FLATTEN ANY SIZE SLAB WITH YOUR ROUTER p.54

ISSUE 252 MARCH 2018

Better Homes & Gardens.

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Compact Workbench

p.24

3 Must-Have Glues

p.36

Plus Great Plans

- Hope Chest p.44
- Backyard Fire Table p.30
- 2 Easy Picture Frames p.76
- Mil-spec A-10 Warthog p.68

Take it outside

When we bought our house many years ago, it was on the edge of our small town in a quiet "no outlet" neighborhood of about 15 houses. Ours was the smallest house in the neighborhood, but a huge selling point for me was 6 acres of empty land (owned by the church at the far end of the property) that backed up to our lot.

With no fences around our or the adjacent lots, it was as if that 6 acres was our own outdoor oasis. I even mowed a little "field of dreams," complete with bases and a removable chain-link backstop, into the corner of the church's property, where kids would gather for pickup baseball and kickball games.

Now, 20 years later, all of the dead-end roads have been extended, most of our original neighbors have moved on, and the edge of town has crept far past our little neighborhood. Thankfully, the church lot escaped the development bulldozer, and Annette and I still enjoy quiet evenings on the deck overlooking it.

With warmer weather right around the corner, it's time to again turn our attention to the great outdoors. Kevin and John, our amazing project designers at *WOOD*® magazine, have planned a great slate of projects to make your patio or backyard into the perfect space for hanging out with friends, family, and neighbors.

The first is the propane-fueled Fire Table on *page 30*, perfect for taking the chill off a spring evening without worrying about flying embers. I won't spoil the surprises to come in future issues, but think seating that combines classic styling with contemporary comfort; and an easy-to-build project that brings the drama (and action, romance, and comedy) outdoors.

With your skills and our plans, this could be the best summer ever.

See you in the shop.

Dave Campbell
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Facebook and Twitter: @WOODeditor

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In This Issue of WOOD®

MARCH 2018 · ISSUE 252

PLANS

TOOLS & TECHNIQUES

DEPARTMENTS


30


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Titebond II
PREMIUM
Wood Glue
#3 SLOW
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HARDENER
DURCISSEUR
Part B
473 mL (1 Pt.)
GENERAL PURPOSE
RESIN
EPOXY RESIN
LA RÉSINE EPOXY
Part A
1 Qt. / 946mL
36


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42
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Custom shop cabinets to the rescue

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These 11 tools will make your cabinetry adventure even easier. woodmagazine.com/11cabinettools

As hardware goes, hinges aren't hard. This guide proves it. woodmagazine.com/faceframehinges

We break down drawer-slide options and installation. woodmagazine.com/slideoptions

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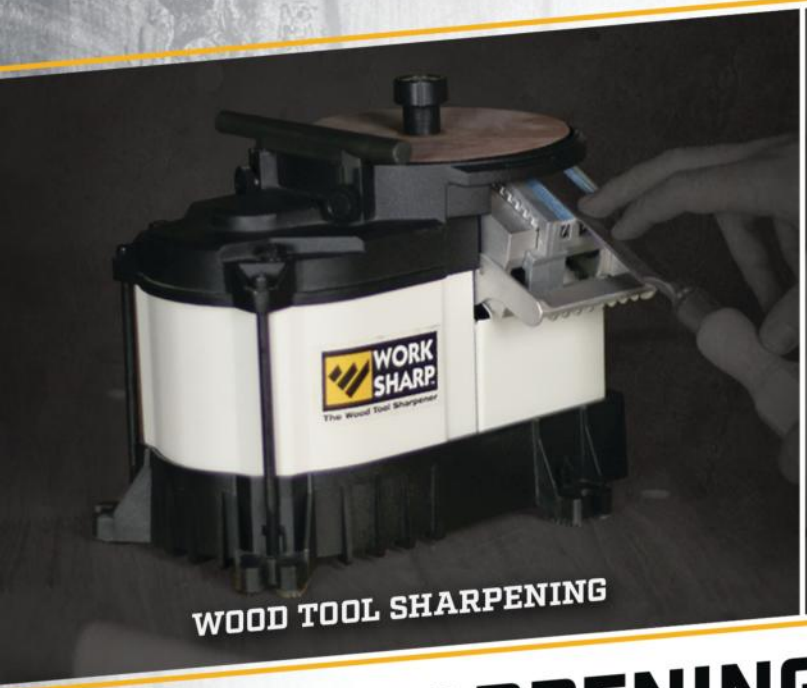

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Drink dispenser: Get the lead out

For the Bar-top Dispenser project in issue 250 (November 2017), you used brass faucets to dispense liquor. Most of today's plumbing components originate in China, where scrap brass and other alloys of unknown composition are utilized in their foundries. There is a very real possibility that lead is present in the metal, and any acidic liquid (pH lower than 7), such as alcohol, can leach the lead from the metal.

Any plumbing that is in contact with food MUST be constructed entirely of stainless steel, or food-grade plastic, such as nylon. So you could instead build it with stainless-steel components (extremely expensive) or of nylon (a little cheap-looking).

—Karl Dick
Waterloo, Ont.

Dr. Peter Thorne, head of the Department of Occupational and Evironmental Health at the University of Iowa, confirmed that brass faucets sold in the U.S. can contain up to 8 percent lead, including those sold as "lead-free." In normal use, corrosion and hard-water deposits would form a protective coating that would prevent lead from leaching into the liquid.

You can minimize the risk by running a strong stream of water through the faucet for 10 minutes, but alcohol standing in contact with the brass for long periods of time could still allow leaching, "perhaps at dangerous levels," according to Dr. Thorne. If you want to be extra safe, we found some stainless-steel faucets online (woodmagazine.com/ssbibbs) for less than $30 each (at the time of this writing).

What's on the slab?

While reading Tools and Materials in issue 250, I liked the big bit by Infinity tools, but was more intrigued by the slab-flattening jig it was shown with, particularly the bristle strips for dust control, and the vacuum attachment for the router base.

Any information on where to obtain these parts would be greatly appreciated. It would be great to see plans for the setup itself.

—Rick Redfield
Soldiers Grove, Wis.

We had several queries about that jig, which Tools Editor Bob Hunter uses for flattening his slabs. So, we decided to include plans for the jig in this issue. You'll find them on *page 54*.

A couple quick corrections

■ In the Materials List for the Cradle in issue 250, the bolts should be M6 × 50mm trusshead bolts.

■ The Lee Valley handsaw file set featured in issue 251 (December/January 2017/2018) does not come with the holder and guide at that price. The complete set (no. 05G46.06) sells for $78.

Too much time on her hands

My daughter, Annika, and I liked the design of the Big-time Wall Clock in issue 243 (November 2016). By adding more radii, we adjusted the ring and dado trammels to create a series of clocks that used the entire quarter-sheet of plywood and a variety of glued-up woods for the backing panels. The result? Several unique variations on your very creative design that now adorn the walls of family members' homes. Thank you very much for all the great ideas.

—Randy Yanoshak
Wrentham, Mass

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continued on page 8

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*After getting the artist's permission, **Lori Butrick**, of Brule, Wis., re-created Jody Bergsma's* Sky Kings *painting as intarsia. The 548 pieces are cut from 18 different wood species, and the project took her about 60 hours.*

*Chairmaker **Hal Taylor**, of Stanley, Va., sculpted this gorgeous rocker entirely from home-center 2x4s, bought right off the rack.*

*To hide the doorway between his pub and a storage area, **John Walker**, of Brentwood, Tenn., created a wine rack that swings out of the way to access the room.*

Inspired by the Mackintosh-style Table in issue 243 (November 2016), ***Rocky Jurgens****, of Lacey, Wash., built several similar tables, including this one with a quartersawn white-oak base and natural-edge maple top. (Get the plan at woodmagazine.com/macktable.)*

Rick Percy*, of Lewis Center, Ohio, built this nightstand and a matching dresser for a guest bedroom. The woods are ambrosia maple, tiger-stripe maple, cherry, and black walnut.*

Send us a photo of your work

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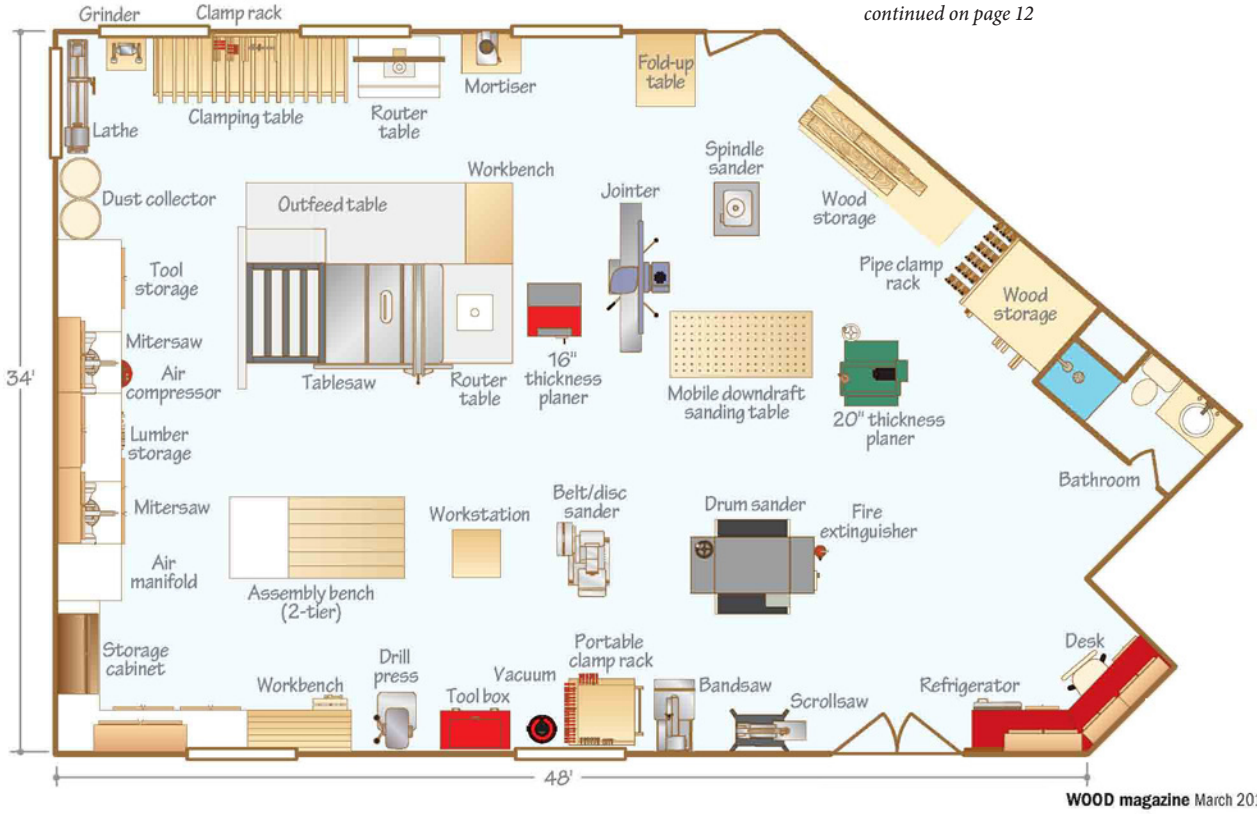
Wayne Wiebe's shop features a full bathroom, wood storage area, office space, three points of entry, 10' ceilings, plenty of natural light, a gas-fired furnace for cold winters, plus a built-in music system and fire detection.

Step into Wayne Wiebe's shop, and you might think you've walked into a woodworker's heaven. After decades of planning, Wayne was able to include everything he wanted in his dream shop: a 60-amp electric sub-panel, in-floor dust-collection system, plywood flooring, an office area, and a bathroom with shower.

continued on page 12



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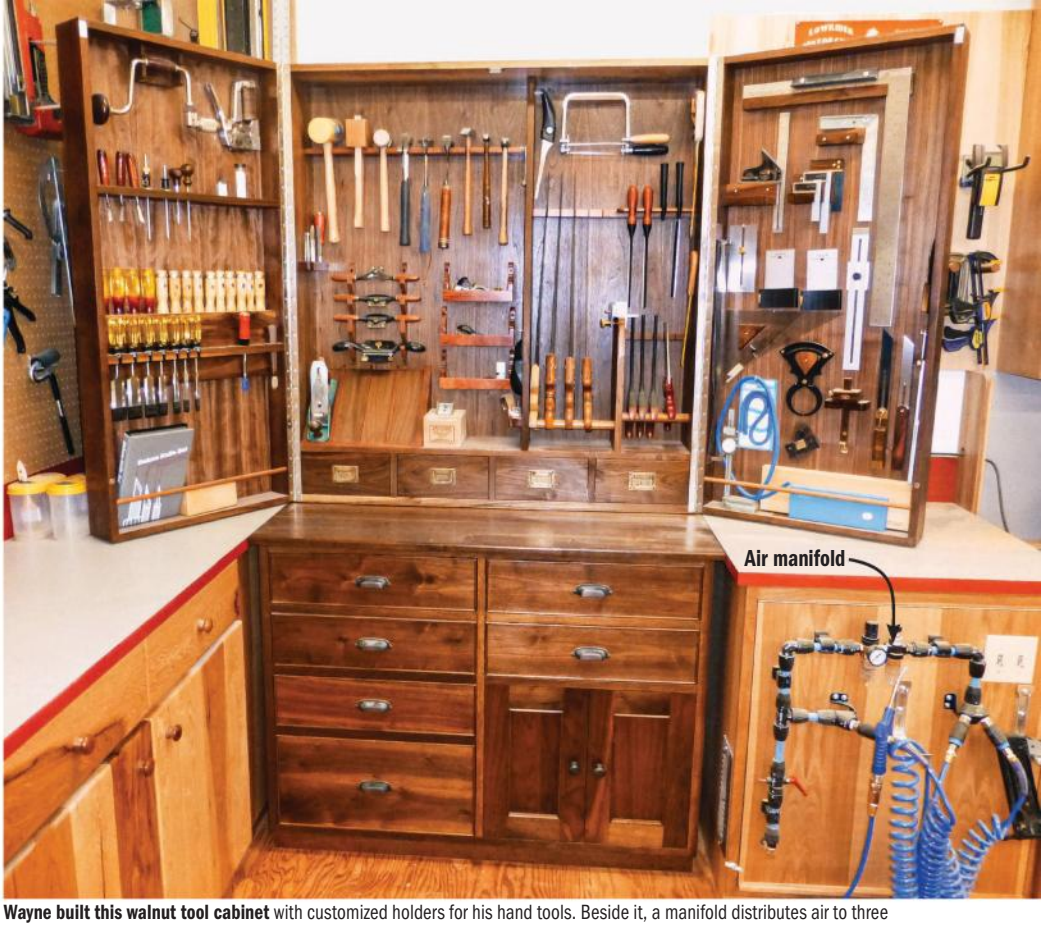
With 1,600 square feet, Wayne allowed himself multiple workbenches and worksurfaces. Behind the tablesaw, a bench made of maple and bubinga doubles as an outfeed surface. A traditional-style workbench of walnut and maple was used primarily during the construction of the many cabinets, with a total of 63 drawers, that line the walls of the shop. Custom cabinets or racks near each power tool hold accessories for that tool. Hand tools reside in their own cabinet, protected from damage. And when it's time to apply finish to smaller projects, he folds down a worksurface hinged to one wall.

Wayne's compressed-air system features a small compressor hidden inside a cabinet, feeding three air lines that include regulators and oilers, *right*. Wayne can power up the compressor with a flip of a switch. A second switch triggers a fan to exhaust hot air from the cabinet when the compressor sees heavy use.

Stick lumber rests on a mobile rack. Next to it, cubbies against a wall organize sheet



Wayne built this walnut tool cabinet with customized holders for his hand tools. Beside it, a manifold distributes air to three separate lines. The manifold panel is hinged at the top, allowing Wayne to remove the compressor for site use.

The central work triangle consists of a tablesaw with sliding cutoff table, backed by a large outfeed table, and a multipurpose workstation, all at the same height.

This stand-alone workstation resides at the hub of Wayne's workspace. Drawers hold common layout and measuring tools. The plastic-laminate top "eliminates coffee rings," Wayne quips.

goods and cutoffs. A pipe-clamp rack, mobile clamp rack, and storage in his assembly and clamping tables keep clamps always close at hand.

Each of the large power tools sits on a ½"-thick rubber mat and is anchored to the floor to reduce vibration. Receptacles mounted in the floor supply power to these tools.

Show us your shop

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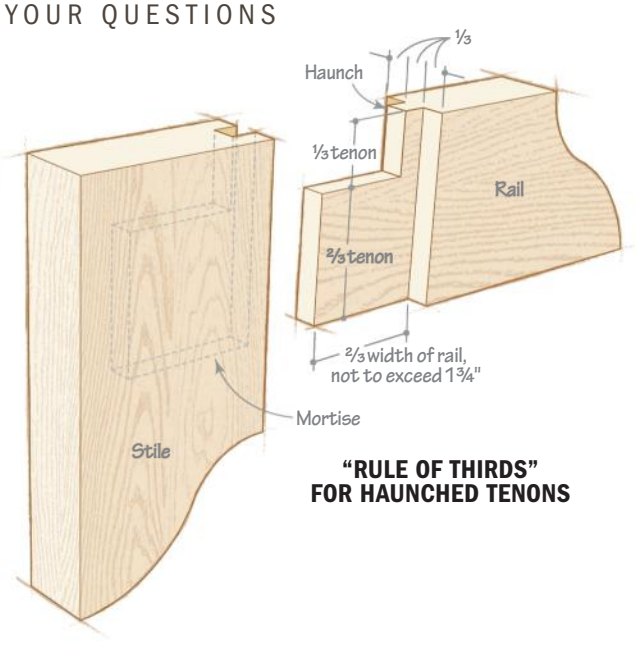


"RULE OF THIRDS" FOR HAUNCHED TENONS

Q A haunch does wonders for a mortise-and-tenon joint

I'm looking forward to using my new mortiser, and am curious about haunched mortise-and-tenon joints. When should I incorporate a haunch in a mortise-and-tenon joint?

—Jim Morelli, Boston

A Simply put, Jim, a haunch—that extra bit of material atop a tenon—gives a tenoned rail more resistance to twisting. It also adds a bit of extra gluing surface, which never hurts. Any large project assembly, including paneled frames and doors, benefits from haunched tenons, as do frequently stressed joints, such as chair and table legs and rails.

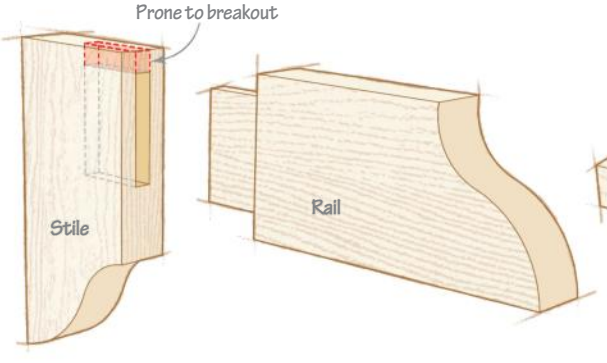
To appreciate the contributions of a haunch, it helps to compare a haunched mortise-and-tenon joint to similar joints. For example, a typical mortise-and-tenon joint proves plenty strong for many applications. But if you make the tenon extra wide for twist resistance, there may be precious little material at the end of the stile to prevent breakout [**Drawing 1**]. A haunch preserves twist-busting tenon width, and sufficient breakout-deterring material at the end of the stile.

For light frames, such as small cabinet doors, the trusty stub-tenon-and-groove joint [**Drawing 2**] proves sufficiently strong. It's also easy to make, and fortunately, you can use it to make bigger doors, too. Simply incorporate a haunched mortise-and-tenon at each frame corner. To do that, cut the panel-holding grooves as always, but leave the rail tenons extra long. Then cut mortises in the stiles to accommodate the tenons, and leave haunches to fill the gap at the end of each stile [**Photo**].

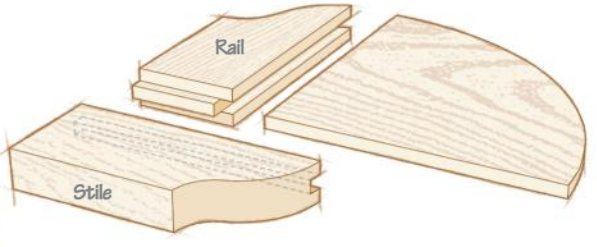
When planning a haunched tenon, remember the "rule of thirds" proportioning shown *above*. Your joints will be strong for years to come.

Learn how to make a haunched mortise-and-tenon joint. woodmagazine.com/haunch

1 MORTISE-AND-TENON JOINT



2 STUB-TENON-AND-GROOVE JOINT



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TOP SHOP TIP

Zero-in perfect dadoes using a dial indicator

Rather than fiddle around with shims, I find it easier to adjust a dado set slightly under the exact dado width required, and make two cutting passes. Or, likewise, use a full-kerf (⅛") blade to cut grooves for ¼" plywood. You just can't beat the fit control that comes with two passes.

To accurately set that second cut without having to make test cuts, I use a dial indicator with magnetic base, (item MMD-100, $28.95 plus shipping from Penn Tool Co., 800-526-4956, penntoolco.com). To start, use calipers to measure the thickness of the material going into the dado or groove. Make the first cut slightly narrow. Then, place the magnetic base/dial indicator on your saw's fence rail or table as shown, zero it, and adjust the rip fence to the difference between the first cut and the desired full cut.

It still makes sense to set up an adjustable dado set for full-width cuts when doing production work. But when you just need a dado or two for a small project, this method delivers accuracy, speed, and simplicity!

—Dan Martin, Galena, Ohio

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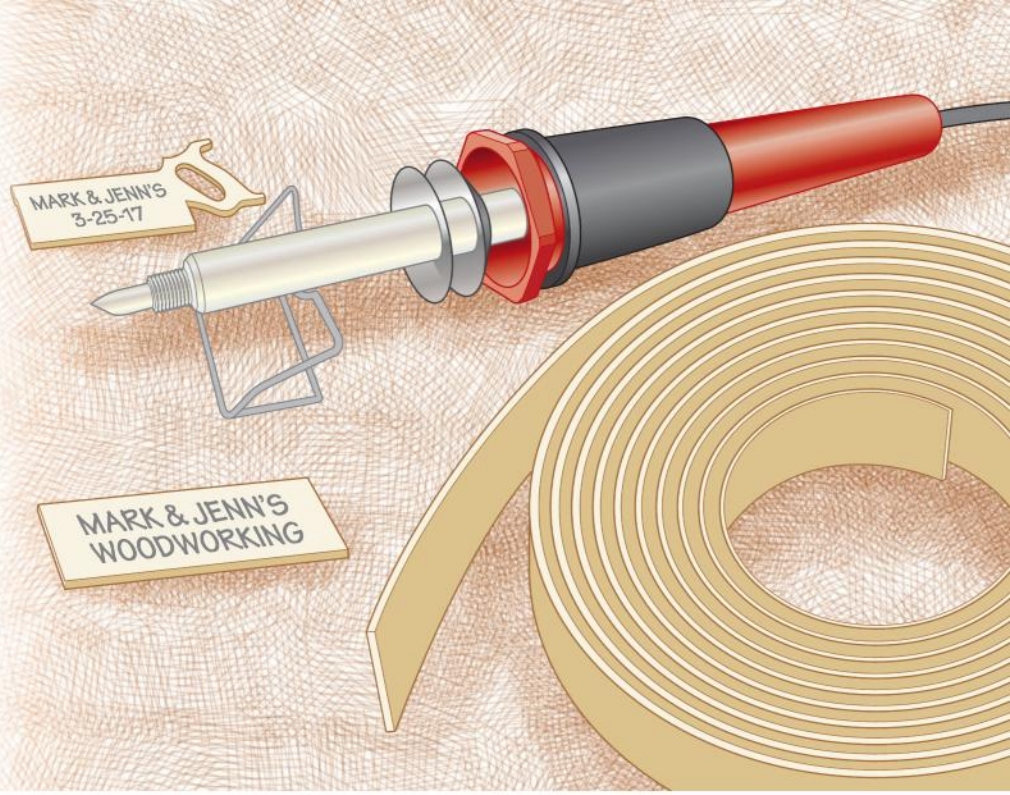
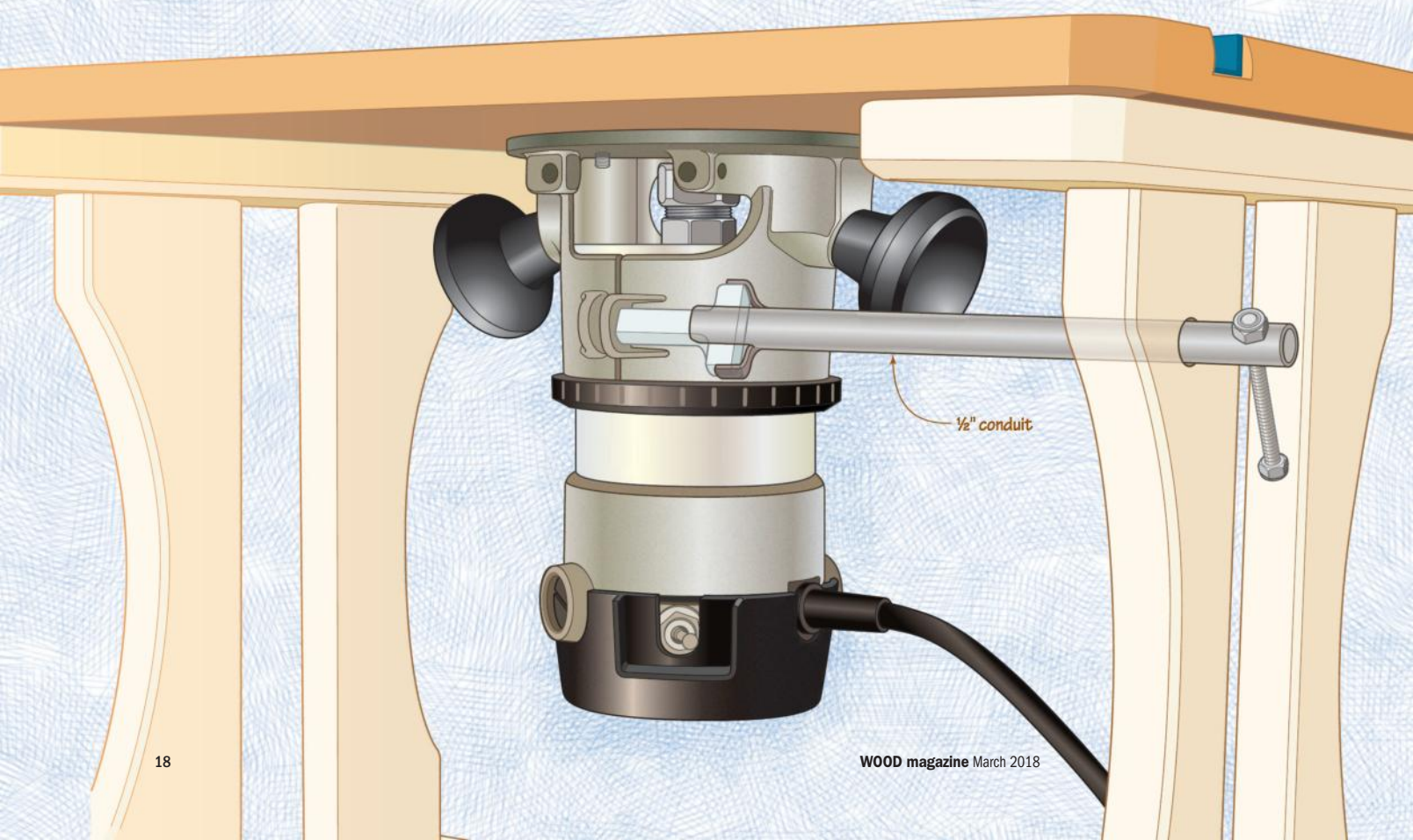
—Merle Riesgaard, Conroe, Texas

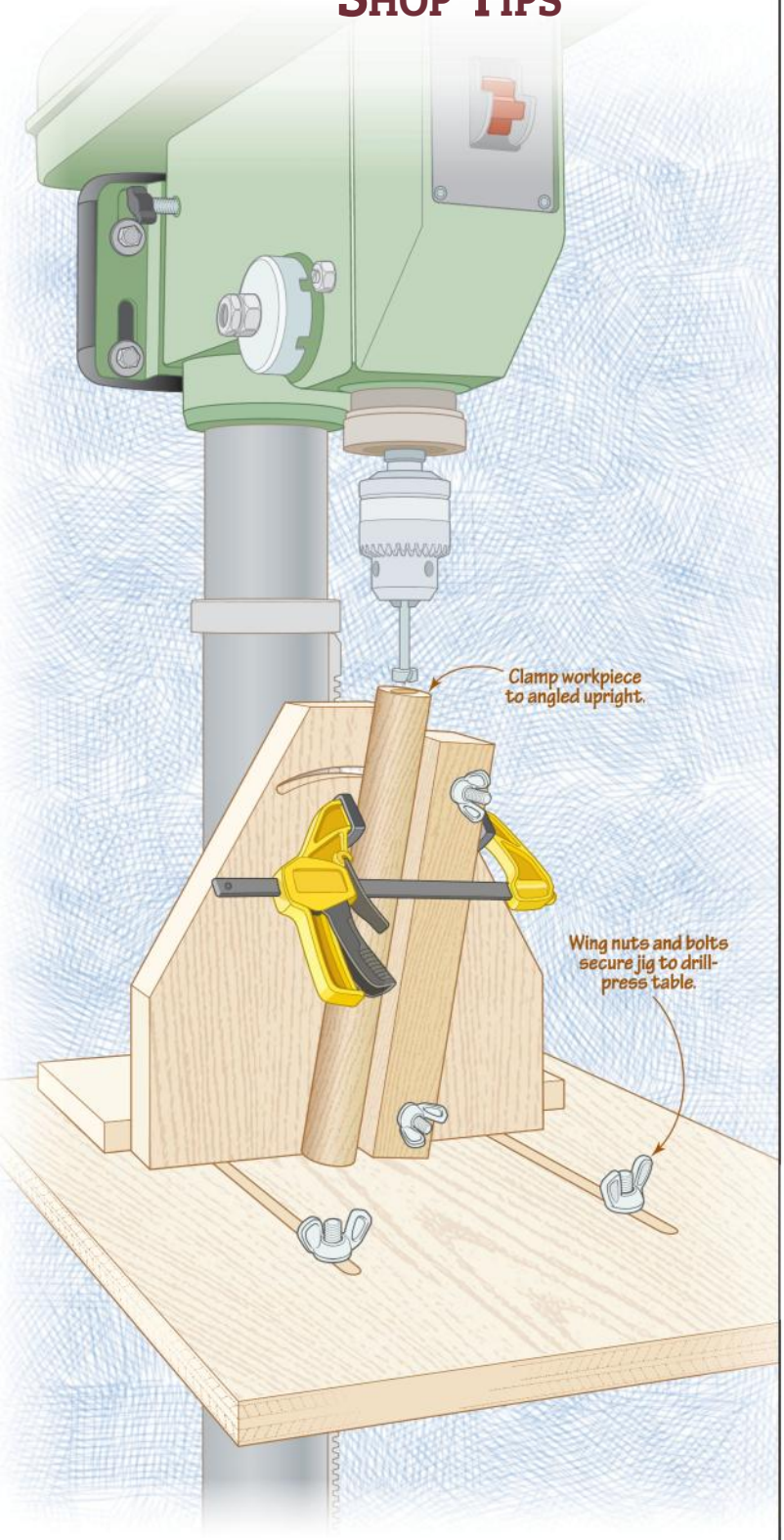


Wing nut extension eases router table bit adjustments

To simplify loosening the motor of my fixed-base router mounted in a router table, I fashioned an extension from ½" EMT (electrical metallic tubing) conduit. To make your own, cut and bend one end of the EMT to fit snugly over the router's tightening wing nut. Extend the tube's other end through a hole in the side of the router table and add a handle consisting of a bolt and lock nut.

—Ollie Coughlin, St. Charles, Mo.

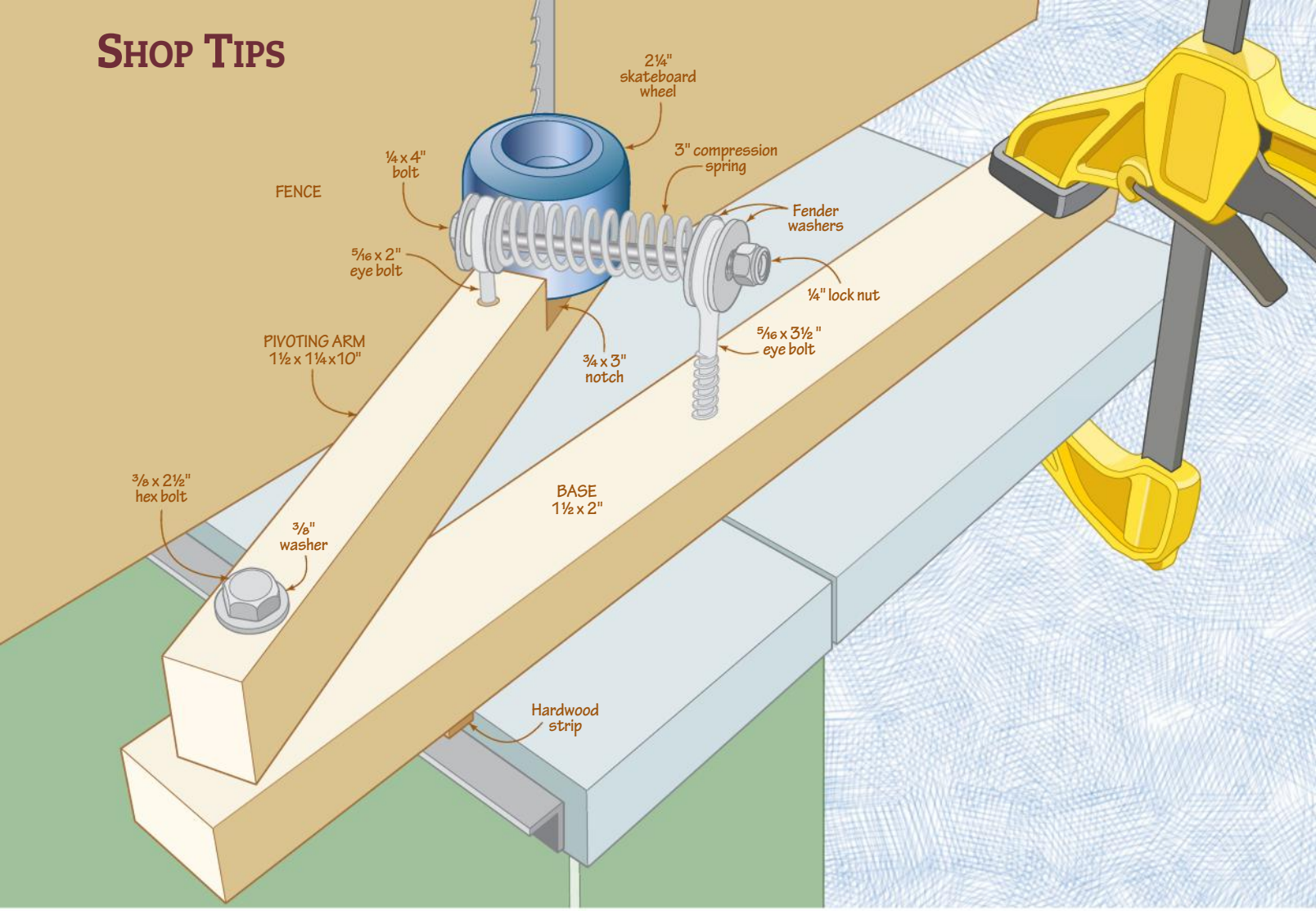




This drill-press jig holds steady for angled drilling

When restoring a set of dining room chairs, I needed to replace a leg rail that required drilling angled dowel holes into the end of the new rail. This jig made drilling the holes a breeze. Make the radiused slot in the jig's face using a router trammel. This makes it possible to adjust the jig's upright to the exact angle you need.

—Joe Stoltz, Springfield, Va.



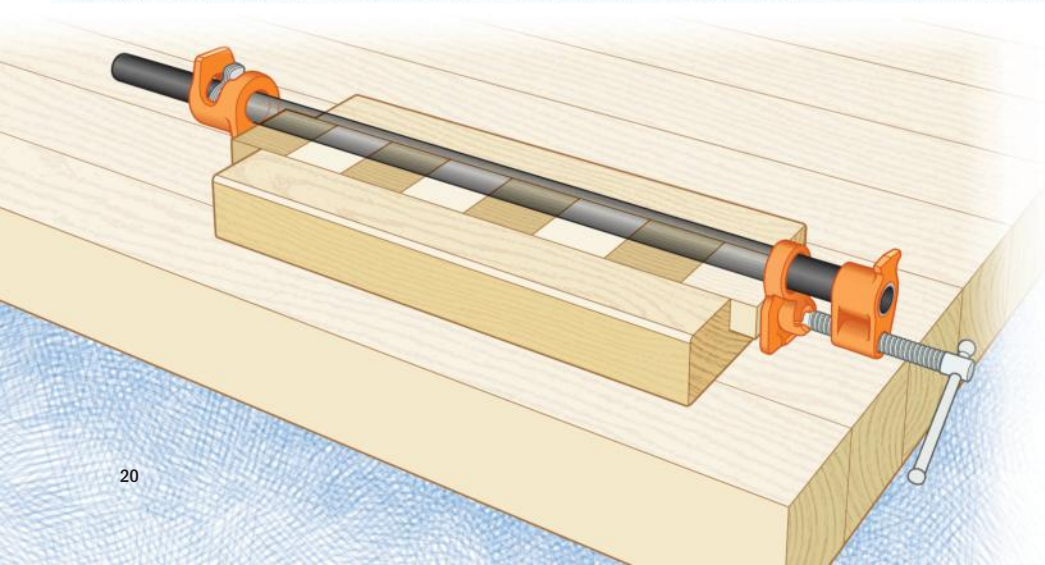
Jig holds stock firmly against a fence

When resawing roughsawn material at the bandsaw, it's important that the board be held tightly against the fence for a good cut. This shop-made hold-in applies ample pressure to the board, and frees you up to focus your attention on a steady feed rate.

To build one, cut the base a few inches longer than your bandsaw table. To its bottom glue a ⅜×¾" hardwood strip that fits snugly in the table's miter channel. At one end of the pivoting arm cut a notch to accommodate a skateboard wheel. Mount the skateboard wheel with a ¼-20 hex screw 2½" long in a tapped 13⁄64" hole, and assemble the jig as shown. Tighten the pivoting arm's nut so the arm rotates freely, but without slop. Secure a compression spring between two eye bolts using a bolt, four fender washers, and a lock nut.

Position the jig in the miter channel so the wheel has ½" clearance in front of the blade teeth. Secure it with a clamp and resaw away.

—Sam Costa, Smethport, Pa.



A winning strategy for aligning chessboard pieces

After deciding to build a chessboard, I became concerned about how to accurately align the 64 pieces of contrasting woods. The solution: a flat and square 2×6 with a groove cut just wide enough for eight board pieces to slide into place. Apply a light coat of wax inside the groove to prevent glue squeeze-out from adhering the pieces to the jig. Make sure the pieces align flat in the jig and clamp as shown. Glue up eight such strips and then glue the eight strips together.

—Phil Andeberg, Adel, Iowa

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Our Customers Love These pens!

Edwin W. wrote, *"WOW what a awesome pen kit. I just completed two Bolt Action pens and dang they turned out beautiful. I am so glad I got this kit."*

Charles F. wrote, *"What a Pen! The Revolver pen is my favorite pen I've turned so far! It looks, works, and feels amazing. It's real easy to turn and real easy to assemble."*

Daryell S. of TN wrote, "*I am extremely delighted with this bolt action pen. The look and feel is remarkable and the craftsmanship is perfect. This already has become my best selling ink pen."*

Bolt Action Pen Kits *BEST SELLER!*

	Item #	1-4	5-24	25-49	50+
Chrome *(shown above)*	#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

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*

SAVE 16%

Revolver Pen Kits *NEW!*

	Item #	1-4	5-9	10-24	25+
Chrome	#PKREVCH	$22.95	$21.95	$20.95	$19.95
Gun Metal	#PKREVGM	$22.95	$21.95	$20.95	$19.95
Antique Brass *(shown above)*	#PKREVAB	$24.95	$23.95	$22.95	$21.95
Antique Pewter	#PKREVAP	$24.95	$23.95	$22.95	$21.95

4 Revolver Pen Kit Starter Set

You get 1 Pen Kit in Chrome, 1 in Gun Metal, 1 in Antique Brass and 1 in Antique Pewter. Plus, you get the bushings and drill bit.

#PKREVSS **SAVE $25 Only $79.95**

**Kits in packs may vary subject to availability*

SAVE 24%

Lever Action Pen Kits *NEW!*

		1-4	5-9	10-24	25+
24kt Gold	#PKLEV24	$22.95	$21.95	$20.95	$19.95
Matte Black	#PKLEVBK	$22.95	$21.95	$20.95	$19.95
Antique Brass	#PKLEVAB	$22.95	$21.95	$20.95	$19.95
Antique Pewter	#PKLEVAP	$22.95	$21.95	$20.95	$19.95

4 Lever Action Make Your Own Gunstock Starter Set

You get one of each pen kit in 24kt Gold, Matte Black, Antique Brass and Antique Pewter. Plus, you get the bushings and drill bit to make the pens.

#PKLEVSS **SAVE $18 Only $86.95**

**Kits in packs may vary subject to availability*

SAVE 17 %

Bolt Action Pen Kit in Gun Metal

Bolt Action Pen Kit in 24kt Gold

Revolver Pen Kit in Chrome

Revolver Pen Kit in Gun Metal

Revolver Pen Kit in Antique Pewter

Lever Action Pen Kit in 24kt Gold

Lever Action Pen Kit in Antique Brass

Lever Action Pen Kit in Antique Pewter

Compact Workbench

Super-sturdy, affordable, do-everything platform for accomplishing your finest work.

Build this bench in a weekend, and enjoy it for the rest of your life. Made entirely of dimensional lumber, it requires just a portable circular saw (or mitersaw) and drill to create it in its simplest form (see photo *below*). For the best results possible, we invested time traveling to various home centers and sorting through fir 2x8s, and then ripping their rounded edges off with a tablesaw to create the version shown *above*. Though doing that results in a little extra waste, we were also able to cut out some defects, such as knots and sap pockets, and incorporate board sections with the straightest grain.

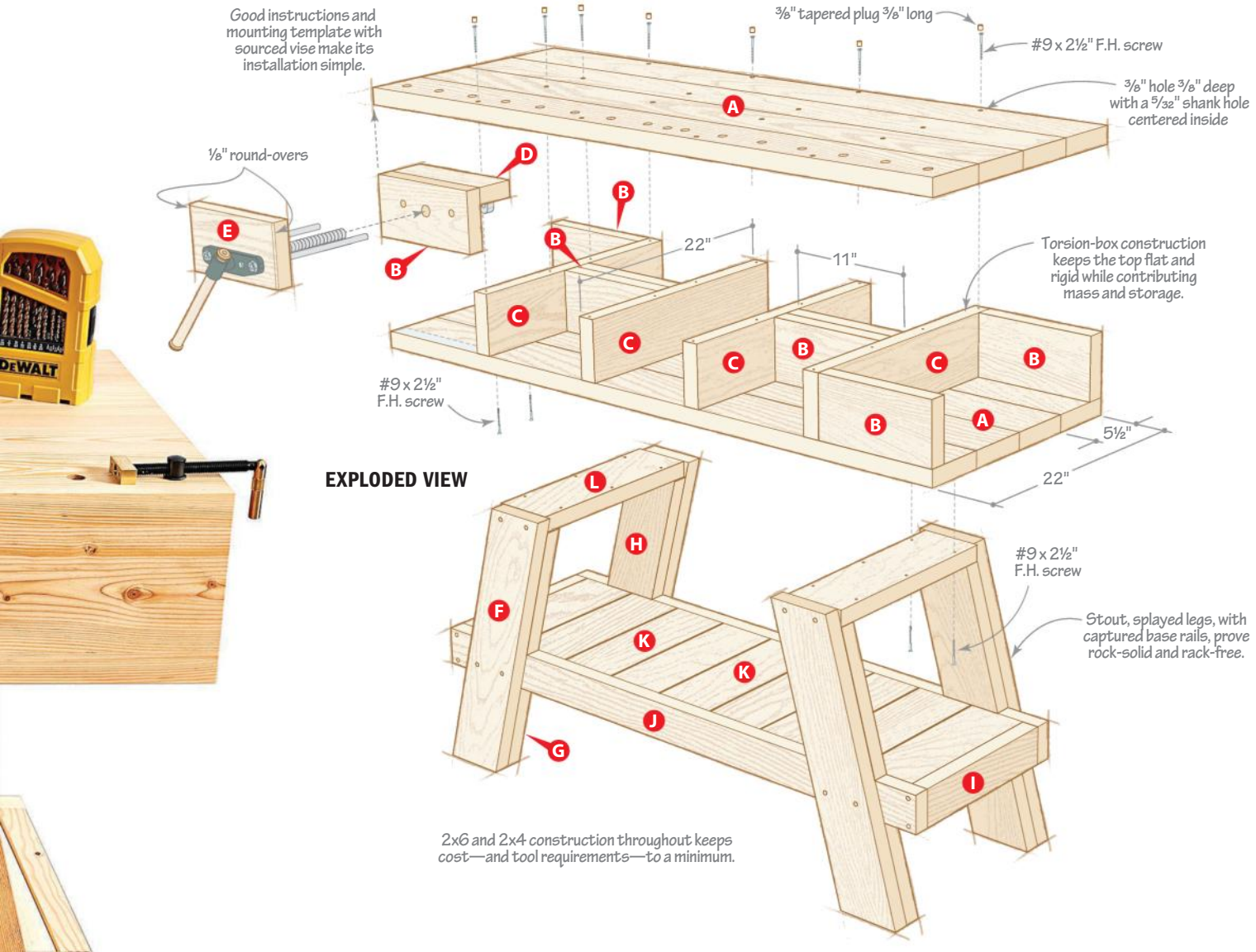
No tablesaw, no problem. Even if you don't have a means to rip or joint boards, you can still build this bench, though the top will have small "valleys" where the boards abut.

DIMENSIONS: 60" W × 27" D × 34" H

Approximate materials cost: **$95** not including vise and bench dogs

9 sq. ft. of worksurface

14 sq. ft. of storage

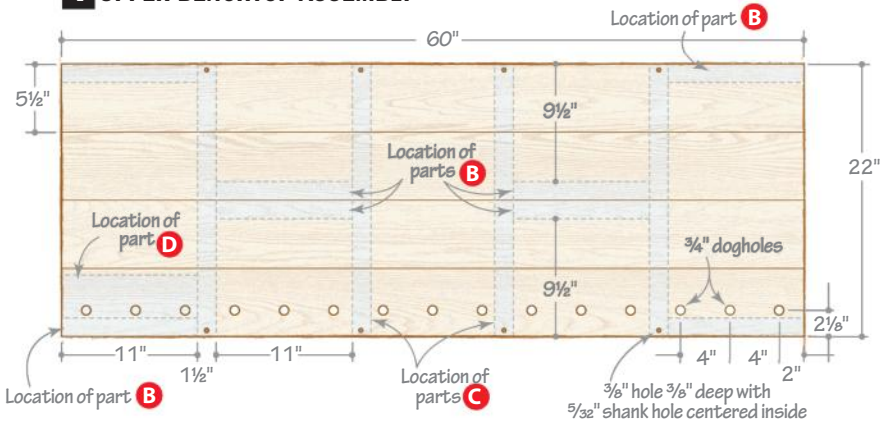


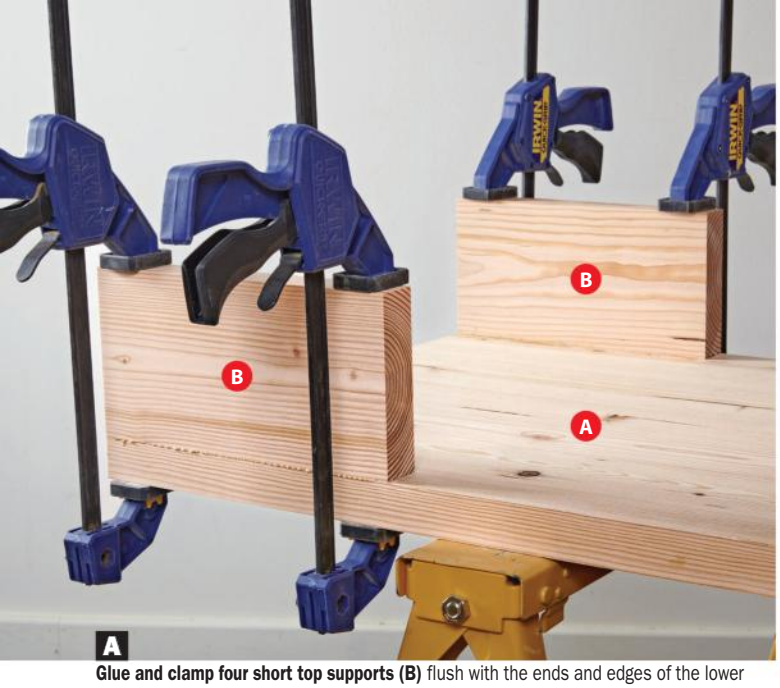
Start at the top

1 Choose eight of your best and straightest boards and rip them to 5½" wide to make the upper and lower benchtops (A) [**Materials List, Exploded View**]. Or simply choose the best 2×6s you can find. Drill ¾" dogholes in one of the boards [**Drawing 1**]. We placed the holes to avoid any vise part that would interfere with inserting a dog fully. If you use a vise other than the one listed under **Source** on *page 29*, you may need to adjust the hole positions. Now edge-glue and clamp two

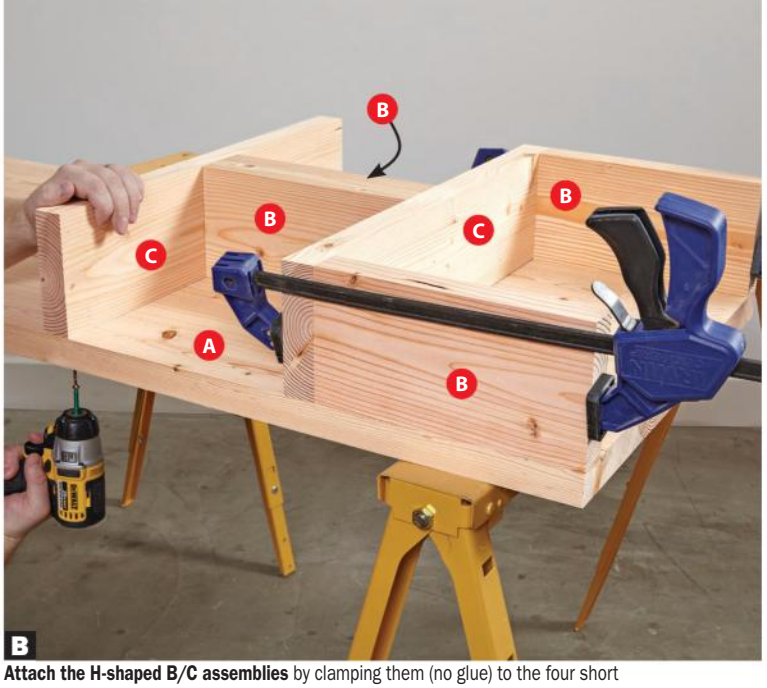
Note: *Though various "white woods" available in dimensional sizes will suffice, it pays to spend a few extra bucks for the added strength and density of fir. Another good choice: untreated Southern yellow pine. Look for wood that's dry, and, if possible, stack it for several weeks to further dry inside with strips of wood (known as stickers) placed between the stack's layers.*

1 UPPER BENCHTOP ASSEMBLY





Glue and clamp four short top supports (B) flush with the ends and edges of the lower benchtop (A).



Attach the H-shaped B/C assemblies by clamping them (no glue) to the four short supports (B) at the corners. Then screw (no glue) the B/C assemblies to the top.

benchtops [see **How to build a workbench when you don't have a workbench** below].

2 Cut the top supports (B, C). Glue face-to-face two pairs of short supports, then glue and screw those laminations between the long supports to make two H-shaped frames [**Exploded View**].

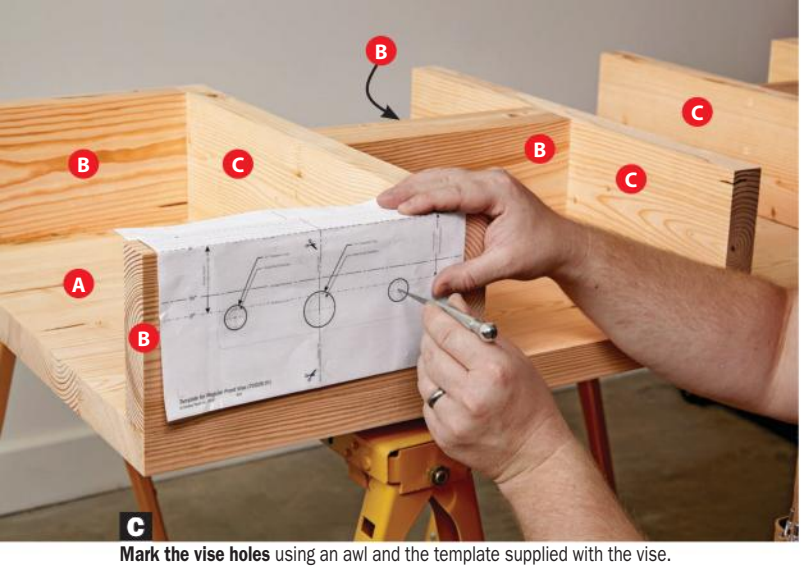
3 Sand the interior surfaces of the benchtops flat and smooth, then attach the supports to the lower benchtop [**Photos A** and **B, Exploded View**].

Note: *Attaching the H-shaped B/C assemblies to the tops with #9×2½" screws in oversize ⅜" counterbores and 5/32" shank holes allows the tops to expand and contract across their width as seasonal humidity changes.*

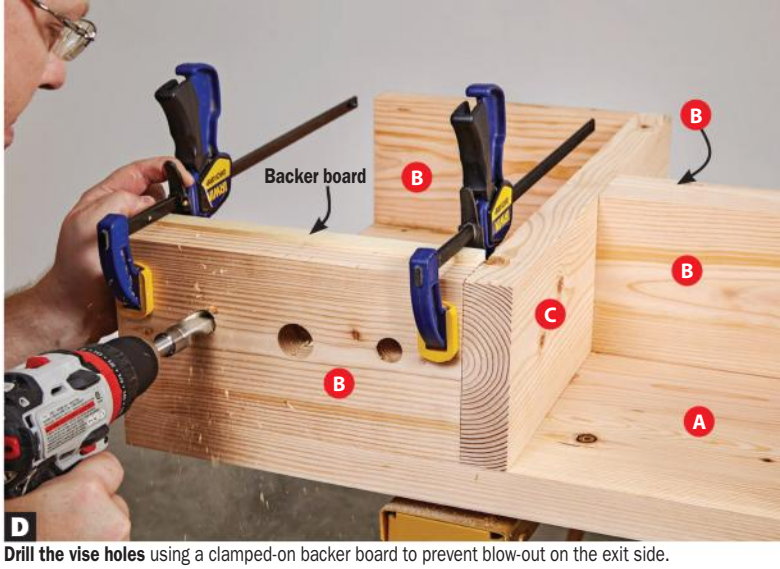
How to build a workbench when you don't have a workbench

If you're building this workbench, there's a good chance you don't already own one. In that case, set up a pair of sawhorses on a level surface (or level them with shims under the legs). Place a flat worksurface (thick plywood or a discarded door works well) on the horses. Clamp the benchtops as shown. After the glue dries, sand the tops flat, place one on the horses, and use it as an assembly surface to build the rest of the workbench.

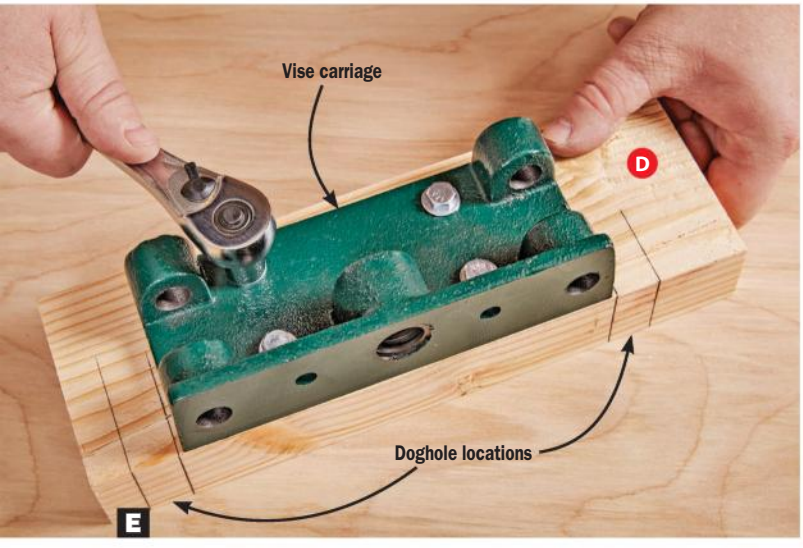
As shown in the photo, we used parallel-jaw clamps. Though costing more than other types of clamps, we turn to them again and again because the parallel jaws help to ensure square and flat clamp-ups. Their stout bars resist bending, and, of course, they stand up! To find out more about parallel-jaw clamps, see a review of them in issue 251 (December/January 2017/2018), or go to woodmagazine.com/paralleljaws.



Mark the vise holes using an awl and the template supplied with the vise.



Drill the vise holes using a clamped-on backer board to prevent blow-out on the exit side.



Attach the vise carriage, being careful that the holes in the carriage align with the holes drilled in the short top support. Measure and mark doghole locations to ensure that the carriage will not interfere with inserting the dogs into the upper benchtop.

Attach the vise-mounting block (D) by gluing and clamping it flush with top edges of the drilled short support (B) and adjoining long support (C).

4 On one of the short supports glued to a corner, mark holes to accommodate the guide rods and leadscrew for the vise [**Photo C**]. Drill the holes [**Photo D**].

5 Cut the vise-mounting block (D). Remove the leadscrew from the vise carriage and lag-screw the carriage to the block [**Photo E, Drawing 2**]. Then, glue and clamp the block to the benchtop support assembly (B/C) [**Photo F**].

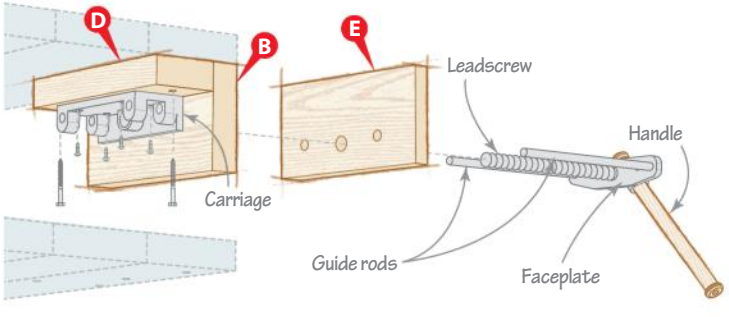
6 Cut the vise jaw (E), rout its round-overs [**Exploded View**], drill holes according to the supplied template, and set it aside.

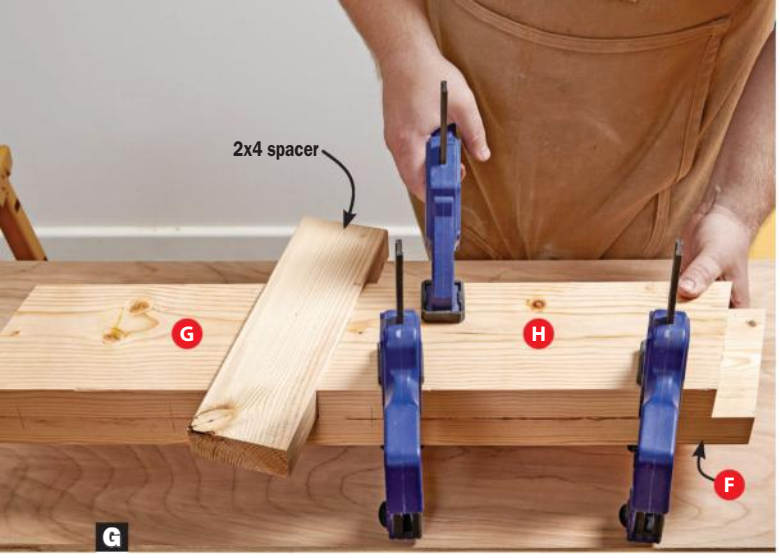
7 Extend the three ¾" dogholes above the vise-mounting block (D). Drill the two outer holes completely through the block. Stop the middle hole just short of going through the block so your drill bit doesn't strike the vise carriage.

8 Finish-sand all surfaces and sharp edges. Apply three coats of an oil finish to the top as well as the vise jaw. (We chose Watco Danish Oil Finish, natural tone.)

Tip! *As described in the instructions for the sourced vise, it's a good idea to plane or a sand a 2° taper on the vise jaw's inner face, making it thinner at the bottom than at the top. This ensures a workpiece will always be gripped at the top of the jaw.*

2 VISE INSTALLATION





Glue and clamp the upper leg filler (H) to the F/G assembly using a 2x4 spacer for correct positioning.

Pocket-screw the slats (K) to a long rail (J). With all of the slats screwed on one long rail, attach the other long rail to the slats and short rails.

Next, build a base

1 Cut the legs (F) and leg fillers (G, H). Trim their ends at 15° [**Drawing 3**] without changing their lengths.

2 Keeping in mind that you will need two pairs of mirrored legs [**Drawing 4**], laminate the lower leg fillers to the legs, flush at the bottoms and edges. After the glue dries, attach the upper leg fillers [**Photo G**]. Finish-sand the leg assemblies and set them aside for now.

3 Cut the rails (I, J) and tray slats (K). Glue and screw two short rails to one long rail. Then attach the slats [**Photo H**] and other long rail. Plug the counterbores in the long rails.

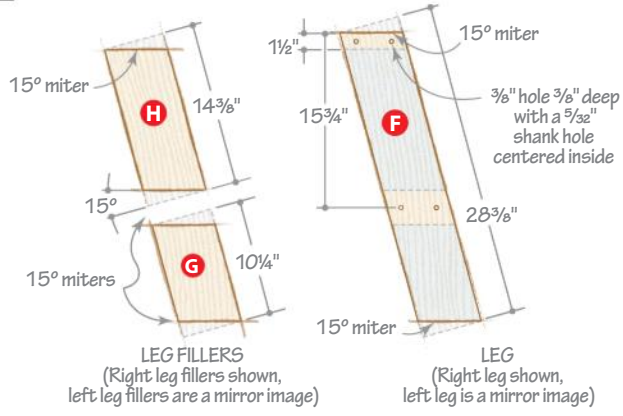
4 Glue and clamp the leg assemblies (F–H) to the tray assembly (I–K). Reinforce the joints with screws.

5 Cut the top cleats (L) to fit your base assembly. Then glue and screw them to the leg tops.

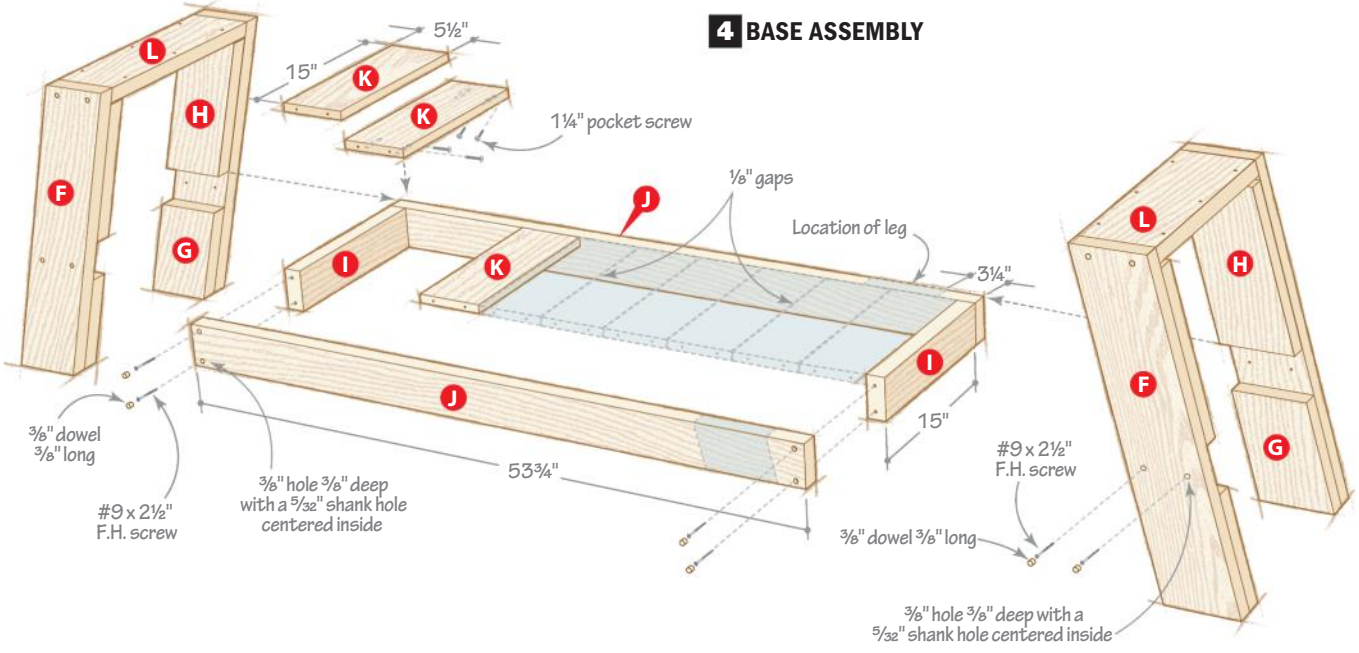
6 Finish-sand the base. Apply oil as done with the top.

▶Buy a ⅜" tapered plug cutter for tight-fitting plugs. woodmagazine.com/plugcutter

3 LEG ASSEMBLY



4 BASE ASSEMBLY



Just a few final touches

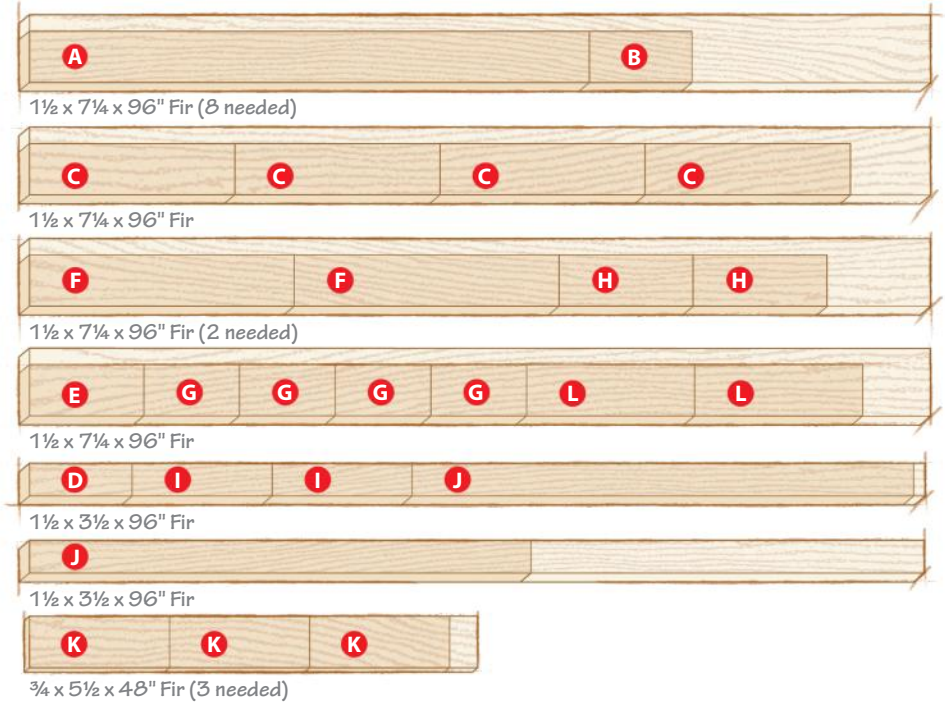
1 Center the top on the base and screw them together [**Exploded View**].

2 Screw the vise jaw (E) to the vise faceplate using the hardware included with the vise [**Drawing 2**]. Secure that assembly to the bench by threading the vise leadscrew into the carriage.

3 Make your own vise handle from a 12" length of 1" dowel rod with 1⅝"-dia. discs screwed to its ends, or buy one [**Source**]. You can also add bench dogs and a clamping bench dog (shown in the main photo on *page 24*) that works like an end vise [**Source**]. Now go forth and build with greater ease and confidence using your sturdy new workbench!

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

Cutting Diagram



Materials List

Part		FINISHED SIZE T	W	L	Matl.	Qty.
Top						
A	benchtops	1½"	22"	60"	EF	2
B	short top supports	1½"	5½"	11"	F	8
C	long top supports	1½"	5½"	22"	F	4
D	vise-mounting block	1½"	3½"	11"	F	1
E	vise jaw	1½"	5½"	12¼"	F	1
Base						
F	legs	1½"	5½"	28⅜"	F	4
G	lower leg fillers	1½"	5½"	10¼"	F	4
H	upper leg fillers	1½"	5½"	14⅜"	F	4
I	short rails	1½"	3½"	15"	F	2
J	long rails	1½"	3½"	53¾"	F	2
K	tray slats	¾"	5½"	15"	F	9
L*	top cleats	1½"	5½"	18"	F	2

*Parts initially cut oversize. See the instructions.

Materials key: EF-edge-joined fir, F-fir.
Supplies: #9×2½" wood screws (68), 1¼" pocket screws (36).
Bits: ⅜" plug cutter, ⅝", ¾", and 1" drill bits or holesaws, 1⅛" Forstner bit, ⅛" round-over router bit.
Source: Regular front vise, item 70G08.01, $65; Optional vise handle, item 05G12.03, $8.95; 2⅜" Bench Pups bench dogs (pair), item 05G04.04, $24.95; Wonder Pup clamping bench dog, item 05G10.02, $36.50; all from Lee Valley, 800-871-8158, leevalley.com

Comfy, Cozy Fire Table

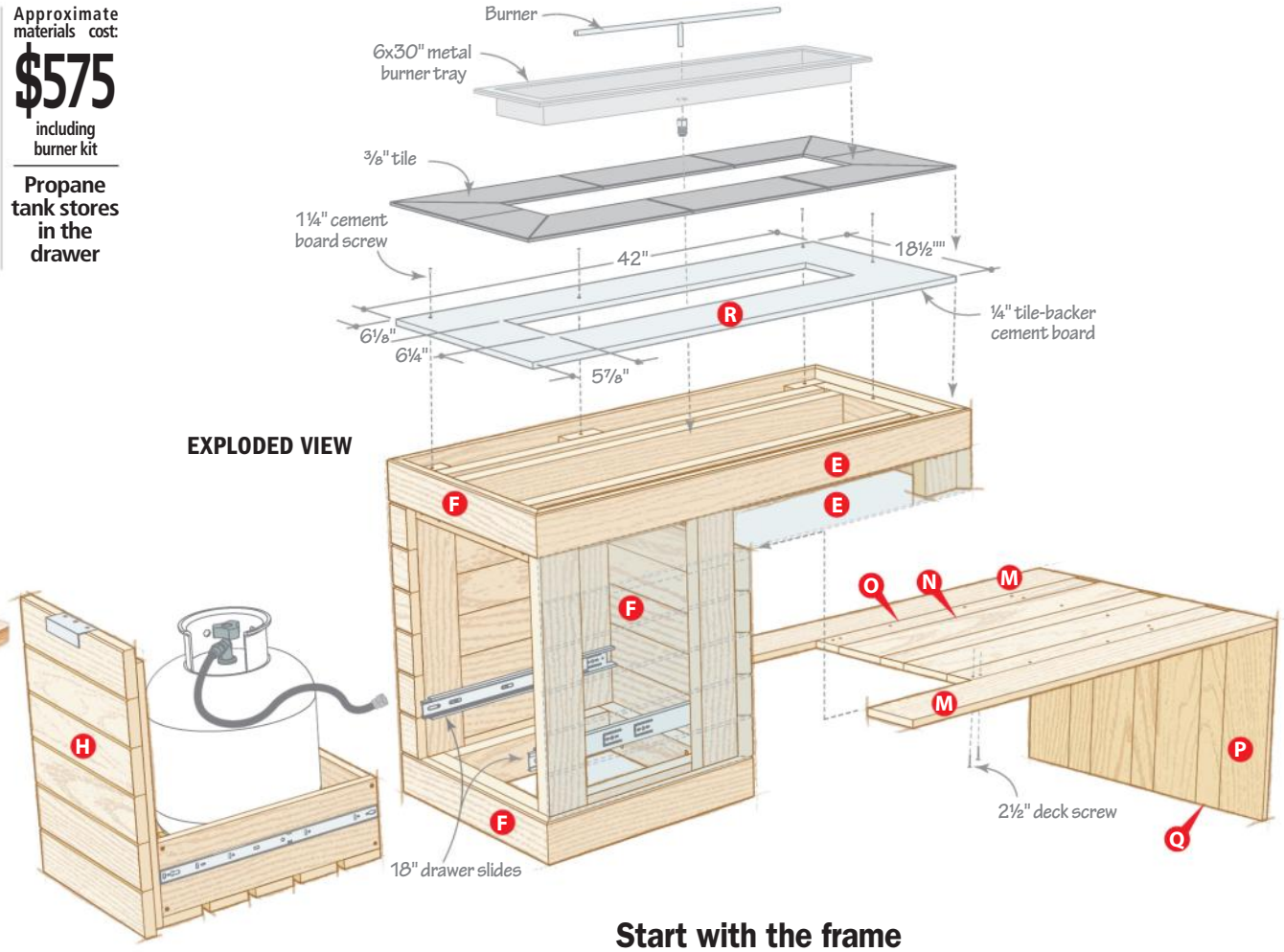
Enjoy relaxing evenings in the glow of warming flames that start instantly—with no smoke, flying embers, or ashes to clean up.

Be the hit of the neighborhood with this powerful magnet for friendly get-togethers. And don't be concerned about building a fire table from wood. Ceramic tiles surround the metal burner kit, and a layer of tile-backer cement board beneath both insulates the wood [**Exploded View, Sources**]. Just be sure to close the propane tank's valve after each use to avoid a potential accident or gas loss.

DIMENSIONS: 60" W × 31" D × 28⅜" H

Approximate materials cost: **$575** including burner kit

Propane tank stores in the drawer

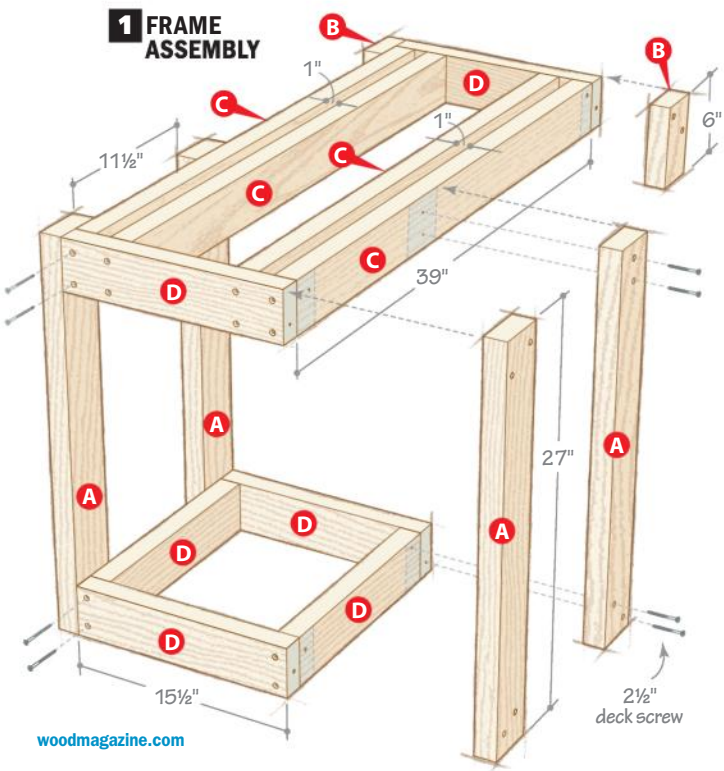


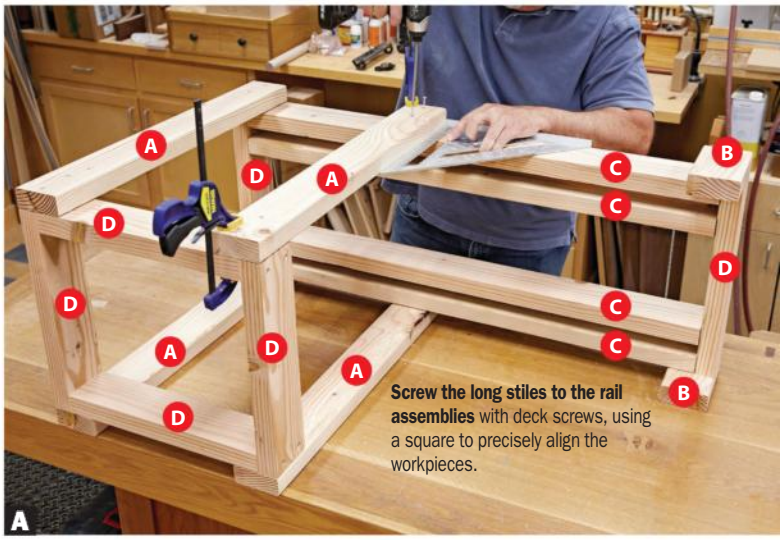
Start with the frame

1 Cut the frame stiles and rails (A–D) to size [**Drawing 1**; **Materials List**, *page 34*; **Shop Tip**, *page 33*]. Using a flat assembly surface and a square, glue and screw together the upper and lower frame assemblies (B–D). Connect them with the long stiles (A) [**Photo A**].

2 Rip the cedar siding parts (E–H) to final width, but don't cut to length yet. Rout ⅛" chamfers along the outer edges of each piece.

▶Learn more about buying and using home-center lumber. woodmagazine.com/homecenterlumber





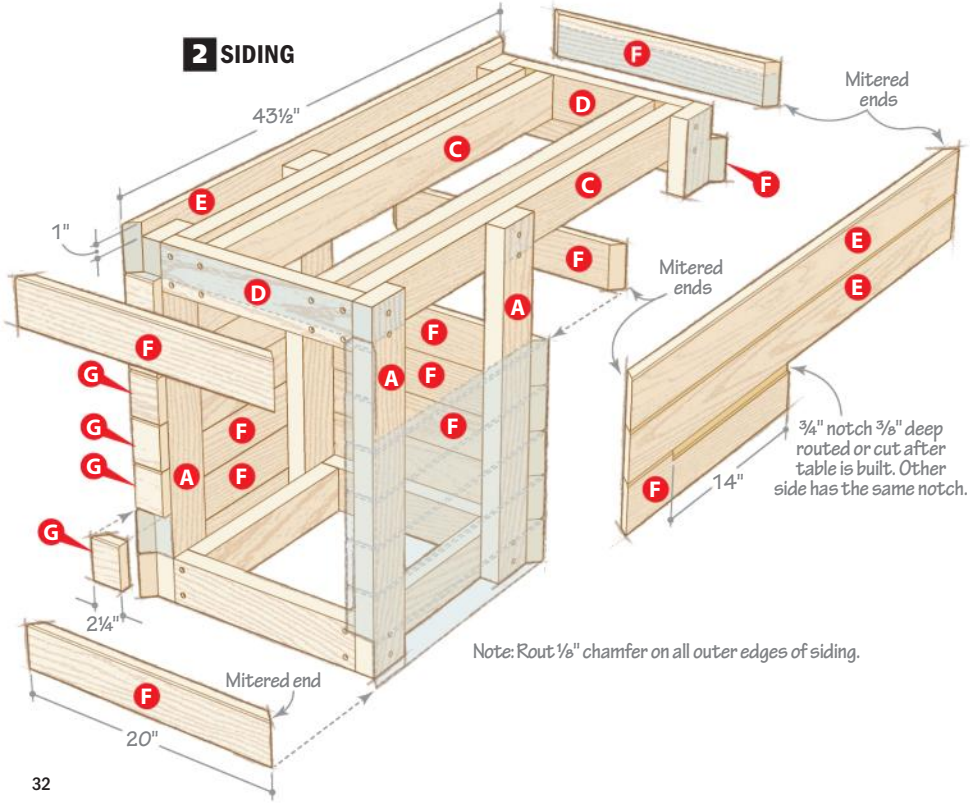
Screw the long stiles to the rail assemblies with deck screws, using a square to precisely align the workpieces.

Clamp the cedar siding to the frame, and then mark the inside face at the corner of the frame. Cut a 45° miter with this mark as the heel.

Clamp a spare board as a stopblock for the end siding (G) flush with the long stile (A). Cut the piece to length, with a miter at one end and square cut at the other, align it against the stopblock, and secure it in place.

▶Cut miters like a pro. woodmagazine.com/mastering-miters

3 For the best "wraparound" appearance in each row of siding, cut the long, short, and end siding pieces (E, F, G), and the drawer siding (H), sequentially from the same board. Miter-cut both ends of the long and short siding pieces [**Photo B**]. The end siding pieces get one miter (the other end, cut at 90°, matches up to the drawer front [**Photo C**]). The drawer siding gets 90° cuts at both ends [**Drawing 3**]. Repeat for each row of the siding. Cut the drawer siding pieces ⅛" longer than final length. Mark these, and set them aside for later assembly. Once you get a row cut to fit, attach those pieces to the frame with an exterior-use-rated glue. (We used Titebond III.) Start the top row of siding 1" above the top of the frame.



Now build the drawer

1 Align the drawer siding pieces (H) on a flat worksurface in the order in which they'll be installed on the drawer front. Edge-glue them with the ends flush to form a panel. Sand smooth after the glue dries.

2 Measure the drawer opening in your assembly. When completed, the drawer box should measure exactly 1" narrower than the opening. (This provides space for the drawer slides.) Cut the drawer front and back (I), sides (J), cleats (K), and bottom slats (L) to fit the opening [**Drawing 3**]. Sand the inside faces of the drawer front, back, and sides to 150 grit.

3 Glue and screw together the drawer parts [**Drawing 3**]. Next, screw the drawer cleats (K) to the drawer front (I), flush at the bottom. Attach the drawer slides to each drawer side, centered top to bottom, and to the inside of the frame.

4 Cut the drawer-front panel (H) ⅛" shorter and narrower than the drawer opening for a 1/16" reveal all around. Chisel out the mortise for the pull [**Sources**] so it sits flush with the top edge [**Drawing 3**]. Screw the handle to the drawer front, and the panel to the drawer cleats.

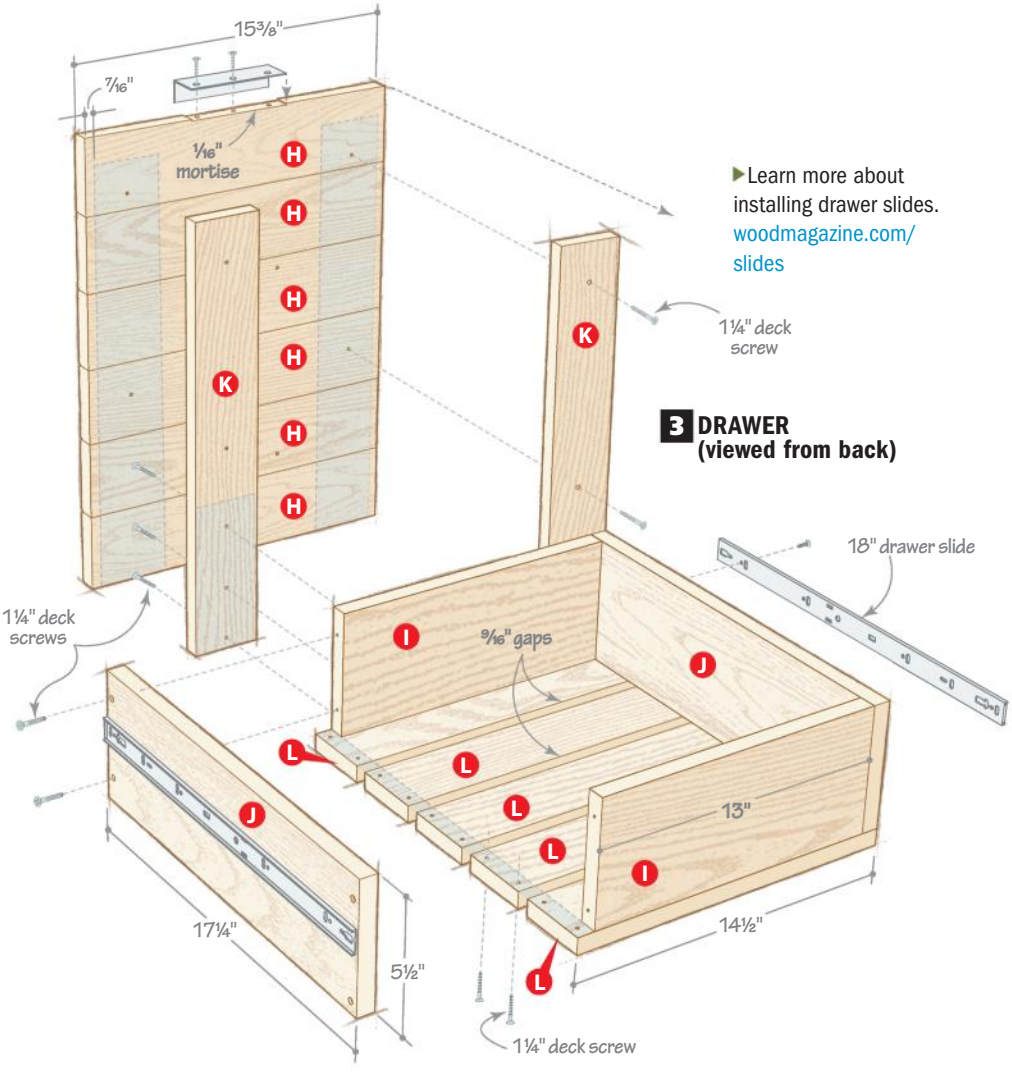
Switch to the oak table

The table consists of two white-oak panels joined with, essentially, a large box joint. Build this section and apply finish to it, as well as for the cedar-wrapped frame, before joining them together. We applied Penofin penetrating oil to the white-oak table, and two coats of Varathane Carbon Gray stain to the cedar-wrapped frame.

1 Cut the tabletop slats (M–O) and supports (P, Q) to size [**Drawing 4**]. Glue together parts N and O [**Photo D**]. ***Note:*** *The combined width of parts N and O must equal the width of the frame assembly.* After the glue dries, glue on the outer long slats. Glue together parts P and Q in the same manner. Sand the dried panels smooth when dry.

2 Glue and clamp the tabletop and support panels, and allow to dry.

3 Position the table on the frame assembly [**Exploded View**]. Mark on the short siding



▶Learn more about installing drawer slides. woodmagazine.com/slides

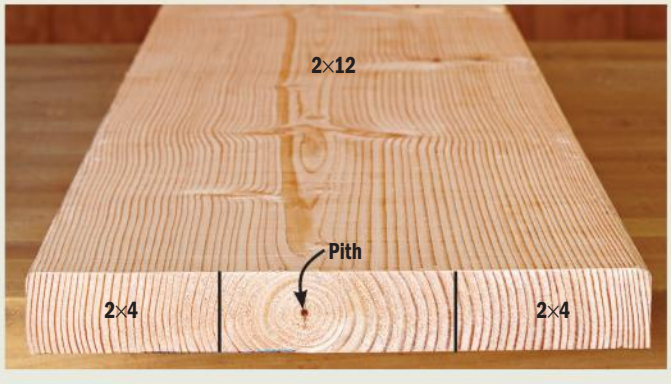
SHOP TIP

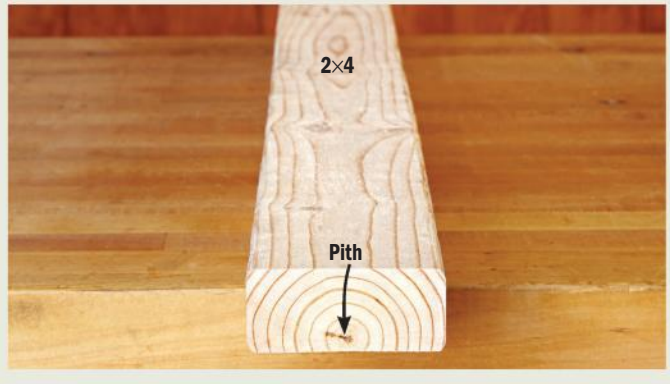
Get great-looking 2×4s by not buying 2×4s

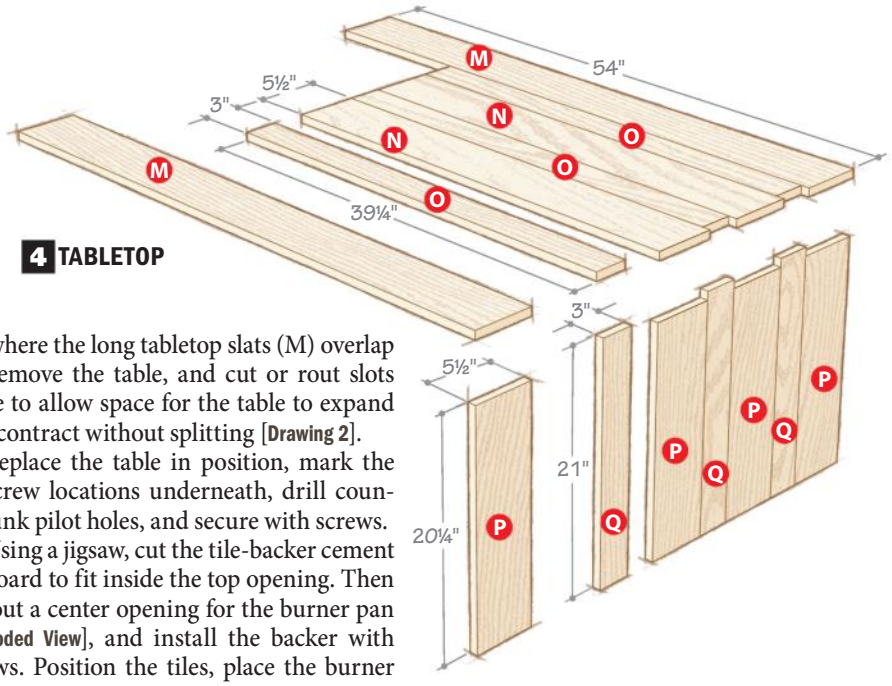
All the frame components (parts A–D) are made from dimensional pine lumber. Even though they measure 1½" thick by 3½" wide—standard 2×4 measurements—we didn't use actual 2×4s. Here's why.

Many 2×4s contain the pith, the most unstable part of a log. So even if you can find straight 2×4s, they might warp later. To minimize this risk, buy wider dimensional lumber (straight-grained 2×10s and 2×12s), and then rip the parts from each edge, avoiding the pith. Straighten edges on the jointer, then rip workpieces to width. (If you like the rounded edges of a 2×4, use a 3/16" round-over router bit.)

For the cedar parts (E–L), buy 1×12s and rip them to size. The gains you make in straighter, more stable and attractive parts offsets the loss in pithy or knotty stock.







(F) where the long tabletop slats (M) overlap it. Remove the table, and cut or rout slots there to allow space for the table to expand and contract without splitting [**Drawing 2**].

4 Replace the table in position, mark the screw locations underneath, drill countersunk pilot holes, and secure with screws.

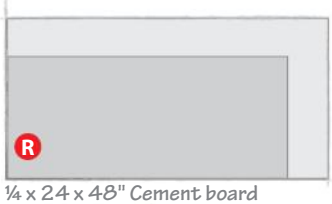
5 Using a jigsaw, cut the tile-backer cement board to fit inside the top opening. Then cut out a center opening for the burner pan [**Exploded View**], and install the backer with screws. Position the tiles, place the burner pan on them (bottom down), and trace around the bottom. Cut the tiles slightly shorter than where marked, then install them with tile mortar. When dry, apply grout between the tiles.

6 Install the burner kit, and attach the propane tank and hose. Then fire up the burner, kick back, and enjoy the feel of your own personal fire table.

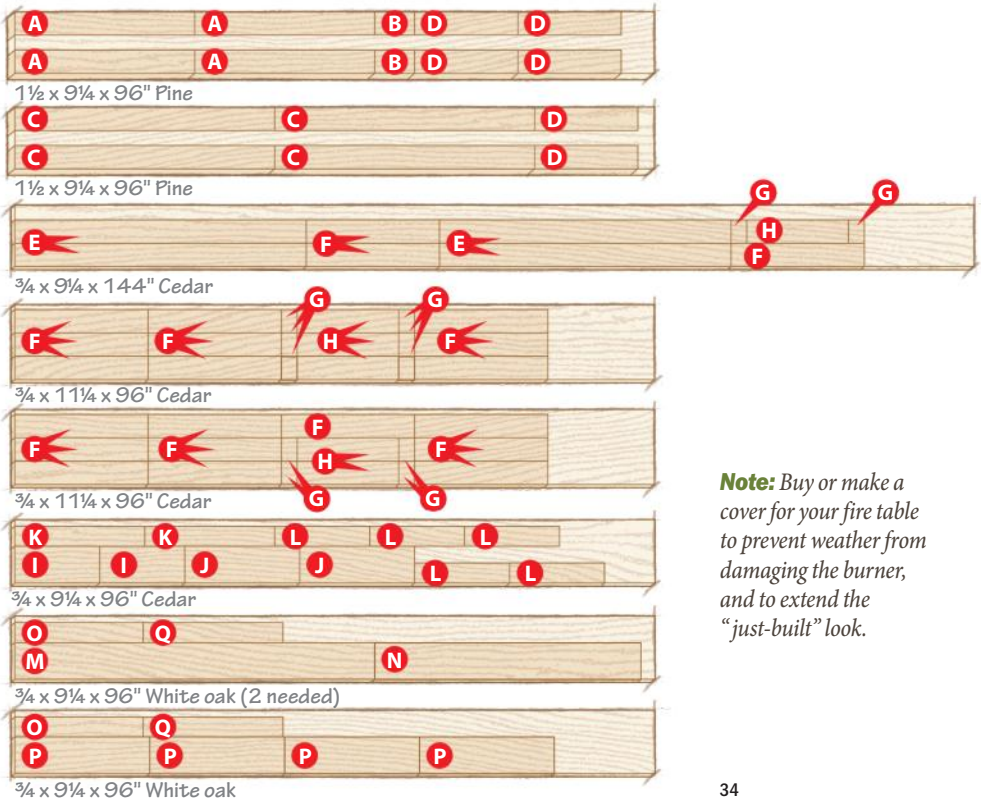
Produced by **Bob Hunter** with **Kent Welsh** and **Kevin Boyle**
Project design: **John Olson**
Illustrations: **Roxanne LeMoine, Lorna Johnson**

Using spacers and a board as a stopblock, glue together the wide and narrow tabletop slats. Wipe away any glue squeeze-out at the board ends.

▶Watch a video showing how to cut and install the tile using a tile saw.
woodmagazine.com/tile



Cutting Diagram



Note: *Buy or make a cover for your fire table to prevent weather from damaging the burner, and to extend the "just-built" look.*

Materials List

Part		FINISHED SIZE T	W	L	Matl.	Qty.
A	long stiles	1½"	3½"	27"	P	4
B	short stiles	1½"	3½"	6"	P	2
C	long rails	1½"	3½"	39"	P	4
D	short rails	1½"	3½"	15½"	P	6
E	long siding	¾"	3½"	43½"	C	4
F	short siding	¾"	3½"	20"	C	22
G	end siding	¾"	3½"	2¼"	C	12
H	drawer siding	¾"	3½"	15⅜"	C	6
I	drawer front/back	¾"	5½"	13"	C	2
J	drawer sides	¾"	5½"	17¼"	C	2
K	drawer cleats	¾"	3"	19½"	C	2
L	drawer bottom slats	¾"	3"	14½"	C	5
M	tabletop long slats	¾"	5½"	54"	WO	2
N	tabletop wide slats	¾"	5½"	40"	WO	2
O	tabletop narrow slats	¾"	3"	39¼"	WO	3
P	wide table supports	¾"	5½"	20¼"	WO	4
Q	narrow table supports	¾"	3"	21"	WO	3
R	tile-backer board	¼"	18½"	42"	TB	1

*Parts initially cut oversize. See the instructions.

Materials key: P-pine, C-cedar, WO-white oak, TB-tile-backer cement board.
Supplies: #8 × 1¼" coated deck screws; #9 × 2½" coated deck screws; 18" full-extension ball-bearing drawer slides.
Bit: 45° chamfer router bit.
Sources:
Drawer pull: Stainless steel 120MM S/S edge pull, no. 1014281, $11.99, Rockler Woodworking & Hardware, 800-279-4441, rockler.com.
Tile: Mohawk 6 × 16" Noble Black slate floor and wall tile (10), no. NB01616HS1P, $1.99 each, Menards, menards.com.
Burner kit and pan: American Fireglass match light fire pit kit no. SS-LCBMKIT-Config, $262.95, Fire Pits Direct, 877-374-6777, firepitsdirect.com.

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3 Must-have Adhesives

There's no need for a shelf full of different glues. This trio helps you effectively build nearly any woodworking project.

You'll seldom need to reach for another adhesive if you stock your shop with a weatherproof polyvinyl acetate (PVA) glue, slow-set epoxy, and medium-viscosity cyanoacrylate (CA). Here's all you need to know to select and use them.

Follow the instructions with the epoxy to mix the proper amounts of resin and hardener. Mix thoroughly, until the adhesive reaches a consistent color.

Epoxy provides enough time to apply adhesive to a number of strips, place them on the form, align them, and clamp them. Apply heat to speed the cure after clamping.

Choose your adhesive

Let's take a look at the types of jobs at which each choice excels.

Type II PVA. This is the go-to glue in a woodworking shop, and the least expensive of the three at about $5 for 8 ounces. Pick it for joinery, gluing up panels, flat laminations, and applying veneer. An open time of about 10 minutes provides sufficient time on most glue-ups for arranging parts and getting clamps in place. A Type II-rated glue resists moisture, so it holds up on indoor and most outdoor projects. It also maintains some flexibility after it dries to accommodate wood movement.

Slow-set epoxy. This two-part adhesive requires mixing a resin and a hardener before use, *above*. It bonds metal and some plastics to wood, and its gap-filling ability can remedy less-than-perfect fits. This adhesive is truly waterproof, exceptionally strong and, with an open time approaching 60 minutes, you won't have to rush through complex assemblies. It cures hard, resisting springback, making it a good choice for bent laminations, *above*. A quart of resin and a pint of hardener cost about $60 for both ($10 for 8 ounces).

Medium-viscosity CA. Also known as super or instant glue, CA sets in about a minute, making it a good choice for small, difficult-to-clamp assemblies, and for reattaching chip-out, so you can keep working. If you need a grip in a matter of seconds, spray the joint with accelerator, typically sold alongside the glue.

A medium-thickness formula, about the consistency of thin syrup, won't squeeze out of tight-fitting joints. If a workpiece soaks up the glue too fast, leaving little on the surface, simply apply another coat.

CA cures hard and brittle compared with PVA, but that brittleness can be an advantage if you have pieces to join temporarily. For example, you can attach a scrap block to a bowl blank before turning it. A sharp rap with a mallet will shear the glue block from the bowl after turning. CA is the most expensive choice of the three at $10 for 2 ounces ($40 for 8 ounces).

▶There are several types of these three adhesives, and a wide variety of other adhesives, for specialty uses. Learn more about them all. woodmagazine.com/iloveglue

Tip! *Control epoxy's open time with your choice of container. A tall, narrow cup concentrates heat the epoxy generates as it cures, shortening open time. A shallow container dissipates heat, extending open time.*

▶CA grabs quickly enough that you can simply hold the pieces in position. After the glue grabs, add clamps if possible, or apply painter's tape.

Tip! *CA has a shelf life of just six months once opened. Buy only as much as you will use in that time.*

PVA glue might fill small gaps, such as this one, but it has almost no strength compared with a gap-free joint. Epoxy would perform just fine along the full length of this joint.

Before applying epoxy, rough up a smooth surface, including wood, with 80-grit sandpaper or a file. Unlike PVA, epoxy needs to lock into this texture to create a stong bond.

Prep your material

To provide the best bond, PVA and CA glues need very smooth surfaces that fit together with no gaps, *above*. Moisture content of the wood must be below 15 percent (most kiln-dried hardwoods fall below 8 percent), and the temperature of the materials and glue must be above 55 degrees Fahrenheit.

Although epoxy fills gaps, it does not accept finish, so visible joints should still fit tightly. Epoxy requires a bit of "tooth" in the faces being bonded, so scuff smooth surfaces, *above, right*. Wipe metals and oily woods, such as teak, with isopropyl alcohol or acetone to remove oils and contaminants. Allow the surface to dry before applying the epoxy. Check labels for details, but typically, the temperature of the materials and adhesive should be above 50 degrees Fahrenheit.

Before applying glue, dry-assemble the workpieces to check the fit of joinery, and to determine how you'll clamp the assembly, *below*. Doing this allows you to identify and correct any ill-fitting joints or parts, and areas of potential glue squeeze-out [**Wipe out squeeze-out,** *next page*].

Tip! *When working with epoxy, cover your benchtop with paper to catch any drips. Dried PVA and CA drips will pop off a bench that has a finish applied.*

A practice assembly without glue helps you determine the order of assembly and number of clamps needed. After the dry-fit, keep the clamps opened and nearby to save time and stress once the glue goes on.

Wipe out squeeze-out

A thin bead of squeeze-out indicates a properly glued joint. But stray adhesive will show under a finish, and you don't want hardened beads or drips as a permanent part of your project. Scraping or prying away dried glue can take chunks of wood with it. Follow these strategies to reduce or eliminate potential problems.

To soften dried PVA, dip a paper towel into a mixture of equal parts acetone, water, and vinegar. Wring out the towel, place it over the squeeze-out, and cover it with plastic wrap or a plastic bag. After soaking for a couple of minutes, the softened glue should scrape off easily.

With PVA glue, allow squeeze-out to happen, then peel it off with a putty knife or chisel after the glue turns rubbery (about 30–40 minutes).

Remove excess epoxy immediately after clamping by wiping with a rag dampened with acetone or lacquer thinner. Roll the rag as you work to avoid smearing the adhesive.

Cutting pieces oversize allows cleanup as you trim the piece to final size. This lamination, shown in the glue-up on *page 37*, has been jointed on the edges. Crosscutting to length removes the squeeze-out on the ends.

CA glue dries so quickly, squeeze-out doesn't have much time to penetrate the workpiece. Simply allow the adhesive to cure, then scrape and sand away the excess.

Eliminate squeeze-out on moldings and edging by routing a shallow V-groove near each edge to capture excess glue.

Prevent squeeze-out from reaching the wood by applying painter's tape around joints, and areas that will be hard to reach after assembly, such as inside corners. Dried adhesive peels away with the tape.

Spreading glue on only one surface speeds up assembly and reduces squeeze-out. Use any suitable disposable item as a spreader: a piece of scrap, disposable roller, or even a nail to drip glue into a hole.

Find flux brushes in the plumbing section of home centers or online [**Sources**]. Drop the brush into a cup of water after use to prevent glue from hardening. Tap the brush on a rag to remove excess moisture before reusing it.

Apply the adhesive

▶CA glue can bond skin instantly. Epoxy can cause skin irritation. Avoid both problems by wearing neoprene or nitrile gloves when using these adhesives.

It may seem obvious, but any surface without adhesive won't stick to another surface. So don't rely on clamping pressure to spread a bead of glue around a joint. Instead, fully cover one of the mating surfaces with an even coating, *above*. Apply adhesive to face and edge grain; porous end grain draws glue in, starving the surface. If you must glue end grain, first appy a thin coat of adhesive to seal the surface. Allow it to penetrate a few minutes, then apply a second coat of glue.

Use a flux brush to cover narrow areas and reach into crevices, *above, right*. A silicone brush [**Sources**] or old credit card works well for edges and moderately sized surfaces. For large areas, roll out the glue with a rubber roller [**Sources**].

Put it under pressure

As you tighten clamps on an assembly, apply just enough pressure to bring the workpieces together or close the joint, then add another quarter- to half-turn of the handle. Excess pressure squeezes the adhesive out of the joint, weakening it. Check parts for proper alignment and make any adjustments before the glue begins to set. Leave PVA- and CA-glued assemblies clamped for at least one hour, and epoxy for at least six hours. On assemblies under stress, such as a bent lamination, leave the clamps on for 12 hours. Allow 24 hours for a full cure on all three adhesives.

▶Get more assembly and clamping tips. woodmagazine.com/glueups

▶Clamping times are for ideal temperatures. At cooler temps, leave the clamps on longer.

Produced by **Craig Ruegsegger**

Sources: Silicone brush, woodmagazine.com/gluebrush
Flux brushes, 36 pack, woodmagazine.com/fluxbrush
4" rubber roller, woodmagazine.com/rubberroller

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10A BELT SANDER 4" X 24"

T4 1200BS

Technical Specification

Power	10A
No Load Speed	656–1312 ft/min
Product Weight	13lb
Suitable For Inversion	Yes - inversion clamps and pad included
Variable Speed	Yes
Belt Dimensions	4" x 24"
Sanding Area	4" x 6 1/8"
Dust Extraction	Yes
Kit Contains	Inversion kit, dust bag, 3 x sanding belts (80, 100 & 120 grit) & spare drive belt

2.5A RANDOM ORBIT SANDER 5"

TROS 125

Technical Specification

Power	2.5A
No Load Speed	7000 - 12,000 rpm
Sanding Disc Size	5" dia.
Sanding Disc Attachment	Hook & Loop
Variable Speed	Yes
Dust Extraction	Yes
Accessories	3 x mesh sanding discs (80, 120 & 220 grit), dust bag & dust port adaptor

2.6A OSCILLATING TILTING SPINDLE SANDER 15"

TSPS 370

Technical Specification

Power	2.6A
No Load Speed	1725 rpm
Table Size Diameter	15" dia.
Oscillations	30 opm
Product Height	19"
Product Weight	31lb
Sanding Sleeves	9/16", 15/16", 1-3/32", 1-3/16", 2"
Dust Extraction	Yes
Dust Extractor Dimensions	Inner: 1-7/8" and Outer: 2"

6.5A ORBITAL ACTION JIGSAW

TJS 001

Technical Specification

Power	6.5A
Stroke Length	1"
Max Cutting Capacity	Wood 4-5/16", Steel 13/32" & Aluminium 31/32"
Blade Type	T-shank
Product Weight	7.8lb
Angle Adjustment Range	0° - 45°, left and right
Pendulum Mode	Yes - 3-Stage
Dust Extraction	Yes
Kit Contains	Guide fence, dust port adaptor, track adaptor, 3 x jigsaw blades (wood cutting blade, wood & plastic cutting blade & metal cutting blade)

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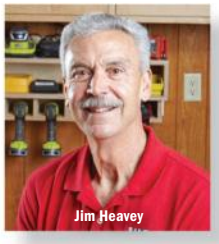
Leave the Maker's Mark

By Jim Heavey


Jim Heavey

When I was little, one of my favorite TV programs was *Zorro*. I was mesmerized by that black-caped swordsman and envisioned myself in each of those 82 episodes. I even took up fencing in college only to find the reality of the sport did not match my skills.

Though my professional dueler career never materialized, what did stick with me was how Zorro left his iconic mark after each heroic deed. Whip, whip, whip—the mark of a "Z." Odd as it may seem, I think there is a lesson here for woodworkers.

Most of us make projects for friends and family, and that's what motivates us. We think of that recipient during each step in the process, from concept through construction and completion. We eagerly await that look of amazement and gratitude as we hand over our labor of love. Many times, the only thing that's missing is the mark of the maker, your inner Zorro. That symbol tells a lot about an object's creator, and provides a sense of their personality and creativity.

I've been leaving my mark ever since I started creating projects, not to bolster my ego but as a way of providing a final touch to that special gift. Here are some suggestions for leaving your mark.

Simple signature. It's yours, it's unique, and it's literally a personal touch (*above*). The solvents in some finishes may blur your signature, so use an indelible fine-point marker after the final finish coat dries.

I chose block lettering on my personalized electric branding iron so that it would be easier to read the brand.

Using the branding iron requires a hot stamp. Occasionally, you may over- burn the message. Light sanding with 150-grit sandpaper will remove the char.

Branding iron. I used this method early in my career, and I still brand things such as cutting boards that will be continuously oiled and washed, photos *above*. It's always best to practice your heated stamp timing on a scrap board because you only get one chance on the finished project.

Custom medallions. Do you have a laser engraver or know someone who does? Now that these machines have become increasingly more affordable, making personalized medallions of wood or metal and inlaying them into your work is a snap (*below*). Design a circular medallion that matches the diameter of a Forstner bit, and you have the perfect way to really add impact.

▶Etch brass medallions without a laser.
woodmagazine.com/brassbadge

A "signature" piece of wood. I met a man years ago who includes a piece of purpleheart in every project he makes. It may be a plug-cut dowel, part of a lamination, or just hidden in the project somewhere.

An inlaid penny. This is my "go-to" mark (*below*). A ¾" Forstner bit creates a perfect-size recess for an appropriately dated penny. Drill 1/16" deep to set the penny flush with the surface, then secure the coin with a dab of two-part epoxy. The copper color looks great, and it stays bright if you seat the penny before applying finish. Each year's coins usually begin to show up in late winter or early spring. I also sign the project next to the penny and sometimes write a meaningful little note.

I typically hide my penny mark in an out-of-the-way place, such as the back side of a drawer box, or at the bottom of a headboard. I like the subtlety, and think that looking for that hidden mark adds even more interest to the project.

Working in your shop creating that perfect gift is a very rewarding experience. You put your heart (and occasionally a bit of blood) into that project. Make the final touch your maker's mark. *En Garde*!

Whether engraved by chemical or laser, a custom medallion offers infinite design possibilities for creating a unique identifier.

On this jewelry box I made for my daughter, the penny rests in the bottom of the box. She and I know exactly when I made it.

A look you'll love

Hope Chest

Topped with an easy-to-make coopered lid, this walnut chest doesn't need a lifetime commitment to create.

Hope chests were in such demand a century ago, they enabled the fledgling Standard Red Cedar Chest Company to become Lane Furniture.

DIMENSIONS: 37¾" W × 19" D × 24" H

Approximate materials cost:

$230

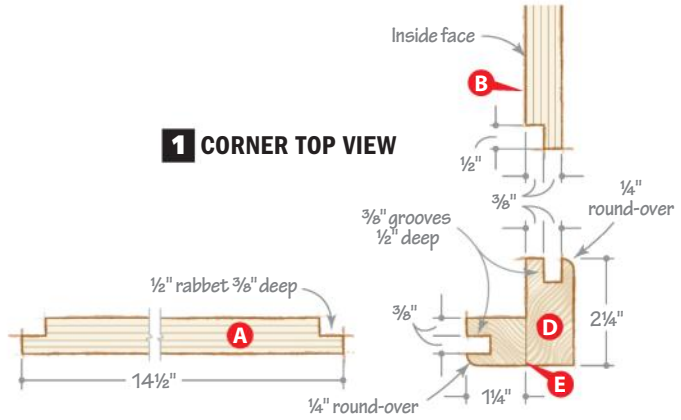
About 6 cubic feet of storage.

Hope chests, or dowry chests, were once used by young women to store their trousseau—linens, clothes, tableware, and personal possessions they would need after marriage. As this Old World tradition took root in America, chests became popular graduation or coming-of-age presents. Today, they're still a handy, stylish way to store blankets, spare linens, and seasonal clothes.

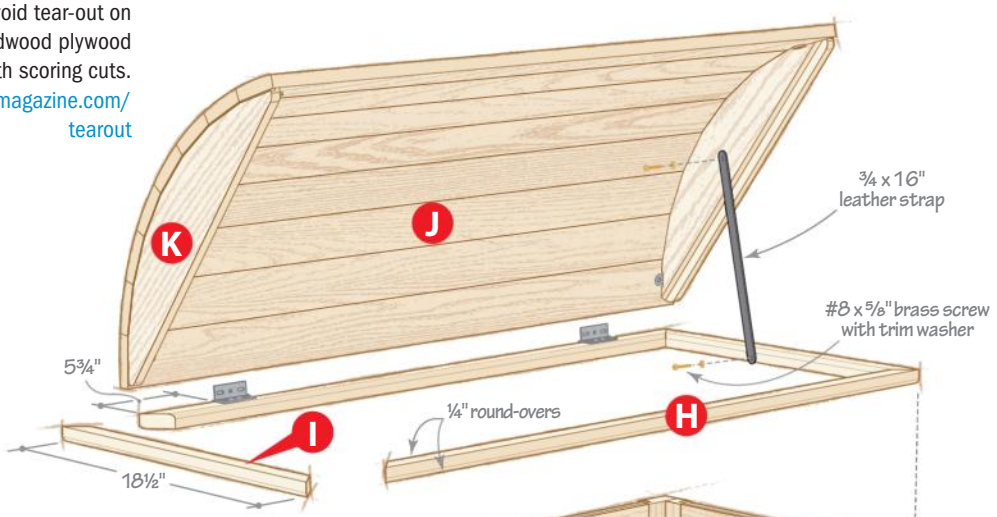
Begin with the box

1 Cut the panels (A, B, C) [**Materials List, Exploded View**]. Rabbet both ends of the end and front/back panels (A, B) [**Drawing 1**].

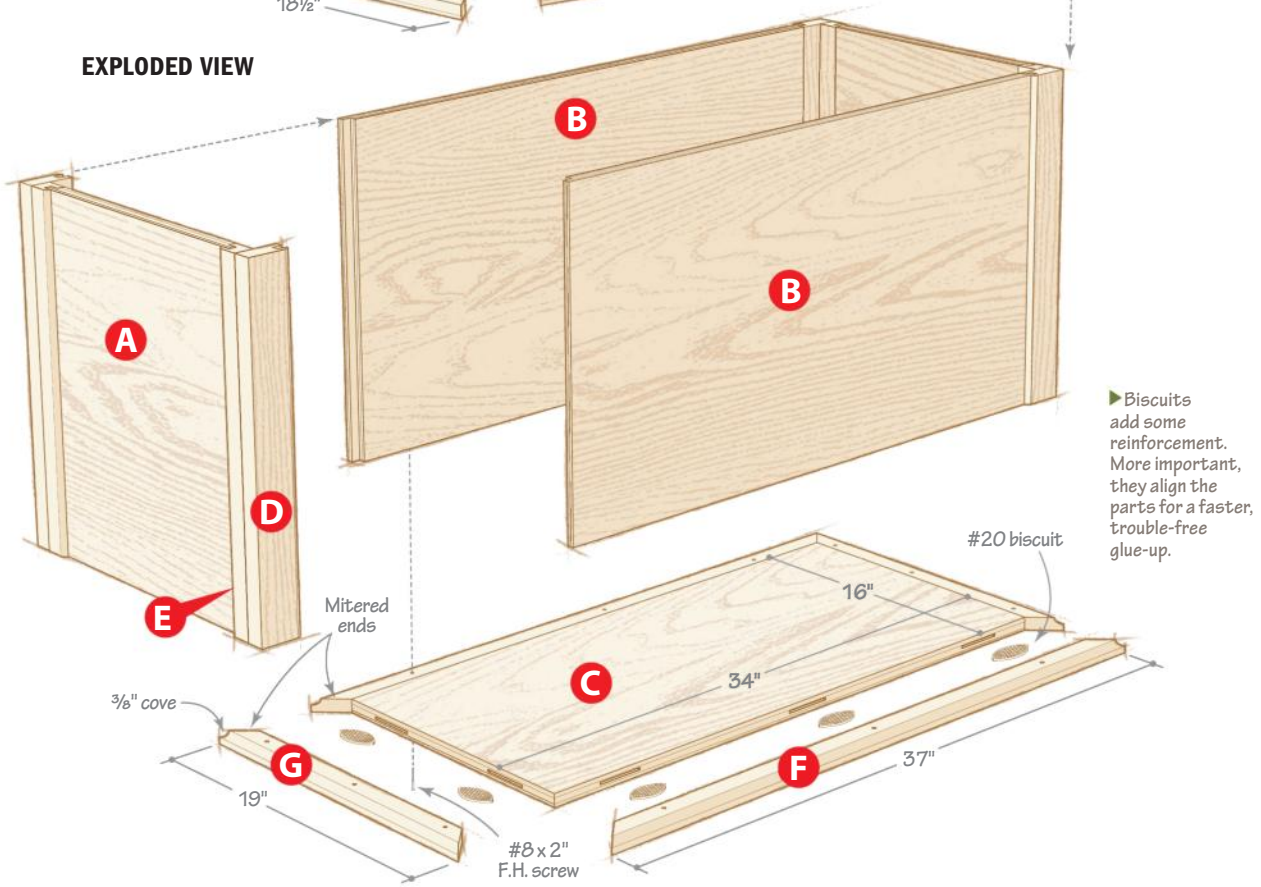
1 CORNER TOP VIEW



▶Avoid tear-out on hardwood plywood with scoring cuts. woodmagazine.com/tearout



EXPLODED VIEW



▶Biscuits add some reinforcement. More important, they align the parts for a faster, trouble-free glue-up.

Keep the corner assembly (D/E) from tipping by using a featherboard to press the workpiece against the fence.

Reduce tear-out by cutting from the outside edge of the molding to the inside edge.

Tip! *When pairing up the corners, check each combination for the best grain match.*

▶Make featherboards from scraps. woodmagazine.com/featherboard

2 Cut the wide (D) and narrow (E) corners. For each pair, cut biscuit slots and glue up the corners [**Drawing 2**].

3 Round over each corner assembly (D/E) [**Drawing 1**] and groove the inside edges [**Photo A**].

4 Glue and clamp corner assemblies to the end panels [**Drawing 2**]. Glue the end panel assemblies to the front and back panels and check for square.

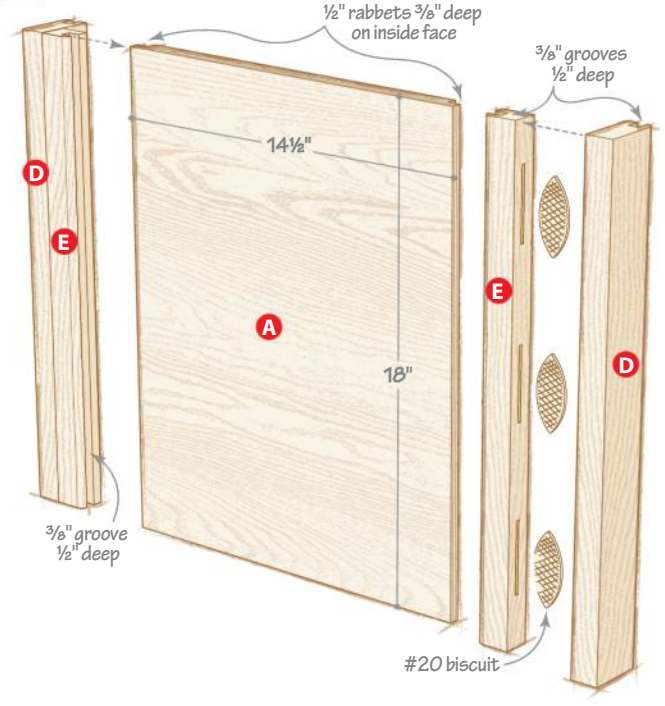
5 Cut the trim and molding (F–I) 1" longer than listed. Round over the top inside and bottom outside edges of the molding (H, I) [**Exploded View**].

6 Cove the base trim (F, G) [**Exploded View**]. Miter the pieces to fit around the base panel (C) [**Photo B**] and biscuit and glue them in place.

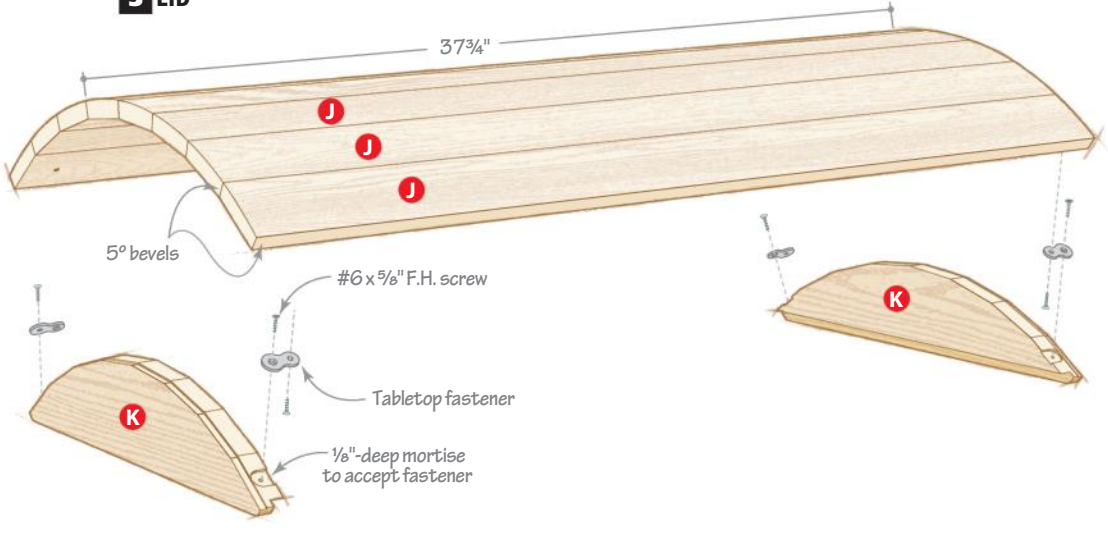
7 Miter the moldings to fit flush with the inside top of the chest and glue them on.

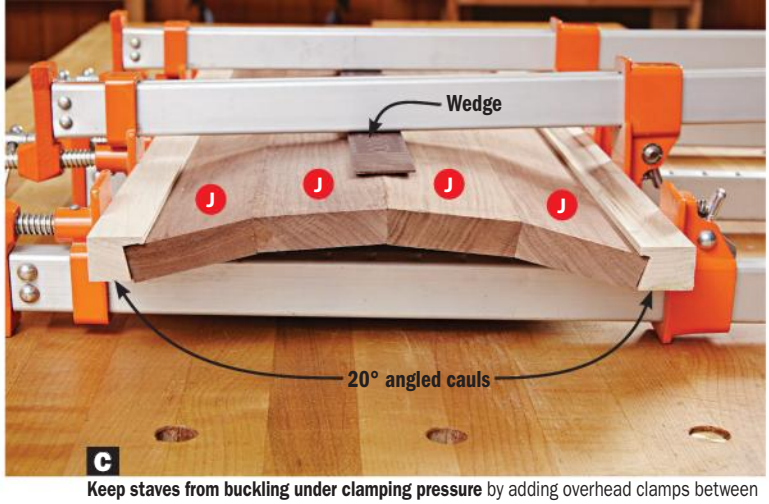
8 Glue and screw the base (C/F/G) to the chest with an even reveal on all sides.

2 END ASSEMBLY

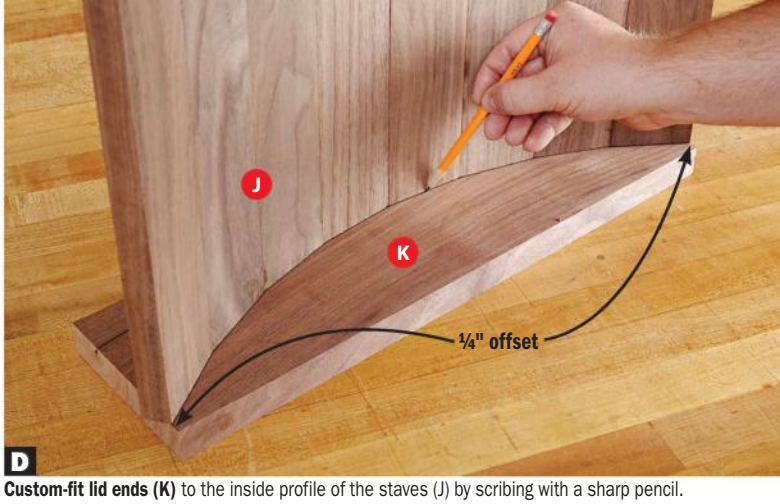


3 LID





Keep staves from buckling under clamping pressure by adding overhead clamps between the bottom clamps. Insert wedges as shown to apply downward force.



Custom-fit lid ends (K) to the inside profile of the staves (J) by scribing with a sharp pencil.

Make a well-rounded lid

Tip! *Tiny bevel angle errors will be magnified 14 times on the finished lid. Use a digital angle finder to dial in a precise 5° blade angle.*

Tip! *If you plan to use a plane to round the assembled lid, orient the staves to plane with the grain on each piece.*

Tip! *Perform at least one dry run on stave glue-ups at each stage before the real thing.*

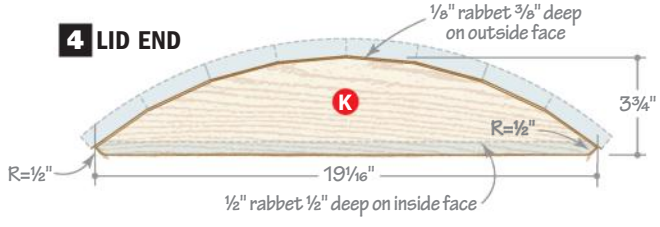
1 Cut eight staves (J) [**Drawing 3**]. Arrange them for an attractive grain pattern and number them in order. Then, bevel both edges of each stave.

2 From 1×2 scrap, cut two clamping cauls 37½" long with a 10° chamfer on one edge of each caul [**Skill Builder,** *right*]. Glue pairs of adjoining staves to create four subassemblies. Now cut 20° bevels on the cauls and glue two pairs of lid subassemblies to form two lid halves [**Photo C**].

3 Cut 40° chamfers on the cauls. Use two clamping frames to glue the lid halves [**Skill Builder,** *bottom*].

4 From 1×5" stock, cut two lid end (K) blanks to fit your stave glue-up [**Drawing 4**]. Lay the end of the stave assembly on a lid end ¼" from the bottom edge [**Photo D**]. Scribe around the inside of the staves and cut along the scribe lines. Repeat for the other end.

5 Rabbet the lid ends (K) and round the corners [**Drawing 4**].



SKILL BUILDER

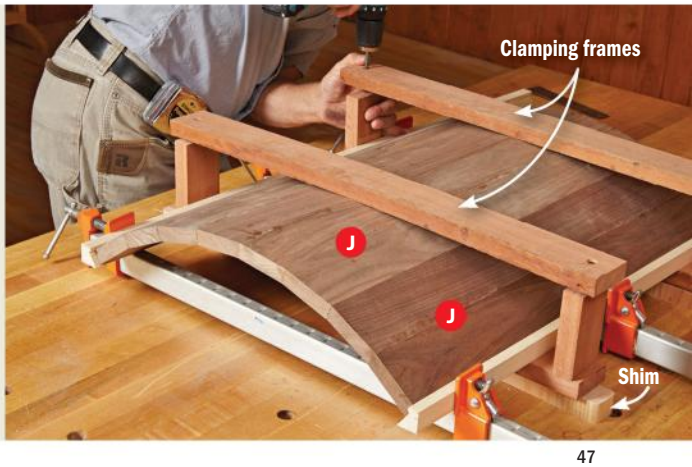
Clamping cauls work better with bevels

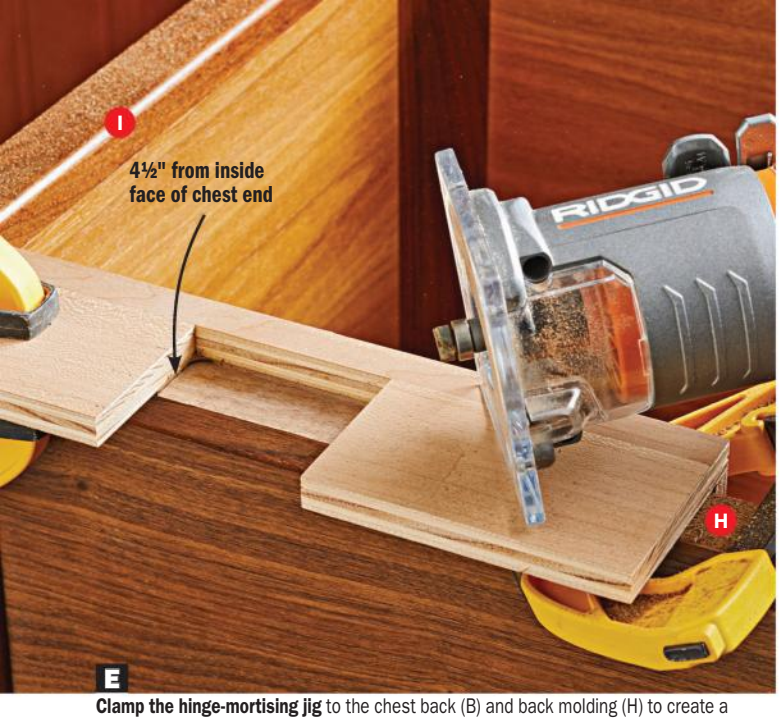
Custom-beveled cauls help you wrestle chamfered lid stave edges into position for gluing. To make these cauls, tilt the blade to 10° and cut the first bevel so the blade emerges from the side of the caul, leaving a lip to hold the staves in position (*below left*). As you increase the number of staves being glued, tilt the blade further while maintaining the lip (*below right*).

SKILL BUILDER

Use frames for picture-perfect joints on curved glue-ups

Gluing the two lid halves creates an assembly too tall for overhead clamps—time for a new trick: clamping frames made from 2×4s. Dry-assemble the lid halves in your clamps and measure from the peak of the center stave joint to the tops of the clamp bars. Then, subtract ¼" and cut four frame sides this length. Cut four top/bottom pieces 27" long. Screw the sides to the frame bottoms, then slide the assemblies between the clamps. Shim the frame bottoms until they touch the bottoms of the cauls. Snug up the clamps until the joint just begins to separate on top. Screw the top of the frame to the sides until it presses the halves of the joint back together (*right*). Check both ends for correct alignment.





Clamp the hinge-mortising jig to the chest back (B) and back molding (H) to create a stable platform for your trim router.

Set the pattern bit cutting depth to equal the thickness of the hinge leaf.

Note: *The reveal left by the lid-end rabbets helps camouflage seasonal wood movement on the lid.*

6 Drill mortises for the tabletop fasteners and screw the fasteners to the lid ends [**Drawing 3**]. Glue and clamp the lid ends to the two center lid staves, allowing the remaining staves to float. Screw the tabletop fasteners to the outside staves.

7 Plane or power-sand the outside peaks of the stave joints until the lid forms a curve. Then, use a curved sander [**Skill Builder,** *below*] to smooth the top.

Complete your chest quest

1 Apply two coats of Watco light walnut Danish oil to the exterior of the chest and lid, and let dry until odorless. Then, apply at least three coats of lacquer. For an odor-free interior, apply shellac inside.

2 Clamp a hinge-mortise routing jig [**Drawing 5**] to the chest [**Photo E**]. Using a ½"-diameter pattern-routing bit, cut hinge mortises [**Photo F**]. If necessary, file the corners and edges of the hinges [**Sources**] to fit the curves made by the router bit.

3 Apply painter's tape to the inside face of the lid where the hinges will be attached. Center the lid on the chest and mark the hinge barrel locations [**Photo G**].

4 Extend the hinge barrel end marks on the tape using a square. Offset the hinge barrel evenly from the stave edge [**Photo H**]. Remove the tape and install the hinges.

5 Cut a ¾×16" leather strap [**Sources**] and radius the ends. Brace the lid open and mark mounting screw locations for the strap [**Exploded View**]. Screw the strap in place. Now, when someone asks if you have a place to store spare sheets or winter blankets, you can tell them "I do."

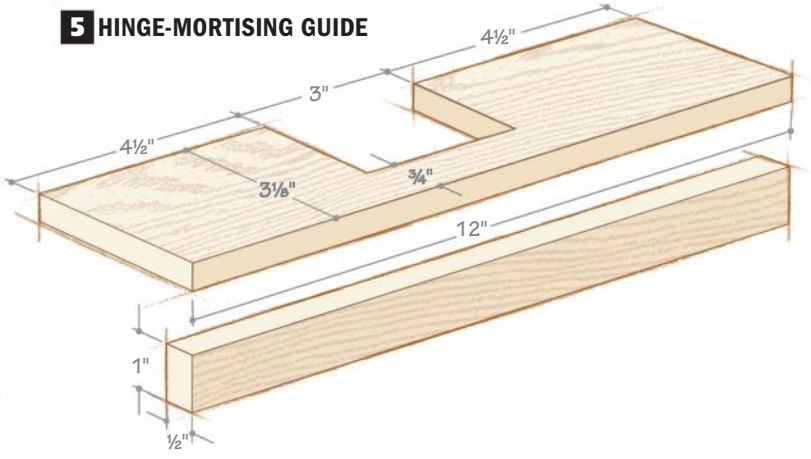
Tip! *Practice cutting mortises in scrap to check for size and depth.*

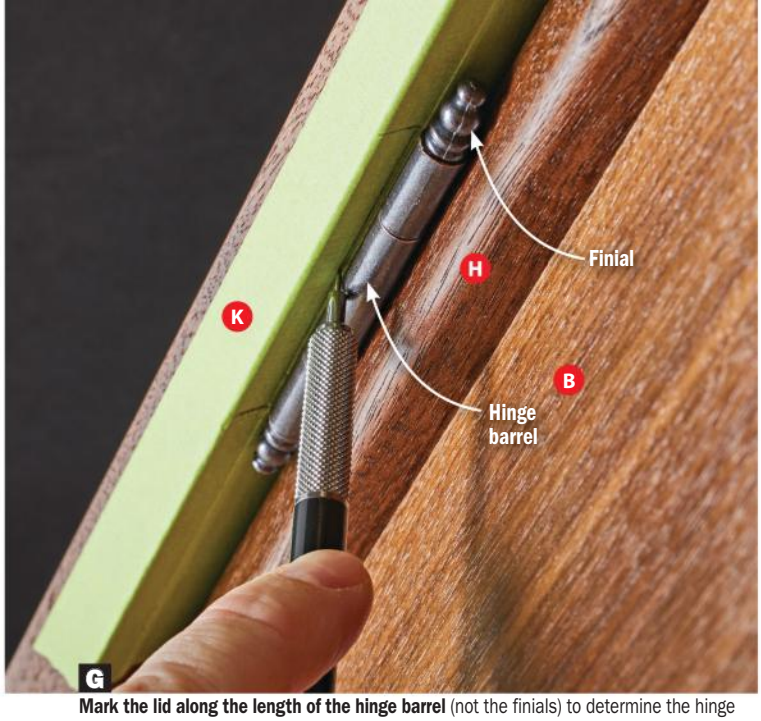
SKILL BUILDER

Toss this sanding challenge a curve

Don't get bent out of shape because a flat sander leaves facets on a curved surface. Instead, make a sander you can bend out of shape. Cut a scrap of ⅛" plywood to 11×4½" (the grain should be perpendicular to the curve). Glue ¾×2×4½" handles to one face and attach adhesive-backed sandpaper to the underside.

5 HINGE-MORTISING GUIDE

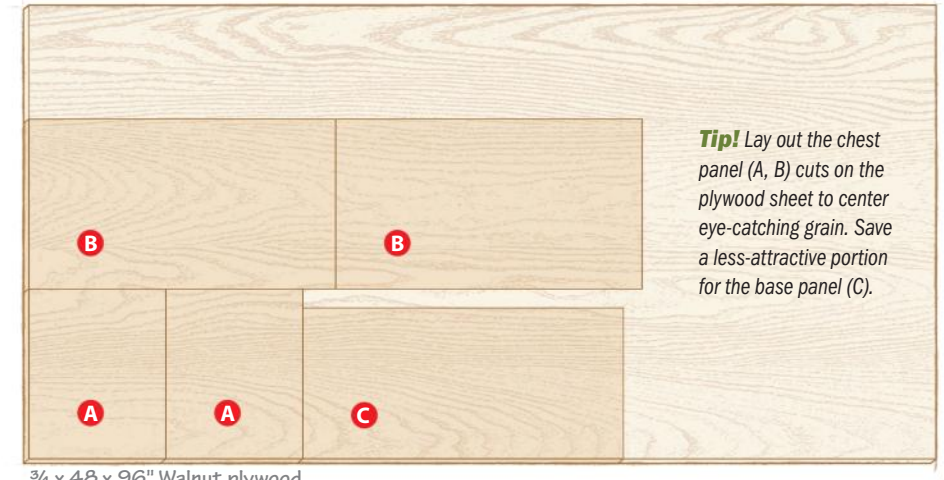




Mark the lid along the length of the hinge barrel (not the finials) to determine the hinge placement on the lid.

Adjust your square to the offset between the hinge barrel mark and the outside stave edge. Then, mark the hinge screw locations and drill 3/32" pilot holes for the #6 screws.

Cutting Diagram



Tip! *Lay out the chest panel (A, B) cuts on the plywood sheet to center eye-catching grain. Save a less-attractive portion for the base panel (C).*

Note: This project requires 5 board feet of 5/4 walnut and 11 board feet of 4/4 walnut.

Materials List

Part		FINISHED SIZE T	W	L	Matl.	Qty.
A	end panels	¾"	18"	14½"	WP	2
B	front/back panels	¾"	18"	32½"	WP	2
C	base panel	¾"	16"	34"	WP	1
D	wide corners	1"	2¼"	18"	W	4
E	narrow corners	1"	1¼"	18"	W	4
F*	front/back base trim	¾"	1½"	37"	W	2
G*	side base trim	¾"	1½"	19"	W	2
H*	front/back molding	¾"	1¼"	36½"	W	2
I*	side molding	¾"	1¼"	18½"	W	2
J	staves	¾"	2¾"	37¾"	W	8
K*	lid ends	1"	3¾"	19 1/16"	W	2

*Parts initially cut oversize. See the instructions.

Materials key: WP-walnut plywood, W-walnut.

Supplies: #6×⅝" flathead screws (12), #8×⅝" flathead screws (8), #8×2" self-drilling flathead screws (12), #8×⅝" brass flathead screws (2), #8 brass finishing washers (2), tabletop fasteners (4), #20 biscuits (22).

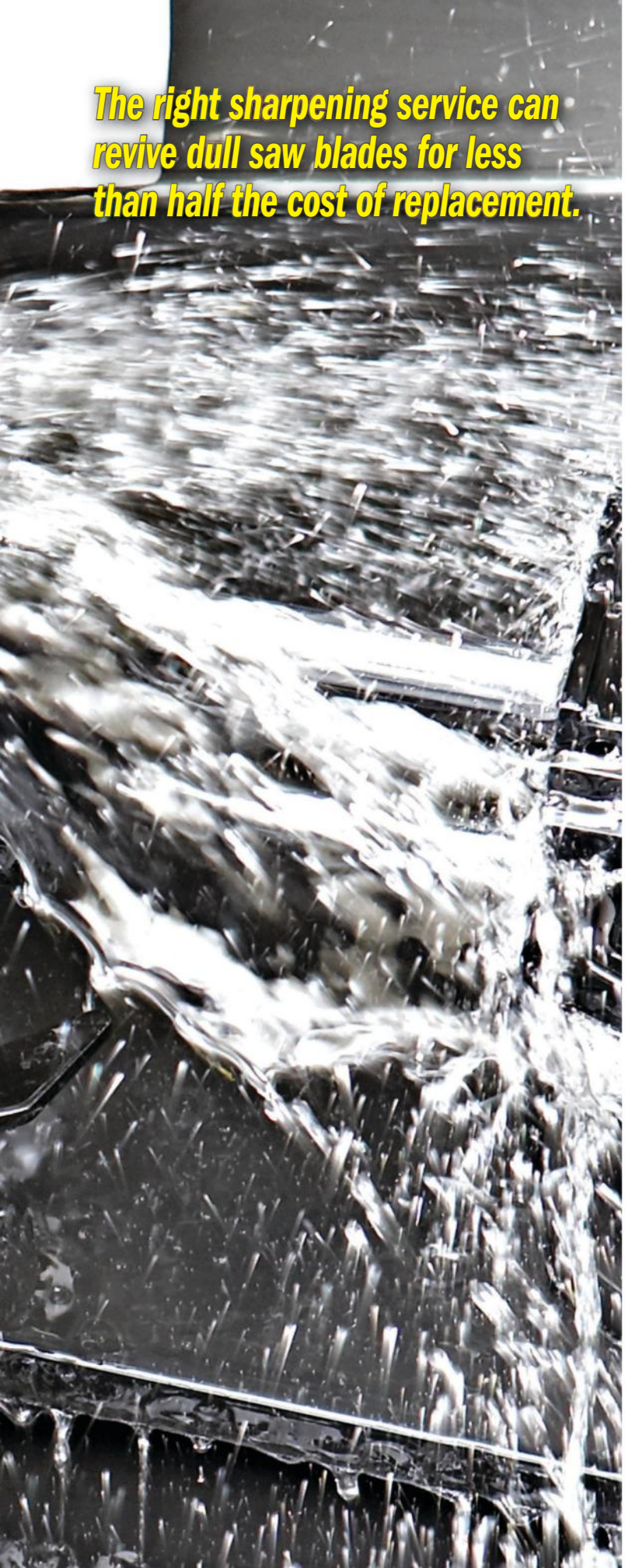
Blade and bits: Dado set; ¼" round-over, ⅜" cove, ½" pattern, and rabbeting router bits.

Sources: No-mortise, bronze-finish 3" hinges (2), no. 00H5224, $6.50 per pair, Lee Valley Tools, 800-871-8158, leevalley.com. ¾×48" black cowhide strip, no. 4523-20, $17.99, Tandy Leather, tandyleather.com, or retail stores nationwide.

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

Regain Your Edge

Coolant washes over this blade as a computer-controlled grinder sharpens each tooth to the same height.



The right sharpening service can revive dull saw blades for less than half the cost of replacement.

Cuts that chip, burn, and bog down your tablesaw motor signal a blade that's lost its edge. That doesn't mean your blade's ready for the trash, though. Today's sharpening services can restore most saw blades up to 10 times. Sharpening prices vary by the number of teeth on a blade, but expect to pay $12 to $22 plus shipping and the cost of any needed repairs.

When, what to resharpen

Tip 1: Send blades out for sharpening at the first signs of dulling. If you wait so long that the carbide becomes severely worn, the sharpening service will need to remove more of each tooth to restore an edge, reducing the number of times it can be resharpened.

Tip 2: Warped blades or those with missing teeth may not be worth repairing. Discard any blade that shows signs of cracking.

Tip 3: Remember your dado set when it comes time to sharpen blades. Most services can handle any of the commonly available dado blades, including Freud's Dial-A-Width set once disassembled. To ensure flat-bottomed dadoes, sharpen the chippers along with the blades to remove carbide to a uniform tooth.

Tip 4: When preparing a shipment to a mail-order sharpening service, pack blades carefully to avoid turning small problems into big ones. Spike Burns at Burns Tools in Tiverton, R.I., once received a shipment of loose saw blades with more than a dozen freshly broken carbide teeth at the bottom of the box. Protect blades by taping each one to a separate sheet of cardboard; then tape cardboard on top of each blade to prevent shifting inside the box or metal-to-metal contact.

Pick a sharpening service

The days when anyone with a grinder or file could handle your sharpening needs have gone the way of high-speed steel saw blades. Whether you choose a local or mail-order sharpening service, first ask what equipment they use. Some firms still successfully sharpen blades without automated equipment, but most use computer numerical control (CNC) sharpening machines like the one shown at *left*. These automatically and consistently match their grinding action to the shapes and angles of the blade teeth while a stream of coolant prevents the fragile carbide from overheating.

Blade manufacturers can help you track down such sharpening services. Forrest Manufacturing offers factory resharpening for its blades as well as other makes. Freud

Still glowing red from the brazing torch, this replacement carbide tooth will next be ground to match other teeth on the blade.

doesn't offer factory resharpening, but can refer you to a sharpening service center.

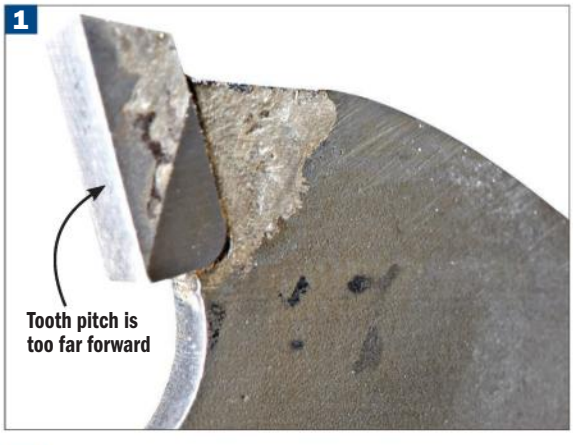
Whichever sharpening firm you choose, ask what comes with the price of the service. This may include removing built-up pitch, inspecting the blade for missing or damaged teeth and repairing them, *left*, checking for runout, and applying a protective coating to the teeth for the return shipment, as shown *at right*. Some will return your blades in reusable protective packages for your next order.

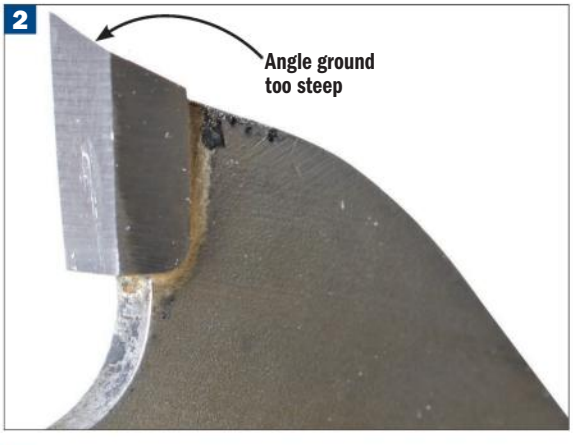
Once you get your blade back from a service you've used for the first time, inspect the quality of the work and look for grinding and repair flaws like those shown *below*. Then date the blade near the arbor hole using a permanent marker before you put it back in service. A properly sharpened blade should last at least as long as a new one. If not, find a new sharpening service.

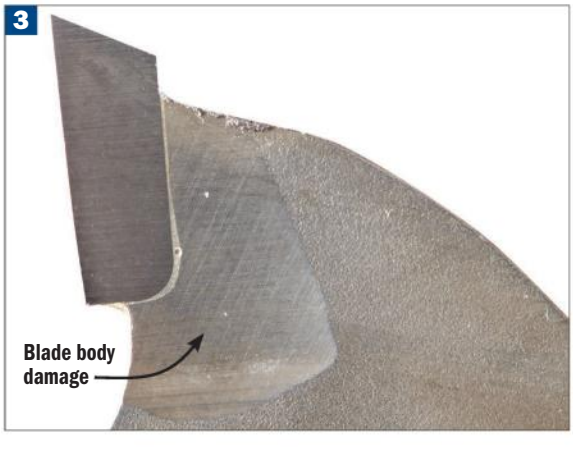
Freshly sharpened teeth receive a protective coating of removable plastic to prevent damage during handling and shipment.

CHECK RETURNED BLADES FOR COMMON FLAWS

Potential saw-blade repair and sharpening mistakes include: 1 teeth brazed on at the incorrect pitch; **2** teeth bevel-ground at the wrong angle or not enough; **3** excessive sidegrinding that damages the blade body; and **4** loosely brazed replacement teeth.







Sharpening services

Acme Tools
629 SW 9th St.
Des Moines, IA 50309
800-544-4189, acmetools.com

Burns Tools, Sharpening Dept.
315 Main Road
Tiverton, RI 02878
800-341-2200, burnstools.com

Bull Sharpening Service
6338 W. Roosevelt Road
Oak Park, IL 60304
708-386-2365

Forrest Manufacturing
457 River Rd.
Clifton, NJ 07014
800-733-7111
forrestblades.com

Manufacturer referral

Freud America, 800-334-4107, freudtools.com/sharpening for approved services.

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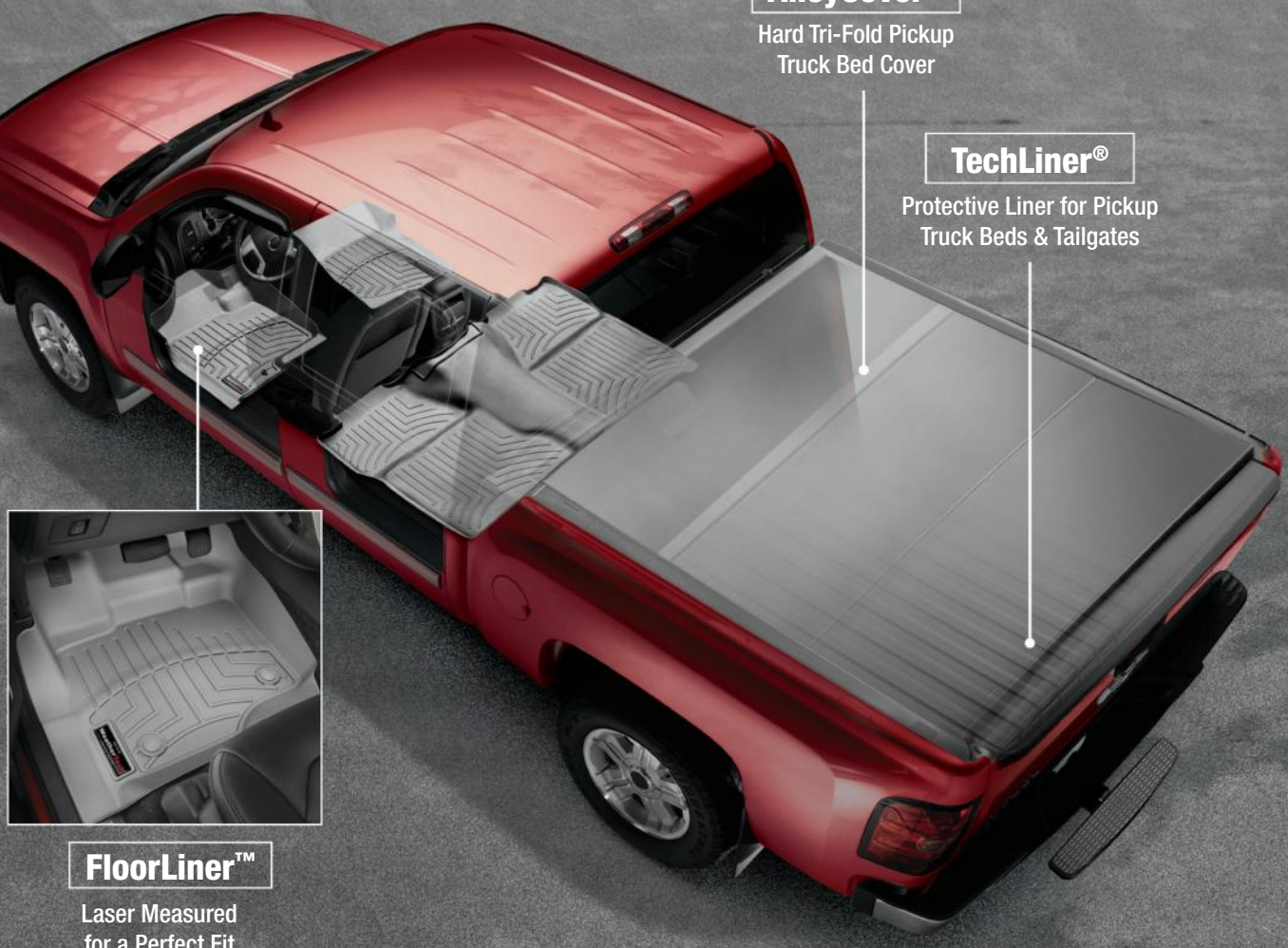

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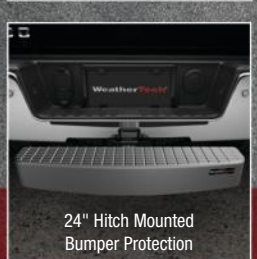 24" Hitch Mounted Bumper Protection				

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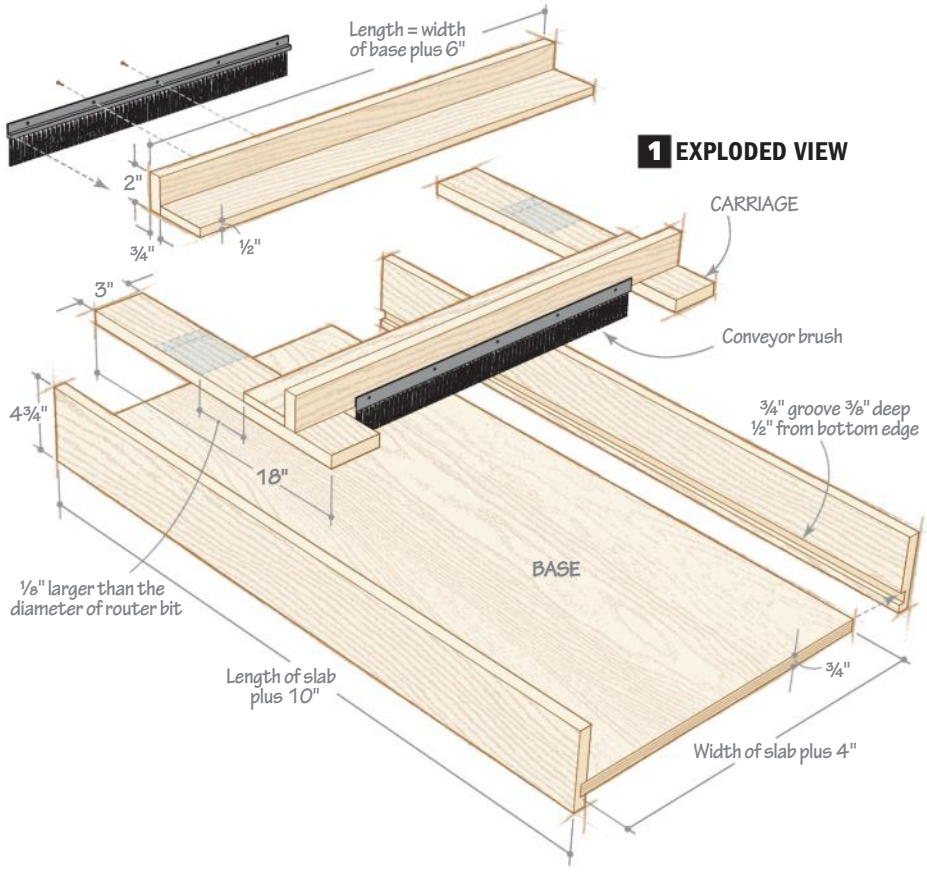
Flattening Sled

Create flat faces on natural-edge slabs or boards too wide for your jointer or planer by using this fixture with a plunge router. Dust-collection accessories capture most of the debris.

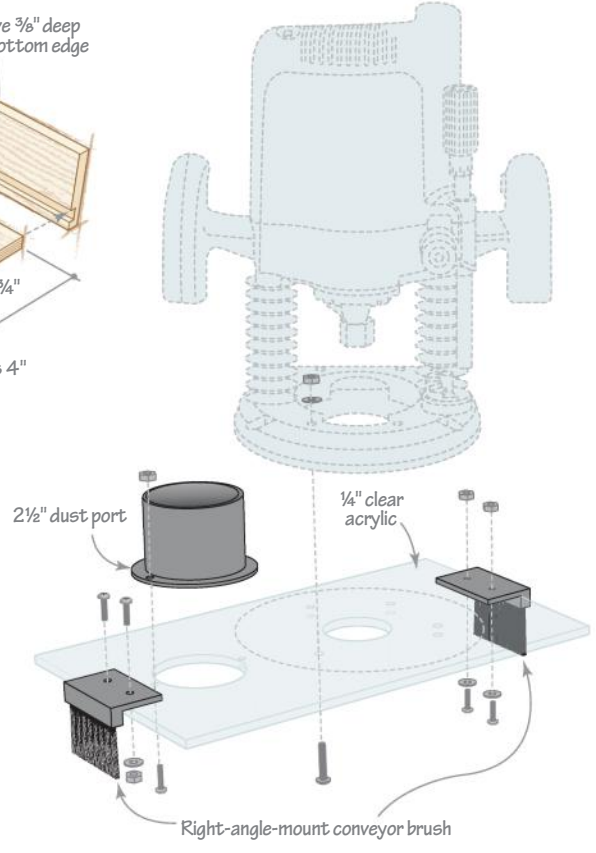
Make this shop project from any combination of sheet goods and solid wood you have on hand. Choose solid stock with as much straight grain as possible to fend off warping. Build a base to fit a specific slab for one-time use [**Drawing 1**], or make it wider and longer in anticipation of working with larger slabs in the future.

Then create the carriage to straddle the base and fit the acrylic router plate (which replaces your router's plastic subbase for maximum plunge depth). An 8×14" acrylic plate [**Drawing 2**] should accommodate most routers; adjust the size to fit your router, if needed. Finally, mount the conveyor brush [**Sources**], dust port, and your router.



1 EXPLODED VIEW

2 ROUTER PLATE



▶Learn more about working with natural-edge slabs. woodmagazine.com/naturaledge

To use, center your slab in the base, then shim under it as needed with wedges to prevent rocking. Secure the slab with scrap cleats screwed to the base (*previous page*). Attach a 2½" hose and shop vacuum. Rout back and forth, taking about a ⅛"-deep maximum cut, and sliding the carriage along the base until you've worked the entire slab. Increase the depth and make another series of cuts, repeating until the face is flat.

Remove the cleats and wedges, flip the slab over, and secure with the cleats again (no shims needed this time). Then rout to either a flat surface or to a desired thickness. Once you've flattened both faces, sand away the router marks with a random-orbit sander equipped with a 60- or 80-grit disc. Then follow up with 100-, 150-, and 180- or 220-grit discs for a flawless surface.

Our setup, using a typical 12-gallon shop vacuum, collected about 90 percent of the chips and nearly all of the dust. Your results could vary. Adding a chip separator between the dust port and vacuum will collect most of the debris, and prevent choking the vacuum's filter.

▶Learn how to make a waterfall joint on a natural-edge slab. woodmagazine.com/waterfall

A few tips for best results

▶**Use a powerful plunge router.** We prefer a 3-hp router so we can make deeper cuts without taxing the motor, but a 2¼-hp router will work fine if you take shallow cuts.

▶**Use a wide bit.** We recommend using a flat-bottom mortising or dado bit at least 1½" in diameter. Our favorite is the Infinity Cutting Tools 2" Mega Dado and Planer Bit [**Sources**].

▶**Add an extension.** If the combination of your router's plunge depth and bit length cannot reach the slab from the carriage, add a collet extender [**Sources**].

Sources:

Conveyor brush: 2" × 6' conveyor strip brush, no. 7372T11, $69.17; 2⁷⁄₁₆" × 3' (right-angle) conveyor strip brush, no. 7372T15, $37.71; McMaster-Carr, 630-833-0300, mcmaster.com.
Dust port: 2½" dust port, no. 42137, $5.99, Rockler, 800-279-4441, rockler.com.
2" dado and planer bit: no. 52-506, $90, Infinity Cutting Tools, 877-872-2487, infinitytools.com.
Collet extender: no. RXX-001, $64.95, Infinity Cutting Tools.

▶Need a plunge router? Read reviews from our editors as well as readers. woodmagazine.com/routerreviews

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

Drill Joinery

These proven methods yield joints ranging from purely practical to fun and fancy without sacrificing strength.

Right-angle brace

Screws reinforce butt joints better than almost any other form of joinery. A right-angle brace keeps the workpieces at a 90° angle.

Screws:
As simple as it gets

How it works

Drill pilot holes fully through one workpiece and partially into the mating workpiece, then connect the two with screws.

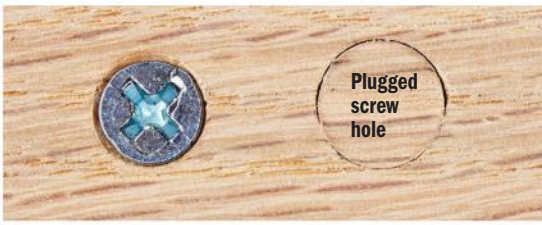
Pros

- Easy and quick
- Costs only pennies per screw
- Vast choices of readily available screw types and sizes
- Pair with dadoes, grooves, or rabbets for almost foolproof joint alignment
- Exterior-use coated screws available
- Wood plugs can be used to conceal screwheads.

Cons

- Visible screwheads can detract from a project's appeal.
- Lack of a pilot hole, or one that's too small, can cause the screw to split the wood

- How to choose and use wood screws. **woodmagazine.com/screws**



A countersinking bit (*top*) creates perfect pilot holes for flathead wood screws, with a countersink for the screwhead. Drill a little deeper to create a counterbore to accommodate a screw-hiding wood plug.

- Read reviews of countersinking bits and other drilling accessories. woodmagazine.com/drillbits

Pocket screws: A (mostly) hidden connection

How it works

Clamp a jig with angled guides to the workpiece, and use a stepped drill bit to bore a counterbored pilot hole with a shoulder for the panhead screw to rest against. Then connect the two pieces with screws.

Pros

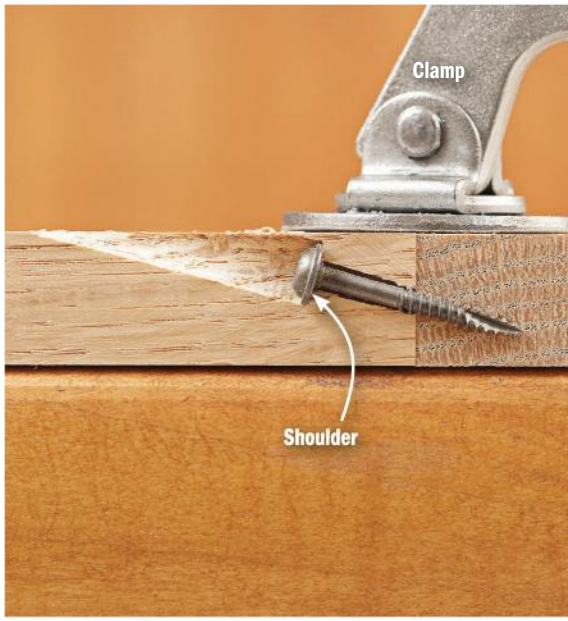
- Easy and quick
- The pockets can be concealed (typically on the least visible surfaces of the project).
- Multiple sizes of drill guides and screws readily available
- Exterior-use coated screws available

Cons

- Requires a jig costing from $20 to $225
- If visible, pockets can detract from a project's appeal.

▶Read reviews of pocket-hole jigs. woodmagazine.com/pocketholejigs

A pocket-hole jig guides the bit to create angled pilot holes. The best jigs either hold the workpiece or clamp to it for drilling.



A cutaway view of a pocket hole shows the angle the screw takes into the mating workpiece. The shoulder stops the panhead screw at the proper depth.

Dowels: Seen or unseen, they require great precision

How it works

Drill mating holes in workpieces, typically using a jig to guide the bit, then glue in wood dowels of the same diameter.

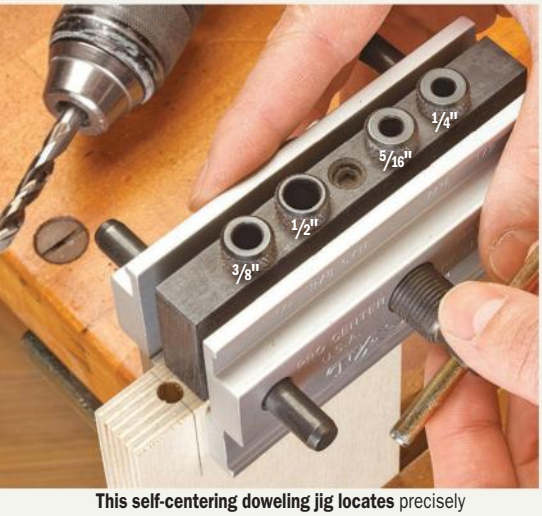
Pros

- Precut short dowels and dowel rods are readily available in birch and poplar in common fractional diameters; other species are available, typically through woodworking-specific retailers.
- Dowels can be hidden for a fastener-free look, or exposed on their ends as a design element.
- Jigs, especially self-centering models can help you achieve consistently precise spacing across each workpiece's thickness.

Cons

- Precise alignment of mating holes is critical; even slightly misaligned holes will mess up a joint.
- Requires a jig, costing from $20 to $250

▶Read reviews of doweling jigs. woodmagazine.com/doweljigs



This self-centering doweling jig locates precisely positioned dowel holes and can drill holes of four different diameters.

A single-sided doweling jig locates holes a fixed distance from a workpiece edge. This works great, providing you reference all holes from the same surfaces.

With a tap from a mallet, dowel centers mark the centerpoints for drilling holes in the mating workpiece.

Mortise and tenon: Tried and true for centuries

How it works

Form a mortise in one workpiece by drilling overlapping holes and chiseling the mortise square. Then, with a tablesaw, bandsaw, or hand tools, you cut a matching tenon on the other piece.

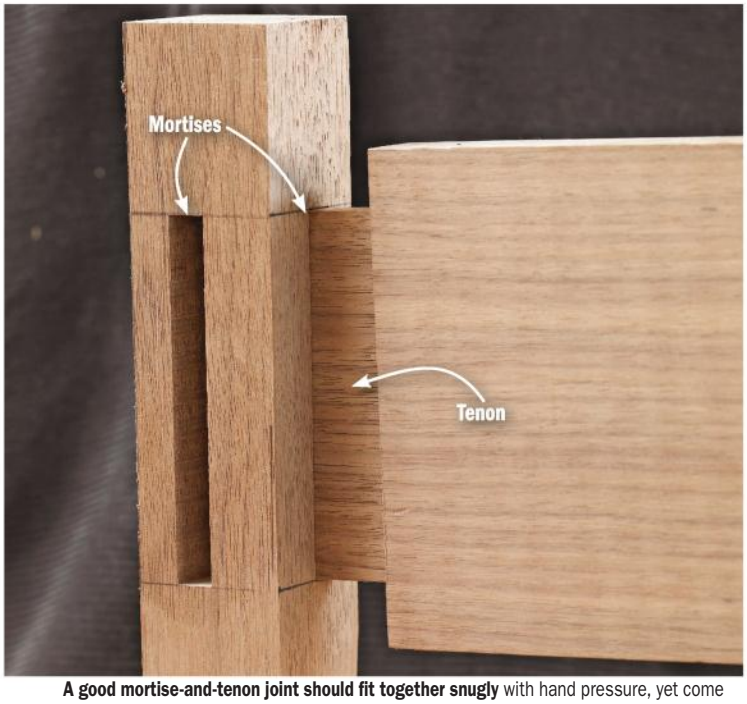
Pros

- Considered the strongest joint in woodworking
- Using a doweling jig ensures alignment of overlapping holes to create precise mortises.
- Uses common twist or brad-point drill bits you already own
- Should you mistakenly make a mortise oversize, you can size the tenon to fit.
- You can also make loose tenons—which fit into mortises on both workpieces—by routing round-overs along both edges of stock. This way, you can leave the mortise ends round.

Cons

- Requires skill gained through practice
- After drilling the holes, you still need to clean up the mortise with a chisel.

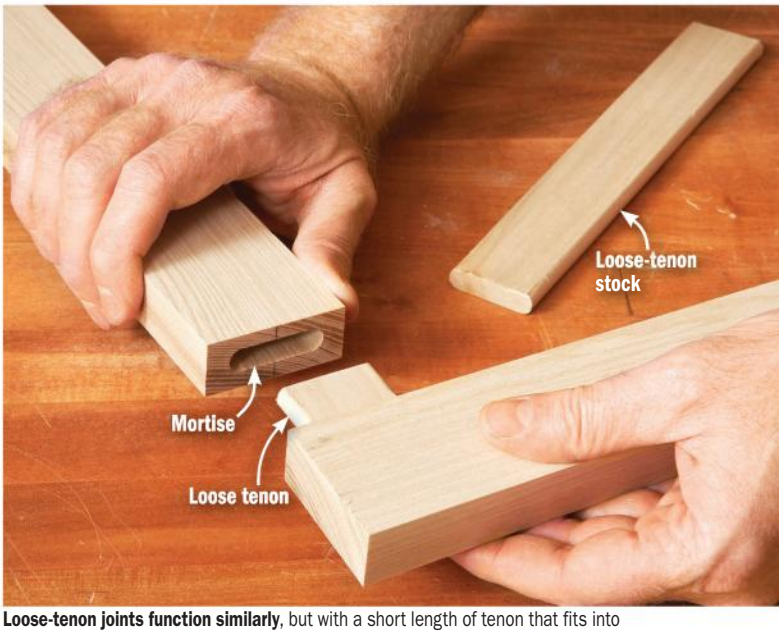
- Download a free article about different ways to create mortise-and-tenon joints. woodmagazine.com/mt4ways



A good mortise-and-tenon joint should fit together snugly with hand pressure, yet come apart with moderate pulling force prior to gluing.

Drill out a mortise with a series of overlapping holes made with a doweling jig.

Flatten and smooth the mortise walls with a chisel. Take care to hold the chisel 90° to the workpiece to ensure a mortise with square walls.



Loose-tenon joints function similarly, but with a short length of tenon that fits into mortises on both mating workpieces.

Miller dowels: An easy, can't-miss fit

How it works

A multi-tiered bit drills a stepped hole through mating workpieces that perfectly fits these unique dowels.

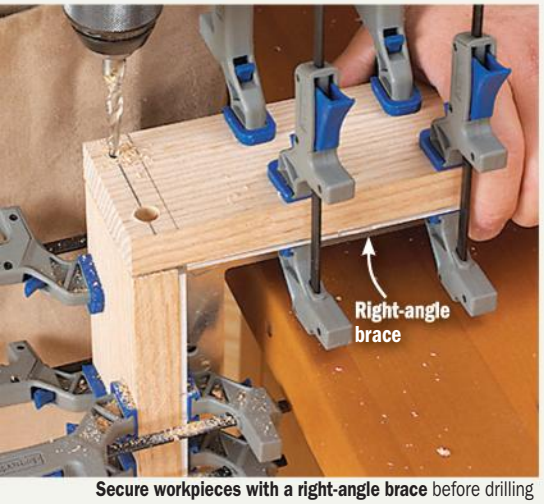
Pros

- You don't need a guide to drill the holes.
- Dowels come in three sizes and are available in birch, oak, cherry, and walnut.
- Easy to use: Drill the hole, add glue, and tap in the dowel.
- You can highlight the exposed dowel end as a design feature, especially when using contrasting wood species.

Cons

- A starter kit, with a bit and 50 or 100 dowels, costs $25 to $35.
- Additional dowels cost 19¢–43¢ apiece.
- If you wobble the drill while drilling, the oversize hole will not tightly fit the dowel.

- Read reviews of the Miller dowel system. woodmagazine.com/millerdowel



Secure workpieces with a right-angle brace before drilling with the Miller bit. Hold the drill at 90° to ensure holes are centered on the mating workpiece.

Here's a stepped Miller dowel ready to be driven home in its matching hole. During assembly, seat the dowel as deep as it will go, then trim the end flush.

A finished Miller dowel joint, crafted with the stepped bit and walnut dowels (oak dowels also shown).

Beadlock: A no-chisel mortise-and-tenon method

How it works

Use a jig to drill overlapping holes to form mortises in mating workpieces. Then glue in a tenon formed with the matching profile.

Pros

- Easy to do—just like drilling dowel joints
- More gluing surface than a typical loose mortise-and-tenon joint makes it stronger.
- Concealed joints improve a project's appearance.
- You can purchase a router bit ($52) to make your own tenons.

Cons

- Requires a kit costing from $30 to $130
- Birch tenon stock costs $9–$10 for packs of 15–25, depending on thickness.
- Precise alignment of mating mortises is critical; even slightly misaligned mortises will mess up a joint.

Produced by **Bob Hunter**

- Read reviews of the Beadlock jigs. woodmagazine.com/beadlock

Drill the Beadlock mortise with a series of overlapping holes using the jig and included bit. Repeat for the mating workpiece.

Beadlock tenons look like stacked dowels, but are routed from a solid piece of wood. They fit perfectly into mortises of the same shape.

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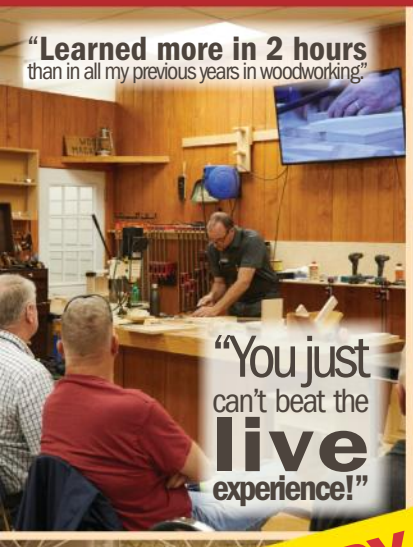

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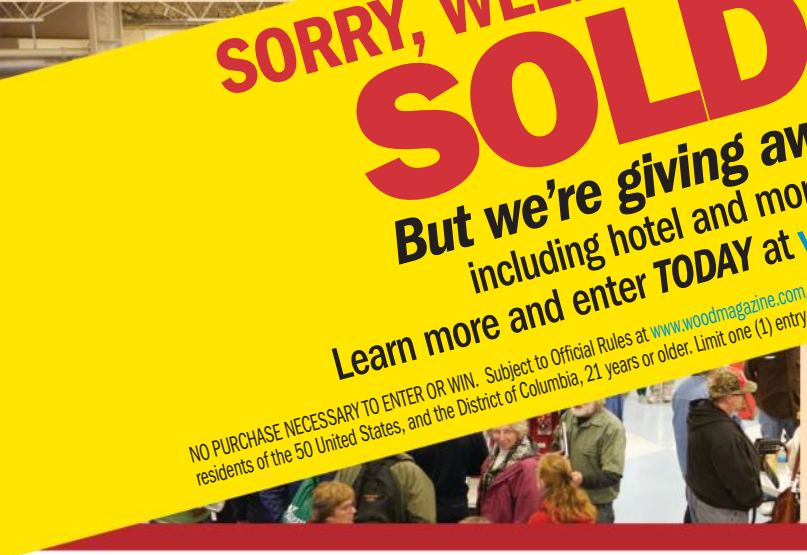

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The (Mostly) Cordless Workshop

Advancements in battery and motor technology are leaving outlets empty all over the shop.

For convenience and portability, there's no beating cordless tools. But do they have enough power and endurance to get you through the toughest woodworking jobs? More and more, the answer to that question is "yes." To be fair, cordless tools can't replace most shop machinery, such as planers, jointers, drill presses, and bandsaws—yet. But with one battery-powered tablesaw already on the market, it seems almost anything is possible.

The downside? Battery-powered tools cost 20–60 percent more compared to equivalent corded tools. But, buying bare tools after you get a few battery packs makes that cost less of a hurdle. (Most of the cost with cordless tools lies in the batteries.)

We've tested countless battery-powered tools in the *WOOD*® magazine shop over the years—including some you might never need for woodworking, but would appreciate nonetheless. So let's take a look at which cordless tools you should consider adding to your shop.

Lithium-ion battery packs range in size from 1.5 to 9 amp-hours (Ah). The more amp-hours, the more run time, weight, and cost.

Recent advancements in cordless tools

Lithium-ion rules the day. Nearly all new battery-powered tools run on lithium-ion (Li-Ion) packs. This chemistry delivers longer run time, faster charges, lighter weight, and the ability to hold a charge longer while sitting idle, compared to the nickel cadmium (NiCd) and nickel metal hydride (NiMH) batteries of a decade ago. Some manufacturers still make original-chemistry packs for those older tools, but they're getting more difficult to find each year. So if you haven't upgraded to Li-Ion tools, it makes sense to do it the next time you need to replace old battery packs. (A few manufacturers make Li-Ion packs that work with older NiCd tools.)

Brushless motors. Compared to carbon-brushed motors (the standard for decades), brushless designs make possible smaller and lighter tools with greater efficiency (longer battery run times) and longer tool life. This technology also aided the development of high-demand cordless-tool categories, such as cordless 10" and 12" mitersaws, 7¼" circular saws, two-knife power planers, and the previously mentioned tablesaw.

Brushless motors add 20–50 percent more to the tool cost compared to brushed motors. So, for the near future, there will still be room in the market for brushed-motor tools simply because of their lower prices.

Higher battery capacities. A battery's amp-hour rating equates to the amount of "gas" in a car's tank: more amp-hours equal more run time per charge. In the past year or so, we've seen 18- and 20-volt packs with 5-, 6-, and even 9-amp-hour ratings hit the market (photo *above*). Higher capacity adds weight—and cost—to batteries, so smaller packs still make sense in a wood shop. And most batteries recharge in less than an hour, with some as quickly as 30 minutes, so you won't have to wait long for a fresh pack.

Double the power. Several manufacturers now make tools that use two identical battery packs simultaneously to achieve twice the power and/or run time. Makita has a few dozen tools that pair 18-volt packs to create 36 volts of power—no need to buy into a new battery platform. Other tool companies have dedicated 36-volt (or larger) battery platforms for high-demand tools.

Multi-voltage packs. DeWalt's FlexVolt battery packs work on two platforms of tools. They power the 60-volt line of tools that share the FlexVolt branding, and automatically switch to work on their 20-volt tools (delivering longer run times).

Chargers with room to spare. Multi-pack and multi-voltage chargers, available in many brands, increase your charging flexibility while reducing the number of outlet-hogging chargers in your shop.

Longer warranties. The number one complaint about cordless tools from *WOOD* readers has always been the cost of replacing battery packs. Although some manufacturers still back their tools and batteries for a year or two, others now offer warranties of 20 years (Rockwell) and lifetime battery replacement (Ridgid).

Despite marketing claims, 20-volt lithium-ion batteries essentially equal 18-volt batteries in terms of power. Each cell outputs 3.6 volts of power, so five cells linked together inside a battery pack equals 18 volts of output. But some manufacturers claim a brief output of 20 volts with a fully charged five-cell pack. That's why those packs say "20 volts max," or something similar.

A battery "platform" is simply a battery configuration used to power tools within a brand. For example, Bosch's lineup of 18-volt lithium-ion tools is a platform. These tools and batteries are usually not compatible with other platforms.

Multipack chargers, such as this Ryobi, charge packs sequentially, then slip into "sleep" mode, monitoring occasionally to maintain a full charge.

Cordless tools every woodworker should have

▶Choose your battery platform with an eye toward future expansion. Research other tools on the same platform that you may want to acquire later.

Even if you're not sure how much you'll use the four tools shown *above*, consider buying them in a combo kit rather than getting each at separate times. You'll save money with a kit, get two (or more) batteries, and find yourself using them more than you think.

▶Drill/driver. If possible, choose a model with a ½" chuck (rather than ⅜"), so you can use a greater range of drill bits and accessories. Most manufacturers offer both compact and full-size drills in the 18/20-volt platform; we prefer the compact models in a shop because of their lighter weight and smaller size. And 12-volt drill/drivers offer even more of a size advantage, yet still have all the power you'll need to build woodworking projects. Most have ⅜" chucks, but you'll love their nimbleness.

▶Impact driver. This tool is our first choice for driving screws. That's because it delivers about four times the torque of a comparable cordless drill, and eliminates the whiplash-like jerk common with drills when a fastener seats. Impact drivers come with quick-release chucks, so you can use only driver bits and accessories with ¼" hex shanks. Look for impact-rated driver bits that can withstand that increased torque.

▶Circular saw. The 18/20-volt saws have the clear advantage here, with higher torque and larger blade sizes than the few 12-volt saws on the market. Most come with 6½" blades—a nice size capable of cutting 2× and 8/4 lumber—but a 7¼" saw provides even more capacity and blade choices.

▶Jigsaw. You'll really appreciate not having to avoid a cord when making curved cuts. All cordless jigsaws use the preferred T-shank blades, giving you the most blade choices. And the best saws have guides to keep the blades tracking true. Both barrel-grip and top-handle versions work well; choose the one that feels most natural in your hand.

▶Get a better understanding of how an impact driver works. woodmagazine.com/impactdriver

▶Read reviews of cordless tools. woodmagazine.com/cordless

▲Get plans for this cordless-drill rack. woodmagazine.com/drillstation

Fully capable tools for the outlet-impaired shop

▶**Trim router.** A cordless trim router means you can just grab it and go. We like having more than one on hand, each equipped with a commonly used bit, such as a small roundover or chamfer. And remember: You don't need to pay for a battery for each one. Buy them bare, and simply pop a battery into the one you need.

▶**Mitersaw.** The power and capacities of these saws now rival those of the biggest corded models—perfect for building outdoor structures.

▶**Track saw.** These hyperaccurate circ saws work great at cutting up sheet goods and wide lumber with precision. You'll never worry about a cord catching on the rail.

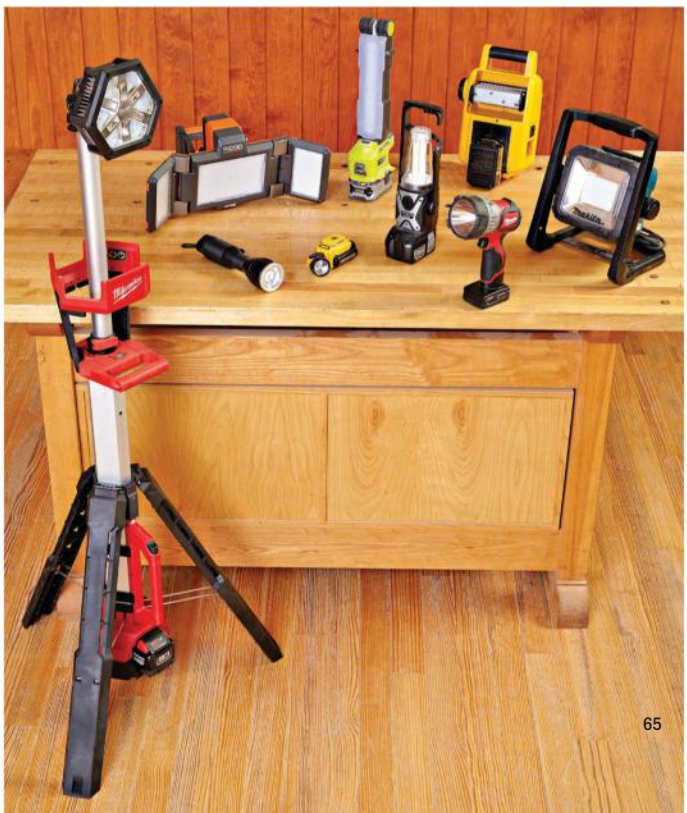
▶**Radio.** Built to withstand the dust and abuse of a job site, these also make sweet music in a wood shop. Get one with Bluetooth capability to play music from your smartphone or tablet. Some models charge batteries, but most do not.

▶**Tablesaw.** DeWalt's FlexVolt 8" saw is the only model on the market as of this writing. It's more powerful than we'd have thought, able to smoothly rip 2× stock with impressive run time, even when cutting hard woods. At about the size of a job-site saw, it also brings those cut-capacity limitations.

▶**Nailers.** You'll enjoy not listening to a loud air compressor, but the slight delay between trigger pull and driven fastener takes some getting used to. Although there are many sizes and types of cordless nailers, 16-, 18- and 23-gauge models serve a woodworker best.

▶**Lights.** Nearly every shop could benefit from more lights, especially portable task lighting. Most cordless kits come with a flashlight, but if not, get an LED model (*below*) on your platform. Some have stands, clamps, or hooks for easy positioning.

▶Recycle your old tool batteries. call2recycle.org



Luxuries worth adding to your platform

Vacuum. Portability makes it great for sucking up dust and small debris, wherever it might be.

Power planer. These are great for trimming doors to fit a space; also for flattening turning blanks prior to attaching a faceplate.

Oscillating multi-tool. You might not use one often, but when you need it for trimming or sanding in tight spaces, very often nothing else will do the job.

Right-angle drill/impact. These work great for spaces too tight for a normal drill.

Angle grinder. Great for metal work, yes, but with a wood-cutting blade, use this for sculpting and shaping chair seats.

Fan. They hang or clamp or sit about anywhere you need relief from the heat—or to blow dust away from you.

Caulking gun. Power makes it possible to lay a smooth, seamless bead without having to fight the globs that invariably happen with a ratcheting hand-powered gun.

Inflator. Need to air up a flat tire? No need to lug out a compressor and hose.

Reciprocating saw. You likely don't do a lot of demolition (hopefully) in your shop, but this saw also works great at cutting PVC and metal pipe.

Outdoor power equipment. Keep your great outdoors tidy with a string trimmer, hedge trimmer, blower, and chainsaw (*bottom left*). The first three can completely replace your gas- or electric-powered lawn tools, with power that will surprise you. A cordless chainsaw works best for trimming and light cutting, but proves very capable and far quieter than gas-powered models.

Heated jackets/coats. Some use 12-volt packs, and some 18 or 20 volts (*right*), but all produce hours of heat you'll appreciate on cold days.

Produced by **Bob Hunter**

Mil-spec A-10 "Warthog"

This model, which we think you'll rate a "10," honors an Air Force mainstay with 40-plus years in service.

Not the fastest, and certainly not the sexiest aircraft (although our version looks great in maple and cherry), the A-10 Thunderbolt, nicknamed "Warthog," proves its worth when called upon for close-air support.

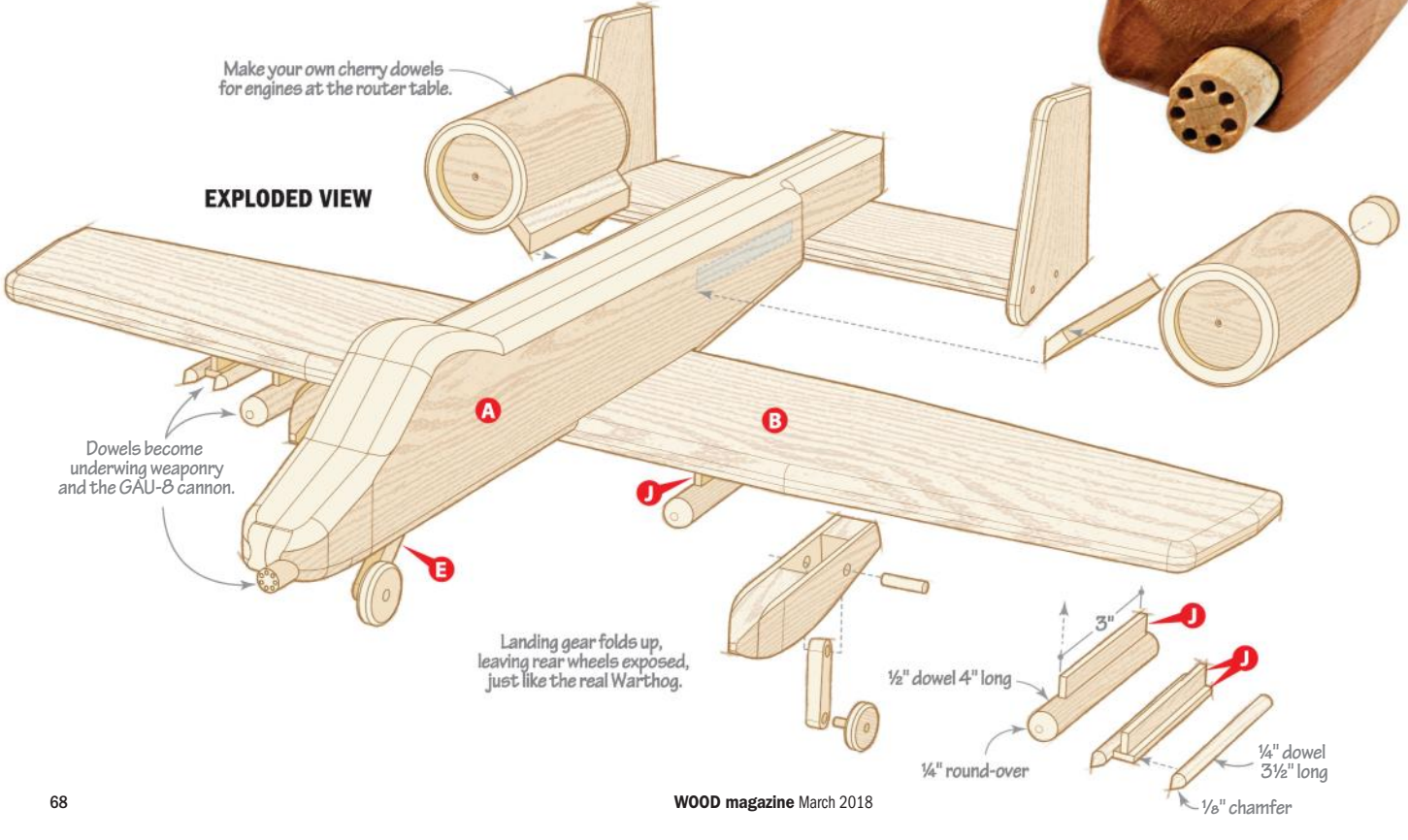


Image courtesy of FI-AEROWEB

DIMENSIONS: 23" W × 20⅜" D × 6⅛" H

Approximate materials cost:

0.000001%
of actual A-10

1/30 scale

7th
in our Mil-spec Collection

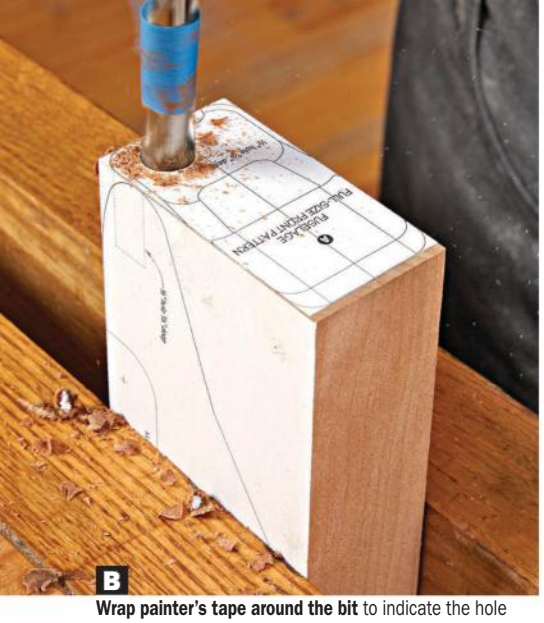
Tip! *Find pointers for using and removing spray adhesive and double-faced tape.* *woodmagazine.com/stickysolutions*

Form the fuselage

1 Cut the fuselage halves (A) to size [**Materials List**]. Enlarge and attach a copy of the **Fuselage Front Side Pattern** [*page 73*] to one fuselage half. Drill the hole, and form the mortise below the cockpit [**Photo A**]. Scrape and sand away the pattern.

2 Glue the fuselage halves together, with the mortise to the inside, and the edges flush. Extend the hole in the mortise ¼" into the unmortised half of the fuselage.

Remove the bulk of the waste with a 1" Forstner bit, then chisel straight the ends and edge of the mortise.



Wrap painter's tape around the bit to indicate the hole depth. A brad-point bit works best, as it won't wander as you start drilling.

Set a dado blade to cut to the horizontal lines on the pattern and make a series of cuts to form the dadoes. Then bandsaw the remaining profile.

▶The Warthog's GAU-8 Avenger cannon can fire 3,900 beer-bottle-size shells in 60 seconds.

3 Apply a complete **Fuselage Side Pattern** and the **Fuselage Front-view Pattern** and drill the hole in the nose [**Photo B**]. Then cut the dado and rabbet for the wing and horizontal stabilizer [**Photo C**].

4 Adhere the **Fuselage Top Patterns** flush with the ends of the fuselage. Cut the top profiles [**Photo D**], sand the fuselage smooth, and rout the round-overs.

5 Apply the **Nose Gun Full-size Pattern** to the end of a ½" dowel and drill the holes. Glue the gun in place.

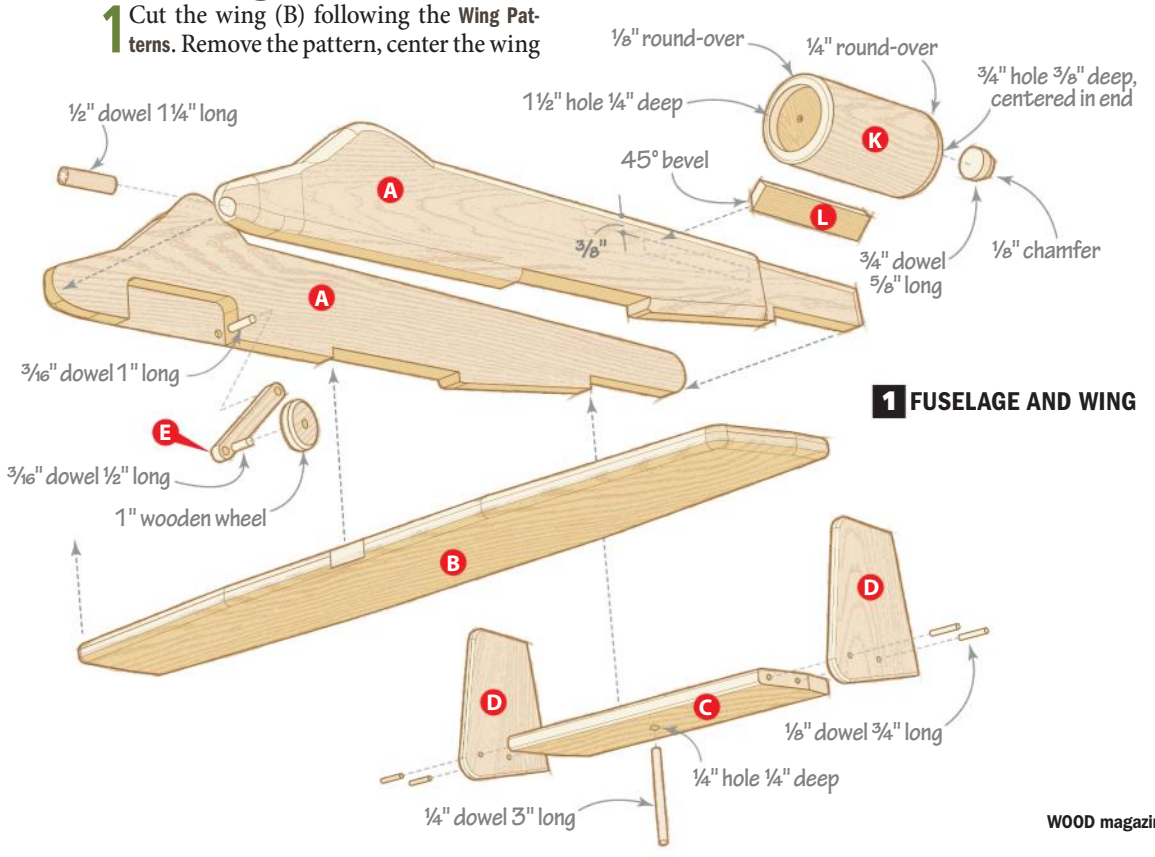
Give it wings

1 Cut the wing (B) following the **Wing Patterns**. Remove the pattern, center the wing in the dado in the fuselage, and mark the wing along each edge of the fuselage. Round over both faces of the wing edges, stopping at these marks on the top face only. Finish-sand the wing to 220 grit.

2 Shape the stabilizers (C, D) following the patterns. Assemble the tail [**Photo E**].

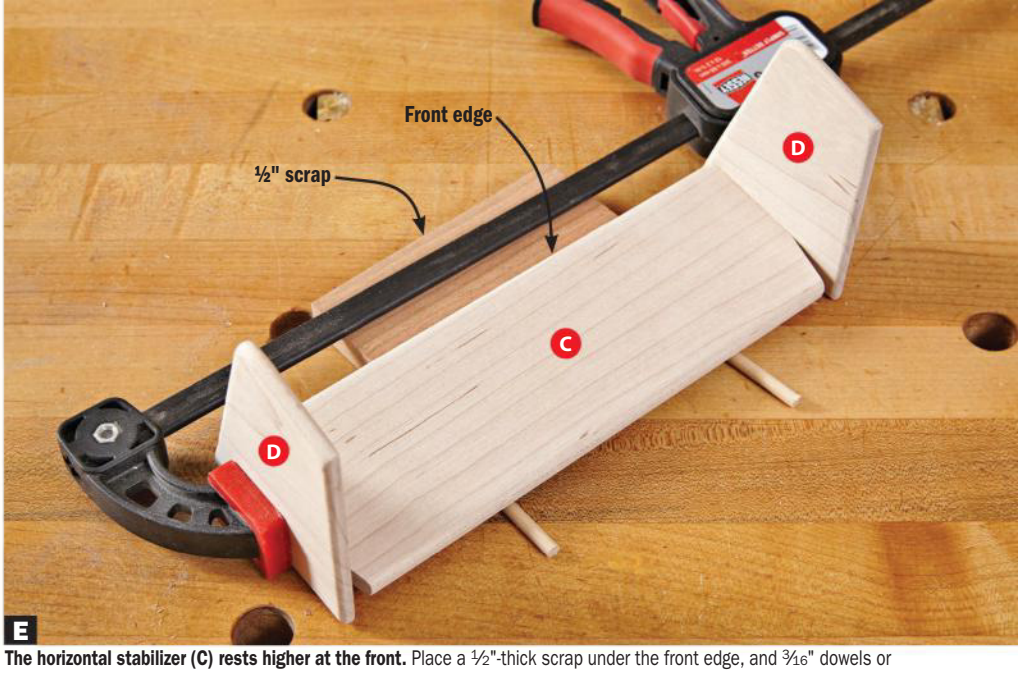
3 After the glue dries, extend the holes in the vertical stabilizers ½" into the horizontal stabilizer. Glue dowels in the holes, and cut and sand them flush.

Tip! *Make identical vertical stabilizers by adhering the blanks together with double-faced tape; then cut and sand both to shape, and drill the holes before separating them and rounding over the edges.*



1 FUSELAGE AND WING

Adhere a ¾"-thick scrap to the fuselage with double-faced tape to steady it while cutting the nose and tail profiles.



The horizontal stabilizer (C) rests higher at the front. Place a ½"-thick scrap under the front edge, and 3⁄16" dowels or scrap under the rear edge. Then glue the vertical stabilizers (D) in place.

Prepare for landing (gear)

1 Attach copies of the patterns for the landing-gear struts (E, F) to a ¼×⅜×12" maple blank. Drill the holes, then cut and sand the struts to shape. Remove the patterns and finish-sand, then set the rear struts aside.

2 Cut the dowels to secure the wheel to the front strut and the strut to the fuselage [**Drawing 1**]. Dry-fit the strut and wheel assembly in the fuselage and check that the wheel fits into the mortise. Then glue the wheel and its dowel in place. Apply a drop of cyanoacrylate (CA) glue to the hole inside the mortise and trap the front landing gear assembly with its dowel. Make sure the strut pivots and doesn't get glued in place.

3 Cut the nacelle sides and spacers (G, H, I) to size. Glue the parts together, flush at the ends and edges [**Drawing 2**]. After the glue dries, drill the holes [**Photo F**], and shape the nacelles following the patterns.

4 Glue the wheels and rear struts (F) to the nacelles [**Drawing 2**] as you did with the front wheel, making sure the struts pivot and that the nacelles are mirror images of each other.

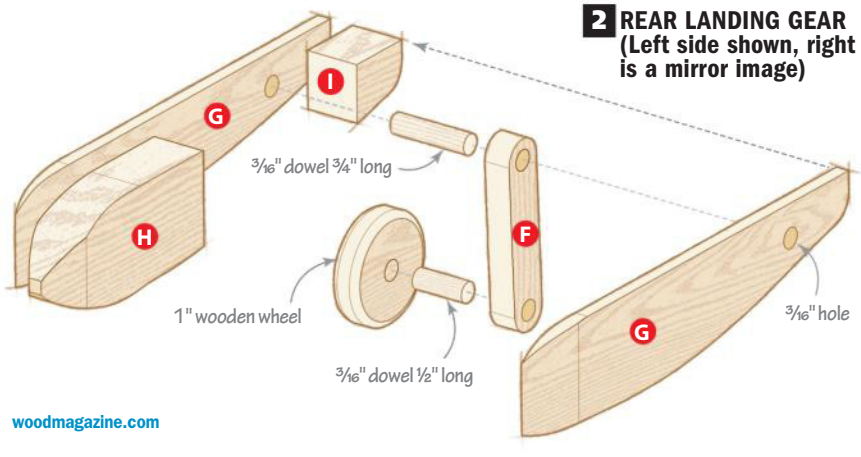
5 Cut the missile mounts (J) to size. Glue two pairs of them together to form T shapes [**Exploded View**].

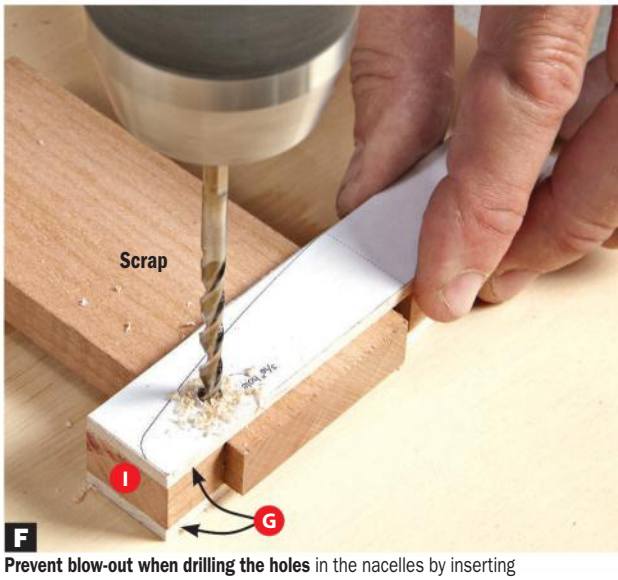
6 For the underwing armaments, rout ¼" round-overs on one end of ½" dowels, and sand centered points on one end of ¼" dowels [**Exploded View**]. Glue the armaments to the mounts (J). Then glue these assemblies and the rear landing gear (F–I) to the bottom of the wing, referring to the **Wing Patterns** for positioning. On the landing gear, note that the struts go to the inside and the wheels to the outside.

7 Glue the stabilizers (C/D) to the fuselage, centered. Then glue the wing (B) in place.

▶The rear wheels of a real A-10 remain partially exposed when retracted.

2 REAR LANDING GEAR (Left side shown, right is a mirror image)





Prevent blow-out when drilling the holes in the nacelles by inserting a scrap between the spacers (H, I).

G

Grip the engine (K) in a handscrew. Center a 1½" Forstner bit on the end and drill ¼" deep. Then drill the ¾" hole in the opposite end [**Drawing 1**].

H

Plane a flat on each engine with a couple of strokes from a block plane. Glue the square edge of an engine mount (L) to this flat on each engine, making a mirrored pair.

Add the engines

1 To make the engines, rout 1" round-overs on all four long corners of a 2×2×12" piece of cherry, leaving 1½" at each end square. Cut the engines from the blank. Round over the ends [**Drawing 1**], then drill the holes [**Photo G**].

2 Rout a ⅛" chamfer around each end of a 4" length of ¾" dowel. Cut a ⅝" length from each end and glue them into the rear of the engines (K) [**Drawing 1**].

3 Cut the engine mounts (L) to size, beveling one edge [**Drawing 1**]. Mount the engines [**Photos H, I**].

4 Drill the hole in the horizontal stabilizer (C) [**Drawing 1**] and cut a length of dowel, but don't glue it in. Finish-sand any areas needing it and apply a finish. We sprayed on three coats of aerosol lacquer.

▶When the GAU-8 cannon is removed from the aircraft for service, the A-10's tail section must be supported to keep the plane level.

I

Mask off the fuselage around the area where the engine mount (L) will go. Apply CA glue to the mount, then press the mount in place. Spray on an activator to speed the CA cure time. Remove the tape after the glue cures.

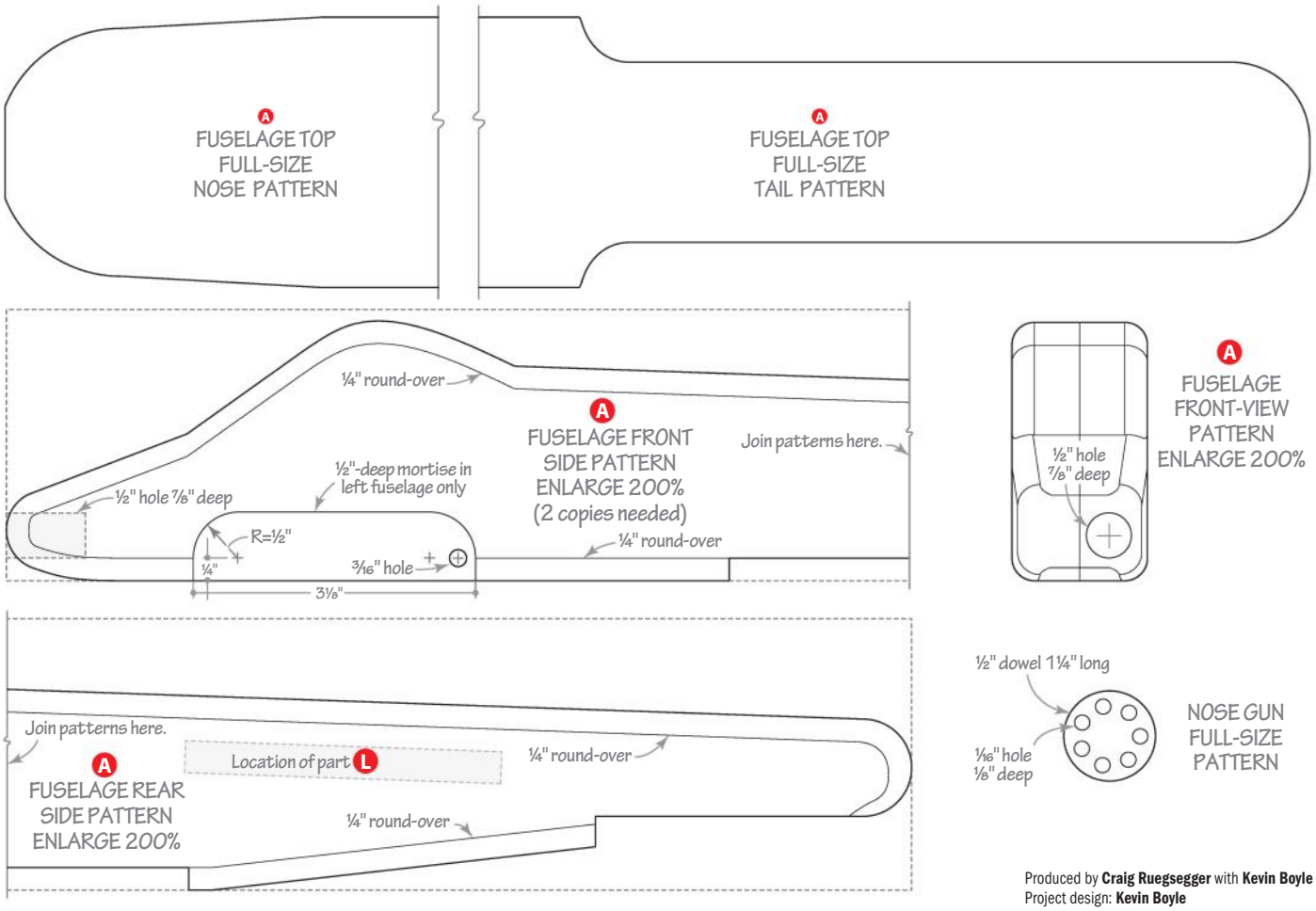
Build the rest of our Mil-spec series

Jeep and 37mm gun (issue 247, July 2017)
This nimble vehicle and light artillery piece performed with distinction in rugged terrain from WWII through Vietnam.

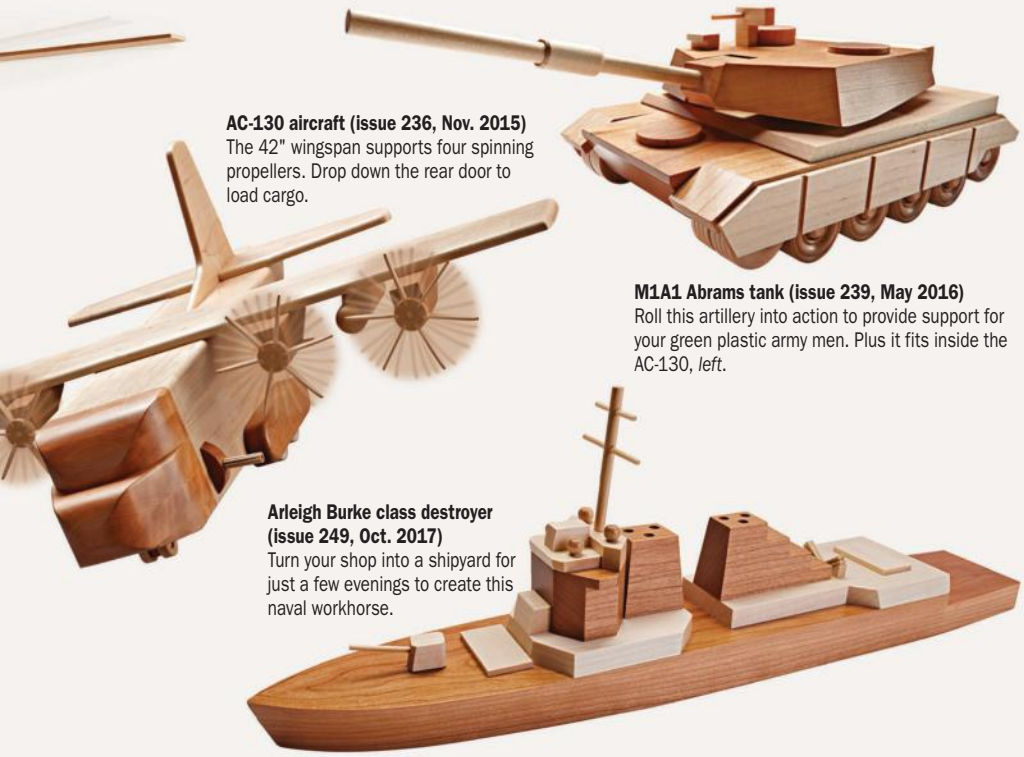
Chinook helicopter (issue 245, March 2017)
The rotors spin, and fold for storage, just like on the real thing. Drop down the rear door to access the spacious interior.

Iowa-class battleship (issue 243, Nov. 2016)
Patrol the waves of your living room floor with this stately warship, or anchor it atop the fireplace mantel.

A-10 "Warthog" Patterns



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



AC-130 aircraft (issue 236, Nov. 2015)
The 42" wingspan supports four spinning propellers. Drop down the rear door to load cargo.

M1A1 Abrams tank (issue 239, May 2016)
Roll this artillery into action to provide support for your green plastic army men. Plus it fits inside the AC-130, *left*.

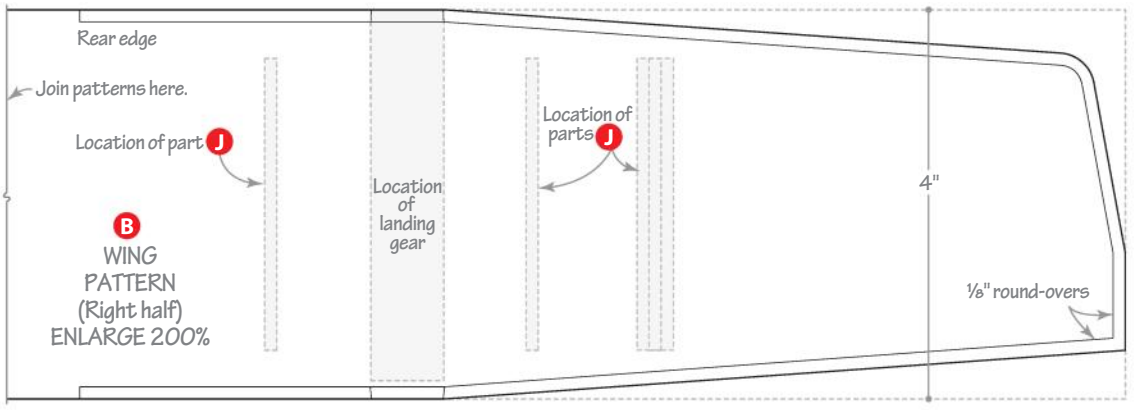
Arleigh Burke class destroyer (issue 249, Oct. 2017)
Turn your shop into a shipyard for just a few evenings to create this naval workhorse.

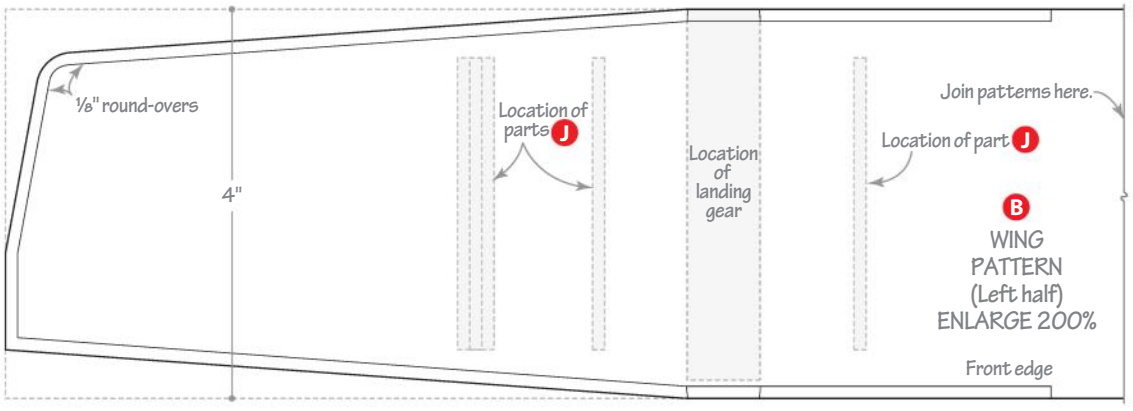
Materials List

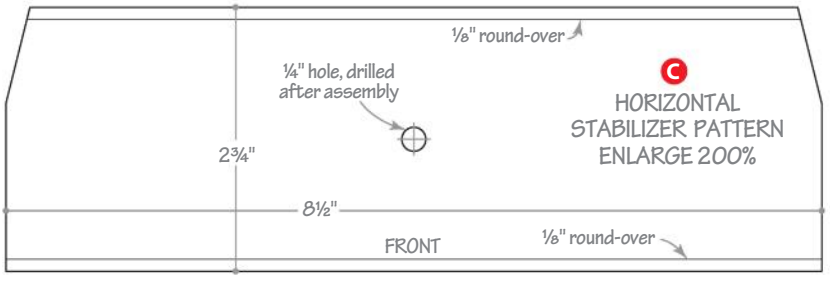
Part		FINISHED SIZE T	W	L	Matl.	Qty.
A	fuselage halves	¾"	3¼"	20"	C	2
B	wings	½"	4"	23"	M	1
C	horizontal stabilizer	⅜"	2¾"	8½"	M	1
D	vertical stabilizers	¼"	3"	4"	M	2
E*	front strut	¼"	⅜"	2⅝"	M	1
F*	rear struts	¼"	⅜"	1¾"	M	2
G	nacelle sides	⅛"	⅞"	4¾"	M	4
H	front spacers	½"	⅞"	2"	C	2
I	rear spacers	½"	⅞"	⅝"	C	2
J	missile mounts	⅛"	⅜"	3"	M	8
K*	engines	2" diam.		4"	C	2
L	engine mounts	¼"	⅝"	3½"	M	2

*Parts initially cut oversize. See the instructions.

Materials key: C–cherry, M–maple.
Supplies: ⅛×6", 3/16×6", ¼×24", ½×24", ¾×12" dowels; 1" wheels (3).
Blade and bits: Dado set; 1/16", ⅛", ¼", 1" round-over, 45° chamfer router bits; 1" and 1½" Forstner bits.
Source: This kit includes the dowels and wheels to construct one A-10 (no lumber). Kit no. RS-01174, $4.95, 888-636-4478, woodmagazine.com/a10kit.

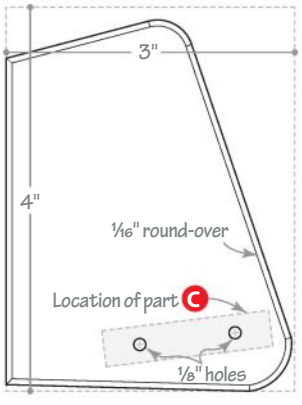




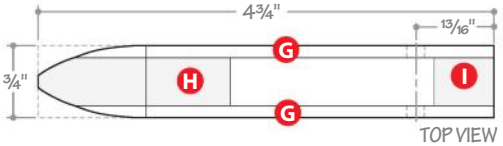


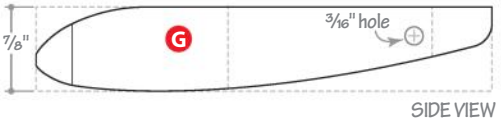
FRONT LANDING-GEAR
STRUT PATTERN
ENLARGE 200%

REAR LANDING-GEAR
STRUT PATTERN
ENLARGE 200%
(2 copies needed)



D
VERTICAL STABILIZER
PATTERN
ENLARGE 200%





NACELLE PATTERNS
ENLARGE 200%
(2 copies needed)

Two Simple Frames

Change the look of this frame with just a simple twist.

You'll get distinctly different looks from similar frame pieces, depending on how you orient them—flat or on edge. You'll also make good use of those offcuts in your scrap bin. The dimensions shown here nicely frame any 8×10" photo.

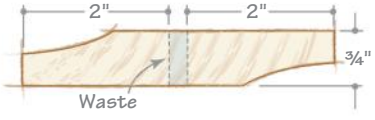
Rout the profile first

For the flat frame (*this page*), mill a ¾×4½×30" hardwood blank. For the deep frame (*next page*), start with a ¾×4½×24" blank. Using any raised-panel bit in your router table, rout a profile on both faces of each blank [**Drawing 1**]. Rout the profile in ⅛"-deep increments to avoid tear-out on your workpiece and stress on your router and bit. Then, rip the frame parts to final width [**Drawings 2a, 3a**].

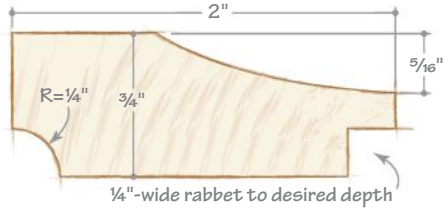
Next, rout a ¼" cove on each blank [**Drawings 2a, 3a**]. Measure the combined thickness of your glass or acrylic, mat board, and backer, and rout a ¼" rabbet of that depth.

FLAT FRAME

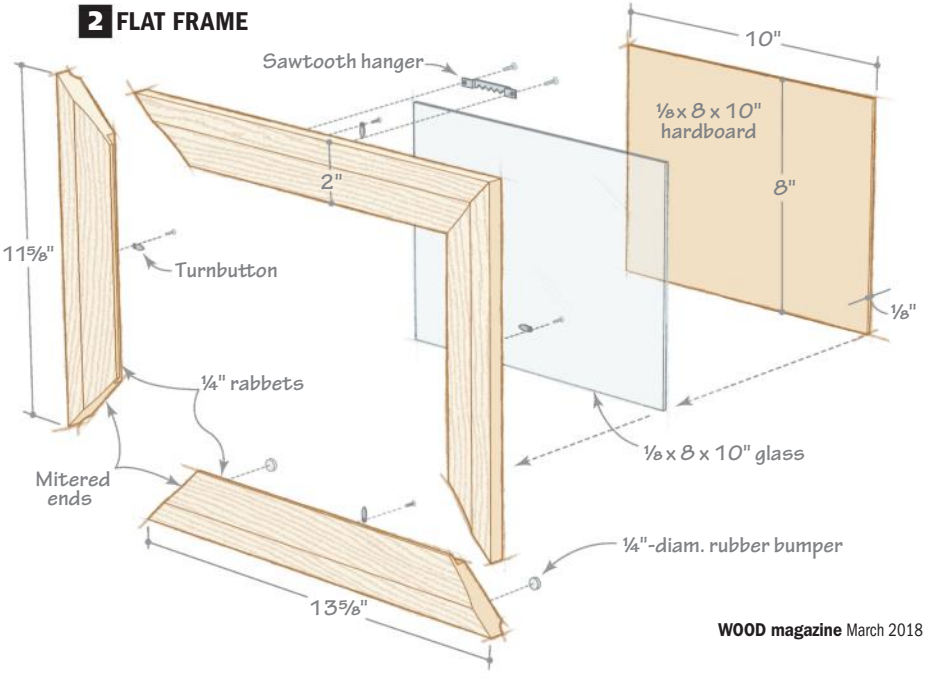
1 ROUTING AND CUTTING THE FRAME BLANKS



2a FLAT FRAME END VIEW



2 FLAT FRAME



DEEP FRAME

Cut the corner joints

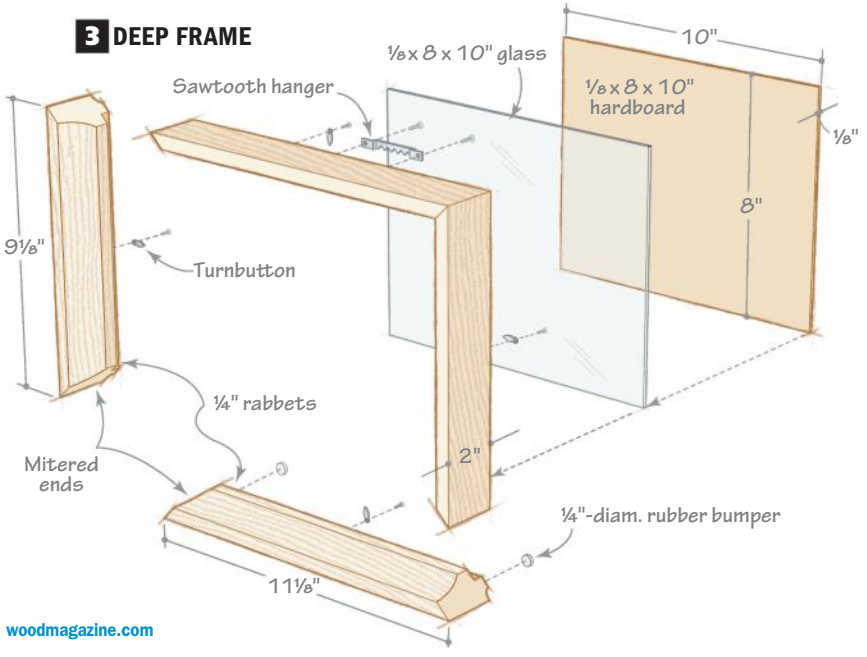
For the flat frame, miter the corners at 45° with the blank lying flat; for the deep frame, stand it on edge. Sand the pieces to 220 grit, then glue and clamp the frame. (We used a band clamp.) Apply stain, if desired, and topcoat. We used four coats of spray lacquer.

Cut the glass or acrylic, photograph, mat board, and backer to fit the rabbet. Install them in the frame and secure with four turnbuttons [**Source**]. Attach a sawtooth hanger to the top rail, and place adhesive rubber bumpers or felt pads on the bottom rail [**Drawings 2, 3**] so the hardware won't scuff your wall.

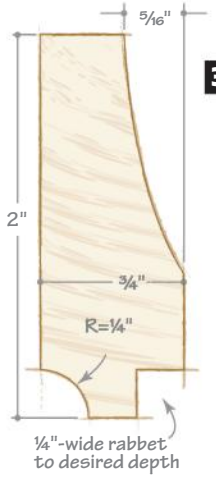
Source:
Turnbuttons: Pack of 8, no. 27912, $3.99, Rockler, rockler.com, 800-279-4441.

Produced by **Bob Hunter**
Project design: **Jeff Mertz**
Illustrations: **Lorna Johnson**

3 DEEP FRAME



3a DEEP FRAME END VIEW



Unbeatable mallets

A mallet can be an indispensible tool in a workshop, providing greater striking surface—and sometimes force—than a hammer, without (hopefully) marring your workpieces. We tried out a variety of mallets, and recommend these four.

Wood Is Good carver's mallet▶

12 oz mallet, no. 44495, $40; 20 oz mallet, no. 44479, $45

We like this tool for striking any type of chisel. Its durable urethane head delivers sufficient force without damaging the chisel, and the hardwood handle feels comfortable. We prefer the 20-oz version for most chisel work; the 12-oz mallet works best for more delicate work.

Rockler Woodworking and Hardware
800-279-4441, rockler.com

Rob Cosman mallet▲

No. 849314, $59.95

This is another great mallet for striking chisels. The resin-impregnated hard-maple head holds up well without denting, and its 12-oz weight feels just right for most joinery work. The handle is wrapped in what feels like athletic tape, and it adds grip, but we're not fond of the uncomfortable coiled cord-like wrap beneath the tape. We removed that and rewrapped the handle on ours for a more pleasing grip.

Woodcraft
800-225-1153, woodcraft.com

Vaughan 12 oz soft-face hammer▲

no. SF12, $17.45

You can find this no-nonsense hammer at most home centers and hardware stores for a reason: It just works well for many applications. We like it for tapping together project assemblies because the two faces—soft red rubber and harder yellow urethane—won't mar workpieces, yet provide good striking force. The traditional hickory handle fits most hands just right.

Vaughan Manufacturing
800-435-6000, vaughanmfg.com

Dead-blow mallet▲

Pittsburgh, 1 lb, no. 41796, $6; 1½ lbs, no. 68981, $7; 2 lbs, no. 41797, $8

These hardened synthetic mallets do a great job, whether assembling a project or machine, or knocking something into alignment. The loose shot pellets inside the head add mass for blows, yet absorb the impact well. We prefer the orange mallets to similar black ones because the black can sometimes leave marks on projects. Get a 1-lb mallet for almost any job, but consider a heavier one for bigger jobs, such as for installing cabinets or building outdoor structures.

Harbor Freight
800-423-2567, harborfreight.com

continued on page 81

Dovetailed clamps add a helping hand

Matchfit dovetail clamps, $39.95 per pair

These clamps solve so many problems, they're like full-time helpers in the shop. Here's how they work: Rout 14° dovetail slots (bit not included) into a board or panel, fit the F-style clamps into the slots, then clamp them to any surface where you need support. They work great at securing an auxiliary fence to a tablesaw rip fence, as shown *above*. They're also ideal for holding jigs in place (within reach of their throat depth) with no jaw interference. They have a throat depth of 2⅜" and jaw opening of 5¼".

—Tested by Bob Hunter, Tools Editor

MicroJig
855-747-7233, microjig.com

Take a shortcut to small tables

Coffee-table bases, from $130; End-table bases, from $150

If you struggle with creating mortise-and-tenon joints, but want to build attractive tables, try this end-around. Buy one of these kits, and all you need to build is a top. Whether for a coffee table or end table, each kit comes with four legs and aprons, precut with tenons and matching slots, as well as pocket holes for attaching the top. Assemble the base by bolting braces to the legs, as shown *right*. For the maple coffee-table kit, I found the legs and aprons needed only a light sanding with 180 grit, and the joints fit perfectly for a solid base.

—Tested by Bob Hunter

Classic Designs by Matthew Burak
800-748-3480, tablelegs.com

continued on page 84

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CENTRAL PNEUMATIC — SUPER COUPON

29 GALLON, 2 HP 150 PSI, CAST IRON VERTICAL OIL-LUBE AIR COMPRESSOR

SAVE $51

NOW $329.99

Customer Rating

$359.99

COMPARE TO SANBORN $381.81 MODEL: SLC1683066

ITEM 62765/61489/68127 shown

33364239

LIMIT 3 - Coupon valid through 5/9/18*

CHICAGO ELECTRIC POWER TOOLS — SUPER COUPON

12" SLIDING COMPOUND DOUBLE-BEVEL MITER SAW

SAVE $169

Blade sold separately.

• Laser guide

Customer Rating

NOW $129.99

$199.99

COMPARE TO KOBALT $299 MODEL: SM3055LW

ITEM 61969/61970/69684 shown

33500973

LIMIT 5 - Coupon valid through 5/9/18*

SUPER COUPON

FREE WITH ANY PURCHASE

PITTSBURGH 1" x 25 FT. TAPE MEASURE

COMPARE TO KOMELON $6.98 MODEL: L4825INV

• Thumb Lock
• Rubber Wrapped Case

LIFETIME WARRANTY

ITEM 69030/69031 shown

33359762

LIMIT 1 - Cannot be used with other discount, coupon or prior purchase. Coupon good at our stores, HarborFreight.com or by calling 800-423-2567. Offer good while supplies last. Shipping & Handling charges may apply if not picked up in-store. Non-transferable. Original coupon must be presented. Valid through 5/9/18. Limit one FREE GIFT coupon per customer per day.

SUPER COUPON

20% OFF ANY SINGLE ITEM

33353627

LIMIT 1 coupon per customer per day. Save 20% on any 1 item purchased. *Cannot be used with other discount, coupon or any of the following items or brands: Inside Track Club membership, Extended Service Plan, gift card, open box item, 3 day Parking Lot Sale item, compressors, floor jacks, sales, saw mills, storage cabinets, chests or carts, trailers, trenchers, welders, Admiral, Ames, Bauer, Cobra, CoverPro, Daytona, Earthquake, Fischer, Hercules, Icon, Jupiter, Lynxx, Pouten, Predator, Tailgator, Viking, Vulcan, Zurich. Not valid on prior purchases. Non-transferable. Original coupon must be presented. Valid through 5/9/18.

Bauer — SUPER COUPON

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

Customer Rating

• 450 in. lbs. of torque
• 1.5 amp hour battery
• Weighs 3.4 lbs.

NEW

NOW $64.99

SAVE $34

$74.99

COMPARE TO PORTER-CABLE $99 MODEL: PCC601LB

ITEM 63531

33813050

LIMIT 4 - Coupon valid through 5/9/18*

CENTRAL MACHINERY — SUPER COUPON

14" OSCILLATING SPINDLE SANDER

Customer Rating

SAVE $64

NOW $99.99

$139.99

COMPARE TO ROCKWELL $164.98 MODEL: RK9011

ITEM 62146/69257 shown

33816092

LIMIT 5 - Coupon valid through 5/9/18*

HaulMaster — SUPER COUPON

• 350 lb. capacity

STEP STOOL/ WORKING PLATFORM

Customer Rating

NOW $19.99

SAVE 65%

$29.99

ITEM 62515 66911 shown

COMPARE TO GPL $57.55 MODEL: H-21

33820285

LIMIT 7 - Coupon valid through 5/9/18*

CENTRAL MACHINERY — SUPER COUPON

8", 5 SPEED BENCHTOP DRILL PRESS

SAVE $53

Customer Rating

NOW $49.99

$67.99

COMPARE TO BUFFALO BLACK $102.99 MODEL: DPSUL

ITEM 62520/62390/60238 shown

33830307

LIMIT 4 - Coupon valid through 5/9/18*

CENTECH — SUPER COUPON

Customer Rating

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

SAVE 57%

NOW $29.99

$49.99

COMPARE TO SCHUMACHER ELECTRIC $69.99 MODEL: SE-1250

ITEM 60581 60653 shown

33832646

LIMIT 4 - Coupon valid through 5/9/18*

CENTRAL PNEUMATIC — SUPER COUPON

23 GAUGE PIN AIR NAILER

Customer Rating

WE CARRY A FULL LINE OF NAILS

NOW $19.99

COMPARE TO MASTERFORCE $71.19 MODEL: 2085003

SAVE 71%

$24.99

ITEM 60241/60664/68022 shown

33835868

LIMIT 7 - Coupon valid through 5/9/18*

U.S. GENERAL — SUPER COUPON

Customer Rating

26", 4 DRAWER TOOL CART

• 6200 cu. in. of storage
• 580 lb. capacity
• Weighs 97 lbs.

NOW $99.99

SAVE $79

$149.99

ITEM 61634/61952 64096/95659 shown

COMPARE TO HUSKY $179 MODEL: HOUC3304B10

33843204

LIMIT 3 - Coupon valid through 5/9/18*

BADLAND Battle Tested — SUPER COUPON

2500 LB. ELECTRIC WINCH WITH WIRELESS REMOTE CONTROL

Customer Rating

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

Voted Best Winches

NOW $49.99

$79.99

COMPARE TO SUPERWINCH $179.99 MODEL: 1125220

SAVE $130

ITEM 61840/61297/63476/61258 shown

33844349

LIMIT 4 - Coupon valid through 5/9/18*

PORTLAND — SUPER COUPON

14 AMP, CHIPPER SHREDDER

• Handles limbs up to 1-1/2" diameter
• Dual action 7" diameter cutting blades

SAVE $96

NOW $99.99

Customer Rating

$139.99

COMPARE TO DURASTAR $196.54 MODEL: ES1600

ITEM 69293/61714 shown

33846686

LIMIT 5 - Coupon valid through 5/9/18*

PITTSBURGH MOTORCYCLE — SUPER COUPON

Customer Rating

1000 LB. CAPACITY MOTORCYCLE LIFT

• Diamond plate steel platform and ramp
• Lift range: 7" – 29-1/2"

SAVE $500

NOW $299.99

ITEM 69904 68892 shown $429.99

COMPARE TO DIRECT-LIFT $799.99 MODEL: 873100

33854533

LIMIT 4 - Coupon valid through 5/9/18*

SUPER COUPON

Customer Rating

4 PIECE ANTI-FATIGUE FOAM MAT SET

SAVE 22%

NOW $6.99

$8.99

• Each pad measures 25" x 25"

ITEM 61607/62389/94635 shown

34095754

LIMIT 8 - Coupon valid through 5/9/18*

PORTLAND — SUPER COUPON

14" ELECTRIC CHAIN SAW

Customer Rating

SAVE 50%

NOW $39.99

$49.99

COMPARE TO CRAFTSMAN $79.99 MODEL: GCS40001

ITEM 61592/67255 shown

34096756

LIMIT 5 - Coupon valid through 5/9/18*

COVERPRO — SUPER COUPON

10 FT. x 20 FT. PORTABLE CAR CANOPY

SAVE $106

Customer Rating

NOW $99.99

$129.99

COMPARE TO SHELTER LOGIC $205.99 MODEL: 23522

ITEM 63054/62858 shown

34099217

LIMIT 4 - Coupon valid through 5/9/18*

HaulMaster — SUPER COUPON

Customer Rating

18" x 12" MOVER'S DOLLY

• 1000 lb. capacity

NOW $7.99

$10.99

SAVE 51%

COMPARE TO BUFFALO TOOLS $16.43 MODEL: HDFDOLLY

ITEM 61899/63095/63096 63098/63097/93888 shown

34160236

LIMIT 8 - Coupon valid through 5/9/18*

CHICAGO ELECTRIC WELDING — SUPER COUPON

170 AMP MIG/FLUX CORED WELDER

EVERYTHING YOU NEED TO WELD

NOW $159.99

Customer Rating

$179.99

SAVE $390

COMPARE TO HOBART $549.99 MODEL: 381204099

ITEM 61888/68885 shown

34163228

LIMIT 5 - Coupon valid through 5/9/18*

luminar OUTDOOR — SUPER COUPON

NEW

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

Customer Rating

SAVE 50%

NOW $19.99

ITEM 63483 $24.99

COMPARE TO PORTFOLIO $39.98 MODEL: SLC128K

34165108

LIMIT 7 - Coupon valid through 5/9/18*

WARRIOR — SUPER COUPON

29 PIECE TITANIUM DRILL BIT SET

Customer Rating ★★★★★

SAVE 83%

NOW $9.99

$17.99

COMPARE TO DEWALT $60 MODEL: DW1369

ITEM 62281/61637 shown

34165798

LIMIT 9 - Coupon valid through 5/9/18*

HYDROSTAR DRAIN MONSTER — SUPER COUPON

50 FT. ELECTRIC DRAIN CLEANER

GFCI

Customer Rating ★★★★½

NOW $199.99

$259.99

COMPARE TO COBRA $399 MODEL: 90041

ITEM 61856 68285 shown

SAVE $199

34394431

LIMIT 4 - Coupon valid through 5/9/18*

PITTSBURGH AUTOMOTIVE — SUPER COUPON

PNEUMATIC ADJUSTABLE ROLLER SEAT

- 300 lb. capacity

SAVE 69%

Customer Rating ★★★★★

NOW $19.99

$25.99

COMPARE TO DURALAST $64.99 MODEL: TR6201C

ITEM 61160/61896/63456/46319 shown

34396814

LIMIT 7 - Coupon valid through 5/9/18*

CENTRAL MACHINERY — SUPER COUPON

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

Customer Rating ★★★★½

SAVE $75

NOW $279.99

$329.99

COMPARE TO JET $354.99 MODEL: 719202

ITEM 34706

34397594

LIMIT 3 - Coupon valid through 5/9/18*

PITTSBURGH #1 SELLING JACKS IN AMERICA — SUPER COUPON

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

- Weighs 73 lbs.

COMPARE TO HUSKY $149.98 MODEL: H000120

SAVE $69

Customer Rating ★★★★★

NOW $79.99

$97.99

ITEM 61253/62326/61282 shown

34400667

LIMIT 3 - Coupon valid through 5/9/18*

Bauer — SUPER COUPON

10 AMP DEEP CUT VARIABLE SPEED BAND SAW KIT

NEW

Customer Rating ★★★★★

NOW $99.99

$139.99

COMPARE TO DEWALT $299 MODEL: DWM120

ITEM 63763/63444 shown

SAVE $199

34402228

LIMIT 4 - Coupon valid through 5/9/18*

PITTSBURGH — SUPER COUPON

4 PIECE WOOD CHISEL SET

- 1/4", 1/2", 3/4" and 1"

Customer Rating ★★★★½

SAVE 83%

NOW $4.99

$7.99

LIFETIME WARRANTY

COMPARE TO DEWALT $29.97 MODEL: DWHT16063

ITEM 42429/69471 shown

34405395

LIMIT 9 - Coupon valid through 5/9/18*

TAILGATOR — SUPER COUPON

- 5 hours run-time @ 50% capacity

900 MAX. STARTING/ 700 RUNNING WATTS 2 HP (63 CC) 2 CYCLE GAS GENERATOR

SAVE $29

Customer Rating ★★★★½

NOW $89.99

NEW

$189.99

COMPARE TO ALL POWER $119.92 MODEL: APG3004A

ITEM 63024/63025 shown

34418865

LIMIT 5 - Coupon valid through 5/9/18*

SUPER COUPON

TILTING FLAT PANEL TV MOUNT

Customer Rating ★★★★★

- 176 lb. capacity

SAVE 81%

NOW $14.99

$24.99

COMPARE TO ROCKETFISH $79.99 MODEL: RF-TVMLPT03

ITEM 62289/61807 shown

34419765

LIMIT 7 - Coupon valid through 5/9/18*

Lynxx — SUPER COUPON

SAVE $79

40 VOLT LITHIUM CORDLESS BRUSHLESS BLOWER

Customer Rating ★★★★★

NEW

ITEM 63284

$139.99

NOW $119.99

COMPARE TO DEWALT $199 MODEL: DCBL790B

34434807

LIMIT 4 - Coupon valid through 5/9/18*

KRAUSE & BECKER — SUPER COUPON

AIRLESS PAINT SPRAYER KIT

Customer Rating ★★★★½

SAVE $129

NOW $169.99

$214.99

COMPARE TO GRACO $299 MODEL: 262800

ITEM 62915/60600 shown

34437885

LIMIT 5 - Coupon valid through 5/9/18*

drillmaster — SUPER COUPON

4-1/2" ANGLE GRINDER

Customer Rating ★★★★½

SAVE 61%

NOW $9.99

$14.99

COMPARE TO PERFORMAX $25.80 MODEL: 2411-1

ITEM 69645/60625 shown

34472405

LIMIT 9 - Coupon valid through 5/9/18*

CHICAGO ELECTRIC WELDING — SUPER COUPON

MIG-FLUX WELDING CART

Customer Rating ★★★★½

SAVE 38%

Welder and accessories sold separately

NOW $32.99

$47.99

COMPARE TO EASTWOOD $53.97 MODEL: 20232

ITEM 60790/61316/69340 shown

34475630

LIMIT 4 - Coupon valid through 5/9/18*

CHICAGO ELECTRIC POWER TOOLS — SUPER COUPON

4" BISCUIT PLATE JOINER

Customer Rating ★★★★½

NOW $44.99

$64.99

COMPARE TO MAKITA $179 MODEL: PJ7000

SAVE $134

ITEM 68987

34616257

LIMIT 3 - Coupon valid through 5/9/18*

CHICAGO ELECTRIC WELDING — SUPER COUPON

ADJUSTABLE STEEL WELDING TABLE

Customer Rating ★★★★½

NOW $59.99

SAVE $80

$74.99

ITEM 63069 61369 shown

COMPARE TO STRONG HAND TOOLS $139.99 MODEL: TS3020

34651313

LIMIT 5 - Coupon valid through 5/9/18*

CENTRAL MACHINERY — SUPER COUPON

2 HP, 5 MICRON INDUSTRIAL DUST COLLECTOR

SAVE $155

- 70 gallon capacity

Customer Rating ★★★★½

NOW $169.99

$199.99

COMPARE TO SHOP FOX $324.99 MODEL: W1685

ITEM 61790/97869 shown

34654243

LIMIT 3 - Coupon valid through 5/9/18*

CENTRAL PNEUMATIC — SUPER COUPON

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

Customer Rating ★★★★½

NOW $59.99

$79.99

SAVE $39

COMPARE TO KOBALT $99 MODEL: SGY-AIR184

ITEM 69265/62344/93897 shown

34656326

LIMIT 5 - Coupon valid through 5/9/18*

PREDATOR — SUPER COUPON

6.5 HP (212 CC) OHV HORIZONTAL SHAFT GAS ENGINE

Customer Rating ★★★★★

NOW $99.99

$119.99

ITEM 60363/69730 ITEM 69727 shown CALIFORNIA ONLY

SAVE $230

COMPARE TO HONDA $329.99 MODEL: GX200UT2QX2

34661392

LIMIT 4 - Coupon valid through 5/9/18*

PORTLAND — SUPER COUPON

1750 PSI ELECTRIC PRESSURE WASHER

NEW

- 1.3 GPM
- Adjustable spray nozzle

SAVE $99

NOW $79.99

$99.99

Customer Rating ★★★★½

COMPARE TO BRIGGS & STRATTON $179.33 MODEL: 20600

ITEM 63255/63254 shown

41011690

LIMIT 3 - Coupon valid through 5/9/18*

WINDSOR DESIGN — SUPER COUPON

DOVETAIL JIG

SAVE 20%

NOW $27.99

Customer Rating ★★★½☆

$34.99

ITEM 34102

35092943

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Ryobi adds 18V pinner

18-volt pin nailer, no. P318, $129

This battery-powered pinner is Ryobi's fifth nailer in its 18-volt platform. The P318 fires 23-gauge pins from ½" to 1⅜" long. It comes with two non-marring nose pads, an LED to illuminate the work area, a guide for aligning pins from an edge, and a belt clip. (Battery and charger not included.)

Ryobi
800-525-2579, ryobitools.com

Rikon launches new line of jointers

6" jointer, no. 20-106H, $1,300

8" jointer, no. 20-108H, $2,000

Nearly a decade after Rikon discontinued its 6" jointer, the company returns to that market with two new machines. The 6" jointer has a 1-hp, 110-volt motor and an insert cutterhead with 28 carbide ½"-square, four-edge cutters. It has a 47½"-long bed, rack-and-pinion fence, and pedestal-mounted power switch. The similar 8" jointer has a 2-hp, 220-volt motor, 40 insert cutters, and a 73½" bed.

Rikon
877-884-5167, rikontools.com

Steel Yourself

At $59, this blade of legendary Damascus steel is a real steal

Damascus steel is the stuff of legend. Using a technique first mastered in the ancient city, swords made from Damascus steel were known to slice gun barrels in half and separate single strands of hair in two, even if the hair simply floated down onto the blade.

Now, you can be a part of the legend. The 7 ½" ***August Knife*** features a blade of modern Damascus steel, inspired by the production techniques and legends of history. Damascus steel blade knives can cost thousands. So, at **$59**, the price itself is also legendary.

Once a lost art, we sought out a knifemaker who has resurrected the craftsmanship of Damascus steel to create the ***August Knife***. The elusive, ancient production technique mixes different steel alloys to form a super steel— the outcome is a beautiful one-of-a-kind pattern of banding and mottling reminiscent of flowing water.

Limited availability. Only a handful of artisans make these blades, with each handcrafted knife taking months to perfect. We currently can get less than 1500 this year, so we can't promise they'll stick around for long— especially at this price. Call today!

Your satisfaction is 100% guaranteed. If you don't feel like we cut you a fair deal, send it back within 30 days for a complete refund of the item price. But we believe once you wrap your fingers around the ***August's*** handle and experience the beauty of its Damascus steel blade, you'll be ready to carve out your own legend.

August Knife

non offer code price ~~$149~~*

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Burnsville, Minnesota 55337
www.stauer.com

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What customers are saying about Stauer knives...

★★★★★

"Very hefty, well-built knife and sheath. Extremely good-looking and utilitarian."

— R., Lacey, Washington

Limited Collector's Edition

BONUS! Call today and you'll also receive this genuine leather sheath!

Not shown actual size.

• 7 ½" overall length • Genuine Damascus steel blade • Stainless steel guard • Leather handle • Includes genuine leather sheath

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NorwoodSawmills.com

What's Ahead

A GLIMPSE INSIDE THE MAY ISSUE (ON SALE MARCH 6)

Outdoor entertainment center
Grab some Zs in the breeze with this simple structure. And after the sun goes down, enjoy your favorite movie stars under the stars (*below right*).

How to build a segmented turning
Vision and precision are the keys to making eye-popping segmented turnings. You'll learn both on your way to making this "woven" vessel.

Shop in a box
It's a tablesaw, mitersaw stand, router table, and more, all rolled into one sturdy, easy-rolling workstation.

Shop Test: Bandsaws under $500
Think you need to spend a fortune to get a robust, accurate bandsaw? Think again! Our tests reveal the top of the bottom-dollar machines.

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