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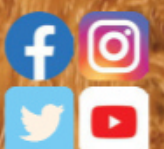
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TAKING MEASURE

Everything I am today, I am because of my father. When my brother Steve and I were 12 and 10, respectively, Dad would roust us out of bed at 4 a.m. every day to deliver the morning newspaper, driving and dropping us at different spots along the route in “the ’60”—his 1960 Chevy Bel Air. The only radio station on the air that early was WHO-AM, so between stop-and-drops we listened to “Mike Hoyer, your country DJ” blasting Red Sovine and Tammy Wynette from the lone dash speaker.

Dad loved building things, and he gently passed that passion on to us every day. During my high school years he’d be up early, getting a couple of hours in the shop building John Deere shadow boxes (he figured he’d made about 800 of them) before heading to work at the savings and loan. At 11 that night, he’d be back working in the shop.



In younger days, Dad made dozens of gifts like this for his kids and grandkids. Shadow boxes were a favorite gift for grown-ups.

Dad passed along that before-sunup-to-after-sundown work ethic to all of us kids, not in a preachy way, but by example. My sister and brothers are the most ambitious, hardworking folks I know. As we grew up and got houses of our own, we could always rely on Dad to help with a remodel, room addition, or rotted-window replacement. On top of that, every family member has at least one woodworking project lovingly crafted and gifted to them by Dad, Grandpa, Papa Leo.

I know that early-morning paper route and Dad’s great sense of humor influenced my first career choice, as a radio personality (including six years at WHO). And I’m just as certain that Dad’s handed-down determination and love of creating things led me to my second career, at WOOD® magazine, of which he was a charter subscriber.

About 10 years ago, Dad gave up woodworking when Parkinson’s disease took away his dexterity and balance. Later, it robbed him of his ability to walk and feed himself, although his sharp mind and sense of humor were unaffected. Ultimately, Parkinson’s took Dad away from us, as the family gathered at his bedside, and I held his hand, a few days before Christmas last year.

Thanks for everything, Pop. I wouldn’t be here without you.

Dave

Dave Campbell
dave.campbell@meredith.com
Facebook and Twitter: @WOODeditor
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When Dad’s dexterity deteriorated, I made him an extra-large cribbage board out of natural-edge curly redwood.

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WOOD®

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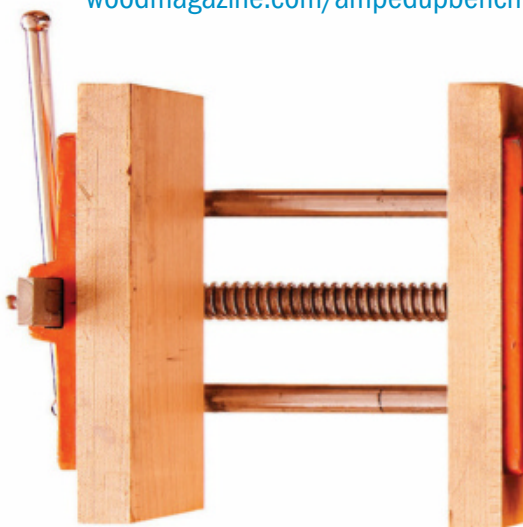
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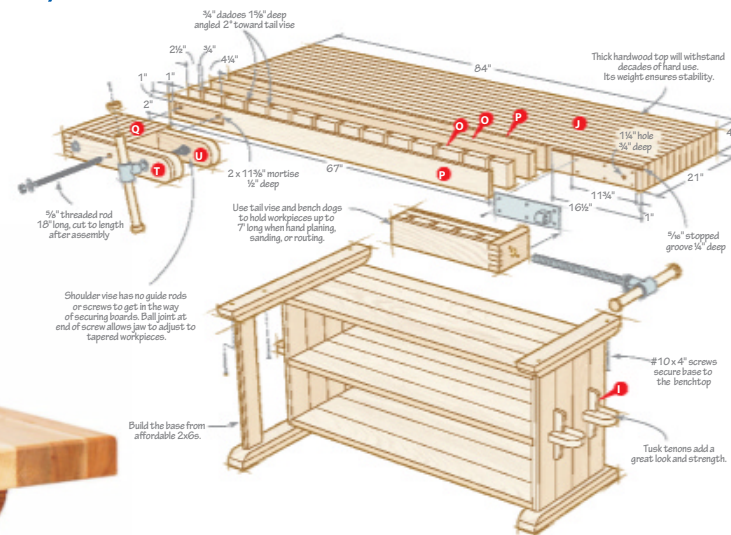


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Resurrecting furniture for family and friends

I wanted to share with you pictures of a vanity I reconstructed for a friend. The “before” picture (below left) shows the vanity when I received it. It was originally a mahogany-veneered case that someone had painted white. But in an effort to restore the piece to its original glory, the owner had dipped the case in paint remover, destroying the veneer.

I rebuilt the case in walnut, accented with curly maple and rosewood. I also inlaid in the top a rose, made of redheart and yellowheart, using the double-bevel marquetry technique. I’m pretty pleased with the results.

—**Bob Devine**
Pahrump, Nev.



My father built a table for our family more than 35 years ago, and between many years of use and several in storage, it had seen better days. Still, I couldn’t bear to throw it out.

So I took the table completely apart, rebuilt the apron and substructure beneath the tabletop (which I also enlarged), and reassembled it using the original parts (above). I also reinforced the seating benches.

My wife, Julie, and I sanded off all of the old finish and refinished it with several coats of spar varnish. The table has found a home on our covered porch and will now serve our family for at least another generation.

—**Stephen Russell**
Charlotte, N.C.



Bye-bye, bad batteries

A few months after we published our review of battery-powered chainsaws in issue 261 (July 2019), we found that the battery pack for the Husqvarna 120i would no longer take a charge. After we reported this, Husqvarna’s Arnie Fie told us they had discovered a manufacturing problem with several tools that was significantly shortening the life of the battery packs, and that repairs would be handled under warranty.

If you’ve experienced a similar problem, Arnie suggests contacting your closest Husqvarna authorized service center (husqvarna.custhelp.com, or call 800-487-5951) with your tool’s model number, and asking if there are any service bulletins for it. He also told us that 120i saws now available at retail have been updated with the replacement parts needed.

Bob Hunter, Tools Editor

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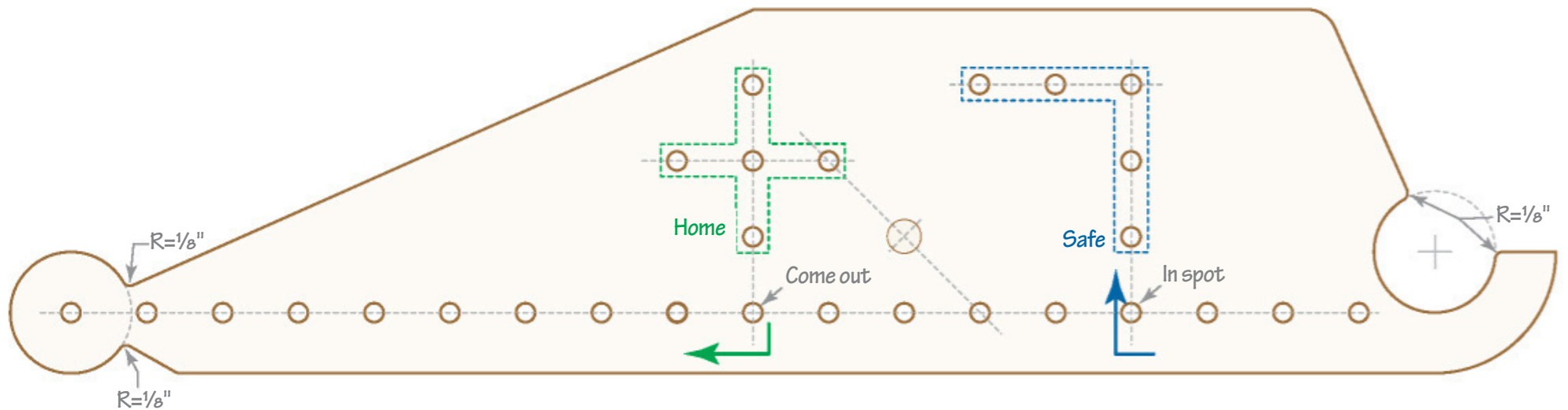
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Cutting corners on Pegs & Jokers

I really like the Pegs and Jokers game in issue 265 (December/January 2019/2020)! Cutting multiple identical parts with lots of repetitious drilling made this a perfect project for my CNC router. But the pattern in the magazine introduced an unanticipated hiccup: The round router bit can't cut into the "corners" where the knob meets the main game board, so four boards won't fit together for a square, and eight pieces won't fit together for an octagon.

To correct this, I altered the pattern to add a $\frac{1}{8}$ " radius (for my $\frac{1}{4}$ " straight bit) at those intersections, and a complementary radius on the socket at the other end of the board.

Even without a CNC, this tip is helpful if you template-rout the boards instead of sanding

them to shape. By the way, the boards made a great gift for my game-loving wife!

—**Dennis Ockree**
Cabot, Pa.

My future in-laws love to play games, and I plan to make them the Pegs & Jokers game from issue 265. But in your plans, the "safe" entry spot is four pegs from the socket, and the "home" (come out) spot is ninth. In other versions I found, "safe" was third and "home" was eighth. This may affect game play for some versions of the rules, based on restrictions for the 8 (back-up) card. Love your magazine!

—**Nick Carter**
Germantown, Tenn.

The only difference between our game and the others, Nick, is that the hole 8 spots back from the come-out spot is located on the same board instead of the previous one. The "safe" entry spot is still 5 back from the come-out spot, and there are the same number of holes between come-out spots on adjacent boards. Because you can't play the game without connecting at least three boards, game play won't be affected.

For people used to playing on other boards, they'll just have to know that the hole located 10 forward from the come-out spot is on the next board, and that the one 8 back from the come-out spot is on the same game board.

John Olson, Design Editor

Don't ask me how I know

After reading your Poured-epoxy Table plans in issue 261 (July 2019), and six years of my own experience with epoxy pours, I thought I should share a couple of hard-won tips with you and your readers.

First, before you start mixing the epoxy, apply a generous helping of hand lotion to your hands and arms. Doing so makes it much easier to clean up afterwards. I also apply hand lotion to the front of my work pants where I might accidentally lean against the epoxy. Then, when I launder the pants, the epoxy comes right out.

Second, never pour epoxy directly from the mixing container; always transfer it into another container before pouring it into your mold. Why? Because there will always be some unmixed material in the mixing container. My proof? I had to remove an entire poured surface when I turned tightwad and drained the mixing container. The top ended up with some soft, sticky places that would never set completely.

Thanks for the magazine. I have enjoyed it for many years.

—**Sam Moler**
Wayandotte, Okla.





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SOUNDING BOARD

YOUR PROJECTS

For his final project in a diploma cabinetry course, **Neil O'Connor**, of Madison, Wis., re-engineered plans for the Cheval Mirror in WOOD® magazine issue 49 (January 1992), to accept custom stained-glass panels. Neil and his wife, Patricia, use the cherry-framed pieces to colorfully screen the picture window in their home.



Tom and Emily Brankel, of Barberton, Ohio, crafted this cherry grandfather clock using a Hermle movement with backlit moon dial and tubular chimes. It's the fourth grandfather clock the couple has built; the first three were for Tom's daughters.



Ever since he saw the plans in issue 170 (June/July 2006), **Pat Newton**, of Salt Lake City, wanted to build the Comfy Classic bench. Last fall, he finally did. His poplar version, customized with the family initial and bird cutouts, rests under the cover of his front porch.



Hover your smartphone camera over this code—no app required—to buy plans for this bench, or visit woodmagazine.com/comfyclassic.



Bill Wells, of Olympia, Wash., built this 26" ship's wheel from sapele and brass as a donation for an exhibit at the Hands On Children's Museum (hocm.org) in Olympia.

continued on page 12

WOOD magazine May 2020

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SOUNDING BOARD

YOUR PROJECTS



Alex Ailor, of Greentown, Ind., built this cherry and curly-maple bedside table as a 9th-birthday gift for his daughter, Audrey.



As a gift to his grandson, Ethan, **Johnny Erwin**, of Nashville, built this chessboard from walnut and maple, framed in cherry. Johnny turned all of the chess pieces, as well.



This gorgeous hall table, built by **Greg Glenn**, of Vista, Calif., is designed to look like its parts are floating independent of one another. The legs and rails are figured maple; the top and shelf are African padauk; the plugs, English walnut.

Working with his seamstress-daughter, Stephanie, **Stan Cook**, of Washington, Ill., created this sewing workstation with 14" extensions that fold down when not in use. Replaceable inserts allow Stephanie to use the workstation with two different sewing machines. 🌳



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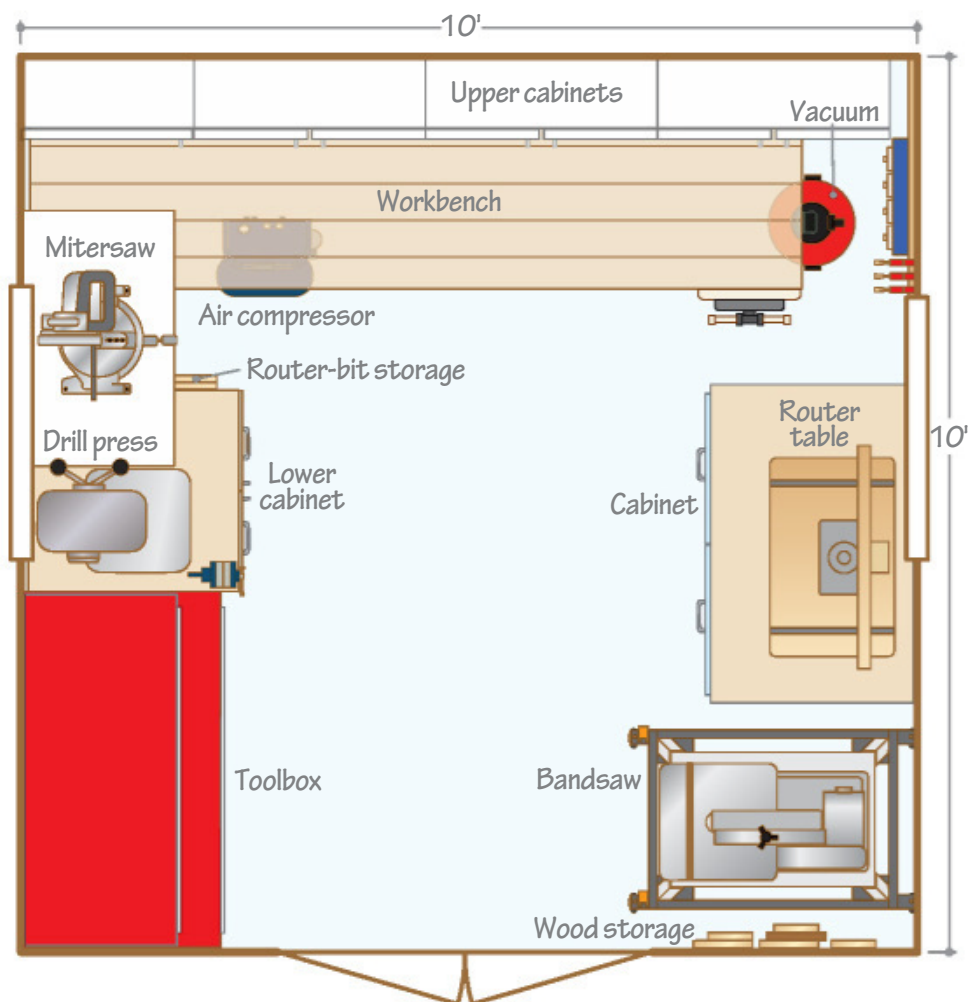
\$1,000 Backyard Workshop

With only 100 square feet to work with, Vern put a lot of thought into laying out the shop and choosing tools that best serve his needs.

Vern Schweigert's backyard shed, *right*, looks like any other that would store rakes, shovels, and other lawn and garden equipment. But open the double doors and you step into the Narnia of woodworking, a fully functional shop.

The 10×10' shed sports insulated walls and ceiling, covered with painted drywall. Vern scouted out discarded materials to finish his shop at very low cost. A friend's kitchen remodel provided recycled cabinets, and excess material purchased from a nearby contractor became the floating, insulated flooring. Vern made the work-





The mechanic's tool chest stores smaller tools and accessories. The plywood-mounted miter saw bridges a gap between a base cabinet and the workbench.

bench base from 8×8 scraps purchased from a construction site and topped it with solid maple reclaimed from a bowling alley.

For the electric supply, Vern ran two 20-amp circuits from the house underground to a small subpanel in the shed. A couple of flat-mount LED fixtures provide adequate lighting without compromising headroom. He did all this work himself for just under \$1,000.

Vern's previous workshops, before he downsized and moved, included a tablesaw and radial-arm saw. At first, he missed having them. But, he says, "The 14" bandsaw

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► Find the plan for this router table in issue 251 (Dec/Jan 2017/2018) or at woodmagazine.com/benchmountrouterstable.



Without a tablesaw, Vern has become proficient with the bandsaw and appreciates its versatility. He rolls it out on a mobile base for easier access when needed. A compact, shop-made router table serves his routing needs.

together with my mitersaw and circular saw get the job done.” To rip longer stock, he simply rolls the bandsaw into the doorway.

He explains that the biggest challenge of working in a small shop is the time it takes to build a project. Limited space makes it difficult to work on more than one project, or part of a project, at a time. But Vern also sees this as an advantage: It forces him to take more time in the planning and execution, which gives him greater satisfaction once the project is complete.

Vern loves spending time in his small shop. But he says: “The only thing I wish I had more space for is a lounge chair and a TV. Then my shop would become a full-time man cave.” 🌲



Vern Schweigert finally retired after owning a business for 30 years. He spends time in his shop building furniture items such as tables, clocks, and bookcases.



Taking advantage of every square inch of space, Vern stores router bits in a rack attached to the side of a cabinet.

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Q Tools for getting started in woodturning

I'd like to try my hand at turning wood—spindles and bowls—and recently found a good deal on a lathe. Now I need the right tools. Which ones should be purchased first?

—Ike Curran, Charlotte, N.C.

A Today's market offers a dizzying array of turning tools, so we understand how picking a few essentials can seem daunting, Ike. But you really only need six tools to complete nearly any turning project.

Even though you're just starting out, avoid the temptation to buy bargain-priced tools in sets. Instead, purchase only the tools you need, and look for high-speed-steel blades that hold an edge better than carbon-steel versions. Our contributing turning pro, Brian Simmons, recommends the following tools to get started:

A 1½" Spindle roughing gouge. This is the first tool you'll reach for in doing most between-centers work because it helps you turn square or out-of-round stock into a cylinder. Avoid the more-common ¾" roughing gouge—it lacks the mass that provides greater stability and better control. As Brian puts it: "You can do small things with a big tool, but you can't do big things with a small tool."

B ⅛" Parting tool. This might be the second, and then the last tool used on a project. With spindles this tool finds its purpose—in conjunction with a calipers—establishing diameters at key points along the length of the cylinder, and in cutting tenons. After completing the project, use this tool to separate or "part" the turned item from the waste material that holds it to the lathe.

C ¾" or 1" Skew chisel. Think of it as a hand plane that helps you cut smooth cylinders. It also comes in handy for cutting V-grooves and beads.

D ½" Spindle gouge. I use this versatile and indispensable tool for nearly all spindle-shaping tasks, including coves and beads.

E ¾" Bowl gouge. (Size based on the European standard measuring across the flutes; for American gouges, measured according to the diameter of the steel, look for a ½" tool.) Few turning tasks prove more enjoyable for a beginner than turning a bowl from a chunk of green wood. This tool helps you quickly shape the inside and outside of vessels from roughing through finishing cuts.

F ½" Squarenose or G ¾" bedan scraper. Use either for cutting recesses on the bottom of bowls, or for making tenons. The bedan scraper has a trapezoid profile; its added thickness makes it amply rigid and useful as a wide parting tool for spindle work.

After mastering the tools shown here, you may want to try specialized shapes and different sizes that cater to specific tasks, or explore exotic features such as long-lasting carbide tips or curved necks for hollowing vessels. 🌲



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Ligno-Scanners indicate true moisture values corrected for wood species. The Ligno-Scanners D and S measure 3/4" or 1/4" deep, respectively. All other Ligno-Scanners have dual-depth capability to choose 3/4" or 1/4" deep.

The Pin Advantage: Versatility. All thicknesses from veneer to thick logs can be measured. If your concern is core moisture in thick wood, choose a pin meter and the Slide-Hamer Electrode E12 with pins up to 2" long.

Standard pinless meters cannot measure more than 3/4" deep and indicate the average moisture for the depth of the board. They cannot differentiate between dry surface and wet core. These are some of the main reasons, why woodworkers still prefer pin meters.

When drying your own Wood: Lignomat offers the mini-Ligno MD/C and DX/C with a connection for remote cables and probes to measure wood moisture inside a lumber dry kiln. The in-kiln probe system allows you to find out how well the lumber is drying and determine when the lumber is dry through-out the stack and the kiln is ready to be unloaded.

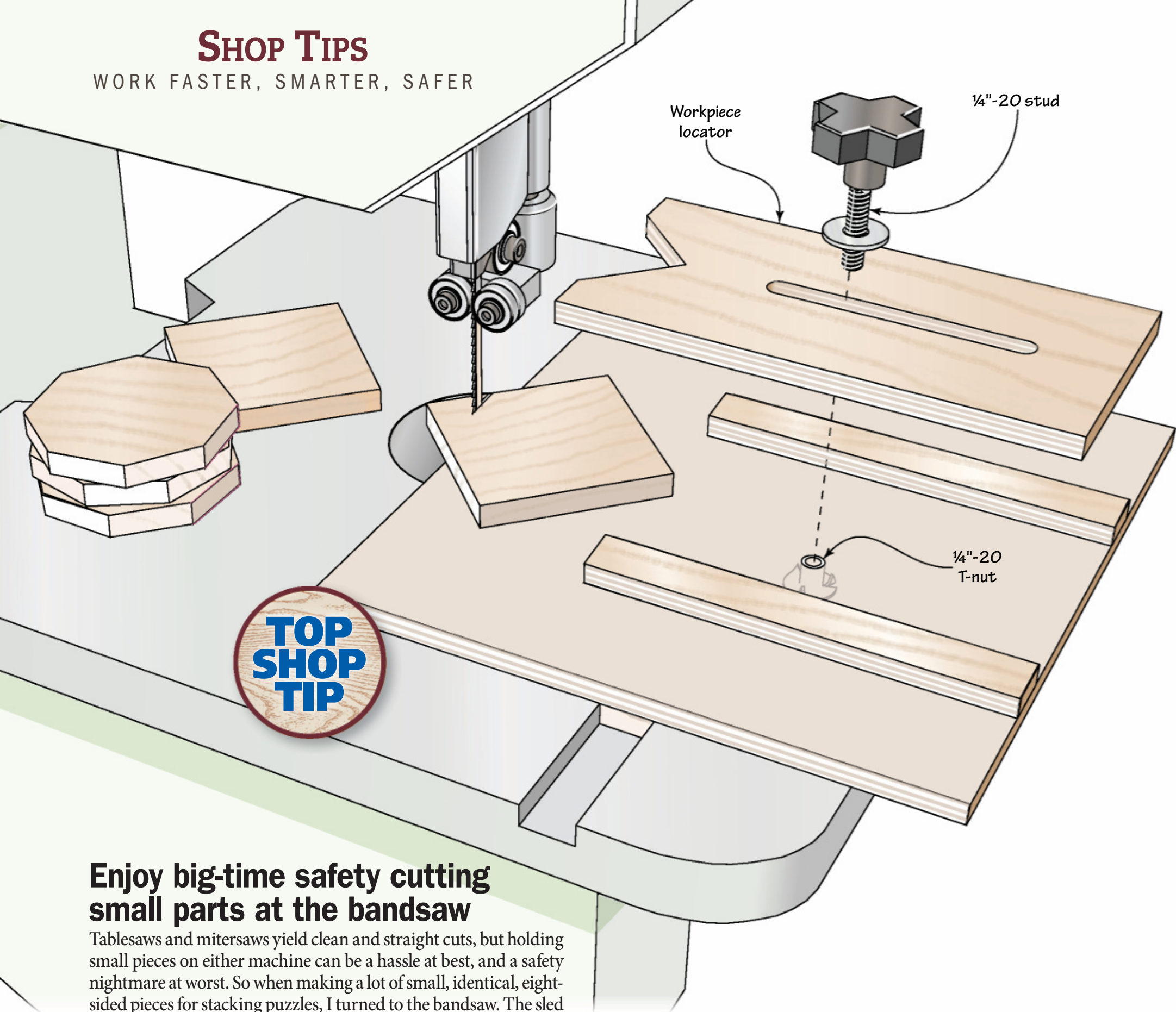
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SHOP TIPS

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**TOP
SHOP
TIP**

Enjoy big-time safety cutting small parts at the bandsaw

Tablesaws and mitersaws yield clean and straight cuts, but holding small pieces on either machine can be a hassle at best, and a safety nightmare at worst. So when making a lot of small, identical, eight-sided pieces for stacking puzzles, I turned to the bandsaw. The sled shown holds the workpiece steady for a smooth cut with no chance of binding or kickback. Vary the size and shape of the notch in the workpiece locator to suit your needs.

—Dan Martin, Galena, Ohio

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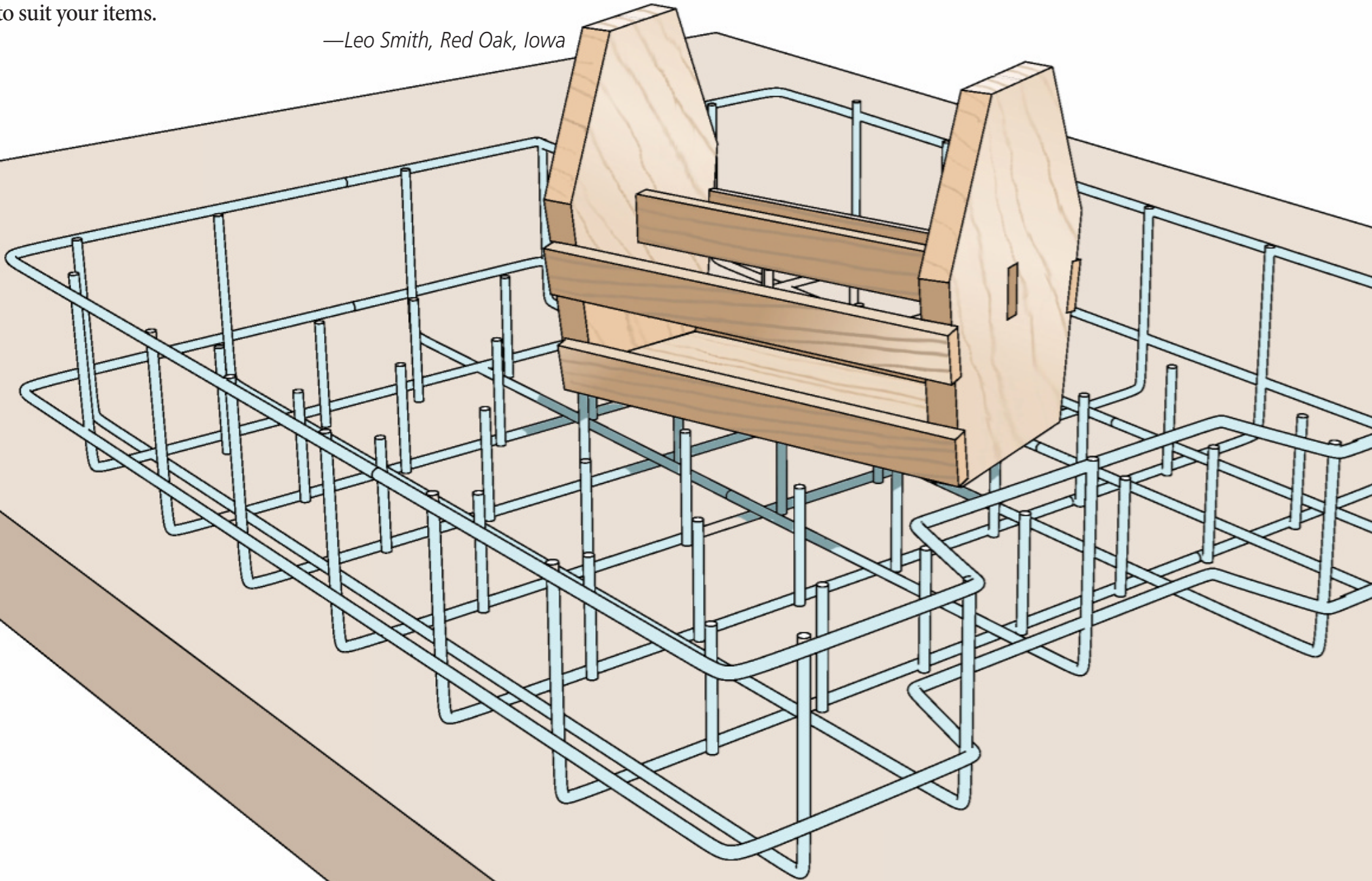
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Clean up on finish-drying tasks with old dishwasher racks

Before you have that old dishwasher hauled away, save the racks. They make great supports for freshly finished small projects. Clip the wires as necessary to suit your items.

—Leo Smith, Red Oak, Iowa

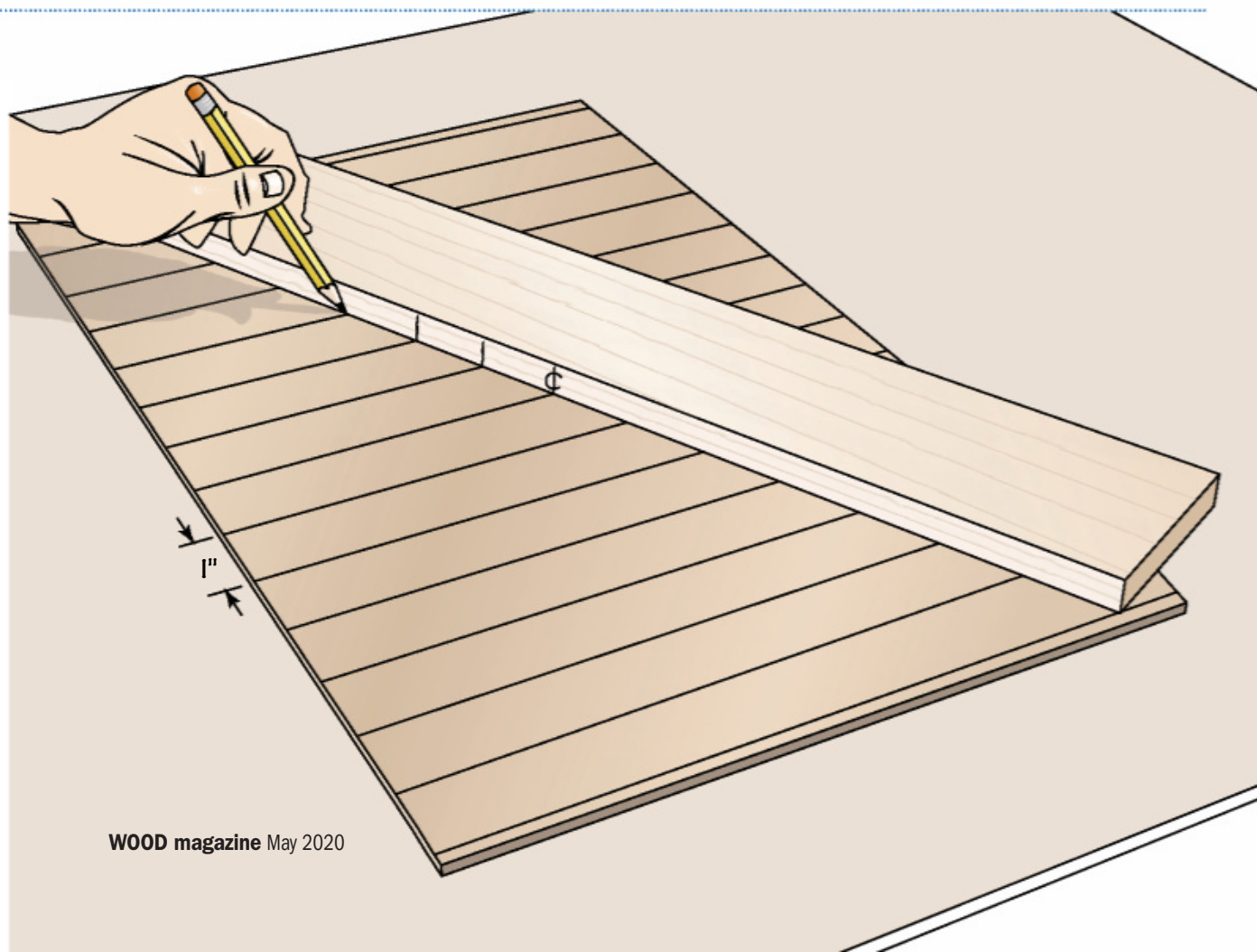


Get equal spacing in seconds, with no math

Here's a dirt-simple and quick way to mark equal spacing along the edge of a workpiece. Simply mark parallel lines spaced 1" apart on a sheet of material, such as hardboard, that's flat, light, and sturdy.

Next, mark the centerline on the edge of your workpiece and align it with a line near the center of your marked sheet. Then, rotate the workpiece to adjust how far apart the marked lines intersect with your workpiece. No matter the angle of the workpiece, the spacing between an equal number of lines on either side of the workpiece centerline will always be equal.

—Paul DeJaynes, Mount Pleasant, Iowa





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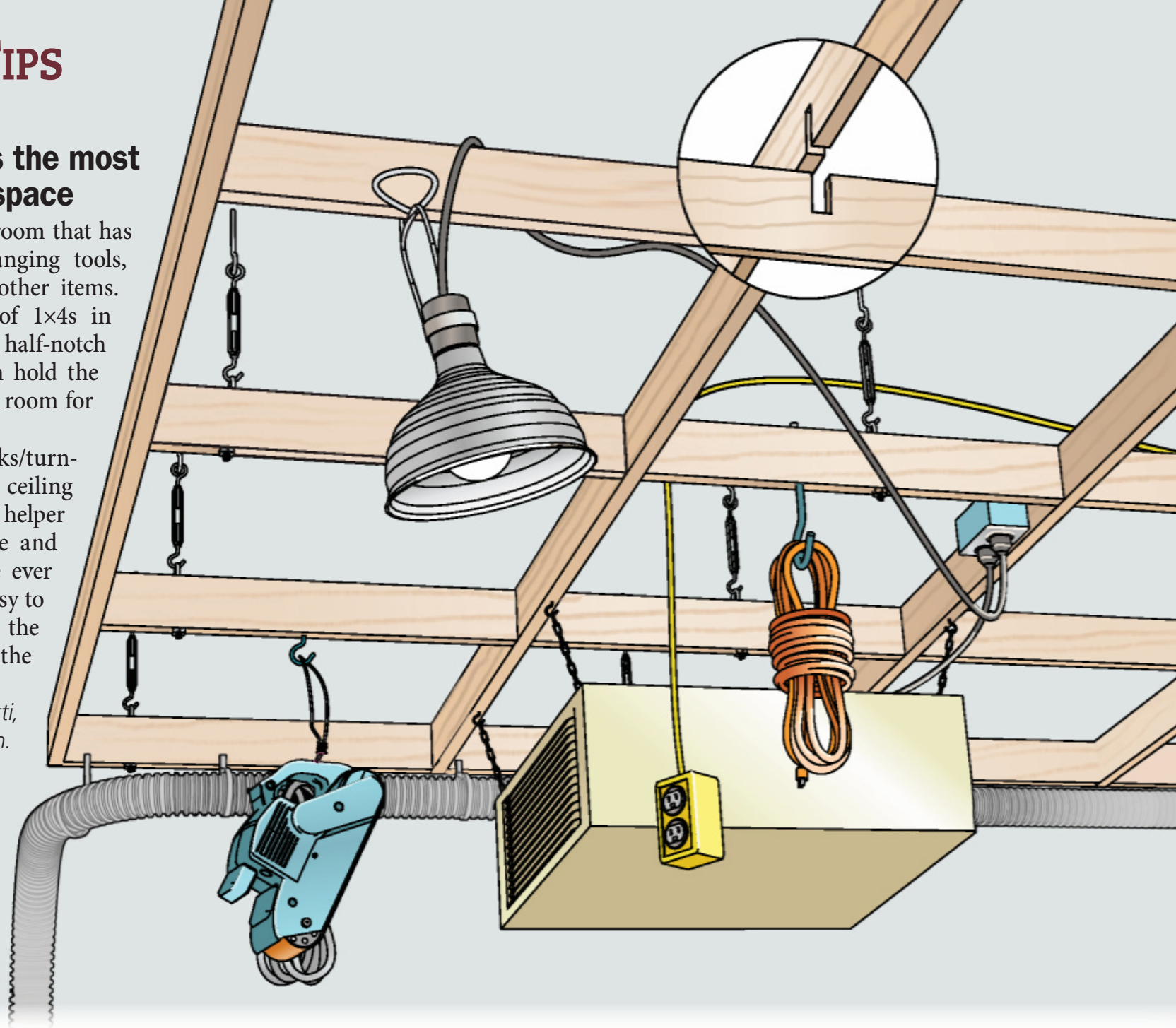
SHOP TIPS

Ceiling grid makes the most of overhead shop space

My shop is in a finished room that has no exposed joists for hanging tools, dust-collection pipes, or other items. So I suspended a grid of 1×4s in 2'-square sections. Simple half-notch joints at each intersection hold the grid together. Now there's room for hanging all sorts of things.

Position the hanging hooks/turnbuckles so they align with ceiling joists, and have at least one helper to lift the grid into place and adjust it level. Should we ever sell the house, it will be easy to take down the grid, patch the ceiling holes, and return the space to normal use.

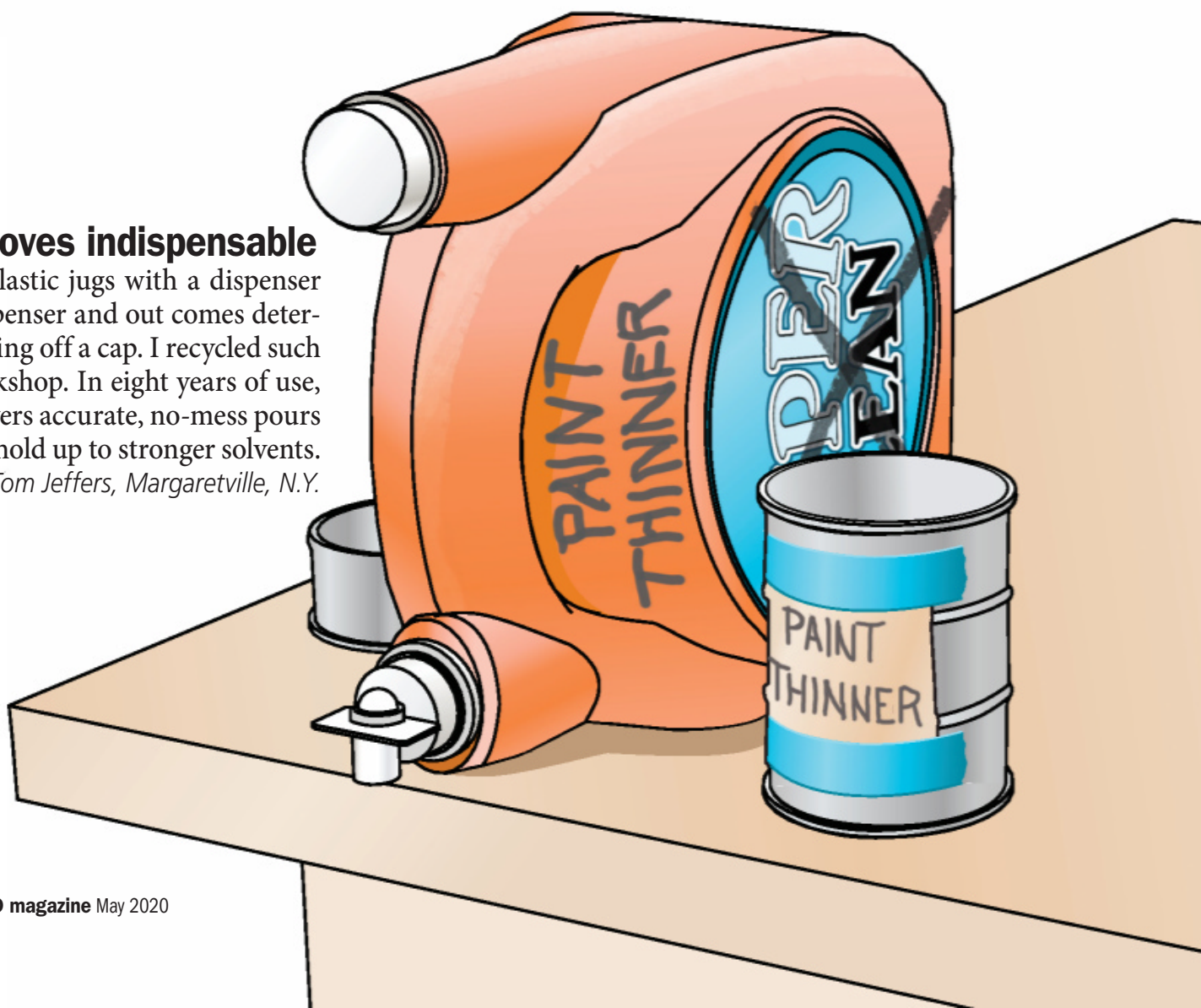
—Dave Blatti,
Grand Rapids, Mich.



This paint-thinner dispenser proves indispensable

Many laundry detergents come in handy plastic jugs with a dispenser that sit on a shelf. Push a button on the dispenser and out comes detergent. No spilling, no lifting the jug, no twisting off a cap. I recycled such a jug to dispense mineral spirits in my workshop. In eight years of use, the dispenser hasn't leaked, and always delivers accurate, no-mess pours with little effort. These plastic jugs may not hold up to stronger solvents.

—Tom Jeffers, Margaretville, N.Y.

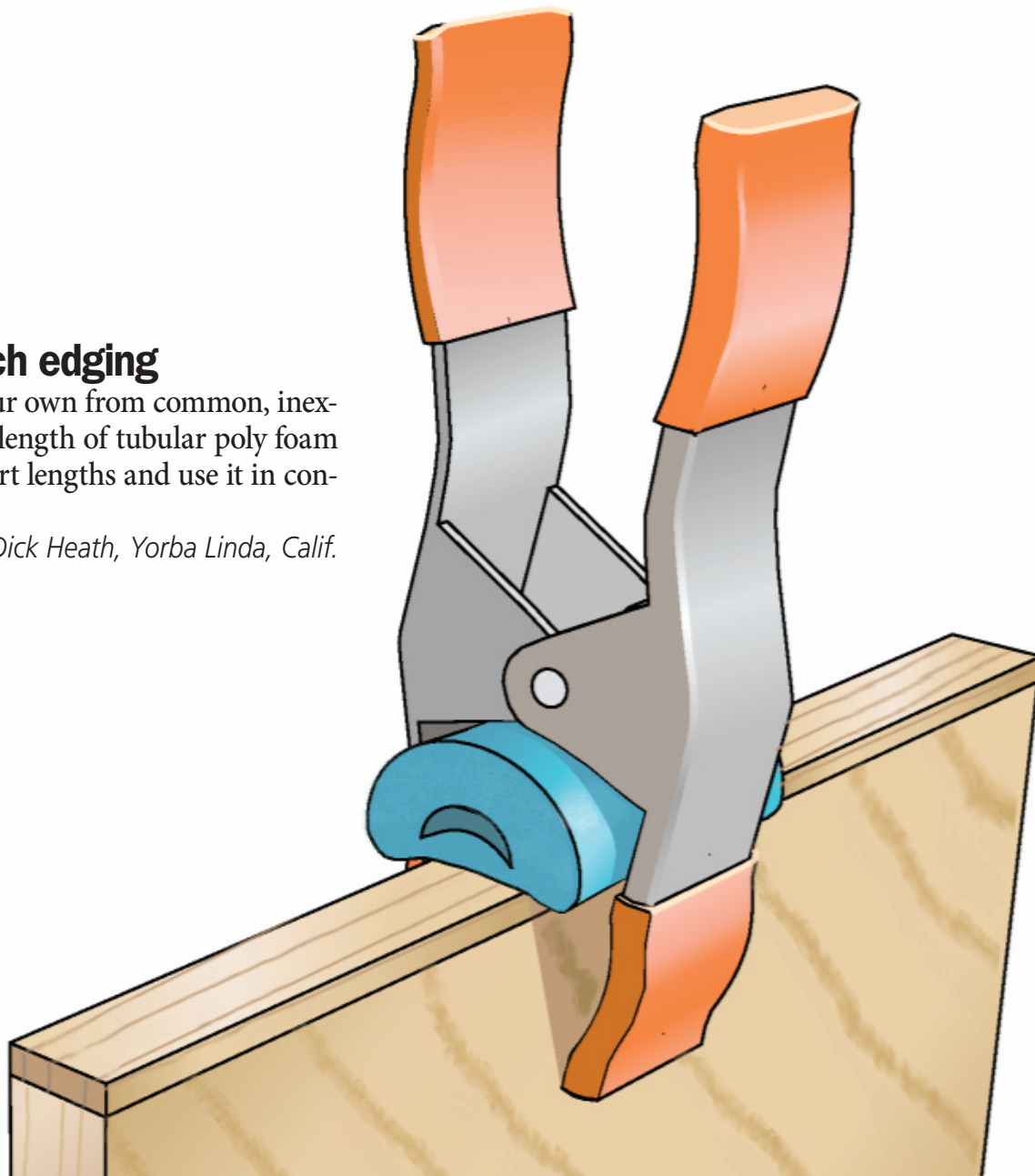


SHOP TIPS

Easy, low-cost, no-mar way to attach edging

Rather than buy specialized edge clamps, make your own from common, inexpensive, and versatile spring clamps. Simply buy a length of tubular poly foam made for insulating $\frac{1}{2}$ " copper pipe. Cut it into short lengths and use it in conjunction with any 2" or 2½" spring clamp. 🌲

—Dick Heath, Yorba Linda, Calif.



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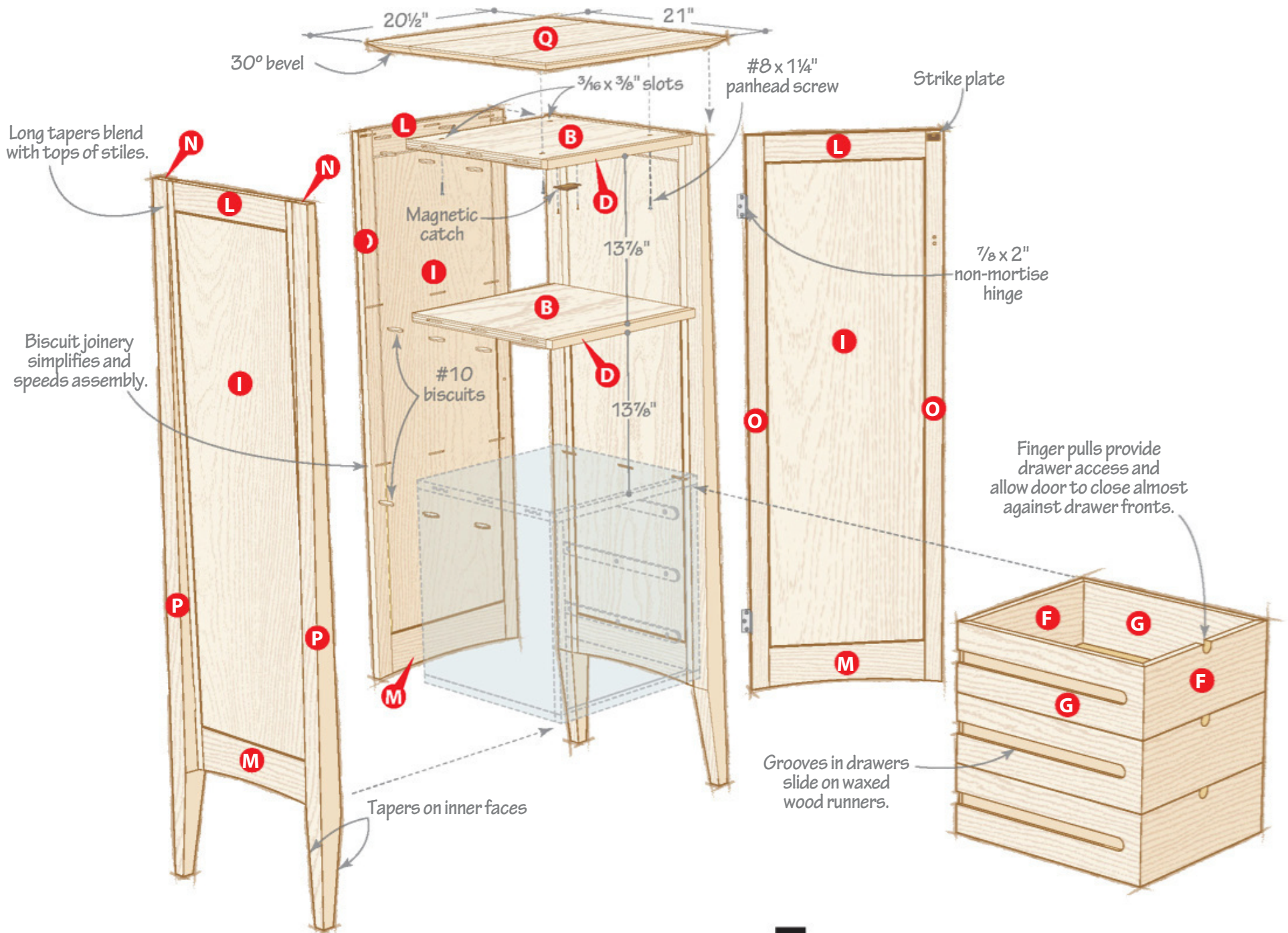
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EXPLODED VIEW



1 DRAWER BOX

Don't let its frame-and-panel looks, including the appearance of stringing (narrow bands of contrasting inlay) fool you: This classic cabinet requires only the simplest edge-to-edge and biscuit joinery.

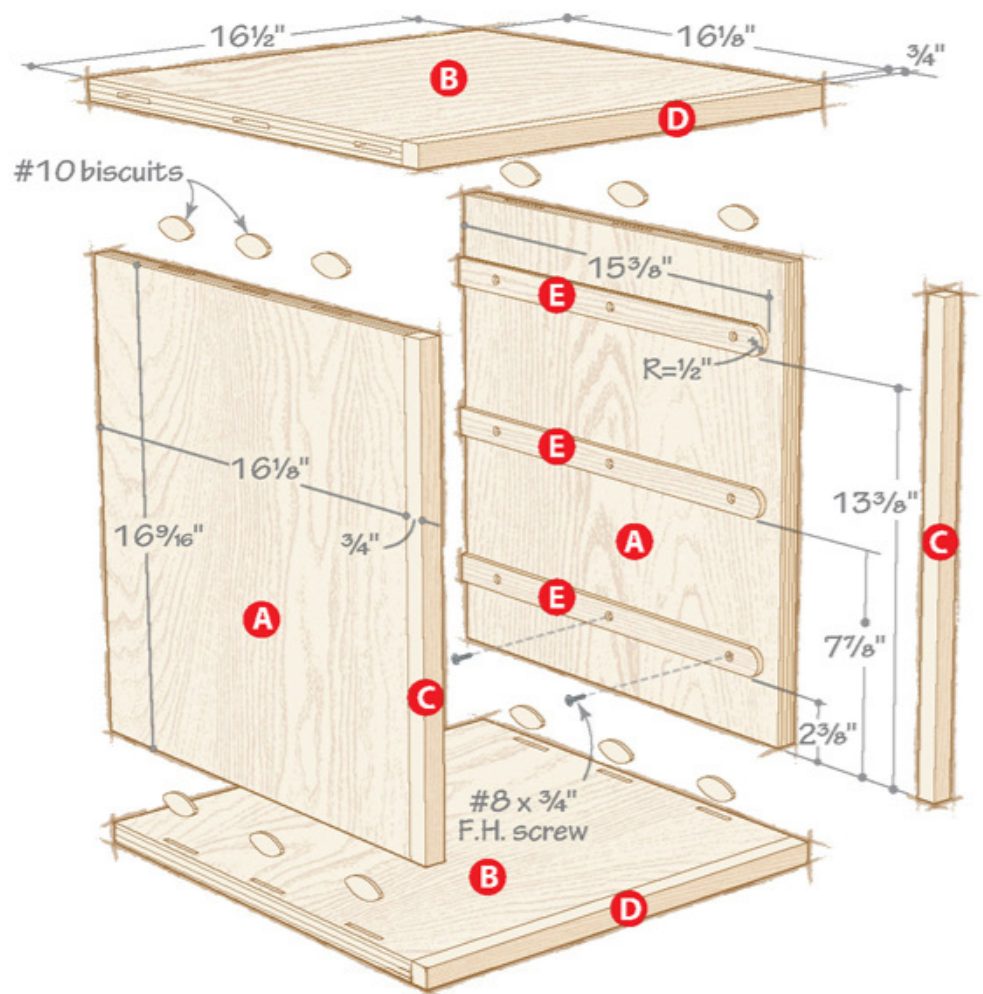
Build the drawer assembly

1 Cut the drawer-box panels (A, B) and trim (C, D) [Materials List, Drawing 1, Exploded View]. Glue the trim to the panels and sand them flush. *Note: The case top, shelf, and drawer-box top and bottom are identical assemblies (B/D). Finish-sand the inside surfaces of the sides (A/C) and case top (B/D) and both surfaces of the drawer-box top and bottom and shelf (B/D). Set the shelf and the case top aside.*

2 Cut only the biscuit slots necessary for drawer-box assembly [Drawing 1]. (You'll cut the slots in the ends of the drawer-box top later.) Biscuit, glue, and clamp the drawer box, checking for square.

3 Cut the drawer runners (E), round one end of each [Drawing 1], and drill the countersunk screw holes. Cut a 13⅜"-tall spacer

Note: Biscuit slots in the ends of the drawer-box top panel (B) position the box in the case during assembly.



from $\frac{1}{4}$ " plywood. In turn, rest each upper runner on the spacer and screw it in place. Cut the spacer to $7\frac{7}{8}$ " tall to position the middle runners and finally to $2\frac{3}{8}$ " tall for the lower runners.

Note: Before cutting the drawer parts to length, measure the drawer box. The drawer ends (F) should be $\frac{1}{8}$ " shorter than the interior width of the box. The side (G) length should be the same as the drawer-box depth.

4 Cut the drawer ends and sides (F, G) to width and miter-cut them to length [Drawing 2]. Groove the lower inside faces, and form the finger pulls with a 1" Forstner bit [Drawing 2a]. Cut the drawer bottoms (H). Finish-sand the bottoms and the inside faces of the ends and sides. Glue and clamp the drawers, check them for square, and stack them on a flat surface to dry.

5 Form the stopped drawer-runner grooves on the router table with a 1" straight bit. Finish-sand the drawers.

Make sides, back, and door

The door and case back start out the same size. You'll joint the edges of the door later to fit between the front legs (P).

1 Cut the case panels (I) and stringing (J, K) [Drawings 3 and 4]. Glue the long stringing (J) to the panel edges followed by the short stringing (K).

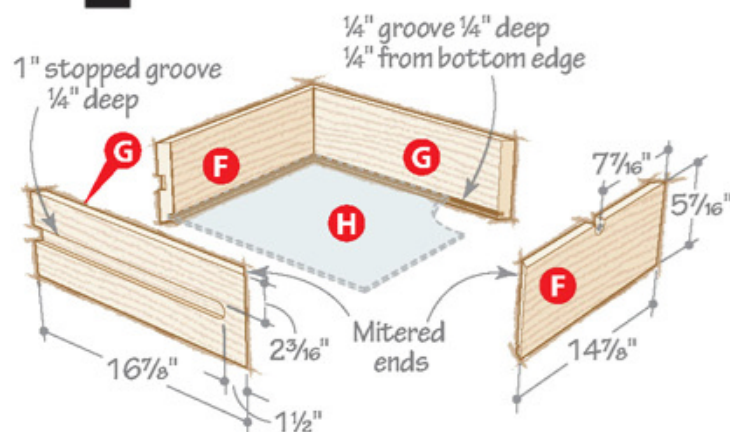
2 Cut the rails (L, M) and stiles (N, O). Glue the rails to the I-K assemblies. Cut biscuit slots and glue the stiles (N, O) to their respective assemblies.

3 Draw the curve at the bottom of the sides, back, and door [Drawing 4] using a fairing stick. Saw and sand the curve to shape. Finish-sand the assemblies, mark the door, and set them aside.

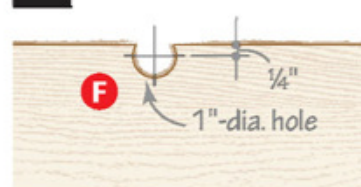
Tip! When cutting the door and side panels, lay out the parts to take advantage of the plywood veneer splicing to get book-matched parts. You may need two sheets.

► Download a free fairing stick plan. woodmagazine.com/fairing

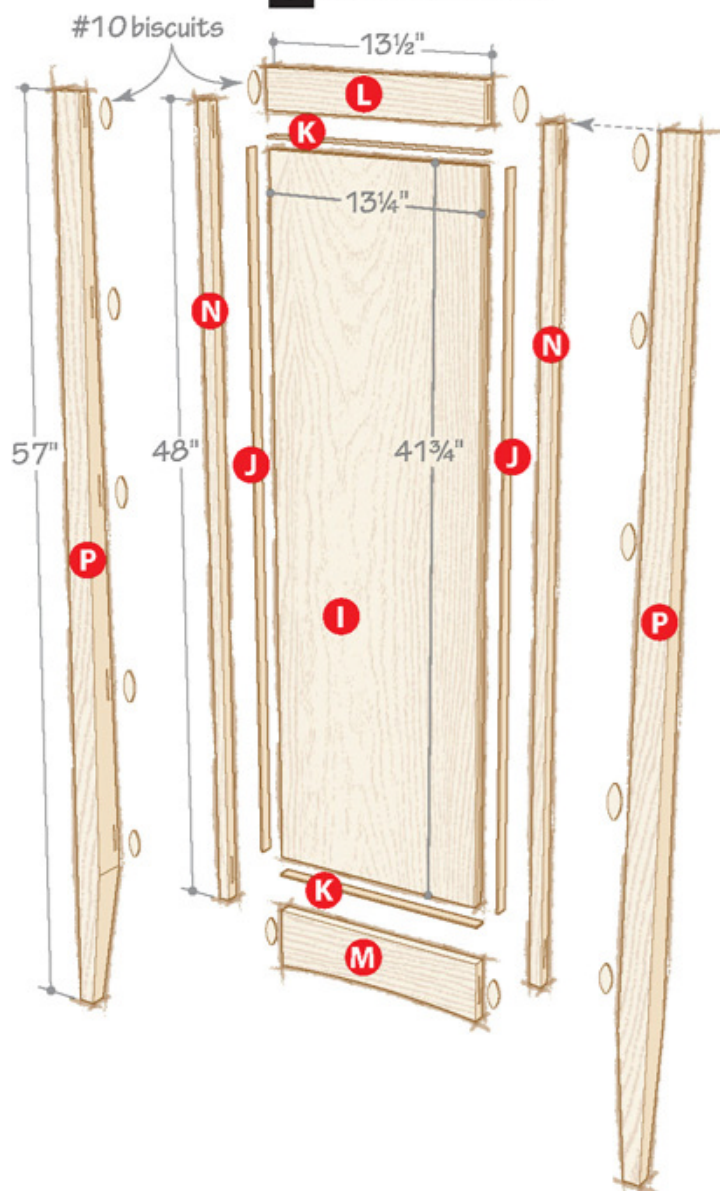
2 DRAWER



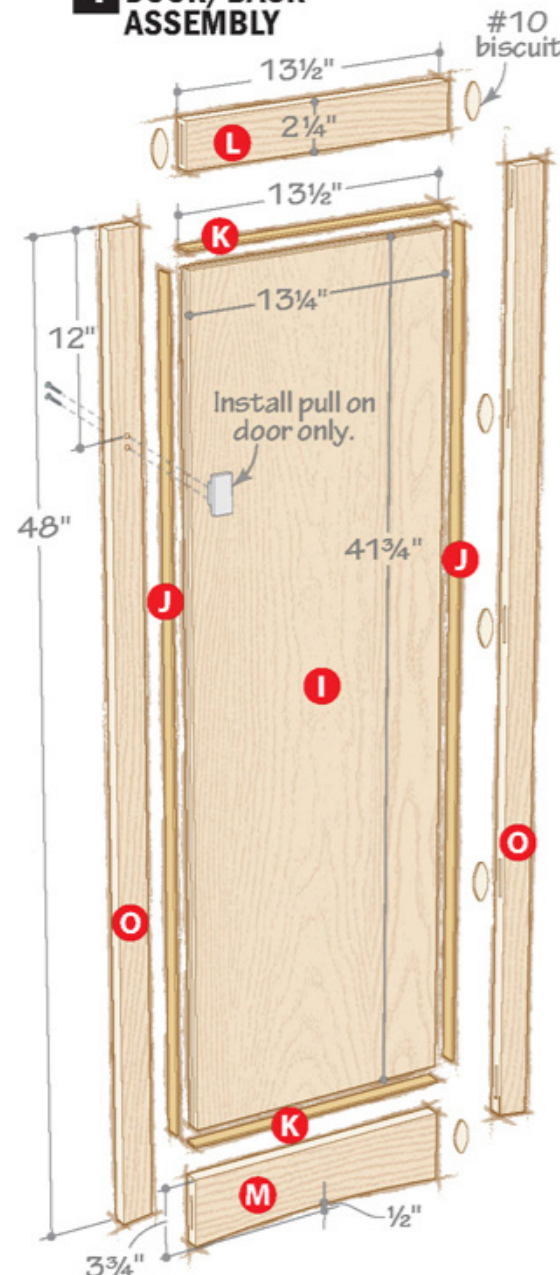
2a FINGER PULL DETAIL



3 SIDE ASSEMBLY



4 DOOR/BACK ASSEMBLY





A Adjust the angle of a taper jig to align the taper line drawn on the leg parallel to the rip fence.



B Cut the first taper, then rotate the leg and cut the second taper.

Note: Orient the legs with the $2\frac{1}{4}$ "-wide faces perpendicular to the case sides.

Tip! Save the long cutoffs from tapering the legs and use them for clamping cauls when assembling the case.

Taper the legs

1 Cut four $1\frac{3}{4}\times 2\frac{1}{4}\times 57$ " blanks for the legs (P). Arrange them for best appearance and label their positions (front right, front left, rear right, rear left) on the top ends. Lay out the lower tapers on the inside faces [Drawing 5, Exploded View] and cut them on the tablesaw [Photos A and B].

2 Make a taper sled [Drawing 6, Source] and cut the out-facing long tapers on each leg [Photo C]. Joint and sand the tapers smooth.

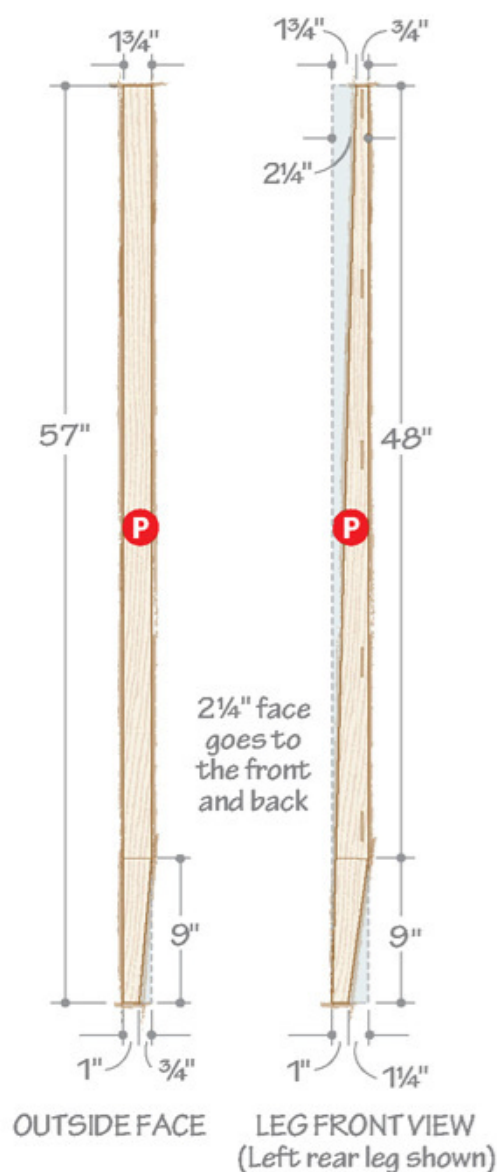
3 Retrieve the sides and cut biscuit slots in the legs and the front and rear edges of the sides [Drawing 3]. Finish-sand the legs and glue, biscuit, and clamp them to the sides.



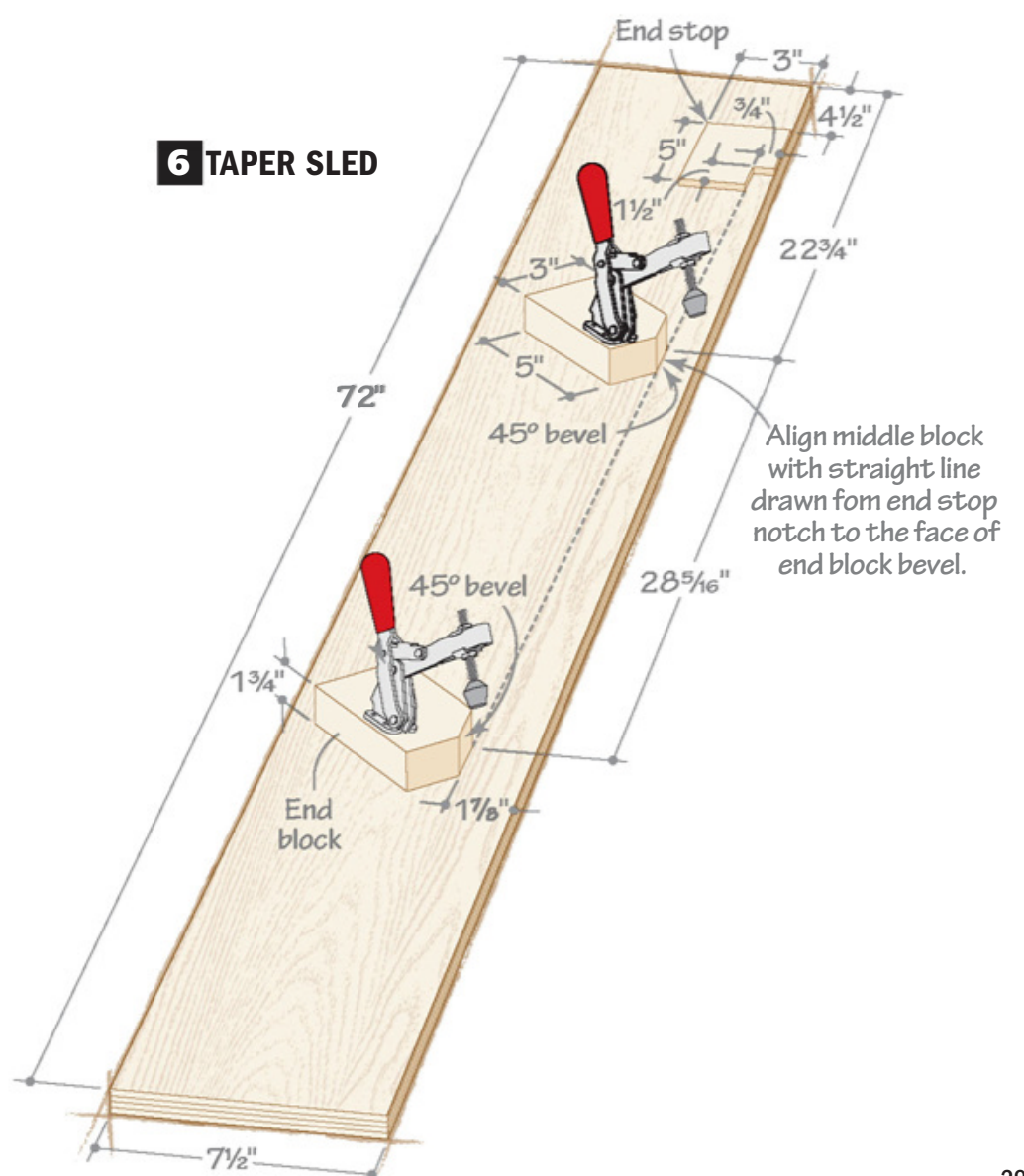
C Cut the long taper with the leg against the lower and middle blocks, and the upper end in the end-stop notch. Secure the leg with toggle clamps.

5 LEGS

Note: The inside surfaces of the legs and sides must be flush. Index the biscuit joiner on the non-tapered inside face of each leg and the inside faces of the side assemblies.



6 TAPER SLED





D Cut drawer-box biscuit slots in the case sides, using a $\frac{1}{2} \times 16\frac{1}{2} \times 29\frac{3}{16}$ " plywood spacer aligned flush at the top and back of each side. Repeat with the case back.



E Cut biscuit slots for the shelf in the case sides after trimming the spacer to $14\frac{5}{8}$ " long. Repeat with the case back.



F Glue, biscuit, and clamp the rear edges of the drawer box, shelf, and case top to the case back, checking the shelf and top for square.



G Glue, biscuit, and clamp the case sides to the drawer box/shelf/case top assembly, spreading glue on the drawer-box sides.

Assemble the case

1 Retrieve the drawer box, shelf, and case top. Cut biscuit slots in the ends and back edges of the drawer-box top, shelf, and case top [Drawing 1, Exploded View]. Leave the biscuit-joiner fence in position and cut slots along the tops of the case sides and back. Drill holes and slots in the case top for the screws that anchor the top (Q).

2 Fold up the biscuit-joiner fence and cut slots for positioning the drawer box and shelf in the case [Photos D and E].

3 Assemble the drawer box, shelf, case top and case back [Photo F], then add the sides [Photo G].

4 Edge-join an oversize blank for the top (Q) [Exploded View]. Cut it to finished size and bevel the edges on the tablesaw. Sand the sawblade marks from the bevels leaving a $\frac{1}{8}$ "-thick shoulder and finish-sand the top. Screw the top to the case.

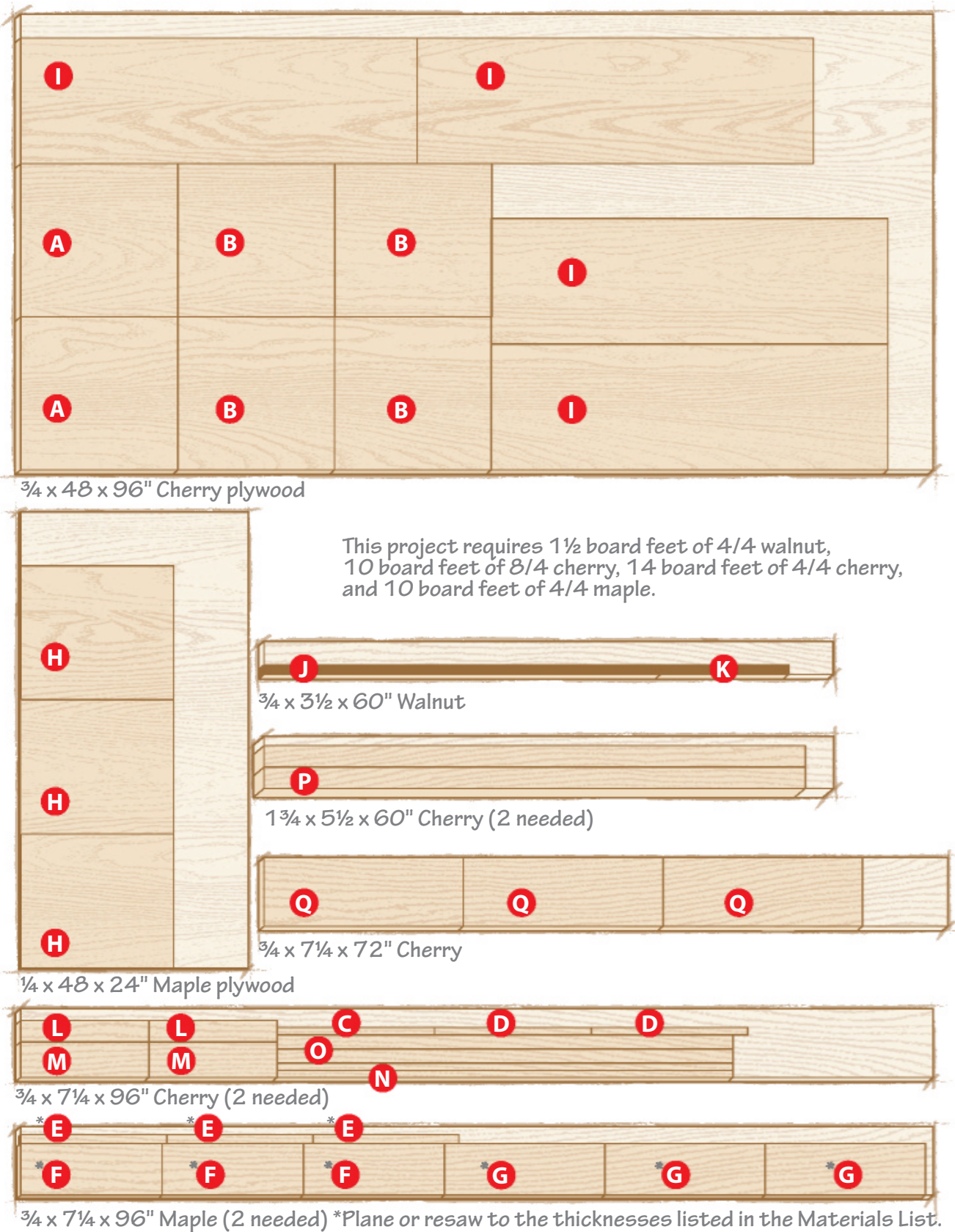
5 Joint equal amounts from the door edges to obtain $\frac{1}{16}$ " reveals between the door and each front leg (P). Drill holes for the knob [Drawing 4, Source], hang the door with non-mortise hinges [Source], and install the magnetic catch [Exploded View, Source].

Finish up

- 1
- Remove the door, top (Q), and all hardware. Finish-sand where needed, then apply a finish. (We sprayed on satin lacquer.)
- 2
- Screw the top to the case. Hang the door and install the knob and catch. Apply paste wax to the drawer runners and slide the drawers into place. 🌲

Produced by Jan Svec with Brian Bergstrom
Project design: John Olson
Illustrations: Roxanne LeMoine, Lorna Johnson

Cutting Diagram



Materials List

Part		FINISHED SIZE			Matl.	Qty.
		T	W	L		
Drawer assembly						
A	drawer-box side panels	¾"	16⅛"	16⅞"	CP	2
B	top, bottom, shelf, and case top panels	¾"	16⅛"	16½"	CP	4
C	vertical trim	¾"	¾"	16⅞"	C	2
D	horizontal trim	¾"	¾"	16½"	C	4
E	drawer runners	¼"	15⅙"	15⅜"	M	6
F	drawer ends	⅝"	5⅙"	14⅞"	M	6
G	drawer sides	⅝"	5⅙"	16⅞"	M	6
H	drawer bottoms	¼"	14⅛"	16⅞"	MP	3
Case						
I	panels	¾"	13¼"	41¾"	CP	4
J	long stringing	⅛"	¾"	41¾"	W	8
K	short stringing	⅛"	¾"	13½"	W	8
L	upper rails	¾"	2¼"	13½"	C	4
M	lower rails	¾"	3¾"	13½"	C	4
N	side stiles	¾"	¾"	48"	C	4
O	back and door stiles	¾"	1½"	48"	C	4
P	legs	1¾"	2¼"	57"	C	4
Q*	top	¾"	21"	20½"	C	1

*Part initially cut oversize. See the instructions.

Materials key: CP-cherry plywood, C-cherry, M-maple, MP-maple plywood, W-walnut.
Bits: 1" straight router bit, 1" Forstner bit.
Supplies: #10 biscuits, #8 x $\frac{3}{4}$ " and #8 x $1\frac{1}{4}$ " flathead screws, #8 x $1\frac{1}{4}$ " panhead screws.
Source: Low-silhouette toggle clamps no. 143938, \$15.75 ea. (2); Mirada knob, satin nickel no. 858720, \$6.09; non-mortise hinges, silver no. 130553, \$8.99 pr.; magnetic catch, brown, no. 27H03, \$2.25. Woodcraft, 800-225-1153, woodcraft.com.

4 Quick & Easy Tablesaw Joints

► Make your own zero-clearance inserts.
woodmagazine.com/zeroclearance

For many of us, the tablesaw proves to be the cornerstone of building most projects. With this machine, you can rip and crosscut lumber to size, cut straight edges on boards that have none, and also cut many types of joinery. In this article, we show four joints you can easily create on your saw using a miter gauge and rip fence (and a few other accessories: **Sources**, page 39).

For all of the joints in this article, always make test cuts in scrap stock to perfect the setups before machining your project parts. And in most cases, using a zero-clearance throat insert on your tablesaw will produce cleaner and safer cuts.

Half-lap

Best uses: any type of frame
(picture, door, face frame)

A half-lap, shown *left*, consists of rabbets, dados, or grooves cut to half the thickness of mating workpieces. This joint lacks mechanical strength, but gets its strength from long-grain to long-grain bonding with glue. You can cut a half-lap joint in two ways on a tablesaw.

Using a single blade

You can cut half-laps best with a 40-tooth general-purpose or 50-tooth combination blade. This method cuts cleaner, smoother cheeks for stronger glue joints.



Cut the shoulder first, using the rip fence as a stop.



Use a tenoning jig to hold the board as you make the cheek cut. Always cut so the cutoff falls away from the blade, not trapped between it and the jig. Sneak up on the cheek cut, making equal cuts on both workpieces in the same setup until you get a perfect fit.

► Make your own tenoning jig.
woodmagazine.com/tsjigs

Using a dado set

Start by installing a stacked dado set; in most cases, the wider the better, because you can remove more material with each pass.

Install an auxiliary fence on a miter gauge to combat tear-out where the blade exits the workpiece.



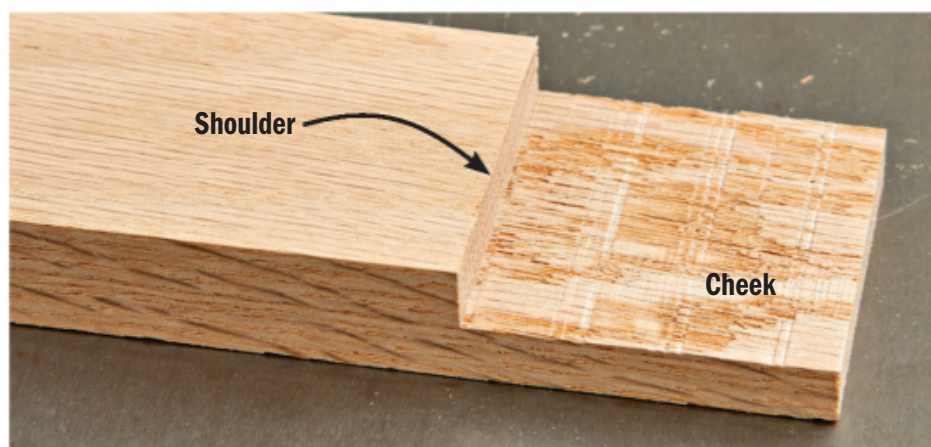
Raise the dado blade to about half the workpiece thickness, and then cut away a short section on one face of each of the mating workpieces.



Test the fit, adjust the dado height, if necessary, and repeat until each board is precisely half the thickness (for a perfect fit).



Using the rip fence as a stop, make the shoulder cut. Lift the workpiece, retract the miter gauge, and reposition the workpiece to cut away the remaining material between the two cuts with one or two passes.



A dado blade leaves a semi-rough cheek, a good, but not great, gluing surface.

Tongue and groove

Best uses: edge-glued panels (tabletops, door panels, etc.), carcass backs, frame-and-panel doors

A well-made tongue-and-groove joint maximizes linear-edge glue surface while also providing goof-proof alignment of the mating workpieces. As with a half-lap, you can cut a tongue-and-groove joint with either a dado set or a single blade. In both cases, cut the groove first, and then cut the tongue to fit snugly.

Using a dado set

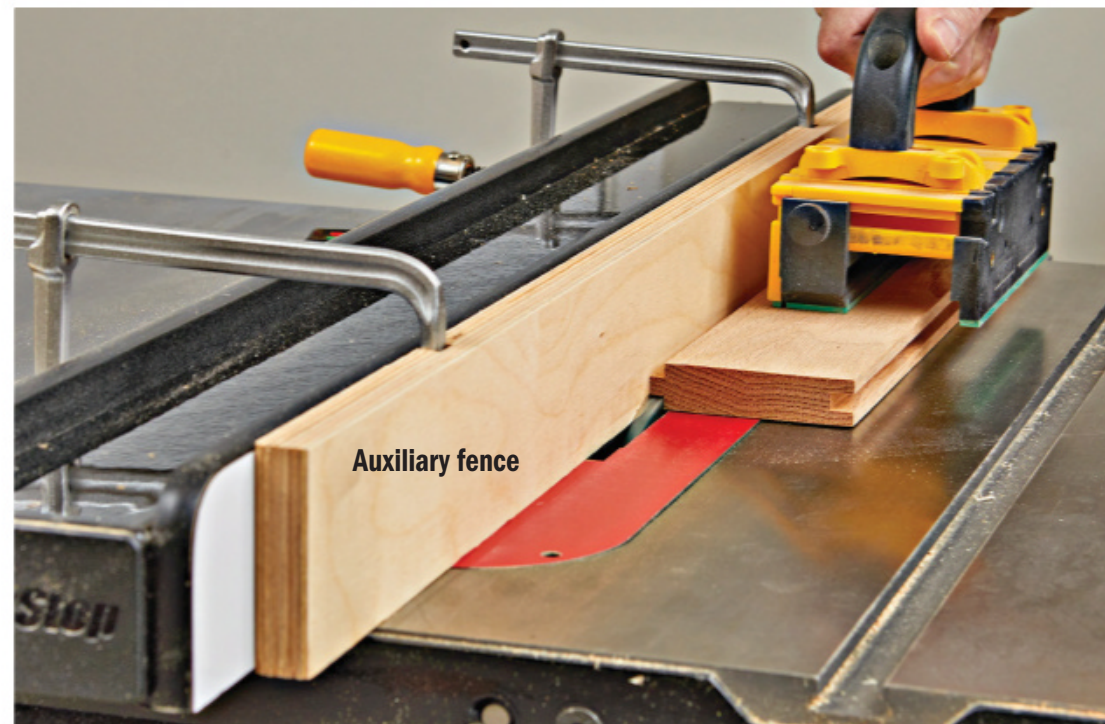
Install a stacked dado set equal to or slightly narrower than the width of the groove you want to cut. Be sure to use a zero-clearance

insert—you'll need workpiece support on each side of the blade.

► We used MicroJig dovetail clamps [Sources] to secure the auxiliary fence to the rip fence.



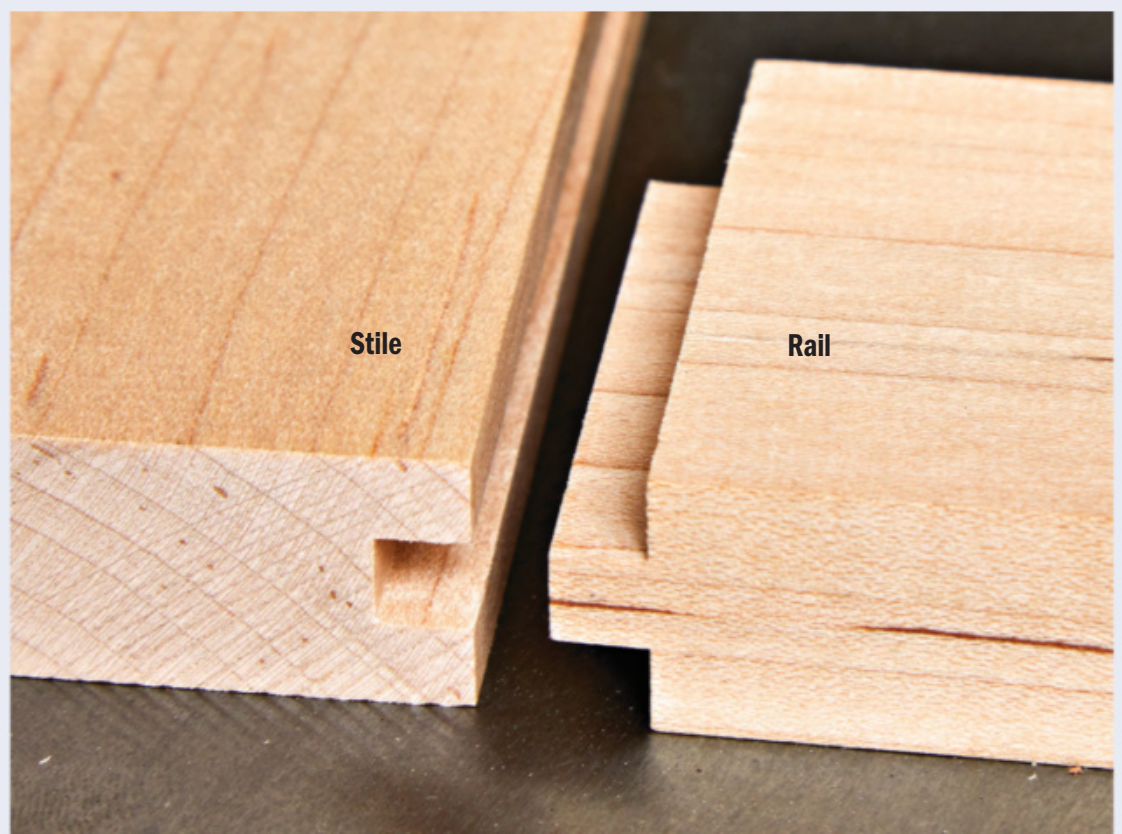
Set the blade height to the groove depth. Position the rip fence to center the dado on the workpiece. Use a featherboard to hold the workpiece tight against the fence. Rip a groove the full length of the board, then rotate it end for end and rip again to ensure a perfectly centered groove.



Install an auxiliary fence on the rip fence, and position it so the dado set slightly rubs against it. Lower the blade height, and cut rabbets along one edge of the workpiece. Adjust the blade height and cut from both sides until the tongue fits perfectly in the groove. If needed, reposition the fence away from the blade to cut the tongue to final length.

This hybrid tongue and groove is an open-and-shut case

Stub-tenon-and-groove joints find use primarily in doors and similar frame-and-panel construction in lieu of using cope-and-stick router bits. Cut this joint in the same manner as a regular tongue-and-groove joint, but with the tongue on the ends of a workpiece, usually the horizontal rails. Cut the groove first, sizing it to fit the door's panel. Then, size the tongue to fit the groove.



Using a single blade

Blade kerf (thickness) doesn't affect the quality of the cut, but thin-kerf blades might require more passes than a full-kerf blade.



Rip a groove to one side of center, then rotate the board end for end, and rip again. Adjust the fence, if needed, and rip both sides of the groove again to get the desired width.



Without changing blade height, reposition the fence to cut each side of the tongue.



With a handsaw, trim the tongue-board corners so you can test the tongue's fit in the groove. Adjust the fence and shave both sides of the tongue until it fits snugly.



Lower the blade until it just grazes the tongue of the tongue board, and then lower it slightly.



Set the fence so the blade intersects precisely with the tongue cuts to form the shoulder. Repeat for the other side.



Box joints

Best uses: small boxes, drawers, chests, tool boxes



► Watch us make this box joint, plus two others, by pointing your smartphone's camera at this code, or by visiting woodmagazine.com/boxjointvid.

A box joint provides lots of glue surface for a strong joint. Use contrasting wood species to add pizzazz to its otherwise purely functional appearance.

You can use a stacked-dado set, but a dedicated box-joint blade set [Sources] yields cleaner, square-cornered cuts. Install the blade set to the desired finger width. You'll build a simple, inexpensive jig (explained in the coming steps) that attaches to a regular miter gauge. When machining the fingers, cut them slightly long so they'll be about $\frac{1}{64}$ " proud when assembled. (Blade height should

equal the workpiece thickness plus $\frac{1}{64}$ ".) Then you can trim the joints flush when assembled.

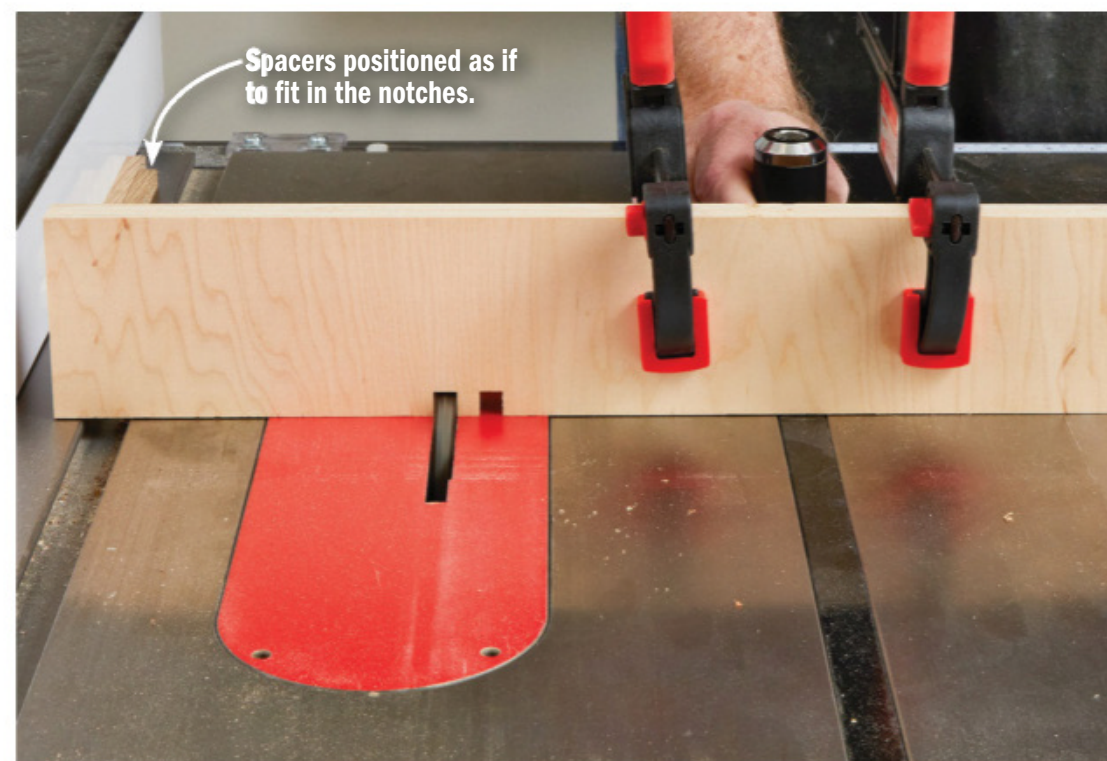
When cutting box joints, separate the box sides into opposing pairs. For the purpose of this article, we'll refer to them as *sides* and *front/back*. Cut these pairs identically to create symmetrical joints.

To get started, cut a test side and a test front/back equal in thickness and width to the actual box parts. Then follow these steps to make the box-joint jig.

Tip! Use hard maple or white oak for finger spacers because they hold up best in use without deforming.



Set the rip fence about 7" from the blade and clamp a 4x18" piece of $\frac{3}{4}$ " plywood—resting against the rip fence—to your miter gauge. With your blade width and height set, cut a notch in the plywood. Remove the plywood from the miter gauge, but do not move the rip fence.



Plane a piece of dense hardwood (about 12" long) to fit snugly into the notch. Rip it to a width matching your workpiece thickness. Crosscut one piece about 3" long; this will serve as the jig's registration spacer. Place both pieces against the rip fence, reposition the plywood fence against the strips, and cut another notch.



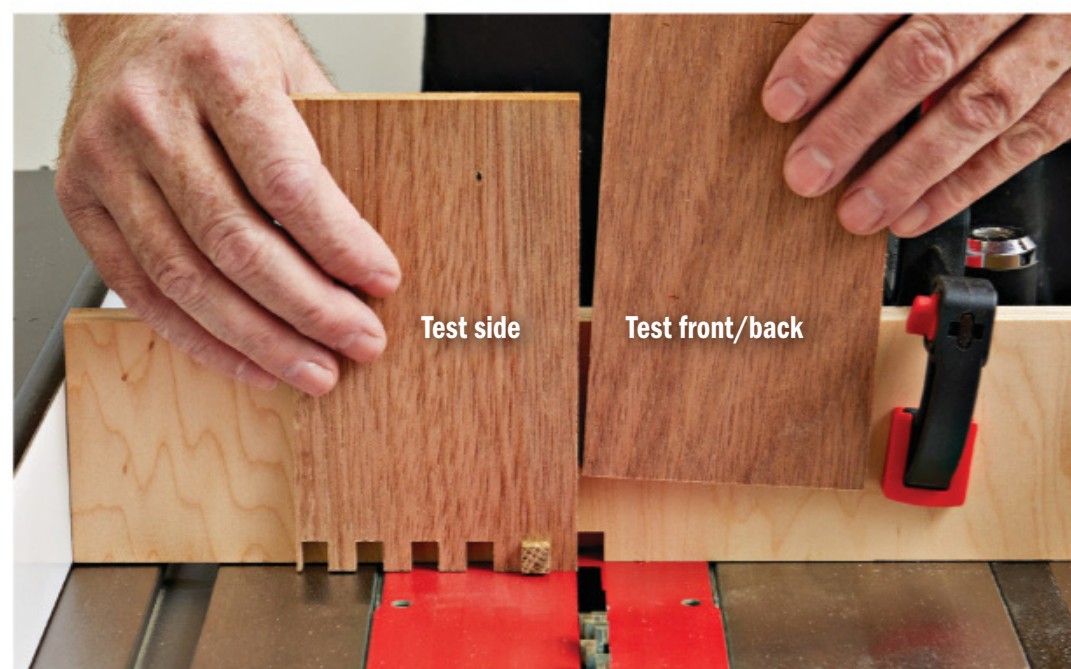
Glue and screw the short spacer in the notch nearest the rip fence. Clamp the jig to the miter gauge so it's against the rip fence. Hold the side test piece against the spacer, resting on the tablesaw top, and cut a notch.



Fit the just-cut notch onto the spacer and cut another notch. Continue this step-and-repeat cutting across the width of the board.

Tip! Rather than trying to cut boards to the precise width needed for a specific set of box joints, leave the boards a little wider than you think you'll need. You'll end up with a partial finger/notch on each, but you can quickly rip the boards to width before assembly.

Once you have a good fit, secure the plywood to the miter gauge with screws (or double faced tape), cut both ends of the box sides in the first manner, then cut the front and back in the second manner. Glue the box together, clamp, and allow to dry. Trim the proud fingers with a block plane or flush-trim router bit.



Place the test side's first-cut notch onto the spacer and butt a front/back test piece against its edge. Hold both pieces tight and cut a notch in the test front/back.



Slide the test front/back's notch over the spacer and cut another notch. Then step-and-repeat across its width. Test the fit of the joint: It should slide together by hand using moderate strength. If you have to use a mallet, the fit is too tight.



If the joint is too tight, reduce the space between the blade and wood spacer. Reposition the plywood slightly away from the rip fence, using a playing card or similar-thickness spacer. Cut another test joint, and adjust as needed. **If the joint is too loose**, increase the space between the blade and spacer. Move the rip fence slightly away from the blade, using a card spacer to reset it. Reposition the jig against the fence, make another test cut, and adjust as needed.

Splined miters

Best uses: small boxes, picture/mirror/door frames



Install a rip blade and set its height to prevent cutting through the inside of the box. The deeper the cut, the longer the spline will appear on the outside of the box.

► Watch a video of making splined-miter joints.
woodmagazine.com/splinedmiters.

Tip! For perfectly square-cornered spline slots, use a rip blade, which has flat-tipped teeth. A blade with alternate-bevel tips will leave tiny “bat ears” in the corners that a spline won’t fill.

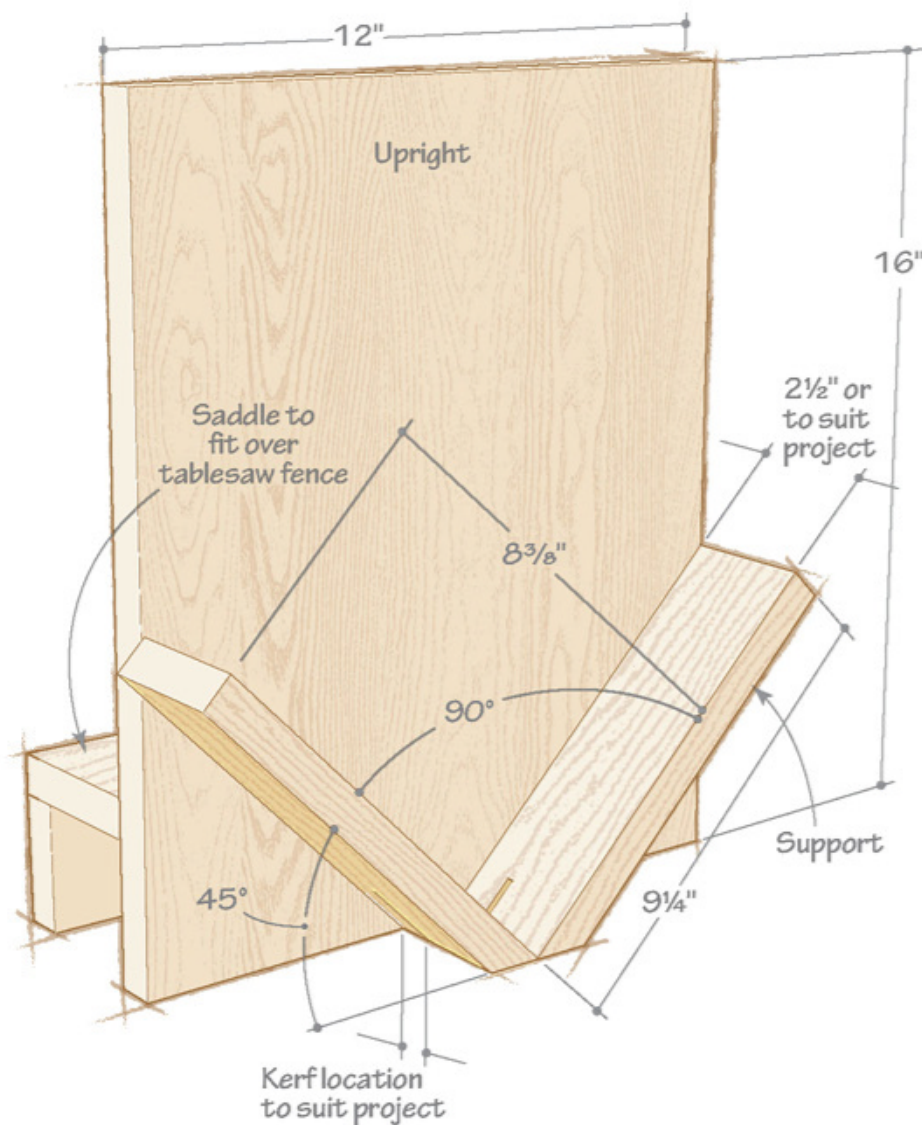
Miter joints look nice because they hide end grain, but they lack strength because glue doesn’t bond well to the quartered end grain. Adding splines across a miter increases its strength substantially. (Cut spline slots with the blade at 90° as shown, or tilt the blade 5–7° for more pizzazz and strength.)

To cut the slots, you’ll need to build a rip-fence saddle jig, shown *right*, to cradle the mitered box. Your jig should slide back and forth easily on the fence but without side-to-side slop. But before tackling the splines, you’ll need to build your mitered box and sand it smooth.



Avoid glue squeeze-out inside a mitered box by applying glue to only the outer two-thirds of the miter.

RIP-FENCE SADDLE JIG





Hold the box in the saddle jig, and slide it along the fence to cut a slot. Lift the box from the jig before sliding the jig back across the blade. Repeat for all corners.



For symmetrical splines, flip the box and cut slots in all corners again without moving the rip fence. To cut additional slots, reposition the rip fence as needed.



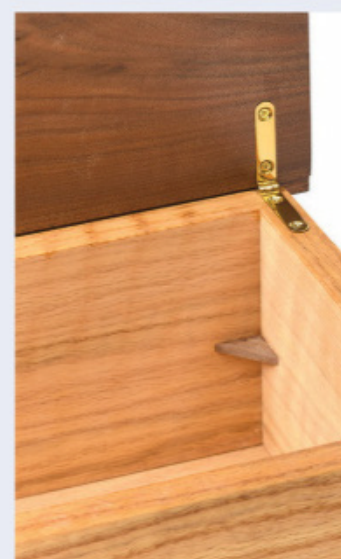
Cut splines from a blank at least 10" long. Use a thin-strip ripping jig [Sources or woodmagazine.com/thinrip] to set the spline thickness. Reposition the fence each time to rip another strip.



Test the spline fit in the slots until snug, and then cut short splines for each slot. Glue them in place, and trim flush when dry. 🌲

Add support with deep splines

For an integrated tray support in a splined-miter box, cut the center slots deep enough to penetrate the inside of the box at least $\frac{1}{4}$ ". You'll need to make wider splines for this, but they will provide an almost-hidden built-in support.



Sources: Matchfit dovetail clamps (2-pack), \$45, MicroJig, 855-747-7233, microjig.com. 8" box-joint blade set ($\frac{1}{4}$ " and $\frac{3}{8}$ "), no. FJ08242, \$159, Forrest Saw Blades, 800-733-7111, forrestblades.com. Thin-strip ripping jig, no. 36833, \$40, Rockler Woodworking & Hardware, 800-279-4441, rockler.com.

Produced by **Bob Hunter**

Finishing Oily Woods

These slick tricks help you apply a long-lasting topcoat.



by Jim Heavey



A Ebony contains oils that easily rub off on fingertips and show on the sanding pad.



B These solvents remove any surface contamination and the natural oils in many exotic woods. The solvents dry quickly and won't leave any residue to interfere with topcoat adhesion.



C Wax-free shellac brings out the inherent color of the stock. Standard shellac contains wax, which can compromise good topcoat adhesion.

The thought of applying finish to a project can be enough to kick up your pulse rate and blood pressure, especially when the project contains an “exotic” wood full of natural oils [Photo A]. That’s because the oils and resins in woods such as cocobolo, rosewood, padauk, purpleheart, teak, and even eastern red cedar can markedly slow or practically stop a finish from bonding or curing. These wood species require different preparation before finishing. Follow these helpful tips to make the process smooth as silk.

Prep, seal, then topcoat

Typically, I sand to 150 grit for projects receiving stain. But because we prize exotic woods for their inherent color, skip the stain and apply a clear topcoat. For oily exotics, sand instead to 220 grit for a smooth surface that allows any finish to bond well. Remove all sanding dust between grits.

Eliminate any oils from the wood by wiping down the freshly sanded surface with a fast-evaporating solvent [Photo B]. Then, apply one or two coats of dewaxed shellac, such as SealCoat, sealing the wood and preventing additional oils from migrating to the surface [Photo C]. A very light sanding with 400-grit sandpaper between coats smooths the surface and removes dust nibs. The prepped surface is now ready for your choice of topcoat.

Choose the best topcoat by considering the intended use of the project: Furniture subjected to heavy use benefits from varnish or a durable oil- or water-based polyurethane finish. A sprayed catalyzed lacquer is also a good choice for experienced finishers.

For decorative pieces and projects that see less wear, try a simple buffing [Photo D], regular nitrocellulose lacquer, or additional coats of shellac. A quality paste wax also suits those projects.

Troubleshooting

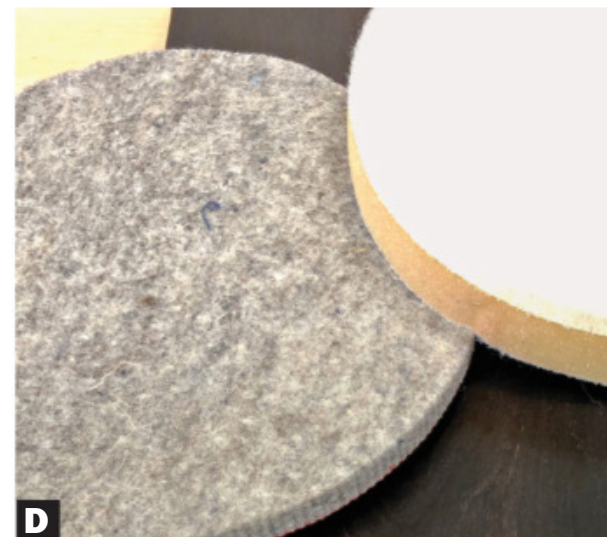
If you apply finish to an exotic-wood project and discover a sticky or tacky finish days later, don’t lose faith: Try these options.

First, be patient. The oils and resins can delay the curing process, so with a little more time, the finish may harden. But be aware that the tacky surface will trap dust during the wait.

Second, a vigorous wiping of the surface with a fast-drying solvent may remove the uncured finish. If that works, follow with a light sanding and a couple of coats of dewaxed shellac to seal the surface and prevent any additional bleed-through. After the shellac cures, reapply the topcoat.

As a last resort, consider it a lesson learned, and scrape, sand, or strip the old finish completely and start over. An out-of-date finish may not cure, so test-apply the finish on scrap to check for freshness before recoating.

The beauty and character of exotic woods should increase interest, not angst, in your projects. Now that you know how to handle those oils, you’ll find finishing Nirvana. 🌿



D For decorative projects that aren’t handled frequently, simply buff the natural oil with a lamb’s wool, left, or a synthetic buffing pad, right, on a random-orbit sander. This provides an incredibly smooth—though not very protective—surface.

► Nothing, including glue, sticks to an oily surface. Before gluing exotic woods, clean all mating surfaces with a solvent.

► Catalyzed lacquer has a shelf life of about 6 months. It chemically cures, creating a more durable finish than nitrocellulose lacquer, found in spray and cans on home-center shelves.

► Learn more about the benefits and uses of shellac.
woodmagazine.com/shellacfinish

Wood-friendly Drill-Press Vise

Hold small, irregular, and even round pieces firmly for accurate, mar-free drilling.



D I M E N S I O N S :
7" W x 8½" L x 3¾" H

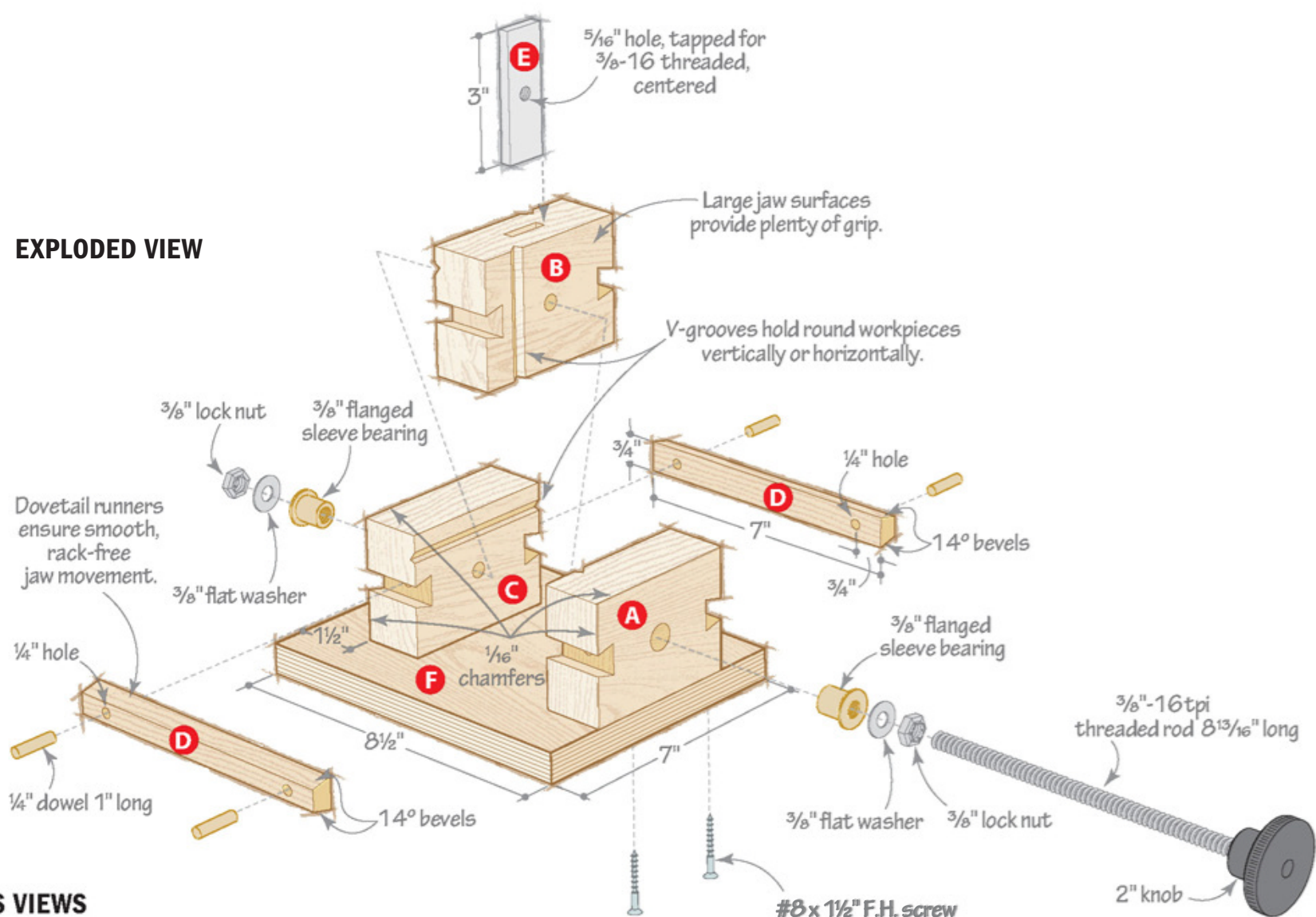
Approximate materials cost:

\$50

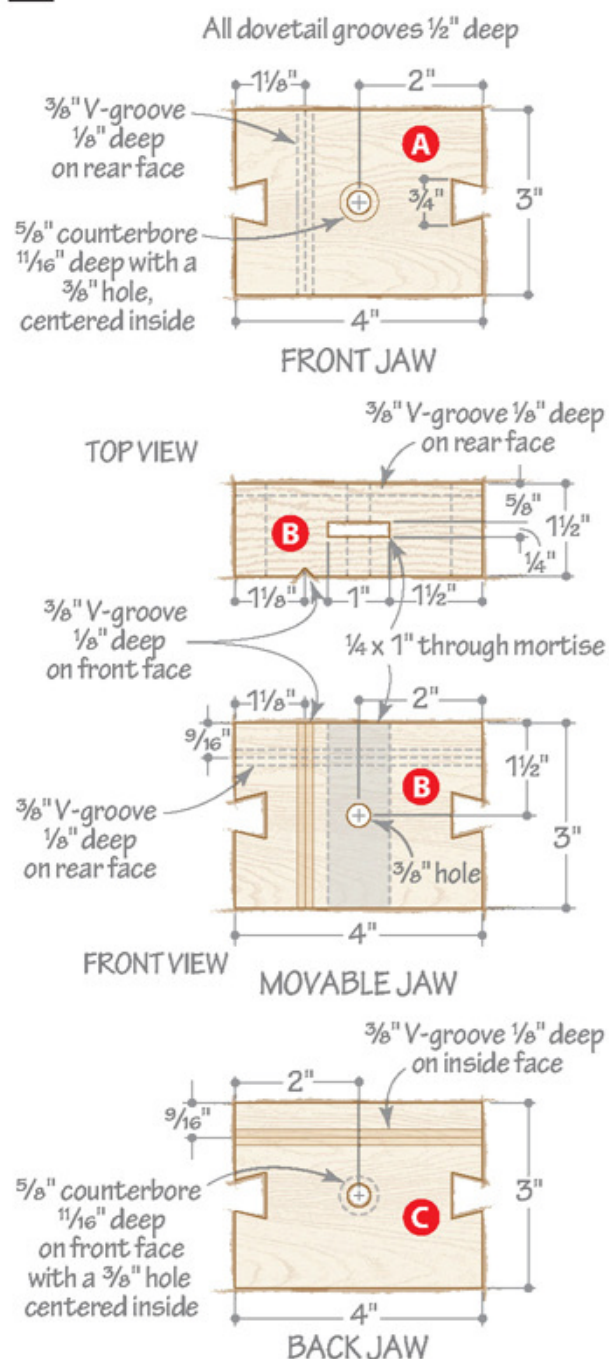
including hardware

Scale it up or down in size to meet your needs.

EXPLODED VIEW



1 JAW PARTS VIEWS



Rout the dovetail grooves using a backing block to prevent tear-out. Make one pass, rotate the workpiece 180°, and make a second pass for a centered cut.

Put an end to drill-press frustrations with a vise that holds your workpieces precisely vertical or horizontal while giving you full control over drill-bit placement. Its wood jaws have up to 2½" capacity and plenty of bearing area to hold pieces with tenacity without bruising them. Making this heirloom vise requires just a few hours, a handful of wood scraps, and hardware obtained from a single supplier [Source].

Start the jawing

1 Cut to size the jaws (A–C) [Materials List, Exploded View]. To make the dovetail grooves in each jaw [Drawing 1], first remove the bulk of the waste at the tablesaw by cutting ¾"-wide, ⅞"-deep notches centered on the jaw ends. Then use a ½"-14° dovetail bit to complete the groove [Photo A]. Leave the bit in the table.



B Rout both edges of the runner blank, leaving a tiny lip that rides along the router-table fence. Sneak up on the final cut to ensure the runners slide snugly in the jaw dovetails.



C Rout the horizontal grooves (shown) and vertical grooves in the jaws using a 45° V-grooving bit. Back the cross-grain cuts to prevent tear-out.



D Use a brad-point drill bit to remove most of the waste for the through mortise in the movable jaw. Drill from both edges to complete the removal.

2 Cut a $\frac{1}{16} \times \frac{13}{16} \times 16$ " blank for the dovetail runners (D). Taper the edges of the blank using the same dovetail bit as before, with its height unchanged, but the fence repositioned [Photo B]. Once satisfied the runner blank fits the dovetail grooves, plane it to finished thickness (removing the top lip), and cut to finished lengths.

3 Rout the horizontal (longer) V-grooves in the movable (B) and back (C) jaws with the grain [Photo C]. Leave the bit in place, but move the fence, to make the vertical (shorter) V-grooves across the grain in the front (A) and movable jaws.

4 Mark and drill the mortise in the movable jaw [Photo D]. Square the mortise walls with chisels, aiming for a tight fit with the steel flat nut (E).

5 Drill the counterbores in the outside faces of the front and back jaws (A, C) [Drawing 1]. Then drill the through holes in all three jaws.

Machine the flat nut and assemble the vise

1 Insert a 6" length of bar stock for the steel flat nut (E) [Source] into the top of the mortise until it's flush with the bottom of the jaw. Mark the finished length of the nut flush with the top of the mortise, and use the through hole in the jaw to scribe the location of the hole onto the flat nut. Withdraw the bar stock, drill the hole, and give it threads with a $\frac{3}{8}$ " $\times$ 16-tpi tap. Cut the flat nut to finished length. Cut the threaded rod to length and check that it spins freely in the tapped hole.

2 Glue one end of both dovetail runners (D) into the grooves in the back jaw (C).

Slide the movable jaw (B) onto the runners (no glue). Then, glue the front jaw (A) to the other runner ends.

3 After the glue dries, drill the holes in the runner ends [Exploded View] 1" deep. Glue dowels into the holes. Finish-sand all surfaces flush. Chamfer the top and side edges on the outer faces of the fixed jaws.

4 Press the sleeve bearings [Source] into the counterbores in both fixed jaws. Press the flat nut into the mortise of the movable jaw. Spin the threaded rod into place and secure it on both ends with washers and lock nuts. Add the knob to the threaded rod, securing it with red thread locker.

5 Cut the base (F) to size. Glue and screw the fixed jaws to the base. Apply a wipe-on oil finish. 🌲

Materials List

Part	FINISHED SIZE			Matl.	Qty.
	T	W	L		
A front jaw	1½"	3"	4"	M	1
B movable jaw	1½"	3"	4"	M	1
C back jaw	1½"	3"	4"	M	1
D* dovetail runners	½"	¾"	7"	W	2
E* steel flat nut	¼"	1"	3"	S	1
F base	¾"	7"	8½"	BB	1

*Parts initially cut oversize. See the instructions.

Materials key: M-maple, W-walnut, S-steel, BB-Baltic birch plywood.

Supplies: #8 $\times$ 1½" flathead screws (4), $\frac{3}{8}$ " flat washers (2).

Blade, bits, and tap: Dado set; ¼" brad-point bit; ½"-14° dovetail, 45° V-grooving, and 45° chamfer router bits; 3/8"-16 tap.

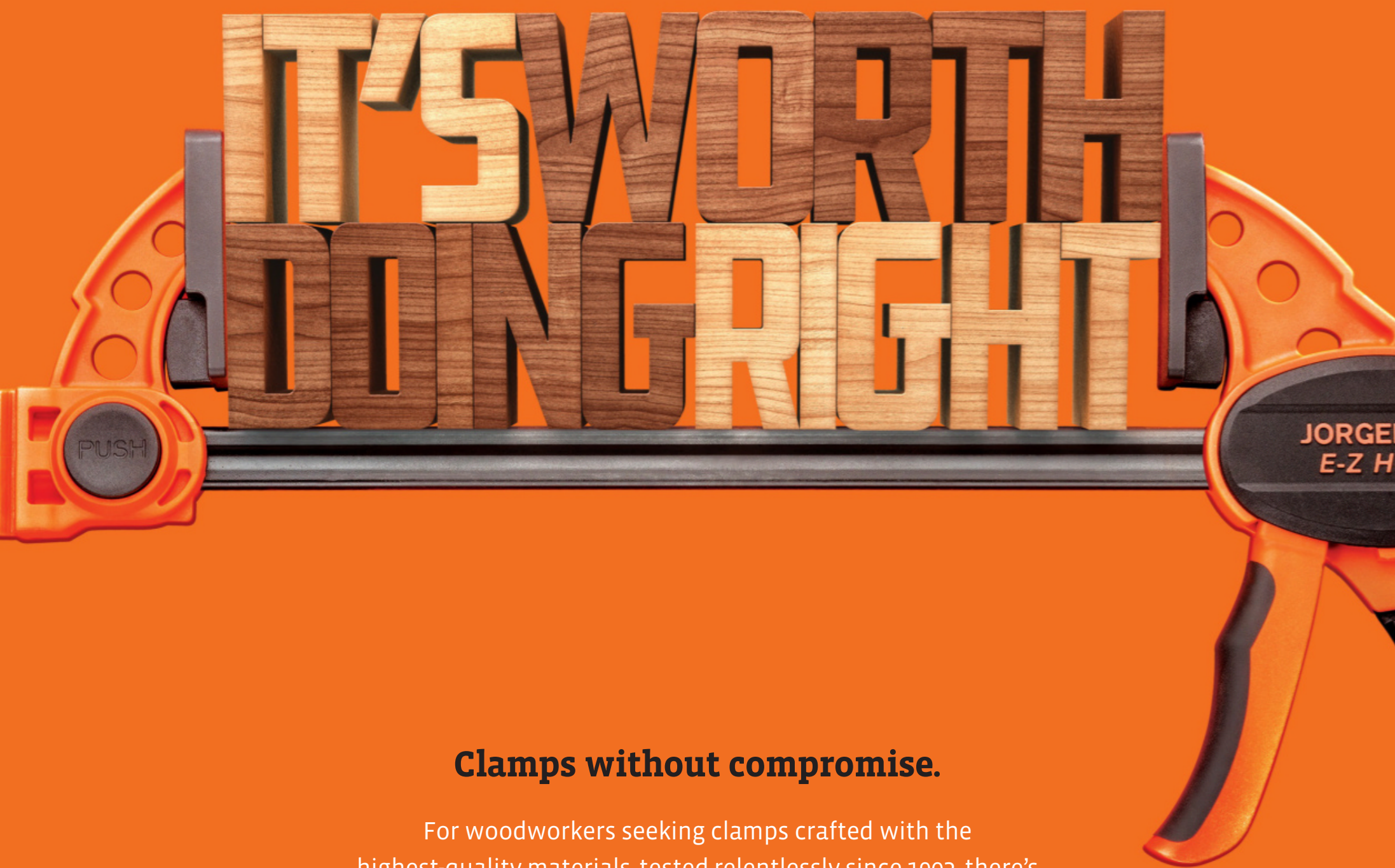
Source: $\frac{3}{8}$ "-16 tpi threaded steel rod 12" long, no. 90322A122, \$6.00; ¼ $\times$ 1" steel bar 6" long, no. 8910K383, \$3.03; 2"-dia. $\frac{3}{8}$ "-16 tpi black oxide steel knurled knob, no. 6121K711, \$5.89; $\frac{3}{8}$ "-shaft $\frac{5}{8}$ " housing flanged sleeve bearings ¾" long (2), no. 7815K23, \$5.18 each; $\frac{3}{8}$ "-16 tpi extra-wide thin flex-top lock nuts (2), no. 94828A425, \$9.58 for a pack of 10. McMaster-Carr, 630-833-0300, mcmaster.com.

Tip! To prevent the knob from ever coming off, drill a hole through it and the threaded rod. Then pin the knob in place.

Tip! Before hacksawing the threaded rod to length, spin a nut onto it. After making the cut, spin the nut off the rod to re-form any damaged threads.

Produced by **Bill Krier** with **John Olson**
Project design: **John Olson**
Illustrations: **Roxanne LeMoine, Lorna Johnson**

IF IT'S WORTH DOING



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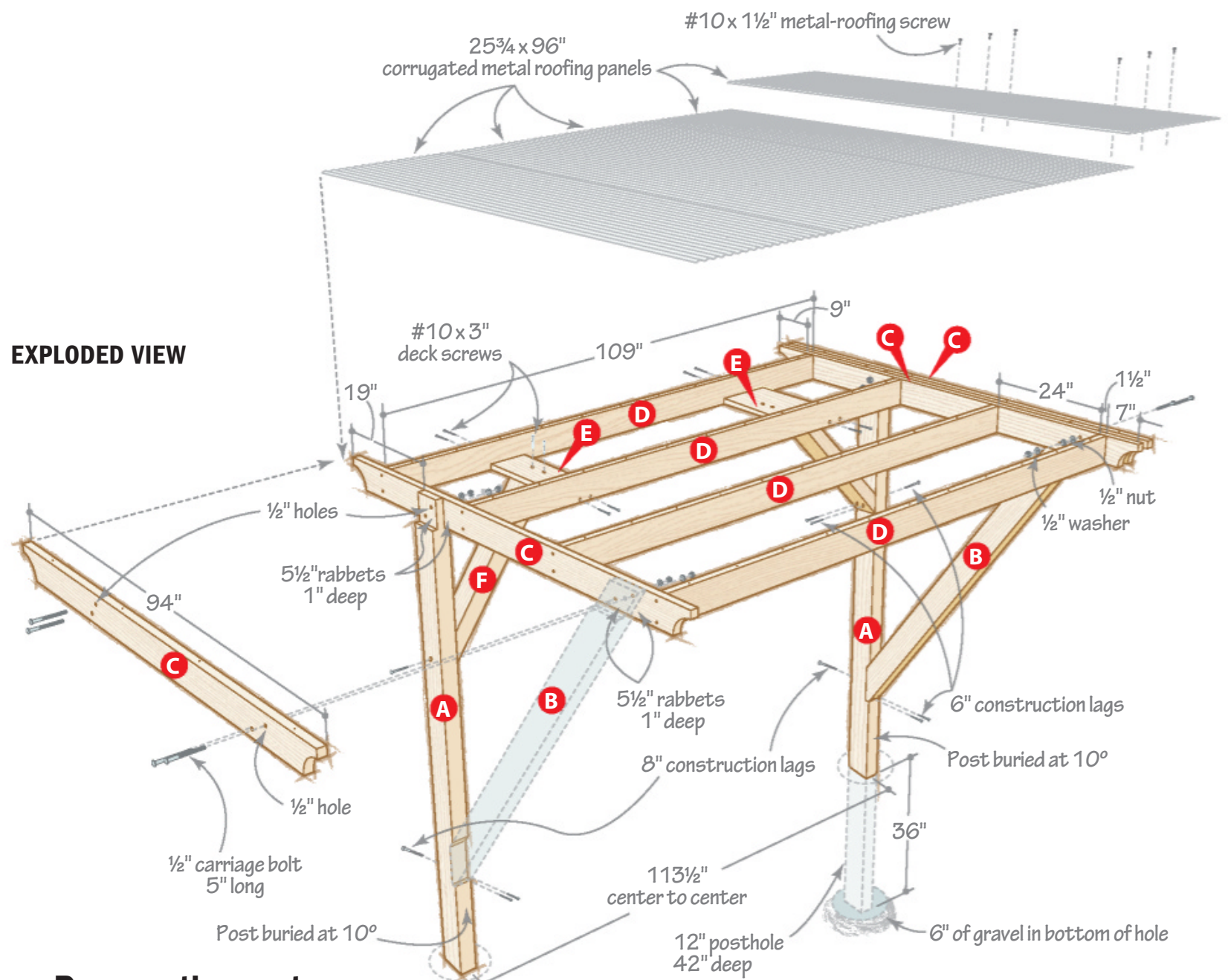


D I M E N S I O N S :
119" W x 96" D x 134" H

Approximate
materials cost:

\$225

Tin roof
panels
offer
protection
from the
rain, too.

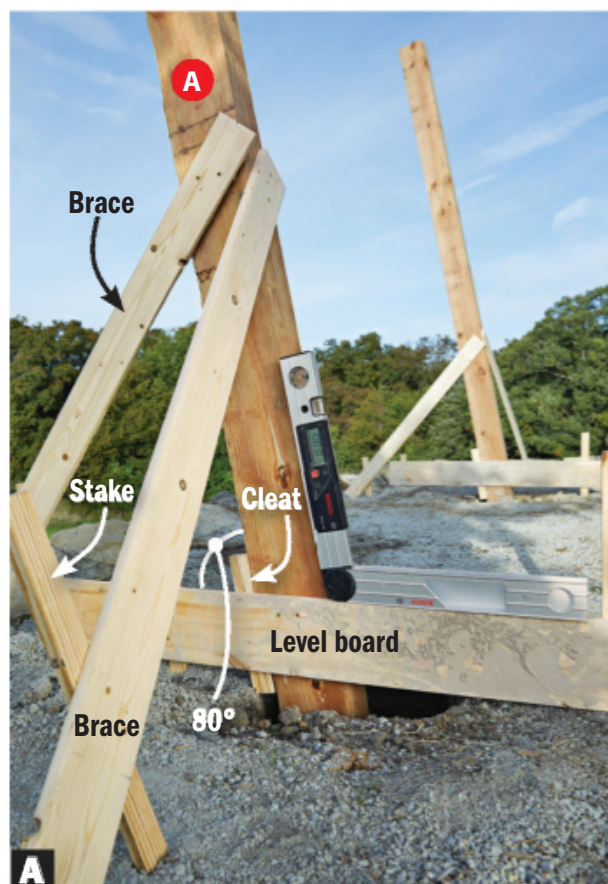


Prepare the posts

Note: Before digging postholes, call 811 (or your provincial One Call number in Canada) to arrange underground utility location. (You can submit a request online in some states; go to call811.com.) Dig the holes to the depth required by local building code.

► Go to woodmagazine.com/postmaster to learn about laying out and digging postholes.

1 On level ground, dig two postholes [Exploded View]. Lengthen the holes so the posts (A) [Materials List] can lean back. Place

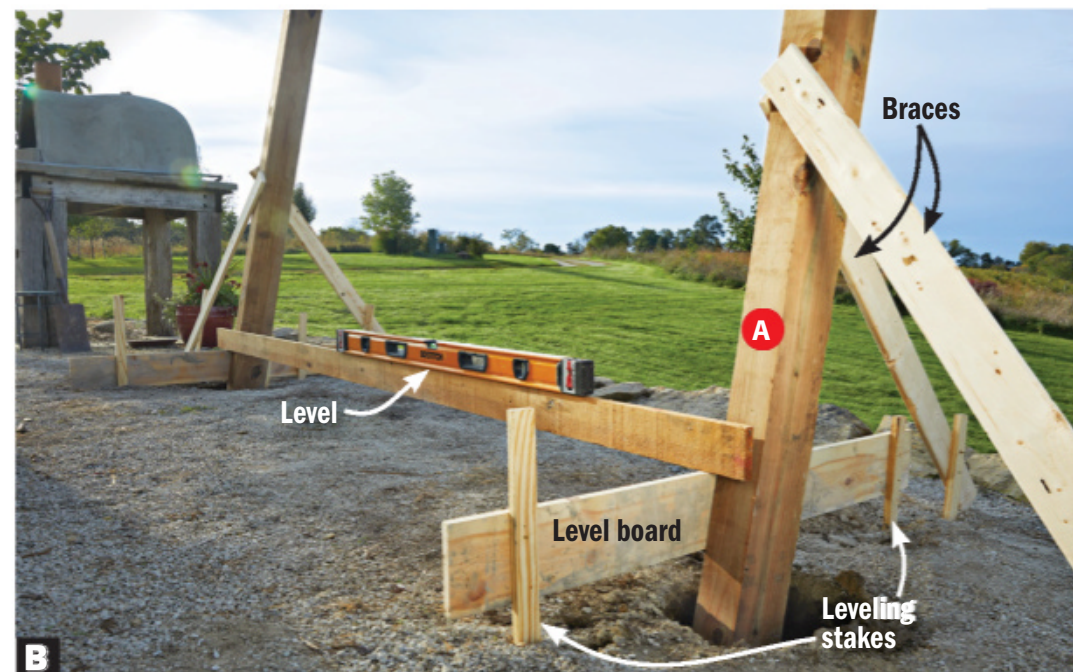


Stake a level 1×6 board to the ground and screw it to the angled post. Also screw a cleat to the board behind the post to help reposition it later.

one post in a hole and brace it plumb from side to side and leaning back at 10° [Photo A].

2 Place the second post in its hole and brace it in position. Place a 1×6 beside the post, level it with the 1×6 level board on the first post [Photo B], screw it to the post, and stake it to the ground. Scribe lines on both posts flush with the top and bottom edges of the level boards.

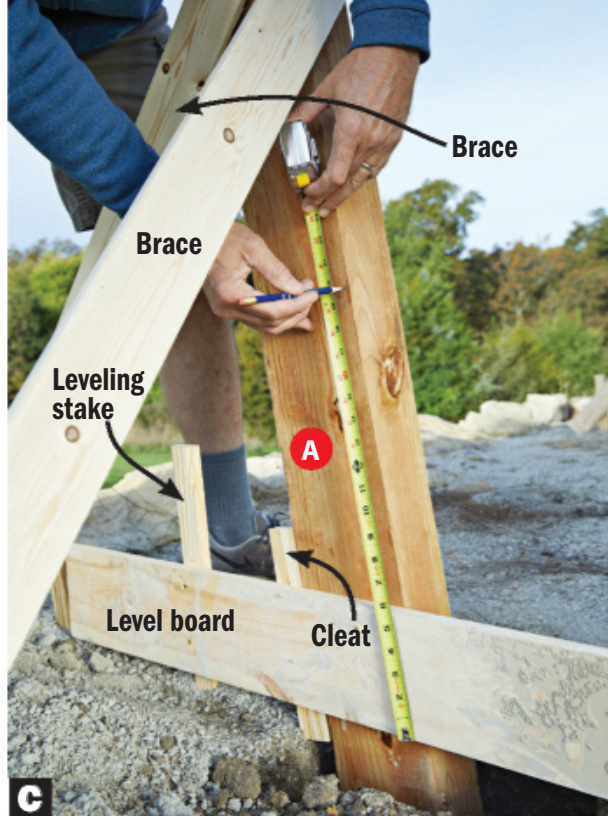
Tip! Screw the level boards and braces to the posts instead of nailing them. You'll remove the posts and replace them in the holes before setting them.



A long board spans the posts to level them. The bottom edge of the level boards on the posts serves as a reference point for joinery and post height.

► Cutting through the 4×6 posts and beams requires a circular saw that cuts at least 3½" deep.

Tip! Each hole requires about three 80-lb. bags of concrete mix; mix full bags of concrete and pour one hole at a time.



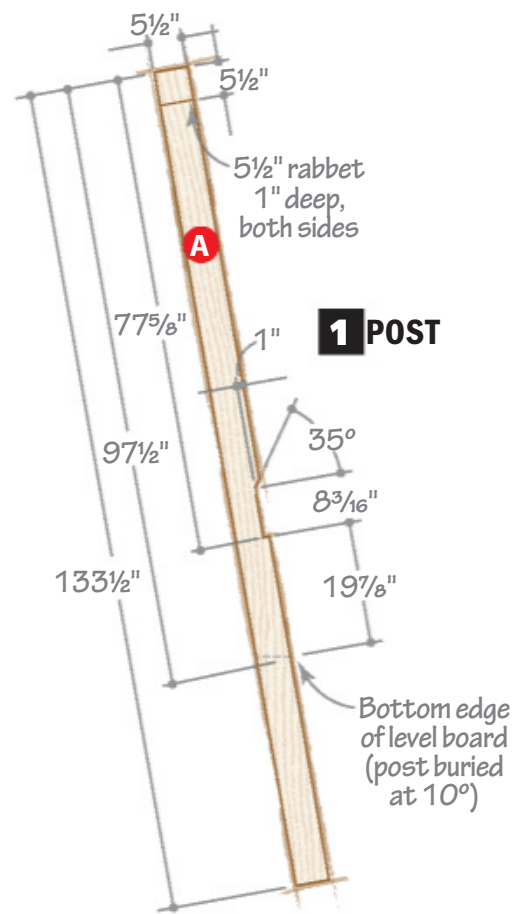
C Measure up from the bottom of the level board to mark the location of the notch for the support beam. Transfer the mark to the edge of the post.

3 On each post (A), mark the bottom of the notch that receives the support beam (B) [Photo C, Drawing 1].

4 Unscrew the posts from the braces and level boards and lift the posts from the holes. Leave the bracing and level boards in place so you can replace the posts in the holes in the same positions.

5 Notch the narrow face of each post (A) [Drawing 1, Skill Builder]. Then, measure from the notch to mark the top of the post. Cut the posts to length, and rabbet the tops.

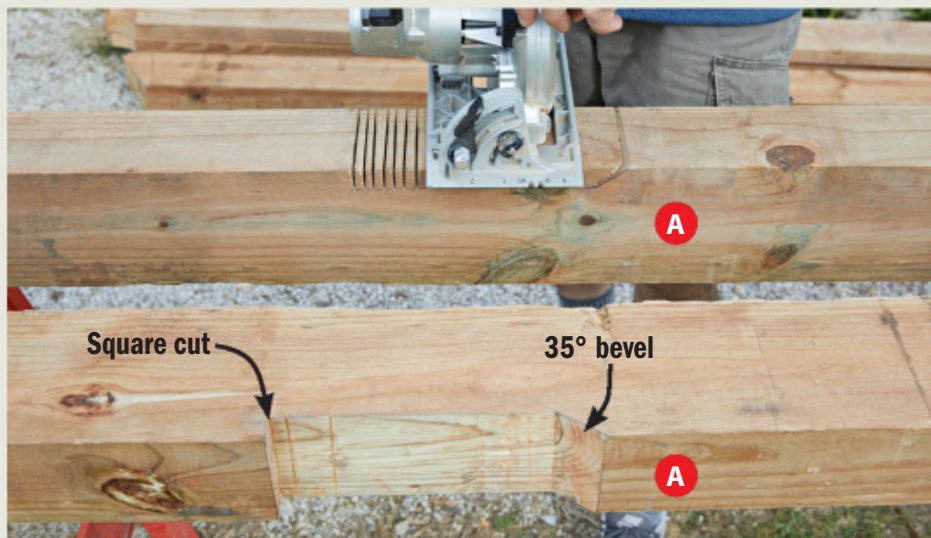
6 Place the posts back into their holes and reattach them to the level boards and bracing, using the original screw holes. Recheck their alignment. Mix concrete and pour it into the holes, working it around the posts with a long stick. Allow the concrete to set firmly without disturbing the posts.



SKILL BUILDER

Big-timber joinery

Joinery cuts in large timbers usually prove cumbersome—and dangerous—on a tablesaw. So, instead of taking the part to the saw, bring a circular saw to the part.



Cut both ends of the notch precisely, sawing the bottom square and the top at a 35° bevel.



Clean up with a chisel. A sharp 1"- or 1¼"-wide firmer chisel readily smooths and flattens the notch.



After making a series of 1"-deep cuts across the notch area, break out the waste wood with a mallet.

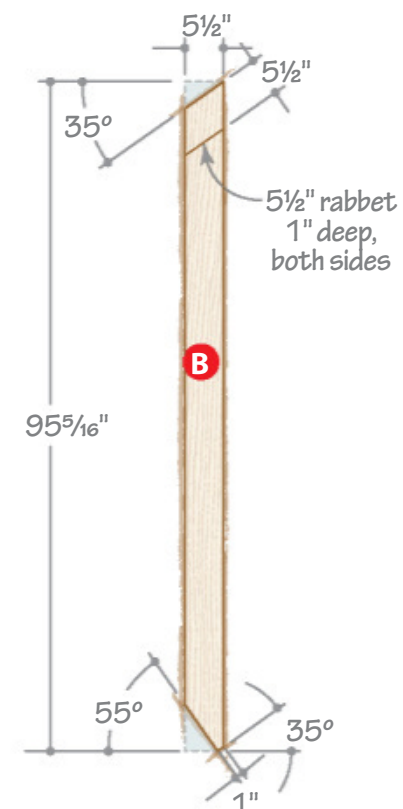


Rabbet the post (A) tops and support beam (B) ends following the same procedure, cutting 1" deep.



D Drive 6" construction lag screws through the support beam (B) into the post (A). Drive an 8" screw into the beam from the back of the post.

2 SUPPORT BEAM



3 END BEAM



E Position the end beam (C) and clamp it to the post (A) and support beam (B). Measure the end-beam overhang at the back.



F Attach the beam to the A/B assembly with screws driven from the outside through the rabbeted ends into the beam.

Add some structure

Tip! Tack temporary guides to the support beams to saw true angles for tight-fitting joints.

1 Make the support beams (B) [Drawing 2] and end beams (C) [Drawing 3]. Test-fit the lower ends of the support beams in the post (A) notches. Set the end beams aside.

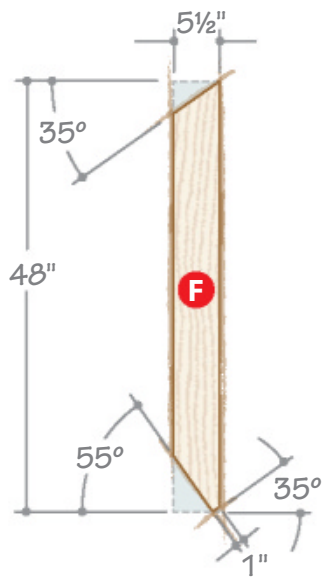
2 With a helper or two, position a support beam in a post (A) notch [Exploded View].

Attach a 1x4 temporary brace between the ground and the beam. Screw the beams to the posts [Photo D].

3 Attach an end beam (C) to the inside faces of the rabbeted ends of the post and beam (A/B) [Photos E and F]. Remove the temporary brace from B.

► Stagger the screws diagonally to allow room for the carriage bolts added later [Exploded View].

4 BRACKET



Clamp support blocks to the bottoms of the end beams (C) to keep the rafters (D) flush with the beams as you drive screws into them.

4 Construct the other A/B/C assembly. Attach the end beam (C) to the inside face of this one, too.

5 Cut the rafters (D) to size and attach them between the end beams (C) [Exploded View, Photo G].

6 Clamp the outer end beams (C) in place [Exploded View]. Drill holes for carriage bolts and attach the beams.

Tip! Hold the brackets (F) in place against the posts (A) to determine placement of the bracket supports (E).

7 Cut to size the bracket supports (E) and brackets (F) [Drawing 4] and screw them into place [Exploded View].

8 Attach corrugated metal roofing with metal-roofing screws into each rafter, letting the material overhang the framing by 1" all around. Now light up the grill and cook in shady comfort. 🌿

Materials List

Part	FINISHED SIZE			Matl.	Qty.
	T	W	L		
A* posts	3½"	5½"	133½"	PT	2
B support beams	3½"	5½"	95½"	PT	2
C end beams	1½"	5½"	94"	PT	4
D rafters	1½"	5½"	109"	PT	4
E bracket supports	1½"	7¼"	24"	PT	2
F brackets	3½"	5½"	48"	PT	2

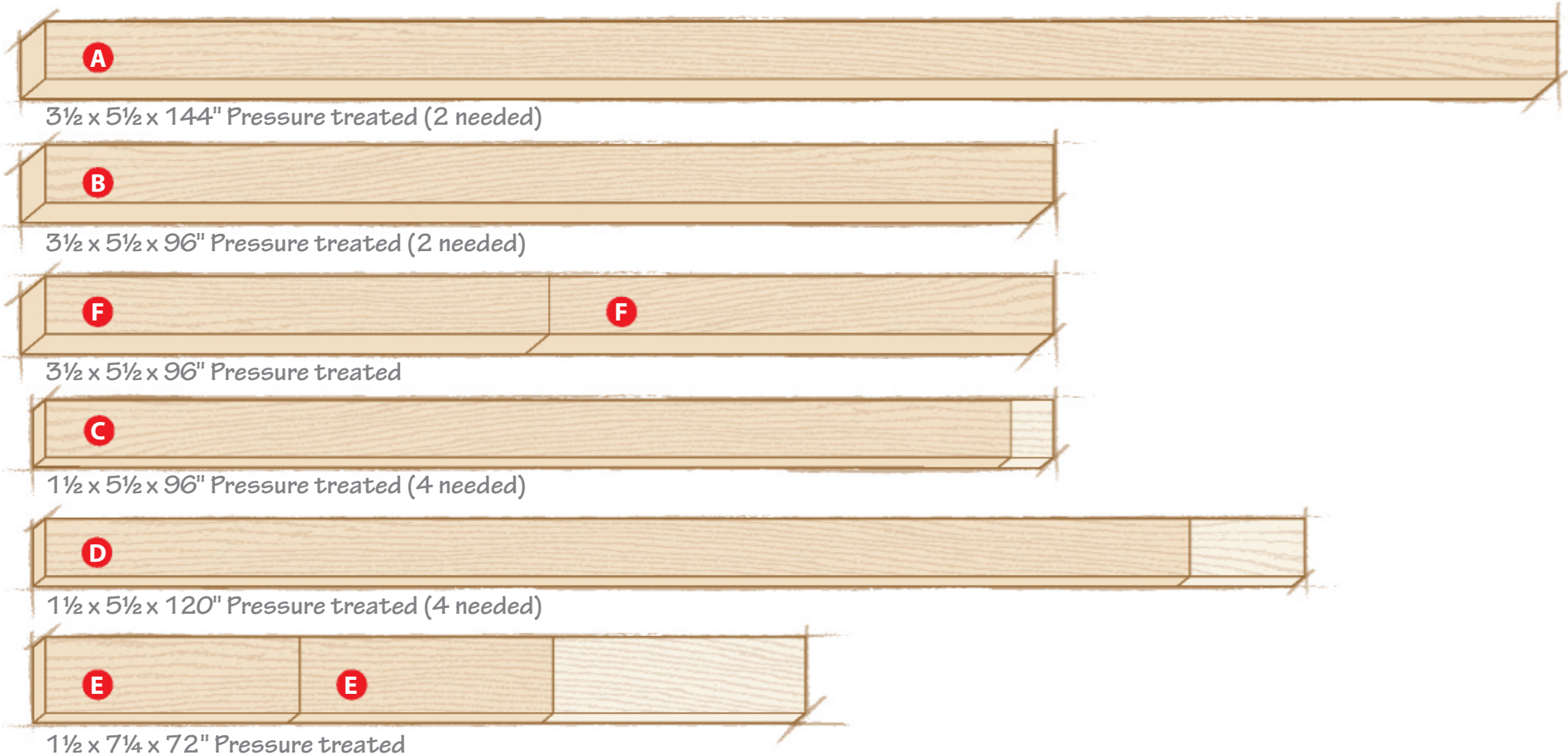
* Start with 12' posts; cut to length following the instructions.

Materials key: PT=pressure-treated lumber.

Supplies: 6" construction lag screws (10), 8" construction lag screws (2), ½x5" carriage bolts with nuts and flat washers (8), #10x3" deck screws, #10x1½" metal-roofing screws, gravel, bagged concrete mix, 25¾x96" corrugated metal roofing (5).

Produced by **Larry Johnston** with **Kevin Boyle**
Project design: **Kevin Boyle**
Illustrations: **Roxanne LeMoine, Lorna Johnson**

Cutting Diagram





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SHOP TEST

6" Jointers

These machines flatten and square lumber with unequaled speed and accuracy.

Although most tools in the shop do one or more jobs solely on their own, two machines depend on each other to create lumber that's flat, square, and of precise thickness. The *jointer* flattens one face of a workpiece and squares an edge to that face. And a *planer* makes the other face parallel and reduces the workpiece to the desired thickness.

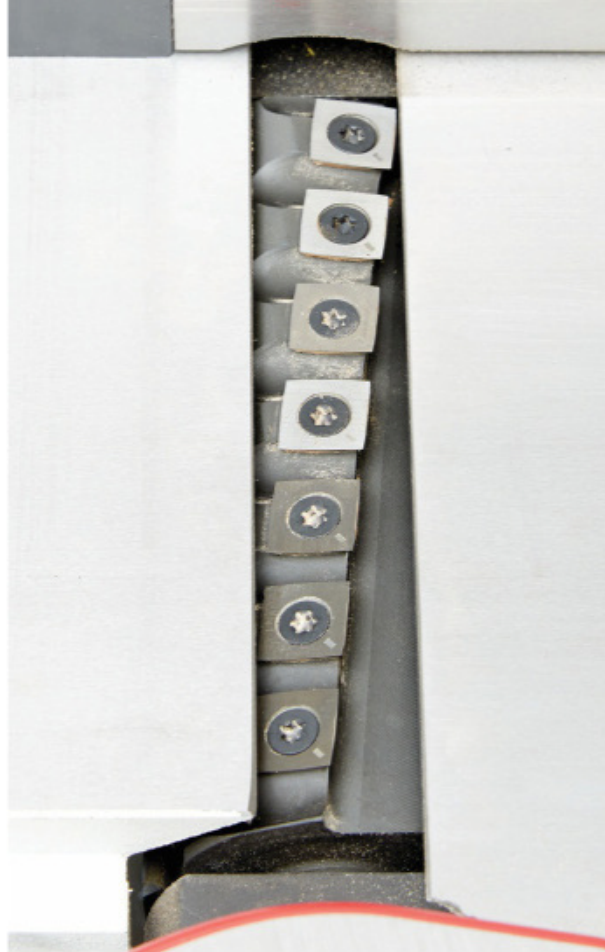
Of all the different sizes of jointers, a 6" model best combines affordability with essential features, such as a cast-iron bed and fence and reasonably powerful motor. This class of machine will most often be the first—and maybe only—jointer you'll ever own. To help find a machine for your shop, we tested six 6" jointers head-to-head in the *WOOD*® shop. Here's what we found.

► Tools Editor Bob Hunter demonstrates the features of a jointer. Point your smartphone's camera at this code, or visit woodmagazine.com/6inchjointers.





Ridgid's straight-knife cutterhead cuts very well when sharp. As the knives dull, you must remove and sharpen (or replace) them.



Jet's spiral carbide-insert cutterhead cuts as cleanly as any similarly equipped machine.



The carbide-insert cutterhead on Grizzly's G0814X uses a V-shaped pattern for the inserts (the only one in our test). It did not cut as cleanly as most others.

It all starts with a cutterhead

Jointers come with two types of cutterheads, equipped with either straight knives or carbide inserts, shown *above*. We chose insert-cutterhead models whenever possible for this test because they machine figured wood with little to no tear-out, and, generally, create less noise than straight knives. The Ridgid JP0610 has the only straight-knife cutterhead, which tends to leave scalloped cuts across the board. Feed the

board too fast, and the further-spaced scallops become noticeable. But slow the feed rate, and the scallops almost disappear.

You cannot do this with an insert cutterhead: As shown *below*, spiral cutterheads cut shallow valleys along the length of a board. The most shallow ones (on the Jet JJ-6HHDX and Rikon 20-106H) remove quickly with a sander, plane, or scraper. But those created by the Grizzly G0814X required more time and effort to clean up.



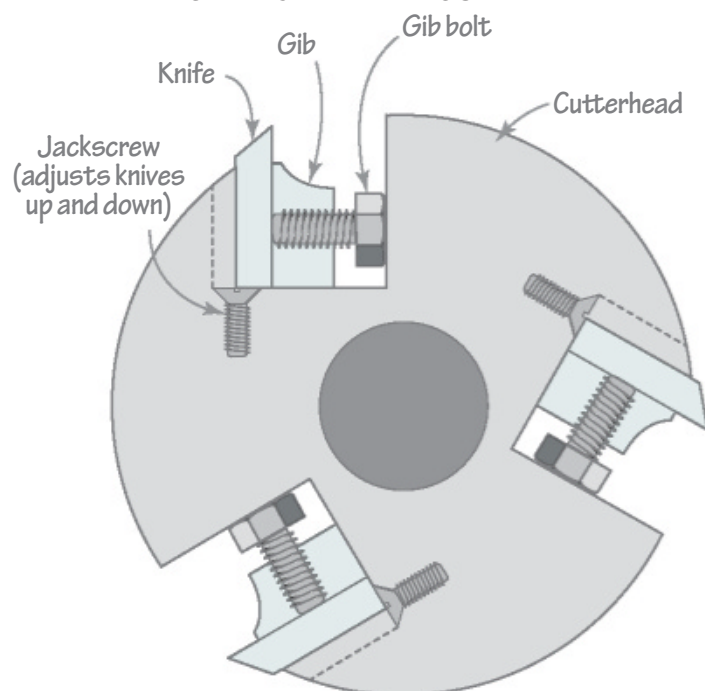
►To learn how to prep lumber using a jointer and planer, point your smartphone's camera at the code, *above*, (no app required!) or visit woodmagazine.com/jointplane.

Quality of cut varies by machine

We made a $\frac{1}{32}$ "-deep cut on walnut boards with each jointer's cutters still sharp, then rubbed the boards with chalk to visualize the high and low spots. We've presented these samples from best (*left*) to worst (*right*).



STRAIGHT-KNIFE CUTTERHEAD



Dull cutters: Resharpener or replace?

Each ½"-square insert has four cutting edges. So when one gets dull or nicked, simply rotate it for a fresh edge. These carbide inserts stay sharp much longer than high-speed-steel straight knives. It's unlikely you'll have to replace all the cutters at one time, but if so, you'll spend \$120 to \$350 for a full cutterhead set. (They sell in 10-packs.)

Changing insert cutters on the Jet and Powermatic 54HH proved easiest. The Grizzly G0452Z comes with a star-shaped hex driver bit, but not the screwdriver handle needed to hold it. The fences on the Grizzly G0814X and Rikon got in the way when changing those cutters closest to the fence.

The Ridgid's straight knives require resharpener or replacing when dull, and resetting them to the right height can be fussy. (See the illustration at *left* to understand the components of a straight-knife cutterhead.) This trial-and-error process takes time, but you'll be rewarded with cleaner cuts each time you do it.

Efficiency = apparent power

The motor represents only one part of the "power" equation that determines how each jointer performs at cutting wood. You also have to factor in the drive belt, ratio of the pulleys, and number of cutters or knives. In our testing, the Ridgid cut fastest; we suspect its straight-knife design gives the motor a brief "rest" between cuts by each of the three knives.

But the Jet nearly equaled the Ridgid's cutting power, leading all insert-cutterhead machines, which require greater effort to feed boards across to make the same cut because there's always two or more cutters engaged in the wood.

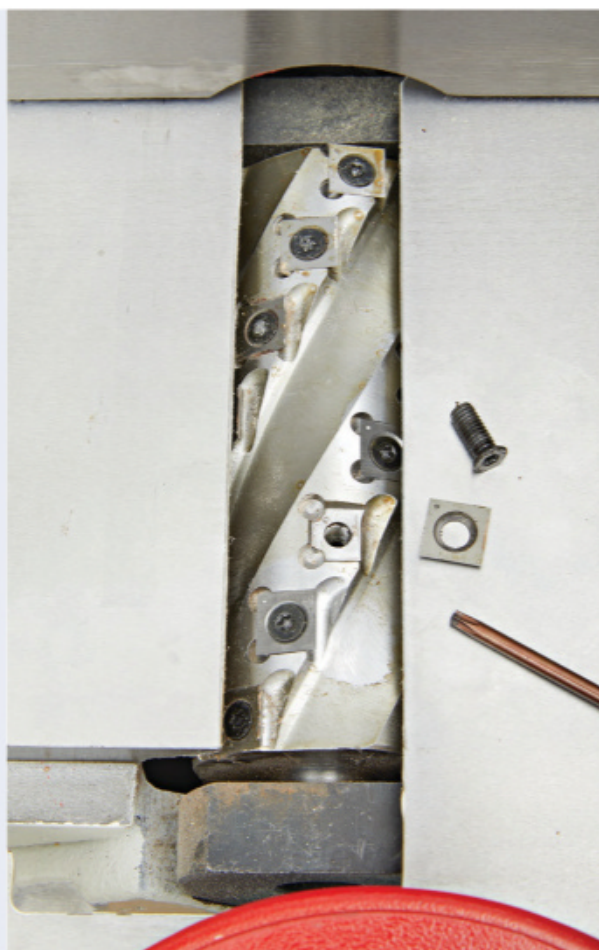
By comparison, the Powermatic bogged down easily, taking twice as long to make the same cut as most of the insert-cutter machines. That could be attributed to having the most cutters (42), an underpowered motor, or a combination of both.

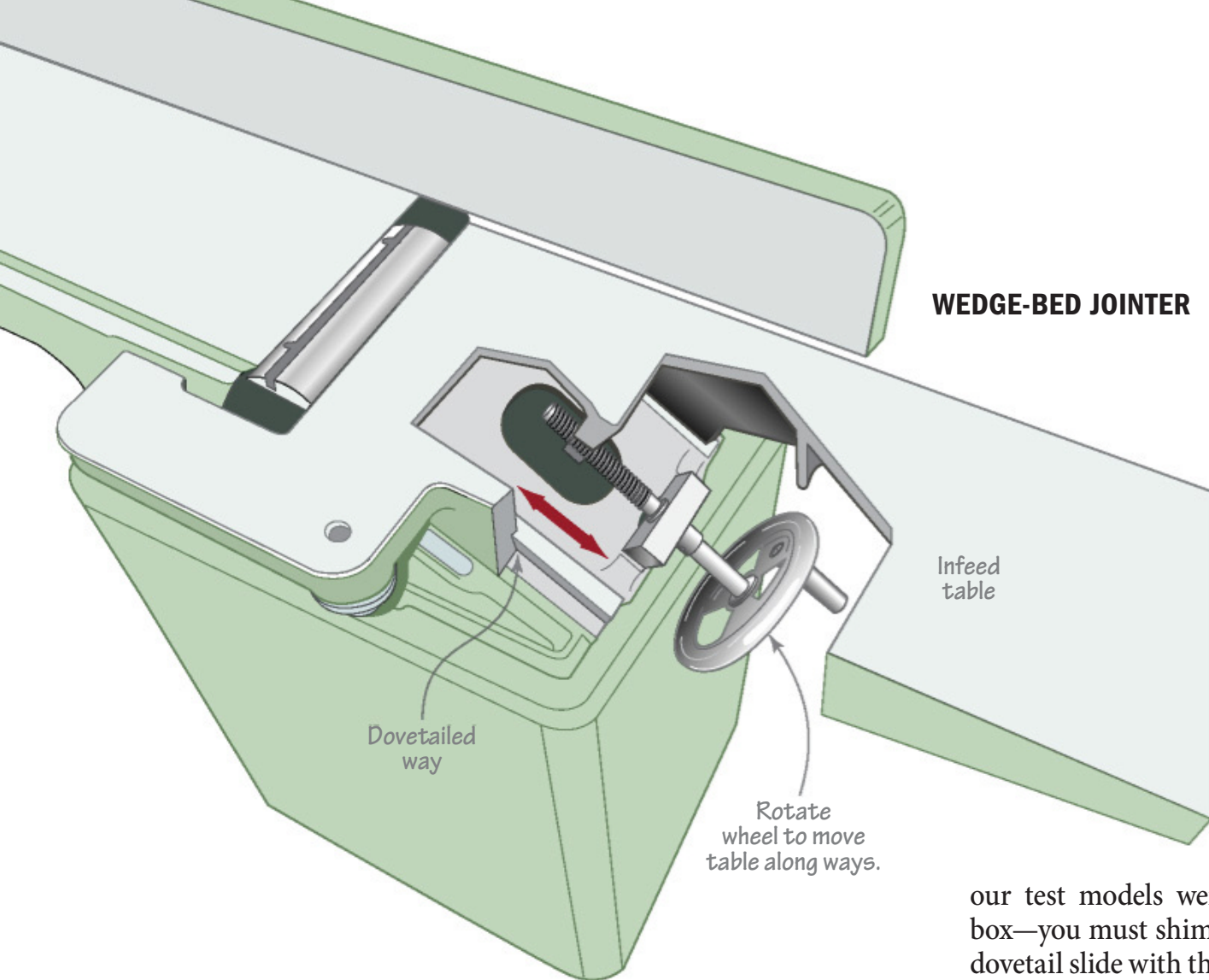
►Take the fuss out of setting jointer knives. woodmagazine.com/jointerknives

►Flatten boards wider than 6" on a 6" jointer. woodmagazine.com/wideflatten

Keep it clean when changing carbide inserts

Insert cutters swap easily, but you have to be meticulous when doing it. To ensure the best cut quality and performance, remove an insert and its screw fully from the cutterhead, then clean the mounting area with a wire brush and compressed air. Any dust or debris beneath the insert or in the screw hole can compromise the fit. And, clean any resin buildup on the beveled edges of each cutter when you turn it to a fresh edge. As we experienced several times during testing, debris can elevate the insert slightly, causing it to cut deeper. It also can result in a broken cutter when you tighten the screw. So always keep extra cutters on hand just in case.





WEDGE-BED JOINTER

► True up dovetail-way jointer tables.
woodmagazine.com/jointertables

Tables: bigger is better

The 6" cutterhead determines the width of the tables (collectively known as the bed), and bed lengths vary by model. A longer bed better enables you to support a long board or one that's not flat, but that adds weight and cost. We like Powermatic's 66½" bed best.

All of the tested jointers have wedge-bed tables that slide up and down on dovetailed ways; these have no built-in adjustment to make the tables coplanar. To make the tables coplanar if they are out of alignment—all of

► **Coplanar:** When two surfaces (jointer tables, in this case) align in the same plane.

our test models were coplanar out of the box—you must shim the outfeed table in its dovetail slide with thin metal pieces until it's in the same plane as the infeed table.

With both tables in the same plane, you set the outfeed-table surface even with the top of the cutters to eliminate snipe. This requires precise tinkering with the table height to get it just right. Ultimately, we were able to eliminate snipe with each machine.

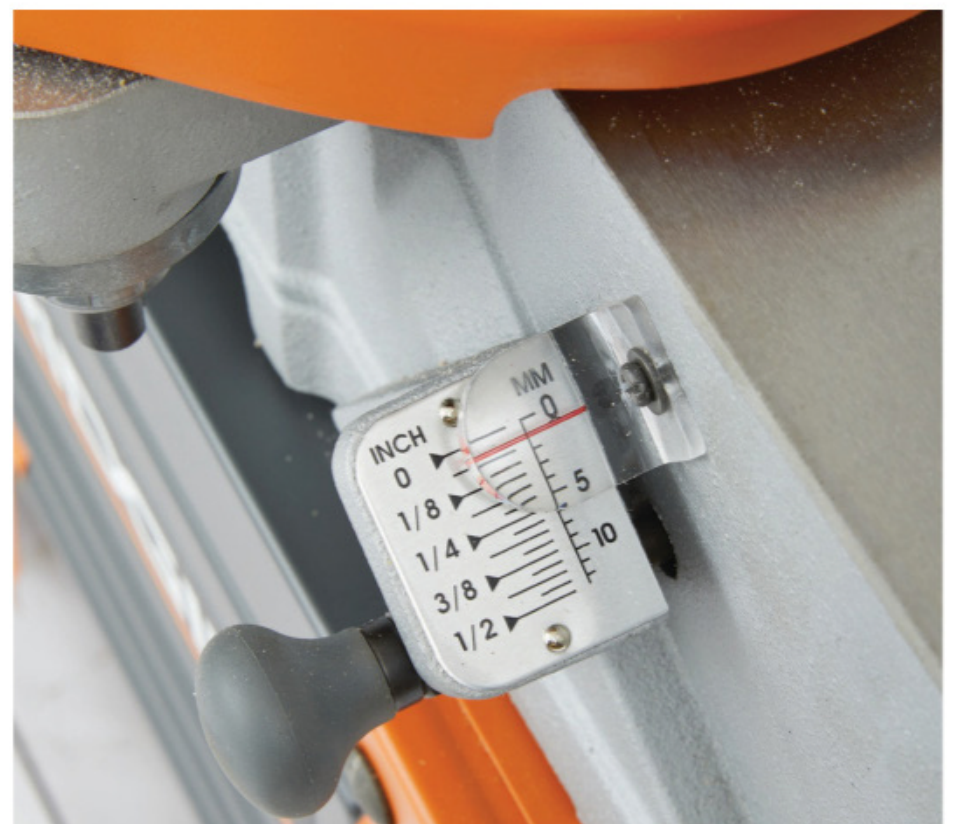
You can raise or lower the infeed tables to make a cut anywhere from a thin shaving to ½" deep (for rabbeting). Setting a precise cutting depth is easiest on the Powermatic and Ridgid machines, shown *below*, which had the least amount of backlash.

► **Snipe:** A slightly deeper cut made by a jointer or planer in the first and/or last 2–3" of a board.

► **Backlash:** a brief lack of up or down table movement when reversing handwheel rotation.



Powermatic's infeed table uses two controls to adjust cutting depth. The lever makes large adjustments by lifting/pushing; twisting the lever knob fine-tunes the setting.



Ridgid's depth-of-cut scale proved easiest to use because it has clear markings on a plate angled for best visibility, and a magnifying viewer/cursor.

More jointer notes to know

■ **Fences.** The fence on each jointer proved flat and straight, and supported work well enough. The fences of two machines travel back and forth via rack-and-pinion mechanisms, as shown *below*. The others use a more traditional keyway design, shown *below right*. Each fence has stops for 90° and 45° front and back; most needed a little fine-tuning, but worked reliably once adjusted.

■ **Power switches.** All six machines use mechanical switches rather than magnetic. This means that if the machine should lose power during operation, it will resume running when power is restored. We prefer a switch mounted on a pedestal above the infeed table because it's easier—and safer—to quickly reach the off button. Machines with this feature: Grizzly G0452Z, Jet, and Rikon.

■ **Mobility.** Both Grizzly machines have integrated casters with a swiveling kickstand. These prevent the potential trip hazard of an aftermarket mobile base that extends into your workspace. The Jet, Powermatic, and Rikon offer mobility kits as optional accessories; you can also buy mobile bases from multiple retailers.

■ **Chip collection.** Each tested jointer includes a 4" port for connecting flex-hose. We used a 1½-hp dust collector during testing, and all but one machine excelled at clearing chips. The Powermatic spewed a lot of chips beneath the cutterhead guard and out a small cutout on the operator side where the jointer mounts to the cabinet base. We could not find a solution to this.

6" Jointers: Some make the cut

MODEL	PERFORMANCE RATINGS (1)								
	PRIMARY				SECONDARY				
	POWER / CUTTING EFFICIENCY	CUT QUALITY	EASE OF CHANGING/ADJUSTING CUTTERS/KNIVES	EASE OF ELIMINATING SNIPE	EASE OF ADJUSTING TABLE HEIGHT	EASE OF ADJUSTING FENCE	ACCURACY OF BEVEL STOPS	EASE OF USING POWER SWITCH	CHIP COLLECTION
GRIZZLY G0452Z	B-	B	B	A	B	A	A-	A	A
GRIZZLY G0814X	B+	C	C+	A	B	A	A-	B	A
JET JJ-6HHDX	A	A	A	A	B	A	A-	A	A
POWERMATIC 54HH	C-	B	A	A	A	B	A	B	B
RIDGID JP0610	A	A	C-	A	A	A	A-	B	A
RIKON 20-106H	B-	A	C+	A	B	A	A-	A	A

1.

A

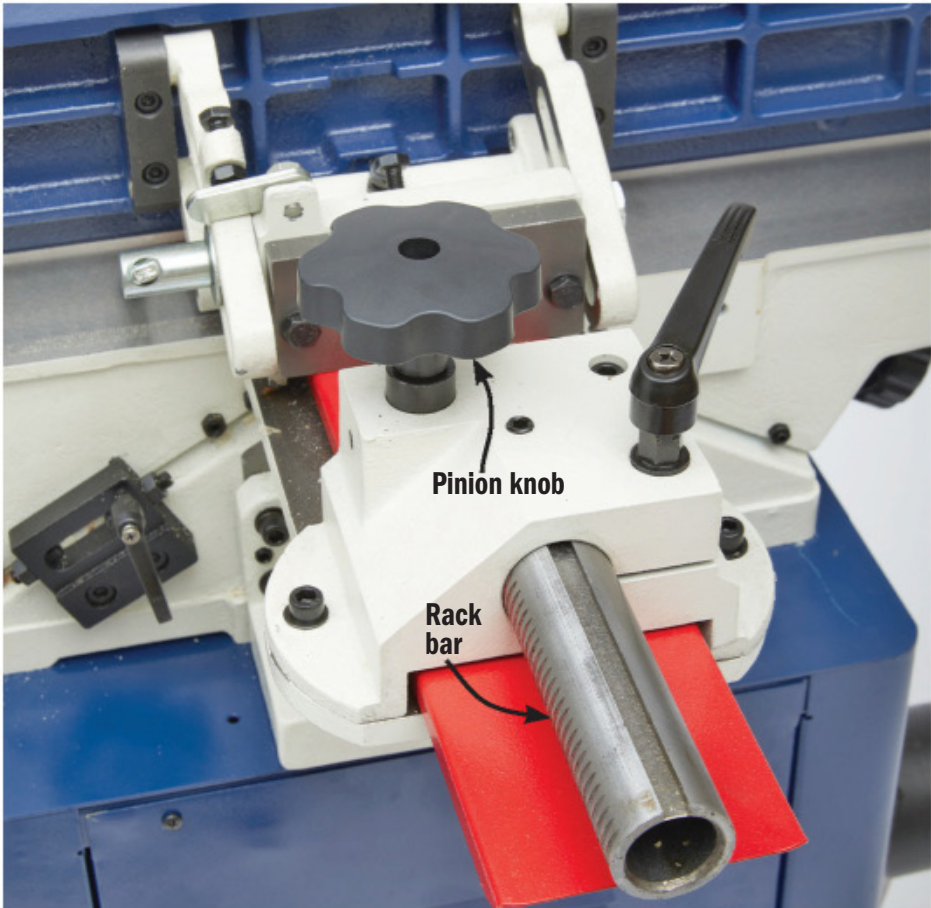
 Excellent

B

 Good

C

 Fair
2. (3) Three high-speed-steel straight knives
(C) Spiral carbide, with number of inserts
3. (K) Keyway slide
(R) Rack-and-pinion gear



Rack-and-pinion fences use a geared mechanism operated easily by a handwheel. However, the rack bar extends 10–12" beyond the cabinet when fully back.



A fence using a keyway slide requires a little more effort to move, but also less space behind the machine.

better than others

MOTOR		TYPE OF CUTTERHEAD (2)	DIMENSIONS, INCHES			FENCE										
RATED HORSEPOWER	RATED AMPS			TABLES												
				INFEED TABLE LENGTH	OUTFEED TABLE LENGTH											
			OVERALL H×L×D			HEIGHT × LENGTH, INCHES	FRONT-TO-REAR ADJUSTMENT TYPE (3)									
1.5	15	C-32	48¾×46×27½	21⅞	22¾	5⅞×35	R	93	260	92	1	C	\$995	\$40/10-pack	800-523-4777; grizzly.com	
1	14	C-26	42×47½×20	23¼	23⅞	4⅞×29¾	K	88	245	79	1	T	\$1,175	\$93/10-pack	800-523-4777; grizzly.com	
1	13	C-28	39¼×55¼×20¼	27¾	27¾	3⅞×32¾	K	85	237	86	5	T	\$1,500	\$70/10-pack	800-274-6848; jettools.com	
1	14	C-42	39¾×66¼×21⅞	32½	32½	4⅞×38	K	85	334	83	5	T	\$1,600	\$70/10-pack	800-274-6848; powermatic.com	
1	12	3	37¾×45½×20	22	22½	4×29⅞	K	93	208	120	3	T	\$700	\$18/3 knives	866-539-1710; ridgidpowertools.com	
1	12	C-28	46½×46×27⅞	22⅞	22¾	5×35	R	87	256	75	5	C	\$1,700	\$90/10-pack	877-884-5167; rikontools.com	

4. Measured while face-jointing 6"-wide hard maple.

5. (C) China
(T) Taiwan

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

Produced by **Bob Hunter** with **Jan Svec**
Illustrations: **Tim Cahill** and **Lorna Johnson**

The best machine in the joint

If we were buying one of these jointers, we'd get the Jet JJ-6HHDX (\$1,500), our Top Tool. It cuts cleanly with good power and has plenty of solid features, including the benefit-heavy insert cutterhead. We'd prefer longer tables, but they work well enough.

It's hard to argue with the performance of the Ridgid JP0610, and at a test-lowest \$700, it's our Top Value. Setting the knives can be a nuisance, but this unit works well once that's done.





Timeless Style Hall Table

Faux-pegged joints and gently curved rails create an elegant fine-furniture look.

The showy pegged-mortise joinery and curved parts may look difficult and time-consuming, but two router jigs speed this project out of the shop and into your family room in no time.

Prepare the legs

1 Cut the legs (A) about 1" overlength [Materials List], group them in pairs, and label the outside faces. Miter-cut the ends to length [Exploded View, Drawing 1].

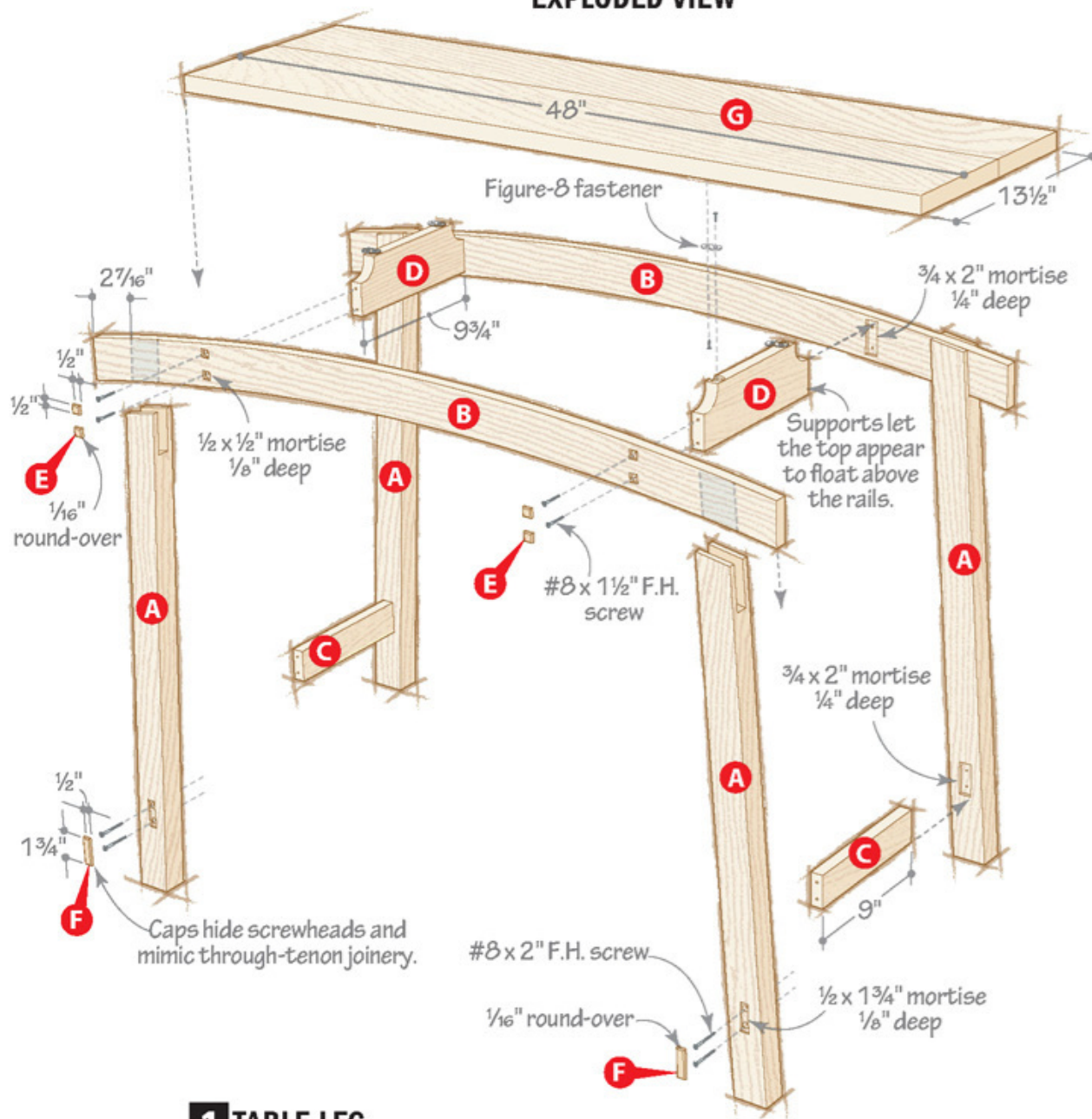
2 Build the leg-mortising jig [Drawing 2]. Clamp it to the outside face of a leg (A) and use a ¼" spiral upcut router bit and ⅝" guide bushing to rout ⅛"-deep mortises [Photo A]. Repeat for the other three legs.

3 Use the same bit, but with a ⅜" guide bushing, to cut ¼"-deep mortises on the inside leg faces. Square off the rounded corners of all mortises with a chisel.

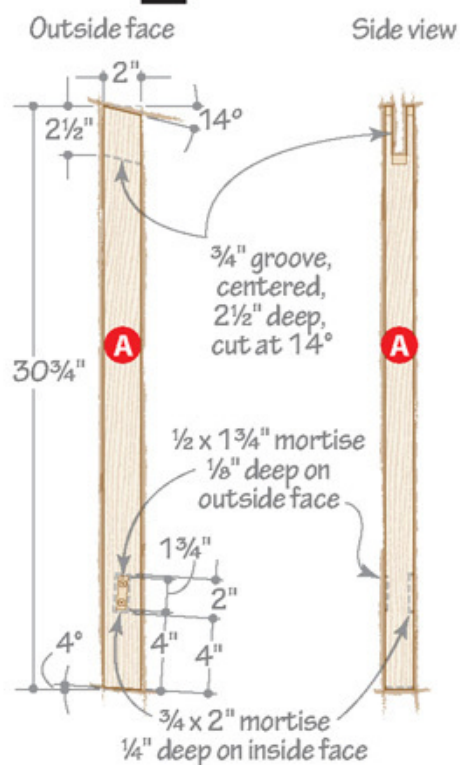
4 Cut the bridle-joint notches at the top of each leg [Photos B and C].

► Learn more about working with router guide bushings.
woodmagazine.com/guidebushings

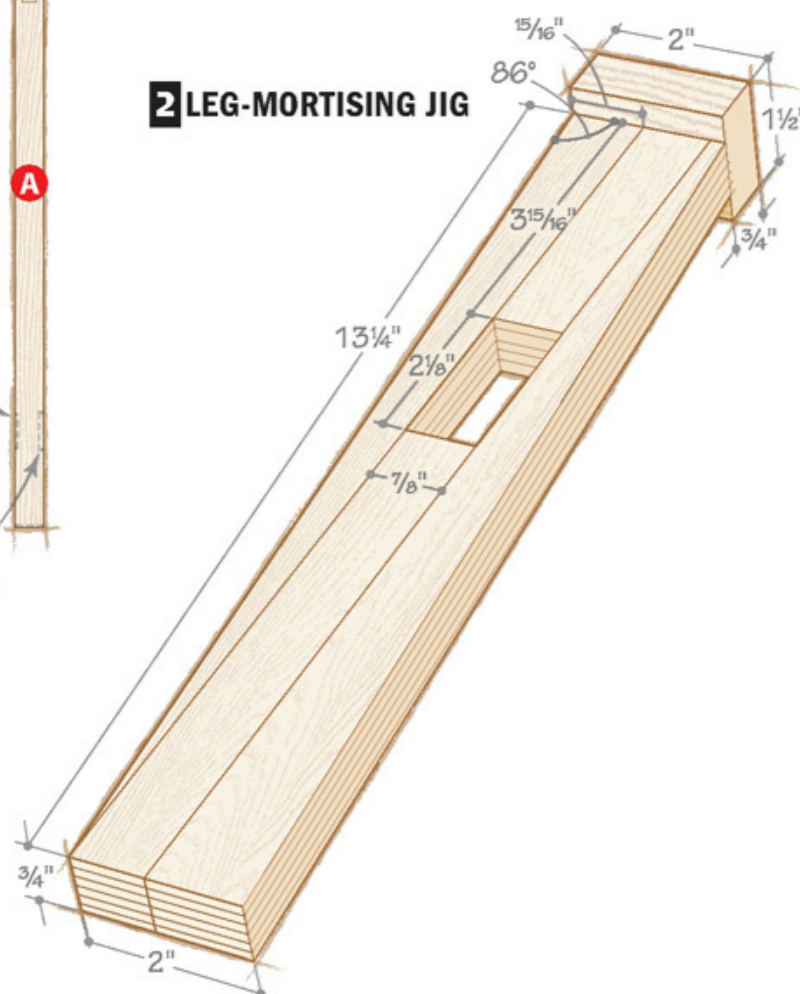
EXPLODED VIEW



1 TABLE LEG



2 LEG-MORTISING JIG



DIMENSIONS:
48" W x 13 1/2" D x 33" H

Approximate materials cost:
\$170
when made from ash and cherry

Make the top stand out by choosing a contrasting wood.

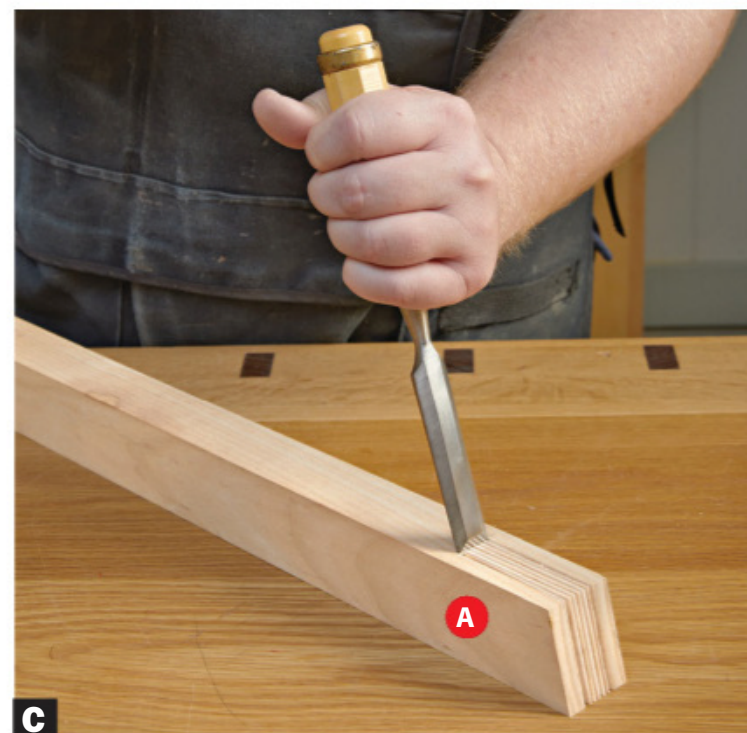
woodmagazine.com



A Clamp the mortising jig to the leg with the end block tight against the bottom leg miter. The same jig works to rout mirror-image mortises on both sides of each leg.

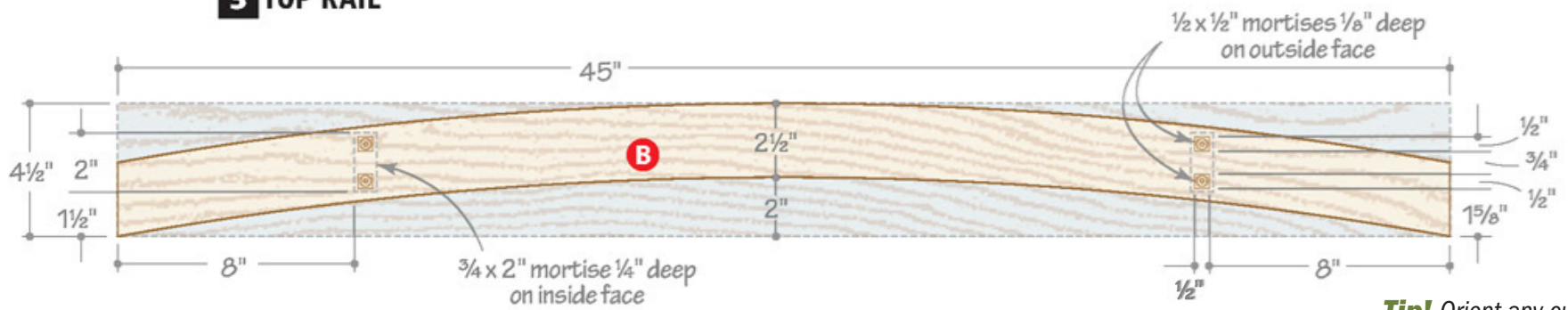


B Cut the sides of the bridge joint with a handsaw held at the same angle as the end miter.



C Match the chisel angle to the miter angle on the end of the leg as you cut away the waste. Kerfs between the joint edges make the job easier.

3 TOP RAIL



Tip! Orient any curved grain in the rail blanks (B) to follow the curve of the finished rails.



► To watch a video about punching square holes, point your smartphone's camera at the code, above, (no app required) or visit woodmagazine.com/squarehole.

Sail through the rails

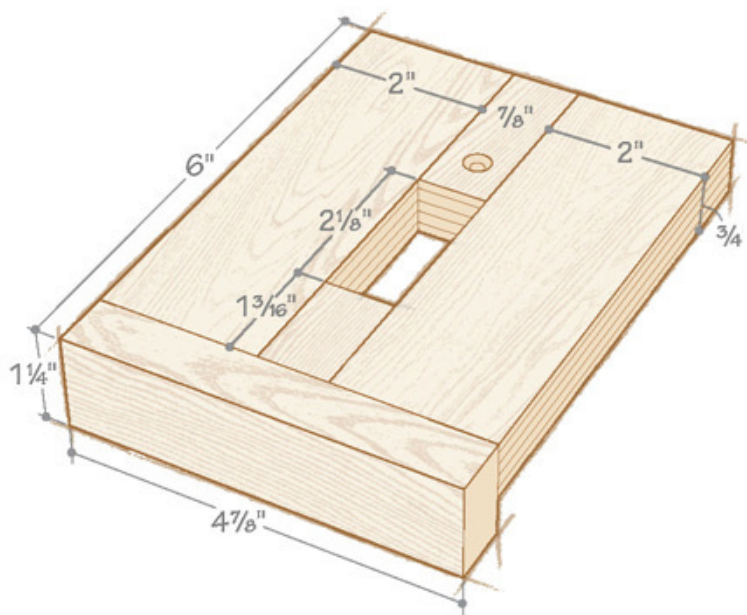
- 1 Cut the top rail blanks (B) and mark the mortise locations on both faces [Drawing 3].
- 2 Build the rail-mortising jig [Drawing 4] and screw it to the inner face of a rail blank centered over the mortise layout. Use a 3/8" guide bushing to mortise the rails [Photo D], then square the mortise corners with a chisel. Repeat for both ends of both rails.
- 3 Mortise the outer faces of the top rails with a square-hole punch centered over the

mortise marks [Photo E, Source]. (A 1/2" chisel also works.) Chisel out the waste. Drill 1/8" pilot holes centered in each square mortise.

- 4 Mark the rail (B) curves onto the blanks [Photo F] and bandsaw on the waste side. Stack and clamp the rails together, then sand the curves smooth.
- 5 Cut the lower rails (C) to size and fit them to the inside mortises on the legs (A) [Exploded View]. Glue and screw the legs to the rails.

► Use fairing sticks to lay out sweeping curves. woodmagazine.com/fairing

4 RAIL-MORTISING JIG



D The rail-mortising jig screws to the rail. Later, you'll cut away the screw holes while forming the curves.



E Clamp a square to the rail (B) to make the mortise edges parallel with the edges of the blank.



F Make a fairing stick by bending a 4' ruler in a clamp. About 1' from the end of the ruler, align the edge with end and center marks before marking half of the curve. Repeat on the other side to mark the rest of the curve.



G

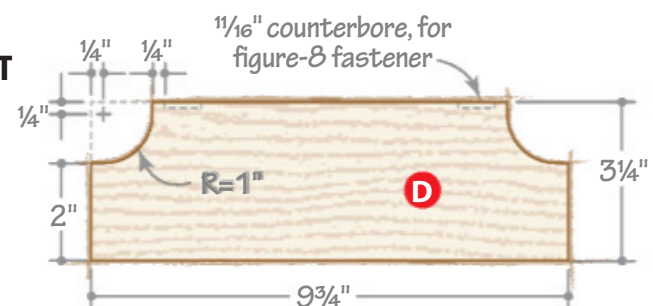
Drill figure-8 fastener mortises to a depth equal to the thickness of the hardware for a flush fit.



H

Working with 12" blanks for the square and rectangular mortise caps (E, F) lets you safely round over and cut each part.

5 TOP SUPPORT



Assemble the table

1 Cut the supports (D) to size and bandsaw the corner curves [Drawing 5]. Drill the upper edges to accept figure-8 fasteners [Photo G, Source]. Glue and screw the rails (B) to the supports.

2 Glue the B/D assemblies to the A/C assemblies [Exploded View]. Sand the rails flush with the leg ends.

3 Cut a 1/2 x 1/2 x 12" blank for the square caps (E) and a 1/2 x 1 3/4 x 12" blank for the rectan-

gular caps (F). Round over one end and cut a cap to length [Photo H]. Repeat to make the remaining caps. Glue the caps in place.

4 Edge-glue pieces for the top (G) and cut it to size. Sand and finish the top and base. (We applied three coats of spray lacquer.)

5 Screw the upside-down base centered on the underside of the top (G) using figure-8 fasteners. Now find the ideal location in your home for this graceful addition. 🌿

► You can also use a natural-edge plank for the tabletop.

woodmagazine.com/naturaledge

Cutting Diagram



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

This project requires 10 board feet of ash and 14 board feet of cherry.

Materials List

Part	FINISHED SIZE			Matl.	Qty.
	T	W	L		
A* legs	1 1/2"	2"	30 3/4"	A	4
B top rails	3/4"	4 1/2"	45"	A	2
C lower rails	3/4"	2"	9"	A	2
D supports	3/4"	3 1/4"	9 3/4"	A	2
E* square caps	3/16"	1/2"	1/2"	A	8
F* rectangular caps	3/16"	1/2"	1 3/4"	A	4
G* top	1"	13 1/2"	48"	C	1

*Parts initially cut oversize. See the instructions.

Materials key: A-ash, C-cherry.

Supplies: Figure-8 fasteners (4), #8 x 2" flathead screws (8), #8 x 1 1/2" flathead screws (8).

Blade and bits: Dado set; 1/16" round-over and 1/4" spiral upcut router bits; 3/8" and 5/8" router guide bushings, 3/4" Forstner bit.

Source: 1/2" square-hole punch, no. 50K59.08, \$36.50; figure-8 fasteners, no. 13K01.50, \$4.80 for 20, Lee Valley Tools, 800-871-8158, leevalley.com.

Produced by Robert Wilson with John Olson

Project design: Kevin Boyle

Illustrations: Roxanne LeMoine, Lorna Johnson

Create a Veneer Starburst

Make a show-stopper with these easy steps.

By Guy Dunlap





The beautiful symmetry of a starburst (or *radial*) veneered pattern transforms a project into something special. The procedure shown here makes it easy, and works for making a tabletop, a box lid, or an inlay for a larger panel.

Determine the foundation

Before starting, consider the size of the veneer field, the type of veneer you will use, and the desired number of sections in the pattern. For this tabletop, I made a 20"-diameter field with eight sections of walnut veneer, surrounded by a segmented oak border.

Start by making an MDF wedge template for guiding cuts on the veneer sections. Dividing the 360° in a circle by 8 gives an angle of 45° for the wedge. The two long sides must be longer than the field radius (10"), so I made mine 12" long. Glue a piece of 120-grit sandpaper to one face to prevent the wedge from slipping in use.

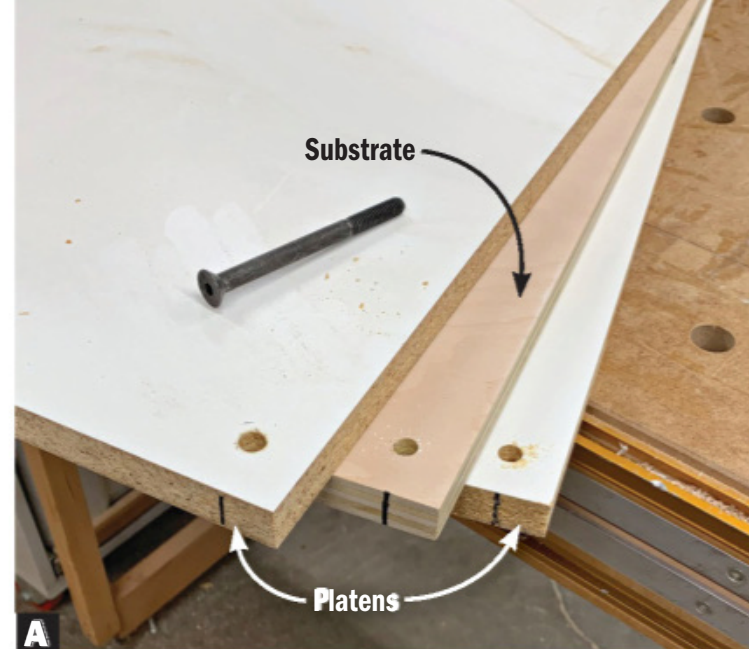
Cut a piece of plywood for the substrate and sand the faces smooth. To press the veneer to the plywood, make two clamping platens the same size as the substrate from 3/4" melamine [Photo A].

Also make six clamping cauls (2×2s as long as the platens and crowned on one side) for providing equal pressure along the faces of the platens. Form the crown using a jointer or a hand plane, tapering from the middle out, removing about 1/16" at the ends.

► The field can just as easily be square or rectangular.

► Substrate: The panel to which you glue the veneer.

► You can also use MDF or plywood for platens. Apply paste wax to them so glue squeeze-out doesn't stick to them.

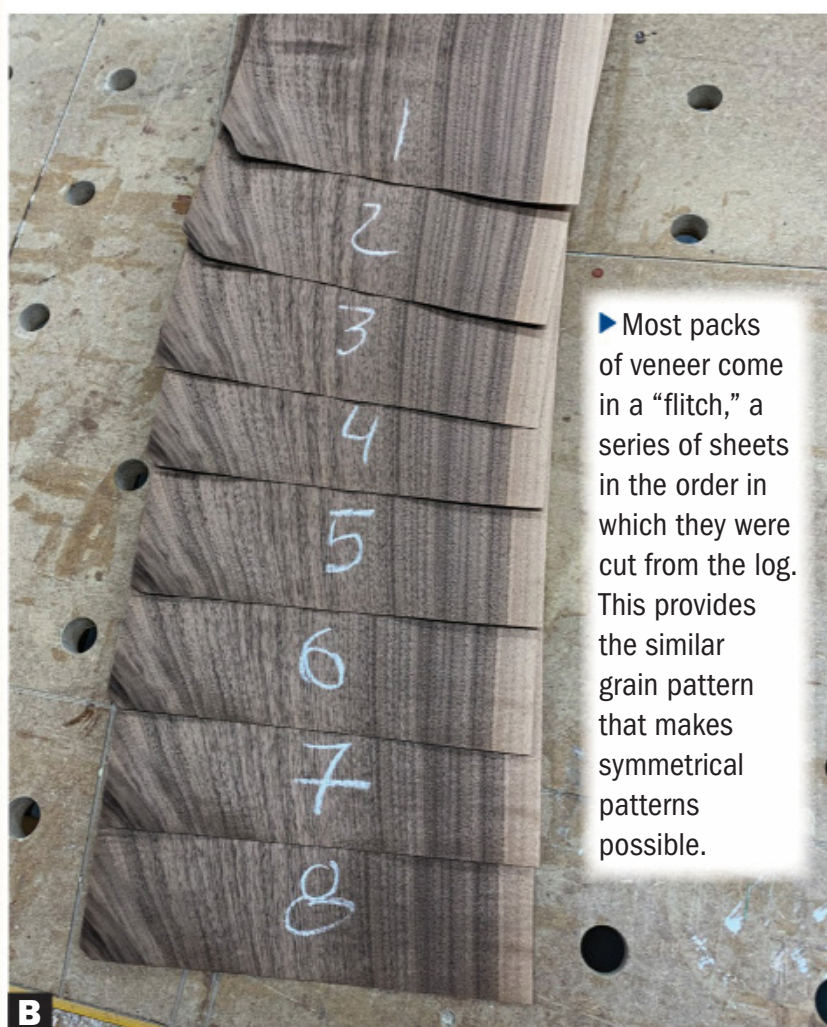


A Drill 5/16" alignment holes through the platens and the substrate on opposite corners. Mark a corner edge so you can easily orient them during assembly.

Assemble the starburst

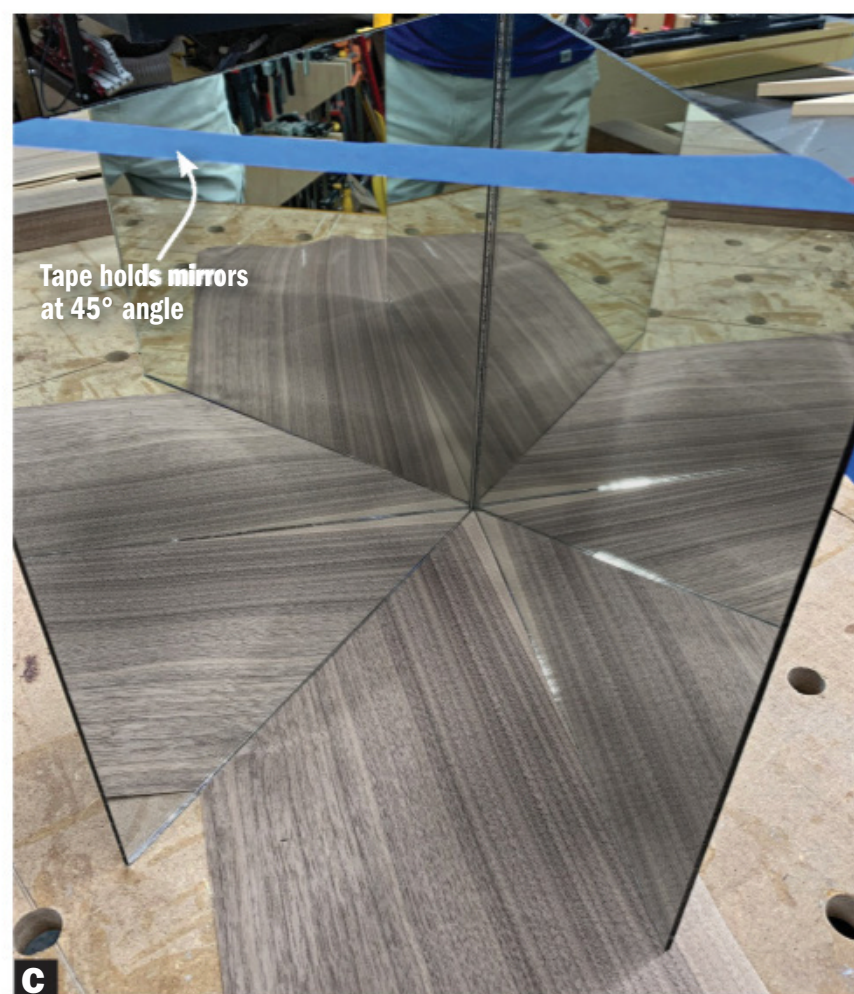
For this pattern, choose eight consecutive pieces of veneer about 8" wide and 12" long and number them 1–8 for reference [Photo B]. Using a pair of mirrors on piece number 1, determine the most attractive pattern and mark the veneer along the inside face of both mirrors [Photo C].

Stack the veneer pieces in order with their edges and ends flush, and tape the stack together. Place the MDF wedge over the veneer pack, aligned with the layout lines and with the point away from you, and clamp the assembly to your bench. Using a veneer saw or a utility knife with a fresh blade, cut through all eight pieces of veneer along the right-hand side of the wedge.



► Most packs of veneer come in a "flitch," a series of sheets in the order in which they were cut from the log. This provides the similar grain pattern that makes symmetrical patterns possible.

B The light sapwood in this flitch will highlight the "star" of the starburst. Number the pieces in the same order they come stacked in the flitch.



C Preview potential patterns with two mirrors joined with a hinge of painters tape. Set the angle between them using the MDF wedge, and bridge their top edges with another strip of tape.

Disassemble the pack and remove pieces 3–6. Restack and tape pieces 1, 2, 7, and 8, and cut their left sides along the wedge. Then, for the best bookmatches, arrange the pieces as shown in **Drawing 1**, alternating the pieces face-up and face-down.

To get a seamless joint between adjacent pieces, “shoot” the edges straight [Photo D]. Then using painters tape, join the wedges [Photo E] to make two halves, one with pieces 1–4 and one with 5–8.

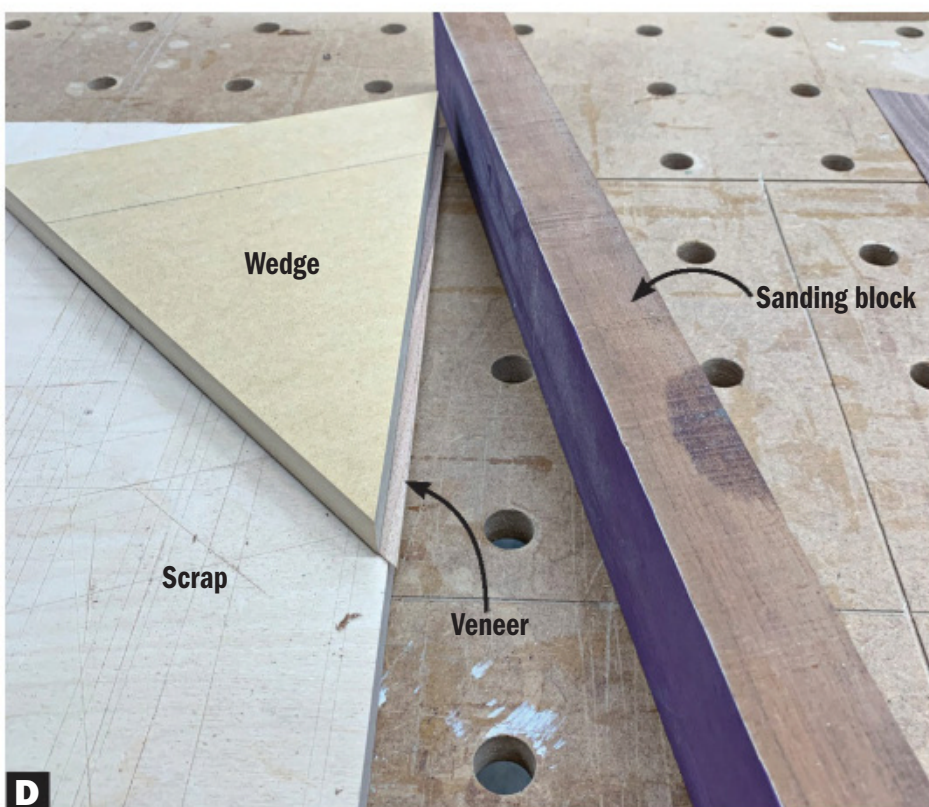
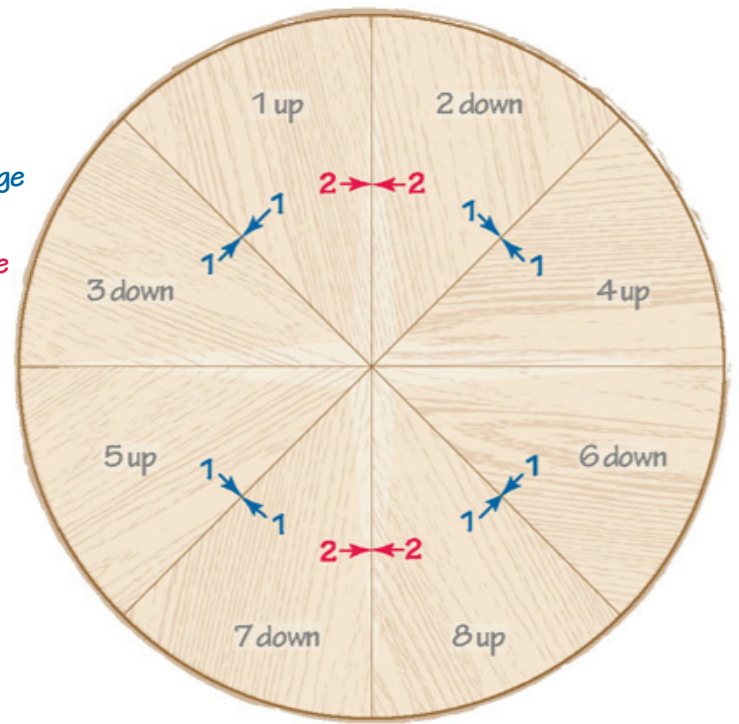
Place a long straightedge over the point where the four wedges meet [Photo F], trim away the excess material from the outer pieces, and shoot the edge as before. Repeat on the other half, then tape the two halves together.

To keep the completed panel stable, the back side of the substrate must also be veneered [Photo G].

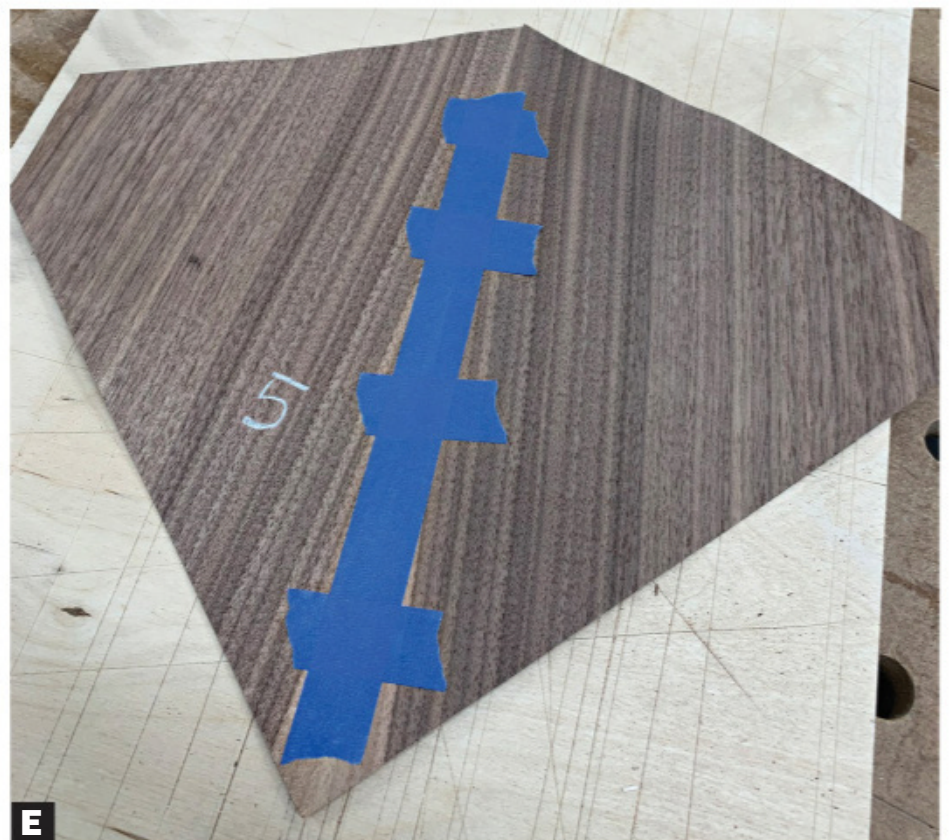
1 BOOKMATCH ASSEMBLY GUIDE

1 - Edges cut on right side of wedge

2 - Edges cut on left side of wedge



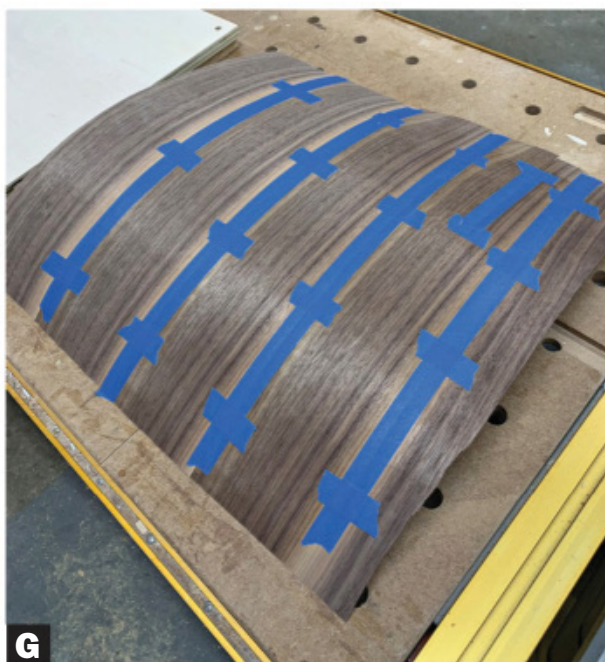
D Attach 120-grit sandpaper to a straight scrap. With the mating edges of two veneer wedges overhanging a scrap of plywood, press the veneer in place with the MDF wedge, and gently sand a straight edge.



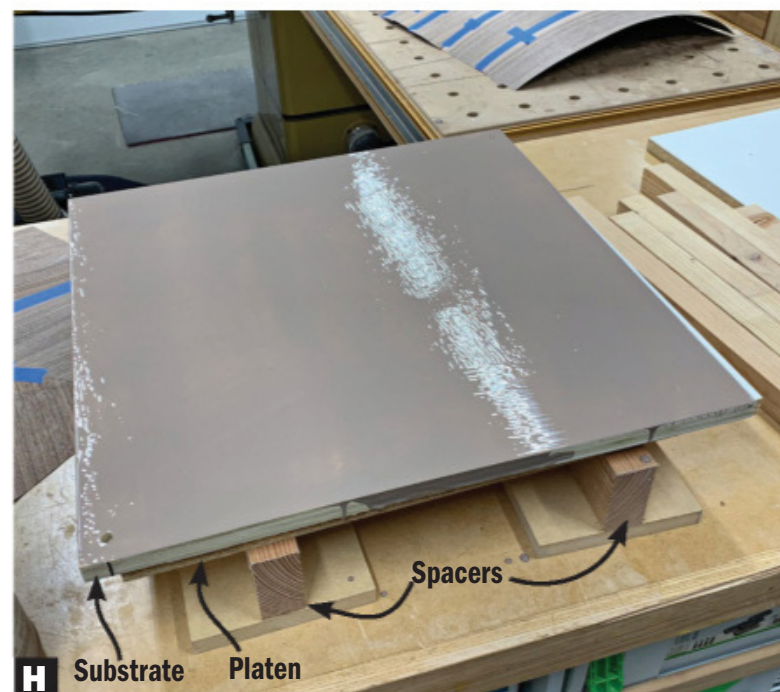
E Stretch short strips of tape across the joint to pull it together. Then run a strip the full length of the joint. Join two two-piece sections to make a half.



F Position the straightedge to make the exposed “keeper” portions of the two outside wedges equal sizes.



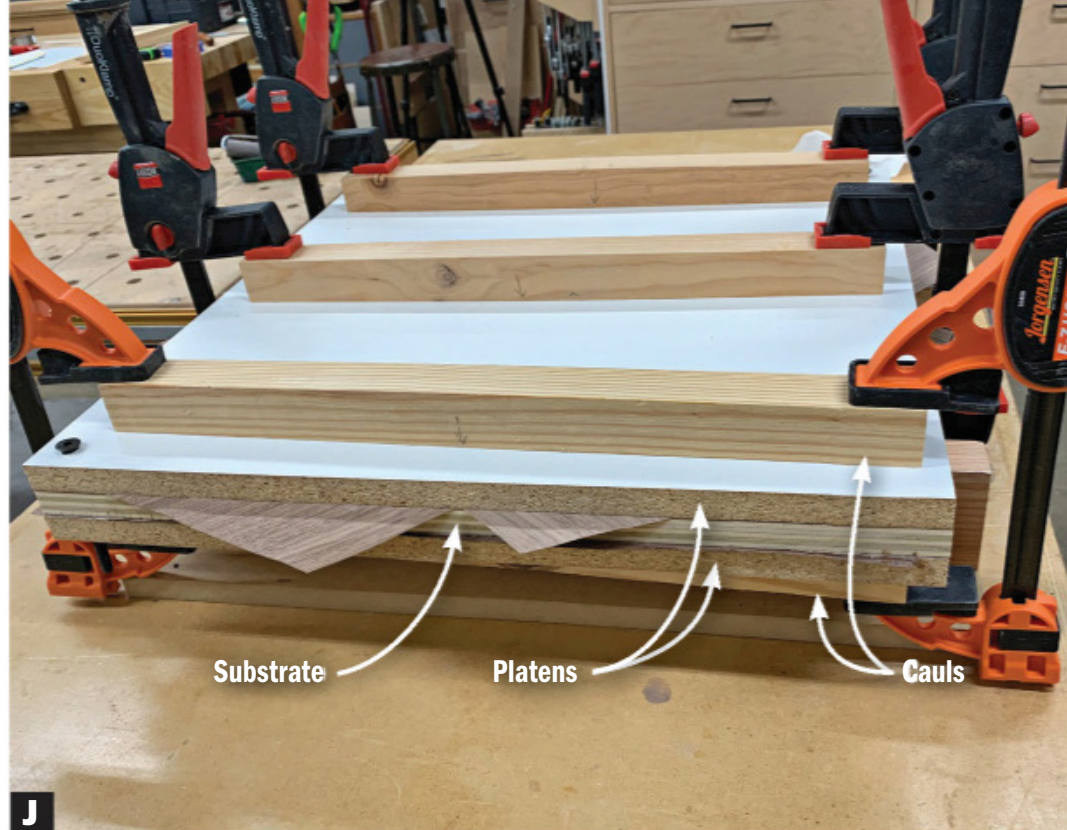
G Backer veneer for the underside of the substrate can be of any species and need not have a fancy pattern. Shoot the edges as for the starburst, then tape the pieces together.



H Spread a thin, even coat of glue. Don't overdo it; excess glue can press through the veneer, causing finish problems.



I Roughly center the starburst pattern on the substrate. Make sure the veneer doesn't cover the corner holes.



J Pair cauls on each face of the glue-up with the crown against each platen. The cauls distribute pressure across the full width of the platens.

► Any type of yellow woodworking glue works.

On your bench, place a couple of 2"-wide scraps just longer than the platens, then set on them a platen, and the substrate. Spread glue over the face of the substrate only [Photo H]. Place the backer veneer on the glued surface and secure it with a few pieces of painters tape. Flip the substrate over and repeat the process on the other side with the sunburst veneer [Photo I]. Line up the holes in the platens and substrate, drop in a ¼" bolt to prevent the pieces from slipping, and clamp [Photo J].

Round things up

► Build a simple trammel for your router.
woodmagazine.com/routcircle

While the veneer dries, glue up a border that will surround the field. Mill the lumber about ⅜" thicker than the veneered top, 3¼" wide, and at least 84" long. Miter-cut each end of twelve segments at 15° [Drawing 2], then glue these into a circle [Photo K].

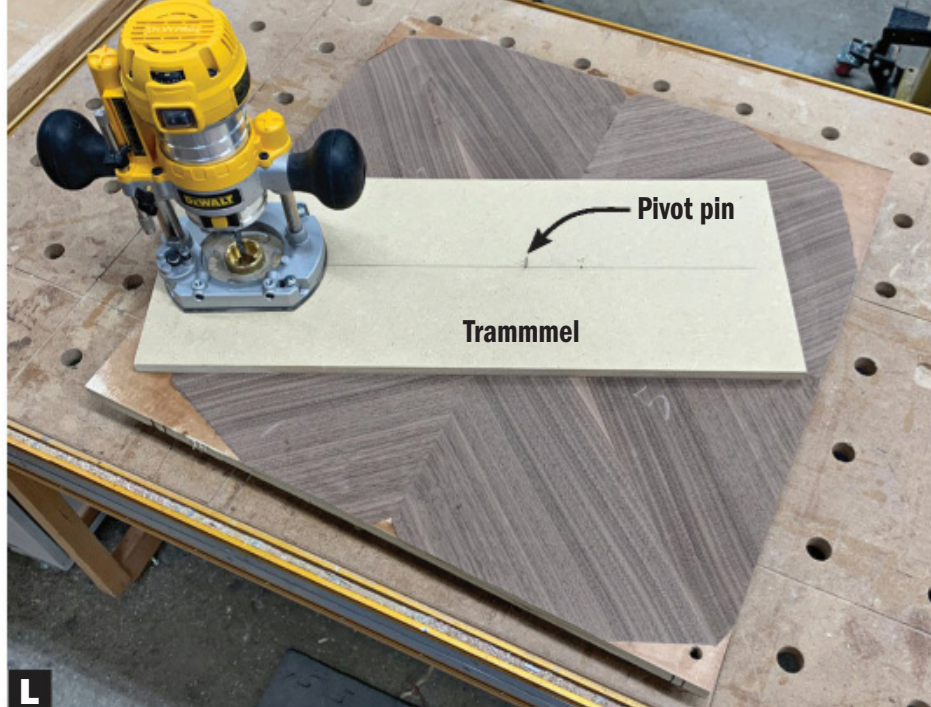
While the border dries, install a ¼" down-cut spiral bit in your router, attach it to a trammel, and set it to cut a 10" radius, measuring to the *inside* of the bit.



K Dry-fit the segments and check for gaps before gluing up the circle. A band clamp pulls everything together.

2 BORDER SEGMENT





L A finish nail makes a good pivot pin for the trammel. Use another nail in your drill to make a matching hole in the veneer substrate.

Tip! Use a heat gun to soften the tape adhesive so it doesn't pull wood fibers from the veneer.

Unclamp the veneered top and peel away the tape. Then drill a hole to accept the pivot pin for the trammel where the veneer points meet [Photo L].

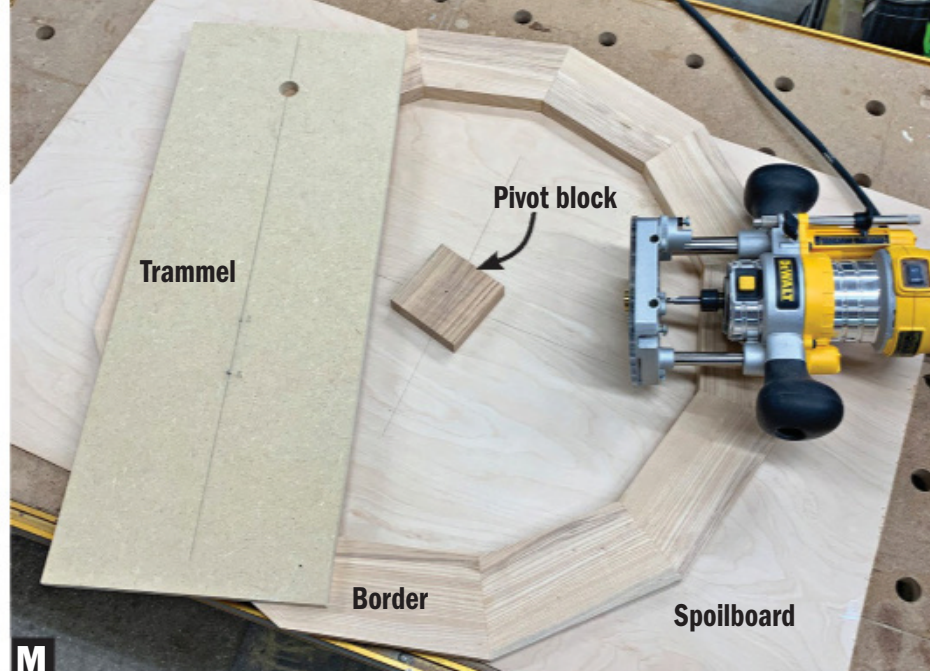
Rout the veneered field round taking three successively deeper passes. Make the first pass in a clockwise direction (a climb cut) to prevent tear-out of the veneer.

After the border dries, sand it to 120 grit. Make a spoilboard from a piece of plywood large enough to hold the border, and mark centerlines on the length and width. Line up the miter joints on the border with these marks to center the assembly on the spoilboard. Secure the border with screws from below, placing them so they won't fall into the 10"- or 12"-radius cutting path of the router bit. Center and secure a 3"-square pivot block [Photo M].

Reset the trammel to cut a 10" radius, measured to the *outside* of the bit, and rout the inside of the border [Photo N]. Then set



N Rout through the border in consecutively deeper passes, just as you did with the field.



M Draw diagonal lines to find the center of the pivot block, align them with the lines on the spoilboard, and screw the block in place. Drill a centered hole in the block to fit the trammel pivot pin.

the trammel to 12" to the *inside* of the bit and rout the outside of the border.

To glue the border to the field, I use a slow-setting epoxy. This fills small gaps between them and won't swell the wood fibers. This bond also reinforces the mitered border joints.

After the epoxy cures, install an inlay between the border and the field. To do this, mount a $\frac{1}{8}$ " straight bit in the router, and set the trammel so the center of the bit falls on the center of the seam between the field and border. Make two passes to cut $\frac{1}{8}$ " deep. Cut $\frac{1}{8}$ "-thick inlay material $\frac{3}{16}$ " wide to fit the groove without hammering it in. Glue this in with PVA glue, allow it to dry for several hours, then work the inlay flush [Photo O].

Rout a $\frac{1}{4}$ " round-over on the top and bottom edges. Cover the trammel pivot-pin hole by drilling a larger ($\frac{3}{8}$ ") hole then filling it with a face-grain plug. 🌲



Guy Dunlap teaches woodworking online and in his home shop. Watch his online videos on YouTube (Guyswoodshop) and at guyswoodshop.com.

Illustrations: Lorna Johnson



O Plane away most of the inlay, then finish up with a card scraper and sandpaper, being careful to not sand through the veneer.



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A

The bottom edge of the ring rests in a plane. Placing that plane on an out-of-round surface shows gaps. Remove material from the high spots.



B

On a smooth, consistent arc, the ring touches all around. The larger the ring, the more accurate the measurement, and the larger the area you can check.

Put a ring on it

A basic geometric principle—a planar section of a sphere creates a circle—provides a simple method for using a ring to check the shape of the urn as you work [Photos A, B].

Tip! Find scraps of solid-surface material at countertop fabricators.

Rings made from a solid-surface material or a similar material prove more stable and less likely to crack than wood ones. Make a 3" and a 1 1/4" ring from a 1/2 x 3"-diameter blank [Photo C]. (Diameters are not critical.) Taper the outside, then part straight in to the interior to separate the ring from the blank, creating a crisp, narrow edge.



C

Turn a glue chuck and mount the blank to it with cyanoacrylate (CA) glue. Turn the blank round, then use a thin parting tool to turn the 3" ring. Round the blank's outside edge again to about 1 1/4" diameter, and turn the second ring.

Select a blank

► Allow one cubic inch of internal volume for each pound of your pet's weight. This 5"-diameter urn with 1/4"-thick walls will hold cremains for a pet up to about 45 pounds. Calculate the urn size for your pet. woodmagazine.com/spherevolume

You can laminate a blank from thinner material, but a solid blank eliminates joint lines, providing a more pleasing grain pattern. For a 5"-diameter urn, we started with a green (undried) 7" cube of walnut cut from a 16"-diameter log. This avoided the pith and sapwood. Rough-cut the blank to just over 6" diameter, leaving it 7" long.

Shape the outside of the urn

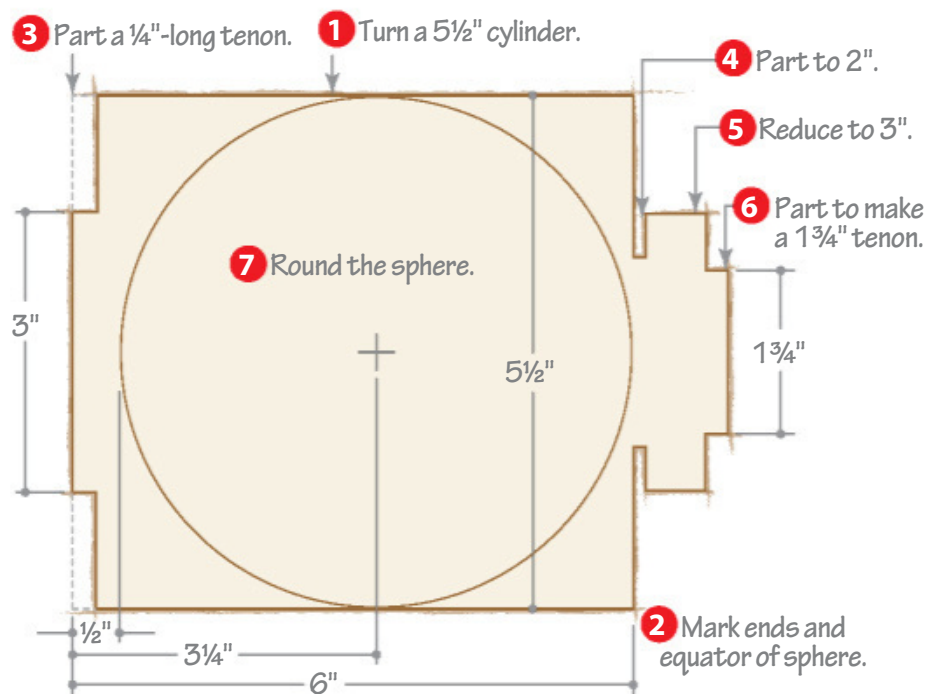
Mount the blank between centers and, using a spindle roughing gouge, turn it to a 5 1/2" cylinder [Drawing]. Mark lines 1/2", 3 1/4", and 6" from the left end to mark the two ends and the middle, or equator, of the sphere.

With a parting tool, cut a 3"-diameter tenon 1/4" long on the left end. At the 6" line, part to a 2" diameter. Reduce the blank to the right of the cut to 3". Create a tenon 1 3/4" in diameter and 1/4" long on the right end.

► Don't worry about shaping a perfect sphere at this point, but get as close as possible. The blank will change shape slightly as it dries, so you'll refine the exterior later.

Rough-shape the sphere with a spindle detail gouge, removing material toward the ends with the initial cuts and starting closer to the equator with each successive cut. Maintain the centerline, redrawing it if nec-

SHAPING THE URN

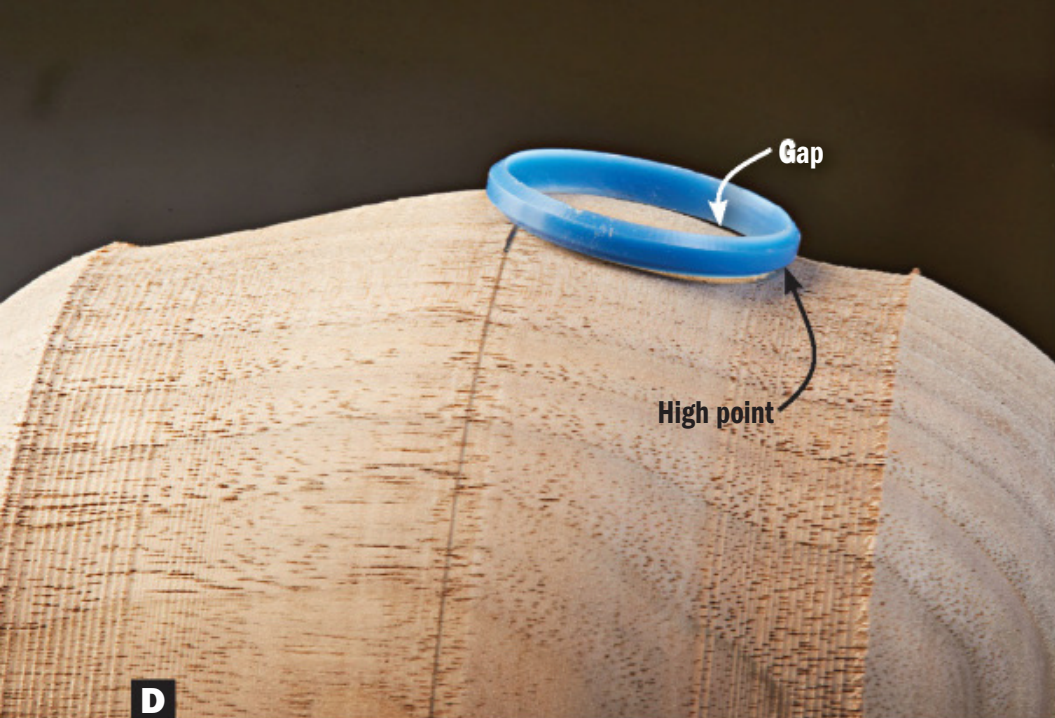


essary. Stop frequently and place the small ring on the equator to check your progress. Work toward making a slightly elongated (football-shape) sphere [Photo A].

Fine-tune the shape, working about 2" to both sides of the equator as shown in Photo B. Once the ring rests along the equator with no gaps, slide it to the right until you see a



Tip! Slip the rings over your tool to keep them close at hand.



D Note the location of the high point, begin the next cut at that point, and work to the right.

gap [Photo D]. Mark the high spot and continue extending the curve to the right until the large ring rests without gaps [Photo E]. After shaping the right half of the sphere to the parting cut, repeat on the left side until you match the tenon.

Hollow the urn and let it dry

Grip the tenon on the left end in a four-jaw chuck and separate the plug blank from the sphere [Photo F]. Drill a hole [Photo G], then create an opening about 1¾" in diameter [Photo H], and hollow the vessel.

An object turned from green wood changes shape slightly as it dries. So set aside the rough-turned vessel and plug for at least two weeks to air-dry in a climate-controlled location. Weigh the blanks every few days; when they stop losing weight, they have reached equilibrium and are ready to turn to finished shape.

► Learn the steps to hollow a vessel.
woodmagazine.com/hollowturn



E As larger areas of the blank become an arc, turn off the lathe and check your work with the large ring.



F Separate the plug blank from the sphere at the original parting cut.



G Drill a ½" hole 4½" deep to define the depth of the interior cuts.



H Alternate between straight and bent tools to achieve a ½" wall thickness to the bottom of the drilled hole. Don't sweat minor inconsistencies in thickness.



I Use a squarenose scraper to make a 2"-diameter mortise $\frac{3}{16}$ " deep.



J Press a cone center against the urn to help stabilize the workpiece. Continue shaping the remainder of the sphere.



K Use a parting tool to create a $\frac{3}{16}$ "-long tenon. Check the fit in the urn opening.



L With a skew chisel, slightly undercut the shoulder from the outside diameter of the plug to the tenon.



M Use a spindle detail gouge to form a half cove between the $\frac{3}{16}$ " line and the tenon shoulder.

Turn the final shape

Remount the urn in the four-jaw chuck and transfer the centerline onto the tool rest. Using a spindle roughing gouge, round on both sides of the equator as before, checking your progress with the rings. Then, transfer the centerline back onto the vessel. Switch to a spindle detail gouge and finish shaping the exterior as before.

Next, form a mortise to fit your four-jaw chuck [Photo I]. Sand the exterior of the urn, then remount it by expanding the chuck jaws into the mortise [Photo J]. After shaping close to the cone center, remove the tail-stock, turn away the waste, and sand the newly turned area smooth.

Make a plug

Retrieve the cutoff from the original blank and grip the tenon in the four-jaw chuck. Reduce the diameter to 2½" with a spindle roughing gouge. Then, form a tenon to fit the recess in the urn [Photo K]. Then, slightly

undercut the tenon shoulder so the shoulder contacts the urn only along its outside edge for a gap-free fit [Photo L].

Turn the blank around and grip the tenon in the four-jaw chuck. Mark lines $\frac{3}{16}$ " and $\frac{1}{2}$ " from the chuck. Part off material to the right of the $\frac{1}{2}$ " line. Make a 2"-diameter tenon $\frac{1}{16}$ " long on the end, then form the cove [Photo M]. Finish-sand the outside edge and cove, then drill a $\frac{1}{8}$ " hole centered on the plug.

Stand it on a base

From 1" stock, cut a 3½"-square base. Drill a 2" hole $\frac{1}{16}$ " deep, centered on the top face. Finish-sand the base, then apply a finish to all pieces. (We wiped on three coats of Arm-R-Seal semigloss oil-base polyurethane.) Screw the plug to the base with a #6×1¼" panhead screw. After placing cremains in the urn, glue the plug in place with CA glue. Order a plaque from a local trophy or gift shop, or online. 🌲

► Watch a video of turning the urn.
woodmagazine.com/turnedurn

Produced by **Craig Ruegsegger**
with **Brian Simmons**
Project design: **Brian Simmons**
Illustrations: **Roxanne LeMoine,**
Lorna Johnson



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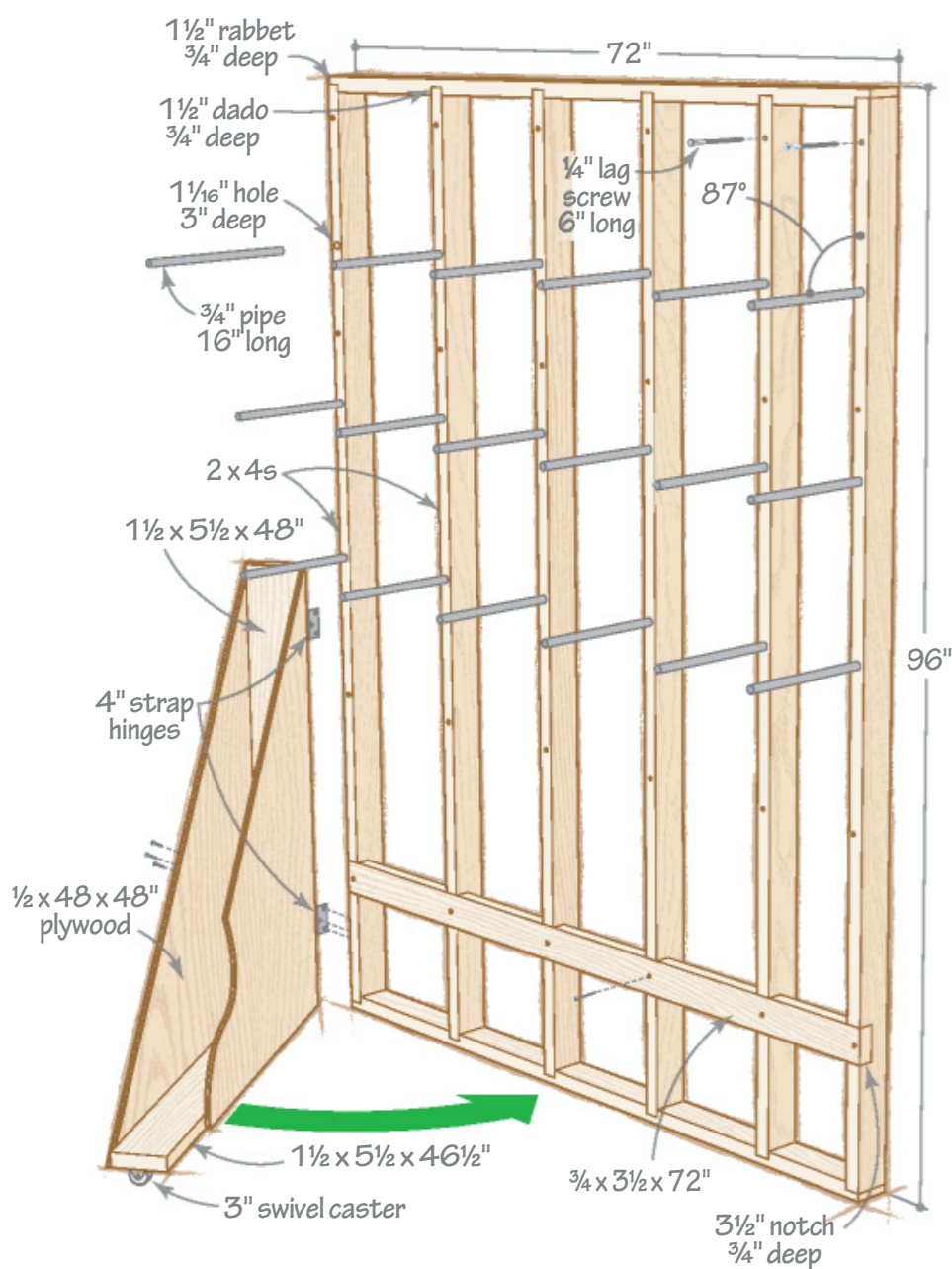
Amazoy is the Trademark Registered U.S. Patent Office for our Meyer Zoysia grass.

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Hug-the-wall Lumber Storage

This wood storage system, designed by Dale Heisinger of Orcas Island, Wash., packs a lot of lumber into a small footprint. If your shop doesn't have exposed studs, lag-screw 2×4s to the studs behind the finished wall. Drill 3"-deep holes angled at 3° and install lengths of black pipe. Toward the bottom of the rack, a horizontal 1×4 captures short lengths of flat stock and dowels between the 2×4s.

The swinging sheet-goods rack consists of a vertical and horizontal 2×6 faced with 4×4' sheets of plywood cut on the diagonal. Attach the rack to the end 2×4 with a pair of hinges. The unit swings out easily on a swivel caster near the end of the rack, providing ready access to materials stored behind. Dale hangs his tablesaw's crosscut sled on the outside face. 🌲



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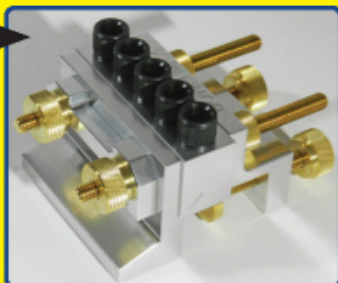
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The **PRO XL DRT** has dual-rotating tines for both cultivating and sod-busting!



1AC67X © 2020

FREE SHIPPING
6 MONTH TRIAL

Some Limitations Apply

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DRrototiller.com
TOLL FREE **888-213-2037**



Forrest Sharpening

Helps Prevent Bad Cuts Like These

NEW Website!
More Blades!



Abrasion, pitch buildup, micro chipping and poor sharpening jeopardize the life and performance of even the finest carbide-tipped blades and dado sets. Our expert factory sharpening will help protect your investment. We handle all types and makes of blades. Typical turn-around is just 4 to 5 days.

We've been the leader for over 60 years, so contact us today.

FORREST

The First Choice of Serious Woodworkers Since 1946

www.ForrestBlades.com
1-800-733-7111
(In NJ, call 973-473-5236)

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Outdoor Entertaining

Downloadable Plan Super Bundle



Create the ultimate backyard for outdoor entertaining!

woodstore.net/outdoorentertaining

Best of the best



Makita XPK02, \$170

- ▶ Voltage: 18 ▶ Weight (bare): 6 lb. 11 oz.
- ▶ 5.0 Ah battery \$130; charger \$100
- ▶ 2 knives (replacements \$15 per pair)
- ▶ Includes: knife wrench and knife-setting tool
- ▶ Pros: Powerful; left/right chip-ejection port prevents clogs; shallower chamfer settings possible than with most planers; Bluetooth module allows for wireless connectivity to similarly equipped dust extractor
- ▶ Cons: 1 3/4" ID port requires large (often unwieldy) vacuum hose

800-462-5482, makitatools.com

Quick-shave artists

You might think of a power planer only for trimming a door, but don't sell this handy tool short. With one, you can flatten a board or slab too wide to fit through a thickness planer; flatten a chainsawn bowl blank to attach a faceplate for turning; chamfer edges using the V-notch in the tool's baseplate; and more. Most come with long-lasting, carbide-tipped, double-edged knives. Most also have a kickstand to prevent accidental cuts (and protect the knives) while resting on its baseplate. Here's our rundown on eight top cordless models (priced as bare tools with no battery or charger). All but one have 3 1/4" cut capacity.

▶ Learn more about cordless planers.
woodmagazine.com/handplaner

Best of the best



Milwaukee 2623-20, \$220

- ▶ Voltage: 18 ▶ Weight (bare): 6 lb. 5 oz.
- ▶ 5.0 Ah battery \$130; charger \$80
- ▶ 2 carbide knives (replacements \$15 per pair)
- ▶ Includes: knife wrench and knife-setting tool
- ▶ Pros: Left/right chip-ejection ports; kickstand can be locked out of the way; also sold in a kit with 3.0 Ah battery, charger, and edge guide (no. 2623-21, \$320)
- ▶ Cons: none

800-729-3878, milwaukeetool.com



Bosch PLH181B, \$200

- ▶ Voltage: 18 ▶ Weight (bare): 4 lb. 7 oz.
- ▶ 4.0 Ah battery and charger kit \$120
- ▶ 1 carbide knife (replacements \$15 per pair)
- ▶ Includes: knife wrench, edge guide
- ▶ Pros: Left/right chip-ejection ports; shallower chamfer settings possible; lightest among the 18- and 20-volt tools
- ▶ Cons: Single-knife cutterhead cuts slower; the only model without a kickstand

877-267-2499, boschtools.com



Ridgid R8481B, \$160

- ▶ Voltage: 18 ▶ Weight (bare): 5 lb. 11 oz.
- ▶ 6.0 Ah battery \$130; dual-port charger \$80
- ▶ 2 carbide knives (replacements \$15 per pair)
- ▶ Includes: knife wrench, edge guide, chip-collection bag
- ▶ Pros: Left/right chip-ejection ports; shallower chamfer settings possible; kickstand can be locked out of the way
- ▶ Cons: Chip bag fills quickly; dust ports difficult to match with vacuum hose

866-539-1710, ridgidpowertools.com



DeWalt DCP580B, \$180

- ▶ Voltage: 20 ▶ Weight (bare): 5 lb. 9 oz.
- ▶ 5.0 Ah battery \$100; charger \$100
- ▶ 2 carbide knives (replacements \$15 per pair)
- ▶ Includes: knife wrench, edge guide
- ▶ Pros: Powerful; cleanest cut; good chip ejection; storage space for an extra set of knives (not included)
- ▶ Cons: Loudest among this group—by a lot

800-433-9258, dewalt.com



Ryobi P611, \$85

- ▶ Voltage: 18 ▶ Weight (bare): 5 lb. 3 oz.
- ▶ 4.0 Ah battery \$70; charger \$40
- ▶ 2 carbide knives (replacements \$15 per pair)
- ▶ Includes: knife wrench, edge guide, chip-collection bag
- ▶ Pros: Left/right chip-ejection ports
- ▶ Cons: Chip bag fills quickly; dust ports difficult to match with vacuum hose

800-525-2579, ryobitools.com



Bosch GH012V-08N, \$180

- ▶ Voltage: 12 ▶ Weight (bare): 3 lb. 6 oz.
- ▶ 3.0 Ah battery \$60; charger \$40
- ▶ 2 carbide knives (replacements \$10 per pair)
- ▶ Includes: knife wrench, chip-collection bag; chip deflector
- ▶ Pros: The most compact unit and the only one in the 12-volt platform; comes with an extra set of knives that stores on the tool
- ▶ Cons: Chip bag fills quickly; narrow width (2 3/16") trickier to use on door edges and wood of similar thickness

877-267-2499, boschtools.com



Metabo HPT P18DSL4, \$180

- ▶ Voltage: 18 ▶ Weight (bare): 6 lb.
- ▶ 3.0 Ah battery \$40; charger \$60
- ▶ 2 knives (replacements \$20 per pair)
- ▶ Includes: knife wrench, knife-setting tool, edge guide
- ▶ Pros: Powerful; shallower chamfer settings possible
- ▶ Cons: No port for connecting a vacuum hose

800-706-7337, metabo-hpt.com

SCISSOR SUPER COUPON

OVER 5,000 5 STAR REVIEWS ★★★★★

SUPER BRIGHT LED/SMD WORK LIGHT/FLASHLIGHT

• Super-Strong, Ultra-Lightweight Composite Plastic
• Magnetic Base & 360° Swivel Hook for Hands-Free Operation
• 3-AAA Batteries (included)
• 144 Lumens

ALL IN A SINGLE SUPER POWERFUL LIGHT

COMPARE TO PERFORMANCE \$1352
TOOL MODEL: W2364

ITEM 63878/63991/69567
64005/60566/63601/67227 shown

37703237

Cannot be used with other discounts or prior purchases. Original coupon must be presented. Valid through 5/6/20 while supplies last. Limit 1 FREE GFT per customer per day.

KRAUSE & BECKER

AIRLESS PAINT SPRAYER KIT

Customer Rating ★★★★★

NOW \$164.99

\$219.99

COMPARE TO GRACO \$299
MODEL: 262800

ITEM 62915/60600 shown

37733057

LIMIT 1 - Coupon valid through 5/6/20*

HaulMaster

72" x 80" MOVING BLANKET

Customer Rating ★★★★★

NOW \$5.99

\$8.99

COMPARE TO BLUE HAWK \$19.99
MODEL: 77280

ITEM 69505/62418/66537 shown

37735303

LIMIT 4 - Coupon valid through 5/6/20*

Bauer

6 GALLON, 4 PEAK HP WET/DRY VACUUM

Customer Rating ★★★★★

NOW \$44.99

\$54.99

COMPARE TO DEWALT \$76.63
MODEL: D1XV6P

ITEM 56201

37750472

LIMIT 3 - Coupon valid through 5/6/20*

Bauer

6.5 AMP CORDED TRIM ROUTER

Customer Rating ★★★★★

NOW \$59.99

\$69.99

COMPARE TO MAKITA \$99
MODEL: RT0701C

ITEM 64944

37763239

LIMIT 1 - Coupon valid through 5/6/20*

SCISSOR SUPER COUPON

20% OFF

ANY SINGLE ITEM*

37711651

Limit 1 coupon per customer per day. Save 20% on any 1 item purchased. *Cannot be used with other discount, coupon or any of the following items or brands: Inside Track Club membership, Extended Service Plan, gift card, open box item, 3 day Parking Lot Sale item, compressor, floor jacks, sales, storage cabinets, chests or carts, trailers, welders, Admiral, Ames, Atlas, Bauer, Central Machinery, Cobra, CoverPro, Dayton, Diamondback, Earthquake, Fischer, Hercules, Icon, Japintex, Lynx, Posi-Loc, Predator, Tailgator, Viking, Vulean, Zentech. Not valid on prior purchases. Non-transferable. Original coupon must be presented. Valid through 5/6/20.

GOOD

Standard Features and Accuracy

12" DUAL-BEVEL SLIDING COMPOUND MITER SAW

Customer Rating ★★★★★

Not available in AZ, OH, OK, and VA.

3-1/2" VERTICAL CROWN MOULDING CAPACITY
2-5/8" TALL SLIDING FENCES
LASER GUIDE LIGHT

ITEM 56597 \$129.99
56775/61970 \$159.99
61969 shown

Blade sold separately.

COMPARE TO \$218.71
W2090A15R MODEL: 2657

SAVE \$88

37736163

LIMIT 1 - Coupon valid through 5/6/20*

BETTER

Superior Features and Accuracy

12" DUAL-BEVEL SLIDING COMPOUND MITER SAW WITH LED AND LASER GUIDE

Customer Rating ★★★★★

6-1/2" VERTICAL CROWN MOULDING CAPACITY
4-1/2" TALL SLIDING FENCES
LASER GUIDE LIGHT & LED WORK LIGHT

FREE BLADE INCLUDED

ITEM 64686 \$179.99
\$199.99 VALUE

COMPARE TO RYOBI \$269
MODEL: TSS12QL

SAVE \$90

37738791

LIMIT 1 - Coupon valid through 5/6/20*

BEST

Jobsite Features and Accuracy

PROFESSIONAL 12" DUAL-BEVEL SLIDING COMPOUND MITER SAW WITH LED SHADOW GUIDE

Customer Rating ★★★★★

7-1/2" VERTICAL CROWN MOULDING CAPACITY
4-3/4" TALL SLIDING FENCES
LED PRECISION SHADOW GUIDE LIGHT

FREE BLADE INCLUDED

ITEM 56682 \$329.99
\$349.99 VALUE

COMPARE TO DEWALT \$599
MODEL: DW5760

SAVE \$270

37745227

LIMIT 1 - Coupon valid through 5/6/20*

WARRIOR

29 PIECE TITANIUM DRILL BIT SET

Customer Rating ★★★★★

NOW \$10.99

\$18.99

COMPARE TO DEWALT \$68.14
MODEL: DW1369

ITEM 5889/62281/61637 shown

37753479

LIMIT 4 - Coupon valid through 5/6/20*

ADMIRAL

12", 80 TOOTH FINISHING SAW BLADE

Customer Rating ★★★★★

NOW \$19.99

\$26.99

COMPARE TO DEWALT \$59.98
MODEL: DW3232PT X

ITEM 64911 \$26.99
62725 shown

37753967

LIMIT 5 - Coupon valid through 5/6/20*

CHICAGO - ELECTRIC

MOBILE MITER SAW STAND

Customer Rating ★★★★★

Supports 16 ft.

SAVE \$69

COMPARE TO HITACHI \$169
MODEL: UR240F

ITEM 63409/62750 shown

37760306

LIMIT 2 - Coupon valid through 5/6/20*

CENTRAL MACHINERY

12" x 33-3/8" WOOD LATHE WITH REVERSIBLE HEAD

Customer Rating ★★★★★

NOW \$299.99

\$399.99

COMPARE TO NOVA \$440
MODEL: 572255975

ITEM 34706

37766031

LIMIT 1 - Coupon valid through 5/6/20*

Lifetime CARBIDE

ALUMINUM OXIDE SANDING SPONGES PACK OF 10

Customer Rating ★★★★★

Item 46751 shown

COARSE ITEM 46751/63918
MEDIUM ITEM 46752/63915
FINE ITEM 63912/46753

YOUR CHOICE \$3.99

SAVE 20% \$4.99

37774989

LIMIT 6 - Coupon valid through 5/6/20*

PITTSBURGH

12" RATCHETING BAR CLAMP/SPREADER

LIFETIME WARRANTY

Customer Rating ★★★★★

COMPARE TO IRWIN \$19.98
MODEL: 1964718

ITEM 62123/46807/63017/69222 shown

37775133

LIMIT 6 - Coupon valid through 5/6/20*

US GENERAL

30", 5 DRAWER MECHANIC'S CARTS

Customer Rating ★★★★★

15,000 cu. in. of storage
700 lb. capacity
Heavy duty locking casters

Item 64031, 56429, 64033, 64059, 64721, 64722, 64720

37731109

LIMIT 1 - Coupon valid through 5/6/20*

YOUR CHOICE OF 7 COLORS \$199.99

\$229.99

COMPARE TO Snap-On BLUE-POINT MODEL: KR8C10TRPES \$830

SAVE \$630

Bauer

SCISSOR SUPER COUPON

15 AMP, 12-1/2" PORTABLE THICKNESS PLANNER

Customer Rating



Four-carriage frame reduces the movement that causes snipe

Two-knife cutter head leaves a blemish-free surface

Extra long in-feed and out-feed tables provide over 31" of material support

Handles lumber 12-1/2" wide to 6" thick

**NOW \$299.99**~~\$349.99~~

COMPARE TO DEWALT \$449 MODEL: DW734

SAVE \$149

ITEM 63445



LIMIT 1 - Coupon valid through 5/6/20*

BRAUN

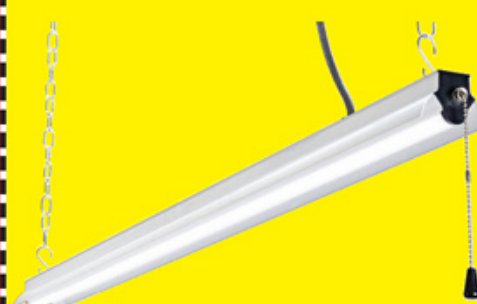
SCISSOR SUPER COUPON

5000 LUMEN 4 FT. LED HANGING SHOP LIGHT

Customer Rating



• 30,000 hour LED life

**SAVE 33%**

ITEM 64410

~~\$29.99~~**NOW \$19.99**

LIMIT 3 - Coupon valid through 5/6/20*

McGRAW

SCISSOR SUPER COUPON

Customer Rating

**20 GALLON, 135 PSI OIL-LUBE AIR COMPRESSOR**

• Air delivery: 4.0 SCFM @ 90 PSI

~~\$199.99~~**NOW \$174.99**

COMPARE TO PORTER-CABLE \$249.99 MODEL: 118903799

SAVE \$75

ITEM 56241/64857 shown



LIMIT 1 - Coupon valid through 5/6/20*

PITTSBURGH

SCISSOR SUPER COUPON

60" ALUMINUM F-STYLE BAR CLAMP

Customer Rating

**LIFETIME WARRANTY**

COMPARE TO SHOP FOX \$35.95 MODEL: D2468

SAVE 69%

ITEM 60673

NOW \$10.99~~\$16.99~~

LIMIT 3 - Coupon valid through 5/6/20*

CHICAGO ELECTRIC POWER TOOLS

SCISSOR SUPER COUPON

10", 15 AMP BENCHTOP TABLE SAW

Customer Rating



Stand sold separately.

COMPARE TO RYOBI \$229 MODEL: RTS22

~~\$144.99~~**NOW \$114.99**

ITEM 45804/63117/64459/63118 shown



LIMIT 1 - Coupon valid through 5/6/20*

CENTRAL MACHINERY

SCISSOR SUPER COUPON

70 GALLON, 2 HP HEAVY DUTY HIGH FLOW HIGH CAPACITY DUST COLLECTOR

Customer Rating

**NOW \$179.99**~~\$209.99~~

COMPARE TO SHOP FOX \$405.99 MODEL: W1685

SAVE \$226

ITEM 61790/97869 shown



LIMIT 1 - Coupon valid through 5/6/20*

CENTRAL MACHINERY

SCISSOR SUPER COUPON

14" OSCILLATING SPINDLE SANDER**NOW \$109.99**~~\$147.99~~

Customer Rating



COMPARE TO TRITON TOOLS \$152.99 MODEL: TSPS450

SAVE \$43

ITEM 62146/69257 shown



LIMIT 1 - Coupon valid through 5/6/20*

FRANKLIN

SCISSOR SUPER COUPON

Customer Rating

**HEAVY DUTY PORTABLE SCAFFOLD****NOW \$169.99**~~\$209.99~~

COMPARE TO BAKER \$260.40 MODEL: I-CISNB

SAVE \$90

ITEM 69055 63051/63050 shown



LIMIT 1 - Coupon valid through 5/6/20*

VOYAGER

SCISSOR SUPER COUPON

15" TOOL BAG WITH 14 POCKETS**NOW \$6.99**~~\$10.99~~

COMPARE TO HUSKY \$12.97 MODEL: 823035N12

SAVE 46%

Customer Rating



ITEM 94993/62348/62341/61469 shown



LIMIT 6 - Coupon valid through 5/6/20*

PREDATOR

SCISSOR SUPER COUPON

4000 WATT MAX. STARTING GAS POWERED GENERATOR

• 10 hour run time

Customer Rating

**NOW \$299.99**~~\$349.99~~

Not available in AZ, OH, OK and VA.

Wheel kit sold separately.

COMPARE TO HONDA \$1,939

ITEM 63080/69729/56172/56174/63079 shown

ITEM 63089/56173/56175/63090, CALIFORNIA ONLY



LIMIT 1 - Coupon valid through 5/6/20*

WARRIOR

SCISSOR SUPER COUPON

18 PIECE, 3/4" - 5" CARBON STEEL HOLE SAW SET

Customer Rating

**NOW \$9.99**~~\$16.99~~

COMPARE TO KOBALT \$96.90 MODEL: 9224

SAVE 89%

ITEM 69073/68115 shown



LIMIT 6 - Coupon valid through 5/6/20*

WINDSOR DESIGN

SCISSOR SUPER COUPON

DOVETAIL JIG

Customer Rating



COMPARE TO GENERAL TOOLS \$47.16 MODEL: 861

SAVE 40%

ITEM 34102



LIMIT 3 - Coupon valid through 5/6/20*

HARDY

SCISSOR SUPER COUPON

POWDER-FREE NITRILE GLOVES PACK OF 100

• 5 mil thickness

SAVE 59%

COMPARE TO VENOM \$14.97 MODEL: VEN4145

NOW \$5.99~~\$7.99~~

ITEM 37050, 64417, 61363, 68497, 61360, 61359, 68498, 68496, 64418 shown



LIMIT 6 - Coupon valid through 5/6/20*

CHICAGO ELECTRIC POWER TOOLS

SCISSOR SUPER COUPON

4" BISCUIT PLATE JOINER

Customer Rating



COMPARE TO MAKITA \$179 MODEL: P.J7000

SAVE \$134

ITEM 38437 68987 shown



LIMIT 2 - Coupon valid through 5/6/20*

PITTSBURGH

SCISSOR SUPER COUPON

4 PIECE WOOD CHISEL SET WITH CLEAR PVC HANDLE

LIFETIME WARRANTY

Customer Rating

**NOW \$5.99**~~\$7.99~~

COMPARE TO DEWALT \$29.97 MODEL: DWHT16063

ITEM 42429/69471 shown



LIMIT 6 - Coupon valid through 5/6/20*

CENTRAL MACHINERY

SCISSOR SUPER COUPON

8", 5 SPEED BENCHTOP DRILL PRESS

Customer Rating

**NOW \$54.99**~~\$69.99~~

COMPARE TO WEN \$79.97 MODEL: 4208

ITEM 38119/62520/60238 shown



LIMIT 1 - Coupon valid through 5/6/20*

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*Original coupon only. No use on prior purchases after 30 days from original purchase or without original receipt. Valid through 5/6/20.

At Harbor Freight Tools, the "Compare to" price means that the specified comparison, which is an item with the same or similar function, was advertised for sale at or above the "Compare to" price by another national retailer in the U.S. within the past 90 days. Prices advertised by others may vary by location. No other meaning of "Compare to" should be implied. For more information, go to HarborFreight.com or see store associate.

AVANTI **SUPER COUPON**

HVLP HANDHELD PAINT SPRAYER

Customer Rating ★★★★★

Advanced HVLP nozzle delivers high volume

3X FASTER THAN MANUAL APPLICATION

1-1/2 quart cup covers up to 40 ft. of fence

High performance trigger activated motor

Super-fast cleanup

~~\$99.99~~ **NOW \$69.99**

SAVE \$30

ITEM 64934

37860299

LIMIT 1 - Coupon valid through 5/6/20*

CENTRAL MACHINERY **SUPER COUPON**

16" VARIABLE SPEED SCROLL SAW

Customer Rating ★★★★★

COMPARE TO PORTER-CABLE \$199

MODEL: PCBS75SS

ITEM 62519/63283/93012 shown

SAVE \$129

~~\$99.99~~ **NOW \$69.99**

37863256

LIMIT 2 - Coupon valid through 5/6/20*

FRANKLIN **SUPER COUPON**

17 FT. TYPE IA MULTI-TASK LADDER

• Versatile - 24 configurations

• Safe + Secure + Stable

• Super Strong - Holds 300 lbs.

• Weighs 34 lbs.

OSHA/ANSI COMPLIANT

Customer Rating ★★★★★

COMPARE TO LITTLE GIANT \$298.99

MODEL: XE M17

ITEM 63419/67646/62514/63418/63417 shown

SAVE \$189

~~\$139.99~~ **NOW \$109.99**

37864806

LIMIT 3 - Coupon valid through 5/6/20*

CENTRAL PNEUMATIC **SUPER COUPON**

3 GALLON, 100 PSI OIL-FREE AIR COMPRESSORS

• Air delivery: 0.6 CFM @ 90 PSI

Customer Rating ★★★★★

YOUR CHOICE \$39.99

SAVE 59%

COMPARE TO PORTER-CABLE \$98.62

MODEL: PCFP02003

ITEM 69269 97080 shown

ITEM 61615/60637 95275 shown

37866348

LIMIT 2 - Coupon valid through 5/6/20*

PITTSBURGH **SUPER COUPON**

50" CLAMP EDGE AND SAW GUIDE

Customer Rating ★★★★★

LIFETIME WARRANTY

NOW \$14.99

~~\$22.99~~

Tools sold separately.

SAVE 62%

COMPARE TO BORA \$39.98

MODEL: 543050

ITEM 56363/66581 shown

37868819

LIMIT 4 - Coupon valid through 5/6/20*

WARRIOR **SUPER COUPON**

18V LITHIUM-ION 3/8" DRILL/DRIVER KIT

Customer Rating ★★★★★

COMPARE TO RYOBI \$74

MODEL: P1810

ITEM 64118

SAVE 62%

~~\$37.99~~ **NOW \$27.99**

37886643

LIMIT 3 - Coupon valid through 5/6/20*

HaulMaster **SUPER COUPON**

18" WORKING PLATFORM STEP STOOL

Customer Rating ★★★★★

• 350 lb. capacity

NOW \$19.99

~~\$29.99~~

SAVE 50%

COMPARE TO NEOCRAFT \$39.99

MODEL: 60635

ITEM 62515/66911 shown

37882615

LIMIT 3 - Coupon valid through 5/6/20*

SUPER COUPON

DUST AND PARTICLE MASKS PACK OF 5

Customer Rating ★★★★★

NOW 99¢

~~\$1.99~~

SAVE 81%

COMPARE TO ACME UNITED \$9.27

MODEL: ACM13259

ITEM 63723/62606/50027 shown

37886694

LIMIT 4 - Coupon valid through 5/6/20*

HaulMaster **SUPER COUPON**

9" x 72" STEEL LOADING RAMPS SET OF TWO

Customer Rating ★★★★★

NOW \$39.99

~~\$59.99~~

SAVE 49%

COMPARE TO MAXXTOW \$79.77

MODEL: MT70120

ITEM 69591/69646/44649 shown

37886780

LIMIT 2 - Coupon valid through 5/6/20*

Grant's GARAGE **SUPER COUPON**

14" x 13" SHOP TOWELS PACK OF 50

Customer Rating ★★★★★

Mechanic's Choice

NOW \$8.99

~~\$11.99~~

SAVE 50%

COMPARE TO VIKING \$17.98

MODEL: 874900

ITEM 63365/64730/56119 63360 shown

37886913

LIMIT 5 - Coupon valid through 5/6/20*

CHICAGO ELECTRIC WELDING **SUPER COUPON**

170 AMP MIG/FLUX CORED WELDER

Customer Rating ★★★★★

EVERYTHING YOU NEED TO WELD

NOW \$169.99

~~\$189.99~~

SAVE \$530

COMPARE TO HOBART \$699.99

MODEL: 500554

ITEM 6271/61888/56835/68885 shown

37899853

LIMIT 1 - Coupon valid through 5/6/20*

HYDROSTAR **SUPER COUPON**

50 FT. ELECTRIC DRAIN CLEANER

Customer Rating ★★★★★

NOW \$199.99

~~\$249.99~~

SAVE \$229

COMPARE TO COBRA PRO \$429

MODEL: CP3020

ITEM 61856/68285 shown

37901111

LIMIT 1 - Coupon valid through 5/6/20*

drillmaster **SUPER COUPON**

1/4" SHEET ORBITAL PALM SANDER

Customer Rating ★★★★★

NOW \$9.99

~~\$14.99~~

SAVE 66%

COMPARE TO BLACK+DECKER \$29.98

MODEL: BDEQS300

ITEM 40070/61509/61311 shown

37920454

LIMIT 4 - Coupon valid through 5/6/20*

PITTSBURGH **SUPER COUPON**

9 PIECE FULLY POLISHED COMBINATION WRENCH SETS

Customer Rating ★★★★★

LIFETIME WARRANTY

YOUR CHOICE \$5.99

~~\$7.99~~

SAVE 66%

COMPARE TO HUSKY \$17.97

MODEL: HCW10PCSAE

ITEM 42305 shown

37934174

LIMIT 4 - Coupon valid through 5/6/20*

CHICAGO ELECTRIC WELDING **SUPER COUPON**

MIG/FLUX WELDING CART

Customer Rating ★★★★★

NOW \$299.99

~~\$309.99~~

SAVE \$70

COMPARE TO FORNEY \$99.99

MODEL: 117535999

ITEM 61316/131/60790/69340 shown

37946272

LIMIT 3 - Coupon valid through 5/6/20*

SUPER COUPON

7" BENCH BRUSH

Customer Rating ★★★★★

Perfect for workshop, home or car

NOW \$1.49

~~\$1.99~~

SAVE 90%

COMPARE TO TOUGH GUY \$16.36

MODEL: 1A849

ITEM 62617/1072 shown

37949271

LIMIT 5 - Coupon valid through 5/6/20*

Lynxx **SUPER COUPON**

40V LITHIUM-ION 14" BRUSHLESS CHAINSAW

Customer Rating ★★★★★

NOW \$149.99

~~\$189.99~~

SAVE \$49

COMPARE TO KOBALT \$199

MODEL: KCS120-07

ITEM 64715/64478/63287 shown

37955181

LIMIT 1 - Coupon valid through 5/6/20*

PITTSBURGH **SUPER COUPON**

6" DIGITAL CALIPER

Includes two 1.5V SR44 button cell batteries.

Customer Rating ★★★★★

NOW \$9.99

~~\$17.99~~

SAVE 66%

COMPARE TO HUSKY \$29.97

MODEL: 1467H

ITEM 63711/61585/62387/47257 shown

37960835

LIMIT 6 - Coupon valid through 5/6/20*

luminar OUTDOOR **SUPER COUPON**

24 FT., 18 BULB, 12 SOCKET OUTDOOR LINKABLE STRING LIGHTS

Customer Rating ★★★★★

YOUR CHOICE OF COLOR

NOW \$21.99

~~\$27.99~~

SAVE 44%

COMPARE TO PORTFOLIO \$39.98

MODEL: SLC12BK

ITEM 64486 63483 shown

ITEM 64739 shown

37978367

LIMIT 2 - Coupon valid through 5/6/20*

U.S. GENERAL STRONGER • MORE STABLE **SUPER COUPON**

26" x 22" SINGLE BANK EXTRA DEEP CABINETS



- 9800 cu. in. of storage
- 1000 lb. capacity
- Weighs 175 lbs.

37989090
LIMIT 1 - Coupon valid through 5/6/20*

Item 64434, 64432, 64162, 56104, 56105, 56106

Customer Rating
★★★★★
YOUR CHOICE OF 6 COLORS
\$219.99
SAVE \$1,470
COMPARE TO SNAP-ON \$1,750
MODEL: KRA4008FPB0

SUPER COUPON **Customer Rating** ★★★★★

4 PIECE ANTI-FATIGUE FOAM MAT SET

- Each pad measures 25" x 25"

NOW \$6.99
~~\$8.99~~
SAVE 65%
COMPARE TO NORSK \$19.99
MODEL: 001119346

ITEM 40187/61607/62389
94635 shown

37991072
LIMIT 5 - Coupon valid through 5/6/20*

PITTSBURGH SERIES 2 **SUPER COUPON**

*1 SELLING JACKS IN AMERICA

RAPID PUMP® 3 TON STEEL HEAVY DUTY LOW PROFILE FLOOR JACK

- Weighs 78 lbs.

Customer Rating ★★★★★
SAVE \$90
COMPARE TO TEQ CORRECT \$189.99
MODEL: T830018Z
NOW \$99.99
~~\$109.99~~

ITEM 56618/56619/56620/56617 shown

38116875
LIMIT 2 - Coupon valid through 5/6/20*

SUPER COUPON **Customer Rating** ★★★★★

200 LUMEN LED SUPER BRIGHT FLIP LIGHT

- Wireless, tool-free and easy installation

NOW \$1.99
~~\$3.99~~
SAVE 60%
COMPARE TO PREMIER \$4.99
MODEL: SW-SWITCH-12/24
ITEM 64189/64723/63922 shown

38005514
LIMIT 6 - Coupon valid through 5/6/20*

Pierce **SUPER COUPON** **Customer Rating** ★★★★★

18 GAUGE BRAD NAILER

NOW \$49.99
~~\$64.99~~
SAVE 44%
COMPARE TO METABO \$89.98
MODEL: NT50AE2M
ITEM 64255

38007474
LIMIT 2 - Coupon valid through 5/6/20*

CENTRAL MACHINERY **SUPER COUPON** **Customer Rating** ★★★★★

FOLDABLE SAWHORSE

NOW \$8.99
~~\$12.99~~
SAVE 50%
COMPARE TO STANLEY \$17.99
MODEL: STST11200
ITEM 60710/61979 shown

38026634
LIMIT 6 - Coupon valid through 5/6/20*

CENT-TECH **SUPER COUPON** **Customer Rating** ★★★★★

2/10/50 AMP, 12 VOLT BATTERY CHARGER AND ENGINE STARTER

NOW \$29.99
~~\$54.99~~
SAVE 49%
COMPARE TO SCHUMACHER ELECTRIC \$59.77
MODEL: SE-1250
ITEM 60581/3418 60653 shown

38028222
LIMIT 3 - Coupon valid through 5/6/20*

Bauer **SUPER COUPON** **Customer Rating** ★★★★★

5" HEAVY DUTY RANDOM ORBITAL SANDER

NOW \$24.99
~~\$39.99~~
SAVE 37%
ITEM 63999

38028616
LIMIT 3 - Coupon valid through 5/6/20*

Apache **SUPER COUPON** **Customer Rating** ★★★★★

ULTRA-LIGHT, CRUSH PROOF WEATHER-RESISTANT LOCKABLE CASE

- 11-7/8" L
- 9" W
- 5-5/16" H

NOW \$21.99
~~\$27.99~~
SAVE \$215
COMPARE TO PELICAN \$237.63
MODEL: 1400
ITEM 63926/64551 shown

38029289
LIMIT 3 - Coupon valid through 5/6/20*

CENTRAL PNEUMATIC **SUPER COUPON** **Customer Rating** ★★★★★

3/8" x 25 FT. RETRACTABLE AIR HOSE REEL

NOW \$39.99
~~\$57.99~~
SAVE \$110
COMPARE TO COX REELS \$149.99
MODEL: 464125
ITEM 46104/69266 64682/69234 shown

38035844
LIMIT 3 - Coupon valid through 5/6/20*

drill master **SUPER COUPON** **Customer Rating** ★★★★★

80 PIECE ROTARY TOOL KIT

NOW \$6.99
~~\$9.99~~
SAVE 69%
COMPARE TO PROFESSIONAL WOODWORKER \$22.76
MODEL: 51832
ITEM 63235/63292/97626 shown

38049253
LIMIT 4 - Coupon valid through 5/6/20*

HaulMaster **SUPER COUPON** **Customer Rating** ★★★★★

132 LB. CAPACITY ROLLER STAND

NOW \$11.99
~~\$17.49~~
SAVE 75%
COMPARE TO PORTAMATE \$48.53
MODEL: PM-5083T
ITEM 68898

38057818
LIMIT 2 - Coupon valid through 5/6/20*

PORTLAND **SUPER COUPON** **Customer Rating** ★★★★★

7 AMP ELECTRIC POLE SAW 9.5" BAR

NOW \$59.99
~~\$79.99~~
SAVE \$39
COMPARE TO WORX \$99.98
MODEL: WG309
ITEM 68862/63190/56808/62896 shown

38062340
LIMIT 1 - Coupon valid through 5/6/20*

DB DIAMONDBACK **SUPER COUPON** **Customer Rating** ★★★★★

7" INDUSTRIAL TILE/BRICK SAW

NOW \$239.99
~~\$269.99~~
SAVE \$99
COMPARE TO KOBALT \$339
MODEL: KWS S7-06
ITEM 64683

38068920
LIMIT 1 - Coupon valid through 5/6/20*

CENTRAL MACHINERY **SUPER COUPON** **Customer Rating** ★★★★★

4" x 36" BELT/6" DISC SANDER

NOW \$64.99
~~\$77.99~~
SAVE \$84
COMPARE TO RYOBI \$149
MODEL: B04601G
ITEM 5154/64778/97181 shown

38072568
LIMIT 1 - Coupon valid through 5/6/20*

CENTRAL MACHINERY **SUPER COUPON** **Customer Rating** ★★★★★

UNIVERSAL TOOL STAND

- 500 lb. capacity

NOW \$29.99
~~\$39.99~~
SAVE 41%
COMPARE TO POWERTEC \$51.27
MODEL: UT1002
ITEM 46075/69805 shown

38100903
LIMIT 2 - Coupon valid through 5/6/20*

SUPER COUPON **Customer Rating** ★★★★★

SAFETY GLASSES

YOUR CHOICE \$1.29
~~\$1.99~~
SAVE 78%
COMPARE TO 3M \$5.96
MODEL: 90552-000008
ITEM 63851/99762 shown
ITEM 66823
ITEM 66822

38106081
LIMIT 4 - Coupon valid through 5/6/20*

BADLAND **SUPER COUPON** **Customer Rating** ★★★★★

2500 LB. ELECTRIC WINCH WITH WIRELESS REMOTE CONTROL

- Weighs 14.3 lbs.
- 11-1/8" L x 4-1/2" H

NOW \$49.99
~~\$69.99~~
SAVE \$140
COMPARE TO SUPERWINCH \$189.99
MODEL: 1125220
ITEM 61258/61297/63476/61840 shown

38109954
LIMIT 3 - Coupon valid through 5/6/20*

drill master **SUPER COUPON** **Customer Rating** ★★★★★

1/4" TRIM ROUTER

NOW \$19.99
~~\$29.99~~
SAVE \$79
COMPARE TO MAKITA \$99
MODEL: RT0701C
ITEM 62659/44914 61626/64314 shown

38113790
LIMIT 4 - Coupon valid through 5/6/20*

TOOLS & MATERIALS

SHOP-TESTED

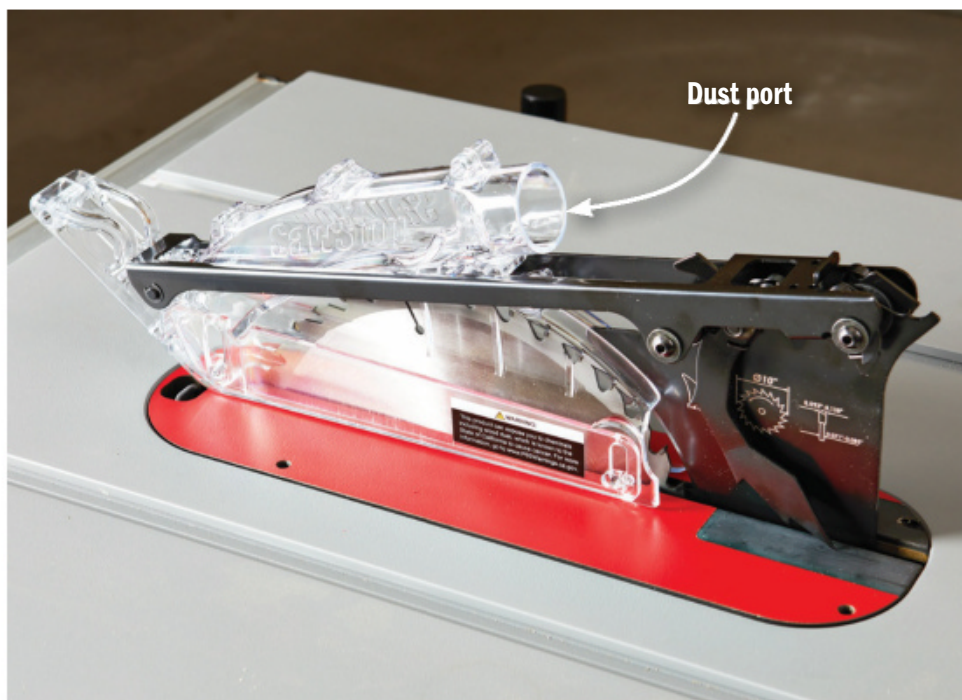
SawStop improves an already great tablesaw

10" job-site tablesaw on stand, no. JSS-120A60, \$1,400

With this second-generation version, SawStop has made its job-site saw easier to use. It still has the industry's unequalled safety feature—flesh-detecting blade stoppage. What's new is improved dust collection, thanks to a two-part dust shroud around the blade, with magnets that hold them closed, and a 1" dust port on the blade guard. The rip fence has a new low-support attachment for making narrow rip cuts easier by reaching beneath the blade guard. And the fence has easier-to-make adjustments. Finally, the table surface measures 2" deeper (front to back) than the previous generation, providing more workpiece support. The saw cuts with power and accuracy, features one-turn blade-height adjustments, storage for all included accessories, and comes with an easy-to-use fold-up stand.

—Tested by Bob Hunter, Tools Editor

866-729-7867, sawstop.com/jobsite



Mesh sanding discs do the job quickly and efficiently

Diablo SandNet 5" random-orbit sanding discs, \$15 per 10-pack

Okay, nobody really *likes* sanding, so we do anything possible to make the process quicker—but not at the cost of sacrificing quality. Diablo's SandNet sanding discs cut quickly and smoothly. These mesh/screen discs come in grits from 60 to 400, giving you the full range of abrasives for almost any project. I've used these on several random-orbit sanders and gotten fast material removal each time. The mesh backer ensures excellent dust collection (especially with a shop vacuum attached), even without a hole pattern that matches the sander pad.

—Tested by Bob Hunter

800-334-4107, diablotools.com





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TOOLS & MATERIALS

NEW AND UNTESTED



Makita launches blades for tracksaws

28T, no. A-99960, \$29; 48T, no. A-99932, \$45; 60T, no. A-99982, \$50

These 6½" blades have been designed specifically for plunge-cutting tracksaws. Makita says the narrow kerf (.073"-.079") optimizes the saw's brushless-motor performance. The company claims its 36-volt cordless saw gets 30 percent longer runtime using these blades versus previous-generation blades.

800-462-5482, makitatools.com

Jet revamps benchtop drum sander

10/20 benchtop drum sander, no. JWDS-1020, \$900

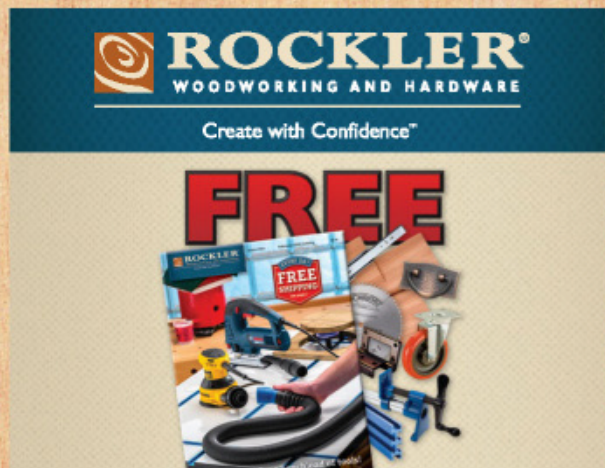
The newest generation of Jet's 10/20 open-end drum sander features a 1-hp motor, an 18×27" footprint, and weighs 73 pounds. This machine sands material from ¼" to 3" thick, with a variable feed rate of 0–10 feet per minute. Jet says its redesigned dust hood helps capture up to 97 percent of all dust, when hooked to a dust collector. 🌳

800-274-6848, jettools.com





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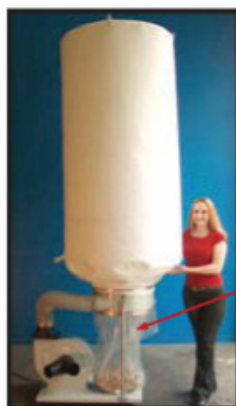
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WHAT'S AHEAD

A GLIMPSE INSIDE THE JULY ISSUE (ON SALE MAY 1)

Chaise lounge

Simple construction will have you relaxing on this stout but comfy lounger before you know it. Thermally modified wood makes it durable outdoors.



Modern desk

A covered compartment conceals computer cables. When you're done browsing, stash the laptop in one of its deep, wide drawers.



Shop test: Trim routers

Once considered suitable only for countertop work, these affordable routers prove surprisingly capable of much more. Our tests reveal the top tools.

Saw-blade basics

Here's everything you need to know about choosing the right blade for the job on your tablesaw or circular saw.



Minimalist wallet

Lighten your load by carrying cash and only essential cards in this svelte, stylish sheath.

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