

ISSUE 235/OCTOBER 2015

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Brad Nailers p.50

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Inspire, then inform

Thanks for all the great feedback on the update of **WOOD**® magazine, which rolled out in issue 234 (September 2015). “Inspire, then inform” is the principle that guided our efforts during the redesign process. In other words, if we don’t present to you projects that make you want to run out to the shop and build them, then the completeness and accuracy of the article doesn’t matter—you’re probably not going to read it.

As woodworkers, we need to chant that same “inspire, then inform” mantra when we pass our skills down a generation or two. Someone in their teens or early 20s might not get too excited about a blanket chest, but if you told her she could build her own skateboard or electric guitar? Now you’ve got her attention! Thus inspired, you can now mentor her as she builds.

Case in point: Our daughter Katie never expressed much interest in woodworking during her first 19 years. Then, last spring, she texted me a photo from her 3-D art class at college—a selfie of the first cuts she made on a tablesaw. When she came home the next weekend, she completed a nice little shelving unit of her own design with only a little guidance from her (very proud) dad. Katie enjoyed the experience so much, we built a desk when she came home for the summer. Without the inspiration of building

something she had designed herself, she had little motivation to become informed about woodworking.

For young people, woodworking (or electronics or metalworking) is the means, not the end. That’s why current technologies, such as robotic routing (CNC), laser engraving, and 3-D printing, give me hope for the future of woodworking. When those CNC-cut parts need an unbreakable joint and that laser-engraved panel needs a mitered frame, those cool tools and cutting-edge projects that *inspire* them give us an opportunity to *inform* them about our favorite hobby. 🌱

See you in the shop!



Dave Campbell

dave.campbell@meredith.com

Katie clamped scrapwood blocks to her shelving unit to keep everything square during gluing and assembly.

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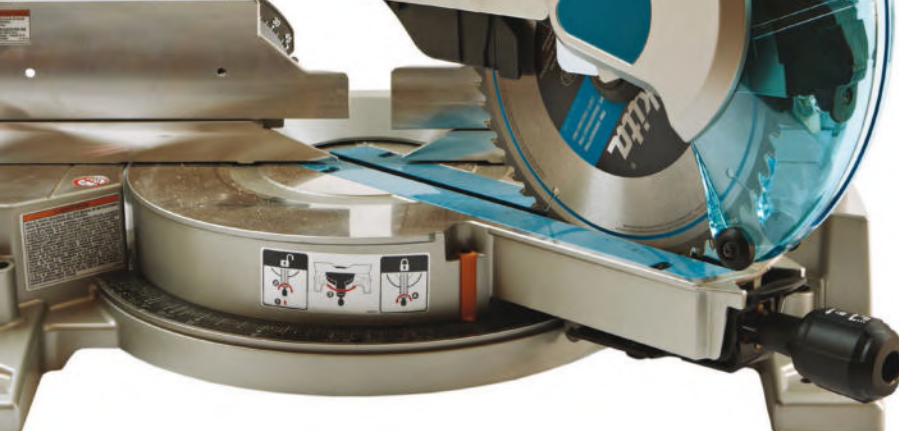


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MANIA**



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Seller beware

I lost my house and garage workshop in a tornado in November 2013. One of the insurance adjusters asked if I had sold any projects made in my shop. Fortunately, I had not. Everything I did was for personal use or gifts. It turns out, if I had sold projects, my agent says my shop could have been classified as a business, and all my equipment would have required a separate insurance policy in order to be replaced. This is something most woodworkers probably don't think about, but should be aware of. Check to make sure your shop is covered for disasters like this.

—Terry Godar
Mechanicsburg, Pa.



“Woodworker” or “carpenter”?

We asked our Facebook community where they draw the line, if any, between carpentry and woodworking.

Mike Barnett:

Carpentry is known as the “master trade” because you have to have working knowledge of all the other trades in order to accommodate the needs of the tradesmen working behind you.

Michael Walker:

A carpenter is an installer and assembler of pre-made goods. A woodworker is an artist.

Chris O'Malley:

When I asked my old tutor the difference between a carpenter and a cabinetmaker, he told me, “An eighth of an inch!”

John Allen Russell:

They're like doctors: Brain surgeons (woodworkers) do the refined work; others (carpenters) work on the whole body.

Jeremy Urban:

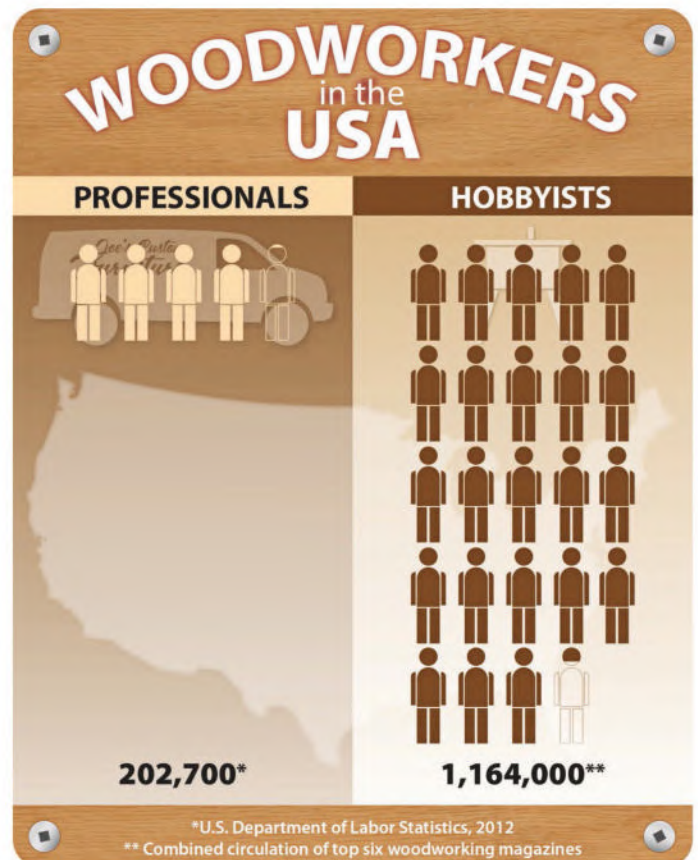
We both like beer, tools, and wood!

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YOUR PROJECTS



Tim Smith of Dover, Del., built this oak coffee table as a gift for his son.



With the help of plans from issue 230 (Dec/Jan 2014/2015), *Marv Glemming* of Omaha, Neb., crafted this walnut dining table.



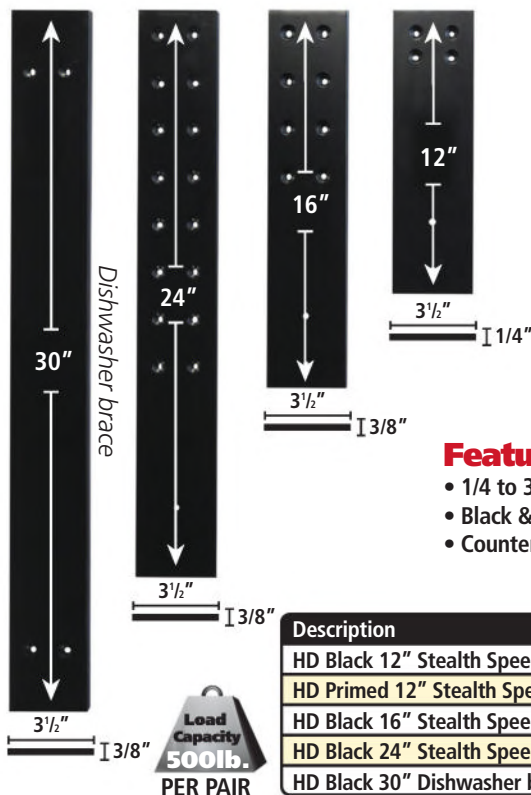
Craig Woodhouse of Paradise, Calif., made dozens of downsized rippling-wave keepsake boxes from issue 228 (October 2014).



These stools, made of sugar maple by *Luke Steeves* of Elgin, New Brunswick, prominently display the tap holes where syrup spiles pierced the tree.

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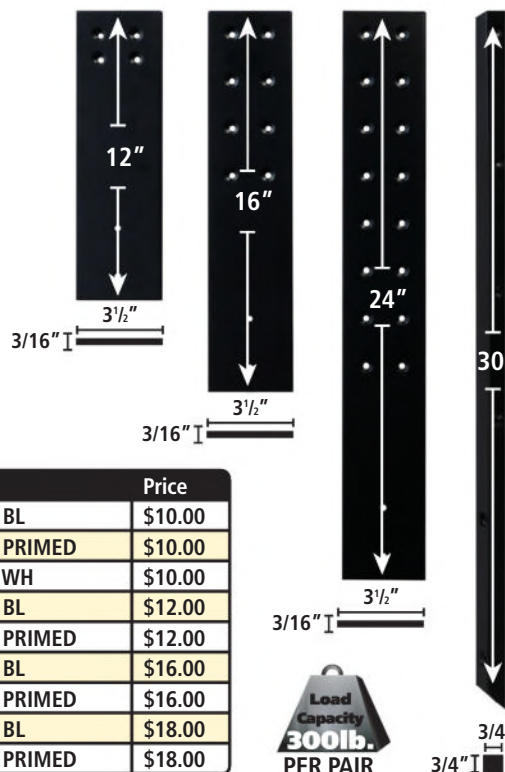
SpeedBrace STEALTH

Features...

- 3/16" to 3/4" steel
- Black, white (12" only) & primed finish
- Countersunk screw holes

Great for...

- Countertops
- Bars
- Extra Bracing

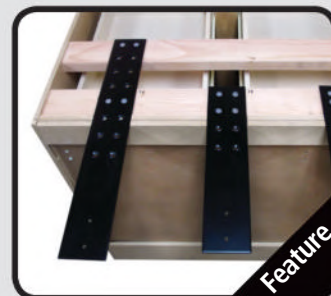


Description	Part Number	Price
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12" White Stealth Speedbrace	SB-12 STEALTH WH	\$10.00
16" Black Stealth Speedbrace	SB-16 STEALTH BL	\$12.00
16" Primed Stealth Speedbrace	SB-16 STEALTH PRIMED	\$12.00
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YOUR SHOP



Pennsylvania woodworker Todd DiOrio's shop outgrew both his garage and his basement. The solution? Build a two-story garage and use the 700-square-foot upstairs for woodworking. To maneuver wood and sheet goods up the stairs, he hinged the stairwell guard wall on one end so it swings like a gate.

Wanting something different from plain plywood sheets for the flooring, Todd ripped the sheets into 6"-wide strips, screwed and plugged the ends for a plank-floor look, and finished it with polyurethane and bowling-alley wax. 🌲

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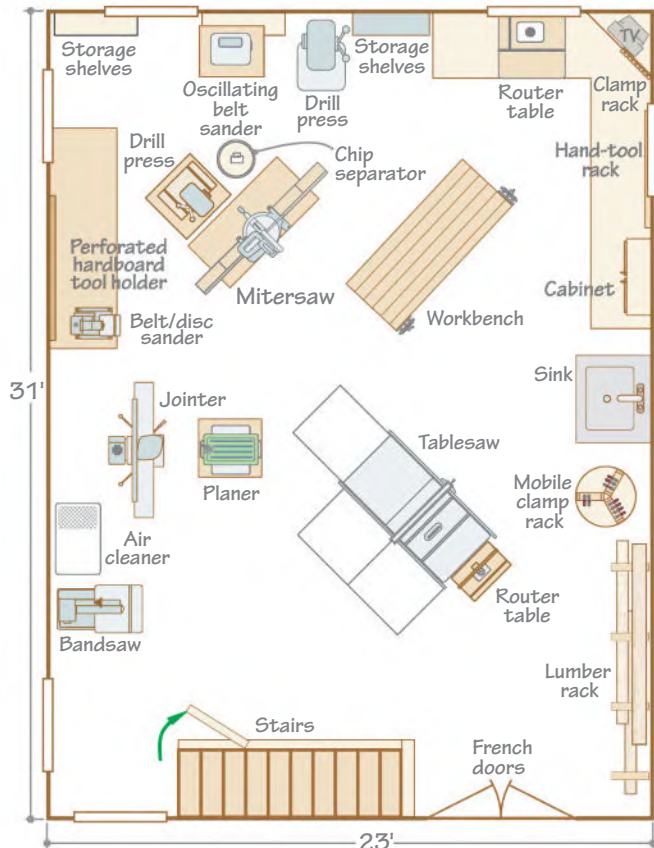
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Todd's main shop area makes a logical and convenient work triangle from the tablesaw to the workbench to the miter saw/mortiser stations.

Q **Stop, in the name of accuracy**
During a recent DIY project, I struggled while cutting crown molding on my miter-saw. I angled the molding against the fence and table, but the pieces kept sliding around, making the cuts unsafe and inaccurate. Can you help?

—Steve Jones, London, Ontario

A You were using our preferred technique for cutting crown molding: holding it upside down in its “spring” position (the angle at which it mounts to the wall). But to prevent slippage, you need something to anchor the molding on the saw. You have two options:

Option 1: Commercial stops. Nearly all miter-saw manufacturers sell crown molding stops as accessories. They mount to the saw’s table via tapped holes; you then adjust them forward and backward [Photo A] to secure the molding against the fence.

Option 2: Shop-made stop. If you prefer to make your own from scrap material, simply hold the molding against the fence at its spring angle and mark the table [Photo B]. Then, clamp in place a scrap stop that extends beyond each side of the blade [Photo C].



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SHOP TIPS

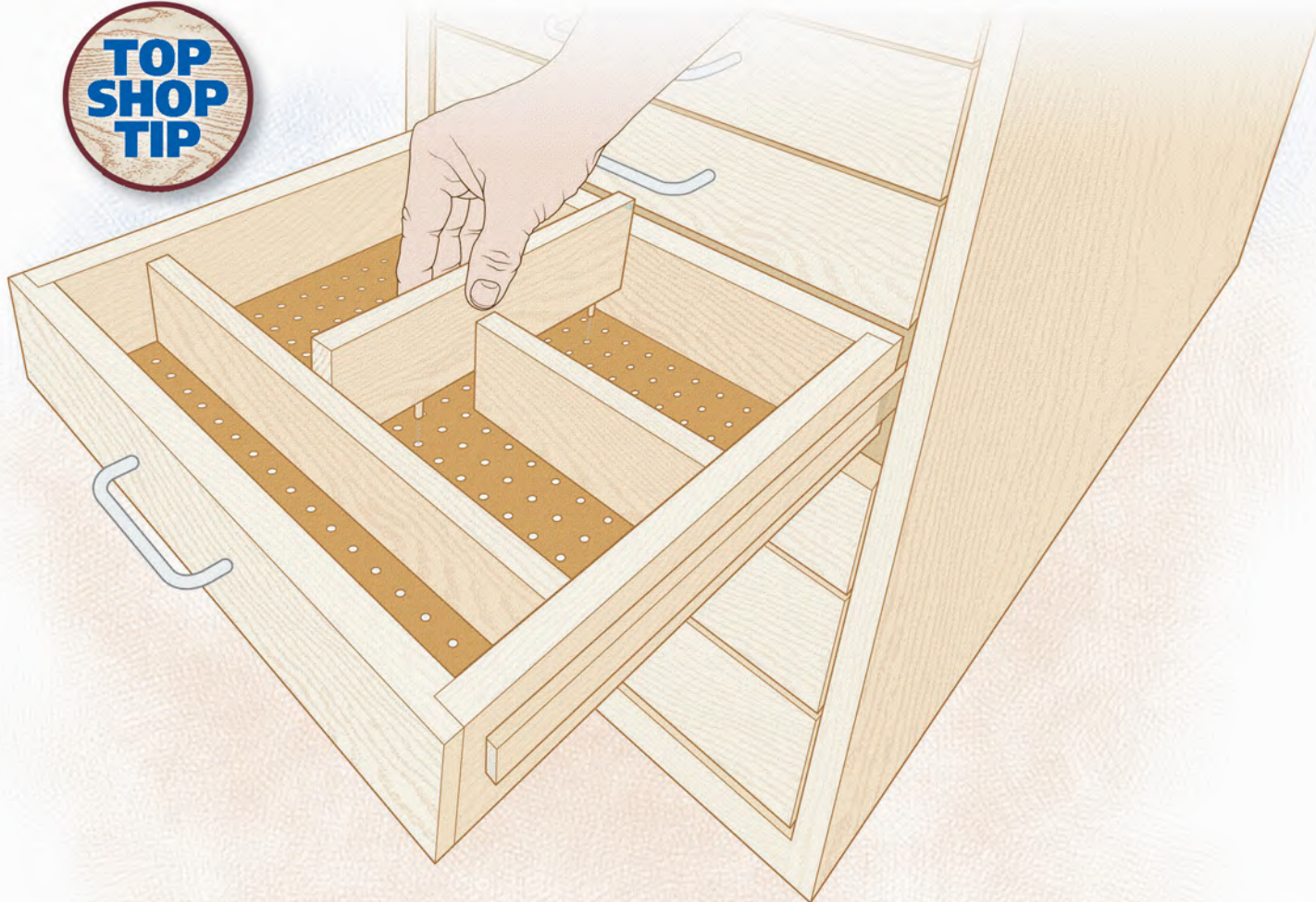
WORK FASTER, SMARTER, SAFER

This drawer divides to conquer clutter

When building cabinets for my shop, I wanted a drawer design that would prevent dust build-up and would accommodate adjustable dividers. The answer: drawer bottoms made from perforated hardboard.

Scrapwood dividers with $\frac{1}{4}$ " dowels mounted in an edge drop right into the holes. My tools stay organized while dust drops through.

—George Sicord, Port Elgin, Ont.



For sending this issue's **Top Shop Tip**, George receives an Air-Tech HP high-performance air-filtration unit from JDS Tools worth \$380.



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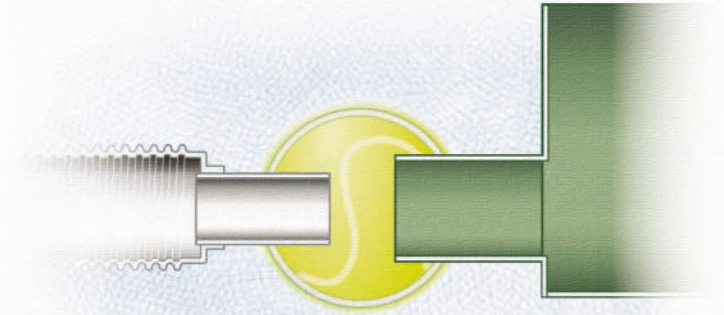
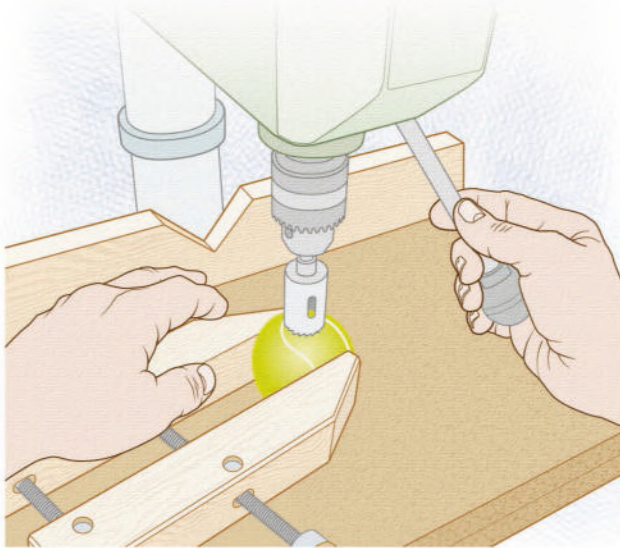
SHOP TIPS

For dust-collection match-ups, this tennis ball tip is an ace

Struggling to come up with a way to connect a shop vacuum to the odd-size port on a sander, I spotted a tennis ball installed as a rail-guide bumper on my bandsaw. Eureka!

Using hole saws the same diameter as the hose and tool ports, respectively, I drilled through a tennis ball to make a custom-fit adaptor. It works great!

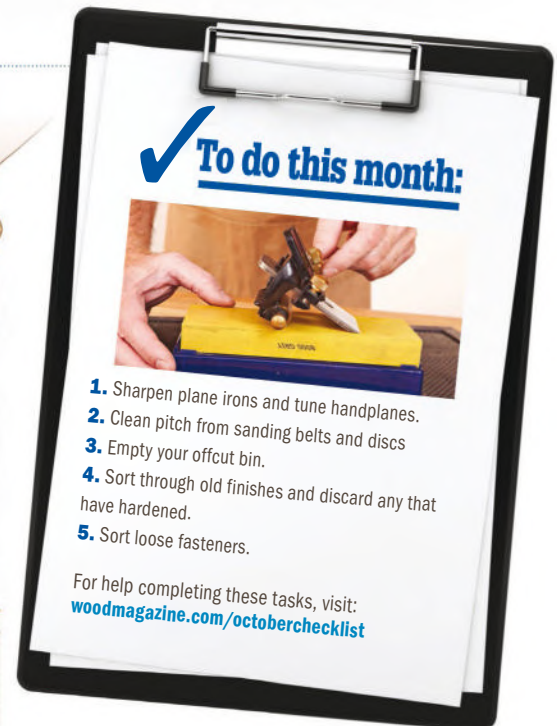
—Bob Muller, Westford, Mass.



This hole patch really drives home the point

After accidentally drilling hinge holes on the wrong side of a jewelry box, I wrestled with how to hide the error. The holes were too small to patch using a plug from a typical plug cutter, so instead, I turned to the shop pencil sharpener. By sharpening the tip of a small dowel the same species as I used for the box's construction, gluing the point into the hole, and sawing off the dowel using a flush-cutting hand saw, the unsightly hole virtually disappeared.

—Ken Thayer, Blythewood, S.C.



1. Sharpen plane irons and tune handplanes.
2. Clean pitch from sanding belts and discs
3. Empty your offcut bin.
4. Sort through old finishes and discard any that have hardened.
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continued on page 18

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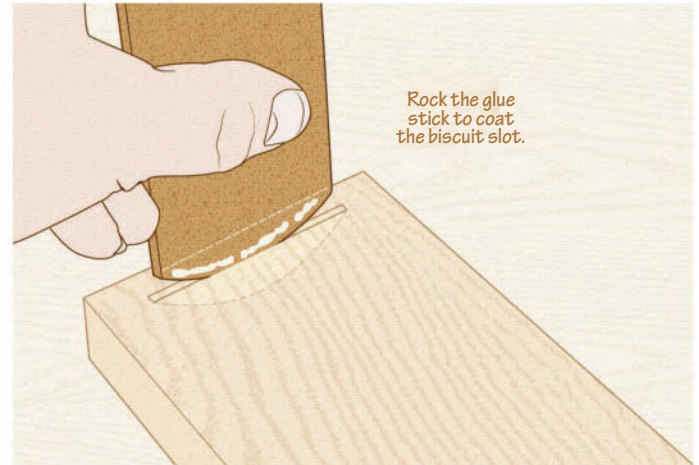
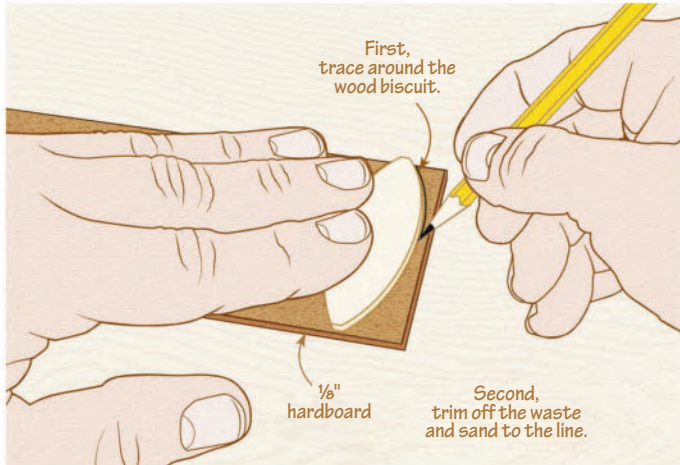
SHOP TIPS

A better way to butter your biscuit slot

I like biscuit joinery; it's simple, fast, and helps align pieces during a glue-up. That said, spreading glue evenly inside a biscuit slot can be a pain. So I made this simple

spreader by cutting one end of a scrap of $\frac{1}{8}$ "-thick hardboard to match the profile of a biscuit. Simply apply the glue, and you're biscuit-ready.

—Serge Duclos, Delson, Que.



Chalk up this tip to better shop organization

Have trouble remembering that to-do list for the shop or house? Need a way to keep track of who borrowed a tool? Try this simple trick. Take the doors off your shop cabinets and paint all or part of them with chalkboard paint. To the bottom of the cabinet, add a small shelf to hold chalk and an eraser.

—Rich Miller, Fort Payne, Ala.



continued on page 20

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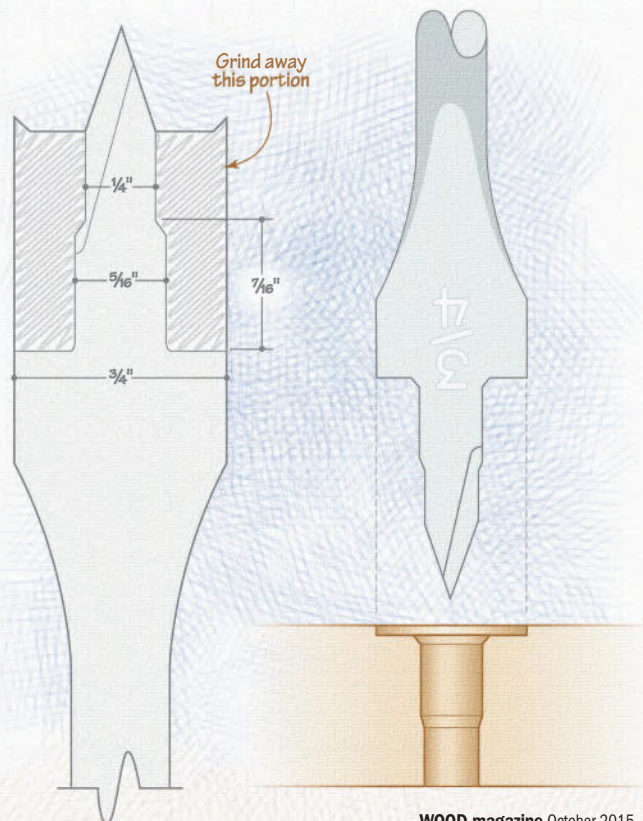
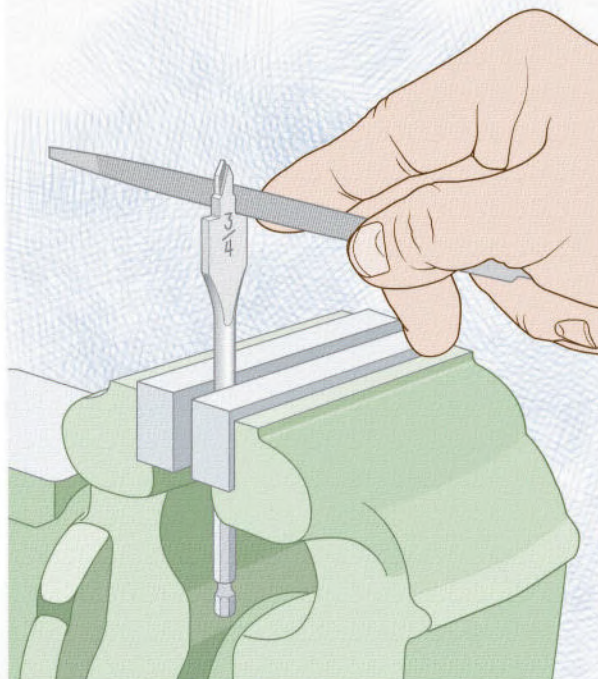
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SHOP TIPS

Install T-nuts easily with this ace of spade bits

Recessing T-nuts flush with the surface of a shop jig requires at least two bit changes with standard drill bits. So I came up with an easier way. By modifying a 3/4" spade bit using a grinder and file, I now drill a 1/4" hole for a bolt, a 5/16" hole for the T-nut's barrel, and a 3/4" counterbore for the T-nut's head all with one bit. 🌲

—Lynn Potter, Green Valley, Ariz.





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✓Yes



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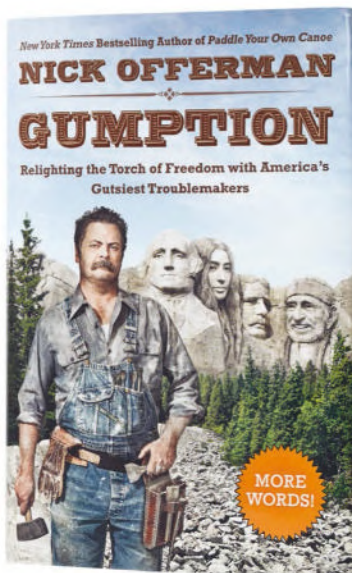
**Next Wave
Automation**

Gumption

by Nick Offerman



Photo by: Jimmy DiResta



Editor's note: **Gumption: Relighting the Torch of Freedom with America's Gutsiest Troublemakers** (New York, Dutton) is the latest book from woodworker, humorist, and actor Nick Offerman (Parks and Recreation, 21 Jump Street, The Lego Movie). *Gumption* is Nick's irreverent tribute to America's founders, the free-thinking idealists who followed in their footsteps, and the creative individuals who inspire all those around them—people who embody gumption in a variety of ways. Nick calls it his “mixtape of great Americans.”

In the following excerpt, Nick recalls his visit to Gannon & Benjamin Marine Railway, where he got to meet one of his heroes, boatbuilder Nat Benjamin. Nat's boatyard builds and repairs wooden boats using traditional methods and materials.

We met Nat at the shop, aka the railway, named thus for the actual steel rails that run fifty yards into the water, upon which a boat of a weight up to dozens of tons can be rolled into and out of the harbor's water. It was amazing to see in person the old barn in which I had remotely viewed and read of so much mastery. As in all my favorite shops, the tools and machines were ancient and brown and heavy, thickly squatting upon their cast-iron bases. Our foursome immediately launched into the classic shop-geek rap, admiring exceptional examples of band saw and planer and lathe (pre-World War II!).

I asked Nat himself why one should choose wood over any synthetic hull, and his answer was most satisfying: “Sailing a wooden boat is a symphony of sound above and below deck as the sea rushes by. She also talks to you—a creak here, maybe a groan or two when driven hard. The glow of varnish, salted-down wooden decks, bronze patina, and the structural timbers and fine joinery—all the lovely details give us a visual feast of grace and beauty. And a wooden boat smells so good.”

“The glow of varnish, salted-down wooden decks, bronze patina, and the structural timbers and fine joinery—all the lovely details give us a visual feast of grace and beauty. And a wooden boat smells so good.”

There's an important distinction to be made here: The people who inspire me never seem to be looking to maximize profits. They have an understanding that life's rewards are to be found much more in the difference between sanding, say, white oak and sanding fiberglass and epoxy. Interestingly, these artisans and freethinkers still manage to lead a life of richness and sometimes even prosperity. I must admit that the more my woodshop relegates itself to solid-wood craftsmanship versus fabricating cookie-cutter items out of man-made "wood" products like medium-density fiberboard, the better we seem to feel.

"You don't have to build the whole boat at once; you just have to make the first piece, and then you make the second piece, and so on."

We were then flatly astonished when we cruised across the road to the larger build shed, in the yard of which were several boats being stored for the winter. Inside, there was an enormous Hong Kong schooner built in 1957 to a Sparkman & Stephens design.

The vessel was stripped down to the frames and planks of the hull, and it was mind-boggling as Nat walked us through each piece of the puzzle and how it would fit back together. That's always an important key for me when I consider any project "impossible"; I first consider the fact that, "well, somebody has done this already, so it *can* be done." Then I remember the advice of Ted Moores, my teacher in canoe craft—you don't have to build the whole boat at once; you just have to make the first piece, and then you make the second piece, and so on. Still and all, this stem-to-stern overhaul that Nat was undertaking would make a grown man weep. Even, perhaps, a grown woman.

We asked Nat what price an overhaul like this would run a person, to which he replied, "About a million." As we stood, blinking and nodding with false understanding, as though we hadn't just [soiled] ourselves, he continued. "That's considerably cheaper than building new." Okay, so wooden boats aren't the cheapest investment out there, but then when I stack it up against a wooden-slab dining table from my shop that goes for ten thousand dollars, it seems rather a

continued on page 24

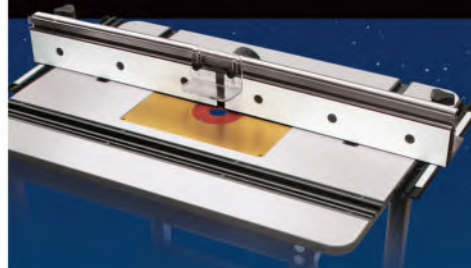


Bitten by the boatbuilding bug himself, Nick Offerman fits the hand-shaped walnut-and-ash deck on his cedar-strip canoe, *Huckleberry*.

Photo by Jimmy Dilesta

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Photo by: Jimmy DiResta

Boatbuilder Nat Benjamin, right, discusses the under-repair yacht taking shape in his boatyard. Nat must keep track of a growing jigsaw puzzle of parts as each piece is removed for repair or replacement.

"Their techniques may be centuries old, but they are becoming largely lost to us in this modern era of mass-production and computer-generated 3-D printing."

bargain. The table has maybe ten parts, and most of that price is the labor and the cost of a large slab of tree (usually around two or three thousand dollars). A boat certainly has more than a hundred times as many parts, all of them curved. In boatbuilding, fine-furniture making, and home building, if anybody's getting rich, it's generally not the men and women swinging the mallets. So

what is it that drives these goofy boat-builders, if not the almighty dollar?

Part of it, for Nat, is simply knowing that he and his shop mates do things in the best possible way they can be done. Their techniques may be centuries old, but they are becoming largely lost to us in this modern era of mass-production and computer-generated 3-D printing.

I think that part of what defines *gumption* involves a willingness, even a hunger, for one's mettle to be challenged. Nat finds no use for a computer in his work, especially when it comes to designing and lofting, even though most modern designers have switched to CAD programs. The familiar note here seems to be that people with gumption will bristle when *less* is required of them. A part of human nature tends toward laziness and comfort, which is the part being so lucratively exploited by corporations, but there is a more noble part: the portion of the human spirit that revels, not in ease, but in having *its capabilities tested*. These estimable characters know the profoundest, bone-deep satisfaction of having themselves challenged by the world, and, relying only upon their human capabilities—their gumption—they not only win the contest, but they infuse those around them with the inspiration to shine as well. 🌲

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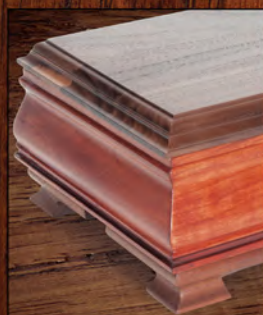


► For better or worse, Nick Offerman is known for his wood shop (offermanwoodshop.com); his two books, *Paddle Your Own Canoe* and *Gumption*; and a variety of acting roles he's assayed over the years, including Ron Swanson and *Metal Beard*.

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It's an age-old quandary—the closets are full, but those Christmas sweaters and spare bedsheets still need a home. With a contemporary look that blends with any decor, this captain's bed offers stylish, under-the-deck storage. Conceal those pesky throw pillows behind the fold-down headboard. Need a hiding place for those Christmas presents? Stow them in the secret compartments running down the center of the bed.





D I M E N S I O N S :
99½" W x 86½" D x 48½" H
(fits a full-size mattress)

Approximate materials cost:
\$750

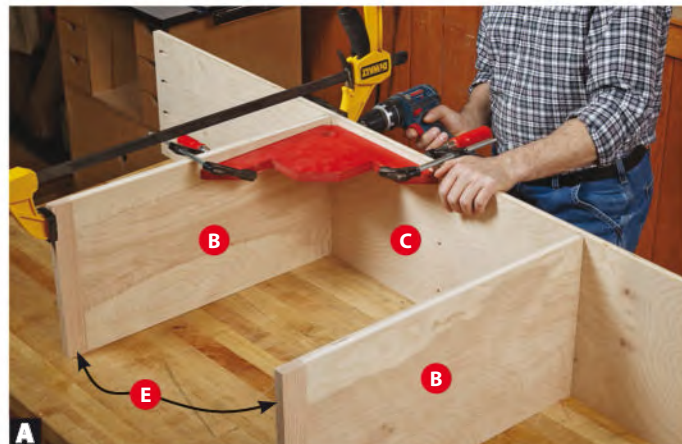
65
cubic feet of hidden space

Begin below decks

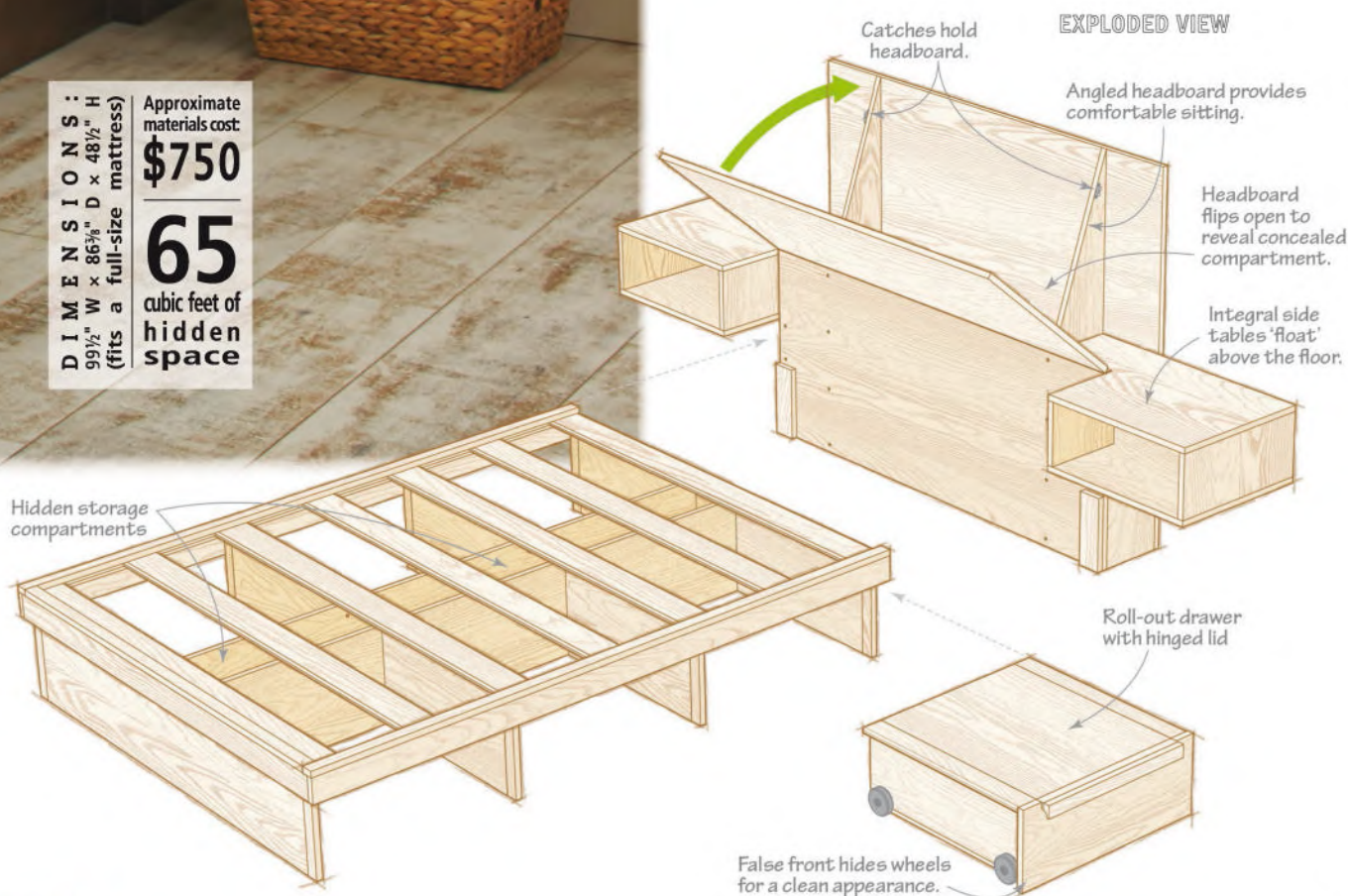
1 Cut parts A–E to size [Materials List, Drawing 1]. Make one end panel (A) from oak plywood, the other from Baltic birch plywood. Glue the edging (E) to the ends of the end panels and dividers (B).

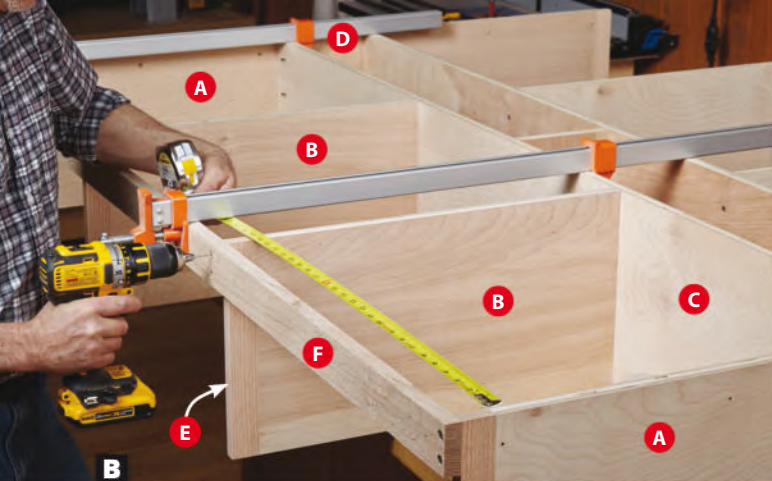
2 Glue and screw together two base divider assemblies (B/C/E) [Drawing 1, Photo A]. Then, glue the base divider assemblies to the spacers (D) and attach the end panel assemblies (A/E).

► Get a free plan to build a right-angle brace.
woodmagazine.com/brace



A An angle brace keeps things square. Clamp a right-angle brace in place to square the dividers (B) to the long rails (C) before gluing and screwing them in place.





Give your frame rigidity. Screw the ends of the side supports (F) flush with the top and outside edges of the end panel assemblies (A/E). Then, measure between the dividers (B) to ensure they're square before driving screws into them.



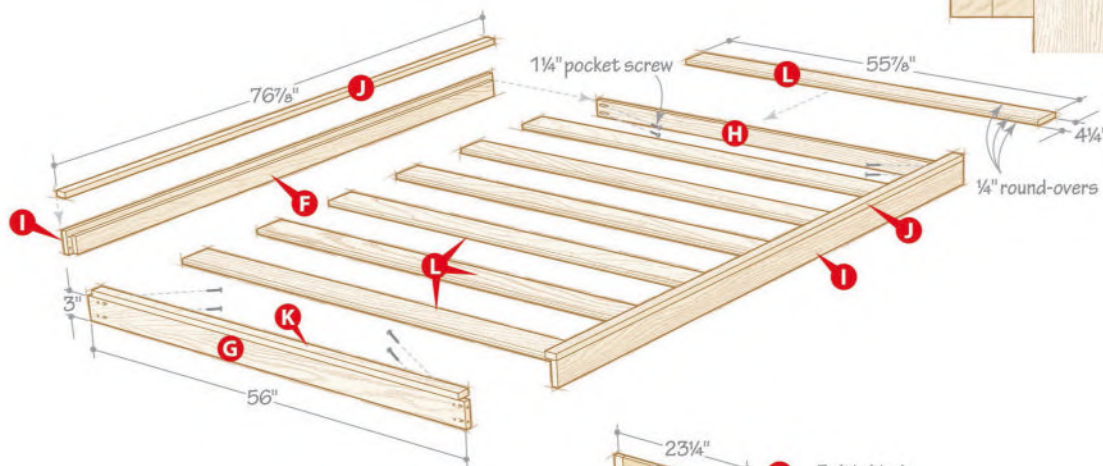
Hide your screws. Glue and clamp the side rails (I) to the side supports (F) with their bottom edges flush, then drive screws through the inside face of the side supports.

3 Cut parts F–K to size [Drawing 1]. Glue and screw the side supports (F) to the base assembly (A–E) [Photo B]. Glue and screw the end rail (G) to the oak plywood end panel assembly (at the foot of the bed), with the bottoms of the end rail and the side supports flush. Repeat for the head rail (H) on the other end panel assembly (A/E), but

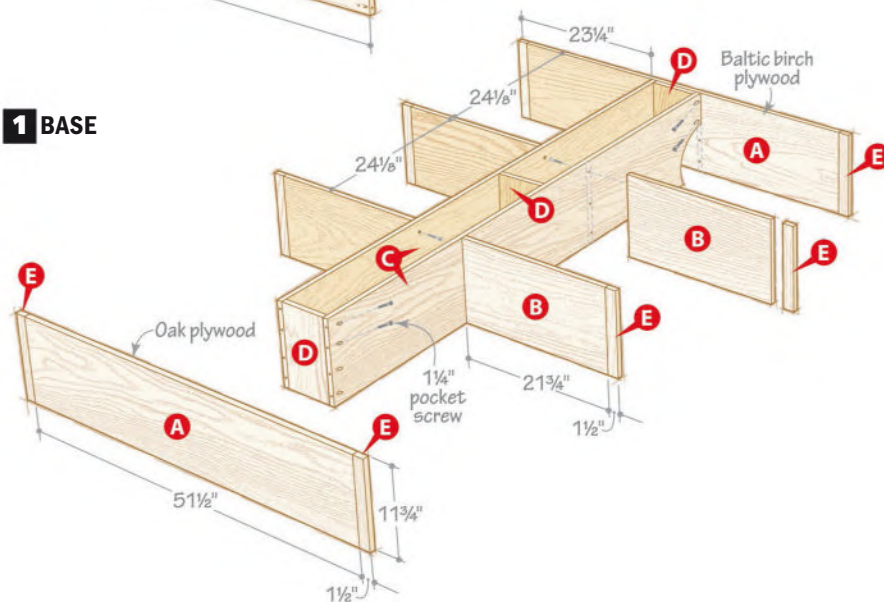
with the top edges flush. (This allows you to slide the slats [L] into place later.)

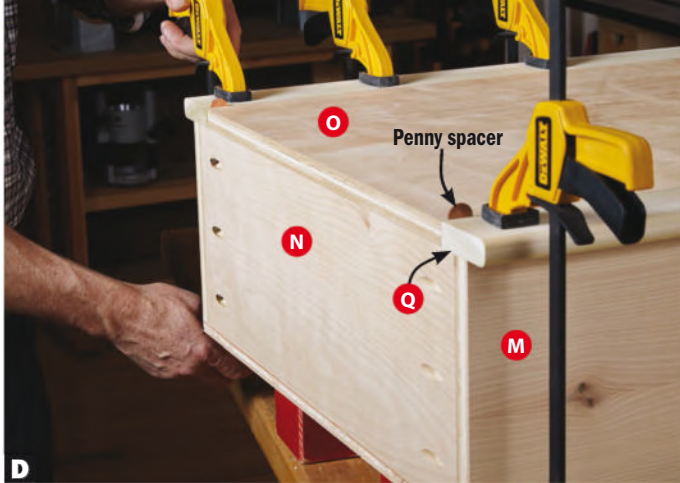
4 Attach the side rails (I) to the side supports (F) [Drawing 1a, Photo C]. Glue on the caps (J, K), flush with the outside faces of their rails. Cut the slats (L) to size, test for fit in the base assembly, then round over their long edges.

1a FRONT SECTION VIEW

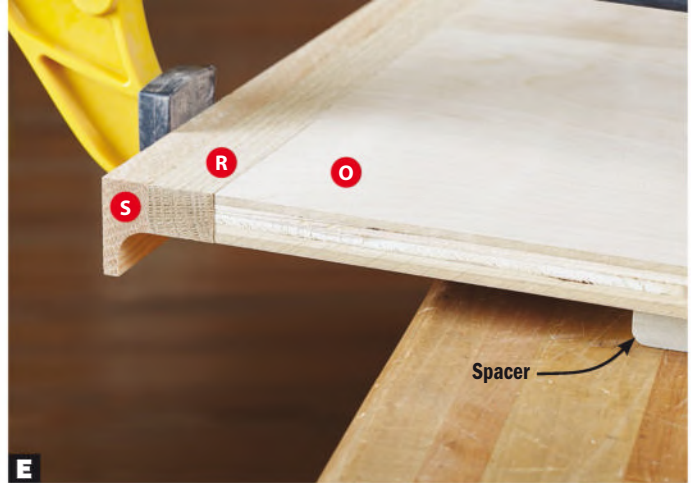


1 BASE





D **Pinch these pennies.** To ensure an even reveal when attaching the bumpers (Q), dry-fit a lid (O) and slide pennies between the bumpers and lid.



E **Raise the lid for clamping success.** Leave room for your clamp jaws when gluing and clamping together the lid assemblies (O/R/S) by slipping a piece of scrap under the assembly to serve as a riser.

Construct the cargo holds

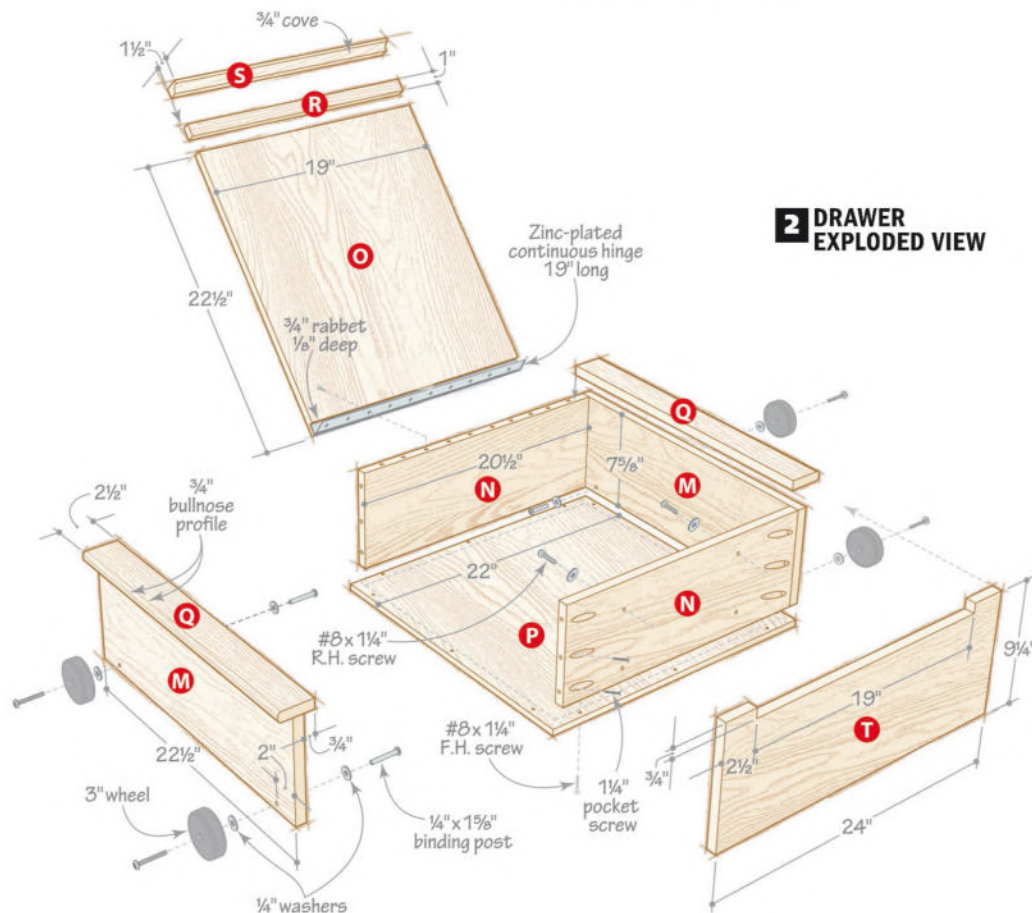
1 Cut drawer parts M–Q to size. Glue and pocket-screw the fronts/backs (N) to the sides (M) [Drawing 2]. Attach the bottoms (P) with glue and screws.

2 Rout the bullnose on the outside edges of the bumpers (Q) and glue them to the drawer sides using a lid (O) and pennies as spacers [Photo D]. Cut a shallow rabbet in the face of each lid so the bottom continuous hinge's [Source] leaf fits flush with the lid.

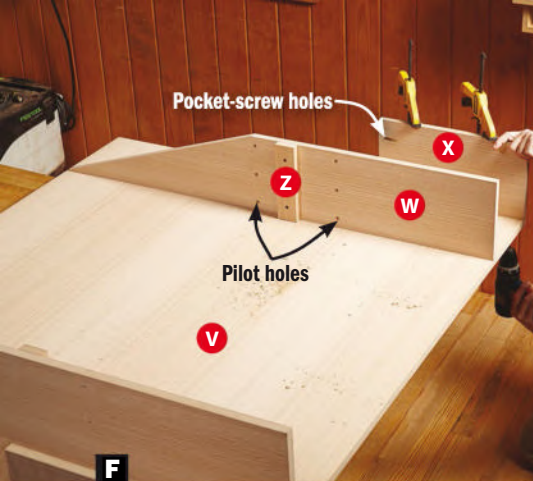
3 Cut the spacers (R) and handles (S) to size. Glue a spacer to each lid. While the glue dries, rout the cove along one edge of each handle. Glue the handles to the spacers [Photo E]. Attach the lids to the drawers.

4 Test the fit of the drawers in the base assembly. If they fit satisfactorily, drill two holes in each drawer side (M)—1" from the bottom edge of the drawer—to fit the binding posts for attaching the wheels. Cut the false fronts (T) to size and shape [Drawing 2], then set them aside.

► Plywood is seldom the exact thickness it's sold as. Use calipers to determine the plywood's thickness before planing the spacer and handle stock.



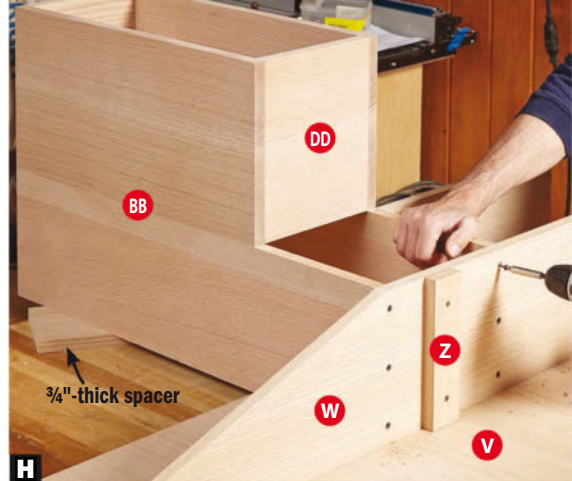
2 **DRAWER EXPLoded VIEW**



F Go overboard. To simplify screwing through the back (V) into the uprights (W) and sides (X), hang the assembly over the edge of a stable surface and screw from below.



G Glue up; don't cut down. Rather than glue up a rectangular panel for the side table tops/bottoms (BB) then cut it to shape, glue together two smaller panels to form the cutout.



H Give your side tables a lift. To aid in attaching the side tables (AA-DD) to the headboard, rest the side table on 3/4"-thick scrap spacers.

► Learn to apply iron-on edge banding.
woodmagazine.com/irononedging

Assemble the headboard

1 Cut parts U–Z to size [Drawing 3]. Apply iron-on edge banding to all plywood edges that will be exposed in final assembly [Drawing 3].

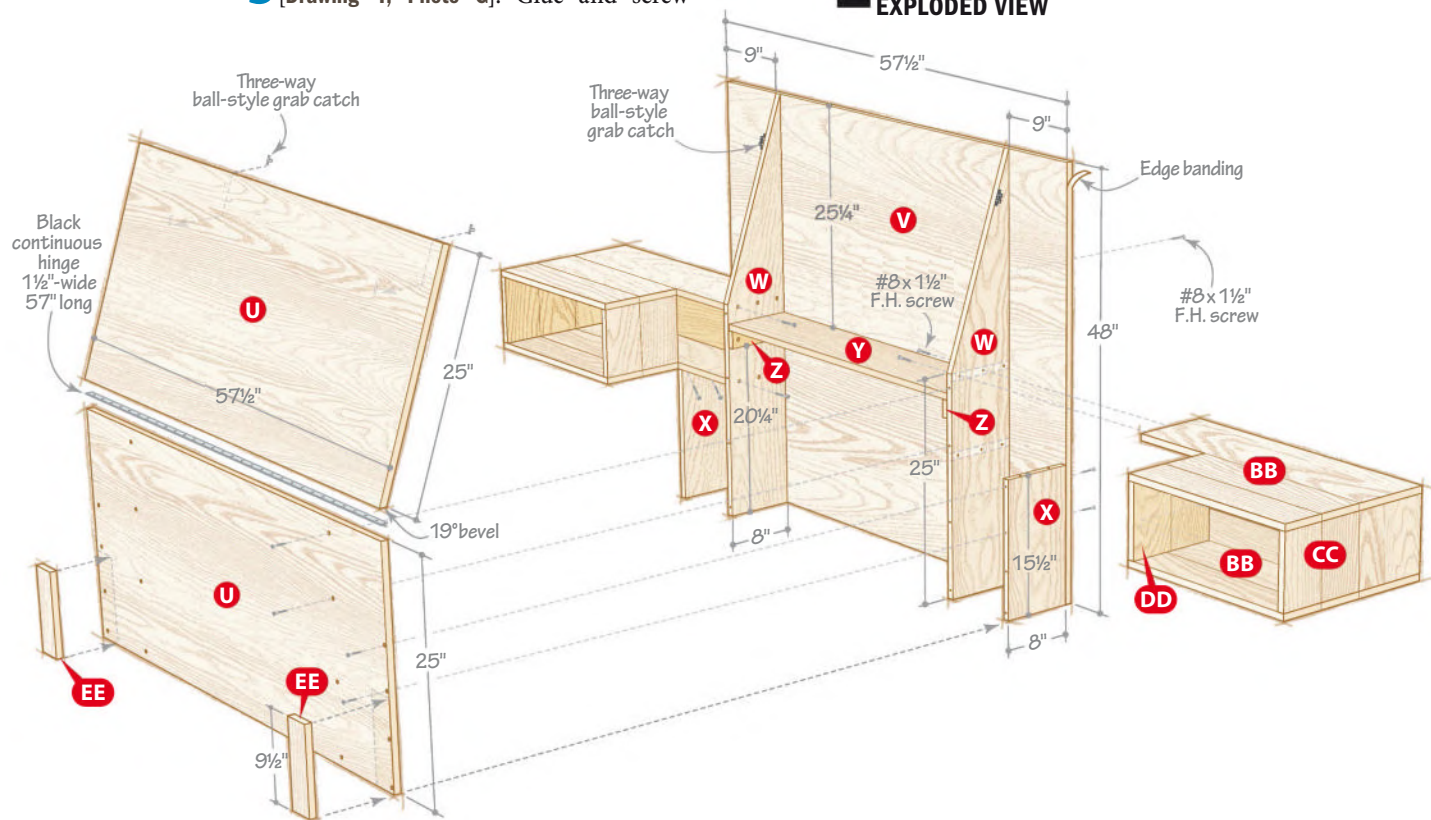
2 Cut the uprights (W) to shape [Drawing 3], then glue and screw the shelf cleats (Z) to them. Next, drill pilot holes and pocket-screw holes in the inside faces of the uprights and sides (X), respectively, before attaching them to the back (V) [Photo F]. Cut the bevel on the top front panel (U) and check for fit.

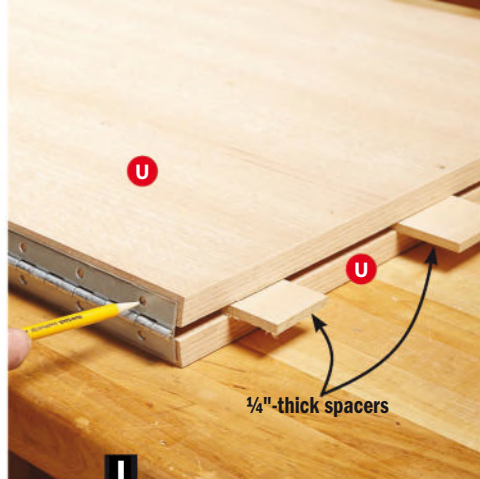
3 Glue up or cut parts AA–DD to size [Drawing 4, Photo G]. Glue and screw

together the side tables, then glue and screw the tables to the headboard assembly (V/W/X/Z) [Photo H].

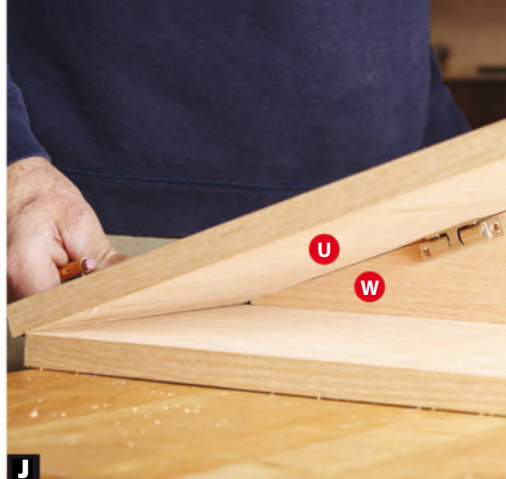
4 Mark and drill the screw holes for the continuous hinge in the mating edges of the front panels (U) [Photo I] and install the hinge. Glue and clamp the lower front panel to the uprights and sides (W, X), then glue and clamp the spacers (EE) in place [Drawing 3]. Mount the catches [Source] to the upper front panel and uprights [Photo J].

3 HEADBOARD EXPLODED VIEW





I Slip in spacers. To create the space needed for the hinge barrel, slide 1/4" spacers between the two front panels (U) before marking the screw holes.



J Align the catches perfectly. With the three-way ball-style grab catches attached to the bottom face of the upper front panel (U), position the panel atop the uprights (W). Mark the screw positions of the catch on the uprights to ensure a perfect fit of the two-part latch without complicated measuring.

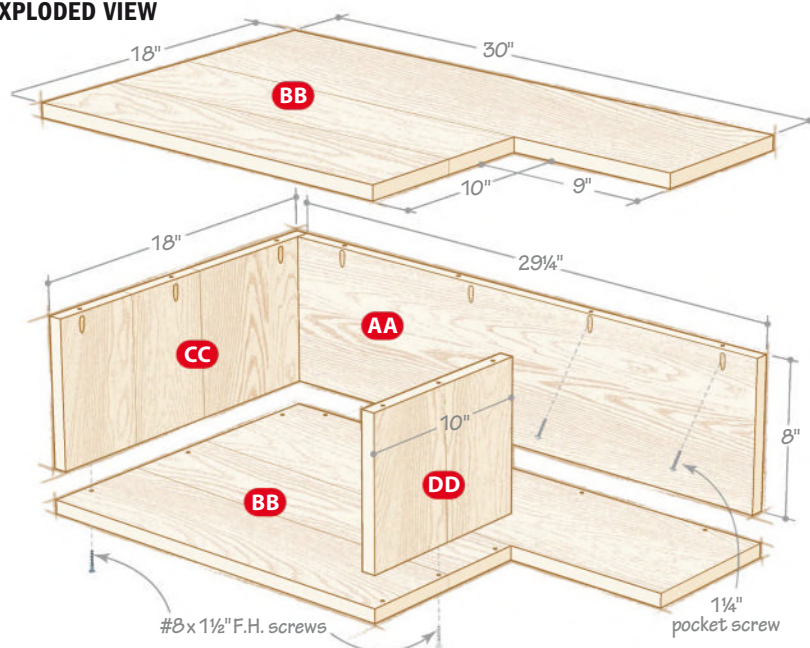
Apply a finish

1 Remove all hardware prior to finishing. To achieve the bed's dark, rich color, we used General Finishes Java gel stain on all exposed oak surfaces. The birch plywood substructure was taped off before staining and left unstained, as were the drawer boxes. Follow with a clear topcoat such as polyurethane, coating all surfaces. Reinstall all hardware after the finish has dried.

2 Mount the wheels, and screw on the drawers' false fronts (T). After moving the bed into the bedroom, kick back on your completed project for a well-deserved rest. 🌳

► Apply a dab of threadlocker to the binding posts to ensure the wheels stay on with extended use.

4 SIDE TABLE EXPLODED VIEW



► This project requires three sheets of 3/4" oak plywood, one sheet of 1/2" Baltic birch plywood, two sheets of 3/4" Baltic birch plywood, 25 board feet of 4/4 poplar, and 50 board feet of 4/4 oak. Download a free cutting diagram at woodmagazine.com/capnbedCD.

Materials List

Part	FINISHED SIZE				Matl.	Qty.
	T	W	L			
Base						
A	end panels	¾"	11¾"	51½"	BP/OP	2
B	dividers	¾"	11¾"	21¾"	BP	4
C	long rails	¾"	11¾"	73⅞"	BP	2
D	spacers	¾"	6½"	11¾"	BP	3
E	edging	¾"	1½"	11¾"	O	8
F	side supports	¾"	2¼"	75⅜"	O	2
G	end rail	¾"	3"	56"	O	1
H	head rail	¾"	2¼"	56"	O	1
I	side rails	¾"	3"	76⅞"	O	2
J	side caps	¾"	1½"	76⅞"	O	2
K	end cap	¾"	1½"	54½"	O	1
L	slats	¾"	4¼"	55⅞"	P	7

Drawers

M sides	3/4"	7 7/8"	22 1/2"	BP	12
N fronts/back	3/4"	7 7/8"	20 1/2"	BP	12
O lids	3/4"	19"	22 1/2"	BP	6
P bottoms	1/2"	22"	22 1/2"	BP	6
Q bumpers	3/4"	2 1/2"	22 1/2"	P	12
R spacers	3/4"	1"	19"	O	6
S handles	3/4"	1 1/2"	19"	O	6
T false fronts	3/4"	9 1/4"	24"	OP	6

Headboard and side tables

U front panels	3/4"	25"	57 1/2"	OP	2
V back	3/4"	48"	57 1/2"	OP	1
W uprights	3/4"	8"	48"	OP	2
X sides	3/4"	8"	15 1/2"	OP	2
Y shelf	3/4"	7 7/8"	37 7/8"	OP	1
Z shelf cleats	3/4"	2"	8"	OP	2
AA side table backs	3/4"	8"	29 1/4"	OP	2
BB side table tops/bottoms	3/4"	18"	30"	O	4
CC side table long sides	3/4"	18"	8"	O	2
DD side table short sides	3/4"	10"	8"	O	2
EE spacers	3/4"	3"	9 1/2"	O	2

Material key: BP-Baltic birch plywood, OP-oak plywood, O-oak, P-poplar.

Supplies: 1/4" washers, #6x1 1/2" flathead screws, #8x1 1/4" flathead screws, #8x1 1/2" flathead screws, 1 1/4" pocket screws, 36" iron-on oak edge banding.

Bits: 1/4" round-over, 3/4" bullnose, and 3/8" cove router bits.

Source:

All hardware purchased from McMaster-Carr (mcmaster.com), 630-833-0300: 1 1/2"-long binding posts (24), no. 98002A208, \$5.43 per 10; Econo-Lite polypropylene wheels (24), no. 2781T72, \$1.47 ea.; zinc-plated steel continuous hinge with holes, 1 1/4" wide (2), no. 1608A51, \$12.88 per 6' length; black-painted steel continuous hinge with holes, 1 1/2" wide (1), no. 1569A938, \$30.91 per 6' length; three-way ball-style grab catch, chrome finish (2), no. 1790A14, \$5.13 ea.

Produced by Nate Granzow with Brian Bergstrom

Project design: John Olson

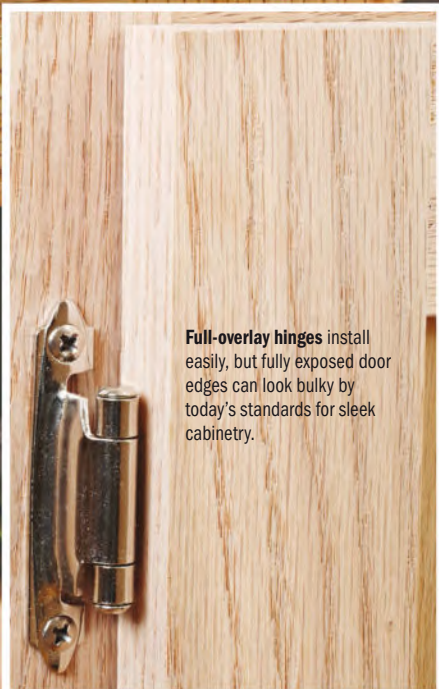
Illustrations: Lorna Johnson

woodmagazine.com

Installing Hinges on Face-frame Cabinets



European hinges hide completely inside a full-overlay or inset door. That, combined with user-friendly soft-closing options and adjustability in three planes, justifies their relatively high prices for many users.



Full-overlay hinges install easily, but fully exposed door edges can look bulky by today's standards for sleek cabinetry.



Partial-overlay hinges work with doors showing less bulk, and install nearly as easily as full-overlay hinges. Still, a lot of hinge shows.



No-mortise inset hinges enable a clean look with none of the door edge exposed, but they don't have a self-closing mechanism, so you'll need to add a catch.

Today's hardware universe offers a nearly limitless variety of cabinet-door hinges. To keep things simple, we'll focus on four types for installation on easy-to-make face-frame cabinets (as opposed to frameless or "European" cabinets). The best

hinge for your application depends on the type of door you're mounting, as well as the desired look and functionality. Here you'll find time-tested tips for installing each type, as well as some exciting hinge innovations that will improve your end result.

Tip! Always install and remove hinges before applying finish. This way you can fine-tune any installation mistakes without damaging the finish.

Full-overlay hinges: Simple and forgiving

As the name implies, full-overlay hinges work with doors that cover, but do not fit inside, a cabinet opening. With no reveal to worry about, slight misfits don't show.

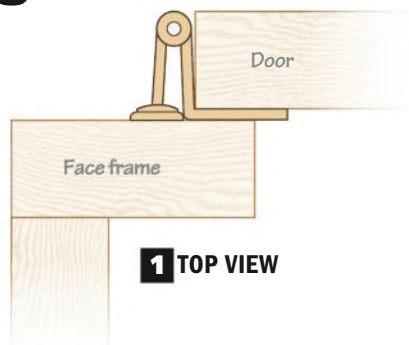
Before buying a face-mount hinge for this type of door, you'll need to know how much larger your doors are on each side than the cabinet opening. A $\frac{3}{8}$ " overlay is common, but these hinges also come in $\frac{1}{4}$ ", $\frac{1}{2}$ ", and more rarely, $\frac{3}{4}$ " and 1" overlay configurations.

To install these hinges, first lay out the hinge locations on the door. (See the **Skill Builder** on the *next page*.) Snug the hinge barrel [Photo A] against the door's edge [Drawing 1], and drill pilot holes into the door stile to prevent splitting. (To drill perfect pilot holes, see **Self-centering bits make perfect pilot holes below right**.) Screw the door leaf to the door back, then flip the door face-up and center it on the case opening.

To center the door, subtract the overlay dimension ($\frac{3}{8}$ " in this case) from the face-frame stile width (2" here) and set your combination square to the resulting dimension (1 $\frac{1}{8}$ "). Now use the square to position



A No door modifications required. Full-overlay hinges require only that you drill pilot holes for their mounting screws.



the door [Photo B].

To ensure that adjacent doors align, clamp a ledger board to the face frame, as shown in the **Shop Tip** on page 35. If the cabinets aren't yet installed, lay them on their backs so you don't fight gravity while installing the doors.

As with any hinge, don't drill all the frame holes or install all the screws at once. Drill and drive a single screw in each hinge to secure the hinge on the face frame while you make minor adjustments. When you're satisfied with the fit, drill and drive the remaining screws into the frame.

Reveal: the gap between the cabinet frame and the edge of an inset door.



B Four points define a door location. Using a combination square, measure near the top and bottom of the door to ensure parallel. Repeat using the face-frame rail.

SKILL BUILDER

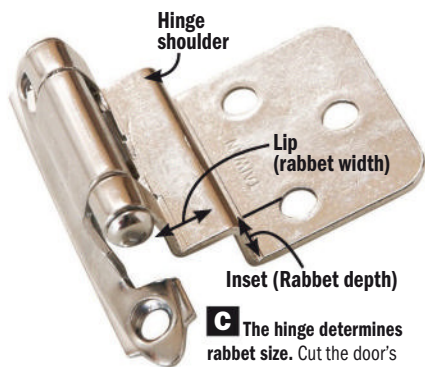
Self-centering bits make perfect pilot holes

Cut down on misaligned holes and snapped-off screws by using a self-centering bit (commonly called a Vix bit) when drilling pilot holes for hinge screws. Available in many sizes, these bits have outer sleeves that perfectly center the bit in a hinge's mounting holes. Adjust drilling depth by loosening a setscrew on the bit body.

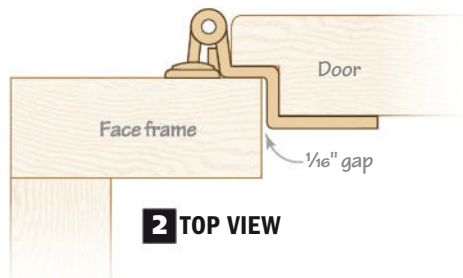
► Shop for self-centering bits.
woodmagazine.com/scbits



Partial-overlay hinges: For a lighter look



C The hinge determines rabbet size. Cut the door's rabbet so its depth equals the hinge's inset, and its width equals the hinge lip.



from the face frame on all sides [Drawing 3]. Now cut a rabbet around the back of the door to match the shoulder in the hinge.

These hinges install in much the same manner as their full-overlay counterparts: After marking the hinge location, attach the hinge door leaf to the back of the door.

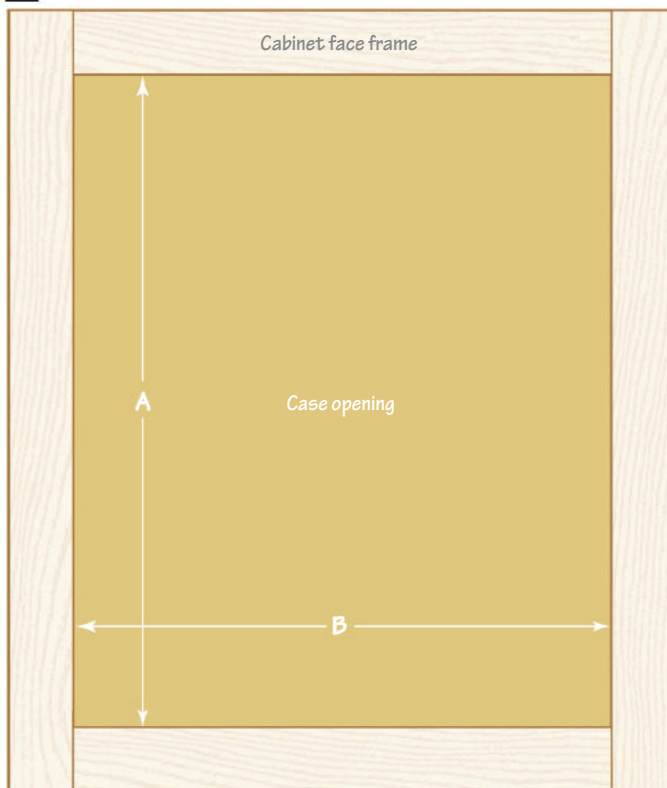
Position the door vertically and drive the frame-leaf screws. There's no need to center the door horizontally in the opening as long as you place 1/16" spacers between the hinge shoulder and the inside edge of the face frame when you drill and drive the leaf screws. With the hinges secured, remove the spacers.

► Learn to build frame-and-panel doors.
woodmagazine.com/frameandpanel

These hinges combine the ease of installation with the simplicity of full-overlay hinges, but work with doors rabbeted on their backs in order to hide half of their edge thickness [Photo C, Drawing 2].

When sizing the door for a partial-overlay hinge, multiply your overlay dimension (3/8" in this case) by 2, and then add the result to the width and height of the cabinet opening. Subtract 1/4" from the resulting dimensions to give the door some clearance

5 SIZE A PARTIAL-OVERLAY DOOR TO FIT THE CABINET OPENING



$$\text{Height of door} = A + (\text{overlay dimension} \times 2) - \frac{1}{4}"$$

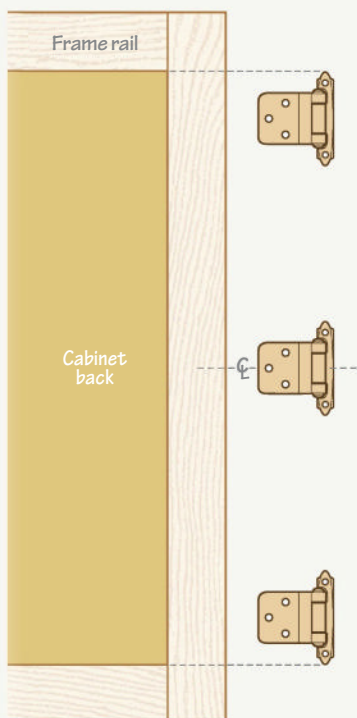
$$\text{Width of door} = B + (\text{overlay dimension} \times 2) - \frac{1}{4}"$$

SKILL BUILDER

Hinge-placement precision

When positioning hinges, you'll find these guidelines helpful:

1. For hinges exposed on the outside of the door, simply align the end of each hinge with the rail's inside edge (see drawing).
2. For European cup hinges mounted to typical cabinet doors, center the cup hole about 4" from the top or bottom of the door.
3. Doors taller than 30", wider than 24", or weighing more than a few pounds, may require three or more hinges. Check with the hinge-maker's specifications for load-bearing capacity, and space the middle hinge(s) evenly between the top and bottom ones.



Inset hinges: Hiding in plain sight

Often used in furniture, inset hinges and the doors they support give a clean, tidy appearance. Inset hinges work well on cabinets, too, but don't usually have the handy self-closing feature found on other hinges—you'll need a catch to keep these doors closed. When shopping for inset hinges, look for ones with screw slots in place of circular holes [Photo D] to provide more adjustability.

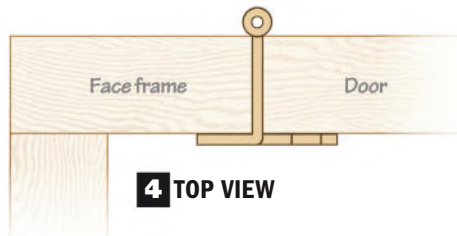
To determine the size of your door, measure the thickness of the hinge when closed, multiply by 2, and subtract the result from the width and height of the cabinet opening. If the opening isn't exactly square, cut your door $\frac{1}{8}$ " wider and longer to give yourself extra material for fitting.

To install these hinges on the door, determine hinge location as before, butt the hinge shoulder against the door edge and back, and drill pilot holes centered in the screw slots. Drive both screws [Photo E].

When installing the door, use a ledger board (below right) to set the vertical spacing, and attach each hinge to the face frame using only one screw. Check that the door swings freely and has an even reveal, then drive the remaining screws.



D Slots help lots. Look for inset hinges with screw slots that allow for slight vertical and horizontal adjustments after mounting.

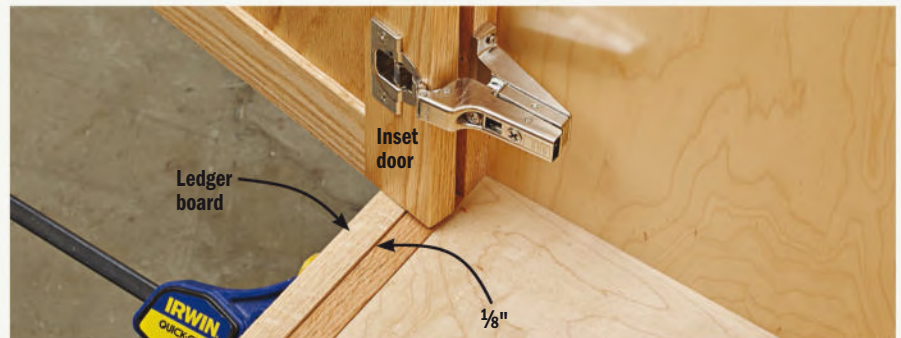
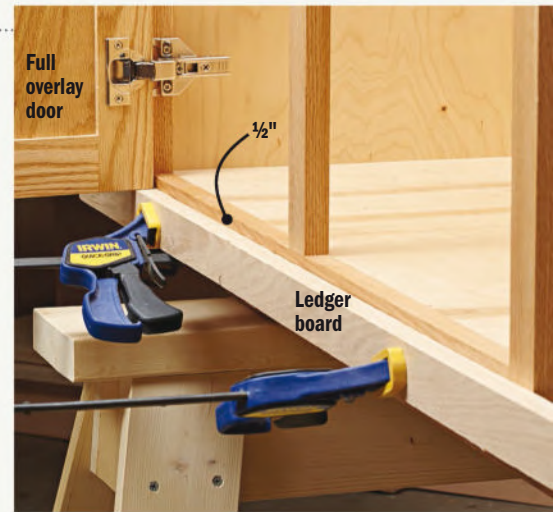


E Shoot for the center. Drive screws in the center of the hinge slots to maximize adjustability. Drill and drive the center screw after making adjustments.

SHOP TIP

Line 'em up with a ledger board

In the course of building and installing more than 200 cabinet doors, reader Dick Babbitt of Friday Harbor, Washington, developed this simple, time-saving method for installing hinges on doors. Key to his method: a ledger board that supports and aligns the doors, right. "Use a straight scrap of wood at least as long as the cabinet, and position it parallel to the bottom rail quickly and easily using $\frac{1}{2}$ " spacers," Dick advises. "In addition to making hinge installation easy, the board perfectly aligns the bottoms of multiple doors." A ledger board helps your install inset doors, too. Simply position the ledger board $\frac{1}{8}$ " above the bottom cabinet rail as shown, below.



European hinges: Totally concealed with features aplenty

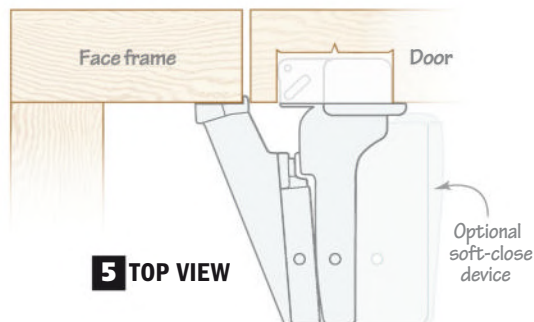


Since their arrival on American shores several decades ago, these hinges [Photo F] have become the standard in manufactured cabinetry for good reason. Though several times more expensive than the other hinges shown in this article, European hinges (also known as 35mm or cup hinges) hide entirely inside a door [Drawing 5], come in configurations for full-overlay and inset doors, and offer user-friendly features such as self-close and soft-close (the door slows toward the end of its close instead of banging shut—see **Bang a door no more** next page). They also offer more adjustability than other types, enabling you to move an installed door about 1/8" in all three planes: in and out, up and down, and side-to-side.

Begin the installation of these hinges by drilling a flat-bottom 35mm (or 1 3/8") hole on the back of the door stile. That hole houses the hinge's round cup. The position of that hole, and the screws that secure the cup side of the hinge, vary by manufacturer and model. If you're installing more than a couple of doors it's a good idea to make a drilling template for quickly marking those hole locations.

Attach the cup side of the hinge with its arm positioned 90° to the door edge and

F Now you see them. But once installed, you see no trace of the hinge on the outside of the cabinet, providing a clean appearance.



5 TOP VIEW

snap the clip side of the hinge onto it. Rest the door on a ledger board clamped securely in place, and while holding it in the open position with one hand, use your other hand to position the clip's stop tangs on the edge of the face frame [Photos G and H]. Drill screw pilot holes in the center of the clip's slots and attach the top hinge first by driving the upper screw. Do the same to the lower hinge. Now drive the remaining screws, as shown on page 32. Remove the ledger board, then close the door(s) and make any necessary fine adjustments.

Tip! To keep things manageable while attaching European hinges, magnetize your driver bit to hold a screw, freeing your hands to hold the door and drill/driver.

► Free hinge-locating jig plan: woodmagazine.com/hingejig



Clip for inset doors



Stop tangs

Clip for overlay doors

Two clips make the same cup hinge work for overlay or inset doors. The process described here works for both types of doors; you simply need different hinge clips attached to either the inside edge or back side of the face frame.

Bang a door no more

If you want to put an end to nerve-shattering cabinet-door closings, simple rubber bumpers won't do the trick. Instead, install a soft-closing device that dramatically slows the closing motion before the door contacts the face frame. You have multiple options, *below*. We show Blum products, but other manufacturers offer similar items. 🌱



Add-on soft-close device for hinge *below*. (Shown installed in cabinet photo *below right*.)



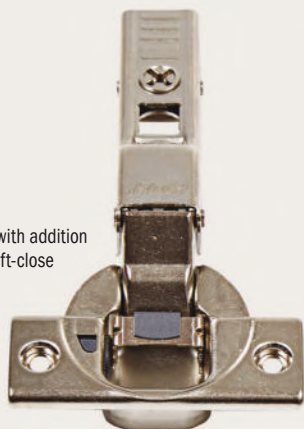
Soft-close mechanism for attachment to a single-door cabinet.



Same mechanism for cabinets with side-by-side doors.



Blum hinge with self-close but not soft-close.



Same hinge with addition of internal soft-close mechanism.



You have a lot of options in slowing a closing door: Buy a new European hinge with the feature built-in, purchase a soft-closing attachment available for some hinges, or add a stand-alone soft-closing mechanism to the upper rail of the cabinet face frame.

► **Source:** Blum hinges and soft-closing mechanisms: Rockler, 800-279-4441, rockler.com.

Keepsake Box

A basic but beautiful box rises from a few scraps of wood.



Spalted maple
with wenge

Douglas fir
with wenge

Here's the perfect project for getting the most bang for your exotic-wood buck. Less than two total board feet does it, plus a foot or so of aluminum rod and a scrap of 1/4" plywood.

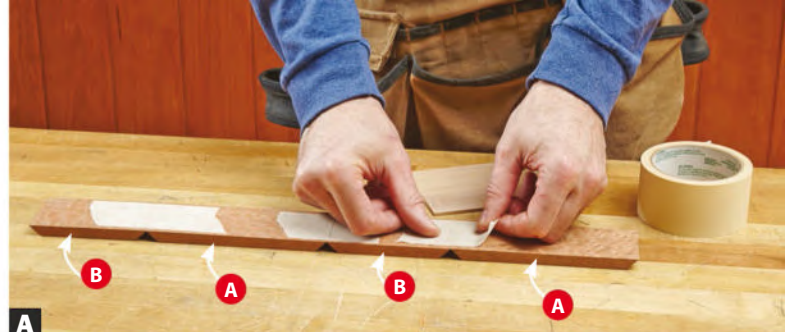
First, build the box and lid

Some of the fun in making this project comes in choosing its two contrasting woods. We used spalted maple, Douglas fir, and lacewood for the boxes and lids, and complemented those with wenge handle ends and legs. Less-exotic but still-effective combinations include oak/walnut and maple/cherry.

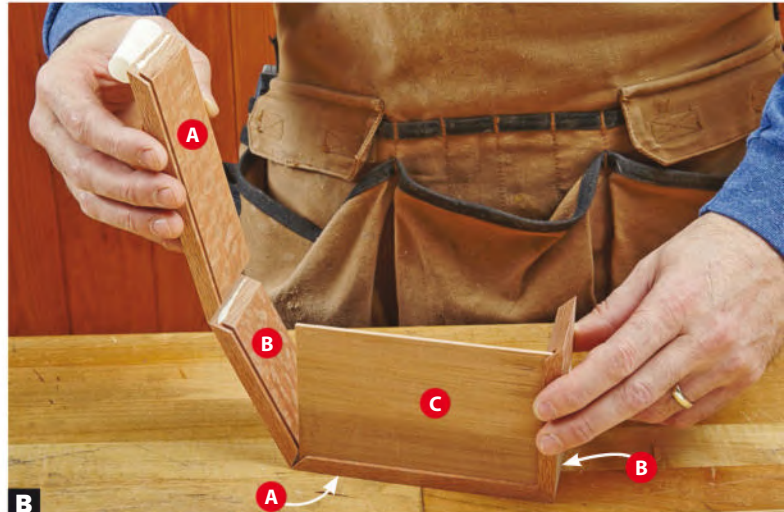
1 Cut a 3/8x2 1/4x24" blank for the sides (A) and ends (B) [Drawing 1]. Miter the sides and ends to final length. For clean miters we used an 80-tooth blade in the tablesaw, and a wood miter-gauge extension to prevent tear-out.

2 Cut the groove in the sides and ends [Drawing 1]. Saw the bottom (C) to size and check for a snug fit in the groove.

3 Assemble the box [Photos A and B]. Remove excess glue and check for tight miters before setting aside to dry.

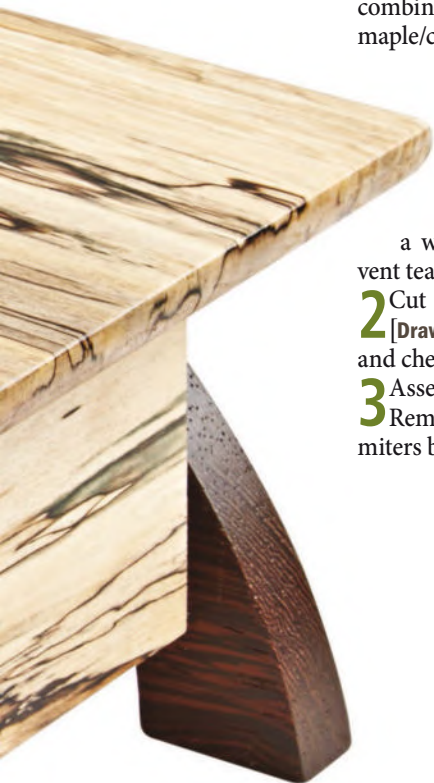
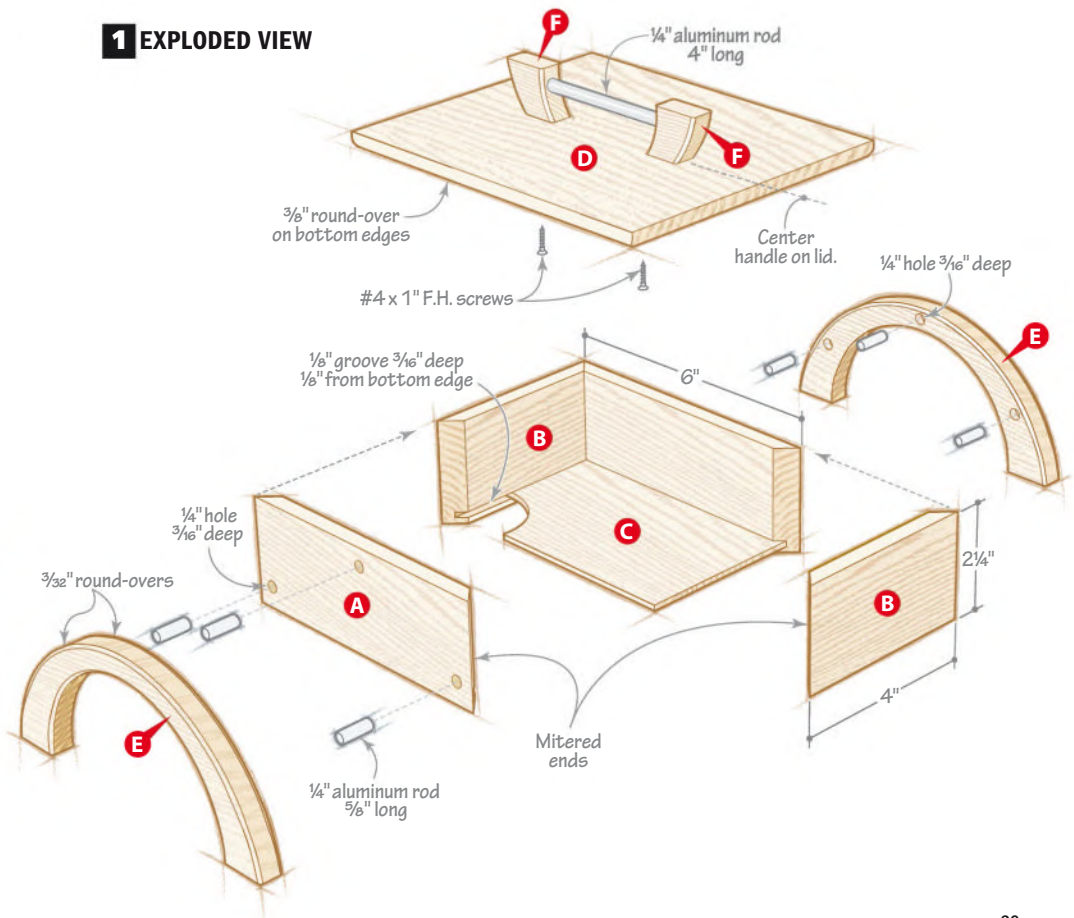


A The miracle of masking tape. Lay the box sides and ends in order on a flat surface with their miters snug together before applying tape.



B It's a wrap. Place glue in the groove and on the miters, wrap the sides and ends around the bottom (C), and secure with one more piece of tape.

1 EXPLODED VIEW



Lacewood with wenge



C A template ensures consistency. Whether you're making one box or dozens, guarantee accurate hole placement and depth by using a drilling template and a drill press.



D One template does it all. By using the same template to drill the box sides and legs (shown here under the template), the holes will always align.

4 Spray-adhere a copy of the drilling template [Drawing 2] to a 3x6" piece of $\frac{1}{4}$ " hardboard and drill the three holes. Clamp the template to a box side (A), flush with the top and ends, and drill the three holes [Drawing 1, Photo C]. Repeat for the other side.

5 Cut the lid (D) to size, then drill and countersink the pilot holes [Drawing 3]. Raise your tablesaw blade to $1\frac{1}{8}$ " high, stand the lid on end, and guide it along your tablesaw rip fence to cut the rabbet on one end of the lid bottom. Repeat for the other end. Now, raise the blade to $1\frac{1}{2}$ " high and repeat for the lid's edges. Round over the outside edges of the rabbeted surfaces.

Now, add the legs and handle

1 Cut two $\frac{1}{2}\times 3\frac{1}{8}\times 7\frac{7}{8}$ " blanks for the legs (E). Make two copies of Drawing 2 and apply one to each leg blank. Cut the legs to shape, staying just outside the lines.

2 Attach the drilling template to a leg using double-faced tape, aligning the bottoms and centering the holes in the template over the holes in the leg pattern. Drill the $\frac{3}{16}$ "-deep holes [Photo D]. Repeat for the other leg. Sand the legs to final shape, remove the pattern, and round over the edges where shown.

3 Cut a $\frac{1}{2}\times 1\times 3\frac{1}{8}$ " blank for the handle ends (F), and attach to it a copy of Drawing 4. Cut the blank in half where shown, secure

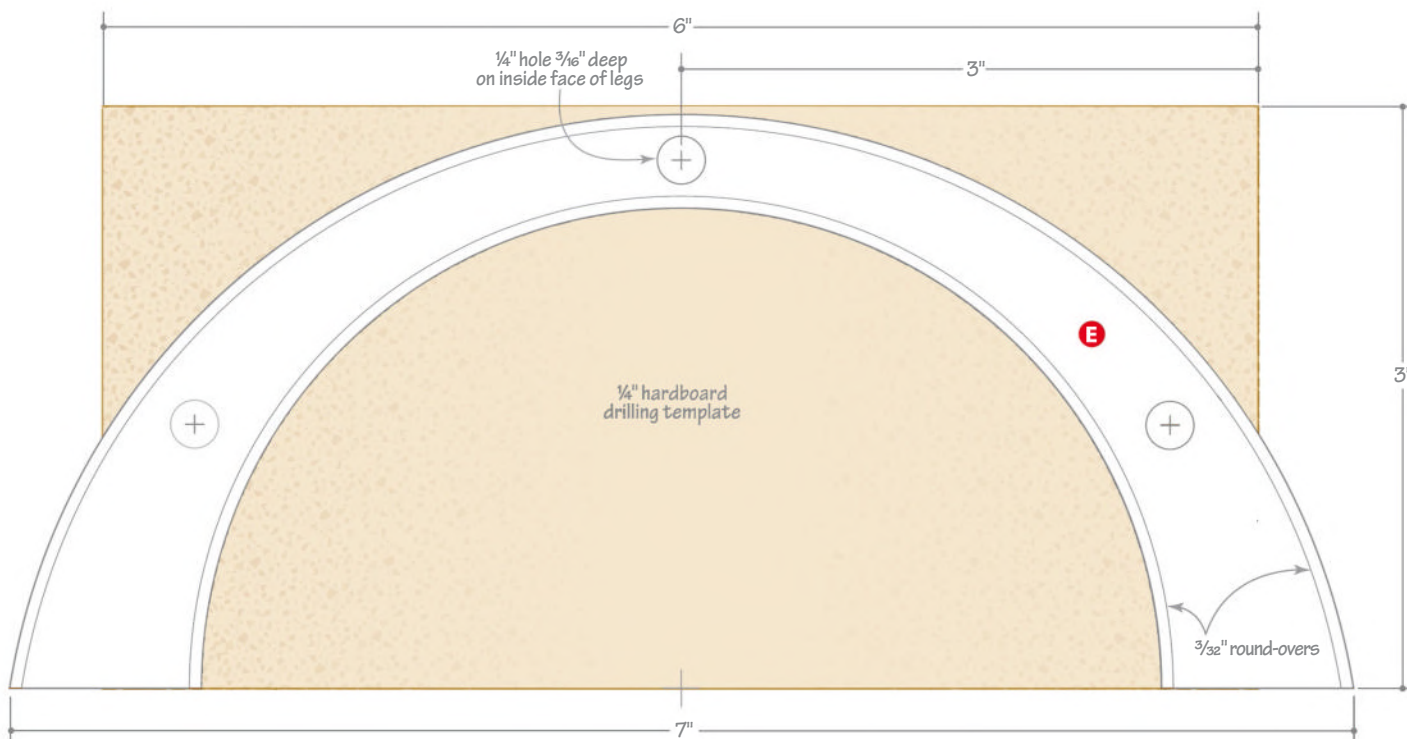
each in a holder (a wood handscrew works well) and drill the holes where shown. Cut and sand to shape, remove the patterns, and sand the round-overs.

4 Cut six pieces of $\frac{1}{4}$ " aluminum rod $\frac{5}{8}$ " long for the leg standoffs, and one handle piece 4" long. See **Tips for working with metal rod**, next page.

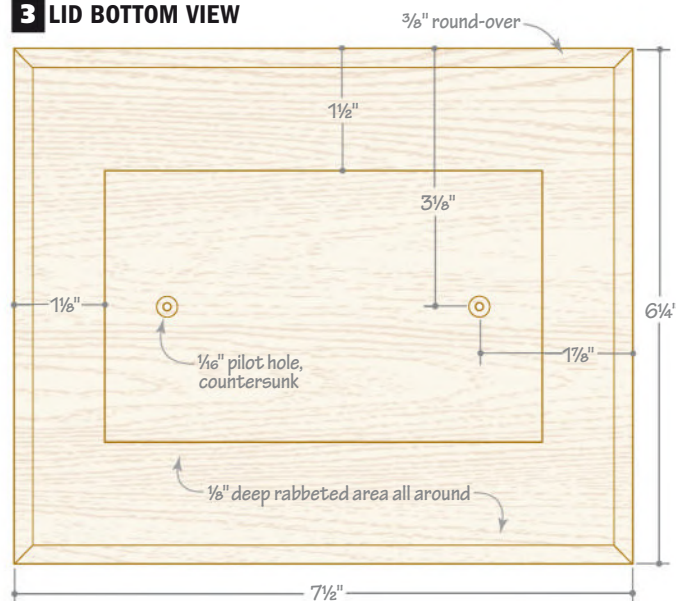
5 Mix up a small amount of epoxy and place some into the leg and box holes. Place the standoffs into the box sides, align the legs over the standoffs, and clamp together the assembly.

6 Apply double-faced tape to the bottoms of the handle ends (F). Insert (no epoxy)

2 DRILLING TEMPLATE/LEG FULL-SIZE PATTERN



3 LID BOTTOM VIEW



Materials List

Part	FINISHED SIZE			Matl.	Qty.
	T	W	L		
A* sides	3/8"	2 1/4"	6"	L	2
B* ends	3/8"	2 1/4"	4"	L	2
C bottom	1/8"	3 5/8"	5 5/8"	P	1
D lid	1/2"	6 1/4"	7 1/2"	L	1
E* legs	1/2"	3 1/8"	7"	W	2
F* handle ends	1/2"	1"	1 1/4"	W	2

*Parts initially cut oversize. See the instructions.

Materials key: L-lacewood, P-plywood, W-wenge

Supplies: #4x1" flathead screws, 1/4x12" aluminum rod

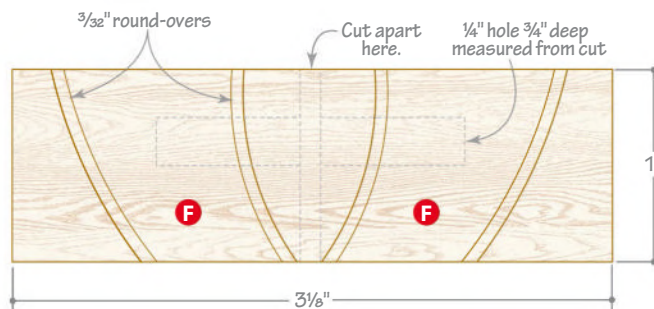
Bits: 1/4" Forstner drill bit; 3/32" and 3/8" round-over router bits

Produced by **Bill Krier** with **Kevin Boyle**

Project design: **Kevin Boyle**

Illustrations: **Roxanne LeMoine**

4 HANDLE ENDS FULL-SIZE PATTERN



the handle rod into the handle ends. Center that assembly on top of the lid [Drawing 1], press into position, and extend the pilot holes 3/4" into the handle ends. Remove the tape and screw the handle assembly in place.

7 Apply a clear finish to all wood and metal surfaces. We sprayed on three coats of clear satin lacquer. 🌱

SHOP TIP

Tips for working with metal rod

A few short pieces of metal rod go a long way in lending sophistication to this keepsake box. Try these tricks for working effectively with various types of metal rods.

1. You'll commonly find rod in brass, aluminum, and steel. Regardless of type, polish it with progressive grits of coarse, medium, and fine abrasive pads, such as Scotch-Brite. You can darken the steel and stave off corrosion by applying gun blue (available at sports and gun stores or at woodmagazine.com/gunblue). Aluminum and brass will also tarnish, so be sure to coat those with a finish that imparts very little amber color, such as lacquer.

2. To cut metal rod cleanly and squarely, build a holder with a groove that matches the rod diameter. Align the end of the rod with the end of the block and cut into the block and through the rod with a hacksaw. The kerf will guide your saw in cutting more pieces to the same length. Use sandpaper to remove any burrs on the cut ends.



Three rod metals to suit your tastes. Use brass, steel, or aluminum to give your box a slightly different flair.



Prepped to perfection. After removing the tarnish on brass and aluminum, treat with a protective clear coat. Gun blue provides an even tint on steel.



Basic metal-prepping supplies. Work through a progression of abrasive pads to remove tarnish. Then, protect and darken steel with gun blue.

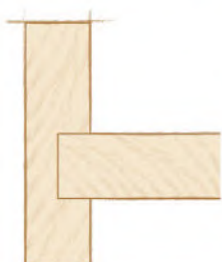


Block out bad cuts. A simple grooved block of wood holds metal rod steady for clean cuts of consistent length.

1 Dado Set

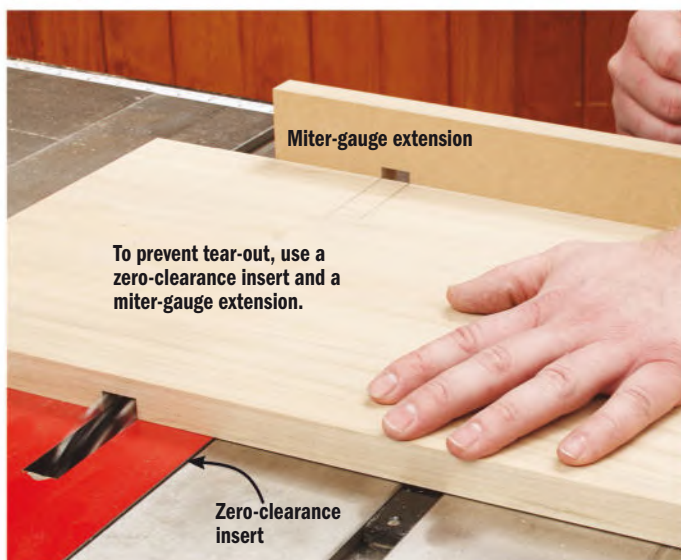
4 Easy Joints

With a good stacked-dado set costing from \$80 to \$270, you may be thinking twice about pulling the trigger on that purchase. To help justify spending so much, consider the fast, effective joinery you can crank out using only a tablesaw and dado set.



1. Dado or groove joint

You cut these narrow channels in different directions: Dadoes go across the grain; grooves run with the grain. Not only do they add significant mechanical strength to butt joints, but also the "walls" of the dado or groove provide additional glue surface area for superior bonding.



2. Rabbet joint

A partial groove or dado cut along the end or edge of a workpiece, a rabbet allows you to attach a cabinet top, bottom, or back flush with the adjacent workpiece.

Here's how: Install your full dado set and clamp an auxiliary rip fence to your table-saw's fence. Bury part of the blade below the table; moving the auxiliary fence over the blade; and, with the saw turned on, slowly raising the blade into the auxiliary fence. You can now fine-tune the width of your rabbet by adjusting your rip fence instead of the width of your dado set.



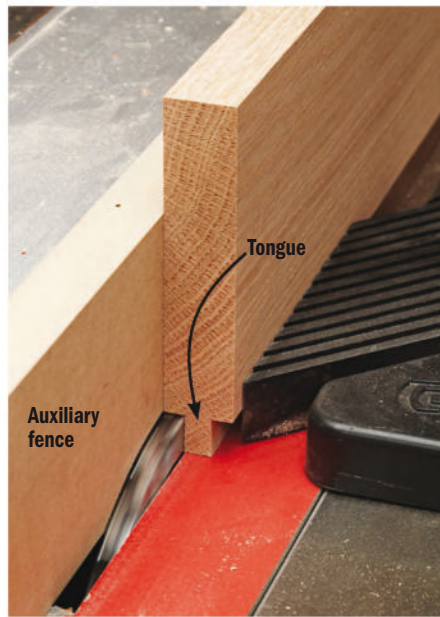
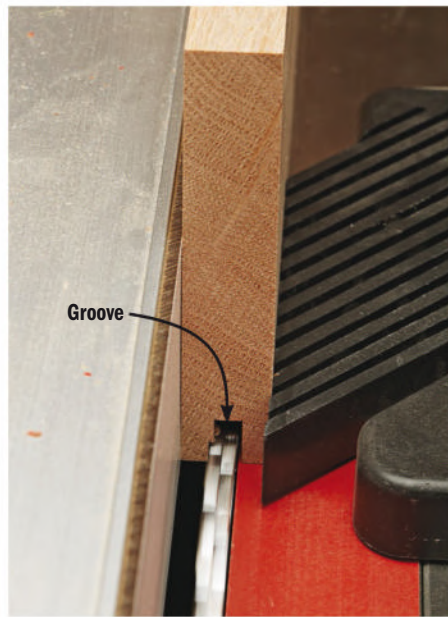
3. Tongue-and-groove joint



In this joint, the center tongue of one board (about $\frac{1}{3}$ the thickness of the board) fits into the groove of the adjoining board. This provides a strong mechanical bond while aligning your boards—ideal for edge-to-edge joints.

Here's how: To perfectly center the groove, set the rip fence to locate the groove approx-

imately in the center of the board; cut the groove. Then, rotate the workpiece 180° and make another pass with the workpiece's opposite face against the fence. For the tongue, use an auxiliary rip fence and cut a rabbet along both edges of the board, leaving the tongue a little oversize. Test the fit, adjust the fence, and recut both rabbets.



Note: When adjusting the fence, remember that adjustment doubles because you recut both sides of the tongue.

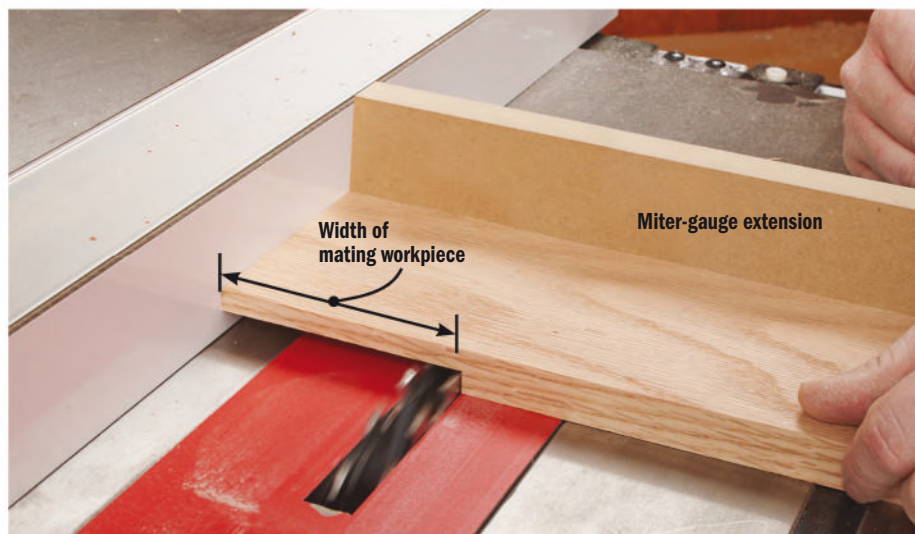
4. Half-lap joint



For a frame joint far stronger than a miter, make it a half-lap by cutting away half the thickness of two boards where they overlap. A stacked-dado set hogs out the waste quickly and smoothly (*below*).

Here's how: Set your blade depth to slightly less than half the thickness of your workpiece. Position the rip fence so the dis-

tance between the far edge of the dado blade and the fence equals the width of the mating workpiece. After you cut the two mating pieces, check the fit; then sneak up to the perfect depth in succeeding cuts. (Like the tongue-and-groove joint, each adjustment doubles because it comes from both halves of the joint.) 🌲



Triple-duty

It's a sheet-goods cutting center.
It's a panel glue-up station.
It's an assembly table.
And you can build it this weekend!



Workstation

Start with the cutting guide

1 Choose a piece of $\frac{3}{4}$ " poplar that is slightly wider than needed for the cutting-guide fence (A) and straighten one edge using your router (see **Skill Builder**, below). Lay out the width using a chalk line or long straight-

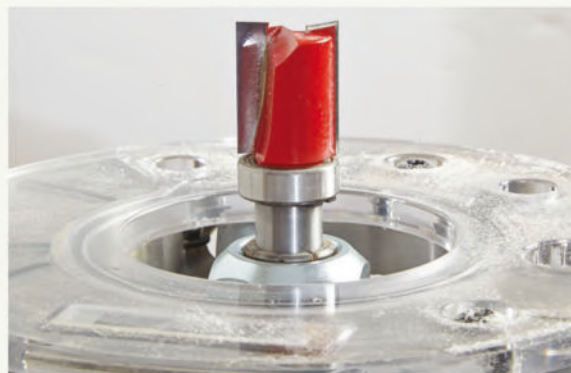
edge. Then, use your circular saw to rip the opposite edge to final width and crosscut to final length [**Materials List**, **Drawing 1**]. Use a holesaw to bore the $2\frac{1}{8}$ " holes.

Note: It's not critical at this stage to straighten the newly rough-cut edge.

SKILL BUILDER

Jointerless edge-jointing

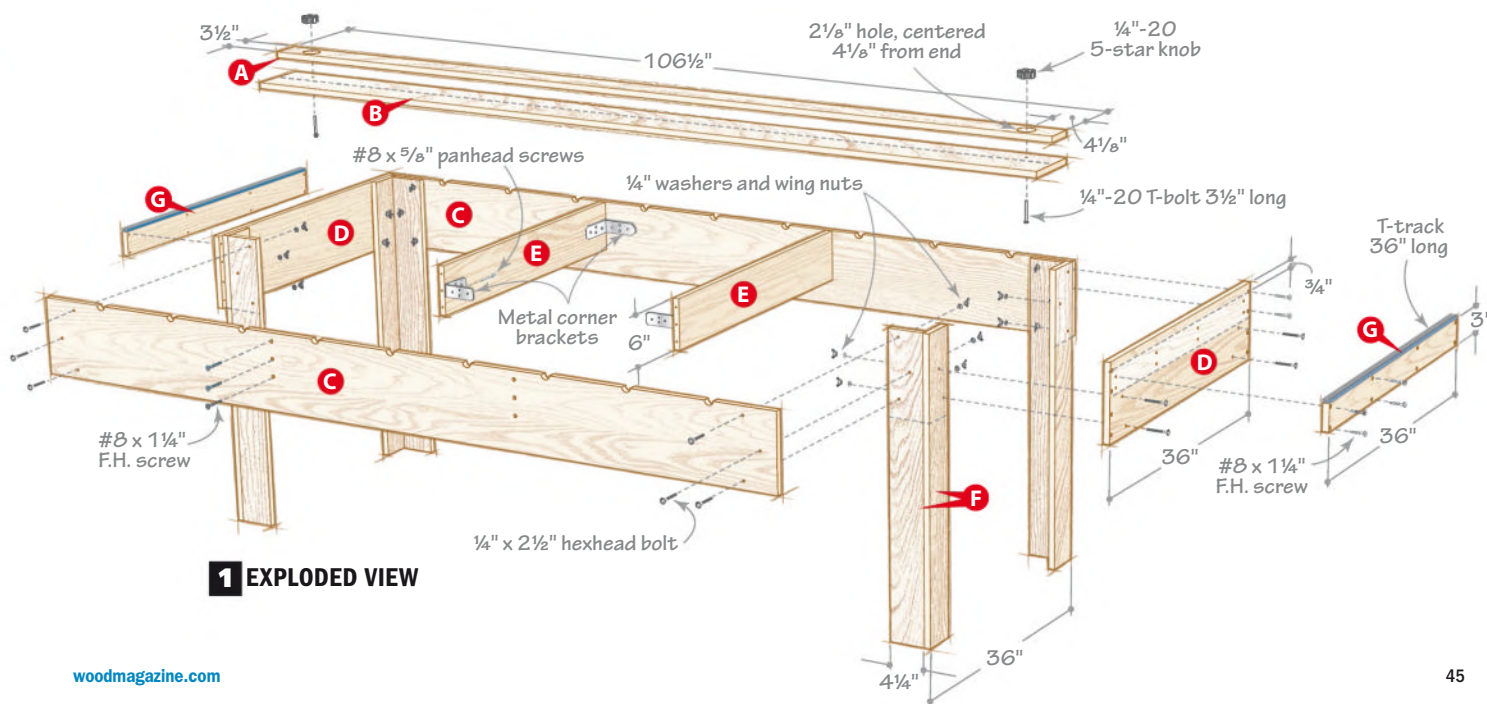
Even if lumber has been surfaced on four sides (S4S), don't trust the edge to be perfectly straight. Instead, straighten one edge using your router. First, position the board on the edge of a sheet of extruded foam insulation. Cover it with a sheet of plywood, double-face taping or clamping it to the board while leaving about $\frac{1}{16}$ " of its edge exposed. Using the plywood's edge to guide the bearing of a pattern-routing bit, below left, straighten one edge of the board, below right.



You'll appreciate the pattern-routing bit. Because a pattern-routing bit's bearing is the same diameter as the cutters, it easily duplicates the pattern in the material below.



Straightedge duplication. Rout the edge of the cutting-guide fence (A) using the factory edge of the plywood as a straightedge. Shift the plywood straightedge before you reach its end to continue jointing.

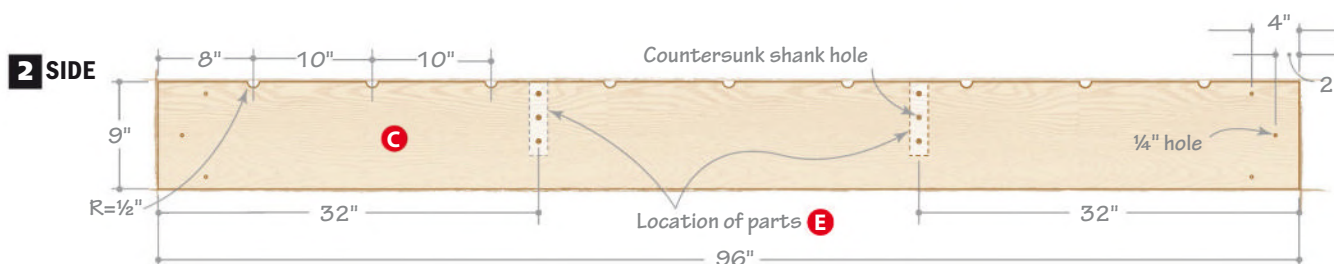


3 Glue and clamp the cutting-guide fence (A) to the base (B) flush at one edge with the routed edge of the fence facing in. After the glue has dried, drill $\frac{1}{4}$ " holes through the base centered in each $2\frac{1}{8}$ " hole in the fence. Then, rip the base to final width, creating a zero-clearance edge **[Photo A]**.

A **Make a zero-clearance edge.** Take care to maintain contact between the saw's baseplate and the cutting-guide fence as you rip to create a smooth, straight edge.



B **Congrats! Your first guided cut.** Offset the plywood and support it with a spacer to create clamp access. Place the cutting guide (A/B) on the keeper piece (rather than the offcut side).



1 Because you'll split it in half later, make the width of the blank for the sides (C) 18" plus the width of the kerf made by your circular-saw blade. Mark that measurement on a 4x8' sheet of $\frac{3}{4}$ " plywood. Then, clamp the cutting guide (A/B) on your marks, and rip the side blank to width [**Photo B**].

plywood with scrap wood to prevent tear-out and drill the holes. Then, rip the blank down the center, forming the sides **[Photo C]**.

3 Cut the ends (D) to size. Then, drill, countersink, glue, and screw the ends to the sides [**Photo D**, **Drawing 1**]. Measure the interior width of the top assembly (C/D) near one end to determine the length of the braces (E). Cut the braces to size, and screw them in place. Add metal corner brackets to the braces to help square and stiffen the assembly.



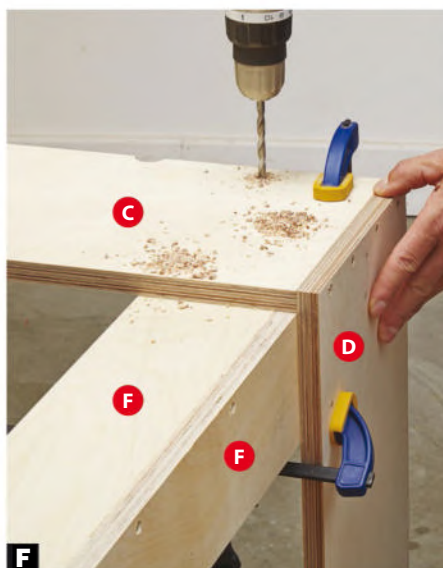
C
Side-splitting performance. Offset the cutting guide by a distance of half the thickness of your blade from the centerline to cut the sides (C) to equal widths.



D
Assemble the top. Pressing the tops of the sides (C) and ends (D) to the floor keeps the edges flush while a clamping brace maintains square. Get a free plan for a right-angle clamping brace at woodmagazine.com/clampingbrace.



E
Get a leg up on your bench. Align and clamp one leg side (F) on top of another on a worksurface with the edges and ends flush. Drill, countersink, glue, and screw them together.



F
One leg at a time. Orient the leg as shown in **Drawing 1**, with the tops flush and clamp the leg to both the side (C) and the end (D) to draw it up tightly for drilling.

SHOP TIP

A hack for clean bolt threads

The shredded threads that remain after hacksawing a bolt or threaded rod to length are rarely nut-ready. Before you take saw to bolt, thread on a wing nut.

Then, clamp the bolt in your vise and hack away. When you're done, lightly file off any burrs. Then, remove the wing nut. The nut's threads will re-shape the bolt's threads, leaving a good-as-new custom bolt.



4 Cut the leg sides (F) to size and assemble them [Photo E]. Clamp one leg (F/F) to the inside corner of the top assembly (C/D). Drill $\frac{1}{4}$ " holes through the sides, ends, and leg assemblies [Photo F, **Drawing 2**].

Note: The ends have only two holes; omit the top one. Then, repeat on the remaining three legs, making sure to make leg pairs mirrored. Then, bolt the legs to the top.

5 Cut the T-track bases (G) to size [Drawing 1]. Screw aluminum T-track [see **Source**] to the top edge of the T-track bases, flush with

the inside face. Then, glue and screw a T-track base to each end (D) $\frac{3}{4}$ " from the top edge.

6 With a scrap of $\frac{3}{4}$ " plywood between them, secure the cutting guide (A/B) to the base (C–G) with $3\frac{1}{2}$ "-long T-bolts in the track. Snug the guide with the 5-star knobs. With the depth of your saw set as discussed in “Using your workstation,” on page 48, position the saw on the end of the cutting guide. You may have to trim the length of the T-bolts [Shop Tip, above] if they interfere with your saw during cutting. If everything checks out, cut away!

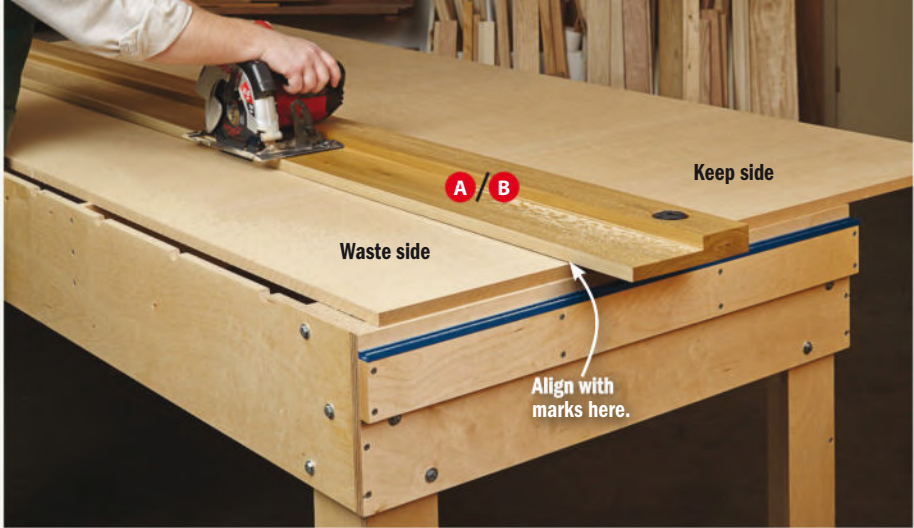
► Working with limited tools? Find more plans to outfit your shop: woodmagazine.com/shopoutfit

Using your workstation

With the cutting guide (A/B) and T-bolts removed, top your workstation with the sheet to be cut. Measure and mark your cut on both ends. Reinstall the cutting guide, aligning its zero-clearance edge with your marks before securing the guide with the knobs. Set your circular saw's depth just below the sheet's bottom face, taking the thickness of the cutting guide into consideration. Then simply make your cut, keeping the saw's baseplate tight against the cutting-guide fence (A), *right*. The blade will nick the top edges of the workstation. Don't sweat it; it won't affect its strength or usefulness.

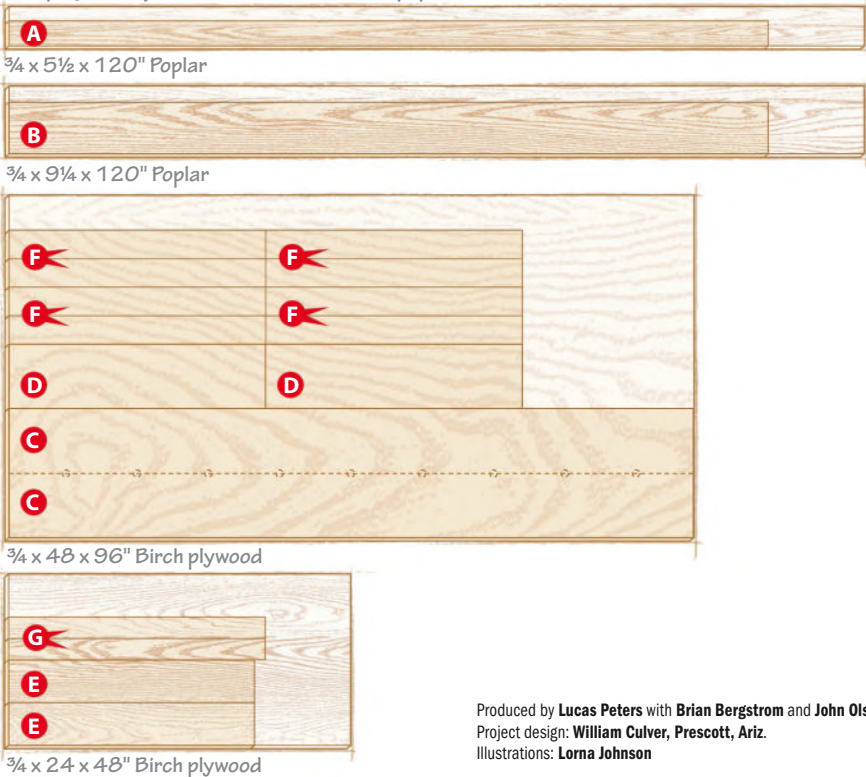
To use your workstation as a panel glue-up station, *below right*, drop pipe clamps into the notches. And use it as an assembly table by dropping a sheet of MDF or a hollow core door on top. 🌲

► Learn to clamp up perfectly flat panels.
woodmagazine.com/flatpanels



Cutting Diagram

This project requires 13 board feet of 4/4 poplar.



Materials List

Part	FINISHED SIZE			Matl.	Qty.
	T	W	L		
A* cutting-guide fence	3/4"	3 1/2"	106 1/2"	P	1
B* cutting-guide base	3/4"	7 1/4"†	106 1/2"	P	1
C* sides	3/4"	9"	96"	BP	2
D ends	3/4"	9"	36"	BP	2
E braces	3/4"	6"	34 1/2"	BP	2
F leg sides	3/4"	4 1/4"	36"	BP	8
G T-track bases	3/4"	3"	36"	BP	2

*Parts initially cut oversize.

†Width varies depending on your circular saw. See the instructions.

Materials key: P-poplar, BP-birch plywood.

Supplies: #8x1 1/4" flathead screws, 3" metal corner brackets (4), #8x5/8" panhead screws, 1/4"-20 hexhead bolts 2 1/2" long (20), 1/4" flat washers (40), 1/4"-20 wing nuts (20).

Bits: Pattern-routing bit, 2 1/8" holesaw, 1" spade or Forstner bit, 7/32" countersinking drill bit.

Source: 1/4"-20 T-bolts 3 1/2" long 5-pack, no. 35856, \$7; 1/4"-20 5-star knobs, no. 23804, \$2 (2 needed); 36" T-track, no. 26420, \$19 (2 needed); Rockler Woodworking and Hardware, 800-279-4441, rockler.com.

Produced by **Lucas Peters** with **Brian Bergstrom** and **John Olson**
Project design: **William Culver**, **Prescott, Ariz.**
Illustrations: **Lorna Johnson**

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Brad Nailer

When you need to fasten a joint or secure workpieces quickly and reliably, reach for one of these air-powered aces.

With the advancements in glue, screws, and joinery tools (biscuit joiners, pocket-hole jigs, etc.) over recent decades, nails have all but disappeared from furniture and cabinet construction. But 18-gauge brad nailers have kept small nails relevant, especially for shop projects, jigs, and difficult-to-clamp assemblies. And, of course, they still excel at installing small trim. We tested a dozen bradders in search of the ideal model for a woodworking shop. Fortunately, we found several that excelled.

The best brads won't be seen

Ideally, a nailer should seat the head of a brad $\frac{1}{16}$ " below the wood surface, leaving you space in the tiny cavity for wood filler. Using an air compressor set for 90-psi hose pressure, we drove $1\frac{1}{4}$ " brads with all 12 nailers into laminated-MDF panels and hard maple

with no problems. However, when we drove 2" brads at that same pressure, only half the nailers could sink them below the surface. Increasing the pressure 10–20 psi (to a level still within each model's approved range) helped all but one of the rest sink the brads. The Porter-Cable left every other 2" brad proud of the wood surface until we increased the hose pressure to 130 psi, just outside its recommended range.

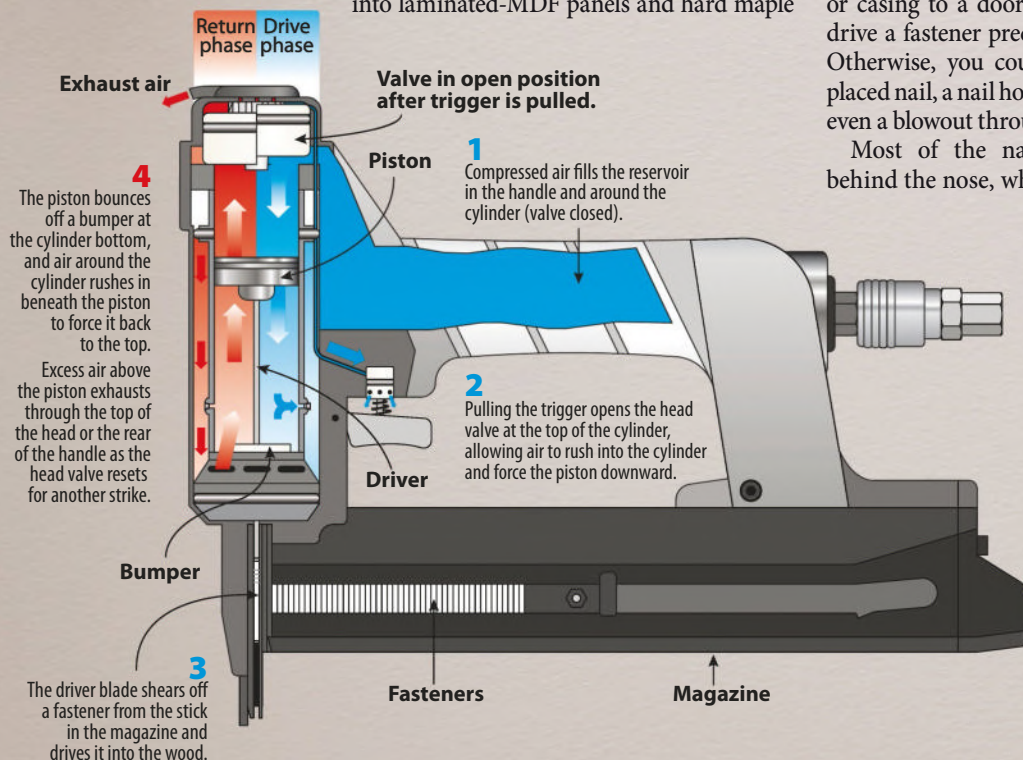
Each of the tested nailers uses a thumb-wheel below the trigger to adjust nail depth. Most worked well, but five were more difficult to get a finger on and turn, and the Cadex would bind frequently. (See the ratings on page 54.)

Precise placement prevails

Whether attaching trim to a furniture piece or casing to a door jamb, your nailer must drive a fastener precisely where you want it. Otherwise, you could end up with a misplaced nail, a nail hole in an unsightly spot, or even a blowout through an adjacent surface.

Most of the nailers have safety trips behind the nose, which improve your sight-

How a pneumatic nailer works



All the tested nailers:

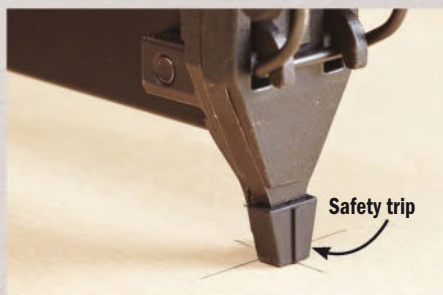
- ▶ are powered by compressed air
- ▶ shoot 18-gauge brads up to 2" or $2\frac{1}{8}$ " long
- ▶ sell for \$80 and above

Shootout

line to the nose for brad placement. These must be depressed against the workpiece before you can fire the nailer via its trigger.

Two models consistently fired brads with the kind of accuracy a jeweler could appreciate. The nearly identical Bostitch Smart Point and DeWalt Precision Point nailers have rear safety trips that serve as the back half of the nose, rather than being separate elements as on the other nailers. The noses on these two resemble those found on micropinners and are dwarfed by the others in the test group (shown at *right*). And with both of these, the opposite-action safety trip defaults to the up (depressed) position, so it doesn't need to be pushed up by workpiece contact. The safety moves downward as you pull the trigger, so as long as the safety trip contacts something that prevents it from moving down, the trigger will fire. With other nailers, you must fully depress the safety trips before the noses contact the wood, often resulting in shallow dimples in the surface.

All the nailers come with at least one narrow nose tip for preventing (or minimizing) dents in the wood. But these tips can impair your ability to place a brad precisely, particularly with the Cadex, Grex, Paslode, and Porter-Cable nailers. The front safety trip on the Grip-Rite makes it the most difficult for brad placement. And with half the nailers, the drivers create dents wider than those made by the brad heads.



Fair. The Grip-Rite's front-mounted safety trip obscures your view of the nose, impairing the ability to precisely place a nail.



Better. Senco's rear-mounted safety trip allows good sightlines from the front, but side-to-side is still a bit iffy.



Best. The narrow nose and rear safety trip on the Bostitch and DeWalt nailers allow for perfect visibility and spot-on nail placement.



Tip! Operating your nailers at 90-psi hose pressure—making exceptions for higher pressure only when needed—will extend the life of your nailers.

► Read our assessment of the Rolair 3-gallon air compressor used during testing, as well as reviews of other compressors. reviewatool.com/ac



Bostitch BTFP12233, \$120

800-556-6696, bostitch.com



Cadex CB18.50A, \$160

604-876-9909, cadextools.com



DeWalt DWFP12233, \$120

800-433-9258, dewalt.com



Window warning. The view window on the Max nailer shows plenty of brads remaining (left), and the red indicator in that window calls for a refill (right).

What to know about nails and magazines

► All 12 of the brad nailers we tested use 18-gauge brads in straight sticks, so they'll work with most brands of brads. Brads are typically galvanized, but you can also find them in stainless steel, although we've never needed those.

Among our test group, only the Grex nailer fires brads as short as $\frac{1}{2}$ ". The Cadex has a minimum of $\frac{3}{4}$ "; the rest start at $\frac{5}{8}$ ". We like the $\frac{5}{8}$ " capability for nailing together thin stock, preventing accidental nail-throughs. For maximum length, five nailers top out at $2\frac{1}{8}$ "; the others at 2". Nails this long prove crucial when installing trim.

The magazines on all 12 nailers open and close easily, with no issues loading and unloading sticks of brads. They all have view windows, shown *above*, to alert you when the brads are almost gone. We prefer nailers that will accept a full stick (100 brads) as soon as the indicator appears in the view window. But with the Cadex, Grex,

Max, and Paslode models, you have to fire 5–8 more brads after the indicator appears before a full stick will fit.

To avoid damage to the driver, dry-fire lockouts prevent firing when the brads run out. Four tested models claim this feature. The Grex works best because it fires all the remaining brads and then locks up its driver. Ridgid's nailer leaves six brads in the magazine when it locks out. Dry-fire lockouts failed to work on the Cadex and Grip-Rite nailers, as they continued to fire on an empty magazine.

We experienced only a few nail jams during testing—a good sign, for sure. But it's comforting to know that all but one nailer have tool-free access, shown *below*, should a jam occur.



Easy open. Tool-free latches, shown here on the Hitachi, help you clear nail jams quickly.



Tool needed. Grex's nailer requires a hex wrench (not included) to open the nose and free a jammed nail.



Grex 1850GB, \$200
888-447-3926, grextools.com



Grip-Rite GRTBN200N, \$90
800-676-7777, grip-rite.com



Hitachi NT50AE2(S), \$80
800-829-4752, hitachipowertools.com

Features that matter

► **Quick connects** All but the Max come with a quick-connect air-hose fitting. Fittings of the Cadex, DeWalt, Grex, Grip-Rite, Ridgid, and Senco nailers swivel, making the tool less clumsy in use than the fixed, straight fittings on the Bostitch, Makita, Paslode, and Porter-Cable nailers. Hitachi's coupler is fixed, but angles upward, reducing the awkwardness. They all work well enough in our testing, so it comes down to user preference.

► **Oil or oil free** The Bostitch, DeWalt, Porter-Cable, Ridgid, and Senco nailers do not require oil for internal lubrication, so if low maintenance is a priority for you, choose one of these. The others require a drop now and then, more so with frequent use, but Hitachi and Max do not include a bottle of oil. Oil-lubricated nailers typically will be less likely to need repairs down the road.

► **Exhaust** Each time you fire a nail, the compressed air powering that blast needs to escape after resetting the piston. Four nailers (Grip-Rite, Hitachi, Makita, and Paslode) use top-mounted, 360° swiveling exhausts that let you direct the air away from you and the workpiece. These tend to be louder than rear exhausts. Of those models with rear exhausts, only Ridgid and Senco have 360° swivels.

► **Blower** Cadex has a built-in air blower, shown at *right*, that comes in handy for

clearing dust and debris from workpieces without having to set the nailer down.

► **Eye protection** The Grex, Hitachi, Makita, Grip-Rite, Paslode, and Ridgid nailers come with protective goggles.

► **Storage** Each of the nailers comes with a storage case, important for protecting the nailer's nose and keeping dust from getting into the air fitting. All are plastic except for Ridgid's canvas bag.

Three features of less importance to woodworkers

► **Bump-fire trigger** All but the Makita, Paslode, and Porter-Cable nailers have dual-mode triggers that let you choose between single fire (pulling the trigger each time) and bump fire (holding the trigger depressed and then lifting and lowering the nailer each time). Woodworkers rarely need to bump-fire in rapid succession.

► **Belt hook** All but the Cadex, Hitachi, and Paslode have a hook to let you hang the nailer on a tool belt. Some rotate to suit your dominant hand, and the Bostitch, DeWalt, and Porter-Cable have a pencil sharpener in their hooks.

► **Padded trigger** Although some nailers tout this as a value-added feature, woodworkers rarely fire more than a dozen or two brads per use. We found no issues with trigger comfort on any model.

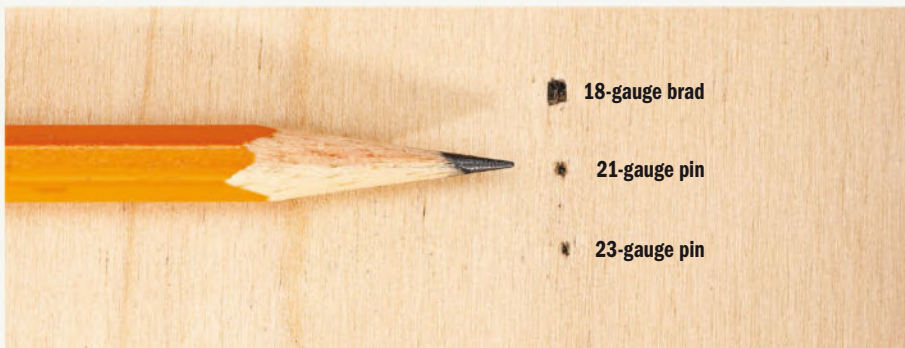


Give it a blast. To blow air through the Cadex nozzle, push the spring-loaded lever.

SHOP TIP

Keep the hold, lessen the hole

If an 18-gauge brad nailer creates too large of a hole for your projects, but you need the holding power of a headed nail, consider a 21-gauge pinner. These tools fire headed wire pins about midway between the size of a brad and a 23-gauge headless pin. Senco's FinishPro 21LXP (\$250) and Cadex's CPB21.50 (\$330) are the only two we know of, and they both performed well in testing in our shop.



Makita AF505N, \$90
800-462-5482, makitatools.com



Max NF255F/18, \$110
800-223-4293, maxusacorp.com



Paslode T200-F18, \$90
800-222-6990, paslode.com

Driving Decisions For 18-Gauge Brad Nailers

MODEL	PERFORMANCE RATINGS (1)						FASTENERS												
	PRIMARY		SECONDARY																
	POWER TO SINK 2" BRADS AT 90 PSI	ACCURACY OF BRAD PLACEMENT	EASE OF ADJUSTING FASTENER DEPTH	ERGONOMICS	ABSENCE OF WORKPIECE MARRING (WITH NO-MAR TIP)	EASE OF CLEARING FASTENER JAMS	LENGTH RANGE, INCHES	WILL A FULL STRIP OF NAILS FIT WHEN INDICATOR FIRST SIGNALS LOW ON NAILS? (YES, NO)											
BOSTITCH BTFP12233	A-	A	A	A	A	A	5/8 – 2 1/2	Y	70-120	N	R	N	Y	Y	3-0	7	C	\$120	
CADEX CB18.50A	A	B	C	B	A-	B-	3/4 – 2	N	70-105	Y*	R	Y	Y	Y	3-7	1	T	\$160	
DEWALT DWFP12233	A-	A	A	A	A	A	5/8 – 2 1/2	Y	70-120	N	R	N	Y	Y	2-13	7	C	\$120	
GREX 1850GB	B	B	A	A	A	C	1/2 – 2	N	70-120	Y	R	Y	Y	Y	3-2	1	T	\$200	
GRIP-RITE GRTBN200N	B	C	B-	B-	A	A	5/8 – 2	Y	70-110	Y*	T	Y	Y	Y	3-3	3	T	\$90	
HITACHI NT50AE2(S)	B	B-	A	A	B	A	5/8 – 2	Y	70-120	N	T	Y	Y	Y	2-4	1	T	\$80	
MAKITA AF505N	A-	B-	B-	A	B	A	5/8 – 2	Y	60-115	N	T	Y	Y	N	3-3	3	C	\$90	
MAX NF255F/18	B+	B-	A	A	B	A	5/8 – 2 1/2	N	70-100	N	R	Y	N	Y	2-10	5	J	\$110	
PASLODE T200-F18	B+	B	B	A	B-	A	5/8 – 2	N	70-100	N	T	Y	Y	N	2-4	1	T	\$90	
PORTER-CABLE BN200C	C-	B	B	A-	A	A	5/8 – 2	Y	70-120	N	R	N	Y	N	2-10	3	C	\$80	
RIDGID R213BNE	A	B-	A	A	B	A	5/8 – 2 1/2	Y	70-120	Y	R	N	Y	Y	2-9	3	T	\$100	
SENCO FINISHPRO 18MG	A-	B+	A	A	B	A	5/8 – 2 1/2	Y	70-120	N	R	N	Y	Y	2-10	5	T	\$90	

► Read reviews of other nailers and post your feedback as well.
reviewatool.com/nailers

1.

A	Excellent
B	Good
C	Fair

2. (*) Lockout did not work

3. (C) China
(J) Japan
(T) Taiwan

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

Three tools nailed our tests

A brad nailer used primarily for building furniture and cabinetry and hanging trim needs to drive brads precisely without marring the wood. The Bostitch Smart Point BTFP12233 and DeWalt Precision Point

DWFP12233 nailers excel at that, and earned excellent marks in all secondary categories. They come with test-topping 7-year warranties. For all this, they share Top Tool honors. Ridgid's R213BNE scored nearly as high and has the dry-fire lockout, but a less-precise

nose kept it a notch below the top pair.

The Senco FinishPro 18MG, for \$90, scored nearly as well as the top two and comes with a 5-year warranty, earning our Top Value award. 🌿

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



Porter-Cable BN200C, \$80
 800-544-6986, portercable.com



Ridgid R213BNE, \$100
 866-539-1710, ridgid.com



Senco FinishPro 18MG, \$90
 800-543-4596, senco.com



Striking Mallet

A good mallet will find a permanent spot on your workbench, always at the ready. Reach for it to encourage a chisel through a tough bit of grain, bring together or separate a joint, and many other duties. This one takes so little time to create, you may want to round up enough scrap to make several in one turning session. That way, you'll always have one nearby.

We used a blank of solid sugar maple for the head because of its hardness. Other species to consider, in increasing order of hardness, include pin oak, black locust, pecan, pear, hickory, and osage orange. For the handle, our scrap bin yielded a length of cocobolo. The boiled linseed oil finish renews easily with a fresh coat when the mallet shows wear.

First, get your head right

Tools: Spindle roughing gouge, parting tool, spindle detail gouge
Speed: 500 rpm for drilling; 1,800 rpm for shaping

Prepare a 3×3×5" straight-grained maple blank for the head. Mark the centerpoint on each end.

Mount a drive center in the tailstock of your lathe, and a drill chuck in the headstock. Install a 3/4" Forstner bit in the chuck. Trap the head blank between the drive center and bit. With the lathe set for 500 rpm, cradle the blank with your left hand to prevent it from spinning, switch on the lathe, and advance the tailstock to drill a

hole 3" deep [Photo A]. You'll likely have to reposition the tailstock to achieve this depth.

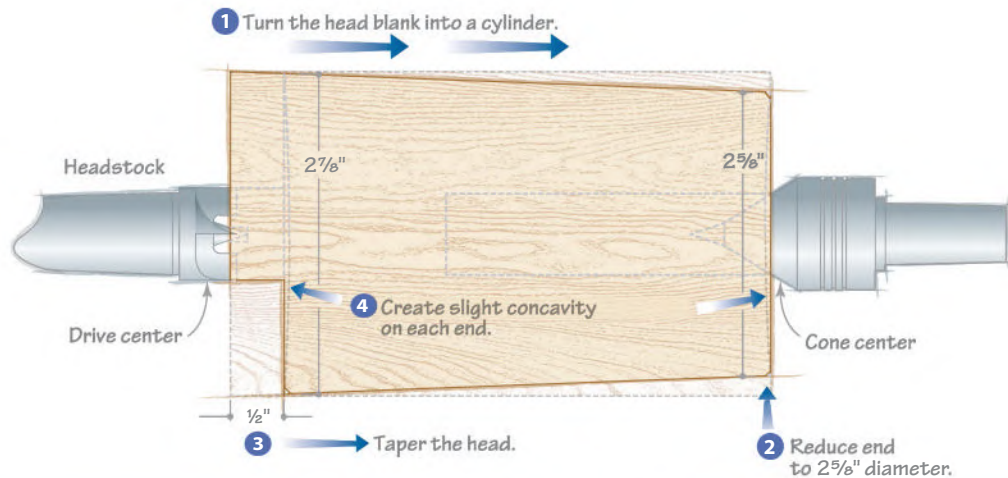
Remove the drive center and the drill chuck. Install the drive center in the headstock, and a cone center in the tailstock. Secure the head between the two, as shown in the drawing (*next page*), change the lathe speed to 1,800 rpm, and with your spindle roughing gouge, turn the blank round.

continued on page 56

Switch to the parting tool and reduce the diameter at the tailstock end to 2 $\frac{5}{8}$ ". With the roughing gouge, create a taper from the left end to the parting cut on the right end [Photo B].

Measure and mark a line $\frac{1}{2}$ " from the left end and, with the parting tool, reduce this area as close to the diameter of the drive center as possible [Photo C].

With the spindle detail gouge, create a slight concavity in each end [Photo D], undercutting the waste tenon slightly. Then turn a $\frac{1}{16}$ " chamfer around each end. Sand the head smooth. Remove it from the lathe, cut off the waste tenon at the top, and sand the top and bottom ends smooth. Then, sand with the grain on the face of the head to remove any cross-grain sanding marks.



► Watch a FREE video of this mallet being turned.
woodmagazine.com/mallet



Now get a handle on it

Tools: Spindle roughing gouge, parting tool, spindle detail gouge
Speed: 1,800 rpm

Prepare a $1\frac{3}{8} \times 1\frac{3}{8} \times 9\frac{1}{2}$ " blank for the handle. Mount the blank between centers and, using the spindle roughing gouge, turn it round. Stop the lathe and, measuring from the right end, mark lines at the six increments shown in the drawing [Photo E]. Transfer the lines around the circumference of the handle.

With the parting tool, turn a $\frac{4}{64}$ "-thick tenon, $2\frac{3}{4}$ " long, on the right end of the handle. (This creates a tight compression fit in the $\frac{3}{4}$ " hole in the head.) At the $2\frac{15}{16}$ " mark, make a parting cut to $1\frac{1}{4}$ " diameter. At the $8\frac{3}{4}$ " mark, make a parting cut to $1\frac{1}{16}$ " diameter. And at the $9\frac{1}{8}$ " mark, part down to $\frac{5}{8}$ ".

Switch to the spindle detail gouge and turn a cove where shown. Then, with the spindle roughing gouge, shape a taper between the $5\frac{3}{4}$ " mark and the cut at the $8\frac{3}{4}$ " mark. Likewise, shape a taper from the $5\frac{3}{4}$ " mark to the bottom of the cove [Photo F]. If needed, use the spindle detail gouge to blend the taper into the cove. Stop the lathe and check the feel of the handle in your hand. Adjust its shape until it grips comfortably.

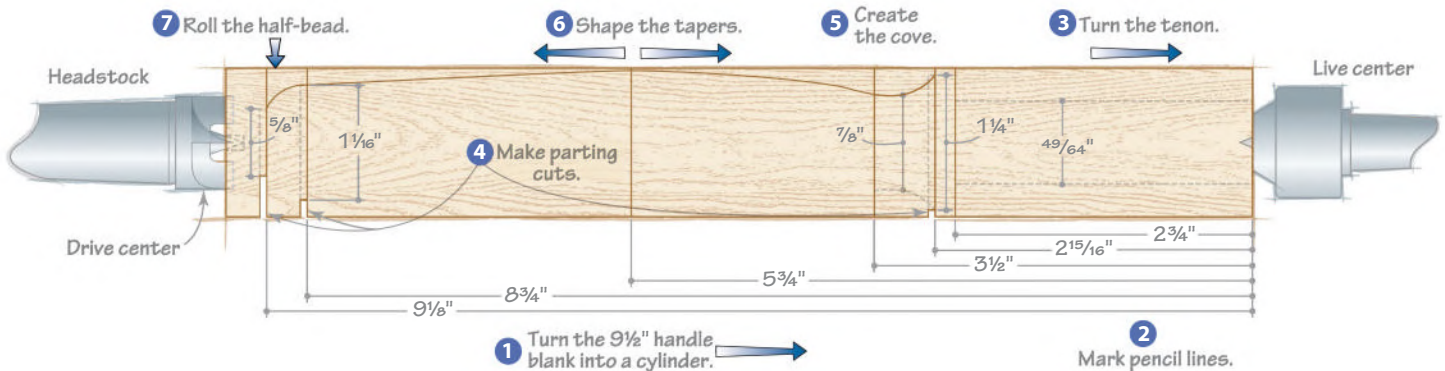
With the spindle detail gouge, roll a half-bead between the parting cuts at the $8\frac{3}{4}$ " and the $9\frac{1}{8}$ " marks. Sand the handle smooth; then part off the left end.

Sand the end smooth, blending it into the half-bead. Then, sand with the grain to remove cross-grain scratches.

To assemble the mallet, use a glue brush to apply a light coat of glue around the inside of the hole in the head. Press the handle into the head using a parallel-jaw clamp [Photo G]. Work quickly before the glue begins to grab.

Apply a finish. (We wiped on three coats of boiled linseed oil.) After the finish dries, you have a custom-made tool that will provide years of solid service. 🌲

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



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Blacker House Bench

Two spacious storage compartments hide within its beautiful exterior.



D I M E N S I O N S :
59½" W × 37¾" H × 22" D

Approximate materials cost
\$395

1907
Year the Blacker House was built for \$100,000

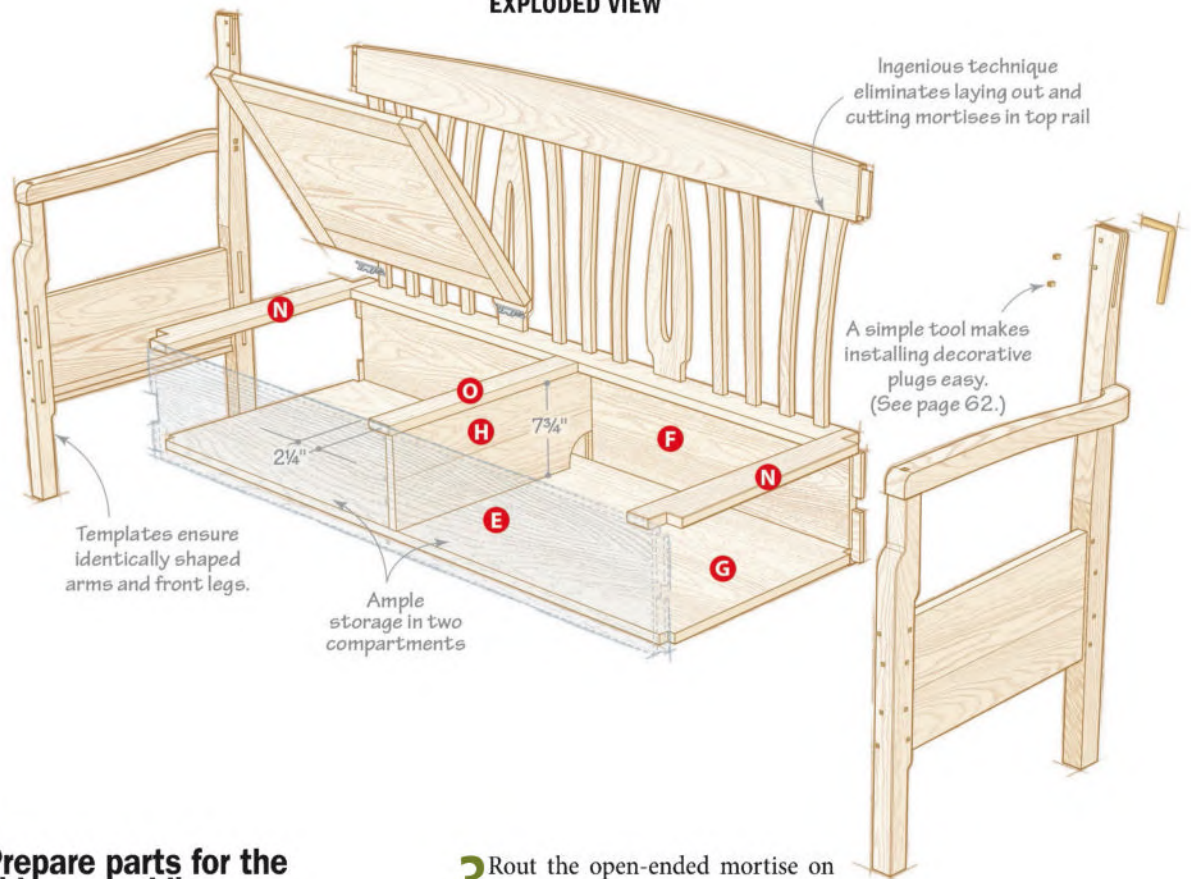
\$2,530,000
Cost of construction in today's dollars

Curved lines on this bench soften the straight, boxy look typical of much Arts & Crafts furniture. Those curves, influenced by Asian designs, identify this piece as a Greene & Greene work. Although the original was made of teak with ebony accents, our cherry with cocobolo version proves just as striking. Traditional mortise-and-tenon joinery ensures it will withstand many derrieres dropping onto its lidded storage.



The Blacker House, in Pasadena, California, was designed by Henry and Charles Greene, namesakes for the Greene & Greene style of design. The brothers designed the structure and almost every item in it. This bench mimics the hall bench from the house.

EXPLODED VIEW



Prepare parts for the side assemblies

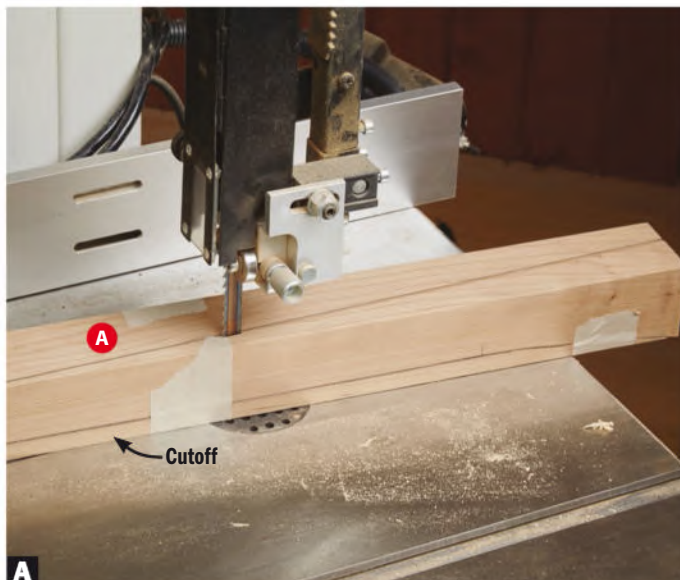
1 Cut the legs (A, B) to size [Materials List, page 66; Drawings 1a, 1b]. Lay out and cut the 1/2" mortises, making sure you create mirror-image pairs. (We used a hollow-chisel mortiser.)

2 Refer to Drawing 1a and lay out the shape of the back legs (A). Bandsaw them [Photo A], and sand the faces to 220 grit.

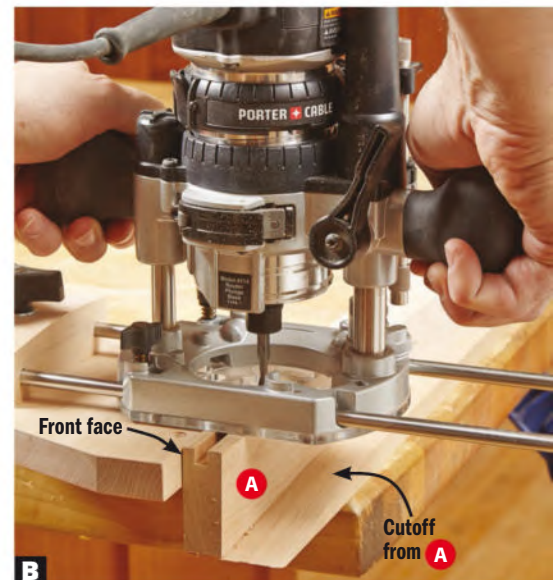
3 Rout the open-ended mortise on each back leg, parallel to the front face [Photo B, Drawing 1a]. Set these legs aside.

4 Following the gridded pattern in Drawing 2, lay out the profile of the front leg on a piece of 1/4" hardboard. Cut and sand the template smooth. Trace the template onto the side of each front leg, then bandsaw the legs to rough shape [Photo C].

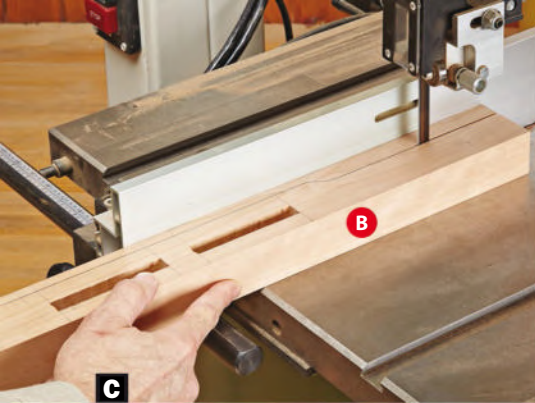
► Learn four ways to make mortises and tenons.
woodmagazine.com/mt4ways



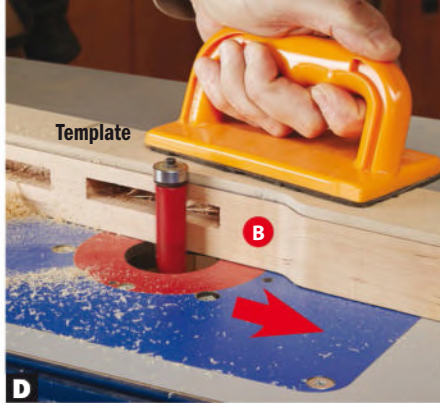
Save the cutoffs. After bandsawing one face, tape the cutoff back in place to provide a flat, square surface when cutting the adjacent face.



Use an edge guide on your router to plow the open mortise in each back leg (A). Rout in three successively deeper passes.



C Guide the blank with the fence to cut the straight portions of the profile. Stay just outside the line.



D Apply the template and rout in the direction shown to prevent chip-out on the shoulders of the leg profile.

5 Adhere the template to a front leg with double-faced tape, and flush trim the leg to final shape [Photo D]. Repeat for the other leg and finish-sand both.

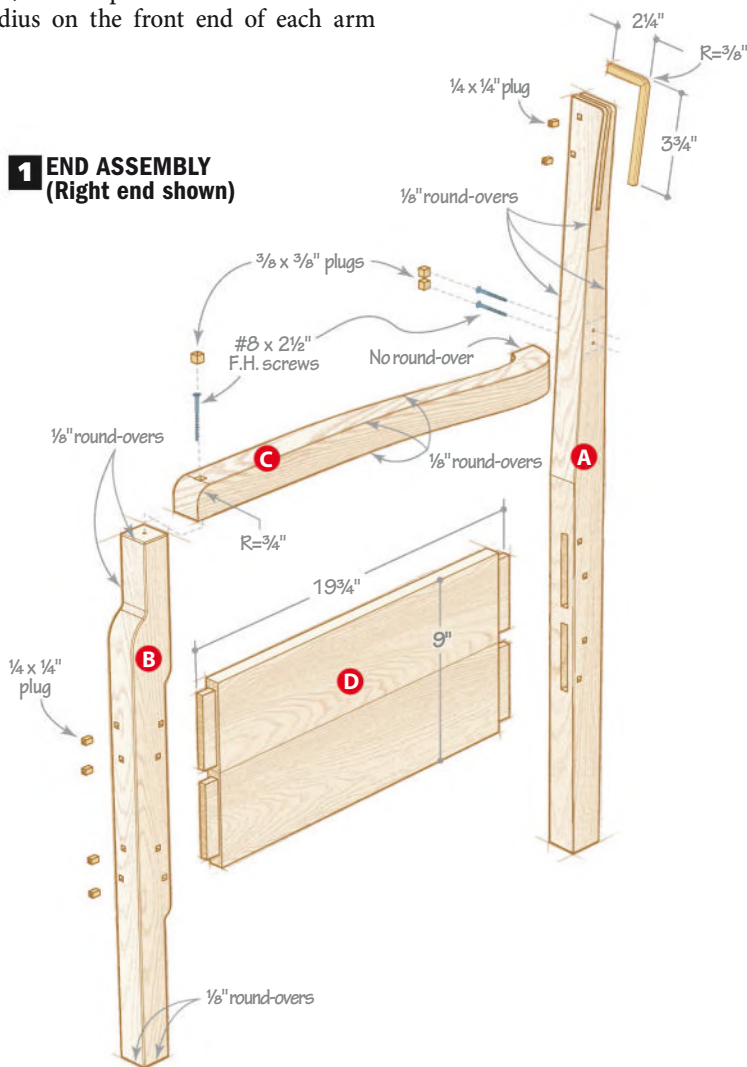
6 Rout $\frac{1}{8}$ " round-overs on the long edges of all four legs, *except* the top 5" of the back legs [Drawing 1]. These will be rounded after assembly.

7 Prepare a $1\frac{1}{2} \times 3 \times 22\frac{1}{8}$ " blank for each arm (C). As you did with the front legs, use Drawing 3 to help you make a template of the arm, then shape the arms. Cut and sand the radius on the front end of each arm

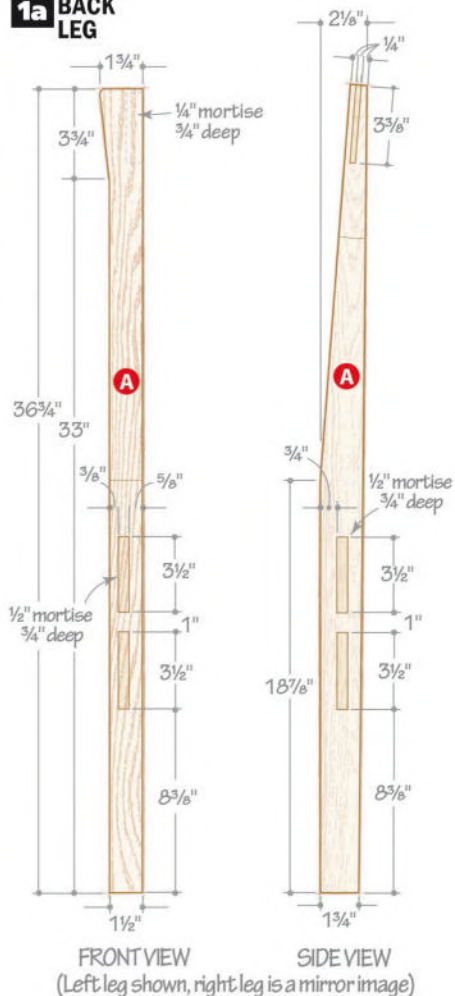
[Drawing 1]. Round over all edges except where the arm joins the back leg.

8 Prepare two $4\frac{1}{2}$ "-wide blanks for each side rail (D). (We ripped a $9\frac{1}{8}$ "-wide blank in half to provide a grain match.) Cut a tenon on each end [Drawing 4a]. Note that the tenons are offset from one end to the other [Drawing 4], so cut the $\frac{1}{8}$ "-deep cheek on each end, then sneak up on the opposite cheek with light cuts until the tenons fit the mortises in the legs.

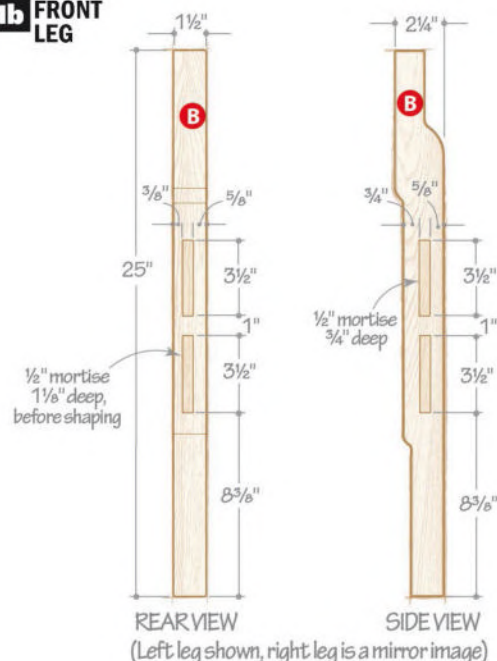
1 END ASSEMBLY (Right end shown)



1a BACK LEG



1b FRONT LEG





E **Leave the rails a bit thick.** Clean up the bandsawn faces with a plane or with light passes on the jointer, but leave enough material to allow for additional cleanup after gluing the rail (D) blanks together.



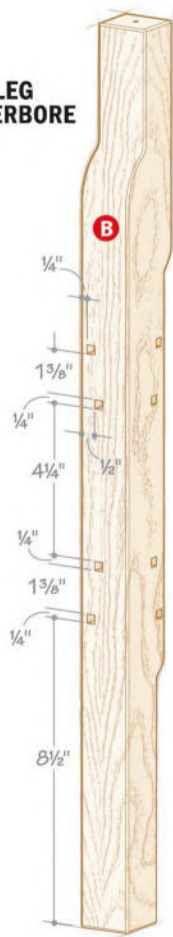
F **Assure the tenons align** by clamping a flat scrap across the tenon cheeks as you glue the side rail (D) blanks together. Plane and sand the rails smooth after the glue dries.

9 After cutting the tenons, lay out the diagonal lines on one edge of each side rail blank (D) and bandsaw just outside the

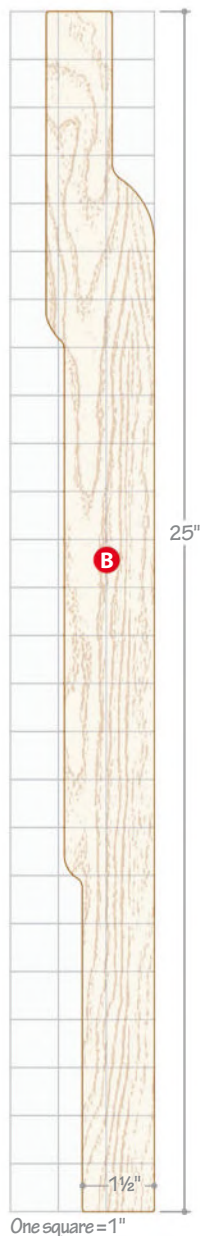
lines [Photo E]. Glue the rail blanks together [Photo F]. After the glue dries, cut the groove along the lower edge of each rail [Drawing 4a].

Tip! If needed, trim the tenon width to fit the rails to the legs. You won't lose significant joint strength.

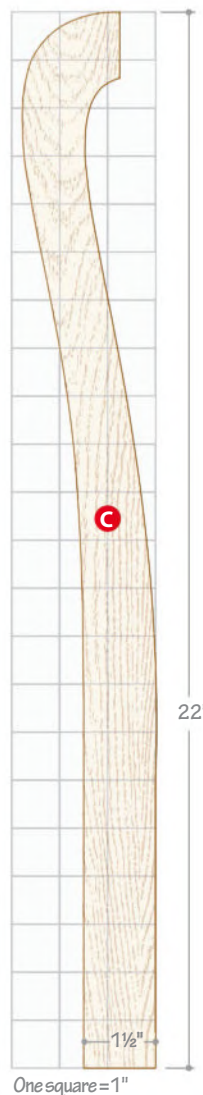
1c FRONT LEG COUNTERBORE LAYOUT



2 FRONT LEG SIDE PROFILE



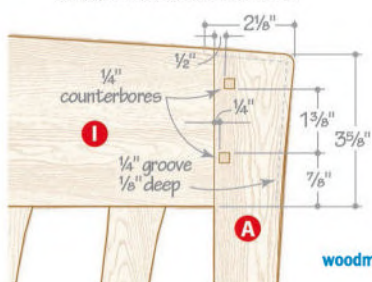
3 ARM GRIDDED PATTERN



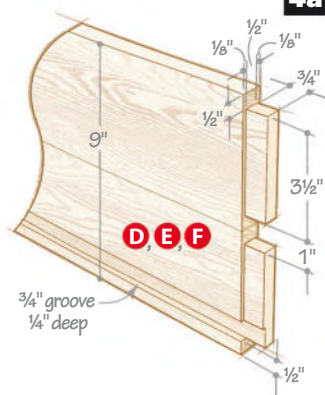
4 SIDE RAIL



1d BACK LEG COUNTERBORE LAYOUT



4a SIDE RAIL AND STRETCHER





G

Let gravity help you dry-fit the bench. Place an end assembly on the floor, then insert the mating pieces before adding the other end assembly.

Start assembling parts

1 Dry-fit a side rail (D) between a back and front leg (A, B), then glue these pieces together to make two end assemblies [Drawing 1]. After the glue dries, dry-fit an arm (C) to each assembly and mark and drill the counterbored holes for the screws and plugs [Drilling a square hole, above right] in the back legs and in the arm, centered over the front leg. Glue and screw the arms to the legs.

2 As you did for the side rails (D), prepare $4\frac{1}{2}$ " blanks for the front and back stretchers (E, F) [Drawing 5]. Cut the tenons [Drawing 4a], glue up the stretchers, then cut the dado and groove on the inside face of each.

3 Cut the bottom (G) [Drawing 6] and notch the corners [Drawing 6a]. Dry-fit the end

SKILL BUILDER

Drilling a square hole

Punches make easy work of drilling and squaring up the counterbores for the plugs that simulate the pegged tenons typical of Greene & Greene furniture.

After laying out each counterbore location, center the punch on it and give a tap to register it into the wood. Without moving the punch, drill a $\frac{3}{4}$ "-deep hole to remove most of the waste. Remove the drill bit and give the punch a couple more whacks to drive it $\frac{1}{4}$ "

deep, creating clean shoulders. You still need to do a little clean-up with a chisel at the bottom of the counterbore, but the crisp cut at the top provides a tight fit for the plugs.

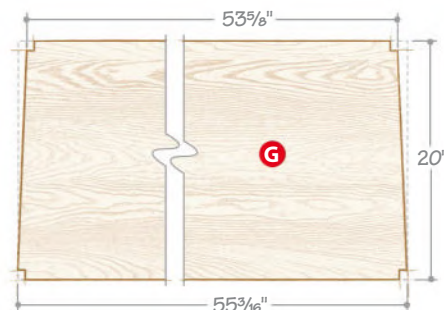
$\frac{1}{4}$ " square hole punch no. 50K59.04. $\frac{3}{8}$ " square hole punch no. 50K59.06, \$29.50 each, Lee Valley, 800-871-8158, leevalley.com.



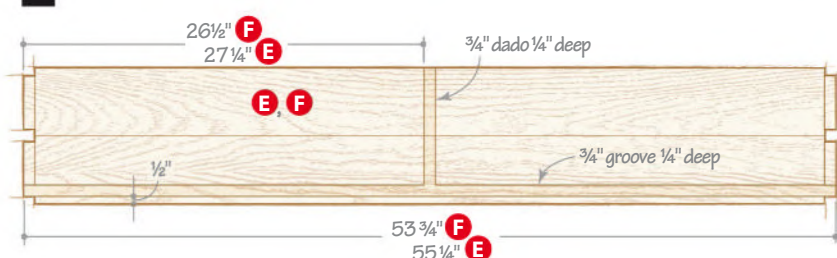
C



6 BOTTOM

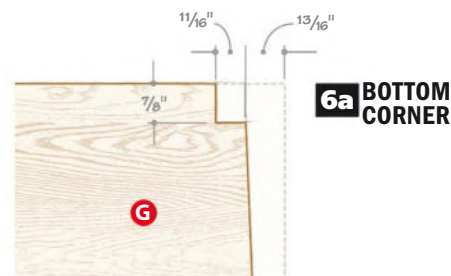


5 STRETCHERS



assemblies (A–D) and stretchers (E, F) around the bottom [Photo G]. If everything fits well, glue these pieces together.

4 Cut the divider (H) to size and glue it in place between the front and back stretchers [Exploded View, page 59], flush with their top edges.



6a BOTTOM CORNER



H

Flex those curves. Align the top edge of a thin scrap with the outside corners of the back legs (A). At the centerline, flex the top edge $4\frac{3}{4}$ " above the bottom edge of the rail (I). Trace along the scrap to mark the arc.



I

Fit and hit (gently). Work your way across the bench, fitting the slats into the groove in the top back rail (I). Make sure the slats sit tight in the bottom back rail (J).

Turn to the back

The thirteen back slats fit into individual mortises in the bottom rail and a groove in the upper rail. The gaps between slats in the upper rail are plugged with fillers.

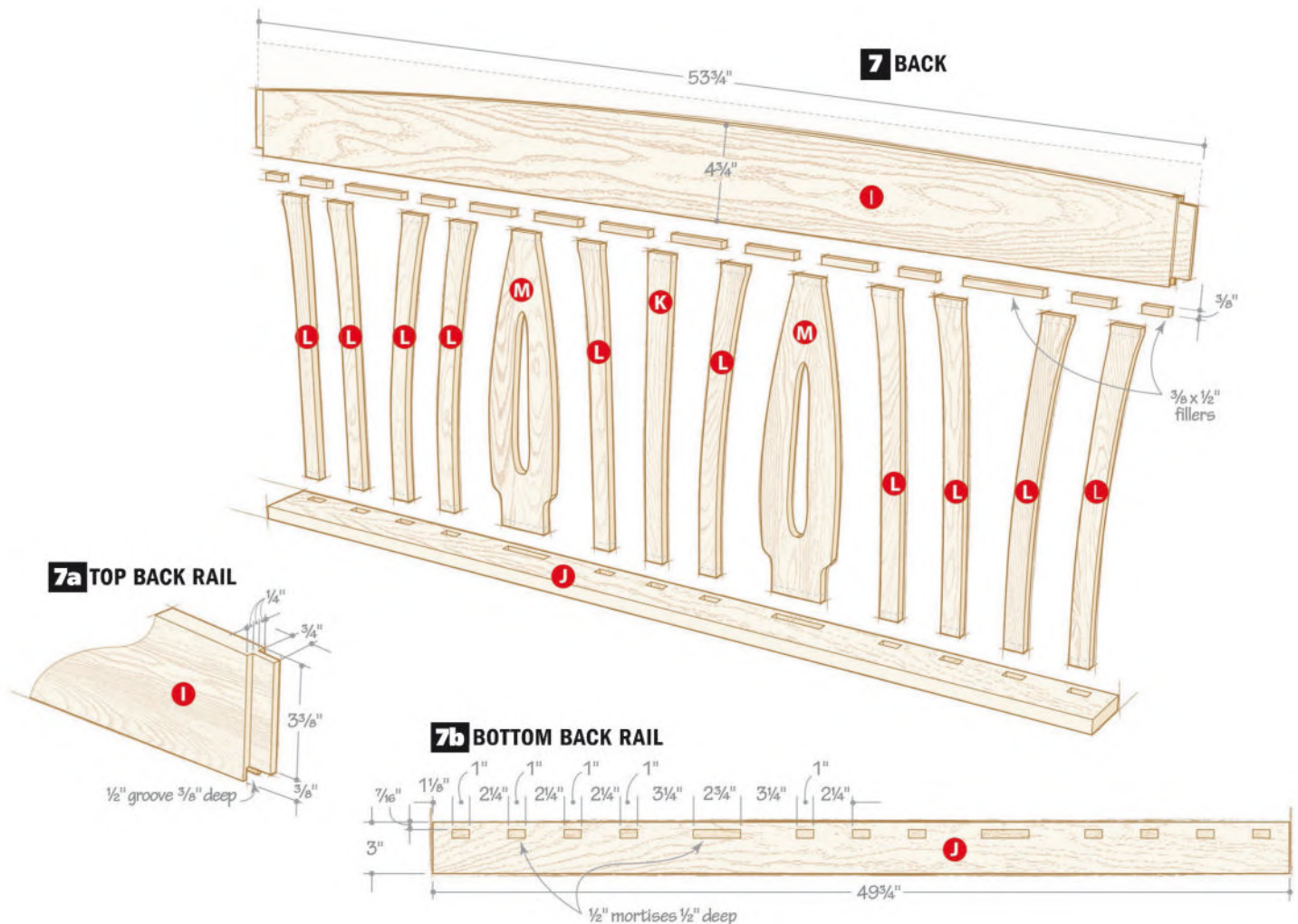
1 Prepare a $\frac{3}{4} \times 5\frac{1}{4} \times 53\frac{3}{4}$ " blank for the top back rail (I). Cut the tenons on each end and a groove centered on its bottom edge [Drawings 7, 7a]. Dry-fit the rail between the

back legs (A) and mark the arc on it [Photo H]. Cut and sand to the line.

2 Cut the bottom back rail (J) to size and bore out the mortises [Drawing 7b].

3 Following the patterns in Drawing 8, make four templates: one for each front profile of the back slats (K, L, M), and one for the side profile shared by all of them. Then cut a 1"-thick blank for each back slat.

4 Trace the side profile onto one edge of each slat. Bandsaw just outside the lines. Tape the waste from the rear face back in place, trace the front profile onto the front of each blank, and cut the profiles. Use a scroll-saw or coping saw to cut out the center of the wide slats (M). Remove the waste pieces and sand the slats smooth. **Note:** Make sure the ends of the slats fit snug in the groove and mortises of the top and bottom back rails (I, J).



5 Cut the seat end slats (N) and center slat (O) to size [Drawing 9, Exploded View]. Cut the taper on the end slats, and the notches to fit around the back legs. On the front end of all three slats, rout a bullnose profile [Drawing 9a]. Save the router setup for the front of the seat lids later. Notch the front of the end slats, then sand a $\frac{1}{16}$ " round-over on the other edges and opposite end. Glue the seat end slats, center slat, and the bottom back rail (J) to the seat box.

6 To make the filler strip for the top back rail (I), cut a 40" strip of cherry so it fits snug in the groove, flush with the edge. (You won't be able to sand the fillers easily after they are glued in place.) Set the strip aside.

7 Retrieve the back slats (K, L, M) and insert them into the mortises in the bottom back rail (J), no glue needed [Drawing 7]. Fit a tenon of the top back rail (I) into the mortise in a back leg and pivot the rail down, positioning each slat in the groove [Photo I]. When you are satisfied with the fit, carefully



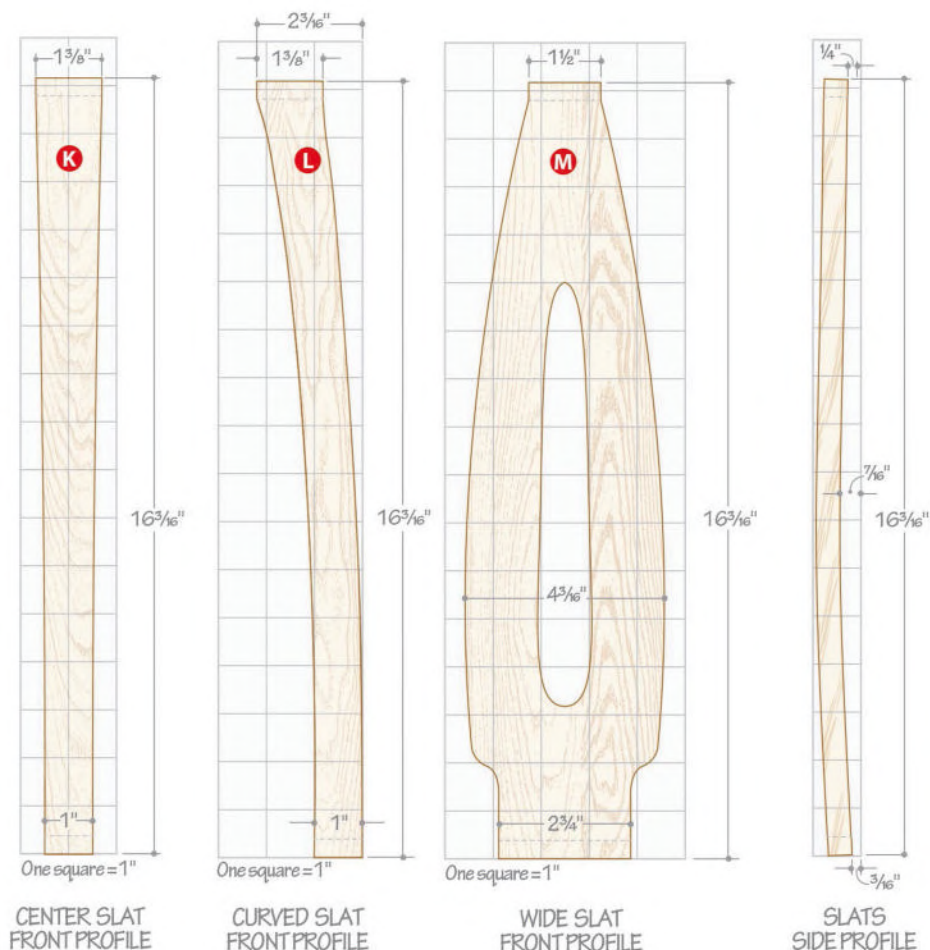
J Fill the grooves. Rest the bench on its back, then cut and glue in place filler segments to fit between each slat. To minimize glue squeeze-out, apply glue only to the face of the filler that contacts the bottom of the groove.

remove the rail, apply glue to its tenons and glue the rail in place (no glue on the slats).

8 Retrieve the filler strip. Hand saw two equal-length fillers to fit between a back leg (A) and the first curved slat (L). Glue

each filler in place on opposite ends of the top back rail. Continue cutting, fitting, and gluing opposing pairs of fillers across the top back rail [Photo J] to space the back slats symmetrically.

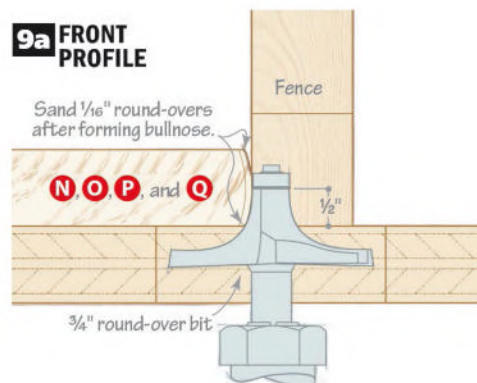
8 BACK SLAT PROFILES



9 SEAT END SLAT DETAIL



9a FRONT PROFILE

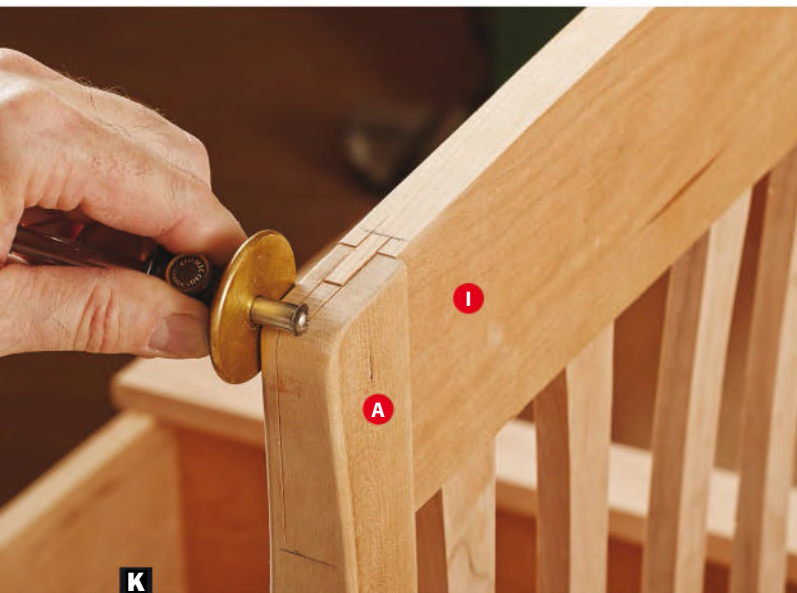
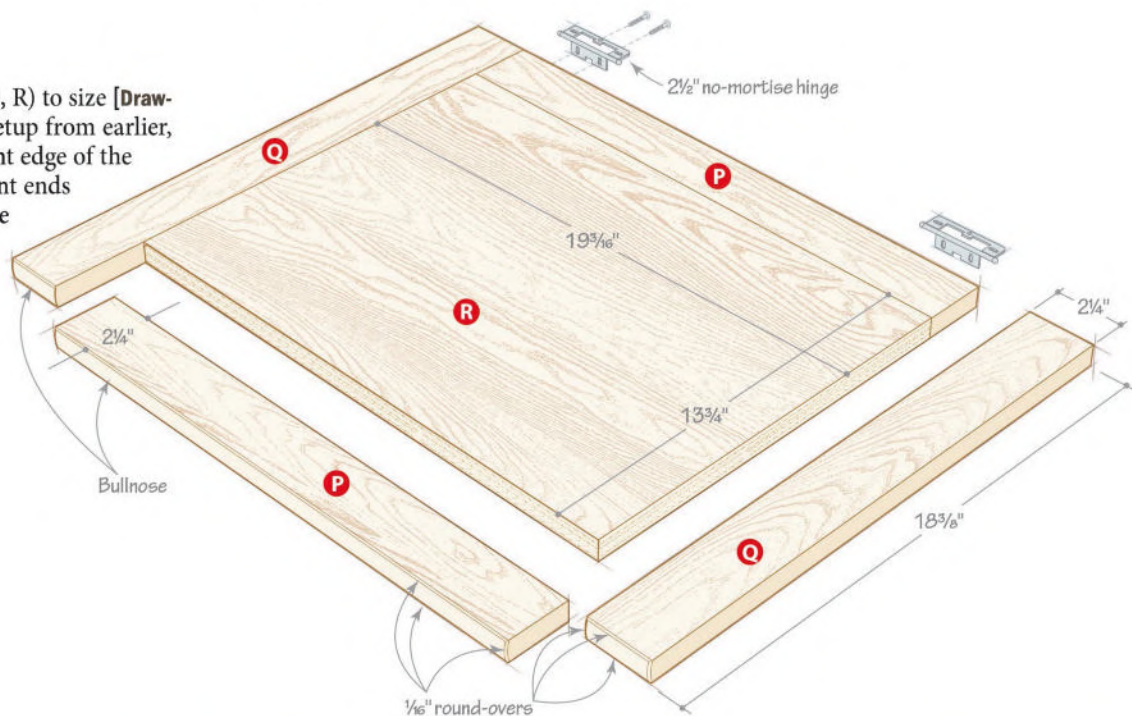


9 Rout round-overs on the top edge of the back rail (I). Then, sand round-overs on the back legs to blend with the round-overs routed earlier.

10 SEAT LID

Put a lid on it

Cut the seat lid parts (P, Q, R) to size [Drawing 10]. Using the router setup from earlier, rout a bullnose on the front edge of the seat fronts (P) and the front ends of the seat sides (Q). Glue up the lids and set them aside to dry. **Note:** With the seat sides flush with the rear edge of the seat back (P), the sides extend $\frac{1}{8}$ " beyond the seat front.



K **Trace under pressure.** Set a marking gauge so the blade touches the shoulder of the groove. Score the top back rail (I) and each back leg (A).



L **Rout carefully.** Mount a $\frac{1}{4}$ " slot-cutting bit in a trim router and cut $\frac{1}{8}$ "-deep grooves between the marks, steadying the router against your leg. Chisel the ends of the grooves square.

Add eye-catching accents

1 To create the $\frac{1}{4}$ "-wide grooves for the accent strips in the back legs (A) and top back rail (I), mark the ends of the grooves with a pencil [Drawing 1d]. Score the sides of the grooves with a marking gauge to create a sharp shoulder [Photo K], then rout the grooves [Photo L].

Tip! Scoring reduces tear-out. If you don't have a way to score the shoulders, carefully back-rout the grooves.

2 For the accent strips, cut $\frac{1}{4}$ "-thick material (we used cocobolo) to fit the grooves. Place a strip in each groove, mark its length [Photo M], and miter the pieces at 46° , leaving the marks. Fit the mating pieces in the grooves, fine-tune the fit, and then sand $\frac{1}{8}$ " round-overs on the long edges of the strips. Glue the accents in place. After the glue

Tip! To prevent dark sanding dust from getting trapped in the cherry wood, mask off around the accent strips and frequently blow the dust away as you work.



M

Mark the inside corner (heel) of each miter. Then cut the pieces to near-finished length with a handsaw.



N

Power-round the ends. Chuck a plug blank in a drill and run the drill slowly, holding the blank against a sheet of 220-grit sandpaper.

dries, sand a $\frac{3}{8}$ " radius on the mitered corner of the accents.

3 Drill the $\frac{1}{4}$ "-square mortises for the plugs where shown in **Drawings 1c** and **1d**. Make several lengths of plug stock to fit the mortises, round over the end [**Photo N**], and cut free a $\frac{3}{8}$ "-long plug. Repeat until you have enough plugs; then glue them in place.

4 Apply a finish to all pieces. (We wiped on a coat of Watco Natural finish. After the oil cured, we sprayed on three coats of lacquer.) Attach the hinges to the lids (P/Q/R), then attach the hinges to the back rail (J).

Produced by **Craig Ruegsegger** with **Kevin Boyle**

Project design: **Kevin Boyle**

Illustrations: **Roxanne LeMoine; Lorna Johnson**

Cutting Diagram



2 1/8 x 7 1/4 x 48" Cherry *Plane or resaw to the thicknesses listed in the Materials List.



1 1/2 x 9 1/4 x 96" Cherry



3/4 x 9 1/4 x 120" Cherry



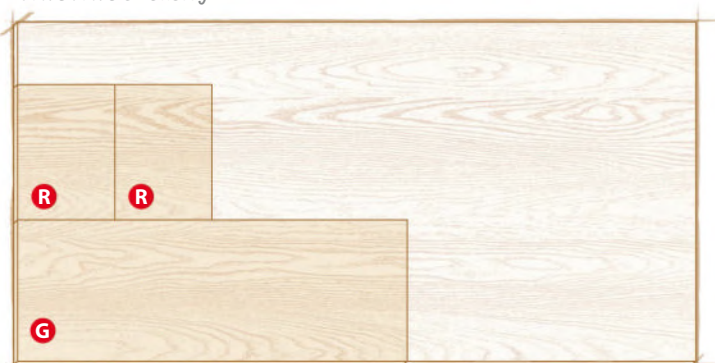
3/4 x 5 1/2 x 96" Cherry



1 1/2 x 7 1/4 x 96" Cherry



3/4 x 9 1/4 x 96" Cherry



3/4 x 48 x 96" Cherry plywood

This project requires 6 1/2 board feet of 10/4 cherry, 17 board feet of 6/4 cherry, and 19 board feet of 4/4 cherry.

Materials List

Part	FINISHED SIZE			Matl.	Qty.	
	T	W	L			
Side assemblies						
A	back legs	1 7⁄8"	2 1⁄8"	36 3⁄4"	C	2
B	front legs	1 1⁄2"	2 1⁄4"	25"	C	2
C*	arms	1 1⁄2"	2 3⁄4"	22"	C	2
D*	side rails	3⁄4"	9"	19 3⁄4"	EC	2
Seat box						
E	front stretcher	3⁄4"	9"	55 1⁄4"	EC	1
F	back stretcher	3⁄4"	9"	53 3⁄4"	EC	1
G	bottom	3⁄4"	20"	55 3⁄16"	CP	1
H	divider	3⁄4"	7 3⁄4"	20"	EC	1
Back						
I*	top back rail	3⁄4"	4 3⁄4"	53 3⁄4"	C	1
J	bottom back rail	3⁄4"	3"	49 3⁄4"	C	1
K*	center back slat	1⁄2"	1 3⁄8"	16 3⁄16"	C	1
L*	curved back slats	1⁄2"	2 3⁄16"	16 3⁄16"	C	10
M*	wide back slats	1⁄2"	4 3⁄16"	16 3⁄16"	C	2
Seat lids						
N	seat end slats	3⁄4"	3 7⁄16"	21 1⁄16"	C	2
O	center seat slat	3⁄4"	2 1⁄4"	18 9⁄16"	C	1
P	seat lid front/back	3⁄4"	2 1⁄4"	19 3⁄16"	C	4
Q	seat lid sides	3⁄4"	2 1⁄4"	18 3⁄8"	C	4
R	seat lid panels	3⁄4"	13 3⁄4"	19 3⁄16"	CP	2

*Parts initially cut oversize. See the instructions.

Materials key: C—cherry, EC—edge-glued cherry, CP—cherry plywood. Also need $\frac{3}{8}$ x $\frac{3}{8}$ x 36" length of cocobolo for plugs and accent strips.

Supplies: 2 1/2" no-mortise hinges (2 pair), #8 x 2 1/2" flathead screws (6).

Bits: 1/4" straight, flush-trim, 1/8" and 3/4" round-over, 1/4" slot-cutting router bits.



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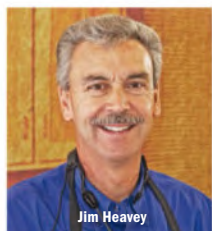


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Making the Perfect Frame

By Jim Heavey



Sometimes it's easy to take the simplest-looking things for granted. While working on a scrollsawn picture for one of my kids, I spent more time thinking about the process of making the picture than the frame I would put around it. After all, how hard can it be to miter a simple frame? I'm pretty happy with the frames I've made, but

the skill came from a lot of practice and some solid techniques. Here are some of the things I've learned, occasionally the hard way. **Note:** Having just reviewed the process of setting up the mitersaw in issue 234 (September 2015), let's focus on making a typical frame on that saw.

► New to the mitersaw? Check out this free video. woodmagazine.com/mitersawbasics



Buy stock molding. Prices depend on intricacy of the profile and finish, but if you do some shopping, you can find attractive molding for under a dollar a foot.

First, select a molding

You can choose from a huge variety of stock moldings at framing stores, *above*. (I found three shops close to my home with a quick online search.) You can also make your own frame from some of the special wood you've been saving, *below*.

To calculate the minimum required length of frame material, you need to know the outside dimensions of the picture or mat, the width of the rabbets on the frame, and the width of the frame.

As an example, let's consider an 8×10" picture and 2⅜"-wide stock with a ⅜" rabbet. Because the width of the frame (for calculation purposes) is the stock width minus the width of the rabbet, you would have a frame width of 2" (2⅜" less ⅜"). Calculate the length using this formula:

► Multiply the width of the frame by 8 (2"×8=16").

► Double each dimension of the item you are framing (8"×2=16") (10"×2=20").

► Add those dimensions, plus another ¼" (⅛" in each dimension) to allow clearance between the framed item and the shoulder of the rabbet.

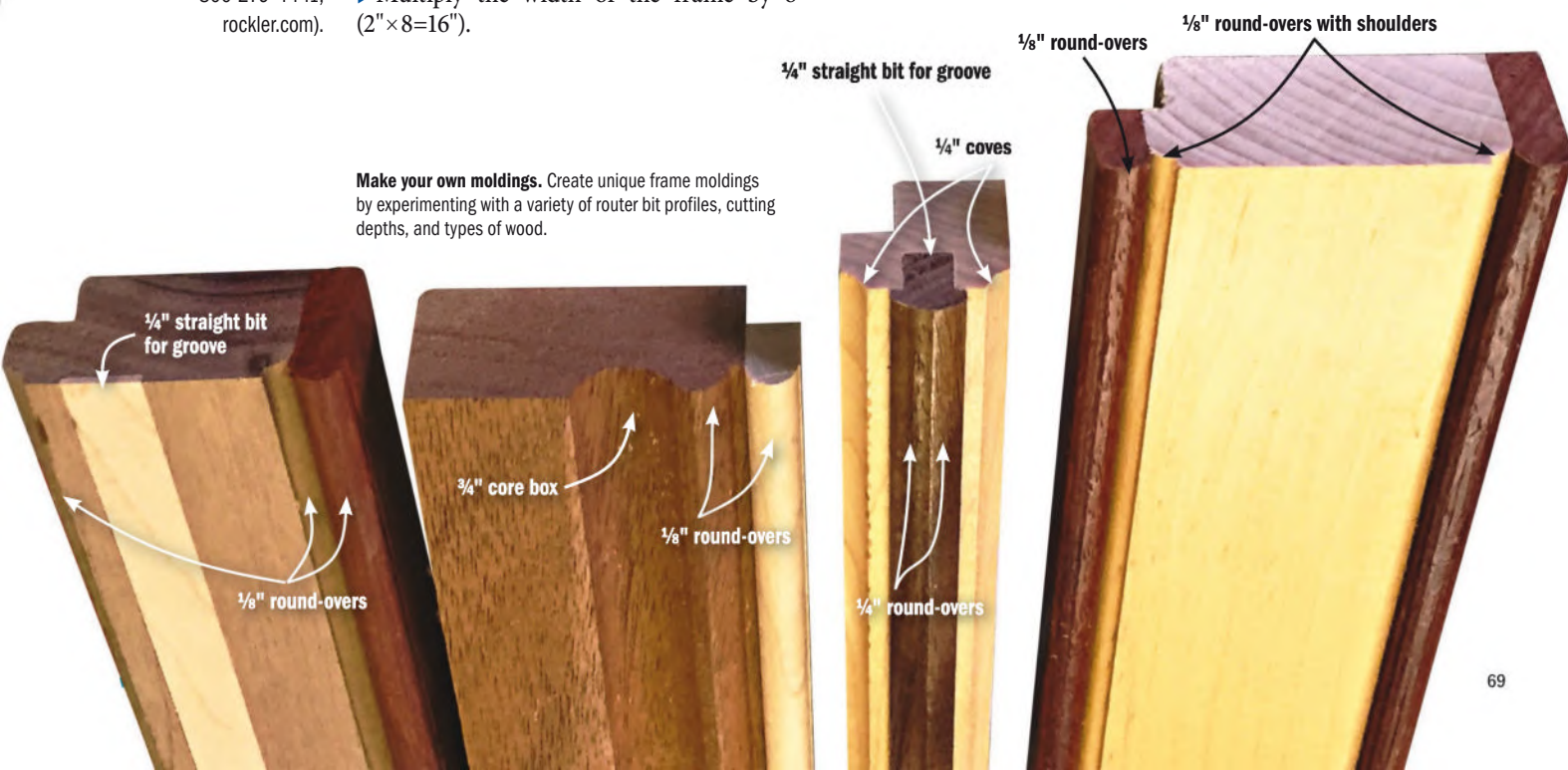
We end up with 16"+16"+20"+¼"=52¼" total length. This is the exact measurement, but you'll need more to account for kerfs and for correcting any errors you might make. I like to allow enough extra that I can recut the longest frame piece if needed. So in our example, add 21" more for a length of 73¼". If you make your own molding, this continuous length, plus a bit extra, allows for a wraparound grain pattern that adds some visual interest. Now that you have sufficient stock, it's time to head to the miter saw.

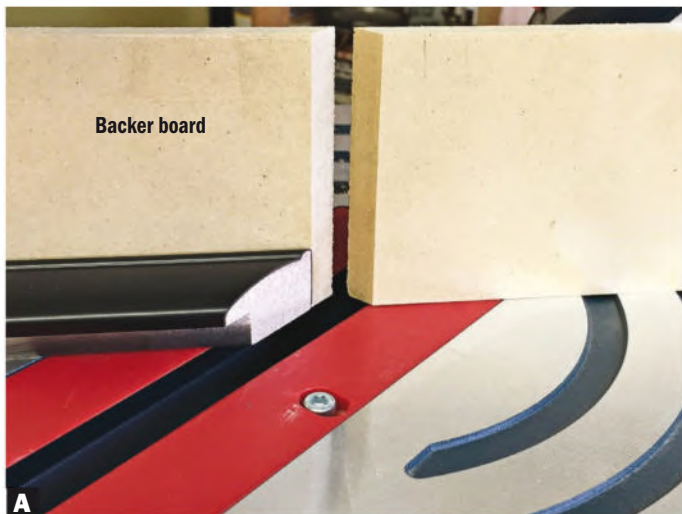
► Get cleaner, more accurate cuts on your miter saw.

woodmagazine.com/maximizemittersaw

► A framing shop uses a point driver to secure a picture within its frame. Find a moderately priced unit from Logan (the Dual Driver Elite) at many home centers. For a more basic approach, Rockler stocks black picture frame turn buttons (no. 22890, \$3.50 per four, 800-279-4441, rockler.com).

Make your own moldings. Create unique frame moldings by experimenting with a variety of router bit profiles, cutting depths, and types of wood.





A
Adding a backer board assures tear-out free cuts. Use double-faced tape to adhere hardboard or MDF to the saw's fence to support the molding during the cut.



B
Start with a stopblock. Clamp the stopblock in position to provide just a bit of extra length on the workpiece. I allow about $\frac{1}{4}$ ".



C
Fine-tune your length. This is where that extra $\frac{1}{4}$ " length comes in handy. You can now dial in the exact cut on one length of molding and use the stopblock so the second piece matches it.



D
Join the band. A band clamp is ideal for assembling a frame. Turning the handle cinches up the band and spreads pressure equally to each corner clamp.

Cut a perfect miter

The keys to flawless miters, besides having a well-tuned saw, are clean cuts and assuring that opposite sides of the frame are exactly the same length.

Trying to cut to a pencil line doesn't guarantee accuracy, so I begin by rough-cutting each of the four moldings $\frac{1}{4}$ " longer than needed. To eliminate chip-out, work with the good side of the molding facing up and cut from the inside edge of the miter to the outside [Photo A]. Then, I set up a stopblock and miter one end of each piece [Photo B]. (This works for square frames. For rectangular frames, cut two pieces, then reset the stopblock to cut the two remaining pieces.)

To cut each opposite-side pair to equal length, place the stopblock on the opposite

side of the blade and pivot the blade to the opposite 45° setting [Photo C].

Now it's time to see how you've done. Test for perfect alignment by dry-clamping the frame without glue [Photo D]. The inside and outside of each corner should fit without any gaps. When you're satisfied with the fit, apply glue to each mitered edge, making sure each edge aligns perfectly, and reclamp. Pieces can slide a bit as the clamp is tightened, so readjust as necessary. I apply moderate pressure with the clamp to assure good glue and edge bonding. When mitered edges fit well, there is no need for excessive clamping pressure. Allow the glued-up frame to cure overnight and you're ready to add glass and a picture.



► Check out three editor-tested band clamps.
woodmagazine.com/bandclampreview

Troubleshoot the gaps

Did your miters go awry? Here are fixes for some of the more common problems you may encounter.

During the dry-clamp test you notice that three of the miters meet nicely but the fourth shows a gap. If the gap is all but imperceptible, quit while you're ahead. Many woodworkers strive for that elusive perfection only to find that the joint was fine before they decided to "fix it." Sometimes, just a hint of glue rubbed into the joint and then sanded allows a bit of fine dust to mix with the still-wet glue and fill that spot that no one would have seen anyway.

If the gap is pronounced, or if gaps show at each miter, attempts to fix them will result in changes to the length of all the sides and will mean that your initial alignment of the saw needs to be rechecked and all the pieces recut.

If the gap is small, you can remove a minute amount [Photo E] from the heel or toe to correct the misalignment, as shown in Photos F-I. A couple of attempts will usually fix small gaps.

I prefer using the shim over trying to fine-tune the miter angle of the saw because I can more easily control how much material is being removed, and where.

Armed with your newfound skill and confidence in making a simple frame, it's time to think about new profiles and adding accents and inlay to your frames. Think of the possibilities! 🌲

► To reduce the moisture-wicking effects when gluing end grain, I spread a thin layer of glue on each mating surface and wait five minutes. Then, I reapply glue as usual and clamp the joint.



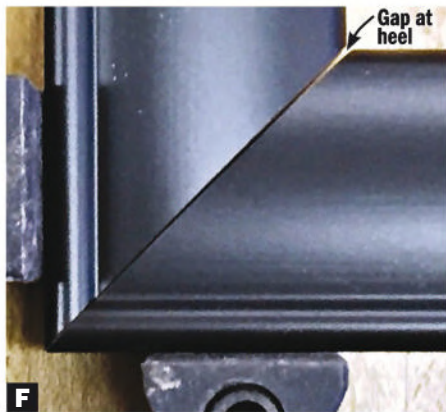
E **Avoid the teeth to shave a whisker.** With the saw off and the blade held down, slide the edge of the mitered molding against the blade body (not the teeth). While holding the molding in place, raise the blade, turn on the saw and cut the molding's edge. The amount of material removed equals the offset of the blade's teeth from the body of the blade.



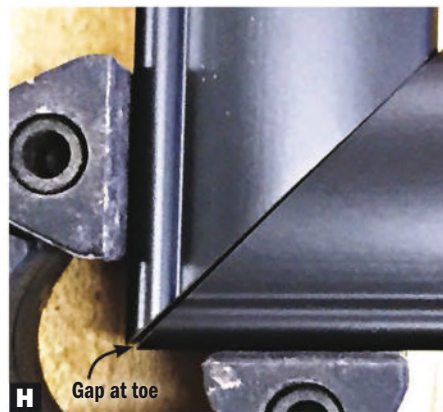
Try a better joint

Gluing miters means joining end grain—not the best glue joint. I've found that with a well-fitted joint, PVA glue (Titebond, Elmer's etc.) applied and clamped correctly, results in a strong frame. Large or very heavy frames may benefit from corners reinforced with splines or pin nails, or you might even opt for a half-lap or bridge joint. Like the look of miters, but want the strength of half laps? Try a mitered half-lap.

woodmagazine.com/miteredhalflaps



F



H

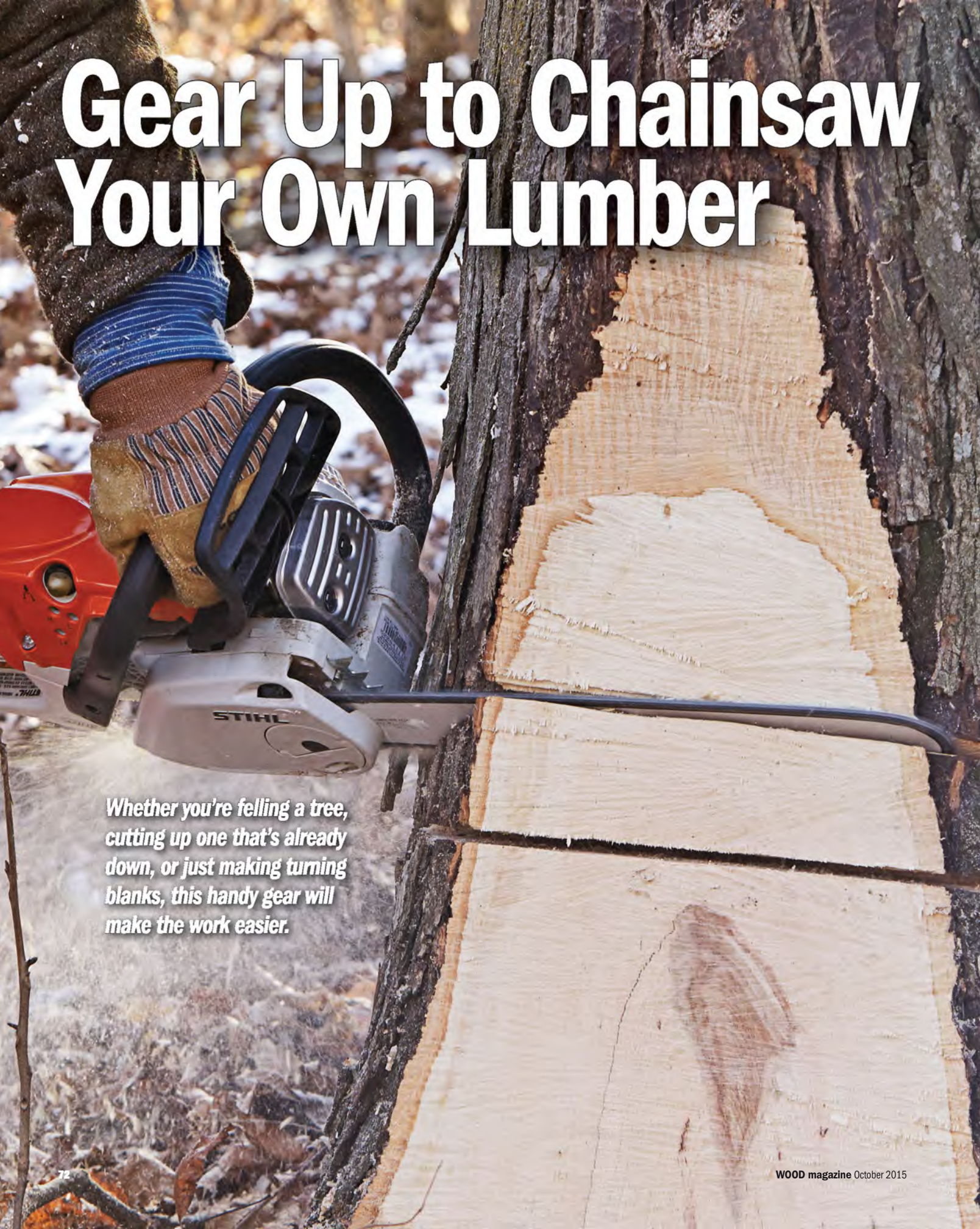


G **Fix the heel.** To trim more from the toe of the miter than the heel, place a sticky note or business card shim between the fence and the end of the workpiece nearest the blade.



I **Fix the toe.** Cutting more of the heel than the toe is done the same way, with the sticky note or business card placed between the fence and the far end of the mitered stock.

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Whether you're felling a tree, cutting up one that's already down, or just making turning blanks, this handy gear will make the work easier.

Choose Your Chainsaws

For light-duty work and smaller trees

► The two-cycle engines on all of these saws require an oil/gasoline mixture. Avoid ethanol-blended gas or any gas older than three months that's not been treated with a stabilizer.

Echo CS-400, \$300

40cc engine, 16–18" bar length

The CS400 has few frills, but it starts easily, runs and cuts well, and handles nicely. It's ideal for a woodturner. And, it comes with a 5-year warranty.

800-432-3246, echo-usa.com



Stihl MS251CBE, \$379

45cc engine, 16–18" bar length

We love this saw for its easy start. Rather than pull the cord fully as with other saws, you make three short pulls and it fires up. It also has tool-free chain adjustments.

800-467-8445, stihlusa.com



For heavy-duty work and larger trees

Echo CS-590, \$400

60cc engine, 18–20" bar length

For a low price, you get a saw with plenty of power to take down large trees, yet it's nimble enough to handle for hours without getting fatigued. And it has Echo's 5-year warranty.



Stihl MS291, \$500

55cc engine, 16–20" bar length

The successor to the Farm Boss (Stihl's top-selling chainsaw for years), the MS291 combines a strong engine with a well-balanced body. Its two-stage air filtration extends the filter life.



► When cutting with a chainsaw, the fuel mixture and bar-lubricating oil typically run out about the same time, so remember to fill both at each interval.

Husqvarna 550XP, \$600

50cc engine, 13–20" bar length

Although the 550XP has a smaller engine and weighs less than the models above, it cuts like a larger saw. The engine never bogged down during cuts, and vibration was the least among the group we tested.



Husqvarna 576XP, \$900

73cc engine, 15–28" bar length

Not only does this beefy saw drop trees with ease, but it also has the muscle to work in either of the chainsaw mills featured on [page 75](#). That power comes with extra weight, though, so make sure you're up to hefting this saw around.

800-487-5951, husqvarna.com/us



► Read reviews of other chainsaws. reviewatool.com/chainsaw



Protect Yourself

Stihl ProMark forestry helmet, \$70

Worn in conjunction with safety glasses, this helmet protects your head from falling or scratching limbs. The steel-mesh face screen keeps out flying debris, and the NRR 25-rated earmuffs dampen engine noise. A no-brainer—to protect your brain.

800-467-8445, stihlusa.com

Stihl ProMark protective chaps, \$90

Waist sizes 30–42"

These heavy-duty chaps protect your legs from a moving chain. Multiple layers of cut-retardant material shred and bind up the saw before it can cut into your leg.

Move Logs Easily

LogRite cant hooks, \$95–115 each

Available with 36", 42", 48", and 60" aluminum handles, these cant hooks work great at helping you roll logs. The textured rubber grips prevent hand slippage, and the hooks grab logs for ideal leverage. We like the 48" handles best because they provide adequate leverage without being too cumbersome.

800-631-4791, logrite.com

LogRite ATV Arch, \$1,750

This ingenious tool, made of heavy welded steel, hooks up to an all-terrain vehicle or small tractor via a 2" ball hitch. Wrap a cable around the log and lift it with the winch, taking most or all of the log's weight off the ground. That makes it easy to pull, and keeps blade-dulling dirt off the log. LogRite says it will hold up to a 25"-diameter log with a maximum weight of 2,000 pounds.





Keep the Chain Sharp

Lee Valley hand-crank chain sharpener, \$132.50

(Sharpener \$109; carbide burr \$23.50)

Inevitably, you'll have to sharpen the chain on your saw, and doing it with this unit beats hand-filing by a long shot. Simply clamp the device onto the bar, align the burr (think of this as a spiral carbide router bit) with a tooth, and then rotate the handle and burr until sharp. Repeat for all teeth.

800-871-8158, leevalley.com

Wilton hitch vise, \$200

This vise fits into a 2" receiver hitch on your truck or SUV, providing a solid workholder in the field. The 6" jaws open to 5¾" (horizontal) with a 5" throat depth (vertical). We love it for holding a chainsaw for sharpening, but it also holds lumber for cutting, drilling, or routing.

800-274-6848, wiltontools.com

Turn Logs into Lumber

Granberg MK-III Alaskan mill

8 sizes from 24" (\$235) to 84" (\$400)

(Chainsaw not included)

► We recommend a chainsaw with at least a 70cc engine for use in a chainsaw mill. Lesser-powered saws will struggle, use more fuel, and wear out quicker. Get as long a bar as you can, depending on the capacity of the mill and saw.

A chainsaw mill provides the lowest price point for a do-it-yourself lumber mill, and you can hand-carry one right to the log. The Granberg Alaskan mill, with few frills (and a lot of your own labor), may not be elegant, but it makes good lumber. To begin, you rig up a flat, straight reference surface, such as a 2x8, on top of the log to register the mill for the first cut; succeeding cuts then reference off the freshly cut face. We recommend cutting boards 2–3" thick to minimize waste and labor. After the lumber dries, resaw it on your bandsaw to make thinner stock.

800-233-6499, granberg.com



Logosol M8 mill, \$1,800

(Chainsaw not included)

Though the M8 requires a more sizable investment than an Alaskan mill, it requires much less effort to saw logs. Once you mount the saw to the carriage and secure a log in place, simply crank a handle that pulls the saw through the log via a cord-and-pulley system. It also has precise depth-of-cut markers for establishing board thickness. This 18" mill can cut logs up to 16' long and as wide (log diameter) as your bar length allows.

800-322-4539, baileysonline.com



► A bandsaw log mill works great for sawing lumber because it cuts a thinner kerf than a chainsaw—less waste—but it requires a greater investment. Entry-level bandsaw mills start at about \$4,000, and the more options you add, the greater the price. You can find a bandsaw mill owner to custom-saw logs for you by using locator services on the manufacturers' websites. 🌲

Hide a sanded-through spot

This simple technique repairs damaged veneer.

Get a little too aggressive with your sander and in a heartbeat you can cut right through the thin face veneer on plywood. On highly visible workpieces, such as a cabinet top, you'll probably need to replace the

damaged workpiece. But it might be worth trying this trick first. If the damaged spot is in an inconspicuous location, it might never be seen. Practice on scrap, then work on your project. What have you got to lose? 🌲

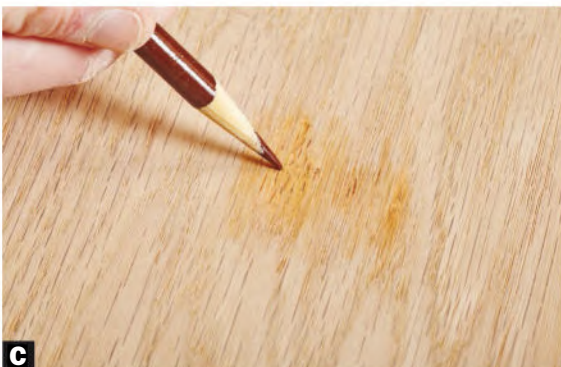
Note: This fix works only on lumber-core plywood. With MDF-core plywood, the substrate will absorb finish and turn dark, so either replace the part or patch the veneer. Test your technique first on scrap, especially when working with a dark veneer, such as walnut, that contrasts with the light-color core plies.



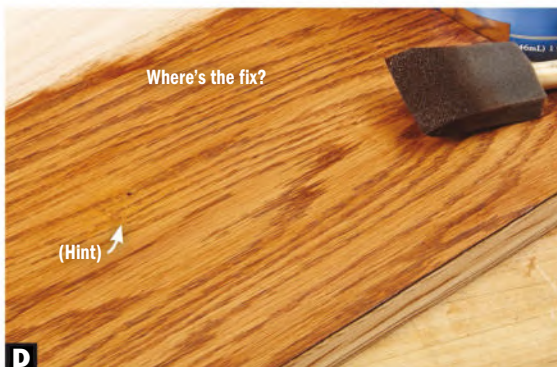
A
Create some grain. The grain on the layer beneath the veneer runs perpendicular to the surface layer. Use a sharp razor knife to replicate the surrounding veneer grain pattern in the substrate. Make some shallow slices and some slightly deeper.



B
Blend to match color. Using yellow, tan, and light-brown colored pencils, blend the sanded-through area with the veneer. Long strokes in the direction of the grain help enhance the grain look.

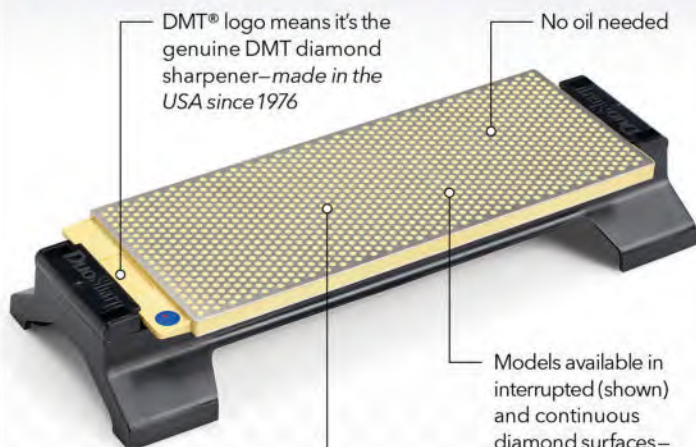


C
Add in some rays. Use a fine-tip dark-brown pencil to draw in ray flecks, overlapping them onto the surrounding veneer. Let the nearby grain guide the length and spacing of your rays.



D
Complete the cover-up. With the spot camouflaged, spray on a coat of clear shellac to seal the wood—brushing may lift the colored pencil marks. A coat of gel stain provides a uniform color. Create additional “grain” by lightly wiping on a second coat of gel stain over the spot, leaving light streak marks.

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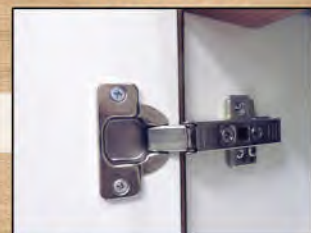
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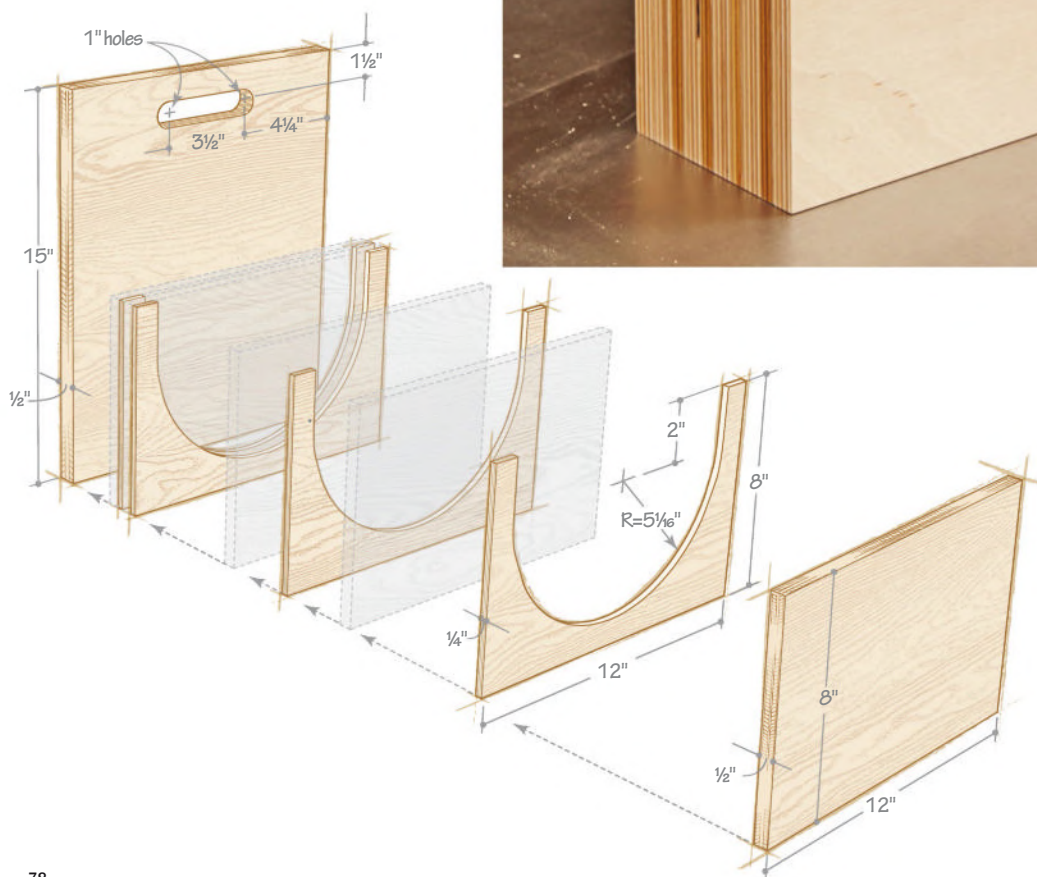
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Totally totable Blade Caddy

Tablesaw blades are like teenage siblings: If you put them in close proximity to each other for an extended period of time, someone's going to lose some teeth. Keep those blades separated and protected with this simple blade caddy. Cut nine 8×12" pieces, four from ¼" plywood and five from ½" plywood. Cut blade pockets in each of the ¼" pieces and a handle in the oversize back [Drawing]. Sand the cutout edges smooth. Glue the layers together, sandwiching the ¼" ones between ½" pieces. When dry, finish the assembly with spray lacquer. 🌲



Tip! Glue up this assembly one layer at a time to prevent the pieces from sliding out of alignment under clamping pressure. Or, for quicker assembly, glue and brad-nail each layer to the one behind it, except only glue the outer face.

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Compact Under Pressure

These easy-to-carry air compressors handle many shop needs, including pneumatic nailing. Here are four of our favorites.



Super quiet

Rolair JC10, \$240
2.5-gallon tank
Fill time from empty: 60 seconds
Recharge time: 17 seconds
This compressor combines quiet operation, quick tank fills, and compactness better than any other. Its oil-free, twin-cylinder pump runs at a crazy-quiet 62 decibels. The solidly built unit weighs 40 pounds, but you can carry it easily enough.
rolair.com



Durable

Makita MAC700, \$220
2.6-gallon tank
Fill time from empty: 60 seconds
Recharge time: 22 seconds
With an oil-lubricated, cast-iron pump, this compressor should last a decade or more. That heavy metal makes this 52-pounder tougher to lug around than most, though its cushioned handle helps some. It ran at a reasonable 75 decibels, but its relatively low pitch keeps it from being bothersome.
800-462-5482, makitatools.com



Fast filler

Bostitch CAP1512-OF, \$150
1.2-gallon tank
Fill time from empty: 37 seconds
Recharge time: 12 seconds
Although this oil-free compressor runs at 82 decibels, it fills the tank so quickly you'll hardly notice the racket. And it fills to 150 psi, giving you longer periods between recharges than similar-size models that top out around 135 psi. This 24-pound compressor carries easily and includes a convenient cord wrap.
800-556-6696, bostitch.com



Lightweight

Makita AC001, \$170
1-gallon tank
Fill time from empty: 2 minutes, 15 seconds
Recharge time: 53 seconds
For its weight (23 pounds), this unit does a nice job keeping up with brad nailers and pinners. Larger nailers could need more pause between shots, depending on your nailing speed. It's nearly as quiet (63 decibels) as the Rolair, and easier to carry.



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reviewatool.com

New Foreman knocks out pocket holes like George

Foreman pocket-hole machine (no. DB210), \$400, Kreg Tool, 800-447-8638, kregtool.com

Kreg's updated Foreman pocket-hole machine brings the production speed of a cabinet shop to the home workshop. This 110-volt benchtop machine bores one pocket hole at a time, but at a rate far faster than a drill and clamp-on jig. Granted, it's not an industrial machine, but if you make

a lot of face frames or cabinets, this can be a real time-saver.

To use the Foreman, butt your workpiece against the fence and pull the handle-mounted trigger, powering the motorized drill bit inside the machine. As you pull forward on the handle, a clamp secures the workpiece and the bit plunges into it from below, creating the pocket hole. After two

months of heavy use, the bit still bored precise holes free of tear-out.

Spring-loaded stops built into the fence let you position a workpiece side-to-side for repeatable drilling. Both the fence and stops maintained spot-on placement without slipping.

—Tested by Bob Hunter, Tools Editor



Two slow-speed 8" bench grinders share tool-rest issues

8" bench grinder (80-805), \$140, Rikon, 877-884-5167, rikontools.com

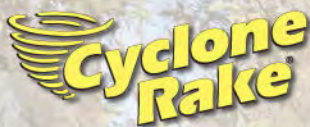
8" bench grinder (JWBG-8), \$330, Jet, 800-274-6848, jettools.com

Rikon's 1,750-rpm grinder, *below*, comes with well-balanced 60- and 120-grit silicon-carbide wheels, and performed nicely shaping and sharpening all my chisels and turning tools. But the aluminum tool rests—which adjust tool-free—attach to the thin steel wheel guards rather than the cast-iron base and flexed slightly under heavy grinding. The left rest has a molded groove for sharpening twist drill bits—an uncommon task, in my opinion—and rendered the rest difficult to use for other tools.

Jet's big, beefy grinder, also a slow-speed model, features two quality Norton wheels: an 80-grit 3X ceramic (blue), and a 100-grit aluminum oxide. They ran smoothly and cut well without overheating. Perpendicular lines etched into the tool rests help align tools when grinding, but the tool rests often worked loose during use. I found the built-in angle indicator for the rests difficult to read and unreliable, and the wrench needed for adjusting the tool rests isn't included. I expected more for this premium price.

—Tested by Brian Simmons





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12" bandsaw joins General International lineup

no. 90-040M1, \$560

With a 15 $\frac{3}{4}$ ×21 $\frac{1}{2}$ " cast-iron table, welded steel frame, 12" throat capacity, and 6 $\frac{1}{2}$ " resaw capacity, General International's 90-040M1 gives you a good option for an entry-level bandsaw. This $\frac{3}{4}$ -hp saw has a miter gauge, dual-position rip fence, and an open-leg stand that locates the table 37 $\frac{3}{8}$ " above the floor. The dust-collection port comes equipped to hook up directly to 2", 3", and 4" hoses. 888-949-1161, general.ca



Install drawer slides with new Rockler jig

Universal Drawer Slide Jig, \$30

Rockler's Universal Drawer Slide Jig holds in position ball-bearing and epoxy-coated drawer slides (side mount and center mount) to ensure precise installation. A sliding lock wedge secures the slide, and you press the jig against the face of the cabinet, which levels and squares the slide and positions it with the proper setback. Cutouts in the jig body allow you to drill mounting holes and screw the slide in place.

800-279-4441, rockler.com



Cordless saw with "cruise control"

18-volt 6 $\frac{1}{2}$ " circular saw, \$200 (XSH03Z, saw only); \$409 (XSH03M, with two batteries and charger)

Makita's newest lithium-ion-powered circular saw has a "smart" motor that Makita says amps up when the sawing gets tough: A brushless motor and "Automatic Speed Change" technology maintain speed (the blade spins at 5,000 rpm) and torque as you cut. You can buy the saw with a pair of 4.0 amp-hour battery packs and charger, or just the tool if you already have Makita 18-volt LXT batteries. 🌱

800-462-5482, makitatools.com

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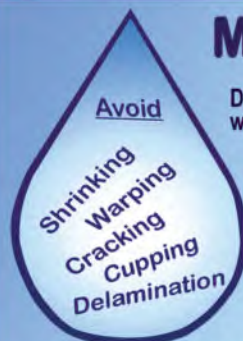


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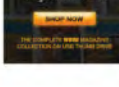
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Forget V-day? WOOD's 5-Step Guide to Making Up

WHAT'S AHEAD

A GLIMPSE INSIDE THE NOVEMBER ISSUE (ON SALE OCTOBER 6)



Hidden-door bookcase

Like a moll in a mystery novel, this beautiful swinger has secrets. Install it over an existing doorway to conceal your hideout.

Limbert end table

Build a graceful Arts & Crafts piece this weekend from only five parts.



Circular logic

Nothing abstract here: Our shop tests deduce which of 10 electric circular saws is arguably the best for your shop.



Big-box-store lumber

We give you the lowdown on buying and working with wood from home centers.



Child's rocking chair

This comely rocker's tough enough to survive even the terrible twos.



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