

WOOD

The World's Leading Woodworking Resource

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**The Best
Cordless
Circ Saws**

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- Motor: 2 HP, 120V, single-phase, 15A
- Max. cutting width: 12 1/2" • Max. cutting height: 4 1/2"
- Max. cutting depth: 1/32" • Feed rate: 26 FPM
- Number of knives: 2, reversible HSS
- Knife size: 12 1/2" x 1/2" x 1/16"
- Cutterhead speed: 8750 RPM
- Number of cuts per inch: 60
- Approx. shipping weight: 72 lbs.



G0790 ONLY **\$289⁹⁵**



2 HP DUST COLLECTOR WITH ALUMINUM IMPELLER

- Motor: 2HP, 240V, single-phase, 3450 RPM
- Motor amp draw: 9 Amps
- Air suction capacity: 1550 CFM
- Static pressure: 11"
- 6" inlet has removable "Y" fitting with two 4" openings
- Impeller: 12 3/4" balanced cast aluminum
- Bag capacity: 5.7 cubic feet
- Standard bag filtration: 2.5 micron
- Portable base size: 21 1/4" x 33 1/2"
- Bag size (dia. x depth): 19 1/2" x 33"
- Powder-coated finish
- Height with bags inflated: 78"
- Approx. shipping weight: 122 lbs.



G1029Z2P ONLY **\$350⁰⁰**



2 HP PORTABLE DUST COLLECTOR

- Motor: 2 HP, 240V, single-phase, 9A
- Air suction capacity: 1360 CFM
- Static pressure: 11.3"
- Filter rating: 2.5 micron
- 6" Inlet and "Y" fitting with two 4" openings
- Impeller: 12 3/4" cast aluminum
- Portable base size: 27 1/2" x 47 1/2"
- Upper bag size (dia. x depth): 19 1/2" x 47 1/2"
- Lower bag size (dia. x depth): 19 1/2" x 33"
- Lower bag capacity: 5.7 cubic feet
- Powder-coated finish
- Height with bags inflated: 94 1/2"
- Approximate shipping weight: 137 lbs.



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30TH ANNIVERSARY 14" DELUXE BANDSAW

CAST IRON WHEELS

- Motor: 1 HP, 110V/220V, single-phase, TEFC, 11A/5.5A
- Precision-ground cast iron table size: 14" sq.
- Table tilt: 45° R, 10° L
- Cutting capacity/throat: 13 1/2"
- Max. cutting height: 6"
- Blade size: 92 1/2" – 93 1/2" L (1/8" – 3/4" W)
- Blade speeds: 1800 & 3100 FPM
- Approx. shipping weight: 247 lbs.



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- Motor: 1 HP, 110V/220V, single-phase, 14A/7A
- Rewired voltage: 110V
- Table size: 6 1/2" x 47 1/2"
- Number of knives: 3
- Cutterhead speed: 5000 RPM
- Cutterhead diameter: 2 1/2"
- Maximum depth of cut: 1/8"
- Maximum rabbeting depth: 1/2"
- Cuts per minute: 15,000
- Fence size: 29 1/2" long x 4" high
- Approx. shipping weight: 262 lbs.



G0813 w/ KD Stand ONLY **\$525⁰⁰**



G0814 w/ Cabinet Stand ONLY **\$595⁰⁰**



10" HYBRID TABLE SAW

- Motor: 2 HP, 120V/240V, rewired 120V, single-phase, 60 Hz
- Amps: 15A at 120V, 7.5A at 240V
- Precision-ground cast iron table w/ wings: 40 1/2" W x 27" D
- Table height: 35 3/8" • Footprint: 21" L x 19 1/2" W
- Arbor: 5/8" • Arbor speed: 3450 RPM



- Max. depth of cut: @ 90° – 3 1/4", @ 45° – 2 1/4"
- Rip cap.: 30" R, 15" L
- Overall size: 57 1/4" W x 35 3/8" H x 37 1/2" D
- Approx. shipping weight: 348 lbs.

G0771 ~~\$795⁰⁰~~ SALE **\$695⁰⁰**



14" 1 3/4 HP DELUXE 110V BANDSAW

- Motor: 1 3/4 HP, 110V/220V, rewired 110V, single-phase, TEFC, 15A/7.5A
- Precision-ground cast iron table size: 19 1/4" x 14 1/8" x 1 1/2" thick
- Table tilt: 45° R, 8° L
- Cutting capacity/throat: 13 3/8"
- Max. cutting height: 10"
- Blade length: 106"
- Blade speed: 3000 FPM
- Approx. shipping weight: 284 lbs.



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You're a doer

My wife got me one of those wristband fitness gadgets that monitors my activity ("10,000 steps a day!"), so I've been out walking more, especially with the beautiful springtime weather in Iowa. Call me snoopy, but as I navigate the newish neighborhood near our house, my eyes seem to laser-lock on any open garage door, curious if I can glean a storage or organization idea, I guess. More often than not, though, I'm stunned by the absolute lack of stuff.

Where are the shovels, rakes, and spreader for taking care of the lawn and garden? Where are the mechanic's tools and floor jack for doing basic service on the car? Where are the sawhorses and DIY tools for painting, plumbing, and patching drywall?

This generation of homeowners does more "hiring" than "doing." A lawn service keeps their lawns trimmed and tidy, the car dealer sends emails reminding them of needed service, and angieslist.com provides them with highly rated handymen.

While I'll admit I can't do much work on my car anymore (too many computers in modern vehicles), I still prefer to do most of

the work around the lawn and house myself, whether it's knocking down a wall, building a new one, or working on the pipes and wires that run inside them.

That goes for the furniture between those walls, too. Mine may not be as perfect as the factory-made stuff, and it costs more to build than to buy, so my brain sometimes asks, "Why?" But my heart knows—it's the journey, not the destination, that counts for us doers.

So here's to you, if you like to do. We've got your back with another issue chock full of unique and practical plans. If you're new to woodworking, check out the latest installment of Idea Shop 6 on *page 36*, where we help fill your garage and build your skills, \$150 at a time. And if you've got a few years' experience under your belt, Jim Heavey's article on *page 20* is a must-read.

See you in the shop!



Dave Campbell

dave.campbell@meredith.com



"Doer" Garage

"Hirer" Garage

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TOOLS EDITOR **BOB HUNTER**

GENERAL-INTEREST EDITOR **NATE GRANZOW**

ADMINISTRATIVE ASSISTANT **SHERYL MUNYON**

CONTRIBUTING CRAFTSMEN **JIM HEAVEY, MARK LANE, MATT SEILER, BRIAN SIMMONS, BOB BAKER, BRIAN BERGSTROM**
PHOTOGRAPHERS **CARSON DOWNING, JASON DONNELLY**
CONTRIBUTING EDITOR **LARRY JOHNSTON**
CONTRIBUTING ILLUSTRATORS **TIM CAHILL, LORNA JOHNSON, ROXANNE LEMOINE, KURT SCHULTZ**
CONTRIBUTING DESIGNER **ANNA FLICKINGER**
PROOFREADERS **SAM CADY, BABS KLEIN, BILL KRIER, IRA LACHER**

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GROUP BUSINESS DEVELOPMENT DIRECTOR **CURT BLADES**

ADVERTISING ACCOUNT EXECUTIVE **DANIEL WELLS**

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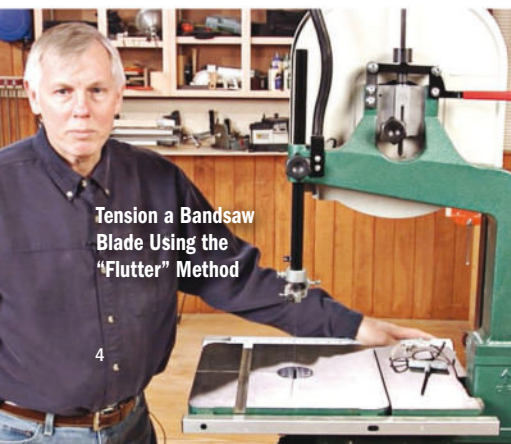
BEHIND THE SCENES

There are only so many photos we can fit in the magazine. View exclusive photos of what's happening in the shop and find sneak peeks of the projects and articles we're working on at [instagram.com/woodmagazine](https://www.instagram.com/woodmagazine).



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Scrap sculptures

Instead of letting my wood scraps languish in a pile for years, I turned my grandchildren loose on them. They had a ball creating sculptures using the scraps and hot-melt glue. I only helped them scrollsaw their initials. I'm hoping experiences like these will encourage them to pursue hobbies that foster their imagination—like woodworking!

—Pierre Falzon, Pickering, Ont.



Too many notches

The exploded view of the Window Cabinet in issue 237 (Dec/Jan 2015/2016) shows notches cut into the back of the fixed shelves (F). Only the front edge of the shelves should be notched.

—Michelle Wildes, Wayne, N.J.

You're right, Michelle. Adding to the confusion are the pencil lines in Photo C, which look like cutlines, but in fact indicate safe gluing area.

Find the mortise

In issue 235 (October 2015), the illustration of the Hall Storage Bench's leg on page 60 seemed unclear. What I found: The ¼" dimension applies only to the mortise and the thickness in front of the mortise (left side of drawing). The thickness behind the mortise (right side of drawing) should be ½", not ¼".

—Jeff Hall, Lithonia, Ga.



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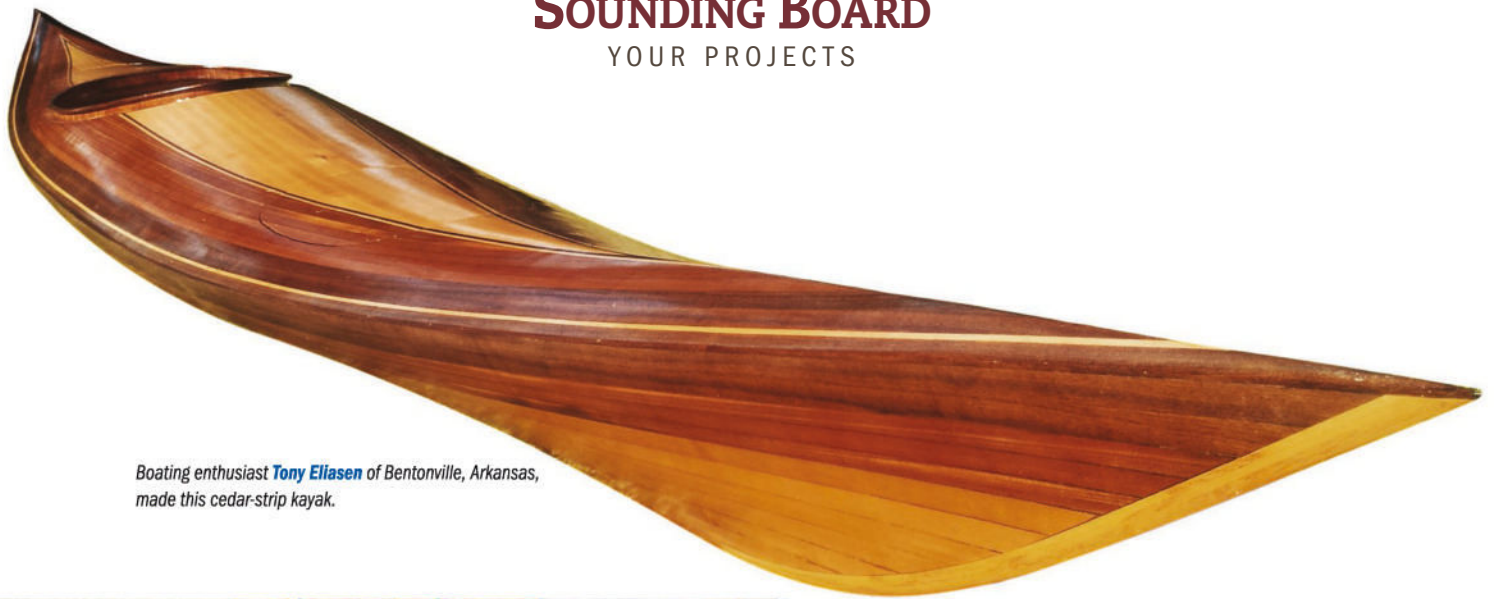
*Overarm Dust Collection requires a DC Blade Guard, which is included with the 3.0HP Professional Cabinet Saw but must be purchased for the 1.75HP model.

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SOUNDING BOARD

YOUR PROJECTS



Boating enthusiast **Tony Eliassen** of Bentonville, Arkansas, made this cedar-strip kayak.



In preparation for their first grandchild's birth, **Gene and Sue Blazick** of Lafayette, California, built this cradle based on the plans in issue 19 (October 1987).



Jim Jensen of Rochester Hills, Michigan, crafted this cherry desk with steam-bent curves for his daughter.



Charles Bartolotta of Williamsville, New York, used maple and cocobolo for this checkerboard.

Send us a photo of your work

Want to see your work showcased in WOOD® magazine? Send a high-resolution digital photo of your completed project to woodmail@woodmagazine.com.

NEW! from *Woodpeckers*[®]

Story Stick Pro-96

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VIDEO
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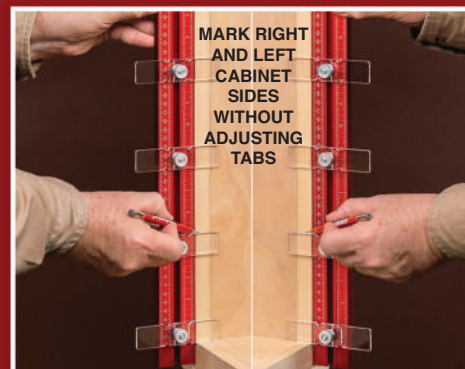
8 Feet of Flawless, Repeatable, Full-Scale Layout, Marking & Measuring

There's a reason story sticks have been in use since before the building of the Egyptian pyramids. They just can't be beat for all sorts of tasks where repeatability of measurements and marks is crucial. That's why the story stick has been an essential woodshop tool for centuries.

Story Stick Pro-96, The Ultimate Evolution of This Trusted Tool! Woodpeckers new SSPRO-96 has all the features and accessories you'd ever want. The generous 8' length is achieved by fastening three sections of super-rigid track together using custom machined connectors. When a shorter story stick is needed, the track is quickly and easily disassembled. An array of fully adjustable measuring and marking tabs make the SSPRO-96 extremely versatile. The removable end-stop allows indexing off the edge of stock. And along the track edges, you'll find laser engraved Imperial and metric scales.

Offset Marking Tabs Means "Center Field" Is Covered. Woodpeckers all-new Offset Marking Tabs allow marking anywhere between stock edges because they step down the track thickness to rest flush on the material. Imagine, now you can make precise, repeatable marks anywhere on a 4 x 8 sheet of plywood or cabinet parts.

Caliper Marking Tabs For Inside-Out Measuring And Machine Setup. With Story Stick Pro's Caliper Tabs you can literally "take off" the actual dimension of a cabinet or box opening or part then use your Story Stick to set your saw fence for the perfect cut. These tabs are ideal for making perfectly sized shelves, drawer bottoms, face frame rails, stiles and more.



But That's Not All! You can use the SSPRO-96 to lay out precise locations for cabinet parts including face frame stiles and rails, partitions, shelves and drawers. Use it to mark precise, repeatable locations of cabinet hardware like door hinges, drawer slides and other decorative hardware such as knobs and pulls. Importantly, you can mark both right- and left-handed locations without making any tab adjustments.

Complete Story Stick Pro-96 Package. Our Story Stick Pro-96 has everything you need. Included are the three sections of track to make up the 8-foot length, four track connectors, four standard edge marking tabs, two caliper arms, four offset surface marking tabs for center of field marking, the end-stop and all the hardware needed for fastening tabs and the end-stop.

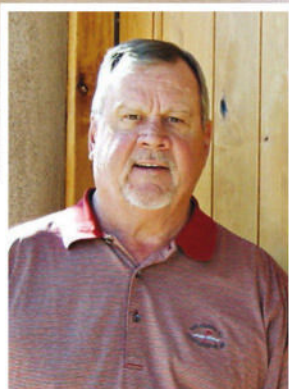
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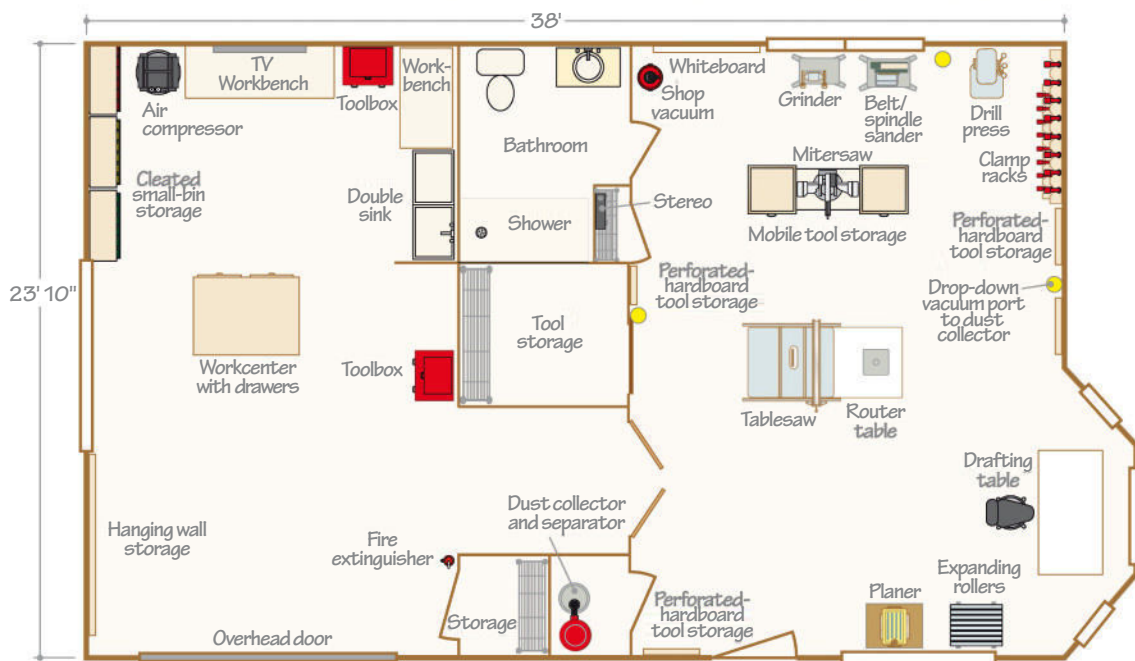


Chris designed his 900-square-foot casita (Spanish for "small house") to work as a shop, but also to convert easily to a guesthouse for easier resale if he decides to move.



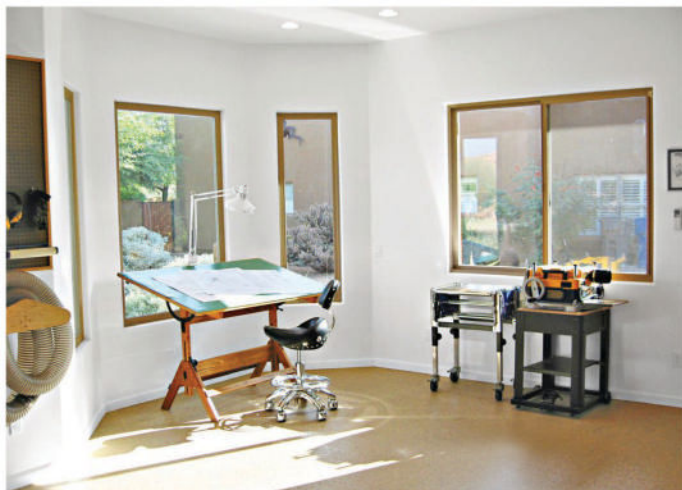
After nine moves through six states in less than 20 years, Chris Finnerty has become an expert at outfitting a new shop space. This one combines everything he's learned.

One trick that's proven especially handy through the years is utilizing beveled cleats for hanging cabinets and tool-storage boards. The cleats work well for fine-tuning a shop setup or reorganizing without much effort. As a bonus, "If I move, I can just take the items off the cleats, unscrew the cleats from the wall, and have a clean wall for better resale," Chris says.





Rolling up the 9x10' overhead door reveals Chris' shop garage. Here, he can cut down sheet goods for his woodworking projects or work on other hobbies, including his '63 Corvette and '07 Harley-Davidson Street Glide.



"It's really distracting to work at this drafting table," Chris says jokingly. "I've got a view right up into the Arizona foothills. If this was a home, this bump-out would be a perfect spot for a kitchen table."



Chris lifted six cabinets from hanging cleats in his old basement shop and relocated them to his current shop—this time using a different arrangement.

Although it's a fully functional wood-working shop, Chris also considers it his man cave: "It's not unusual for me to spend the entire evening in the shop. I've got a TV, a stereo, and a bathroom. There's not much I don't have." 🌲

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Capture squeeze-out. Outline the base's footprint with masking tape, and mask the base too. Wipe away excess adhesive and remove the tape before the adhesive dries.

Q Go for serious adhesion when attaching a granite top
I have a granite remnant left over from a kitchen remodel, and want to use it as a top for a coffee table. My challenge: How do I attach the slab to my table assembly? I'm guessing drilling into the granite is not an option.

—Neil Thackery, Allendale, Mich.

A You're correct, Neil; drilling into granite requires special tools and expertise, and could fracture the slab if done wrong. We checked with several cabinet and countertop installers, and they all suggested using an adhesive. So we asked experts from Franklin International (makers of Titebond adhesives), DAP, and Liquid Nails. They all agree that the best choice would be a polyurethane construction adhesive, such as: Titebond GREENchoice Premium Polyurethane Construction Adhesive, DAP SmartBond Heavy-Duty Construction Adhesive, or Liquid Nails LN-950 Polyurethane Adhesive.

Although your installer might have used a silicone-based product to secure your kitchen countertops to the cabinets—a popular choice among the installers we surveyed—our experts advise against this. Because your table will likely be in a location where it might be bumped or moved around occasionally, you need the reliability of an adhesive with more grip than silicone can provide. 🌲

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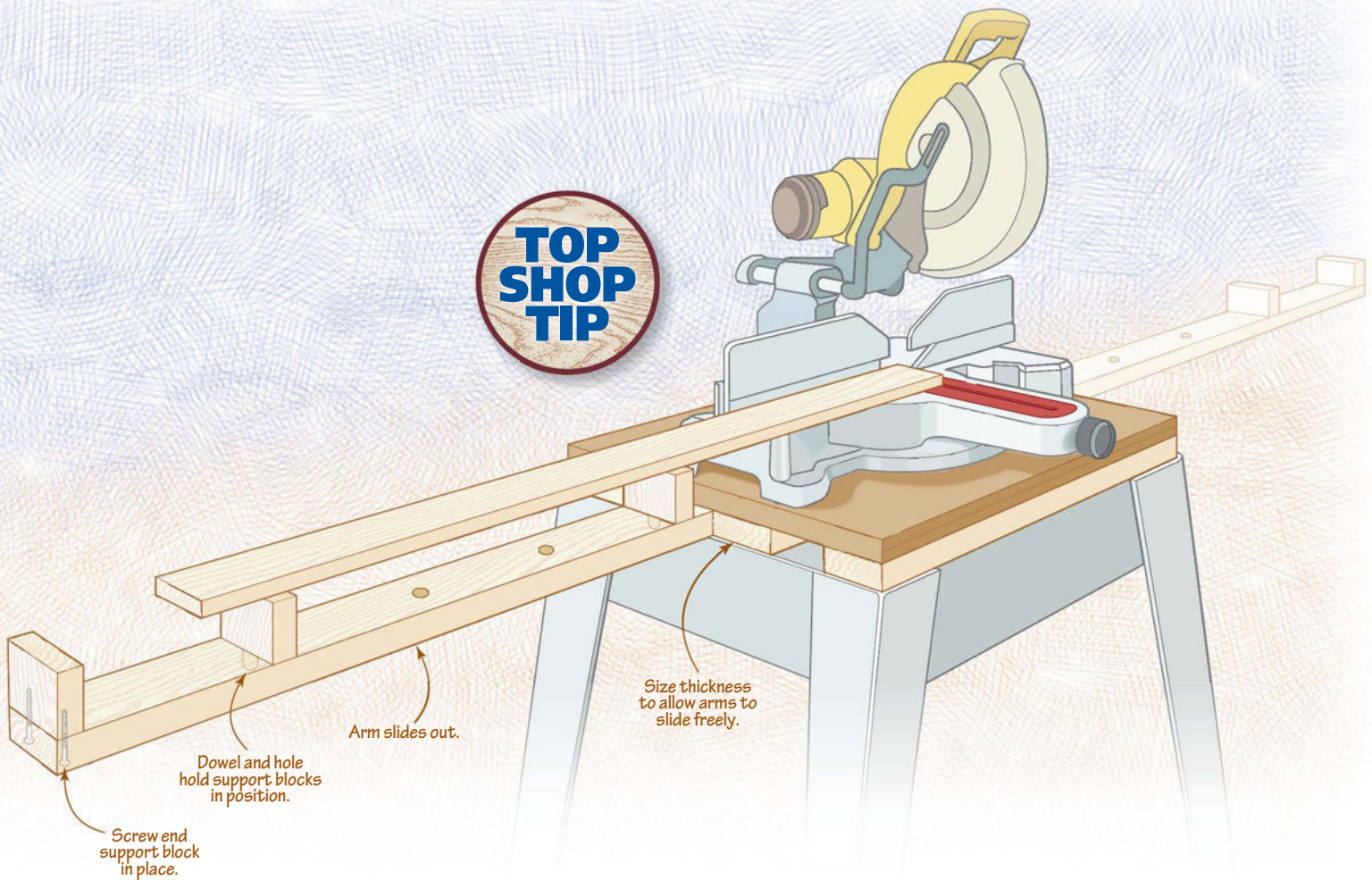


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drop into the arms via dowels, making it possible to quickly disassemble the support or move it from one side to the other with just a push.

—Pete Burke, Torrance, Calif.

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Send your tip, photos or drawings, and contact info to shoptips@woodmagazine.com

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



For sending this issue's **Top Shop Tip**, Pete receives a Woodpeckers PRL-V2 router lift worth \$370.



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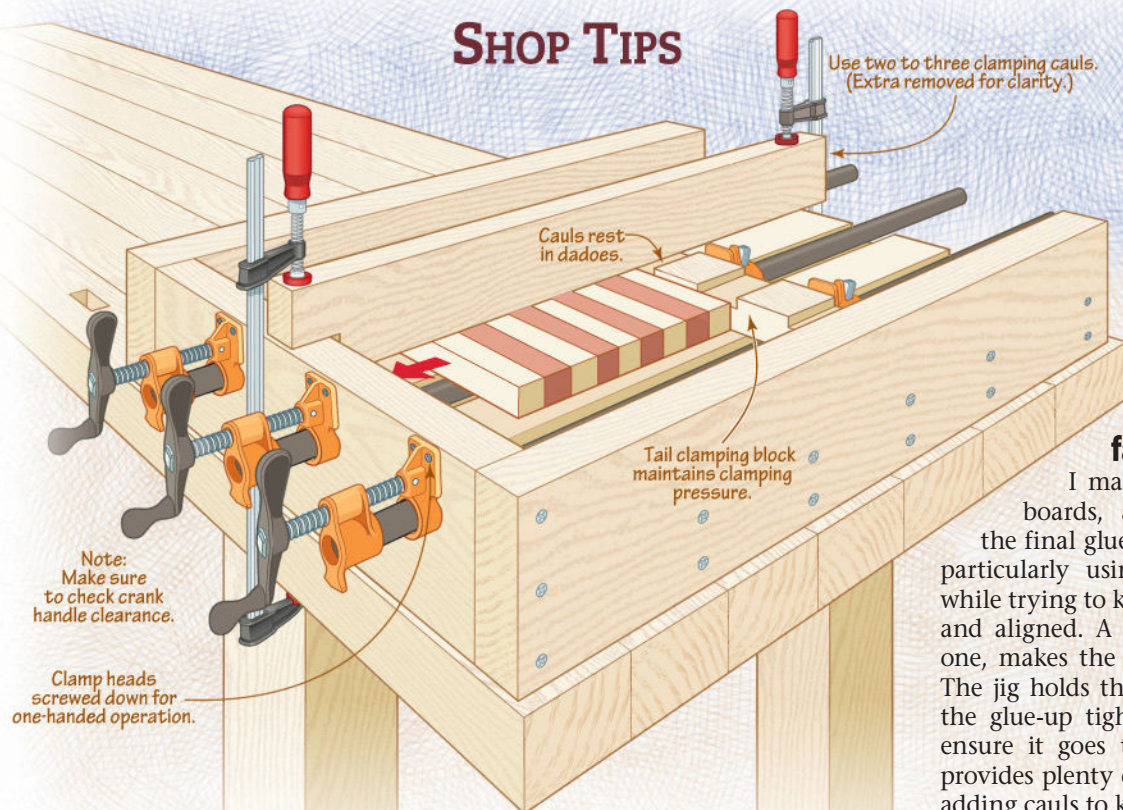
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SHOP TIPS



Make glue-ups fair and square

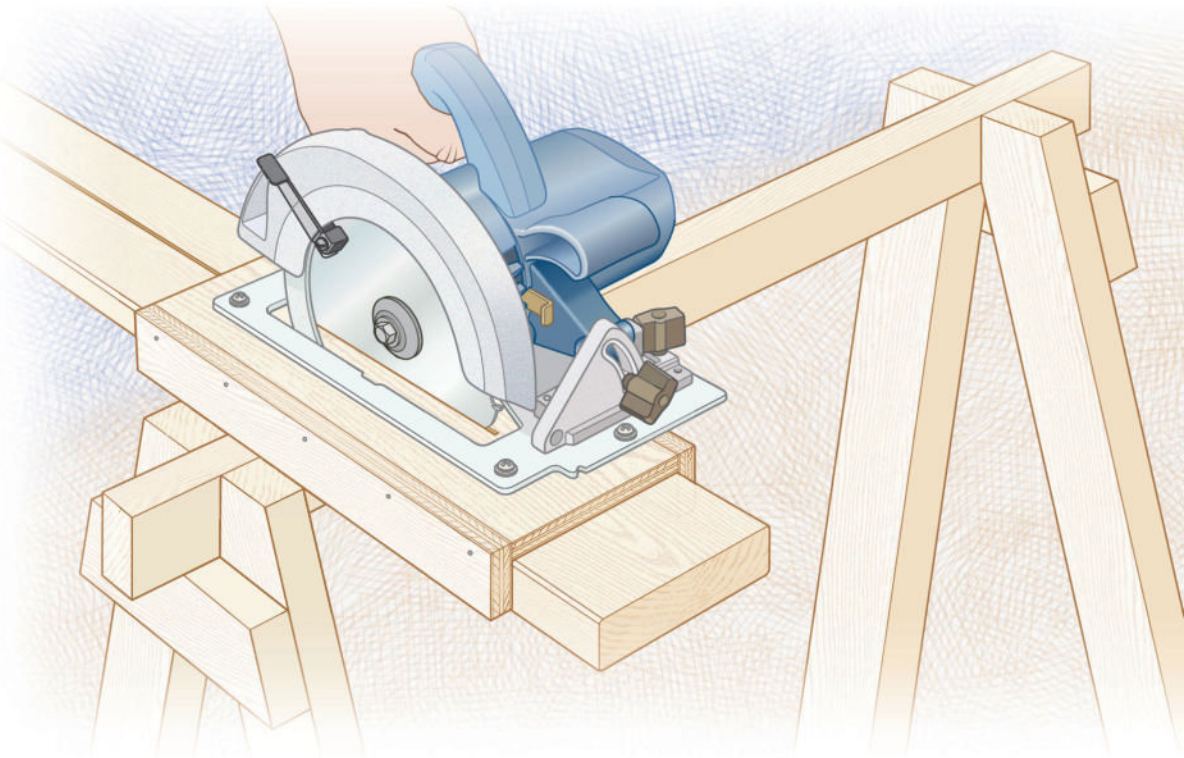
I make quite a few cutting boards, and have found that the final glue-up can be frustrating, particularly using tippy pipe clamps while trying to keep all the parts square and aligned. A clamping jig, like this one, makes the process much simpler. The jig holds the clamps upright, pins the glue-up tightly against its side to ensure it goes together squarely, and provides plenty of clamping surface for adding cauls to keep the glue-up flat.

—Gene Heimerman, Perry, Iowa

No tablesaw handy? Make a circ saw rip saddle instead

When building my kids a treehouse, I ran into a snag: I needed narrow stock and had an extra 2x6 to make it, but no tablesaw to make the rip cut. Digging through a pile of cutoffs, I found the parts necessary to nail together a simple saddle jig for a circular saw. Though crude, it kept the blade tracking true during the cut.

—Justin Shepard, Columbus, Ohio



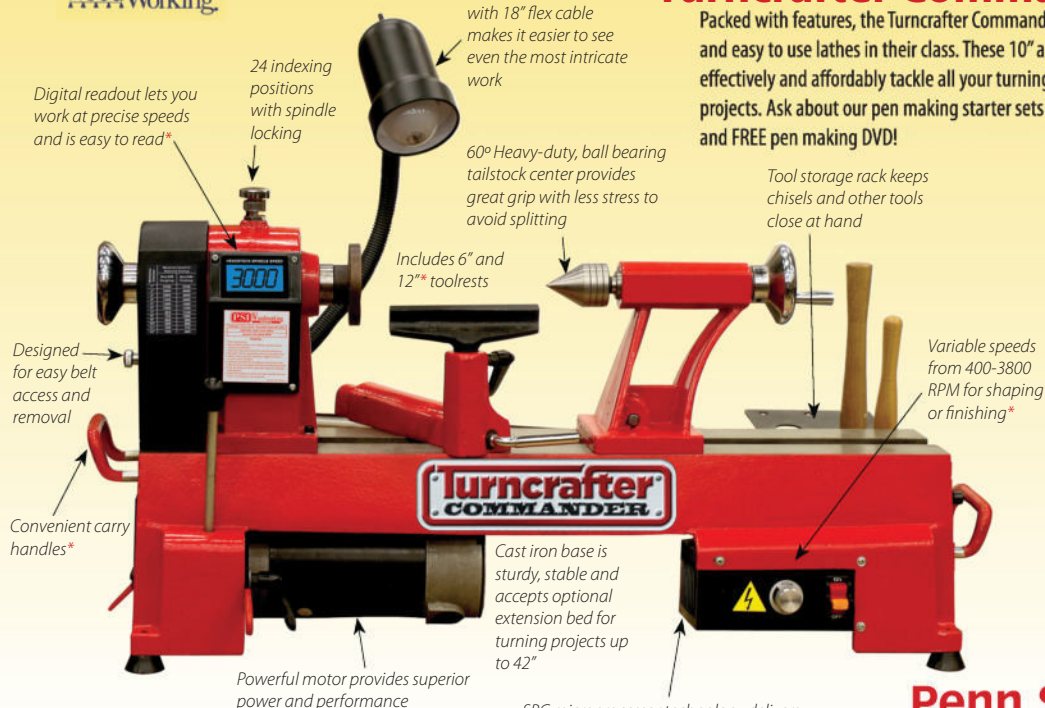
continued on page 18

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SHOP TIPS

Hold logs tight as they ride your resaw jig

Many bandsaw resaw jigs require screwing or hot-gluing the log to the sled to hold it steady during a cut. But I found it easier and less messy to simply clamp the log in place with a one-handed bar clamp.

—Jon Gilmore, Milwaukee

✓ To do this month:



1. Organize your sandpaper drawer by grit.
2. Check the tires on your bandsaw for cracks or excessive wear. Clean, re-crown, or replace if necessary.
3. Sharpen your card scrapers.
4. Check your jointer knives for nicks. Sharpen or replace if necessary.
5. Empty dust collector and tap filters clean.

For help completing these tasks, visit:
woodmagazine.com/maychecklist

Tape trick warns of sharp edges while turning

When hollowing a natural-edge bowl on a lathe, the bowl's jagged edges turn into a blur, making it difficult to know when your hands are getting too close. To give myself clear warning, I apply bright orange duct tape to the bowl's edges. The tape is easy to see, and doesn't beat up my hands if they come in contact. 🌲

—James Meier, Batavia, N.Y.

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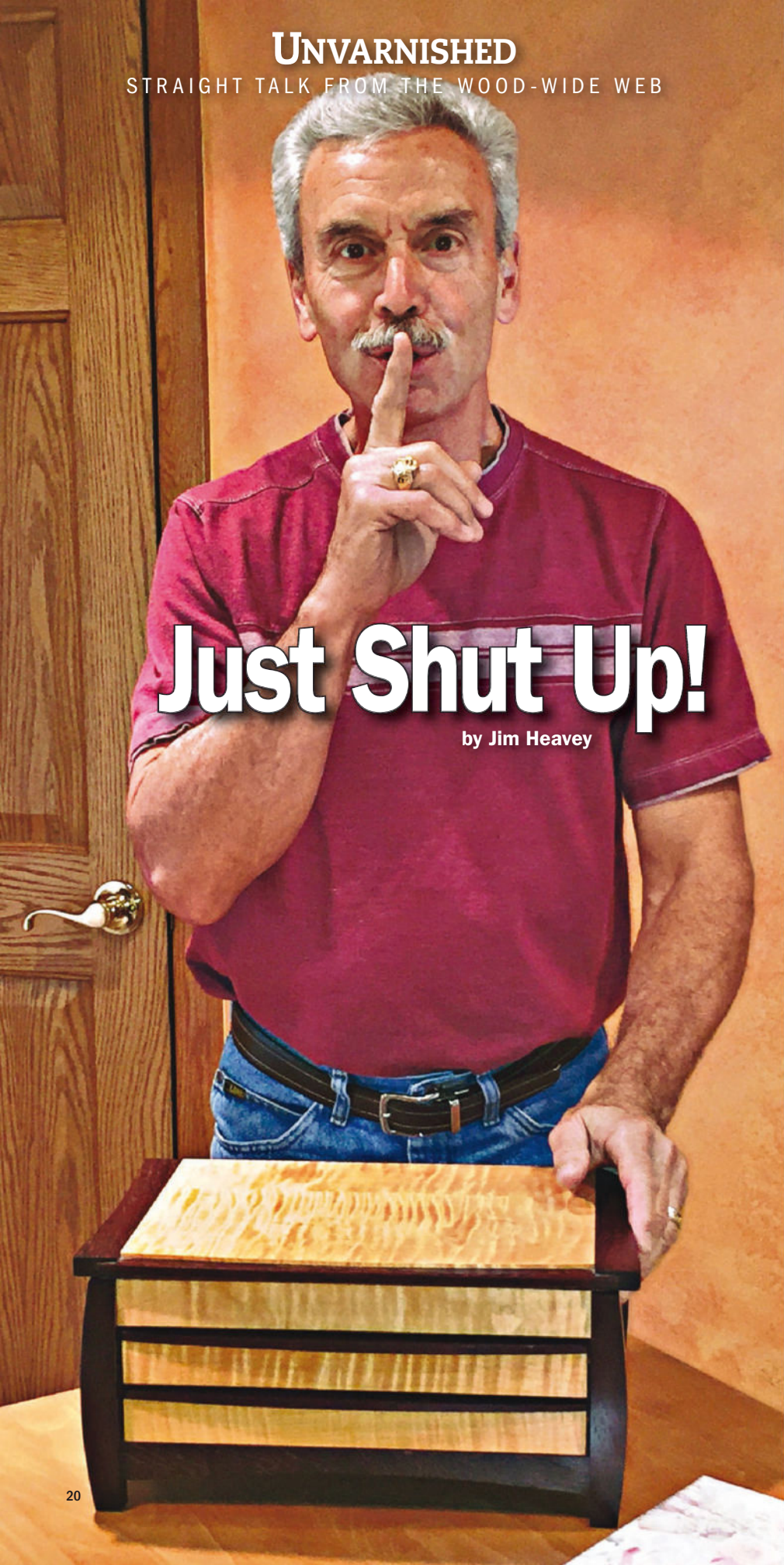
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Testimonial Video





Just Shut Up!

by Jim Heavey

We teach our kids that saying “shut up” is inappropriate. But, for woodworkers, that phrase is an important admonishment to yourself. The next time you hand a woodworking gift to someone and they offer sincere thanks, I suggest saying, “You’re welcome.” And then shut up.

Admit it: Most of the time this is when you offer disclaimers such as, “No big deal.” Or “Not bad for the first time I tried cutting dovetails.” Or “The finish would have looked a little deeper had I used oil.”

Maybe the recipient said that this masterpiece must have taken you forever. And you counter with: “No, it was actually really easy. I had some scrap that I wanted to use up, and this seemed like a good project for it.”

Shut up!

Friends and family know how much you must care about them to have handcrafted a gift. Don’t tarnish that sentiment by denigrating your work. You are a lot better than you give yourself credit for, and those who know you hold your sincerity and craftsmanship in high regard. You might just as well have said: “This is nothing special. When I make something that’s really not that good, I think of you.”

Shut up!

Accepting compliments makes many woodworkers uncomfortable, especially when they are given in person. So we deflect those kind words by minimizing our accomplishments. Or maybe we are so insecure about our skill that we immediately point out our flaws, figuring that someone is going to see them anyway.

You might just as well have said: “This is nothing special. When I make something that’s really not that good, I think of you.”

Listen: Anyone who looks for imperfections in another’s work only reflects back their own character flaws, not your woodworking mistakes. (At any rate, if that’s the type of people you’re making things for, consider a nice gift card instead.)

At a woodworking show awhile back, an attendee wanted to show me his submission for the weekly contest. As he opened the cardboard package and unwrapped his entry, he told me that he had a bit of trouble working with that particular species of wood. He explained that the finish was affected by the natural oils in the stock. He apologized for not backing up the material when he cut the dovetails.

continued on page 23



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On gifts, finish flaws sometimes escape notice until it's too late. To the non-woodworker recipient, they'll escape detection forever as long as you don't point them out.



Bet you didn't notice that the feet of this recently published humidior project were a mismatched size due to a routing mistake. We didn't use Photoshop to fix it. We just shut up about it.

Before I had even seen his jewelry box, he had told me all the reasons that I probably wouldn't like it.

It was actually very well done, and I told him so. Truth be told, had I entered that particular contest, I would have taken my project out of the running after seeing his. He won handily that weekend, and he deserved to.

The long-term effects of being so self-critical and self-effacing get in the way of the joy that comes with woodworking. Aside from the occasional screaming and swearing, woodworking is supposed to be fun. What should give you pleasure is seeing the appreciative look that you get from those you have chosen to make something for. Every time they look at that clock, nightstand, or cutting board, they will think of you. While you may question your ability, they are in awe.

Try this the next time you present someone with a handcrafted item. After the effusive and well-deserved compliments, say, "You're welcome" or "You're too kind."

Then take a deep breath.

Feel the love.

And shut up!

Trust me, you'll thank me for it. Now I'll shut up. 🌲

Aside from the occasional screaming and swearing, woodworking is supposed to be fun.

▶ Jim has been teaching and touring with *WOOD* magazine for almost 20 years. You can find him in the *WOOD* booth at The Woodworking Shows (thewoodworkingshows.com) again this season.

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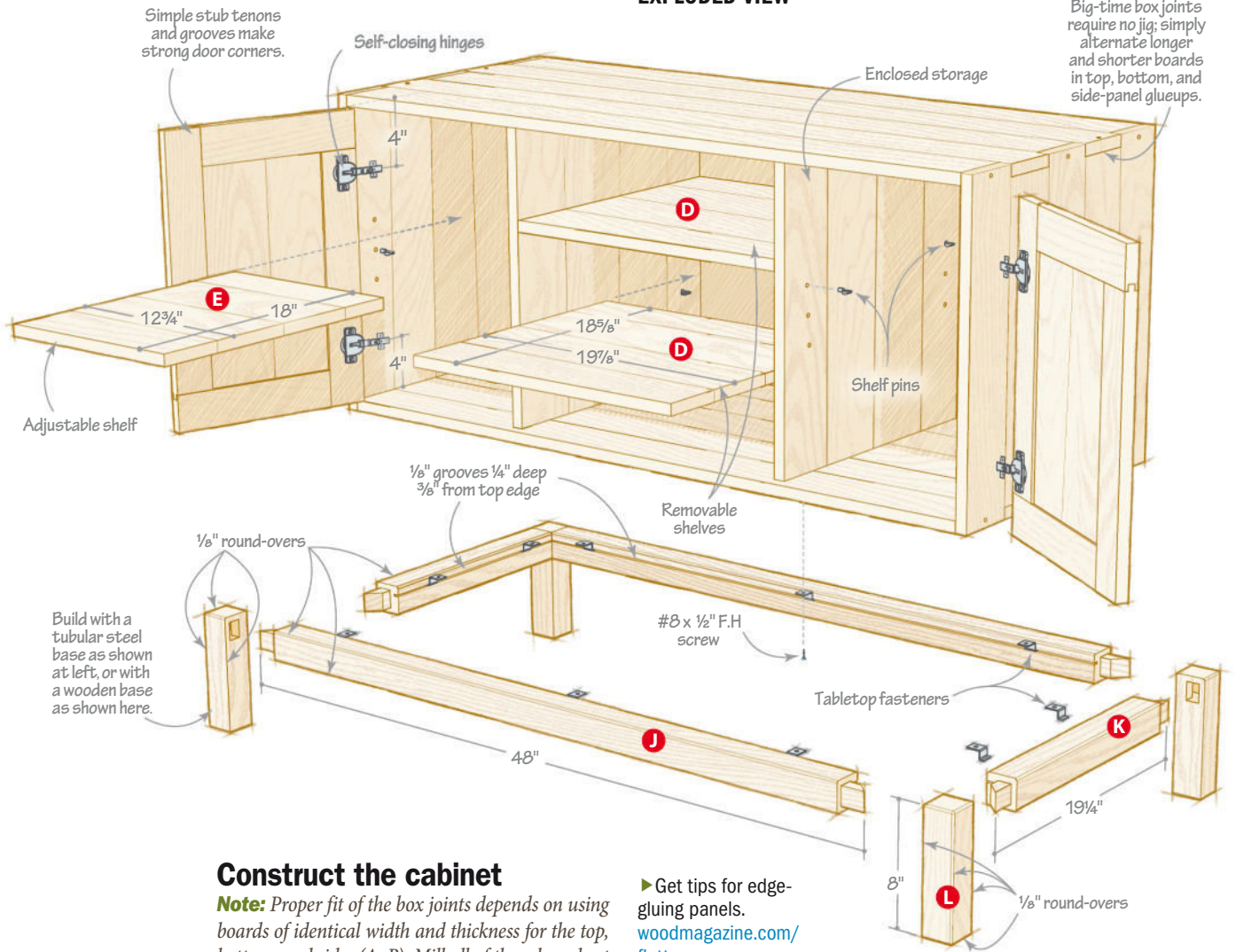
DIMENSIONS:
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Approximate
materials cost:

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46–55"
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overhanging

EXPLODED VIEW



Construct the cabinet

Note: Proper fit of the box joints depends on using boards of identical width and thickness for the top, bottom, and sides (A, B). Mill all of these boards at one time for best results.

Tip! Edge-glue the panels (A, B) in stages, two or three boards at a time. This helps you keep control of the end offsets and maintain flush top and bottom surfaces.

1 From 3/4" stock, cut six boards 4x47 1/4" and four 4x48 3/4" for the top and bottom (A) [Drawings 1 and 2], and six boards 4x21" and four 4x19 1/2" for the sides (B).

2 Glue together the boards to make the top, bottom (A), and side (B) panels, offsetting the boards by 3/4" at the ends [Drawings 1 and 2, Photo A].

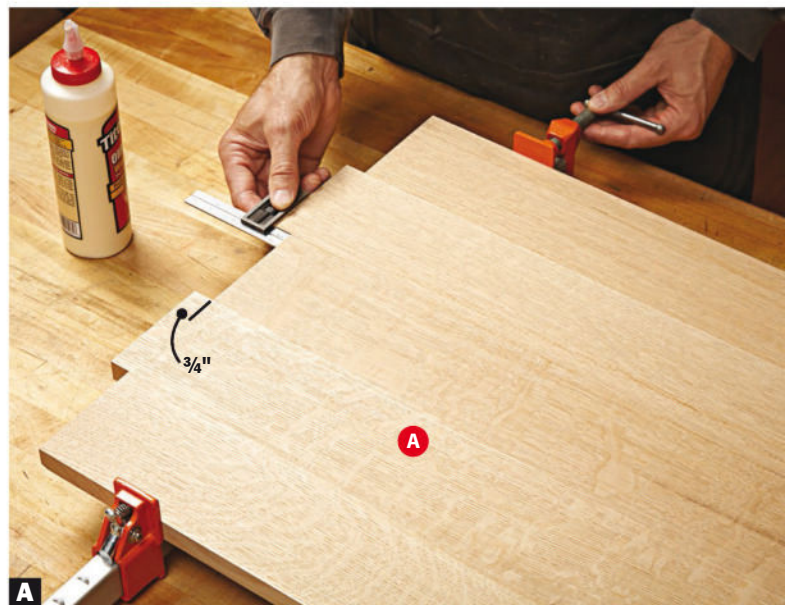
3 Edge-glue the dividers (C) [Materials List, page 29; Drawing 2], and shelves (D, E) [Exploded View].

4 Cut the grooves in the top and bottom (A) and the biscuit slots in the top, bottom, and dividers (C) [Drawings 1 and 2].

5 Finish-sand the inside faces of the top and bottom, sides, and both faces of the dividers and shelves. Dry-assemble A, B, and C with biscuits to check the fit, then disassemble the carcass.

Tip! Align the back edges of the dividers (C) with the inside edges of the grooves in the top and bottom (A) when laying out the biscuit slots. For easy, accurate alignment, slip scrap pieces of 1/4" plywood into the grooves.

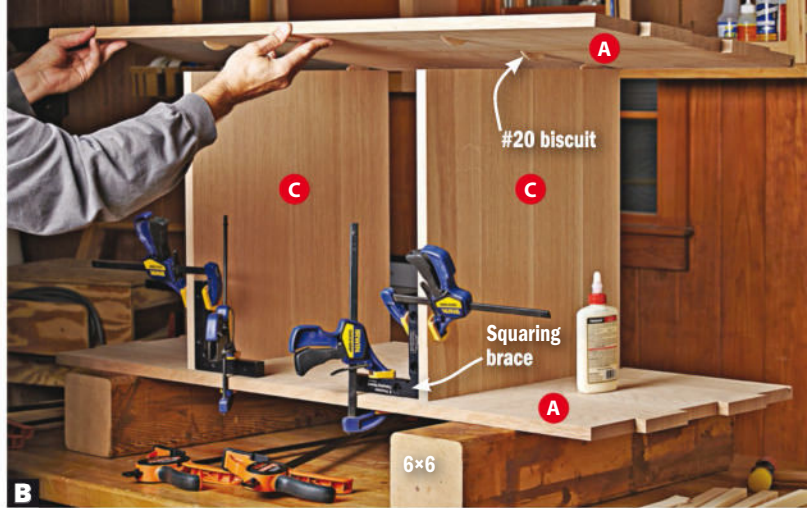
► Get tips for edge-gluing panels.
woodmagazine.com/flattop



Measure the end offsets precisely. A board extending too far at one end will be short at the other end, creating a gap in the box joint.

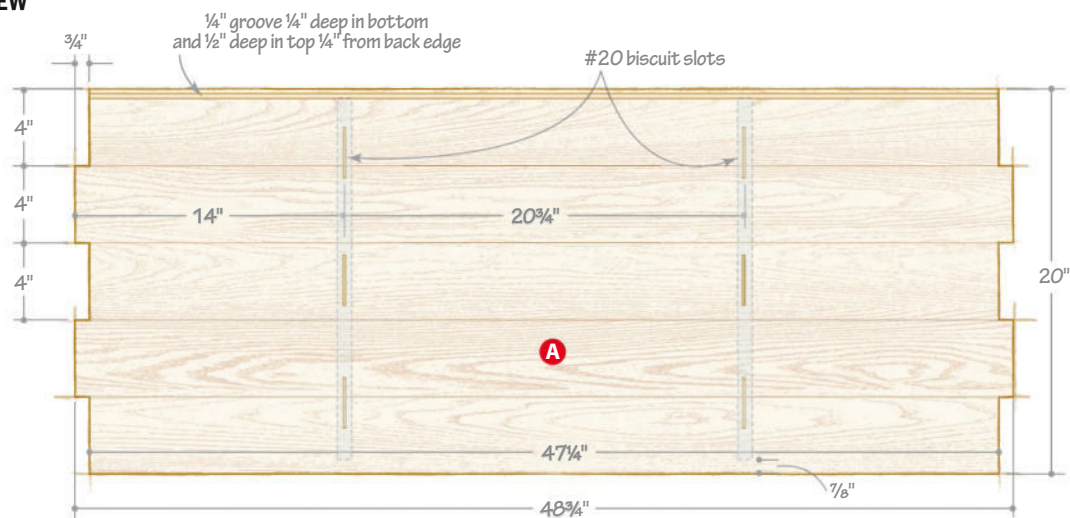
► Get free plans for squaring braces and benchtop risers. woodmagazine.com/brace woodmagazine.com/riserplan

- 6 After applying glue to the biscuit slots and mating edges, clamp together the A/C assembly [Skill Builder, Photo B].
- 7 Apply glue to the box-joint mating surfaces on the top/bottom (A) and sides (B). Clamp the sides in position.
- 8 Drill $\frac{1}{4}$ " holes centered in the joint fingers [Drawing 2, Photo C]. Glue dowels into the holes and cut them off [Photo D]. Finish-sand the outside of the cabinet.
- 8 Drill holes for shelf pins in the sides (B) and dividers (C) [Drawing 2].
- 9 Cut the back (F) to size. Lay out and cut the wire opening [Drawing 2], and finish-sand the back.



Set the top/bottom/divider assembly on 6×6 stock or benchtop risers for easier clamping. Squaring braces hold the dividers perpendicular during assembly.

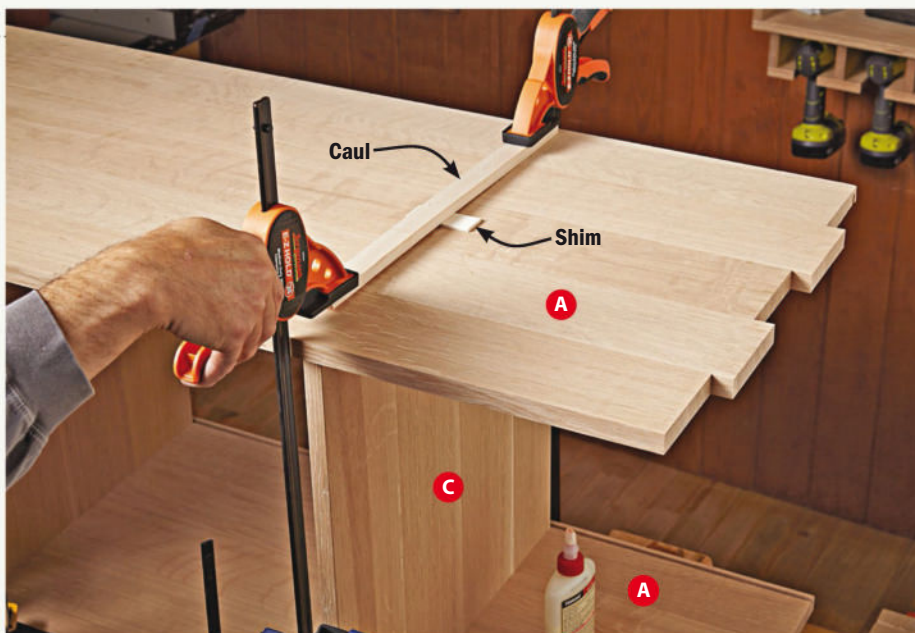
1 PART VIEW



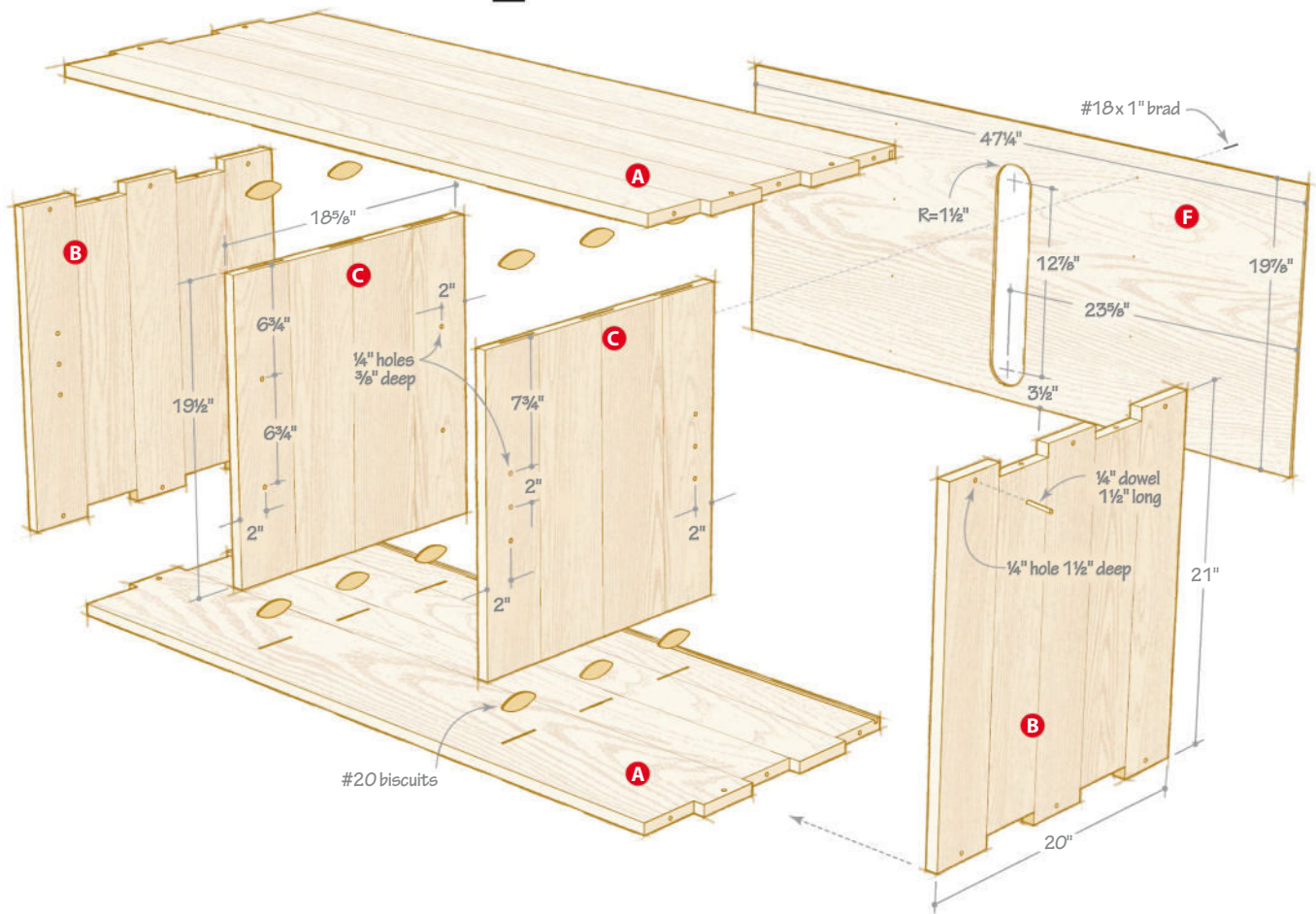
Skill Builder

Caul and shim spread clamping pressure across broad panels

Applying clamps only at the edges of wide assemblies can result in little or no clamping force toward the middle. Ensure adequate clamping across the panel by placing a thin piece of scrapwood—say, $\frac{1}{8}$ " or $\frac{1}{4}$ "—at the center of the glue-up beneath a caul spanning the carcass.

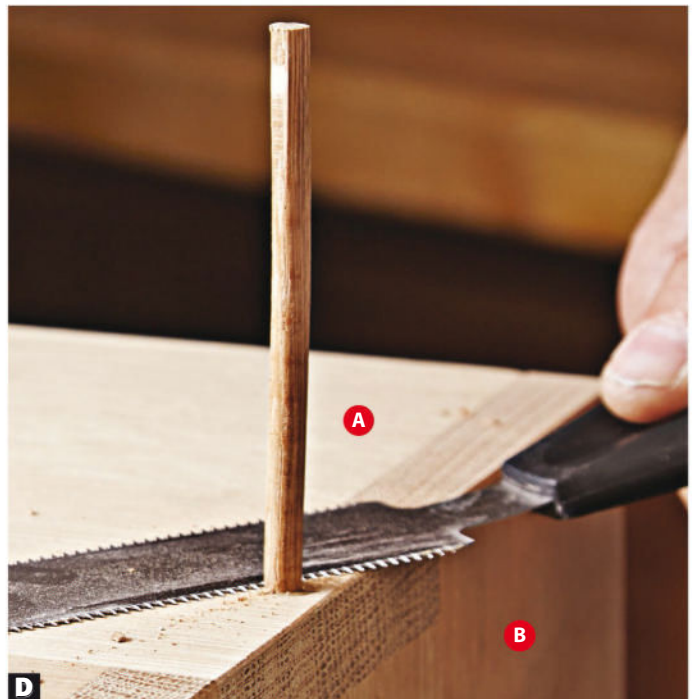


2 CABINET



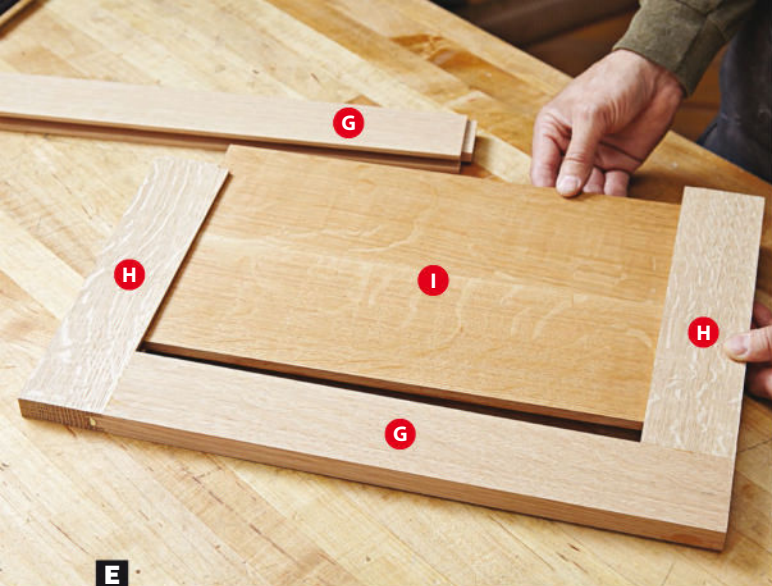
C

Control drill depth with a simple, nonmarring, wood stop. Make it by drilling through a scrap that leaves enough bit exposed for your desired depth.

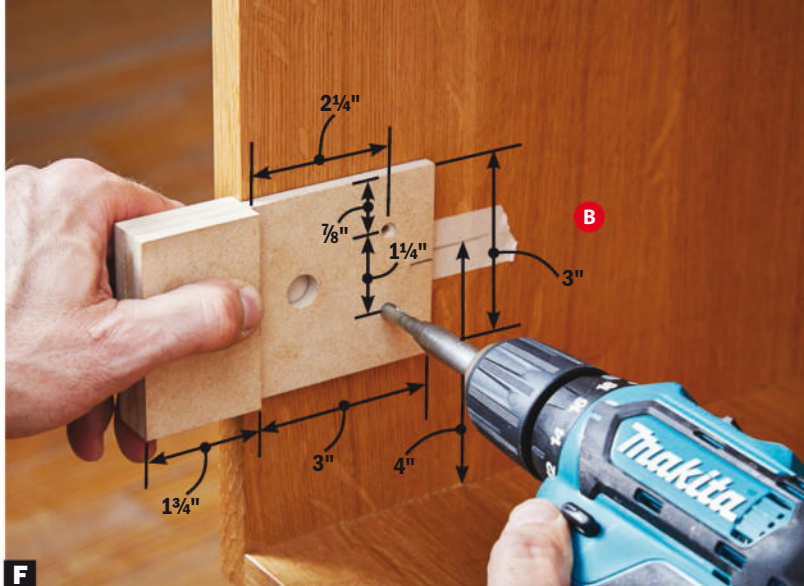


D

A flush-cutting saw trims the dowels without scarring because the teeth are not set to the sides. Put a playing or business card under a blade with set teeth.



E Slide the panel into the door grooves without gluing. A floating panel moves with humidity changes without cracking or damaging the frame



F Drill hinge-clip holes accurately with a simple jig. Mark the hinge location on the side (B), and hold the jig in position to drill the clip holes.

Make a pair of doors

► If you plan to stain the TV stand, apply stain to the door panels (I) before assembling the doors.

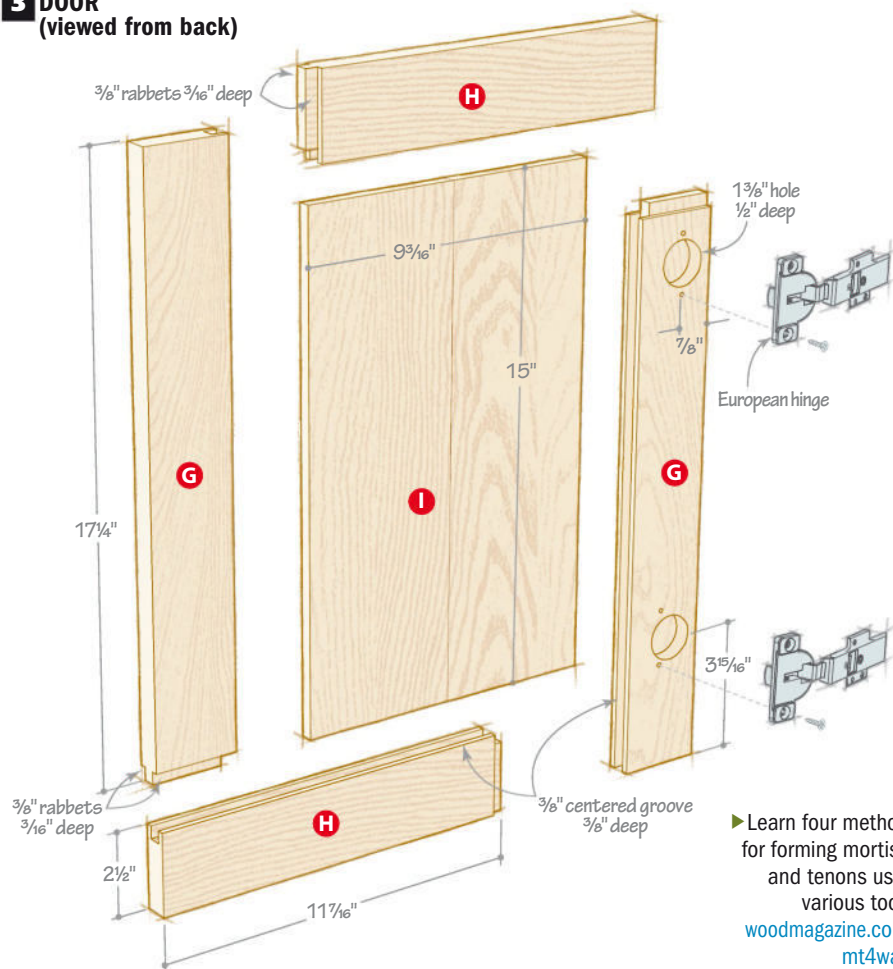
1 Asymmetrical corner joints give the doors a distinctive look and are simple to construct. Cut the door stiles (G) and rails (H) to size. Edge-glue the door panels (I), trim them to size, and finish-sand them.

2 Groove the stiles and rails [Drawing 3] and rabbet one end of each part.

3 Glue two rails (H) to a stile (G), then, slide the panel into the grooves [Photo E]. Glue the other stile in place. Build the other door the same way.

4 Bore holes for the hinges [Source] in the left inside stile of one door and the right inside stile of the other [Drawing 3]. Refer to the hinge instructions for installation details. Finish-sand the doors.

3 DOOR (viewed from back)



Build a base

Note: To build the steel base as shown in the opening photo, fabricate a 48 3/4 x 20" rectangle of 2" square tubing with mitered corners. Add a 6" leg at each corner. Grind all welds smooth. Weld on tabs about 3" from each corner on the inside of the front and back rails to attach the base to the cabinet. Prime and paint the base. To make the base from wood, follow the numbered steps, below.

1 Laminate 1 1/2"-thick stock to make blanks for the base rails (J, K) and legs (L) [Exploded View]. Cut the parts to size. Then, cut a groove in each rail (J, K).

3 Form the mortises in the legs (L). The mortises are offset toward the outer faces of each leg, so mark each leg for position and mortise location to maintain correct orientation [Drawing 4].

4 Make tenons on the ends of the rails (J, K) [Drawing 4], carefully heeding each rail's orientation. Miter-cut the tenons to seat against each other in the leg mortises.

5 Glue together the rails (J, K) and legs (L) [Exploded View]. Measure the diagonals; they must be equal to ensure a square assembly. Clamp the base.

6 Round over the edges of the base [Exploded View] and finish-sand.

► Learn four methods for forming mortises and tenons using various tools.
woodmagazine.com/mt4ways

4 BASE DETAIL

Put it all together

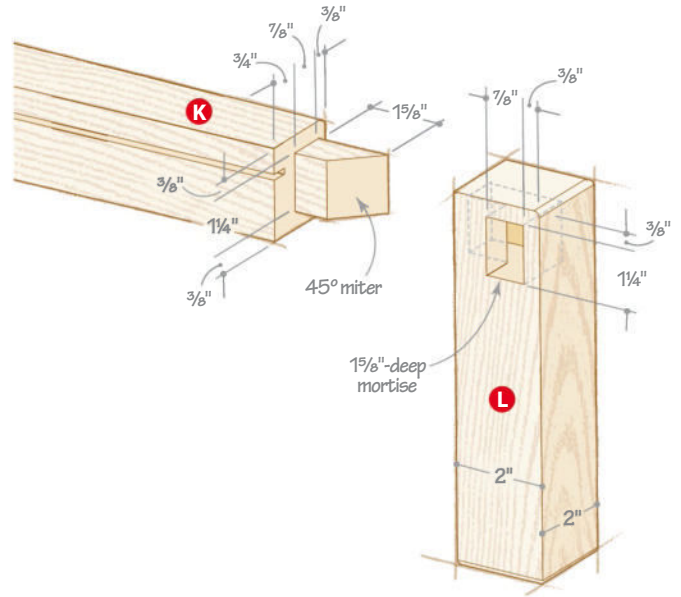
1 Mark the locations for hinge-clip mounting holes on each side (B) [Exploded View]. Drill the holes [Photo F] and test-mount the doors. Remove the doors.

2 Touch up the finish-sanding as necessary. Apply a finish to all assemblies and components. (We chose satin polyurethane.) You can stain and clear-finish the base, or paint it with semigloss black enamel for the steel-base look.

3 After the finish dries, invert the cabinet (A–C) and attach the wooden base (J–L) with tabletop fasteners [Exploded View].

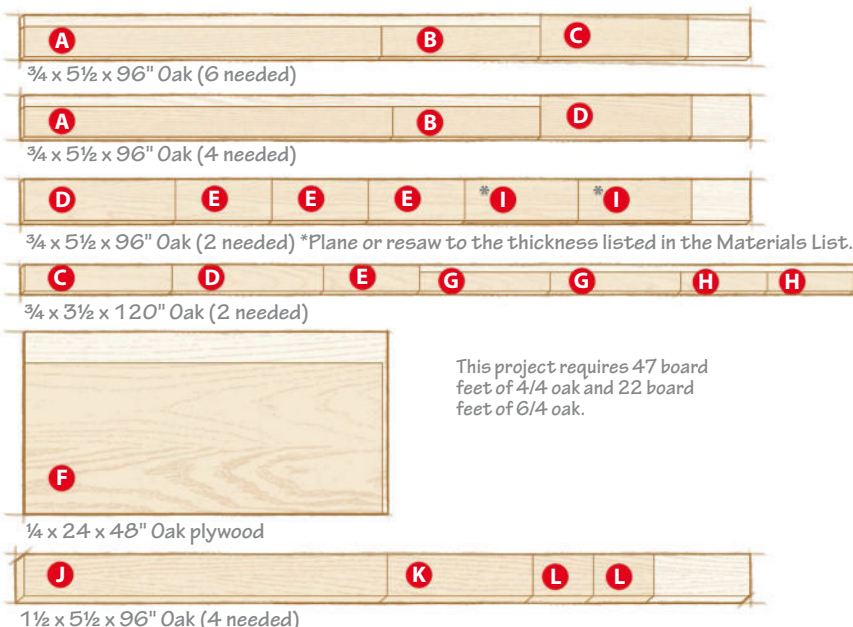
4 Position the back (F) in the rear opening and lift the top edge into the groove in the top panel (A). Raise the panel up and let it drop into the bottom (A) groove. Nail the back to the dividers [Drawing 2].

5 Reattach the doors and install the shelves. Set the TV on top, components on the center shelves, and sit back for a break. 🌳



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

Cutting Diagram



Materials List

Part	FINISHED SIZE			Matl.	Qty.
	T	W	L		
Cabinet					
A* top/bottom	¾"	20"	48¾"	EO	2
B* sides	¾"	20"	21"	EO	2
C dividers	¾"	18⅝"	19½"	EO	2
D center shelves	¾"	18⅝"	19⅞"	EO	2
E outer shelves	¾"	18"	12¾"	EO	2
F back	¼"	19⅞"	47¼"	OP	1
Doors					
G stiles	¾"	2½"	17¼"	O	4
H rails	¾"	2½"	11⅞"	O	4
I panels	⅜"	9⅜"	15"	EO	2
Base					
J front/back rails	2"	2"	48"	LO	2
K end rails	2"	2"	19¼"	LO	2
L legs	2"	2"	8"	LO	4

*Prepare stock for these panels as described in the instructions.

Materials key: EO—edge-glued oak, OP—oak plywood, O—oak, LO—laminated oak.

Supplies: #8×1/2" flathead screws (10); #20 biscuits (12); self-closing, European-style hinges (4); tabletop fasteners (10); #18×1" brads; 1/4×36" oak dowel; shelf pins (16).

Bits: Stacked dado set, 1/8" round-over bit.

Source

Hinges and mounting plates: Blum 110°, clip-top, soft-close, half-cranked, screw-on hinge, nickel finish, no. B071B3650, \$5.48 (4); Blum frameless, 0mm, screw-on clip mounting plate, no. B175H710, \$1.83 (4); Woodworker's Hardware, 800-383-0130, wwhardware.com.



Easy-chairs Patio set

Build a cushy chair, love seat, and footrest this weekend.

► We built this set from white oak, a dense, rot-resistant wood. Other good wood choices include redwood, cypress, or cedar.

All three pieces in this snazzy matching set require the same, super-simple construction and share the great majority of components. The chair serves as the base design for the set, so here we'll take you step-by-step through building it. To make the other two pieces you follow the same instructions but make the minor modifications noted in **red bold** for the love seat and *blue italic* for the footrest. It couldn't be easier or faster!

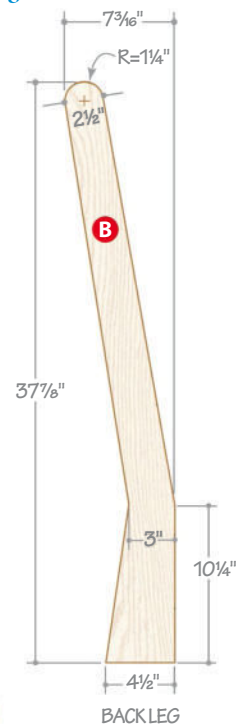
► If you plan to buy cushions, rather than make ones sized the same as ours, be sure to have them on hand before building these projects. With so many retailers online you should be able to find cushions sized within an inch or so of the width and depth of ours—and that's close enough. If you can't, you'll need to tweak the length of some parts to accommodate your cushions. For this set we purchased seat cushions measuring 5½" thick, 23" wide, and 24" deep. (We rotated the cushions 90°, running the "deep" dimension across the width of the chairs/footrest.) The back cushions measure 4¼" thick, 22½" wide, and 20" deep.



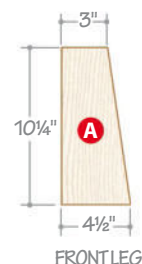
First up, the sides

1 From 8/4 stock (planed to 1½" thick), cut oversized blanks for the front and back legs (A, B) [Materials List, Exploded View]. Lay out and cut to shape the legs [Drawing 1], then sand smooth. Save the cutoffs for the next step. *If building the footrest, make four front legs and skip the back legs.*

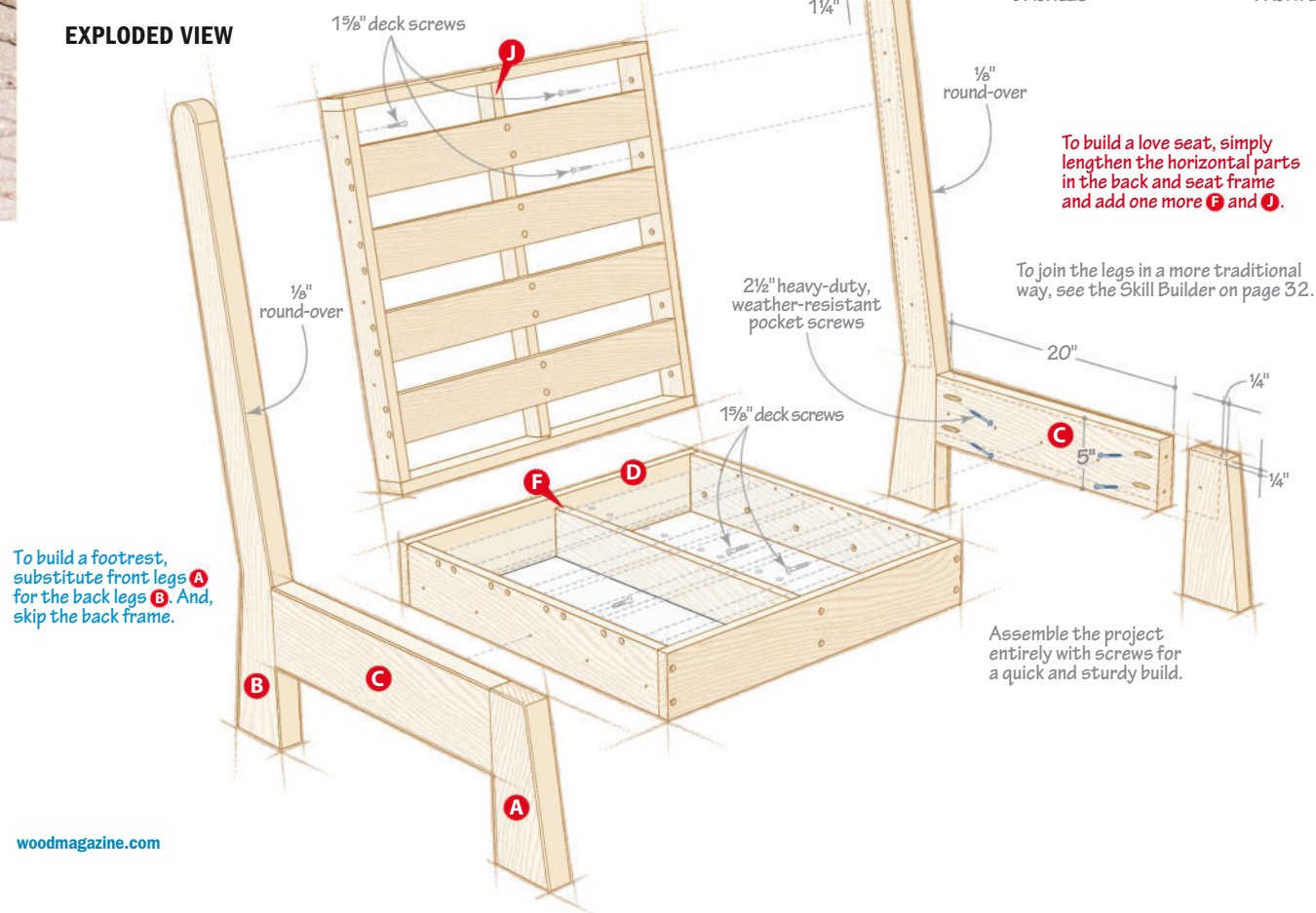
Tip! To make identical multiples of parts, make a hardboard template and use that in combination with a ½"-shank flush-trim router bit to trim the legs to final shape.



1 LEG VIEWS



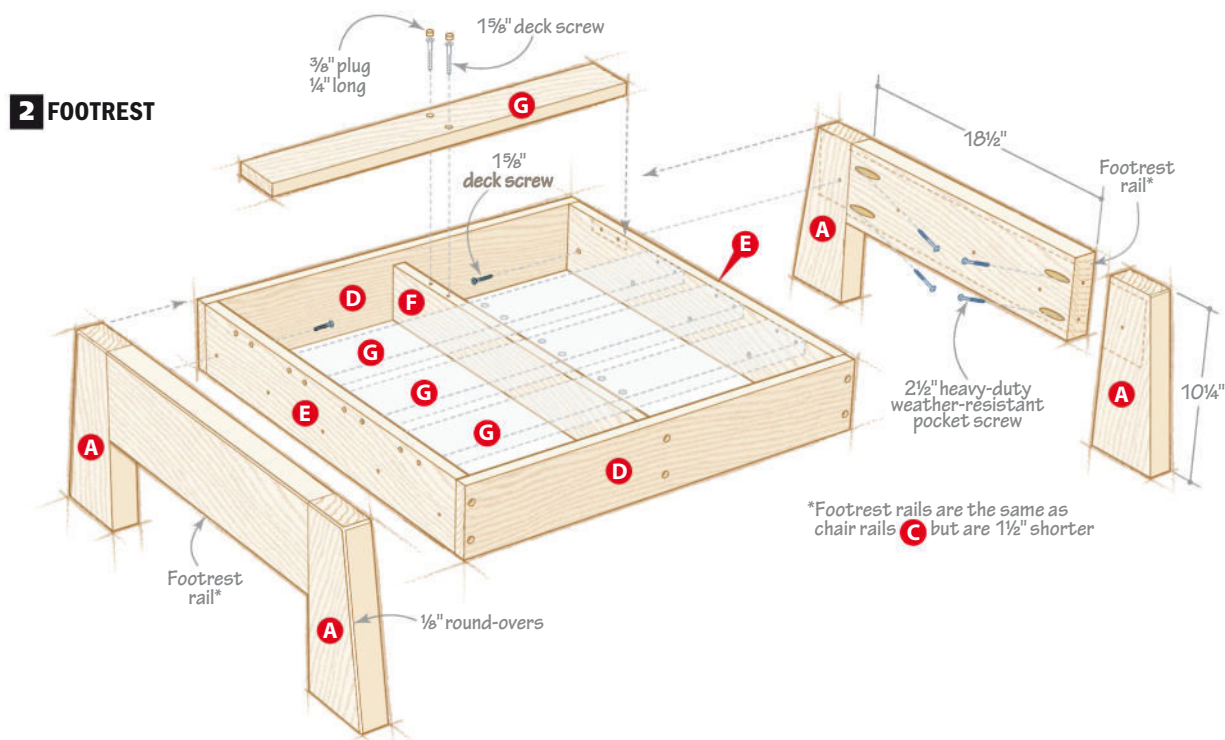
EXPLODED VIEW



2 Cut the chair rails (C) to size and drill pocket holes where shown [**Exploded View**]. *For the footrest cut the rails 1½" shorter than the chair rails [**Drawing 2**].* Attach the rails to the legs [**Photo A**], being mindful to make mirror images. For strength and weather

resistance, use Kreg Heavy-Duty pocket screws. (These require use of a Kreg Jig HD—see kregtool.com.)

3 Finish-sand the leg/rail assemblies, then round over the outside edges.



Skill Builder

A time-tested alternative to pocket screws

Don't own a Kreg Jig HD and don't want to plunk down \$60 to buy one? No problem. Simply join the legs to the side rails with easy-to-make-but-strong loose-mortise-and-tenon joints. Use a ½" upcut spiral bit and plunge router with edge guide to cut a

centered mortise 4" long and 1" deep in
each mating edge/end as shown *below left*.

To machine the loose tenons, start with a ½"-thick, 4"-wide blank of oak at least 12" long. Check that it will fit snug in the mortise and adjust the thickness and width as

necessary. Then, rout a bullnose profile on both edges using a $\frac{1}{4}$ " round-over bit with pilot bearing as shown *below*. Cut the blank into tenons $1\frac{7}{8}$ " long, apply water-resistant glue, and clamp for a joint that will last the life of your patio set.





A Attach the rails to the legs using 2½" heavy-duty pocket screws (no glue necessary). Position the leg cutoffs to ease clamping.

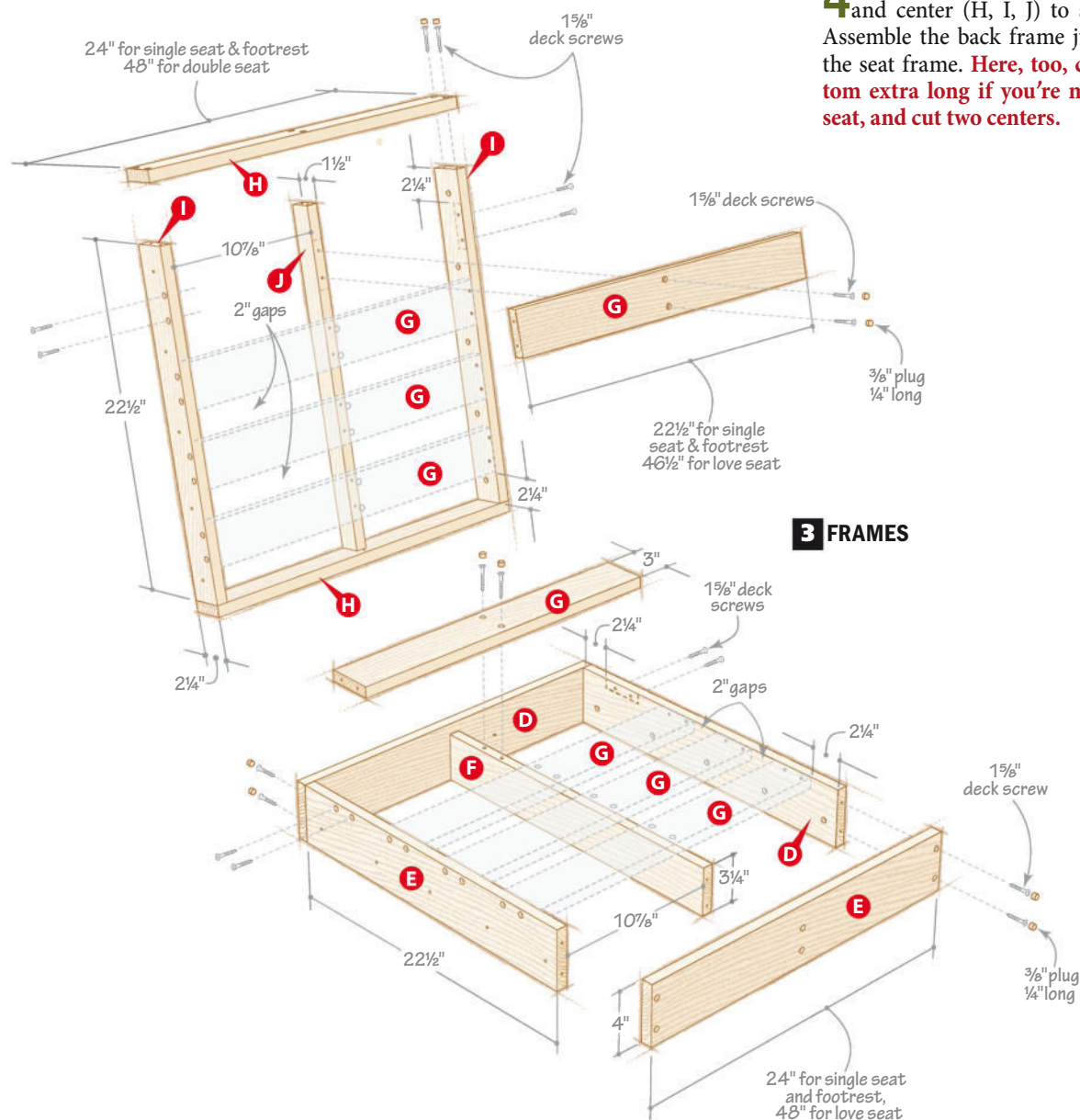
Now, the seat frame and back

1 Cut the seat frame front/back (D), sides (E), and center (F) [Drawing 3]. **If building the love seat, cut the front/back twice as long, and cut two seat frame centers.** Working on a flat surface, clamp and screw together the seat frame (D-F) [Drawing 3].

2 Cut the slats (G) so they fit snug between the seat frame sides (E). At the same time, cut the slats you'll need later for the back frame. *For the footrest cut only four slats.*

3 Space the slats evenly and attach them with screws driven through the seat frame sides [Drawing 3]. Before screwing the slats to the seat frame centers (F), drill ¼"-deep counterbores at the pilot holes to receive wood plugs. Break sharp edges on the frame as you finish-sand it.

4 Cut the back frame top/bottom, sides, and center (H, I, J) to size [Drawing 3]. Assemble the back frame just as you built the seat frame. **Here, too, cut the top/bottom extra long if you're making the love seat, and cut two centers.**



3 FRAMES



B Position the seat frame $\frac{1}{4}$ " from the front of the leg/rail assembly (A–C) and $\frac{1}{4}$ " from the top edge of the rail (C).

► Though spar varnish contains UV inhibitors, like any clear finish it will degrade from sun exposure, requiring sanding or stripping and reapplication. To limit the effects of outdoor exposure, purchase covers available from many retailers—simply search online for “patio furniture covers.” If that’s not something you want to do, then consider applying a heavily pigmented stain or paint for maximum protection.

Put it all together

1 Retrieve the leg/side rail assemblies (A–C). To one of them glue and clamp a seat frame (D–G) [Photo B]. Reinforce with screws [Exploded View, [Drawing 2](#)].

2 Attach the back frame (G–J) to the back leg just as you did the seat frame, positioning its bottom edge $\frac{1}{2}$ " above the top edge of the seat frame.

3 Retrieve the other leg/rail assembly and glue, clamp, and screw it in place [Photo C].

4 Complete any final sanding and apply a protective finish. We put down three coats of a clear spar varnish to show the attractive grain of the white oak. 🌲

Produced by **Bill Krier** with **Kevin Boyle**
Project design: **Kevin Boyle**
Project built by **Brian Bergstrom**
Illustrations: **Roxanne LeMoine**; **Kurt Schultz**



C Use spacers to position the seat frame when attaching the second leg/rail assembly. Check for symmetrical spacing on both sides.

Cutting Diagram (chair)

One chair requires 18 bd. ft. of $\frac{3}{4}$ " white oak and 12 bd. ft. of $\frac{1}{4}$ " white oak.



$1\frac{1}{2}$ x $5\frac{1}{2}$ x 72" White oak



$1\frac{1}{2}$ x $7\frac{1}{4}$ x 84" White oak



$1\frac{1}{2}$ x $7\frac{1}{4}$ x 84" White oak



$\frac{3}{4}$ x $4\frac{1}{4}$ x 96" White oak



$\frac{3}{4}$ x $8\frac{1}{2}$ x 96" White oak



$\frac{3}{4}$ x $9\frac{1}{2}$ x 48" White oak

One footrest requires 7 bd. ft. of $\frac{3}{4}$ " white oak and 6 bd. ft. of $\frac{1}{4}$ " white oak.

One loveseat requires 18 bd. ft. of $\frac{3}{4}$ " white oak and 22 bd. ft. of $\frac{1}{4}$ " white oak.

Materials List (chair)

Part	FINISHED SIZE			Matl.	Qty.
	T	W	L		
Leg/rail assemblies					
A* front legs	1½"	4½"	10¼"	0	2
B* back legs	1½"	7⅞"	37⅞"	0	2
C chair rails	1½"	5"	20"	0	2
Seat frame					
D front/back	¾"	4"	24"	0	2
E sides	¾"	4"	22½"	0	2
F center	¾"	3¼"	22½"	0	1
G* slats	¾"	3"	22½"	0	8
Back frame					
H top/bottom	¾"	2¼"	24"	0	2
I sides	¾"	2¼"	22½"	0	2
J center	¾"	1½"	22½"	0	1

*Parts initially cut oversize. See the instructions.

Materials key: O-oak.

Supplies: $1\frac{1}{8}$ " deck screws, $2\frac{1}{2}$ " heavy-duty weather-resistant pocket screws.

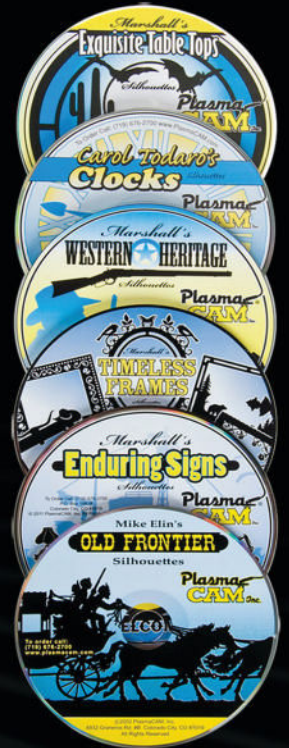
Bits: $\frac{3}{8}$ " plug cutter and $\frac{1}{8}$ " round-over router bit.

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Idea Shop 6:

Lumber Storage and Routing

With a circular saw and the cutting jigs previously made, you now can cut sheet goods and dimensional lumber straight and square—the foundational skills of woodworking. Practice and improve those skills over the next few weeks by building more fixtures for your shop. The budget for the second four paychecks allows buying a few more tools, including a router, one of the most versatile items in a wood-working shop.

► Watch a video of the shop growing, updated with each paycheck.
woodmagazine.com/is6progress

Learn through this series of Idea Shop 6 articles how to set up a shop by working within a budget of \$150 every two weeks over 26 pay periods. Coinciding with each paycheck, we provide online a collection of related articles, plans, and videos at woodmagazine.com/ideashop6.

To receive an email reminder of that posting, sign up for our newsletter at woodmagazine.com/newsletter. The first article in this series ran in WOOD® issue 238 (March 2016). Catch up with the previous installments at woodmagazine.com/ideashop6.



Paycheck 5

Building projects requires boards and plywood, and that requires places to store those materials. Part of this paycheck buys the plywood and lumber to make a rolling rack that doubles as a sheet-goods cutting sta-

tion. Add a jigsaw and some blades to your collection for cutting curves and making interior cuts, such as the notches in the center support of the sheet-goods rack. Bank about \$10–\$15 from this check.



The jigsaw we chose (JS481LG) accepts T-shank blades for quick blade changes, has variable speed for control, and orbital action for powering through tough materials. Find reviews of jigsaws at reviewatool.com.



Paycheck 6

With your sheet goods organized, pick up materials for a wall-mounted rack to hold boards. Secured to wall studs by lag bolts, this 2x4-and-plywood rack holds plenty of lumber. Add a level to your toolkit to help you plumb and align the racks as you fasten them to the wall. After these small expenses, beef up your bank by about \$115.

► Find plans for the jigs and fixtures shown. woodmagazine.com/ideashop6

Paycheck 7



► Get started with a handheld router.
woodmagazine.com/startrouting

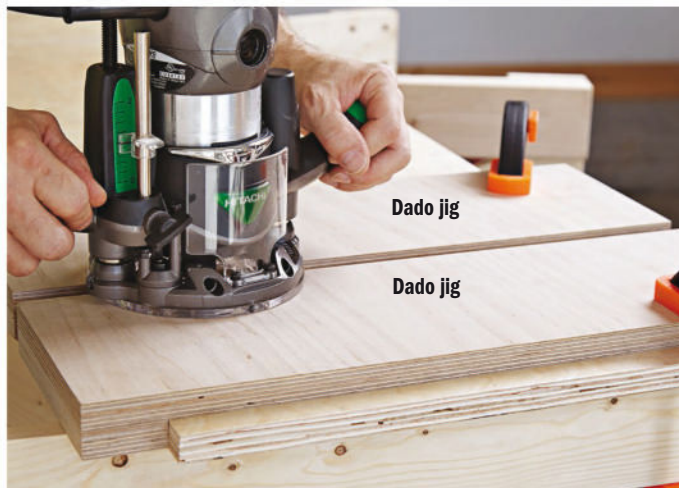
► Learn dozens of tricks and tips for a handheld and table-mounted router.
woodmagazine.com/routing

With this check and a portion of the savings set aside from previous checks, purchase a multi-base router kit. A handheld router performs dozens of operations. And when you mount the tool under a table with the bit extending through, *above*, you dramatically increase the router's usefulness, enabling you to steady small or narrow workpieces on the broad tabletop and guide them along the fence past the bit for consistent cuts. Router tables don't come much simpler than this version that rests on your folding sawhorses.



Buying Smart: A multi-base router kit essentially gives you two tools for the price of one. A single motor fits two bases: a spring-loaded plunge base allows lowering the spinning bit into the work to make cuts that start and/or stop in the middle of a surface. Mount the fixed base in a router table and quickly switch the motor from handheld work to table work. This Hitachi KM12VC comes with guide bushings that thread into the router base and guide the bit along a pattern to duplicate parts or shapes.

Paycheck 8

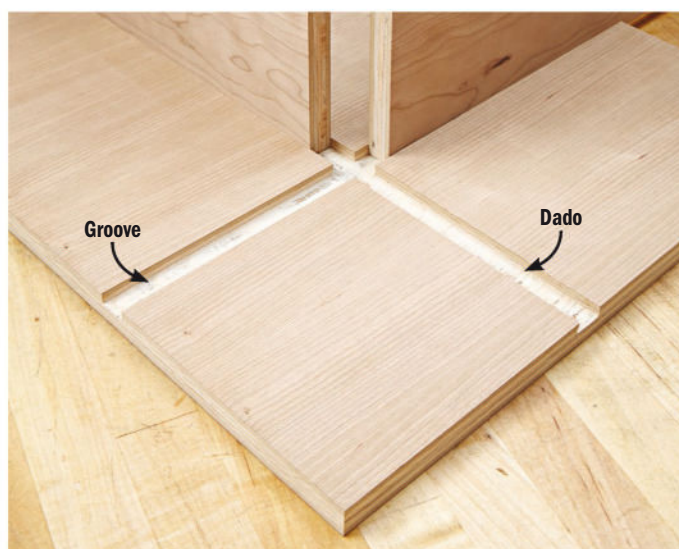


A mortising bit's bearing matches the diameter of the cutter (below). Run the bearing along a guide, such as the dado jig, above, and the cutter removes material exactly in line with the guide.

Add a jig that helps you create mechanical woodworking joints (ones where the wood interlocks), not just glue-and-screw joints, such as those used on the router table and sawhorses. The super-simple two-piece dado jig, *above*, guides a mortising bit, *right*, mounted in a router to plow clean, accurate dados and grooves. You then can fit mating parts (such as a cabinet top, shelf, or divider) into the dado or groove, *below*. Because you only have to buy a router bit, replenish the nest egg with about \$130.

Gradually, and steadily, the nest egg grows, so by paycheck 10 (next issue), it should cover the cost of a tablesaw. Then, as you build jigs for the saw, your woodworking skills will really take off. 🌲

► Watch how this jig and bit work together.
woodmagazine.com/routdados



Dado (DAY-doe): A flat-bottomed channel running across the grain.
Groove: A flat-bottomed channel running with the grain.

Produced by **Craig Ruegsegger** with **Lucas Peters**

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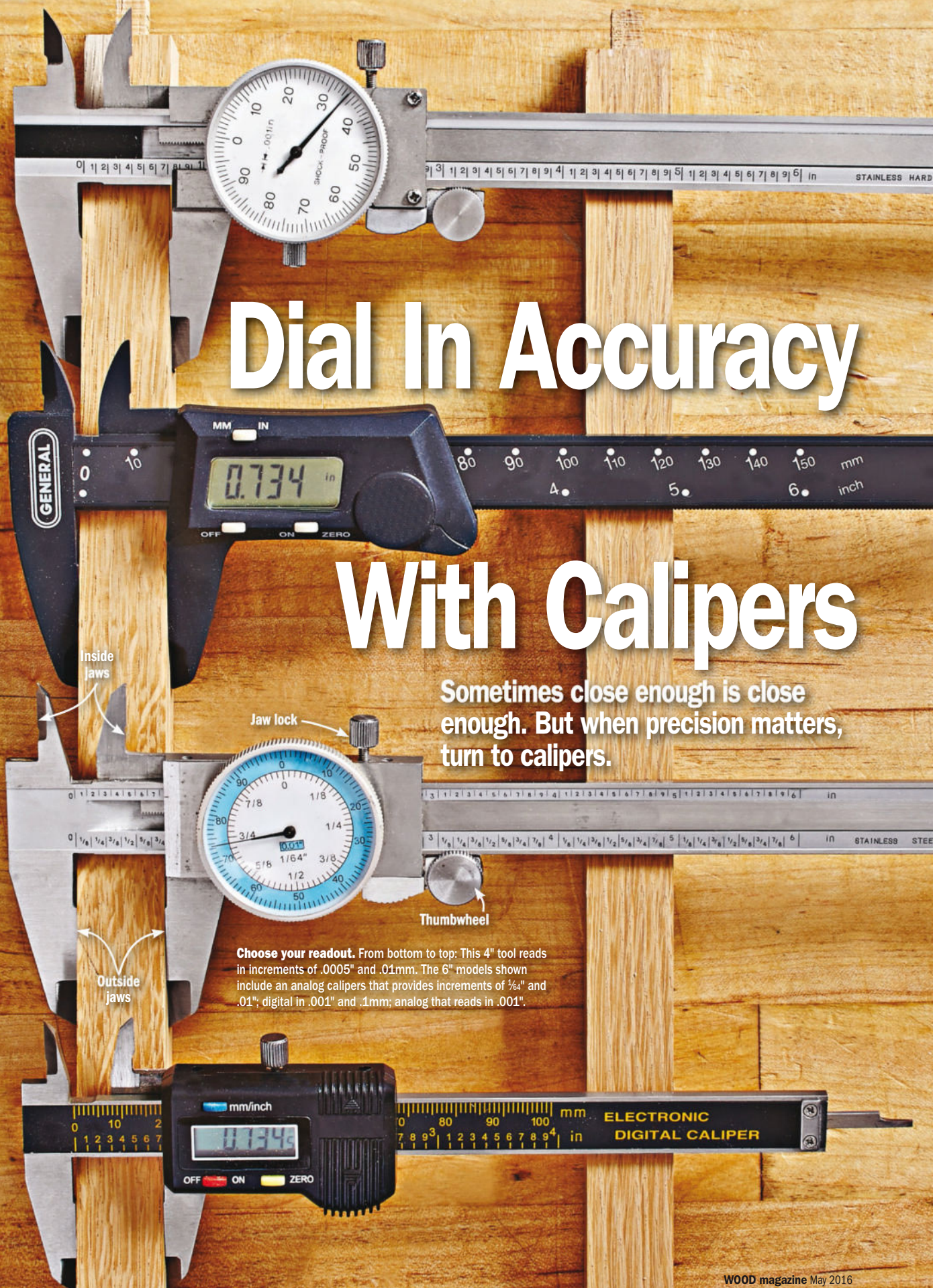


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With Calipers

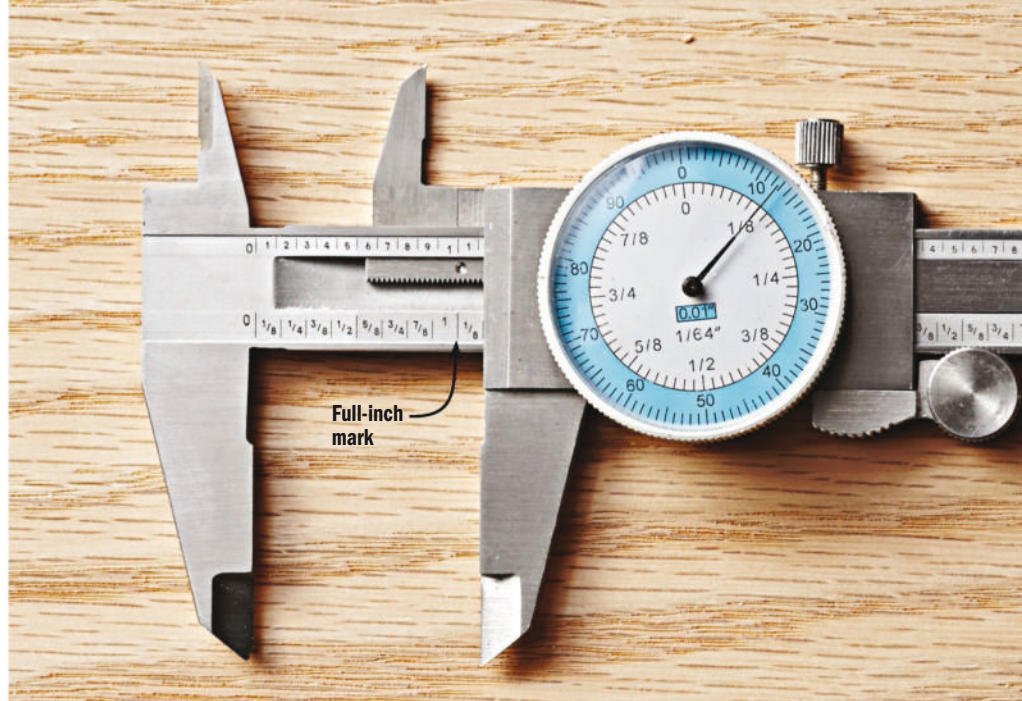
Sometimes close enough is close enough. But when precision matters, turn to calipers.



Choose your readout. From bottom to top: This 4" tool reads in increments of .0005" and .01mm. The 6" models shown include an analog calipers that provides increments of $\frac{1}{64}$ " and .01"; digital in .001" and .1mm; analog that reads in .001".



Depth rod



Know how many inches you have. For measurements over 1", read full-inch increments on the bar, and add the precise fractional measurement shown on the dial. This measurement reads 1 1/8".

Because calipers physically contact the surfaces being gauged, they deliver hair-splitting measurements you can't get from sighting across the markings on a ruler or tape measure. Here's how to choose and use calipers.

Understanding the tool

Typical calipers open a little more than 6", although 3" and 4" models provide enough capacity for most woodworking tasks and stow easier in a shop apron. The display, whether an analog dial or digital LCD read-out, shows measurements in fractional (1/64"), decimal (increments to .001"), and/or metric (.1 or .01mm). Fractional readings are most useful for woodworking, but decimal and metric scales can simplify math. Markings on the bar, *above*, provide quick reference, including whole-inch increments.

On digital calipers, the LCD screen provides a fast and precise read. And you can convert measurements from fractions to metric (and to decimal imperial [.001"] on some models) with the push of a button. On the other hand, analog calipers, which we prefer, allow you to eyeball gradations between marked increments, and never have a dead battery.

Taking a measurement

Whether dial or digital, all calipers work in the same fashion. First, close the jaws. If the display doesn't read zero, adjust the calibration. For a dial model, loosen the bezel clamp screw, if it has one, and rotate the bezel until the zero on the scale aligns with the pointer and retighten the screw. For



A

Measure outside dimension. Close the caliper's jaws gently on each face of the workpiece, and read the measurement on the display.



B

Gauge inside dimension. Hold the calipers perpendicular to the surface, and apply light pressure to the thumbwheel to find the widest span of the hole or opening.



C

Find step distance. Place the flat end of the calipers on one face, and the step contact on the rear of the sliding head on the other surface. To avoid tilting the calipers, press the bar against the shoulder between the surfaces.



D

Determine depth. Rest the end of the calipers on the edge of the hole. Extend the depth rod and take your reading when it touches the bottom of the hole.



E

Lay out lines parallel to an edge or end. Open the jaws the desired dimension and tighten the jaw lock. Place the step contact against the edge of the board and mark along the end of the calipers.

digital versions, simply press the zero reset button.

Before taking measurements, brush the surfaces of the workpiece clean to prevent sawdust or other debris from affecting your reading. Then gently touch the jaws to the workpiece [Photos A-D]. Forcing the jaws or thumbwheel can distort the caliper and throw off the reading. If you want to preserve the

measurement after removing the tool from the workpiece (to compare to another workpiece, for example), tighten the jaw lock to prevent the jaws from moving.

In addition to determining dimensions, calipers serve as a layout tool [Photo E].

While you can spend north of \$100 on calipers, you can find a quality pair suitable for woodworking tasks for \$20–\$40. 🌲

► Left-handed? Search online for left-handed calipers. Most models are digital.

Produced by Mike Berger with Craig Ruegsegger

SKILL BUILDER

What's the difference?

To quickly find the difference between the thickness of two pieces, or the depth of two holes, measure the thinner or shallower of the two first, *below*. Tighten the jaw lock and zero the scale, *inset*. Now, loosen

the lock and measure the thicker or deeper item, *below*. The display shows the difference between the two, *inset*. Fast, accurate, and no math required!



Set scale to 0.



Read the difference ($\frac{3}{32}$ ").

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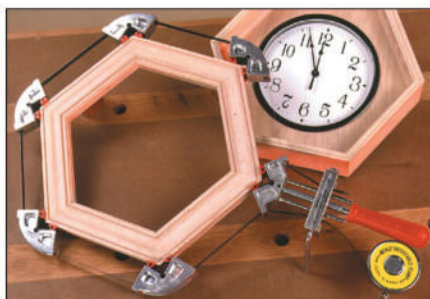
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D I M E N S I O N S
13 1/4" L x 5 3/4" W x 4 1/4" H

60
tons: weight
of an M1 tank

16
wooden
wheels on
this toy

Construct the chassis

1 Begin by cutting the chassis (A) blank to size [Materials List]. Make a copy of the **Chassis Pattern** (page 49) and use it to locate the $\frac{7}{32}$ " holes on one edge of the blank. Then, adhere the pattern to the opposite edge and drill the holes. Bandsaw the chassis to shape,

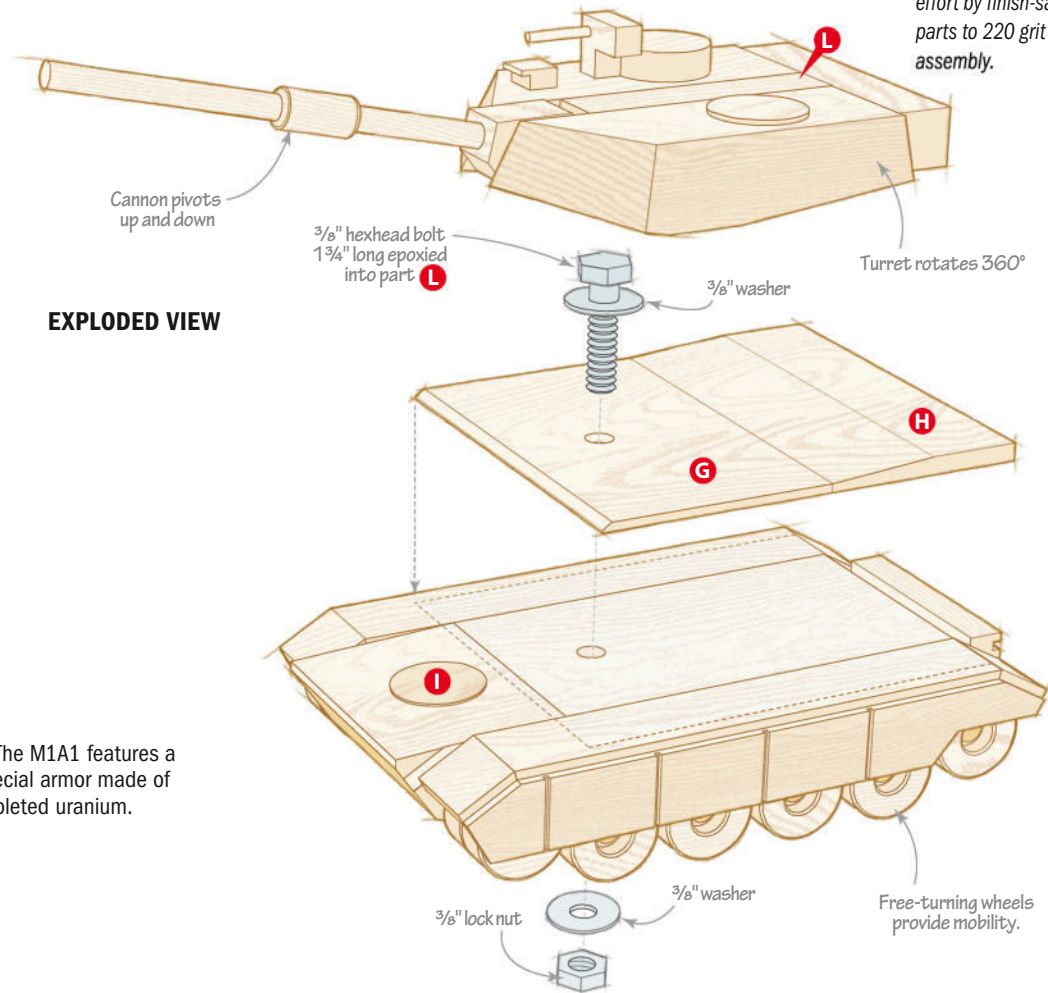
cutting just outside the lines and sanding the cut faces smooth. Bore the centered 1" counterbore and drill the $\frac{3}{8}$ " hole where shown on the pattern.

2 Cut the wheel spacers (B) to size [Drawing 1a], then drill the holes and sand the radii on the ends. Glue the spacers to the sides of

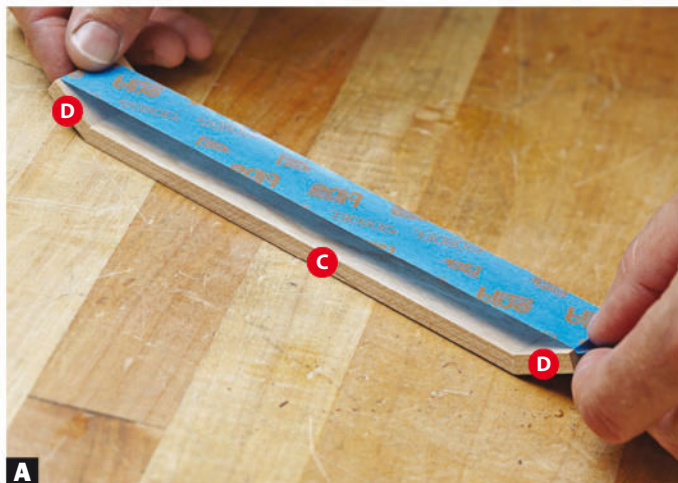
Tip! Learn to apply patterns and remove them.

woodmagazine.com/stickysolutions

Tip! Save time and effort by finish-sanding parts to 220 grit before assembly.



►The M1A1 features a special armor made of depleted uranium.



Use tape to clamp up small parts. Place the fenders (C, D) top-face-up on your workbench with mitered ends touching. Apply painter's tape across the miters, flip the assembly over, and apply glue to the miters. Pull the joints tight with another piece of tape and let dry.

the chassis (A), flush with the bottom and $1\frac{1}{16}$ " from the chassis' back edge [Drawing 1].

3 To make the fenders (C, D), first cut two $\frac{1}{4} \times 1\frac{1}{8} \times 12$ " blanks. Then, tilt your table-saw blade to 15° and miter-cut them to length [Drawing 1b]. Glue up the fenders [Photo A]. After the glue dries, finish-sand the fenders. Attach them to the chassis (A) [Photo B].

4 Cut two track armor blanks (E) to size and adhere them together with double-faced tape, keeping the edges and ends flush. Adhere a copy of the **Track Armor Pattern** (page 49) and cut the dadoes in both pieces. Then, cut the armor to shape. Remove the pattern, separate the two pieces, and set them aside.

5 To safely cut the grooves in the engine grille (F) [Drawing 1], start with a $\frac{1}{2} \times \frac{7}{8} \times 12$ " blank. After cutting the grooves, trim the grille to match the width of the chassis (A). Glue the grille to the chassis, flush with the bottom edge of the top chamfer.

6 Cut the turret base (G) and engine cover (H) to size. Chamfer the front edge of the

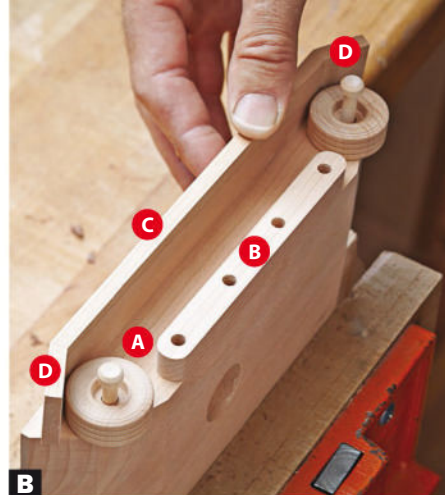
turret base [Drawing 1]. Use a saddle jig on your table saw to bevel the engine cover's front edge. Drill the holes in the back edge of the engine cover [Drawing 1c]. Sand the two parts smooth.

7 Glue the turret base (G) and engine cover (H) to the chassis assembly, centered side to side, with the back edge of the engine cover aligned with the rear fender joint (C/D). After the glue dries, invert the chassis and, using the $\frac{3}{8}$ " hole as a guide, drill a $\frac{3}{8}$ " hole through the turret base.

8 From $1\frac{1}{4}$ " dowel, cut two hatch covers (I) and the commander's hatch (J). Glue one hatch cover centered on the front of the chassis [Drawing 1]. Set the other two pieces aside for now.

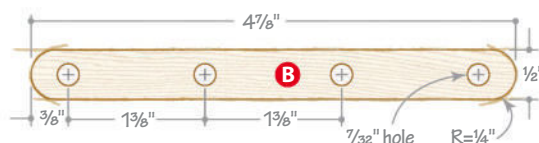
Tip! Learn how to build and use a table saw saddle jig to safely cut bevels.

woodmagazine.com/saddlejigbevels

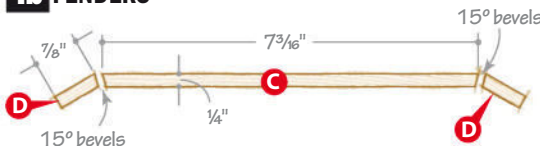


Don't let the wheels rub. Temporarily place wheels in the front and back holes in the chassis (A) before locating the fender assembly (C/D). Center the fenders, keeping them flush with the top of the chassis and away from the wheels.

1a WHEEL SPACER



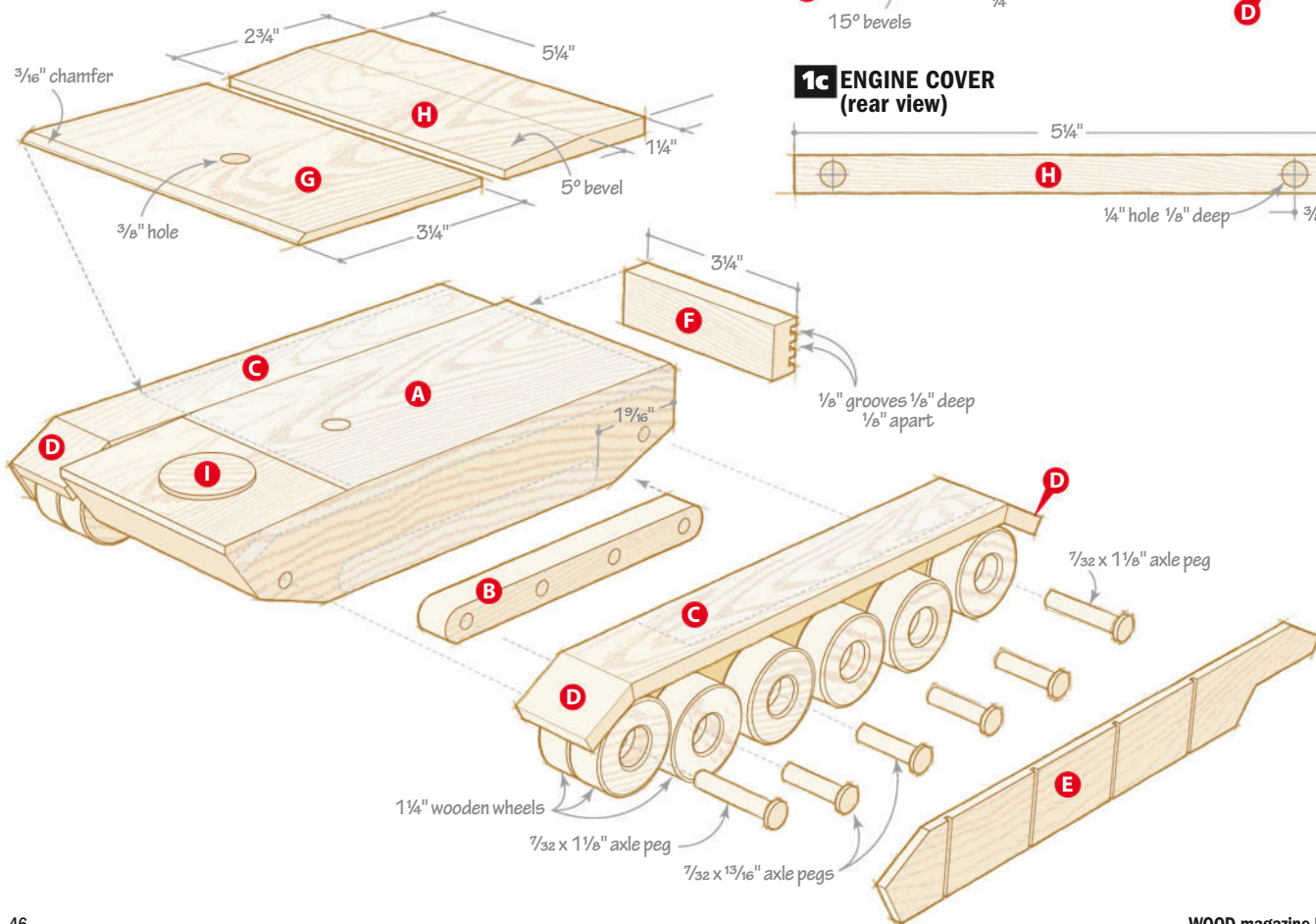
1b FENDERS

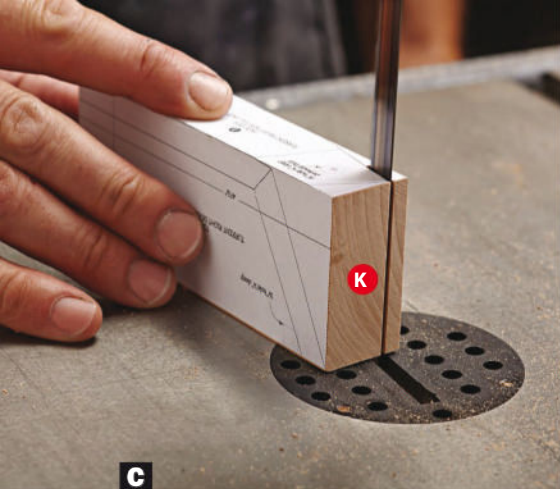


1c ENGINE COVER (rear view)



1 CHASSIS ASSEMBLY

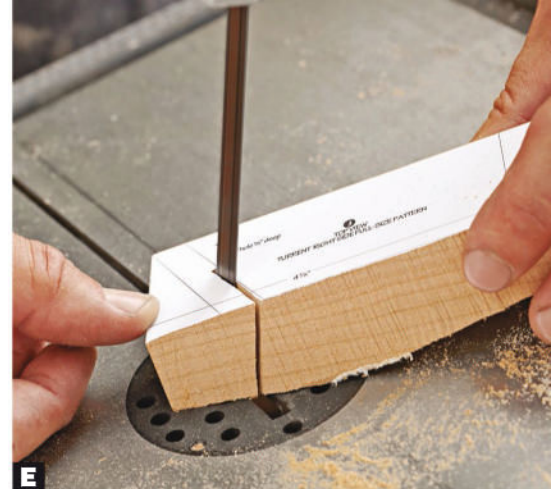




C **Begin on the bottom.** Bandsaw the bevels on the bottom of the turret sides (K), keeping the blade to the outside of the pattern lines. Sand the cut surface to the line.



D **Tilt the table 15°**, then cut along the long edge of the patterns. Keep the flat center portion of the piece resting on the table throughout the cut.



E **Finish the cuts.** Without adjusting the bandsaw's table, crosscut the ends of the turret sides, keeping the bottom front of the workpiece flat against the table.

Tip! Cut the turret sides (K) and core (L) from one blank so the joint lines disappear.

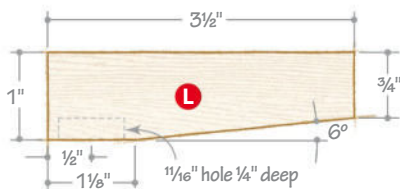
Tack on a turret

1 Cut to size the turret sides (K) and cut the turret core (L) blank $1\frac{1}{8}$ " longer than listed. (Use the cutoff for the cannon base [M].) Apply the right- and left-side **Turret Patterns** to the turret sides, wrapping them over the edges. Drill the $\frac{1}{4}$ " holes and shape the turret sides [Photos C, D, E].

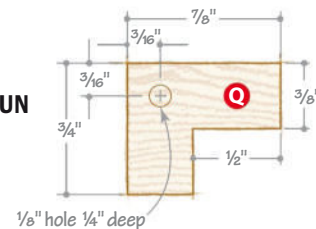
2 Drill the hole in the turret core (L) [Drawing 2a]. Then, with the turret core's bottom face up, hold it between the turret sides (K) [Drawing 2], keeping the back edges flush. Using one of the sides as a guide, mark the bevels on the turret core, then bandsaw and sand to the lines.

► The M1A1 can travel at speeds up to 45 miles per hour, propelled by a 1,500-horsepower gas turbine.

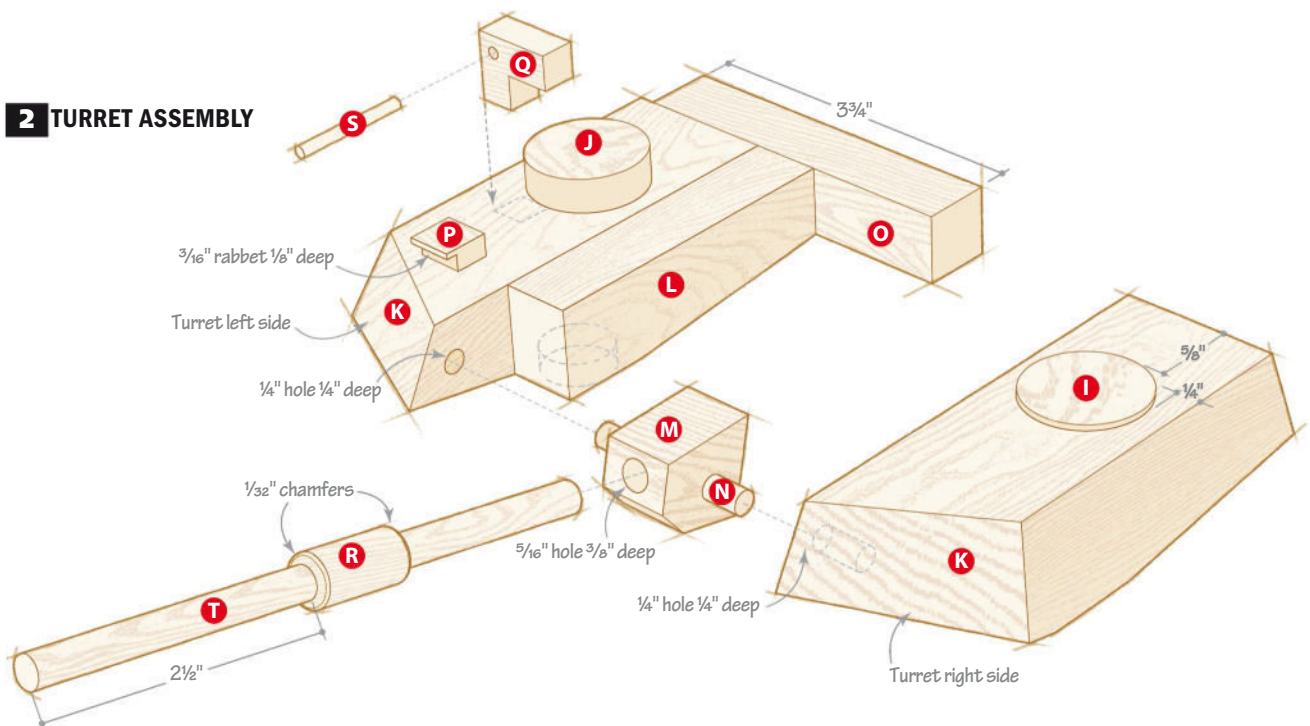
2a TURRET CORE



2b MACHINE-GUN MOUNT



2 TURRET ASSEMBLY





F **Drill holes in small parts safely.** Use a wooden handscrew to hold the cannon base (M) securely when drilling its holes.

►The Abrams's 120mm smoothbore gun has a range of up to two miles.

3 Crosscut the cannon base (M) from the turret core (L). Adhere the **Cannon Base Pattern** to the blank and cut it to shape. Drill the holes where shown [Photo F].

4 From $\frac{1}{4}$ " dowel, cut the cannon pivot (N) to size and insert it into the cannon base (M) [Drawing 2]. Glue up the turret assembly (K-N) [Photo G]. Cut the rear storage (O) to size and glue it to the back of the turret assembly.

5 Invert the turret assembly (K-O) and epoxy the head of a $\frac{3}{8} \times 1\frac{3}{4}$ " hexhead bolt into the turret core's (L) hole. (Trim away any excess epoxy after it cures.) Make sure the protruding bolt shaft is perpendicular to the turret assembly before setting it aside until the epoxy cures.

6 Glue the remaining hatch cover (I) and the commander's hatch (J) to the turret sides (K) [Drawing 2]. Then, cut the periscope (P) and machine-gun mount (Q) to size and shape [Drawing 2b]. Drill the hole in the machine-gun mount, then glue the two pieces in place.

7 From $\frac{1}{2}$ " dowel, cut the fume extractor (R) to length. Holding it in a handscrew, drill a centered $\frac{5}{16}$ " hole through the piece, and chamfer the ends [Drawing 2]. Cut the machine-gun barrel (S) and cannon (T) to length. Glue the machine-gun barrel into the machine-gun mount (Q). Slide the fume extractor over the cannon and carefully glue in place. Glue the cannon assembly (R/T) into the cannon base (M).

8 Attach the wheels by gluing into place the axle pegs [Drawing 1]. Then, glue on the track armor (E). Apply three coats of satin spray lacquer, sanding between coats with 800-grit sandpaper. Bolt the turret assembly to the chassis assembly [Exploded View]. Finally, get this tank off the assembly line and onto the battlefield! 🌳



G **Clamp down on the turret.** Use the bar of a one-handed bar clamp to keep the ends of the turret assembly aligned during glue-up.

Materials List

Part	FINISHED SIZE			Matl.	Qty.
	T	W	L		
A chassis	1½"	3¼"	8¾"	C	1
B wheel spacers	½"	½"	4⅞"	C	2
C side fenders	¼"	1⅞"	7⅞"	C	2
D front/back fenders	¼"	1⅞"	⅞"	C	4
E track armor	⅞"	1"	8½"	M	2
F* engine grille	½"	⅞"	3¼"	M	1
G turret base	¼"	5¼"	3¼"	M	1
H engine cover	⅜"	5¼"	2¾"	M	1
I hatch covers	1¼" diam.	⅞"		C	2
J commander's hatch	1¼" diam.	⅜"		C	1
K turret sides	1"	2"	4⅞"	C	2
L* turret core	1"	¾"	3½"	C	1
M cannon base	1"	¾"	1"	C	1
N cannon pivot	¼" diam.	1⅞"		M	1
O rear storage	¾"	¾"	3¾"	M	1
P periscope	⅜"	½"	½"	M	1
Q machine-gun mount	⅜"	¾"	⅞"	M	1
R fume extractor	½" diam.	1"		M	1
S machine-gun barrel	⅞" diam.	1¼"		M	1
T cannon	⅝" diam.	6"		M	1

*Parts initially cut oversize. See the instructions.

Materials key: C-cherry, M-maple.

Supplies: $\frac{1}{8}$ ", $\frac{1}{4}$ ", $\frac{5}{16}$ ", $\frac{1}{2}$ " maple dowels; $\frac{1}{4}$ " cherry dowel; $\frac{3}{8} \times 1\frac{3}{4}$ " hexhead bolt; $\frac{3}{8}$ " washers (2); $\frac{3}{8}$ " lock nut.

Bits: $\frac{1}{8}$ ", $\frac{1}{4}$ ", $\frac{7}{32}$ ", $\frac{5}{16}$ ", $\frac{3}{8}$ " brad-point bits; $\frac{1}{16}$ ", 1" Forstner drill bits.

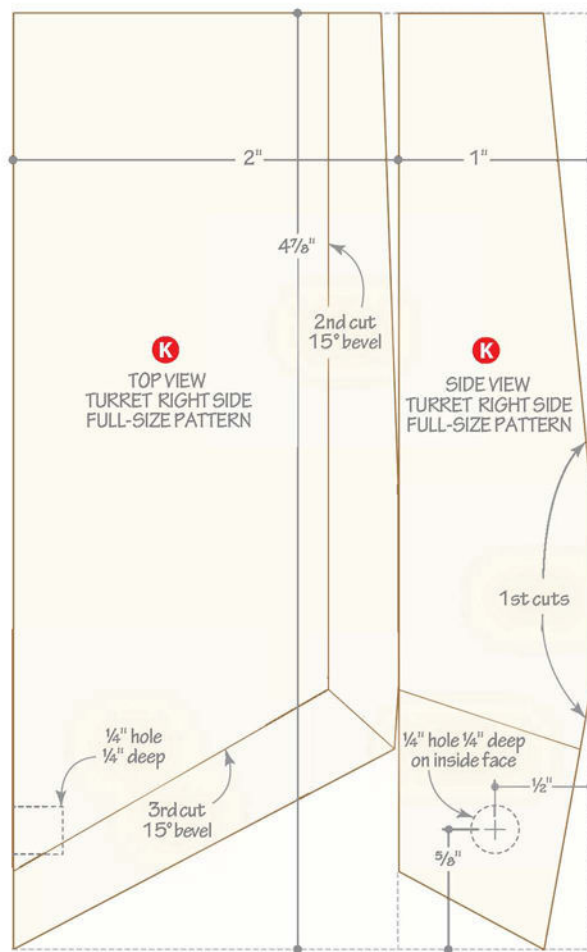
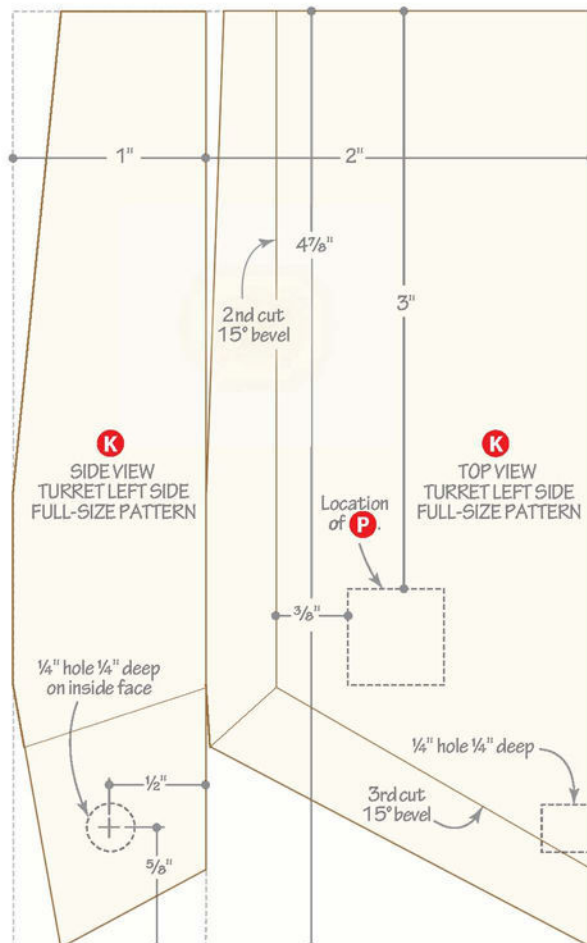
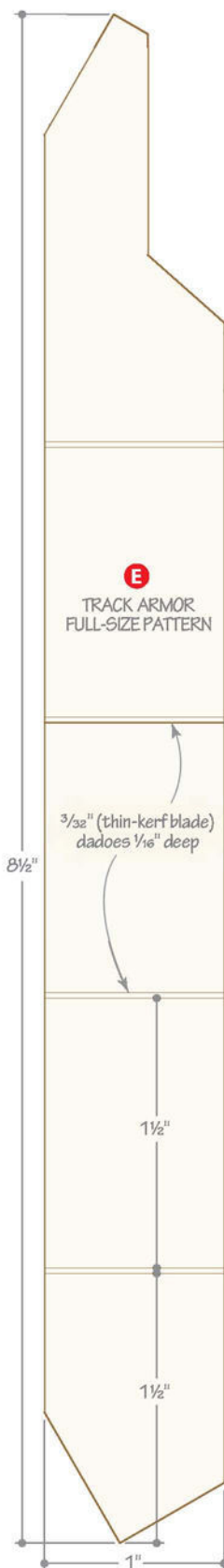
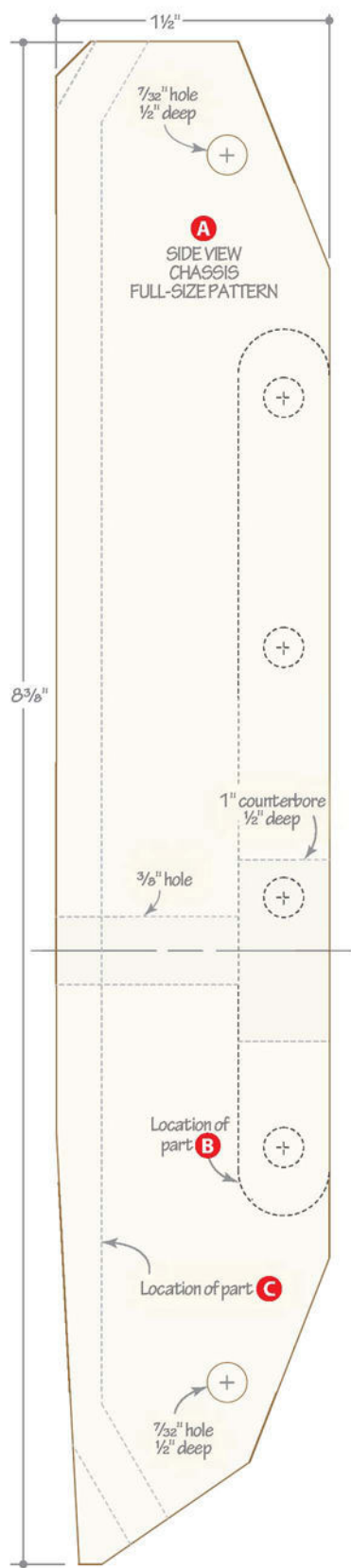
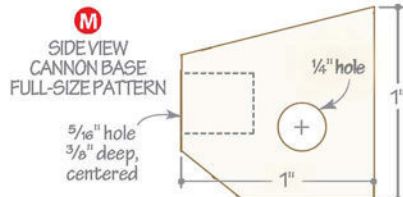
Source: This kit includes the following specialty parts and hardware to construct one tank: 1¼" wheels (16), $\frac{7}{32} \times 1\frac{1}{8}$ " axle pegs (4), and $\frac{7}{32} \times 1\frac{3}{16}$ " axle pegs (8), kit no. RS-01110, \$12.95, 888-636-4478, woodmagazine.com/m1tankkit.

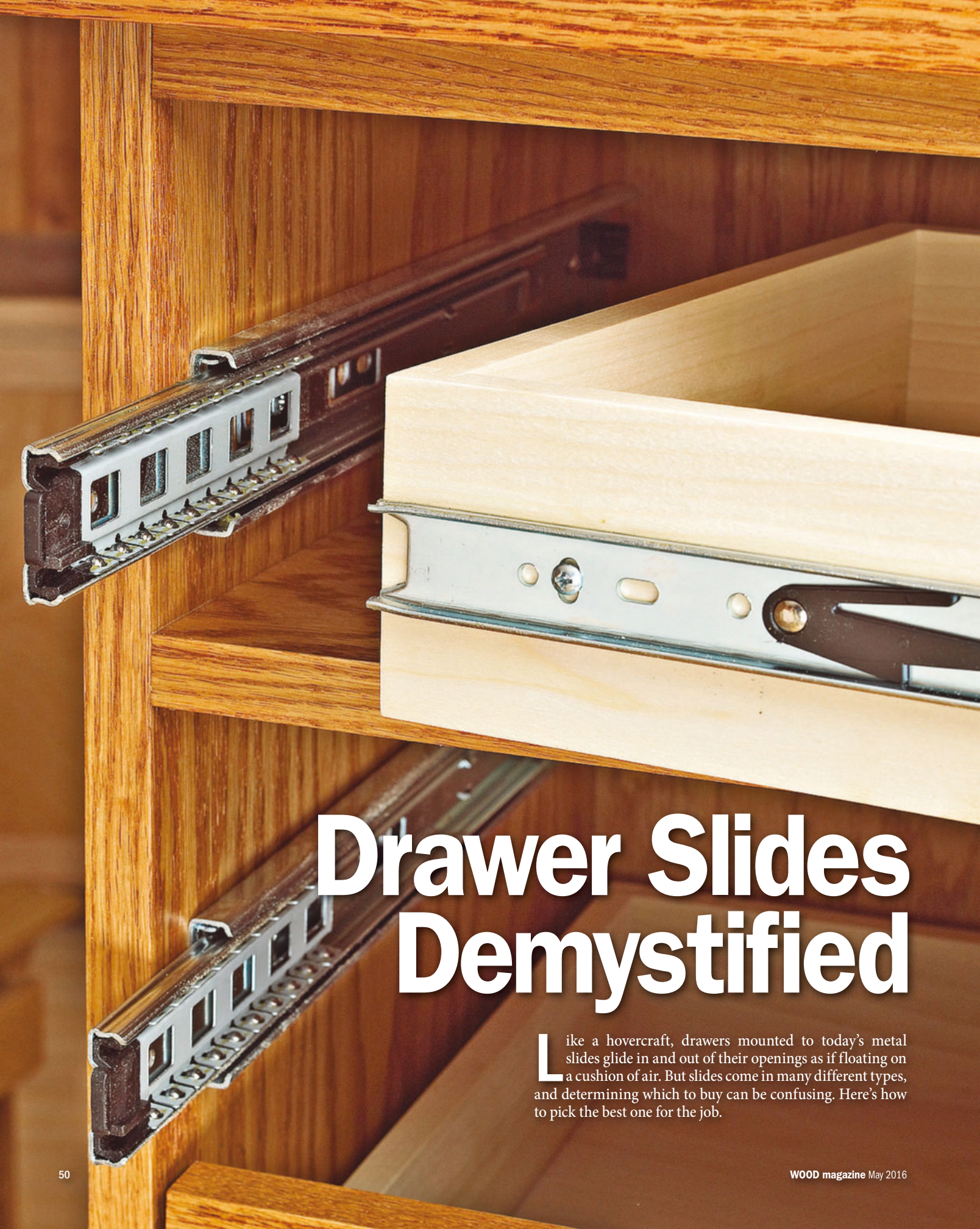


Tip! If the fit between the fume extractor (R) and main cannon (T) is too tight, sand the cannon to achieve a good fit.

Produced by **Nate Granzow** with **Kevin Boyle**
Project design: **Kevin Boyle**
Illustrations: **Roxanne LeMoine**, **Lorna Johnson**

► Download these full-size printable patterns at woodmagazine.com/239patterns





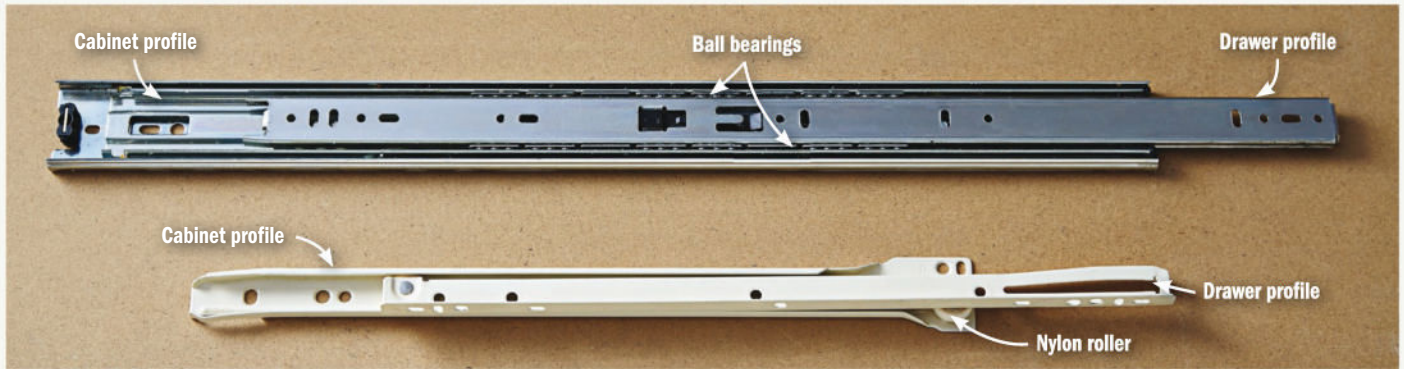
Drawer Slides Demystified

Like a hovercraft, drawers mounted to today's metal slides glide in and out of their openings as if floating on a cushion of air. But slides come in many different types, and determining which to buy can be confusing. Here's how to pick the best one for the job.

What makes up a slide

Drawer slides have two mating pieces. The *drawer profile* attaches to the drawer and slides into or rests on the *cabinet profile*,

which attaches to the cabinet. Ball bearings or nylon rollers allow the parts to move smoothly past each other.



Slides with ball bearings, top, typically carry heavier loads. Sophisticated construction and heavy-duty materials make them more expensive than roller slides, bottom.

To see or not to see

One of the first considerations when choosing a slide is whether you want it visible when the drawer opens. Some visible slides

come in various colors (white, ivory, brown, or black) to help them blend better with light or dark drawer boxes.

VISIBLE SLIDES



Side-mount slides come in pairs and attach to both sides of the drawer and cabinet interior. They're efficient at carrying weight, but don't support the drawer bottom.



Roller slides (also called **European slides**) mount to the bottom edge of each drawer side, so they do not support the drawer bottom. Thin-gauge epoxy-coated metal and nylon wheels limit their weight-carrying capacity. Although not invisible, they are less conspicuous than side-mount slides.

HIDDEN SLIDES



Center-mount slides sell individually and require a face-frame rail or web frame, as shown here, to support the cabinet profile. Light-duty construction limits their weight rating, typically no more than 35 lbs.



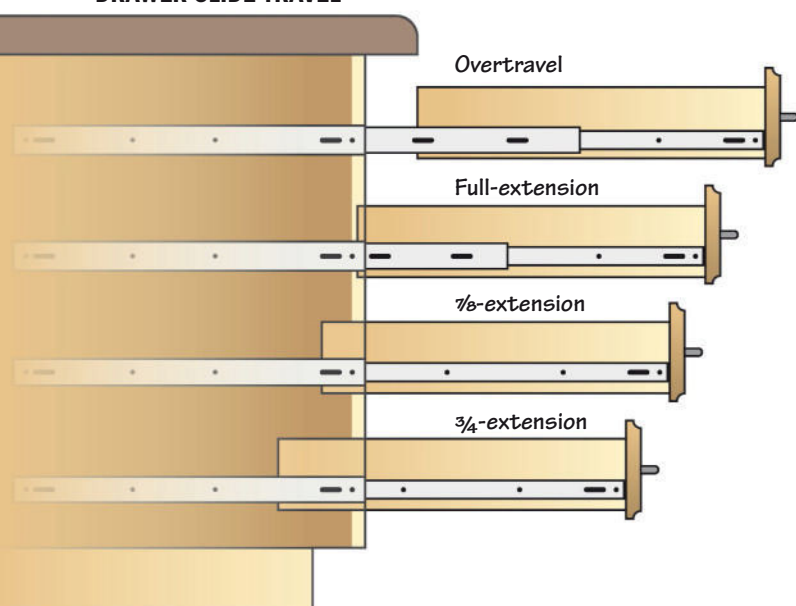
Undermount slides resemble side-mounts, but install on the drawer bottom. They cost more than side-mount slides, and the drawer box must be built to the exact specifications of the slide manufacturer. For example, the slide shown requires $\frac{3}{8}$ "-thick sides, a bottom $\frac{1}{2}$ " above the lower edge of the drawer sides, and $\frac{3}{16}$ " of clearance below the drawer side and the face frame. Also the drawer must match the length of the slide.

Hide that slide

To conceal slides otherwise visible from the front, add a false front to the drawer box, or build a drawer front with a lip wider than the box.



DRAWER-SLIDE TRAVEL



Think about drawer access

Drawer slides further differ by how far they allow a drawer to open.

Overtravel slides utilize a telescoping design that lets the drawer extend beyond the cabinet. Use them when overhanging countertops get in the way of drawer access. Make sure the cabinet location provides room for opening the drawer fully.

Full-extension slides also telescope, allowing the full length of the drawer to clear the cabinet. Choose these when you need easy access to the rear of the drawer, as in a file drawer.

7/8-extension slides allow the drawer to extend 7/8 of its length—a good compromise between 3/4- and full-extension.

3/4-extension slides, as you might guess, allow the drawer to open 3/4 of its length. Choose this type of slide when unblocked access to the entire drawer matters little, or where space limits how far a drawer can extend.

Weigh the weight options

Typical light-duty slides have weight ratings up to 75 lbs, medium-duty up to 100 lbs, and heavy-duty for more than 100 lbs, *right*.

► Weight ratings apply to a pair of slides (if installation requires a pair), so two 100-lb slides cannot handle 200 lbs.

Longer slides have more robust construction than shorter ones of the same rating. For example, an 18" slide rated for 100 lbs will be stouter than a 16" slide with the same rating. A shorter slide has leverage to its advantage.

With decisions made on type, extension, and weight rating, determine the right size slide for the project.



100-lb slides will support 100 lbs, provided the drawer will, and that you screw the slides to hardwood or plywood per the manufacturer's instructions. MDF and other composite materials will not hold screws as well.

Measuring for slides

Taking accurate measurements ensures you buy slides that work in your cabinet. Follow these tips to make sure everything goes smoothly:

Slides come in lengths from 10" to 28". A too-short slide prevents the drawer from opening fully, and one that's too long won't fit in the cabinet. To determine the proper length, measure the interior depth of the cabinet (behind the face frame, if there is one) and choose a slide the next size shorter than that measurement.

Because the thickness of drawer slides and the width of the drawer opening are fixed, best practice is to build the drawer box to fit the difference between the two after assembling the cabinet. For example, most roller slides require $\frac{1}{2}$ " of mounting space on each side. To use these in a 12"-wide drawer opening, build the drawer 11" wide.

For shallow drawers or a pull-out tray, buy a slide no taller than the drawer or tray.

Installation considerations

For frameless cabinets, just screw the cabinet profile to the cabinet side, parallel to the cabinet bottom. On face-frame cabinets, the front of the slide attaches to the face-frame stile, *top* photo. To align and secure the rear of the slide, manufacturers provide brackets and standoffs that fasten to either the side or back of the cabinet. You can also create your own standoffs from wood scraps.

Use the exact type of screw called for or provided by the manufacturer, as screw-heads that stand too proud can prevent slides from moving smoothly. Many slides come with multiple holes and slots to allow fine-tuning drawer position and accommodate a variety of mounting options, *middle* photo. Also, *handed* slides must mount on a specific side, *bottom* photo; *unhanded* slides mount on either side.

Now that you know the options, simply consider all installation requirements and pick a slide that best suits the project. 🌲

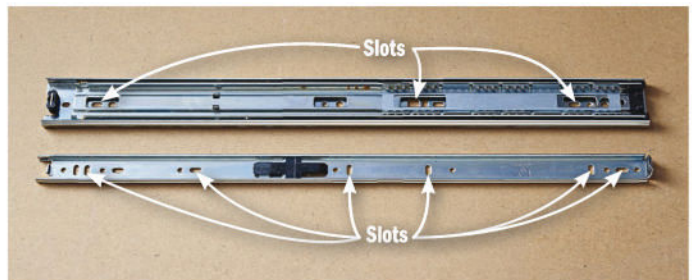
Produced by **Craig Ruegsegger** with **Mike Berger**
Illustration: **Tim Cahill**

► Learn more about cabinetmaking with these videos and articles.
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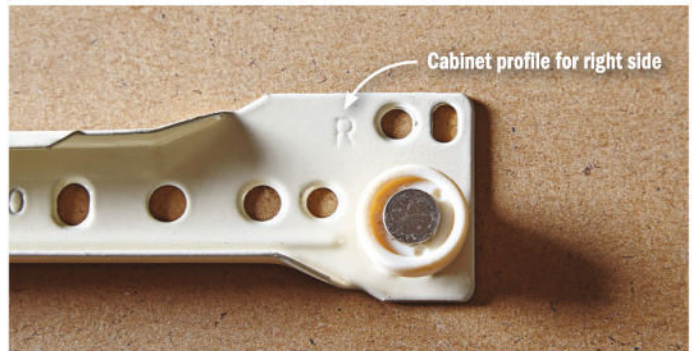
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Secure the front of the slide to the face frame. The bracket at the rear slides to reach the back of the cabinet. This requires a stretcher or cabinet back at least $\frac{1}{2}$ " thick.



Screw slots allow for adjusting drawer position in, out, up, and down. With the drawer properly positioned, drive screws into the holes to lock the slide in place.



Know right from left. Slides that must be installed on a specific cabinet side (viewed from the front of the cabinet) have that designation stamped on them.

Some fancy functions

Manufacturers provide several options to add a touch of luxury to a drawer slide's operation.

Soft-close slides slow the drawer as it closes, ensuring that it doesn't slam.

Self-closing slides take the concept further and pull the drawer closed with just a gentle press on the drawer front.

Touch-release slides do the opposite—with a touch, the drawer pops open; useful for sleek cabinets without pulls.

Progressive movement slides provide a smooth glide because all segments move simultaneously, instead of having one segment reach the end of its travel before it begins pulling the next along.

Detent and locking slides hold in a set position until pushed, preventing unintended movement—ideal for small appliance stands or cutting boards.

See-inside Birdhouse

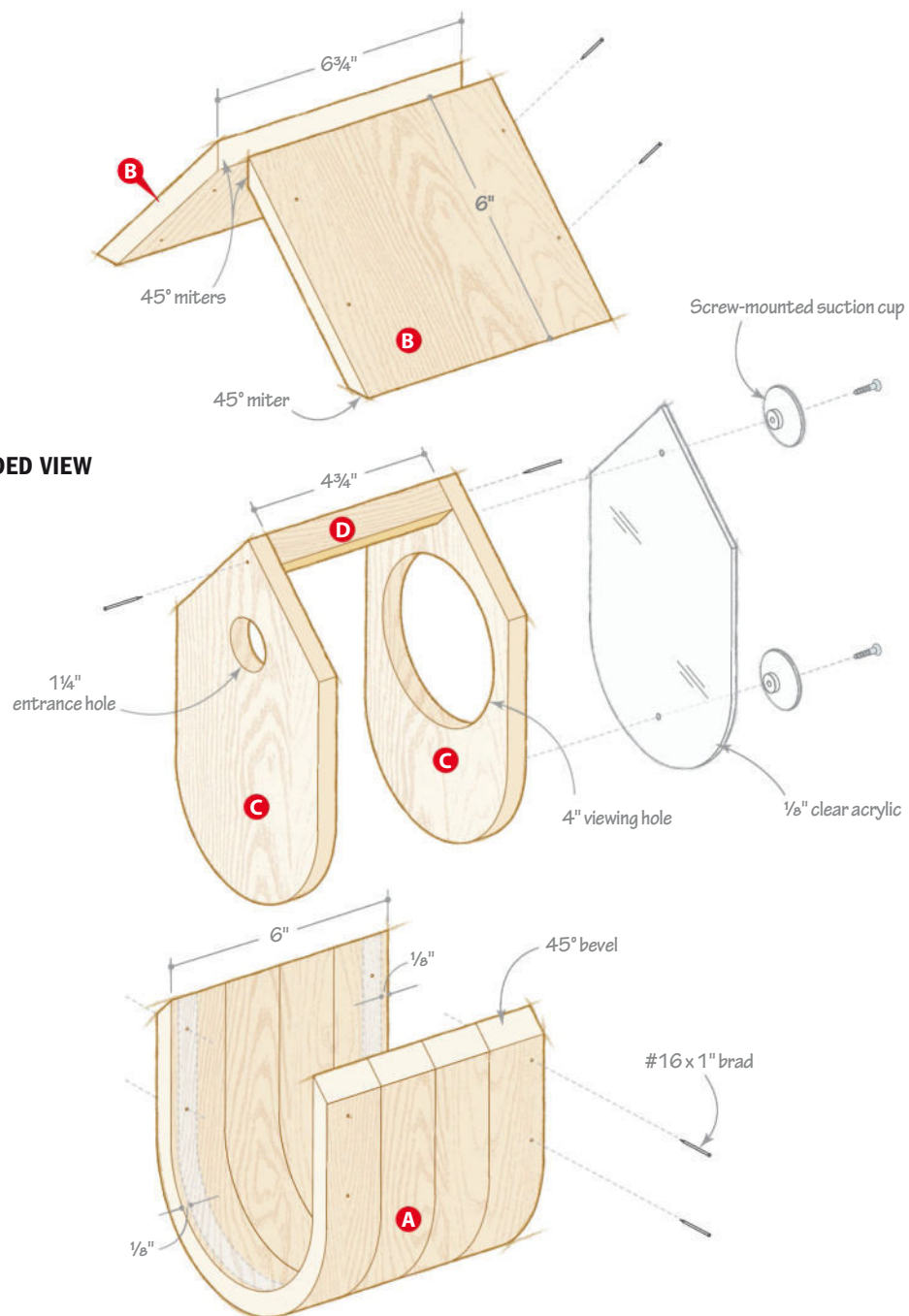


A great project to share with a young woodworker, this simple bird abode makes it possible to experience the wonder of nature from the comfort of your home. Just stick it to a window and wait for feathered friends to arrive.

DIMENSIONS
9 3/4" L x 8 1/2" W x 6 3/4" D

Only
7
pieces
to make

EXPLODED VIEW

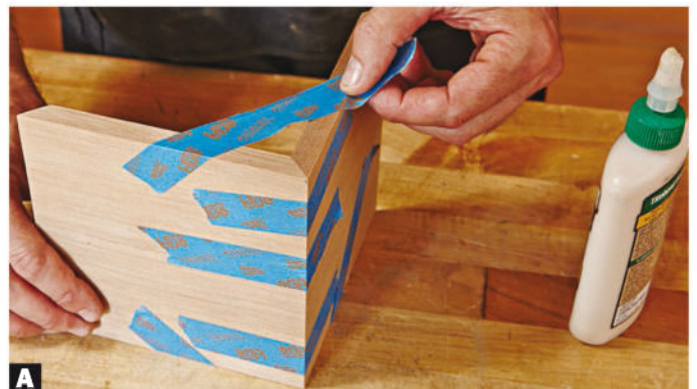


Note: If you must joint the body (A) layers thinner than 1 1/2", that's okay. It's not going to affect the bird's lifestyle or the look of the birdhouse.

1 Begin by cutting four 1 1/2"-thick, 7"-square blanks for the body (A). Joint the faces to ensure they're flat; any inconsistencies will produce unsightly gaps between layers. Glue the four blanks together face-to-face and let dry.

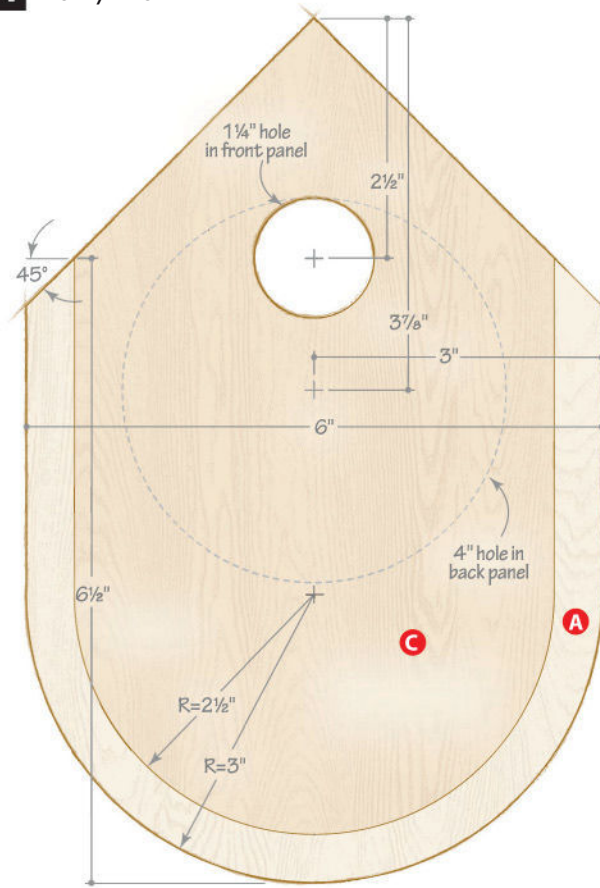
2 Lay out the body or adhere a copy of the pattern (page 56) to the face of the body glue-up. Bandsaw it to shape and sand to the line. We found a tall spindle sander (or sanding drum mounted in a drill press) worked best for this.

3 Next, miter-cut the roof panels (B) [Exploded View] and glue them together [Photo A].



A **Wrap the roof.** Keep the miter joint between the roof panels (B) tight during glue-up by using painter's tape to pull the parts together.

1 FRONT/BACK DETAIL



Note: Keep the paper or clear film on the acrylic panel until after you've finished cutting it to shape. This helps reduce the likelihood of chipped edges or scratches.

4 Cut two blanks an inch oversize in each direction for the front and back (C). Transfer the shape of the body interior to the pieces [Photo B]. Cut and sand the panels to shape, then trace the back onto clear acrylic. Cut the acrylic to shape with a bandsaw, jigsaw, or scrollsaw equipped with a minimum 24 teeth-per-inch blade, and set it aside.

5 Drill the hole in the front panel (C) and scrollsaw or jigsaw the viewing window in the back panel (C) (not the acrylic) [Exploded View].

6 Glue and nail the front and back (C) into the body (A), set 1/8 inch from the edge. Cut



Pencil it in. After tracing the interior onto one panel, flip the roof and body over for the opposite panel, as the two sides may be slightly different. Mark them as front or back to keep track.

the center support (D) to fit snug between the front and back, and glue and nail it in place [Exploded View]. Apply glue to the top ends of the body, clamp the roof in place, and drive nails.

7 Drill holes in the acrylic for the suction-cup screws. Then secure the acrylic by screwing the suction cups into the back panel (C). Now your birdhouse is ready for new residents! 🌿

Produced by **Nate Granzow** with **Kevin Boyle**
Project design: **John Olson**
Illustrations: **Roxanne LeMoine; Lorna Johnson**

► Learn woodworking do's and don'ts for birdie health.
woodmagazine.com/birdhouseguide

Materials List

Part	FINISHED SIZE			Matl.	Qty.
	T	W	L		
A* body	6"	6"	6 1/2"	LC	1
B roof	1/2"	6 3/4"	6"	C	2
C* front/back	1/2"	5"	8 1/2"	C	2
D center support	3/4"	3/4"	4 3/4"	C	1

*Parts initially cut oversize. See the instructions.

Materials key: C-cedar, LC-laminated cedar

Supplies: 1/8"-thick clear acrylic at least 6x9", screw-mounted suction cups (2), #16x1" brads.

Bits: 1/4" Forstner drill bit.



Next Wave
Automation

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160958

8" Jointers

These beefy machines true up boards quickly and accurately.

An old adage among chefs says “Never pass up an opportunity to add flavor.” In woodworking, we say never pass up an opportunity to add capacity and power. So when buying a jointer for your shop, we strongly suggest considering a model with an 8"-wide cutterhead. With one of these machines, you'll no longer have to rip boards between 6" and 8" to narrower pieces, face-joint them, and then glue them back together after planing to thickness.

For this cutterhead-to-cutterhead comparison, we tested six 8" jointers: two with traditional straight-knife heads, and the others with helical heads (a spiral arrangement of square carbide cutters), as shown *next page*. We expected good things from machines of this caliber and price range, and we were not disappointed. In this test, though, it was the little things that made the difference between the good and the great.

The cutterhead makes the machine

Cutterheads with straight knives have changed little, in terms of design, in the past half-century. But helical cutterheads have evolved greatly since they became available

6" or 8": Which is right for you?

Reasons to get a 6" model (\$450–\$1,500)

- ▶ If your budget is tight, you can get a 6" jointer for about 30–50 percent less than the price of an 8" model. In that situation, a 6" jointer is better than no jointer at all.
- ▶ If your shop is not wired for a 220-volt outlet (necessary for an 8" machine), get a 6" jointer (all of which run on 110 volts).
- ▶ The narrower cutterhead means you'll spend 20–40 percent less when replacing a full set of knives or carbide inserts, compared to an 8" machine.
- ▶ A typical 6" jointer requires a smaller footprint, critical if space is tight in your shop.

Making the case for an 8" model (\$850–\$3,000)

- ▶ Get an 8" jointer if you want the capability to face-joint boards up to 8" wide.
- ▶ With infeed and outfeed tables each measuring 10–18" longer than those on a typical 6" model, an 8" jointer helps you more accurately joint longer workpieces without adding support.
- ▶ The 2- and 3-hp motors deliver more power to the cutterhead, letting you remove more material per pass, when needed.
- ▶ If your shop is wired for 220 volts, an 8" jointer will draw fewer amps than a 110-volt motor, extending the life of the motor.



STRAIGHT-KNIFE CUTTERHEAD



Straight-knife cutterheads tend to leave ripples or scallops across a board's width. You can reduce this effect on a straight-knife machine simply by slowing your feed rate.

CARBIDE-INSERT HELICAL CUTTERHEAD

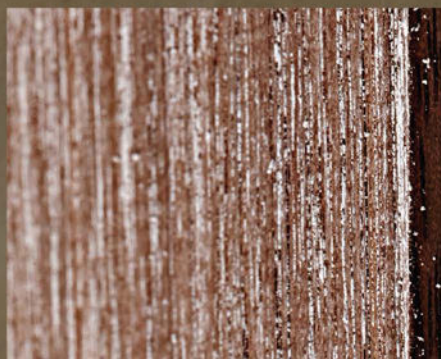


Helical cutterheads leave shallow, linear grooves along the length of boards. These sand out easily enough with a power sander. A slower rate on a helical machine makes little difference on its cut pattern.

to the home woodworker in the past dozen or so years. In general, helical cutterheads add about a \$300–\$400 upcharge to similar 6" and 8" jointers with straight-knife heads. (You also can replace the straight-knife cutterhead on an older machine with a helical head for about that same upcharge.)

The helical-head machines we tested provide several advantages over machines with straight knives:

► **Significantly lower noise levels.** The Laguna MJOIN8012-0130 measured the quietest at 82 decibels, while the General International 80-200L and Grizzly G0656W straight-knife



▶ A garbage disposal measures about 80 decibels; 90 decibels is louder than a lawn mower.

machines peaked at 94 decibels. (See the chart on *page 62* for model comparisons.)

▶ **Four-edge carbide cutters stay sharp** far longer than high-speed-steel knives, saving you downtime and sharpening costs.

▶ **Easy cutter changes.** Simply loosen a cutter's single screw, rotate it to expose a sharp edge, and retighten. The self-indexing cutters ensure perfect alignment.

▶ **Remedy a nicked cutter edge** by rotating only the damaged cutters, giving you a clean cut once again across the head.

▶ **Tear-out-free cuts,** thanks to the position and cutting action of a helical head's inserts. That's especially beneficial when working with (pricey) figured wood.

▶ **The narrow cutters make small chips.** Long ribbons or shavings from straight knives (especially prevalent on softwoods) can sometimes clog up dust collectors or ductwork.

▶ Setting straight knives accurately can prove fussy and frustrating. Learn a sure-fire method that alleviates the stress and gets you back to work quicker (*page 64*).

Power depends on the motor—and the cutterhead

The Shop Fox W1741SW and both Grizzly jointers have 3-hp motors, while the other models are rated at 2 hp. Despite having lower-rated motors, the Jet JJ-8HH and General

International powered through 1/8"-deep cuts without bogging down. The Grizzly G0656XW, Laguna, and Shop Fox (all with helical heads) pulled down slightly while face-jointing the same 8"-wide hard maple, but if you seldom remove more than 1/32"—as we do—you won't have a power issue with any of the machines. We tested these jointers on a 220-volt, 20-amp circuit without any trips; if your breaker is rated lower than that, you might need to upgrade it or buy a machine based on its amp draw. See the chart on *page 62*.

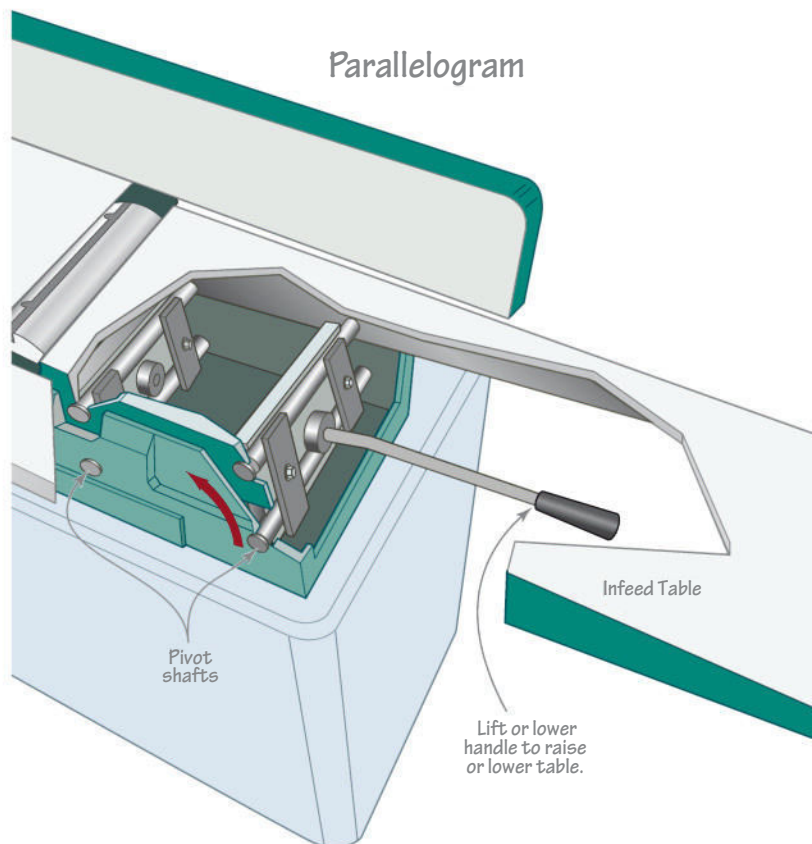
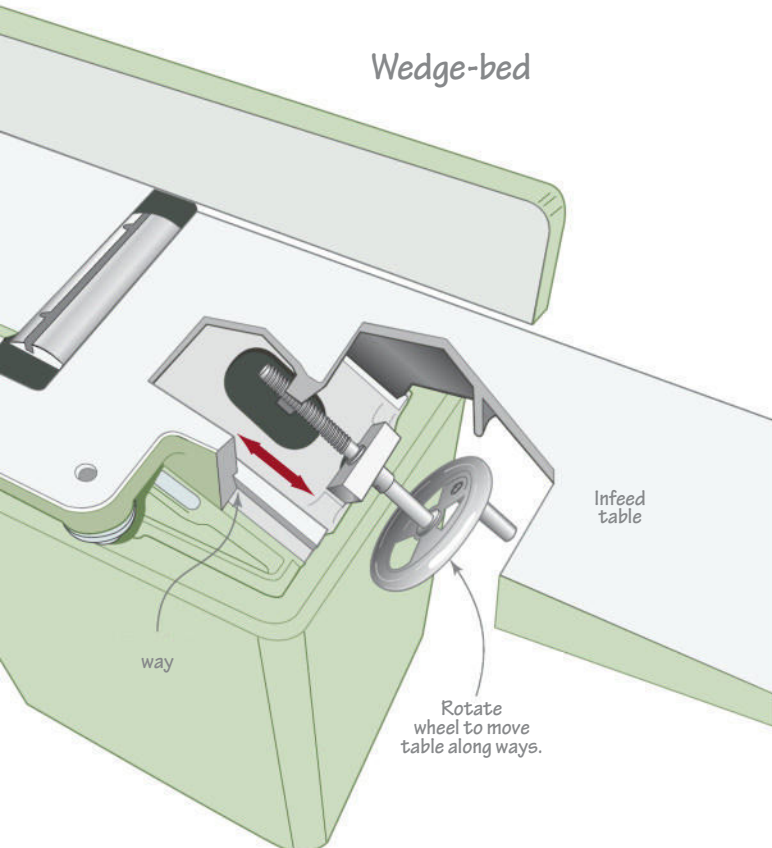
Tables provide critical support and control snipe

The longer the jointer bed, the longer boards you can joint—about twice the bed length, as a rule of thumb. The Shop Fox has the longest bed and infeed table (43½"), with just a 31" outfeed table. That longer infeed table proved valuable for supporting workpieces with irregular faces or edges. The 32¾" tables on the Jet left us wanting more.

When it comes to setting table height, the General International, Jet, Laguna, and Shop Fox machines make it easiest. They all have handwheels (or levers, on the Shop Fox) and

▶ The "bed" of a jointer includes both the infeed and outfeed tables.

Jointer table adjustment mechanisms



► Backlash is a lack of table movement when reversing handwheel rotation.

► Learn how to true up tables on a wedge-bed jointer.
woodmagazine.com/jointertables

locks located on the front or sides of the machines, so you don't have to reach behind to adjust or lock the tables. Backlash in the handwheel mechanisms on both Grizzly jointers made it difficult to completely eliminate snipe on these machines, although we did get it to about .001", which sanded out with a power sander. All machines but the General International have an easy-to-read depth-of-cut scale.

The Shop Fox is also the only tested jointer with parallelogram tables. (See the illustrations *previous page*.) Unlike the wedge-bed tables found on the other machines that move up and down on dovetailed ways, the parallelogram tables hinge on two parallel plates. Should the tables get out of coplanar alignment, you can recalibrate them more easily with a parallelogram system. This upgrade typically costs \$150–\$300 more than a comparable wedge-bed jointer.

Fences should be tall and free

Free-moving, that is. We like the 5"-tall fences on the Grizzly and Shop Fox jointers for the extra workpiece support when edge-jointing. And we like those that move easily across the tables. The General International and both Grizzly machines have rack-and-pinion adjusters that move the fences

smoothly. The other three slide manually on a keyway; the Jet and Laguna glide smoothly, but not the Shop Fox.

All of the fences tilt 45° forward and back, with stops for each and another at 90°. All but one worked reliably. General International's 90° flip-stop wiggled too much to rely on it for accuracy; we set the fence using a trusted square instead.

More factors to consider when making a buying decision

► **Power switches.** The pedestal-mounted switches on the Grizzly and Shop Fox machines proved easiest to reach. Laguna's switch sits at the end of the fence just above table level, a good-enough spot. But we wish Jet and General International could better locate their switches (shown *below*).

► **Mobile bases.** Both Grizzlys and the Shop Fox have a built-in "tricycle" base. They work great on smooth floors, but even slight irregularities made the kick-style pivoting caster on all three drop and bring the jointer to an abrupt halt. Laguna's four non-swiveling casters move the machine well enough, but you have to slide it sideways to steer; you secure it in place by hand-tightening locks against two of the casters.

► Need a mobile base for your jointer or other heavy machine? We like Portamate's newest heavy-duty model (reviewed on *page 78*).



Jet's switch sits behind the fence, making the off paddle awkward to reach in an emergency. You can also mount the switch to the cabinet below, but it's equally awkward.



General International's switch mounts below the infed table, and cannot be easily reached if you're working nearer the outfeed table.

Laguna MJOIN8012-0130, \$2,000



Shop Fox W1741SW, \$1,700



8" Jointers: Big Capacity, Big Power, Years of Dependability

MODEL	PERFORMANCE RATINGS (1)									MOTOR		TYPE OF CUTTERHEAD (2)	DIMENSIONS, INCHES			
	PRIMARY				SECONDARY								OVERALL H L D		TABLES	
	POWER	CUT QUALITY	EASE OF CHANGING/ADJUSTING CUTTERS/KNIVES	EASE OF ELIMINATING SNIPE	EASE OF ADJUSTING TABLE HEIGHT	EASE OF ADJUSTING FENCE	ACCURACY OF BEVEL STOPS	EASE OF USING POWER SWITCH	CHIP-COLLECTION EFFECTIVENESS	RATED HORSEPOWER	MAXIMUM AMPS MEASURED AT 1/8" CUT				INFEED TABLE LENGTH	OUTFEED TABLE LENGTH
GENERAL INTERNATIONAL 80-200L	A	A-	B+	A	A-	A	C	B	A-	2	16.5	3	38 74% 26¼	36½	36½	
GRIZZLY G0656W	A	B+	B+	B	A-	A	A-	A	A-	3	11.2	4	47¼ 72½ 24¼	35	35	
GRIZZLY G0656XW	A-	B+	A-	B	A-	A	A-	A	A	3	13.5	C (40)	47¼ 72½ 24¼	35	35	
JET JJ-8HH	A	A	A	A	A	A-	A	B	A	2	18.5	C (36)	37 67¼ 24½	32¾	32½	
LAGUNA MJOIN8012-0130	A-	A	A	A	A-	A-	A	A	A	2	17.5	C (54)	32 75 25	36¾	36%	
SHOP FOX W1741SW	A-	A	A-	A	A	B	A	A	A	3	14	C (40)	45½ 76½ 24	43½	31	

Notes:

- A Excellent
 B Good
 C Fair
- (3) Three high-speed-steel straight knives
 (4) Four high-speed-steel straight knives
 (C) Carbide inserts in a helical configuration, followed by the total number of inserts.

Grizzly G0656W, \$845



Choosing a pair of winners

All six of these machines performed well enough that you'd be happy with any of them. But the longer tables on the Laguna MJOIN8012-0130 and Shop Fox W1741SW put them a nose ahead of the pack. So Laguna and Shop Fox share Top Tool honors. The straight-knife Grizzly G0656W, a good performer at well below \$1,000, earns the Top Value award. 🌲

Produced by Bob Hunter with Bob Baker
Illustration by Tim Cahill

► If you plan to have one of these jointers delivered to your home, be aware that some freight companies will only deliver to your driveway (rather than to your shop door). Discuss options with the seller and shipper before committing if you're not equipped to move a 400-plus-pound crate.

FENCE											CONTACT INFORMATION
HEIGHT	LENGTH, INCHES	BEVEL STOPS, DEGREES	FRONT-TO-REAR ADJUSTMENT TYPE (3)	NOISE LEVEL, DECIBELS (4)	WEIGHT, LBS	CORD LENGTH	WARRANTY, YEARS	COUNTRY OF ASSEMBLY (5)	SELLING PRICE (6)	CUTTER REPLACEMENT COST	
4	38	45, 90, 135	R	94	572	5'8"	2	T	\$2,100	\$82	888-949-1161; general.ca
5	34½	45, 90, 135	R	94	465	8'	1	C	\$845	\$53	800-523-4777; grizzly.com
5	34½	45, 90, 135	R	87	465	8'	1	C	\$1,275	\$70/10 pack	
4	38½	45, 90, 135	K	89	411	6'2"	5	T	\$1,940	\$55/10 pack	800-274-6848; jettools.com
4¾	38	45, 90, 135	K	82	510	6'2"	1	T	\$2,000	\$60/10 pack	800-234-1976; lagunatools.com
5	36	45, 90, 135	K	90	510	7'	2	C	\$1,700	\$100/10 pack	800-840-8420; shopfox.biz

3. (K) Keyway slide
(R) Rack & pinion gear

4. Measured while face-jointing
8"-wide hard maple at ½" depth.

5. (C) China
(T) Taiwan

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

Setting Jointer Knives

Follow this no-fuss, low-tech method for perfect results every time.

Like cleaning your home's gutters or giving the dog a bath, changing jointer knives can be a chore you keep putting off (maybe even hoping someone else will do

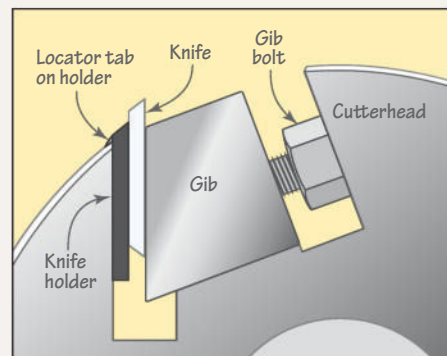
it). But these knives need periodic resharpening to ensure clean cuts and prevent strain on your jointer's motor. Here's how to make the job quick and easy.

continued on page 66

Never sharpen or adjust jointer knives again—for a price

Bypass sharpening and resetting jointer knives by replacing them with Dispozablade Self-Set knives. These disposable knives have two edges (just like those on a benchtop planer). The knives register to pins on a magnetic metal holder that rests in the cutterhead channel on locator tabs, as shown *right*. You

secure the knife and holder in place with the jointer's gibs. A starter set for a 6" jointer with three-knife cutterhead costs \$239; replacement knives are \$28 for a three-pack. Costs increase for wider jointers and those with four knives. Learn more at dispozablade.com, or call 800-557-8092.



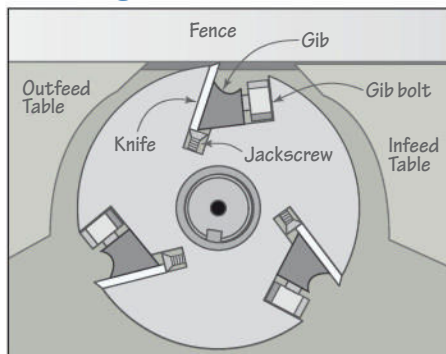


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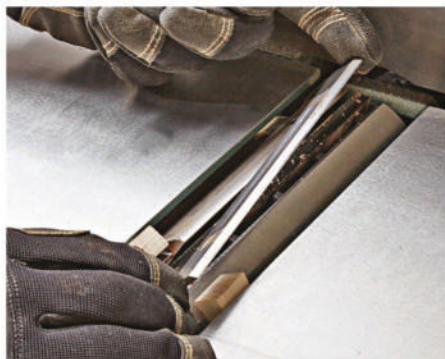
Anatomy of a straight-knife cutterhead



Remove the dull knives

1. Unplug the machine, remove the cutterhead guard, and move the fence clear of the knives. Lower the infeed table $\frac{1}{8}$ " or so, but *do not lower the outfeed table*; it serves as the point of reference for installing the sharp knives. To keep the cutterhead from rotating, lightly tap a pair of small wedges between the cutterhead and each table, as shown.

Tip! To avoid cutting your hand on a knife—when a wrench slips off a gib bolt, for example—wear protective gloves.



2. Loosen the gib bolts, then remove the knife and gib. If you'll remove all knives to sharpen and replace later, remove the jackscrews (or springs, if so equipped) too, so they don't fall into the machine when you rotate the head to access the next knife. If you're installing a backup set of knives, leave the jackscrews in place and simply install a new knife on top of them.

Tip! Keep a second set of sharpened knives on hand to avoid jointer downtime.



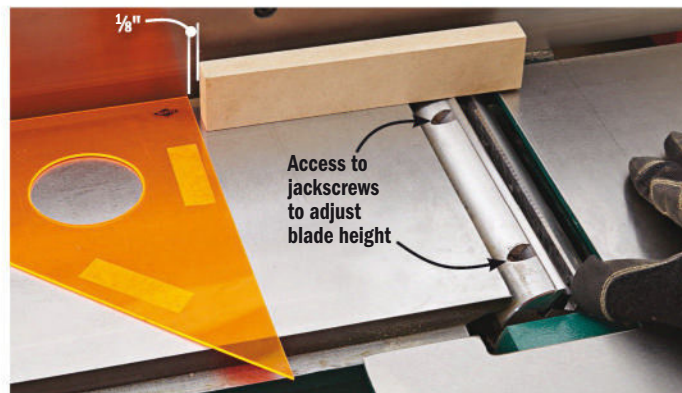
3. Clean the knife, gib, and knife slot using a wire brush and mineral spirits or lacquer thinner. Wipe dry with a rag. Repeat for each knife location.

► A jointer knife rests on jackscrews. Adjusting these up or down determines the knife's height on the cutterhead.



Install the sharp knives

1. Clamp or tape a square or 90° drafting triangle to the outfeed table as shown, and reinstall the wedges. Insert the jackscrews, gib, and knife for one channel. Snug up the outer gib bolts to hold the knife in place, but just loose enough to allow adjustments. Remove the wedges.



2. Place a scrap of lightweight wood or MDF over the cutterhead and against the triangle. Rotate the cutterhead by hand. When the knife moves the block about $\frac{1}{8}$ ", as shown, without lifting it off the table, you have the correct knife-height setting. Repeat this procedure for the other end of the cutterhead. When finished, tighten all the gib bolts. Reset the infeed table to your desired cut depth. 🌲

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Memorial Box

A hand-crafted tribute provides a beautiful legacy.

Share your talents with generations to come by crafting an urn for the cremated remains of a loved one (or even for yourself someday). Choose wood with significance to the recipient and make the box even more special.

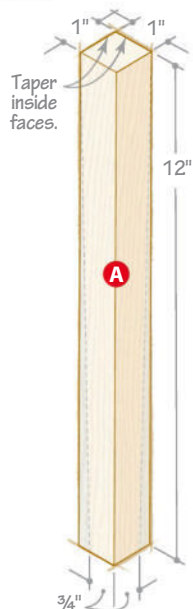
DIMENSIONS:
12 5/8" H x 6" W x 6" D

Approximately
200
cubic-inch
capacity

71%
Projected
cremation
rate by 2030

1 Cut the corners (A) to size [**Drawing 1**]. Mark the two best faces as the outside faces, then cut the tapers on the inside faces.

1 CORNER

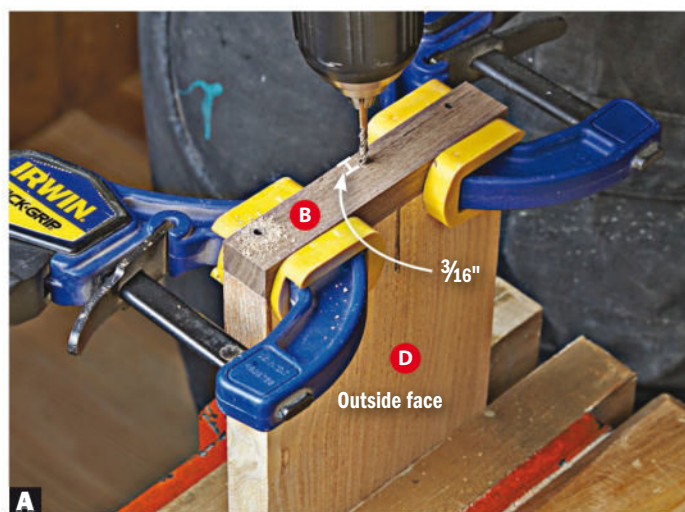


► Bamboo skewers used for kabobs work well in place of 1/8" dowels.

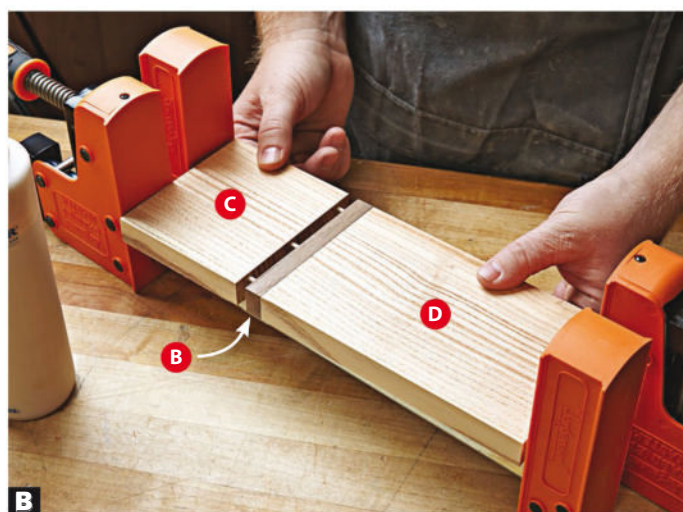
EXPLODED VIEW

Diagram illustrating the exploded view of a wooden cabinet assembly, showing various components and their dimensions:

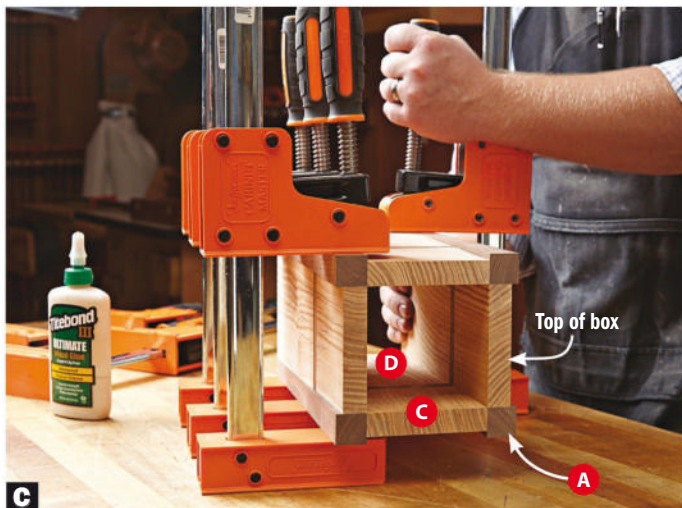
- Top Panel:** Dimensions: 4" (width), 1/8" dowel, 1 1/2" long.
- Side Panel (A):** Dimensions: 4" (width), 3/4" rabbet, 7/16" deep.
- Back Panel (E):** Dimensions: 6" (width), 6" (height), 3/4" (width), 3/4" (height), 3/8" rabbet, 1/4" deep.
- Base Panel (F):** Dimensions: 4" (width), 4" (height), 3/8" rabbet, 1/2" deep.
- Assembly Details:**
 - 7/64" pilot hole
 - 5/8" (width)
 - 3/4" (width)
 - 3/8" rabbet, 1/4" deep
 - 3/8" rabbet, 1/2" deep
 - #6 x 3/4" F.H. screw
 - 9/64" shank hole, countersunk on bottom



Clamp each stripe (B) to its mating top (C) and bottom (D) in turn. Mark the outside faces so you can properly align the pieces during glue-up. Drill through the stripe $\frac{1}{2}$ " deep into the mating piece.



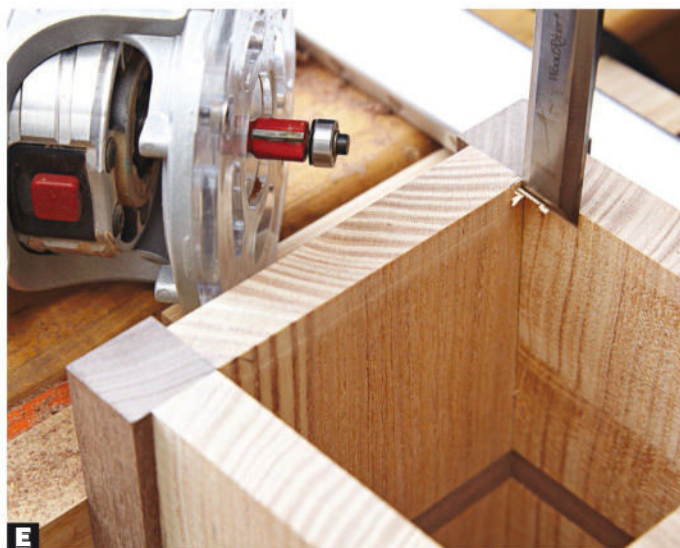
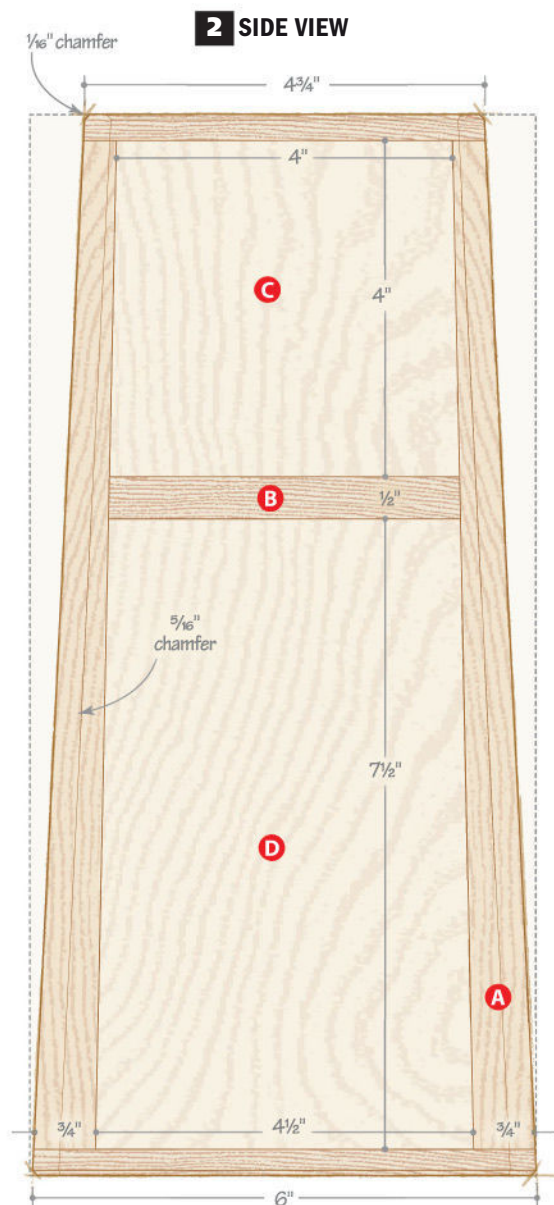
Tap 1½" lengths of dowel through the stripes, exposing ½" on each side. Dry-fit the panel to check the fit; then apply glue and clamp the panel together.



C Glue and clamp the two remaining panels (B–D) to the corner/panel assemblies (A–D). Keep the panels flush with the inside faces of the corners (A).



D Make a big sanding block by spray-adhering sandpaper to a scrap of flat plywood or MDF. Sand diagonally in alternating directions until the top and bottom of the box are flat.



E Set the flush-trim bit to expose $\frac{1}{2}$ " of the cutter. Rout around the top of the interior of the box, then clean up the corners with a chisel.

3 Cut tapers on each edge of the panels (B–D) [Drawing 2]. Then glue the corners (A) to two opposite panels, flush on the inside faces. Note that the wide ends of the corners are at the top.

4 Assemble the panels to create a box [Photo C]. Then flatten the top and bottom of the box [Photo D]. Start with 120-grit sandpaper, then work through 150 and 180 grit.

5 Because the top (E) would only contact the very top of the tapered interior, create a flat glue surface by flush trimming around the top of the box [Photo E].

6 Cut the top and bottom (E) to size. Rabbet the top to fit snug in the opening [Exploded View] and glue it in place. Rabbet the bottom and fit the raised field to the opening [Photo F]. Do not glue it in place yet.

Tip! Secure opposite panels together with double-faced tape, then bandsaw and plane them to identical shape.

continued on page 73

Is a computer controlled router (CNC) the best tool you don't have in your work shop?



A computer controlled router (CNC machine) is an extremely flexible tool that can find a place in almost any woodshop. It lets you cut simple or complex 2D and 3D shapes safely and with repeatable accuracy. In addition it can be used to make high quality joints or jigs and easily create interesting textures, precise lettering or decorative dimensional carvings.

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F Rout the rabbet slightly narrow, then sand or plane a taper on each shoulder of the rabbet to match the slope of the panel bottoms (D).



G Lay out a 3¼"-square opening centered on the bottom (E). Drill ⅜" holes tangent to the lines in each corner.



H Rout a ⅜" rabbet ¼" deep around the opening in the bottom (E). Square up the corners with a chisel.



I Taper the fourth side evenly by taping a cutoff onto the adjacent face so the box ends rest square to the table.

7 Lay out the opening for the plug (F) in the bottom (E) and drill the corners [Photo G]. Glue the bottom to the box.

8 After the glue dries, jigsaw along the lines between the holes, cutting as straight as possible. Then rabbet the bottom (E) to accept the plug (F) [Photo H, Exploded View]. Cut the plug to size, rabbet its top face, and screw it in place.

9 Bandsaw the tapers on each face [Drawing 2, Photo I]. Plane and sand the sides smooth. Rout ⅝" chamfers on each corner (A) and a ⅛" chamfer around the top (E).

The final touches

1 Apply a finish. We sprayed on a coat of lacquer followed by four coats of clear acrylic, rubbing out the final coat with 400-

grit sandpaper followed by gray (ultrafine, 1500 grit), then gold (microfine, 2500 grit) synthetic scuff pads.

2 When adding cremains to the box, you may choose to glue the plug in to seal the box permanently. Otherwise, secure it with countersunk screws [Exploded View]. 🌳

Produced by **Craig Rueggsegger** with **John Olson**
Project design: **John Olson**
Illustrations: **Roxanne LeMoine**; **Lorna Johnson**

► Purchase scuff pads.
woodmagazine.com/scuffpads

Materials List

Part	FINISHED SIZE			Matl.	Qty.
	T	W	L		
A corners	1"	1"	12"	W	4
B* stripe	¾"	½"	4⅜"	W	4
C* panel top	¾"	4⅜"	4"	R	4
D panel bottom	¾"	4½"	7½"	R	4
E top/bottom	¾"	6"	6"	W	2
F plug	¾"	4"	4"	R	1

*Parts initially cut oversize. See the instructions.

Materials key: W-walnut, R-red elm.

Supplies: ⅝" dowel.

Router bits: Flush-trim, 45° chamfer.

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9 PIECE FULLY POLISHED
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60 LED SOLAR
SECURITY LIGHT
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LOT 62534/69643 shown

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All cut, no cord

Today's cordless circular saws are compact, powerful, and nimble, thanks to lightweight lithium-ion battery packs and, in the case of the top performers, high-efficiency brushless motors. A brushless motor (no carbon brushes creating friction equates to greater efficiency) proves itself most worthwhile in a circular

saw, where torque and run time are critical. If you're considering buying a cordless circ saw, it might make sense to get a "bare" saw (without battery) that uses the same battery packs as other cordless tools you own.

Brushless saws worth changing battery platforms for



Makita XSH03M, \$400

- ▶ Inches of cut per amp-hour*: 168
- ▶ Includes two 4.0 amp-hour battery packs, charger, and canvas bag
- ▶ Bare tool, \$195

This left-blade saw far outdistanced the other 6 1/2"-blade models. It has the best torque, dust ejection, and footplate cutline indicators and markings. And at just 7 1/2 lbs, it feels and operates like an extension of your hand.

800-462-5482, makitatools.com



Milwaukee 2731-22, \$430

- ▶ Inches of cut per amp-hour: 175
- ▶ Includes two 4.0 amp-hour battery packs, charger, and canvas bag
- ▶ Bare tool, \$225

In our testing, this saw cut the longest and did not bog down, and it handles more like a corded saw than the others: nimbly, despite its 9-lb heft. With a 7 1/4" right-side blade, you'll find more aftermarket blade choices compared with the 6 1/2" field.

800-729-3878, milwaukeetool.com

*Rip cuts made in pressure-treated 2x southern yellow pine.

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- 800-433-9258, dewalt.com



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- 866-539-1710, ridgid.com

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Zoysia is the perfect choice for hard-to-cover spots, areas that are play-worn or have partial shade, and for stopping erosion on slopes. North, South, East, West – Zoysia grows in any soil, no ifs, ands or buts!



Zoysia thrives in partial shade to full sun!

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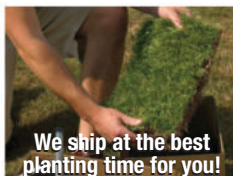
No more pulling out weeds by hand or weeds sprouting up all over your lawn. Zoysia Plugs spread into a dense, plush, deep-rooted, established lawn that drives out unwanted growth and stops crab-grass and summer weeds from germinating.

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When ordinary lawns brown up in summer heat and drought, your Zoysia lawn stays green and beautiful. The hotter it gets, the better it grows. Zoysia thrives in blistering heat (120°), yet it won't winter-kill to 30° below zero. It only goes off its green color after killing frosts, but color returns with consistent spring warmth. Zoysia is the perfect choice for water restrictions and drought areas!

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1¾-hp, 110-volt, 14" bandsaw (no. JWBS-14SF), \$1,600; (3-hp, 220-volt model, no. JWBS-14SF-3, \$1,800)

The Jet JWBS-14SF steel-frame saw comes fully assembled except for the table, making setup a breeze. After outfitting the saw with a new blade and setting the bearing guides, I resawed 13½"-wide white oak with ease: The 110-volt motor never bogged down. The dual-bearing guides adjust without tools, and hold the blade true with little deflection, thanks in part to thrust bearings with a slot in them to "trap" the back of the blade.

I'm as impressed with this bandsaw's fit and finish as I am with its performance. The JWBS-14SF comes dressed with a flawless paint job and polished components; no rough edges here.

The table sits 39" above the floor—a comfortable working height for my 6' frame—and tilts 45° right and 10° left. I like the dual-position rip fence (tall for resawing and most ripping; low for short, thin stock) because it locked solidly and adjusted easily to match the blade's slight drift. But to remove the fence from the saw, you must first slide the face off the bracket, then pivot and lift the bracket off—a minor nuisance.

—Tested by John Olson, Design Editor

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—Tested by Bob Baker

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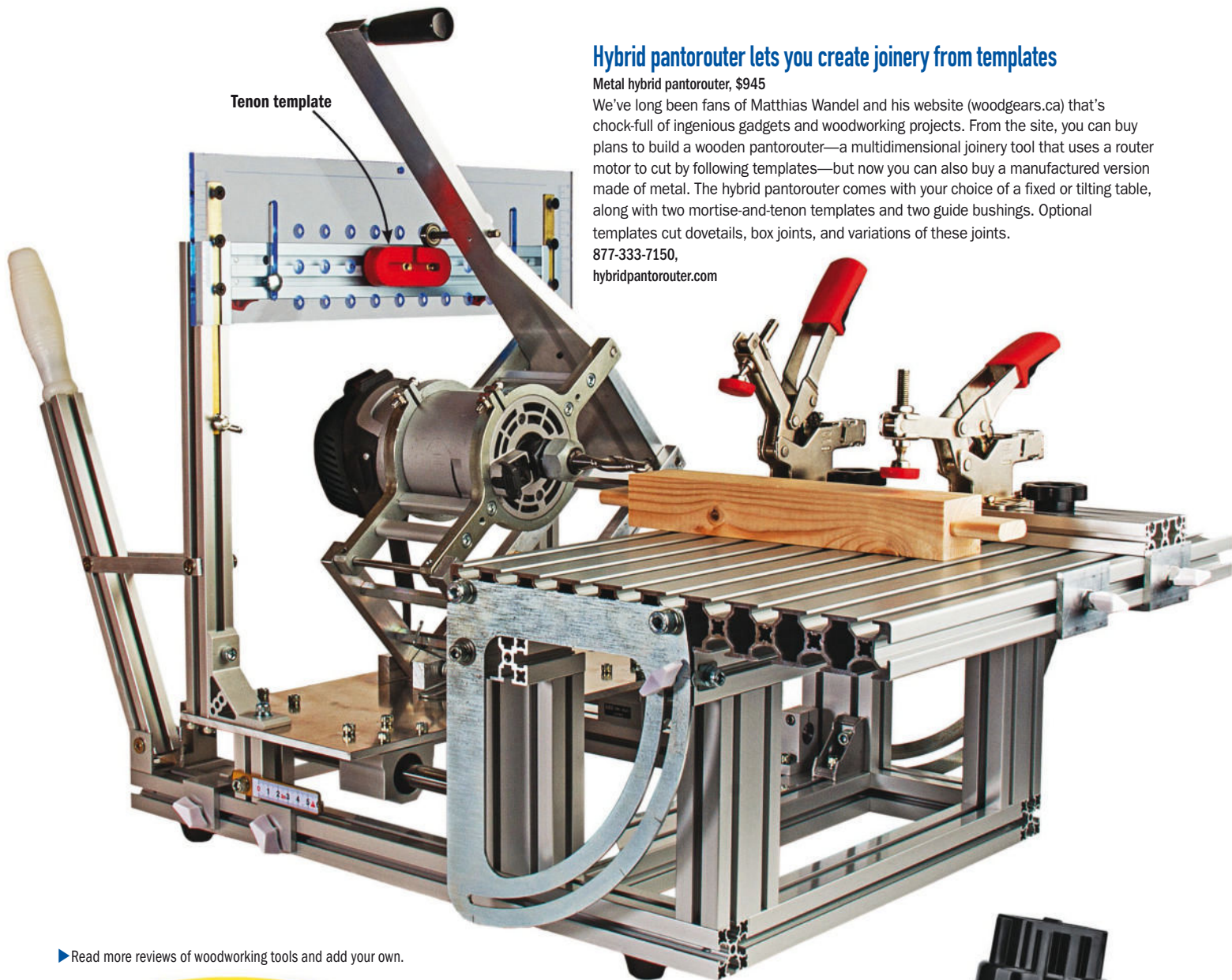
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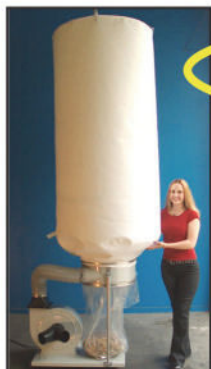
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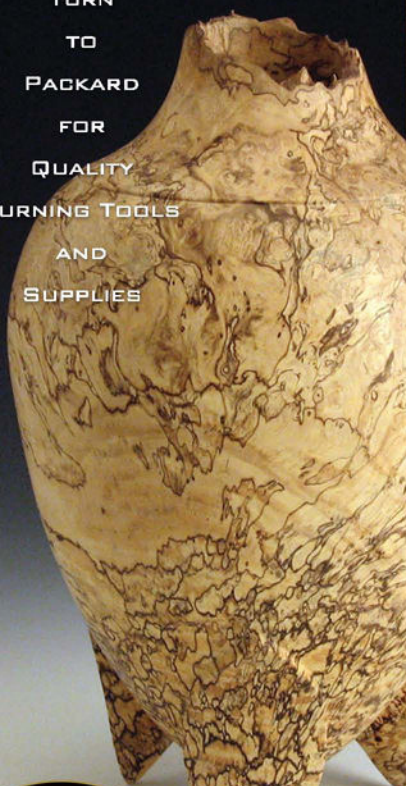
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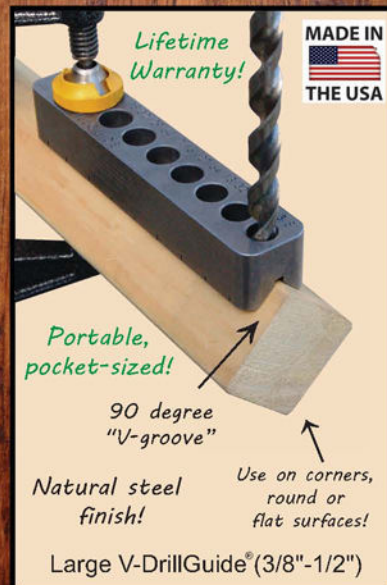


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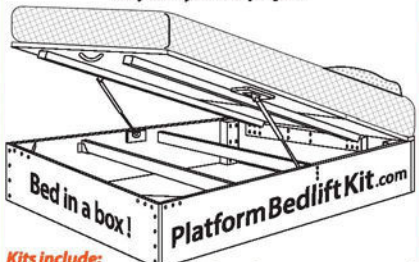
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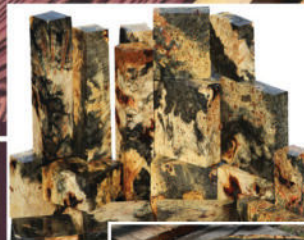
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A GLIMPSE INSIDE THE JULY ISSUE (ON SALE MAY 3)

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Only 12 parts make up this attractive, sturdy seating that can be used indoors or out.



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Plane talk

We show how to walk the walk for great hand-planing results.



Sander showdown

We test 15 random-orbit sanders with 5" pads in search of the best smoothers.

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This classic mahogany beauty also makes a handsome hall table.



WOOD magazine May 2016

25 X 2 ES DUAL DRUM SANDER

MACHINE FEATURES:

- › Sand two grits in one pass, 25" width capacity
- › Exclusive Edge Sanding Feature for panels and doors
- › INTELLISAND Technology auto-regulates the conveyor
- › Closed stand with built-in storage
- › 3hp, 220v power requirements



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MACHINE OVERVIEW

- › Sand 19" in a single pass, 38" in a double pass!
- › Sand as thin as 1/32", as thick as 4" as short as 2-1/4"
- › INTELLISAND Technology auto-regulates the conveyor speed, preventing gouging, burning or damaging stock!
- › Power requirements 110 Volt, 20 AMP service



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