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WOOD®

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GREAT PLANS

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QUILTING BEE

COLLABORATIVE CRAFTSMANSHIP CREATES COMMUNITY AND CONNECTION.

Isn't it interesting how often woodworkers and quilters build a life together? It's true of me and my wife. It is true of my parents. I've heard from many of you who've said the same.

In the tiny community in which I was raised, the quilting bee met every other Wednesday morning in the basement of the Mennonite church. If you're unfamiliar with the term, our local quilting bee consisted of a dozen ladies, including my mother and grandmother, who would sit around a full-sized quilting frame to chat while they collectively stitched designs into one of the members' nearly completed works of fabric art.

The junior members of the quilting bee consisted of three preschool-aged kids–my two sisters and me–whose job it was to scamper around under the quilt, literally getting underfoot, until we were sent outside to offer the birds "scrap thread" for their nests. That, and the break for the potluck lunch, are indelible memories for me.

Of course, the quilting bee is a form of collaborative craft that is largely lost today. But seeing the "Quilt Display Cabinet" on *page 22* brought all of the nostalgia of that simpler time rushing back. And it occurred to me that it's an opportunity to reclaim some of that sense of collaborative craftsmanship. When I first saw the cabinet emerge from our shop, I was struck by how the clean lines and understated wood tones–though masterfully built–were purposefully selected to fade into the background in favor of celebrating and framing the colorful quilts. The woodworking compliments the quilt. It's a project meant to unite you and your quilter into your own small community of collaborative craft.

Before you gift it to your quilter, though, invite some woodworkers over to help sand and apply the finish and–hey!–you've started the new tradition of a woodworking bee. Make sure you have some kids underfoot who will carry the importance of community and collaboration decades into the future.

And don't miss the other lovely gifts in this issue. The "Three-way Lamp" on *page 36* is an elegant project that is surprisingly easy, and perfect for making multiples this holiday season. And like the quilt display, the desk clock on *page 48* and the "Mobile Media Center" on *page 52* make perfect gifts for the nostalgiaphile on your list.

Now get out to the shop and make something. We'll help.

Lucas

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

A subscription to our sister publication, *American Patchwork & Quilting*, makes a great gift for the quilter in your life.
woodmagazine.com/quiltingbee

WOOD
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Construct this attractive lamp and then light up the top, bottom, or both. You need only a tablesaw and a dado blade to get this project glowing.



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IT'S ALL AN ILLUSION

David Copperfield, Criss Angel, David Blaine, and *WOOD*® magazine. All of them can convince you that you're seeing something you're not.



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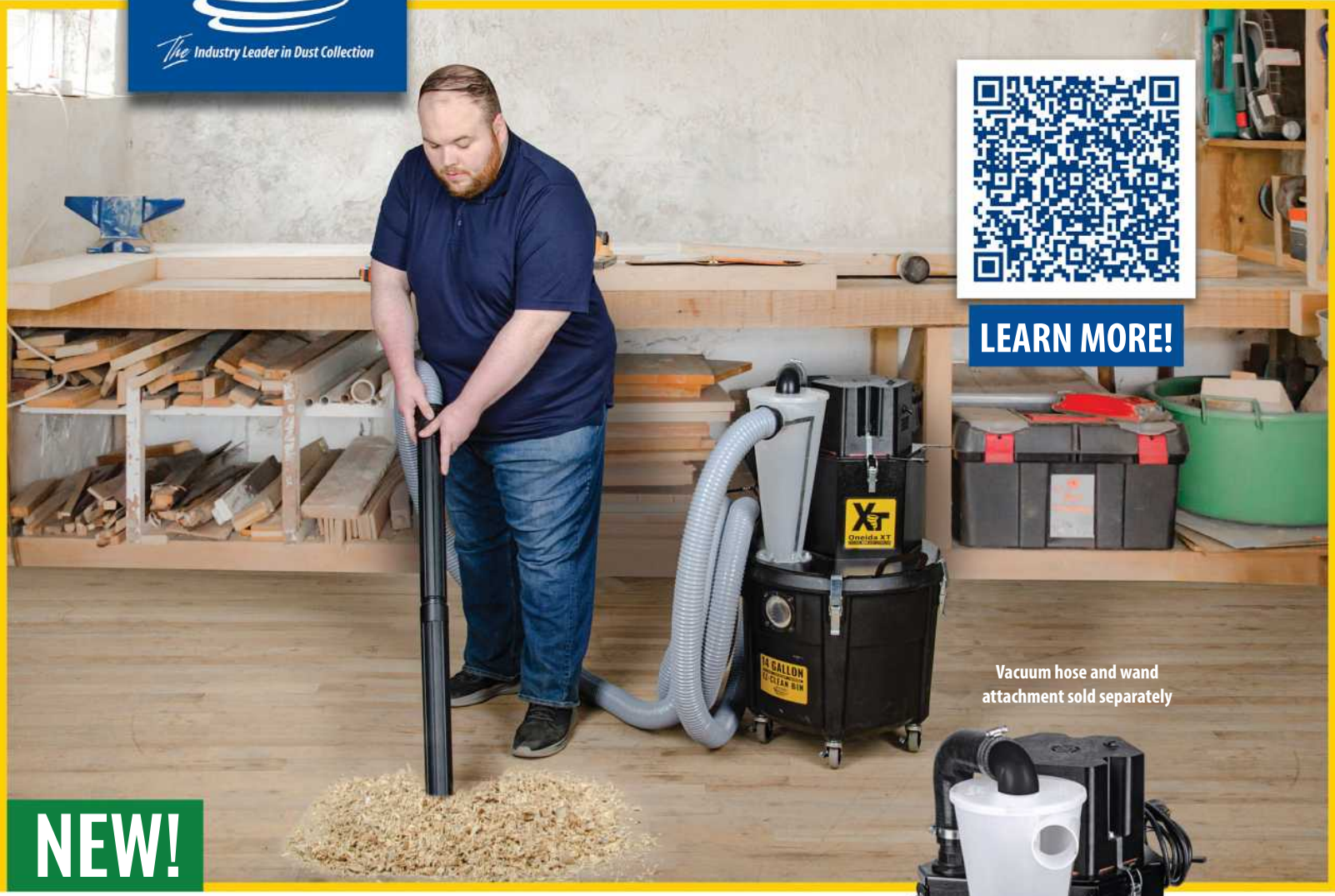
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YOUTHFUL WOODWORKING



As a student in high school, I made this segmented bowl. I used American elm, red oak, genuine mahogany, Pennsylvania cherry, soft maple, and walnut. I cut the segments with a tablesaw sled set to 20°, glued them into rings using hose clamps, and then sanded each ring flat. After roughing out the shape on the lathe, I sanded through finer grits before applying a wood bowl finish.

Will Guidera
Hackettstown, New Jersey



EXPANDING THE FLEET

Some years ago, in high school, I found issue 243 (November 2016) and built the "Mil-spec Iowa-class Battleship." After recently graduating from college, I was inspired to design and build my own model of the smaller Fletcher-class destroyer, complete with swiveling turrets. It matches the style of *WOOD*® magazine's USS Iowa quite nicely.

Nathan Li
Somerville, Massachusetts

Purchase plans for the Iowa-class battleship.
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A DIFFERENT ROUT

I've owned the Rockler router table you reviewed in "Benchtop Router Tables," issue 296 (July 2024) since it was first offered. I had to drill mounting holes for my Craftsman router. By angling the base, I can fit the router through the insert plate hole without removing the handles.

I like that my router table serves double duty as a sander with the spindle sander baseplate. I purchased a less expensive Wen sander versus the Triton, and it fits perfectly.

Dave Oberg
Wausau, Wisconsin



GRANDPA GUIDANCE

Every year while our older grandchildren spend a week with us, I try to help them build a woodworking project that is appropriate for their age. My 11-year-old granddaughter, Alexandra, and I built a piano coat rack for her room. We used four wood species, including katalox, a hardwood from Central and South America sometimes called Mexican ebony. We finished the rack with Minwax wipe-on polyurethane. Alexandra learned to use most of the tools in my shop—with my supervision, of course. I'm extremely proud of her.

James Arnold
St. Peters, Missouri



TANKS A LOT!

Inspired by your "Mil-spec M1A1 Abrams Tank" design (issue 239, May 2016), I built one for my dad, who drove a tank in the National Guard's 32nd Division in the early 1960s. However, he drove an M48 Patton, which is significantly different from an Abrams. Following your basic construction method, I used images and detailed sketches found online to redesign the parts to the proper shapes and scale to make a Patton.

Kevin Brandner
Bartlett, Illinois



DOUBLE SWORD EDGES

I teach middle school social studies, and woodworking is a hobby of mine. At the end of the year, we have an awards ceremony for 8th graders. Eight years ago I made a wooden sword dubbed "The Sword of Knowledge" to give to the student with the highest GPA.

It's become a yearly tradition in my classroom and I've since built a display case out of red oak, which was my first time doing a through-tenon. This year's sword is made from curly maple and padauk, with the Latin phrase *Invictus Maneo* (I remain unconquered).

John LaRosa
Syracuse, New York



I made this play sword for my grandson out of ash. I rounded the point to make it safer; he has a younger brother and I didn't want to be responsible for an accident. I tried woodburning for the first time to create the knight head on the grip. Now I'm addicted. I didn't know woodburning could be so fun.

John Bazen
Grand Rapids, Michigan



UP ON A PEDESTAL

After seeing the pedestal table in issue 307 (December 2025/January 2026), I designed an entry table using the profile of the pedestal leg. I finished it with an ebony stain and polyurethane. *WOOD* magazine continues to push my abilities but the detailed instructions and photos make it possible.

Ronald Sekora
Hastings, Nebraska

TABLE EXTENSION

I recently finished my first dining table, as a wedding gift for my daughter. I drew inspiration from the "Danish Modern Dining Table" from issue 299 (November 2024). Using walnut, I followed the plans to make the base and legs. But I changed the tabletop, making it a conventional extension top with three center leaves that store within the base. The table can seat up to 14 when fully open.

Eric Larson
Tomball, Texas





BRADLEY GOLDSAMT of Hewlett Harbor, New York, made the "Entry Hall Tree Storage Bench" from issue 198 (July 2010). He built the case from maple plywood, then stained the poplar face frame before assembly to create a two-tone look.

As a housewarming gift for his daughter and son-in-law, **HOWARD TARAGANO** of Cincinnati, Ohio, made this table and bench from hickory. He stained them with General Finishes Java gel stain and finished them with six coats of satin Arm-R-Seal. The table measures 7' long and 54" wide with two 24" leaves. The bench also expands and contracts as the table does.

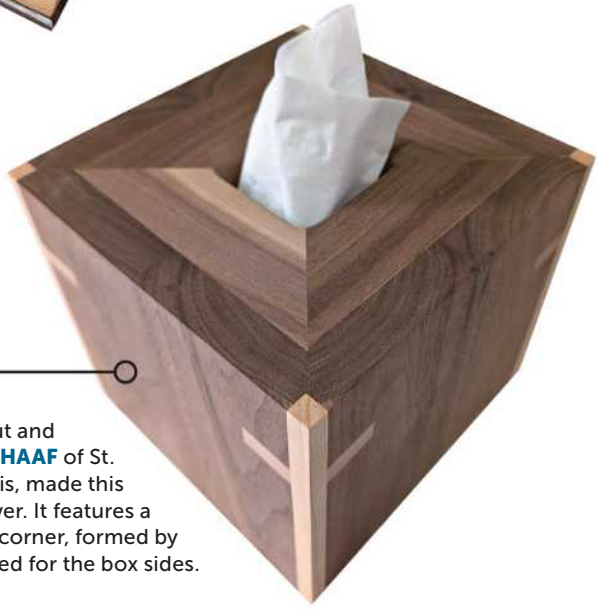




CRAIG ROBERTSON of Steilacoom, Washington, made his version of the "Sliding Tray Jewelry Box" featured in issue 286 (December 2022/January 2023). The cherry box is accented with walnut feet, splines, and handle.



TOM MIRON of Aiken, South Carolina, built this "Tapered-seat Bench" from issue 227 (September 2014). Live-edge curly maple creates an eye-catching top. Hand-cut mortises preserve the live edge. For the legs, he laminated walnut and hard maple.



Using walnut and maple, **ANDY HAAF** of St. Charles, Illinois, made this tissue box cover. It features a cross at each corner, formed by the joinery used for the box sides.

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ENGINEERED FOR EFFICIENCY

Sharing a space with two vehicles in this 2½-car garage isn't a sacrifice—it's intentional design.

WRITER: RANDY MAXEY



Ernie retired from The Boeing Company after a 40-year career developing, building, installing, and supporting flight test equipment for every B-1B and B-52 Bomber upgrade program since 1980.

PHOTOGRAPHER: ERNEST TORRES; **ILLUSTRATOR:** ROXANNE LEMOINE

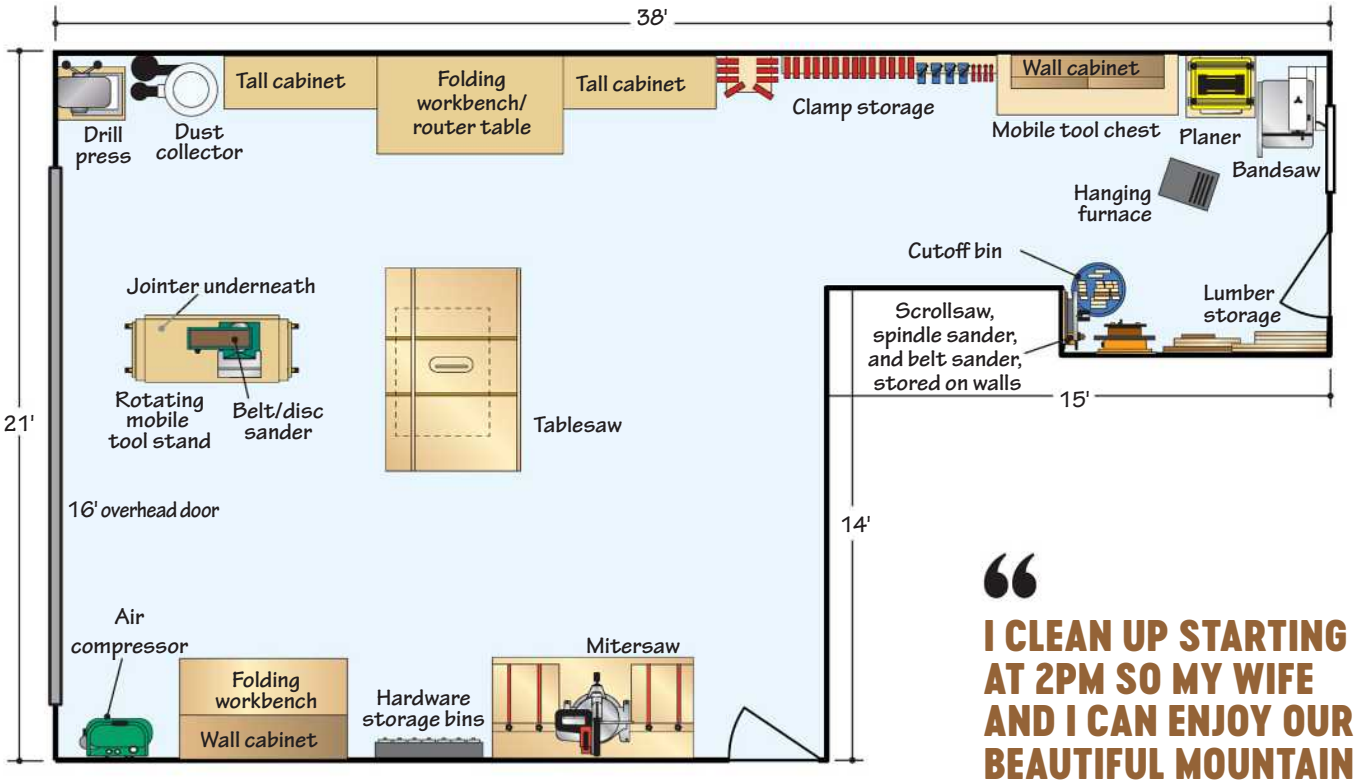
With his engineering mindset, Ernie Torres never stops looking for solutions to problems or better ways to accomplish a task. His garage workshop overlooking the Spokane River in Washington State reflects that mentality. He has devised many clever solutions that help his shop tools serve multiple functions. One of those, his "Tri-Top Table," was the Top Shop Tip in issue 311 (September 2026).

Like many woodworkers' garage shops, Ernie's must coexist with two vehicles. Mobility is the key that opens up the possibilities. Almost all of Ernie's larger tools and workbenches ride on casters or mobile bases. After pulling the cars outside, he can quickly roll tools and benches into place and get to work on his projects. At the end of the day, he tucks everything into their dedicated spaces, allowing room for the cars to come back inside.

There is one notable exception to Ernie's mobility strategy: A fold-down workbench, which doubles as a router table, that he designed and built along the shop's longest wall. T-track installed in the benchtop provides options for clamping, as well as for mounting tools.

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>
> ***-ERNIE TORRES, SHOP OWNER***



Flanked by spacious storage cabinets, this 40×84" fold-down workbench as the main assembly worksurface in Ernie's shop when working on projects.

The fold-down bench swings on four heavy-duty hinges. Cleats on the underside keep the solid-wood top flat and provide mounting for pivoting legs that extend down to support the bench while in use. When the bench is stowed against the wall, it takes up no precious floor space.

Ernie built two tall storage cabinets on either side of the folding workbench. Both are wall mounted and don't touch the floor, making sweeping and cleanup easier. A torsion box shelf spans the cabinets, providing storage and a place to mount recessed LED lights that illuminate the bench.



Sheets of T1-11 vertical siding provide solid anchoring for clamp racks, tool cabinets, and tablesaw accessories. Indoor/outdoor carpet squares define the walkways.



A metal tool cabinet provides a strong, movable base for a mitersaw station. The drawers keep mechanic's tools handy and separated from woodworking tools.

Ernie mounted benchtop tools such as his drill press, oscillating spindle sander, edge sander, and scrollsaw on plywood bases. Some tools hang on wall-mounted pegs above the lumber storage in the back corner of the shop. The drill press resides on the narrow wall space at one end of the garage door.

To minimize noise in the home, Ernie installed mineral wool insulation in the walls. A solid-core fiberglass 32" door to the house and an insulated 16' garage door also help contain noise.

Ernie relies on a small dust collector to control dust generated by the larger tools, especially his tablesaw. He also dusts, sweeps, and blows out the shop throughout the day as he works.

Because of the cold winters, Ernie installed 24" indoor/outdoor, self-adhesive carpet squares along the walkways. He uses a cordless stick vacuum to keep the carpet clean.

A ceiling-mounted furnace warms the shop during cold winter months, heating the space to working temperature in about 15 minutes. Strategically placed self-adhesive carpet squares prevent standing on a cold slab.

Ernie was exposed to woodworking as an infant. "I have a 1958 photo of me in diapers with the Shopmaster belt/disc sander in the background of my dad's workshop." Ernie now owns and still uses that sander. He adds, "My earliest memory of being in the shop was as an 8-year-old providing outfeed support for 4×8 sheets of plywood cut on my dad's Craftsman tablesaw."

An oilless two-cylinder air compressor tucks neatly into the corner between the garage door and wall cabinet. Hanging on the wall below, a folding table provides extra workspace for applying finishes.





Ernie's "Tri-Top Table," featured in issue 311 (September 2026), pivots to serve as outfeed support or to use the benchtop jointer and vintage Shopmaster belt/disc sander.

In the quest for space-saving efficiency, Ernie stores his benchtop tools on the wall. When he needs a tool, he clamps it to a workbench.



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Q: GIVE YOUR WORKBENCH A FACELIFT

My workbench is about 20 years old and the top is really starting to show its age. What's the best way to resurface it?

Artie Vance
Roanoke, Virginia

A: Workbenches are meant to be used, so over time it's only natural for them to exhibit scars from errant edge tools or random drips of glue, stain, or finish. Most solid-wood benchtops can be resurfaced to a near-new appearance, but it's important to maintain the flatness of the top as well. How you go about doing this depends on the level of wear and damage.

To start with, use a long straightedge to determine if the top is flat, checking the surface at various points. If the top checks out but just needs a freshening up, scrub the surface with a stiff brush or non-woven abrasive pad dampened with soapy water. Dry the top with a rag and then scrape the entire surface with a card scraper to remove any spots of glue, finish, or embedded dirt.

A top that is no longer flat or has multiple nicks, scratches, or gouges requires a more aggressive approach. Traditionally, most cabinetmakers flattened their workbenches using hand planes, and that remains a viable option today. Use a jointer plane with a sharp blade set to take a fine cut. The long sole of a jointer plane will bridge any low spots in the surface, taking down only the peaks. Work the plane diagonally or perpendicular to the grain first to flatten the top, using a long straightedge or level to check your progress. Once the top is flat, go over the surface again, this time parallel to the grain. To minimize tear-out, avoid planing against the grain.

A belt sander is another option, but it's easy to create low spots when using a hand-held belt sander. For more accurate results, consider running your top through a wide-belt sander. Some cabinet shops offer this sanding service for a nominal fee. You'll have to remove the top from the workbench and take off any vises or hardware before taking your top to a cabinet shop.

A shop-made, slab-surfacing jig will allow you to flatten a workbench top with your router. The jig consists of a sled supported by a pair of rails that flank the workbench top. The router glides back and forth along the rails as the suspended bit shaves down the high spots of the top. Take progressively deeper passes until the entire surface has been dressed. Then follow this up with light hand sanding to remove any tracks left behind by the router bit.

Sanding or routing usually removes most dings and scratches in a top. But if your top has a deep gouge or hole, mend it with a butterfly patch (also known as a Dutchman patch) or colored epoxy. After completing any surfacing or repairs, protect your rejuvenated benchtop with a finish that soaks in rather than building a film that can be quickly damaged.

All of the above applies to workbenches with normal wear and tear. If your bench has been so badly abused that it's beyond resurfacing, consider adding an overlay of 1/4" tempered hardboard or MDF. If you use screws or nails to attach the overlay, you can replace it as it wears out.

Learn about the jointer plane and three other must-haves for your shop: woodmagazine.com/fourplanes

Learn how to flatten a workbench using a router and jig: woodmagazine.com/flatten

TIP!

Make your own workbench finish by mixing equal parts (by volume) turpentine, boiled linseed oil, and beeswax.

Have a question? Drop us an e-mail.
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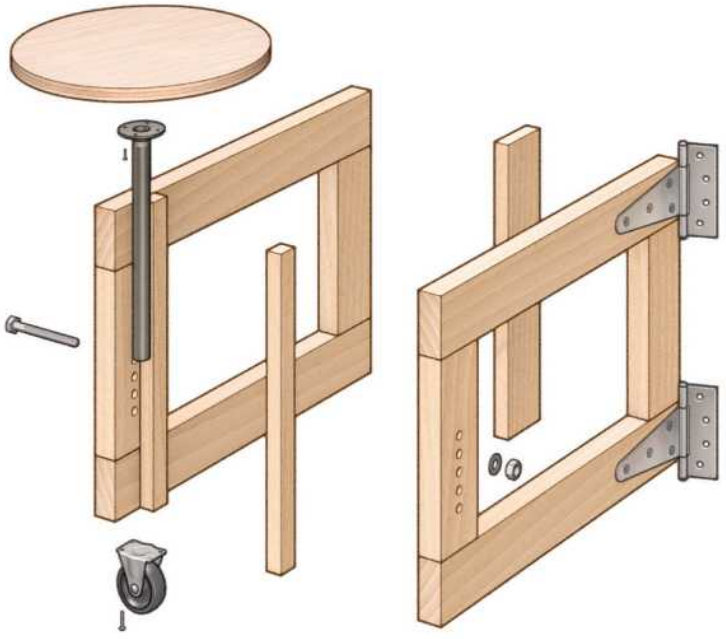
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TOP SHOP TIP





SWINGIN' SEAT

I often like to sit at the workbench when working on a project, and this swing-out stool provides the perfect perch. It's sturdy, adjustable, and easy to stow.

The stool starts with a two-layer frame made from ¾" boards. At the outer end, two narrow spacer strips fit snugly around a 12" length of ¾" black pipe. I also added a spacer between the frames at the hinged end.

A pair of heavy-duty T-hinges attach the frame to my bench leg with lag screws, while the outer end rests on a 3" fixed caster. Together, they allow the bench to pivot out when needed, then roll under the bench and out of the way.

I cut the seat to 12" in diameter and mounted it to a standard pipe flange. Holes drilled through the frame between the pipe spacers accept a bolt that makes the stool height adjustable.

David Deater
Linesville, Pennsylvania



For his tip, David wins a Spider M-1500Pro Mobile Base worth $570 from Harvey Industries International.

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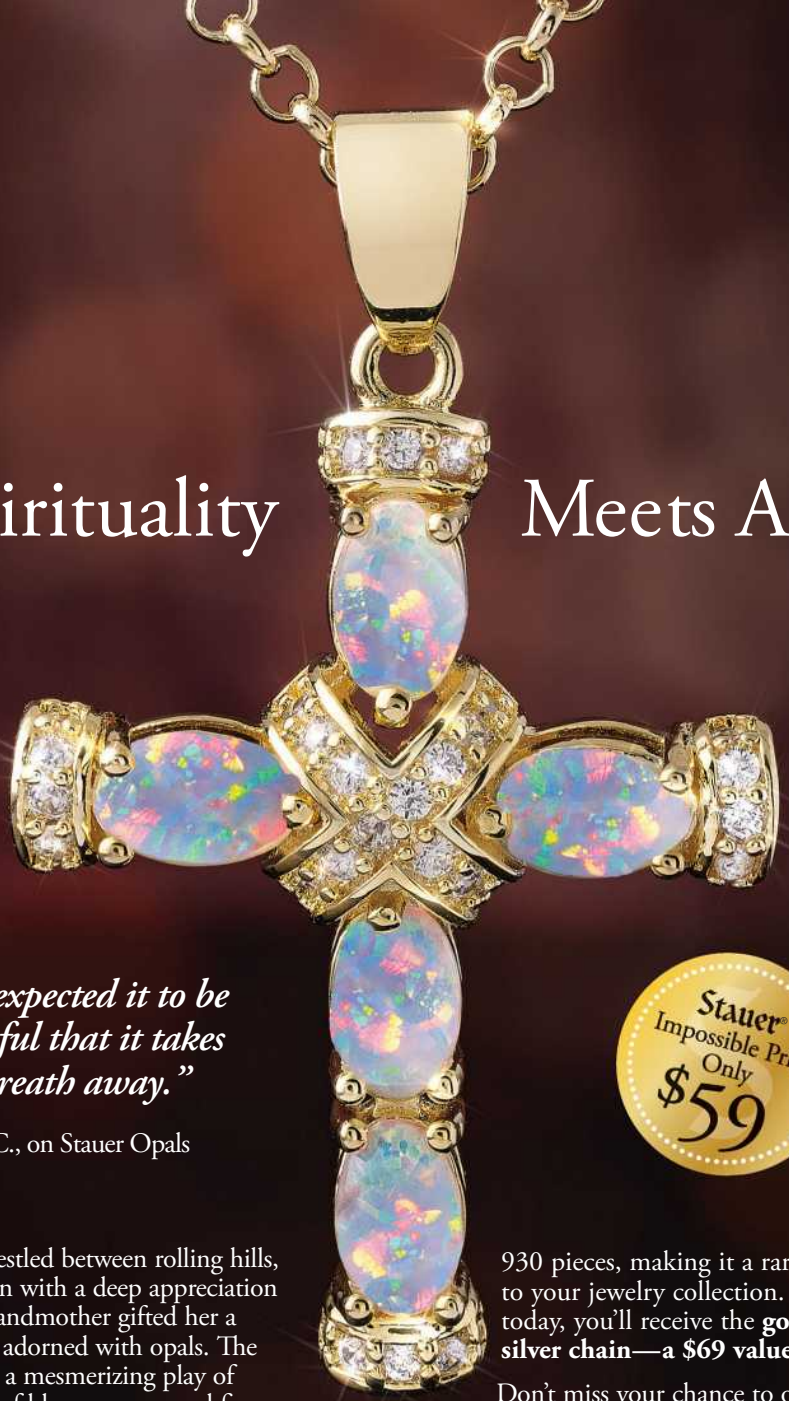
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Because we try to publish original tips, please send yours only to *WOOD*® magazine.

ILLUSTRATOR: CHRISTOPHER MILLS

continued on page 18

Spirituality Meets Artistry



"I never expected it to be so beautiful that it takes your breath away."

— Kaya C., on Stauer Opals

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In a quaint village, nestled between rolling hills, lived a young woman with a deep appreciation for gemstones. Her grandmother gifted her a delicate cross pendant adorned with opals. The opals shimmered with a mesmerizing play of colors, reflecting hues of blues, greens, and fiery oranges. Her grandmother shared the legend of the opals, believed to bring hope, purity, and luck to those who wore them.

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BACK TO THE GRIND

I often make my own wood filler using sawdust and wood glue. Rather than trying to gather enough fine dust from my sander, I grab chips from my tablesaw or planer and use an old electric coffee or spice grinder to make fine dust. I store extra sawdust in Mason jars labeled with the wood species so I have plenty on hand.

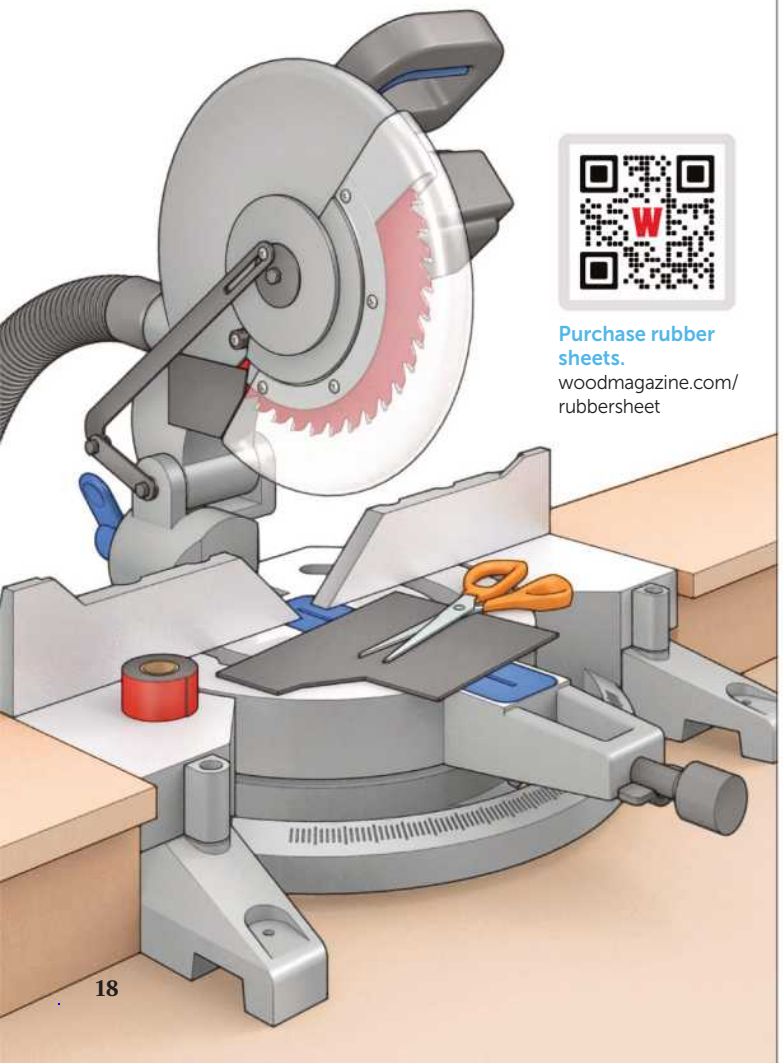
Jim Booker
Salida, California



MITERSAW MUD FLAPS

Most mitersaws don't have a good method for directing the sawdust for easier cleanup. I found that using pieces of rubber sheet fastened to the saw's housing can help. I use ⅛"-thick rubber sheet cut and shaped to fit over the openings and wrap around the back where sawdust can escape. I use double-sided tape to fasten the rubber to the saw. Just make sure the flaps don't interfere with the operation of the saw, especially the blade guard.

Dennis Hansen
Freeland, Michigan



Purchase rubber sheets.
woodmagazine.com/rubbersheet



VERTICAL ADVANTAGE

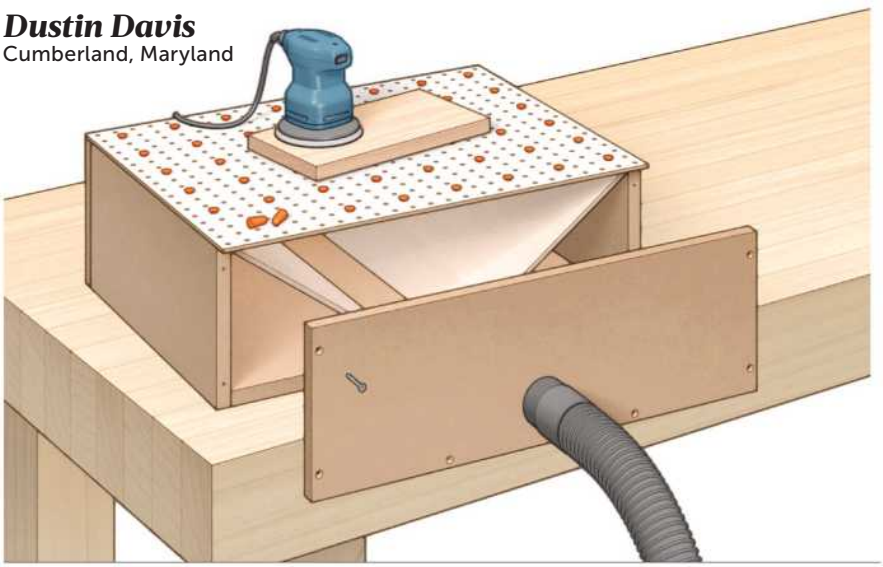
These tool storage panels fit perpendicular to the wall, maximizing space in my small shop by taking advantage of depth instead of width. They're easy to customize to match the width, depth, and height you need for the tools you want to store, and can double storage area without taking much wall space. I designed mine with French cleats that interlock with my wall-mounted cleat system.

Dave Boyd
Corner Brook, Newfoundland and Labrador

FOAM FOUNDATION

I built a downdraft sanding table using pegboard for the top. To prevent the workpiece from moving while sanding, I insert disposable foam earplugs in the holes beneath it, letting them stick out ¼" or so. They're grippy, stay in place, and are inexpensive when purchased in bulk bags. It's easy to reconfigure the plug locations depending on the workpiece shape.

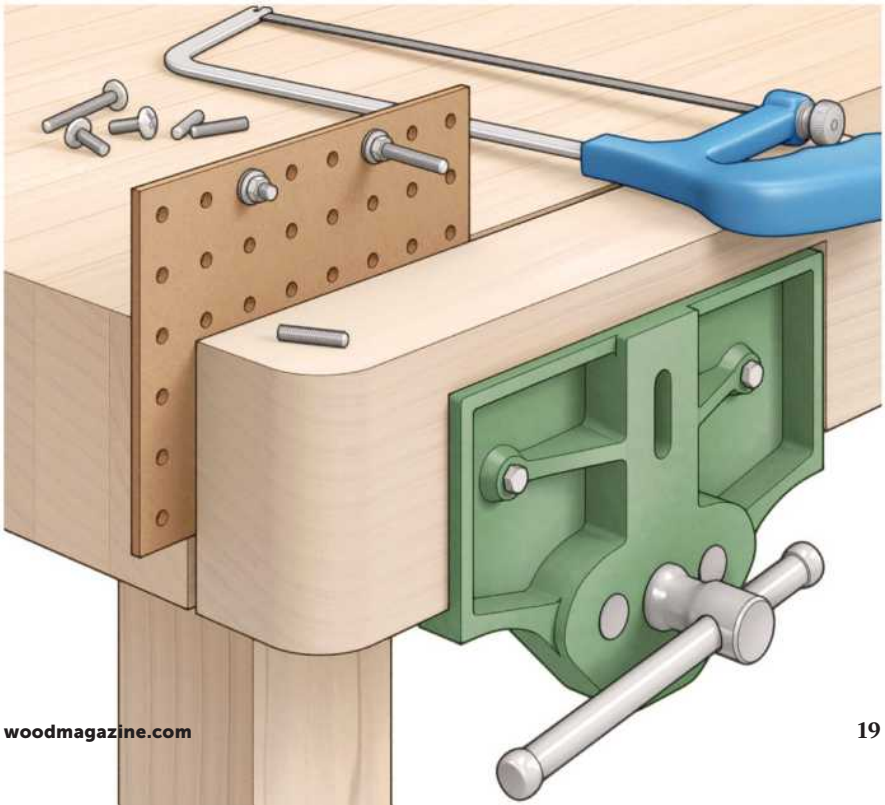
Dustin Davis
Cumberland, Maryland



HANDY SCREW HACK

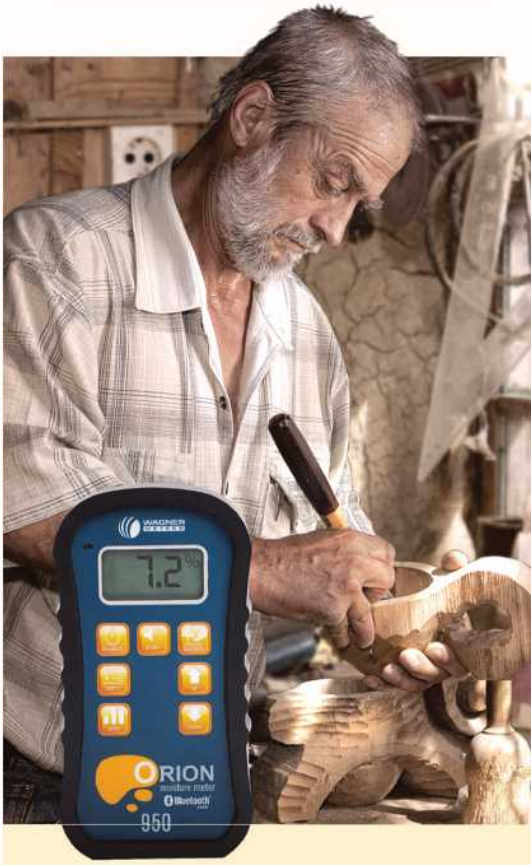
If you need to shorten a screw, bolt, or threaded rod, fasten it through a thin piece of stock (I used pegboard) with a washer, lock washer, and nut. Then clamp the assembly in a vise to hold it steady as you cut or grind the screw to length. After cutting, removing the nut helps clean up the threads.

Steve Hopkins
Boone, North Carolina



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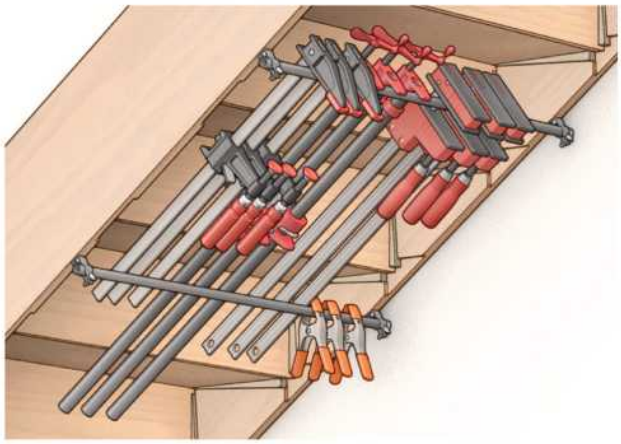
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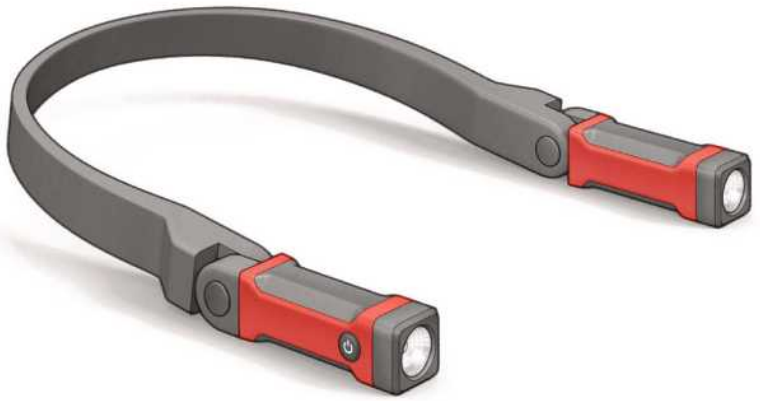
WAGNER METERS

STEP-UP CLAMP STORAGE

This simple rack utilizes previously wasted space under the stairs in my basement shop. I made it by attaching conduit hangers to the underside of the stair stringers to secure the conduit. I simply slip the bottom end of the clamp over the lower conduit and lift the top end over the top conduit. It's a great use for otherwise wasted space.

Nick Schirz
Oglesby, Illinois





AROUND THE NECK

I used to wear a headlight when working in poorly lit areas, as well as to provide extra light when sanding and finishing. But the light proved harsh, and it moved wildly with every small movement of my head. Switching to a neck light solved both issues. The light is softer, and I can aim the dual beams to stay focused on my work even as I move my head around.

Daniel Smith
Mazomanie, Wisconsin

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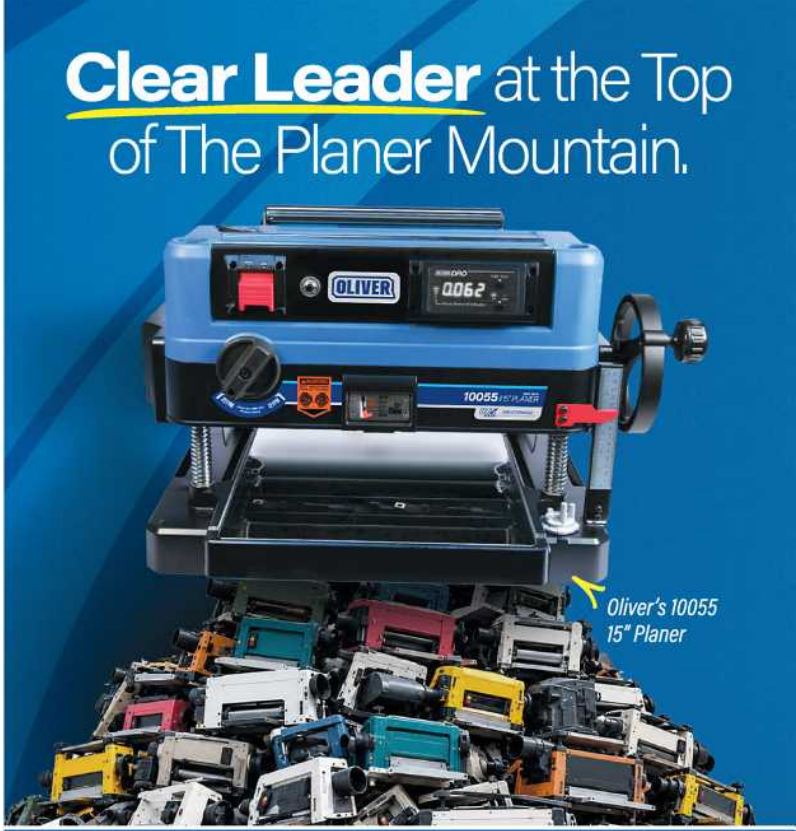
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QUILT DISPLAY CABINET

Hang and show off your heirloom quilts or substitute the rods for shelves to create an attractive curio case.

WRITER: ZACHARY BROWN
DESIGNER/BUILDER: KEVIN BOYLE

With space to hang up to four quilts above plus storage for plenty more below, this case-on-base cabinet provides a fitting home for your quilt collection—or any collection you want to display. Frame-and-panel door construction and cove trim details give it an understated yet updated appearance that fits anywhere while letting the beauty of its contents shine through.

Building the case from plywood simplifies construction and provides you options to create the look you want. We chose knotty pine, then used solid pine for the trim, tops, and door frames. Let's get started.

STITCH UP A PAIR OF CASES

The upper and lower cases share joinery and construction techniques, so we built them at the same time to minimize setup changes.

1 From ¾" plywood, cut the base and case sides (A, O) and tops/bottoms (B, P) to size **[Parts List, Drawings 1 and 2]**.

2 Install a dado stack in your tablesaw that matches the thickness of your plywood and set the height to ⅜". Form the dadoes in the base and case sides (A, O) to receive the bottoms (B, P).

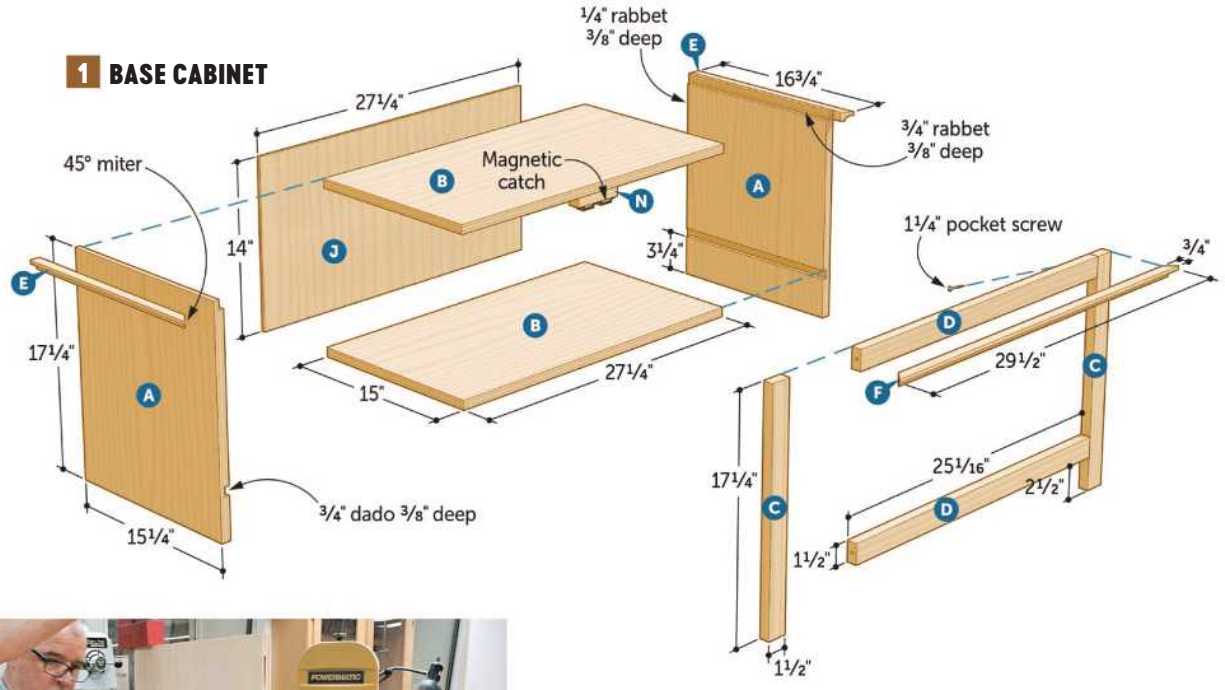
3 Attach an auxiliary face to the tablesaw rip fence, position it to just touch the dado blade, then rabbet each case side for the tops. To form the rabbets for the backs, partially bury the dado stack in the auxiliary fence, leaving ¼" exposed. Rabbet each case side rear edge, being sure to form mirrored pairs.

4 Start the base assembly by gluing the bottom (B) into the dado in a case side (A) **[Photo A]**. Once the glue dries, add the top and other side, making sure everything remains square. Repeat for the upper case.



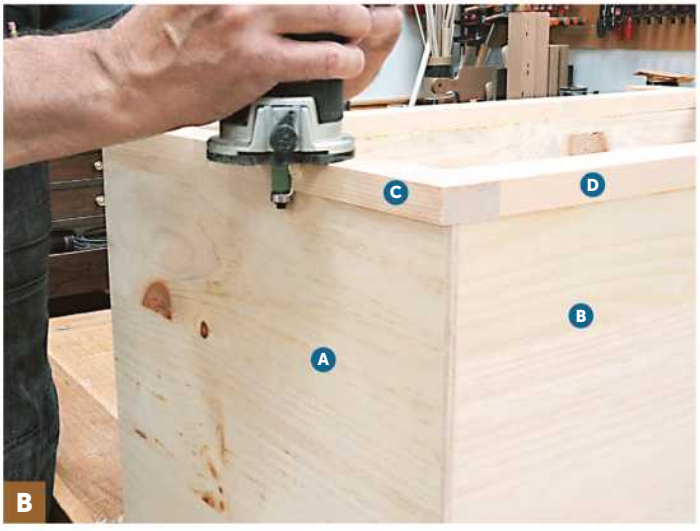
OVERALL DIMENSIONS
30"W × 17"D × 68¾"H

PHOTOGRAPHER: BRIE GOLDMAN; **ILLUSTRATOR:** CHRISTOPHER MILLS





Apply glue to the dado and insert the bottom (B), using a clamping square to hold it in place. Then add clamps to the bottom.



Use a flush-trim bit to rout the face-frame stiles (C, Q) flush to the base and case sides (A, O). Clean up any burn marks with 80-grit sandpaper.

SEW ON THE TRIM AND TOPS

The case itself becomes the key to creating perfectly flush-fitting face frames and tightly mitered trim without fussy measuring.

1 From ¾" stock, cut the face-frame stiles (C, Q) and rails (D, R) to size. **[Parts List, Drawings 1 and 2]**. Drill pocket holes; then assemble the face frames with glue and pocket screws.

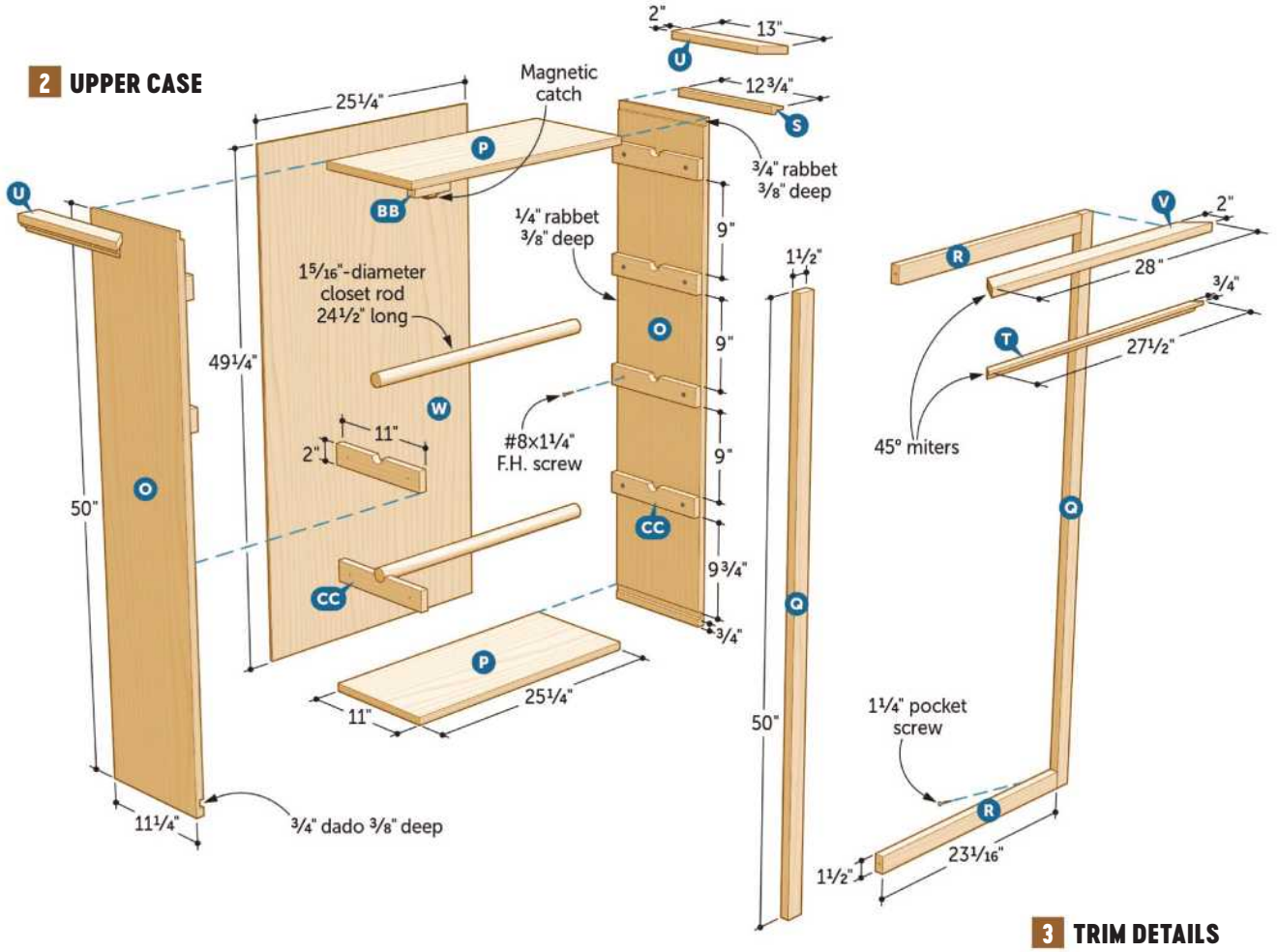
2 Glue and clamp each face frame (C/D, Q/R) to its case, flush with the top and overhanging the sides. After the glue dries, trim the frames flush to the case sides **[Photo B]**.

3 To make the cove trim (E, F, S, T), prepare a ¾×5×35" blank. Rout the edges **[Photo C, Drawing 3]**, then ripcut the cove to width from the blank. Repeat until you have enough pieces to cut front and side trim for both cabinets.

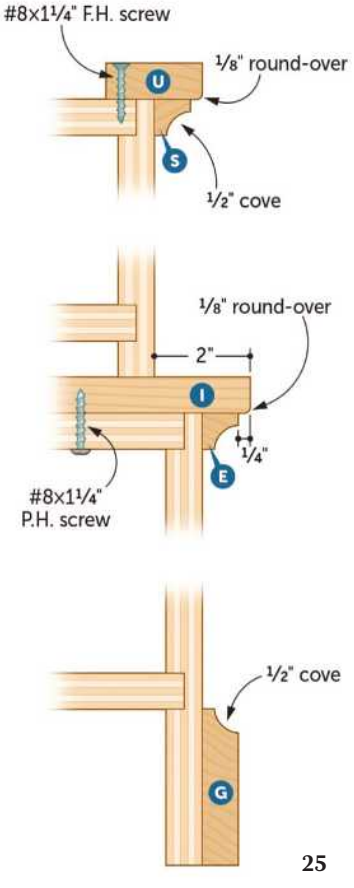
4 Miter-cut the front end of the cove sides (E, S), leaving them overlength, then clamp them in position without glue. Use them as a gauge to miter-cut the cove fronts (F, T) to fit. Then glue and clamp the cove fronts in place. Mark the length of the cove sides, flush with the case back, crosscut them to length, and glue them to the case.

Note: **We sized the rails slightly overlength in the Parts List to create face frames wider than the cases, which allows you to trim the frames for an exact fit.**

2 UPPER CASE



3 TRIM DETAILS





Install a ½" cove bit in your router table and raise it to ½". Rout the cove on both edges of the blank for the cove trim (E, F, S, T).

5 Prepare two ¾×3¼×35" blanks for the base lower trim (G, H) **[Exploded View]**. Rout the cove on one edge of each blank **[Drawing 3]**. Use the marking and fitting technique you used with the cove trim to miter-cut and crosscut the lower trim to fit around the base cabinet, flush with the bottom and back.

6 Glue up a panel for the base cabinet top panel (I). After the glue dries, cut it to size. Form the ⅛" round-over on the lower face of the sides and front edge. Drill holes and slots in the base top (B), then use panhead screws to attach the base top panel, centered side to side and flush at the back **[Exploded View]**.

7 Cut the upper case cap sides (U) and front (V) to size, miter-cutting their mating ends **[Drawing 2]**. Apply glue to the miters and use masking tape to hold the assembly together while the glue dries. Form the round-over on the bottom edge of the assembly. Glue and screw it to the upper case, centered side-to-side and flush with the rear.

8 From ¼" plywood, cut the backs (J, W) to size and set them aside.

PIECE TOGETHER THE DOORS

We used two types of door construction–one to keep the base doors simple and another to make the case doors strong despite having a large glass area.

1 Cut the base cabinet door stiles and rails (K, L) to size **[Parts List, Drawing 4]**, as well as a few extra pieces for machine setup. Form the grooves in the stiles and rails for the door panel. If your panel material measures a full 1/4" thick, cut the grooves with a dado stack. If the plywood is undersized, cut the groove with a standard blade by roughly centering the blade, making a pass, then flipping the workpiece end for end and making a second pass.

2 Install a 3/8" dado blade in your tablesaw. Attach an auxiliary face to the rip fence and position it to just touch the blade. Set the blade height to just under 1/4" and form a stub tenon on the end of a test piece. Check the fit in a stile groove and adjust the blade height as necessary. Once you have a good fit, form the tenons on the ends of the rails (L).

3 Dry-fit the doors and measure for the door panels (M). Then cut them to size **[Drawing 4]**. Apply glue to the rail tenons and clamp the door assemblies (K-M) together, checking for square. Cut the door catch block (N) to size and glue it behind the upper face-frame rail (D), centered side-to-side **[Drawing 1]**.

CASE DOOR CONSTRUCTION

Your tablesaw miter gauge and a dado blade make quick work of these notched door tenons. The result is a seamless mortise-and-tenon joint with lots of glue surface for long-lasting door strength.

1 Start with the mortises. Install a 1/4" chisel in your mortising machine and form the mortises in the stiles (X). If you don't have a mortising machine, use a 7/32" brad-point bit in your drill press to clear out the bulk of the waste. Then clean up the walls and corners with a sharp chisel.

2 Install a 3/8" dado blade in your tablesaw and adjust the height to 1/2". Attach an auxiliary face to the rip fence and position it to just touch the blade. Rabbet the inside face of the stiles (X) and rails (Y) for the glass.

3 Lower the dado blade to 1/4" and position the auxiliary fence 1 1/4" (the tenon's length) from the far side of the blade. Make passes on the faces and edges of both ends to form the rail tenons, *below*.

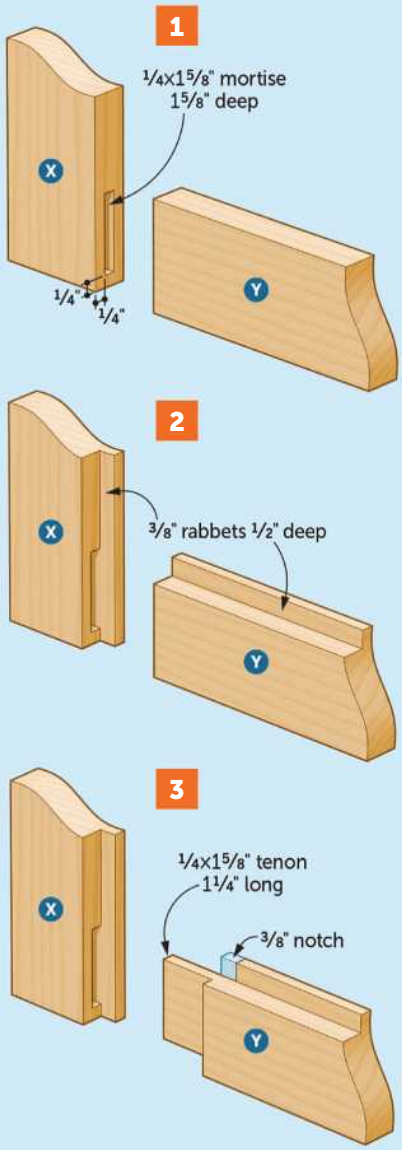
To assemble the doors, apply glue to the stile mortises and clamp the door frame (X, Y) together, checking for square.



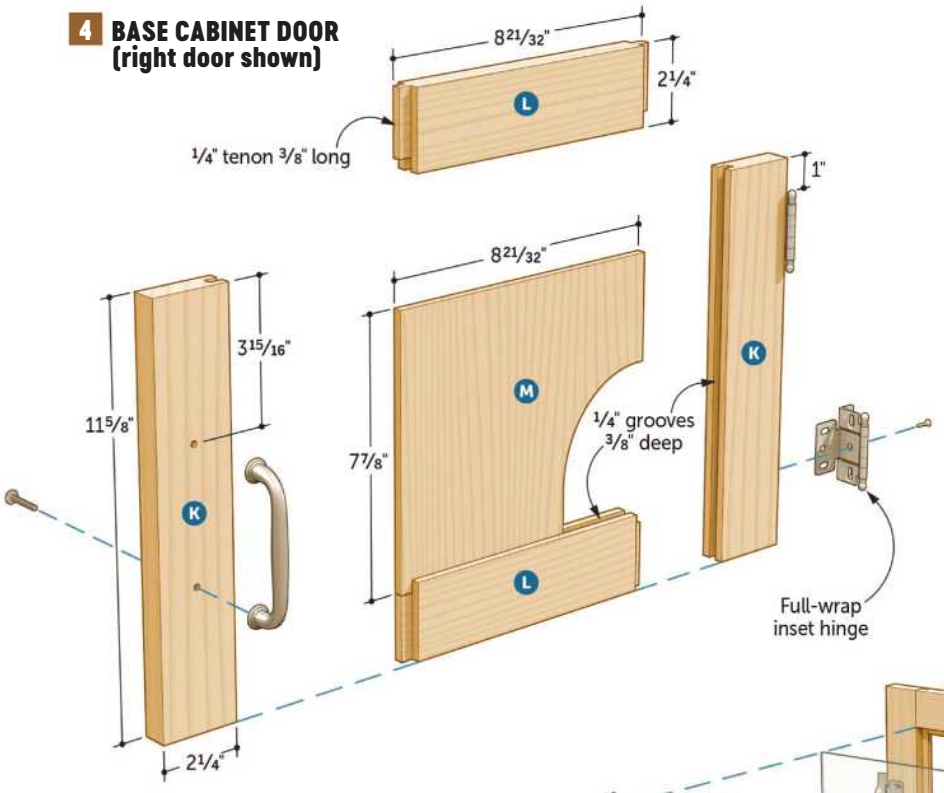
First form a tenon on the end of a test piece. Check the fit in a stile (X) mortise, adjusting the blade height as necessary. Then form the tenons on the ends of the rails (Y).



Adjust the fence 3/8" farther from the blade. Make a pass on the front face of the test-piece tenon, check the fit, then form the notches on the rails' tenons.

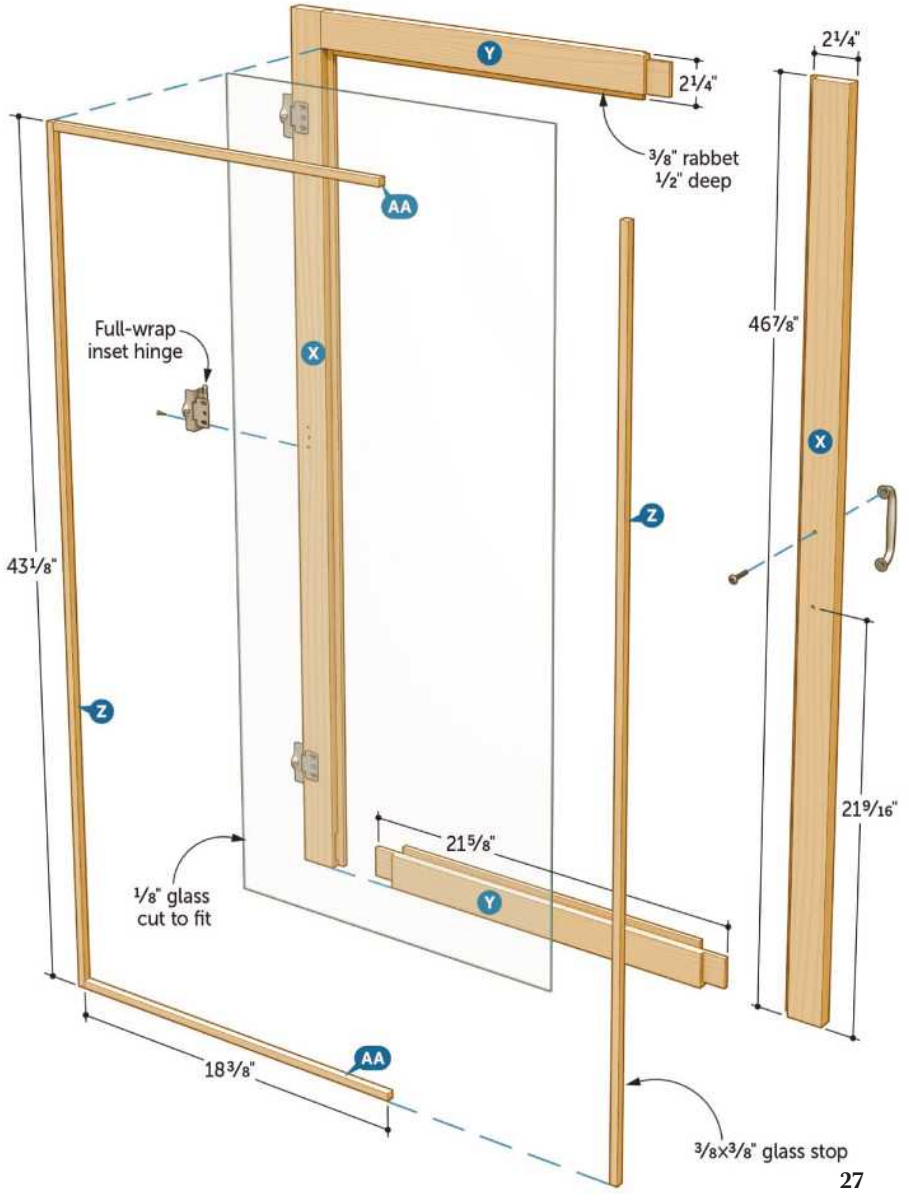


4 BASE CABINET DOOR (right door shown)



> **MORTISES AND NOTCHED TENONS ARE A BIT MORE INVOLVED TO CREATE, BUT THEY ADD STRENGTH THAT KEEPS A DOOR WITH A LARGE GLASS AREA FROM SAGGING.**
>
> ***-KEVIN BOYLE, SENIOR DESIGN EDITOR***

5 UPPER CASE DOOR (rear view)



4 Screw the hinges to the doors **[Drawing 4]**; then attach them to the face-frame stiles (C). Adjust the fit of the doors as necessary, label them left and right, and remove the hinges.

5 Cut the upper case door stiles and rails (X, Y) to size **[Drawing 5]**. Build the doors using the techniques in *Case Door Construction* on the *previous page*.

6 From 3/8" stock, cut the glass stops (Z, AA) to size **[Drawing 5]**. Cut the upper cabinet door catch block (BB) to size and glue it behind the face-frame upper rail, opposite the hinge side **[Drawing 2]**.

7 Install the door in the upper cabinet using the hinges and check the fit. Make any necessary adjustments, then remove the hinges.

TIP!

After assembling the door, measure for the glass and have your local hardware store or glass supplier cut it to fit, making it about 1/8" shorter and narrower than the opening.



Drill a centered 1⅜" hole in four 4⅛×11" blanks. Ripcut each blank in half to make eight hanging rod cleats (CC).

TRIM THE LOOSE THREADS

1 From ¾" stock, make the hanging rod cleats (CC) **[Photo D, Drawing 2]**. Then screw them to the upper case sides.

2 Finish-sand the cases, doors, and backs; then apply a finish. We wiped on three coats of satin water-based polyurethane, sanding between each coat with a 320-grit sanding sponge.

3 Install the glass in the upper case door using the glass stops (Z, AA) and ¾" pin nails. Hang the doors in both cabinets with their hinges, and install the magnetic catches on the catch blocks and doors.

4 Install a pull on each door **[Drawings 4 and 5]**, and attach the backs to the cases with glue and ¾" pin nails. Cut the closet rods to fit and hang your quilts with pride.



PARTS LIST

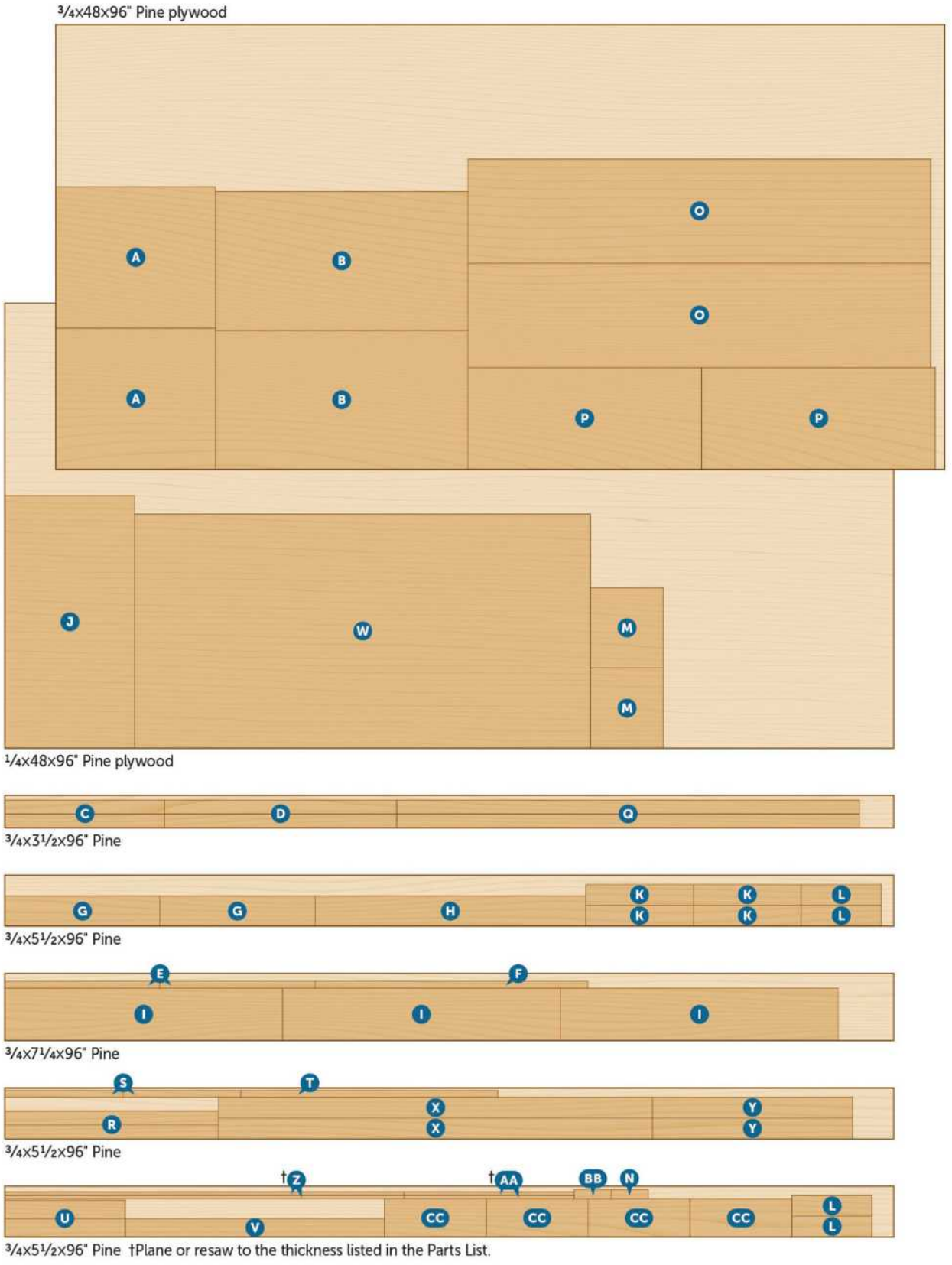
PART		FINISHED SIZE T	W	L	Matl.	Qty.
BASE CABINET						
A	BASE SIDES	¾"	15¼"	17¼"	PP	2
B	BASE TOP/BOTTOM	¾"	15"	27¼"	PP	2
C	BASE FACE-FRAME STILES	¾"	1½"	17¼"	P	2
D	BASE FACE-FRAME RAILS	¾"	1½"	25 1/16"	P	2
E*	BASE COVE SIDES	¾"	¾"	16¾"	P	2
F*	BASE COVE FRONT	¾"	¾"	29½"	P	1
G*	LOWER TRIM SIDES	¾"	3¼"	16¾"	P	2
H*	LOWER TRIM FRONT	¾"	3¼"	29½"	P	1
I*	TOP PANEL	¾"	17"	30"	EGP	1
J	BASE BACK	¼"	27¼"	14"	PP	1
K	BASE DOOR STILES	¾"	2¼"	11⅝"	P	4
L	BASE DOOR RAILS	¾"	2¼"	8 21/32"	P	4
M	BASE DOOR PANELS	¼"	8 21/32"	7⅞"	PP	2
N	BASE CATCH BLOCK	¾"	1"	4"	P	1
UPPER CASE						
O	CASE SIDES	¾"	11¼"	50"	PP	2
P	CASE TOP/BOTTOM	¾"	11"	25¼"	PP	2
Q	CASE FACE-FRAME STILES	¾"	1½"	50"	P	2
R	CASE FACE-FRAME RAILS	¾"	1½"	23 1/16"	P	2
S*	CASE COVE SIDES	¾"	¾"	12¾"	P	2
T*	CASE COVE FRONT	¾"	¾"	27½"	P	1
U	CASE CAP SIDES	¾"	2"	13"	P	2
V	CASE CAP FRONT	¾"	2"	28"	P	1
W	CASE BACK	¼"	25¼"	49¼"	PP	1
X	CASE DOOR STILES	¾"	2¼"	46⅞"	P	2
Y	CASE DOOR RAILS	¾"	2¼"	21⅝"	P	2
Z	VERTICAL GLASS STOPS	⅜"	⅜"	43⅛"	P	2
AA	HORIZONTAL GLASS STOPS	⅜"	⅜"	18⅜"	P	2
BB	UPPER CATCH BLOCK	¾"	1"	4"	P	1
CC*	HANGING ROD CLEATS	¾"	2"	11"	P	8

*Parts initially cut oversize. See the instructions.

MATERIALS KEY: PP–pine plywood, P–pine, EGP–edge-glued pine.
SUPPLIES: Pocket screws, #8×1¼" flathead screws, #8×1¼" panhead screws, ¾" pin nails, 1 5/16"-diam. closet rod, ⅛×19⅛×43⅛" single-strength glass.
BLADE AND BITS: Dado blade, flush-trim and ½" cove router bits, 1⅜" Forstner bit.
SOURCE: Full inset ball tip hinges satin nickel (7) no. AMPK3175TBG10, $7 each; 3¾" satin nickel cabinet pulls (3) no. AM53702G10, $9 each; 1 7/16" magnetic catches (3) no. BK-P109-2C, $4 each, cabinetparts.com.
PROJECT COST: It cost us about $450 to build this project. Your cost will vary by region and source.

CUTTING DIAGRAM

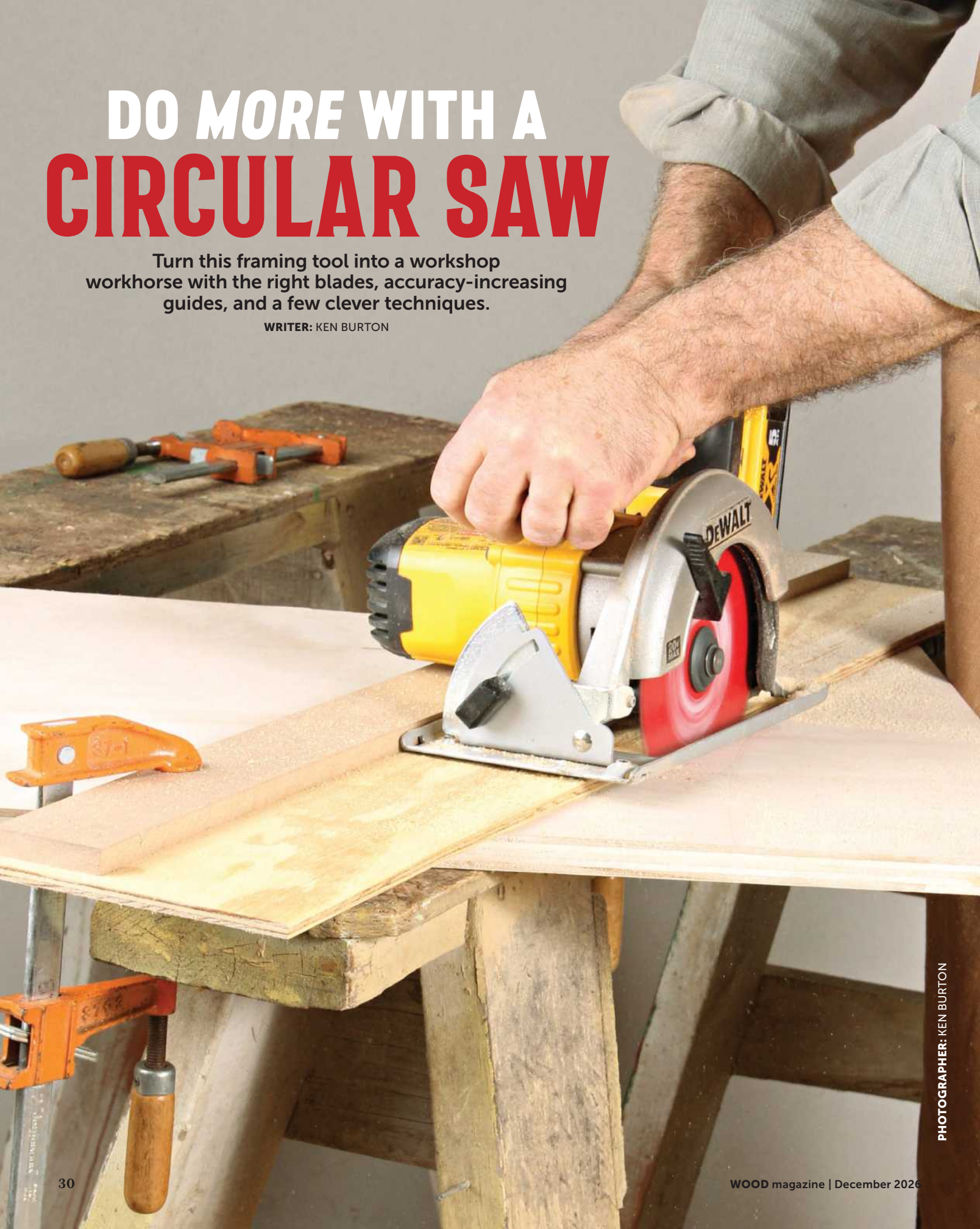
We purchased 20 board feet of 4/4 pine. Before cutting parts to size, we planed them to the thicknesses shown in these example boards.



DO *MORE* WITH A CIRCULAR SAW

Turn this framing tool into a workshop workhorse with the right blades, accuracy-increasing guides, and a few clever techniques.

WRITER: KEN BURTON



PHOTOGRAPHER: KEN BURTON

When you make a list of essential woodworking tools, the handheld circular saw is easy to overlook. It's often dismissed as a carpenter's tool, suitable for cutting 2-by framing lumber but not for "real" woodworking.

For years, woodworkers said the same thing about the mitersaw. Now it's a must-have tool in most shops. A circular saw deserves the same status because it offers convenience and capabilities your tablesaw or mitersaw can't match.

The keys to turning a circular saw into a woodworking tool are pretty simple: Take advantage of its capabilities, outfit it with the right blade for the job, and use saw guides to ensure accurate cuts.



A 16-tooth blade (*left*) makes fast but very rough cuts. A 24-tooth model (*top right*) rips boards, even hardwoods, with ease. A 60-tooth blade (*bottom right*) crosscuts well and cuts sheet goods cleanly.

IT'S TIME TO CUT THE CORD

You'll find plenty of people who think you need a professional-grade worm-drive circular saw to do real work, but we beg to differ. The power, rugged construction, and increased capacity are great for cutting ganged stacks of studs in the tough conditions of a construction site. But they're overkill for woodworking. A cordless model with a 6½" blade offers plenty of capacity for slicing sheet goods and for cutting lumber as thick as 8/4. Today's 18- to 24-volt saws boast enough power to ripcut hardwoods without stalling.

Choosing the right blade proves the biggest key to getting great cuts. And the best blade for woodworkers is rarely the one that comes with the saw, *above, left*. We advise using a thin-kerf blade that taxes the motor less and turns less of your expensive wood into sawdust.

The biggest advantage of going cordless, though, is that you can take your saw to the work instead of having to take your work to the saw, *below*.



A cordless circular saw makes it easy to break long boards down to rough length before they enter the shop or, for that matter, before you leave the lumber dealer's parking lot, making it a cost-effective alternative to owning a pickup truck.

CROSSCUT TO THE CHASE

A mitersaw is tough to beat for crosscuts, but if you don't have one or you lack space for long supports, use a circular saw and a guide to crosscut pieces squarely and accurately to length.

A rafter square makes the simplest crosscutting guide around, *right*. And a rafter square can guide your saw for 90° crosscuts and 45° miters.

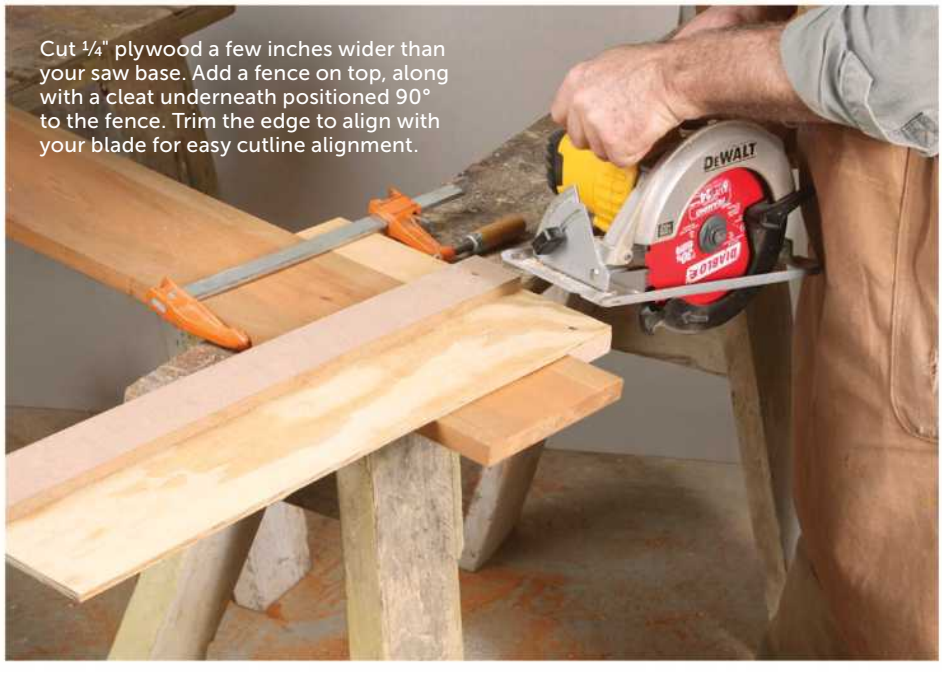
You can make a guide for 90° crosscuts that works much like a rafter square, *below*. The shop-made version offers one advantage: a base that provides a zero-clearance edge for your blade. That makes it easy to align the guide by laying it on your cutline, and it helps reduce tear-out.

Learn how to easily align your rafter square in this video. woodmagazine.com/speedycuts



Align your blade with the cutline, slide a rafter square against the edge of the saw base, then press the square's foot tightly against the board edge. Maintain saw base contact with the square as you cut.

> **WITH THE RIGHT BLADES AND GUIDES, A CIRCULAR SAW CAN RIVAL TABLESAW ACCURACY AND CUT QUALITY, MAKING IT A GO-TO TOOL IN MY SHOP.**
>
> ***-KEN BURTON, CONTRIBUTING EDITOR***



Cut ¼" plywood a few inches wider than your saw base. Add a fence on top, along with a cleat underneath positioned 90° to the fence. Trim the edge to align with your blade for easy cutline alignment.

CUT CLEAN DADOES

TIP!

When cutting multiple dadoes of the same width, use a spacer of matching width to set the second guide position.

The same rafter square or shop-built guide you use for making crosscuts will also guide a circular saw for dado cuts. While these saws can't accept dado blades, they can make the cuts in multiple passes.

Start by setting the cutting depth. If you're using a shop-made guide, be sure to account for the thickness of the base. Lay out the dado on your stock and align the guide with one layout line, pushing the cleat tight to the board's edge. Clamp the guide in place. Cut the first dado shoulder, then move the guide to the opposite edge of the board and align it to cut the second dado shoulder, *below, left.*

Make repeated cuts to remove most of the waste between the two shoulders. Then pare away the remaining waste using a chisel, *below, right.*



After establishing the first shoulder of the dado, flip the guide 180°. Measure from the outside of the first cutline to position the edge of the guide at the distance equaling the dado's width.



Cut multiple kerfs between the dado shoulders, either freehand or using the guide. Then use a chisel, held with the bevel down, to break out the waste and smooth the bottom of the dado.



Circular-saw edge guides ride against the edge of the workpiece to help keep the saw moving straight while ripcutting. You still need to guide the saw carefully to prevent wandering, especially at the end.

GET RIPPING-GOOD RESULTS

The secret to great ripcuts lies in moving the saw in a straight line. If you've tried to follow a line by eye with a circular saw, you know it can be a tough task. Once again, a guide makes ripcuts easier.

Most circular saws have an optional guide that attaches to the base. They rely on having one straight edge to follow, *left*, and they have limited capacity that suits them better for ripcutting boards than for cutting sheet goods.

SHOP-MADE ANGLE GUIDE

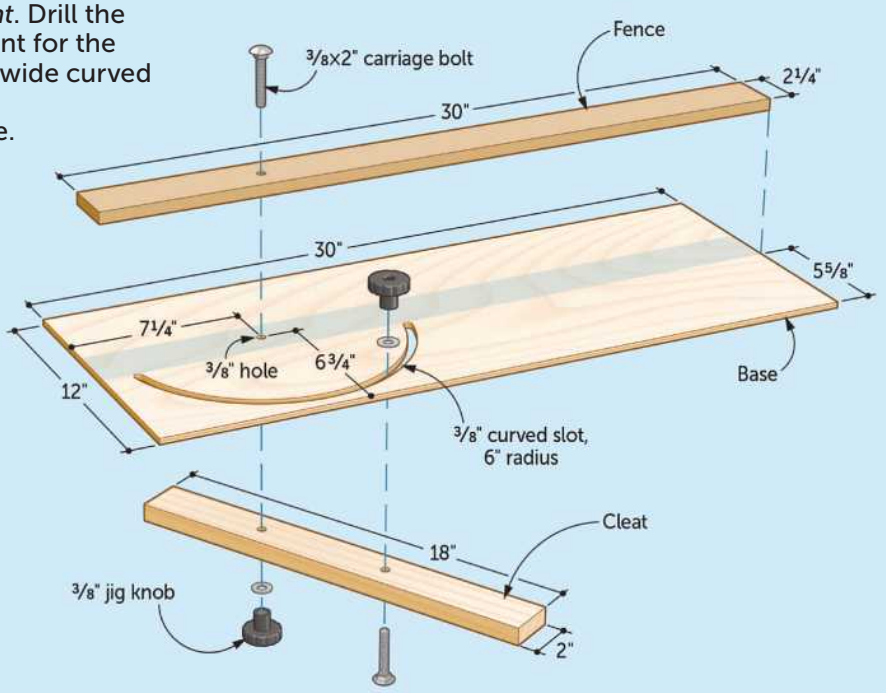
This circular saw guide takes the shop-made track to another level by incorporating a cleat that swivels for cuts at 90°, more than 45° in both directions, and any angle in between.

To make the guide, first cut a base to size from ¼" plywood, *Drawing, right*. Drill the hole that serves as the pivot point for the swiveling cleat. Then rout a ⅜"-wide curved slot, *below, left*.

Cut the fence and cleat to size. Glue the fence to the base, centered over the pivot hole. Complete the base assembly by guiding your saw along the fence to trim the cutting edge (opposite the slot) to match your saw.

Drill holes in the cleat and attach it using ⅜" carriage bolts, washers, and knobs. Pivoting the stop allows you to lock in the angle you need, *below, right*.

> **MITER-CUTTING LONG BOARDS PROVES CHALLENGING AT THE TABLESAW. A CIRCULAR SAW AND GUIDE MAKE THESE CUTS WITH EASE.**
>
> ***-KEN BURTON, CONTRIBUTING EDITOR***





Outfit your router with a ⅜" straight bit and a trammel. Secure the trammel's centerpoint in the pivot hole in the base, then rout a curved slot.



Swivel the guide's cleat to the cutting angle desired using a bevel gauge. Align the cutting edge with your layout line and guide the saw along the fence to make your cut.



Guide tracks, like this one from Milescraft, place a saw on a sled that follows the track. A zero-clearance edge strip reduces tear-out, and grippers on the underside help hold the track in place.



Place the saw guide along your layout line. Secure it with three clamps, when possible, so you can remove and then replace one clamp at a time to provide saw clearance.

TIP!

Lay sheet goods and boards on 2"-thick rigid foam insulation to support them while cutting.

Guide tracks bridge the gap between a circular saw and a tracksaw, *above, left*. Tracks usually have a capacity of about 50", enough to crosscut a sheet of plywood. Most manufacturers offer track extensions that increase capacity to 8' and beyond. The first time you use a new track, your saw cuts a rubber strip to create a zero-clearance edge. This allows you to lay the edge of the track on your cutline with no offset.

You can create a shop-made saw track–much like an elongated version of the crosscut guide on *page 32*–from a strip of 1/4" or 1/2" plywood a few inches wider than your saw base. Glue a fence near one edge that runs the length of the strip. A straight fence is critical, so 1/2" MDF or plywood makes a great choice. After the glue dries, make a cut holding the saw base tightly against the fence to trim the base to match your saw. Lay the shop-made track on your layout line, clamp it in place, and guide the saw against the fence to ripcut boards to width, *above, right*, to cut sheet goods, or to establish a straight edge on a crooked board.

TIP!

When rip-cutting boards with a saw track, place scraps of the same thickness under the overhanging track edge to provide support.



Set the cutting angle on a bevel gauge. Place the body against one edge of your workpiece and align the blade with your layout line. Position the saw guide track against the bevel and clamp it.

COVER ALL THE ANGLES

A circular saw and a guide also come in handy for making angled cuts, especially in sheet goods.

For occasional angled cuts, you can use a commercial circular saw track or the shop-made one. In either case, setting the angle correctly is key, *left*. For wide cuts across sheet goods, a long bevel gauge provides greater accuracy than a standard short bevel gauge. You can use a digital angle finder in place of the bevel gauge, if you prefer.

If you make a lot of angled cuts with your circular saw, build the guide with an adjustable fence shown in *Shop-Made Angle Guide* on the *previous page*. Whichever of these guides you use, you'll find that your circular saw is capable of making the precision cuts that woodworking projects demand.

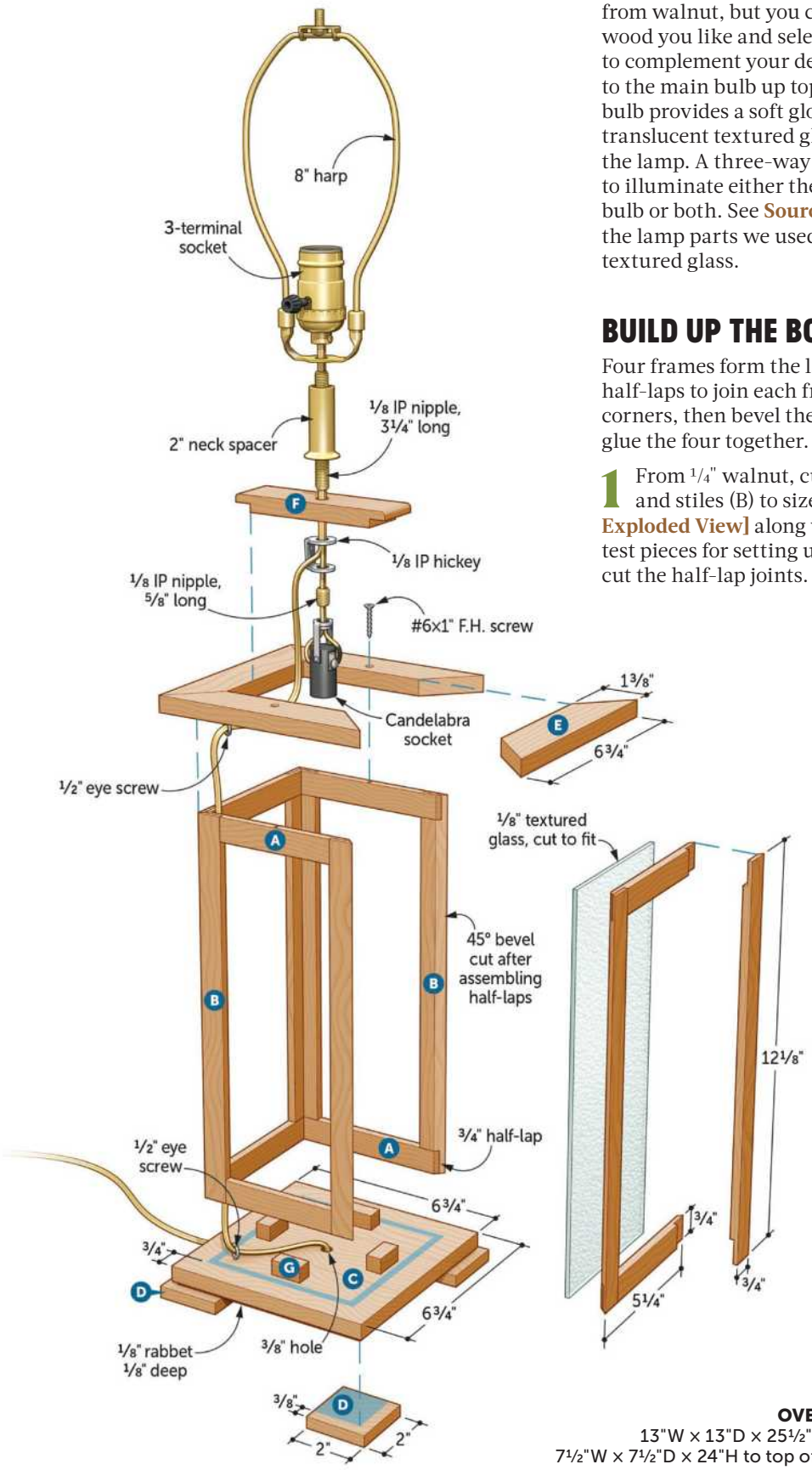
THREE-WAY LAMP

Twist the knob to illuminate the lampshade, the textured glass base, or both.

WRITER: CRAIG RUEGSEGGER
DESIGNER/BUILDER: KEVIN BOYLE



EXPLODED VIEW



This lamp invites glowing reviews of your craftsmanship. We built ours from walnut, but you can choose any wood you like and select a lampshade to complement your decor. In addition to the main bulb up top, a smaller bulb provides a soft glow through the translucent textured glass in the body of the lamp. A three-way socket allows you to illuminate either the top or bottom bulb or both. See **Sources** on *page 41* for the lamp parts we used, including the textured glass.

BUILD UP THE BODY

Four frames form the lamp body. Cut half-laps to join each frame at the corners, then bevel the long edges and glue the four together.

1 From 1/4" walnut, cut the rails (A) and stiles (B) to size **[Parts List, Exploded View]** along with a couple of test pieces for setting up the tablesaw to cut the half-lap joints.

OVERALL DIMENSIONS
13"W x 13"D x 25½"H with shade shown
7½"W x 7½"D x 24"H to top of harp with no shade

PHOTOGRAPHER: BRIE GOLDMAN; **ILLUSTRATOR:** CHRISTOPHER MILLS

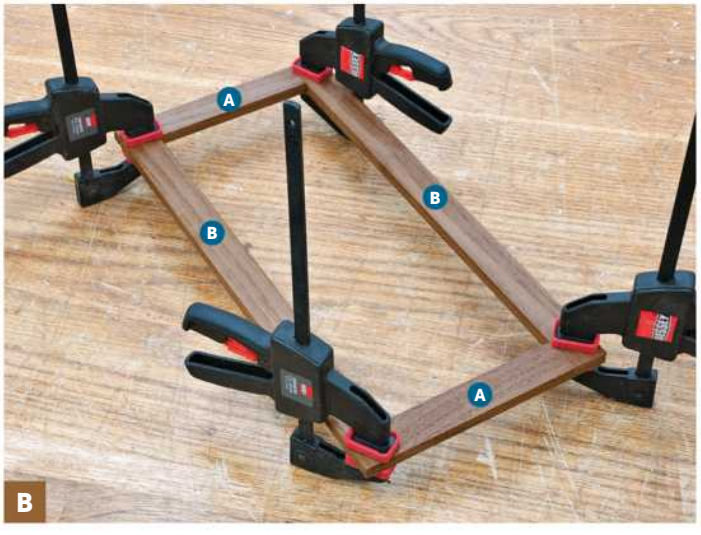
2 Install a dado stack in your tablesaw the same width as the rails and stiles. Raise the blade 1/8" above the table. Attach an auxiliary face to your rip fence and position the auxiliary fence so the dado blade just brushes it.

3 Add an auxiliary fence to your miter gauge and use it to guide the test pieces while making cuts on their ends. Test the fit of the joint **[Photo A]** and adjust the blade height until the test pieces slide together. Then cut the half-laps on the rails and stiles (A, B).

4 Glue up each frame **[Photo B]**, checking them for square. Allow the glue to dry.



The rabbeted faces of a perfect half-lap just slide together with both pieces resting on a flat surface. If the pieces bump into each other, raise the blade slightly. If there is a gap, lower the blade.



Apply a light coat of glue to the rabbets on each rail to prevent excessive squeeze-out. Make sure the shoulders of the half-laps are tight to each other, then clamp down at each corner.



Make a pushblock wide enough to cover both stiles (B) to help you maintain control and prevent the thin stock from chattering while bevel-cutting the edges.

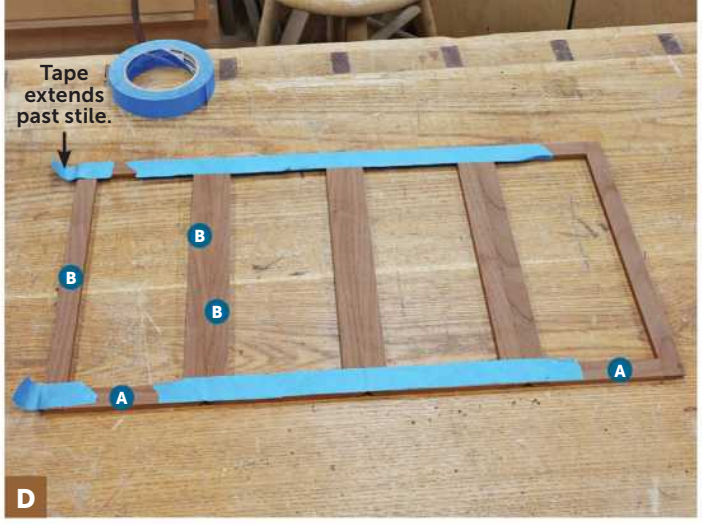
> **YOU WON'T NEED FANCY TOOLS TO BUILD THIS LAMP. YOU CAN CUT ALL OF THE JOINERY ON YOUR TABLESAW.**
>
> ***-KEVIN BOYLE, SENIOR DESIGN EDITOR***

5 Install a combination blade in your tablesaw and tilt it to 45°. Adjust your rip fence to bevel the edges of the stiles (B), removing only enough material to complete the bevel without altering their width **[Photo C]**. Bevel-rip both edges of each frame.

6 To assemble the lamp body, lay the four frames (A/B) on your workbench, outside faces up and edge to edge **[Photo D]**. Apply painter's tape to the rails (A) across the joints, then carefully flip the frames over. Apply a light coat of glue to the bevels, close the assembly, and clamp across the joints **[Photo E]**, checking for square.

7 After the glue dries, finish-sand the lamp body to 220 grit.

Note:
A combination blade provides the cleanest edge and reduces burning.



Align the four frames edge to edge and with the rails (A) flush at the top and bottom. Apply a strip of tape to the rails across the three joints and additional strips overhanging an outside stile (B).



After applying glue to the bevels, stand the frames up, close the joints and wrap the overhanging tape to secure the top and bottom. Add clamps or more tape in the middle to close the bevels fully.





After applying glue to the bottom edges of the lamp body (A/B), align the body with the tape and hold it in place for a few minutes until the glue grabs. Then clamp each bottom rail (A) to the base (C).

BUILD A BASE

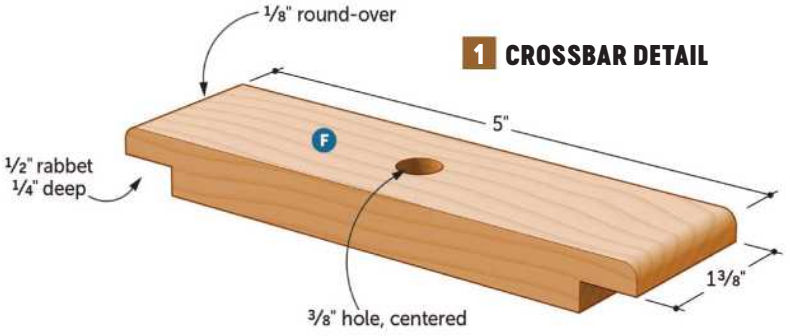
1 From 5/8"-thick walnut, glue up a blank for the base (C), then cut it to size **[Exploded View]**. Drill the 3/8" hole through the center. Cut a 1/8×1/8" rabbet around the lower face of the base to create a shadow line, then finish-sand the base.

2 Cut the feet (D) to size from 3/8"-thick stock. Finish-sand them, then glue them to the base extending 3/8" beyond the edges. Clamp the feet in place until the glue dries.

3 Center the lamp body (A/B) on the base (C). Mask along two outer faces of the body with painter's tape to mark the body's position. Mark the inside faces of the rails (A) in one corner, then remove the lamp body.

4 Install an eye screw inside the marked inside corner of the lamp body, leaving room for the 1/8"-thick glass **[Exploded View]**. Glue the body in place **[Photo F]**. Remove the tape and wipe away any squeeze-out.

Note: **Align the eye of the eye screw diagonally to provide clearance when installing the cord later.**



1 CROSSBAR DETAIL

TOP IT OFF

1 From 1/2" walnut, miter-cut the top frame pieces (E) to length **[Exploded View]**. Glue up the frame, drawing the miters together with a band clamp. After the glue dries, finish-sand the top frame.

2 Cut the crossbar (F) to size **[Drawing 1]**. Rabbet the ends and drill the centered hole. Sand a round-over on the ends, finish-sand the crossbar, then glue it to the top frame (E), centered.

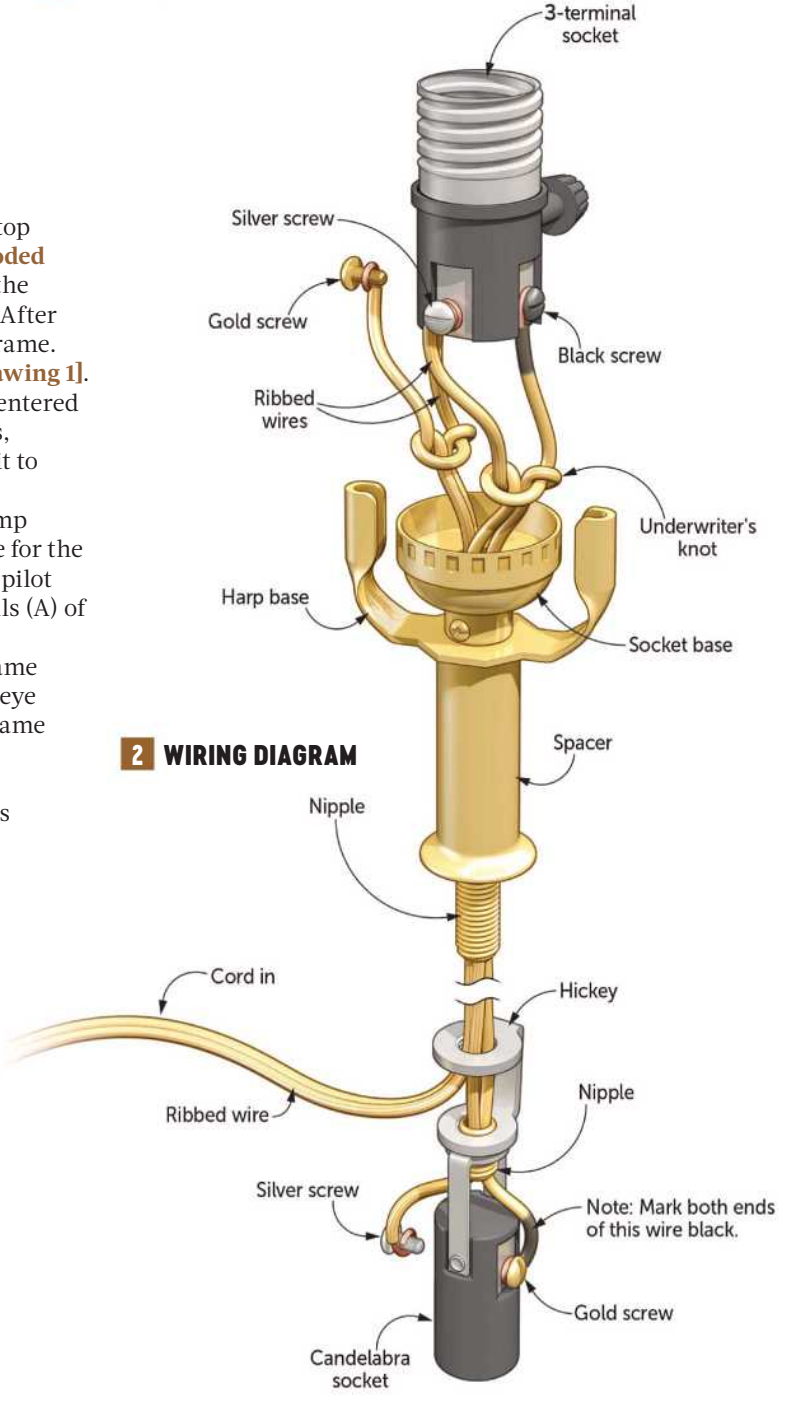
3 Dry-fit the top frame on the lamp body, centered. Mark the frame for the two screws, then drill countersunk pilot holes through the frame into the rails (A) of the lamp body.

4 Mark the bottom face of the frame on the inside corner above the eye screw in the base (C). Remove the frame and install an eye screw near this corner as before.

5 Cut four pieces of textured glass **[Sources]** to fit inside the lamp body. Cut the glass stops (G) to size. Then, working on one side at a time, place a piece of glass against a frame (A/B) and glue a glass stop to the base (C) snug against the glass. Remove the glass after a few minutes.

6 Apply a finish to the base and top assemblies. We sprayed on two coats of aerosol satin-finish polyurethane. We also applied three coats of dulling spray on the inside faces of the glass to help obscure the electric parts inside the lamp body.

Break glass cleanly with this simple shop-made jig.
woodmagazine.com/cleanbreak



2 WIRING DIAGRAM

WIRE IT UP

Wiring the lamp requires no special skills, but if you don't feel comfortable doing this yourself, find a local lamp shop to do it.

Note:
One strand of the lamp cord has a rib along its length. This indicates the neutral wire. It gets attached to the silver screw of the socket.

1 Make short wires to connect the two sockets by cutting 8" from the bare end of the lamp cord **[Sources]**. Separate the 8" length into two single conductors. Strip 3/8" of insulation from each end of these conductors. Mark both ends of the unribbed single conductor strand with a black marker. Feed the remaining cord through the lamp base (C) from underneath and thread it through the eye screws. Strip 3/8" of insulation from the end of each wire.

2 Cut a 5/8" length from the 4" nipple. Thread the hickey onto each of the nipples in turn to clean up the cut threads, then remove the hickey.

3 Remove the bottom of the three-terminal socket, and the top of the harp. Fit the base of the harp over the longer nipple and thread the nipple into the socket **[Exploded View]**. Slide the spacer over the nipple, then insert the nipple through the crossbar (F). Secure the assembly by threading on the hickey and tightening it to the underside of the crossbar. Attach the candelabra to the hickey using the 5/8" nipple.

4 Attach one end of the marked single-conductor wire to the gold screw on the candelabra **[Drawing 2]**. Secure the unmarked conductor under the silver screw. Thread the single conductors and the intact lamp cord through the nipples and out of the socket base **[Exploded View]**.

5 Tie underwriter's knots **[Exploded View, Drawing 3]**, then attach the wires to the screw terminals on the socket: the black marked wire to the black screw, both ribbed wires to the silver screw, and the remaining wire to the gold screw. Replace the top of the socket and secure the assembly on both sides of the crossbar (F). Install a bulb in the candelabra.

6 Place a dab of silicone sealant on the center inside face of each top rail (A), then install the glass, pressing it against the silicone. Pull the excess cord down through the eye screws. Screw the top frame (E) to the lamp body.

7 Attach the harp, install a bulb in the socket, then mount a shade of your choice. (See **Sources** for the shade we show.) Now, bask in the glow of a job well done.

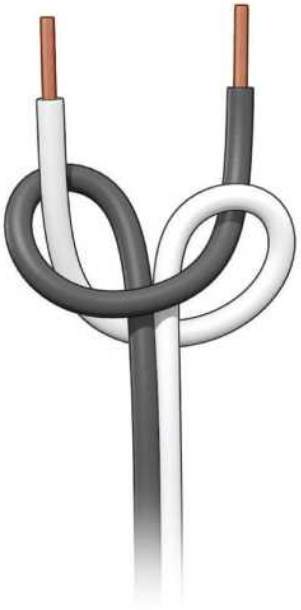
PARTS LIST

PART		FINISHED SIZE T	W	L	Matl.	Qty.
A	RAILS	1/4"	3/4"	5 1/4"	W	8
B	STILES	1/4"	3/4"	12 1/8"	W	8
C	BASE	5/8"	6 3/4"	6 3/4"	W	1
D	FEET	3/8"	2"	2"	W	4
E	TOP FRAME PIECES	1/2"	1 3/8"	6 3/4"	W	4
F	CROSSBAR	1/2"	1 3/8"	5"	W	1
G	GLASS STOPS	1/2"	1/2"	1"	W	4

*Parts initially cut oversize. See the instructions.

MATERIALS KEY: W–walnut.
SUPPLIES: #6x1" flathead screws, 1/2" eye screws (2), silicone sealant, clear A19 bulb, clear candelabra bulb.
BLADE: Dado blade.
SOURCES: 3-wire twist knob socket no. SL19053, $10; 8" harp no. SL15014, $2; 2" brass spacer no. SL07310, $1; 4" nipple 1/8 IP no. SL04388, $3; 1/8x1/8 IP hickey no. SL16110, $2; 2" candelabra base socket no. SL19121, $3; 8' cord set no. SL19713SPT2, $5, mylampparts.com. Loose ripple stained glass sheet 12x12" no. 519819 (2), $11/each, hobbylobby.com. Dulling spray no. B086W9SNHJ, $13; square lampshade no. B0DNR88XPC, $22, amazon.com.
PROJECT COST: It cost us about $150 to build this project. Your cost will vary by region and source.

3 UNDERWRITER'S KNOT



CUTTING DIAGRAM

We purchased 4 board feet of 4/4 walnut. Before cutting parts to size, we resawed and planed them to the thicknesses shown in these example boards.



1/4x3 1/2x48" Walnut



5/8x3 1/2x48" Walnut †Plane or resaw to the thickness listed in the Parts List.

20 WAYS TO GET MORE OUT OF YOUR DRILL

From specialized bits to cool jigs, these essential add-ons will unlock your drill's potential.

WRITER: VINCE ANCONA
PHOTOGRAPHER: BRIE GOLDMAN

A drill is one of the first power tools most woodworkers acquire, and it's easy to see why. They're essential for basic tasks like boring holes and driving fasteners. But a host of accessories will expand the versatility of this essential tool. We've picked out a few of our favorites.

EXTEND YOUR REACH

Unlike a drill press, a handheld drill allows you to take the tool to the work, giving you more mobility and making it easier to drill a hole or drive a fastener right where you want. There are times, though, when even a small cordless drill is too big to get right where you need to. Here are a few options to deal with these situations.

1. BIT EXTENDER

Bit extenders are long shafts that add physical length to a drill bit or an impact driver bit (see *Drill vs. Drivers, page 45*). They allow you to get into spaces where a drill can't fit, like the back of a cabinet or inside corner of a project. Basic extenders are just a steel shaft with a socket on one end to receive the bit. Setscrews hold the bit in place. Fancier versions utilize a quick-change chuck and have a floating sleeve on the shaft that allows you to grip the extender to steady it while it's spinning.

Ares Tool, *arestool.com*
6" bit holder, no. 70206, $13
12" bit holder, no. 70207, $17



2. RIGHT-ANGLE ATTACHMENT

Sometimes a shorter reach is better than a longer one. For work in tight, confined spaces, a right-angle attachment proves indispensable. This inexpensive accessory uses internal bevel gears to transfer the spinning motion of the drill 90°. It allows you to work inside tight cabinets, between wall studs, or right next to an obstacle.

Milescraft, *milescraft.com*
Drive90Plus drill attachment, no. 1303, $20





3. FLEXIBLE BIT EXTENDER

A flexible bit extender offers another option for tight spaces. This type of extender uses a bendable shaft rather than gears that allow it to snake around obstructions without having to make a sharp 90° bend. However, it lacks the high-torque driving capability of a right-angle attachment, making it more suited for light-duty tasks.

Makita, ***makitatools.com***
12" flexible bit holder, no. B-51873, $40

MAKE IT A BIT SPECIAL

Standard twist bits are fine for ordinary drilling, but specialty bits speed drilling operations or work better for specific tasks.

4. QUICK-CHANGE BIT SET

Whether you use a drill/driver or an impact driver, a quick-change bit set will speed your work. This set from Snappy contains an assortment of drill bits in commonly used sizes, along with countersink bits and driver bits, all with 1/4" hex shanks. The hex shanks allow you to quickly insert and remove the bits from an impact driver, or use the included quick-change chuck to drive the bits with a standard drill/driver. A folding nylon canvas case keeps everything together.

Snappy Tools, ***snappytools.com***
25-pc drill and countersink set, no. 48025, $95



> **DON'T SKIMP ON DRIVER BITS. LOW-PRICED ECONOMY BITS TEND TO ROUND OVER QUICKLY, LEADING TO STRIPPED SCREWHEADS AND A LOT OF FRUSTRATION.**
>
> ***-KEVIN BOYLE, SENIOR DESIGN EDITOR***



5. ZACK RABBIT BIT SET

Zack Rabbit bit sets take standard drill/countersink and driver bits (like those in the Snappy set) to the next level. A combined drill and countersink bit slips over a driver bit, eliminating the need to continually switch back and forth between bits and drivers. After drilling a countersunk hole, use the quick-release collar to remove the bit and drive the screw. Then slide the bit back on for the next screw hole. Zack Rabbit bit sets are sold individually or as a set of three to cover #6, #8, and #10 screws.

Zack Rabbit, ***zackrabbit.com***
Zack Rabbit Quick Draw Holster, $89

6. SELF-CENTERING DRILL BITS

Drilling holes for hinge screws requires precision. If you drill one of the holes slightly off center, the screw can pull the hinge out of alignment. Self-centering bits (also known as Vix bits) feature a spring-loaded sleeve with a beveled nose surrounding an internal drill bit. When placed into the countersunk screw hole of a hinge, the sleeve automatically centers the bit, ensuring a perfectly aligned pilot hole. A setscrew in the sleeve allows you to set the hole depth. Self-centering bits come in a range of sizes for different screw sizes.

Lee Valley, *leevalley.com*
Hex-shank centering bits, various nos., $12-14



7. SHELF-PIN BITS

Similar to self-centering bits, shelf-pin bits are specialized bits designed to bore clean, accurate holes to a consistent depth for shelf pins. They have a spring-loaded collar with a shouldered step on the end to fit in shelf-pin jigs, *see 14. Shelf-Pin Jig, page 46.* And like the self-centering hinge bits, shelf-pin bits also have a setscrew to control the hole depth. Shelf-pin bits are available in 1/4" and 5mm sizes.

Milescraft, *milescraft.com*
1/4" shelf-pin bit, no. 2313, $12



STRAIGHTEN UP

A handheld drill is great for portability, but when it comes to drilling straight, perpendicular holes, it lacks the accuracy of a drill press. These accessories can lend a hand.

8. DRILL-GUIDE BLOCK

A drilling guide block is a simple, inexpensive device that holds a bit perpendicular to a surface as you drill. Most blocks have multiple holes sized for common bit sizes. Metal sleeves line the holes to prevent wallowing from the spinning bit. To use the guide block, simply clamp or hold it against your workpiece and start your drill bit in the appropriate hole. Once the hole is started, you can remove the guide block if you need to drill deeper. Some guide blocks feature a V-groove along the bottom to allow you to drill a hole through a dowel or on an edge where two surfaces meet.

Kreg Tool, *kregtool.com*
Drilling guide, no. KDG-6000, $10





9. PORTABLE DRILL GUIDE

A portable drill guide can turn your handheld drill into a makeshift drill press. The guide features a drill chuck that mounts into your drill and travels on a pair of guide rods. A large base provides stability, allowing you to plunge the drill straight down toward your workpiece. The base can be tilted for angled holes, and a V-groove on the bottom centers the jig on round stock.

Milescraft, *milescraft.com*
DrillMatePRO, no. 1348, $125

SCRATCHING THE SURFACE

The rotary action of a drill is well-suited for more than drilling holes. With the right accessories, you can use your drill to sand wood or metal, or to strip rust or paint.

10. SANDING DISC

A small (2" or 3") sanding disc turns your drill into a mini-sander for hard-to-reach areas or small, localized spots where a larger sander would be overkill. Small sandpaper discs attach to a rubber pad mounted on a mandrel. The pad flexes to allow you to sand contours and inside curves, such as the inside of a turned bowl. Or use non-woven abrasive discs instead of sandpaper to remove rust or buff metal.

Amazon, *amazon.com*
240 pc. 2-inch sanding disc variety kit, no. B09BMZ6TG6, $14





11. SANDING DRUM

A small sanding drum works great for sanding contours along edges. Most of these work similarly to sanding drums used in drill presses, but one that we particularly like has a free-floating handle on the end that allows you to control the drum with two hands. This provides a greater amount of finesse and prevents the drum from spinning out of control in use.

Amazon, *amazon.com*
Handheld sanding drum, no. B09B16V57T, $20

DRILLS VS. DRIVERS





You'll often see drills, drill/drivers, and impact drivers lumped together as one category of tools. But they serve different functions. A standard drill uses a smooth, continuous rotational action to drill holes. A switch on some drills allows you to choose between low and high gear settings, depending on whether speed or torque is the priority.

A drill/driver works like a drill, but incorporates an adjustable clutch to control torque. Once the tool meets a specific level of resistance, the clutch slips and the bit stops turning. This prevents overdriving fasteners, stripping screwheads, or breaking off screws entirely. A clutch override setting provides maximum torque when drilling holes.

Impact drivers add a hammering action to the rotational force of the drill, making it possible to drive larger-diameter or longer fasteners into dense hardwoods and tough materials. They're great when brute force is needed, but lack the finesse of a drill/driver, relying on trigger pressure alone to control the torque. They also don't drill as precisely as a drill or drill/driver.

Drills and drill/drivers typically have three-jaw chucks and can accept both round and hexagonal-shank bits. Impact drivers use ¼" hex collets and accept hex-shank bits only. Be aware that not all drill accessories are rated for use with impact drivers. The hammering action can damage or destroy the bit or accessory over time.



12. WIRE BRUSHES

For rust or paint removal, keep an assortment of small wire brushes on hand. These mandrel-mounted brushes come in a variety of sizes and shapes, including flat wheel brushes to cup brushes to straight-tipped brushes. Steel-wire brushes work best for aggressive rust removal. Choose brass-wire versions when you need a gentler touch.

Amazon, *amazon.com*
6 pc. wire brush set, no. B0D94RN23T, $7

GET JIGGY WITH IT

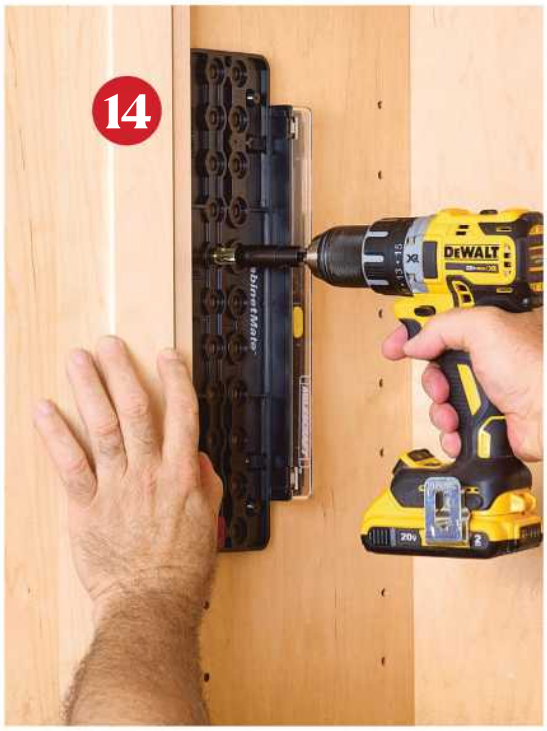
Whether you're wanting to install hardware or create joinery, these aftermarket jigs greatly expand the versatility of any drill.

13. CONCEALED-HINGE JIG

Installing concealed hinges becomes incredibly easy with a jig. Most concealed-hinge jigs clamp directly to the workpiece and use adjustable stops to control the depth, offset, and vertical alignment while you drill the cup holes for 35mm cabinet door hinges. Once set up, the jig takes all the guesswork out of the equation, allowing you to drill accurate hinge holes quickly and efficiently.

Amazon, *amazon.com*
Concealed hinge jig, no. B0FH62WZX1, $43





14. SHELF-PIN JIG

A shelf-pin drilling jig makes it easy to drill evenly spaced shelf-pin holes on an assembled project using a handheld drill. Holes in the jig provide the spacing while stops or a shoulder on the jig registers against the edge or back of the cabinet to ensure the holes are perfectly aligned.

Milescraft, *milescraft.com*
CabinetMate, no. 1316, $28

15. POCKET-HOLE JIG

For quickly assembling doors, face frames, and cabinets, pocket screws are a game changer. And to create pocket-screw joints, all you need is a drill and a jig. Pocket-hole jigs are available in different configurations, but they all guide a pocket-hole bit at an angle to drill a stepped hole for the pocket screw.

Kreg Tool, *kregtool.com*
Pocket-hole jig 720PRO, no. KPHJ720PRO, $150





16. DOWEL JIG

Dowel joinery is simple in theory, but the challenge has always been drilling straight, accurately positioned holes in both parts you're joining. A self-centering dowel jig makes the process easier by precisely positioning the drill bit and guiding it in a straight path as you drill the hole. Clamp the jig directly to your workpiece using index marks to align it with the center of your dowel hole. Hardened sleeves guide the drill bit and prevent it from wandering.

Woodcraft, *woodcraft.com*
Doweling jig, no. 124315, $75

17. MORTISING JIG

Creating mortises for loose-tenon joinery is usually a job for the router or an expensive loose-tenon joiner. But Kreg's MortiseMate jig allows you to do the same thing with a drill. The jig guides the drill in a back-and-forth motion, plunging a special-purpose bit deeper into the wood with each swing. In just a few seconds, it creates a perfect-fitting mortise for the loose tenon.

Kreg Tool, *kregtool.com*
MortiseMate, no. KLTJ100, $300



THINK OUTSIDE THE BOX

There are lots of accessories available to extend the use of a drill beyond woodworking. While some of these seem a little dubious or downright unsafe, here are a few we find genuinely useful.

18. SCRUB BRUSHES AND PADS

For tough cleaning jobs, a set of nylon scrub brushes, sponges, and nonwoven abrasive pads comes in handy. When paired with a drill, these brushes and sponges make quick work of scrubbing or washing all kinds of surfaces, from tile to metal to walls. Like the wire brushes, these come in a variety of shapes and sizes.

Amazon, *amazon.com*
30 pc. brush attachment set, no. B0CM651CJT, $18





19. PAINT/EPOXY PADDLE

Stirring paint with a stick is so last century. A paint mixer and drill do a better job and do it faster. These paddles work great for mixing epoxy, as well.

Amazon, *amazon.com*
Paint mixer, no. B085YDCC5D, $11

20. GARDEN AUGER

If you have a green thumb, consider pairing your drill with a garden auger to make clean holes for planting bulbs or plants. While an auger won't drill through hardpan or packed soil, it makes quick work of drilling holes in prepared gardening soil. Augers are available in different diameters and lengths.

Amazon, *amazon.com*
Planting auger bits,
no. B0GXNBSGG8, $18



TIME-TRAVELING DESK CLOCK

Building this timepiece, inspired by fold-up travel clocks, is so alarmingly simple, you can make a whole collection of them in no time.

WRITER: CRAIG RUEGSEGGER
DESIGNER/BUILDER: JOHN OLSON

Before everyone had multiple alarms available on a phone in their pocket, a folding clock perched beside the bed or on a motel room desk kept travelers on time. This wood-cased version turns your interesting small scraps into a gift anyone would love. We found a bit of ash for the clock movement **[Source]** to nest in and, for contrast, a nice piece of walnut for the case. A highly figured piece works well for the lid, which doubles as a stand to hold the clock upright on a desktop or nightstand.

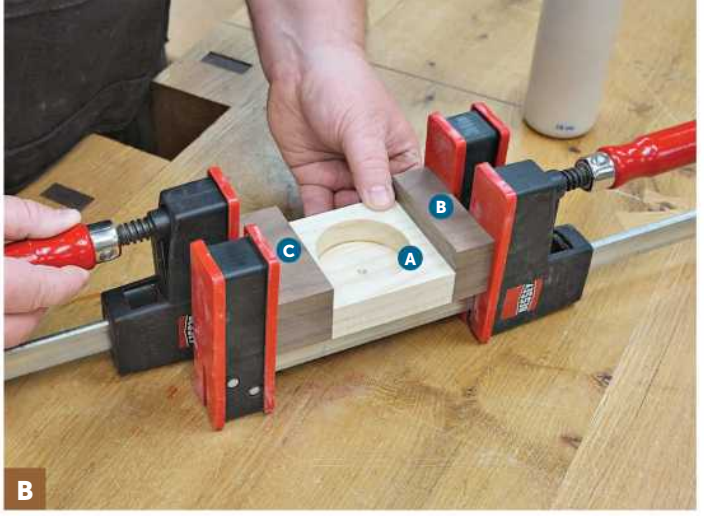


OVERALL DIMENSIONS
4¼"W × 1⅞"D × 5¾"H (with lid closed)

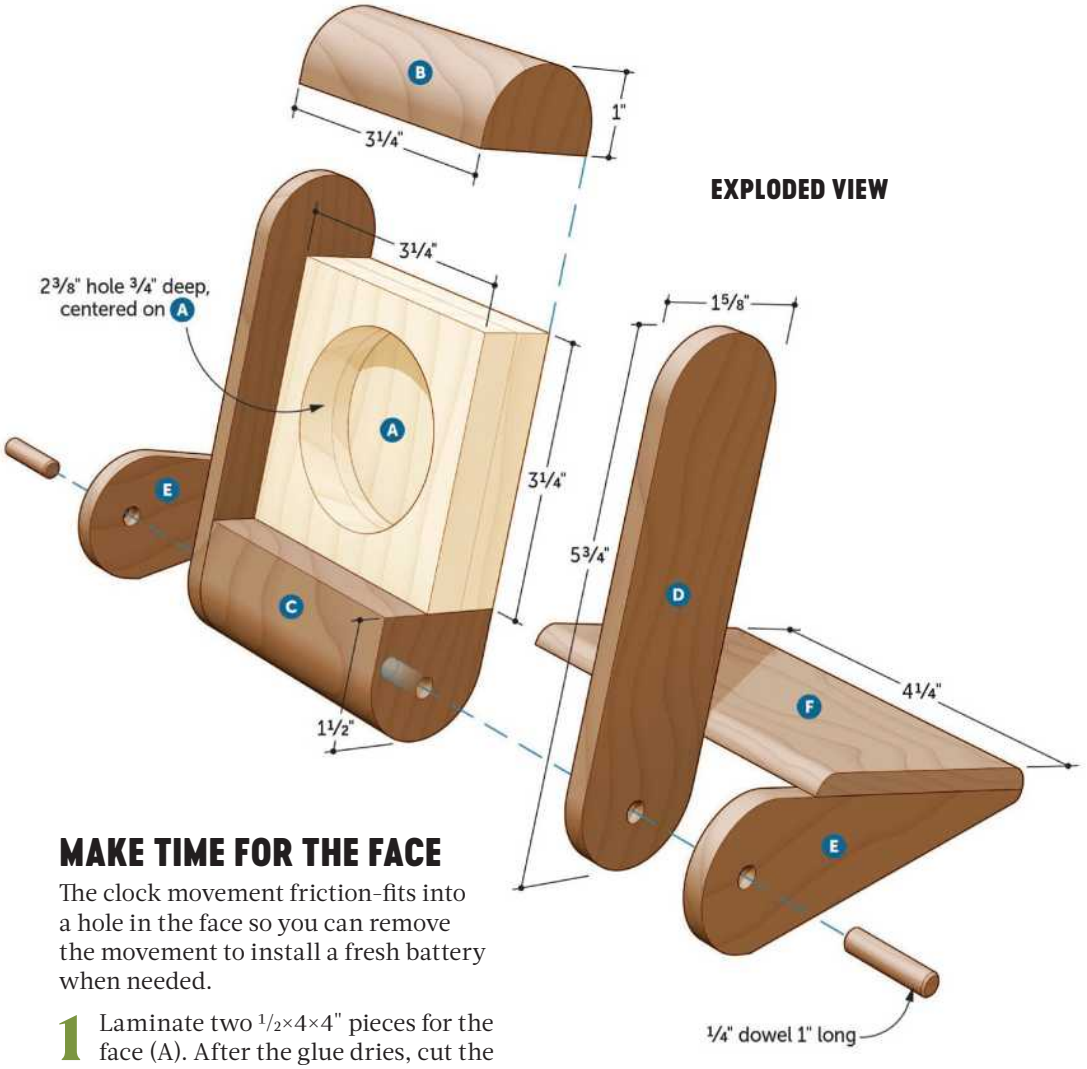
PHOTOGRAPHER: JAKE STERNQUIST; **ILLUSTRATOR:** CHRISTOPHER MILLS



Clamp an auxiliary table to your drill-press table. Center the face (A) under the Forstner bit, then trap it by screwing scrap blocks on all sides. Double-check the blank's position, then drill the stopped hole.



Apply glue only to the ends of the face (A). Then keep the edges and rear faces of the three parts flush as you clamp the face between the top (B) and bottom (C).



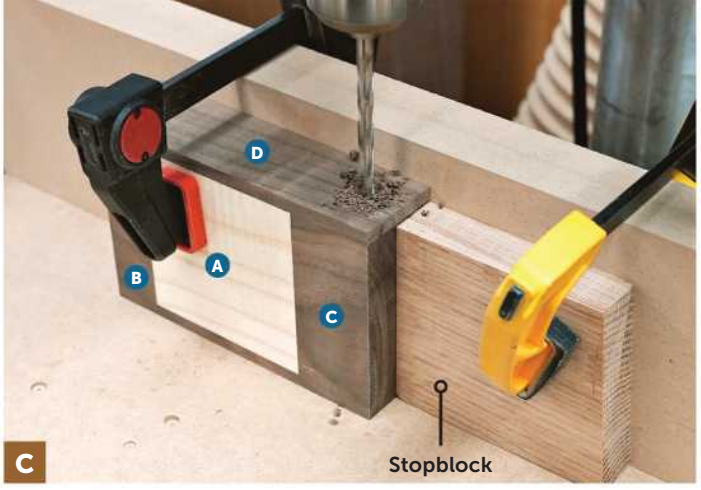
MAKE TIME FOR THE FACE

The clock movement friction-fits into a hole in the face so you can remove the movement to install a fresh battery when needed.

1 Laminate two ½×4×4" pieces for the face (A). After the glue dries, cut the face to size **[Parts List]**.

2 Mark diagonal lines from corner to corner to locate the center of the face. Then, using a Forstner bit **[Source]**, drill a 2⅜"-diameter hole ¾" deep at this point **[Photo A]**.

3 For parts B–E, mill a 1⅝×3¼×12" blank. Crosscut the top (B) and bottom (C) to length from the blank **[Parts List]**. Glue the face (A) between the top and bottom **[Photo B]**.



Clamp the face assembly (A–D) to a tall fence and clamp a stopblock against the bottom (C). Flip the piece over to drill the hole on the opposite side.



Stabilize the face (A–D) by clamping it to a thick scrap with square edges. This will help keep the face perpendicular to the blade as you round the ends.

Use this jig to safely rip thin strips.
woodmagazine.com/ripstrips

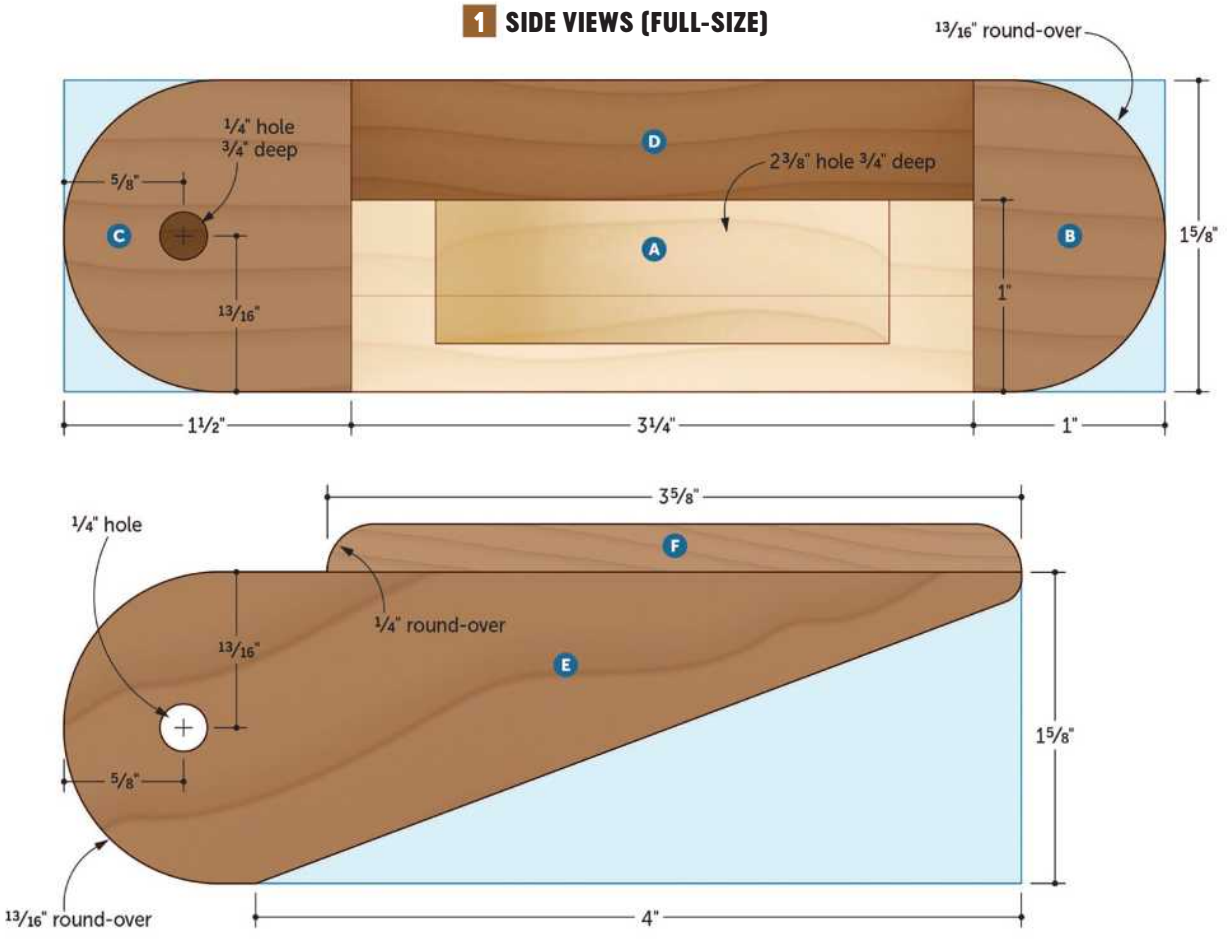
4 Rip four 1/4"-wide pieces from the blank and set two aside. Crosscut the sides (D) to length from the other two strips **[Exploded View]**. Glue and clamp the sides to the face assembly (A/B/C) flush with the ends and edges.

5 After the glue has dried, mark the hinge-pin locations centered on the width of each side (D) **[Drawing 1]**. At the drill press, drill 1/4" holes 3/4" deep at these marks **[Exploded View, Photo C]**.

6 Using the full-size pattern **[Drawing 1]**, lay out the radii on the ends of the sides (D) **[Photo D]**. Cut just outside the lines at the bandsaw, then sand the curves smooth.

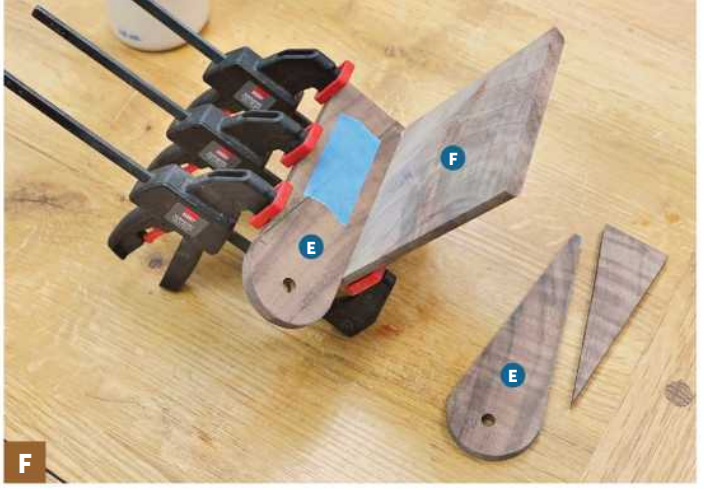
7 Finish-sand the assembly to 220 grit, easing any sharp edges.

1 SIDE VIEWS (FULL-SIZE)





Bandsaw the radius first, then cut the taper along the edge. Work to make the taper as smooth as possible, and save the cutoff to help with clamping later.



Tape the cut-off wedge back to the arm (E) it came from, then apply glue to the opposite edge of the arm. Clamp the assembly to the bottom face of the lid (F), flush at the end and edge of the lid.

SECOND, MAKE THE LID

The lid covers the clock movement. It also doubles as a display stand when you rotate it back to reveal the clock.

1 Retrieve the two remaining 1/4" walnut strips. Cut the arms (E) to length from these strips **[Parts List]**.

2 Mark the hole location on each arm **[Drawing 1]**, then drill the holes at the drill press.

3 Lay out the radius and taper on each arm and cut the arms to rough shape at the bandsaw **[Photo E]**. Don't sand the cut edges smooth yet.

4 Cut the lid (F) to size from 1/4" stock. Rout 1/4" round-overs along each end **[Drawing 1]**.

5 Glue and clamp the arms (E) to the lid (F) **[Photo F]**. After the glue dries, remove the cutoffs and use a sanding block to sand the tapered edges of the arms smooth and blend their narrow ends to the round-over of the lid.

6 Dry-fit the lid assembly (E/F) to the face assembly (A–D) with overlong 1/4" dowels, then sand the ends of the arms to match the profile of the bottom (C). Remove the dowels and lid assembly from the face assembly.



WIND IT UP

1 Apply a finish. We sprayed on two coats of aerosol sanding sealer, buffing the second coat with an 800-grit sanding sponge. We then sprayed on three coats of aerosol satin-finish lacquer, buffing between coats with a 1200-grit sanding sponge and gently rubbing the final coat with 0000 steel wool. We topped this with a light coat of furniture wax.

2 Cut two 1" lengths of 1/4" walnut dowel and sand a slight chamfer on both ends of each one. Using a toothpick, apply a drop of glue in each 1/4" hole in the bottom (C), align the arms (E) with the holes, and tap in each dowel. The dowels should rest slightly proud of the face of the arms.

3 Install a battery in the clock movement, set the time, and press the movement into the face (A). Now, it's about time to show off your work.

Note: **A single drop of glue is sufficient. Any squeeze-out will be difficult to remove and will glue the arms in a fixed position.**

PARTS LIST

PART		FINISHED SIZE T	W	L	Matl.	Qty.
A	FACE	1/2"	3 1/4"	3 1/4"	A	2
B*	TOP	1 5/8"	3 1/4"	1"	W	1
C*	BOTTOM	1 5/8"	3 1/4"	1 1/2"	W	1
D*	SIDES	1 5/8"	1/4"	5 3/4"	W	2
E*	ARMS	1 5/8"	1/4"	5"	W	2
F	LID	1/4"	4 1/4"	3 5/8"	W	1

*Parts initially cut oversize. See the instructions.

MATERIALS KEY: A–ash, W–walnut.
SUPPLIES: 1/4" walnut dowel.
BIT: 1/4" round-over bit.
SOURCE: White Roman 2 3/4" clock movement no. 200920, $13; 2 3/8" Forstner bit no. 400901, $29, schsons.com.

MOBILE MEDIA CENTER

Perfect for a living room, game room, or basement, this sleek cart adds mobility to your TV and flexibility to your room layout.

WRITER: VINCE ANCONA
DESIGNER: KEVIN BOYLE
BUILDER: BRIAN BERGSTROM



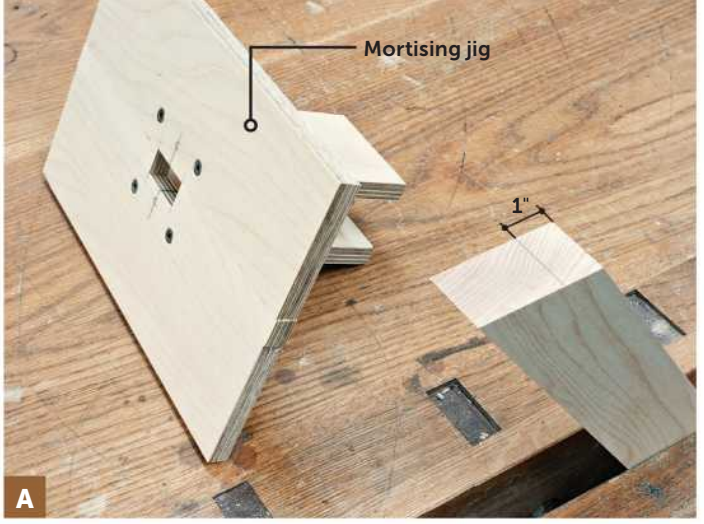
PHOTOGRAPHER: JAKE STERNQUIST, **ILLUSTRATOR:** CHRISTOPHER MILLS

Finding a spot to mount a TV can be a challenge in a small room. This project solves the problem by mounting the TV to an upright panel on casters. A storage unit in the base of the cart provides space for a game console or components.

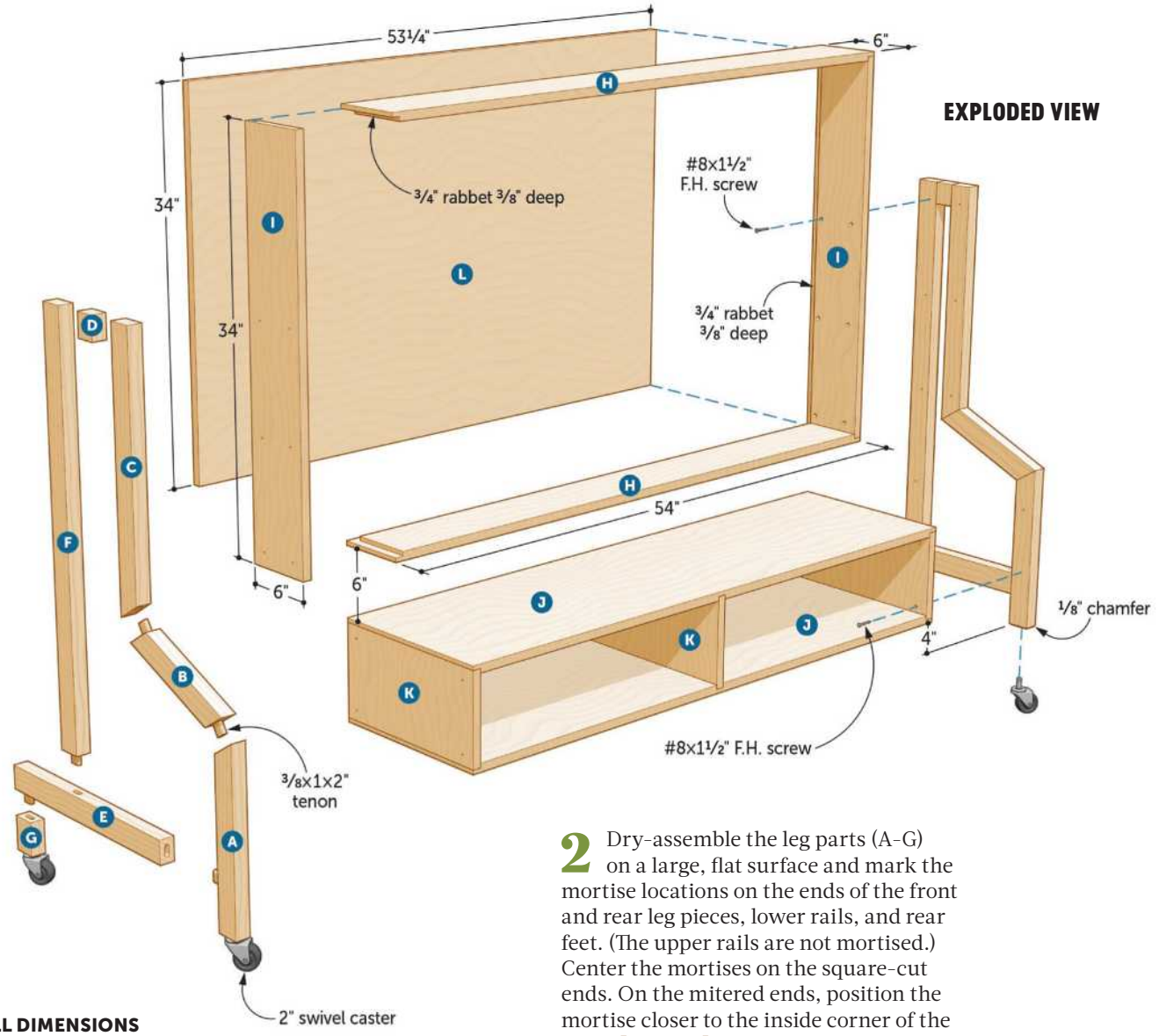
BUILD THE LEG ASSEMBLIES

Note: Cut the upper rails (D) so the grain runs vertically to match the legs (C, F).

1 Mill enough stock to size for the lower front legs (A), middle front legs (B), upper front legs (C), upper rails (D), lower rails (E), rear legs (F), and rear feet (G) **[Parts List, Exploded View]**. Miter-cut the front leg parts (A-C) to length **[Drawing 1]**. Cut the upper and lower rails, rear legs, and rear feet to length. Use one of the leg parts as a gauge to build a shop-made mortising jig. (See *Low-Budget Loose Tenons, page 55.*)



On the mitered ends of the front leg pieces (A–C), position the mortise centerline closer to the inside corner of the joint to avoid accidentally routing through the workpiece edge.



OVERALL DIMENSIONS
56½"W x 22"D x 56"H

2 Dry-assemble the leg parts (A-G) on a large, flat surface and mark the mortise locations on the ends of the front and rear leg pieces, lower rails, and rear feet. (The upper rails are not mortised.) Center the mortises on the square-cut ends. On the mitered ends, position the mortise closer to the inside corner of the miter **[Photo A]**.



To round over the edges of the loose-tenon stock, position the router-table fence so it's flush with the bit's guide bearing. Rout a 3/16" round-over on all four edges of the blank.



Working on a flat surface, glue up the front legs (A–C) using loose tenons. Green painter's tape provides just enough stretch to hold the mitered joints together tightly while the glue sets up.

3 Using a router and the mortising jig, cut the mortises.

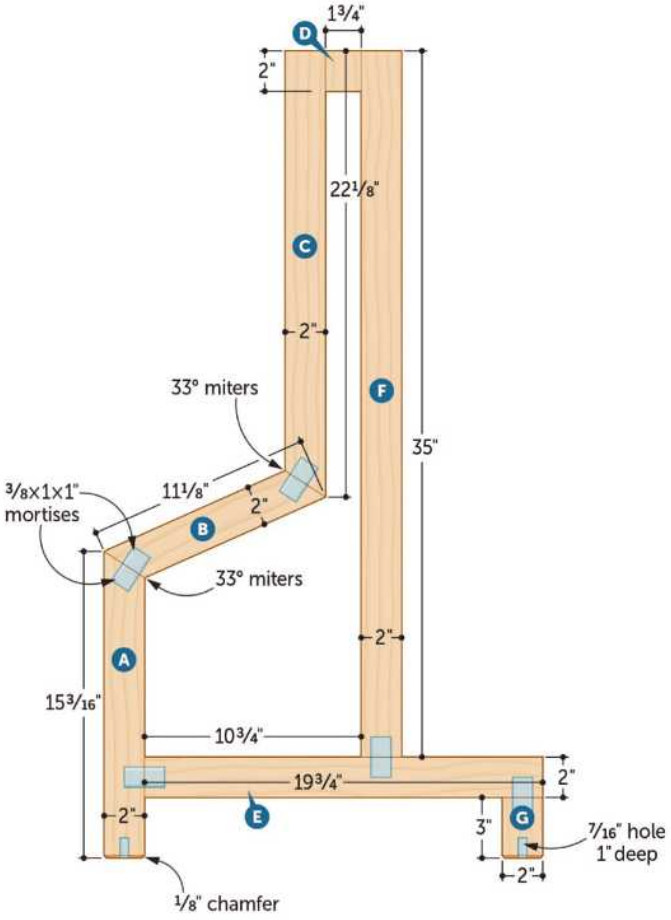
4 To make the loose-tenon stock, round over the edges of a 3/8×1×24" blank **[Photo B]**. Check the fit in the mortises and lightly sand the blank if necessary. Cut the tenons to length.

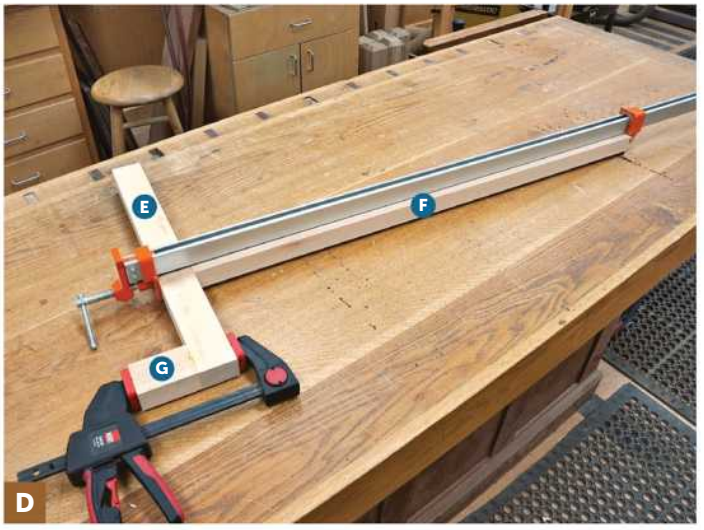
5 To assemble the front legs (A-C), first apply glue to the ends, mortises, and tenons, then join the parts together and add painter's tape to secure the joints while the glue dries **[Photo C, Drawing 1]**.

6 Glue the upper rails (D) to the front leg assemblies (A-C). You don't need loose tenons as reinforcements here: The edge grain provides a strong glue joint.

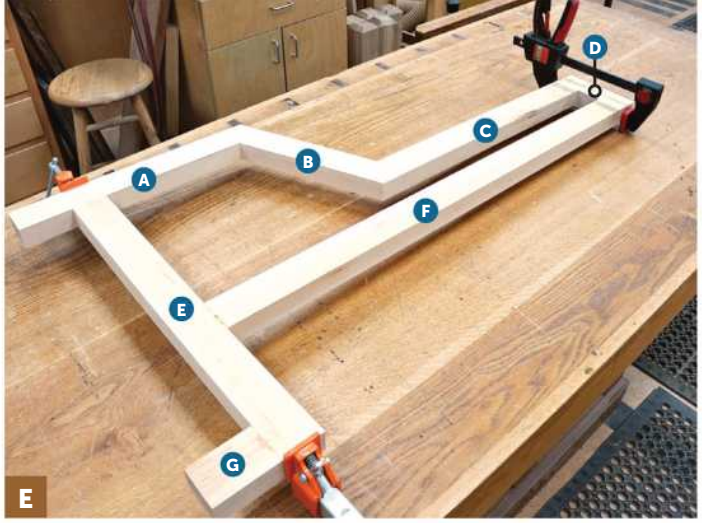
7 Glue and clamp the rear legs (F) and rear feet (G) to the lower rails (E) **[Photo D]**.

1 LEG ASSEMBLY

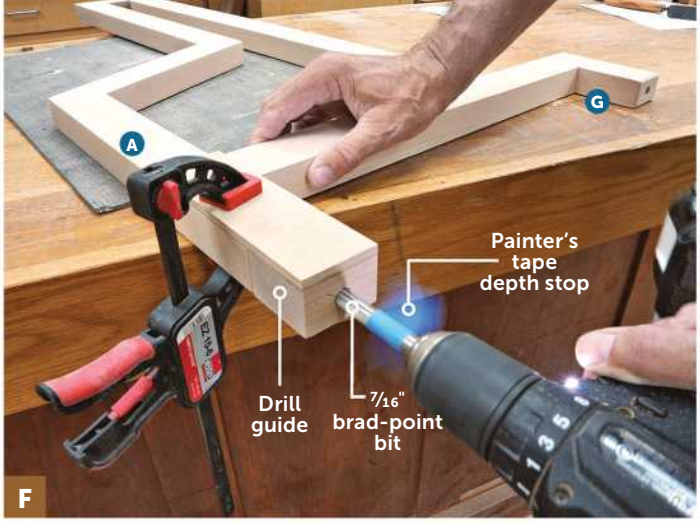




Glue and clamp the rear leg (F) and rear foot (G) to the lower rail (E), using loose tenons to align and reinforce the joints.



Glue and clamp the front leg assembly (A–D) to the rear leg assembly (E–G), ensuring that the faces of both assemblies are flush.



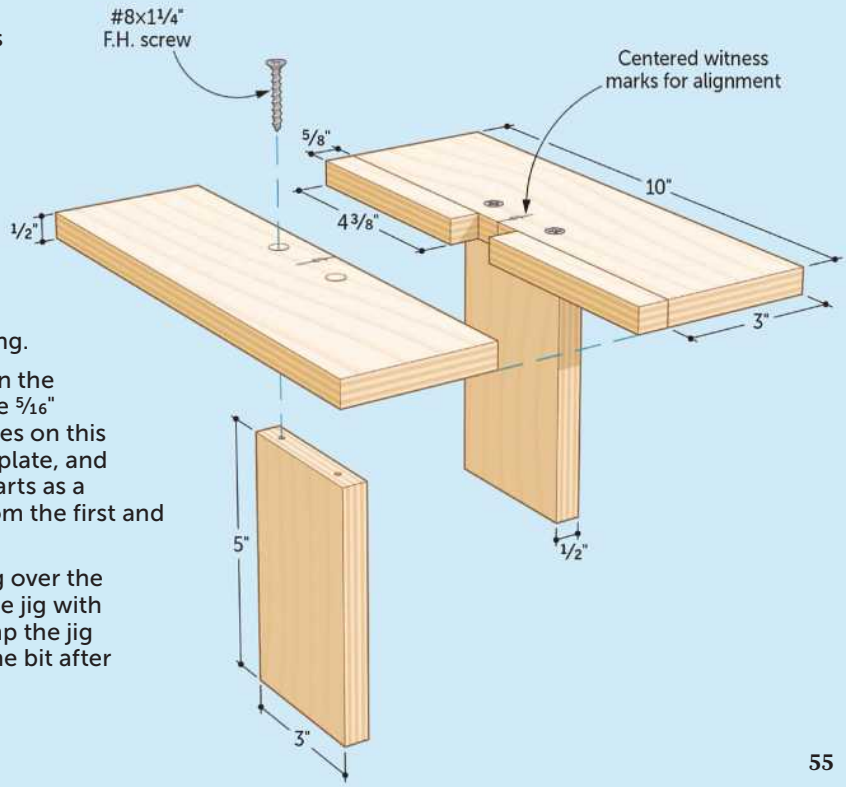
With edges flush, clamp the drill guide in place and drill centered holes into the ends of the lower front legs (A) and the rear feet (G).

8 Glue the front leg assemblies (A-D) to the rear leg assemblies (E-G) **[Photo E, Drawing 1]**. After the glue dries, remove the clamps and sand the leg assemblies smooth and flat. Ease the edges with sandpaper and chamfer the bottom ends of the legs.

9 Make a drill guide by first using your drill press to drill a centered 7/16" hole through the edge of a 2×2" scrap block that is the same thickness as the leg parts. Glue the block to a 2×7" piece of 1/4" hardboard. Use the drill guide to drill holes in the leg assemblies for casters **[Photo F]**.

LOW-BUDGET LOOSE TENONS

You don't need an expensive tool to create accurate loose-tenon joints. This mortising jig uses a plunge router, a 5/8" guide bushing, and a 3/8" spiral upcut bit to rout consistently sized mortises. A pair of fences attached to the bottom of the jig straddle the workpiece, and the jig's opening acts as a template as you rout the mortise. Follow the steps below to build and use the jig.



1 From 1/2" plywood, cut two 3×10" plates and two 5/8×4 3/8" spacers **[Drawing]**. Glue the spacers between the mortising plates, keeping the ends flush to form a 1¼"-long opening between the two plates.

2 Measure and mark a centerline for the opening on the top face of both mortising plates. Extend the lines onto the edges of the opening.

3 Also from 1/2" plywood, cut two 3×5" fences. On the bottom of one of the plates, draw a parallel line 5/16" from the edge of the opening. Place one of the fences on this layout line, centered on the length of the mortising plate, and attach it with screws. Using one of the project leg parts as a spacer, position the second fence directly across from the first and screw it to the other mortising plate.

4 Clamp the workpiece in a vise and place the jig over the end to be mortised. Align the centerlines on the jig with the mortise centerlines on your workpiece and clamp the jig in place. Rout the mortise in two passes, lowering the bit after the first pass.

ADD A PAIR OF CASES

The leg assemblies support a pair of cases—one for the TV and one for components. We sized the TV case to accommodate a 50" to 55" television, but you can scale up the dimensions if your TV is slightly larger.

Note: **We built the cases from Baltic birch plywood because the edges look great without edge banding.**

1 Cut the TV case top and bottom (H), TV case sides (I), component case top and bottom (J), and component case sides and divider (K) to size **[Parts List, Exploded View, Drawing 2]**.

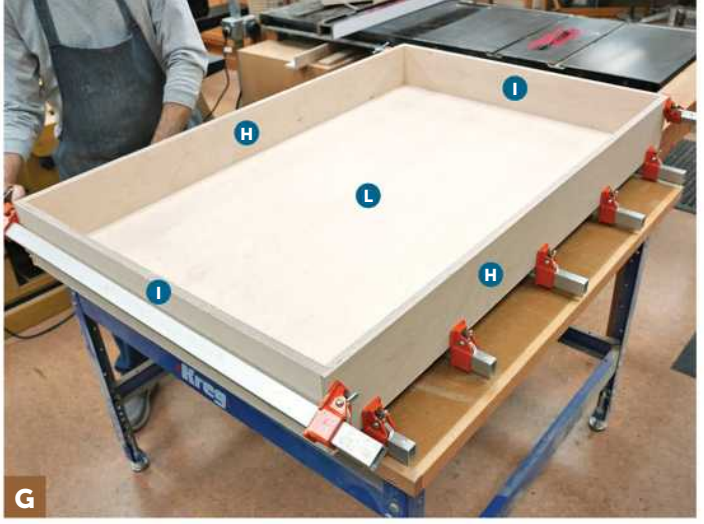
2 Install a dado stack to match the thickness of your plywood and raised to 3/8". Add an auxiliary face to the tablesaw rip fence and position the fence so the blade just brushes the face. Rabbet the ends of the TV case top and bottom (H) and component case top and bottom (J). Using the same setup, rabbet the rear edge of the TV case top and bottom (H) and TV case sides (I).

3 Remove the auxiliary face and reposition the rip fence to cut a centered dado in the component case top and bottom (J). Using a miter gauge with a long auxiliary fence, cut the dadoes.

4 Cut the TV case back (L) to size. Glue the TV case top, bottom, and sides around the back **[Photo G]**.

5 Glue and clamp the component case top and bottom (J) to the component case sides and divider (K).

6 Finish-sand both cases and apply a finish to the cases and leg assemblies. We applied three coats of wipe-on polyurethane, sanding between coats with a 400-grit sanding sponge.



Glue the TV case top and bottom (H) to the back (L), using the TV case sides (I) as spacers to help square the assembly. After the glue dries, glue and clamp the sides.

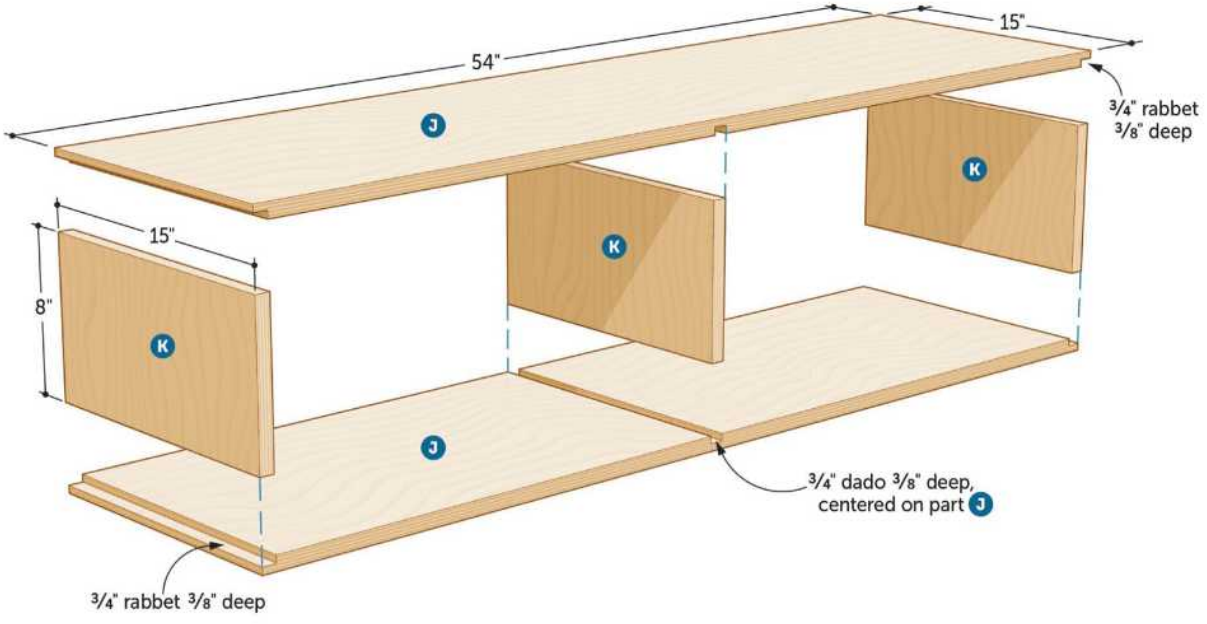
7 Set the component case on its back along the front of your workbench and position the leg assemblies so the lower rails (E) extend past the bottom of the case by 1". With the back of the component case flush with the edge of the rear legs (F), screw the case to the leg assemblies.

8 Set the TV case on its back and position it 6" above the component case and flush with the rear legs (F). Drill and screw the TV case to the leg assemblies.

9 Install the casters in the legs. Install a mount compatible with your TV on the TV case back (L), following the manufacturer's instructions, and hang the TV. (If necessary, drill holes in the back for cord and control access.) Wheel the stand into place, plug the set in, and tune in to your favorite show.

Note: **Avoid mounts that allow the TV to swivel or extend because these could affect the cart balance.**

2 COMPONENT CASE



PARTS LIST

PART		FINISHED SIZE			Matl.	Qty.
		T	W	L		
A*	LOWER FRONT LEGS	1¼"	2"	15 3/16"	M	2
B*	MIDDLE FRONT LEGS	1¼"	2"	11⅛"	M	2
C*	UPPER FRONT LEGS	1¼"	2"	22⅛"	M	2
D	UPPER RAILS	1¼"	1¾"	2"	M	2
E	LOWER RAILS	1¼"	2"	19¾"	M	2
F	REAR LEGS	1¼"	2"	35"	M	2
G	REAR FEET	1¼"	2"	3"	M	2
H	TV CASE TOP/BOTTOM	¾"	6"	54"	BB	2
I	TV CASE SIDES	¾"	6"	34"	BB	2
J	COMPONENT CASE TOP/BOTTOM	¾"	15"	54"	BB	2
K	COMPONENT CASE SIDES/DIVIDER	¾"	15"	8"	BB	3
L	TV CASE BACK	¾"	34"	53¼"	BB	1

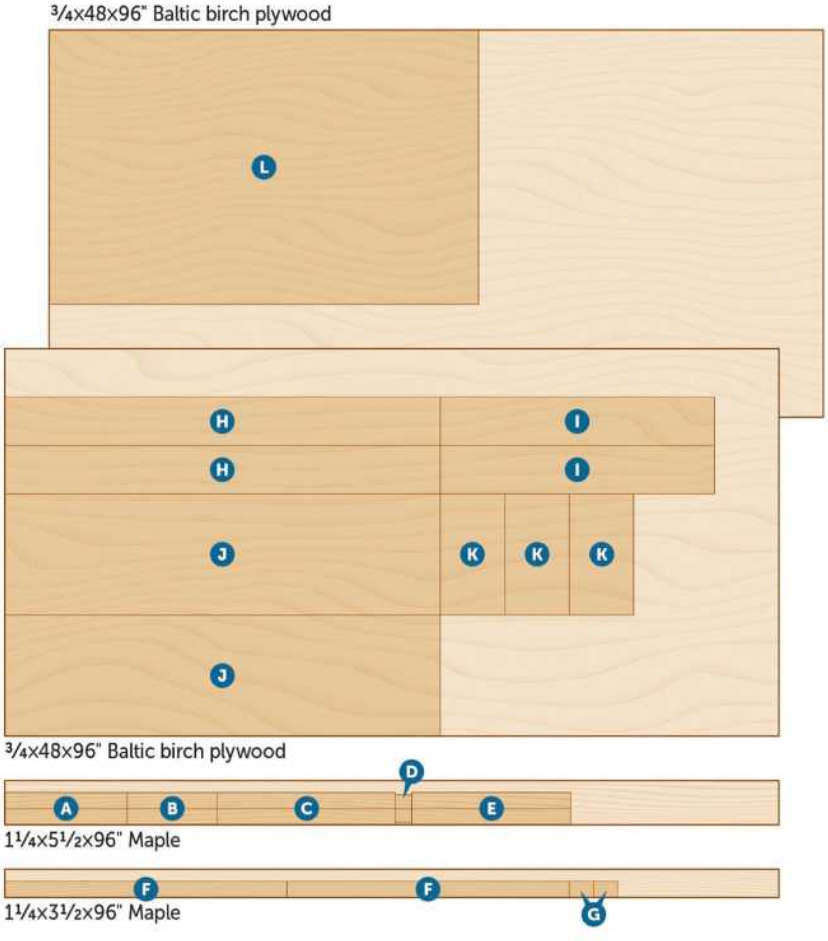
*Parts initially cut oversize. See the instructions.

MATERIALS KEY: M–maple, BB–Baltic birch plywood
SUPPLIES: #8×1½" flathead screws, #8×1¼" flathead screws.
BLADE AND BITS: Dado blade, 7/16" brad-point bit, ⅜" spiral upcut router bit, ⅝" router guide bushing.
SOURCE: 2" swivel stem casters no. 2391T1 (4), $8 each, mcmaster.com.
PROJECT COST: It cost us about $375 to build this project. Your cost will vary by region and source.



CUTTING DIAGRAM

We purchased 13 board feet of 8/4 maple. Before cutting parts to size, we planed them to the thickness shown in these example boards.



JOINTING ON THE ROUTER TABLE

A simple fence and a basic straight bit make it easy to put straight edges on boards without the need for a jointer.

WRITER: KEN BURTON

Straightening the edge of a board is one of the fundamental tasks in woodworking. Whether you need a reference edge for a ripcut on the tablesaw or you're preparing to glue up a panel, straight edges are critical to success.

In many shops, straightening edges is a job for a jointer. But if you don't have one, you can use your router table as a very capable substitute. All you need are a straight bit and a fence that allows offsetting the infeed face on the right side of the bit farther back than the outfeed face on the left.

This setup works on the same principle as a jointer: The outfeed surface sits flush with the edges of the cutter (a router bit in this case), while the infeed surface sits slightly behind. As the board edge travels along the fence, the cutter trims away an amount equal to the surfaces' offset.

Some commercial router-table fences allow offsetting the faces for jointing, but you can easily create a shop-made version. This fence doesn't need to be fancy, and it doesn't have to be tall. It needs only a pair of straight, parallel front edges slightly offset from one another, along with a recess for the bit.



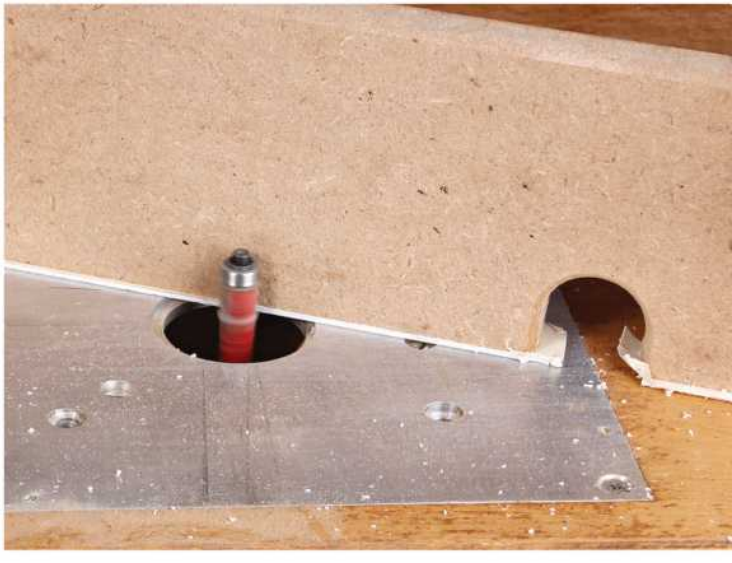
PHOTOGRAPHER: KEN BURTON



Guide a utility knife along a steel rule to score the acrylic. Make a couple of passes, then place the cut line over a sharp corner, like the end of your bench, and flex the sheet to snap the cut piece free.



Adhere the acrylic with double-faced tape. Use a caul to spread clamping pressure and to prevent damaging the acrylic. Move and retighten each clamp every 2" to 3" to ensure good adhesion.



A flush-trim bit easily routs away excess acrylic. Use a slow feed rate to prevent chipping or tearing out the acrylic. At the fence end and notch, use a knife to cut away most of the excess before routing.

FASHION THE FENCE

To create straight edges, a router-table jointing fence needs to be reliably straight. MDF makes a great choice. Start by cutting ¾" MDF to 4×36". Though this will probably exceed the width of your router table, the extra length creates longer guide surfaces that will yield straighter jointed edges.

Cut a U-shaped notch in one edge at the fence midpoint, making it about ½" wider and deeper than the diameter of the bit you'll use for jointing. See *Sizing Up Your Bit* on *page 61*.

Next you need to create the offset in the fence edge. We prefer building up the surface on each side of the bit using a thin, slick material: one layer on the infeed side, and two layers on the outfeed side. For this fence, we chose 1/16"-thick acrylic, which is available at home centers in small sheets.

Cut three overlength pieces of acrylic about ⅛" wider than your fence thickness, *above*. Using double-faced tape, adhere one acrylic strip to the left and right faces of your fence, making sure the acrylic overhangs evenly, *right, top*. Then add a second strip to only the outfeed side of the fence.

Use a flush-trim bit to rout the acrylic flush to the fence faces and ends, *right, bottom*. Then file or sand a slight chamfer on the acrylic edges to remove any sharp edges.

Flatten board faces with a shop-made router sled.
woodmagazine.com/flattenslabs

SET UP AND START JOINTING

Setting up for jointing requires only a few steps. First, install the bit in your router and set the cutting depth to protrude about 1/16" above your material.

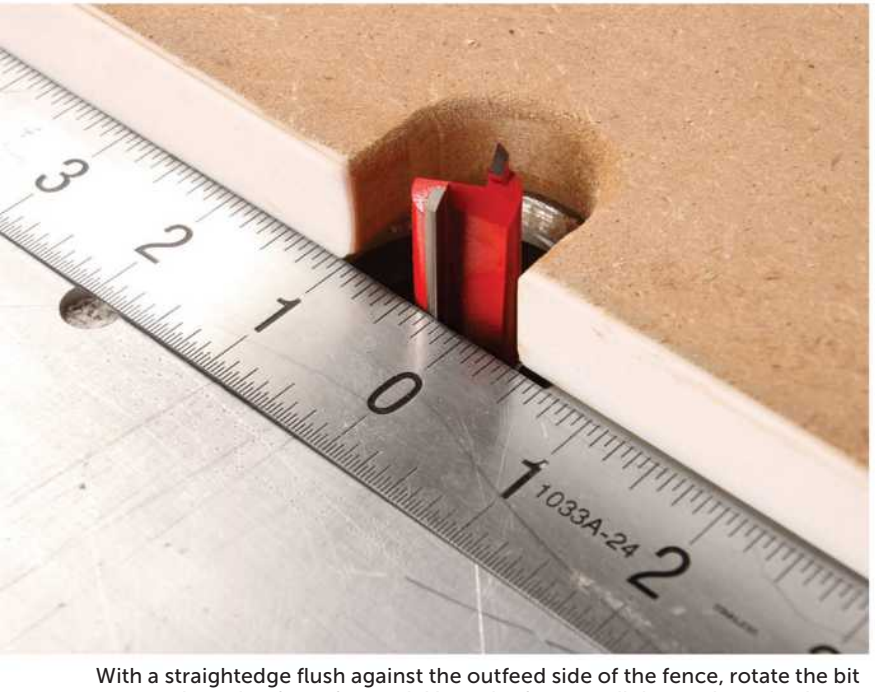
Place the fence on the router table, making sure the thicker outfeed face is on the left side. Then use a straightedge to align the fence with the bit, *below, left*. Clamp the fence to the table.

Now make a test cut to verify the fence position. Turn on the router and feed your test stock from right to left. Maintain pressure against the infeed fence face as you push the workpiece.

If the fence is aligned to the arc of the bit, the board's freshly jointed edge will ride against the face on the outfeed side, *below, right*. As you push the board through, transfer most of your pressure to the outfeed fence face, *next page, top.*

If the workpiece runs into the outfeed side as it passes the bit notch, then the fence is too far forward. Loosen one clamp and tap the fence slightly back. Then make another test cut. Another symptom of a fence being too far forward is that the board can lose contact with the bit before you reach its end. If you get snipe at the end of the cut, the fence is too far back, *next page, bottom.*

Once you have your fence position dialed in, securely tighten the clamps. It may take several passes to fully flatten a board edge. Experiment with feed rate and bit speed to create the smoothest surface without going so slow that the bit burns the edge. The right combination varies by wood type and thickness. With a little practice, you can create smoothly jointed board edges without a jointer.

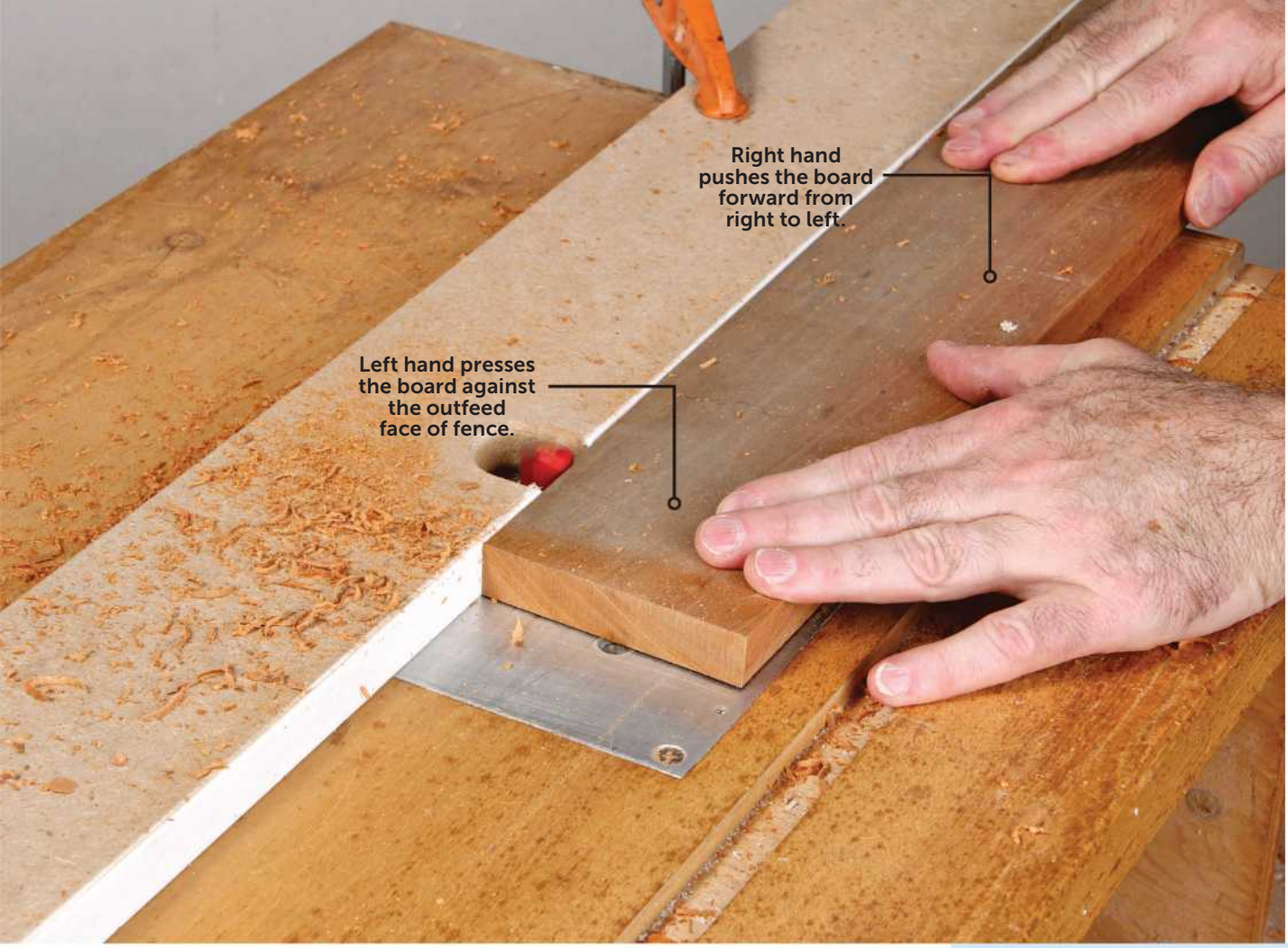


With a straightedge flush against the outfeed side of the fence, rotate the bit so a cutting edge faces forward. Move the fence until the cutting edge just brushes the straightedge, then clamp the fence down.

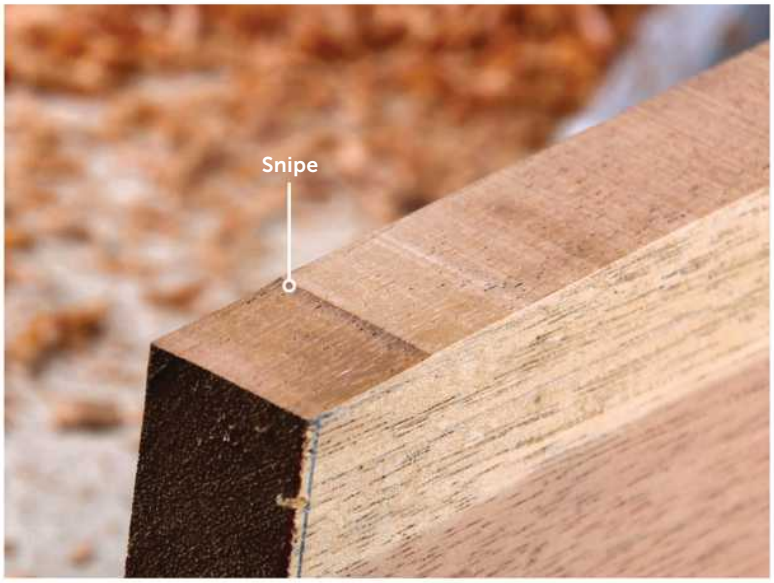


As you push the board past the bit, it should cut away 1/16"—the thickness of the offset—from the board edge, causing the newly cut edge to ride along the outfeed face.

> **JOINTING ON THE ROUTER TABLE LETS YOU WORK WITH LUMBER THAT'S SURFACED ON TWO SIDES (S2S). FOR ROUGH-SAWN LUMBER, YOU'LL WANT A JOINTER AND A THICKNESS PLANER.**
>
> ***-KEN BURTON, CONTRIBUTING EDITOR***



Creating a straight, consistent edge requires holding the jointed edge against the outfeed surface. You can use a featherboard on the outfeed side, but it requires frequent repositioning as you make successive passes.



A short, deeper cut at the end of a board is called snipe. If this occurs, the fence is too far back, putting the arc of the cut slightly proud of the outfeed face of the fence.

SIZING UP YOUR BIT

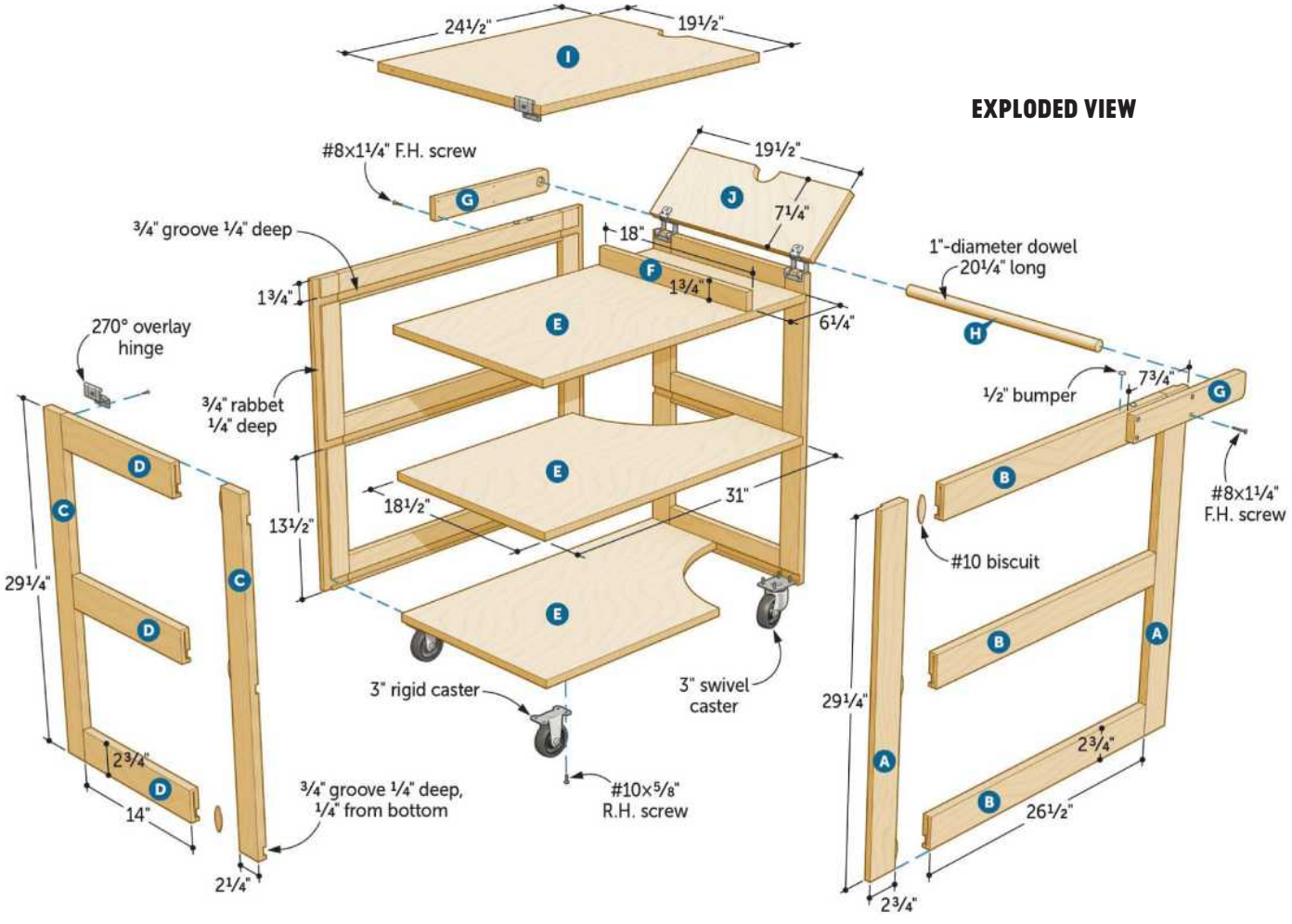
After trying several types of router bits, we settled on a standard ¾" straight bit with a ½" shank for router-table jointing. A bit with 1¼" cutting length handles 4/4 stock. The cutters produce smooth surfaces and are easy to sharpen with a diamond hone. Plus, straight bits are among the most economical to replace.

We tried ½"-diameter spiral bits, thinking the spiral cutters would produce better results, but we experienced more chatter with these smaller bits.

SINGLE SHEET SHOP CART

Keep tools, supplies, and workpieces within easy reach, and add an assembly surface to your shop with this handy mobile helper.

WRITER: OWEN DUVALL
DESIGNER: JEFF MERTZ
BUILDER: BRIAN BERGSTROM



OVERALL DIMENSIONS
38¾"W × 21"D × 33 13/16"H

PHOTOGRAPHER: BRIE GOLDMAN; **ILLUSTRATOR:** CHRISTOPHER MILLS


G0555LX
grizzly.com
Makita
FESTOOL

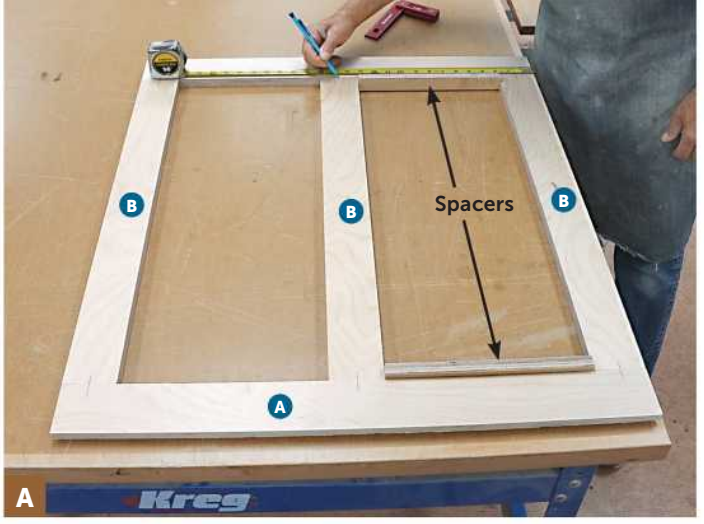
With a weekend and one sheet of 3/4" plywood, you can build this sturdy shop accessory that you'll use to organize every project.

FRAME IT UP

Simple biscuit-joined side and end frames combined with easy rabbet-and-groove joinery create a sturdy cart that minimizes material use. To ensure you get all of the cart parts from one 4×8' sheet of plywood, refer to the **Cutting Diagram** on *page 67*.

1 Cut the side stiles (A), side rails (B), end stiles (C), and end rails (D) to size **[Exploded View, Parts List]**.

2 To mark centerlines for biscuit slots on the stiles and rails, lay out two side stiles (A) and three side rails (B) as they will be assembled **[Drawing 1]**. Position the center side rail as shown in **Photo A** using two 10½"-long spacers and mark the biscuit-slot centerlines across the stile/rail joints. Label the rails to ensure correct frame orientation later. Repeat the marking process for the remaining side stiles and rails, and the end stiles (C) and rails (D), keeping the parts for each frame together.

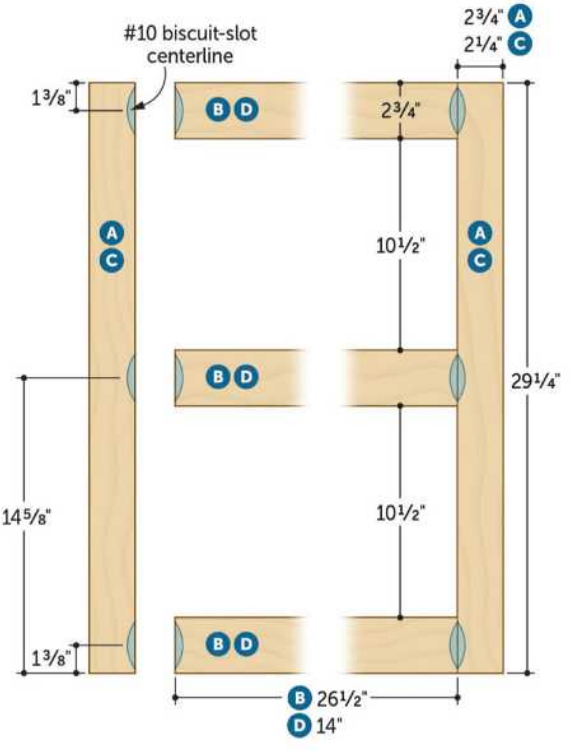


Position the top and bottom side rails (B) flush with the ends of the side stiles (A). Position the center side rail (B) with spacers and mark the centerlines for biscuit slots on the side stiles and rails.

3 Adjust the fence on your biscuit joiner to center the blade on the plywood thickness. Then clamp the parts to your workbench and plunge slots for #10 biscuits at the marked centerlines. Glue, biscuit, and clamp the frames together, again using the spacers to position the center rail in each frame.



1 SIDE & END FRAME ASSEMBLIES



4 Fit your tablesaw with a dado stack that matches your plywood thickness. Cut the ¼"-deep groove in the bottom rail of each frame **[Exploded View]**, then reposition the rip fence to cut the grooves in the middle rails. Reposition the fence again to cut the remaining grooves in the top rails.

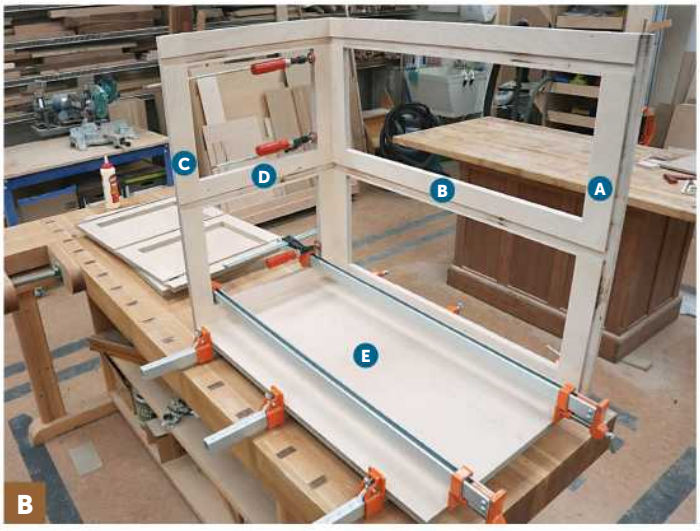
5 Attach an auxiliary fence to your rip fence. Then cut a ¾" rabbet ¼" deep along the outer edge of the side stiles (A) on the inside face.

ADD THE SHELVES

Three shelves tie the frames together and provide plenty of storage on the completed cart for project parts and tools.

1 Cut the shelves (E) to size. Sand the side frames (A/B), end frames (C/D), and shelves to 150 grit, being careful to not sand through the plywood veneer. Then glue the frame together in four stages. First, clamp a side frame, end frame, and the bottom shelf together **[Photo B]**. When the glue dries, glue and clamp the center shelf in position. Next, glue the top shelf in place. Then glue and clamp the remaining side and end frames to the assembly.

2 To mount the casters to the bottom shelf (E), flip the cart upside down. Place a caster **[Supplies]** on the bottom face of the shelf, against the stiles (A, C). Mark the centers of the mounting holes, then drill ⅛" pilot holes at these points. Drive #10×⅝" roundhead screws to hold the caster in place **[Exploded View]**, then repeat at each corner of the shelf.



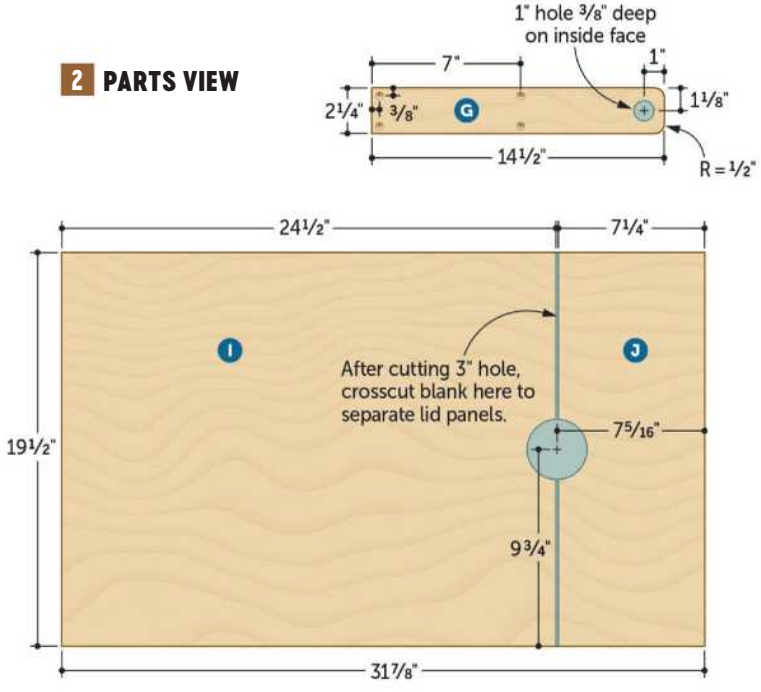
Glue and clamp a side frame (A/B), end frame (C/D), and the bottom shelf (E) together, making sure you close the frame corner joint by drawing the end frame tightly into the rabbet in the side frame.

HOW TO HANDLE THE LIDS

1 Cut the top-shelf divider (F) to size **[Parts List]**. Then glue and clamp the divider to the top shelf (E) **[Exploded View]**.

2 Cut the handle supports (G) to size **[Drawing 2]**. On the outside face of the supports, mark centerpoints for four countersunk shank holes and lay out the ½" radii. On the inside face of the supports, mark a centerpoint for a 1" stopped hole. Drill the countersunk shank holes. Then, using a Forstner bit in your drill press, bore the stopped holes ⅜" deep. Then bandsaw and sand the radii smooth.

2 PARTS VIEW



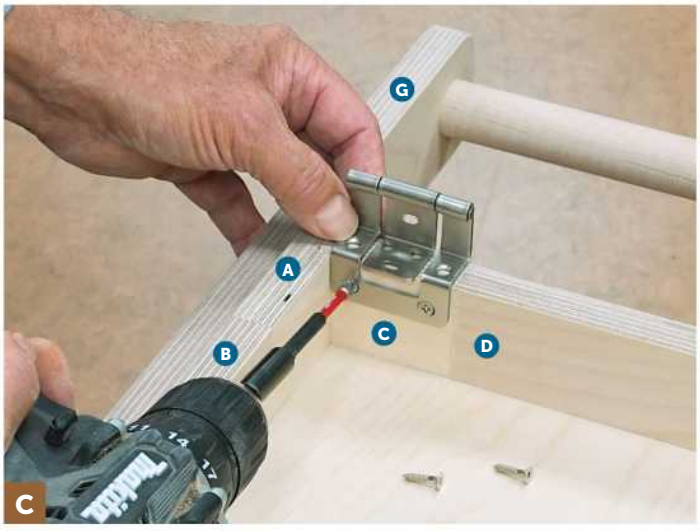
3 Cut a 20¼" length of 1"-diameter birch dowel for the handle (H).

4 To mount the handle supports (G), draw alignment lines on the top side rails (B) ¼" from the top edge and extending 7¾" from the ends **[Exploded View]**. Then glue and clamp a handle support to a top rail, aligning the support with the marked line. Drive the screws. Capture the handle (H) between the supports in the stopped holes as you attach the remaining support.

TIP!

You could also use a 3" holesaw to drill the hole. Work slowly to avoid chip-out.

5 Cut a 19½×31⅞" plywood blank to form the long and short lid panels (I, J). Draw a circle for a 3" hole for finger access on the blank **[Drawing 3]**. Drill a ½" blade start hole just inside the circle, then jigsaw the 3" hole to shape and sand it smooth.



With a 270° overlay hinge positioned on a top end stile (C) and tight to a side stile (A), drill the mounting holes. Then drive the screws that came with the hinges.



6 Position your tablesaw fence 7¼" from the blade. Crosscut the blank through the center of the hole to separate the lid panels.

7 To mount the lid hinges **[Exploded View]**, position a hinge on a top end stile (C), against a side stile (A) **[Photo C]**. Drill pilot holes, then drive the screws. Repeat for the three remaining hinges.

8 Place the lid panels (I, J) on the cart with the finger-access hole straddling the top-shelf divider (F). Position the panels tight against the hinges and flush with the outside faces of the side rails (B). There should be a gap about ⅛" wide between the panels. Drill a pilot hole centered in the slot of each hinge into the edges of the lids. Drive the screws. Then open the lids and drill mounting holes centered in the hinge holes and slots into the bottom faces of the lids. Drive the remaining screws.

> **PARK THIS CART BESIDE YOUR BENCH TO COLLECT THE TOOLS AND SUPPLIES THAT CLUTTER YOUR BENCHTOP.**
>
> ***-KEVIN BOYLE, SENIOR DESIGN EDITOR***

GET READY TO ROLL

1 Remove the casters, lid panels (I, J), and hinges. Sand any areas of the cart that need it to 150 grit and gently round the sharp edges of the plywood. Remove the sanding dust.

2 Apply two coats of a clear finish. (We used Varathane Diamond water-based polyurethane, sanding to 220 grit between coats.)

3 Finally, reinstall the casters and lid panels. Open the lid panels and install a pair of ½"-diameter self-adhesive rubber bumpers on each top side rail (B) **[Exploded View]**. Now move the tools and supplies from your bench to your new cart, and start working with a new level of organization and convenience.



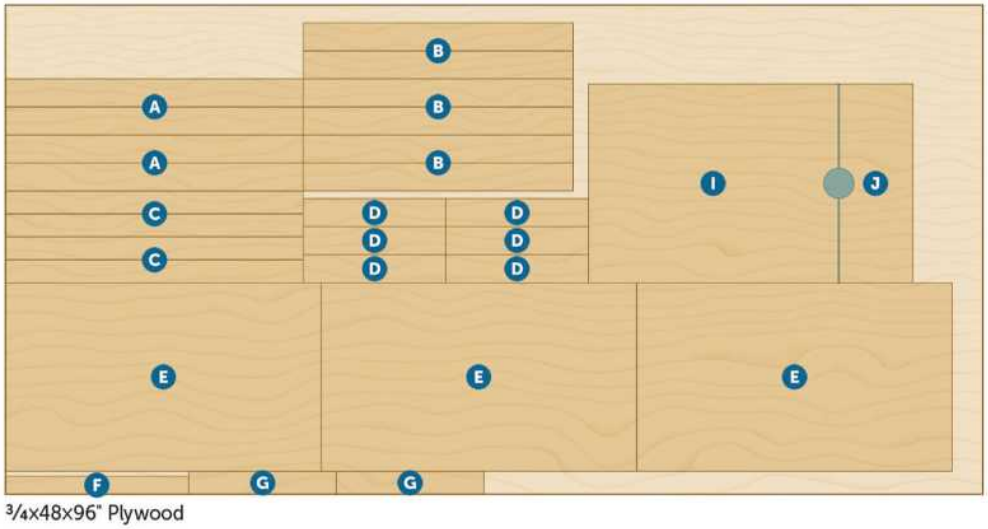
PARTS LIST

PART		FINISHED SIZE			Matl.	Qty.
		T	W	L		
A	SIDE STILES	¾"	2¾"	29¼"	P	4
B	SIDE RAILS	¾"	2¾"	26½"	P	6
C	END STILES	¾"	2¼"	29¼"	P	4
D	END RAILS	¾"	2¾"	14"	P	6
E	SHELVES	¾"	18½"	31"	P	3
F	TOP-SHELF DIVIDER	¾"	1¾"	18"	P	1
G	HANDLE SUPPORTS	¾"	2¼"	14½"	P	2
H	HANDLE	1" dia.		20¼"	B	1
I*	LONG LID PANEL	¾"	19½"	24½"	P	1
J*	SHORT LID PANEL	¾"	19½"	7¼"	P	1

*Parts initially cut oversize. See the instructions.

MATERIALS KEY: P–plywood, B–birch dowel.
SUPPLIES: #10 biscuits, 3" swivel casters (2), 3" rigid casters (2), #10×⅝" roundhead screws, #8×1¼" flathead screws, ½"-diameter self-adhesive rubber bumpers (4).
BLADES AND BIT: Dado blade, scroll-cutting jigsaw blade, 1" Forstner bit.
SOURCE: Satin nickel 270° overlay hinges no. 38303 $8/pair (2 pairs), rockler.com.
PROJECT COST: It cost us about $210 to build this project. Your cost will vary by region and source.

CUTTING DIAGRAM



¾x48x96" Plywood

FULL-FEATURED BABY BENCHES

Portable worktops offer an intriguing alternative to folding workcenters that often lack sturdy surfaces and strong clamping capability. The four worktops reviewed here are built from solid beech, come equipped with traditional vises, and have dogholes that provide clamping options. Simply clamp one of these petite benches to any tabletop, or even a tailgate, to take a real woodworking bench just about anywhere.



Big-bench builder goes small
Sjobergs builds its Smart Workstation Pro with the same materials as its full-size benches. It arrives finish-sanded and ready for you to wipe on an oil topcoat before assembling, which takes only a few minutes. The bench has a 1 9/16×14 3/8×15 3/4" top equipped with two rows of ¾" dogholes. The 4½"-capacity vise holds firmly without excessive racking. Four bench dogs are included.

Sjobergs, *sjobergsworkbenches.com*
Smart Workstation Pro no. 33309, $320

PHOTOGRAPHER: BRIE GOLDMAN



Classic style with a substantial vise

The Ramia Clever Worktop measures 1 3/16×14 3/16×16 1/8" and stands on sturdy wooden feet. Two rows of wide-set ¾" dogholes combine with a beefy vise that boasts 5 1/8" capacity and strong holding power. The worktop arrives unfinished, letting you choose the desired topcoat before assembly. Four bench dogs are included.

Highland Woodworking, *highlandwoodworking.com*
Ramia Clever Worktop HB-CW no. 114217, $269

Low-cost worktop alternative

The Beaccoss bench (also sold under other names) gives you a portable workbench at a bargain price. Measuring ¾×11 1/16×16 7/8", the top provides adequate working space and offers the largest vise capacity in this group at close to 8", though the vise isn't exceptionally powerful and tends to rack. The bench comes assembled and finished and includes four bench dogs plus C-clamps to secure it to your tabletop.

Beaccoss, *amazon.com*
Portable Workbench no. 757582972590, $80





A little bench in a larger size

Measuring 1½×16×32", Rockler's Handy Bench offers a much larger worktop than the others in this group. The Moxon-style vise was unique among the benches we tested and had a stated capacity of 3" (though we found it closer to 4"). Also unique: You can relocate the vise to your preferred location along the edges or ends using the included bolts and cross dowels. This lets the vise work anywhere on the grid of ¾" dogholes using four included bench dogs. A steel deadman attaches to the powder-coated legs to support long pieces. This workcenter comes prefinished.

Rockler, *rockler.com*
Handy Bench no. 62650, $260



SHOP-TESTED

ROUTER TABLE GUARD KEEPS DUST AT BAY AND HANDS AWAY

Tester: Jim Heavey

I tested the Infinity Tools Nautilus Dust Collection Guard and found it to be a great router table addition. I can tell because I have almost nothing to show for it—no dust, that is.

Dust collection on a router table is notoriously inefficient even with a fence-mounted dust port. When not using a fence, such as while routing curves or template routing, collecting dust proves almost impossible.

Infinity's guard is shaped like a nautilus shell, a design that directs dust and chips away from the bit and corrals them directly under the dust port, where they're collected with impressive efficiency when connected to a 2¼" or 2½" vacuum hose. Capped by clear acrylic, this guard provides an excellent view of the bit (up to 2" tall) while keeping fingers safely away.

The design of this guard makes it easy to use, and it attaches to the router table by threading into any plate or tabletop equipped with a ¼"-20 threaded starter-pin hole. I was surprised by just how well this guard works. Pardon the pun, but this one is a clear winner.

Infinity Cutting Tools, *infinitytools.com*
Nautilus Router Table Dust Collection Guard no. NDCG-100, $40

NEW & UNTESTED

PICK A SIZE, PICK A SPEED, DRILL A HOLE



Three new drill presses from Grizzly come equipped with a variable-frequency drive (VFD), often found on industrial electric motors, that controls speed by changing the voltage and frequency supplied to the motor. This allows precise speed selection as well as compensation that maintains the set speed under load. On these drill presses, that provides an exceptionally wide spindle-speed range from 30 to 3,000 rpm.

The 15" version is available in a benchtop and floor model that share the same 1-hp motor. Both offer 15¼" swing (7⅝" between the chuck center and the column). The benchtop model has a maximum height capacity of 18¹⁄₁₆" from the spindle to the table. That jumps to 28⅜" on the 15" floor model. The 17" floor drill press is equipped with a 1½-hp motor and offers 17" swing and 28⁹⁄₁₆" capacity between the spindle and table.

All three drill presses come equipped with cast iron tables that tilt 45° left and right as well as rotate 360° around the column, dual LED work lights, laser crosshairs, and rotary-dial depth stops.

Grizzly, *grizzly.com*
15" Benchtop Variable-Speed Drill Press no. T34612, $940;
15" Floor Variable-Speed Drill Press no. T34613, $995;
17" Floor Variable-Speed Drill Press no. T34614, $1,395

SHOP-TESTED

SILICONE APPLICATOR SET MINIMIZES GLUE-UP MESS

Tester: Dave Stone



A bottle of glue and an index finger have served as my glue-application system for decades. Silicone gluing products like the new Glue Applicator Kit from Powertec, though, are changing my ways (and keeping my shop aprons cleaner).

The kit includes a flexible silicone glue basin with a cap that seals tightly between uses. Spouts on each end allow returning excess glue to its original bottle when desired. Two capped holes in the lid hold and effectively seal the included ½" and 1" silicone brushes. The kit's spreader works great for applying glue over large surfaces and has, like the brushes, a scraper for removing squeeze-out. Best of all, dried excess glue peels easily off of the container, brushes, and scraper. This kit gets two thumbs (and one index finger) up.

Powertec, *powertecproducts.com*
Glue Applicator Kit With Sealable Keeper & Two Brushes no. 72254, $27



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