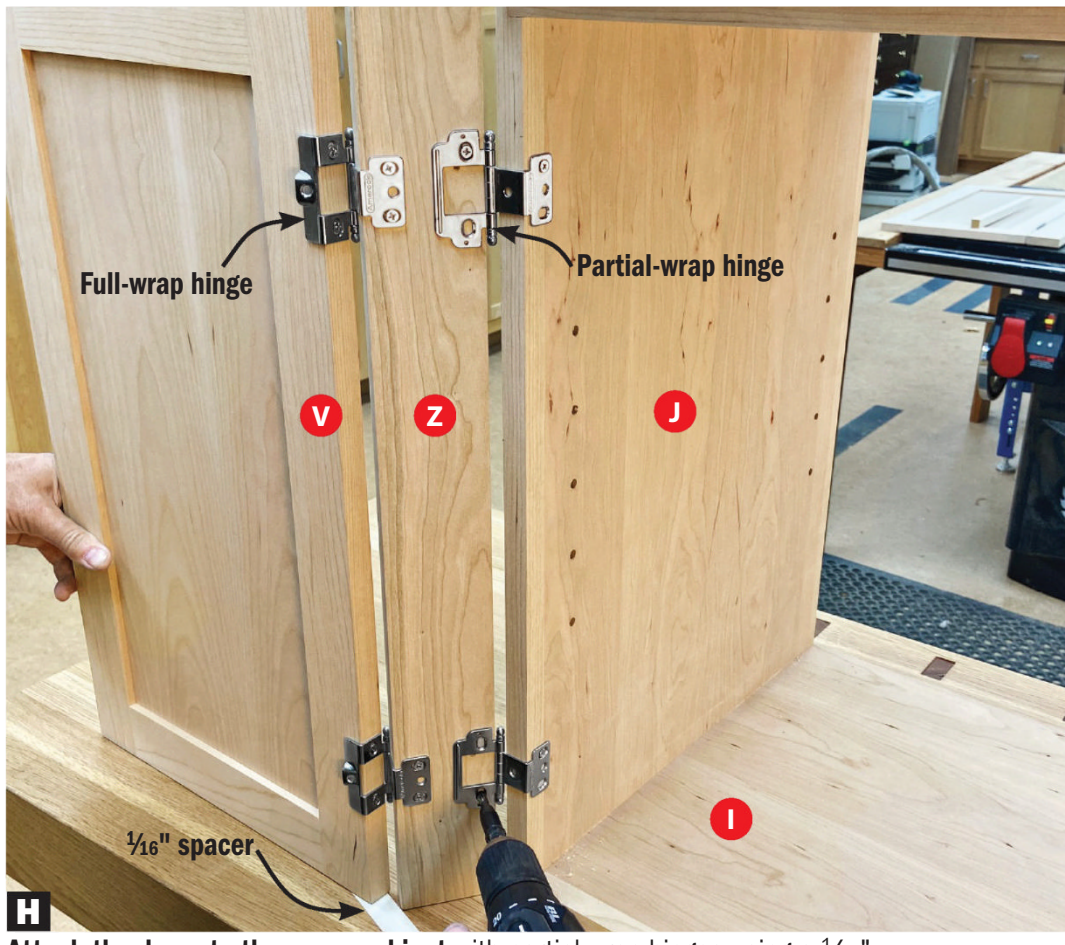
4 Attach the lower doors to the lower case with full-wrap hinges [**Sources**], then install the magnetic catches [**Exploded View**].

5 Cut the swing stiles (Z) to size [**Drawing 4**] and finish-sand. Attach the swing stiles to the upper doors with full-wrap hinges. Install the doors on the cabinet [**Photo H**].

6 Install the magnetic catches for the swing stiles (Z) and the doors [**Exploded View**].

7 Drill holes for the door pulls and install them [**Drawings 3, 4**].

8 Form slots in the side fillers (S) and upper cabinet top (I), then attach the top (T) to the upper cabinet, centered side-to-side and flush at the back [**Drawing 2**].



Attach the doors to the upper cabinet with partial-wrap hinges using a 1/16" spacer to elevate the door and swing stile.

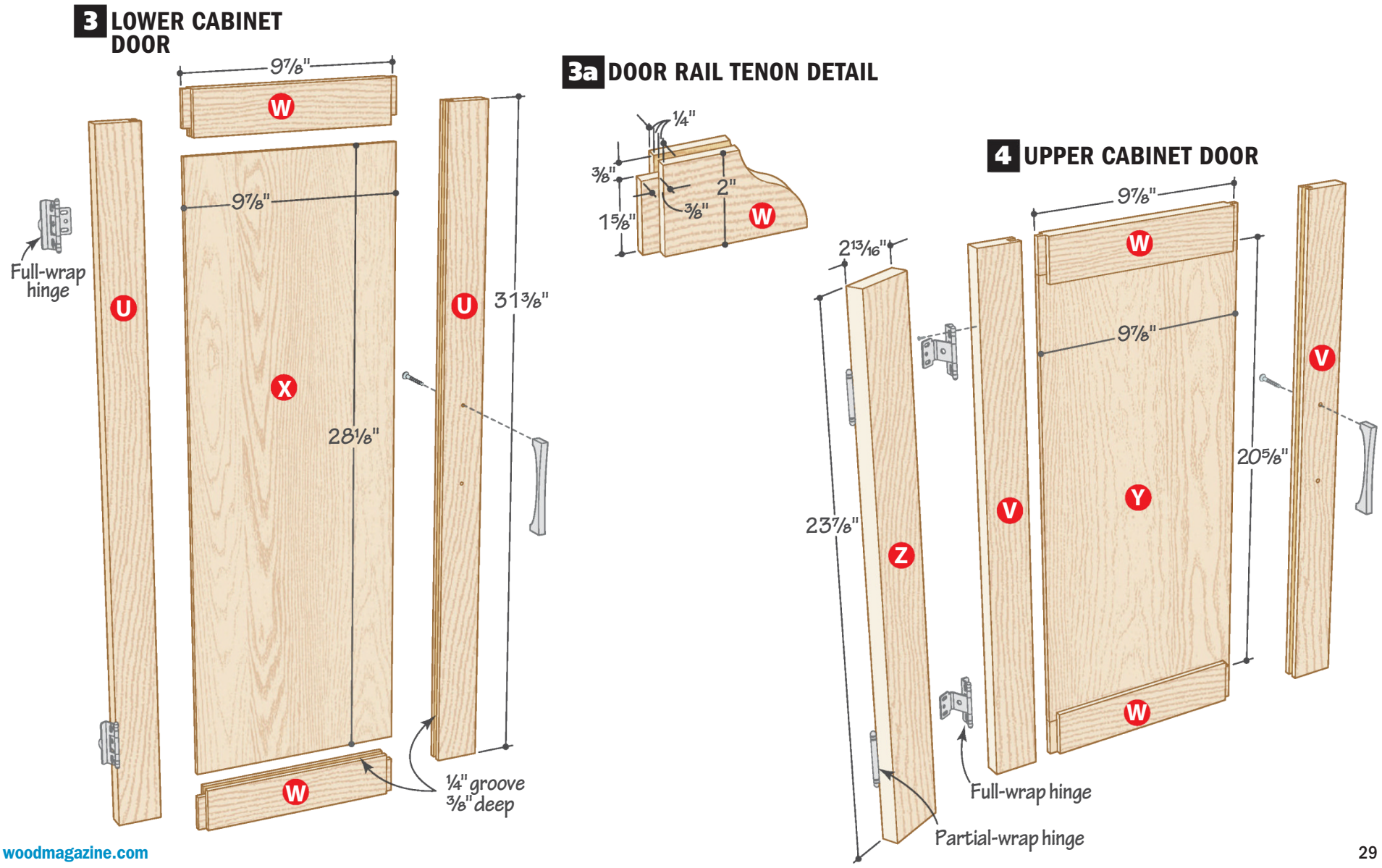
Final details

1 Cut the shelves (AA, BB) and edging (CC, DD) to size [**Exploded View**]. Glue the edging to the front edge of each shelf.

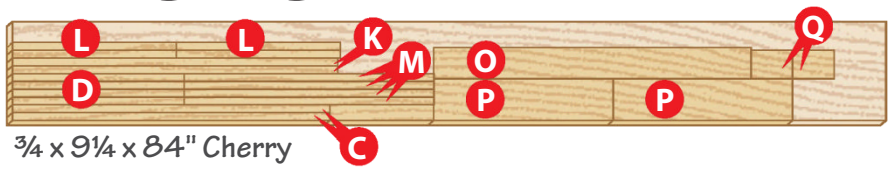
2 Remove all the hardware, then apply your desired finish. (We used General Finishes Enduro-Var Satin.)

3 Screw the upper cabinet to the lower cabinet, flush at the back [**Exploded View**].

4 Reinstall the hardware and attach the doors, wings, and supports. After attaching the backs (F, N) with brad nails, it's party-planning time with this buffet as the centerpiece.



Cutting Diagram



¾ x 9¼ x 84" Cherry

This project requires 4 square feet of ½" cherry and 36 board feet of 4/4 cherry.



¾ x 7¼ x 96" Cherry



¾ x 5½ x 96" Cherry (2 needed)



¾ x 7¼ x 96" Cherry



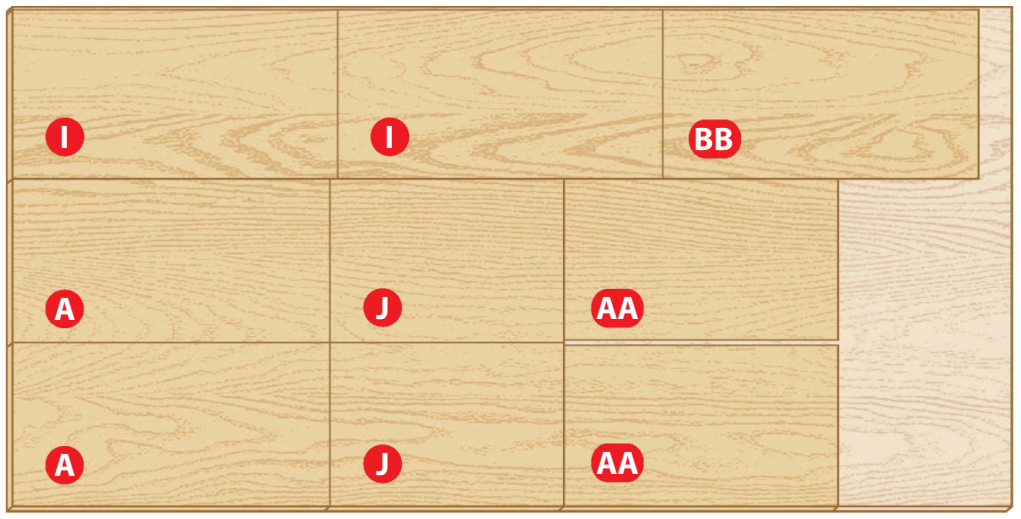
¾ x 7¼ x 96" Cherry



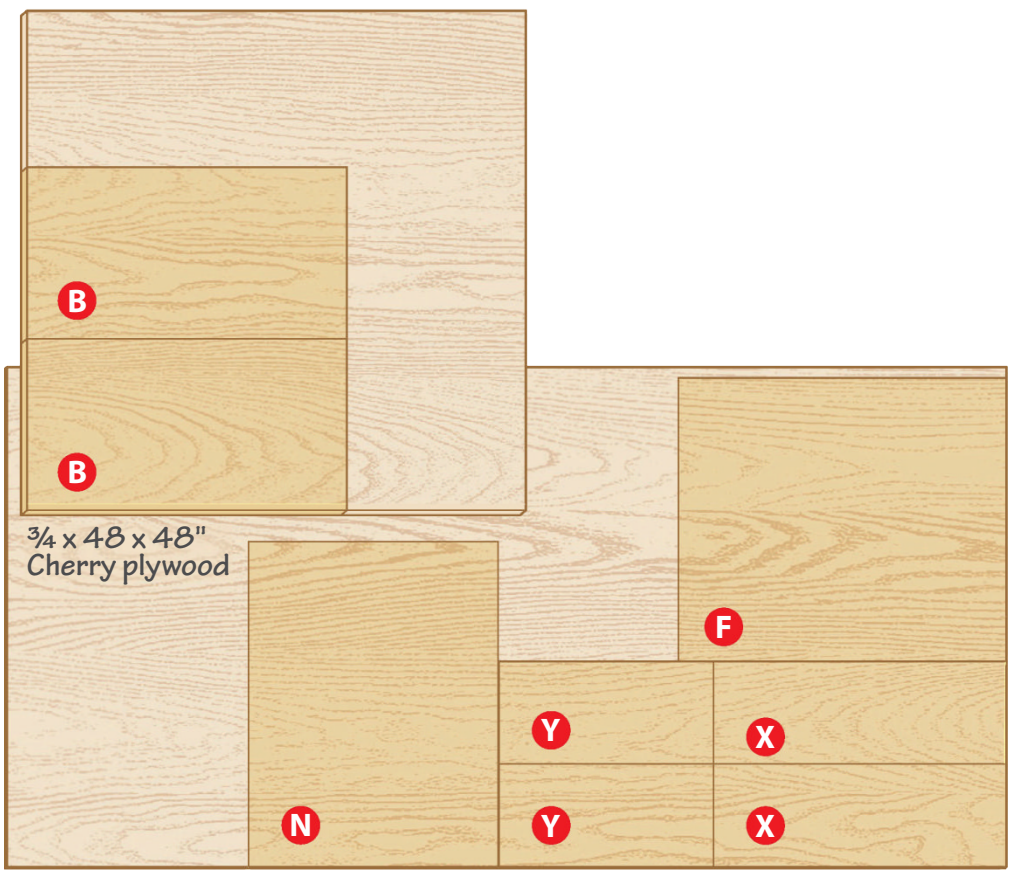
½ x 7¼ x 72" Cherry



¾ x 9¼ x 96" Cherry



¾ x 48 x 96" Cherry plywood



¾ x 48 x 48" Cherry plywood

¼ x 48 x 96" Cherry plywood

Materials List

Part		FINISHED SIZE T	W	L	Matl.	Qty.
Lower Cabinet						
A	top/bottom	¾"	15¾"	30½"	CP	2
B	sides	¾"	16½"	30¾"	CP	2
C	front edging	¾"	¾"	30½"	C	2
D	end edging	¾"	¾"	16½"	C	4
E	stiles	¾"	2¾"	31½"	C	4
F	back	¼"	27¼"	31½"	CP	1
G	wings	¾"	16¼"	29¾"	EC	2
H	supports	¾"	15½"	15½"	EC	2
Upper Cabinet						
I	top/bottom	¾"	16¼"	31¼"	CP	2
J	sides	¾"	15¾"	22½"	CP	2
K	front edging	¾"	¾"	31¼"	C	2
L	end edging	¾"	¾"	15¾"	C	4
M	side edging	¾"	¾"	24"	C	4
N	back	¼"	31¼"	24"	CP	1
Base, Fillers, and Top						
O	front	¾"	3"	30½"	C	1
P	sides	¾"	4"	17¼"	C	2
Q	blocking	¾"	2¾"	4"	C	2
R*	front fillers	½"	2"	31½"	C	3
S*	side fillers	½"	2"	17¾"	C	6
T	top	¾"	19"	34"	EC	1
Doors						
U	lower door stiles	¾"	2"	31⅜"	C	4
V	upper door stiles	¾"	2"	23⅞"	C	4
W	door rails	¾"	2"	9⅞"	C	8
X	lower door panels	¼"	9⅞"	28⅛"	CP	2
Y	upper door panels	¼"	9⅞"	20⅝"	CP	2
Z	swing stiles	¾"	2 13/16"	23⅞"	C	2
Shelves						
AA	lower shelves	¾"	15½"	26⅜"	CP	2
BB	upper shelf	¾"	16¼"	30⅜"	CP	1
CC	lower shelf edging	¾"	¾"	26⅜"	C	2
DD	upper shelf edging	¾"	¾"	30⅜"	C	1

*Parts initially cut oversize. See the instructions.

Materials key: CP–cherry plywood, C–cherry, EC–edge-glued cherry.

Supplies: #8×1" flathead screws, #8×1¼" flathead screws, #8×1¾" flathead screws, #8×1¾" roundhead screws, 5/32" washers, 1" brad nails.

Blade and bits: Dado set; ⅜" cove router bit; 1½" Forstner bit.

Sources: Partial-wrap nickel hinges no. AMPK3180TBG10 (8), $5.45; full-wrap nickel hinges no. AMPK3175TBG10 (8), $5.45; magnetic catches no. BK-P109-2C (8), $1.75; 36" continuous hinge no. RPC-CP2-2203S-36, $8.17; shelf pins no. FUT-72111-52-004 (pack of 100), $5.28, cabinetparts.com, 561-295-8476. Palladium pulls (128 mm) no. 02W3911 (4), $6.40, Lee Valley, 800-871-8858, leevalley.com.

Produced by **Bryan Nelson** with **Kevin Boyle** and **Brian Bergstrom**
Project design: **Kevin Boyle**
Illustrations: **Roxanne LeMoine, Lorna Johnson**

A Chip off the Old Block

Three-corner chip carving adds decorative detail to your project.



Chip carving provides a great way to learn carving basics. This method employs shallow, angled cuts to remove a wedge-shaped, three-corner chip. This simple style is sometimes called Swiss chip carving. For centuries, chip carvers decorated household items such as small boxes, plates, and spoons, many as gifts. It was a favorite pastime during the cold, harsh winters. With a sharp knife and a little practice, you'll soon be creating attractive designs sure to earn the admiration of friends and family.



On the cutting edge

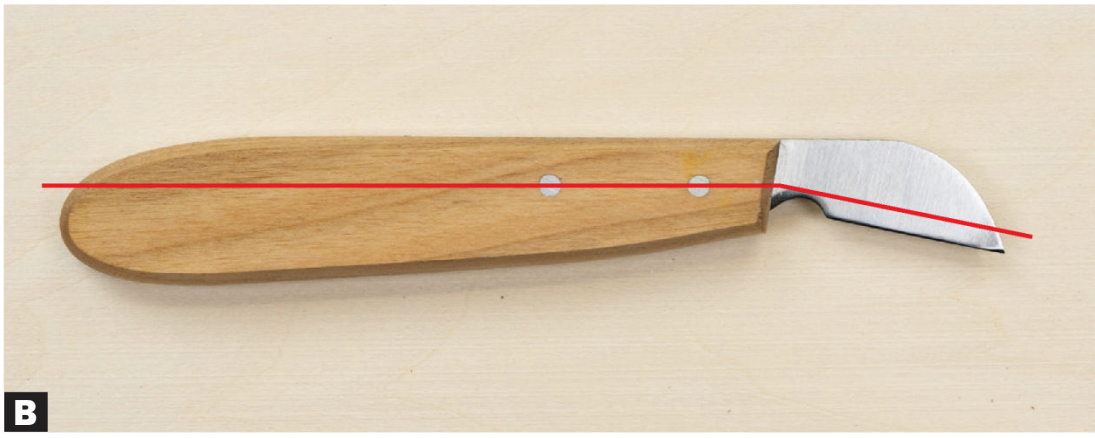
Chip carving, in its basic form, utilizes a specialized chip-carving knife. You'll find plenty to choose from. Plan to spend from $20 to $50 for a quality knife. The blades and handles vary in size and shape but all are similar in design [**Photo A**].

The traditional chip-carving knife features a cutting edge angled downward [**Photo B**]. The blade tapers from the spine to the cutting edge, making it ideal for the slicing and stabbing cuts that define the chip's shape. The shallow, double bevel angle slices wood fibers cleanly. Purchase this style of knife first. It's the knife you'll use most often as you gain experience.

Besides a knife, you need only a few sharpening supplies (see **Staying sharp**, *page 35*), and a thumb guard, available at most woodworking or carving tool resellers.



Knife makers offer a variety of handle styles. MyChipCarving.com and Wayne Barton knives feature a broad, rounded handle. Pfeil knives sport a simple handle with rounded edges. Ramelson knives, with their longer handles, are ideal for larger hands. Flexcut offers a more rounded, contoured shape.



The thin, angled blade of a chip carving knife features a double bevel and excels at making the clean cuts deep enough to form a chip.

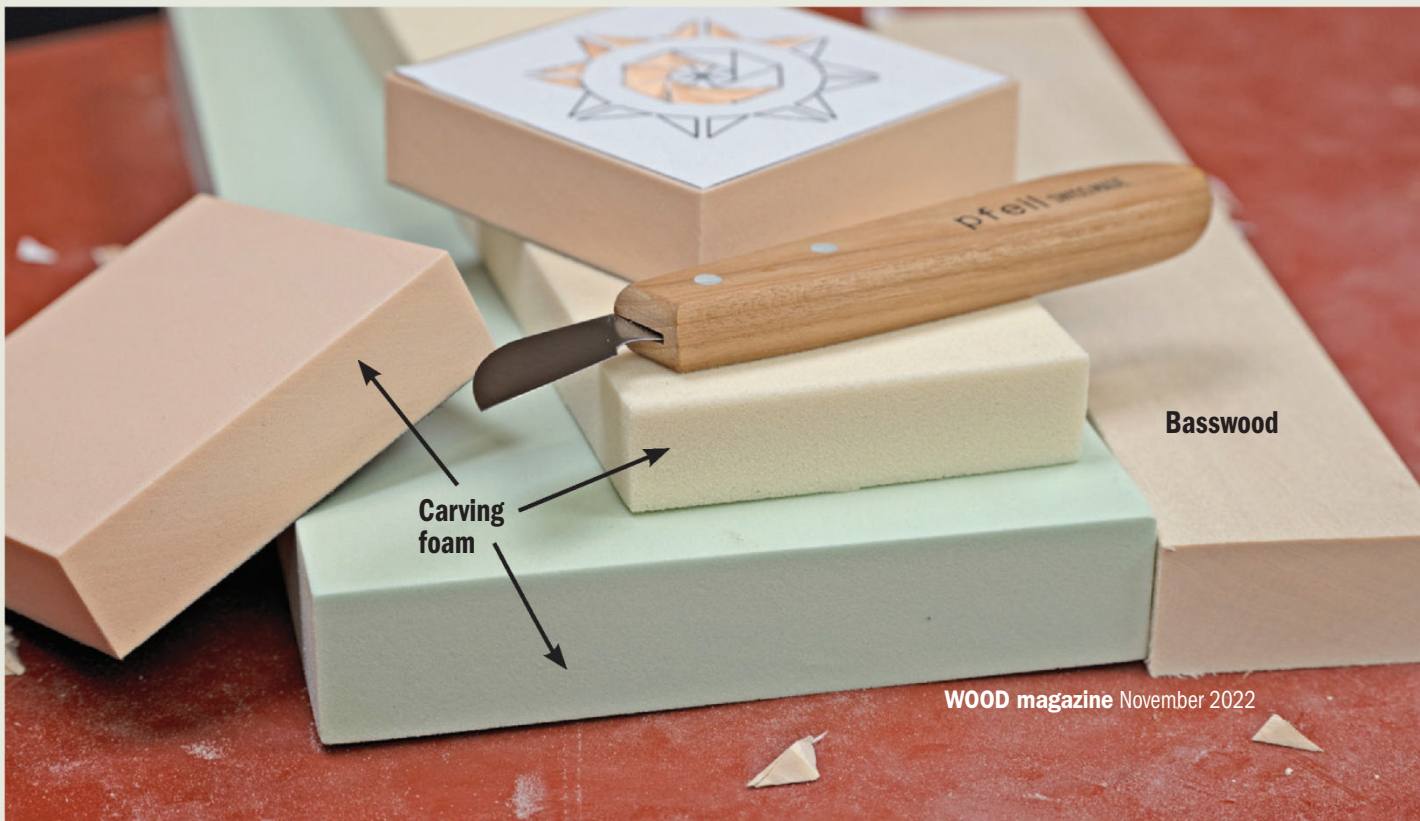
Carving media

Basswood (also known as linden) posesses creamy color, consistent and nearly invisible grain, and softness that make it ideal for carving. Sharp tools create crisp, smooth cuts in basswood. If you can't find quality basswood locally, look online or seek out a local carving club [**Sources**].

Basswood you find at a craft store is likely to be too hard and dry to carve. You'll know as soon as you try to make a chip. Before carving, set the basswood blanks alongside an open container of water inside a lidded plastic storage tote. After a day or two, you'll find the basswood easier to carve.

Another trick: Periodically spray a mist of 50/50 rubbing alcohol and water on the workpiece as you carve. This softens the wood fibers for easier carving.

Often used in making commercial signs, high-density urethane (HDU) foam makes a good alternative to basswood. It's easy to carve, making it ideal for practicing your technique. A foam density of 15 to 20 pounds per cubic foot matches that of most basswood. Signmakers in your area may be able to supply scraps of HDU. Some foam you find online is labeled "sculpture" or "carving" foam used for crafting. Its lighter density makes it easy to carve, and tan foam already resembles the color of wood.

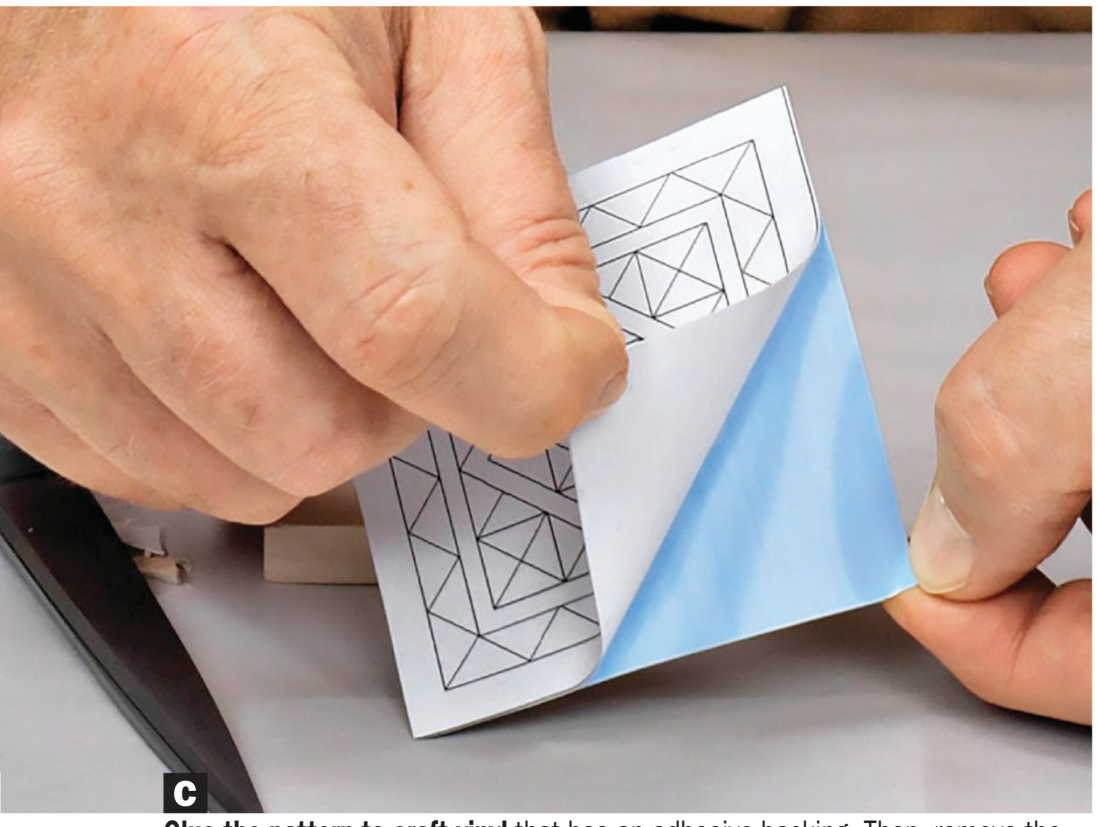


Classic chip carving requires a geometric pattern to define where to make the knife cuts. Find patterns online or in chip-carving books and magazines. Or create your own designs with a pencil, compass, and ruler, or use graphics software on your computer. Find full-size patterns for these coasters on *page 35*. Try either of these two methods to easily transfer the pattern to the workpiece.

First, attach the pattern to adhesive-backed craft vinyl [**Photo C**]. Purchase Oracal 631 vinyl where craft supplies are sold. Use a light-duty spray adhesive to fasten the pattern to the vinyl. Use scissors to cut away the excess, peel away the liner on the back of the vinyl, then carefully position it over the workpiece. Start at one corner and press the pattern onto your workpiece to eliminate air bubbles. After carving, the vinyl peels away easily. This method works equally well on wood and foam.

Alternately, for wood, apply the pattern with a heat transfer tool [**Photo D**]. First, print the pattern on a laser printer or duplicate it on a copier—the toner is the key.

Place the pattern facedown on the workpiece and slowly rub the heated tool on the back of the pattern to transfer it to the workpiece. Check your progress until the entire pattern appears on the wood.



C

Glue the pattern to craft vinyl that has an adhesive backing. Then, remove the liner and attach the pattern to the workpiece.



D

Use a heat transfer tool, which resembles a woodburning pen with a flat plate, on patterns printed or copied with toner.

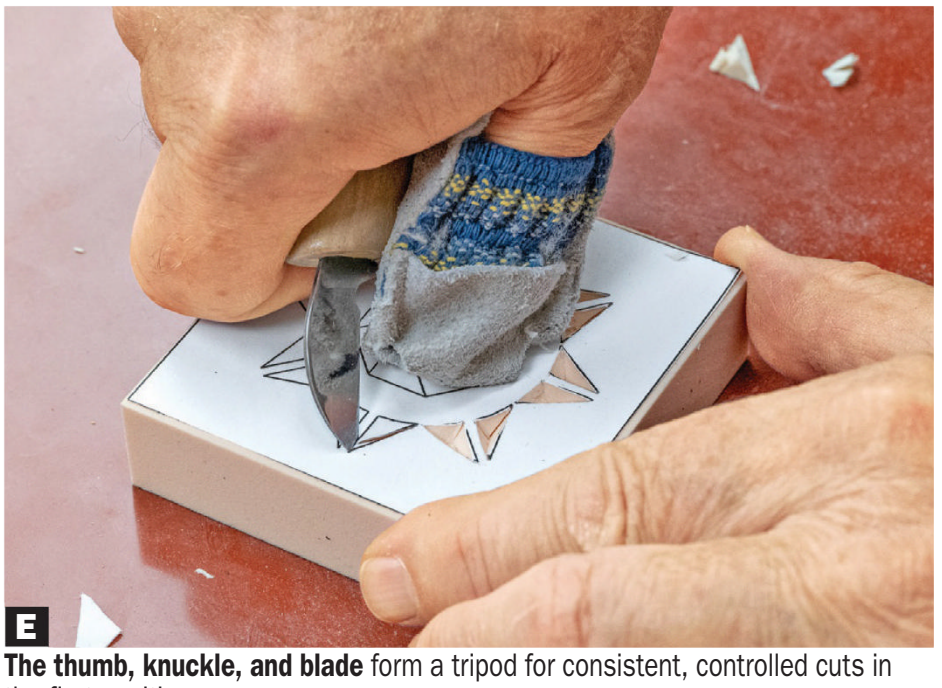
Making the cut

Precise knife cuts create the classic look of chip carving. Adjacent faces of the cuts intersect at a straight, clean line from top to bottom with all the cuts meeting at a point at the bottom. These cuts, made with one pass, vary in depth from start to finish. With these techniques and with practice, you'll learn to create perfect chips.

Note: *For safety, use a thumb guard while carving.*

Many traditional chip carvers work sitting down, with the workpiece in their lap. If this feels awkward, a worksurface at a comfortable height may offer a suitable work environment. A task light helps to highlight pattern lines and knife cuts.

When gripping the knife, use one of two hand positions, depending on the direction



E

The thumb, knuckle, and blade form a tripod for consistent, controlled cuts in the first position.

of cut. The first position uses the thumb and a knuckle of the index finger as anchor points on the workpiece [**Photo E**]. In this hand position, place the blade at the start of the cut with the thumb and knuckle securely on the workpiece. Move your hand and thumb as one unit to complete the cut.

The second position places the thumb on the top edge of the knife handle [**Photo F**]. This allows you to apply pressure with your thumb when cutting with the blade angled away from your body. If you can easily rotate the workpiece, you won't use the second hand position as often as the first position.



F

The second position, with the thumb on top, makes it easier to cut with the blade angled away from you.

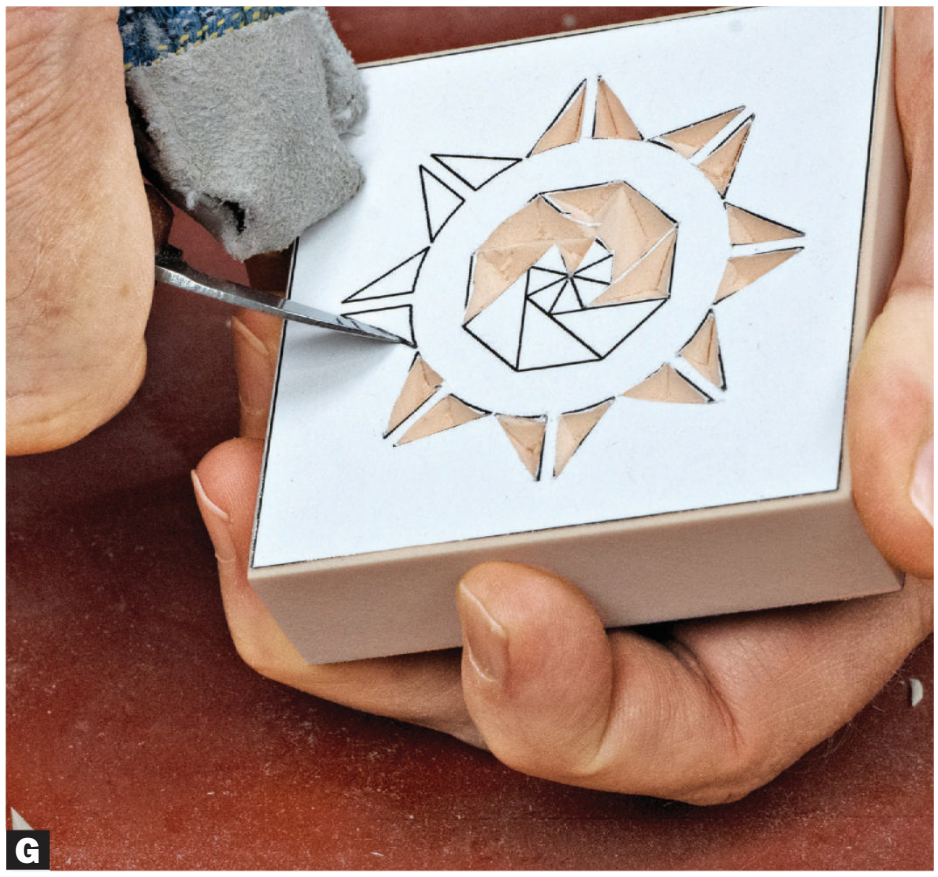
For your first exercise, cut a three-corner chip using the following steps.

1 Place the point of the blade at one corner of the triangle [**Photo G**]. Start at one end with a shallow cut. As you progress toward the midpoint of the cut, slice deeper while trying to visualize the blade tip at the center of the three-dimensional triangle shape. Once you pass the midpoint, start lifting the blade until it exits the cut at the end.

2 Turn the workpiece to make the second cut [**Photo H**]. Cut this side of the triangle the same way as the first.

3 Rotate the workpiece to cut the third side. As you complete this cut, you will end up where your first cut began.

Ideally, the chip will pop out freely with a "snap" [**Photo I**]. If it doesn't, repeat the cuts a little deeper, making sure to match the angle of the original cut. It's tempting to use the knife to pry out the chip, but you risk damaging the thin blade.



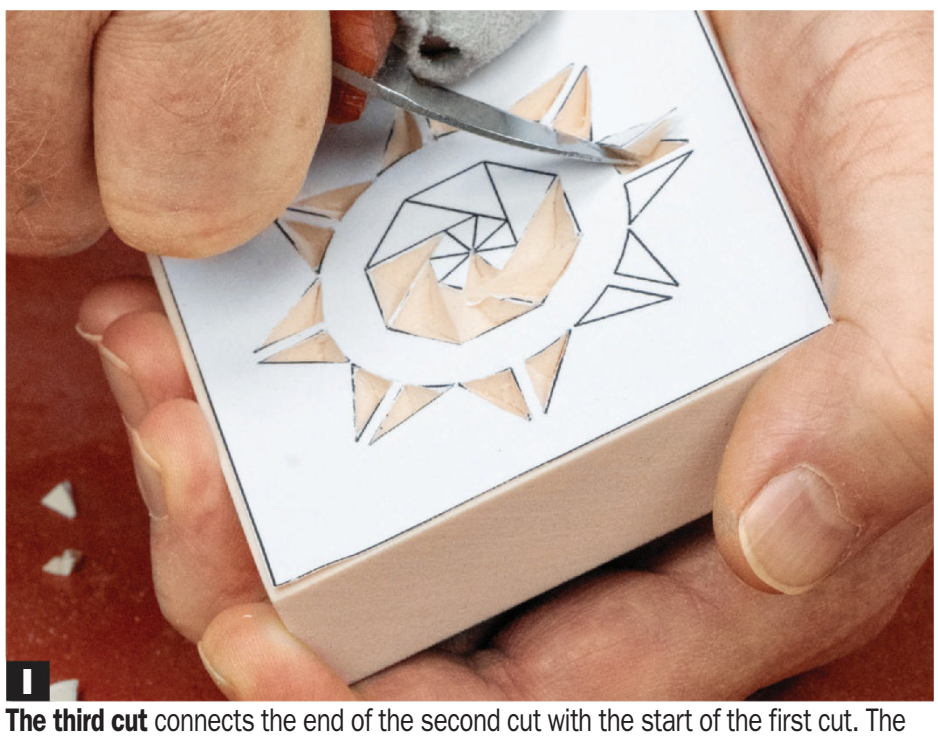
G

Make the first cut from tip to tip of the triangle, cutting deeper in the middle. Keep the blade between a 55° and 65° angle relative to the workpiece.



H

Start the second cut from the end of the first, while maintaining the same angle on the blade so that, at full depth, the cuts meet in the center of the triangle.



I

The third cut connects the end of the second cut with the start of the first cut. The chip should pop out cleanly.

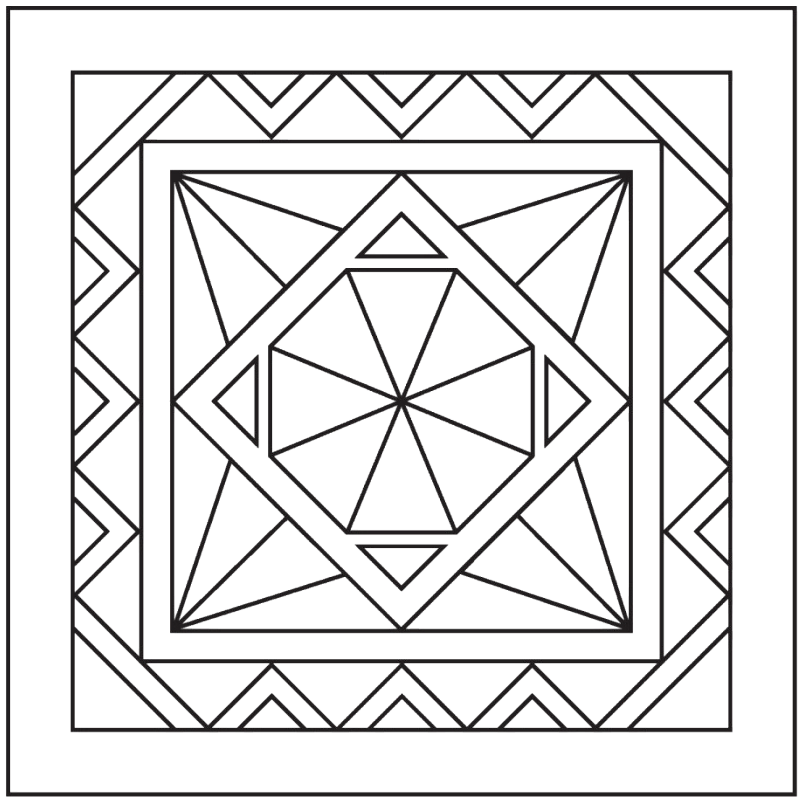
After the final cut

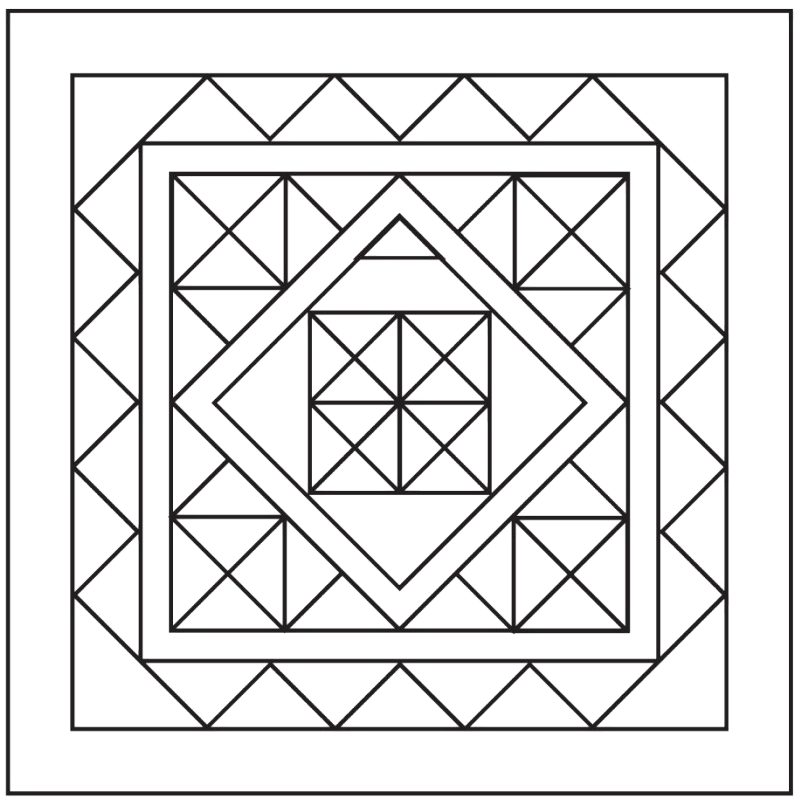
Remove pattern marks and any remaining adhesive with denatured alcohol. A white plastic eraser also helps with this task. Follow up with a 220-grit sanding block, if necessary, but don't go overboard. A light touch preserves the crisp cut lines and facets you worked so hard to achieve.

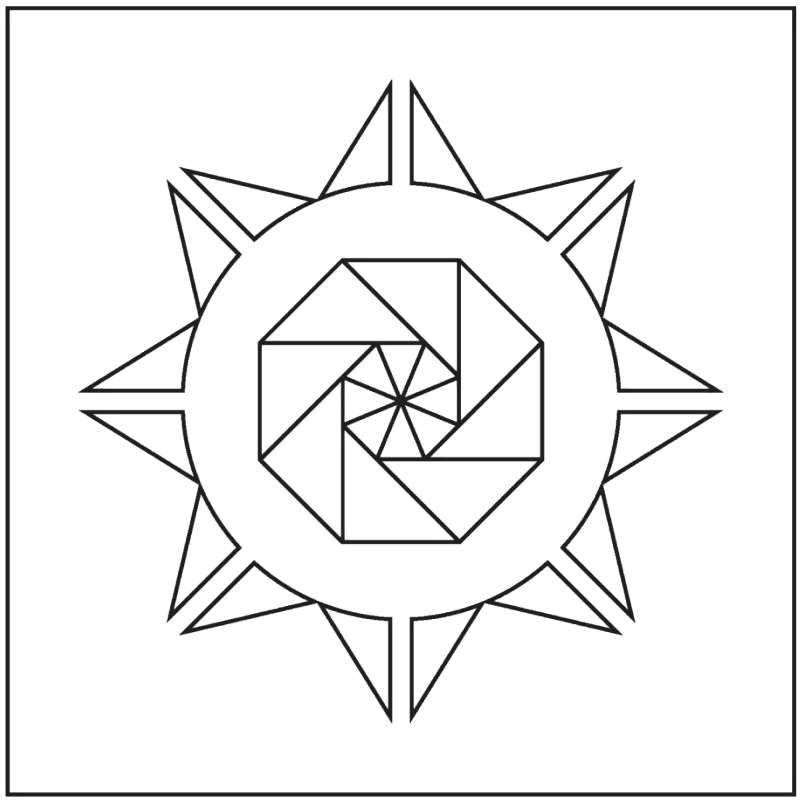
After a final, light sanding apply the finish of your choice. Aerosol acrylic or lacquer provide easy, quick finishes on both basswood and foam.

As with any craft, learning the nuances, techniques, and styles of chip carving comes with time and experience. But starting with this basic chip-carving technique, you'll soon be carving attractive designs to dress up your projects.

Produced by **Randy Maxey**







Staying sharp

As with any style of wood carving, chip carving requires sharp tools. Hone the knife periodically to keep it razor sharp. Before starting, use a fine ceramic sharpening stone followed by a few swipes on a leather strop charged with stropping compound, *right*. As you carve, use the strop often to keep the edge sharp.

Sources:
Basswood: heineckewood.com/
Knives:
Premier Chip Carving knives: wayne-barton.square.site
Ramelson knives: ramelson.com
Pfeil and Flexcut knives: woodcraft.com
Diamond Carving knives: mychipcarving.com
Ceramic sharpening stones: wayne-barton.square.site



A ceramic sharpening stone helps keep your knife razor sharp, which makes the intricate cuts easier.



Use a leather strop often to hone the knife edge for smoother, easier cuts.

All About Lacquers

By spray or brush, when in a rush, lacquer works, but know its quirks.

For a century, the fine furniture featured in stores and catalogs, and now online, often boasted of sporting a lacquer finish. So it's understandable to think that because pros use it, lacquer must be the "best" finish. It can be—but not in every case and not without understanding the challenges that come with its application. Learn **Why pros shoot lacquer**, *below*, and the differences in the various products labeled as lacquer before deciding if this finish suits your next project.

So what is lacquer?

Lacquer gained favor in the 1920s as a finish that provided better protection and wear resistance than shellac, a favored finish of the era. Nitrocellulose (also referred to as NC or nitro) lacquer consists of cotton and cellulosic solids chemically modified with nitric acid and carried in a lacquer-thinner solvent. Like shellac, each coat of NC lacquer dissolves the previous coat, then dries again, to create one unified layer. This solvent-based finish still sees wide use today.

However, in response to concerns about air-polluting volatile organic compounds (VOCs) in the solvents that make up lacquer thinner, finish manufacturers developed water-based formulations that perform similarly to nitrocellulosic formulas—but there are differences.





An industrial-size blower behind a wall of filters pulls air out of the spray booth, exhausting it outdoors. A respirator remains necessary for protection from fumes.

Why pros shoot lacquer

Pros choose lacquer primarily because it dries fast, which allows them to build several coats in a short time and quickly move many pieces through the finishing process. Lacquer also provides moderate durability that suits a variety of indoor items, such as shelving, tables, and cabinets that won't see heavy use—so one finish works for many of a shop's builds. And should the finish need repair, most any solvent-based lacquer will melt into the existing coats, making fixes nearly invisible.

These shops cover surfaces quickly and evenly with high-volume, low-pressure (HVLP) spray equipment. Because lacquer generates flammable and unhealthy fumes that must be evacuated from the finishing area, pros spray in booths where explosion-proof fans pull a large volume of air through wall-size filters.

▶Get the lowdown on HVLP spray systems.
woodmagazine.com/hvlp

What you find on the shelf

In stores and online, you'll find many containers labeled "lacquer," but they are not all the same or interchangeable. Here's how to make sense of what you find.

Solvent-Based

If the label says the product requires lacquer thinner for thinning and cleanup, you have a solvent-based nitrocellulose lacquer, *below*. This finish imparts an amber tone to materials, it yellows with age, and it can become brittle. Exposure to sunlight can accelerate and increase yellowing and cracking or crazing.

Water-Based

A label that specifies water for cleanup indicates a water-based acrylic lacquer, *below*. This product goes on and stays clear, without the amber tone of solvent-based lacquer. Water-based formulations provide more flex, so are less likely to crack over time. The initial coat raises the wood grain, which requires sanding before recoating. Water-based lacquers contain fewer VOCs, and tend to cost more.





Curiosity about cats

Solvent-based lacquers can be found in two formulations: pre-catalyzed and post-catalyzed. Water-based lacquers may have a pre-catalyzed offering. Blending in a catalyst initiates a chemical reaction as the finish cures that makes the lacquer more durable—but at the expense of shelf life. Once the catalyst mixes with the lacquer, shelf life may be anywhere from 30 days to 2 years, depending on the formulation.

Precatalyzed lacquer (often referred to as pre-cat) has the catalyst added before (or just as) you buy it, *right*. The minimum quantity may be a gallon, so consider whether you'll be able to use all or most of it before it expires.

Post-catalyzed lacquer (post-cat) is sold primarily to industrial and commercial users, so quantities begin at one gallon and go up. The catalyst comes separate and you must mix it into the lacquer before use. This allows for a longer shelf life for the uncatalyzed finish, and for mixing only the quantity needed. But mixing requires precision—otherwise the finish won't cure properly. Post-cat works well for pro users who buy finish in quantity and must ensure their supply stays viable until they need it. For home users, the hassle of buying larger quantities and then mixing smaller batches isn't worth it.



Dates written on these cans show when the catalyst was added. One has a 120-day working life, the other 180 days. Ask your dealer about working life, if none is listed.

Laying down lacquer

Most lacquer gets sprayed using HVLP equipment, but other methods, *below*, don't require this investment. Regardless of how you apply it, the fumes for water- and solvent-based lacquers pose health and fire hazards—you must provide adequate ventilation. Protect yourself further with a respirator rated for organic vapors, and safety glasses.

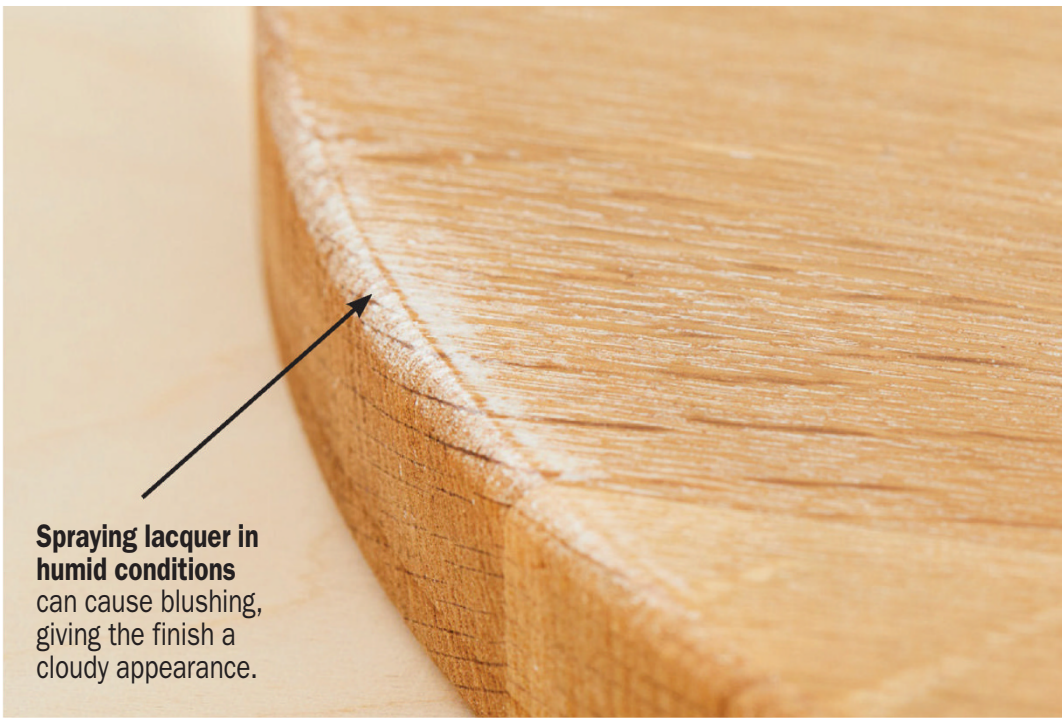
Lacquer also requires a narrow window of temperature and humidity for best results: generally, between 65° and 85°F, with relative humidity below 65 percent. Too-humid or too-cool conditions can trap moisture below the finish as solvent flashes off, causing blushing, *right*.

Lacquer dries quickly for recoating, but allow 10 days before setting heavy items on a freshly finished surface. Cleaners containing ammonia, bleach, alcohol, or acetone will damage lacquer. Instead, use a damp rag or a spray-and-wipe furniture polish.

Because lacquer formulations vary among manufacturers, stick with the same brand and type (water- or solvent-based) once you start a job. If you have a repair job and don't know which type was used, generally, you can apply a water-based lacquer over a solvent-based one. However, solvent-based over water-based may cause the existing finish to wrinkle. In either case, first test the combination in a hidden area.

Produced by **Craig Ruegsegger**

▶ Avoid placing plastic items and foam, such as shelf liner, on a lacquer finish for extended periods. The plastic and finish can melt into each other.



Spraying lacquer in humid conditions can cause blushing, giving the finish a cloudy appearance.

Aerosol



Aerosol cans serve well for small projects where setup and cleanup would take longer than the finishing, but they cost the most per coverage area. Find ready-to-use rattle cans in just about every hardware store and home center. Satin, semi-gloss, and gloss sheens are common.

Most aerosols have fewer solids, and the nozzle dispenses smaller amounts than an HVLP gun, so apply more coats to reach the desired build. The narrow spray pattern reaches into small crevices and fine details without excessive build-up.

Spray Gun



For covering large projects and vertical surfaces, a spray gun can't be beat. It provides the most control over how much finish you apply, by allowing you to thin the finish before spraying, and by adjusting the amount the gun dispenses. Like aerosol cans, a spray gun evenly covers detailed areas without finish building up in them.

You can get an HVLP gun to work with your air compressor without having to invest a lot. Be sure to use a water separator in your air line. Or step up to a self-contained HVLP system.

Brushing



Brushing lacquer has additives that slow its drying time. This allows you to maintain a wet edge, but you must still work quickly. The higher solids content of brushing lacquer makes it more durable and helps it build thicker in fewer coats. However, higher solids make it a poor choice for repairs. For blending in fixes, choose an aerosol or thin and spray a standard lacquer.

Use a natural-bristle brush. Solvent-based and water-based lacquer will both melt a plastic or foam brush. Brushing lacquer can be thinned and sprayed, but because it dries slower, apply light coats to avoid runs and drips. You'll need to experiment to find how much thinner achieves the desired results.

Build Your Own Jack Plane

A fun, low-cost way to expand your collection.



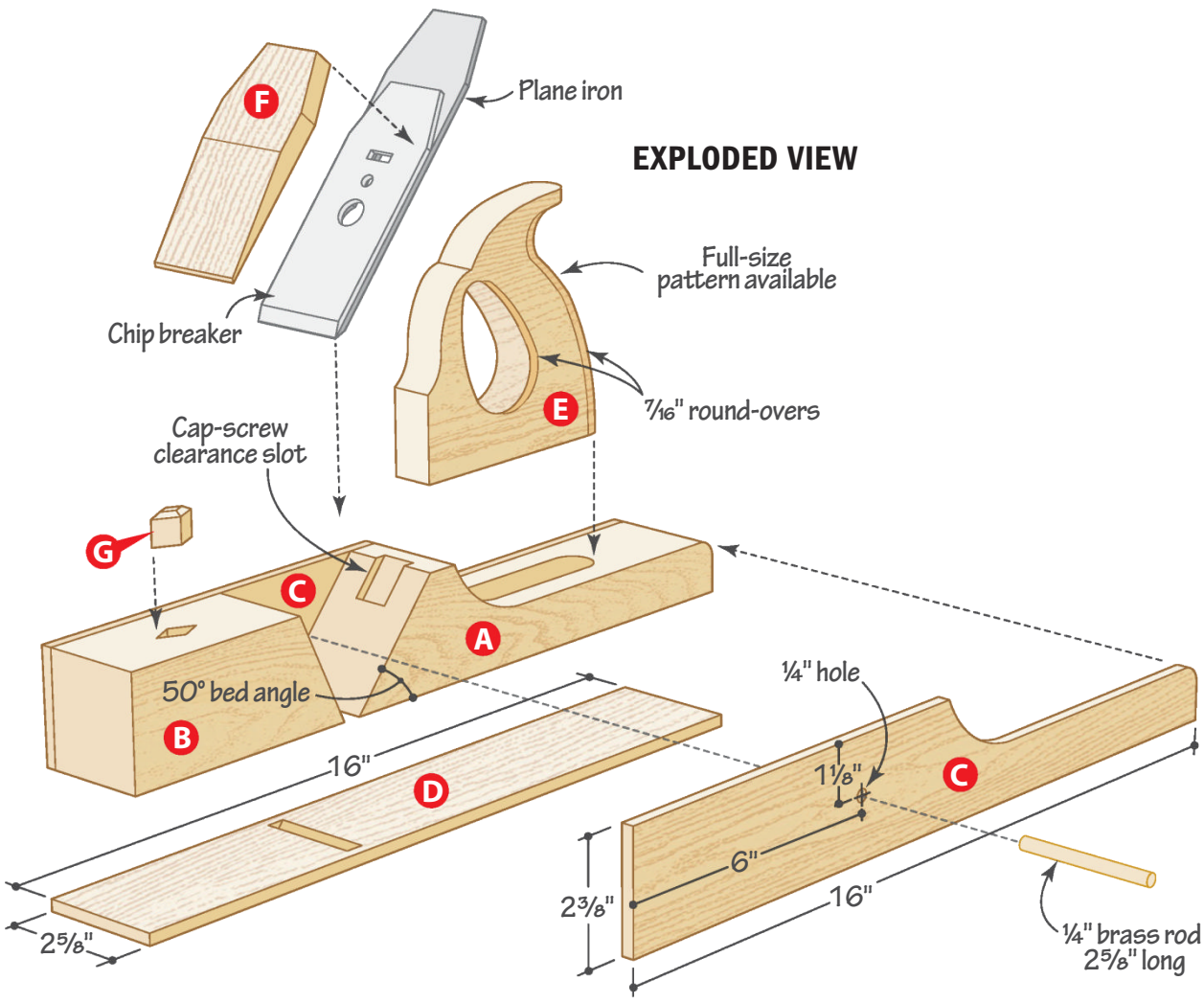
Making your own hand planes is easier than you might think. This one removes the need for complicated machining by building up the body from multiple parts.

Well-suited for trimming and dimensioning stock, this lightweight jack plane is also long enough to joint the edges of shorter boards found in most furniture projects. The 50° bed angle reduces tear-out in harder woods, and a high-quality blade and chipbreaker [**Source**] provide excellent planing results.

DIMENSIONS:
2⅝" W × 16" D × 5⅝" H

Approximate materials cost:
$120
Including blade and chipbreaker

50°
bed angle



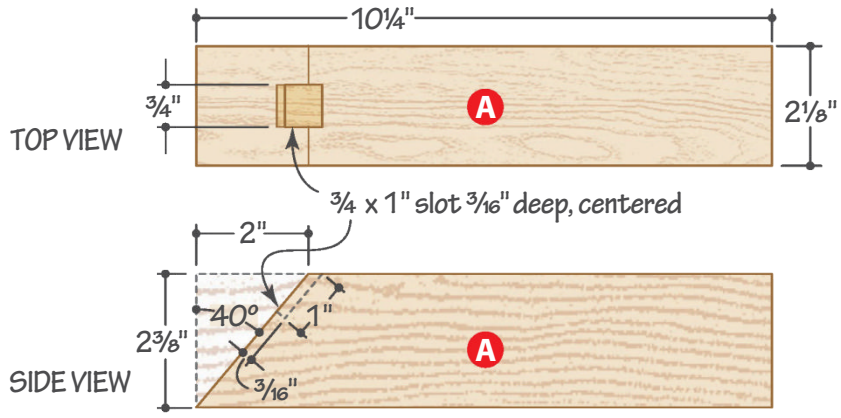
Body by you

1 Cut the infills (A, B) and sides (C) to size [**Materials List**], miter-cutting the ends of the infills [**Drawings 1, 2**]. Lay out and form the cap-screw clearance slot in the mitered end of the rear infill [**Photo A**].

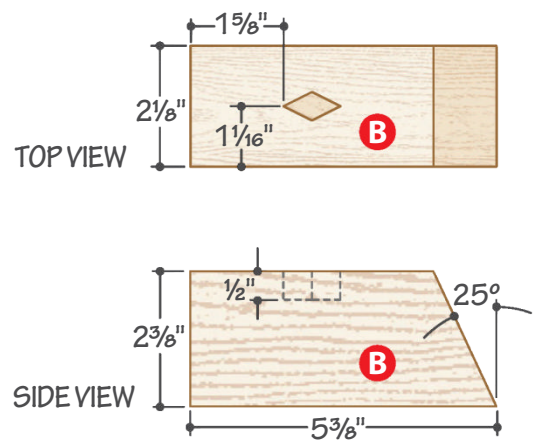
2 Stack the sides and drill the hole through both [**Exploded View**]. Glue and clamp the infills between the sides with the outer ends flush, then secure the brass rod in the side holes with CA glue or epoxy, wiping any excess from the brass rod before it cures.

3 Cut the sole (D) to match the width and length of the body assembly (A–C). Clamp it to the bottom of the body assembly and lay out the mouth opening [**Photo B**].

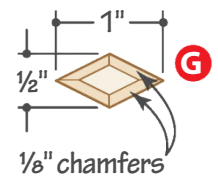
1 REAR INFILL

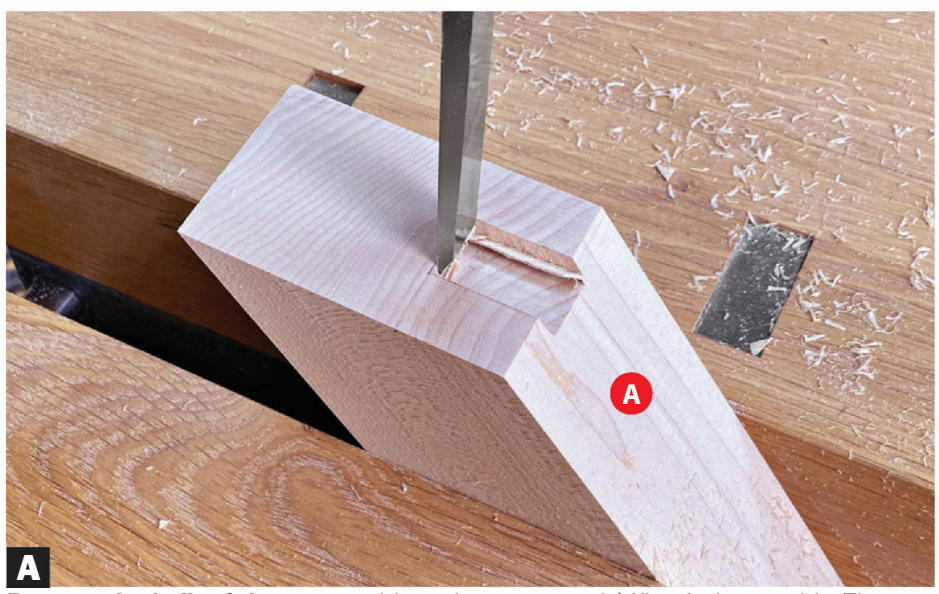


2 FRONT INFILL

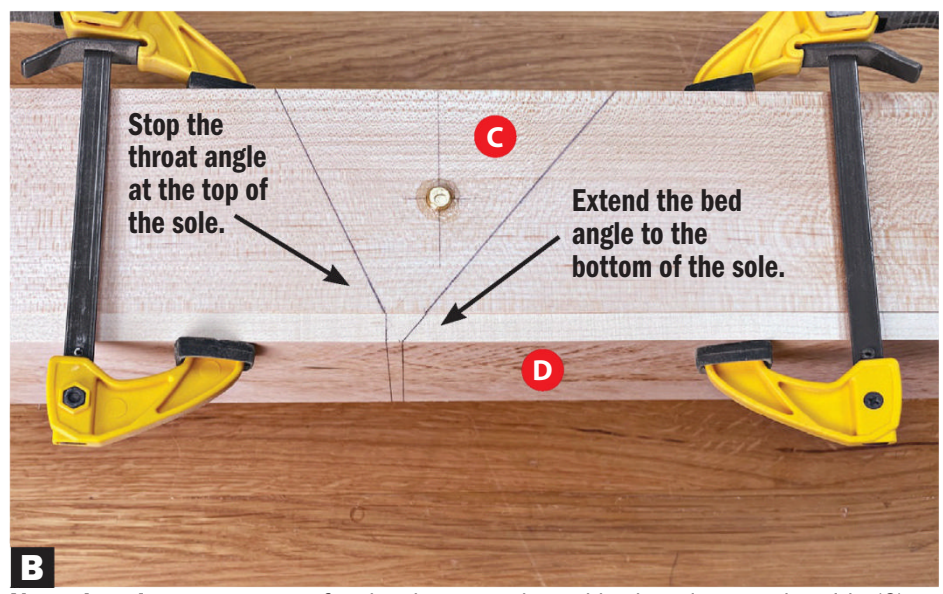


2a STRIKE BUTTON





Remove the bulk of the waste with a trim router and ¼" spiral upcut bit. Then, clean up the edges and corners with a chisel.



Use a bevel gauge to transfer the throat angle and bed angle onto the side (C). Then mark parallel lines across the sole (D) to lay out the mouth opening.



Install a ⅛" brad-point bit in your drill press. With the bottom face of the sole up, drill out the waste between the layout lines, stopping ¼" from the edges.



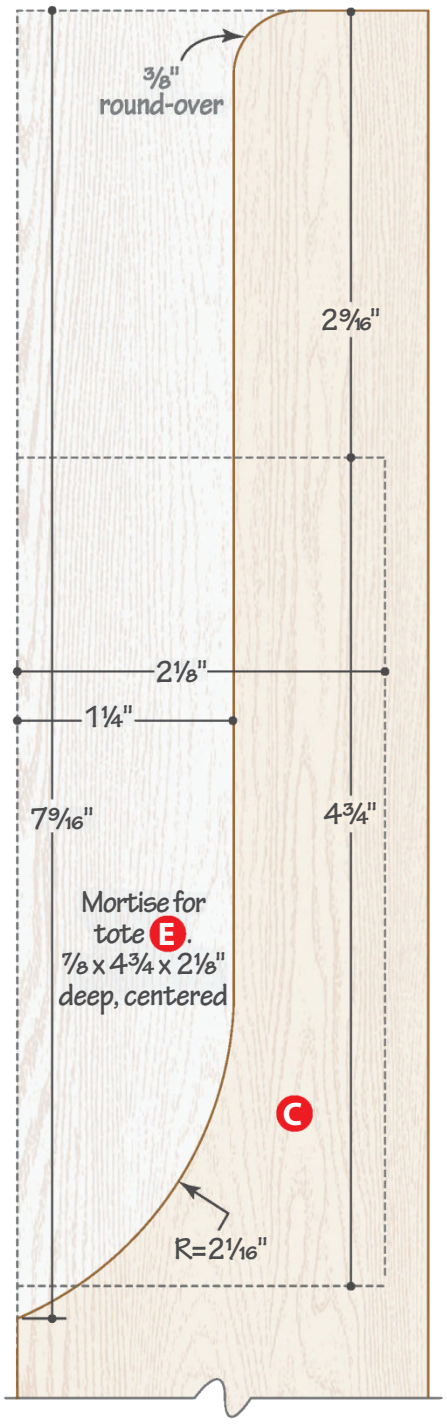
Use a ⅞" Forstner bit to drill overlapping holes 2⅛" deep.

4 Remove the sole from the body assembly and drill out the bulk of the waste from the mouth [**Photo C**]. Then, glue and clamp the sole to the plane body. Once the glue dries, finish forming the mouth with a chisel and file.

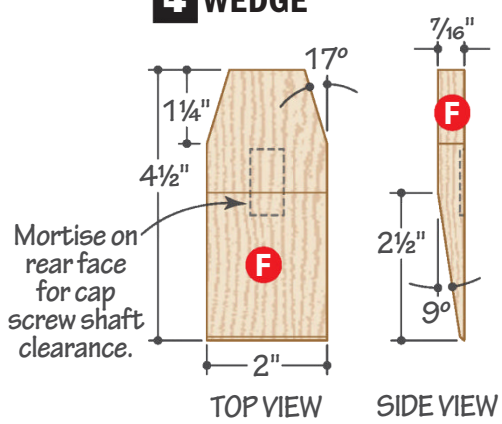
5 Lay out the rear body profile on one side (C) and the tote mortise on top of the rear infill (A) [**Drawing 3**]. Drill out the bulk of the mortise [**Photo D**], then bandsaw the rear body to shape. Finish the mortise with a chisel, squaring the sides and front end, but leaving the radius from the Forstner bit on the back end.

Tip! *Use a quart-size paint can to trace the radius for the rear body cutout.*

3 REAR BODY (SIDE VIEW)



4 WEDGE



Get a grip

1 Apply a copy of the **Tote Full-Size Pattern** on the end of a 10"-long blank, using spray adhesive. The extra length provides clamping surface as you shape the tote (E).

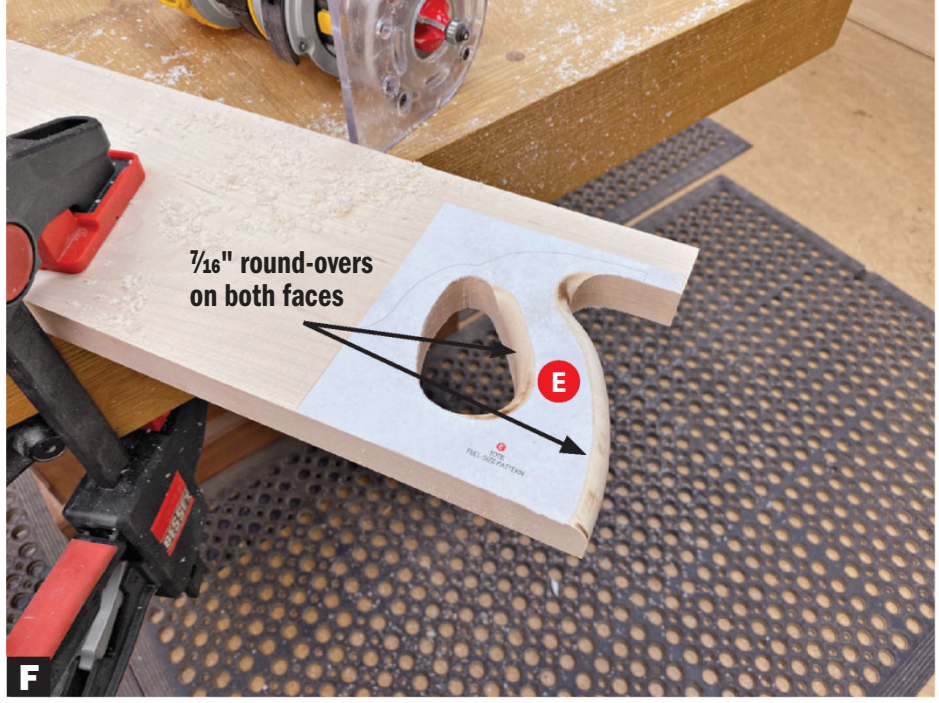
2 Start shaping the tote at the drill press [**Photo E**], then jigsaw, file, and sand the interior cutout and back end. Round over the edges of the tote that contact your hand [**Photo F**], then jigsaw the front end free from the blank.

3 Finish-sand the tote and check the fit in the body mortise. When you have a snug fit, glue and clamp the tote into the mortise [**Exploded View**].

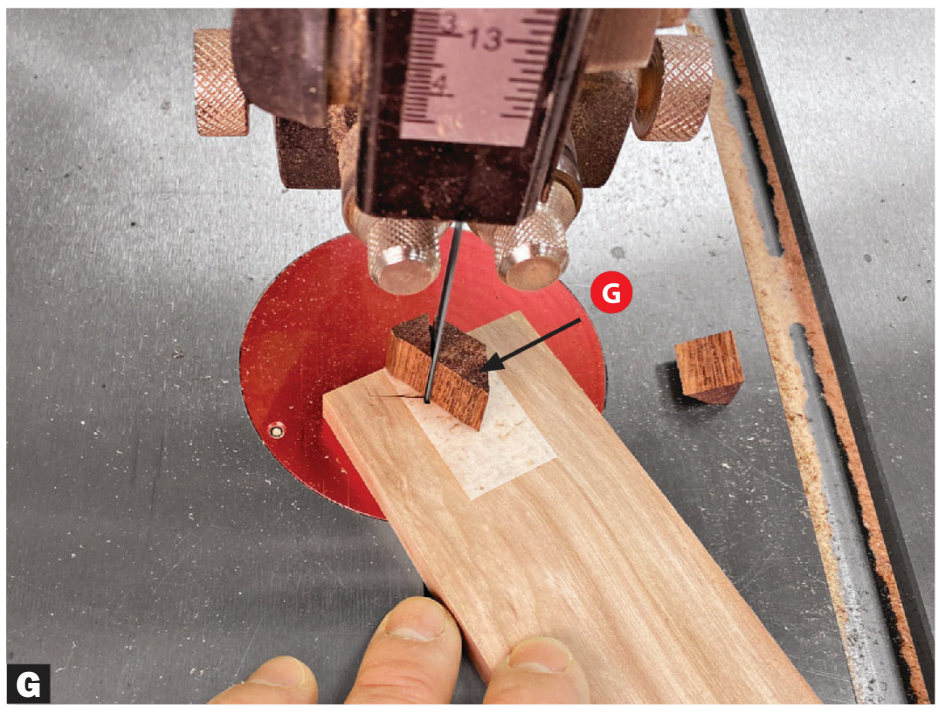
▶ See how you use your entire body for best hand-planing results.
woodmagazine.com/properplaning



Use a 1" Forstner bit to remove material from the tight curves on the interior and exterior of the tote (E).



Round over the edges indicated with a trim router and 7/16" round-over bit. Then, file or sand the transitions and remaining edges until the grip feels comfortable.



Use double-faced tape to hold the workpiece on a carrier board. Cut one side of the diamond, then rotate it on the tape to cut the other side.

Button it up

1 Bandsaw the wedge (F) to shape [**Drawing 4**], then check its ability to firmly hold the iron/chipbreaker assembly in the plane [**Exploded View**]. Sand or plane the wedge, adjusting its thickness on either side, until the brass rod leaves an even imprint line across the full width of the wedge.

2 Crosscut a 5/8"-long piece of rosewood and lay out the strike button (G) [**Drawing 2a**] on its end grain. Then, bandsaw it to shape [**Photo G**] and finish-sand it.

3 Position the strike button on the front infill [**Drawing 2**] and scribe around it with a marking knife. Use a chisel to chop the mortise, then glue in the strike button.

4 Chamfer the top edges of the plane and strike button, then finish-sand the plane to 220 grit. Apply a finish. We rubbed on three coats of tung oil to everything except the back face of the wedge.

5 Sharpen your plane iron and make some shavings!

Tip! *When you get close to a good fit, flatten the back of the wedge on 120-grit sandpaper adhered to a flat surface. The coarse finish provides extra grip on the chipbreaker.*

Materials List

Part		FINISHED SIZE T	W	L	Matl.	Qty.
A	rear infill	2 3/8"	2 1/8"	10 1/4"	M	1
B	front infill	2 3/8"	2 1/8"	5 3/8"	M	1
C	sides	1/4"	2 3/8"	16"	M	2
D	sole	1/4"	2 5/8"	16"	M	1
E*	tote	7/8"	5 1/8"	4 3/4"	M	1
F	wedge	7/16"	2"	4 1/2"	M	1
G	strike button	1"	1/2"	5/8"	R	1

*Part initially cut oversize. See the instructions.
Materials key: M-hard maple, R-rosewood.
Supplies: 1/4x2 5/8" brass rod.
Bits: 7/8" and 1" Forstner bits; 7/16" round-over router bit; 1/4" spiral upcut router bit.
Source: 2" plane iron no. 1-BL-2, $60; 2" chipbreaker no. 1-CB-2, $50, Lie-Nielsen, 800-327-2520, lie-nielsen.com.

Produced by **Zach Brown** with **John Olson**
Project design: **John Olson**
Illustrations: **Roxanne LeMoine, Lorna Johnson**



Portable Tablesaws

A job-site tablesaw cuts through concerns about limited budget and shop space. We test 12 models on collapsible stands in search of the best.



Most people make a tablesaw their first machine purchase when they get serious about woodworking. And we heartily endorse that plan. But if a stationary cabinet saw with 3-hp motor and large cast-iron top is not an option for you due to space or budget limitations, consider a portable model for your first tablesaw. Choosing that route doesn't mean settling: You can find several capable saws in this category that should last for years. Let's take a look at the contenders.

How we chose the field

To be included in our test group, each tablesaw had to meet the following criteria:

- powered by a corded 110-volt motor;
- uses a 10" blade and has at least 25" rip capacity;
- mounted on a collapsible stand.

Note: *We equipped each tablesaw with a new Diablo 24-tooth ripping blade for all rip tests, and a new 50-tooth combination blade for all crosscut tests.*





DeWalt's rip fence clamps to the front and back rails. To adjust the fence side-to-side, you release the lock and rotate the rack-and-pinion knob. Other saws using this system: Metabo HPT, Kobalt KT10152, Skil TS6307-00, Ridgid R4550, and Skil SPT99-11.

▶ **Definition:** *Worm drive*—a spiral gear used to transfer power from the motor shaft that is oriented 90° to the blade arbor shaft, placing the motor parallel with the blade.

▶ **Definition:** *Rip capacity*—the maximum distance between the blade and rip fence (the greatest width to which you can rip a workpiece). Rip capacity is greater to the right side of the blade than the left.

Power up your search engine

Because all but one of these tablesaws use direct- or belt-drive systems and similar motors, they perform comparably when it comes to cutting power. The worm-drive motor in Skil's SPT99-11—like those found in its professional-series handheld circular saws—held its own against the other saws. We found we could bog down any of them with an aggressive feed rate, but backing off solved that. Bottom line: Power should not be a factor with any of these saws.

Ripping gets the nod

These saws rip wood reasonably well with some limitations. All boast sufficient capacity to rip a 4×8' sheet of plywood in half lengthwise. Six saws provide at least 30" rip capacity (see the chart on *page 48*), led by the Metabo HPT C10RJS with 35".

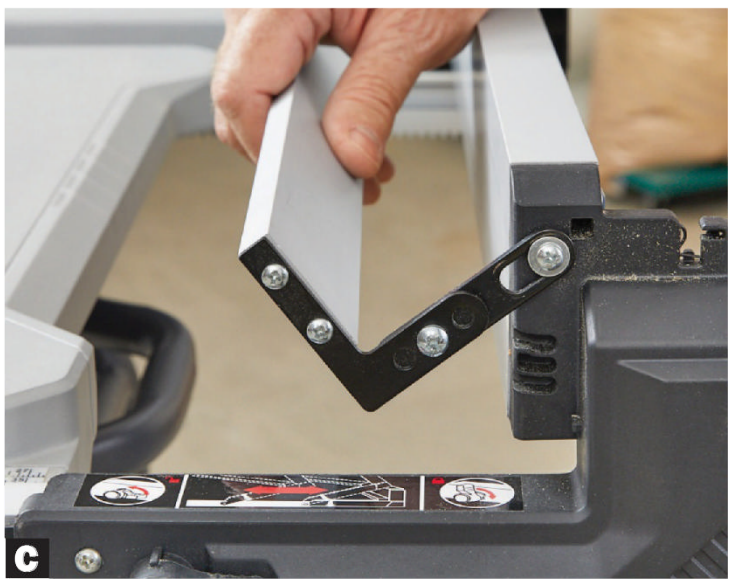
Each saw's rip fence can be removed and installed easily, attaching to rails at each end to hold it securely. Saws with rack-and-pinion fences [**Photo A**] adjust more easily—especially for fine adjustments—than those with telescoping fence rails [**Photo B**]. In our testing, no saw's rip fence deflected or crept enough to create a problem.

All the test saws have a rip-fence attachment for making narrow ripcuts that would otherwise be problematic because the standard fence butts up against the blade guard. This low-profile component slips beneath the blade guard to position your stock for narrow rips. On all but the Bosch 4100XC-10 they permanently attach to the rip fence and rotate or extend into place. Bosch's L-shaped version fastens to the T-slot on the fence face, and stores separately on the saw when not in use. Most also serve as a workpiece support when you extend the fence beyond the tabletop [**Photo C**].

The best rip fences couple scales featuring clear markings with an easy-to-use view window and hairline cursor. Both make it easy to accurately lock the fence where desired. We found the fences on the Bosch, DeWalt DWE7491RS, Metabo HPT, and SawStop to be the most accurate. All but three saws allow fence use on the left of the blade, with a second scale and view window. Of these, the DeWalt, Metabo HPT, and Ridgid lead the left-side capacity with 22". Fences on the Grizzly G0870, Oliver 10010, and Rikon 11-600S—nearly identical saws—cannot be used left of the blade because their rack-and-pinion rails lack the needed length.



Bosch's fence clamps to fixed rails. To rip wider than the table size, release the lock and the small table section and rails slide in and out of the fixed rails. Also using this fence style: Ryobi RTS23 and SawStop.



To use the rip-fence attachment, simply rotate it from the right to the left side (on most saws) and snap it into place.

18+

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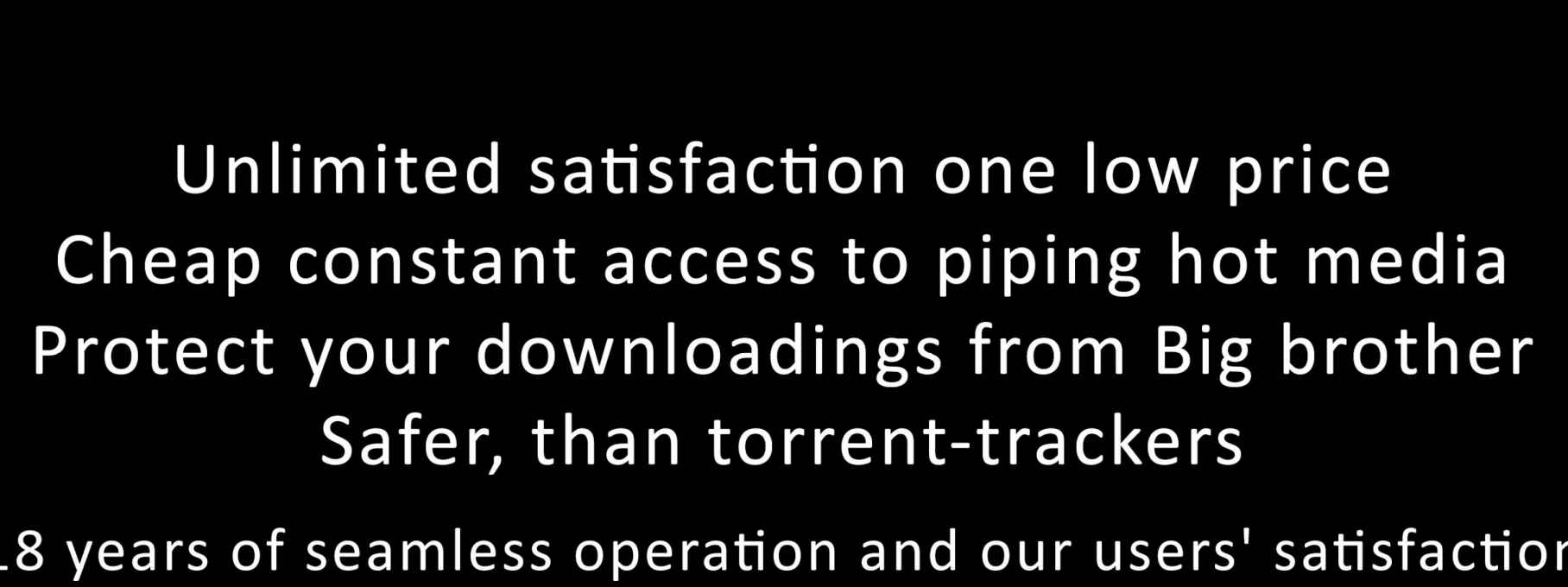

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Crosscuts need a miter gauge

Each test saw comes with a small, basic miter gauge, used for making (hopefully) accurate crosscuts and miter cuts. Unfortunately, most of these will only be as accurate as you make them. Three models (Bosch, Metabo HPT, and Ridgid) have stops, which can be calibrated, if inaccurate, for setting 90° and 45° angles. The other nine miter gauges use only a scale and pointer to set angles. With no stops, they make miter-angle misalignment all too easy. Use an accurate square or drafting triangle to set angles with these models.

Each saw's miter gauge has a T-shaped bar or a washer at the front end of the bar to help it stay in the mating slot and parallel to the tabletop if you back the head off the table. Despite this, each one fits in its miter slots loosely, making accurate cuts even more challenging. Add an auxiliary fence to eliminate grain tear-out at the cut exit, better support longer workpieces, and move cutoffs safely past the blade [**Photo D**].



D

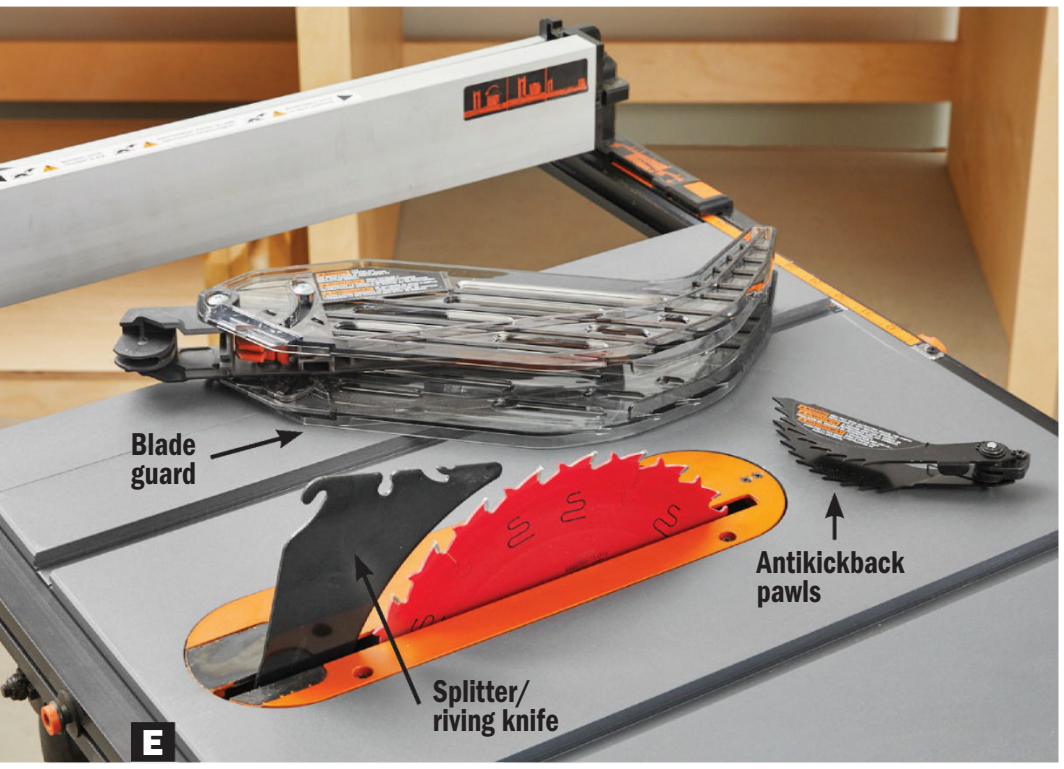
Attaching an auxiliary fence to the miter gauge on the left proves difficult because the screw slots cannot be accessed from the back side of the head. With the other two styles, you can easily screw on a plywood or MDF fence.

Blade guards are your friend

▶ SawStop tablesaws provide a unique flesh-detection safety feature that prevents serious injury should you contact the spinning blade. Watch a video demonstration of how it works. woodmagazine.com/sawstop

Each saw comes with a three-piece blade-guard assembly [**Photo E**]. They're not perfect, but they work better than the guards of years past to reduce the likelihood of injury. The blade guard protects your hands from getting into the blade; the split faces of this guard keep one side of the blade fully covered if the workpiece doesn't extend beneath both. A splitter/riving knife mounts behind the blade to the arbor assembly, so it travels up and down with the blade. The splitter/riving knife keeps the workpiece and cutoff from closing up on the blade after the point of cut, which could lead to kickback. Teeth on the antikickback pawls will dig into a workpiece should it get pulled back at you, preventing kickback. However, these teeth tend to scratch the wood, especially softwoods, during normal use.

Our advice: Use all three components whenever possible. Remove them only when necessary, such as when making non-through cuts and when using a stacked dado set. If you choose not to use the blade guard and antikickback pawls, lower the splitter/riving knife so its peak sits just below the top of the blade.



E

The safety guards work in four modes: blade guard and antikickback pawls mounted on the splitter/riving knife; either blade guard or pawls on the splitter/riving knife; or the splitter/riving knife by itself.

In tablesaws, bigger is better

Portability is central to these saws' appeal, but making them easy to move comes at a cost: a small tabletop. (See the table sizes on *page 48*.) Although the rip capacity on many of the test saws allows you to work "wide," the table surface often proves limiting when working with long or heavy stock, especially full sheets of plywood or MDF. Four saws (Grizzly, Metabo HPT, Oliver, and Rikon) provide built-in outfeed extensions that add 6–10" of support. With all the test saws, though, use additional infeed and outfeed support for oversize stock.

For crosscutting, each of the saws provides at least 9¼" of table surface between the front edge and a blade raised 1". With the blade at maximum height (3–3⅝", depending on the saw), that distance shrinks to 7¾" on half the saws, with the others at least 8". To crosscut a board wider than these figures, you'll need to back the miter-gauge head off the table or use a crosscut sled.

Move it on over

Each of these saws collapses to store in a space about one-third that of its in-use footprint. Those saws with rigid two-piece tubular frames that scissor-pivot in the center (Bosch, Kobalt, Ridgid, SawStop, Skil SPT99-11) set up and stow away the quickest, and maneuver easily while set up.

The other models require you to manually unfold each leg individually and then pull the saw upright while holding two legs in place. Generally the more stable design, these four-leg saws can be difficult to move once set up because the wheels do not touch the floor. Of these, we like the DeWalt [**Photo F**] and Metabo HPT best. The Skil TS6307-00 has four legs, but no wheels.

Remove any of the test models from its stand to use as a benchtop saw. Grizzly is the only manufacturer in this lot that sells the saw without a stand; DeWalt and Ridgid also offer their saws on scissor-type stands.

Saws that fold, tilt, and roll away necessitate storage for accessories, such as miter gauges, rip fences, blade-guard components, pushsticks, blades, and blade wrenches. With a few exceptions, these store on the test saws securely. We like SawStop's solution best [**Photo G**].



F

Legs on the DeWalt stand splay at different angles: The more obtuse angle of the rear legs helps to resist the pushing force of ripping lumber, making it more stable.



G

SawStop's accessories store in a tray beneath the tabletop, which you expose by extending the rip-fence rails. (The rip fence stores below the saw.)

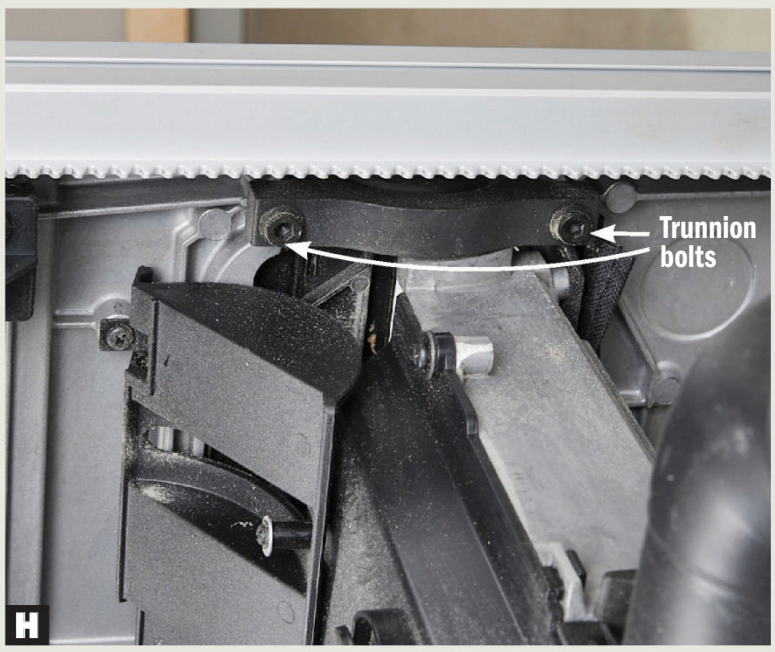
More noteworthy nuggets

• **Blade and fence alignment.** Before you use a new saw, check to make sure the blade aligns parallel to the miter slots [**Photo H**]. This ensures clean, accurate, and safe cuts. Do the same with the rip fence. (Follow the instructions in the owner's manual.) We aligned each saw before doing any testing; see our grades for each model on *page 48*.

• **Dado setup.** Each saw accepts an 8"-diameter stacked dado set, but using a 6" set puts less strain on the motor without losing any meaningful capacity. All but one saw accept up to a 13⁄16"-wide stack, although you will have to leave the arbor washer off for some models. The Ryobi accepts only a ½" dado stack. You'll need to order the optional dado throat insert plate for each saw, or make your own.

• **Dust collection.** A shroud around the blade on each saw connects to a 2½" port on the back side. When we attached a shop vacuum, it sucked up nearly all the sawdust.

• **Cord wrap.** All the saws have cord-wrap brackets, but those on the Kobalt and Ridgid models are mounted so close together that the stiff, tightly wrapped cords take on an almost circular form.



H

To align the blade with the top, loosen three of the four trunnion mounting bolts, and then pivot the motor/arbor assembly until the blade is within .002" of parallel to the miter slots. Then tighten the bolts.

How We See The Saws

MODEL	PERFORMANCE RATINGS (1)																	DIMENSIONS, INCHES		
	PRIMARY						SECONDARY													
	OBSERVED POWER	ABSENCE OF RIP-FENCE DEFLECTION	EASE OF USING RIP-FENCE SCALE	QUALITY/ACCURACY OF MITER GAUGE	EASE OF USING BLADE GUARD/PAWLS/SPLITTER	EASE OF USING LOW-PROFILE RIVING KNIFE	EASE OF CHANGING BLADES	EASE OF USING ON/OFF SWITCH	EASE OF ALIGNING TABLETOP TO BLADE	EASE OF ALIGNING RIP FENCE TO BLADE	EASE OF ADJUSTING BLADE-TILT STOPS	EASE OF USING BEVEL SCALE	DUST COLLECTION	PORTABILITY	LACK OF VIBRATION	STORAGE OF ACCESSORIES	EASE OF USING HANDWHEELS	OVERALL, HxDxW (ON STAND, IN OPERATING POSITION)	TABLETOP (INCLUDING EXTENSION WINGS), DxW	TABLETOP HEIGHT FROM FLOOR (IN OPERATING POSITION)
BOSCH 4100XC-10	B+	A	B+	B	B-	B	A-	A	B+	B-	B-	B-	A	A	B	B	A	42½×31×47½	22½×30	35½
DEWALT DWE7491RS	B+	A	A-	C	A+	A+	A	A	B-	B	A	A	A+	A	A	A	B	44×40×47	22×26½	36½
GRIZZLY G0870	B	A-	B+	D	A	A	B	C	C+	C	B+	B+	A	B	B	B-	B	40×34½×42	22¼×26	34¼
KOBALT KT10152	B+	A-	C+	D	B-	B	C-	A	B	B	A	A	A	B-	C-	B	B-	41×25×45½	21×24	34½
METABO HPT C10RJS	B+	A	A-	B	B	B	B	A	C+	B	A-	B	A	A	A	A	A	42×33×45	22×28¾	36
OLIVER 10010	B	A-	B+	D	A	A	B	C	C+	C	B+	B+	A	B	B	B-	B	40×34½×42	22¼×26	34¼
RIDGID R4550	B+	A	C+	B-	B-	B	C	A	B	B	A	A	A	B-	B	B	C	42×27×45	21×26½	36¼
RIKON 11-600S	B	A-	B+	D	A	A	B-	C	C+	C	B+	B+	A	B	B	B-	B	40×34½×42	22¼×26	34¼
RYOBI RTS23	B-	A	B	D	B-	B	C	A	C-	C	B+	A	B	D	C-	C	B	41×30½×36½	21¼×31¾	34–35¼
SAWSTOP	B	A	A-	D	A	A	B+	A	A	B+	A+	A	A+	A	A	A+	A	42½×34×47	24½×31¼	35¾
SKIL TS6307-00	B	A	C+	D	C	C	C-	A	A+	B	A	A	A	B-	A	B	B	40×30¾×29	22¼×24	33½
SKIL SPT99-11	B	A	C+	D	B	B	A-	A	B+	B	A	A	A	A+	B	A	A	41×29×51½	22×27½	35



DeWalt DWE7491RS, $650

dewalt.com

High Points

▲A release lever located on the outside of the cabinet makes this the only test saw that allows removing and repositioning the splitter/riving knife without first removing the throat insert plate.

▲Featuring one of our favorite stands, this model is easy to set up and take down. It's also steadiest in use and easy to roll around when collapsed.

▲With a dust-collection port on the blade guard as well as a blade shroud and rear port, this machine tied for best overall dust collection.

▲The pushstick stores on the right side of the rip fence within easy reach when ripping boards.

Low Point

▼Cranking the blade from fully down to maximum height takes a tedious 44 handwheel turns.

More Points

▶When set up for use, the table sits 36½" above the floor, tallest among the test saws.

▶You can buy this saw on a scissor-type stand (model DWE7491X), but it costs $30 more than the much-better wheeled-stand version.



CAPACITIES, INCHES								ACCESSORIES (3)						
MAX. CROSSCUT (2)	MAX. RIP, LEFT OF BLADE	MAX. RIP, RIGHT OF BLADE	MAX. BLADE HEIGHT AT 90°	MAX. BLADE HEIGHT AT 45°	BLADE CHANGES: 1 OR 2 WRENCHES	MITER-GAUGE ANGLE STOPS	HANDWHEEL TURNS TO MAXIMUM BLADE HEIGHT	STANDARD	OPTIONAL	WEIGHT, POUNDS	CORD LENGTH, FEET	WARRANTY, YEARS	COUNTRY OF ASSEMBLY (4)	SELLING PRICE (5)
8	9¼	30	3⅛	2¼	1	0, 45	25½	A, M, P, T	D, O, Z	110	6	1	T	$600
7¾	22	32½	3⅛	2¼	2	0	44	A, G, M, P, T	D	55	6	3	T	$650
7¾	0	28	3⅛	2¼	1	0	5½	A, M, O, P, T	D, S	96	6	1	T	$580
7¾	17	30	3½	2½	2	0	43	A, M, P, T	D	68	6½	3	T	$300
8	22	35	3⅛	2¼	2	0, 22½, 45	30	A, M, O, P, T	D	96	6	2	C	$530
7¾	0	28	3⅛	2¼	1	0	5½	A, M, O, P, S, T	D	90	6	2	T	$650
7¾	22	32½	3½	2½	2	0, 15, 30, 45, 60	47	A, M, P, T	D	78	6½	5	T	$500
7¾	0	28	3⅛	2¼	1	0	5½	A, M, O, P, S, T	D	96	6	5	T	$800
8	7½	27	3	2½	2	0	34½	A, M, P, T	D	59	6	3	C	$350
8	9½	25½	3⅛	2⅛	2	0	1	A, B, C, G, M, P, T	D, Z	113	9	1	T	$1,579
8⅜	14	25½	3½	2½	1	0	14	A, P, T	D	51	6	3	C	$339
8	16½	30½	3⅝	2⅜	1	0	19½	A, P, T, W	D, O	53	6	1	C	$650

1. A Excellent
   B Good
   C Fair
   D Poor
   N/A Not applicable

2. Measured from front of blade at maximum height to front edge of table.

3. (A) 10" general-purpose blade
   (B) 8" blade-brake cartridge
   (C) 10" blade-brake cartridge
   (D) Dado throat plate
   (G) Dust-collecting blade guard
   (M) Mobile stand with casters
   (O) Outfeed extension
   (P) Pushstick
   (S) Sanding disc
   (T) Thin-kerf low-profile riving knife
   (W) Stand without casters
   (Z) Zero-clearance throat plate

4. (C) China
   (T) Taiwan

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



SawStop Jobsite Saw Pro, $1,579

sawstop.com

High Points

▲For the safety-conscious buyer, this saw's proprietary system provides a distinct advantage.

▲It has the largest tabletop among the test group, the widest throat opening, a rigid phenolic insert plate, and easy blade changes.

▲With a dust-collection port on the blade guard as well as a blade shroud and rear port, this machine tied for best overall dust collection.

▲Cranking the blade from fully down to maximum height takes only one handwheel turn.

▲A cord wrap makes it easy to store the 9' power cord when not in use, and this saw's unique storage tray provides an excellent and secure way to keep all parts and accessories in place.

Low Points

▼At about double the next-highest price model, this saw's cost could prove too daunting for woodworkers with a limited budget.

▼Aligning the blade to the top requires that you loosen the blade to access the adjustment bolt on the arbor assembly, then retighten the blade and check the alignment. It's a trial-and-error process that can be time-consuming.

More Points

▶An 8" dado brake cartridge comes with the saw, but you have to buy a new insert plate ($34) if you don't want to lose the zero-clearance support of the insert for your 10" blades. (You cannot use a 6" dado set with this saw.)



Bosch 4100XC-10, $600

boschtools.com



High Points

▲A gas strut makes setting up and folding this saw easy in one quick movement without any heavy lifting.

▲The rip fence has T-slots on both faces, making it easy to attach featherboards and hold-downs. Its large cursor and scale make it one of the easiest to use.

▲Adjustment screws on the outside of the cabinet eliminate under-the-saw work you encounter on most saws when aligning the blade to the top.

Low Points

▼Off by 1° and with no way to calibrate it, the blade-tilt scale could not be relied on.

▼When ripping stock longer than 4', the stand feels tippy; it never tipped over, but we were always mindful of the potential.

More Points

▶The narrow-rip fence attachment mounts and stores separately from the fence, but the mounting screws and nuts vibrated loose and fell off when stored on the saw if not sufficiently tightened.

Grizzly G0870, $580

grizzly.com



High Points

▲Outfeed arm pulls out for additional support.

▲Its variable-speed motor (2,000–4,000 rpm) provides the ability to slow the blade speed for cutting plastics and nonferrous metals.

▲We found Grizzly's owner's manual more detailed with clearer images than the Oliver and Rikon manuals.

▲Cranking the blade from fully down to maximum height takes a mere 5½ handwheel turns.

Low Points

▼The small on/off power switch is harder to shut off than with other saws because it lacks an easy-to-locate "off" paddle.

▼We had to calibrate the blade-tilt stops and scale cursor, but doing so required removing the blade-height handwheel. The difficult-to-read cursor required squatting down low.

▼Aligning the blade to the miter slots proved difficult.

▼The miter gauge routinely falls off the saw from its storage position when moving the saw.

More Points

▶We like the rip-fence view window for helping to clearly see the scale increments, but dust builds up on it frequently—more so than most models—obstructing the view.

▶An optional 10" sanding disc (no. T30883, $25) mounts on the arbor in place of the blade (another use for slower motor speed).

▶You can buy this saw without the stand (model G0869) for $430.

Kobalt KT10152, $300

lowes.com



High Points

▲Thanks to its open "cabinet," we had excellent access to the trunnion-mounting bolts.

▲The pushstick stores on the right side of the rip fence within easy reach for ripcuts.

Low Points

▼The saw vibrates and the light-duty stand wobbles and scoots when cutting—an uneasy feeling when you're midway through a long ripcut.

▼The miter gauge routinely falls off the saw from its storage position when being moved.

▼The thin plastic throat insert did not sit flush with the table surface, with no way to adjust it.

▼We accidentally broke the plastic dust-collection shroud around the blade when changing blades due to the narrow throat opening. The splitter/riving knife lock also impedes access.

▼Cranking the blade from fully down to maximum height takes a tedious 43 handwheel turns.

More Points

▶The narrow-rip fence attachment works only on the left side of the blade. Thicker than most, it can't provide workpiece support when you position the fence off the table.

Metabo HPT C10RJS, $530

metabo-hpt.com



High Points

▲We like the splayed-leg stand for its portability and stability, which includes an adjustable foot for leveling.

▲Adjustable stops at 0°, 22½°, and 45° make this miter gauge one of the two best in the test.

▲ This saw tops the competitors' rip capacity with 35" to the right and 22" to the left. Its outfeed support and rip-fence attachment provide additional workpiece support.

Low Points

▼Not only is the blade-tilt scale hard to read, but the sliding handwheel also creeps a bit as you tighten the lock. We were unable to get the blade fully to the 45° tilt stop, so we could not cut an accurate 45° bevel.

Oliver 10010, $650

olivermachinery.net



High Points

▲An outfeed arm pulls out for additional support.

▲Its variable-speed motor (2,000–4,000 rpm) provides the ability to slow the blade speed for cutting plastics and nonferrous metals.

▲Use the included 10" sanding disc in place of the blade (another use for slower motor speed).

▲Cranking the blade from fully down to maximum height takes a mere 5½ handwheel turns.

Low Points

▼The small on/off power switch is harder to shut off than with other saws because it lacks an easy-to-locate “off” paddle.

▼We had to calibrate the blade-tilt stops and scale cursor, but to do so we first had to remove the blade-height handwheel. The difficult-to-read cursor required squatting down low.

▼Aligning the blade to the miter slots proved difficult.

▼The owner’s manual includes blurry, dark photos that make assembly and use difficult. Some hardware was missing, requiring a trip to the store to get what we needed.

▼The miter gauge routinely falls off the saw from its storage position when being moved.

More Points

▶We like the rip-fence view window for helping to clearly see the scale increments, but dust builds up on it frequently, obstructing the view.

▶During our power/stress testing, this was the only saw that tripped its breaker (twice). Slowing our feed rate eliminated this.

Rikon 11-600S, $800

rikontools.com



High Points

▲An outfeed arm pulls out for additional support.

▲Its variable-speed motor (2,000–4,000 rpm) provides the ability to slow the blade speed for cutting plastics and nonferrous metals.

▲Use the included 10" sanding disc in place of the blade (another use for slower motor speed).

▲Cranking the blade from fully down to maximum height takes a mere 5½ handwheel turns.

▲Comes with a 5-year warranty.

Low Points

▼The small on/off power switch is harder to shut off than with other saws because it lacks an easy-to-locate “off” paddle.

▼We had to calibrate the blade-tilt stops and scale cursor, but to do so we first had to remove the blade-height handwheel. The difficult-to-read cursor required squatting down low.

▼Aligning the blade to the miter slots proved difficult.

▼The owner’s manual includes blurry, dark photos that make assembly and use difficult. Some small parts were missing and two small plastic knobs were broken.

▼The miter gauge routinely falls off the saw from its storage position when being moved.

More Points

▶We like the rip-fence view window for helping to clearly see the scale increments, but dust builds up on it frequently, obstructing the view.

Ridgid R4550, $500

ridgidpowertools.com



High Points

▲We found this saw’s blade-tilt scale and stops easy to use and adjust.

▲The pushstick stores on the right side of the rip fence within easy reach for ripcuts.

▲It comes with a 5-year warranty.

Low Points

▼The lock for the splitter/riving knife impedes access when changing blades.

▼The stand scoots when cutting—an uneasy feeling when you’re midway through a long ripcut. When collapsed, the stand’s lock frequently comes loose while moving the saw.

▼Cranking the blade from fully down to maximum height requires a test-high 47 handwheel turns.

More Points

▶You can buy this saw on a scissor-type stand (model R4540) for $380.

Ryobi RTS23, $350

ryobitools.com



Low Points

▼The thin plastic throat insert plate flexes downward at times (depending on the task and workpiece); we worry about its longevity.

▼The saw vibrates and the light-duty stand wobbles and scoots when cutting—an uneasy feeling when you’re midway through a long ripcut. It’s awkward to roll around when folded up, and the plastic feet repeatedly fell out of the metal-tube legs.

▼When set up, the saw tabletop slopes 1¼" out of level with no way to adjust it.

▼There’s only one miter slot, to the right of the blade. Having just one could suffice, but we’d prefer it to be left of the blade.

More Points

▶We found the rip fence fussy to set up, but once locked it held securely.

Skil TS6307-00, $339

skil.com



High Points

▲An open cabinet and single adjustment bolt make it simple (easiest in the test group) to align the blade to the miter slots. Blade-tilt stops are also easily adjusted.

▲Despite having no wheels, this stand folds up and carries easily. One of the feet also adjusts to level the stand on uneven surfaces.

Low Points

▼The thin plastic throat insert plate broke during testing. We would replace this insert with one made from phenolic, aluminum, or plywood.

▼After a few times of collapsing and setting up the stand and making test cuts, the blade and rip fence lost their parallel alignment to the miter slots and had to be readjusted.

▼The narrow throat opening, plastic dust-collection shroud, and long splitter/riving knife lock lever make changing blades difficult.

More Points

▶Curiously, the plastic shut-off paddle on the power switch is black instead of eye-catching bright red—not a problem, just unusual.

Skil SPT99-11, $650

skil.com



High Points

▲We love this stand. It collapses and sets up easily, and its 16"-diameter wheels—twice as big as those on the other saws—roll easily over power cords, floor cracks, and other obstructions.

▲Because this saw has no closed cabinet, we could easily access the blade-alignment bolts.

▲You can raise the blade to a test-best 3⅝".

Low Points

▼The rip fence has a T-slot on each face, but the plastic end caps prevent inserting anything into those slots.

More Points

▶Based on past experience with handheld circular saws, we expected the worm-drive motor to demonstrate greater torque than the other tested tablesaws. Instead, we found we could bog this one down with heavy cuts, putting it on par with the other saws in our test.

▶The pushstick stores in a plastic housing, so it's easy to reach when ripping stock, but if you don't pull it straight out, you'll break the housing (trust us, we know).

Park your portable-saw dollars on these models

Several machines fared well in our testing, but two saws stand out: The DeWalt DWE7491RS ($650) and SawStop Jobsite Saw Pro ($1,579) share Top Tool honors. The DeWalt performed at the top or near it in every test and has the best stand for stability. SawStop's hard-to-beat safety system adds to its top-shelf performance. The Metabo HPT C10RJS performs well and, for just $530, it's our Top Value.

Produced by **Bob Hunter** with **Peter Kasper**

SawStop launches an even more compact benchtop saw

SawStop's newest tablesaw features a smaller footprint—and price tag—to make it more accessible to the home woodworker. This compact saw uses a tube-steel frame rather than a cabinet, and has rubber feet to prevent scooting during use. The 23×22⅝" top provides 24½" of rip capacity, thanks to its rack-and-pinion fence-rail system. The saw also features microadjustable blade tilting, three-piece blade guard, and SawStop's unique flesh-detection safety-brake system. A starting price of $899 includes a 10" blade, 10" brake cartridge, and miter gauge. We were unable to include this saw in our test, but will review it in a future issue.



Sofa Shelf

Add handy storage without sacrificing much floor space.

DIMENSIONS:
72¼" W × 6" D × 32¾" H

Approximate materials cost:
$140
Lumber and hinges

Box interior dimensions:
69¾" W × 4½" D × 5¼" H





Install a ¼" straight or spiral bit in your trim router, then rout the vertical grooves using an edge guide.



Clamp a straight scrap across the end assembly to guide the router while machining the horizontal stopped dado.

No room for a coffee table? Hesitant to sacrifice that sweet, sweet footrest real estate? This lidded box provides a great sofa storage alternative. Its slim design slips between your sofa and the wall to store drink coasters, remote controls, or your latest woodcarving project.

Begin at the ends

1 Cut to size the stiles and rails (A, B) [**Materials List**], noting the grain orientation. Rout the grooves [**Drawing 1**].

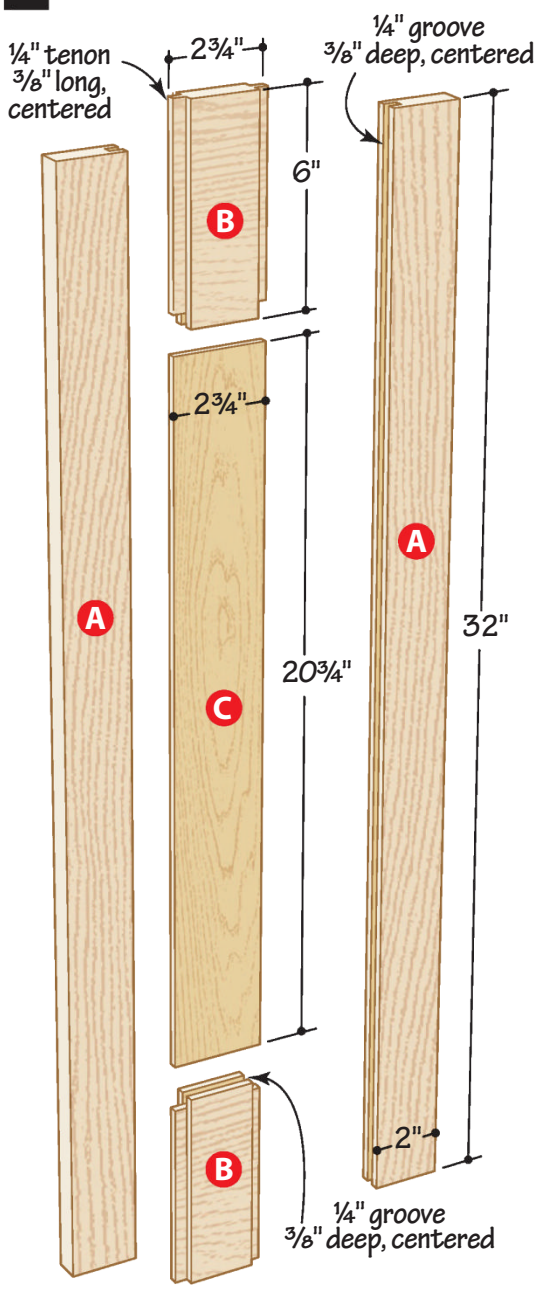
2 Rabbet the ends of the rails (B) to form the tenons [**Drawing 1**].

3 Dry-fit the frame assemblies to verify the size of the panels (C), then cut them to fit. Glue and clamp together the end assemblies (A–C).

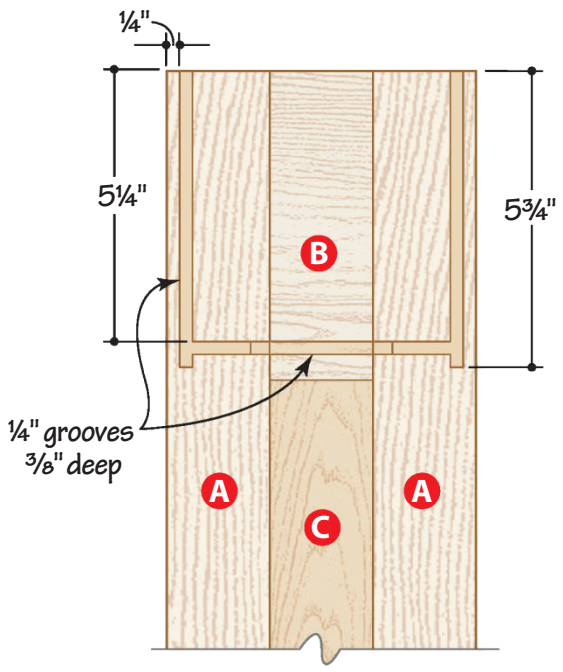
4 Rout the grooves on the faces of the end assemblies [**Drawing 2, Photos A, B**].

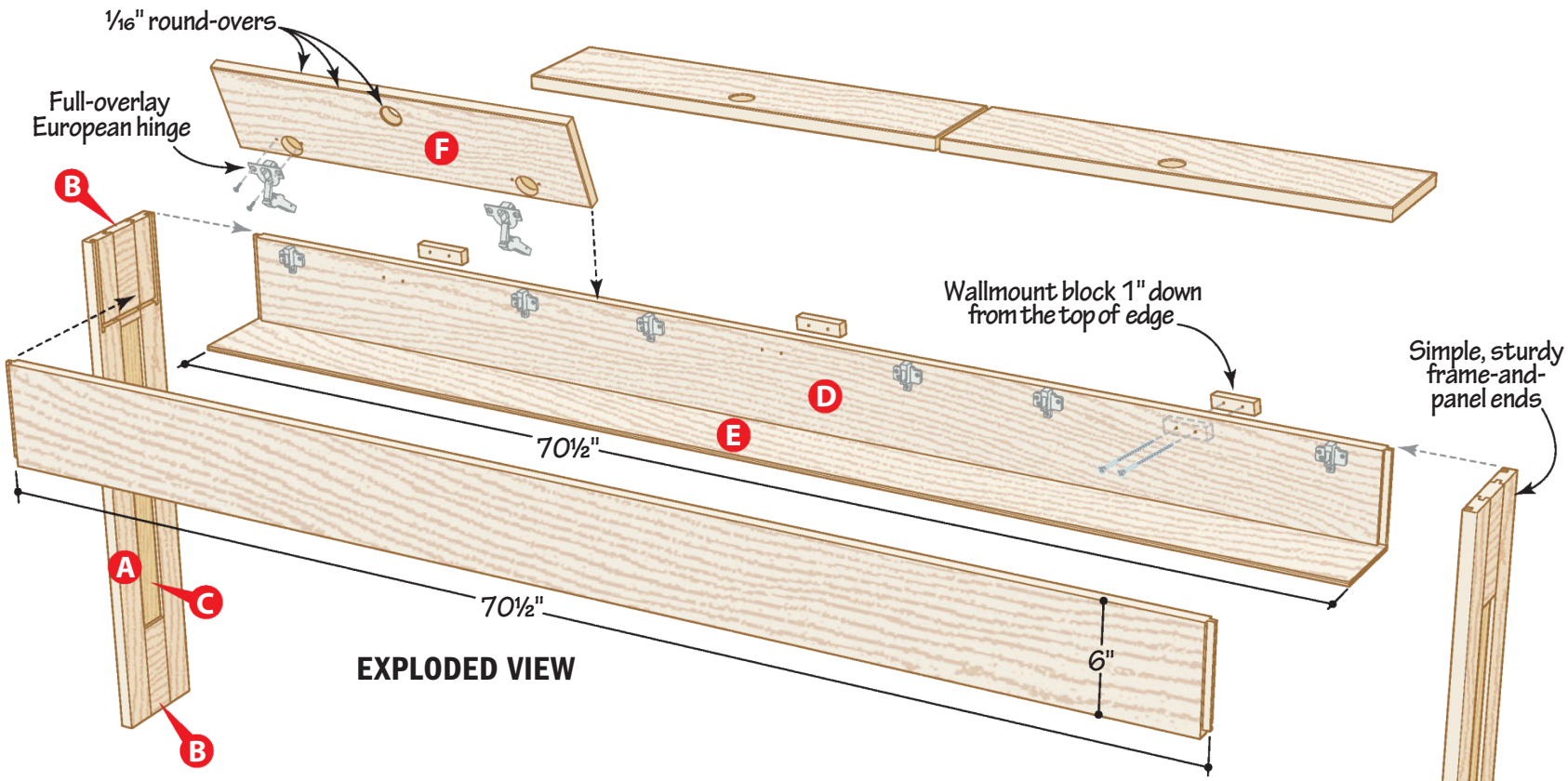
Note: *Adjust the height of the stiles (A) to match, or be slightly taller than, the height of your sofa.*

1 END ASSEMBLY



2 END GROOVE DETAIL





EXPLODED VIEW

Build a big ol' box

1 Cut to size the front and back (D). Form the tenons on the ends, then rout the grooves [**Drawing 3**].

2 Dry-fit the front and back between the end assemblies, checking for square. Verify the size of the bottom (E), then cut it to fit. Insert the bottom into the grooves on the front and back (D), apply glue to the front/back tenons, and clamp the box assembly between the end assemblies [**Exploded View**], checking again for square.

3 Cut to size the lids (F) and drill the hinge recesses and finger-pull holes [**Drawing 4**]. Round over the edges of the finger pulls and front edges of the lids [**Exploded View**].

Finish is a snap

1 Finish-sand the box, ends, and lids and apply a finish. We wiped on a coat of General Finishes Pecan stain, followed by two coats of Enduro-Var water-based topcoat.

2 Attach the hinges to the lids (F) and position the lids on the box with equal gaps and overhangs [**Exploded View**]. Secure the outside clip for each outside lid, then snap the hinge to it to determine the location of the inside clip. Repeat for the center lid, centering it between outside lids.

3 Slip the shelf behind your sofa, and secure it to the wall, shimming behind the box with wood blocks the same thickness as your base trim [**Exploded View**].

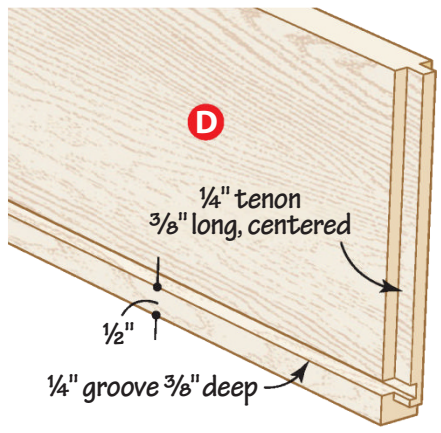
Tip! *Sneak up on the fit of the tenon, removing material from both faces each time you raise the bit or blade.*

▶ Explore ways to get long clamping reach, without long clamps. woodmagazine.com/extrareach

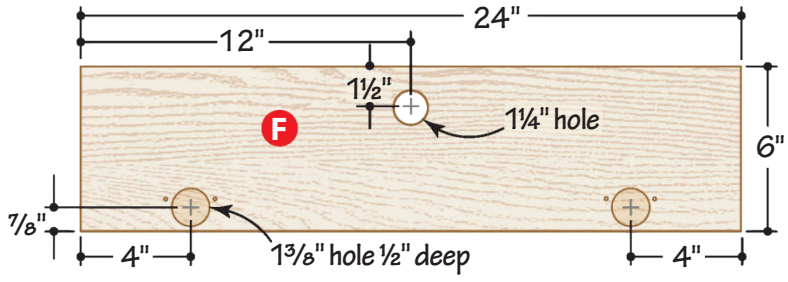
▶ Learn more about installing European-style hinges. woodmagazine.com/eurohinges

Produced by **Zach Brown** with **Kevin Boyle**
Project design: **Kevin Boyle**
Illustrations: **Roxanne LeMoine, Lorna Johnson**

3 FRONT/BACK DETAIL

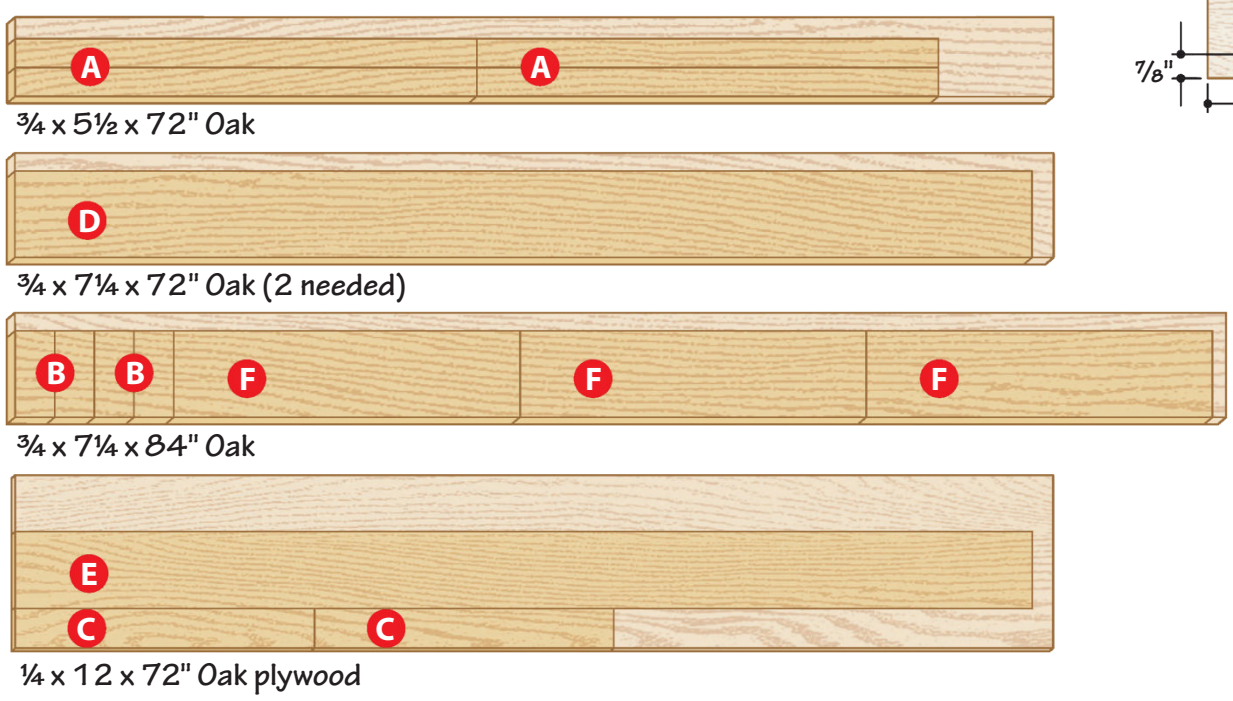


4 LID



Cutting Diagram

This project requires 15 board feet of 4/4 oak.



Materials List

Part		FINISHED SIZE T	W	L	Matl.	Qty.
A	stiles	¾"	2"	32"	O	4
B	rails	¾"	6"	2¾"	O	4
C	panels	¼"	2¾"	20¾"	OP	2
D	front/back	¾"	6"	70½"	O	2
E	bottom	¼"	5¼"	70½"	OP	1
F	lids	¾"	6"	24"	O	3

Materials key: O-oak, OP-oak plywood.
Bit: ¼" straight or spiral router bit, 1/16" round-over router bit.
Source: 95° full-overlay European hinges (6) no. BH71B9550, $7.53; hinge mounting clips (6) no. BH175H7100, $2, cabinetparts.com, 561-295-8476.

Port-a-plant

Seedling Carrier

A perfect gift for any gardener.

DIMENSIONS:
16¼" W × 7¾" D × 8" H

Approximate materials cost:

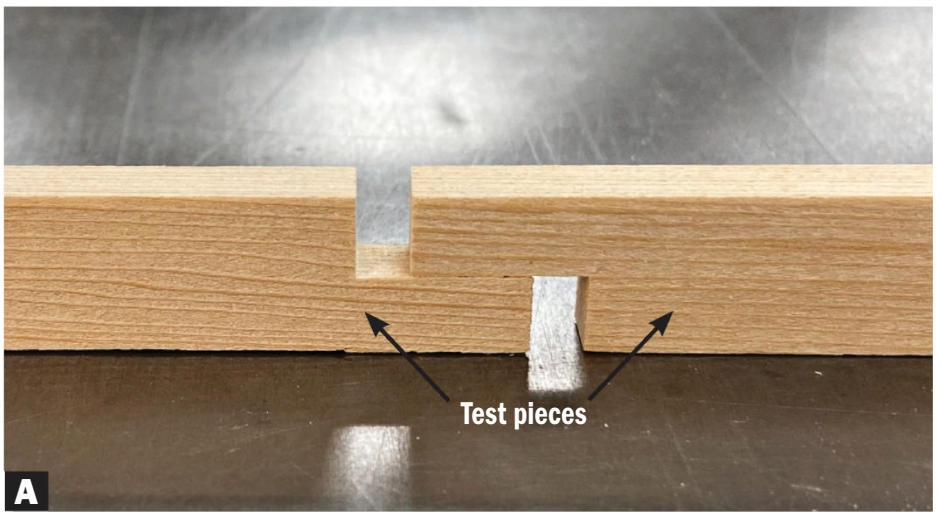
$15

or make your carrier from scrap stock

6

seedlings carried with ease

The hope of spring gardening buoys residents of northern climates through cold winters. In warmer climes, growing season barely, if ever, pauses. Regardless of when you nurture seeds to sprout indoors, transport them for transplanting in this handy hauler. The upper grid organizes six 3" peat pots [**Source**], and the open-grid bottom lets excess dirt fall free. Dowel pins at the corners reinforce the butt joints, ensuring many planting seasons of use. If you want to upsize yours to hold more pots, add a row on each side so the handle remains centered above the grid for balance and where it won't crowd tender young plants.



When one test rabbet slides over another with no gap, lock the dado blade at that height.

Build a box

▶ We used cypress. Other durable woods include cedar, redwood, and white oak.

1 Start by cutting the sides (A) and ends (B) to size [**Materials List, Exploded View**]. Save a cutoff from an end for use later.

2 Set up a ¼" dado blade in your tablesaw and cut a groove in a piece of scrap. Use this groove as a gauge to plane stock for the dividers (C–F) to thickness, then cut the dividers to size along with a few test pieces. Cut the post halves (G) and handle (H) to size and set them aside.

3 Remount your ¼" dado blade and set the height by rabbeting the ends of two test pieces [**Photo A**]. Then, rabbet the ends of the dividers (C–F) [**Drawing 1**].

4 Using the rip fence as a stop, stack like parts together to gang-cut the outer notches in the bottom edges of the sides (A), the rabbeted edges of the lower long dividers (E), and the unrabbeted edges of the lower short dividers (F) [**Photo B, Drawings 1, 2**]. Then, use a spacer to notch the bottoms of the ends (B) [**Photo C**].

5 Reposition the fence to notch the top edges of the sides (A), the upper long divider (C), and the unrabbeted edges of the upper short dividers (D).

6 Reset the fence again and cut the center notches on the sides (A) and lower long dividers (E) [**Exploded View, Drawing 1**]. Use a spacer again to notch the top edges of the ends (B).

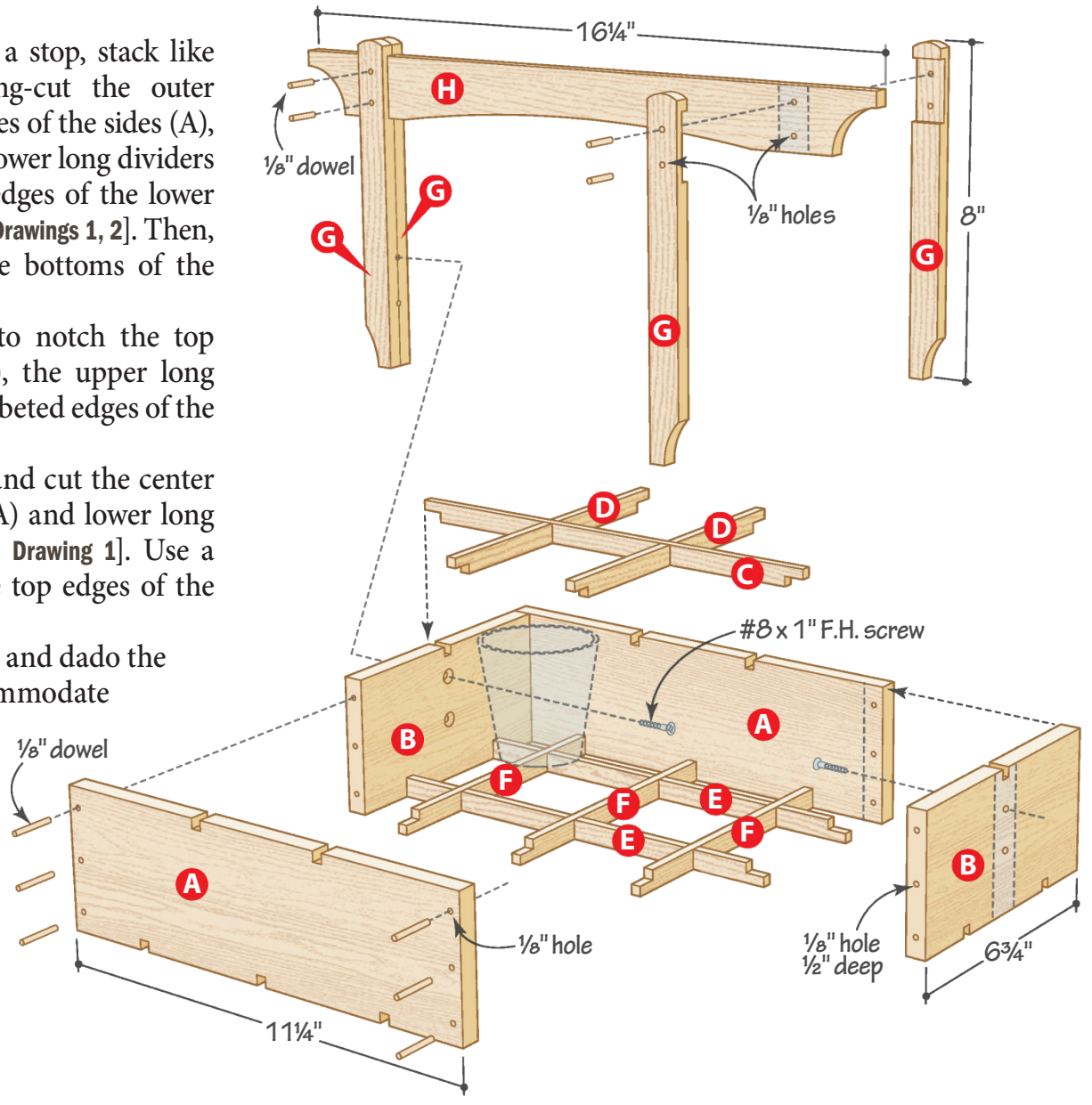
7 Adjust the blade height and dado the post halves (G) to accommodate the width of the handle (H) [**Drawing 2**]. Laminate the halves to make two posts, aligning the dadoes. Bandsaw the arcs on the posts and handle, then finish-sand these parts.

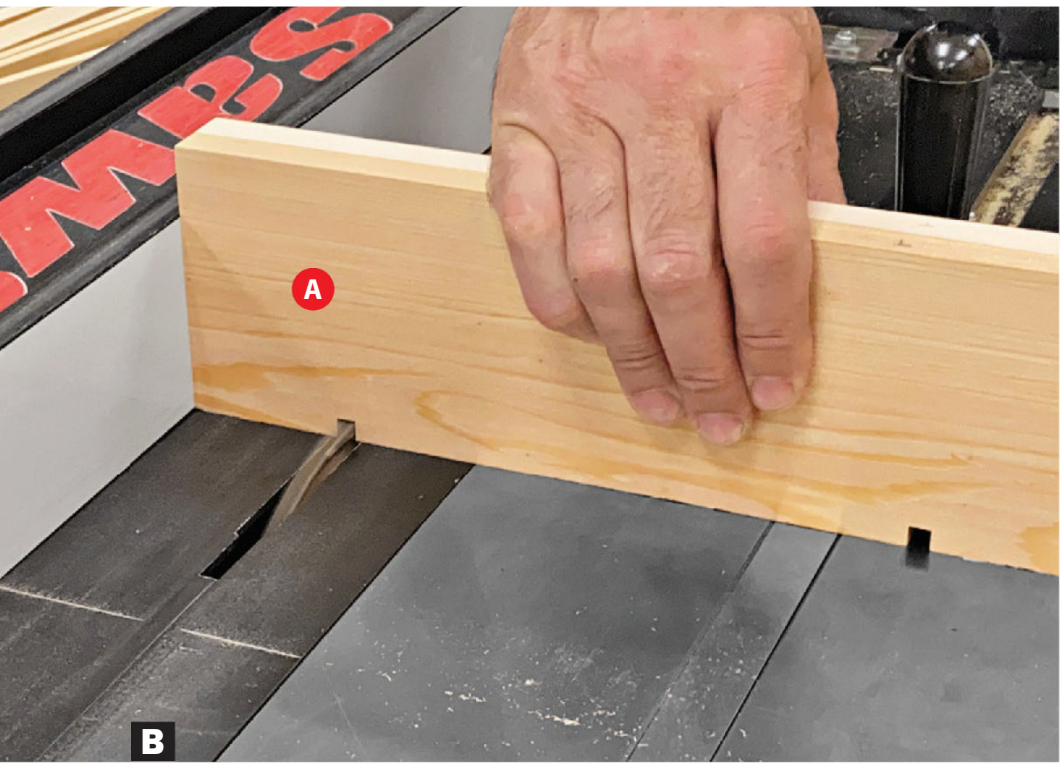
Sow let's assemble

1 Glue the ends (B) between the sides (A) and check for square.

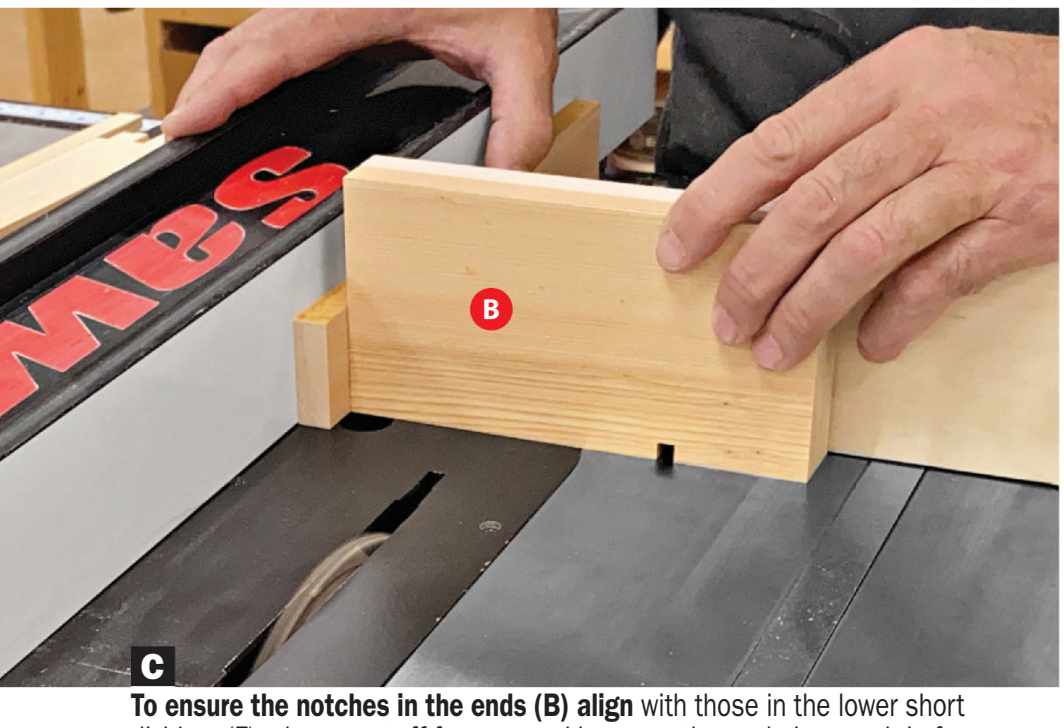
2 Make a drilling guide from a scrap and a piece of ¼" plywood [**Photo D**]. Drill ⅛" holes in the guide, ¼" from the plywood leg, to match those shown on the sides (A) in **Drawing 2**. Use the guide to drill holes through each corner. Glue in lengths of dowel (we used walnut for contrast) and trim and sand them flush.

EXPLODED VIEW

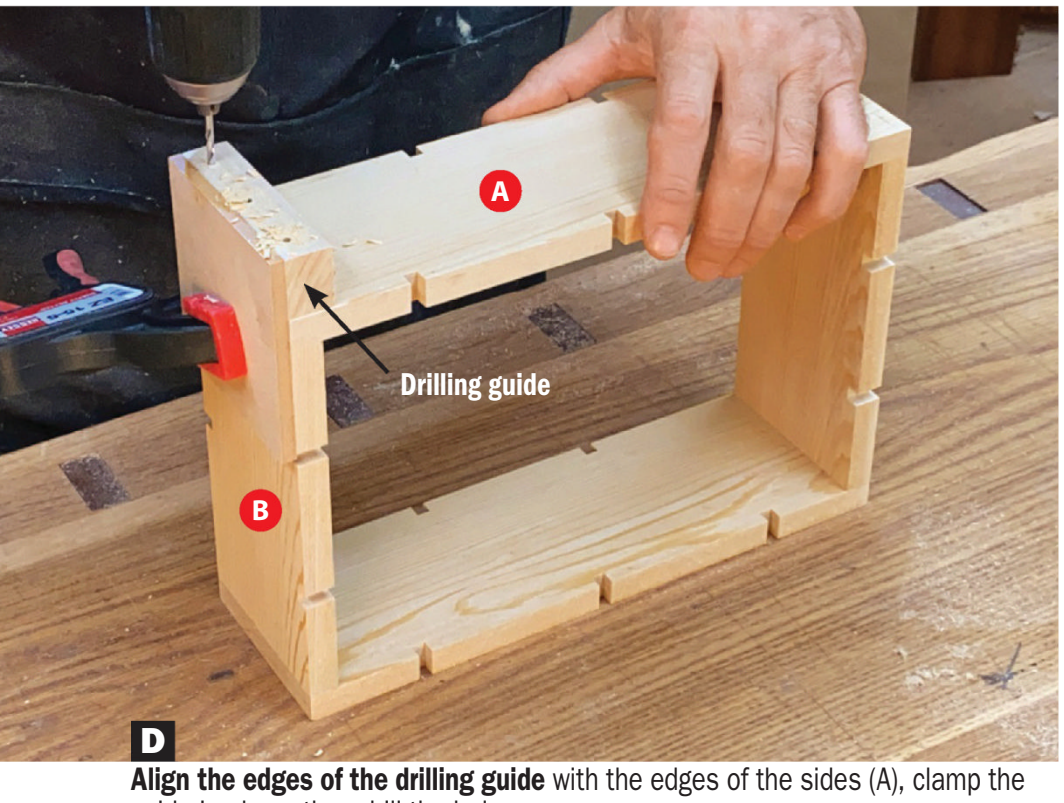




Stack the parts together and use one fence setting to gang-cut the outer notches in the sides (A) and lower dividers (E, F).

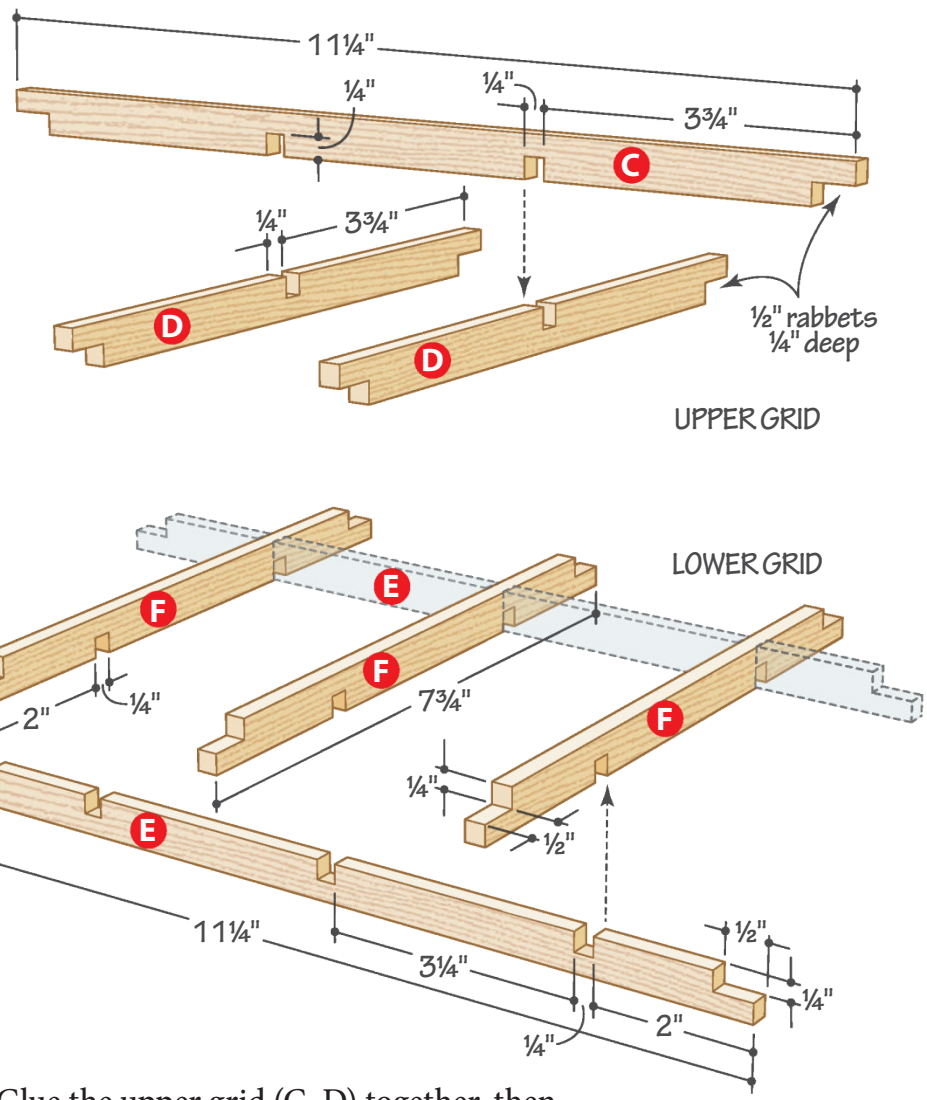


To ensure the notches in the ends (B) align with those in the lower short dividers (F), place a cutoff from an end between the workpiece and rip fence.



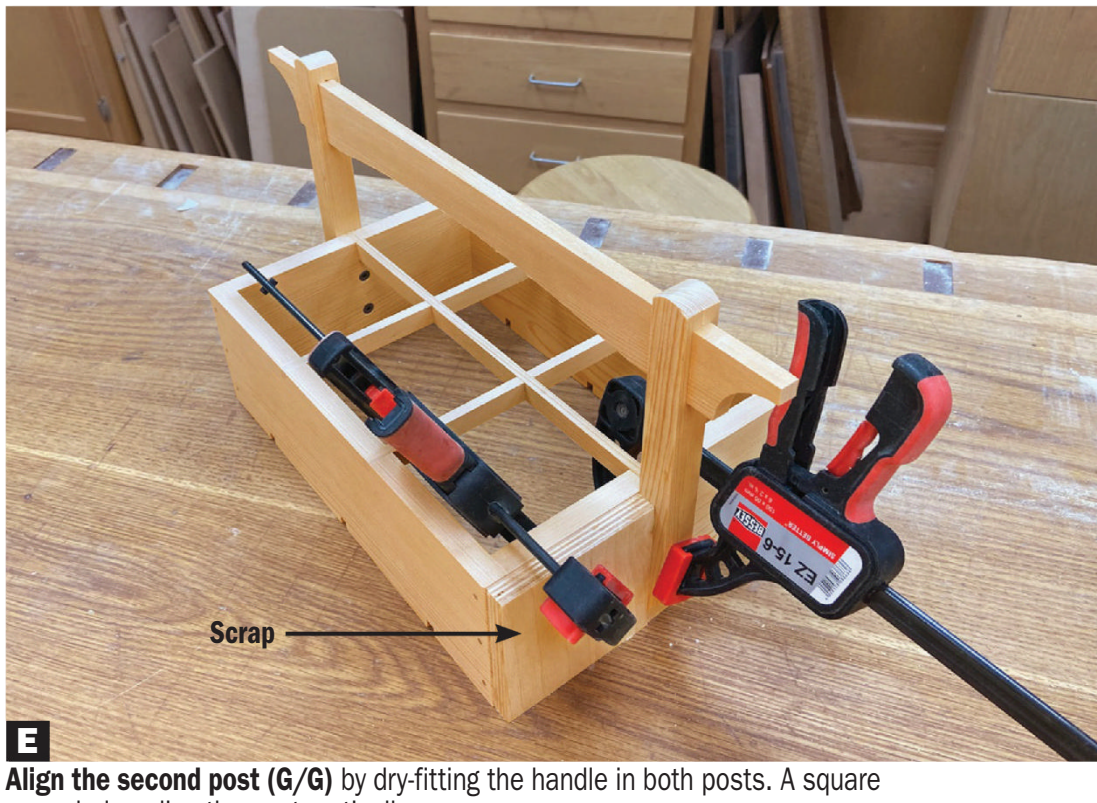
Align the edges of the drilling guide with the edges of the sides (A), clamp the guide in place, then drill the holes.

1 DIVIDERS



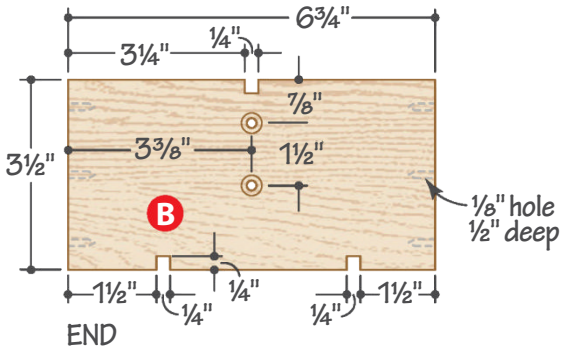
3 Glue the upper grid (C, D) together, then glue it into the box.

4 Using a square scrap for alignment, glue and screw one post (G/G) centered on the outside face of an end (B). Then, add the second post [**Photo E**]. Don't glue the handle; instead, slide it into place, then drill holes for ⅛" dowels [**Drawing 2, Exploded View**]. Dab a bit of glue in the holes, tap the pins into place, and trim and sand them flush.

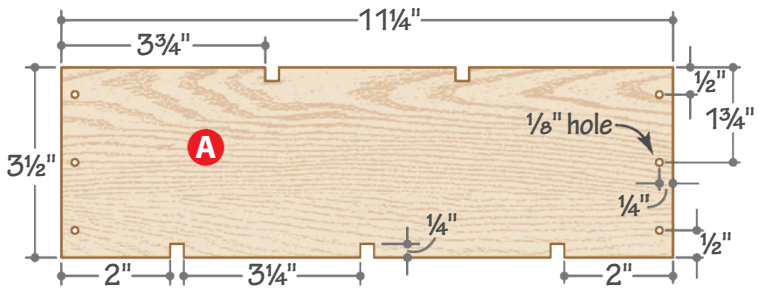


Align the second post (G/G) by dry-fitting the handle in both posts. A square scrap helps align the post vertically.

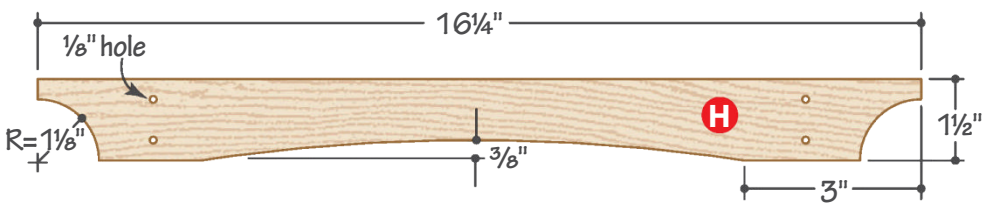
2 BOX AND HANDLE



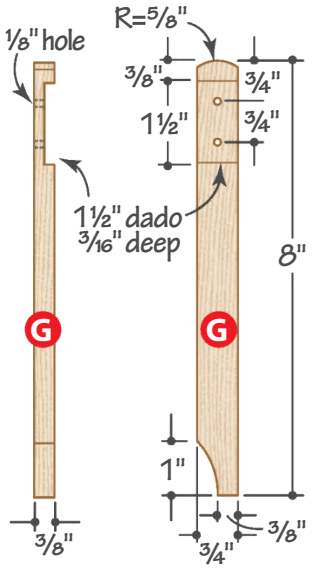
END



SIDE



HANDLE



POST HALF
(Two needed for each post)

Cutting Diagram



½ x 3½ x 96" Cypress *Plane or resaw to the thicknesses listed in the Materials List.

5 Glue together the lower grid (E, F); then, glue it in place. Cypress resists rot, so you can skip a finish if you like, but polyurethane will provide additional protection against dampness and dirt.

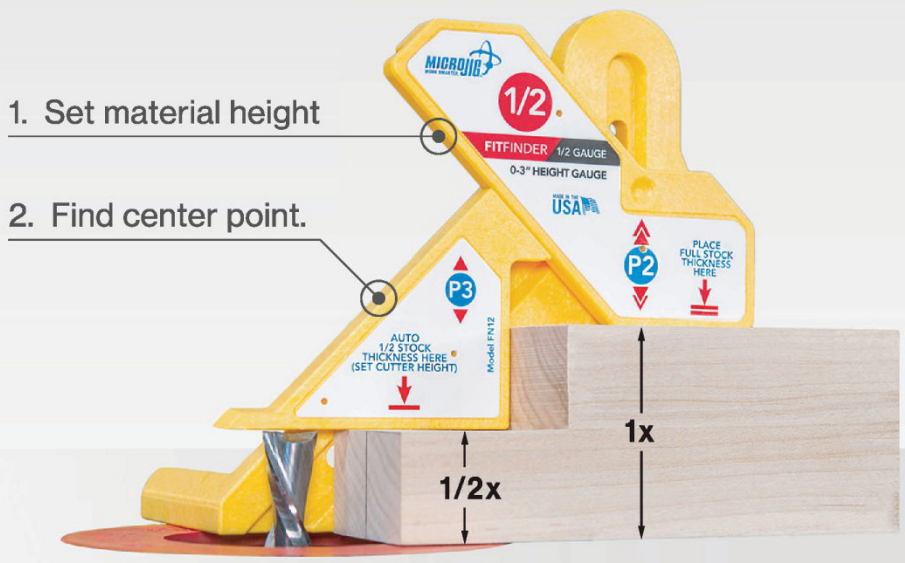
Produced by **Craig Ruegsegger** with **Kevin Boyle**
Project design: **Kevin Boyle**
Illustrations: **Roxanne LeMoine, Lorna Johnson**

Materials List

Part		FINISHED SIZE T	W	L	Matl.	Qty.
A	sides	½"	3½"	11¼"	C	2
B	ends	½"	3½"	6¾"	C	2
C	upper long divider	¼"	½"	11¼"	C	1
D	upper short dividers	¼"	½"	7¾"	C	2
E	lower long dividers	¼"	½"	11¼"	C	2
F	lower short dividers	¼"	½"	7¾"	C	3
G	post halves	⅜"	¾"	8"	C	4
H	handle	⅜"	1½"	16¼"	C	1

Materials key: C-cypress.
Supplies: ⅛×24" walnut dowel, 8×1" flathead screws.
Blade: Dado set.
Source: 100-pack 3" round peat pots, $18, woodmagazine.com/peatpots.

Find the center of stock instantly.



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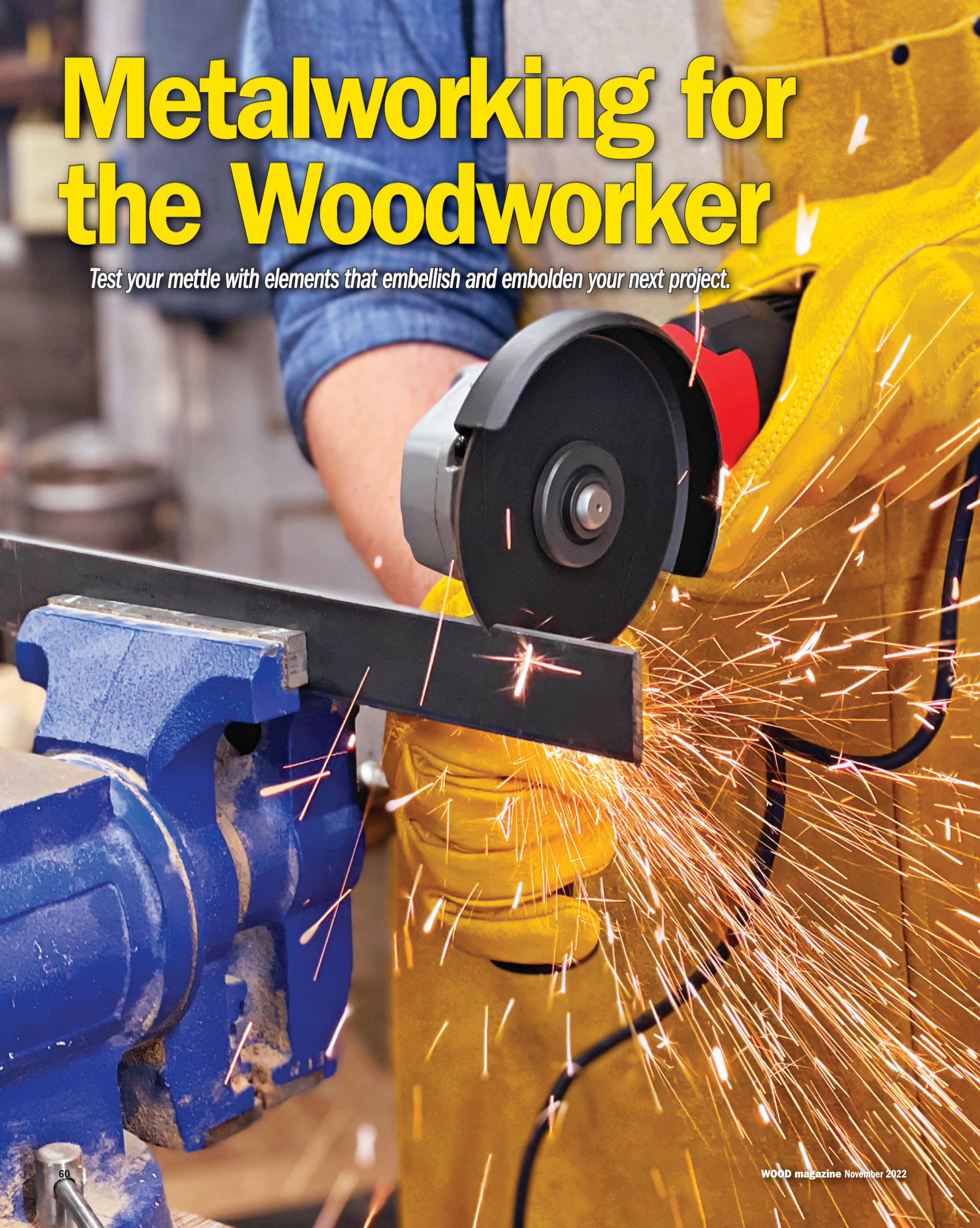
Metalworking for the Woodworker

Test your mettle with elements that embellish and embolden your next project.





A

Aluminum angle, brass bar stock, aluminum diamond plate, and 20-gauge sheet metal work easily with basic shop tools.



B

This set of tools allows you to cut almost any metal. The blade of a dedicated metal chopsaw (top) cuts steel without sparks, while an angle grinder and jigsaw provide versatility. A hacksaw with a fresh blade, metal snips, and a bastard mill file round out the mix.

Sometimes, the hardware you want isn't available off the shelf. Or you may want to mix metals, such as aluminum, brass, or steel, into your next wood project. Metal also helps reinforce joints and allows you to accomplish things not possible with wood-only joinery.

With a few simple tools (many of which you likely already have), you can add useful metalworking skills to your repertoire and unlock a new world of making: brass drawer pulls, aluminum tabletop fasteners, inlaid copper bowties, steel reinforcing brackets, aluminum-edged casework, and more.

Material knowledge

Tip! *Not sure whether a metal is ferrous or non-ferrous? A magnet will be attracted to ferrous metals.*

▶ Add instant age to brand new brass. woodmagazine.com/brasspatina

Metals fall into two simple categories: ferrous and non-ferrous. Ferrous metals contain iron; non-ferrous metals include aluminum, copper, and brass, an alloy of copper and zinc [**Photo A**]. Understanding whether your metal is ferrous or non-ferrous is the first step to figuring out how to process it.

In most cases, non-ferrous metals machine easily with regular woodworking tools (though a material-specific blade typically leaves a better finish). But to cut ferrous metals, choose blades specifically designed for the material. Beyond these typical woodshop tools, a handheld grinder with a cutting disc does a great job cutting both ferrous and non-ferrous metals [**Photo B**].

Most home centers and hardware stores carry a variety of sheet metal, bar, tube, and pipe stock, mostly in sizes less than 1" square (or diameter) and lengths less than 4'. This convenience comes at a higher price per foot. For better selection (and prices), seek out a dedicated metal supplier. Materials there often come in 12' lengths, though most suppliers will cut it to length for a fee.

Sheet and plate metals typically come in 4×8' and 4×10' sizes at metal suppliers. And again, most will cut it to size for an additional fee—a worthy investment because they can cut these large sheets more accurately and quickly than you can in a home shop. Plus, the more-manageable size and weight minimize the hassle of working with them back in the shop.

Beyond shape, metal also comes in different thicknesses. Fractional or decimal inches define the thickness of aluminum and brass. Steel uses gauge for thicknesses less than ¼" and inches above that. Rather unintuitively, the smaller the gauge, the thicker the material [**Gauging steel thickness**].

GAUGING STEEL THICKNESS

GAUGE	INCHES	ACTUAL THICKNESS
10	.1345	
11	.1196	
12	.1046	
14	.0747	
16	.0598	
18	.0478	
20	.0359	
22	.0299	
24	.0239	
26	.0179	
28	.0149	

Working safely

As with all shop work, metalworking requires that you protect yourself with the right gear [**Photo C**].

Metal pieces flying and spinning around the shop tend to ruin your day, so always clamp your work securely before you cut, drill, or grind. Most metal chopsaws feature built-in clamps. For a typical woodworking mitersaw, add a couple extra clamps when cutting non-ferrous metals. A simple machinist vise mounted to your drill-press table helps position metal securely for drilling.

Cutting metal creates small chips that easily embed in workbench surfaces, scratch wood projects, or damage finishes. The best approach: Dedicate a separate area for metalworking. If that's not an option, temporarily install a protective surface, such as a sheet of hardboard, on your workbench. Then, clean up thoroughly after working with metal.

Obviously, sparks and hot metal chips don't play well with sawdust, solvents, or even synthetic materials used for clothing. When using a grinder or otherwise generating sparks, clear the area of anything combustible. Spend a little extra time cleaning up to make sure nothing is smoldering before you leave the shop for the day. Finally, if something feels dangerous or wrong, find a different way to do it. A hacksaw and a file will cut and shape most metals—it just requires a little more patience.



C

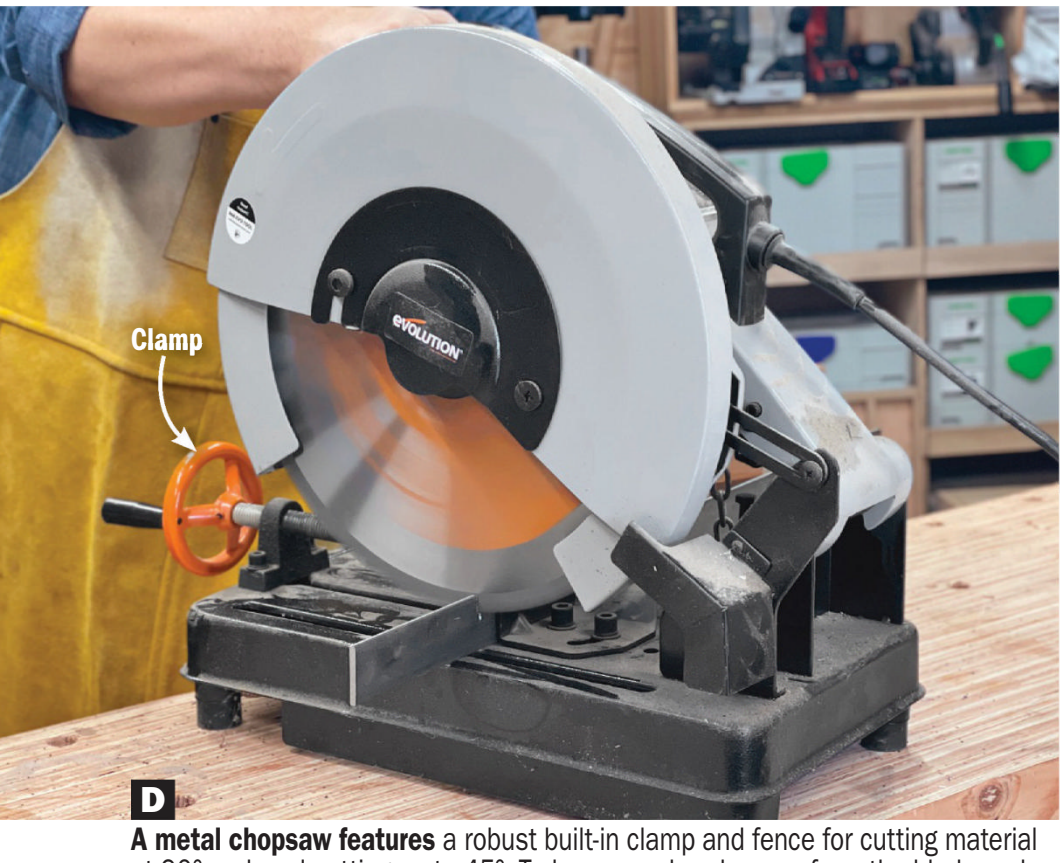
Safety glasses and hearing protection safeguard you when metalworking. A heavy leather apron and leather gloves guard against sparks and sharp edges when grinding and handling metal.

Let's cut to it

A regular woodworking mitersaw equipped with a blade for non-ferrous metals does a great job cutting aluminum and brass stock to length. But a dedicated metal chopsaw [**Photo D**] handles those and steel, too. This coldcut chopsaw features a toothed metal carbide blade designed to cut without generating heat or sparks. You can find these saws for as little as $250.

Metal-cutting snips, which come in left-, right-, and straight-cutting versions, work great for thin material. For thicker material, a woodworking bandsaw easily cuts brass and aluminum [**Photo E**]. Use a ¼" or ⅜" blade with 3–4 teeth per inch. Be sure to clean up any metal chips and dust left on the table after you finish to avoid marring future work.

For fast cutting of a metal piece you'd normally hacksaw, a handheld portable



D

A metal chopsaw features a robust built-in clamp and fence for cutting material at 90°, or bevel-cutting up to 45°. To keep your hands away from the blade and prevent binding or kickback, clamp the workpiece securely.



E

Your bandsaw, set up with a fine-toothed blade makes straight and curved cuts in brass, aluminum, and other metals softer than the steel blade.



A portable bandsaw excels at cutting metal. Use it handheld with your metal clamped in place or build an auxiliary table.



Two clamps, a piece of scrap wood, and a pair of supports secure this sheet of aluminum to the bench. Complete the cut with a jigsaw just as you would when cutting a piece of wood.

▶ Get plans for building this portable bandsaw table in issue 279 (Dec/Jan 2021/2022) or at woodstore.net/minibandsaw.

bandsaw makes a great addition to the shop. To increase its accuracy, consider making a custom stand [**Photo F**]. The adjustable miter gauge and miter slots improve control and cut quality.

A handheld grinder is one of the most inexpensive and versatile tools around for cutting and shaping metal. The grinder accepts both cutting (or cut-off) wheels and grinding wheels. The thin ⅛" profile of a cutting wheel slices through metal with ease [**Opening photo**]. A bastard mill file takes care of smoothing sharp edges.

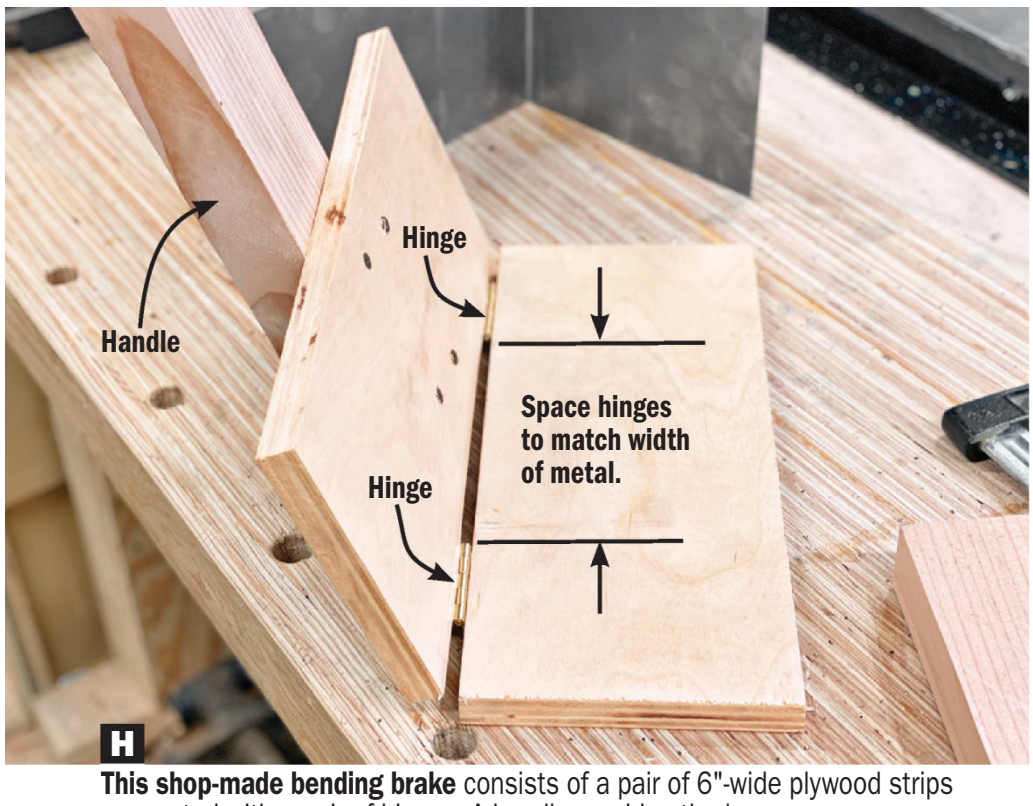
Switch to a grinding wheel (¼" thick or more) for shaping, such as rounding edges and corners: Its thicker profile better withstands lateral pressure. Be sure to keep both hands on the grinder during use.

The right metal-cutting blade in a jigsaw does a pretty good job of cutting sheet metals, with no sparks [**Photo G**]. Choose a 24 tpi bi-metal blade for thin-walled pipe and soft metals thinner than ⅛". Switch to a 12–18 tpi blade for thicker or harder metals. The tool tends to struggle with thicker material, so take it slow and easy.

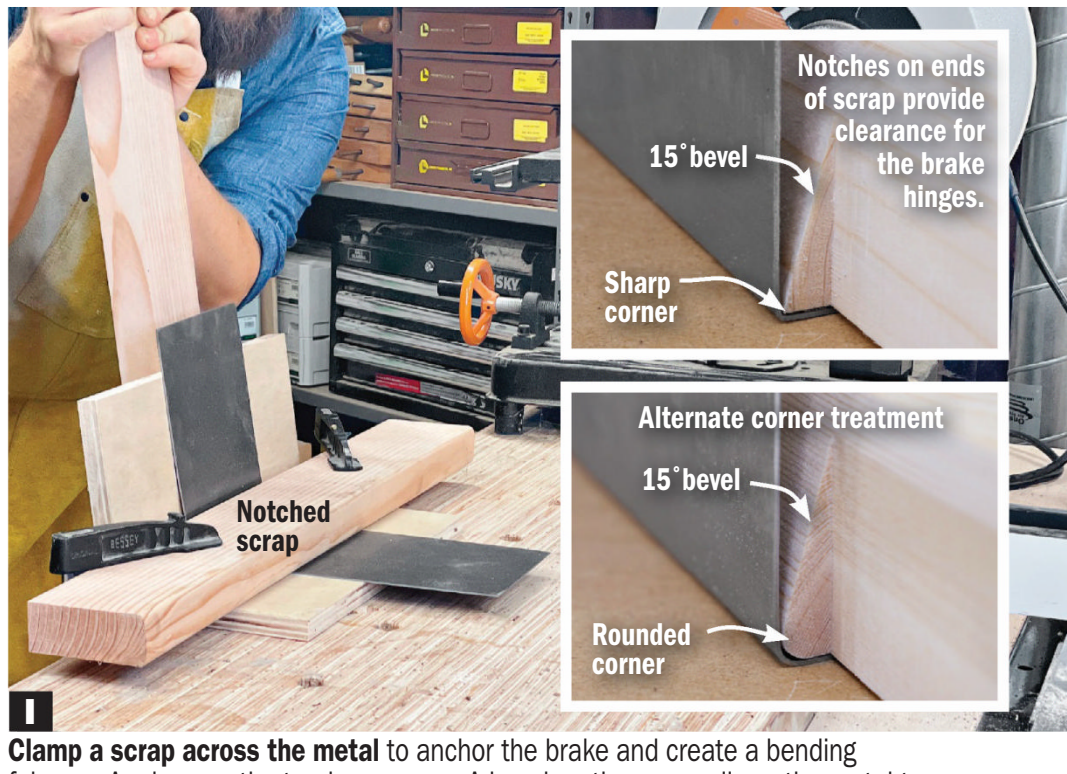
Hit the brake to make a turn

In metalworking shops, a bending brake creates straight, even bends in sheet metal. Smaller models cost as little as $50, but you can fabricate a shop-made version for even less [**Photos H, I**].

Adding heat to the equation makes bending thick steel stock easier. First, clamp your material in a vise and heat the



This shop-made bending brake consists of a pair of 6"-wide plywood strips connected with a pair of hinges. A handle provides the leverage.



Clamp a scrap across the metal to anchor the brake and create a bending fulcrum. Apply smooth steady pressure. A bevel on the scrap allows the metal to form a complete 90° angle. The corner shape determines the look of the bend.



A MAPP-gas powered torch burns hotter than propane or butane. Heat the metal to a bright orange for bending.



Grab the heated steel with locking pliers and bend it to shape. The resulting gently radiused bend works well for headboard brackets or a semi-flexible back on a chair. For a sharper corner, pound with a sledgehammer while hot.

bending area with a torch [**Photo J**]. Then, grab your locking pliers and make the bend [**Photo K**]. After the steel cools, it'll hold its shape and remain plenty strong.

Tap dance to sharp threads

Need to drill holes? Then head to the drill press, a tool actually designed for metal-working. The key: Match the rpm to the bit size. Always clamp your piece in place, whether with a set of F-clamps [**Photo L**], or a drill-press vise that mounts to the table.

Once you master drilling holes, add threads to accept machine screws and bolts. With an inexpensive tapping kit and cutting oil [**Photo M**], you can quickly tap threaded holes to join pieces of metal together, or join metal to wood. After drilling the pilot hole, cut a small chamfer to make it easier to seat the tap properly in the hole.

To ensure the tap starts squarely, install it in your drill press and turn the chuck by hand. Once the tap begins cutting, remove the tap from the drill press and fit it into the

▶Learn the best bit speed for different bit styles and materials. woodmagazine.com/dpspeed



Drilling metal requires a solid grip. A V-shaped groove cut in a scrap, along with clamps, provides a secure hold for round workpieces.



A tap set often comes with matching bits to drill the pilot hole. Cutting oil lubricates the tap and helps carry away metal chips.

included handle. Next, make a half turn, back it off a quarter turn, clear out the shavings, add another drop of oil, and make another half turn [**Photo N**]. Keep an eye on the tap to make sure it stays perpendicular to the work.

Continue this forward/back process, stopping occasionally to thread in a bolt of the matching size to check your progress. After tapping the hole, run the tap through one final time to remove excess shavings and ensure clean, crisp threads.

Now it gets riveting

Machine screws and bolts hold tight, yet allow for easy disassembly. For a more permanent joint, and in areas where you may not be able to thread on a nut, choose rivets. Start the riveting process by drilling mating holes in the two pieces of metal you want to join [**Photo O**]. Push a rivet through the two holes, then set the rivet [**Photo P**].

A manual riveter and rivets will set you back about $30; for faster work, a pneumatic model runs about $100. If you ever need to disassemble a riveted joint, simply drill out the rivet.

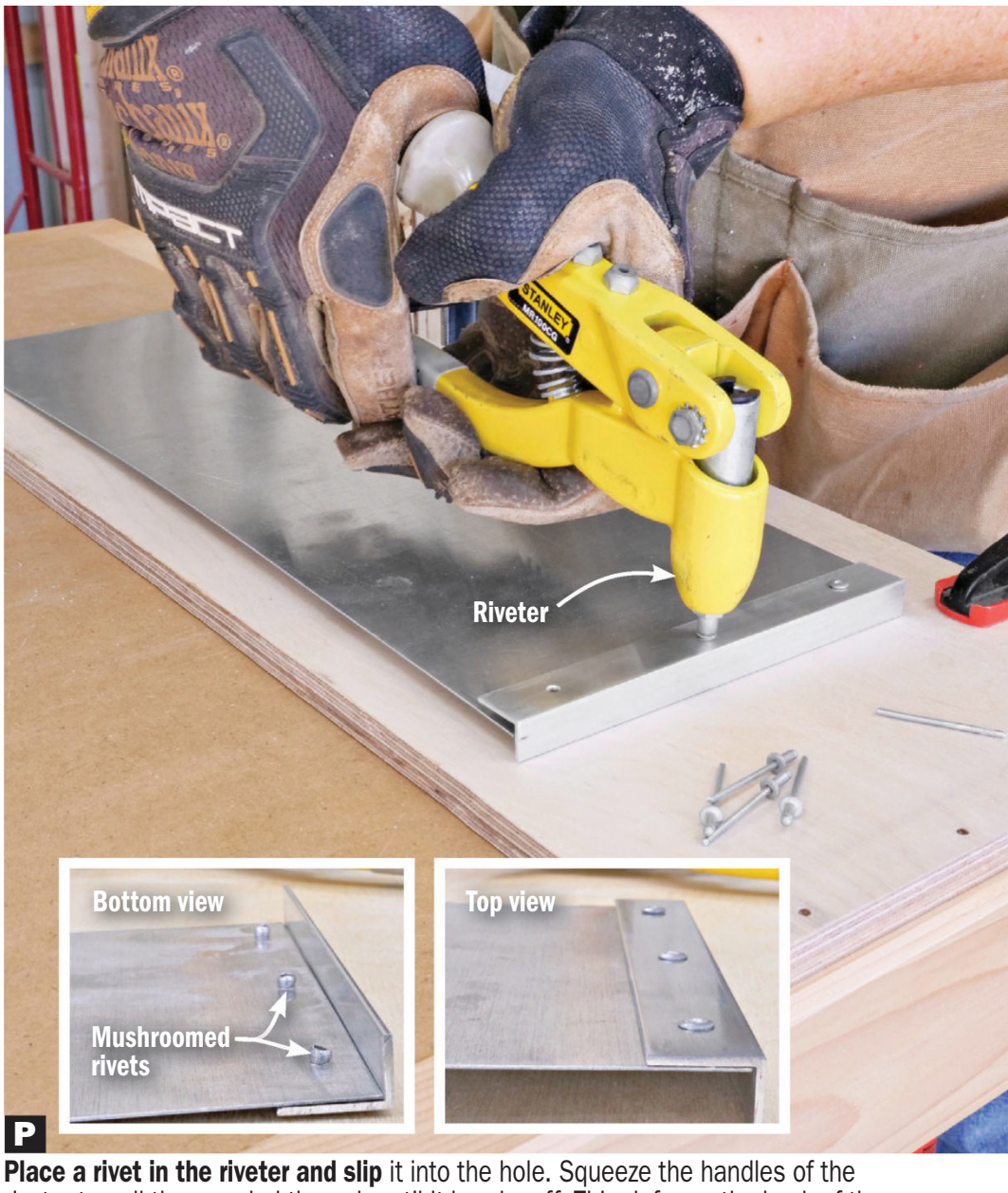
Produced by **Andrew Zoellner** with **Bryan Nelson**



A methodical, back and forth process creates the threaded hole. Locate the hole with a punch prior to drilling, then countersink to seat the tap.



Clamp the workpieces together and drill holes to match the diameter of the rivet.



Place a rivet in the riveter and slip it into the hole. Squeeze the handles of the riveter to pull the mandrel through until it breaks off. This deforms the back of the rivet (left inset), locking the two pieces of metal together (right inset).

Parquet-Panel Mantel Clock

There's never been a better time to build an image with blocks of wood.

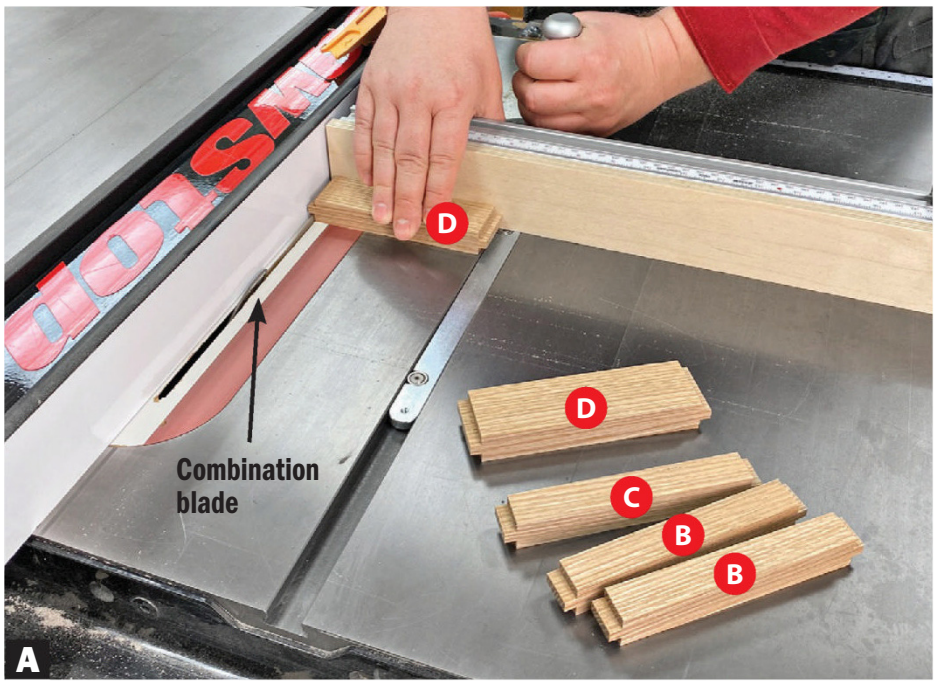
DIMENSIONS:
10½" W × 5" D × 17¾" H

Approximate materials cost:
$90
Lumber and clock kit

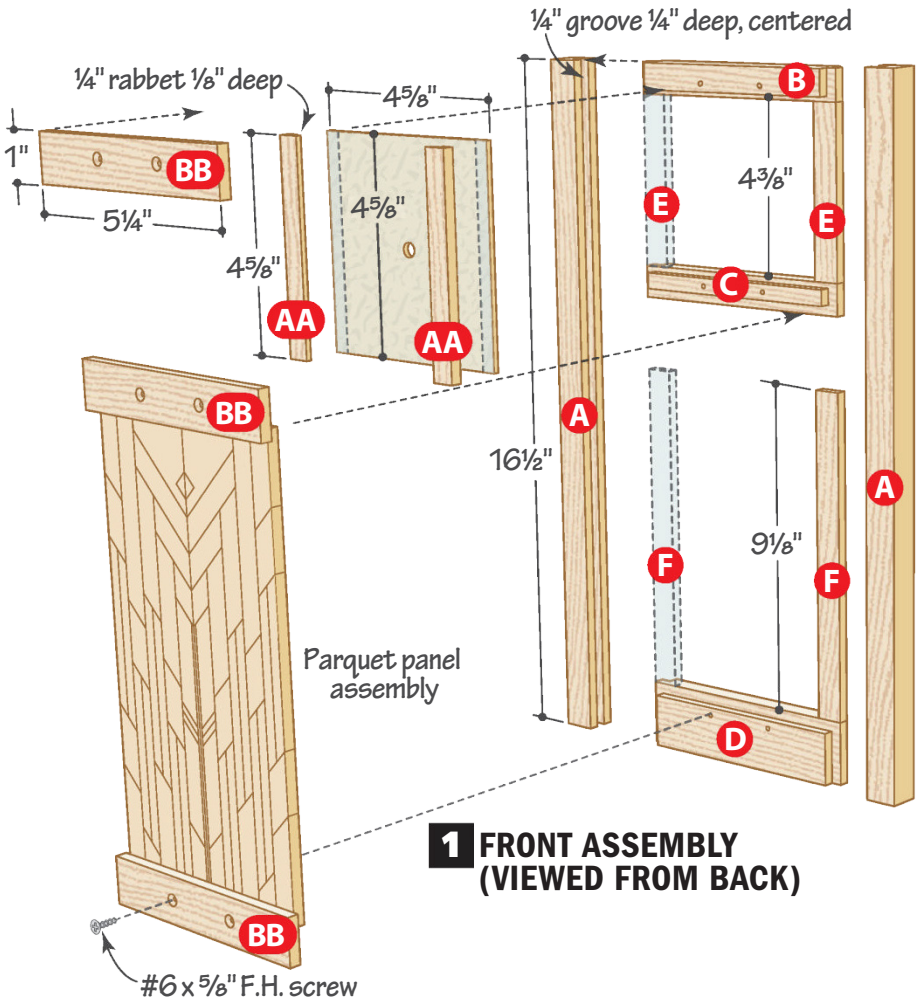
60
Pieces make up the parquet panel

Party up front, business in back

Two similar frames make up the front and back of the clock case. The front frame holds the clock face and the parquet panel, while the rear frame holds a removable back for replacing the battery in the clock movement.



Using the rip fence as a stop, cut ¼ × ¼" stub tenons on the ends of all the rails (B–D).

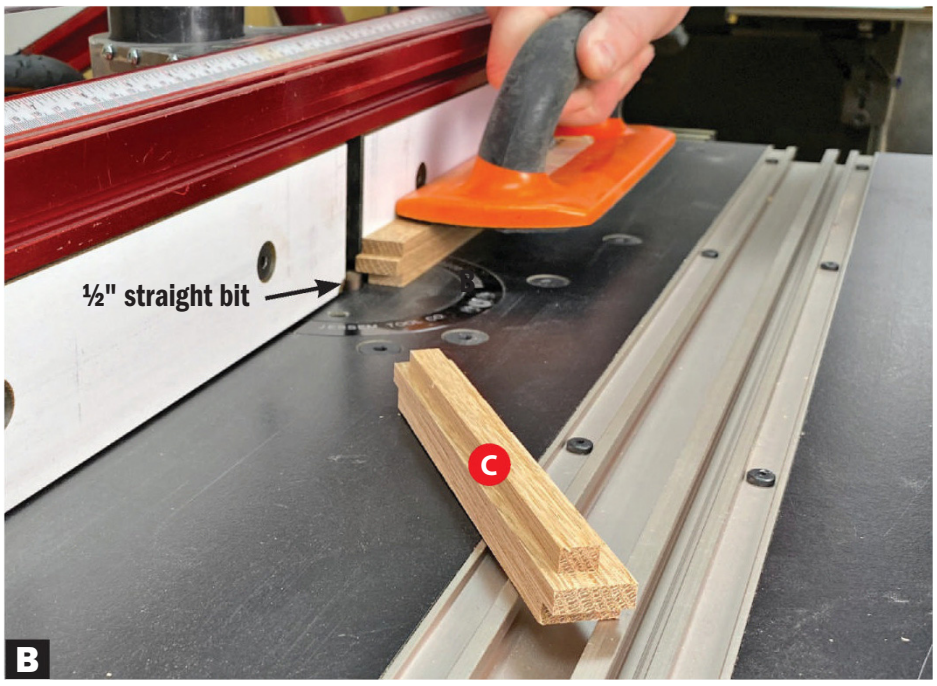


1 FRONT ASSEMBLY (VIEWED FROM BACK)

1 Cut the stiles (A) and upper (B), middle (C), and lower rails (D) for the front and back frames to size [**Drawings 1, 2, Materials List**]. Cut a centered groove in one edge of each stile.

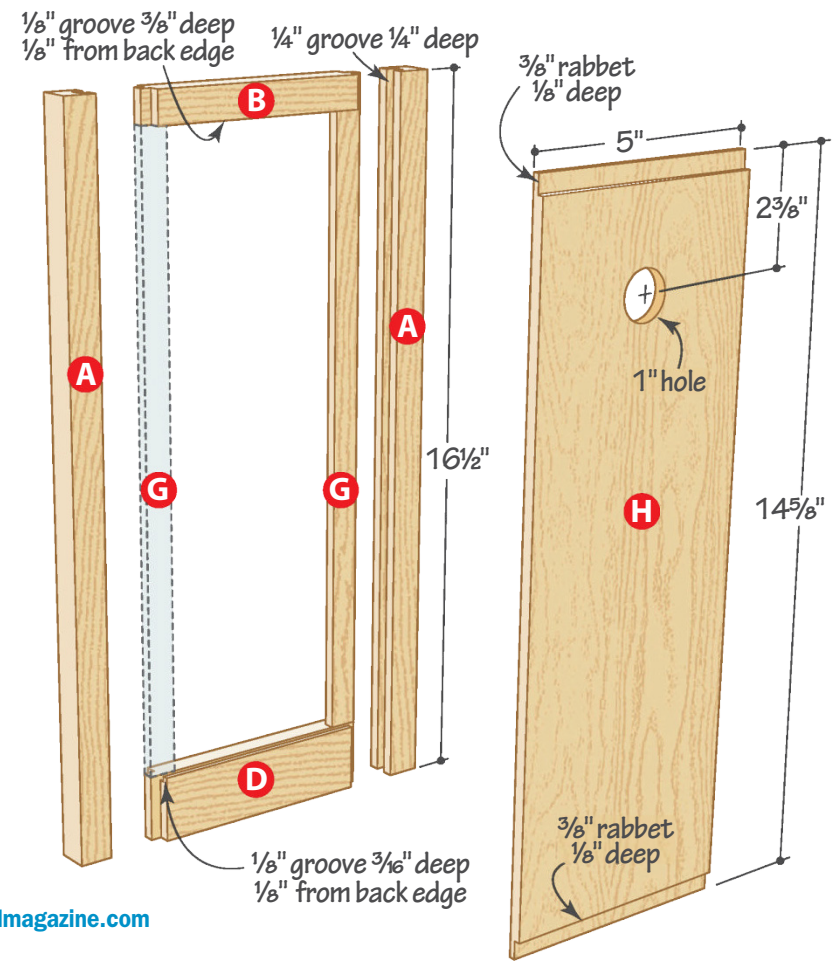
2 Cut stub tenons on the ends of all the rails (B–D) [**Photo A, Drawings 3, 4**]. Cut a groove in the upper and lower rails of the back frame [**Drawing 4**].

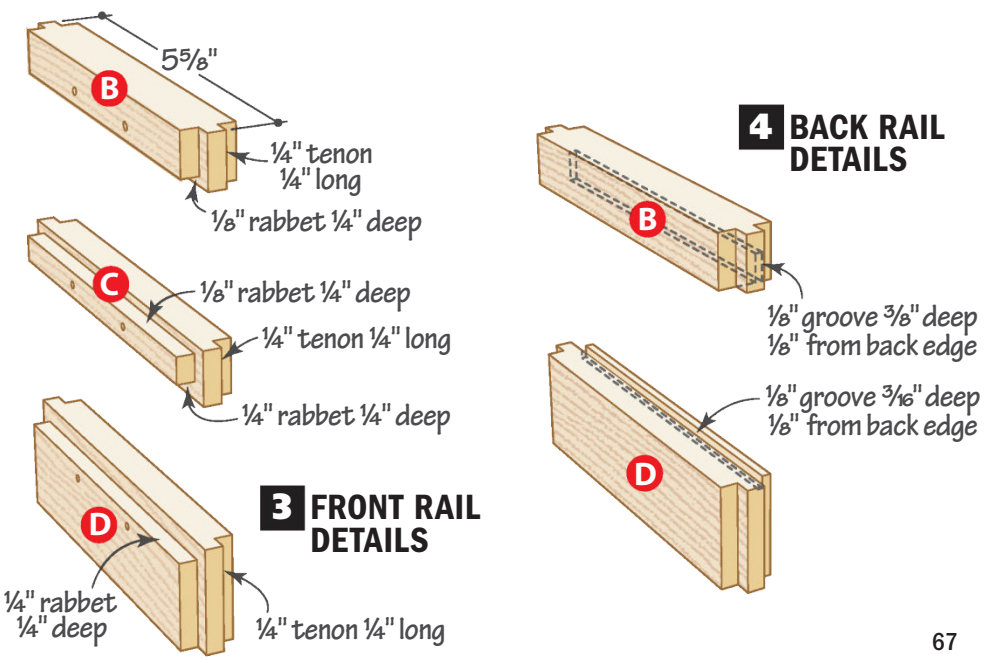
3 Rout rabbets on the inside faces of the front rails (B–D) [**Photo B, Drawing 3**].

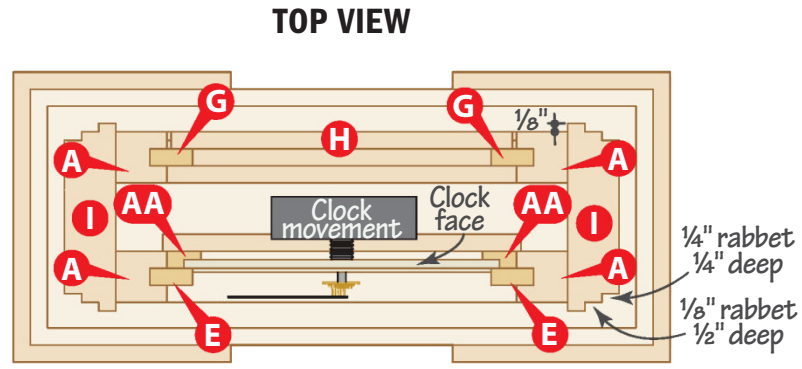


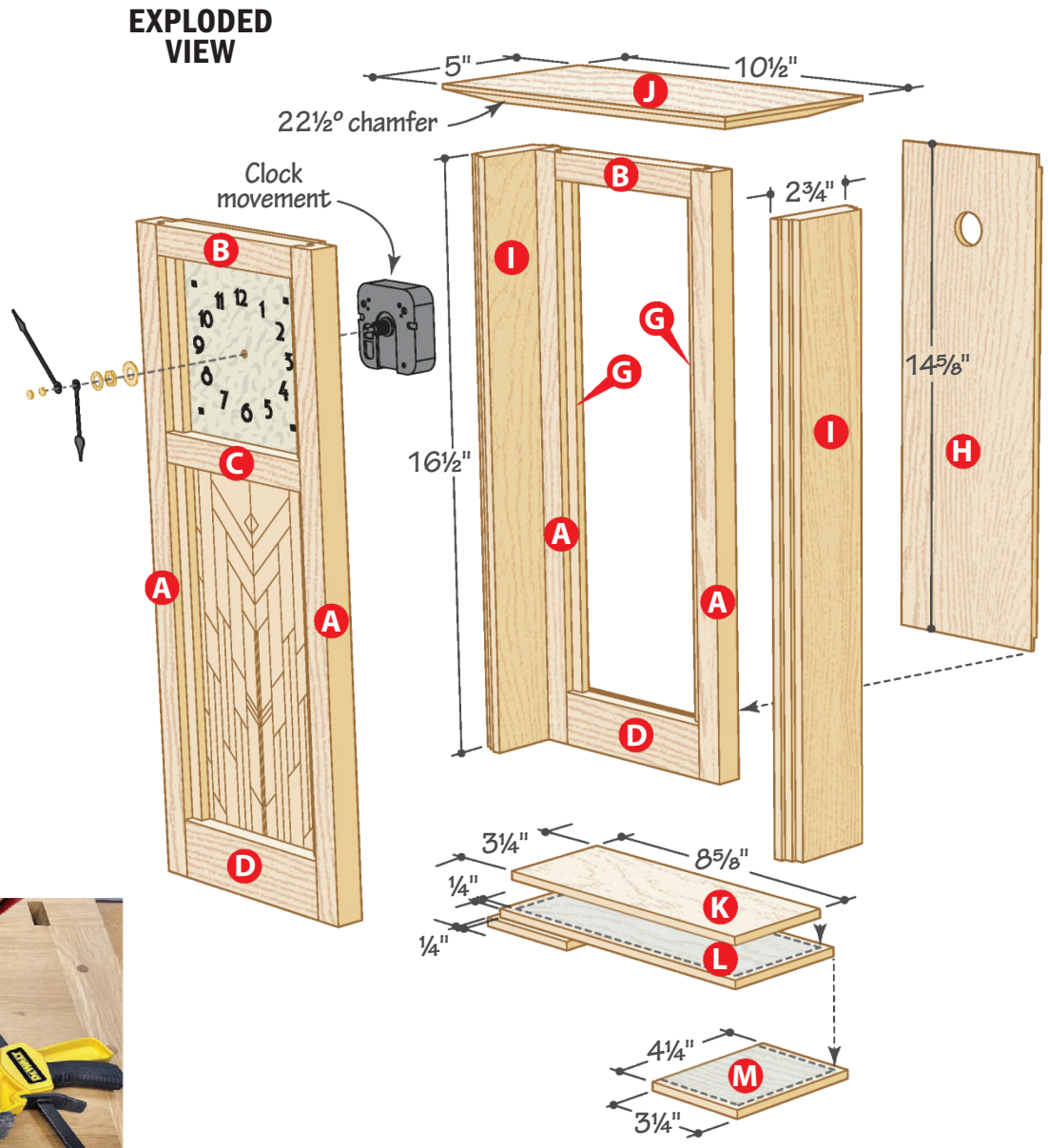
Rout rabbets for the panel in the middle (C) and lower (D) front rails. Then reposition the fence to rout rabbets for the clock face in the middle (C) and upper (B) front rails.

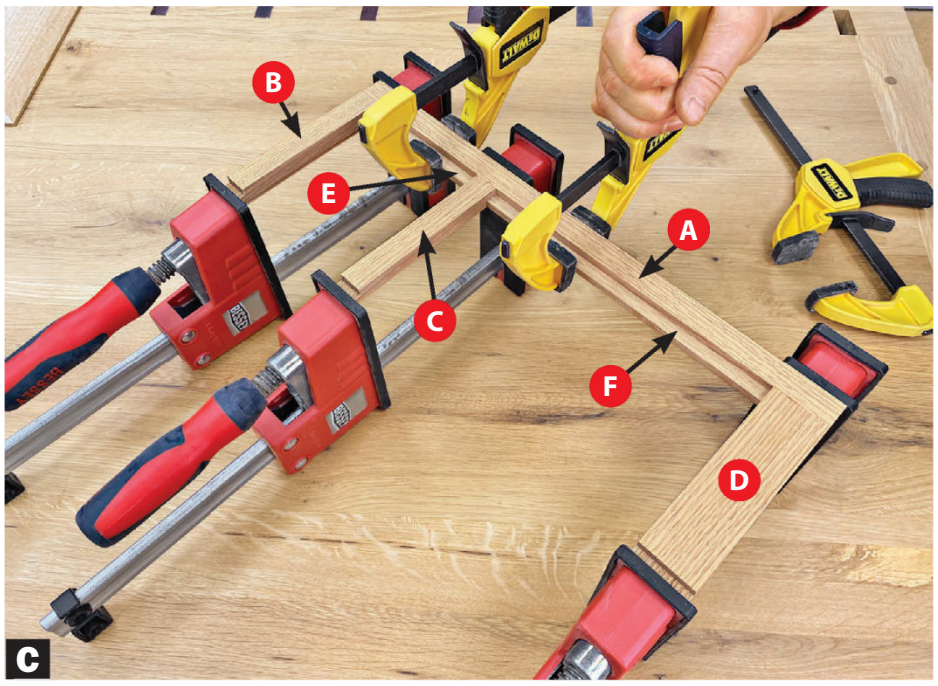
2 BACK ASSEMBLY (VIEWED FROM BACK)











Glue the upper and lower rails (B, D) flush with the ends of the stiles. For the front frame, use the stops (E, F) to position the middle rail (C).

4 Cut the clock face stops (E), panel stops (F), and back stops (G) to size. Glue and clamp together the front and back frames [**Photo C**].

5 Cut the back (H) to size. Cut rabbets on each end of the back [**Drawing 2**] and test the fit in the back frame assembly. Drill a hole in the back.

Capture the frames

1 Cut the sides (I) to size and rout stepped rabbets along the front and back edges [**Photos D** and **E, Top View**].

2 Glue the sides (I) to the front and back frame assemblies [**Exploded View, Top View**].

3 Cut the top (J) to size and chamfer all four bottom edges [**Exploded View**]. Glue and clamp the top to the case assembly so that the top overhangs equally on all sides.

4 Cut the upper and lower base plates (K, L) and the feet (M) to size [**Exploded View**]. Glue these four pieces into a base assembly and then center the case on the base assembly and glue it in place.

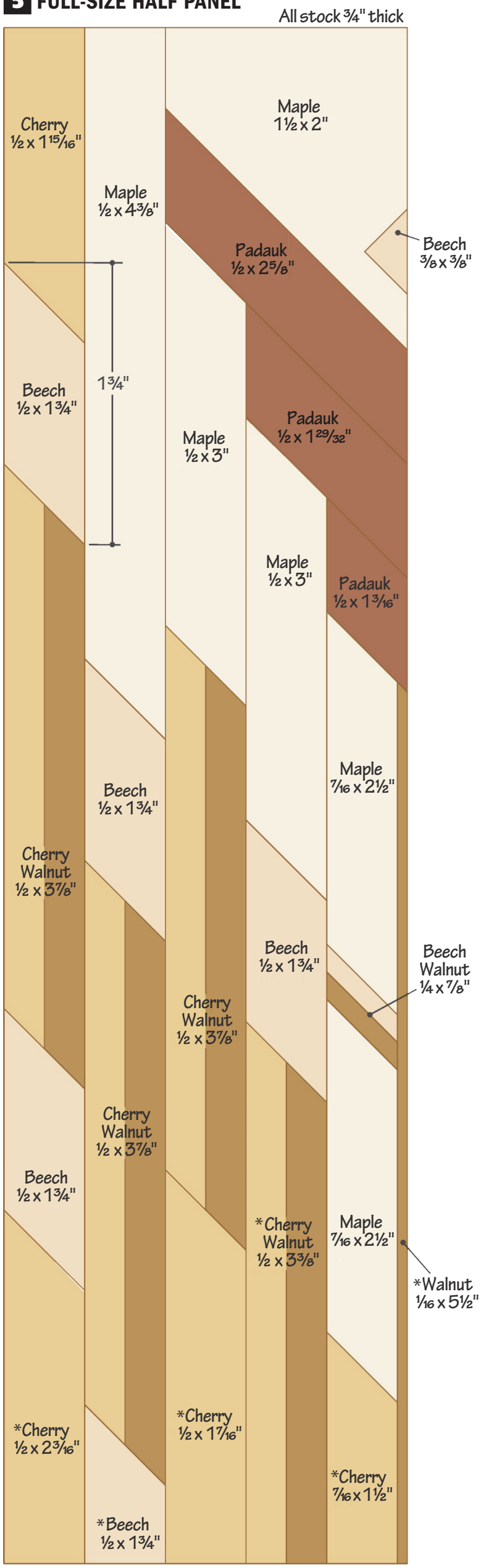


Create the stepped rabbet in two passes, starting with a narrow rabbet on both edges of the sides (I).

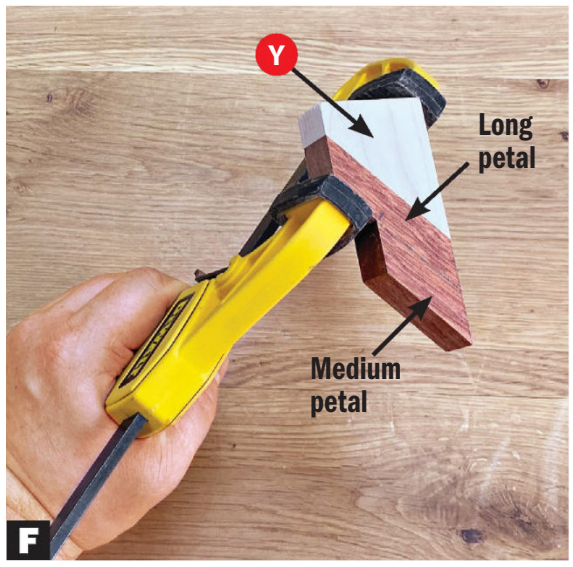


For the second pass, lower the bit and reposition the fence.

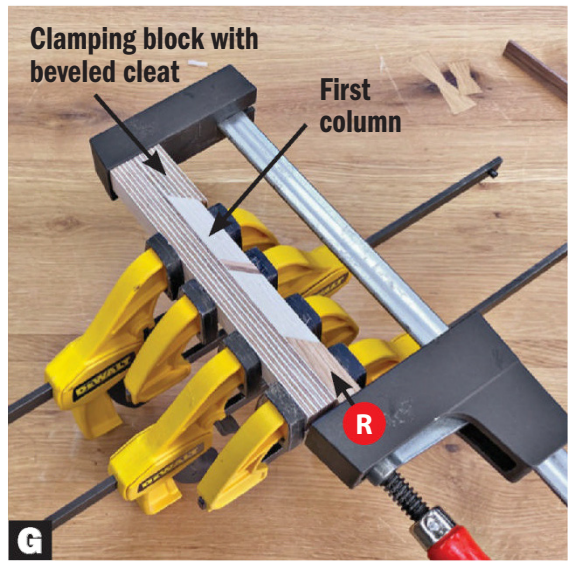
5 FULL-SIZE HALF PANEL



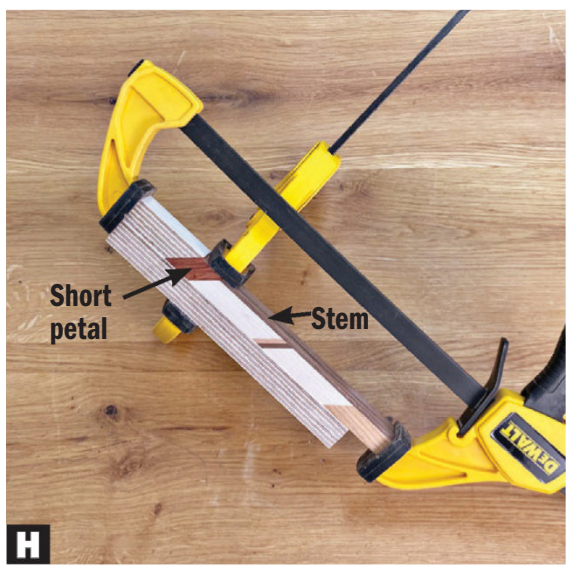
*Cut panel to final length after assembly.



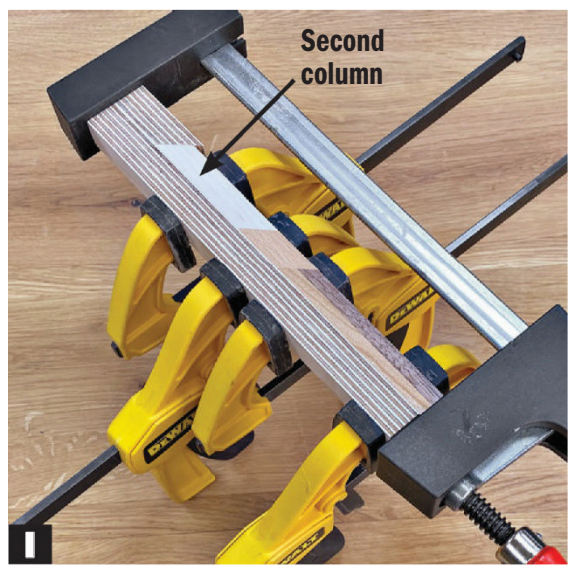
Check to ensure the pieces remain flush as you apply clamping pressure to the segments.



Use a clamping block with a beveled cleat at one end to hold the segments in place during assembly.



After gluing the walnut stem to the side of the assembly, add the short petal to the end.



Make a longer clamping block to glue up the segments for the second column.

It's not butter

For simplicity, build the parquet panel in sections. Five vertical columns make up the panel. Glue together mitered segments for each column, joining the columns together as you go and checking them against the full-size illustration [**Drawing 5**] to create a stylized flower with a geometric background. Then, you'll resaw this panel into two book-matched halves.

1 From ¾"-thick stock, cut the strips for the panel segments to width [**Materials List**]. Cut ½"-wide strips of padauk, beech, cherry, and maple (N–Q), 7/16"-wide strips of cherry and maple (R, S), ¼"-wide strips of cherry and walnut (T, U), ⅛"-wide strips of beech and walnut (V, W), and a 1/16"-wide strip of walnut (X).

2 Laminate the ⅛"-wide strips of beech (V) and walnut (W) into a blank for the leaves. Laminate the ¼"-wide strips of cherry (T) and walnut (U) into a blank for the background segments.

3 From the padauk strip, miter-cut three pieces to length for the petals of the flower. Note that all miters are 45° and all pieces are measured from long point to long point. Cut a block (Y) to size for the background above the flower. Glue the long and medium-length petals together, then add the block [**Photo F**].

4 From the previously cut strips, miter-cut the segments for the first (7/16"-wide) column to length. (Leave the bottom segment a little long for now; you'll trim it to length after assembly.) Glue these segments together end to end [**Photo G**]. Miter-cut the flower stem (X) to length and glue it to the edge of the column. Glue the remaining short petal to the end of the column [**Photo H**].

Tip! *For consistency, cut all the strips of each width before moving your rip fence to cut the next width.*

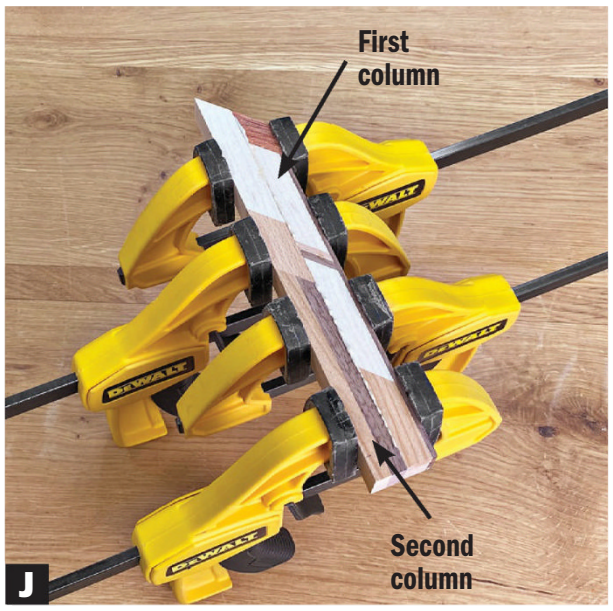
5 Miter-cut the segments for the second column to length and glue them together end to end [**Photo I**]. Glue this column to the one you completed in **Step 4** [**Photo J**].

6 Miter-cut the segments for the third column to length and glue them together. Glue this column to the petal assembly you made in **Step 3** [**Photo K**]. When the glue is dry, glue this assembly to the first and second columns from **Step 5** [**Photo L**].

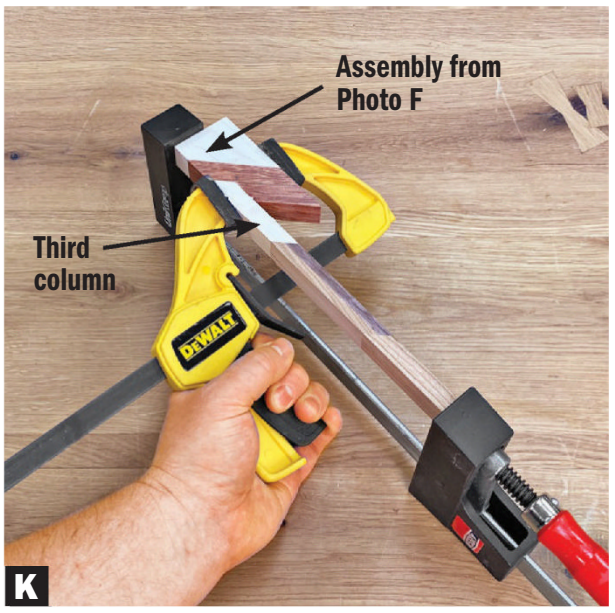
7 Miter-cut the segments for the fourth and fifth columns to length and glue them together separately. With the glue dry, glue these columns to the assembly [**Photo M**].

8 Cut a triangular notch in the panel blank at the tablesaw [**Photo N**] and then cut block Z to fit the notch and glue it in place.

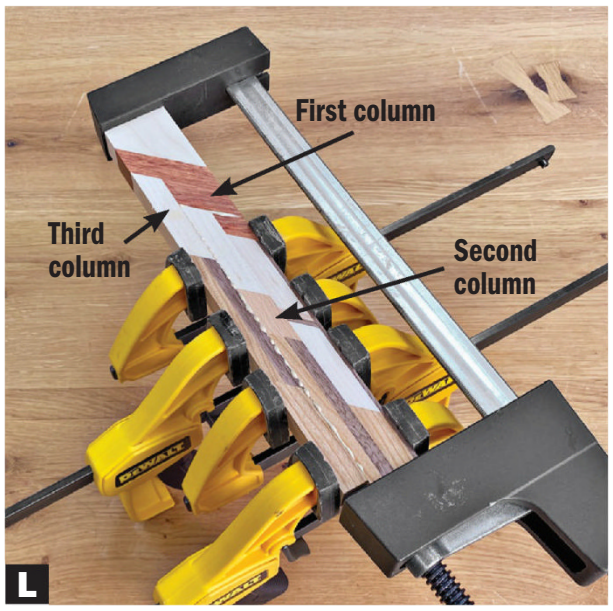
9 Resaw the blank at the bandsaw [**Photo O**] and glue the book-matched halves together edge to edge. Plane or sand the panel to a finished thickness of ¼". If necessary, trim the panel to final size: 5×9½".



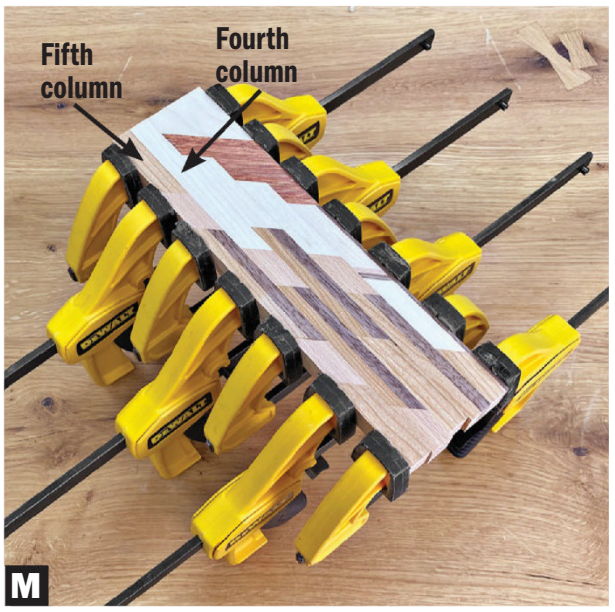
Keeping the beveled ends flush, glue the two columns together.



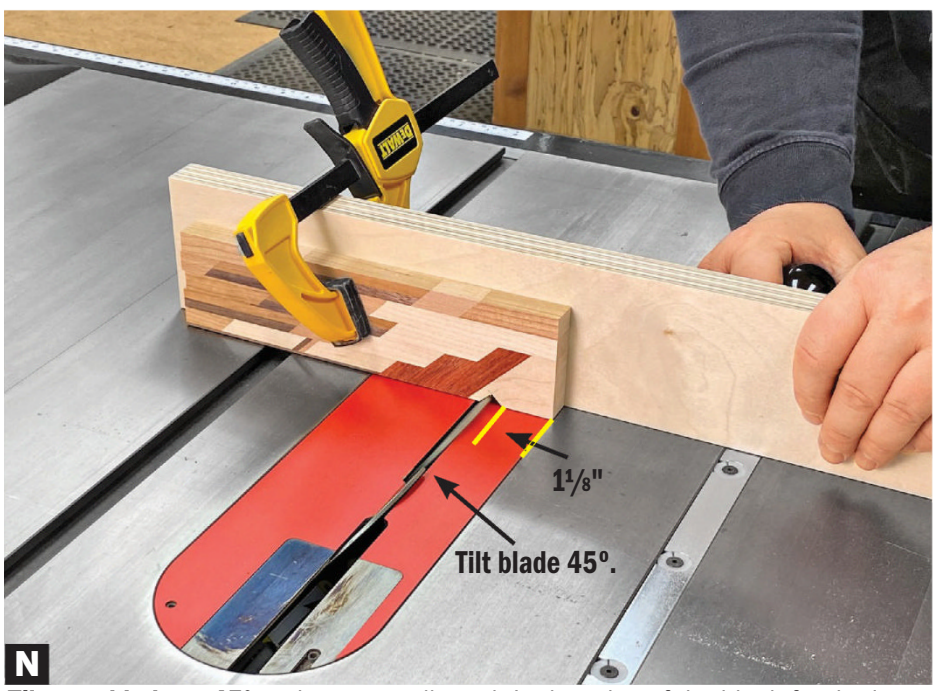
Glue the third column, then add the assembly you made previously (Photo F).



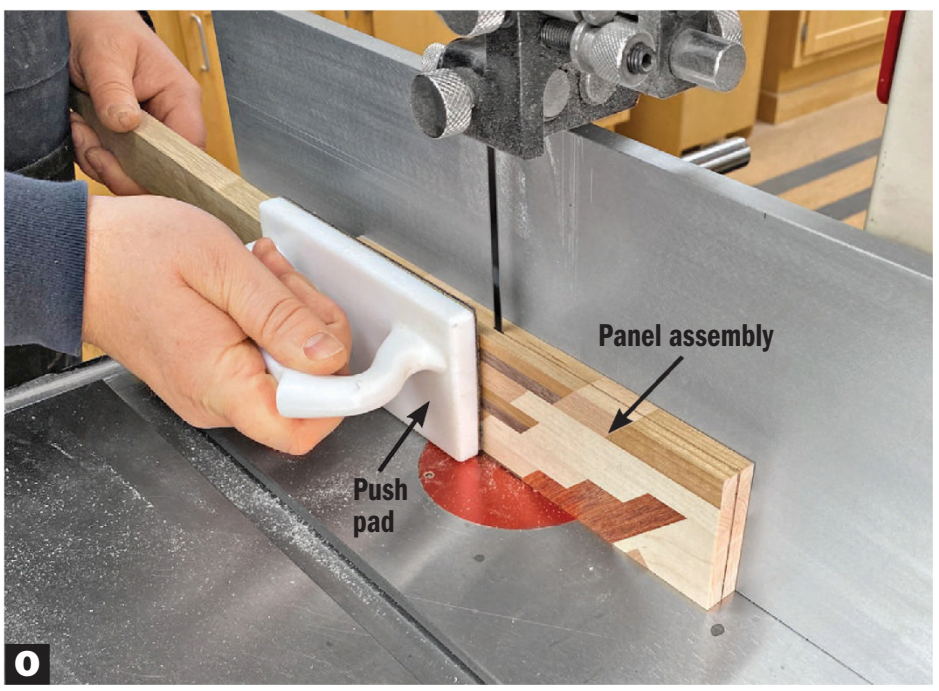
The panel is beginning to take form as you glue the two column assemblies together.



Add the fourth and fifth columns, keeping the ends flush at the top of the panel.



Tilt your blade to 45° and cut a small notch in the edge of the blank for the last block (Z). You'll make two passes, flipping the panel end-for-end in between.



Resawing the blank right down the center of the edge will leave plenty of material for final planing after gluing up the panel.

Run out the clock

1 Finish-sand the case, panel, and back panel, slightly easing any sharp edges.

2 Apply a coat of stain to the exterior of the case and back panel. (We used PureColor's Concerto stain.)

3 With the stain dry, apply three coats of lacquer to the case, back panel, and both faces of the parquet panel.

4 Cut the clock face cleats (AA) to size and rabbet one edge of each cleat to accept the thickness of the clock face [**Drawing 1, Top View**].

5 Cut the retainers (BB) to size and drill a pair of countersunk holes in each one [**Drawing 1**]. Through the back of the clock, position the parquet panel, the clock face, and the clock face retainers in the case and secure them by driving screws through the retainers.

6 Attach the clock movement to the face and add the hands. Slide the back panel into place, and then take a timeout to admire a job well done.

Produced by **Vince Ancona** with **Brian Bergstrom**
Project design: **John Schlabaugh**
Illustrations: **Roxanne LeMoine, Lorna Johnson**

Cutting Diagram

This project requires 3 square feet of ¼" oak, 3 board feet of 4/4 oak, and .25 board feet each of 4/4 padauk, 4/4 beech, 4/4 cherry, 4/4 maple, and 4/4 walnut.



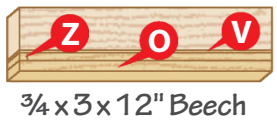
¾ x 5½ x 60" Oak *Plane or resaw to the thickness listed in the Materials List.



¼ x 5½ x 60" Oak



¾ x 3 x 12" Padauk



¾ x 3 x 12" Beech



¾ x 3 x 12" Cherry



¾ x 3 x 12" Maple



¾ x 3 x 12" Walnut



Facelift. *Like the clock but want a different look? Replace the parquet panel with one made of figured wood, such as this spalted maple.*

Materials List

Part		T	W	L	Matl.	Qty.
A	stiles	¾"	¾"	16½"	O	4
B	upper rails	¾"	¾"	5⅝"	O	2
C	middle rail	¾"	¾"	5⅝"	O	1
D	lower rails	¾"	1½"	5⅝"	O	2
E	clock face stops	¼"	⅝"	4⅜"	O	2
F	panel stops	¼"	⅝"	9⅛"	O	2
G	back stops	¼"	⅝"	14¼"	O	2
H	back	¼"	5"	14⅝"	O	1
I	sides	¾"	2¾"	16½"	O	2
J	top	½"	5"	10½"	O	1
K	upper base plate	¼"	3¼"	8⅝"	O	1
L	lower base plate	¼"	3¾"	9⅛"	O	1
M	feet	¼"	4¼"	3¼"	O	2
N*	padauk strip	¾"	½"	12"	P	1
O*	beech strip	¾"	½"	12"	B	1
P*	cherry strip	¾"	½"	12"	C	1
Q*	maple strip	¾"	½"	12"	M	1
R*	cherry strip	¾"	7/16"	12"	C	1
S*	maple strip	¾"	7/16"	12"	M	1
T*	cherry strips	¾"	¼"	12"	C	2
U*	walnut strips	¾"	¼"	12"	W	2
V*	beech strip	¾"	⅛"	12"	B	1
W*	walnut strip	¾"	⅛"	12"	W	1
X*	walnut strip	¾"	1/16"	12"	W	1
Y*	maple block	¾"	1½"	2"	M	1
Z*	beech block	¾"	⅜"	⅜"	B	1
AA	clock face cleats	¼"	½"	4⅝"	O	2
BB	retainers	¼"	1"	5¼"	O	3

*Parts initially cut oversize. See the instructions.

Materials key: O-oak, B-beech, W-walnut, C-cherry, P-padauk, M-maple.

Supplies: #6 x ⅝" flathead screws.

Blade and bits: Dado set, ½" straight router bit, 22½° chamfer bit.

Source: Clock kit (quartz movement, dial, and hands), no. RS-01354, $18.90, 888-636-4478, woodstore.net/parquetclock.

Vise Squad

A vise makes a workbench more than a flat surface for working on projects. Install a vise on one end and another on an edge, and you'll cover nearly all your workholding needs. Design your workbench to accommodate the specific vises you purchase, or alter an existing bench to mount one or more. We've built a lot of workbenches over the decades with a lot of vises, and we recommend these six.

▶ Learn more about workbench vises.
woodmagazine.com/vises





Best of the best



Veritas quick-release front vise (no. 05G3401, $379) and quick-release sliding tail vise (no. 05G3001, $375)

Front vise maximum travel: 12¼";
Tail vise maximum travel: 7¾"

If we're building our dream workbench today, we'd anchor it with these two vises. Yes, they require a sizable investment, but they work so smoothly and solidly and install so easily—Lee Valley's detailed instructions ensure a job well done—that you'll quickly forget the purchase pain. The quick-release on each lets you open or close the outer jaw rapidly, a huge benefit when you're changing workpieces often.
Lee Valley, leevalley.com



WoodRiver large end vise, no. 144807, $110

Maximum travel: 9"

With this hardware you can make an excellent—and value-priced—tail vise that operates smoothly and holds well. It lacks a quick-release, so you'll have to turn the screw fully for each task. (Handle not included.)
Woodcraft, woodcraft.com



Lee Valley large front vise, no. 70G0802, $119

Maximum travel: 13" (minus the thickness of the wood jaws)

We like this value-priced vise kit so much that we've used it on several workbenches over the years. It mounts easily, and you can build the jaws to suit your bench and work style. Buy the optional handle (no. 05G1203, $10.50) or make your own.
Lee Valley, leevalley.com

continued on page 74

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Tools & Materials

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Veritas twin-screw vise
16⅞" width, no. 05G1221, $289
24" width, no. 05G1222, $299



Maximum travel: 12" (minus the thickness of the wood jaws)

Twin-screw vises feature two screws that can be positioned up to 24" apart, with jaws that you build to suit your workbench width and your type of work. A chain (chain cover removed for clarity) connects the screws to ensure the jaws travel parallel to each other without racking. If you need to clamp a workpiece without parallel surfaces, disengage the chain and operate each included handle independently.

Lee Valley, leevalley.com

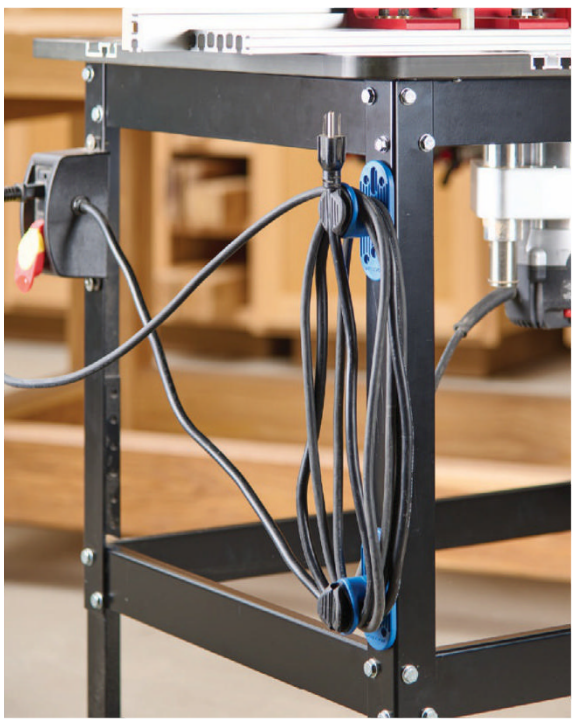


Woodcraft 7" quick-release vise, no. 162794, $170

Maximum travel: 7¾" (minus the thickness of the wood jaws)

If you need only a small vise, get this one. It's easy to install, and once you build jaws, it works well at gripping workpieces securely. The pop-up bench dog lets you trap workpieces between it and another bench dog you install in the bench surface.

Woodcraft, woodcraft.com



Wrangle those pesky power cords

Power-cord winding brackets, no. 66359, $10 per pair

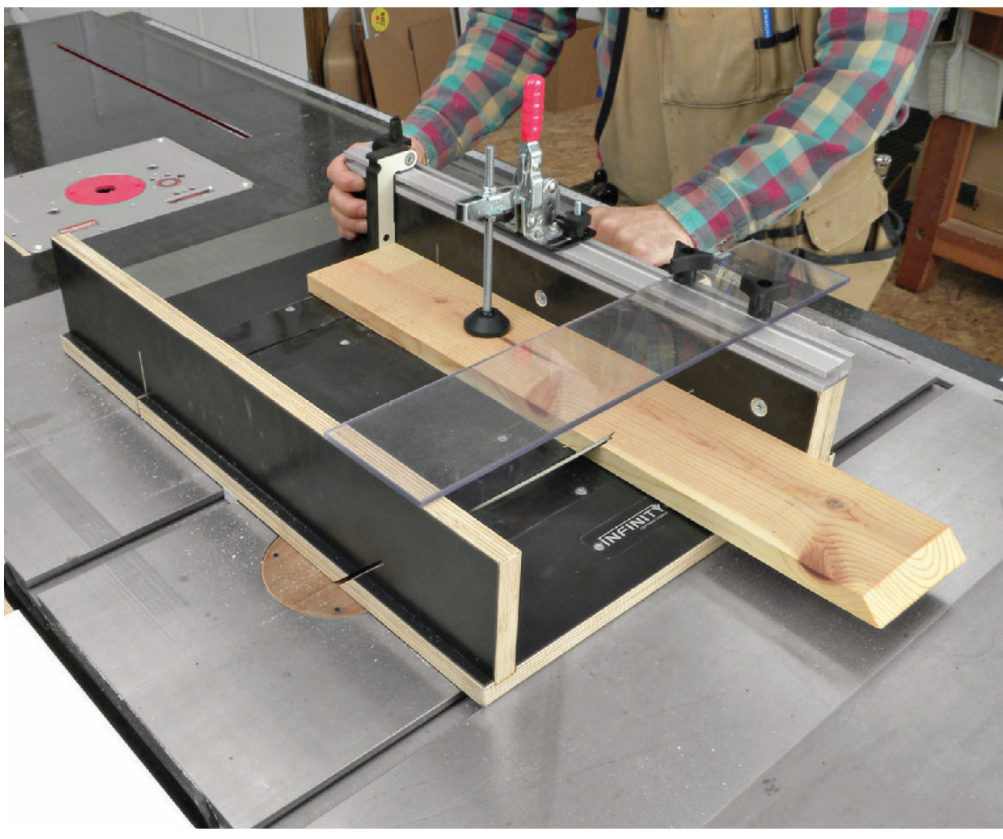
I've always appreciated long power-tool cords, as well as machines and tools that come with built-in brackets for storing these cords when not in use. Sadly, few provide such a solution. Enter these handy brackets from Rockler to solve this problem. Attach the brackets simply by using the self-adhesive backing—which grips well, but for how long is hard to say—or with screws. Multiple screw holes at 1" and 32mm spacing (so they fit on existing Rockler stands and fixtures) provide lots of mounting options. It's easy to mark and drill holes in steel legs; cast iron takes a bit more effort.

—Tested by Bob Hunter, Tools Editor

Rockler, rockler.com

Tablesaw sled makes the cut

Tablesaw crosscut sled, no. TCS-200, $315



This well-made sled allows crosscutting pieces up to 12⅛" wide. The clear instructions made assembling the melamine-coated Baltic birch plywood parts easy. Two replaceable inserts let you make cuts with the single miter-gauge bar in either slot. Use this to set up one slot for 90° crosscuts, for example, and the other for 45° bevels. The backer board provides 2" of side-to-side adjustment so you can reposition it for a clean backing surface when it begins to get chewed up—a nice feature. A replacement kit (TCS-200.CRP) provides additional inserts and a fresh backer for the fence; having one (or more) allows you to use the sled for additional angles, or even cuts with your dado blade.

The toggle-clamp hold-down works well, and the flip-stop locks solidly in place. The solid handle attached to the rear fence keeps your hands clear of the blade path while pushing the sled through a cut, and the clear blade guard extends past the rear fence to protect your hands as the blade exits the cut. It also deflects some of the debris thrown up by the blade. One limitation: With the guard in place, the shortest piece on which I could use the hold-down and the stop was 4⅞" because they all crowd together in the T-track on the top rail. Maximum crosscut length with the stop is 17"; your saw's configuration might change this figure.

The points of the tri-star knobs extend beyond the edges of the clear blade guard, so to allow positioning the hold-down closer to the guard, I redrilled the holes closer to the center of the guard. They still worked fine and provided the desired clearance.

While large enough for crosscutting and bevel-cutting individual boards and small panels, this sled remains easy to lift and maneuver. I still have my big shopmade sled for larger jobs, but this one will save a lot of effort when working on smaller jobs.

—Tested by Craig Ruegsegger

Infinity Cutting Tools, infinitytools.com

continued on page 76

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Milescraft launches concealed-hinge jig

35mm EuroHinge Jig, no. 1342, $25

This jig helps you precisely locate and bore holes for 35mm European-style cup hinges for cabinet doors. The self-aligning jig works with frameless and face-frame cabinets, and offers settings for most popular hinge styles. Two edge-alignment knobs position the cup hole from the edge of the door, while a locating pin sets the distance from the door top and bottom. Use the included 35mm Forstner bit to bore the cup hole, and then the included twist bit to drill pilot holes for the mounting screws. An included template also helps you position and mount the door to the cabinet.

Milescraft, milescraft.com

Festool upgrades its small plunge router

Compact plunge router OF 1010 REQ-F-Plus, no. 576922, $499

Festool's new OF 1010 router provides woodworkers 2⅛" of plunge travel, with a microadjuster capable of changing bit depth in 1/256" increments. The kit comes with ¼" and 5/16" collets, a chip deflector, and a Systainer storage box.

Festool, festoolusa.com



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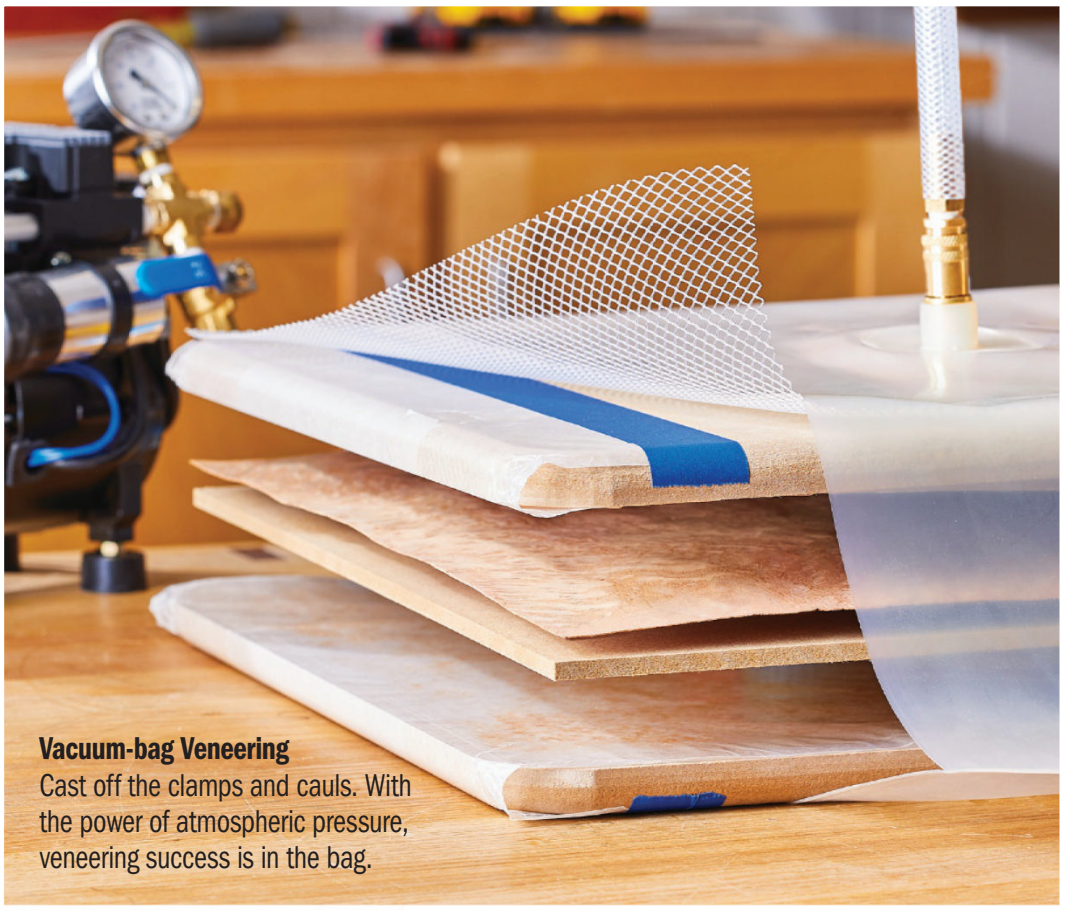
What's Ahead

A GLIMPSE INSIDE THE DECEMBER/JANUARY ISSUE (ON SALE NOVEMBER 18)



Contemporary Veneered Cabinet
Inspired by the work of furnituremaker George Nakashima, this gorgeous cabinet features hand-cut dovetails and sliding, veneered doors.



Vacuum-bag Veneering
Cast off the clamps and cauls. With the power of atmospheric pressure, veneering success is in the bag.



Sliding-tray Jewelry Box
Divided inserts and a sliding tray organize the items you want to find quickly, and a secret compartment hides the rest safely away.



Dust Collectors Compared
Whether you're working with a few machines or an entire ducted system, you need a properly sized dust collector. We tested several sizes and types to clear the air about which setup you should buy for your shop.



Tablesaw Bevel Jig
This simple-but-sturdy jig lets you bang out bevels and mass-produce miters on your tablesaw with repeatable accuracy.

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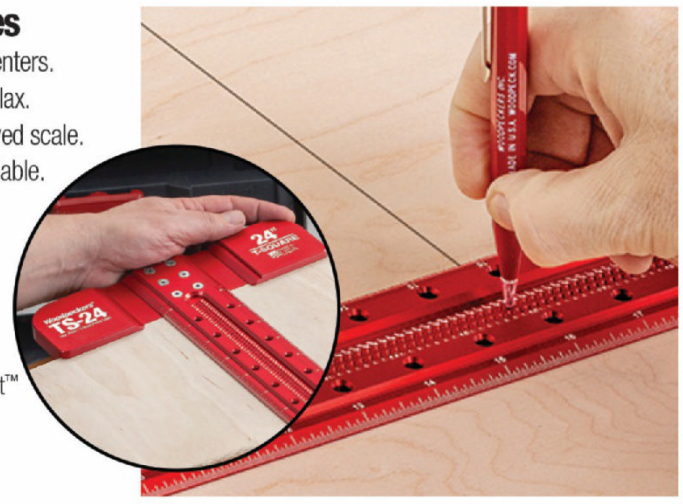

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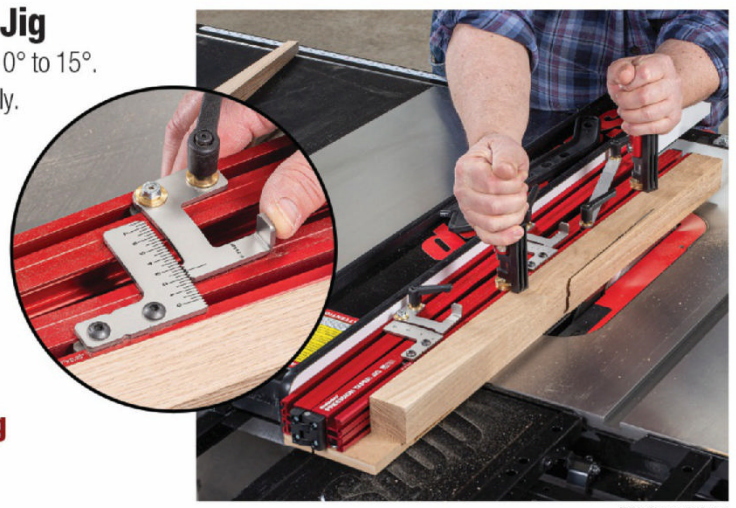

Table Saw not included.

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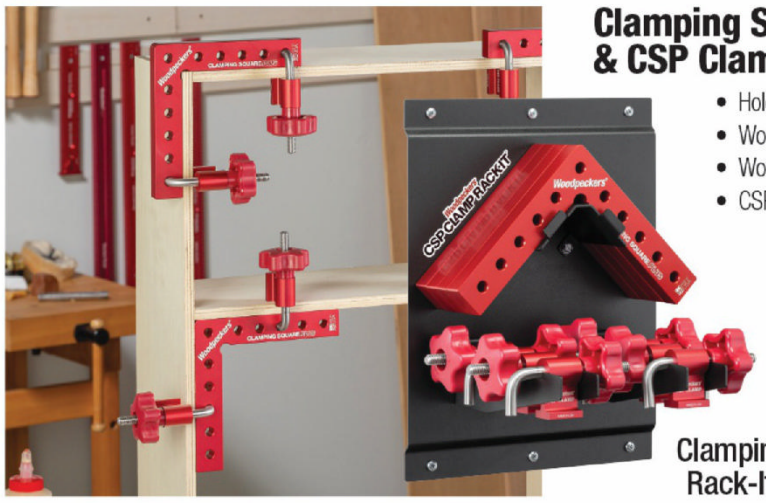

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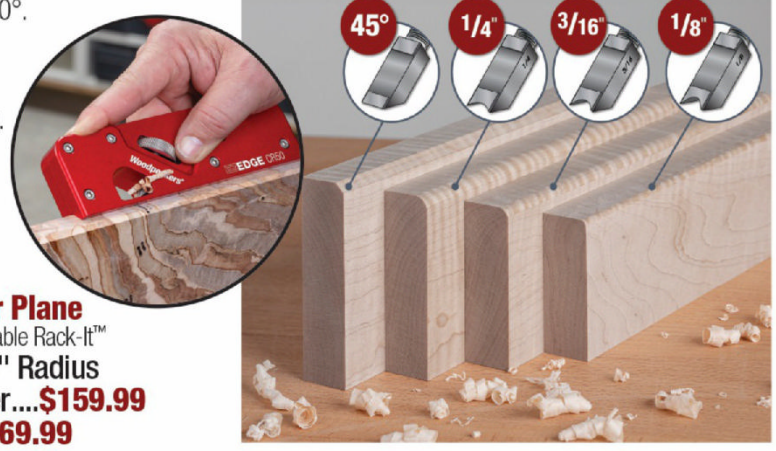
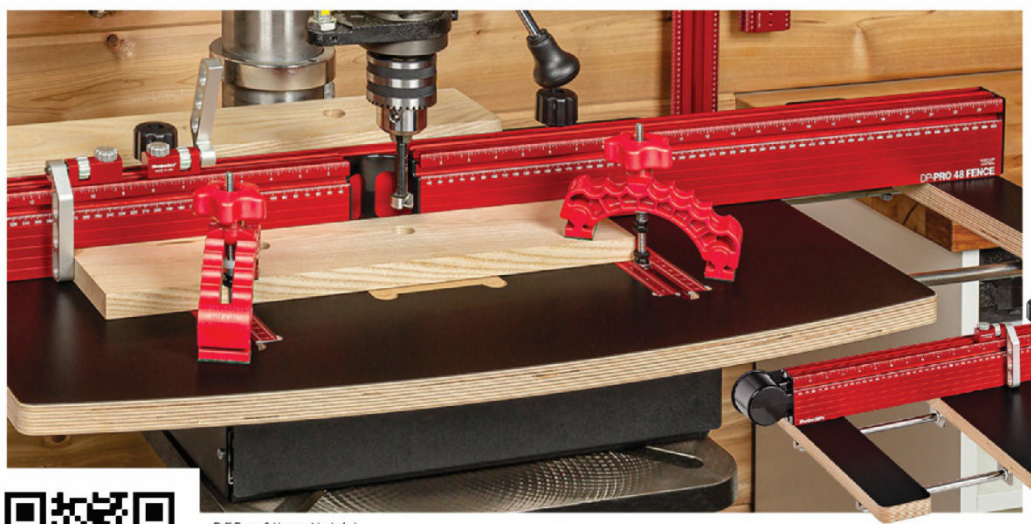
38" Capacity....**$169.99**
50" Capacity....**$199.99**

EZ Edge Corner Plane

- Sole is a perfect 90°.
- 3 radius profiles.
- 45° chamfer.
- Resharpens easily.



EZ Edge Corner Plane
Includes a wall-mountable Rack-It™
1/8", 3/16", 1/4" Radius
-or- 45° Chamfer....**$159.99**
Deluxe Set....**$569.99**



Drill Press & Hose not included.



DP·PRO Drill Press Table System

- Integrated dust collection.
- Micro-adjustable Flip Stops.
- 1" thick Baltic Birch with laminate both sides.
- Extension Wings for long material support.

DP·PRO Drill Press Table Master System
36" Table, 24" Fence....**$499.99**
36" Table, 36" Fence....**$519.99**
48" Table, 36" Fence....**$549.99**
48" Table, 48" Fence....**$569.99**

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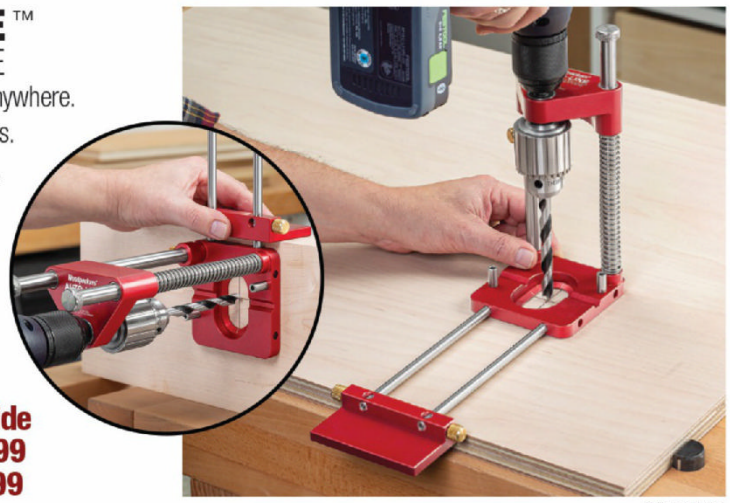
Woodpeck.com

MADE IN USA

AUTO-LINE™ DRILL GUIDE

- Perpendicular holes anywhere.
- Fence fits on all 4 sides.
- Works with most drills.
- 1" inside frame.
- 2" capacity outboard.
- Deluxe Kit includes extensions.



Drill not included.

Auto-Line Drill Guide
Drill Guide....**$269.99**
Deluxe Kit....**$369.99**



Table Saw not included.

Exact-90 Miter Gauge

- Square cuts every time.
- Miter bar self-adjusts 3/4" slots.
- Micro-adjust flip stop & 45" extension.
- 24" cross-cut capacity on most saws.
- Miter Bar available separately.

Exact-90
Miter Gauge....**$329.99**
25.5" Miter Bar....**$69.99**



Table Saw not included.

THIN RIP GUIDE™

NEW TOOL

- Safe, accurate jig for repeat cutting of thin strips.
- Works with 3/8" x 3/4" T-slot table grooves.
- Easily calibrated scales in both inch & metric.
- Ball bearing contact for smooth feeding.

ThinRip Guide....**$149.99**

DUAX Angle Drilling Table

- Auxiliary table mounts to your drill press.
- Adjusts to any angle from 0° to 90°.
- Teeth engage for repeatable angles.
- Optional Clamping Kit adds workholding ability.
- Designed to fit most drill presses 12" & larger.
- Ideal for chair and stool projects.

Duax Angle Drilling Table
Duax....**$299.99**
Deluxe Kit....**$339.99**



Drill Press not included.



Table Saw not included.

RIP-FLIP Fence Stop System™

- Relocates rip fence perfectly.
- Flips out of the way when not needed.
- Couple 2 stops for perfect fitting dadoes.
- Extra stops & dado couplers available.

RIP-FLIP Fence Stop System
*Fits SawStop**
36" Capacity....**$209.99**
52" Capacity....**$219.99**
*Powermatic/Biesemeyer**
30" Capacity....**$219.99**
50" Capacity....**$229.99**



Table Saw not included.

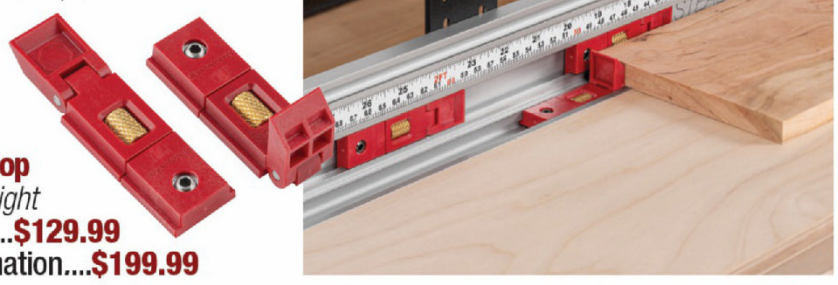
AUTOSCALE™ Miter Sled

- Scale accurate at any angle.
- Miter bar fits any 3/8" x 3/4" slot.
- Flip stop with micro-adjust.
- Stop extends to 50".
- Stops for 3-. 4-, 5-, 6-, 8- & 12-sided miters.

AutoScale Miter Sled
Deluxe....**$1089.99**
Left-*or*-Right Miter Sled....**$529.99**
Drop Zone....**$129.99**

StealthStop™ Miter Saw & Fence Stop System

- Stops retract completely within track.
- Micro-adjust provides precise control.
- Installs flat or as a vertical fence.
- Include track, stops, brackets & rule.



StealthStop
Left -or- Right
4' Fence....**$129.99**
4' Combination....**$199.99**

AUTOANGLE™ DRILL GUIDE

- Precision drilling without a drill press!
- Drill perfectly vertical or at any angle from 90° to 40°.
- Entry point is constant at any angle.
- Fence & stop system speeds repetitive work.
- Works with most hand drills.

AutoAngle Drill Guide
Standard....**$549.99**
Deluxe Kit....**$649.99**



NEW TOOL

Drill not included.

*Visit **Woodpeck.com** for hundreds of other American Made Tools!*

NOTE: The SawStop, Powermatic & Biesemeyer brand names are the registered trademark of the respective company and is not associated with Woodpeckers, LLC.



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Specially formulated with exclusive Freud-made TiCo™ Hi-Density carbide and unique cutting geometries, these solid carbide bits offer an unmatched cutting performance and durability on workshop and small CNC machines.

Featuring the industry's first functional coating, Black I.C.E. (Industrial Cooling Element) protects the solid carbide cutting edge by creating a slick, lubricant like action for less friction, heat and pitch buildup.



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