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We all need a John

Maybe it's the time of the year, or maybe it's the time of man, but I find myself reflecting on childhood memories more and more these days.

My earliest memory—I couldn't have been more than 4 years old—is of my older brother, Steve, shaking me awake one Saturday morning, saying, "We're getting a bar!" I popped out of bed and raced with him to the kitchen, where Dad and another man were reviewing plans for a dining-room addition to the house, which included a breakfast bar. (I was so disappointed. I thought I was getting a *candy* bar!)

Next thing I remember, I'm driving nails into the kitchen floor, "helping" a man I've always called "Carpenter John," who was assisting Dad with parts of the remodel. I can't imagine I was very good at installing underlayment yet, so I must have bent dozens of nails over, spoiling the otherwise perfect work of the handyman. What I *don't* remember is Carpenter John scolding, yelling, or telling me to run along.

I wish I had been more like Carpenter John with my own kids when they were growing up. I could have been more patient, more encouraging, more willing to let them make their own mistakes and learn from them. It's not like I'm a perfectionist; it just always seemed that I was in a hurry to get stuff done.

Funny how you never realize the impact you can have on someone else's life, simply by crossing their path. I have no other memories of Carpenter John after that day more than 50 years ago on the kitchen floor. And I suspect he had no special memory of the day at all. He was just doing his job. But his kind patience kindled the tinder smoldering in my little maker's hands and heart.

So, this Christmas, remember to give the gift of time. Time in the shop, of course, building those great handmade gifts. But also the time to encourage, mentor, and share your woodworking talent with someone just wanting to learn. It's what the carpenter would do.

See you in the shop!

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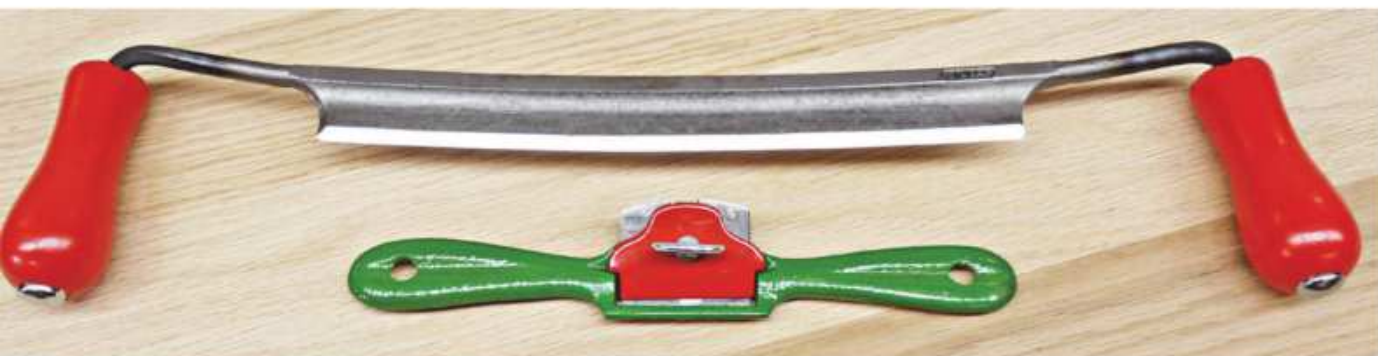


**You've got questions.
We've got answers.**

Need to know where babies come from? Ask your mom. Which candidate to vote for? Ask your neighbor Larry, after a few beers. But if you've got woodworking questions, we've got you covered. These woodworkers weren't afraid to raise their hands and ask. Email your questions to askwood@woodmagazine.com and see your answers in our Ask WOOD section on page 16 and at woodmagazine.com.

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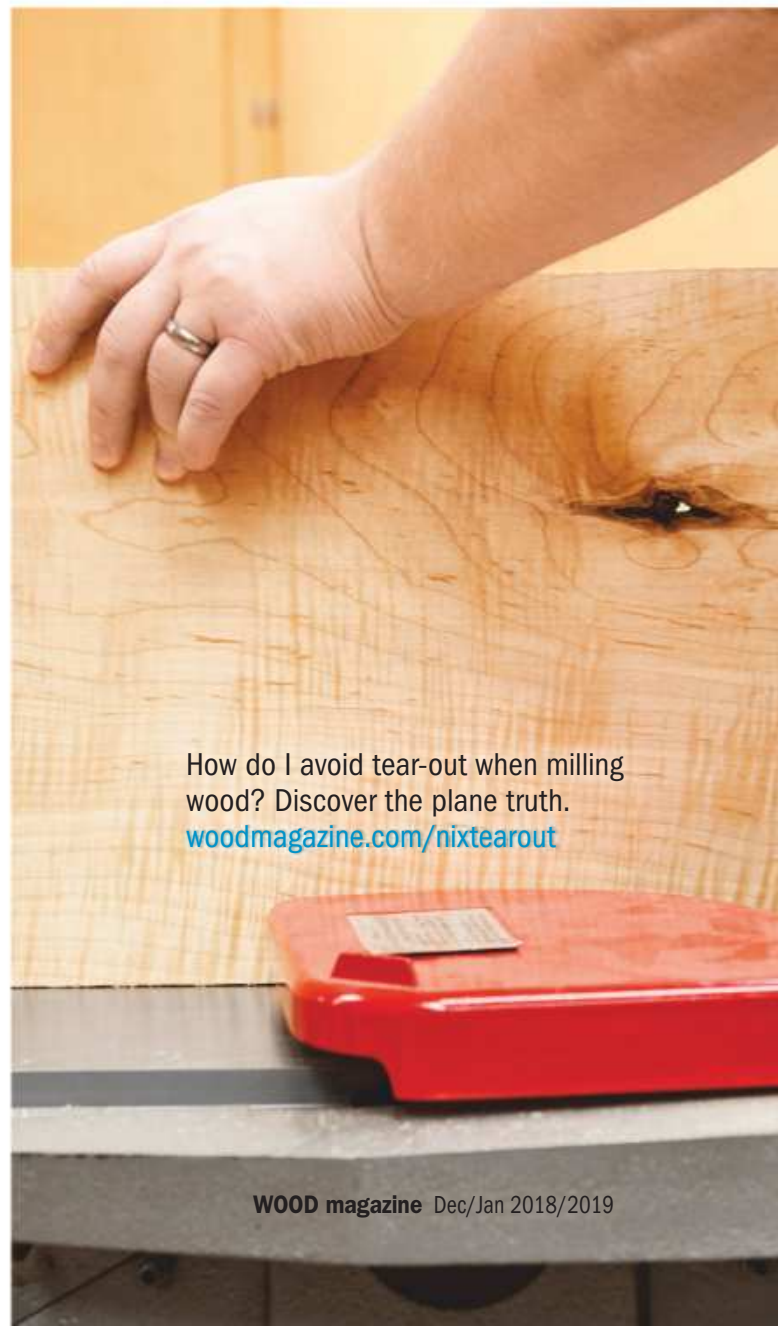
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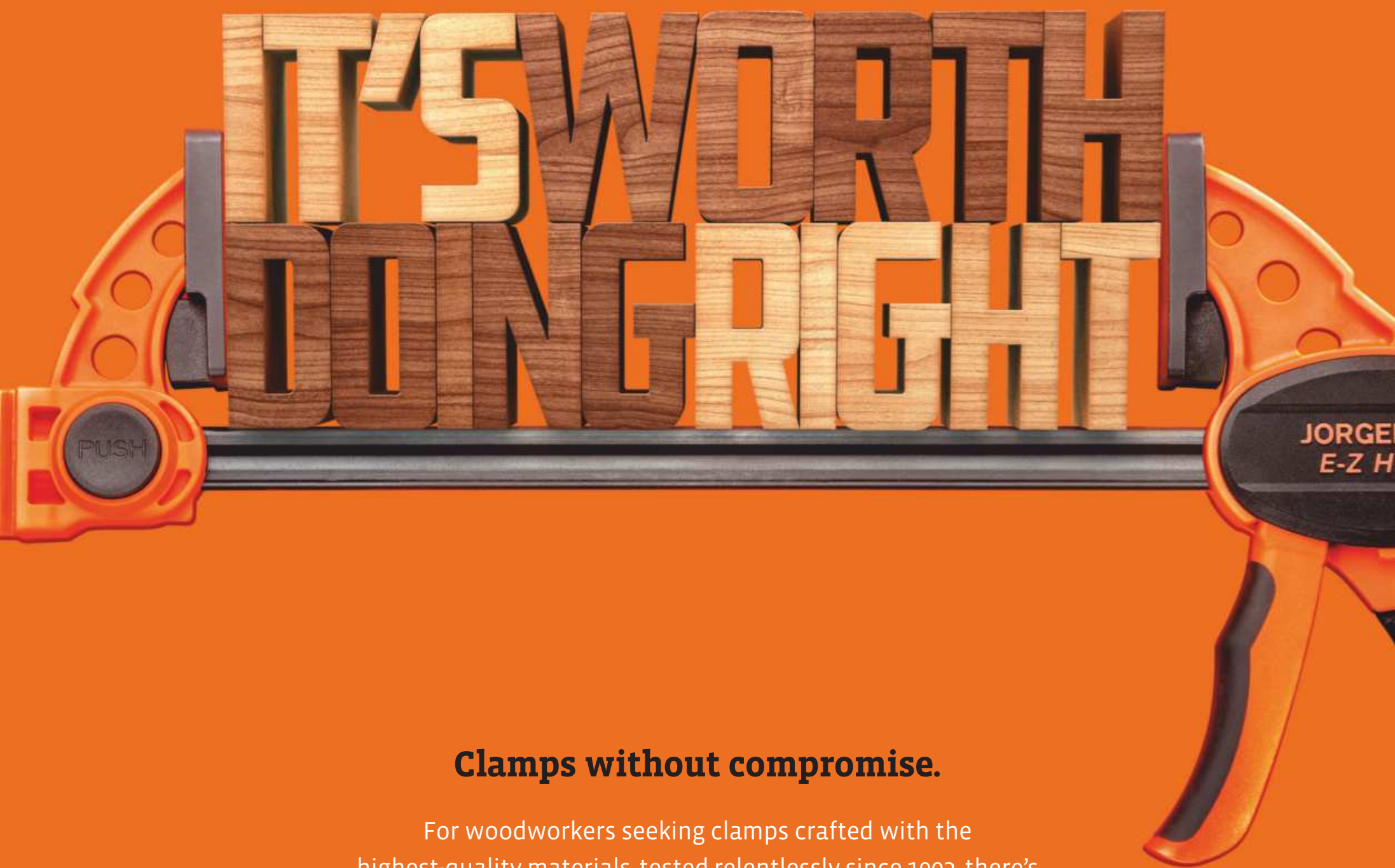
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Bloomfield Hills, Mich.

Will the *real* first sliding mitersaw please stand?

While reading your review of sliding compound mitersaws in issue 256 (October 2018), I was fascinated with some of the improvements in this technology. But the margin note on page 45 about the first slide saw is incorrect: The first one was actually the Rockwell/Delta Sawbuck, and I worked on it during its development and introduction in the late 70's and early 80's.

The Sawbuck was the precursor of the whole slide-saw genre. We used front and rear trunnions

that required the user to slide the wood in from the side. (The Sawbuck is still the only saw capable of a 16" crosscut.) Our customers loved it because it was the first "radial-arm saw" that could be easily taken to a job site. It had its own wheels and stand built in so you could roll it in and set it up quickly.

Hitachi, which was developing tools specifically for construction instead of woodworking shops, eclipsed the Sawbuck when they introduced the

open front sliding mitersaw by utilizing linear bearings. Other tool companies followed suit, and Delta finally launched an open-front saw in the 1990s.

So there you go, an unrequested history lesson from someone that lived it.

—**Mark Strahler**
MGS Options, LLC
Augusta, Ga.

The almost-best compliments

I enjoyed Dave Campbell's "Buy the (not) best" column (Taking Measure, issue 256). My dad was a mechanic, and he had the same philosophy: For tools that you use often, buy quality but not necessarily the absolute best. There are plenty of second-best tools that will last a lifetime.

And your advice about not buying top-of-the-line tools you'll use only once or twice a year is spot-on. When I built a fence, I bought a \$69 nailer that has (so far) lasted through the fence and a deck. Even if it dies, the price was less than a rental and far less than a top-quality tool. Buy only what meets your needs and budget.

—**Jim Coffey**
Atlanta, Ga.



As an amateur woodworker, I used to be tormented by my inability to purchase expensive woodworking equipment, thinking that was what I needed to move up in the skills arena. Well, I'm here to tell you that I couldn't agree more with Taking Measure in issue 256. I am amazed what I can do, and the results that I get, with my meager tool budget. Thank you for confirming my beliefs.

—**Nick Franks**
Mountainair, N.M.

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The bocote in this coffee-table top, made by **Alex Gilson**, of Coral Gables, Fla., came from the Nicaragua hometown of his wife, Hazel. The plank was cut into pieces small enough to fit into his suitcase, then rejoined with maple strips in the final project.



Rather than buying for his dad an “ugly plastic medical-style” shower seat, **Martin Heuer**, of St. Petersburg, Fla., designed and built this one from red oak, using mostly hand tools. Splines at both ends keep the seat wedges aligned; the frame joinery is mortise-and-tenon.

After a neck injury forced **Nick King**, of New River, Ariz., to scale down his projects, he began making canes, which he gives to military veterans in need. He’s also made six elaborate snake canes, like this one made of mesquite with an ironwood handle. He hand-carved the snake from aspen.



Curtis Luker, of Sweet Water, Ala., adapted the High-style Adirondack Pair plans in issue 254 (July 2018) to build this dining table and chairs out of southern red cedar, harvested in Marengo County, Ala. The table measures 44×87”.

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Dream Shop on the Lake



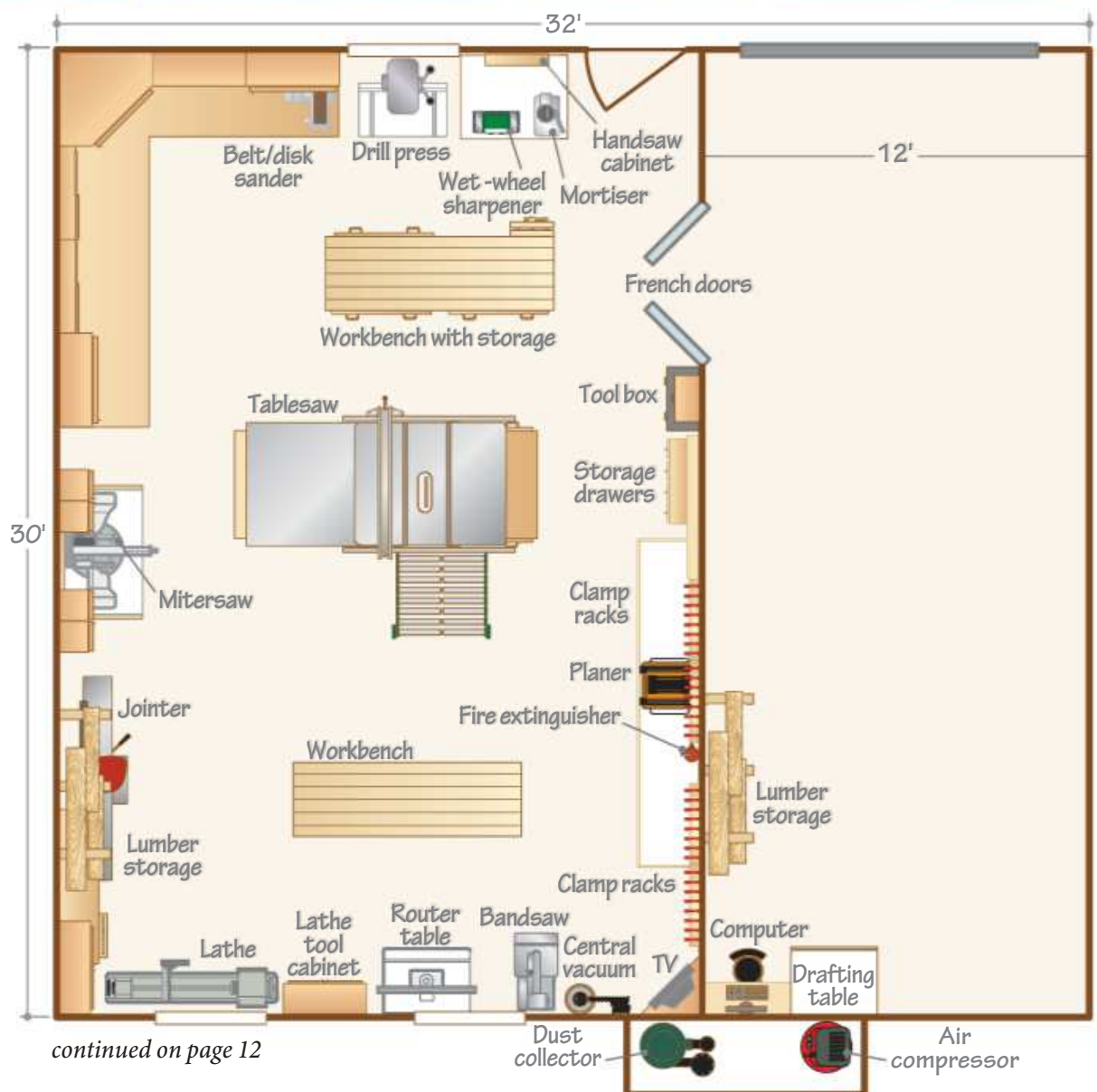
The open, bright atmosphere creates a great environment for building toys and making pens.

Dennis Bosch credits *WOOD*® magazine for much of the design of his workshop and many of the projects he makes. The shop incorporates features from other readers' shops, including equipment layout and a floating wood floor that hides the dust-collection ductwork.

Dennis also put a lot of his own thought and effort into organizing the shop space for efficiency and storage. He built the cabinets, including a wall cabinet with sliding peg-board panels, and added multiple drawers under workbenches. Cleaning chores are handled by a wall-mounted Bissell central vac system with a 40' hose for picking up what's missed by the in-floor dust ports of his dust-collection system. An outdoor shed houses the dust collector and air compressor, which are operated by wireless remotes.

Both of his workbenches sit at the same height as the tablesaw. This helps with mov-

The building includes a 12×30' garage area that houses lumber and finishes, leaving a 20×30' space for the woodshop. A 10×6' shed addition houses the dust collector and air compressor.



continued on page 12

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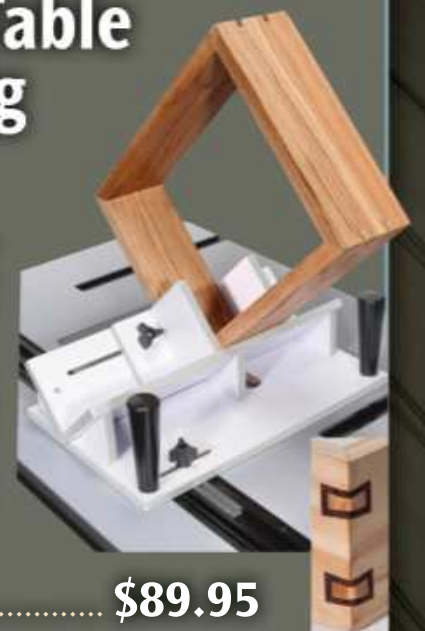


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A cabinet surrounding the tablesaw base stores blades and accessories. The cabinet rolls easily on wheels lowered by foot-operated cams.



A pair of shop-made risers on Dennis' workbench make project assembly, glue-ups, clamping, and routing easier. The portable chisel rack ensures that his chisels are always at hand.

ing and supporting sheets of plywood. His benchtop planer rests on a third table, with infeed and outfeed support to minimize snipe. Each table rolls easily on casters.

Hand tools, such as planes and saws, that Dennis inherited store in wall-mounted tills he crafted.

The shop contains modern conveniences, too, such as satellite TV and a heat pump for heating and cooling. For security, Dennis installed motion-activated, high-definition cameras at each door. The building has a separate electric service with a 200-amp circuit panel.

When discussing his shop, Dennis says he only has two regrets: He wishes he had built 9'-high walls instead of the standard 8' walls.



Dennis built two workbenches with solid-maple bases and two layers of MDF for the tops. The box shown on the bench *above* connects to a dust port in the floor, creating a sanding station. It stores on end under the wing of the bench when not in use. Cabinets and shelves underneath provide plenty of storage. A roll of kraft paper mounted at one end (not shown) allows him to cover the bench, protecting it from glue and finishes.



Sliding doors with pegboard panels double the storage of a wall-mounted hand-tool cabinet.

And he would have liked to have a bathroom. Dennis says, "That would eliminate both the dirt I track into the house and my wife's frequent reminders of the fact." 🌲



Dennis Bosch enjoys spending time in his lakeside shop in Arkansas. He likes to make pens and other small projects, especially toys for charities and his many grandchildren.

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With both bits spinning at 25,000 rpm, the edge of one travels much faster than the other. Like a larger wheel that covers more ground with each revolution compared with a small wheel, the tips of large router bits move much faster than the tips of small bits.

Be in the know about when to go slow

Q I've gotten by with a fixed-speed (25,000 rpm) router but am wondering if I can improve my results, and use a wider variety of bits, by buying a variable-speed router that runs as slow as 8,000 rpm. When and how might I benefit from owning a variable-speed router?

—Jack Purdy, Seattle

A By varying the speed of a router bit, Jack, you can improve operating safety and comfort, ramp up cut quality and control, and possibly extend the life of a router and the bits used in it. Let's take a closer look at each of those benefits.

■ **Safety and comfort.** Slowing a router bit, regardless of its diameter, makes the router more comfortable to operate. And your ears will welcome the noise reduction.

For bits larger than 1½", consider variable speed a must-have feature. That's because as the diameter of a bit increases, the speed at its cutting edges increases dramatically. Take, for example, the two bits shown *above*. At 25,000 rpm, the panel raiser far exceeds the 100 mph "speed limit" considered safe. Its 260 mph tip speed combined with the considerable mass of the bit would cause a router to vibrate excessively (and should scare the bejeebers out of you). Fortunately, by dialing down the speed of a 3½" bit to 10,000 rpm, its tips travel at 104 mph. That's more like it!

■ **Cut quality and control.** While a bit's diameter determines its *maximum* speed, several other factors affect a bit's *ideal* speed—the sweet spot that yields the best cut quality. Key variables determining an ideal speed include: type of wood being routed, bit sharpness, feed rate, and cutting depth.

To find a bit's ideal speed, first consult the chart *right* for maximum speed. Some routers have a variable-speed dial with numbers on a scale (from 1 to 10, for example) that do not tell the router's actual rpm. To determine

maximum router-bit speed for those routers, chuck a bit, start the router at a low speed, then slowly increase the speed until the router vibrates. Back off the speed until the vibration goes away, and jot that setting in the third column of the speed chart.

Now, set the router for the bit's maximum speed and make test cuts in scrap matching your project wood. You may want to keep a record detailing the ideal speed for your bits under various conditions. Make note of the wood used; some species, such as cherry and maple, require slower speeds to avoid burning. Dialing down the speed will also help minimize grain tearing in highly figured woods. Your notes will save time in the future.

■ **Router and bit longevity.** Spinning a router bit faster than the suggested maximum speed stresses the router's drive spindle and bearings. And even the stout ½" shanks on large bits could become damaged when spinning too much steel and carbide at excessive speeds.

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Today's routers and variable-speed control

Nearly all 3-hp routers have variable speed for accommodating panel raisers and other big bits. But variable speed is also finding its way onto small routers, even laminate trimmers. That's because delicate work, such as routing inlay grooves, benefits from the control achieved by slowing bit speed. And even small bits, such as ¼" round-overs, can burn some woods if not slowed down. 🌲



Router Bit Speed Chart

Bit diameter	Max. speed x 1,000 rpm	My router
Up to 1"	24	
1 1/8–2 1/2"	16–18	
2 5/8–3"	12–24	
3 1/8" or larger	10–12	

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On shock absorber you'll find a super cool "kick-start" mechanism that replicates the kickstarter on the motorcycle. This mechanism functions the same way as our Bolt Action pen kits to smoothly advance and retract the refill. Requires a pen making mandrel, bushings (Item #PKPT100BU \$5.95) and 10mm drill bit (Item #PK10-10 \$7.95).

Dog Pen Kits **NEW!**

Always be reminded of your best friend - everywhere you go. Inspired everything doggie including; Click Top: Casted into the shape of a classic dog bowl with biscuit detail that wraps around the exterior. The top features a stamped dog paw print and is slightly recessed for comfortable clicking. Includes a super quiet, smooth action click mechanism. Spring Pen Clip: A bone is commonly considered a dogs favorite treat (or toy) and we thought it the perfect way to represent the clip. Backend and tip: Paw prints are engraved in a playful pattern around the tip and backend to represent the happy, energetic spirit of a dog. "I LOVE MY DOG" is engraved below the paw prints on the tip to signify the valuable relationship between an owner and their dog. Requires a pen making mandrel, bushings (item #PKMAJSQBU \$4.95) and 3/8" drill bit (item #PKEXEC-38 \$3.95).

Firefighter Pen Kits **NEW!**

The details of the pen pay homage to the dedication, sacrifice and bravery these hero's display. Including; a pen clip that represents a Firefighter's ladder and iconic Firefighter's Maltese Cross. The pen end depicts a silhouette of a Firefighter in uniform a holding a hose with the words "Honor" "Bravery" "Duty" and "Dedication" displayed behind

the silhouette. The pen top features a classic Firefighter's helmet form. The pen tip is shaped like a Firefighter's hose nozzle. While the "Push and Lock" Pen Mechanism emulates an American fire hose. To extend the refill, simply push the back-end of the pen downward and rotate to lock the upper adapter clips into place. Requires a pen making mandrel, bushings (item #PKFIREBU \$4.95) and 10mm drill bit (item #PK10-10 \$7.95).

Bolt Action Pen Kits

Our best-selling pen kits enjoys a huge following in the pen making community. It's beloved for its realistic bolt-action handle that smoothly advances and retracts to securely lock the refill in place. Includes a bolt-action rifle clip and replica 30 caliber cartridge and rose gold tip for added authenticity. Requires a pen making mandrel, bushings (Item # PKCP3000BU \$5.95) and 3/8" drill bit (Item #PKEXEC-38 \$3.95). Patent No.: US D682,352 S

Motorcycle Pen Kits **NEW!**

From the straight pipes to the muscular lines of the old school single cylinder engine with kickstart mechanism, your custom-built Motorcycle pen will make a statement. The pen tip features a fierce, intricately cast eagle head with the engraved words, "Ride Hard. Live Free" as a band above the eagle head. A true to life old school single cylinder engine adorns the pen end.

Need a lathe to get started?



This basic pen making starter set includes our top rated Turncrafter 10" Variable Speed Midi Lathe and includes enough tools and accessories to start turning 10 beautiful 24kt Gold plated slimline pens and pencils. You will also get other essentials you need to start making pens including a Pen Mandrel, 3pc Carbon Steel Chisels, Assortment of Pen Blanks, Mid Cure Epoxy Glue, Barrel Trimmer, Shellawax Cream and a 45 minute instructional pen making DVD.

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Their Hands on One

Bolt Action Pen Kits **BEST SELLER!**

	Item#	1-4	5-24	25-49	50+
Chrome (shown opposite page)	#PKCP8010	\$12.95	\$12.05	\$11.15	\$10.25
Gun Metal	#PKCP8020	\$12.95	\$12.05	\$11.15	\$10.25
24kt Gold	#PKCP8000	\$14.95	\$13.95	\$12.95	\$11.95



Bolt Action Pen Kit in Gun Metal



Bolt Action Pen Kit in 24kt Gold

3 Bolt Action Pen Kit Starter Set

You get one of each pen in Chrome, Gun Metal and 24kt Gold plus the 3/8" drill bit and 2pc Bushing Set

#PKCPBAPAK **SAVE \$8 Only \$42.75**

*Kits in packs may vary subject to availability

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Motorcycle Pen Kits **NEW!**

	Item#	1-4	5-9	10-24	25+
Antique Pewter	#PKMOTAP	\$24.95	\$23.95	\$22.95	\$21.95
Matte Black	#PKMOTMB	\$23.95	\$22.95	\$21.95	\$20.95
Matte Black & Chrome	#PKMOTMBCH	\$22.95	\$21.95	\$20.95	\$19.95
Chrome (shown opposite page)	#PKMOTCH	\$21.95	\$20.95	\$19.95	\$18.95



Motorcycle Pen Kit in Antique Pewter



Motorcycle Pen Kit in Matte Black



Motorcycle Pen Kit in Matte Black & Chrome

4 Motorcycle Pen Kit Starter Set

You get one of each pen in Antique Pewter, Matte Black, Matte Black & Chrome and Chrome. Plus, you get the bushings and drill bit.

#PKMOTSS **SAVE \$20 Only \$87.70**

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Dog Pen Kits **NEW!**

	Item #	1-4	5-9	10-24	25+
Chrome (shown opposite page)	#PKDOGCH	\$14.95	\$14.25	\$13.55	\$12.95
24kt Gold	#PKDOG24	\$16.95	\$16.25	\$15.55	\$14.75
Antique Brass	#PKDOGAB	\$18.95	\$17.95	\$16.95	\$15.95



Dog Pen Kit in 24kt Gold



Dog Pen Kit in Antique Brass

3 Dog Pen Kit Starter Set

You get one of each pen kit in Chrome, 24kt Gold and Antique Brass. Plus, you get the bushings and drill bit.

#PKDOGSS **SAVE \$12 Only \$47.75**

*Kits in packs may vary subject to availability

SAVE 20 %

Firefighter Pen Kits **NEW!**

	Item#	1-4	5-9	10-24	25+
Chrome & Red (shown opposite page)	#PKFIRECHR	\$23.95	\$22.75	\$21.55	\$20.35
Antique Brass	#PKFIREAB	\$29.95	\$28.45	\$26.95	\$24.95
Polished Brass & Red	#PKFIREBRR	\$27.95	\$26.55	\$25.15	\$23.75



Firefighter Pen Kit in Antique Brass



Firefighter Pen Kit in Polished Brass & Red

3 Firefighter Pen Kit Starter Set

You get 1 pen in Chrome and Red, 1 pen in Antique Brass and 1 pen in Polished Brass and Red. Plus you get the bushings and drill bit.

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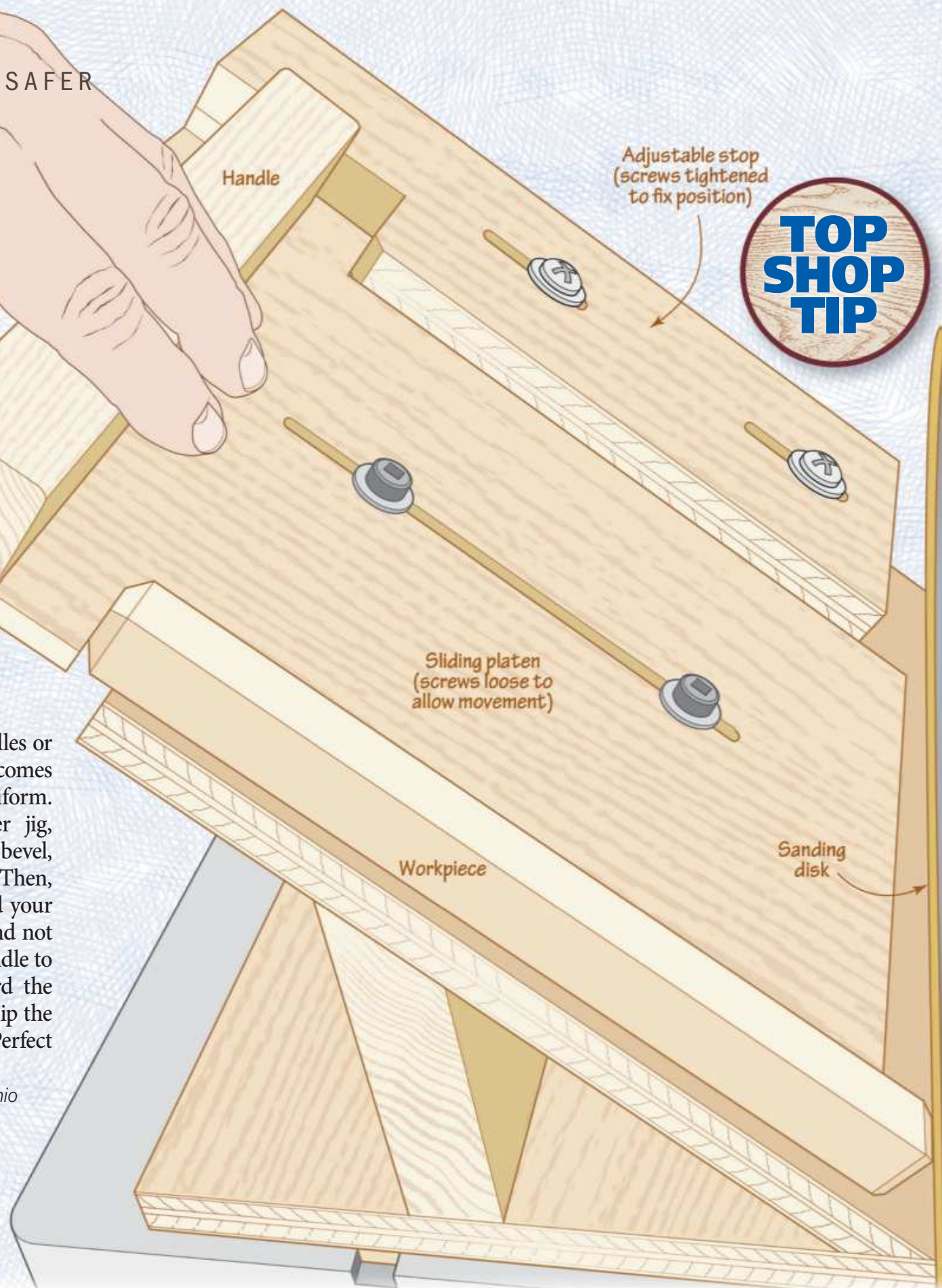
SHOP TIPS

WORK FASTER, SMARTER, SAFER

Sand perfect end bevels

When a project requires multiple spindles or other pieces with beveled ends, it becomes quickly apparent if the bevels aren't uniform. With this quick-and-easy disc-sander jig, simply adjust the stop for the desired bevel, and place the workpiece where shown. Then, with your left hand on the handle and your right hand on the workpiece (right hand not shown for clarity purposes) use the handle to slide the platen and workpiece toward the disc. Sand all four bevels on one end, flip the workpiece end-for-end, and repeat. Perfect bevels every time!

—Dan Martin, Galena, Ohio



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

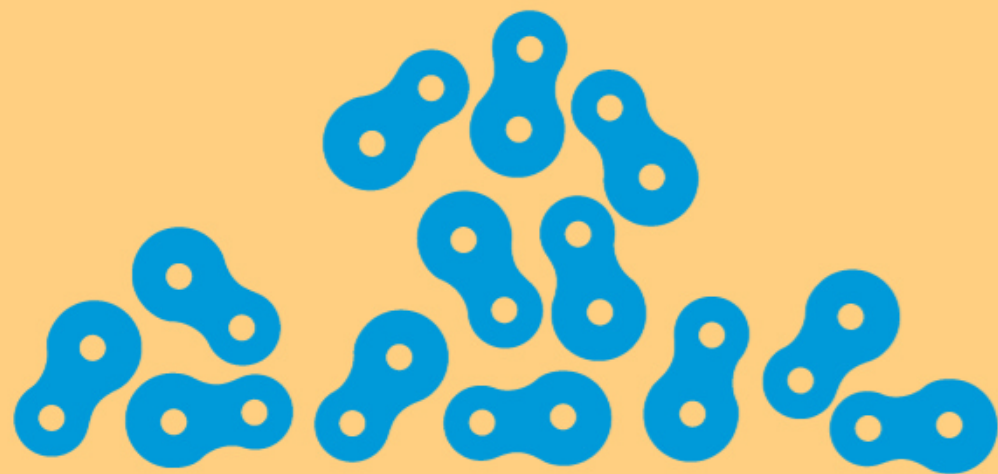
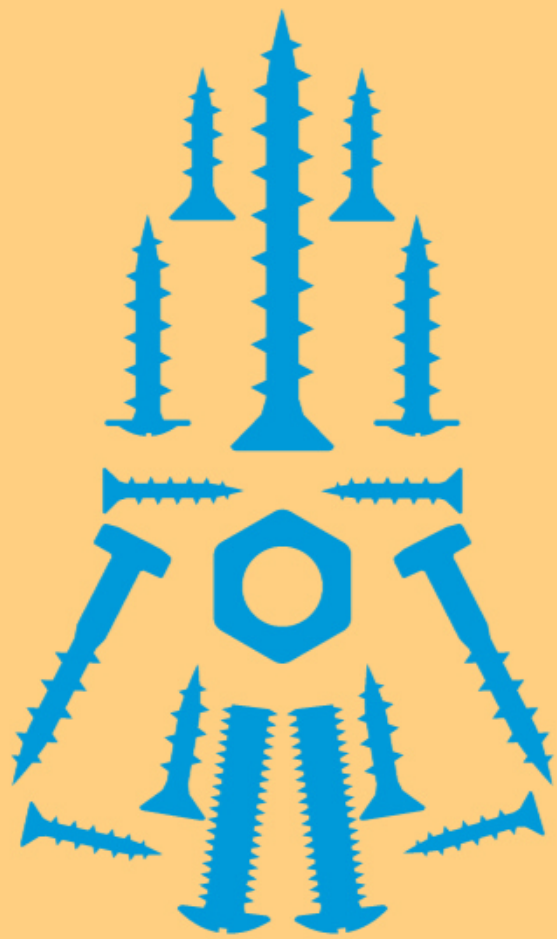
Because we try to publish original tips, please send yours only to **WOOD** magazine.



For sending this issue's *Top Shop Tip*, Dan receives a Porter-Cable 20V MAX 8-Tool Combo Kit worth \$350.



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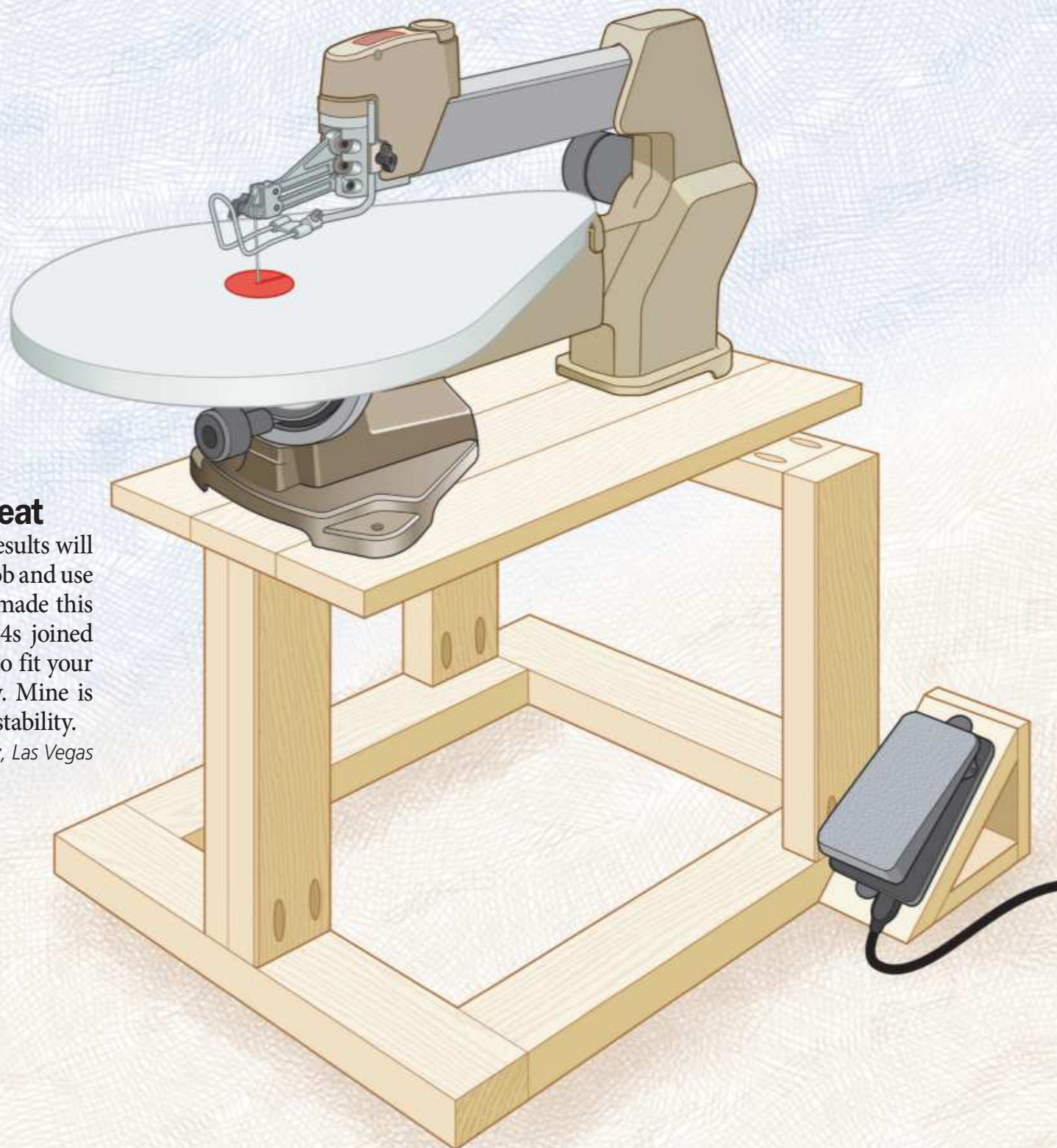


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Low scrollsaw stand puts you in the driver's seat

Your scrollsawing enjoyment and results will improve when you sit down on the job and use a foot-pedal switch. To that end, I made this low-cost stand from MDF and 2×4s joined with pocket screws. Size the stand to fit your stature, chair height, and scrollsaw. Mine is 17" tall and 18" wide at the base for stability.

—Brian Wojtowicz, Las Vegas

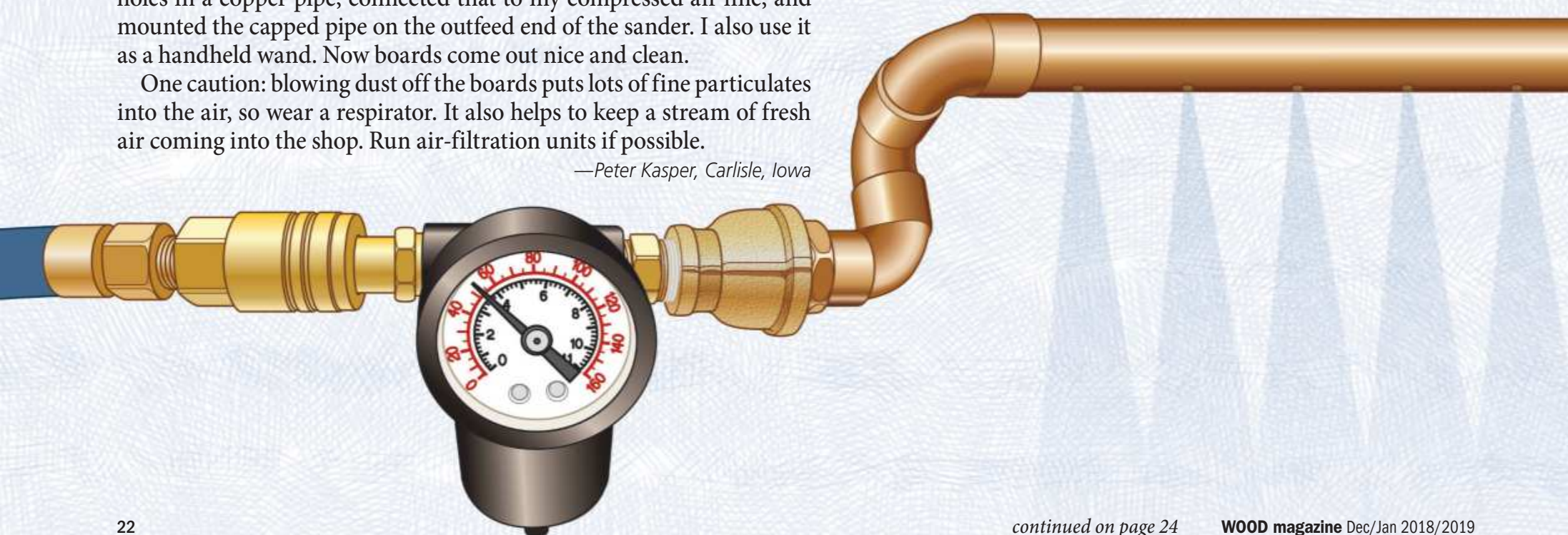


Beat the drum-sander dust blues

Like a lot of dust collectors, mine can't keep up with the large volume of fine debris produced by a drum sander. So boards emerge from the sander covered with dust. To get that dust off, I drilled a series of small holes in a copper pipe, connected that to my compressed air line, and mounted the capped pipe on the outfeed end of the sander. I also use it as a handheld wand. Now boards come out nice and clean.

One caution: blowing dust off the boards puts lots of fine particulates into the air, so wear a respirator. It also helps to keep a stream of fresh air coming into the shop. Run air-filtration units if possible.

—Peter Kasper, Carlisle, Iowa



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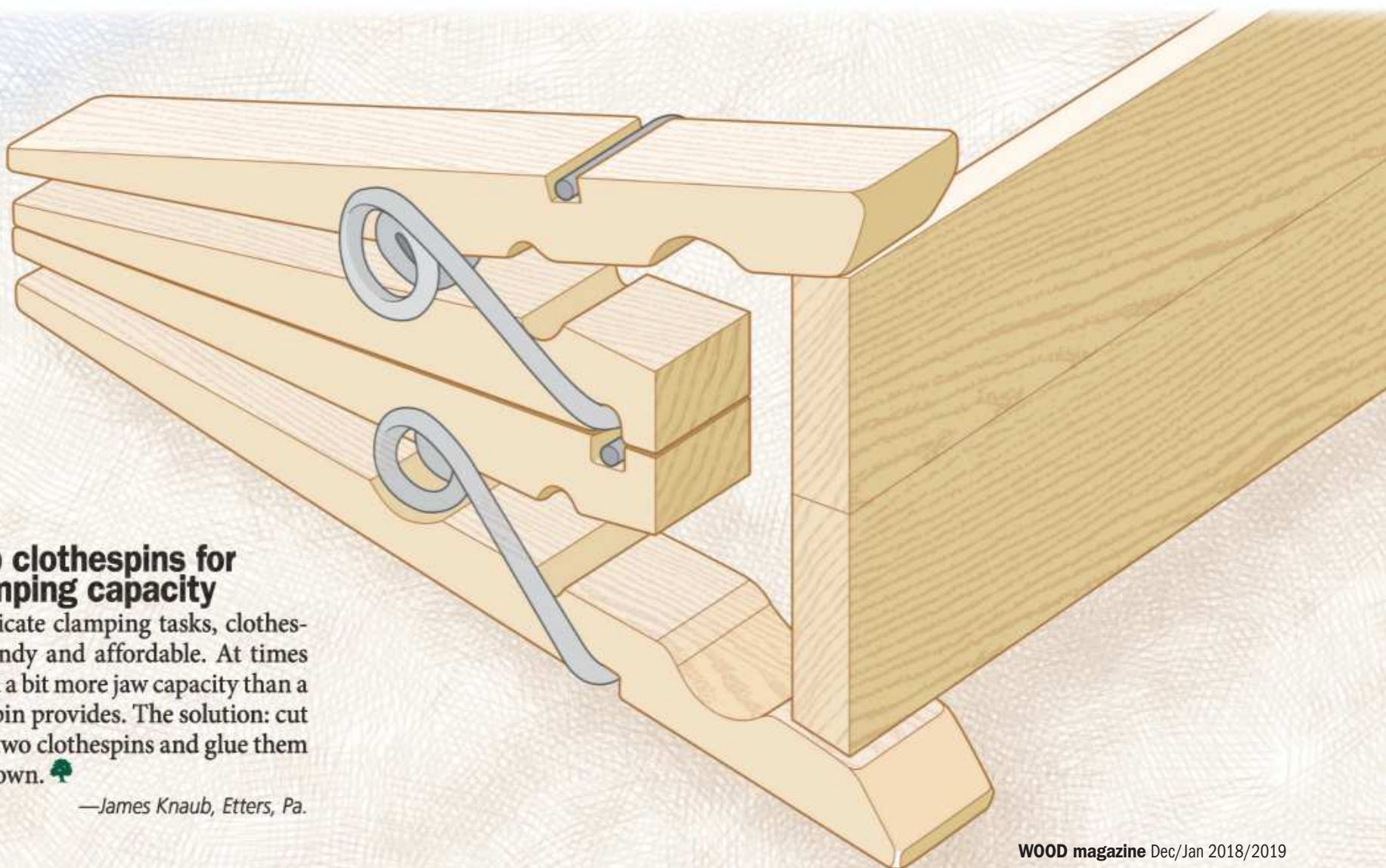
SHOP TIPS



Make your benchtop more attractive

Always looking for ways to cut clutter and improve convenience, I embedded rare-earth magnets into the edges and ends of my workbench for holding steel rules, small tools, and other ferrous items. This reduces benchtop mess, while keeping frequently used tools at the ready. Drill the holes with a Forstner bit and secure each magnet with a dab of epoxy.

—John Padgham, Franklin, Tenn.



Double-up clothespins for extra clamping capacity

For small, delicate clamping tasks, clothespins prove handy and affordable. At times though, I need a bit more jaw capacity than a single clothespin provides. The solution: cut one jaw from two clothespins and glue them together as shown. 🌲

—James Knaub, Etters, Pa.

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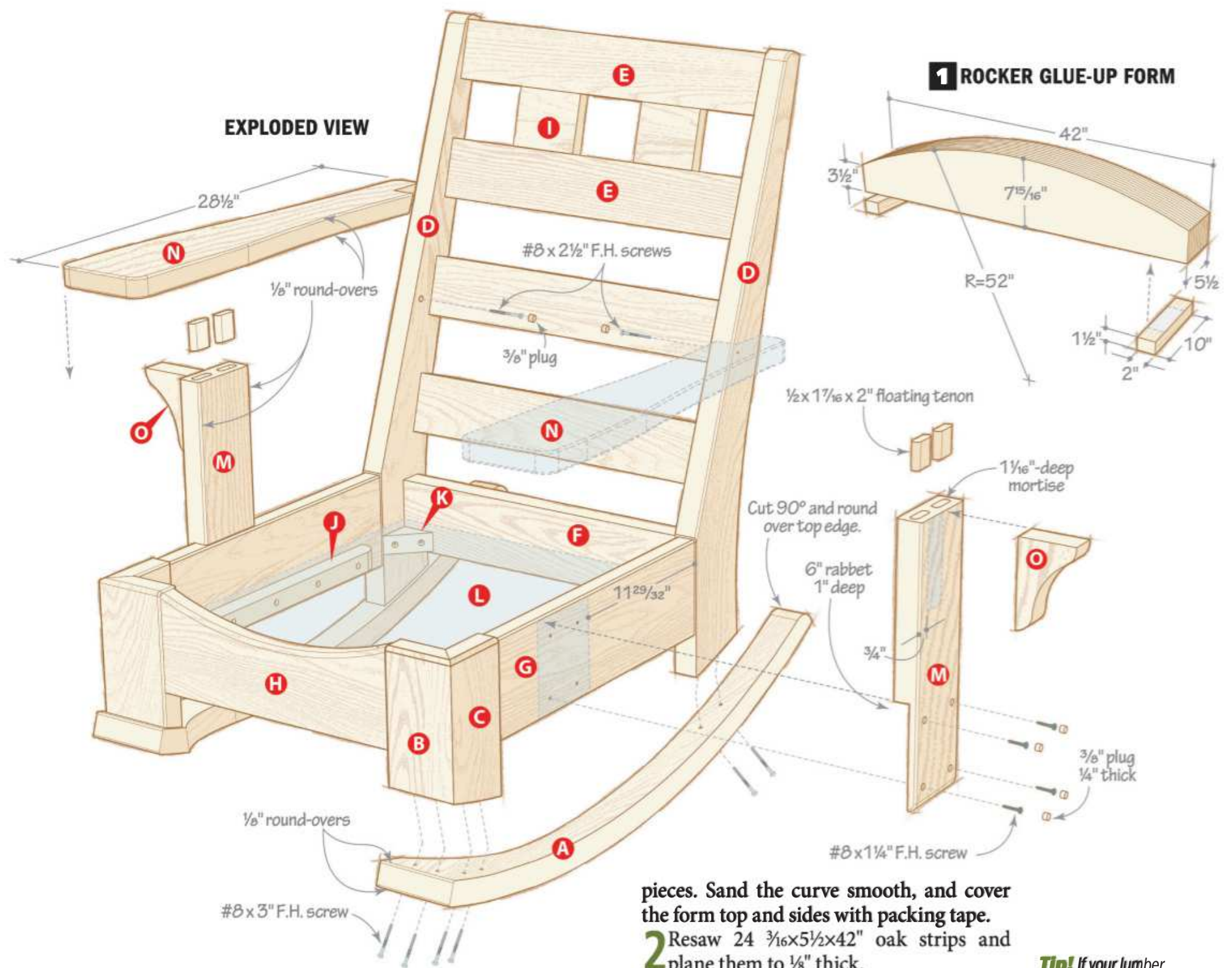
Mortise-and-tenon joints were essential to Charles Limbert's original rockers, but easy-to-cut floating tenons and our mortising jigs will help you achieve equally rugged results.

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materials cost:

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plus seat
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and
covering of
your choice

WOOD magazine Dec/Jan 2018/2019



Start with the rockers

Each rocker (A) is made from 12 layers (laminations) of $\frac{1}{8}$ "-thick material glued in layers around a bending form. To work within the glue's open time, you'll glue them up in three stages, as we'll explain in **Step 3**.

1 Cut 11 $\frac{1}{2} \times 8 \times 42$ " MDF blanks for the rocker glue-up form. Mark and cut curves [Drawing 1, Photo A], and laminate the

pieces. Sand the curve smooth, and cover the form top and sides with packing tape.

2 Resaw 24 $\frac{3}{16} \times 5 \frac{1}{2} \times 42$ " oak strips and plane them to $\frac{1}{8}$ " thick.

3 Glue up the first four layers and clamp them to the form [Photo B]. Allow the assembly to dry with the clamps in place overnight to minimize springback. Glue a second stage of four more layers on top of that, followed by the final four layers, allowing the glue to dry overnight between stages. Repeat for the other rocker.

4 Cut the rockers to 5×39 " from tip to tip, but wait to cut profiles.

Tip! If your lumber supplier charges more than twice as much for 8/4 stock as for 4/4, save money by cutting rocker laminations from 4/4 boards.



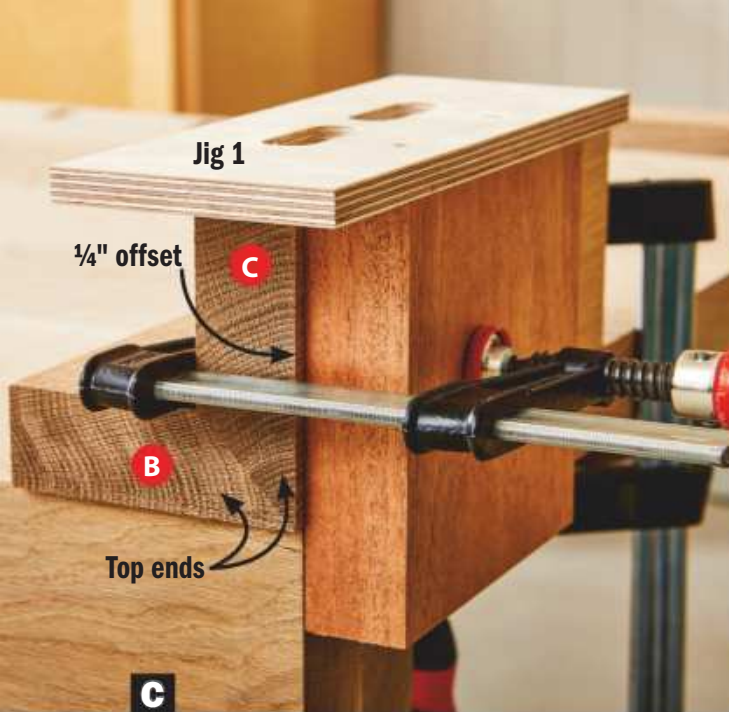
A

Pinch a 4' metal rule in a clamp to create a curve for the rocker forms. Then align the rule's curve with marks on the ends and center.



B

Elevate the rocker form on blocks to provide clamp clearance on both sides and the ends. The shape of the form allows for minor springback.



C Create a 1/4" offset between the side-rail edges (G) and the tops of the front legs (B/C) by shifting the edge of Jig 1 1/4" from the tops of the legs.

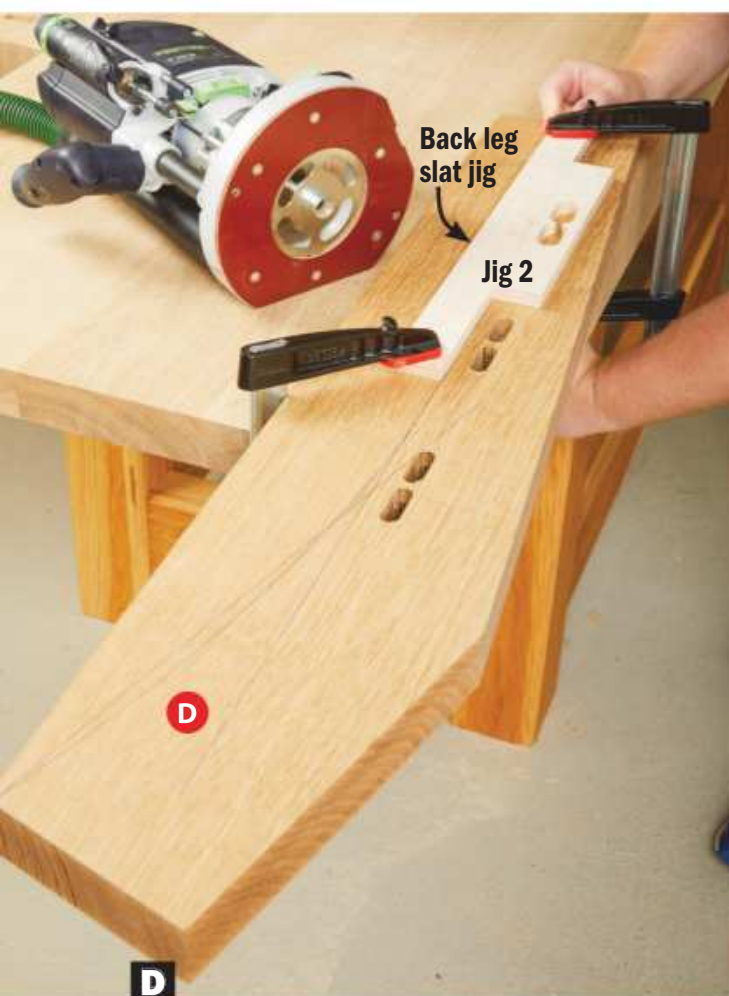
Make front and back legs

1 Build and label the five mortise-routing jigs shown on page 33.

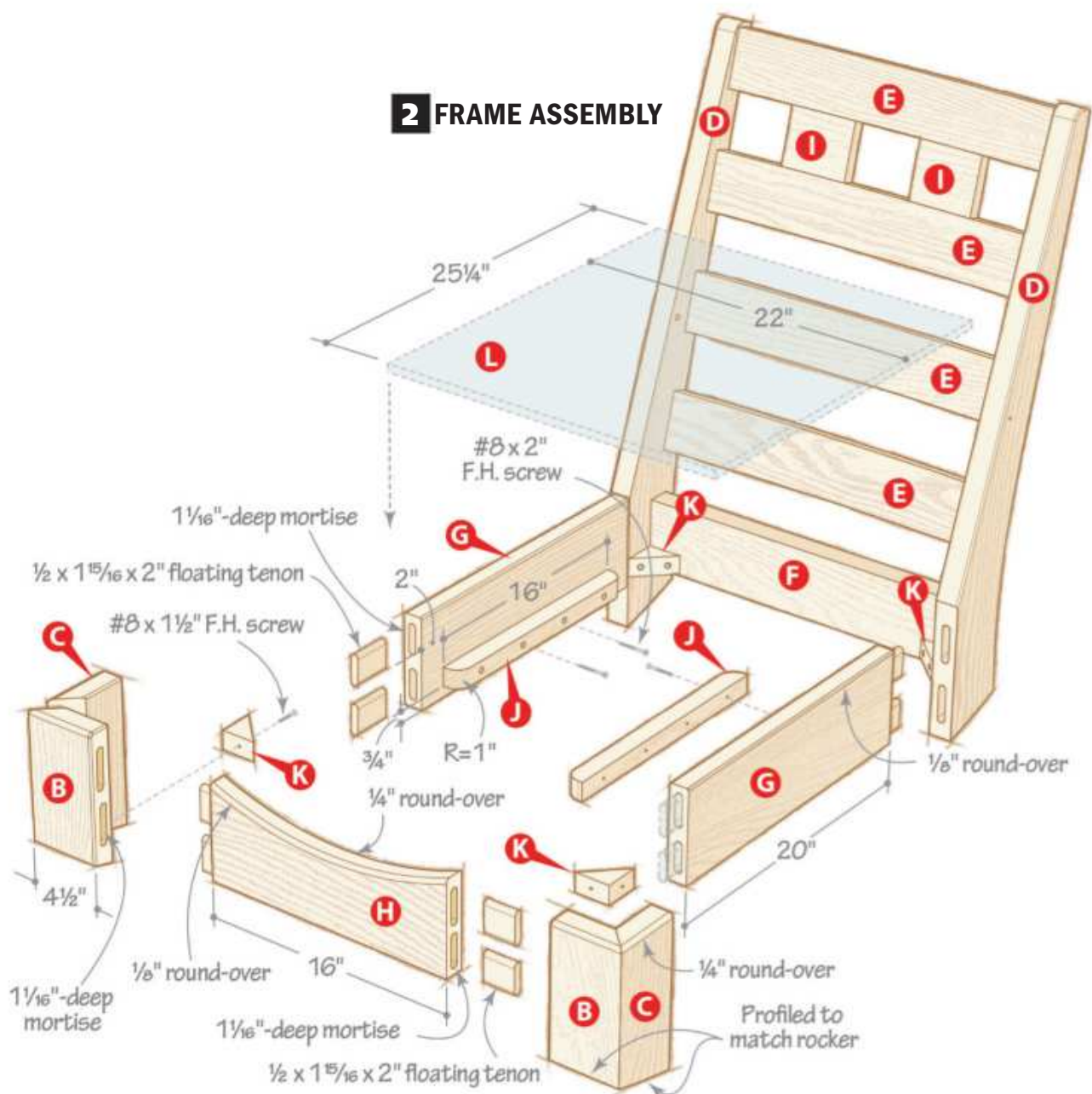
2 Cut the front leg halves (B, C) 1/2" over-width. Bevel-rip and glue the front leg halves [Drawing 2]. Use Jig 1 to mortise the front leg assemblies (B/C) [Photo C].

3 Lay out two 7x38" blanks for the back legs (D) and cut their front edges to shape [Drawing 3]. Mark the centerline of each mortise pair. Rout the mortises for the slats (E) using Jig 2 [Photo D] and for the back rail (F) using Jig 3.

4 Mortise the back leg for the side rails (G) using Jig 1 [Drawing 2]. Finish cutting the back legs to shape.



D Align the clamping tab edges of Jig 2 with the back edge of the back legs (D). Align the centerline on the jig with the centerline of a mortise pair.



Assemble the rails and back

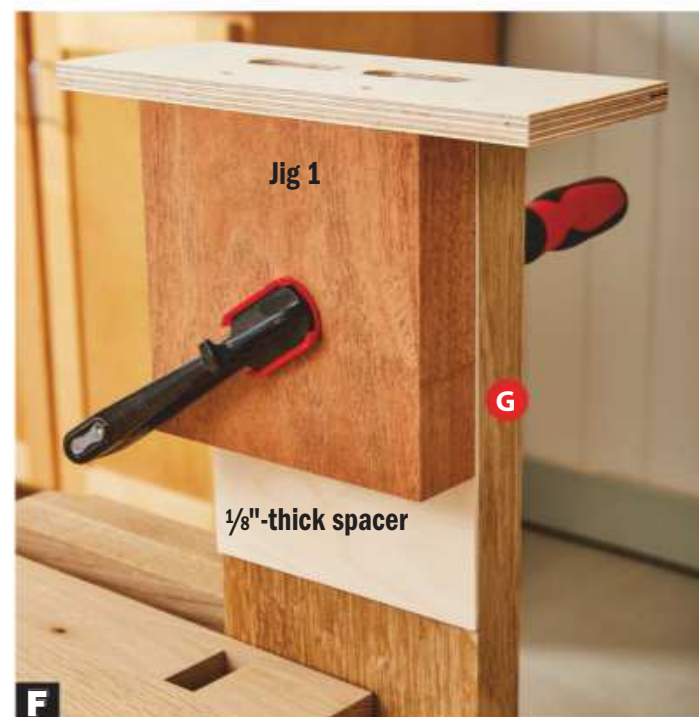
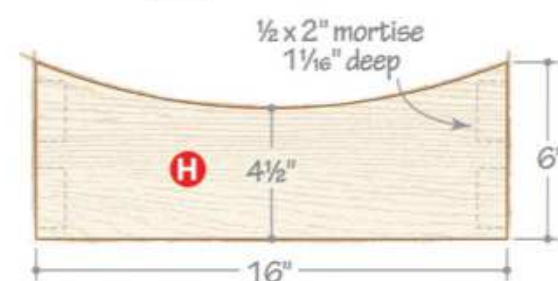
1 Cut the slats and rails (E-H) to size. Cut the slat spacers (I) from 1 1/2"-thick stock and set them aside.

2 Use Jig 4 to mortise the ends of the back slats (E) [Drawing 4, Photo E], and Jig 5 to mortise the back rail (F). Use Jig 1 to mortise the side rails (G) [Photo F] and front rail (H).



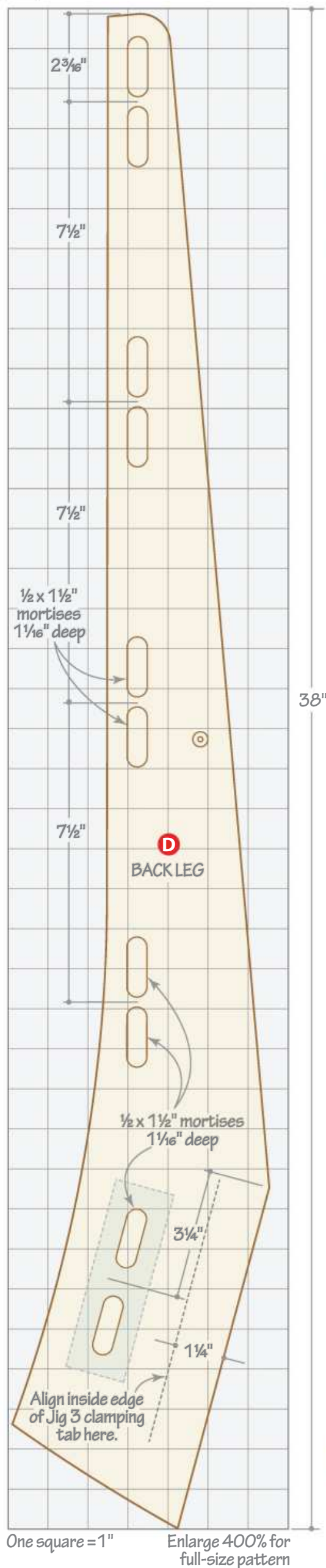
E Center Jig 4 on the end of a back slat (E). Place the jig's clamping leg against the same face of each workpiece at both ends.

2a FRONT RAIL

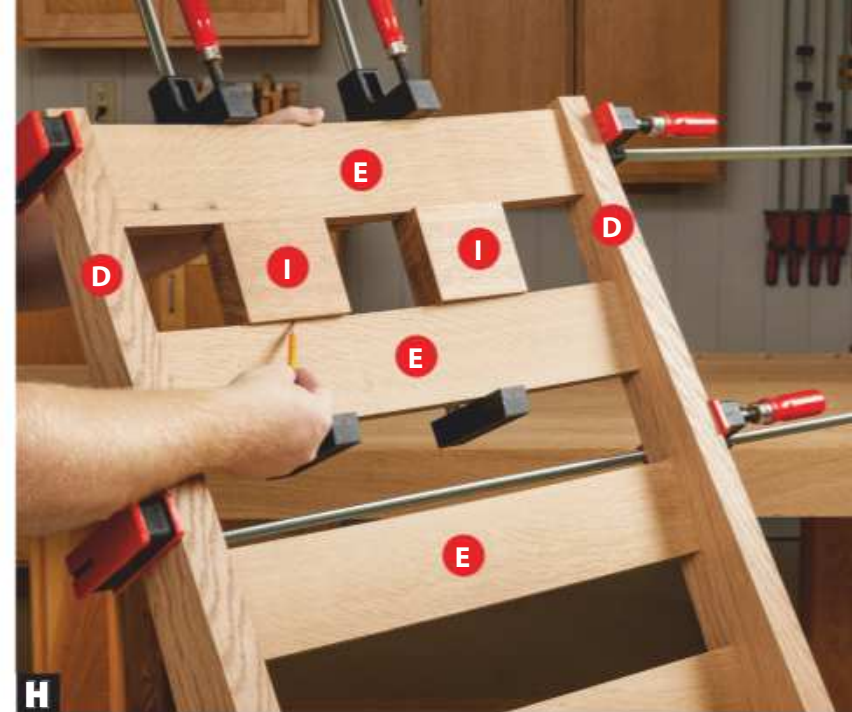


F Center the mortises on the side rail (G) ends by adding a 1/8" spacer between Jig 1 and a side rail face. Use the same face for both ends.

3 BACK LEG GRIDDED PATTERN



G Contour the back slats (E) after boring mortises for the floating tenons.



H When dry-assembled, the back slats (E) fit loosely enough to clamp the oversize slat spacers (I) between them.

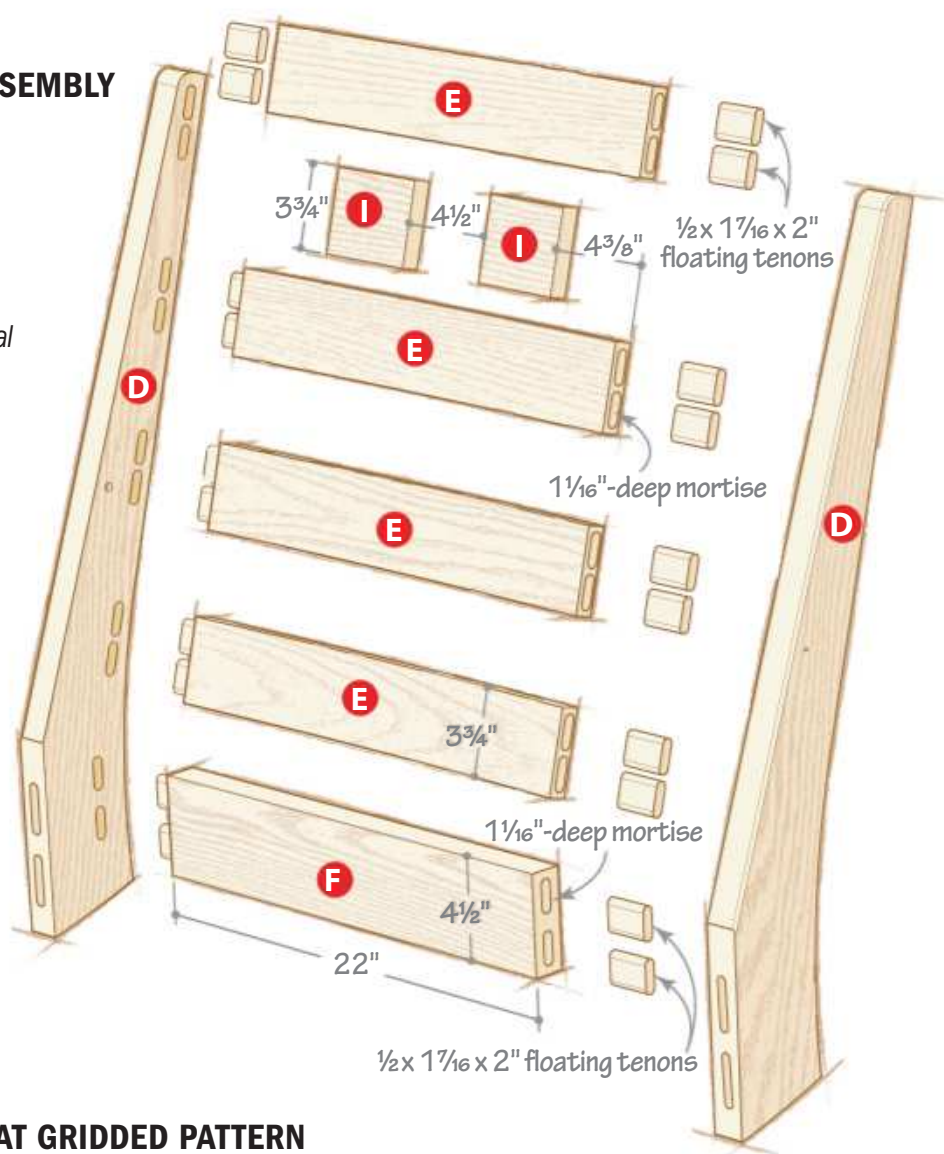
3 Shape and sand the back slats (E) [Drawing 5, Photo G] and front rail (H) [Drawing 2a].

4 To make floating tenons, cut $\frac{1}{2} \times 1\frac{15}{16} \times 60$ " and $\frac{1}{2} \times 1\frac{15}{16} \times 30$ " maple blanks. Rout $\frac{3}{8}$ " round-overs on all the edges without narrowing the strips. From the $1\frac{15}{16}$ "-wide blank, cut 24 tenons 2" long. From the $1\frac{15}{16}$ "-wide blank, cut 12 tenons 2" long.

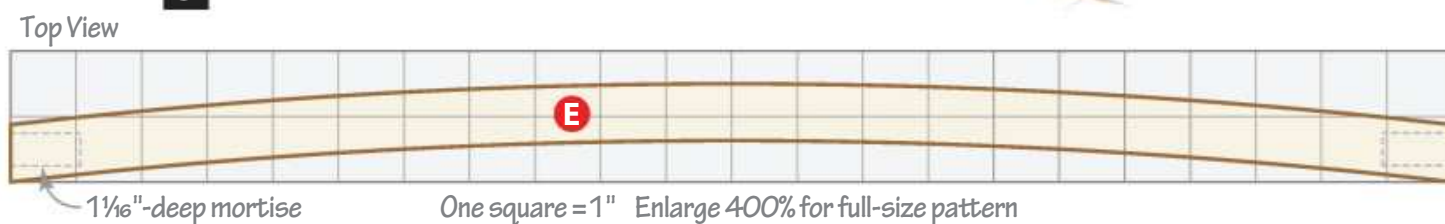
5 Dry-assemble the legs (B/C, D), rails (F, G, H), and slats (E). Rip the slat spacers (I) to fit between the top two back slats (E), clamp them in position, and scribe the front and back curves [Drawing 4, Photo H]. Bandsaw and sand the spacers to shape, then glue them in place.

4 BACK LEG ASSEMBLY

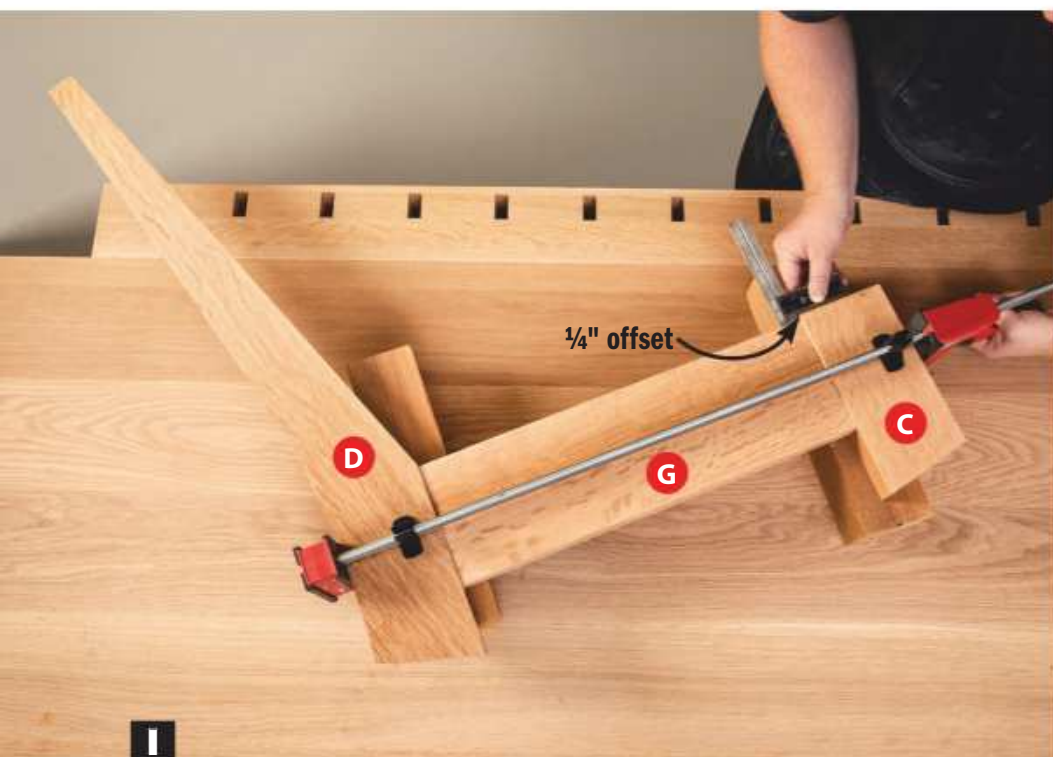
Tip! Download a full-size back-leg pattern and have a local print shop make full-size copies on 36x48" blueprint stock. woodmagazine.com/rockerlegs



5 BACK SLAT GRIDDED PATTERN



6 ROCKER GRIDDED PATTERN



I Glue the front legs (B/C) to the seat side rails (G) with a 1/4" offset. Make the other end of the rail edge flush with where the back leg (D) angle starts.



J Lightly clamp a rocker (A) to a side assembly without straightening the curve.



K Butt the end of the arm (N) against the edge of the back leg (D) and use a 3"-wide scrap to trace the angle of the leg onto the edge of the arm.

Assemble the chair frame

1 Dry-assemble a front leg (B/C), back leg (D), and side rail (G) to make two sides. Clamp a rocker (A) to the bottoms of the legs [Drawing 6], then scribe, cut, and sand to shape the bottoms of the legs.

2 Bandsaw the rockers to shape [Drawing 6]. Sand the rockers and frame parts B–H.

3 Glue the legs (B/C, D) to the side rails (G) [Photo I]. Glue and screw the rockers to the side assemblies [Exploded View, Photo J].

Note: Drill the counterbored screw holes in the rockers perpendicular to the rocker—not parallel with the chair legs—to leave a round hole for the plugs.

4 Glue the slats (E, E/I), back rail (F), and front rail (H) to the side assemblies (A–D/G) [Drawing 2].

5 Cut the cleats (J) and braces (K) to size. Glue and screw them to the frame [Drawing 2]. Cut the seat (L) to fit and set it aside.

Attach the arms

1 Cut and rabbet the arm supports (M) [Exploded View]. Mortise the top ends using Jig 5.

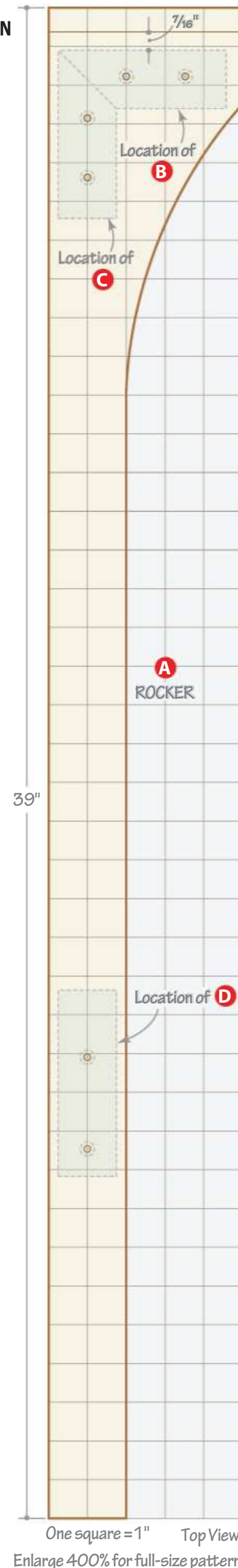
2 Cut the arms (N) to shape, but without the notch at the narrow end [Drawing 7]. Mortise the arms using Jig 3, aligning the short edge of the jig with the inside edge of the arm.

3 Dry-assemble (without tenons) an arm support (M) and arm (N) on the side rail (G). Mark and notch the arm to match the angle of the back leg (D) [Photo K].

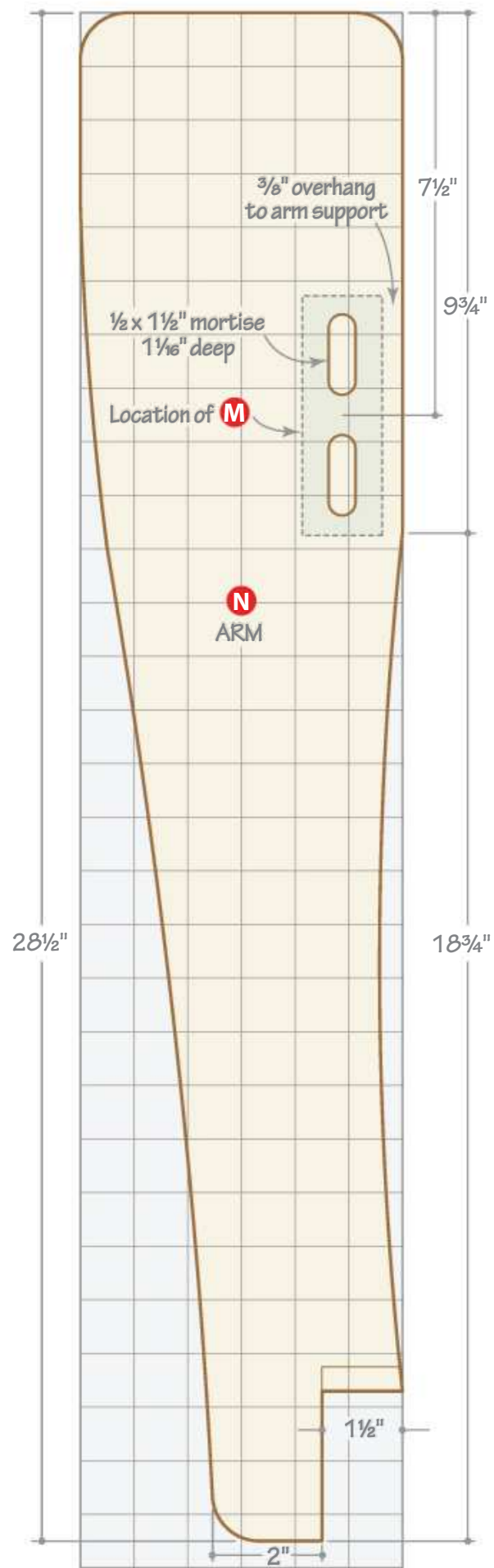
4 Glue the arm supports (M) to the arms (N). Glue and screw the arm assemblies to the side rails (G) and back legs (D) [Exploded View]. Plug the counterbores.

5 Cut arm brackets (O) to shape [Drawing 8] and glue them in place [Exploded View].

Note: Remember to flip the pattern to mark rockers for a right and left profile.

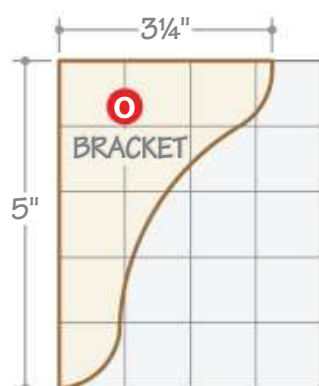


7 ARM GRIDDED PATTERN



One square = 1" Enlarge 400% for full-size pattern

8 ARM BRACKET GRIDDED PATTERN

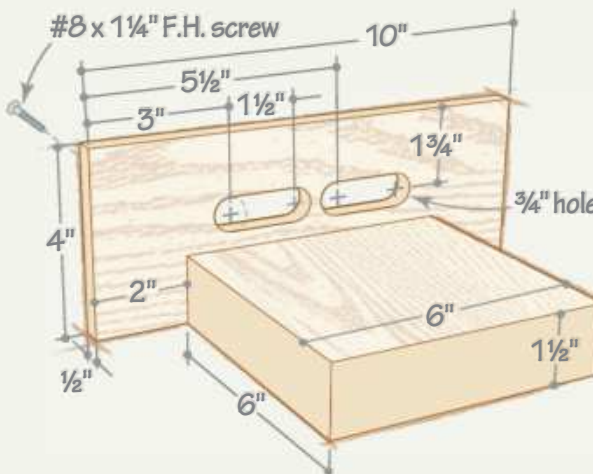


One square = 1"
Enlarge 400% for full-size pattern

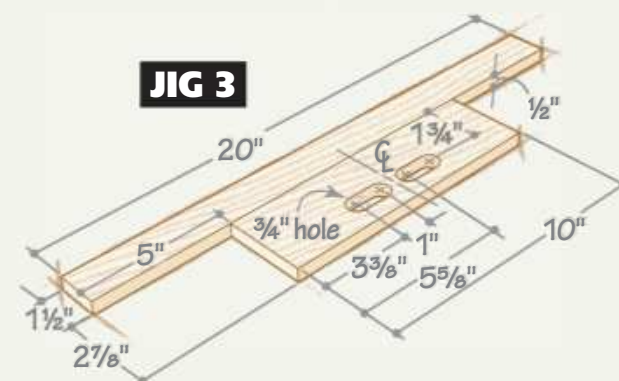
Rout meticulous mortises with these simple jigs

Floating tenons won't sink your project when you use these five jigs to rout precise mortises using a 1/2" upcut spiral bit and 3/4" guide bushing. Check that the guide bushing slides smoothly but snugly within the slots.

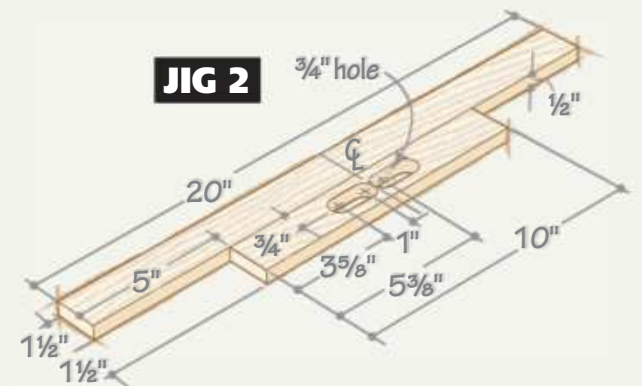
JIG 1



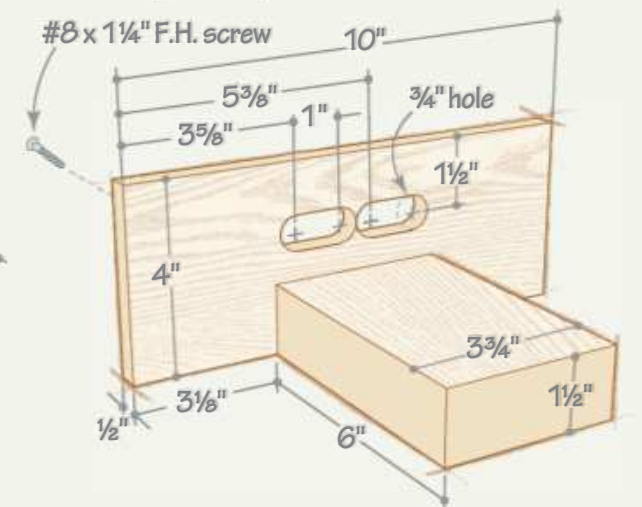
JIG 3



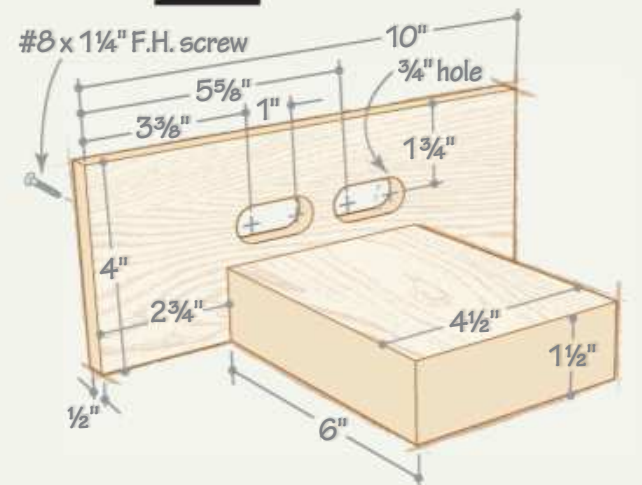
JIG 2



JIG 4



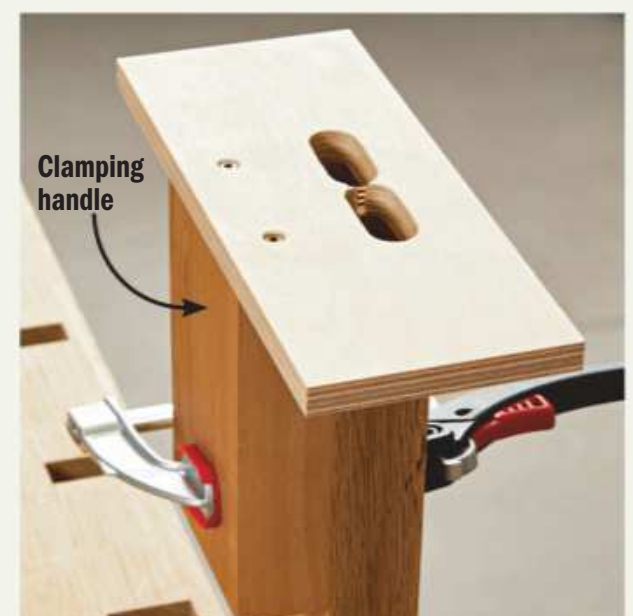
JIG 5



Lay out hole locations on the jig blank and drill the 3/4" holes forming the rounded ends of the slots.



Cut straight lines in the waste area between the holes and sand to the lines.



Clamping handles on Jigs 1, 4, and 5 center the mortises on the ends of the rails.

Almost ready to rock

- 1 Finish-sand where needed and stain. (We used Old Masters dark mahogany.) Then apply the clear finish of your choice. (We used a basecoat of Zinsser Bulls Eye amber shellac for added color and topped that with two coats of spray lacquer.)
- 2 Cut two 6×22×25½" pieces of upholstery foam for the cushions. Sew the cushions using the covering of your choice.
- 3 Screw the seat (L) to the cleats (J) and braces (K). Then add the seat cushions and relax with your next issue of WOOD® magazine. 🌲

Tip! If you lack experience making seat cushions, turn the job over to an upholsterer for less waste and better results.

Build these companion pieces

Make your rocking chair part of a room set. Go to woodmagazine.com/plans for the instructions you need to build these Arts & Crafts furnishings.



Limbert-style End Table (issue 236, Nov. 2015)
Simple flowing lines make it a natural fit in many interiors.



Limbert-style Coffee Table (issue 234, Sept. 2015)
This coffee table will impress guests with its visually intriguing cutouts and subtle curves.



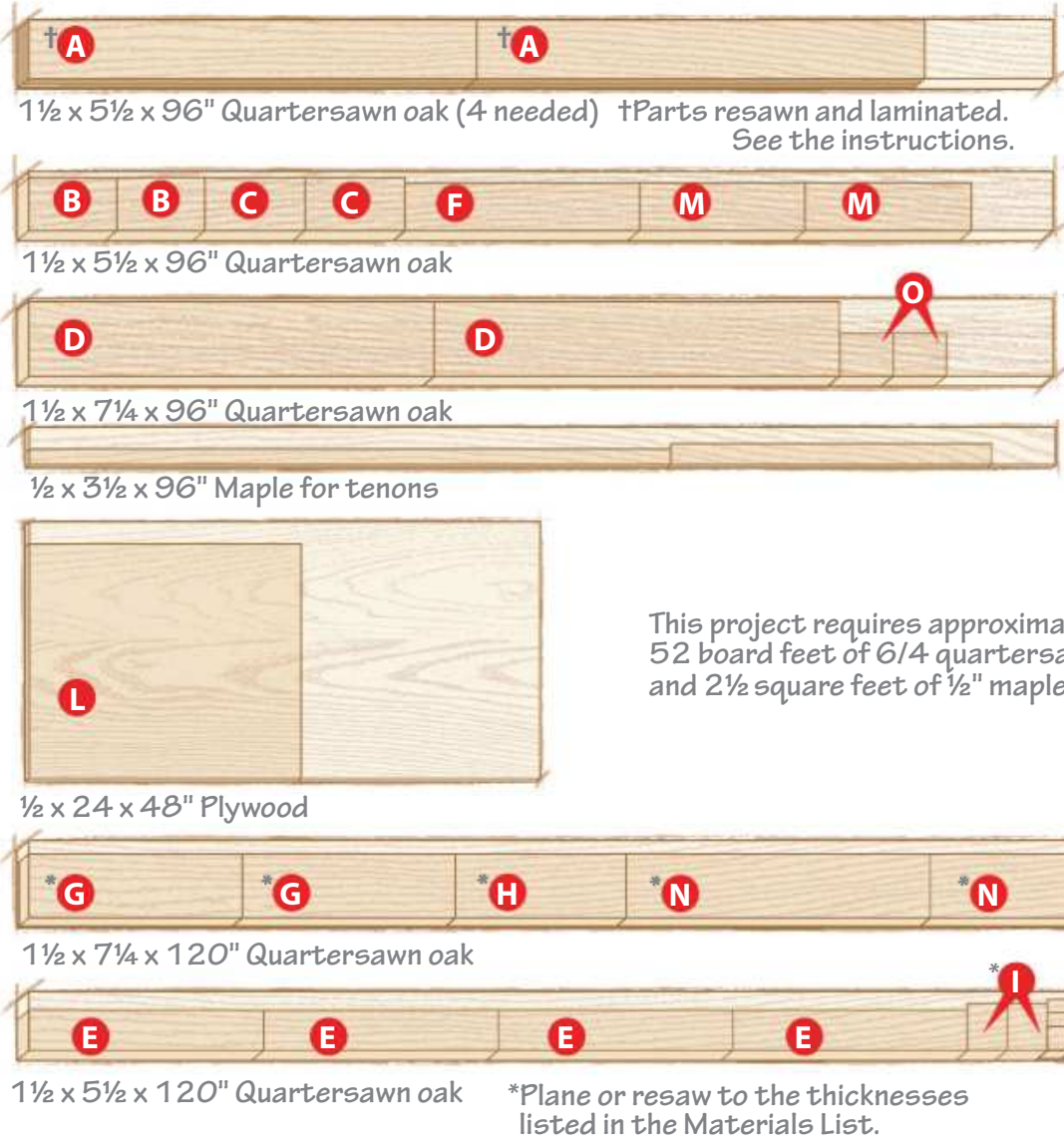
Limbert-style Arts & Crafts Table (issue 192, Sept. 2009)
This end table features the hallmarks of Charles Limbert's designs: curves and cutouts.



Morris Chair & Ottoman (issue 212, July 2012)
The most comfortable chair and footrest you'll ever build.

Cutting Diagram

Produced by Robert Wilson with John Olson
Project design: John Olson
Illustrations: Roxanne LeMoine, Lorna Johnson



Materials List

Part	FINISHED SIZE			Matl.	Qty.
	T	W	L		
A* rockers	1½"	5"	39"	L0	2
B* front leg fronts	1½"	4½"	8¼"	O	2
C* front leg sides	1½"	4½"	9¾"	O	2
D* back legs	1½"	6½"	37⅞"	O	2
E back slats	1½"	3¾"	22"	O	4
F back rail	1½"	4½"	22"	O	1
G side rails	1¼"	6"	20"	O	2
H front rail	1¼"	6"	16"	O	1
I* slat spacers	1"	3¾"	4¾"	O	2
J cleats	1¼"	1¼"	16"	O	2
K braces	1¼"	2¼"	2¼"	O	4
L seat	½"	22"	25¼"	P	1
M arm supports	1½"	4½"	16"	O	2
N arms	1¼"	6"	28½"	O	2
O arm brackets	1½"	3¼"	5"	O	2

*Parts initially cut oversize. See the instructions.

Materials key: L0-laminated oak, O-quartersawn oak, P-plywood.
Supplies: #8×1¼" flathead screws, #8×1½" flathead screws, #8×2" flathead screws, #8×2½" flathead screws, #8×3" flathead screws.
Blade and bits: Dado set; ⅛" round-over, ¼" round-over, ⅜" round-over, and ½" upcut spiral router bits; ¾" OD router bushing, and ⅜" plug cutter.



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PROFESSIONAL HVLP



We honor these eight new tools and accessories as the most innovative in the field of woodworking.



Super-compact 12-volt router

Although battery-powered routers have been around for years, they've all run on bulky 18-volt or larger battery packs. Bosch's new compact router uses a single 12-volt pack to power the offset spindle and 1/4" collet. It has a larger base than most trim routers, but weighs just over 2 pounds.

12-volt palm router

no. GKF12V-25N, \$150 (bare tool)
Bosch
877-267-2499, boschtools.com



Perfect slots are only a click away

Unlike traditional adjustable slot cutters that use shims to fine-tune slots to precisely fit a mating workpiece, Infinity's Precision Twist bits do the job mechanically. Simply rotate the adjuster knob one "click" to adjust slot width .004". Each bit features a top and bottom cutter with an adjustment range up to 1/4" and a bearing that limits the depth of cut to 1/2".

Precision Twist slot-cutting bits

1/8-1/4", no. 61-512, \$140; 1/4-1/2", no. 61-513, \$140;
2-pc. set, no. 00-512, \$250
Infinity Cutting Tools
877-872-2487, infinitytools.com



Fine-tune miters at any angle

A shop-made shooting board and hand plane work great to trim miters to a single precise angle. But the head of Lee Valley's new shooting board locks at any angle, with detents at 0°, 18°, 22.5°, 25.7°, 30°, 36°, 45°, and 60°. The board comes with everything except the plane and an auxiliary wood fence that you provide. Your shooting plane rides on a UHMW track, with an adjustable rail to prevent the plane from pushing away from the workpiece. (Remove this rail to use a regular bench plane.) You can also buy just the fence/head and make your own shooting board.

Veritas adjustable shooting board

no. 05P54.90 (right hand) or 05P54.91 (left hand), \$199;
fence alone, no. 05P54.85, \$109
Lee Valley
800-871-8158, leevalley.com



Get zero-measure accuracy without the cost of a rail-mount saw

Unless you own a rail-guided plunge saw, you typically have to factor in the offset measurement between the blade and the edge of the circ saw's base when guiding it with a straightedge. With the cordless ExacTrack circular saw, you simply clamp your straightedge on the cutline, rest the base's red portion on the straightedge, press the blade against the edge, and cut precisely on the mark. The base works with any straightedge up to 3/4" thick.

ExacTrack 20-volt 6 1/2" circular saw

bare tool, no. WX530L.9, \$100;
with one 2.0 Ah battery and charger, no. WX530L, \$120
Worx
855-279-0505, worx.com



Straightedge

woodmagazine.com



Clamping force gets more compact

Bessey's new GearKlamps look and work similarly to traditional F-style clamps, but without the handle extending from the sliding jaw. Instead, the in-line handle rotates around the bar for easy access in tight spaces, and four gears (inset photo) transfer clamping force to the padded jaw. Bessey says these clamps can produce up to 450 pounds of clamping force.

GearKlamp

6" (GK15) \$16; 12" (GK30) \$20; 18" (GK45) \$23; and 24" (GK60) \$25
Bessey Tools

800-828-1004, besseytools.com



Cutting tools now “talk” to the vacuum

Makita’s new Autostart Wireless System (AWS) uses Bluetooth technology to link a shop vacuum/dust extractor with likewise equipped cordless sliding mitersaws, rail-guided saw, and concrete rotary hammers. Simply sync the tool and vacuum, and then every time you activate the tool’s trigger, it automatically powers up the vac as well. These machines and the vacuum run on two 18-volt LXT battery packs, so you don’t need any electric cords.

Autostart Wireless System

Dust extractor, no. XCV08Z, \$460; 10" sliding compound mitersaw, no. XSL04ZU, \$515 (bare tool); 6½" plunge-cut saw, no. XPS02ZU, \$360 (bare tool)
Makita
800-462-5482, makitatools.com



Powermatic thinks outside the box for air cleaner

The innovation here comes from the pleated electrostatic filter, which the company claims traps dust as fine as .1 micron—an incredible accomplishment compared to other air-filtration systems that claim 1-micron filtration. The fan runs at a whisper-quiet level, so you’ll be more likely to leave it running all the time. The cover screen and filter can both be removed and cleaned when needed.

Micro-Dust air-filtration system

no. PM1250, \$700
Powermatic
800-274-6848, powermatic.com



Muffler quiets the ‘clone

Noise remains the biggest objection to keeping a dust collector running all the time you’re in the shop. Oneida’s new stacking sound filter installs in-line with the cartridge filter of many of its cyclone collectors, reducing the noise output by 6–7 decibels, according to Oneida, without adding to the machine’s footprint.

Stacking sound filter

13" diameter, no. BSS131400, \$199;
18" diameter, no. BSS181600, \$229
Oneida Air Systems
800-732-4065, oneida-air.com



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Oil-pulse Impact Drivers

These tools drive fasteners much more quietly than traditional impacts.

If you've ever used an impact driver to drive screws, you have an appreciation for its tremendous torque, typically 3–4 times more than a comparable drill/driver. Impacters tend to be lighter and smaller than drill/drivers—more reasons to love them. But their loud clattering noise can drive you crazy, especially when working in tight surroundings, such as when hanging wall cabinets or installing a countertop onto a base cabinet. But now there's a quieter alternative: oil-pulse impact drivers.

We tested four battery-powered oil-pulse drivers head-to-head, and ran a traditional cordless impact driver (the Makita XDT12Z) through the same tests for comparison.

How they work

A typical impact driver uses a spinning hammer-and-anvil mechanism to increase rotational torque. (See illustration on *next page*.) The more demand a fastener puts on the tool, the more torque the hammer and anvil attempt to apply by slamming together. It's this metal-on-metal action that creates the loud noise and vibration.

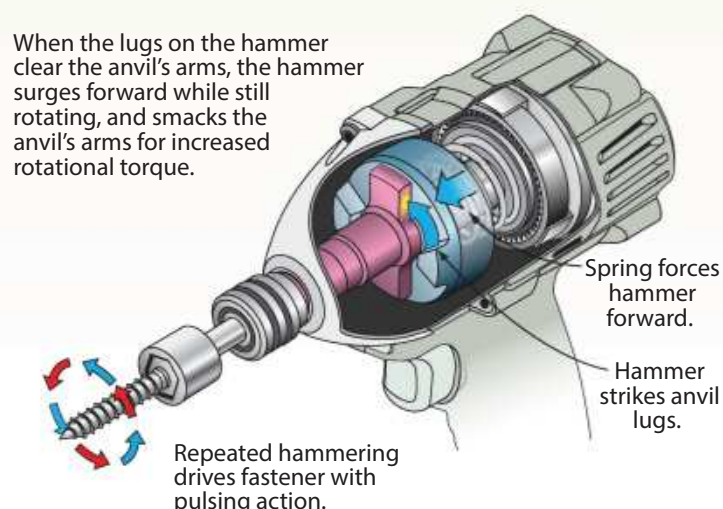
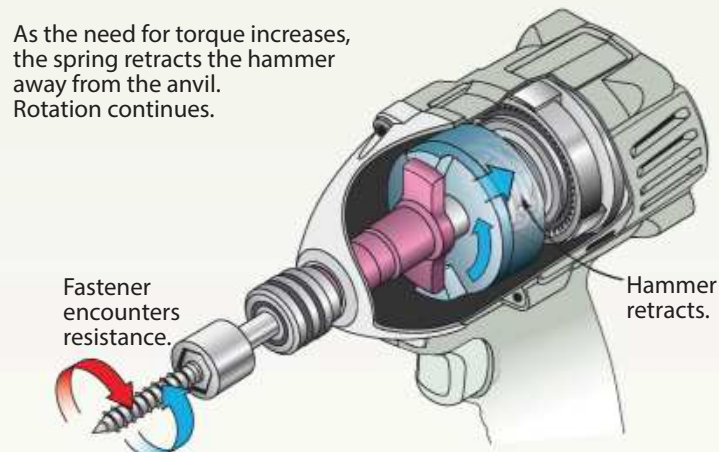
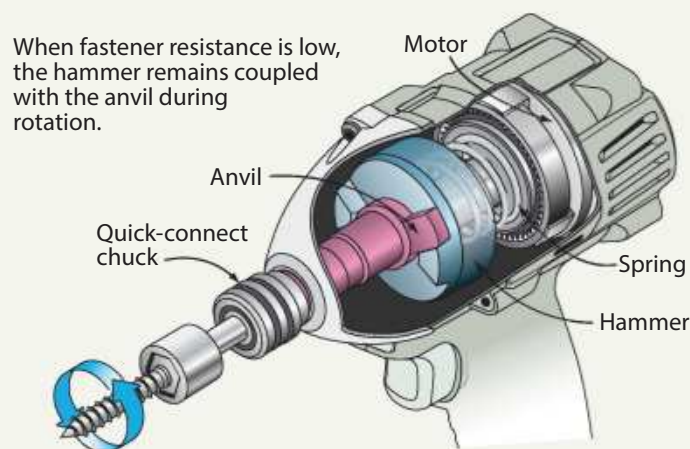
An oil-pulse driver uses a different hammer-and-anvil mechanism, encased in a module containing gear oil. Rapid, pulsing movement of this fluid operates the hammer and anvil, which make contact for a longer, but slower, duration to create quieter impacts (compared to regular impact drivers). And manufacturers tell us this “cushioned-impact” system helps prolong tool life.

► Learn more about standard impact drivers.
woodmagazine.com/impactdriver

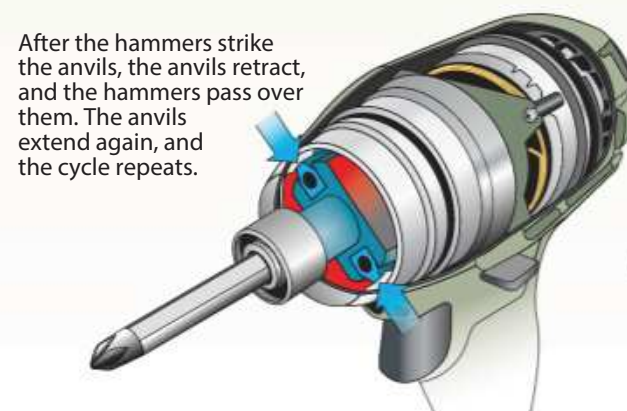
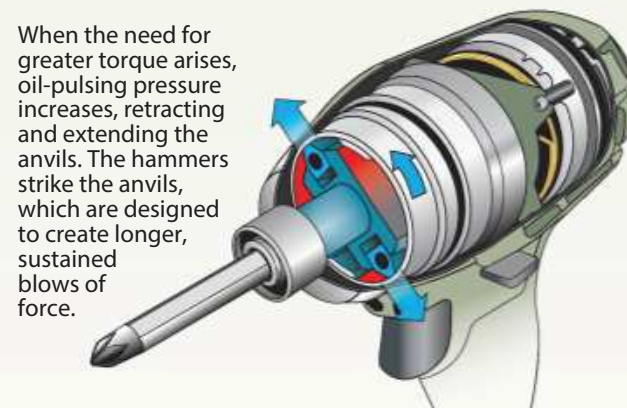
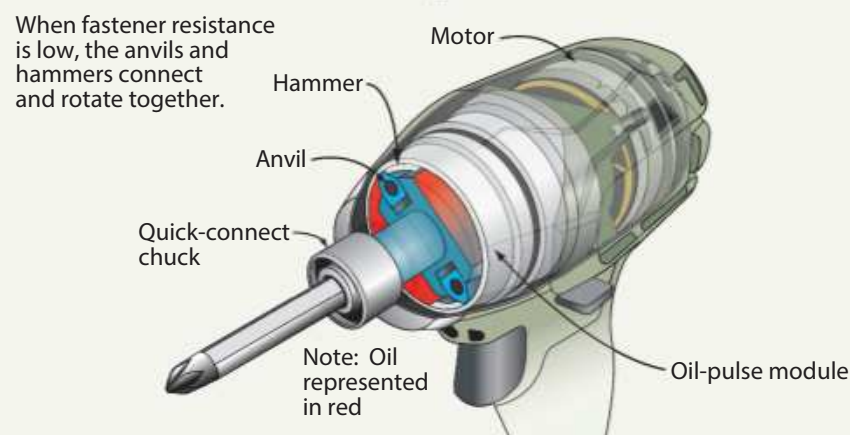


How Oil-Pulse Drivers Differ

Standard Impact Driver



Oil-pulse Driver



Note: The oil-pulse driver illustrated here resembles the Makita and Milwaukee tools. The Ridgid and Ryobi tools use a different type of mechanism.

Power exceeds rated torque

With each tool, we drove three sizes of wood screws and lag screws up to 3½" long in Douglas fir lumber. The Ridgid Stealth Force demonstrated the most power among the four oil-pulse drivers, performing about equal to the traditional-impact Makita XDT12Z, despite being rated as having half as much torque. (See the chart on *page 43*.) The Milwaukee Surge driver ranked as second most powerful among the oil models, followed by the Makita Oil Impulse and the Ryobi Quietstrike, respectively. Despite the differences, each of these oil-pulse impact drivers produce all the torque you'll likely ever need in your shop, as well as when you build that new deck, pergola, or garden arbor.

A substantial noise and vibration difference

The oil-pulse drivers consistently created 5–8 fewer decibels of noise in our testing, compared to the traditional impact. That's a noise level one-half to one-quarter that of traditional drivers. Compound that noise reduction over a day or more, and you'll greatly appreciate these new tools.

In addition, oil-impulse drivers vibrate noticeably less than traditional impacts. Even after driving a few dozen fasteners, we experienced none of the hand and arm tingling that normally results from using a traditional impact driver. The Ridgid driver, like the others, did not show excessive vibration, but under heavy load tended to wobble significantly.

► Watch videos of these oil-pulse impact drivers to better understand how the internal mechanisms work. woodmagazine.com/oilpulse

► The National Institute for Occupational Safety and Health (NIOSH) has determined 85 decibels to be the threshold where you can experience hearing loss in even a day's work. So wear hearing protection while using tools making noise at or above that level.



Makita's Oil Impulse driver has four speed settings, a battery-charge gauge, and an on/off switch for the LED, all electronically operated.



Milwaukee's Surge also has four speed settings, controlled electronically, but the battery gauge is on the battery rather than the tool.

More helpful features abound

■ **Battery power.** All four oil drivers run on battery packs compatible with each brand's existing 18-volt line. All but the Ridgid sell as bare tools, saving you money if you already own that brand's battery packs and charger. Each model except the Makita also sells in a kit with batteries and charger.

■ **Multiple speed ranges.** The Makita, Milwaukee, and Ridgid drivers offer at least three speed-range settings, letting you select the best range for the fastener you're using. A fourth setting on the Makita and Milwaukee drivers (shown *above*) starts self-tapping screws at a fast speed until the threads grab, then the tool automatically reduces the

speed to seat it without stripping. All the drivers have variable triggers, so you can control the speed within each range by feathering the trigger.

■ **Brushless motors.** The Makita and Milwaukee drivers have brushless motors that allow for a smaller overall size. The Ridgid, though also with a brushless motor, comes in a bulkier body as a result of its larger oil-pulse module.

■ **Quick-connect chucks.** Each of the four oil drivers has a 1/4" hex chuck that features one-hand bit installation, meaning you don't have to retract the sleeve (as when removing bits). All the chucks performed well.



Use impact-ready driver bits with an impact driver to avoid twisting or shearing off regular bits. Impact bits are typically black in color and labeled as impact-ready.



Makita Oil Impulse XST01Z,
\$180 (bare tool)

800-462-5482, makitatools.com



Milwaukee Surge 2760-20,
\$150 (bare tool)

800-729-3878, milwaukeetool.com



Ridgid Stealth Force R86036K, \$200 (kit)

866-539-1710, ridgidpowertools.com



Oil-pulse drivers make a quiet impact

MODEL	PERFORMANCE RATINGS (1)						RATED TORQUE, INCH-POUNDS (IN-LBS)	MAXIMUM IMPACTS PER MINUTE	SPEED RANGES (NO LOAD), RPM	WEIGHT, LBS-OZ	WARRANTY, YEARS (2)	COUNTRY OF ASSEMBLY (3)	PRICE (4)	
	TORQUE	ABSENCE OF VIBRATION	OVERALL FEEL AND BALANCE	EASE OF CHANGING SPEEDS	NOISE LEVEL AT ARM'S LENGTH (DECIBELS)	LED EFFECTIVENESS							BARE TOOL	WITH BATTERY PACKS & CHARGER
OIL-PULSE IMPACT DRIVERS														
MAKITA OIL IMPULSE XST01Z	B+	A	A	A	82	B-	355	2700	0-1200, 0-2000, 0-3200	2-10	3	J	\$180	NA
MILWAUKEE SURGE 2760-20	A-	A	A	A	84	B-	450	4000	0-900, 0-2100, 0-3000	3-4	5	C	\$150	\$250 (2.0 Ah packs)
RIDGID STEALTH FORCE R86036	A	B	C	B	81	A	750	1700	0-1000, 0-1800, 0-2400	4-3	3*	C	NA	\$200 (2.0 Ah packs)
RYOBI QUIETSTRIKE P290	B	B+	C	C+	81	A-	450	2200	0-3200	4-1	3	C	\$80	\$100 (1.5 Ah pack)
TRADITIONAL IMPACT DRIVER														
MAKITA XDT12Z	A	C	A	A	89	B-	1550	3800	0-1100, 0-2100, 0-3200, 0-3600	2-13	3	J	\$150	\$260 (2.0 Ah packs)

1. **A** Excellent
B Good
C Fair
D Poor

2. (*) Lifetime service agreement, upon registration

3. (C) China
(J) Japan

4. Prices current at time of article production and do not include shipping, where applicable.
NA Not sold in this configuration

► We tested each tool with “slim” battery packs (1.5 or 2.0 Ah) to make the tool as light and nimble as possible. If you prefer, each manufacturer offers larger battery packs.

■ **Light the work.** All four drivers illuminate the area in front of the chuck with LEDs. The Ridgid and Ryobi provide the best lighting, shown *below*, but Ryobi’s trigger must be depressed to activate the light. A switch on the Ridgid’s handle activates the

LED, which stays on about 10 seconds after releasing this switch or the trigger. The Makita and Milwaukee drivers use a single LED just above the trigger that creates shadows around the fastener during use.



Ryobi Quietstrike P290,
\$80 (bare tool)
800-525-2579, ryobitools.com



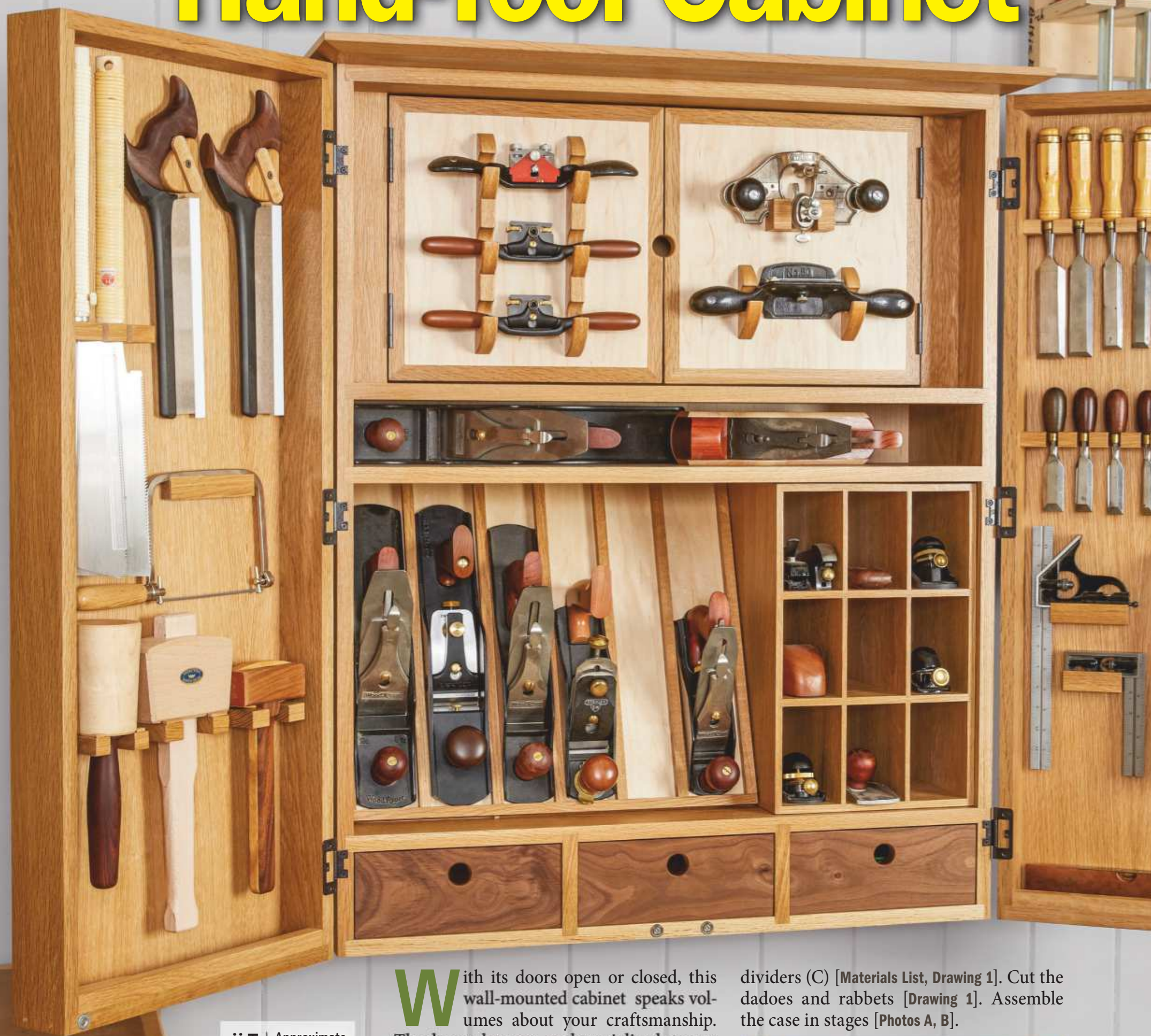
Ridgid's Stealth Force uses three bright LEDs surrounding the chuck to provide shadow-free illumination, best among this test group.

The bottom line

Although we appreciate the Ridgid Stealth Force’s torque, its large size and weight negate a couple of key reasons we like an impact driver in a woodshop. The Makita Oil Impulse and Milwaukee Surge performed similarly in our tests, without the bulk of the Ridgid. Because it was so close between these two—Milwaukee had slightly greater torque, but the Makita was a little quieter—they share our Top Tool honor. 🌳

Produced by **Bob Hunter** with **Michael Springer**

Heirloom Hand-Tool Cabinet



D I M E N S I O N S :
34" W x 14" D x 40 3/4" H

Approximate materials cost:

\$300

Customize tool holders to fit your collection.

With its doors open or closed, this wall-mounted cabinet speaks volumes about your craftsmanship. The doors, drawers, and specialized storage areas provide ample accommodations for your most-prized tools. With joinery you can cut on the tablesaw or router table, it's quick to construct, too.

Build the case

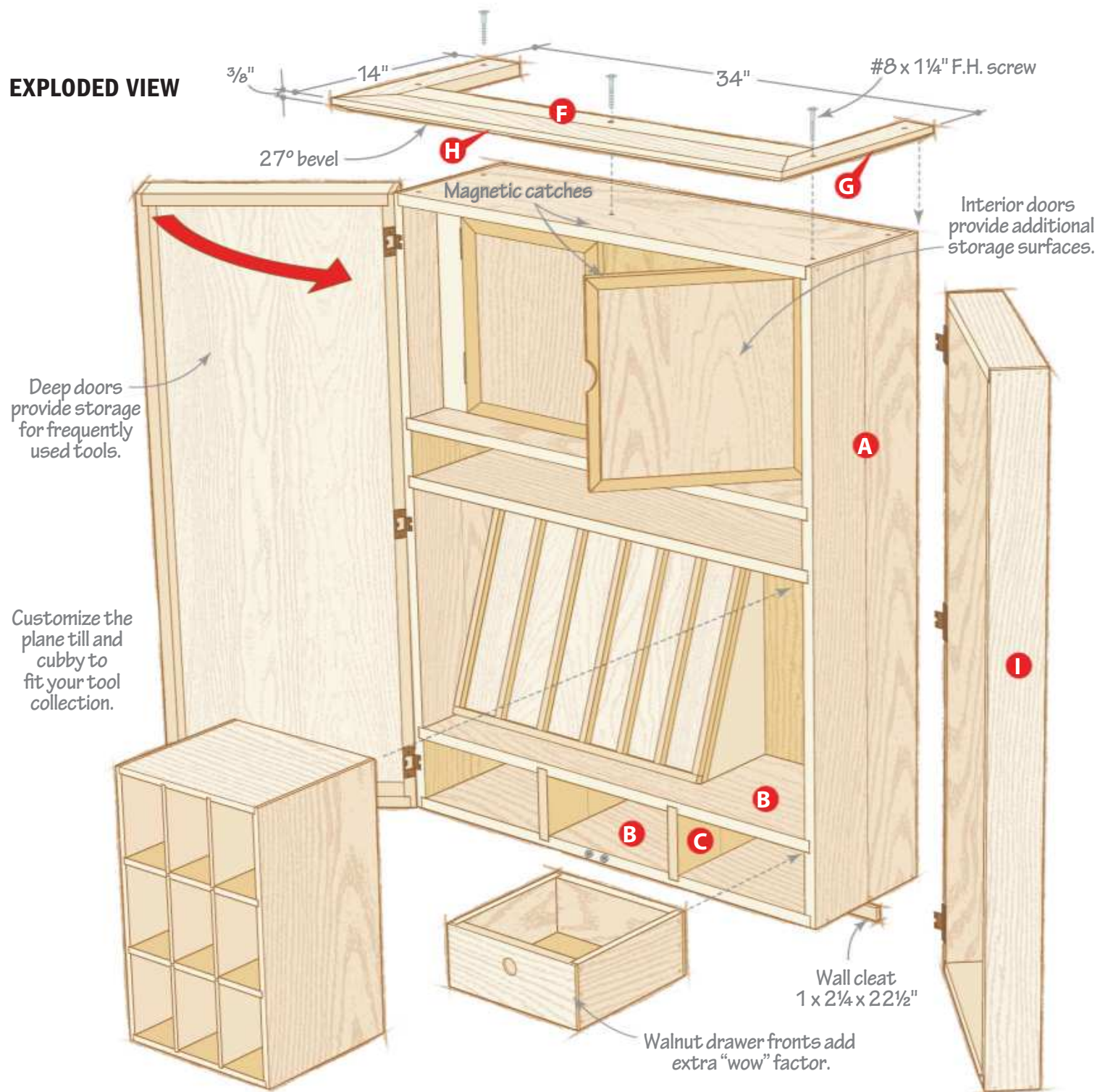
1 Glue up and cut to size panels for the sides (A), top/bottom/shelves (B), and

dividers (C) [Materials List, Drawing 1]. Cut the dadoes and rabbets [Drawing 1]. Assemble the case in stages [Photos A, B].

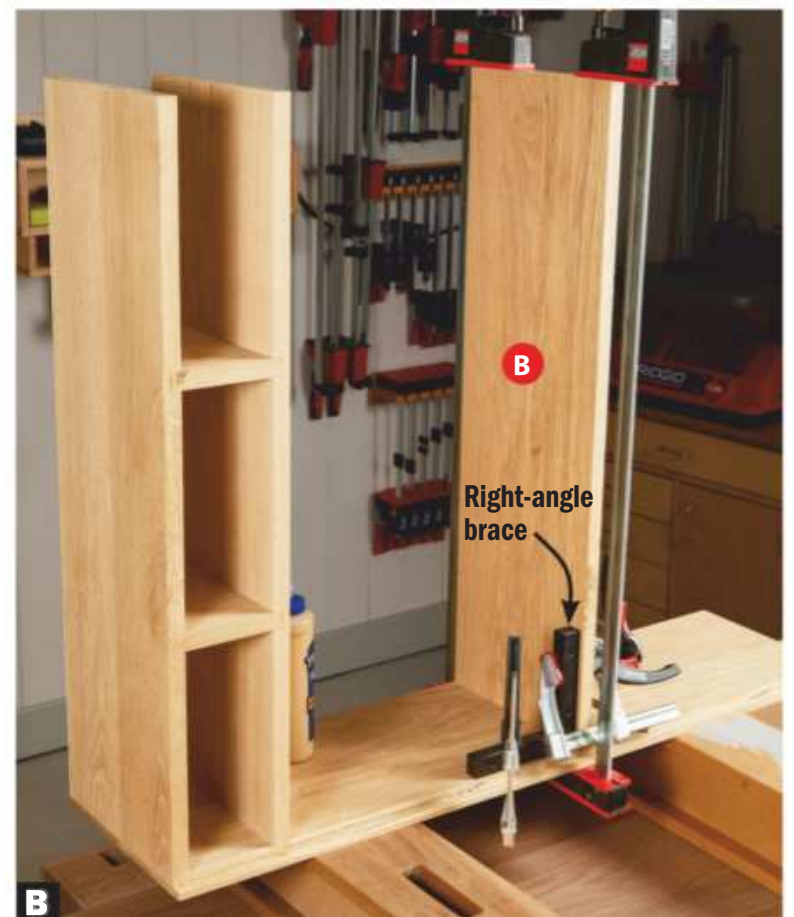




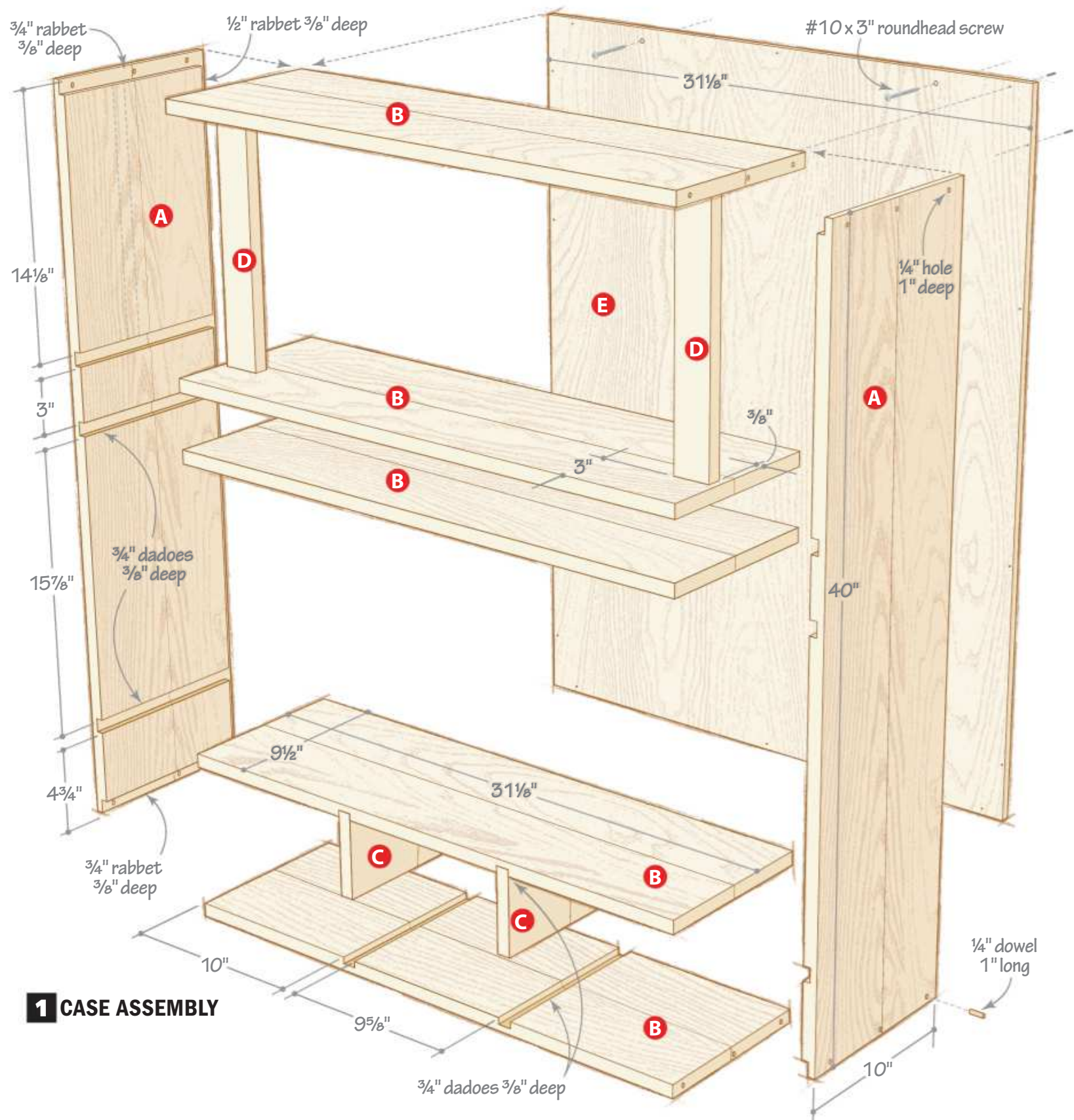
EXPLODED VIEW



Glue the dividers (C) between the bottom and a shelf (B). Then glue this assembly to a side (A).



Add the shelves (B) and top (B) one at a time. Then add the remaining side (A) to this assembly.



1 CASE ASSEMBLY

2 Cut the interior-door jambs (D) to size and glue them in place [Drawing 1]. Cut the back (E) to fit the case, then set it aside.

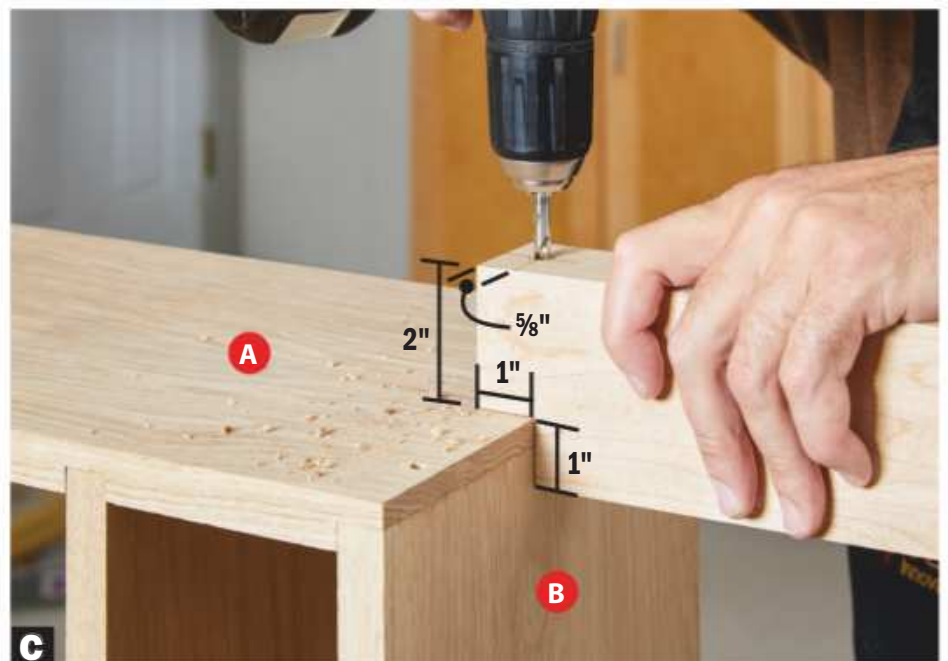
3 Reinforce the top and bottom (B) joints with dowels [Photo C].

4 Cut the cap (F) to size [Exploded View, Materials List]. Miter-cut the cap trim (G, H) to length. Bevel-rip one edge of the trim, glue it to the cap, and set the cap assembly aside.

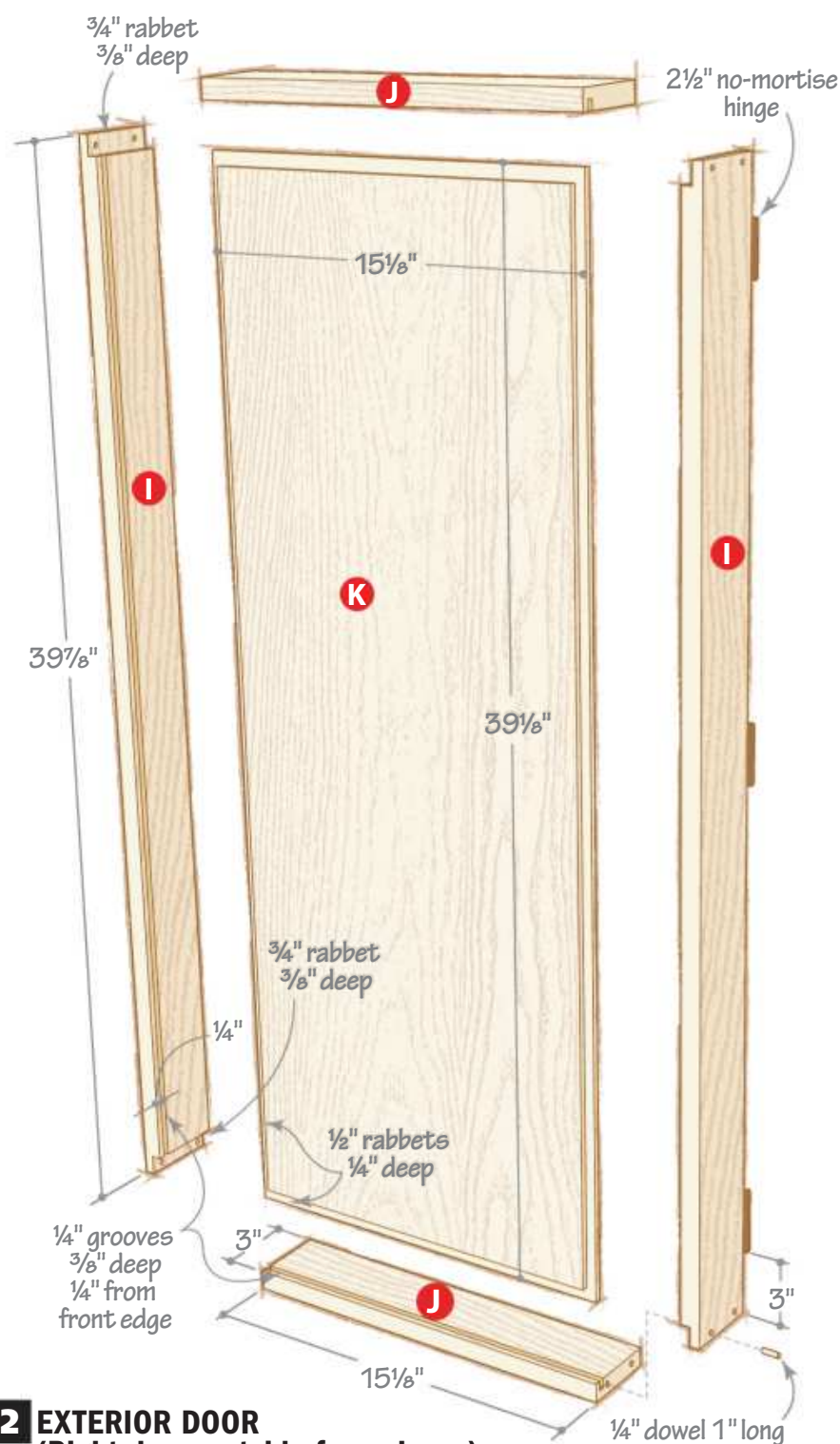
Add doors and drawers

1 Cut the door stiles and rails (I, J) to size [Drawing 2]. Rabbet the ends of the stiles and groove all four pieces. Using a 1"-diameter core-box bit, rout the 1/4"-deep finger hold in each bottom door rail [Drawing 2a]. Cut the exterior-door panels (K) to size and rabbet

Tip! Laminate two sheets of 1/4" plywood if you cannot find 1/2" oak plywood.



C Make a drill-bit guide to help drill three evenly spaced 1/4" holes through each side (A) and into the top and bottom (B). Glue in dowels, then trim them flush.



2 EXTERIOR DOOR
(Right door, outside face shown)

Note: The rabbet on the door panel faces out to create a shadow line.

their edges. Glue up the doors and reinforce the joints with dowels as on the case.

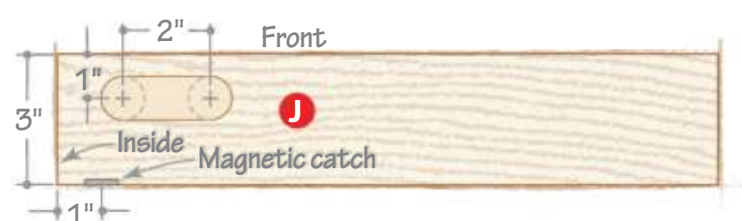
2 Rest the doors on risers and spacers [Photo D], and attach the hinges [Drawing 2]. Drill counterbores in the bottom door rails for the magnetic catches [Drawing 2a] and install them. Install the mating catches in the case bottom (B).

3 Cut the interior-door panels (L) to size [Drawing 3]. Cut the trim (M) 1 inch longer than needed, miter it to fit around the panels, and glue it in place.

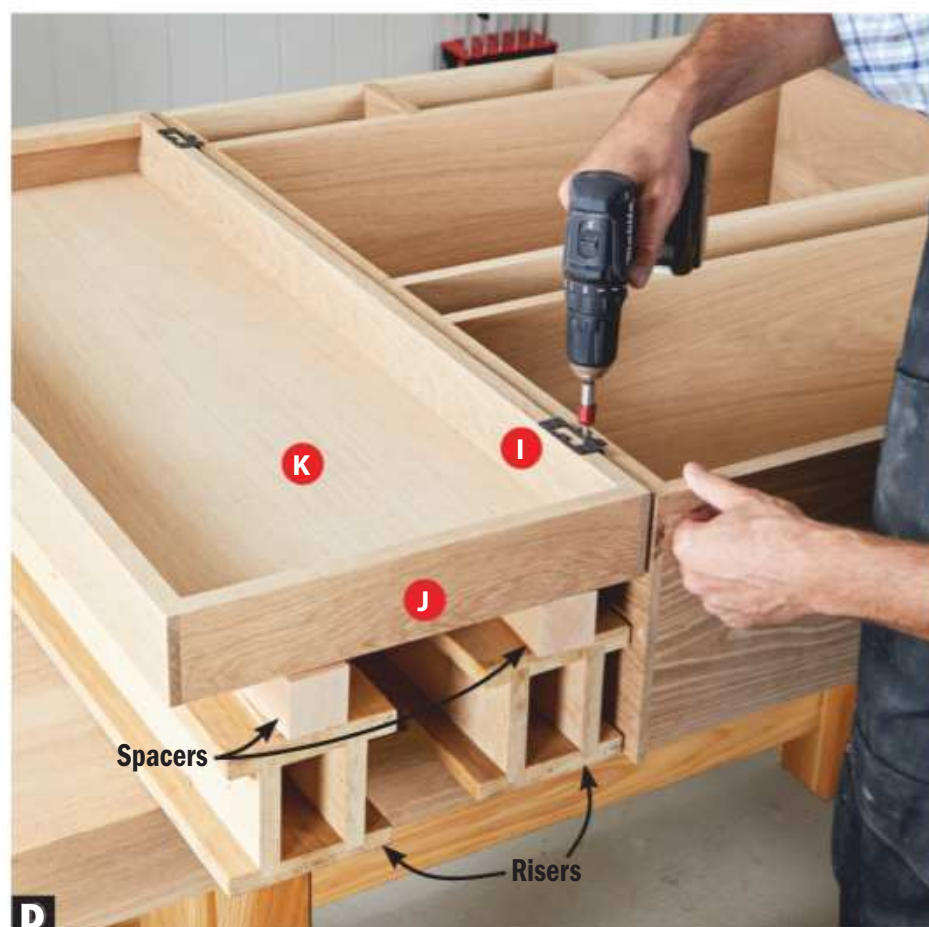
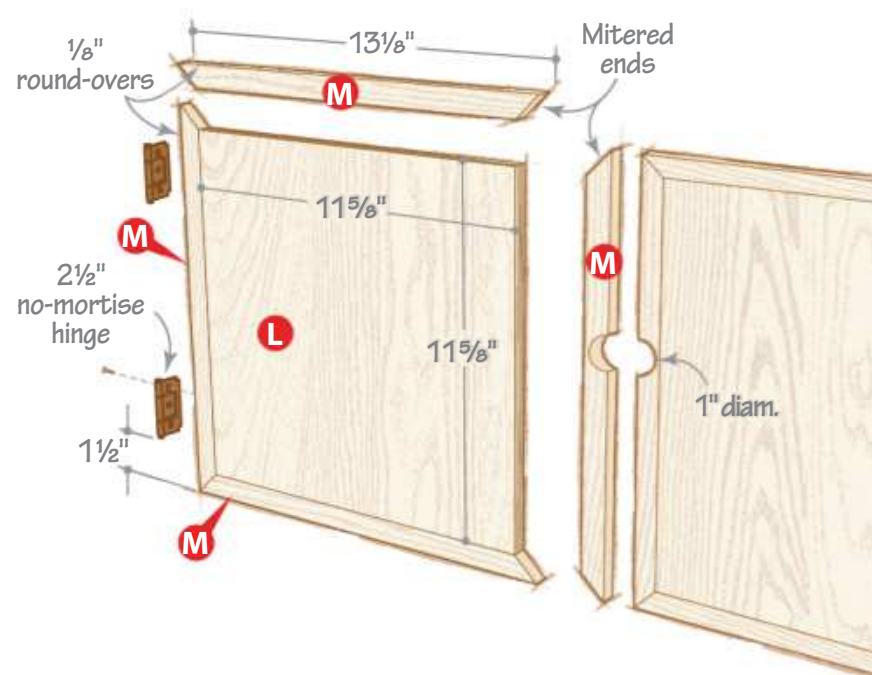
4 Butt together the edges of the interior doors as they will sit in the case, clamp them, and drill a 1 inch hole centered on the joint line [Drawing 3]. Round over the edges of the doors. Mount hinges to the doors, then mount the doors to the jambs (D).

5 Working from the rear of the case, install the magnetic catches for the interior doors. Screw the strikes to the doors.

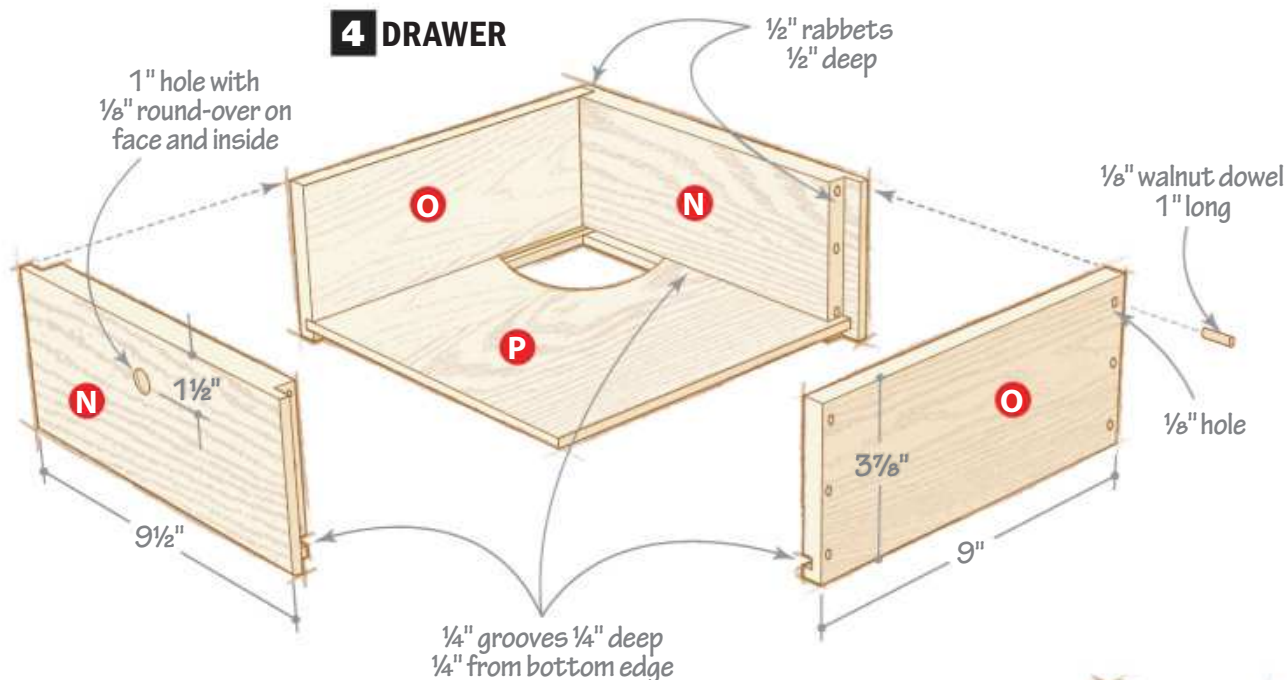
2a FINGER HOLD DETAIL
(Bottom view)



3 INTERIOR DOOR



D Set the case on its back, and align the doors flush with the case front. Screw the hinges to the case and doors.



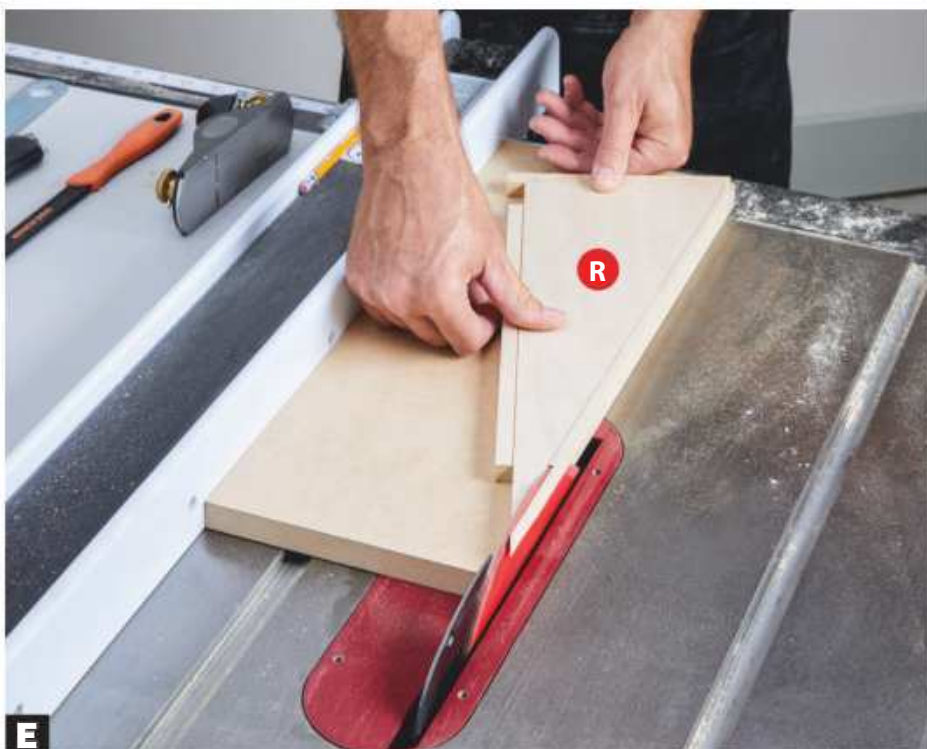
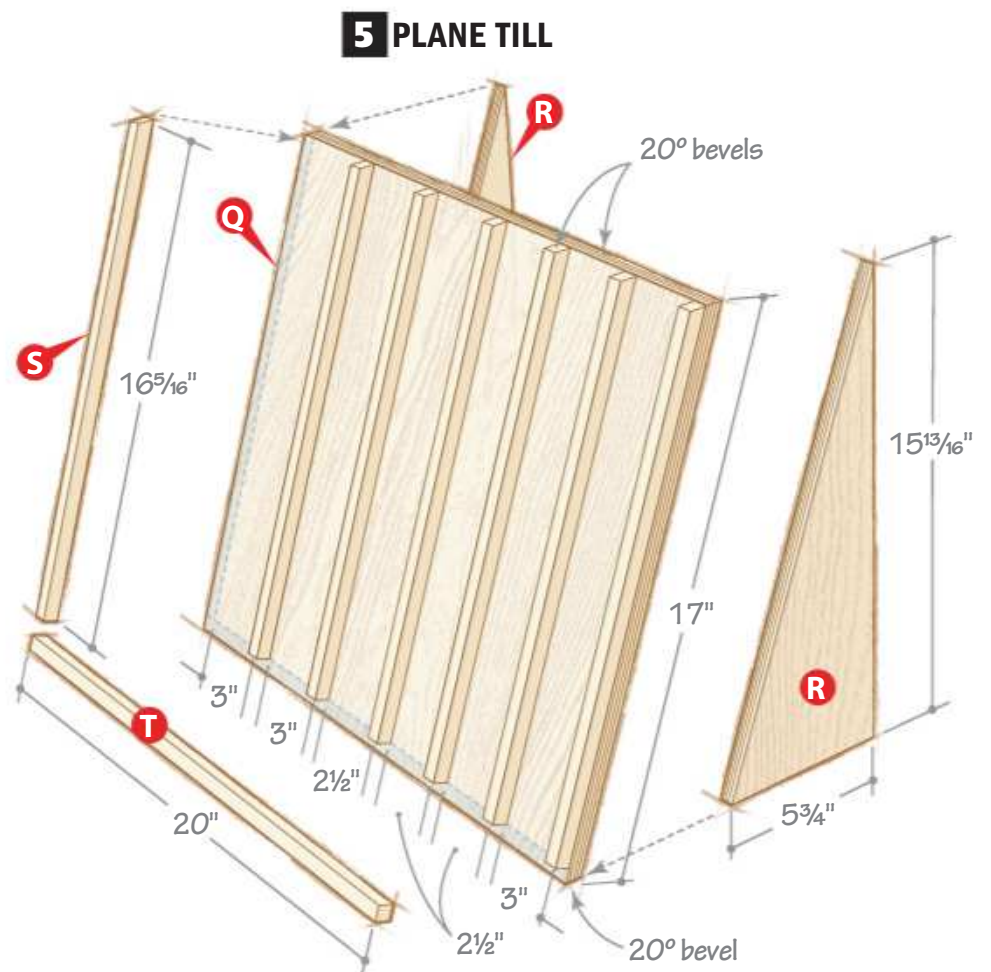
6 Cut the drawer parts (N, O, P) to size [Drawing 4] and rabbet the fronts and backs (N). Drill a hole in each front for a finger pull, and round over the hole edges on both faces. Groove the sides, fronts, and backs, and assemble the drawers, trapping the bottoms (P). Build a new drill-bit guide, and add $\frac{1}{8}$ " dowels to the joints.

Note: We used a walnut dowel to complement the drawer fronts.

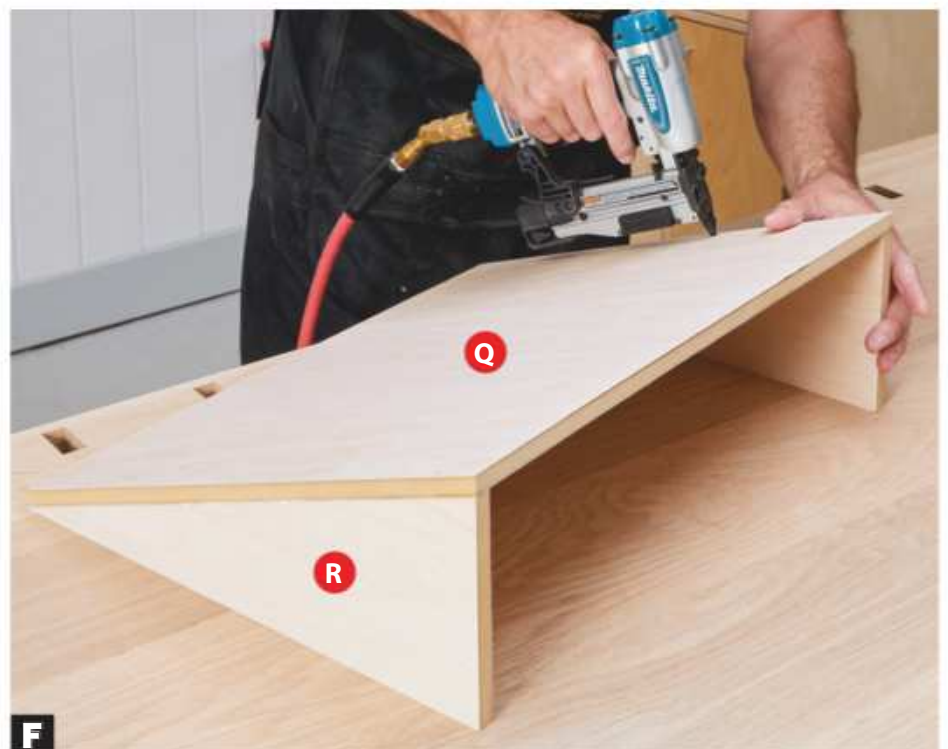
Make the till and cubby

The area above the drawers holds a plane till that accommodates up to a no. 5½ jack plane, and a nine-cubby assembly. Customize the till and cubbies as needed to suit your selection of tools.

1 Cut the till base (Q) to size, beveling the top and bottom [Drawing 5]. For the supports (R), cut a 12×16¼" blank, and bandsaw it diagonally to create two triangular blanks. Cut the supports to final size [Photo E].

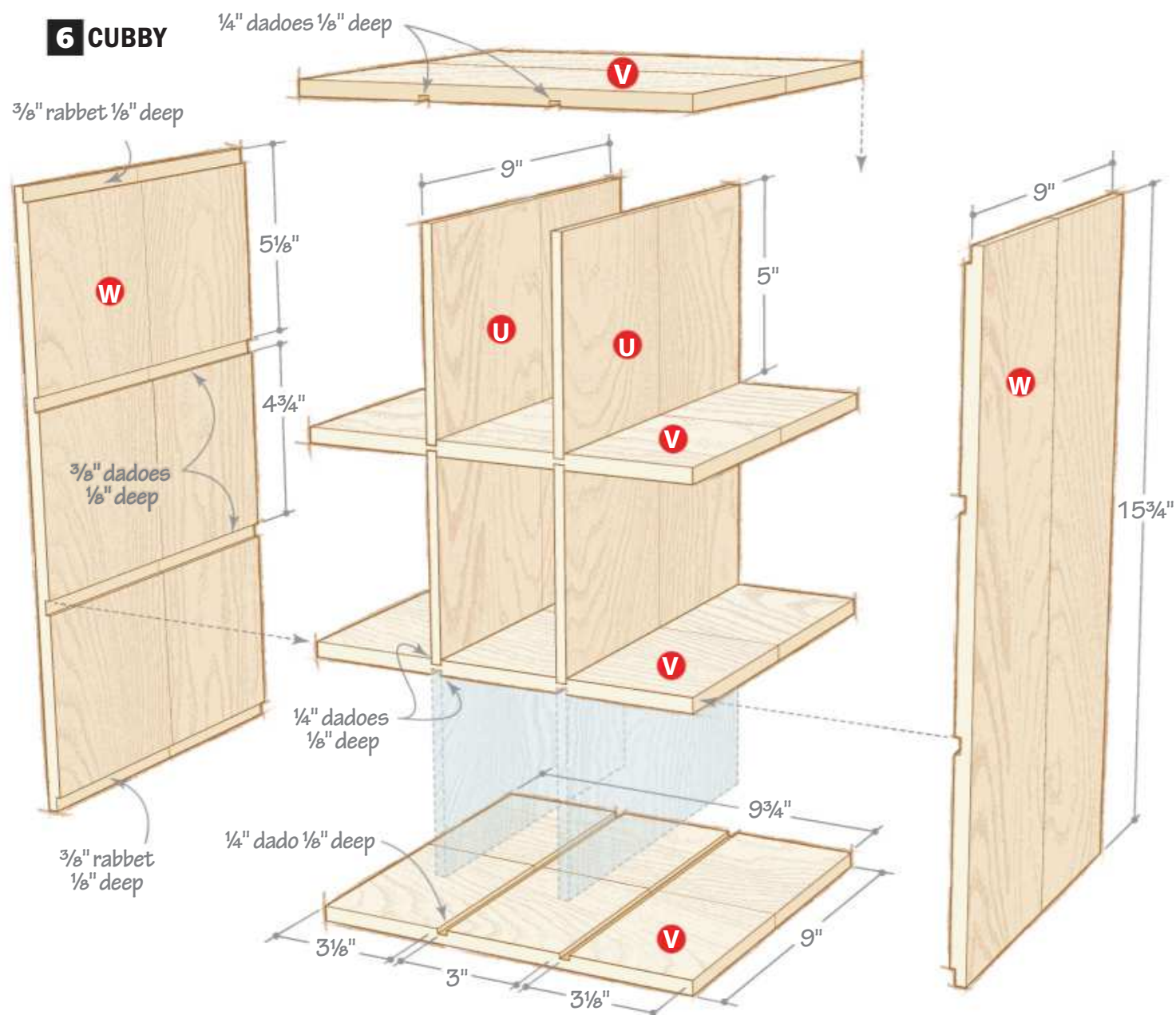


E Tack cleats to a scrap of plywood to make a jig to carry the plane-till supports (R) through the tablesaw blade.



F Align the edges of the base (Q) with the ends of the supports (R). Glue and brad-nail the base in place.

6 CUBBY



Tip! Place your planes in the till and check if the handles extend past the front of the cabinet. If so, arrange tools on the doors to allow room.

2 Assemble the till base and supports [Photo F]. Cut the till dividers (S), beveling the top ends [Drawing 5]. Cut the bottom (T) and finish-sand the till parts. Glue the dividers and bottom in place.

3 Cut the cubby parts (U–W) to size [Drawing 6]. Cut the rabbets and dados, then finish-sand the parts. Assemble the cubby [Photos G–I].



G Glue two dividers (U) between two shelves (V). Check the assembly for square.



H Glue the U/V assembly between the sides (W) and allow the glue to dry.



I Glue two more dividers (U) to a shelf (V), and glue the top (V) in place. Repeat with the two remaining dividers and bottom (V).



J

Group like tools together, allowing room to remove each without bumping a sharp edge.



K

Hang pull saws in slotted holders, angled to allow the saws to nest inside the door depth. Trace the interior of western-saw handles, then add a turnbutton to hold them in place. Mallets and a coping saw rest on lipped holders similar to those in Photo N.



L

Lay out and drill holes to accept chisel and carving-tool ferrules. Cut away the front portion of each hole to allow placing the tool in the holder. Rout a $\frac{1}{8}$ " chamfer around each opening.



M

To secure spokeshaves, drill holes in a $1\frac{1}{2}$ "-thick blank. Bandsaw a hook shape as shown, then resaw the blank to make two identical holders.

Add the cap and tool holders

1 Screw (no glue) the cap (F–H) to the cabinet flush at the back and centered side-to-side [Exploded View].

2 Remove the doors and place them on your bench. Arrange tools on the doors as you like [Photo J]. Photos K–N show the holders made for our tools. Glue the holders in place.

Tip! Add lips to the bottom rails of the doors to make storage trays.

3 Finish-sand any areas needing it, then apply a finish. Glue the back in place and screw it to the shelves (B).

4 Determine the placement of the cabinet in your shop. Screw a cleat to the wall to rest the cabinet on [Exploded View]. Screw the cabinet to studs, and treat your tools to their new home. 🌱



N Rest squares and marking gauges on a rectangular scrap. A ¼" lip at the front keeps the tool in place. Rest the blade of a bevel gauge in a notched dowel. A second dowel prevents the tool from swinging.

Materials List

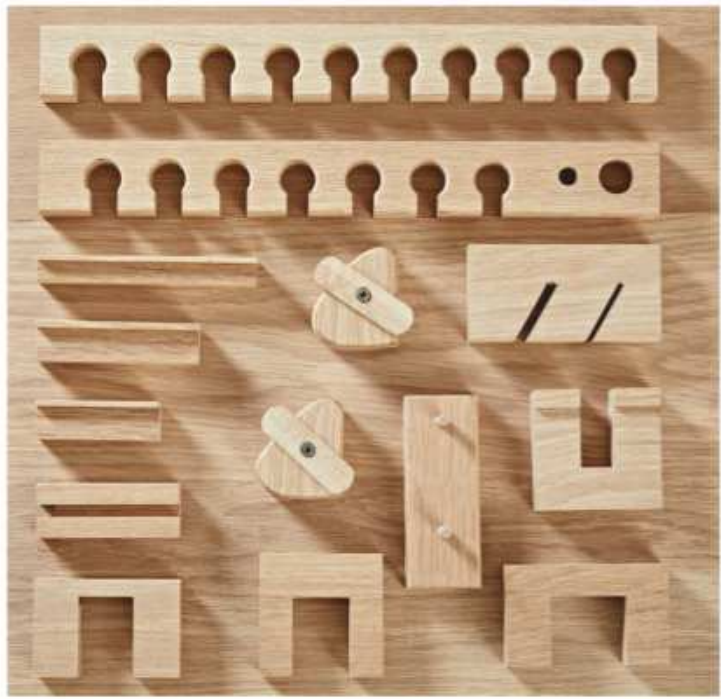
Part		FINISHED SIZE			Matl.	Qty.
		T	W	L		
Case						
A	sides	¾"	10"	40"	O	2
B	top/bottom/shelves	¾"	9½"	31⅞"	O	5
C	dividers	¾"	9½"	4¾"	O	2
D	interior-door jambs	¾"	2"	13⅜"	O	2
E	back	½"	31⅞"	40"	OP	1
F	cap	¾"	2"	28½"	O	1
G*	cap side trim	¾"	2¾"	14"	O	2
H*	cap front trim	¾"	2¾"	34"	O	1
Doors						
I	stiles	¾"	3"	39⅞"	O	4
J	rails	¾"	3"	15⅞"	O	4
K	exterior-door panels	½"	15⅞"	39⅞"	OP	2
L	interior-door panels	½"	11⅝"	11⅝"	OP	2
M*	door trim	½"	¾"	13⅞"	O	8
Drawers						
N	fronts/back	¾"	3⅞"	9½"	W	6
O	sides	½"	3⅞"	9"	O	6
P	bottoms	¼"	9"	9"	OP	3
Plane till						
Q	base	½"	20"	17"	OP	1
R*	supports	½"	5¾"	15⅓⅓"	OP	2
S	dividers	½"	½"	16⅓⅓"	O	7
T	bottom	½"	½"	20"	O	1
Cubby						
U	dividers	¼"	9"	5"	O	6
V	shelves/top/bottom	⅜"	9"	9¾"	O	4
W	sides	⅜"	9"	15¾"	O	2

*Parts initially cut oversize. See the instructions.

Materials key: O-oak, OP-oak plywood, W-walnut.

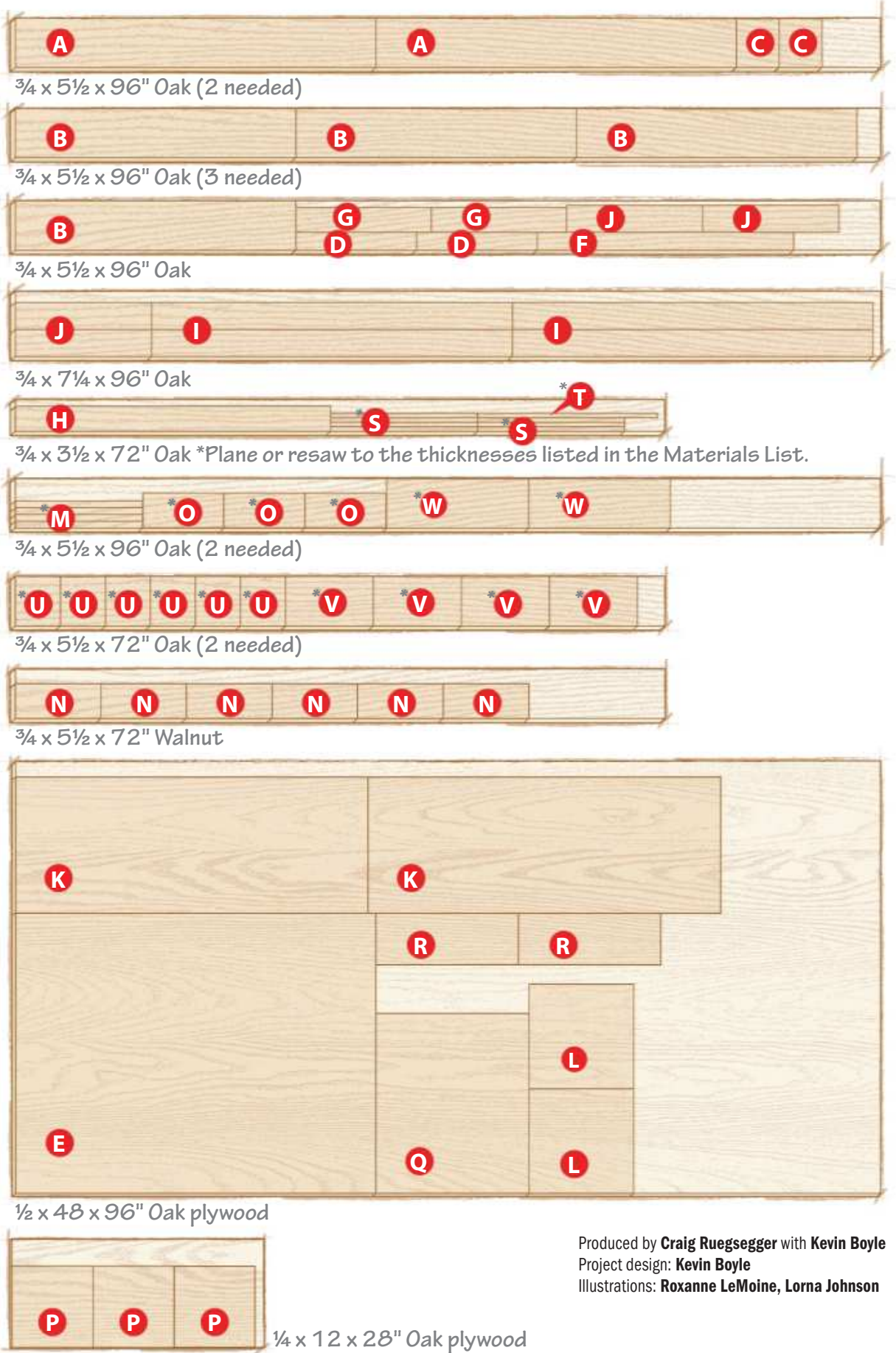
Supplies: #8×1¼" flathead screws, #10×3" roundhead screws, #10 brads, 2½" no-mortise hinges (10), magnetic door catches (2), ¼×36" oak dowel, ⅛×18" walnut dowel.

Blade and bits: Dado blade; ⅛" round-over, 1"-diam. core-box router bits.



Cutting Diagram

This project requires 45 board feet of 4/4 oak and 3 board feet of 4/4 walnut.



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

Simpler than it looks Puzzle Ball



Though geometrically complex in appearance, this puzzle consists of 30 identical, simple-to-make parts. You need only a tablesaw dadoing sled and these assembly instructions.

Build a sled, then have a ball

Cutting the puzzle pieces goes lickety-split, with great accuracy, using a sled [Drawing 1]. Let's begin by making the sled's carrier.

Tip! For precisely setting blade angles and laying out angled lines, use an adjustable triangle, woodmagazine.com/triangle, or protractor with adjustable arm, woodmagazine.com/protractor.

1 Tilt your tablesaw blade to 36° and rip a ¾×12×12" plywood blank in half [Photo A]. On one of the pieces cut a 54° bevel on the edge opposite the 36° bevel [Photo B].

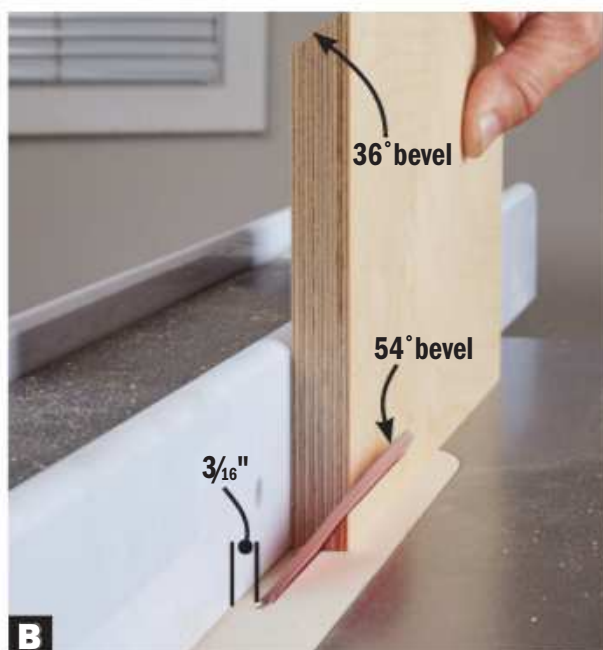
2 On the other workpiece, rip away the tip of the beveled edge to leave a ⅜"-wide flat. Glue together the ⅜" flats to form a trough with a 36° wall and 54° wall.

3 After the glue dries, lay out a rectangle as shown in Photo C. Bandsaw just beyond one side of the rectangle and sand back to the line to create one straight edge. From that edge, saw the other edges with a series of 90° cuts to complete the carrier.

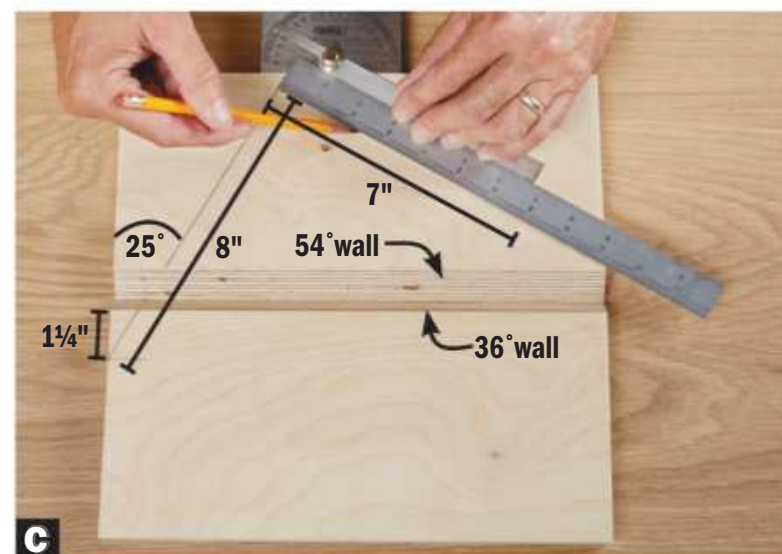


A

Rotate the workpiece to cut a complementary angle. After ripping a 36° bevel on one edge (Photo A), slide the fence to ⅜" from the blade, stand the workpiece upright, and cut a 54° bevel (right).

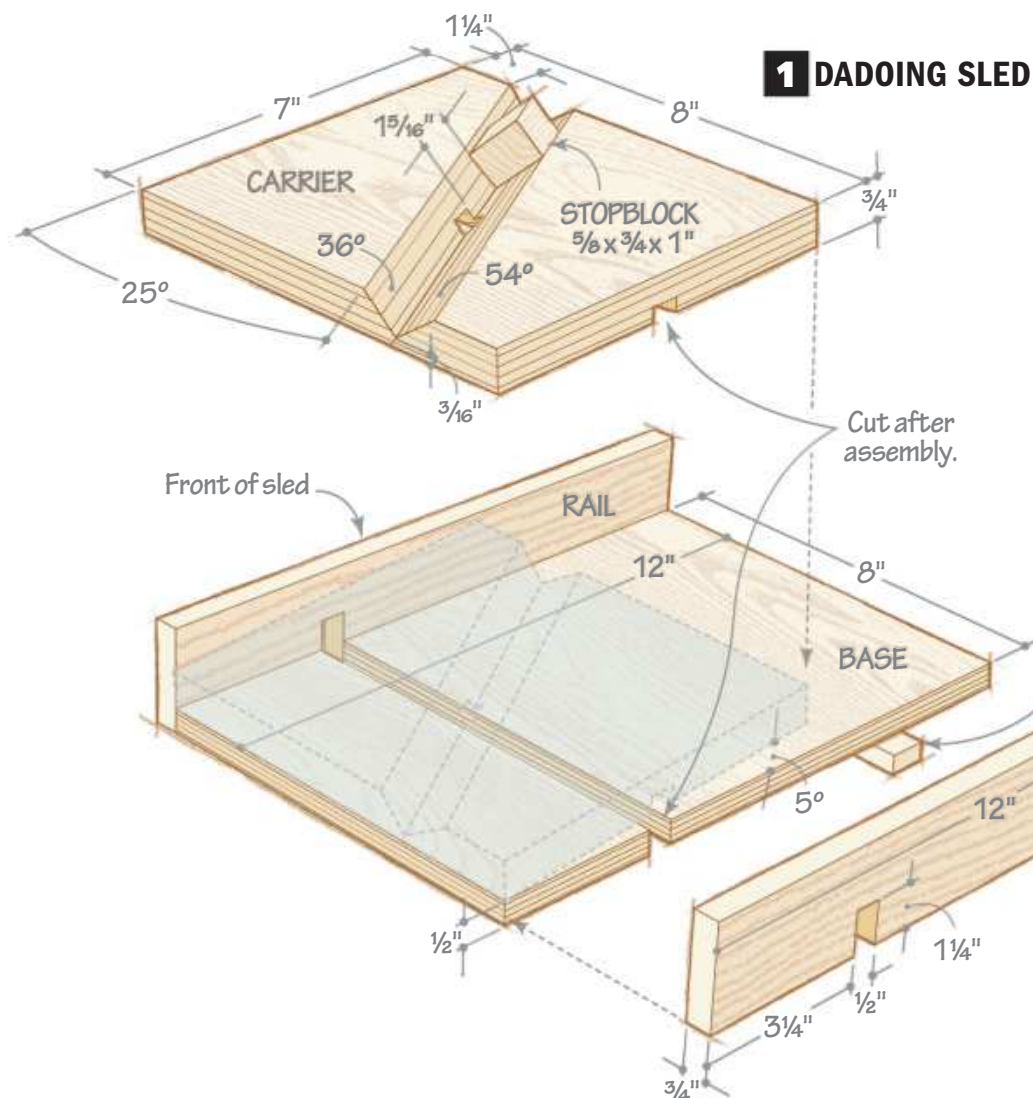


B

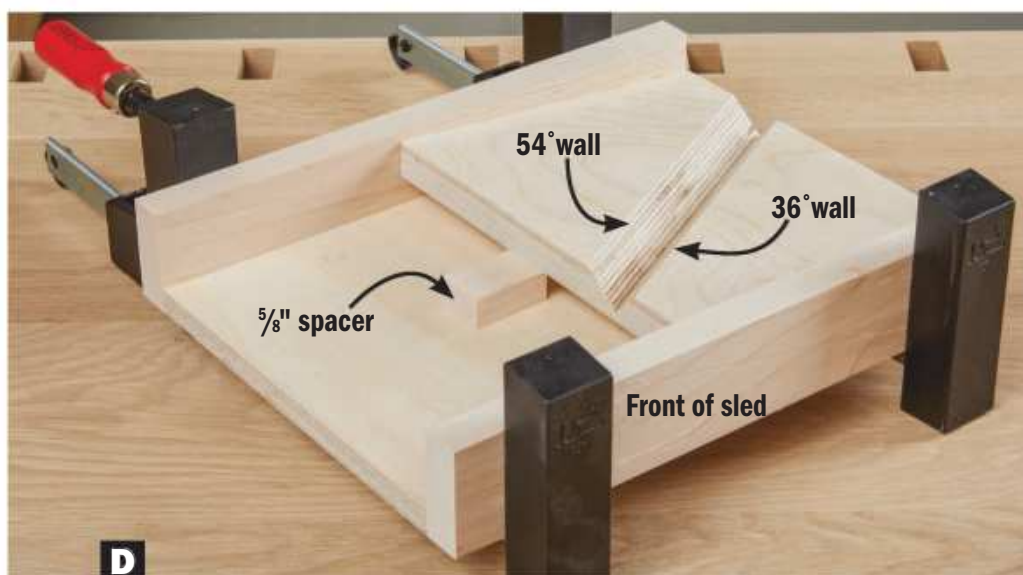


C

Draw the perimeter of the sled's carrier by first making a mark 1¼" from the rim of the 36° wall. From that point mark an 8"-long line at a 25° angle. Then mark a series of lines at right angles to complete a 7×8" rectangle.



- 4** Cut the base and rails to size [Drawing 1].
- 5** Glue one rail to the base and let dry.
- 6** Apply glue to the edges of the carrier and the remaining long edge of the base, and glue together the sled [Photo D].
- 7** Place the sled on your tablesaw with its front (the rail closest to the trough's 36° wall) positioned to go into the blade first. Move the sled laterally so a 1/2" dado set will cut approximately in the middle of the carrier. Slide the saw's fence up to the sled to square it to the blade. Use the saw's miter channel to mark the position of the sled's guide, and glue the guide to the base.

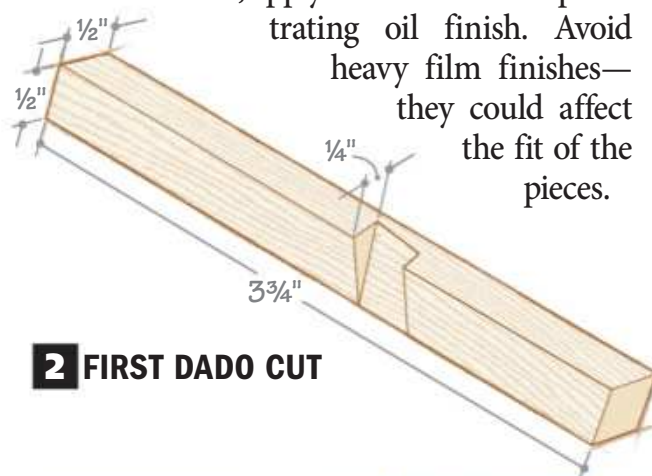


D Angle the carrier in the sled using a 5/8" spacer to prop up one edge. Clamp the carrier between the rails until the glue dries. Remove the spacer.

- 8** Cut 31 pieces sized 1/2 x 1/2 x 3 3/4". We used cherry. You'll need 30 of those pieces for the puzzle, and an extra test piece.
- 9** Install a 1/2" dado set with a .008" shim between the chippers (for a .508"-thick stack). Make a series of cuts until the dado set cuts through the bottom of the trough. Gradually raise the set until it cuts 1/4" deep in the test piece (measured at a right angle from the bottom of the dado to the corner of the workpiece [Drawing 2]). Test the fit of one of your puzzle pieces in the test dado cut. It should fit loosely. If it fits tight, slightly increase the dado width. Glue the stopblock into the trough [Drawing 1].

Dado the puzzle pieces

- 1** Place a puzzle piece against the sled's stop and make a dado cut. The dado should be splinter free; if it's not, try slowing your feed rate or sharpening the dado set.
- 2** Keeping the same edges of the puzzle piece oriented down, spin the workpiece end for end and butt it against the stop. Rotate the piece 90° toward you [Photo E]. Make the second dado cut.
- 3** Repeat Steps 1 and 2 with the other 29 puzzle pieces. Finish-sand all surfaces and sand slight chamfers on all edges. We left our puzzle pieces bare, but if the puzzle will be handled a lot, apply a coat or two of a penetrating oil finish. Avoid heavy film finishes—they could affect the fit of the pieces.



2 FIRST DADO CUT



E Cut the second dado with the opposite end of the workpiece against the stop and the first dado visible on the workpiece side facing away from you.

Let's get the puzzle together

To start you'll need two rubber bands and some patience. You may also need another person to help hold things together during assembly. 🌲

Produced by **Bill Krier** with **Kevin Boyle**
Project design: **Richard Munson, Glasford, Ill.**
Illustrations: **Roxanne LeMoine, Lorna Johnson**



1

Assemble five pieces, one by one, with the dados facing out. Note the patterns are repeated throughout the puzzle.



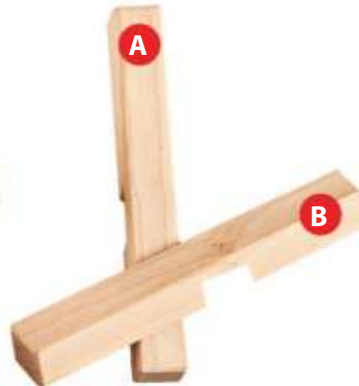
2

Carefully slide five more pieces (indicated by the dots) into position. Hold the pieces together with a rubber band wrapped around the outside.



3

To make the following steps easier, carefully flip the assembly upside down.



4

Form a "Y" with two pieces and carefully fit them into the puzzle. Using the positions of the two pieces as reference, add more pieces in the same orientation until you reach 20 total. (You'll have 10 puzzle pieces remaining.) Use the second rubber band to hold each added piece.



5

The puzzle should now look like this. Adjust the second rubber band around the ball's "equator" to hold the pieces tightly together.



6

Separately fit nine more pieces into the puzzle, sliding each one under and into the pieces sticking outward. Five (dotted) are shown here. This gets tricky. To make it easier to insert the pieces, loosen up the ball by removing the second rubber band.



7

The final piece will be the most difficult to add. Remove the rubber bands and hold the ball together, but loose, to complete the puzzle.

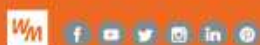


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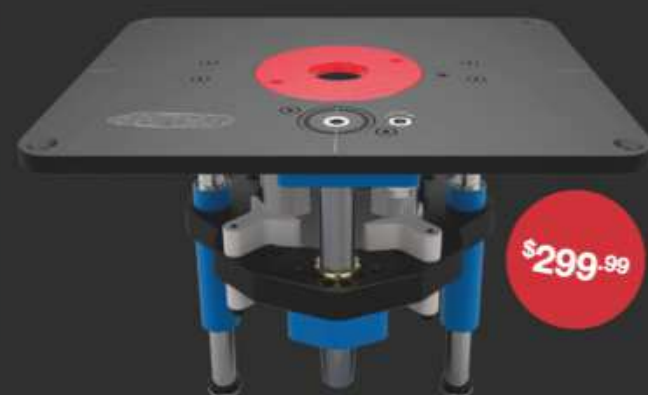
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Color to Dye For

Easy to mix, easy to use, and compatible with any topcoat. Prepare to dye.



Off-the-shelf canned stain may be your go-to product for coloring wood simply because it's readily available. But dye goes on just as easy and can solve some common finishing challenges. You'll find extensive color options, including bright and playful primary colors, and it's easy to mix custom colors. Read on to learn how to add dye to your finishing kit.

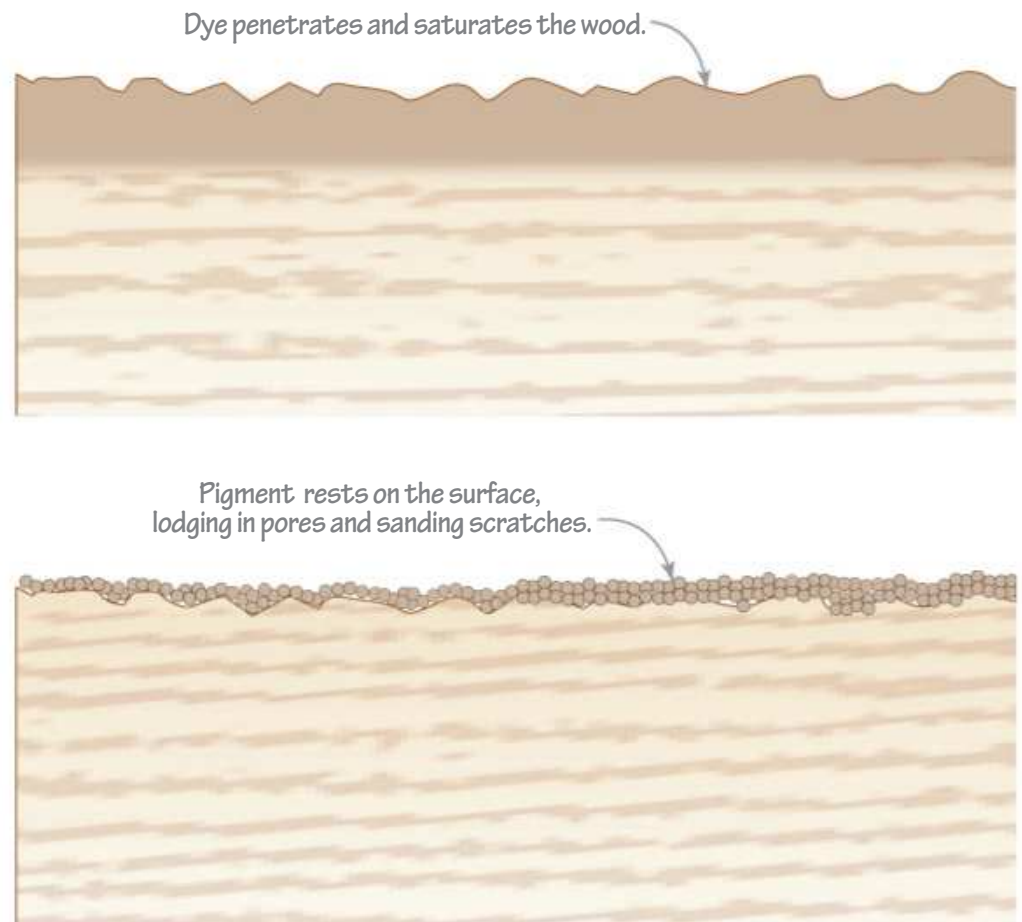
Why dye?

Dye differs from stain in three important ways: First, dye contains particles so small that its solvent carries them *into* the structure of the wood. So, color reflects from within the board. Most stains contain larger pigments that rest *on top* of the wood, lodging in pores and sanding scratches, as shown at *right*. This slightly obscures the wood grain and figure.

Second, stain contains a binder that adheres the pigment particles to the surface, so stain is colorfast. Dye has no binder, so even after it dries, you can remove some color by wiping with its solvent. A topcoat creates a barrier that protects the dye by preventing solvent from reaching it.

Third, dye tends to fade more than stain with exposure to strong light. So, dyes aren't suitable for outdoor projects or items that will sit near a sunny window. Consider how much light the final resting place for a piece receives before you dye.

► For improved lightfastness, choose a metal-complex dye [Sources].



Choose the right solvent for the job

Dyes come in powders or liquid concentrates that you dissolve in water, alcohol, or oil [Photo A, Sources]. Each solvent has its best applications.

You'll find water-base dye most useful. Its readily available solvent makes it easy to apply and manipulate, though it does raise the wood's grain—more on that later. And its slower drying time allows for adjusting the color during application by wiping away excess.

Use alcohol-base dye when you want to build color gradually, or to tint shellac before applying it. The alcohol evaporates quickly, so the color doesn't penetrate as deeply as a water-base solution, and you have less opportunity to wipe away color. Several coats can be applied in a short time to reach the desired shade.

Oil-base dyes can be used to provide a longer drying time, and for tinting oil-base finishes.

Tip! Mixing dye lighter than needed lets you build color with successive applications. For deep color quickly, add more dye to the solution.



A Read the manufacturer's instructions to determine a dye's solvent. Liquid dye, top left in the photo, can be mixed with water or alcohol; the powder in the foreground with water; the powder on the right with oils.



B

Weigh powdered dye rather than measuring by volume. Use a digital kitchen scale (about \$10). For liquid dyes, gently squeeze the bottle and count the number of drops used.



C

Powdered dye may not dissolve completely, especially when mixed with oil. Straining the dye through a paint filter removes clumps that would create unsightly globs of color.



D

Dry dye on the left looks flat. A topcoat (lacquer in this case) restores the sheen and brings out the figure in this curly-maple board. (TransTint no. 6001 Honey Amber)

Get ready to dye

► Some dyes can be an irritant, so wear eye protection, a respirator, and nitrile gloves.

Working with dye requires no special skills or tools. Simply mix the powder or concentrated liquid with its solvent to the desired color strength [Photo B]. Use a glass or plastic container—metal can react with dye. If you mix from a powder, strain the solution through a paint filter into a clean container before use [Photo C]. Wipe on the dye with a lint-free rag, brush it with a foam brush, or spray it.

Store mixed dye in an airtight jar, away from light. Dye solutions stored for long periods can fade, so test older mixtures on scrap before attempting to color-match a piece tinted when the batch was fresh. The dye won't require mixing again because its tint doesn't settle out, as pigment does.

Hot water dissolves water-base dye quicker. (No need to boil it; hot water from the tap works.) Before applying water-base dye, lightly wet the workpiece with a damp sponge or rag and let the wood dry. Sand the

raised grain lightly with the last grit used to finish-sand, and remove the sanding dust.

The solvent in alcohol-base dye evaporates quickly, so spray large surfaces rather than brush. Spraying evens out coverage on blotch-prone woods such as pine, maple, birch, cherry, and others. Alcohol does not raise the grain.

A board wet with freshly applied dye shows off the figure, then dries to a dull, flat appearance. But don't worry—applying a topcoat restores the luster [Photo D]. You can temporarily preview the color of a dry dyed surface by wiping it with naphtha; it won't lift the dye.

Apply any topcoat over dye, but beware that brushing or wiping a topcoat with the same solvent as the dye will redissolve and lift the color into the topcoat, muddying the appearance. To prevent this, spray on shellac to seal the dye before applying the topcoat, or spray the topcoat.

► Use plain water to raise the grain, rather than the initial coat of dye. That way, sanding to remove the raised grain won't remove any of the color.

Seal rather than sand

End grain notoriously finishes darker than face or edge grain, as shown below. Traditional advice says to sand the end grain a grit or two finer than the faces and edges, but sanding those narrow surfaces can be a

challenge, especially if you want to preserve the crisp edge of a routed profile. Instead, sand to the same grit as the faces, then seal the end grain with a 1-lb cut of clear shellac. (Thin premixed shellac 1:1 with alcohol.) This prevents the end grain from absorbing more dye.



Unevenly sanded end grain draws in more dye, making it darker (left). Brushing on shellac reduces absorption, evening out the color (right). (Lockwood no. 6850 Bright Blue)



Danish oil only

Danish oil with dye

Bare wood

E

Mixing dye into this oil finish creates a slightly richer color than the finish alone. (J.E. Moser no. L23001 Reddish Brown Walnut)



Walnut

Dyed sapwood

Undyed sapwood

G

Blend dissimilar areas of a board to even out the color by wiping dye on the lighter areas. Build color gradually with several coats. (Lockwood no. 6 Reddish Tone Walnut)



F

The large pores of oak's earlywood trap more stain, providing contrast to the denser latewood (left). Dye absorbs more evenly, resulting in less contrast (right). (Minwax Red Oak 215, Lockwood 77 Dark Golden Oak)



H

Dye provides bold colors without obscuring the wood grain, as paint would—and it won't chip off. (Lockwood no. 5230 Lemon Yellow, no. 8145 Bright Green, no. 6850 Bright Blue, no. CW17 Poppy Red)

When to use dye

Add dye with a compatible solvent into a topcoat, such as wiping varnish, lacquer, shellac, or polyurethane, to create a custom shade (called “toning”) [Photo E]. Keep in mind that the topcoat locks the dye in place, so you won't be able to wipe away color, as you would with just a dye solution.

Choose dye rather than stain when you want more consistent color across earlywood and latewood. Pigmented stain emphasizes the differences because open pores capture more pigment particles, while areas of tighter grain capture fewer [Photo F].

Dye's transparency keeps the grain visible even under several coats. This makes it a better choice for spot application to match light portions of a board to darker areas

[Photo G]. Stain obscures the grain more with each additional coat.

Any project that needs bright colors cries out for dye. Although most pigment stains come in only wood tones, you'll find dyes in vibrant reds, blues, yellows, greens, oranges, and more [Photo H].

The wide range of available colors provides infinite options. You'll find dozens of stock colors, but dyes with the same solvent, even from different manufacturers, can be mixed to create new shades. To do this, mix each color separately in its own container, then combine the solutions in the desired ratio in another container.

Pick a few colors, experiment on some scrap, and discover how dyeing can breathe new life into your projects. 🌳

Sources: Powdered dyes, metal-complex dyes. W.D. Lockwood & Co. 212-966-4046, wdlockwood.com; TransTint metal-complex dye concentrates, TransFast powdered dye, Homestead Finishing Products, 216-631-5309, homesteadfinishingproducts.com; J.E. Moser's powdered dyes and dye concentrates, Woodworker's Supply, 800-645-9292, woodworker.com.

Produced by **Craig Ruegsegger**

Rocking

Build this realistic rocker from oak and plywood, and then turn a child loose on the road to adventure.

Whether you're a parent, grandparent, aunt, or uncle, you'll love building this rocking cycle almost as much as watching the little youngster in your life taking it for a spin.

Start with the wheels

You'll make the wheels/tires by laminating plywood. Because plywood thicknesses can vary by maker, there could be subtle differences between our plan and your bike. So make the wheels first, and then adjust measurements as indicated for certain parts of the bike to match the wheel thickness.

1 Cut birch plywood blanks for the wheel assemblies (A–C): eight at $\frac{3}{4} \times 10 \times 10$ ", and six at $\frac{1}{4} \times 9\frac{1}{2} \times 9\frac{1}{2}$ ". Mark the center-point of each blank.

2 Lay out the three diameters and spokes for the rims (A) [Rim Gridded Pattern page 67, Drawing 1]. Drill a $\frac{3}{8}$ " hole at the centerpoint of all blanks. Create a bandsaw circle-cutting jig by cutting a piece of $\frac{3}{4}$ " plywood to a size slightly smaller than your bandsaw's table. Cut the spacers (B) to shape [Photos A and B]. Repeat the process for the rims and sidewalls (A, C), creating a second pivot point on the jig for these larger parts.

D I M E N S I O N S :
34" W x 13 $\frac{1}{4}$ " D x 18 $\frac{3}{8}$ " H

Approximate materials cost:

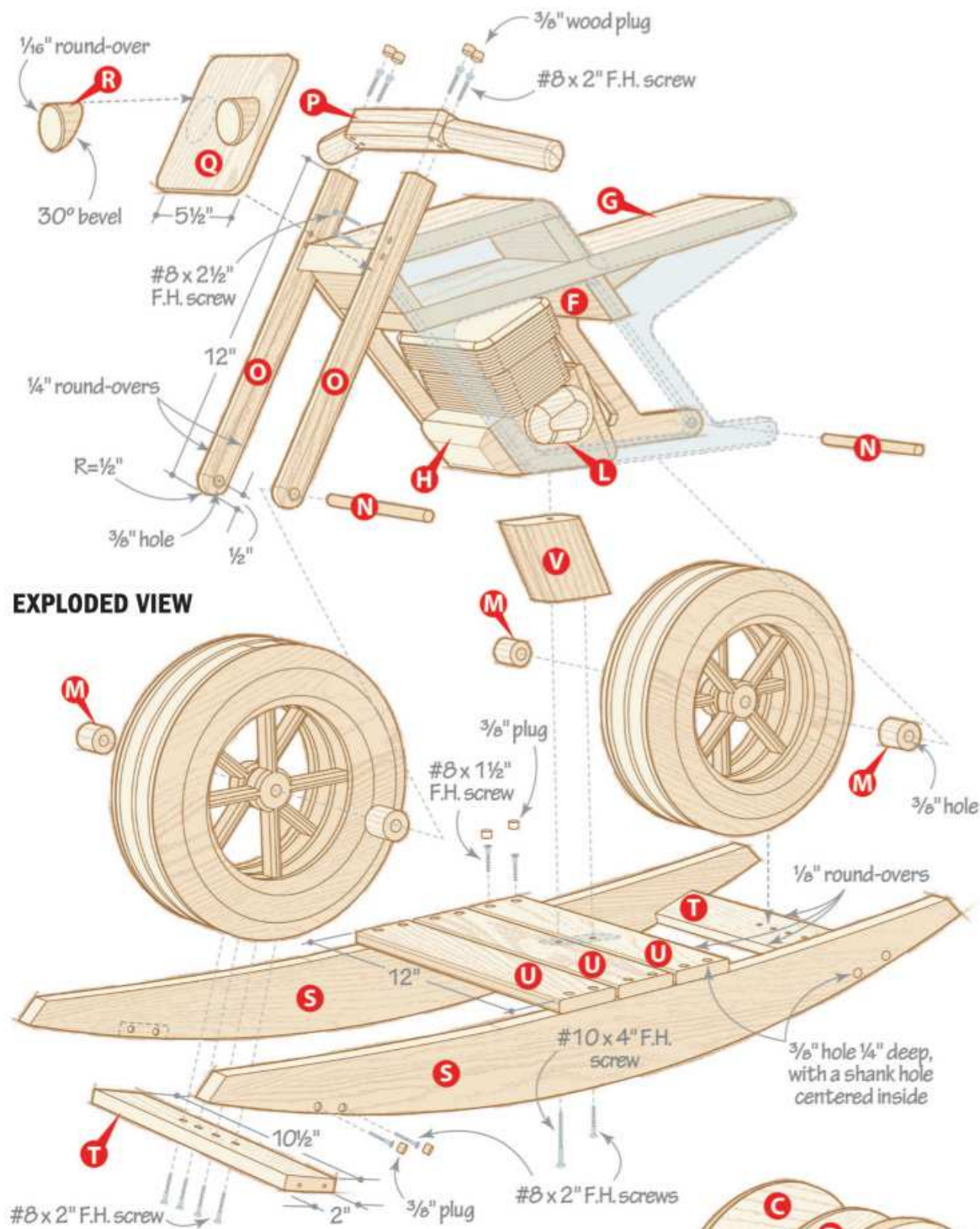
\$175

(engine-revving sounds not included)

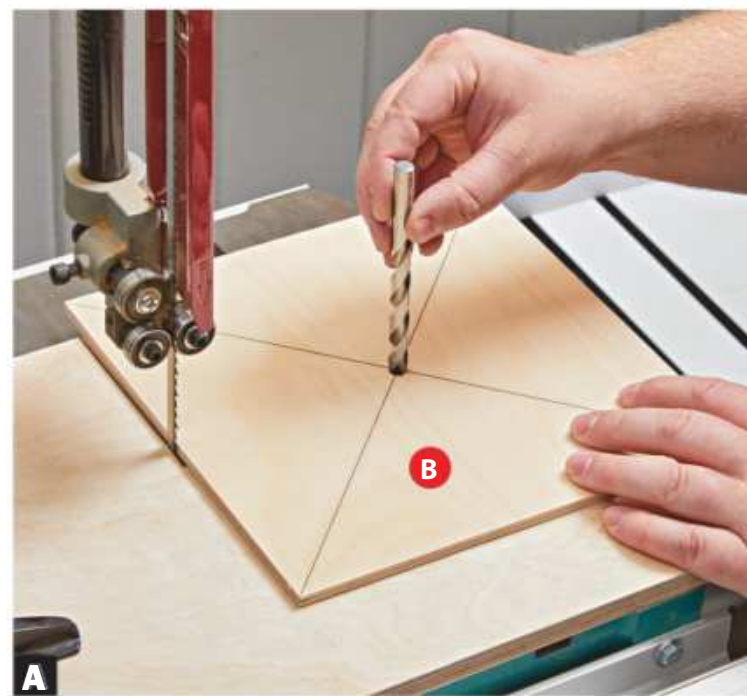
Seats toddlers about 1 $\frac{1}{2}$ –4 years old



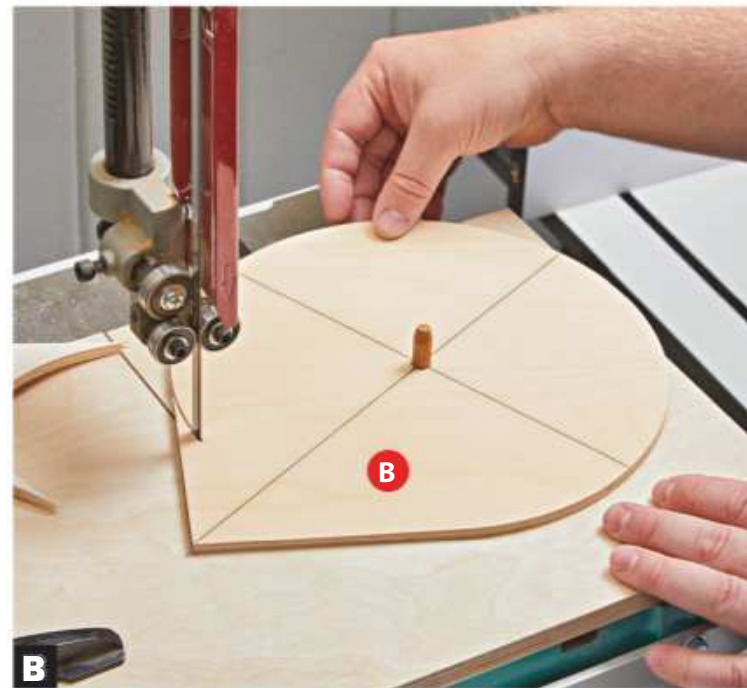
Motorcycle



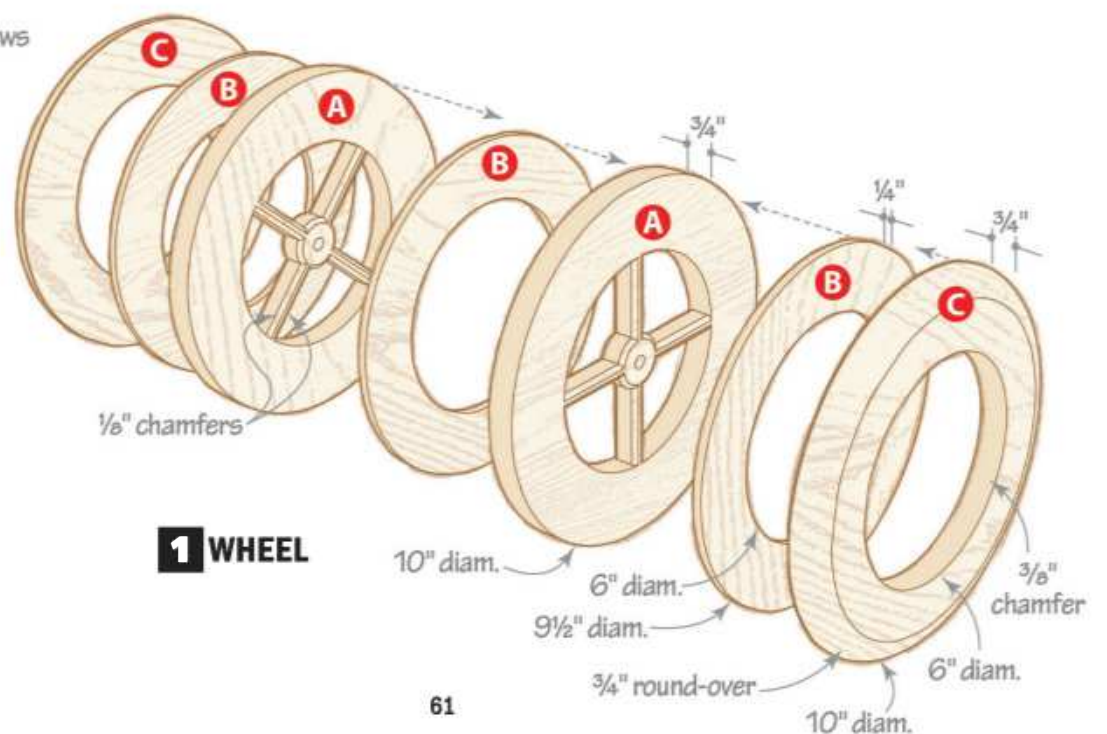
3 The inner diameters cannot be cut at the bandsaw because there is no entry/exit point. Instead, make an offset pivot base [Photo C] for your plunge router to make these inner cutouts [Photo D]. (We used a 1/4" upcut spiral bit.) Rout all the spacers (B) first because they can be cut in one pass. Then do the sidewalls (C), but make the cut in progressively deeper passes to avoid breaking the bit.



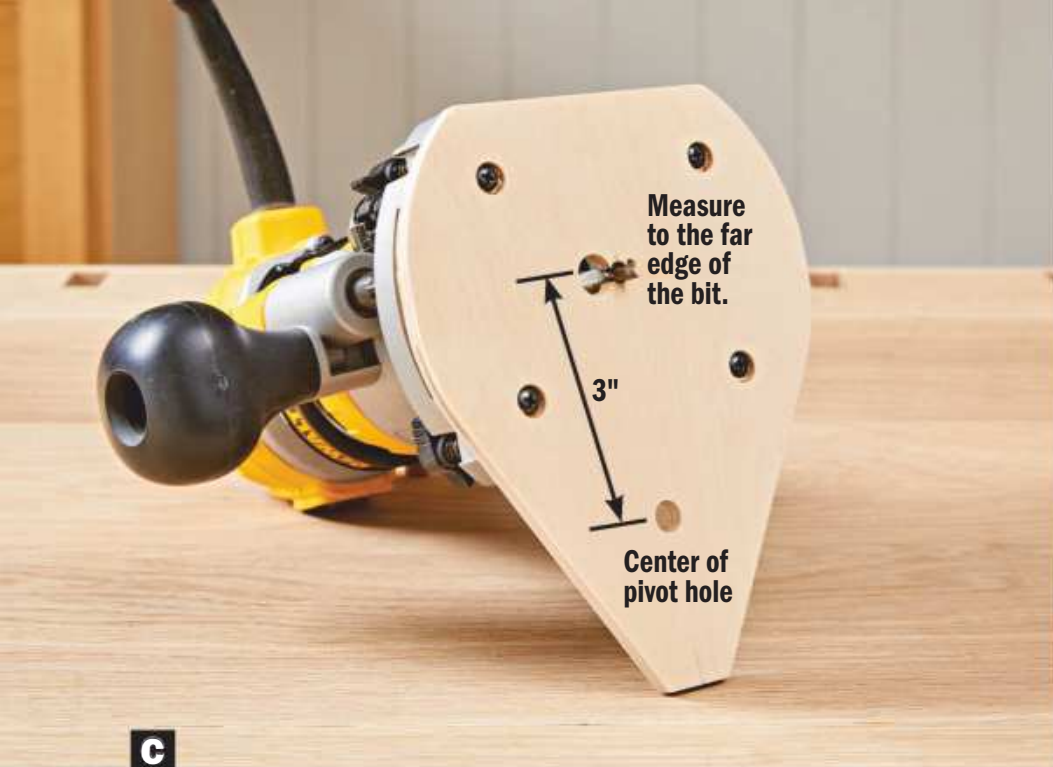
A Cut about 4" into the jig, and clamp it to the bandsaw table. Using one of the spacer (B) blanks as a guide, align the center of one edge with the teeth of the (stopped) blade. Use a 3/8" brad-point drill bit to mark the pivot point on the jig. Remove both from the bandsaw, drill a 3/8" hole in the jig where marked, and clamp it to the table again.



B Insert a 3/8" dowel pivot pin and one of the blanks, and rotate the blank to cut it round. Repeat for the remaining spacers. Mark a second pivot point for the rims (A) and sidewalls (C) and cut them to shape.



1 WHEEL



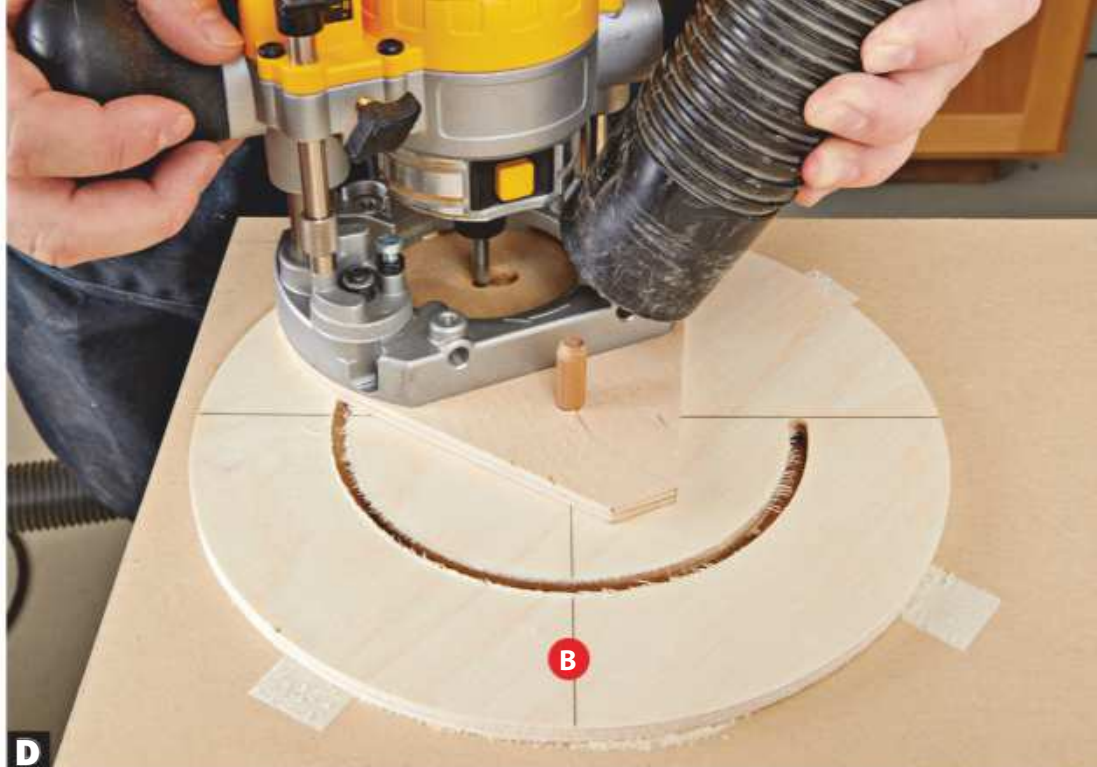
C

Custom-fit the offset pivot base to your router, drilling counterbored holes for the mounting screws, a hole for the bit, and a hole for the pivot pin positioned to rout a 3" radius.



E

Rout between the drilled holes by plunging the router bit $\frac{1}{4}$ " into one hole, and then routing counterclockwise to the next hole. Lift the bit, lower another $\frac{1}{4}$ ", and repeat until through. Repeat for the other quadrants.



D

When routing a spacer (B) or sidewall (C), secure the blank to a scrap piece of plywood with double-faced tape, including the center part. This ensures the center will not move as you separate it from the outer part.



F

Using a jigsaw and 20-tpi plywood blade, cut from hole to hole to remove the waste between the spokes.

4 The rims (A) require an extra step because of the spokes. Before routing, drill $\frac{3}{8}$ " holes where the spokes join the inner tire diameter, and $\frac{1}{4}$ " holes where the spokes meet the hub. Then "connect the dots" with a router and jigsaw [Photos E and F].

5 File and sand smooth all edges on each wheel part. Rout $\frac{1}{8}$ " chamfers along the spokes and the inner hub of the rims (A), but not the outer or inner diameters of the tire [Drawing 1].

6 Glue each wheel assembly together, starting with the center parts and working outward, staggering the spokes 45° from each other. After the glue dries, chamfer the inner diameters of the sidewalls (C), and

Tip! To ensure correct alignment during assembly, place each wheel part on a length of $\frac{3}{8}$ " dowel.

round over the outer diameters. Finish-sand as needed.

Now make the frame

1 Make two angle-marking templates to use in laying out the frames (D), starting with $\frac{1}{4} \times 4 \times 15$ " blanks of any stock. Cut one of the blanks with a 75° angle at one end and 130° at the other. Make the second blank with 110° and 120° angles. Label each angle for easy reference as you lay out the frame.

2 Cut two $\frac{3}{4} \times 10 \times 19$ " plywood blanks for the frames (D), and secure together with double-faced tape. Using the dimensions and angles on Drawing 2, lay out the frames, cut them to shape [Photos G–J], and rout the $\frac{3}{16}$ " and $\frac{1}{2}$ " round-overs.

Tip! When cutting angles that are not marked on your miter saw, simply subtract that figure from 90° or 180° , then set the saw at that number. For example, to cut 130° , simply set your saw for a 50° cut.



G

Starting at the bottom edge, lay out the frame with a pencil, steel rule, and angle-marking templates (that you make).



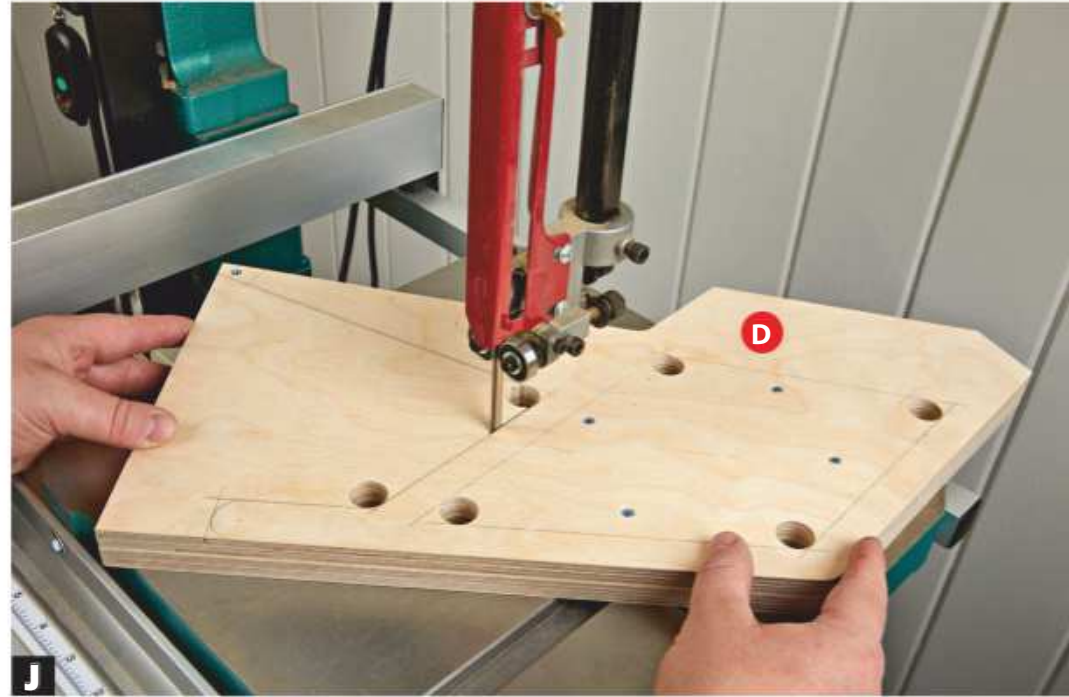
H

Use the angle templates to transfer the correct angles to your frame layout.



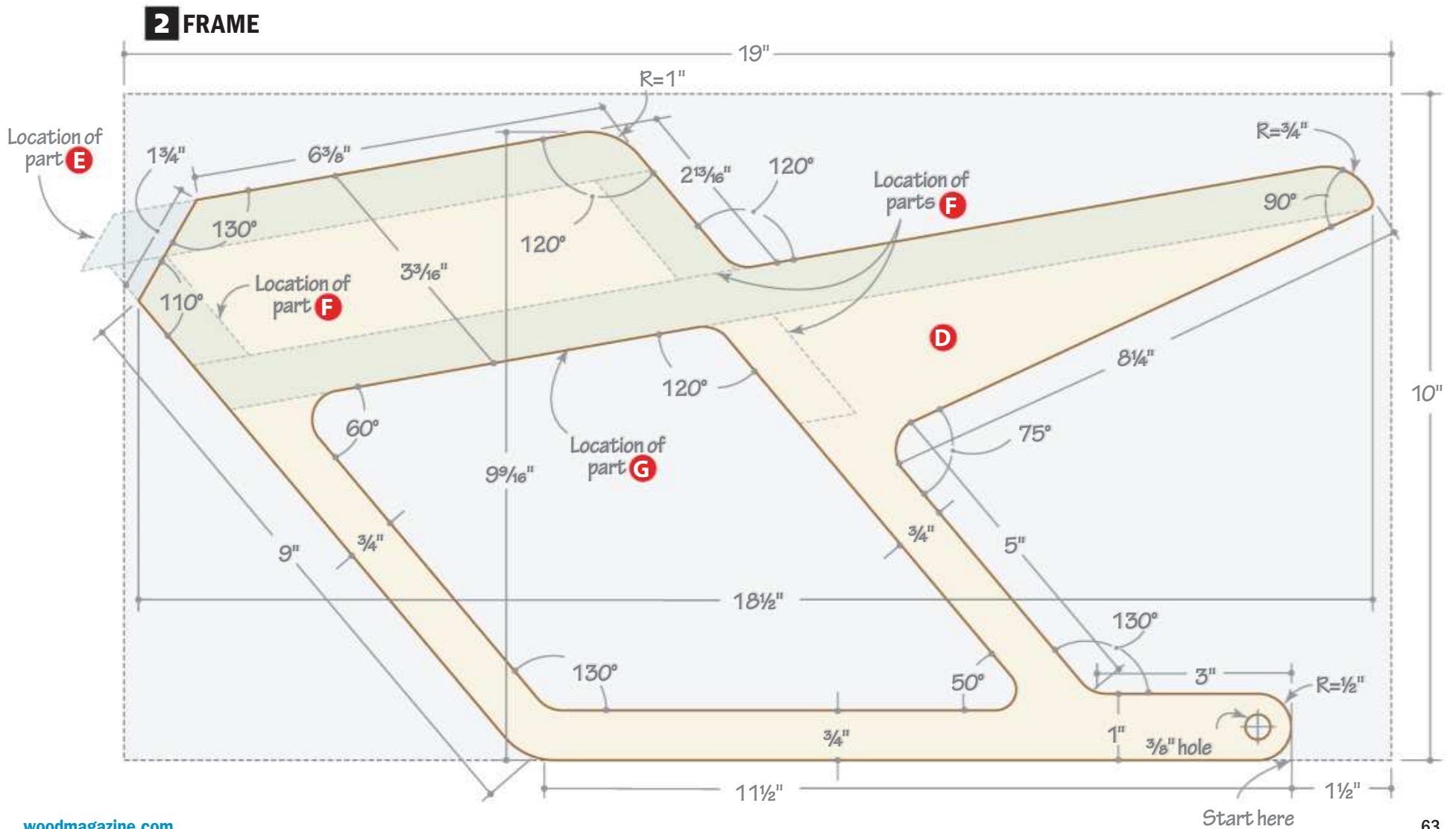
I

Round all intersecting corners with a $\frac{3}{4}$ " circle template or a $\frac{3}{4}$ "-diameter flat washer.



J

Bandsaw the frame's outer edges to shape after drilling $\frac{3}{4}$ " holes at each intersection. Cut the interior edges with a jigsaw and plywood blade.





K

Glue the tank top (E), seat (G), and tank front/back (F) to the frame, keeping the edges aligned with those of the frame. Glue the tank front/back to the tank top and seat as well as to the frame.



L

With the rabbets facing up, stack the large fins (J) together with glue only on the raised portions. Keep the edges and ends aligned. Repeat for the small fins (K). Top the large-fin assembly with the motor cover (I).

Add the seat and motor

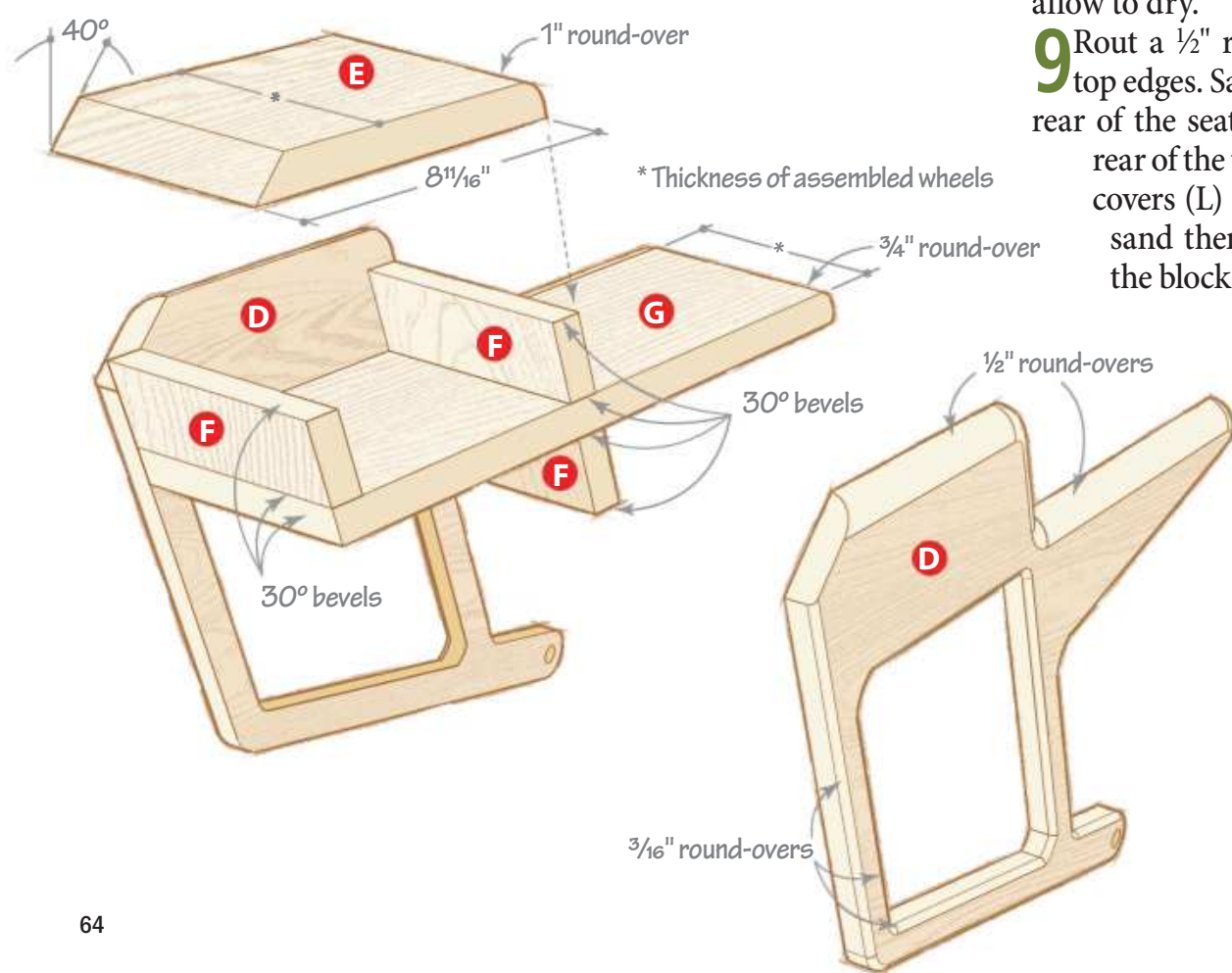
1 Retrieve a wheel assembly and measure its thickness. Cut the tank top (E), front/back (F), and seat (G) to size [Drawing 3, Materials List], using the wheel thickness as the part width. Bevel the ends. (The round-overs come later.)

2 Glue the tank parts and seat to one of the frames (D) [Photo K].

3 Laminate white oak to make the block (H) the same thickness as the wheel assemblies, and then cut it to shape [Block Gridded Pattern]. Rout $\frac{1}{8}$ " round-overs along the top and bottom edges. The front edges get $\frac{1}{2}$ " round-overs, and the back edges $\frac{3}{4}$ " [Drawing 4].

4 Cut the cover (I), large fins (J), and small fins (K) to size [Drawing 4].

3 FRAME/SEAT ASSEMBLY



5 Rabbet all the fins, and then glue them into separate assemblies [Photo L]. When dry, sand a $\frac{1}{2}$ " radius on the corners of the fins and cover. Rout a $\frac{1}{4}$ " round-over on the motor-cover edges.

6 Fasten the fin assembly (I-K) to the block (H) [Photo M], and then glue the block to one frame (D) [Photo N].

7 From a 1" white oak dowel [Skill Builder, page 67], cut four axle spacers (M). Drill a centered $\frac{3}{8}$ " hole through each. Cut two $5\frac{3}{4}$ "-long sections of $\frac{3}{8}$ " white oak dowel for the axles (N).

8 Insert an axle through the back-wheel hub, slip an axle spacer onto the axle, and glue it all to the frame with the axle extending $\frac{1}{4}$ " beyond the frame. Add another spacer, then glue the remaining frame to the block (H) as well. Clamp and allow to dry.

9 Rout a $\frac{1}{2}$ " round-over along the frame's top edges. Sand a $\frac{3}{4}$ " round-over along the rear of the seat, and a 1" round-over at the rear of the tank [Drawing 3]. Cut the clutch covers (L) to size and shape [Drawing 4a], sand them smooth, and glue them to the block.

Give it some steering

1 Cut the forks (O) to size [Exploded View]. Drill the axle holes, and round the edges.

2 Laminate two pieces of $\frac{1}{2}$ " plywood for the handlebar (P) [Handlebar Gridded Pattern], and lay it out. Drill the counterbores and pilot holes, and then cut to shape. Rout the round-overs and sand smooth.



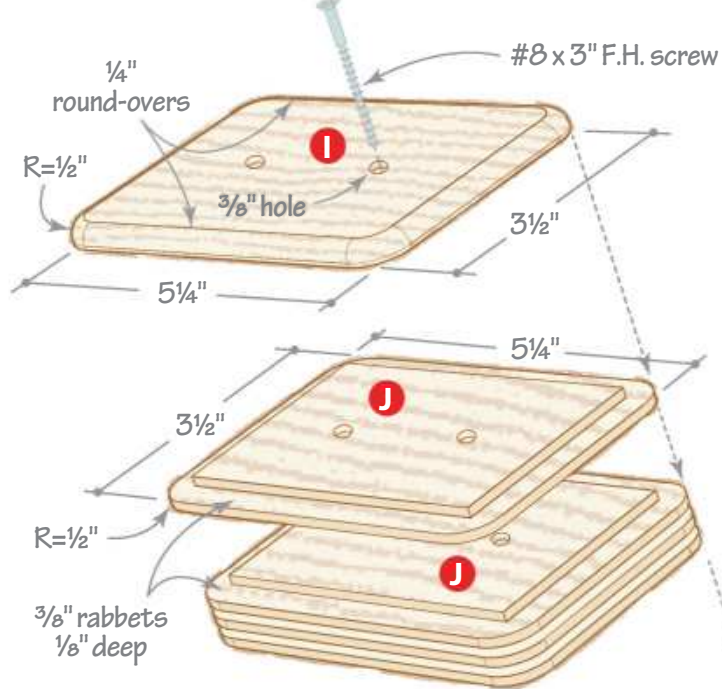
M

Glue and screw the motor stack (I-K) to the block (H), keeping it centered front-to-back and side-to-side.

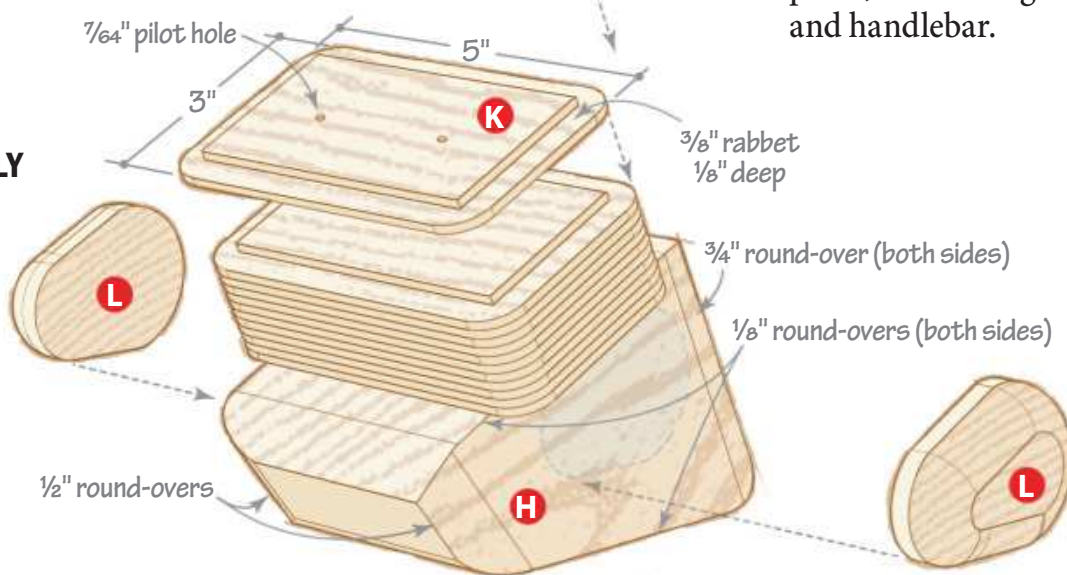


N

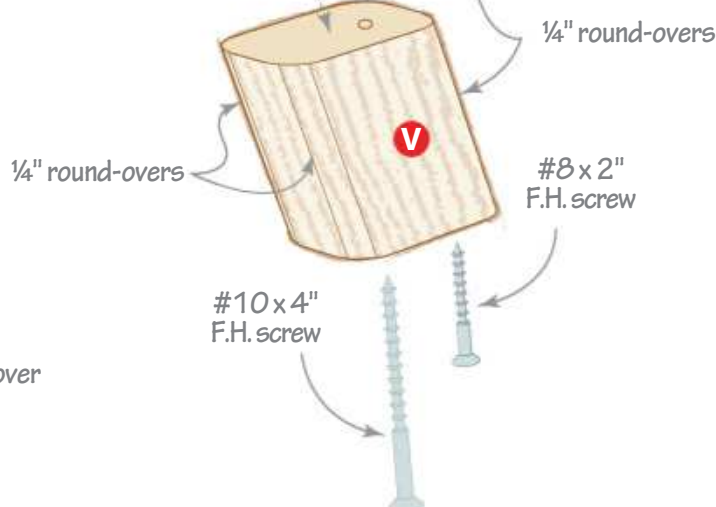
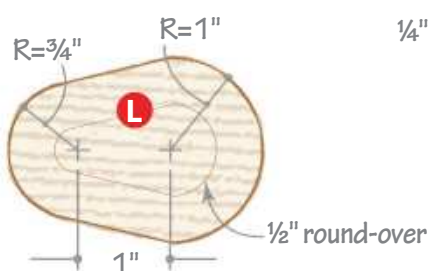
Glue and clamp the motor assembly to the frame, aligning the block flush with the bottom edge of the frame and extending $\frac{1}{2}$ " forward.



4 ENGINE ASSEMBLY



4a CLUTCH COVER

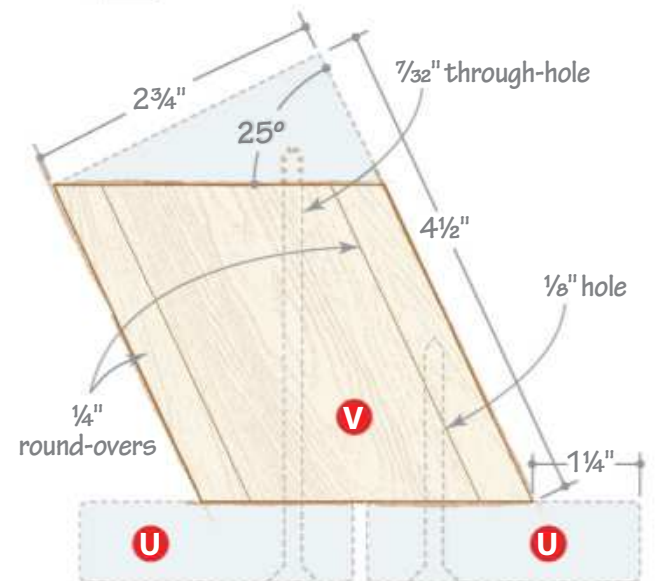


holes, and then cut to shape. Rout the round-overs and sand smooth.

3 Glue the front wheel between the forks with the axle and spacers in place [Exploded View]. Next, glue the assembled fork to the frame assembly, leaving 2" of length extending above the tank. Drill countersunk pilot holes diagonally through the fork, and drive screws into the frame. (These will be covered by the headlight panel [Q].) Screw the handlebar to the fork, and cover the screwheads with wood plugs.

4 Cut the headlight panel (Q) and headlights (R) to size and sand smooth [Exploded View]. Glue the headlights to the panel, and then glue the panel to the forks and handlebar.

4b MOTOR STAND



Finally, get to rocking

1 Lay out the rockers (S) using the **Rocker Grid-ded Pattern**. Stack-cut and edge-sand the rockers at the same time to ensure identical shapes. Next, cut to size the tire supports (T) and platforms (U) [**Exploded View**], and round over the edges. Glue and screw the platforms to the tops of the rockers; leave the supports off for now.

2 Cut the motor stand (V) to size [**Drawing 4b**], and lay out its location on the platforms [**Photo 0**]. Drill the countersunk pilot holes in the platforms and stand; round over the stand's edges. Glue and screw the stand to the rear platform with a 2" screw. Then turn the motorcycle upside down, and fasten the platform and stand to the block with a 4" screw.

3 Position the tire supports between the rockers, resting on the wheels. Transfer the support locations to the rockers. Remove the motorcycle from the rockers, drill counterbored pilot holes, and attach the supports with screws. Plug the holes and trim flush.

► Learn how to cut perfect wood plugs to cover screws. woodmagazine.com/perfectplugs

► We prefer using Baltic birch plywood for projects like this because it leaves clean edges with no gaps. But it can sometimes be difficult to find. Order a kit from Woodworker's Source with three sheets of Baltic birch plywood sized to fit all the parts for this motorcycle. woodmagazine.com/balticbirchkit

4 Apply a finish of your choice. We sprayed on three coats of Watco satin lacquer, sanding between coats with a 320-grit sanding sponge.

5 Reattach the motorcycle to the stand. Then add four screws through the supports to the thick "tread" of the front and back wheels.

6 Now you're ready for title, license, and registration, and the open road!

Produced by **Bob Hunter** with **John Olson**
Project design: **John Olson**
Illustrations: **Roxanne LeMoine, Lorna Johnson**

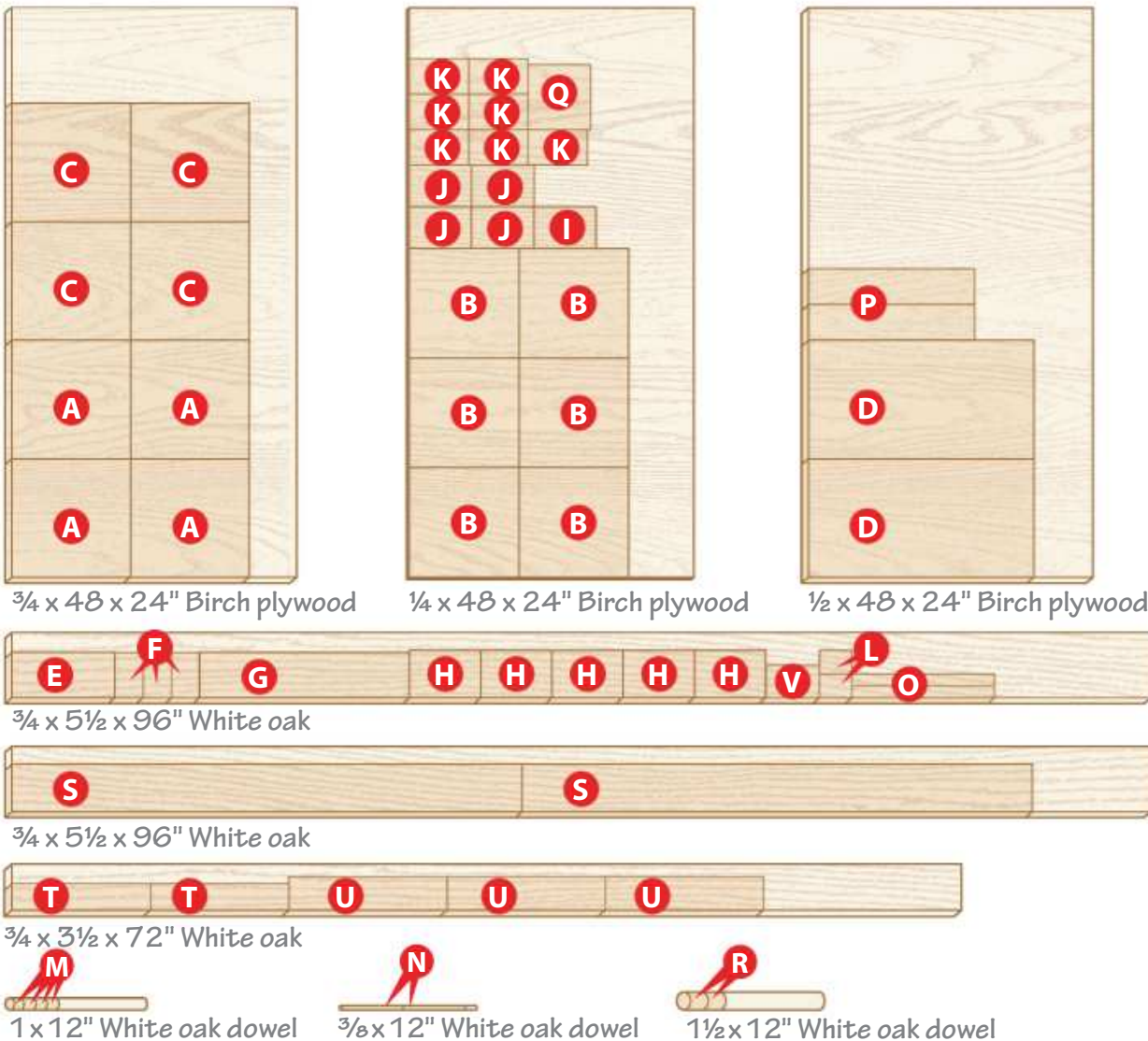


Materials List

Part		FINISHED SIZE			Matl.	Qty.
		T	W	L		
Wheels						
A	rims	¾"	10" dia.		BP	4
B	spacers	¼"	9½" dia.		BP	6
C	sidewalls	¾"	10" dia.		BP	4
Frame						
D*	frames	½"	9⅞"	18½"	BP	2
E	tank top	¾"	†	8⅞"	WO	1
F	tank front/back	¾"	†	2⅜"	WO	3
G	seat	¾"	†	17⅞"	WO	1
Motor						
H	block	†	3⅓"	5⅞"	LWO	1
I	cover	¼"	3½"	5¼"	BP	1
J	large fins	¼"	3½"	5¼"	BP	4
K	small fins	¼"	3"	5"	BP	7
L	clutch covers	¾"	2"	2¾"	WO	2
Front end						
M	axle spacers		1" dia.	1"	WO	4
N*	axles		⅜" dia.	5¼"	WO	2
O	forks	¾"	1"	12"	WO	2
P	handlebar	1"	2¾"	13¼"	LBP	1
Q	headlight panel	¼"	5½"	5¼"	BP	1
R	headlights		1½" dia.	1"	WO	2
Rocker assembly						
S	rockers	¾"	3⅝"	33⅝"	WO	2
T	tire supports	¾"	2"	10½"	WO	2
U	platforms	¾"	2½"	12"	WO	3
V	motor stand	¾"	2¾"	4½"	WO	1

* Parts initially cut oversize.
† This dimension equals the total wheel thickness. See the instructions.
Materials key: BP-birch plywood, LBP-laminated birch plywood, WO-white oak, LWO-laminated white oak.
Supplies: #8×1 1/2" flathead screws, #8×2" flathead screws, #8×2 1/2" flathead screws, #8×3" flathead screws, #10×4" flathead screw.
Blade and bits: Dado set; 1/16", 1/8", 3/16", 1/4", 1/2", and 3/4" round-over router bits; 45° chamfer bit; countersinking drill bit; 3/8" brad-point drill bit; 3/8" plug cutter.

Cutting Diagram



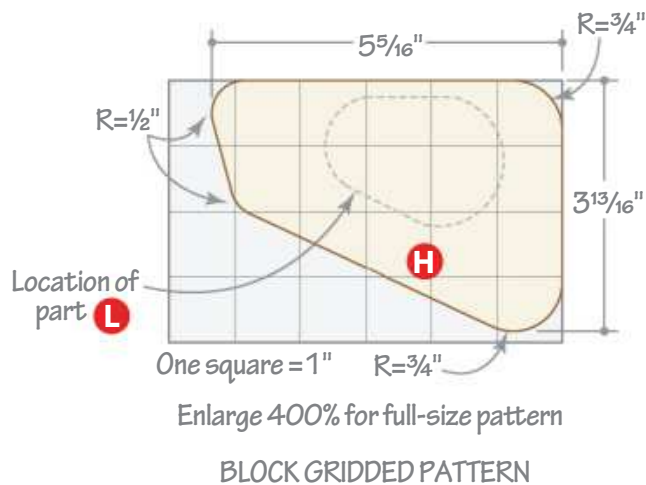
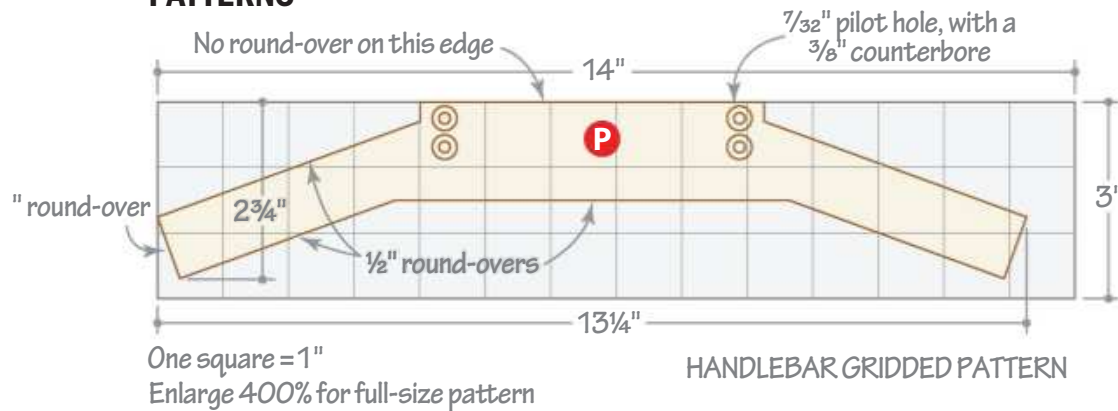
SKILL BUILDER

Make your own dowels (especially the large ones)

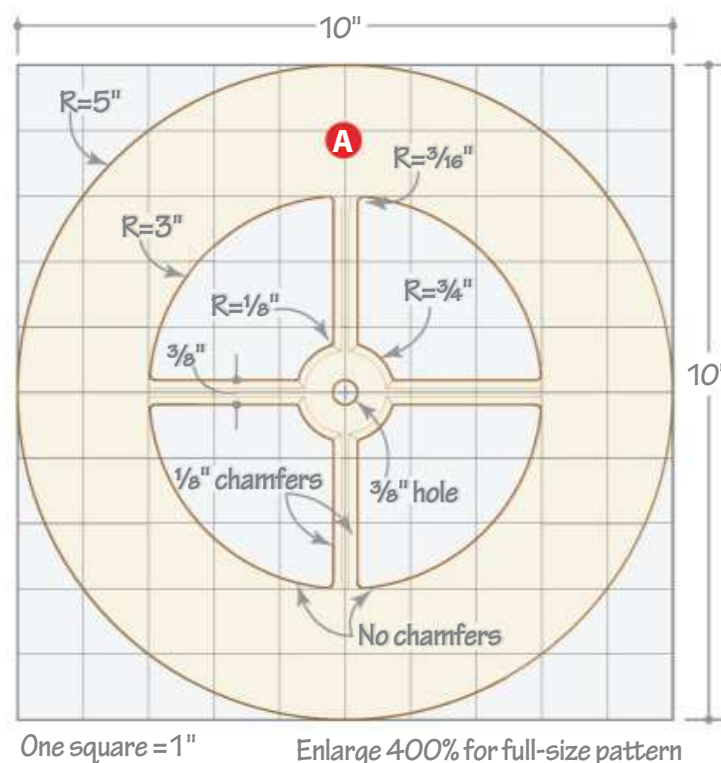
It can be difficult to buy dowels larger than $\frac{3}{4}$ " in diameter—especially in wood species other than birch or poplar. But you can easily make your own at the router table, using a round-over bit with a radius equal to half the dowel diameter. For example, to make the $1\frac{1}{2}$ " white oak dowels for the headlights (R), use a $\frac{3}{4}$ " round-over bit. To start, rip a length of stock exactly $1\frac{1}{2}$ " square. Set stopblocks to the right and left of the bit about 1" closer than the length of your stock. To rout, place one end of the stock against the right stopblock, pivot the stock into the spinning bit, rout to the left stopblock, and then pivot it away from the bit. Repeat for all four edges. The square ends prevent your custom dowel from rotating during machining. When done, simply cut off the square ends. 🌲



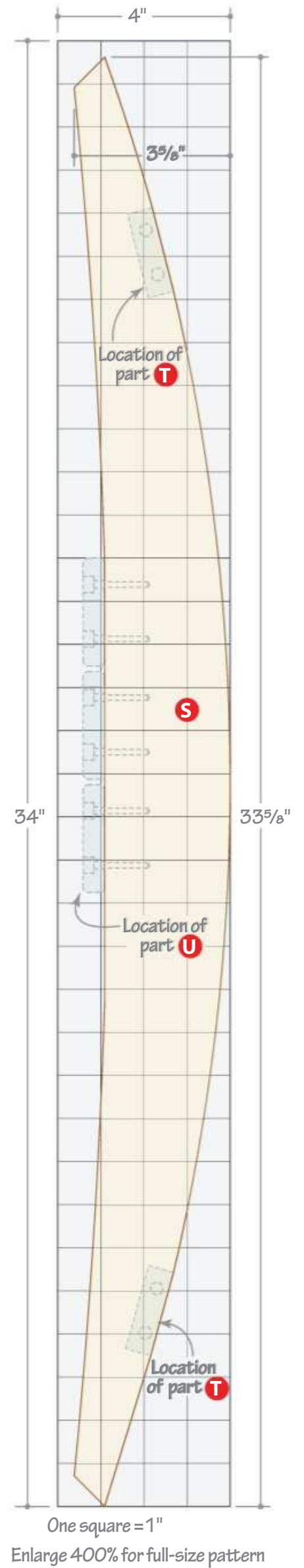
PATTERNS



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RIM GRIDDED PATTERN



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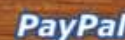
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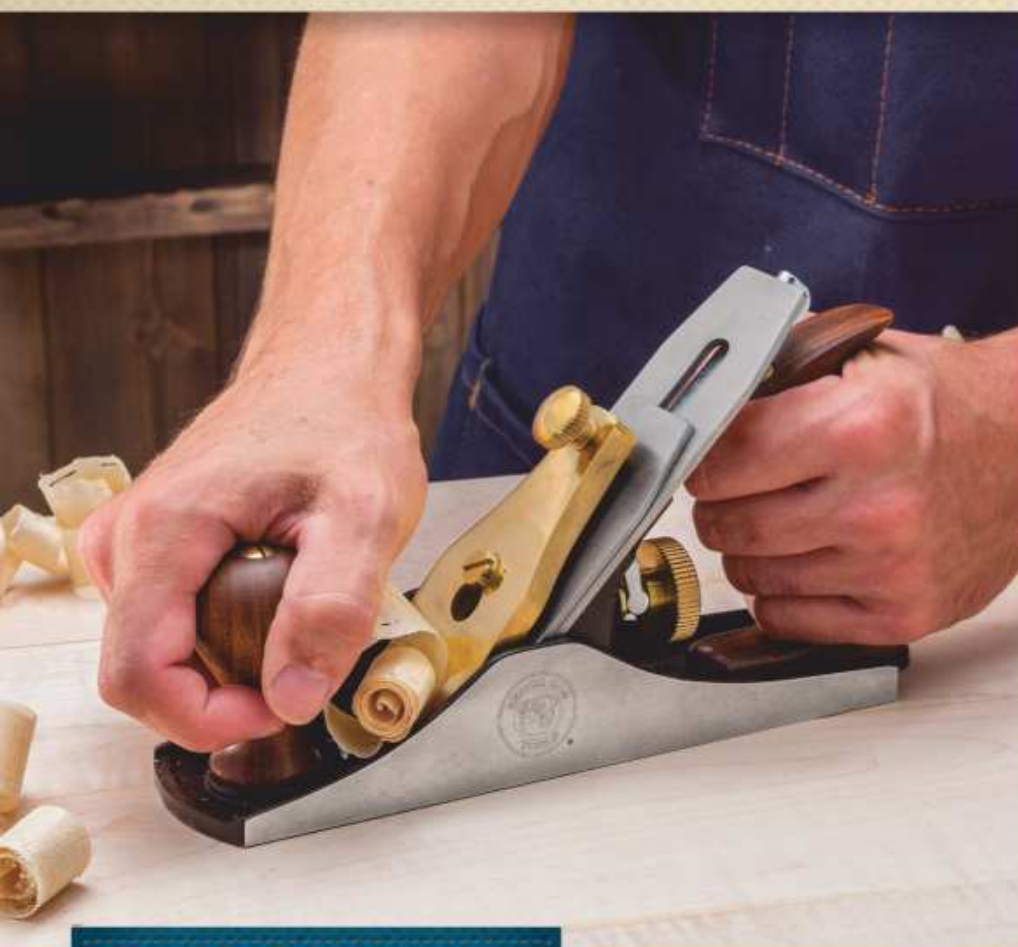


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We chose yellowheart (closed blossom), padauk (partially open), and purpleheart (open). Select any color wood you like or try turning poplar or maple and dyeing the flowers bright colors (see [page 56](#)).



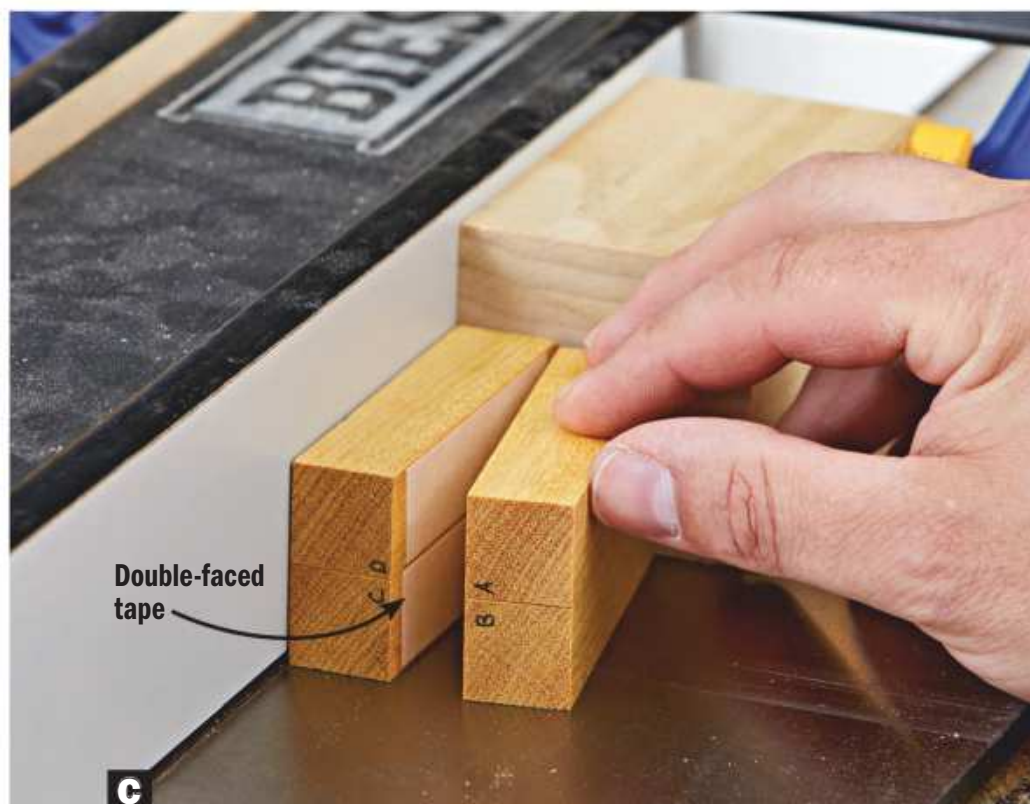
A

Square up the blanks, then resaw each into quarters. Machine each quadrant for the closed and partially open tulip to $\frac{3}{4}$ " square, and the open tulip to 1" square. Dry-assemble and tape together each blank as shown on the right.



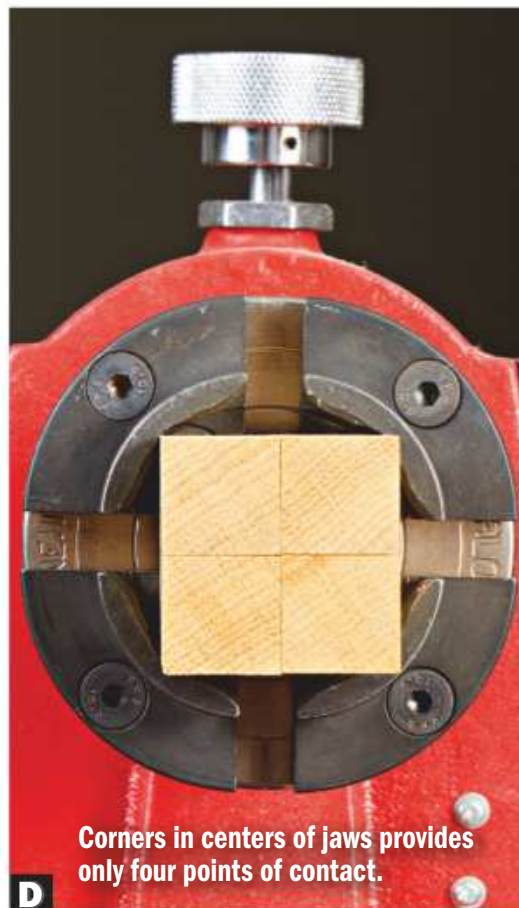
B

Clamp a squared-up scrap to your tablesaw rip fence. Join quadrants A and B, then C and D, pressing the pieces against the scrap, fence, and table.

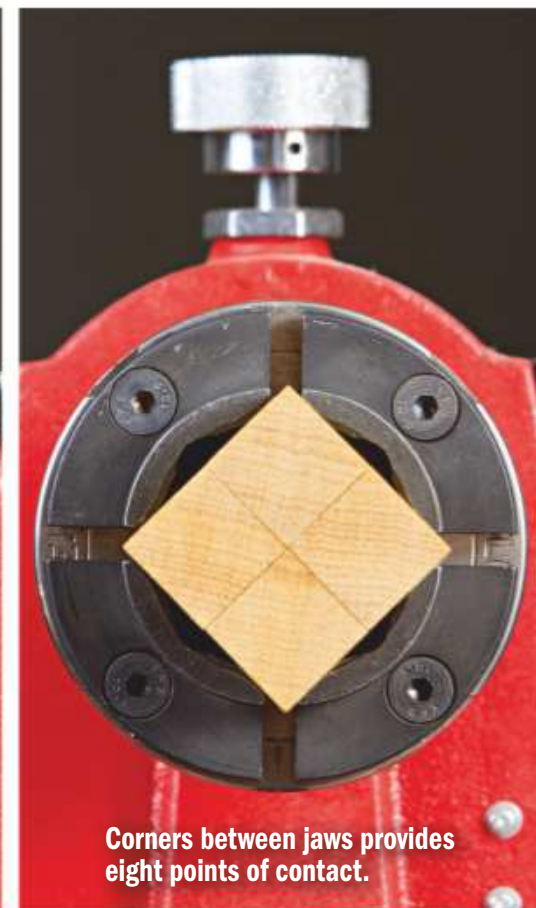


C

Apply tape to the C/D pair and press the A/B pair against it. The edges should be flush, and the joints aligned.



Corners in centers of jaws provides only four points of contact.



Corners between jaws provides eight points of contact.

Mount the blank correctly. Chucking it as shown on the left does not provide as firm a grip as the method shown on the right.

Prepare the blanks

1 For the closed and partially open tulips, prepare $1\frac{1}{16}$ "-square blanks 13" long. For the open tulip, prepare a $2\frac{3}{16}$ "-square blank 13" long. Label each corner, then resaw and reassemble the blanks by wrapping them with masking tape [Photo A].

2 For each flower, cut a 3" length from its taped blank. Assemble the quadrants with double-faced tape [Photos B, C]. Then mount a blank in a four-jaw chuck with the labeled end against the chuck [Photo D]. Draw lines around the blank 1" and $1\frac{3}{8}$ " from the unmarked end.

Tip! Relabel the freshly cut end so you can cut additional tulip blanks from it.

Shape the outside (which becomes the inside)

The three flowers share some turning techniques, while each has its own, as well. Look for the **bold subheads** to guide you through the steps needed for each flower.

Closed and Partially open flowers: With the lathe at 1,800 rpm, use a skew chisel to cut a pommel between the lines [Photos E and F]. Using a roughing gouge, turn a $1\frac{1}{2}$ " cylinder from the pommel to the right end. For the

► Pommel: A transition from round to square.



E

Use the toe of the skew to shape the pommel, rolling from left to right, but starting away from the left line. Stop when the cut just traces the full circumference at the right line. Work back to the left line if necessary.



F

Cut traces
circumference



G

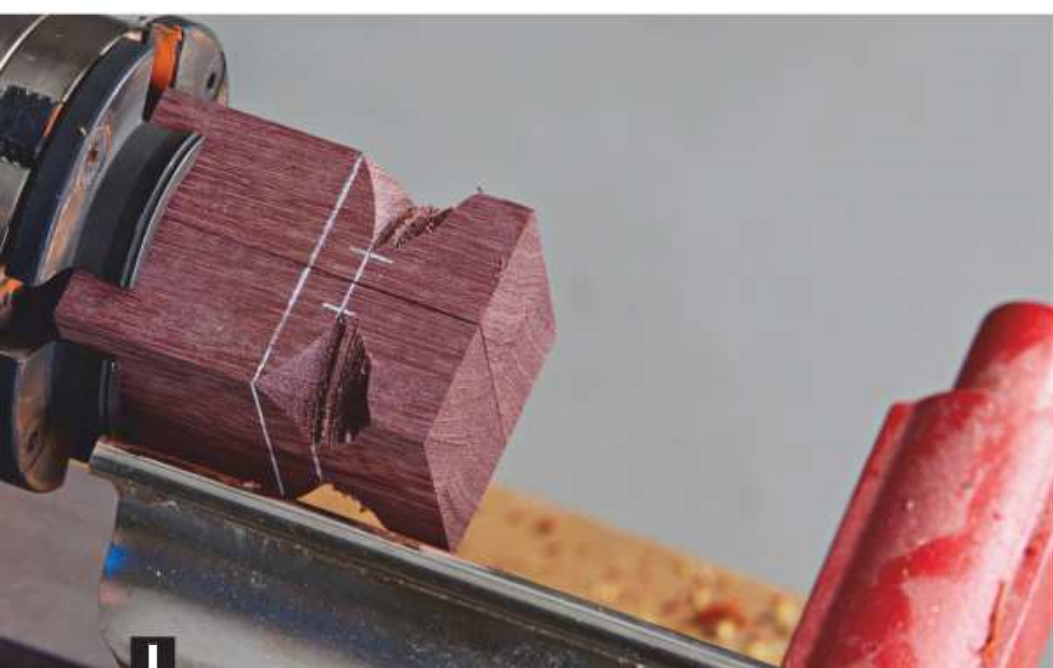
Round the end of the partially open flower to match Pattern A.



H

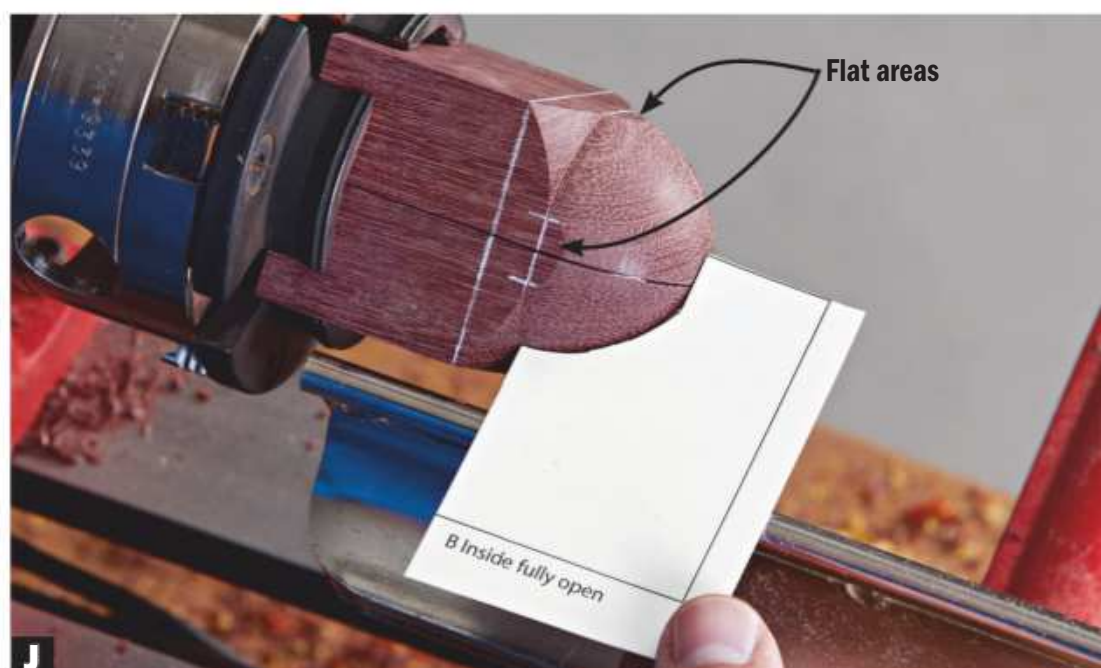
Tip! Use a white-lead pencil to mark on dark woods such as purpleheart.
woodmagazine.com/whitepencil

On each face of the open-flower blank, make two marks $\frac{3}{4}$ " from the edges.



I

Turn a pommel between the lines, rolling from left to right and stopping when the cut touches the intersections of the two marks and the right line.



J

Flat areas

With a spindle roughing gouge, turn a $2\frac{1}{8}$ " diameter from the right line to the end. Note that a flat area will remain on each face. Switch to a spindle detail gouge and round the end to match Pattern B.

Note: Use the patterns as guides, not fixed profiles. Work for smoothly curved shapes in each step.

closed flower, move on to the step labeled **All** in the next column. For the partially open flower, use a spindle detail gouge to round over the right end [Photo G]. Then go to the step **All**.

Open flower only: Follow the steps in Photos H-J then go to the step **All** below.

All: Sand and finish only the turned surfaces. (We wiped on Briwax using a paper towel.) Remove the blank from the chuck and sepa-

Safety Note: Unlike cloth, paper towels will tear away, rather than get tangled around a spinning workpiece.



K

Clamp the blank to a work surface with the joint overhanging the edge. Separate the halves without damage by twisting a second clamp secured to the overhanging portion. Repeat to separate the two remaining pairs.

rate the quadrants [Photo K]. Peel off the tape and glue the quadrants together in their original orientation (labels in the outside corners) keeping the edges and ends flush.

Shape the true outside

All: After the glue dries, grip the labeled end of the blank in your four-jaw chuck as before.

Closed flower: Using a spindle roughing gouge, turn the blank to a 1½" diameter, working as close to the chuck jaws as possible. Mark lines 1" and 2" from the right end. Using a skew or spindle detail gouge, shape the petals [Photo L]. Go to **Closed and Partially open** in the *next column*.



L

Round from the right line to the end of the blank. Stop when you remove the last flat from the tips of the petals.



M

With a spindle detail gouge, round from the right line to the bottom of the parting cut, checking the shape against **Pattern C** or **D**.

Partially open flower: Using a spindle roughing gouge, turn the blank to a 1½" diameter, working as close to the chuck jaws as possible. Using a skew or spindle detail gouge, finish shaping the petals by reducing the diameter until the flats at the ends of the petals disappear. Mark a line around the blank at the base of the petals, and another 1" to the left of that line. Proceed to **Closed and Partially open below**.

Closed and Partially open: To the left of the left line, part to ⅝" diameter. Shape the bottom of the flower [Photo M]. Go to **The finishing touches** on the *next page*.



N To avoid catches when “turning air” between the petals, begin the cut with the handle low. Raise the handle rather than pushing the tool forward.



O Shape the cove until the flats disappear from the tips of the petals. Compare the profile to **Pattern E**.



P After parting near the chuck, shape the bottom end of the flower between the pencil line and the parting cut.



Q Use a skew chisel and sandpaper to blend the round-over down to the remaining waste. Add finish to the newly shaped area.

Open flower: Mark pencil lines around the blank $1\frac{1}{4}$ " and $2\frac{1}{8}$ " from the right end. Part between these lines to a diameter of $1\frac{1}{16}$ ". With a spindle roughing gouge or spindle detail gouge, shape a cove from the right end of the blank to the right end of the parting cut [Photos N, O].

► Build a vase to display your tulips.
woodmagazine.com/vases

Mark around the blank at the base of the petals. Part at the $2\frac{1}{8}$ " line to $\frac{5}{8}$ " diameter. With a spindle detail gouge, round the bottom of the flower to match **Pattern F** [Photo P].

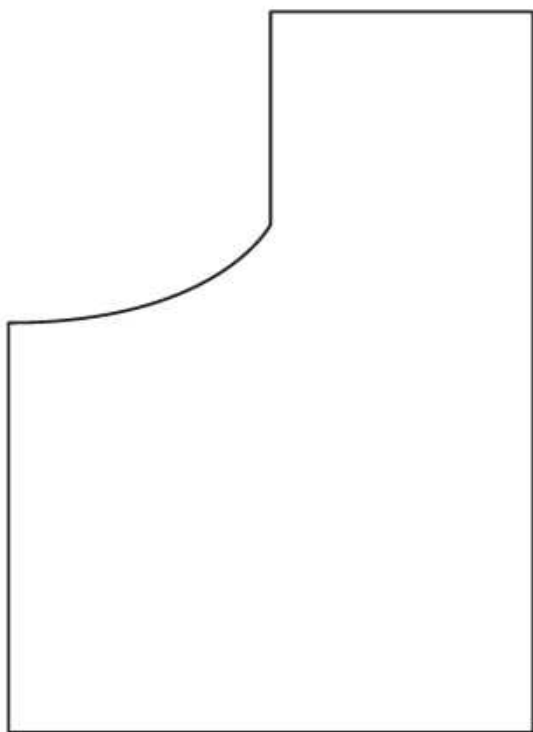
The finishing touches

All: Sand and finish the outside of the flower. At $\frac{1}{16}$ " from the bottom of the flower, part to $\frac{3}{16}$ " diameter and blend the round-over to the parting cut [Photo Q]. Switch off the lathe, and hand saw the flower from the blank.

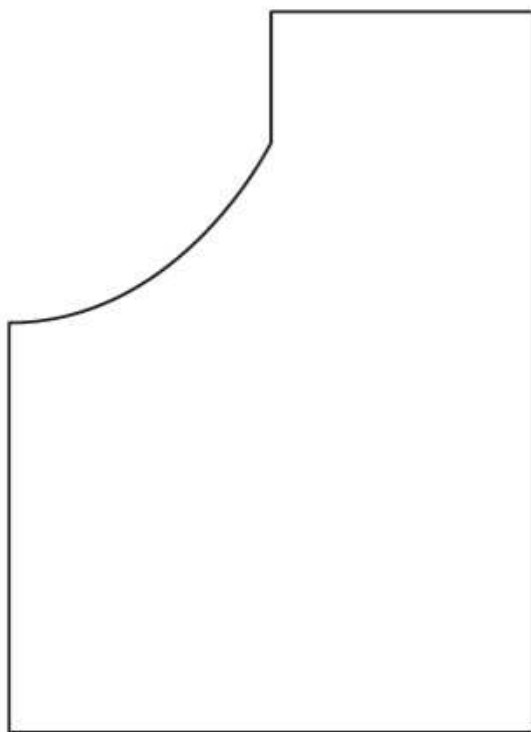
Drill a $\frac{1}{8}$ " pilot hole $\frac{5}{16}$ " deep centered on the nub. Then enlarge the hole to $\frac{3}{16}$ " and finally $\frac{1}{4}$ ". Apply a clear finish to lengths of $\frac{1}{4}$ " poplar dowel, then glue them into each flower as stems. 🌱

► Get more turning projects, tips, and techniques.
woodmagazine.com/turning

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



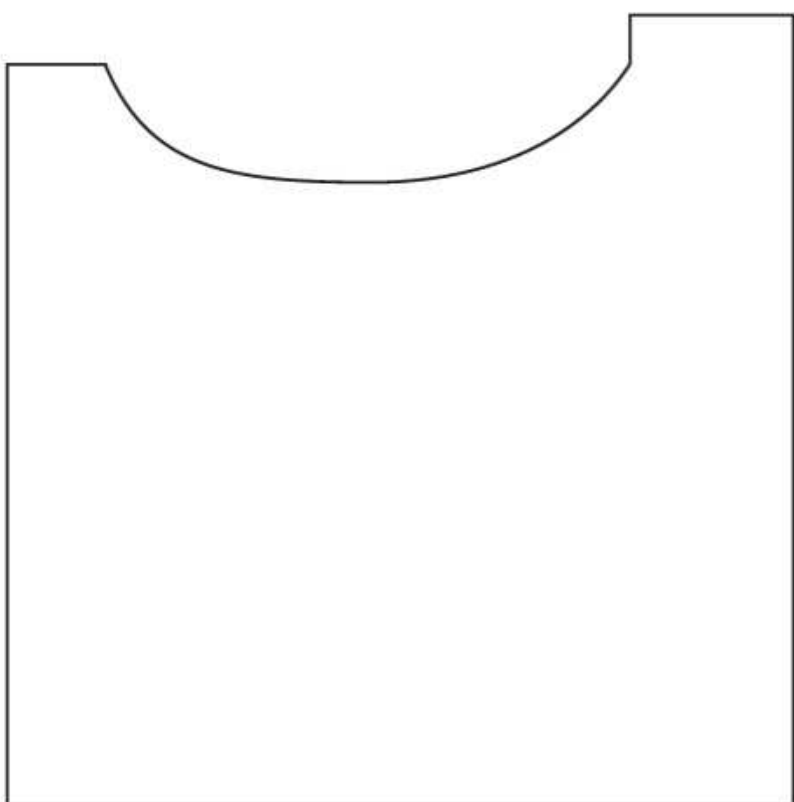
A Inside partially open



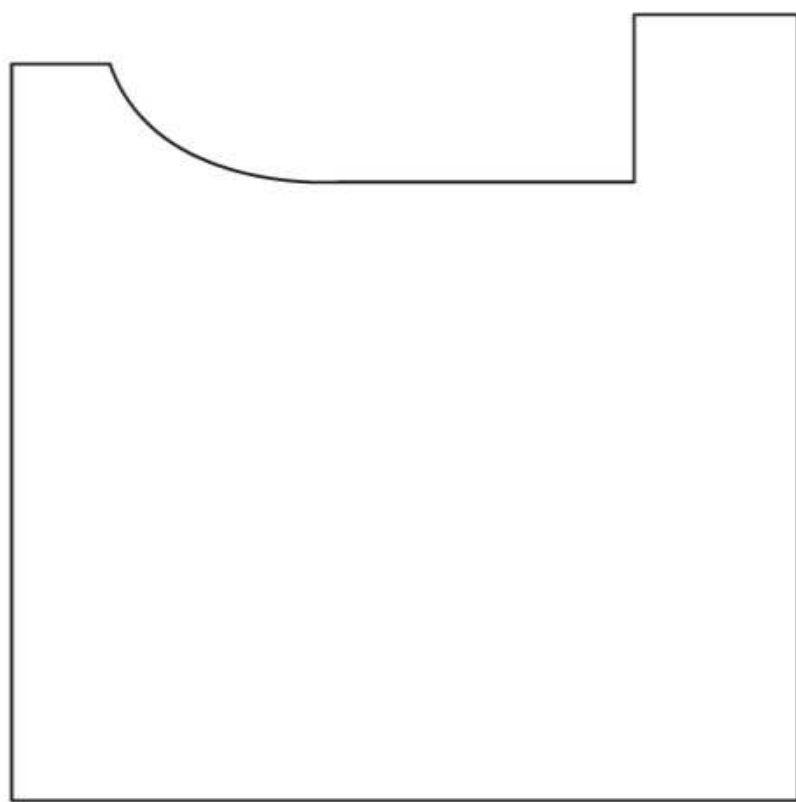
B Inside fully open



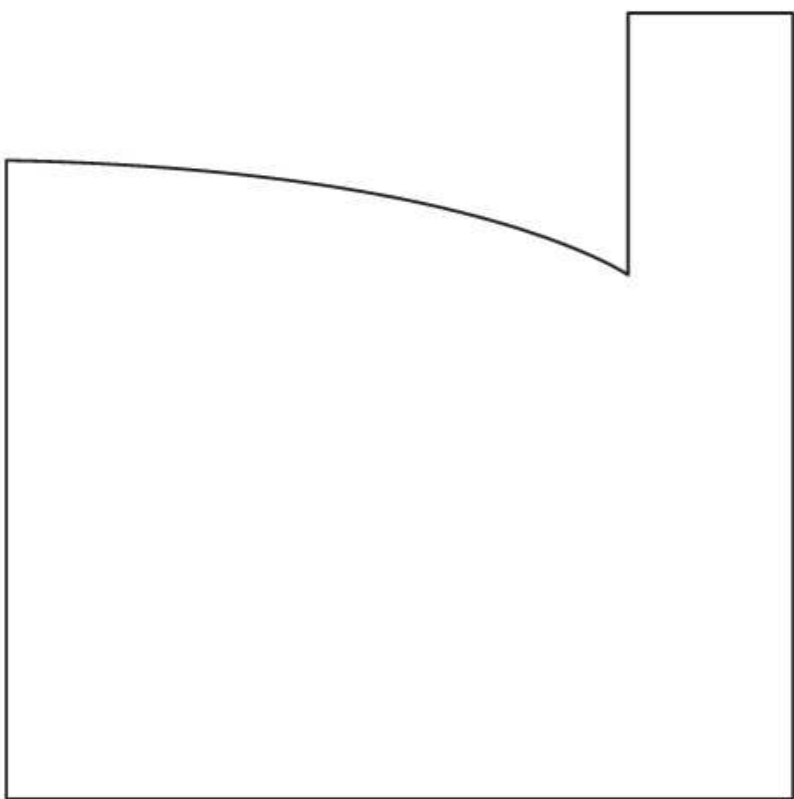
Get the bright colors of real flowers by dyeing poplar tulips and stems. Learn more about using dye on [page 56](#).



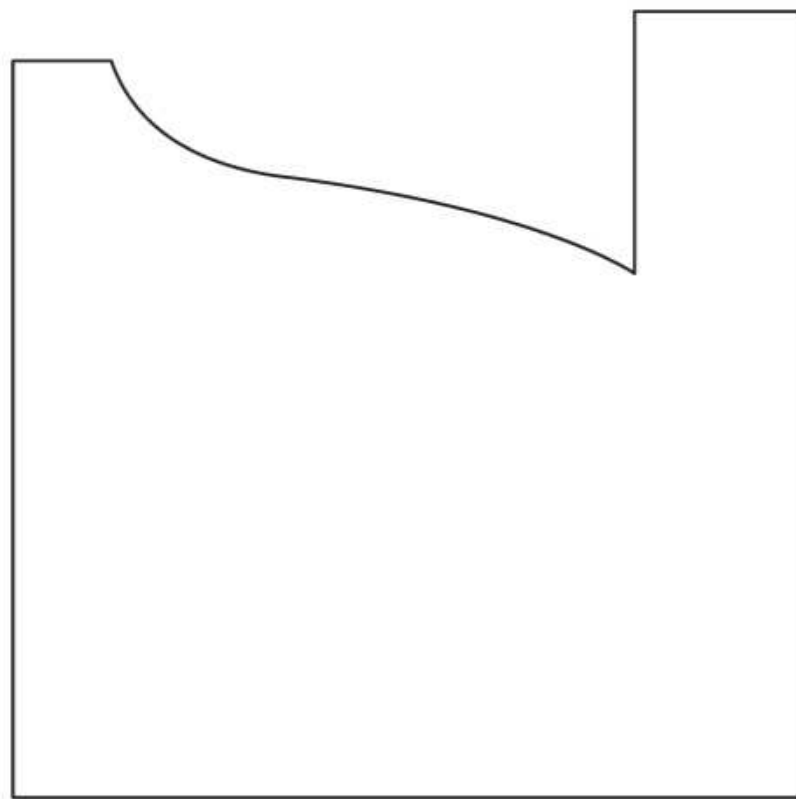
C Outside closed



D Outside partially open



E First outside fully open



F Second outside fully open

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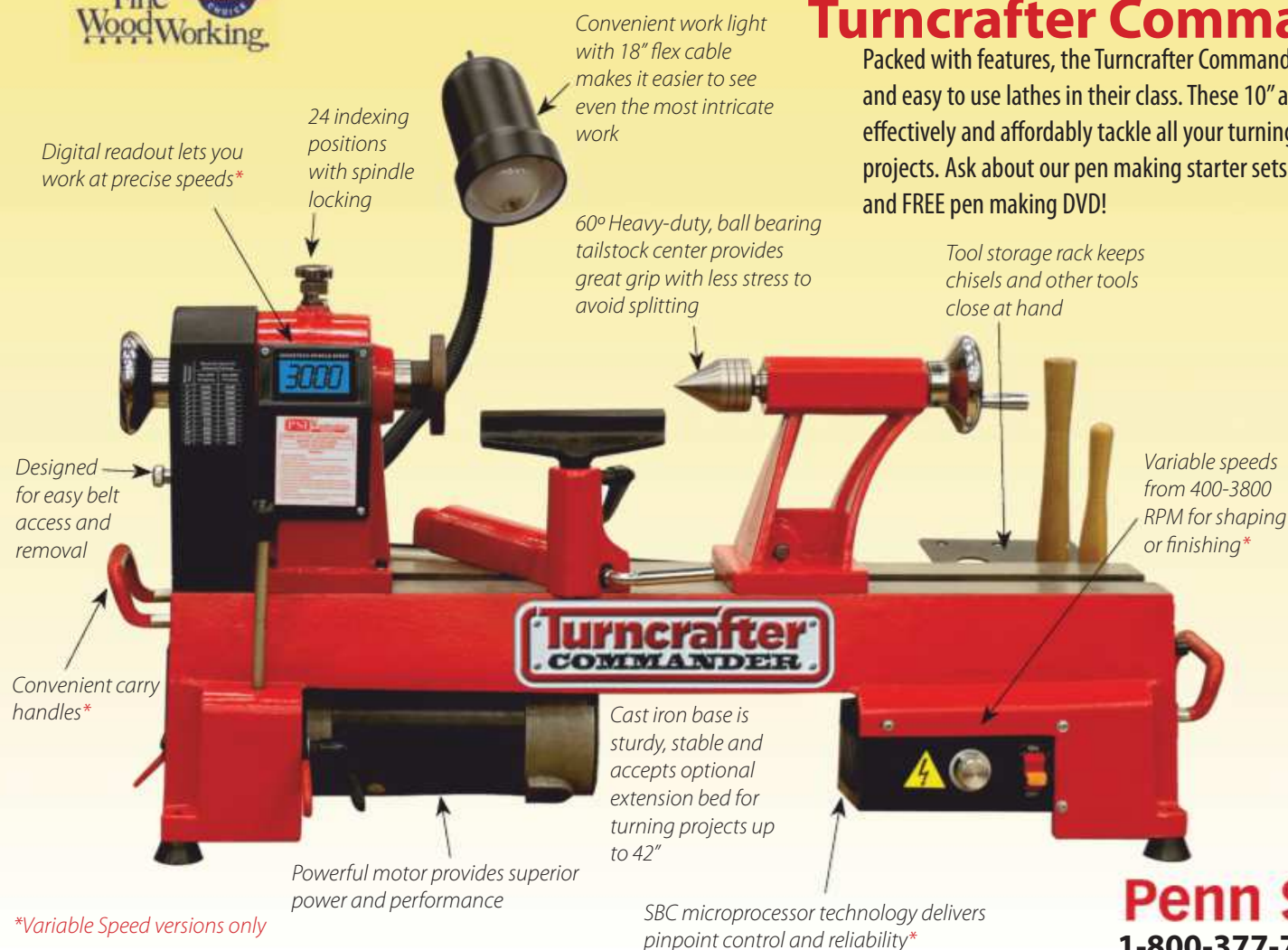
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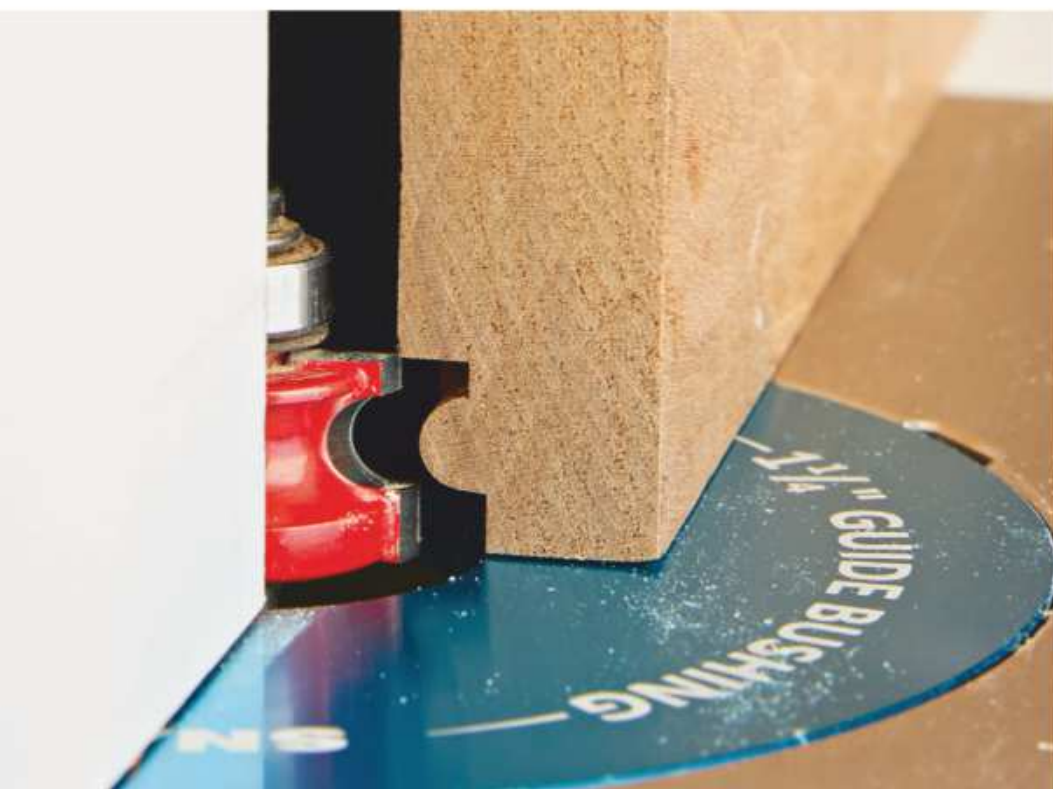
1 1/2x1 1/4", no. 06-694, \$89.90

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The Mega Flush-Trim compression bits, shown *above*, work great for pattern routing because the combination of upcut and downcut shearing cutters eliminates chip-out on both workpiece faces. They cut cleanly and smoothly and produce precise results. To maximize the compression advantage, center the bit height on the workpiece thickness, which might require a thicker template. We like the 1 1/2"-diameter bits because they cut at a shallower angle than the 3/4" bits, making them less "grabby" in reversing-grain shapes, such as circles. But if you can get only one bit, go for the 3/4x1 1/4"—it's the one we use most often.

Infinity Cutting Tools
877-872-2487, infinitytools.com



1/8"-radius Traditional Bead

no. 80-102 (1/4" shank), \$34

We love this bit for table aprons because the bead and recess create a shadow that adds an eye-catching detail to an otherwise plain surface. You can also use this bit on the edge of adjacent faces of a workpiece to create a full-round bead that wraps around the corner.

Freud
800-334-4107, freudtools.com



1 1/2" Rail & Stile Profile

no. 99-060, \$64

This bit has multiple uses, a great attribute in a premium-priced bit. It works great for routing mating cope-and-stick profiles for door rails and stiles (use a slot-cutting bit [no. 99-062, \$62] for the mating tenon and slot). But we use it most often to rout one-step edge profiles on small box lids and tabletops. The combination of a cove, round-over, and fillet provides a pleasing look scaled appropriately for smaller projects like these.

Freud
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continued on page 81

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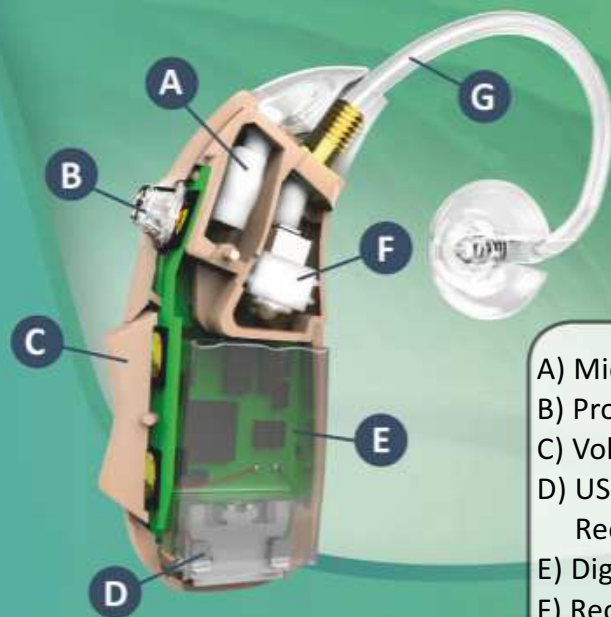


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Hitachi's Triple Hammer driver uses a unique mechanism with three hammers and anvils (other impacts use two) to create greater torque options for different fasteners. It does this via four driving modes: three different speeds using three impacts per motor rotation, and one at high speed using only two impacts per rotation. (In this mode, the hammer skips every other anvil, creating a greater "windup" for more force.)

In use, this tool feels just like a traditional two-hammer impact, light with a short head that fits easily into tight spaces. It has all the power and speed I expect from an impact driver, able to sink 4"-long lag screws with ease. But, like most other impact drivers, it's loud: 92 decibels, well above the threshold where you should wear hearing protection. It also vibrates more than I expected during heavy use.

—Tested by Michael Springer

800-829-4752, metabo-hpt.com

Note: Shortly before this issue went to press, Hitachi Power Tools changed its name to Metabo HPT. This impact driver, and all other Hitachi-branded tools, will transition to the Metabo HPT branding over the coming months with no other changes, according to Abby Levy, marketing director.



Reclaim materials—and your time—with the Restorer

Restorer portable drum/brush sander, no. PXRA2676, \$100

I build a lot of projects from reclaimed materials, so I'm eager to latch onto any tool that makes easier the process of restoring the wood to its original surfaces. The Porter-Cable Restorer works as a handheld drum sander, using a 3"-diameter, 4"-long sanding sleeve to abrade away paint, varnish, or even aged grime from wood, steel, and virtually any surface that will hold up to the abrasive.

I used the Restorer to remove several layers of paint from an old window frame and door. The included 60-grit sleeves made quick work of this, but you have to be careful not to sand too aggressively and gouge the wood. The 80-grit sleeves work well, too, without being as aggressive, but load up quicker with debris. I recommend practicing on scrap to get a feel for the tool before tackling a project.

In addition to sanding, you can buy optional drums that swap out easily. A hard-textured paint/rust-removal head works well, especially on steel. And the nylon-brush head effectively removes soft grain from wood, leaving a coarse texture that feels like aged, weathered wood. The steel-wire brush works best on metal. The tool has a dust port, but does not include a bag or adapter for the most common-sized vacuum hoses.

—Tested by John Knight

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MODEL: VEN4145
SAVE 40%
ITEM 37051, 37052, 64417, 64418, 61363, 68497, 61360, 61359, 68498, 68496 shown
44240626

LIMIT 5 - Coupon valid through 3/29/19*

HaulMaster **SUPER COUPON**

72" x 80" MOVING BLANKET



Customer Rating **★★★★★**
NOW \$5.99
~~\$8.99~~
COMPARE TO BLUE HAWK \$19.99
MODEL: 77290
SAVE 70%
ITEM 69505/62418/66537 shown
44242763

LIMIT 6 - Coupon valid through 3/29/19*

KRAUSE & BECKER **SUPER COUPON**

AIRLESS PAINT SPRAYER KIT



Customer Rating **★★★★★**
NOW \$169.99
~~\$214.99~~
COMPARE TO GRACO \$299
MODEL: 262200
SAVE \$129
ITEM 62915/60600 shown
44246658

LIMIT 4 - Coupon valid through 3/29/19*

BANKS **SUPER COUPON**

23 GAUGE PIN NAILER



NOW \$24.99
~~\$29.99~~
Customer Rating **★★★★★**
COMPARE TO PORTER-CABLE \$119
MODEL: PH138
SAVE \$94
ITEM 64143
44252669

LIMIT 4 - Coupon valid through 3/29/19*

WINDSOR DESIGN **SUPER COUPON**

DOVETAIL JIG



Customer Rating **★★★★★**
NOW \$27.99
~~\$34.99~~
COMPARE TO GENERAL TOOLS \$46.99
MODEL: 861
SAVE 40%
ITEM 34102
44261837

LIMIT 3 - Coupon valid through 3/29/19*

CENTRAL MACHINERY **SUPER COUPON**

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



Customer Rating **★★★★★**
NOW \$299.99
~~\$379.99~~
SAVE \$80
COMPARE TO \$919.99
JET MODEL: 708352
ITEM 34706
44280388

LIMIT 6 - Coupon valid through 3/29/19*

PITTSBURGH **SUPER COUPON**

24" CLAMP AND CUT EDGE GUIDE



Customer Rating **★★★★★**
NOW \$7.99
~~\$13.99~~
COMPARE TO BORA \$70.28
MODEL: 543030K
SAVE 88%
ITEM 66126
44285959

LIMIT 9 - Coupon valid through 3/29/19*

CENTRAL MACHINERY **SUPER COUPON**

4" x 36" BELT/6" DISC SANDER



Customer Rating **★★★★★**
NOW \$64.99
~~\$74.99~~
COMPARE TO RYOBI \$119
MODEL: 8D4601G
SAVE \$54
ITEM 62502/64778/97181 shown
44290674

LIMIT 5 - Coupon valid through 3/29/19*

Bauer **SUPER COUPON**

20 VOLT LITHIUM CORDLESS 1/2" COMPACT DRILL/DRIVER KIT



• 450 in. lbs. of torque
• 1.5 amp hour battery
• Weighs 3.4 lbs.
Customer Rating **★★★★★**
NOW \$64.99
~~\$74.99~~
COMPARE TO RYOBI \$99
MODEL: P1811
ITEM 64754 63531 shown
44292160

LIMIT 4 - Coupon valid through 3/29/19*

drillmaster **SUPER COUPON**

Customer Rating **★★★★★**
4-1/2" ANGLE GRINDER



SAVE 65%
COMPARE TO PERFORMAX \$28.99
MODEL: 2411-1
ITEM 69645/95578/60625 shown
44294260

LIMIT 6 - Coupon valid through 3/29/19*

PITTSBURGH **SUPER COUPON**

PNEUMATIC ADJUSTABLE ROLLER SEAT



Customer Rating **★★★★★**
• 300 lb. capacity
NOW \$19.99
~~\$26.99~~
SAVE 69%
COMPARE TO DURALAST \$64.99
MODEL: TR6201C
ITEM 61160/61896/63456/46319 shown
44299240

LIMIT 7 - Coupon valid through 3/29/19*

HaulMaster **SUPER COUPON**

1000 LB. CAPACITY SWING-BACK TRAILER JACK



Customer Rating **★★★★★**
• Height range: 12-1/2" to 24"
NOW \$17.99
~~\$25.99~~
COMPARE TO REESE \$45.99
MODEL: 74410
SAVE 60%
ITEM 69780/41005 shown
44300413

LIMIT 6 - Coupon valid through 3/29/19*

BRAUN **SUPER COUPON**

450 LUMENS LED TROUBLE LIGHT



• Impact-resistant lens and housing
• Super-bright 20 LED light source
• Stays cooler and lasts longer than incandescent bulbs
Customer Rating **★★★★★**
NOW \$16.99
~~\$22.99~~
SAVE 26%
ITEM 63920
44301457

LIMIT 4 - Coupon valid through 3/29/19*

PITTSBURGH #1 SELLING JACKS IN AMERICA

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

Customer Rating ★★★★★

• Weighs 73 lbs.

COMPARE TO TEQ \$149.99
MODEL: T8300182

SAVE \$70

NOW \$97.99

ITEM 64264/64266/64879/64881
61282/62326/61253 shown

44303461

LIMIT 5 - Coupon valid through 3/20/19*

CENTRAL MACHINERY

2 HP, 5 MICRON INDUSTRIAL DUST COLLECTOR

Customer Rating ★★★★★

• 70 gallon capacity

NOW \$179.99

SAVE \$145

COMPARE TO SHOP FOX \$324.99
MODEL: W1685

ITEM 61790/97869 shown

44307766

LIMIT 3 - Coupon valid through 3/20/19*

WINDSOR DESIGN **BEATS GRIZZLY***

60" WOOD WORKBENCH

60" TABLE WIDTH 60"
4 DRAWER COUNT 2
YES HARDWOOD YES
YES WOOD BLOCK VISE YES
YES FELT LINED DRAWERS YES

GRIZZLY H7723

* GRIZZLY H7723 stated specs.

LIMIT 4 - Coupon valid through 3/20/19*

HaulMaster

18" WORKING PLATFORM STEP STOOL

Customer Rating ★★★★★

• 350 lb. capacity

NOW \$19.99

COMPARE TO GPL \$51.45
MODEL: H-21

SAVE 61%

ITEM 62515/66911 shown

44323838

LIMIT 7 - Coupon valid through 3/20/19*

CHICAGO ELECTRIC POWER TOOLS

4" BISCUIT PLATE JOINER

Customer Rating ★★★★★

NOW \$44.99

COMPARE TO MAKITA \$179
MODEL: PJ7000

SAVE \$134

ITEM 68987

44328124

LIMIT 5 - Coupon valid through 3/20/19*

Lifetime CARBIDE

ALUMINUM OXIDE SANDING SPONGES PACK OF 10

Customer Rating ★★★★★

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

YOUR CHOICE \$3.99

SAVE 20%

Item 46751 shown

44332421

LIMIT 9 - Coupon valid through 3/20/19*

Bauer

10 AMP DEEP CUT VARIABLE SPEED BAND SAW KIT

Customer Rating ★★★★★

NOW \$99.99

COMPARE TO DEWALT \$299
MODEL: DWM120

SAVE \$199

ITEM 63763/64194/63444 shown

44332631

LIMIT 3 - Coupon valid through 3/20/19*

drillmaster

1500 WATT DUAL TEMPERATURE HEAT GUN (572°/1112°)

Customer Rating ★★★★★

NOW \$8.99

COMPARE TO BLACK & DECKER \$28.06
MODEL: HG1300

SAVE 67%

ITEM 35776/62340/62546/63104/96289 shown

44337985

LIMIT 9 - Coupon valid through 3/20/19*

Diablo

3/8" x 50 FT. ENCLOSED RETRACTABLE AIR HOSE REEL

NEW

NOW \$79.99

COMPARE TO FLEXZILLA \$139.99
MODEL: L8250FZ

SAVE \$60

Customer Rating ★★★★★

ITEM 64351

44344647

LIMIT 4 - Coupon valid through 3/20/19*

PORTLAND

14" ELECTRIC CHAIN SAW

Customer Rating ★★★★★

NOW \$39.99

COMPARE TO CRAFTSMAN \$99.99
MODEL: 071-45247

SAVE \$60

ITEM 64498/64497 shown

48530525

LIMIT 5 - Coupon valid through 3/20/19*

PITTSBURGH

12" RATCHET BAR CLAMP/SPREADER

LIFETIME WARRANTY

Customer Rating ★★★★★

NOW \$2.99

COMPARE TO IRWIN \$19.98
MODEL: 1964718

SAVE 85%

ITEM 62123/46807/63017/69222 shown

44351777

LIMIT 9 - Coupon valid through 3/20/19*

CHICAGO ELECTRIC POWER TOOLS

2.5 HP, 10" INDUSTRIAL TILE/BRICK SAW

Customer Rating ★★★★★

NOW \$219.99

COMPARE TO KOBALT \$429
MODEL: KWS S10-06

SAVE \$209

Blade sold separately.

ITEM 62391/69275 shown

44352689

LIMIT 5 - Coupon valid through 3/20/19*

HaulMaster

4 PIECE, 1" x 15 FT. RATCHETING TIE DOWNS

Customer Rating ★★★★★

NOW \$6.99

COMPARE TO ATE TOOLS \$54.88
MODEL: 33079

SAVE 87%

ITEM 63094/60405/63056/63057/63150/61524 shown

44353747

LIMIT 9 - Coupon valid through 3/20/19*

SUPER COUPON

200 LUMENS LED SUPER BRIGHT FLIP LIGHT

• Wireless, tool-free and easy installation

Customer Rating ★★★★★

NOW \$2.99

COMPARE TO PROMIER \$6
MODEL: P-SWITCH-12/24

SAVE 50%

ITEM 64189
64723/63922 shown

44361011

LIMIT 9 - Coupon valid through 3/20/19*

Apache MODEL 2800

ULTRA-LIGHT, CRUSH PROOF WEATHER-RESISTANT LOCKABLE CASE

NEW

Customer Rating ★★★★★

NOW \$22.99

COMPARE TO PELICAN \$73.18
MODEL: 1400

SAVE 68%

ITEM 63926

44365545

LIMIT 9 - Coupon valid through 3/20/19*

Bunker Hill Security

60 LED SOLAR SECURITY LIGHT

Includes 6V, 900 mAh NiCd battery pack.

Customer Rating ★★★★★

NOW \$29.99

COMPARE TO EATON \$59.99
MODEL: MSLED180W

SAVE 50%

ITEM 60524/62534/69643 shown

48525929

LIMIT 4 - Coupon valid through 3/20/19*

PORTLAND

1750 PSI ELECTRIC PRESSURE WASHER

• 1.3 GPM
• Adjustable spray nozzle

NOW \$79.99

COMPARE TO BRIGGS & STRATTON \$174.44
MODEL: 20800

SAVE \$94

ITEM 63255/63254 shown

44380844

LIMIT 5 - Coupon valid through 3/20/19*

Bauer

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

Customer Rating ★★★★★

NOW \$249.99

COMPARE TO DEWALT \$399
MODEL: DW734

SAVE \$149

ITEM 63445

44386862

LIMIT 4 - Coupon valid through 3/20/19*

CHICAGO ELECTRIC POWER TOOLS

BENCHTOP ROUTER TABLE WITH 1-3/4 HP ROUTER

Customer Rating ★★★★★

NOW \$94.99

COMPARE TO SKIL \$139
MODEL: RAS900

SAVE \$44

ITEM 95380

44404661

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TOOLS & MATERIALS

NEW AND NEXT



DeWalt launches new battery-powered woodworking tools

D-handle jigsaw: bare tool, no. DCS334B, \$179; with 5.0 amp-hour battery, no. DCS334M1, \$329

Barrel-grip jigsaw (bare tool), no. DCS335B, \$199

5" random-orbit sander with 5.0 amp-hour battery, no. DCW210P1, \$249

Trim router (bare tool), no. DCW600B, \$179

Featuring brushless motors and lightweight, compact body designs, these four new woodworking tools bring more cordless options to the shop. Leading the group: DeWalt's first battery-powered router, a trim router with 1/4" collet, variable-speed soft-start motor, and dual LEDs to light around the bit. The D-handle jigsaw has a variable-speed trigger and dial, dust blower, 1" stroke, four orbital positions, an LED, and tool-free blade changes and shoe tilting. A barrel-grip version of this saw (due out in early spring) will share the same features except for the variable-speed trigger. The 5" random-orbit sander features variable speed and a low-profile design.

DeWalt

800-433-9258, dewalt.com

Food-safe finishes from Walrus Oil

No, they're not actually made from walrus. Instead, this company makes seven finishing compounds from natural products, including four blends made only from plants. Cutting-board oil, made of coconut oil, beeswax, and mineral oil, sells in three sizes: 8 oz., \$10; 32 oz., \$26; and 1 gallon, \$70. Other products include wood wax, pure mineral oil, wood oil, leather oil, and leather wax.

Walrus Oil

417-848-8598, walrusoil.com



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A vitrine is a glass showcase for displaying fine wares. You'll love the heirloom look afforded by this one's seeded glass panel.



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It's easy to find affordable hardwoods when you know where to look. And the more you're willing to invest, the more you'll save.



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