ISSUE 249 OCTOBER 2017

Better Homes & Gardens

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Simon says...

On my old tablesaw, the insert won't take a ¾" dado stack, and the factory insert is so thin, I can't replace it with a zero-clearance insert, so a tablesaw is probably what I'll buy next." I could have heard talk like that from just about any seasoned woodworker. In fact, that statement came from Simon Carlson, who has about a dozen years of experience.

At life; not woodworking. See, Simon is only 13 years old.

The woodworking bug bit him hard a couple of years ago when he decided to build a carpetball table (think table shuffleboard, but with billiard balls) like the one he'd played on at summer camp. That's when he figured out "that I really like making stuff." Turns out he's good at it, too: His project earned a blue ribbon in the 4-H competition at the Cherokee (Iowa) County Fair.

Simon's shop—like those of many of us—contains a variety of hand-me-down tools and auction finds. And using that equipment, Simon has made a variety of projects, from a wood "cube-in-cube" and workbench for his younger brother, Kashton, to a lumber storage cart. His to-do list includes a router table, pegboard cabinet, and a grilling cart.

His ambition doesn't end at the shop door. Besides being active in band and choir at school, Simon earned all the money he needed to attend *Weekend With WOOD* last spring by doing chores for his dad and socking away his birthday and Christmas money.

He won't have to worry about saving up for *Weekend* next year: Simon's knowledge of woodworking (and frankly, his charm) quickly endeared him to his fellow attendees, who secretly passed the hat and collected enough money to ensure his return. His parents, Tammy and Matt, were floored by the generosity. And Simon can instead save his money for that upgraded tablesaw.

Simon Carlson checks the surface of an urn side panel he sanded during the *Weekend With WOOD* Charity Build.

Dave Campbell
dave.campbell@meredith.com
Facebook and Twitter: @WOODEditor

Two summers ago, Simon showed all of these "projects," including the carpetball table he's sitting on, at the county fair.

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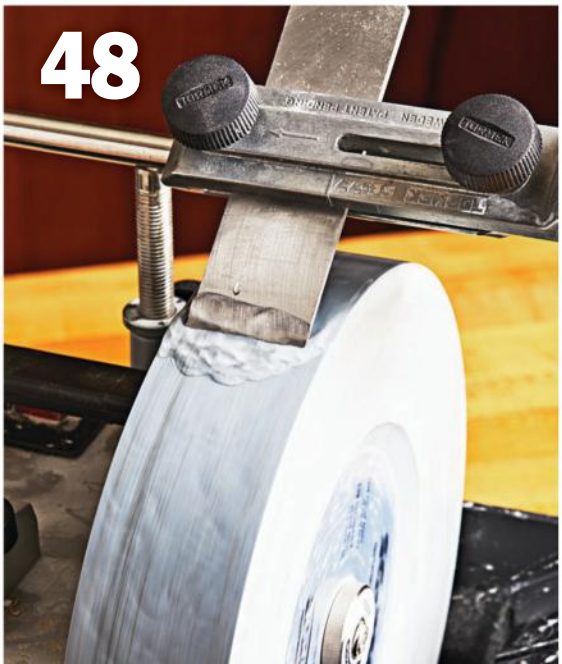
In This Issue of WOOD®

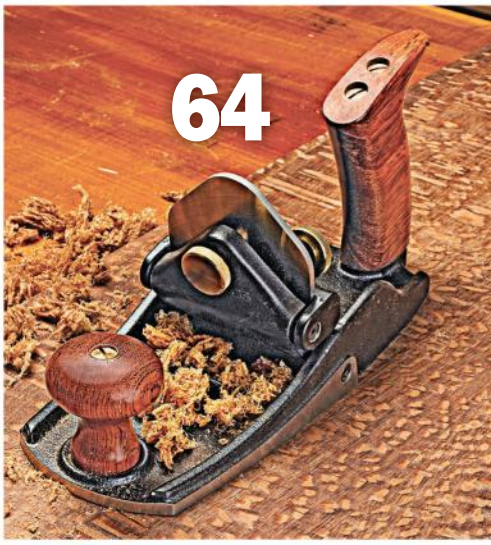
OCTOBER 2017 · ISSUE 249

PLANS

TOOLS & TECHNIQUES

DEPARTMENTS



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REAL-DEAL TOOL REVIEWS!

What's better than *WOOD* magazine's tool reviews? *Your* reviews right next to *WOOD* magazine's tool reviews. Give your fellow woodworkers a heads-up by telling them your real-world, real-woodworker experience with your tools. Or, if you're in the market for a tool, stop here first. You'll find the real poop from the hardworking gals and guys putting tools through their paces in actual woodworking shops.
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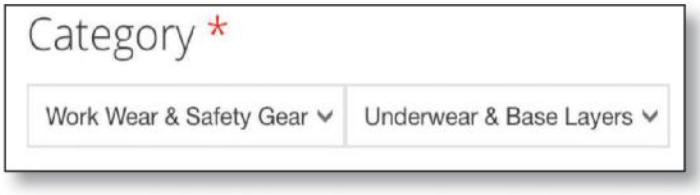

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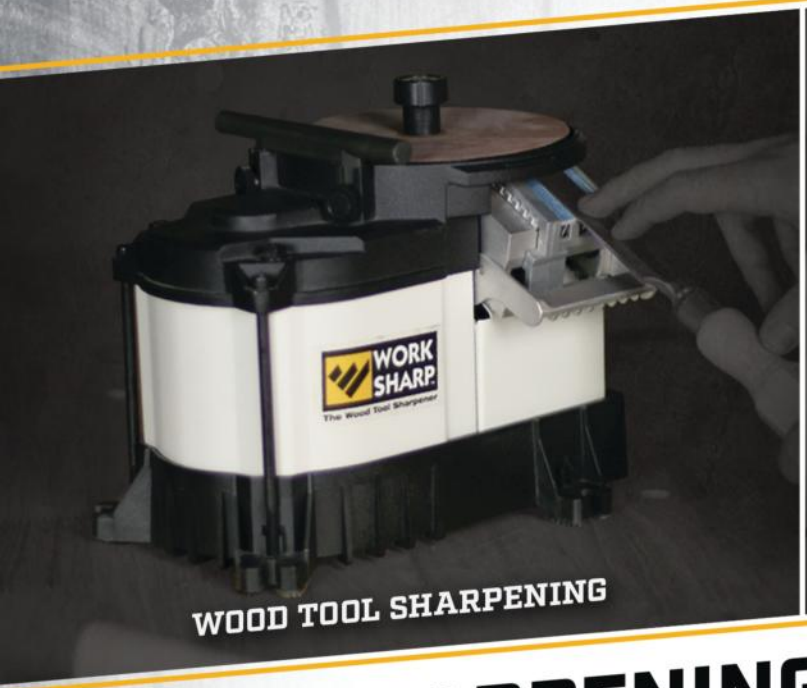

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Sounding Board

YOUR VOICE

One good turn deserves another

My dad taught me woodworking starting around 6 years old. I have so many fond memories of working with him in his shop as I grew up and learning so much from him, and I'm still an avid woodworker. Before he passed away two days shy of his 82nd birthday, my father told me he wanted me to have his lathe—the one on which he taught me to turn.

It was pretty beat up, having been manufactured in 1938 and seen a lot of use. So, I built a new stand for it using the original cabinet's metal frame, and added a new top and drawer unit from red oak and walnut, as you can see in this photo. *The lathe itself I had professionally sandblasted and powder coated, and replaced the bearings, and once again it works as good as new.*

Every time I use it, I think about my dad and how he instilled in me a love of woodworking.

—Ken Jerome
Batavia, Ill.

Readers sweat pipe details

Just read your article "Plumb your shop for air" in issue 247 (July 2017), but I can't see the need and expense for using copper pipe. Although it's not as pretty as copper, PVC pipe is much simpler, far cheaper, and just as good.

—Ted Schultz
via e-mail

I disagree with the comment regarding avoiding PVC pipe for a compressed-air distribution system because PVC is "not rated for high pressure and can fracture or explode under pressure." In some sizes, schedule 80 PVC has a higher maximum operating pressure rating (MPR) than type M copper pipe. Although PVC pipe also comes in standard sizes rated at pressures of 160 and 200 psi, respectively, even PR-160 pipe should be safe for shop use.

—Norman Aubuchon
Mesa, Ariz.

I enjoyed your article on shop air, but found an easier way to plumb my shop: I used the kit from RapidAir. It took me about 3½ hours to run 200' of air line and attach all the outlets.

—Roger Bredemeier
Littleton, Colo.

Although several readers told us they're using PVC pipe for compressed-air distribution, the National and International Piping Codes specifically prohibit the use of PVC pipe for this purpose. Even the Plastic Pipe Institute and PVC pipe manufacturers themselves recommend against it. PVC becomes brittle with age, temperature fluctuations, and exposure to airborne oils and UV light. And when it fails, it sprays razor-sharp shrapnel through the shop.

We've not tested it yet, but the oil-resistant flexible nylon tubing in the RapidAir kits (rapidairproducts.com) looks promising for a home-shop system. It's pricier than copper, but the quick-connect fittings make installation literally a no-sweat job.

Foiled by motor oil

While reading your Ask WOOD article in issue 246 (May 2017) about changing the oil in air compressors, I was reminded of the time I nearly ruined my compressor by using automotive motor oil instead of compressor oil. That's when I learned that detergents in automotive oil will foam when mixed with the moisture in the air being compressed.

—Jeff Ament
Tigard, Ore.

Good reminder, Jeff. Always use dedicated compressor oil when adding or replacing it.

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continued on page 8

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Sounding Board

YOUR PROJECTS

*Inspired by a Roche Bobois desk he saw in a decor magazine, **Greg Harness**, of Peoria, Ill., designed and built this gorgeous dressing table from poplar. It features hand-carved edge beading and Greg's first attempt at cabriole legs.*

*It took **Paul Ramm**, of Bentonville, Ark., about a year to build this knotty-pine grandfather clock, his second. (His first—a Craftsman-style clock—took about four years.) Paul did all the scrollwork on the clock face.*

*Members of the **Sawdust Club of Cleveland** (Ohio) worked together to choose the design and species (white oak, walnut, and maple burl veneer), then cut and assembled parts for this table, which they donated to the Daniel Parmertor Memorial Scholarship fundraising auction. **Bill McCracken** led the project.*

***Tom Baker**, of Machesney Park, Ill., constructed this trestle table and book-matched benches from the wood of a single black walnut tree. The tabletop measures 71" long and 36⅜" wide.*

continued on page 10

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*A self-proclaimed "beginner woodworker," **Jerry Mattern**, of Brockport, N.Y., learned how to cut half-blind dovetails while making this Heirloom Hutch from issue 223 (Dec/Jan 2013/2014).*

*After building several of our Construction-grade Toys (woodmagazine.com/cgtoys), **Jim Allen**, of Lakeside, Ore., designed and built his own heavy hauler: this logging truck.*

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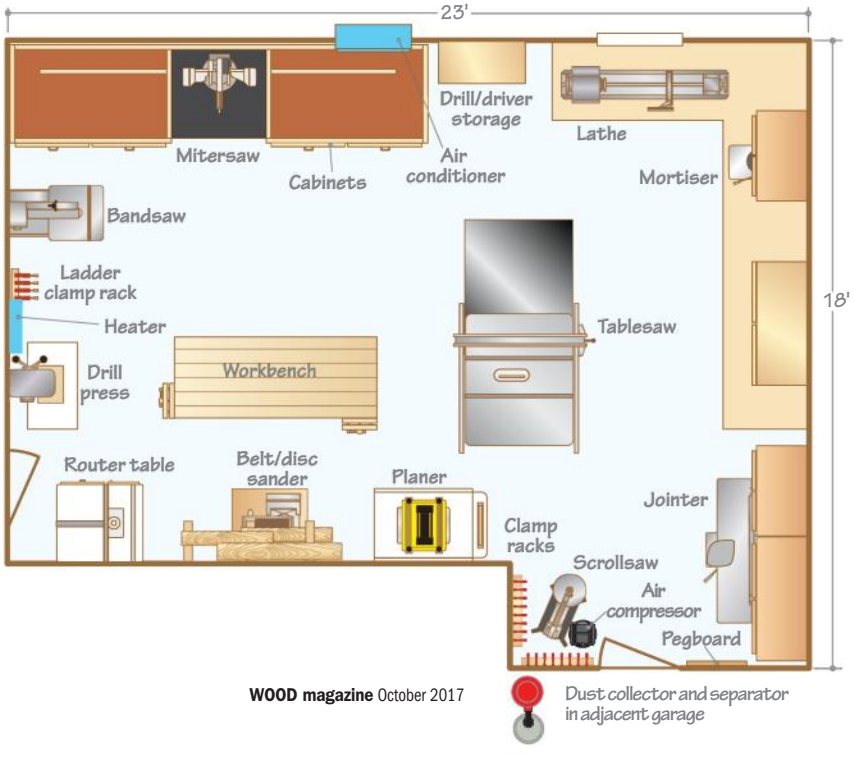
Ladder clamp rack

Lenny Butler enjoys building gift boxes such as the wine box made for his daughter and son-in-law's anniversary. His shop sits behind his garage.

Moving from an 8×11' basement shop with 6' ceilings to an 8×16' addition at the rear of his garage provided Lenny Butler some breathing room. For a while. A second addition, nearly tripling the footprint to 16×23', finally made it his "slice of heaven."

A 50-amp subpanel in the garage feeds two 220-volt circuits (used by the tablesaw and 8" jointer) and two 110-volt circuits. Fluorescent and LED fixtures mounted between the trusses provide illumination, supplemented by two skylights.

Lenny parked his 1½-hp dust collector in the adjacent garage, freeing up floor and wall space in the shop and reducing noise. A trash-can separator collects most of the dust and chips fed in by the 6" PVC trunk lines mounted near the ceiling. 4" drops placed around the shop service individual tools. One of those drops evacuates dust from the enclosed base and the fence of his router



Flip-up wings on a planer cart provide a place to set boards between planing passes, then fold down for storing the cart. The roller extends on a sliding platform to support long boards.

Family names scrollsawn from purpleheart serve as router-table drawer pulls, complementing the purpleheart and yellowheart stripes in the drawer fronts.

table, *above*. A floor vent fitted in the front of the base provides make up airflow.

Interior walls covered with T1-11 plywood siding give the shop a warm feel and offer unlimited options for mounting fixtures (and family photos). Among the fixtures: the ladder from Lenny's childhood bunk bed, now holding a few clamps.

An adjustable-height workbench, with a bar-and-pawl mechanism (like an adjustable candlestick) on each leg, serves as an outfeed for the tablesaw and, when lowered, as an assembly table.

To keep the shop shirtsleeve comfortable, Lenny installed a natural-gas heater and an in-wall air conditioner. Should his wife need him back in the house, a press of a button in the kitchen triggers a strobe light in the shop.

Show us your shop

Send high-resolution digital photos of your shop to woodmail@woodmagazine.com *and we may showcase it in the magazine!*

Ask Wood
YOUR QUESTIONS

Clockwise, from low-dough to high-dollar, three ways to defend your lungs: paper/cloth masks, respirators, or power air shields.

Q Don't skimp on your last line of dust defense

Since I installed ceiling-mounted air-filtration units to supplement the cyclone dust collector piped to my machines, the shop has never been so clean! Should I still wear a dust mask? If so, what kind?

—Pat Goodwin, Cleveland, Tenn.

A Even the best dust-collection equipment can't keep all superfine dust—the stuff most harmful to your lungs—completely out of the air, Pat. So, you'll still need an effective personal respiratory-protection device. Choose from these three types:

▶ **Paper or cloth masks.** You'll find an array of these available, including disposable ones costing pennies apiece. Better masks include double straps, and valves for easier breathing, but none fit airtight to your face. So fine dust particles can still sneak in around the edges. These masks provide no protection from solvent fumes.

▶ **Respirators.** Highly effective and costing as little as $20, this choice suits most woodworkers. A silicone face seal forms an airtight barricade around your nose and mouth (unless you have facial hair—then see the next option). Fit a respirator with replaceable cartridges made for filtering fine particulates, spray finishes, or various solvents, as your needs dictate.

▶ **Power air shields.** If you can afford to spend several hundred dollars, you won't regret buying one. A battery-powered fan provides a stream of filtered air that keeps your face cool and prevents fogging. Positive air pressure inside the shield prevents particulates from penetrating around the loose, comfortable-fitting edges.

Have a question? Drop us an e-mail. askwood@woodmagazine.com

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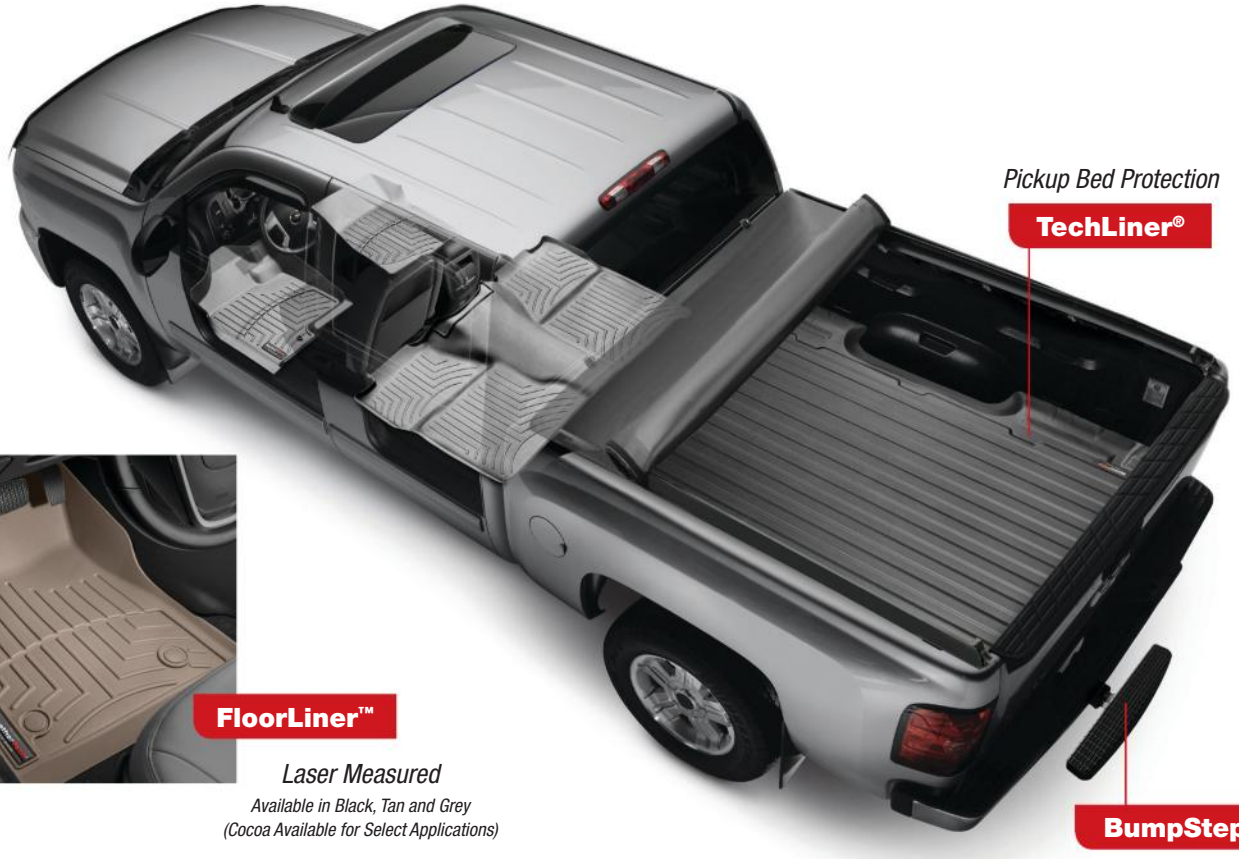

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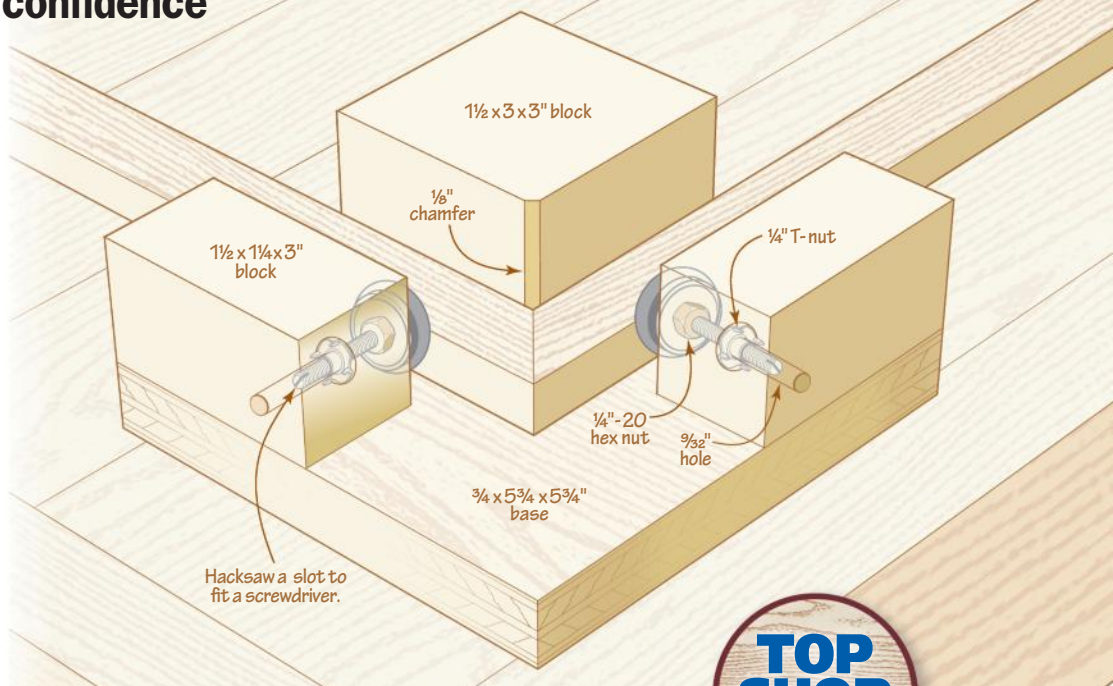
First, cut the base and blocks as shown. I use MDF and plywood scraps. Drill a hole into the outside blocks to accommodate a furniture leg-leveling glide (no. 78072, $2.97 from Lowe's, lowes.com). Use a hacksaw to cut a slot in the threaded end of the glide, as shown. Then, press a T-nut into each hole, and add a hex nut to each glide before threading the glides into the T-nuts. Now mark square alignment lines on the base and use those to position and glue the blocks to the base.

After the glue dries, apply paste wax to the clamp's surfaces to ward off glue squeeze-out. Place your box or frame pieces in the clamp and use the hex nuts to tighten the glide pads against the workpieces. If a wrench isn't available or convenient, use a screwdriver inserted through the holes in the blocks.

The version shown here works well with ¾"-thick box sides or narrow frames. You can size the clamp parts as necessary for larger or smaller frame or box pieces.

—David Cole, New Kent, Va.



TOP SHOP TIP

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For sending this issue's Top Shop Tip, David receives a SuperMax Tools model 821200 1½-hp dust collector worth $450.

continued on page 18

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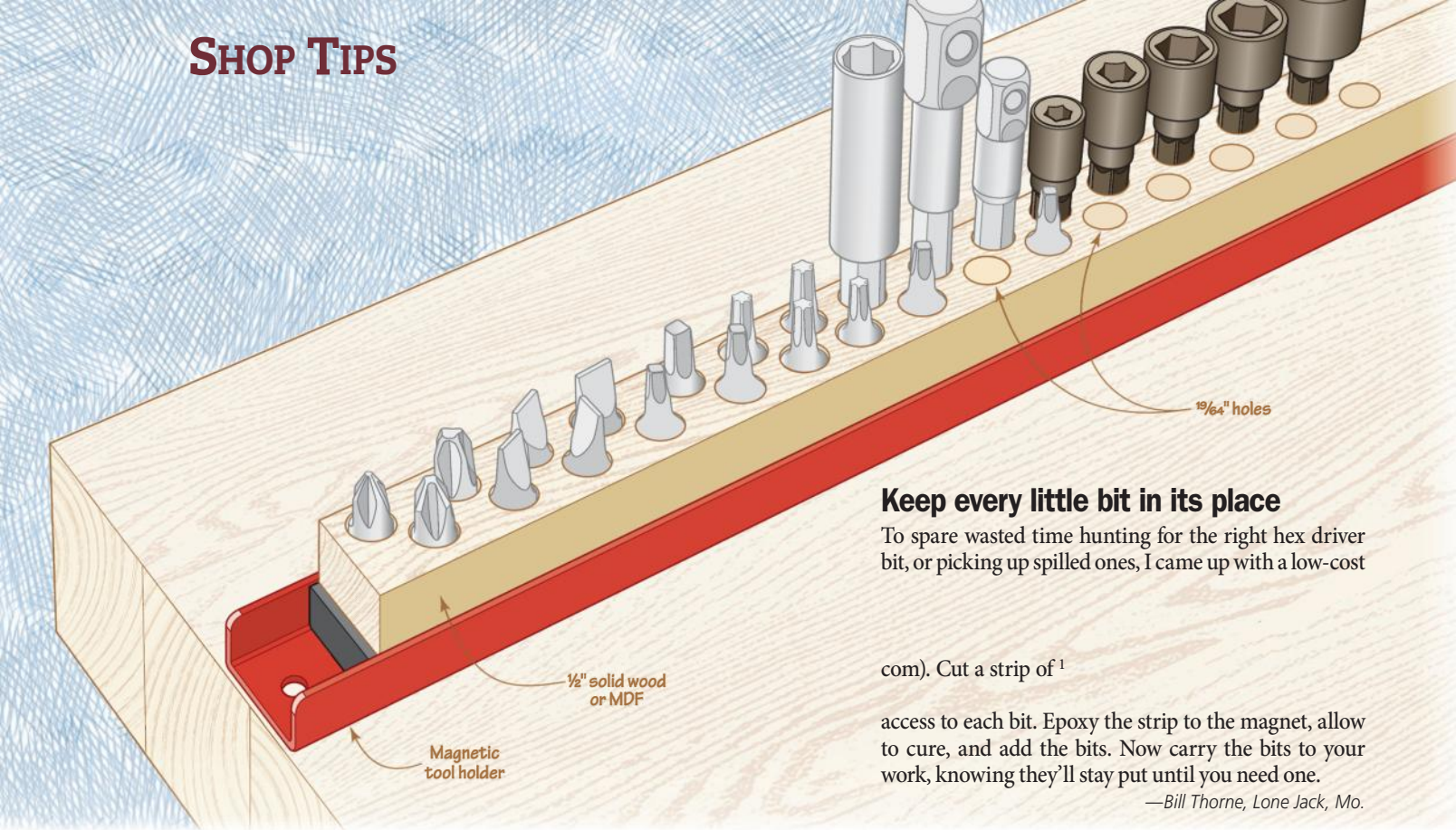

Keep every little bit in its place

To spare wasted time hunting for the right hex driver bit, or picking up spilled ones, I came up with a low-cost

com). Cut a strip of [1]

access to each bit. Epoxy the strip to the magnet, allow to cure, and add the bits. Now carry the bits to your work, knowing they'll stay put until you need one.

—Bill Thorne, Lone Jack, Mo.

Know your true grits

Smoothing turned pens requires a wide array of sandpaper grits to obtain a silky finish. I found it difficult to keep track of the multiple abrasives—and keep them off the floor—until I developed this simple organizational system. For each grit, I screwed a small binder clip to my turning-tool shelf. If the grit number doesn't show on the back of the sheet, I simply jot it with a permanent marker.

—Bruce Melton, Rolling Prairie, Ind.

continued on page 20

Make Money in Metal Art

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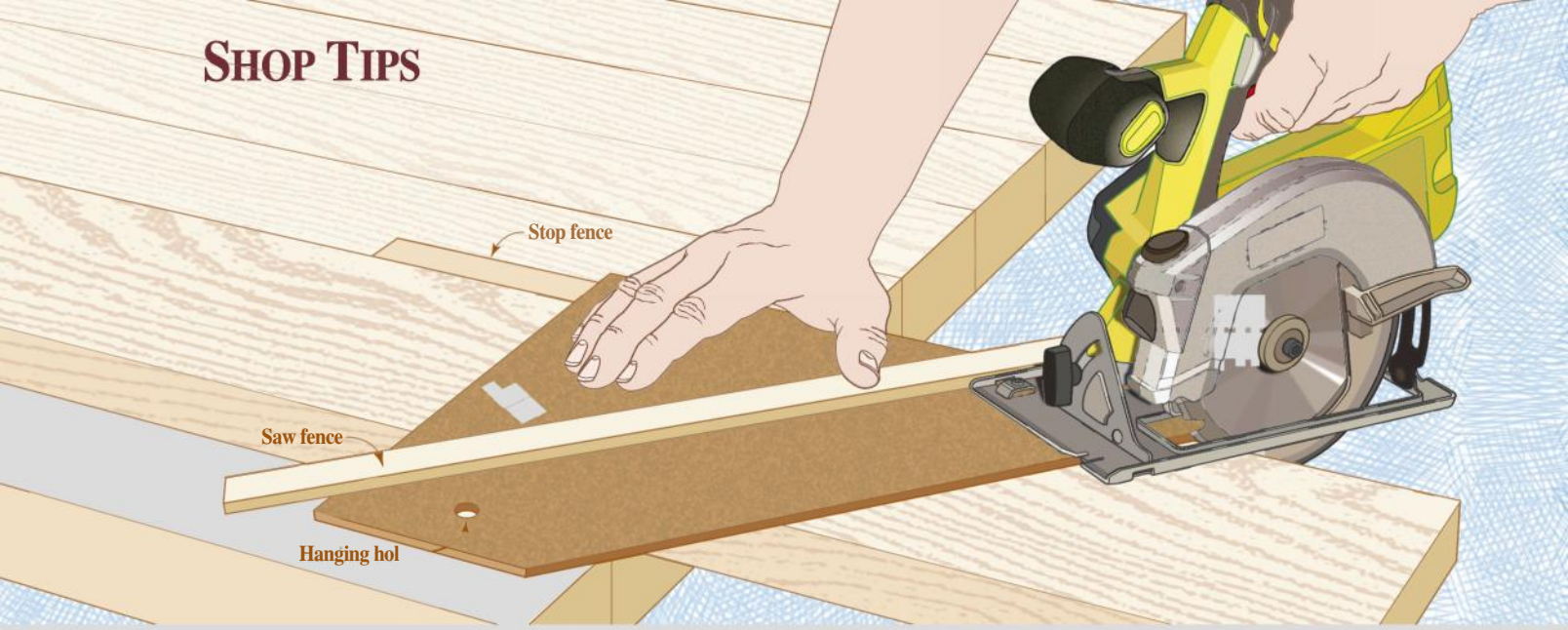


Cut dead-on angles with a portable circ saw

Sometimes you simply can't angle-cu the end of a board using a tablesaw o mitersaw because of the length of th workpiece or where you're workin For those times I use shop-made fixed-angle guides and a portable ci cular saw to get accurate, smooth, an controllable cuts.

Start with a piece o¼" plywood or hardboard large enough to provid ample coverage across the width of you workpiece, with room to support you saw's shoe, and space for a handhold Along one edge glue on a½×1" stop fence. On the opposite face glue on a similar saw fence at exactly the ang you need relative to the stop fence (45 in the example shown). Mark the angl on the guide for future reference. Add hole for hanging the guide

Use your saw to cut the base's angle edge. Glue rubber or gasket material the bottom of the guide to give it a cush ioned grip. Now align the angled edge o the guide with your marked cutline, an saw with steady precision. If you need t slightly tweak the angle of the cut, sim ply place a thin shim or two between th stop fence and workpiece edge

—Paul Fiebich, Derby, Kan

Put the brakes on stopped-up nozzles

Makers of aerosol finishes typically suggest yo clean a nozzle by tipping the can upside down an spraying. That wastes finish and propellant, an you may still end up with a clogged nozzle. Here a better way I've used with success for yea

When you're done spraying, remove the nozz and attach it to a can of brake parts cleaner (av able at auto parts stores). Give a brief spray, w the tip of the nozzle with a rag, and replace th nozzle on its original can. That's it! You will like need two cans of brake parts cleaner: one th accepts male-type nozzles and one that fits fema type nozzles. My aerosol cans never run out o propellant, and I have bags of leftover clean nozzl to share with friends who still clog them

—Jim Jackson, Fruitport, Mich

Extend the life of disposable glue brushes

Soldering flux brushes work great for applying glue to small parts and tight spots. I used to go through a lot of them in the course of building a project, and that struck me as wasteful. Then I hit upon this remedy.

Drill a ¼" hole in the cap of a disposable water bottle and fill it with enough water to immerse the brush bristles. The water keeps the glue from hardening. When you need the brush simply unscrew the cap and squeeze the bristles between paper towels. By keeping the cap in place on the brush, it holds the glue-loaded bristles off your bench when set down.

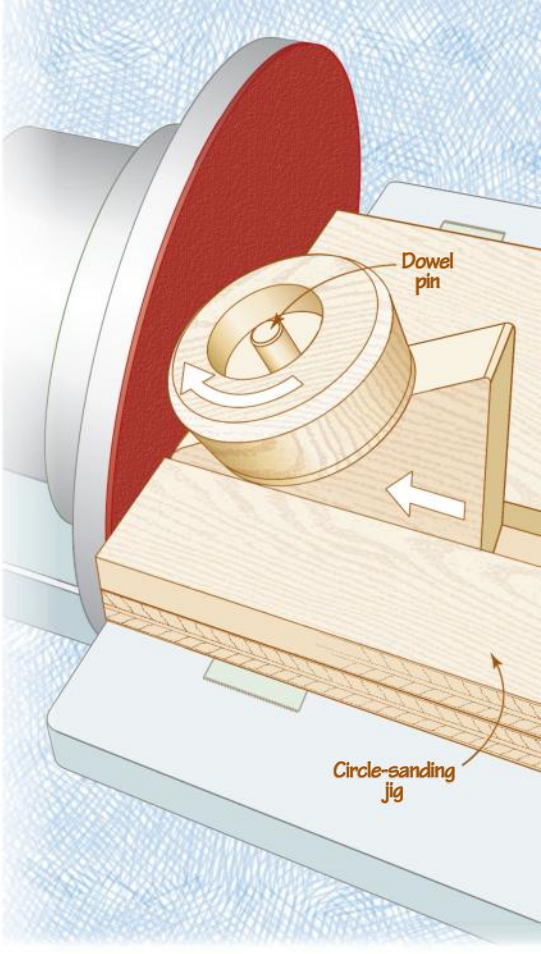
—Arthur Morse, Olympia, Wash.

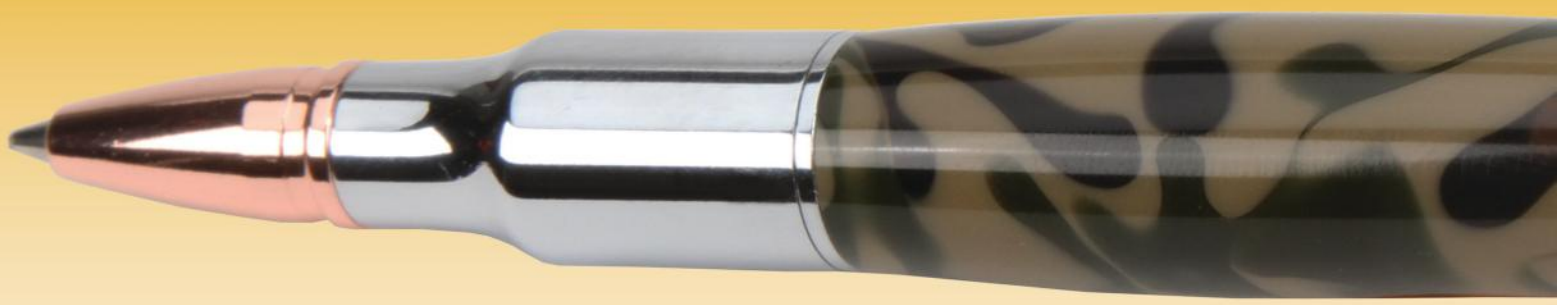
Chamfer wheels on the same tool you sand them round

I regularly use a circle sanding jig (woodmagazine.com/circlesander) to round toy wheels, and I figured out a way to modify that jig to add a nice-looking chamfer. Here's how to do it.

Cut a length of ¾×4" scrap with one end angled 45°. Mount the dowel pin in the angled end (its exact location depends on the diameter of your wheel). Place the wheel on the pin, slide the jig forward in the slot until the corner of the wheel contacts the spinning disc, and rotate the wheel to make a chamfer.

—John Carter, Jenks, Okla.





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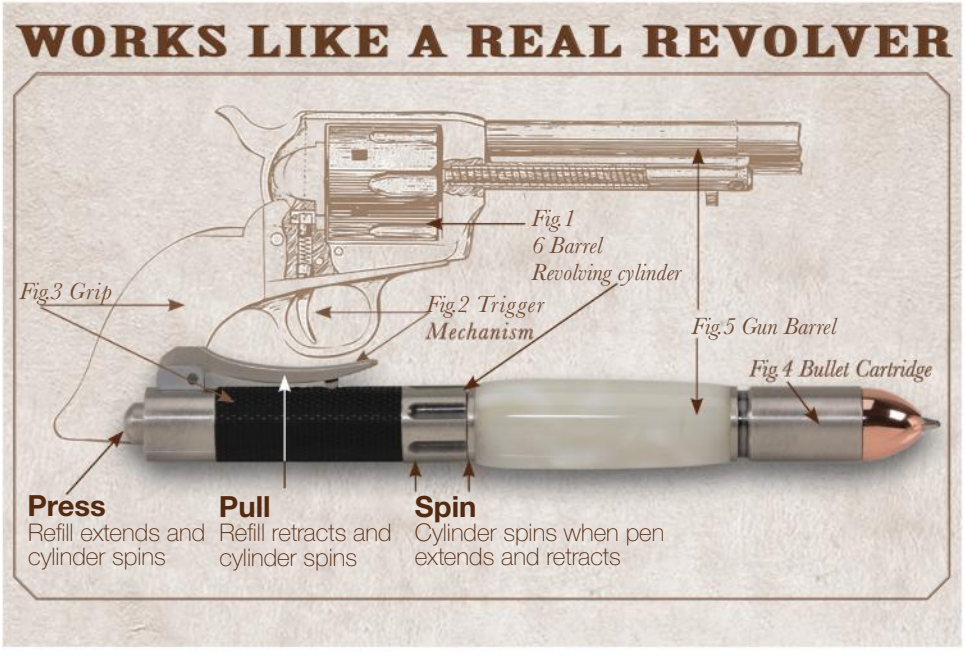
Our FREE 45-minute instructional DVD is packed with all the info you need to start making pens. Order Item # DVD. You'll join thousands of other pen makers who love creating beautiful gifts!

Revolver Pen Kits *NEW!*

These nostalgically stylish pens look and work just like a real revolver. When you press the click mechanism the pen tip extends, the trigger clip moves up and the 6-barrel cylinder rotates to replicate you loading the gun. Then, when you pull the hairpin trigger pen clip the tip retracts while the 6-barrel cylinder quickly spins to replicate you firing the gun. Right above the cylinder you'll find a black metal grip that mimics a revolver handle. And the bullet cartridge pen tip represents your favorite revolver bullet. Requires a pen making mandrel, bushings (Item # PKREVBU $5.95) and 3/8" drill bit (Item # PK10-10 $3.95).
Patent pending.



Bolt action handle smoothly advances and retracts the refill

Bolt Action Pen Kit in Chrome

Revolver Pen Kit in Antique Brass

Revolver Pen Kits *NEW!*

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

4 Revolver Pen Kit Starter Set

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

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

**Kits in packs may vary subject to availability*

SAVE 24%

Chrome

Gun Metal

Antique Pewter

Bolt Action Pen Kits *BEST SELLER!*

	Item #	1-4	5-24	25-49	50+
Chrome *(shown above)*	#PKCP8010	$12.95	$12.05	$11.15	$10.25
Gun Metal	#PKCP8020	$12.95	$12.05	$11.15	$10.25
24kt Gold	#PKCP8000	$14.95	$13.95	$12.95	$11.95
Antique Brass	#PKCP8040	$14.95	$13.95	$12.95	$11.95

3 Bolt Action Pen Kit Starter Set

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

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

** Kits in packs may vary subject to availability*

SAVE 16%

Gun Metal

24kt Gold

Deer Hunter Bolt Action Pen Kits

	Item #	1-4	5-24	25-49	50+
Antique Brass	#PKCP8DHAB	$16.95	$15.95	$14.95	$13.95
Antique Pewter	#PKCP8DHAP	$16.95	$15.95	$14.95	$13.95

Antique Brass

Antique Pewter

Search and Research

Digging for information may have been a drag in school, but in the shop, research makes each project better than the last.

by Rob Porcaro

Wendell Castle is a sculptor and designer, often called the father of the art furniture movement.

Furniture designer Wendell Castle once commented that often, not enough time is spent designing a piece. The same can be said of *researching* a piece.

Neglecting adequate research before a build can lead to a lot of wasted effort, resulting in disappointment. The research phase of a project should be enjoyable as you explore the possibilities and expand your woodworking knowledge.

Here are three areas that require attention. To illustrate the research phase, I'll use lessons learned from a wedding wine box [*above*] I built.

1. Function. Almost all woodwork is functional. Think of it this way: making a baseball bat requires more than understanding wood and turning; you have to know something about baseball. For my wine box, I researched the dimensions of numerous wine bottles to design a cradle that would accommodate a range of sizes.

2. Materials. This is not an area for guessing or shortcuts. Processes that are routine in one species can be fraught with surprises in another. What's more, nearly every project involves nonwood materials that woodworkers need to understand.

A few boards of gorgeous curly ovangkol (shedua) caught my eye. I had not worked

Practice on the chosen wood species provided understanding of the working characteristics of the material. This allowed fine-tuning techniques for flawless joinery.

The internet contains vast resources for research. Just be sure that the information is valid and balanced against your own skills, experience, and knowledge.

with this species before. So I looked at data on its physical properties and movement characteristics. Most important, I practiced sawing, chiseling, and planing it to learn its working properties. I also tested finishes and glues, and researched leather.

3. Techniques and tools. Every project provides opportunities to develop as a woodworker by learning new techniques and reinforcing your skills. Almost every piece I make involves at least one modified or nonstandard construction technique. If you never venture from the conventional, you miss out on a lot of fun in woodworking. It really helps to consider solutions that other woodworkers have used, though it's important to use sound principles and experience to distinguish good information from bad.

Processes that are routine in one species can be fraught with surprises in another.

With this project, I sat at the drawing board for a long time, scratching my head and then making mock-ups of the cradle before finding a solution.

And yes, there is also the excuse to buy a new tool, which, by the way, has to be studied and tuned. In this project, because I did not do enough research on installing the lock I chose, I needed to buy drawer-lock chisels to bail me out.

Research is part of smart woodworking. Don't cheat on your homework.

▶Rob Porcaro has more than 35 years experience in woodworking. He has exhibited work in premier juried artisan shows, fine galleries, and numerous national and regional publications. Find more of his writing at rpwoodwork.com.

DIMENSIONS:
77½" H × 23¾" D × 48⅞" W

Approximate materials cost:
$550

20 cubic feet of shelf storage

15 linear feet of door cubbies

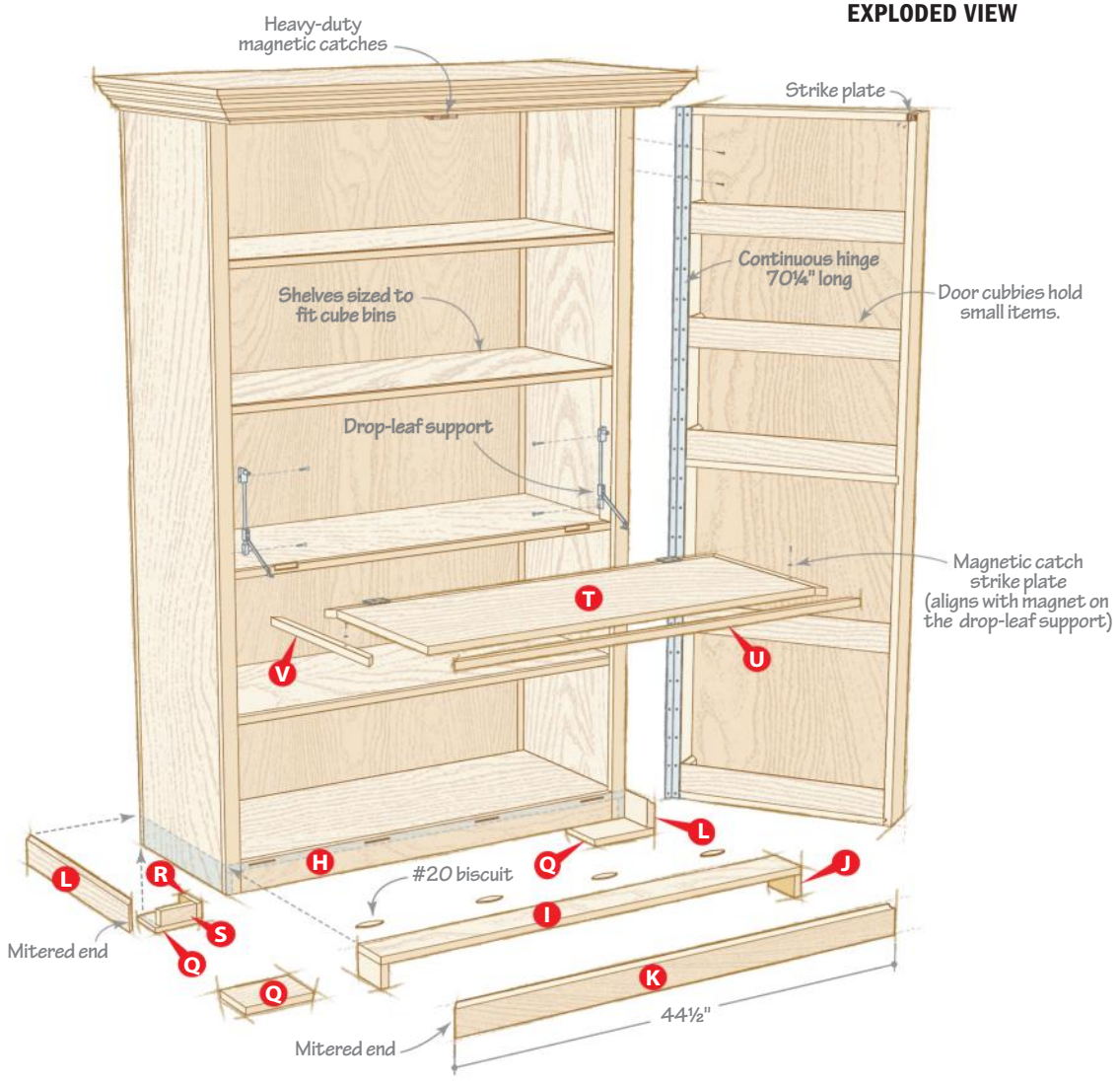
9 square feet of work surface

Crafter's Project Center

Convert any room into a crafting workshop.

If your dining room doubles as a crafting space, this cabinet will corral the clutter with shelves sized to fit widely available fabric-covered cube bins. It also features oodles of storage on the doors and a spacious fold-down worksurface. When not in use, close the doors and presto! Your workshop hides behind the doors of an attractive traditional-style cabinet (see *page 32*).

EXPLODED VIEW



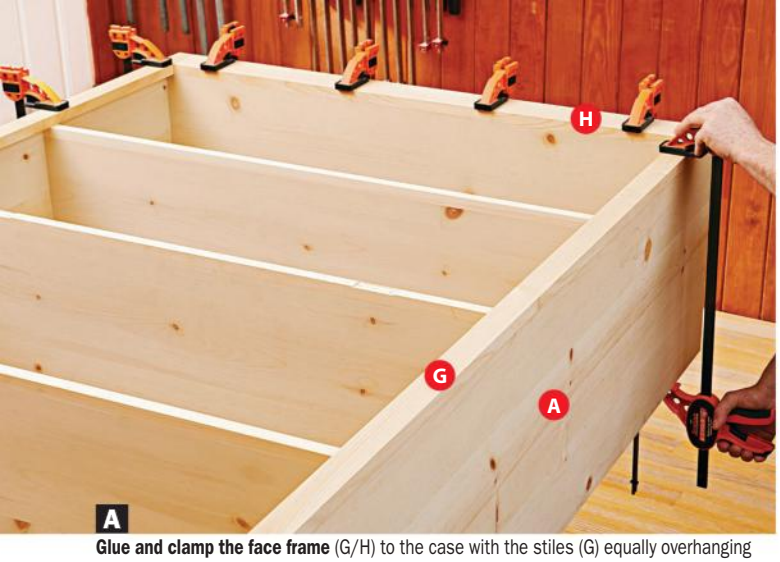
Build the case

Tip! To check the case for square, measure it diagonally from corner to corner. Equal dimensions ensure a square case.

1 Cut the case sides (A), top and bottom (B), and shelves (C) [**Materials List**]. Cut the shelf trim (D) and glue them to the shelves [**Drawing 1**]. Dado the case sides [**Drawing 2**]. Finish-sand the parts and glue the case.

2 Cut and rabbet the back retainers (E) [**Drawing 1**]. Finish-sand the retainers and glue and screw them to the case with the outside edges flush. Cut the back (F) to size, finish-sand it, and set it aside.

3 Cut the stiles (G) and rails (H). Drill pocket holes in the rails and assemble the



Glue and clamp the face frame (G/H) to the case with the stiles (G) equally overhanging both sides (A).

Rout the stiles flush to the sides using a bottom-bearing flush-trim bit.

face frame. Attach the face frame to the case [**Photos A** and **B**].

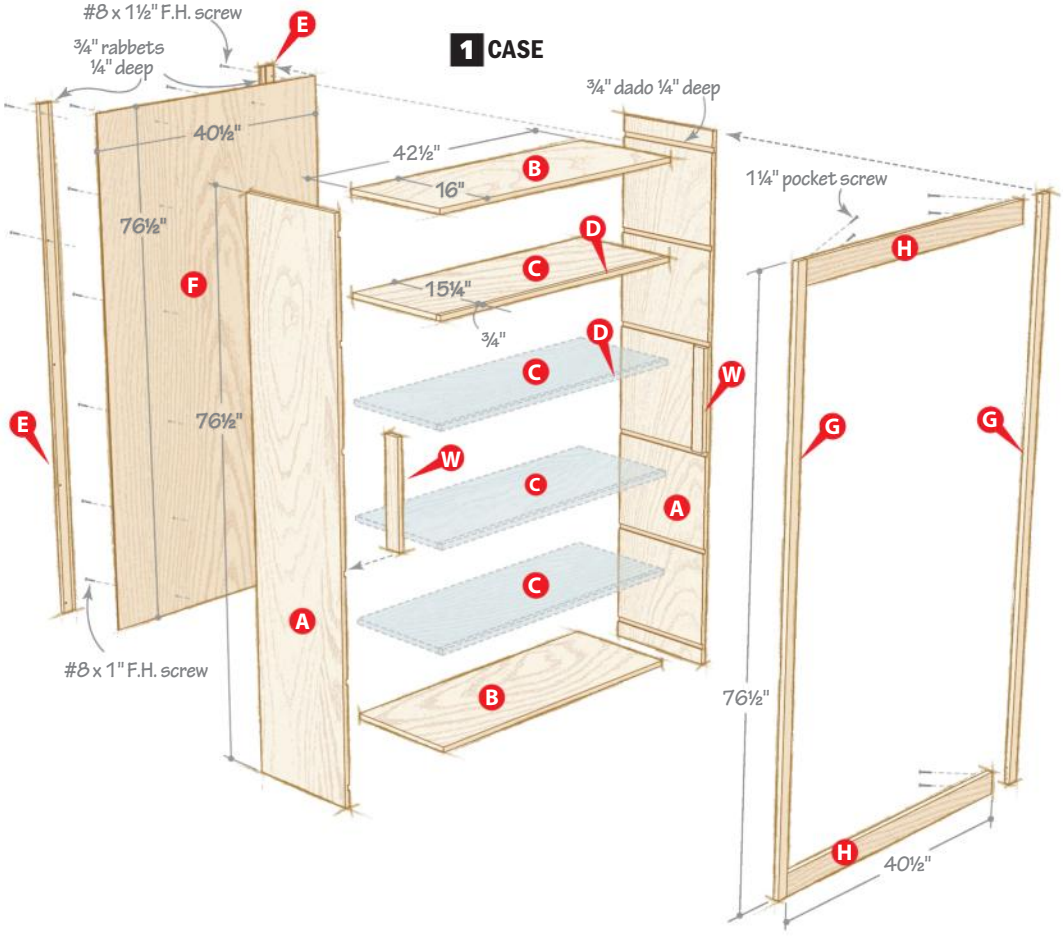
4 Cut the extensions (I, J). Biscuit the side extensions to the top and bottom extensions [**Exploded View, Drawing 3**]; then attach the extension assemblies to the case.

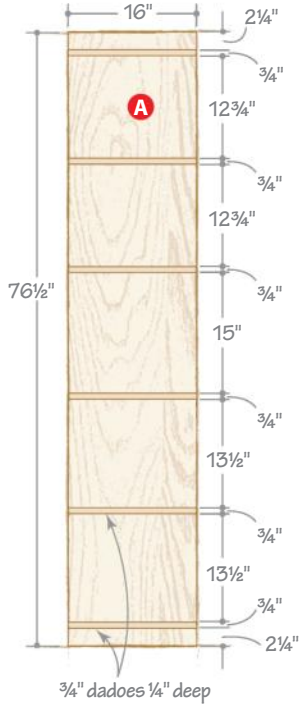
Wrap the case with moldings

1 Cut the cove moldings (K, L) 1" longer than listed. Rout ½" coves along one edge and miter-cut the moldings to length. Glue the moldings to the case sides (A), top and bottom extensions (I), and side extensions (J) [**Exploded View, Drawings 3** and **3a**].

2 Cut to shape the crown supports (M) [**Drawing 4**], and glue them to the cove moldings (K, L) [**Drawing 3**]. Cut the side and front crowns (N, O) 1" longer than listed and then compound-miter-cut them to length [**Skill Builder**, *next page*]. Glue the crown moldings to the cove moldings (K, L) and crown supports.

Note: *Check the spring angle of your crown molding* [**Drawing 4**]. *If it is different from the molding we used, modify the shape of the crown supports (M) to match.*



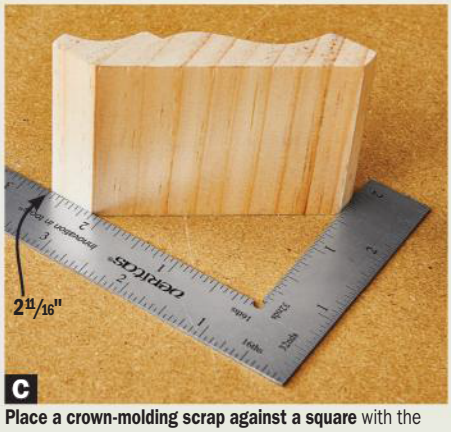


SKILL BUILDER

Stand-up method for cutting crown molding

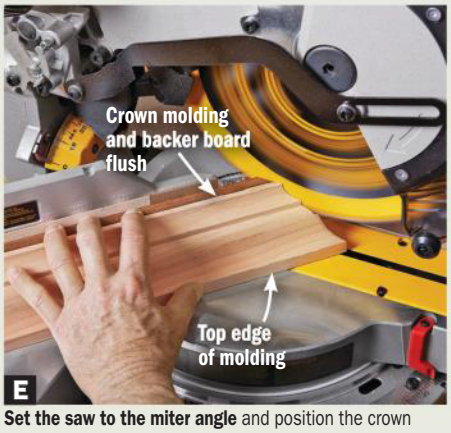
Not all miter saws tilt to allow cutting the compound angles needed to miter crown molding with the molding flat on the saw bed. And some saws that do only tilt in one direction. Even if you have a dual-tilt miter saw, setting the proper angles can be confusing. By positioning the molding at an angle against the saw fence [**Photos C, D,** and **E**], you simply set the saw to the desired miter angle and cut.

▶Watch a free video on mitering crown molding. woodmagazine.com/moldingvideo



Place a crown-molding scrap against a square with the upper horizontal and lower vertical edges in full contact. Measure the vertical dimension (the rise).

Cut a backer board to a width equal to the rise of the crown molding. Attach the backer to the saw fence with double-faced tape.



Set the saw to the miter angle and position the crown molding upside down against the backer with the bottom of the molding and top of the backer flush. Make the cut.

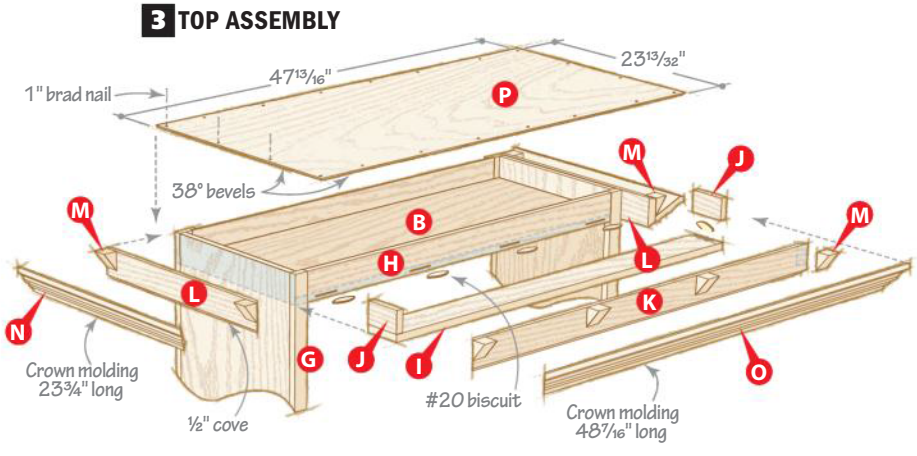
Tip! *Use 23-gauge pin nails to secure the crown molding while the glue dries.*

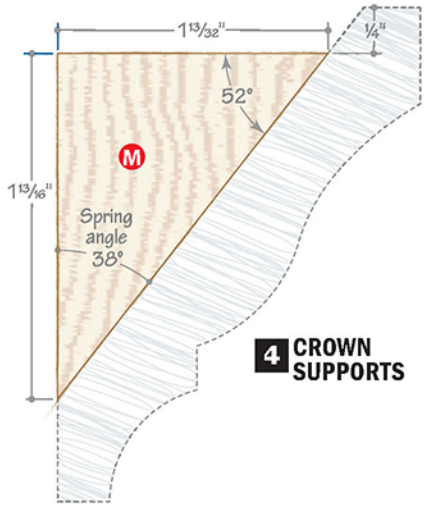
3 Cut the case top (P) and bevel the front and side edges for a tight fit against the crowns (N, O). Finish-sand the top and glue and brad-nail it to the case.

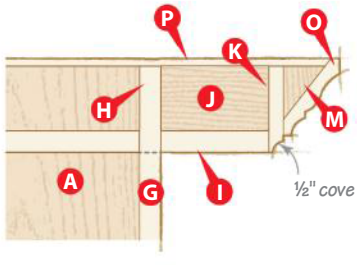
4 Cut the feet (Q), rear foot spacers (R), and rear foot rails (S). Bevel the inside edge and end of each foot [**Drawing 5**], making mirrored pairs front and back. Glue the front feet to the bottom of the case, flush with the faces of the cove moldings (K, L).

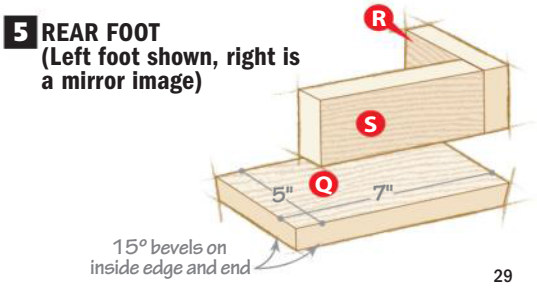
5 Glue up two spacer/rail assemblies (R/S) [**Drawing 5**]. Glue these assemblies between the rear feet and the case bottom (B) as you glue the rear feet in place [**Exploded View**].

6 Cut the drop-leaf panel (T). Miter-cut the trim (U, V) to fit around the panel [**Exploded View**]. Glue the trim to the panel and finish-sand it. Mortise the edges of the worktop and adjoining shelf for hinges [**Sources**].

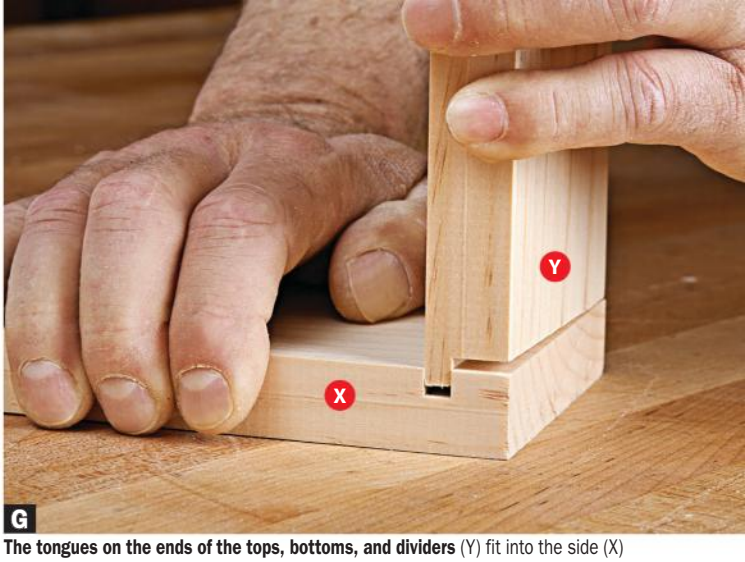








Clamp a dead-flat scrap to the shelf and drop leaf, then screw the Stopmatic Supports to the drop-leaf stops (W).



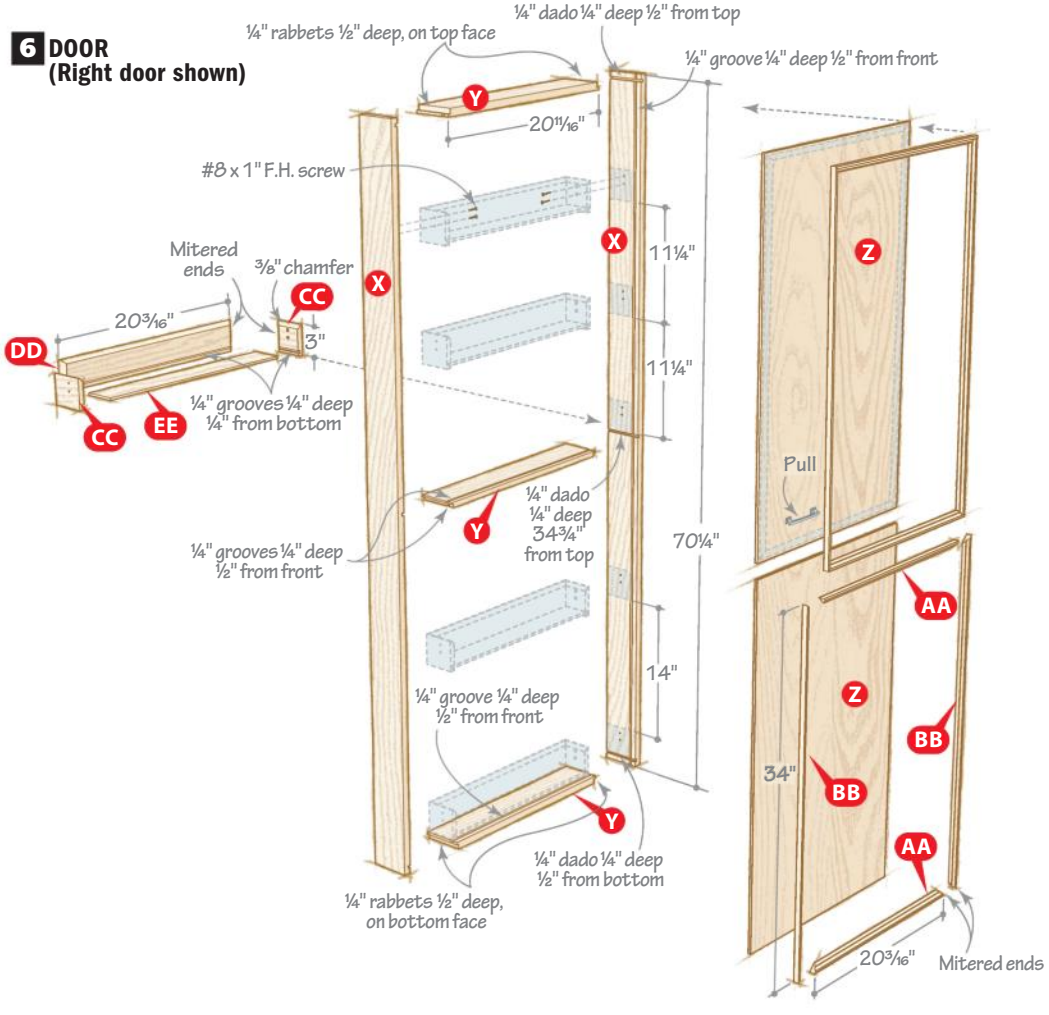
The tongues on the ends of the tops, bottoms, and dividers (Y) fit into the side (X) dadoes. The joints are exposed so make them a snug fit.

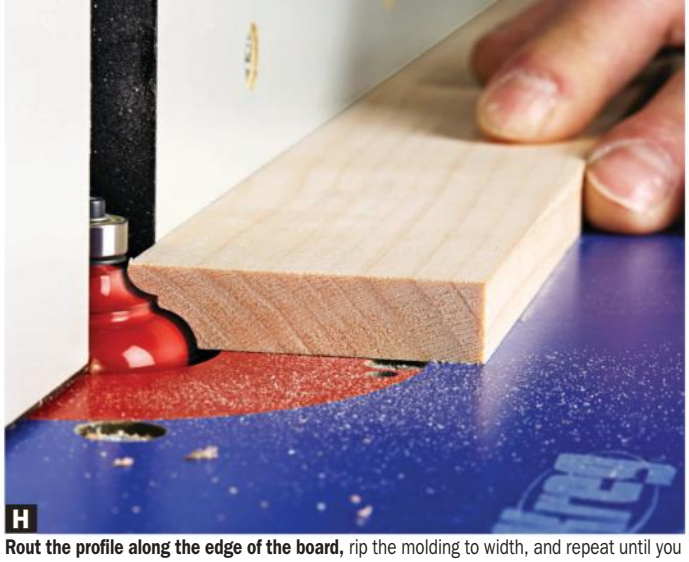
7 Cut the drop-leaf stops (W) and glue them to the case sides, against the back of the face-frame stiles (G) [**Drawing 1**]. Screw the hinges in place and, following the instructions included with the Stopmatic Supports, install them so the front face of the magnetic catch aligns with the rear face of the face frame [**Sources, Exploded View, Photo F**].

Make the doors

1 Cut the door sides, tops, bottoms, and dividers (X, Y). Dado, rabbet, and groove these parts [**Drawing 6, Photo G**].

2 Cut the door panels (Z) and finish-sand them. Dry-fit the door assemblies to check the fit, then glue them together, making sure they are square and flat.





Rout the profile along the edge of the board, rip the molding to width, and repeat until you have eight each of parts AA and BB.

3 Plane 1×4s 22" and 36" long to thickness for the door moldings (AA, BB). Rout the cove-and-round profile [**Blade and bits, Photo H**]. Miter-cut the moldings and glue and pin-nail them to the doors [**Drawing 6**].

4 Cut the cubby sides and fronts (CC, DD) 1" longer than listed. Cut the cubby bottoms (EE). Groove the sides adn fronts, and cut the chamfers and miters [**Drawing 6**]. Glue up the cubbies and set them aside.

Finish it up

1 Remove the drop-leaf hardware. Finish-sand the cabinet where needed. Apply a clear finish. (We sprayed on a Sherwin Williams satin catalyzed varnish.)

2 With the finish dry, slide the case back (F) into place and screw it to the top and bottom (B) and shelves (C) [**Drawing 1**].

3 Move the case to the desired location. Install the drop leaf. Clamp the doors to the sides (A) in the fully open position and attach them with continuous hinges. Install magnetic catches and door pulls [**Sources, Exploded View**].

4 Position the cubbies in the doors and screw them in place from the inside [**Drawing 6**]. Organize your craft supplies into bins and arrange them on the shelves. Place small items in the door cubbies, fold down the drop leaf, pull up a chair, and start planning your next project!

Shop for fabric bins.
woodmagazine.com/fabricbins

Produced by **Craig Ruegsegger** with **Brian Bergstrom** and **Jan Svec**
Project design: **John Olson**
Illustrations: **Roxanne LeMoine**, **Lorna Johnson**

Materials List

Part		FINISHED SIZE T	W	L	Matl.	Qty.
	Case					
A	sides	¾"	16"	76½"	Ply	2
B	top and bottom	¾"	16"	42½"	Ply	2
C	shelves	¾"	15¼"	42½"	Ply	4
D	shelf trim	¾"	¾"	42½"	P	4
E	back retainers	¾"	2¼"	76½"	P	2
F	back	¼"	40½"	76½"	Ply	1
G	stiles	¾"	1½"	76½"	P	2
H	rails	¾"	3"	40½"	P	2
I	top and bottom extensions	¾"	3¾"	43½"	P	2
J	side extensions	¾"	3¾"	2¼"	P	4
K*	front cove moldings	½"	3"	44½"	P	2
L*	side cove moldings	½"	3"	21¾"	P	4
M	crown supports	1½"	1 13/32"	1 13/16"	P	8
N*	side crown	9/16"	3¼"	23¾"	P	2
O*	front crown	9/16"	3¼"	48 7/16"	P	1
P	case top	¼"	23 13/32"	47 13/16"	Ply	1
Q	feet	¾"	5"	7"	P	4
R	rear foot spacers	¾"	2¼"	4¼"	P	2
S	rear foot rails	¾"	2¼"	5"	P	2
T	drop-leaf panel	¾"	14½"	38¾"	Ply	1
U*	front and back trim	¾"	¾"	40¼"	P	2
V*	side trim	¾"	¾"	16"	P	2
W	drop-leaf stops	¾"	2¼"	15"	P	2
	Doors					
X	door sides	¾"	3¾"	70¼"	P	4
Y	door tops, bottoms, and dividers	¾"	3¾"	20 11/16"	P	6
Z	door panels	¼"	20 11/16"	34½"	Ply	4
AA*	horizontal molding	½"	⅝"	20 3/16"	P	8
BB*	vertical molding	½"	⅝"	34"	P	8
CC*	cubby sides	½"	3"	3"	P	20
DD*	cubby fronts	½"	3"	20 3/16"	P	10
EE	cubby bottoms	¼"	2¾"	19 11/16"	Ply	10

*Part initially cut oversize. See the instructions.

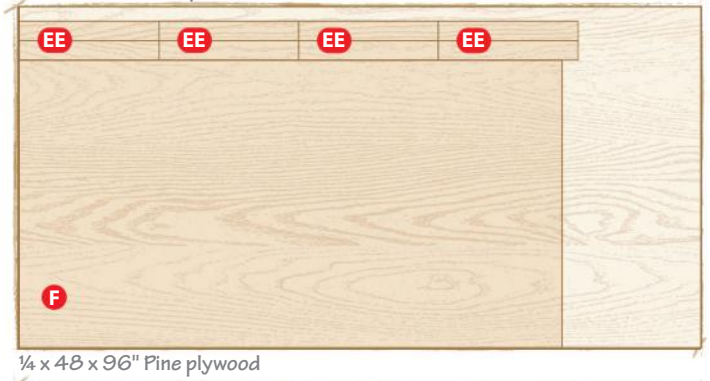
Materials key: Ply-pine plywood, P-pine.
Supplies: 1¼" pocket screws (8), #8×1" flathead screws (32), #8×1½" flathead screws (10), #20 biscuits (12), 1" brad nails.
Blade and bits: Dado set; bottom-bearing flush-trim, ½" cove, classical cove-and-round (Freud no. 38-614) router bits.
Sources: Stopmatic Support with magnetic catch, no. 30741, $16 ea. (2); butt hinges, 2½" L×1½" W, satin nickel, no. 54646, $6 pr.; continuous hinge, 72" L×1½" W, no. 39170, $25 ea. (2); magnetic catch, no. 40332, $4.49 ea. (2), Rockler, 800-279-4441, rockler.com. Sutton door pulls, satin nickel, no. 635-96SN, $9.85 ea. (2). Hardware Resources, 800-463-0660, hardwareresources.com.

Purchase the router bits for this project.
woodmagazine.com/250routerbits

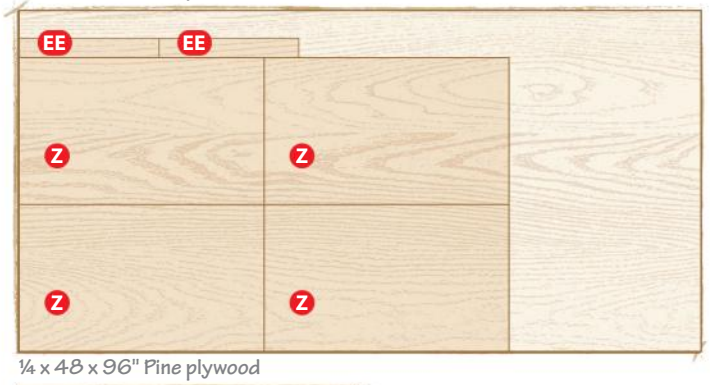
Cutting Diagram

¾ x 48 x 96" Pine plywood

¾ x 48 x 96" Pine plywood



¼ x 48 x 96" Pine plywood



¼ x 48 x 96" Pine plywood

¼ x 24 x 48" Pine plywood

¾ x 3½ x 96" Pine (2 needed)

¾ x 7¼ x 96" Pine (2 needed)

¾ x 5½ x 72" Pine (2 needed)

¾ x 5½ x 72" Pine

¾ x 9¼ x 96" Pine(2 needed)

½ x 3½ x 96" Pine

½ x 3½ x 96" Pine

1½ x 1½ x 24" Pine

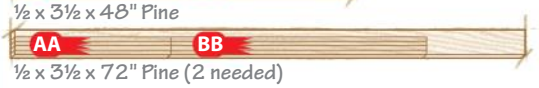
9/16 x 3¼ x 96" Pine crown molding

9/16 x 3¼ x 96" Pine crown molding

½ x 3½ x 96" Pine

½ x 3½ x 96" Pine (2 needed)

½ x 3½ x 48" Pine



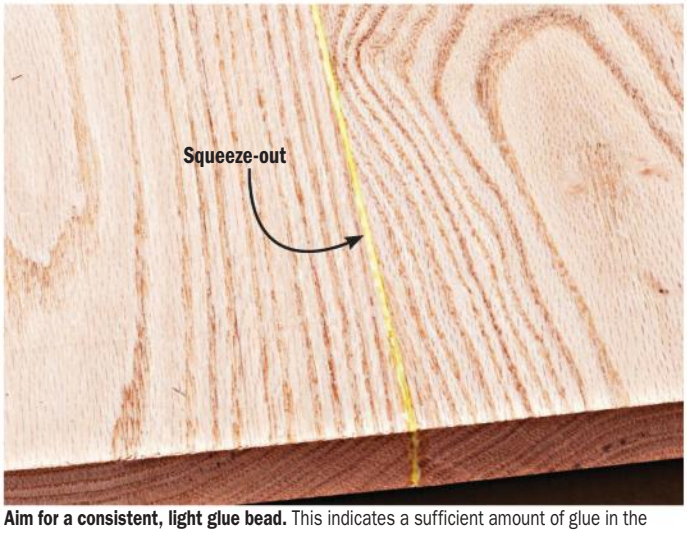
½ x 3½ x 72" Pine (2 needed)

6 Edge-Gluing Tricks for flat, mar-free panels

Making wide boards from narrow ones can be tricky. Ironically, the glue that sticks them together can make clamping a slippery mess, and the clamps themselves may accidentally damage the wood. Here are six tips to nip dings, dips, and dark spots in the bud.

1 To prevent a panel from bowing during glue-up, keep the clamping pressure centered on the edge of the workpiece. For thin stock, use scrapwood supports, as shown *above*, to raise the panel to the clamp's line of pressure, typically the center of the jaws.

2 An overtightened clamp damages delicate wood, and causes excessive glue squeeze-out and a weakened joint. This often results from counting on your clamps to fix joints that aren't straight and square to begin with. For edge-glued panels, joint the board's face first and then square an adjacent edge to the face. During glue-up, when the joint is closed and even, an additional half-turn on the clamps will give you a consistent, light bead of squeeze-out along the length of the joint, like that shown at *right*.



Aim for a consistent, light glue bead. This indicates a sufficient amount of glue in the joint. Anything more requires additional cleanup and wastes glue.

Clean clamps don't ding wood surfaces. Mineral spirits cleans most debris from clamps. Scrape off dried glue with a putty knife. Soften stubborn glue with heat and a damp rag.

Add materials that cushion jaws. Scrap leather, self-adhesive furniture pads, cork, or even scraps of hardboard all prevent crushing the edges of panels during a glue-up.

3 Hardened glue residue on clamps can dent or scratch your workpiece. Clean or replace clamp pads that have stuck-on glue burrs, and wipe down metal surfaces with mineral spirits.

4 When hard metal clamp jaws press on relatively softer wood, metal wins. To prevent denting the wood, use store-bought pads, *previous page*, or adhere cushions to your clamp jaws using hot-melt glue.

▶Make your own wood clamp pads. woodmagazine.com/cpad

Apply a waxed-paper or tape barrier. Keep the ends of the paper or tape a couple of inches away from the jaws so the jaws have room to move in during clamp-up.

Take a tip from a crutch. It's not as cruel as it sounds. You can find them at many drug stores and at medical-supply stores.

5 Wrap waxed paper or painter's tape around clamp bars where they might contact glue. That prevents the glue from reacting chemically with the metal and staining the wood. And you won't have to worry about delicate plywood veneers sticking to the tape or waxed paper.

6 Sharp threads on the ends of pipe clamps can scratch or gouge a workpiece while you position the clamp, especially when you're rushing to stay ahead of the glue's open time. Cover those threads with a tip from a cane or crutch to prevent damage.

▶Discover how to achieve perfect clamp pressure. woodmagazine.com/clamppress

Mil-spec Destroyer

Turn your shop into a shipyard for just a few evenings to create this naval workhorse.

DIMENSIONS: 3½" W × 21" D × 6 13/16" H

Approximate materials cost: **$40**

30 knots: Top speed of an Arleigh Burke-class destroyer

Designed to defend against threats from the air, sea, and even below the sea, destroyers accompany carrier strike groups, and also patrol independently. Assign this one to duty on a shelf, and it will leave nothing but compliments in its wake.

Lay the hull

Start your build by preparing a 1¼×3½×22" blank for the hull (A), a 1½×3½×14" blank for parts F, G, and H, and a ½×3¾×18" maple blank for parts B, C, I, J, and M.

1 Photocopy and connect the **Hull Full-size Patterns,** (*pages 40* and *41*) apply the pattern to the hull blank, and cut the helicopter platform [**Photo A**].

2 Bandsaw the hull profile from the line on the pattern back to the rabbeted end of the blank. Then bevel the front edges of the

▶The 450,000 square feet of hull insulation in a destroyer could cover the roof of the Superdome.

Set the rip fence for the innermost cut, then move the blank away to widen the rabbet for the helicopter platform. Use a dado blade if you have one to work faster.

hull [**Photo B**]. Drill the hole and counterbore. Sand the hull smooth, blending the bevel cuts into the vertical edges.

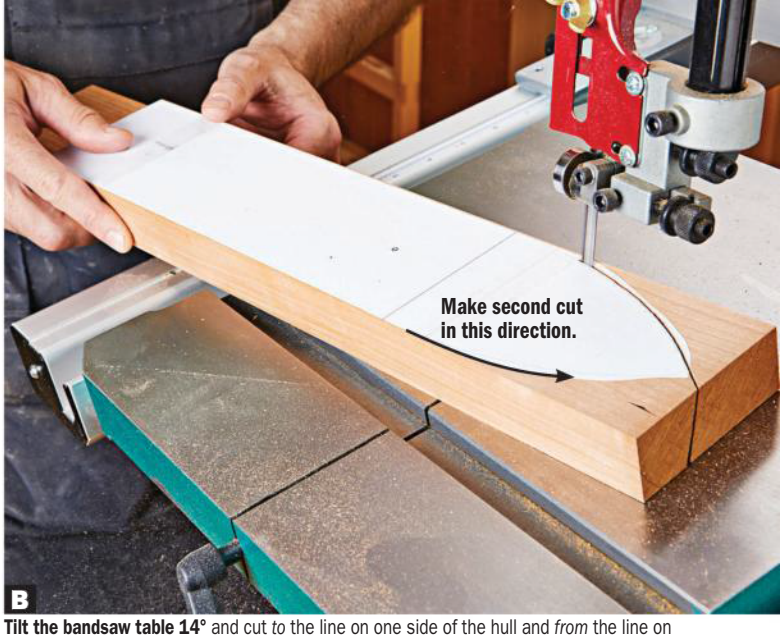
3 From the ½" maple blank, crosscut the fore deck (B), then cut it to shape, beveling the indicated edges [**Drawing 1**].

4 Crosscut the aft deck (C) from the maple blank. Bevel-rip the edges of the aft deck at 14°. Then rip a ⅝" strip from each edge, Miter-cut the ends of the cutoffs [**Drawing 2**], then glue them back to the blank.

5 Glue the fore and aft decks in place [**Hull Patterns**]. Cut the missile tube covers (D) and glue them in place [**Exploded View**].

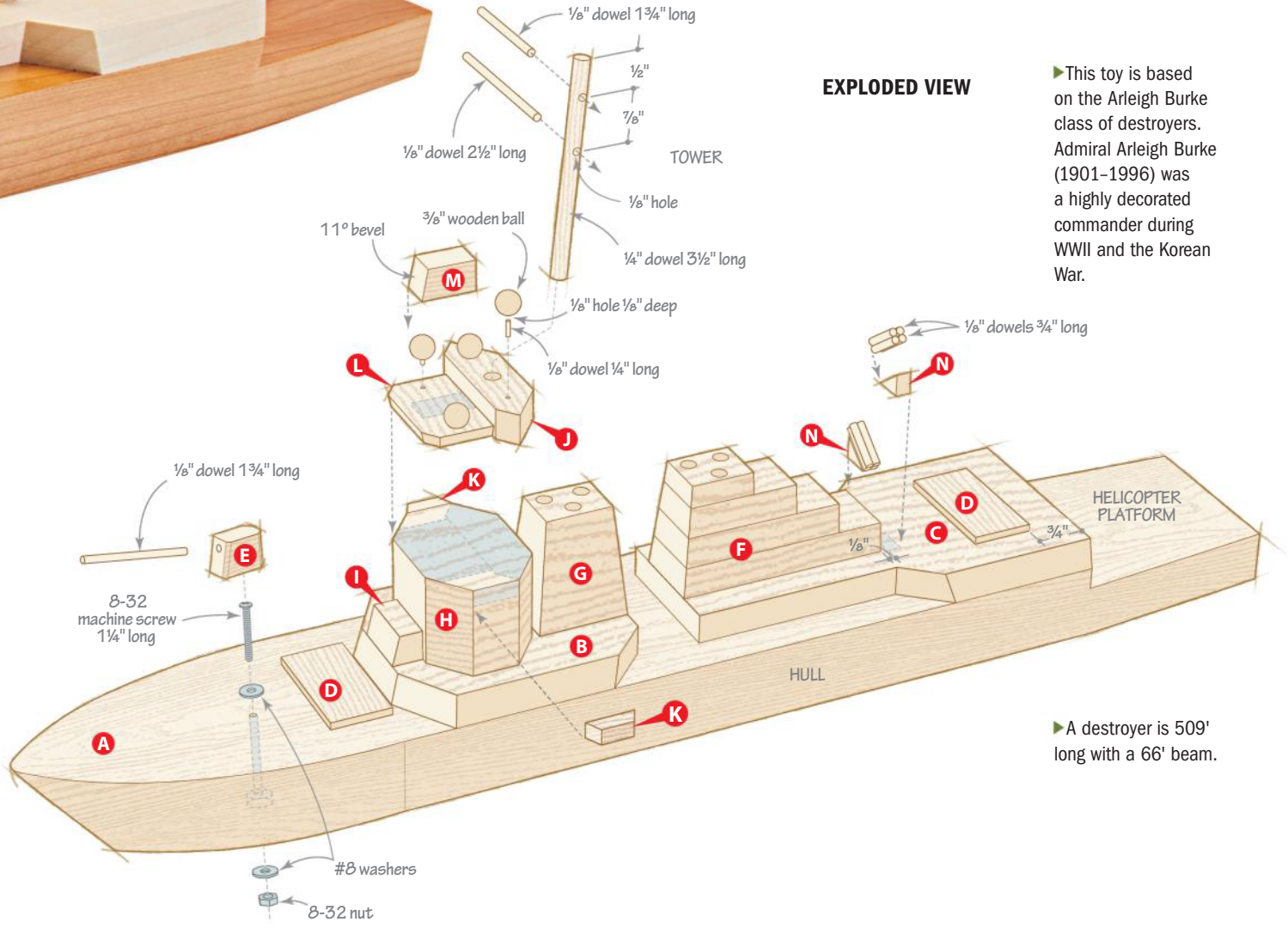
6 For the turret gun (E), bevel-rip the edge of a ⅝"-thick blank [**Drawing 3**]. Crosscut the gun from the blank, grip it in a handscrew, and chamfer the corners. Drill the

▶Learn to cut and shape small parts safely. woodmagazine.com/smallparts



Tilt the bandsaw table 14° and cut *to* the line on one side of the hull and *from* the line on the other side.

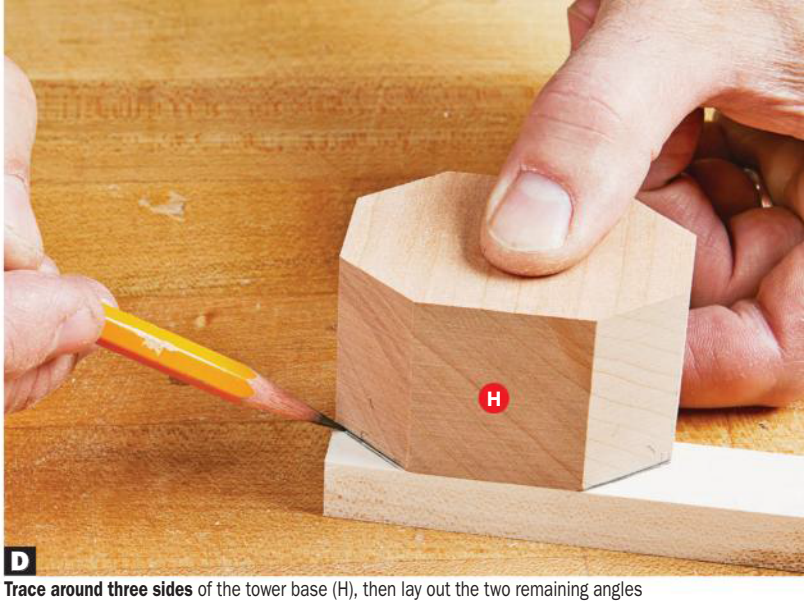
EXPLODED VIEW



▶This toy is based on the Arleigh Burke class of destroyers. Admiral Arleigh Burke (1901–1996) was a highly decorated commander during WWII and the Korean War.

▶A destroyer is 509' long with a 66' beam.

Offset the ends ¾" when regluing the blank. Keep the strips in their original order for seamless glue joints.



Trace around three sides of the tower base (H), then lay out the two remaining angles [**Drawing 7**].

holes. Glue a dowel into the front hole, and epoxy a machine screw into the bottom hole [**Exploded View**].

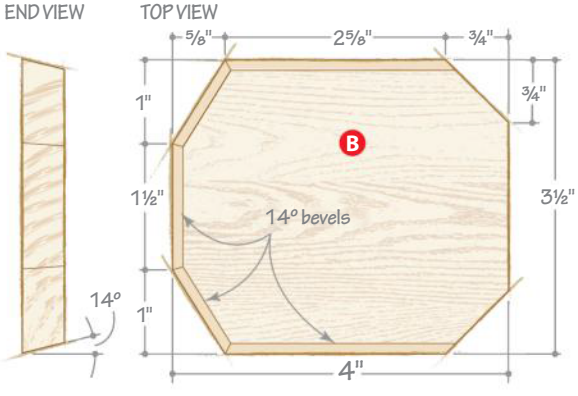
Start on the superstructure

1 From the cherry blank, crosscut the tower base (H) and set it aside. Plane the remaining blank to 1¼" thick. Rip off three ½"-wide strips and reassemble them, staggered to make a blank for the exhaust towers (F, G) [**Drawing 4, Photo C**].

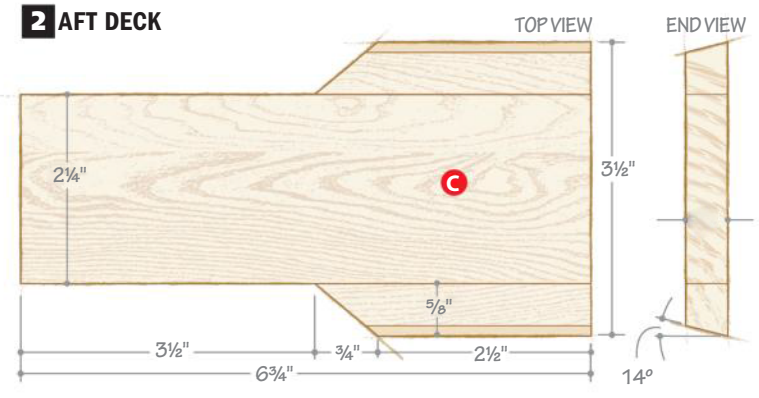
2 Tilt your bandsaw table and rip the edges of the blank [**Drawing 4**]. Then cut the towers (F, G) to length. Bevel both ends of G and the front end of F. Drill the holes in the top of each tower.

3 Retrieve the tower base (H). Cut it and the phalanx platform (I) to size and shape [**Drawings 5, 6**].

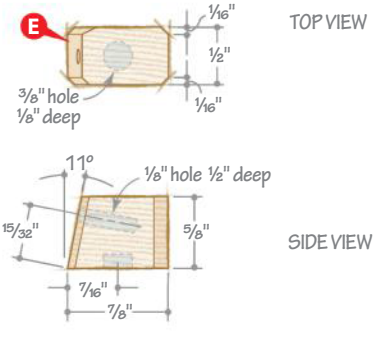
1 FORE DECK



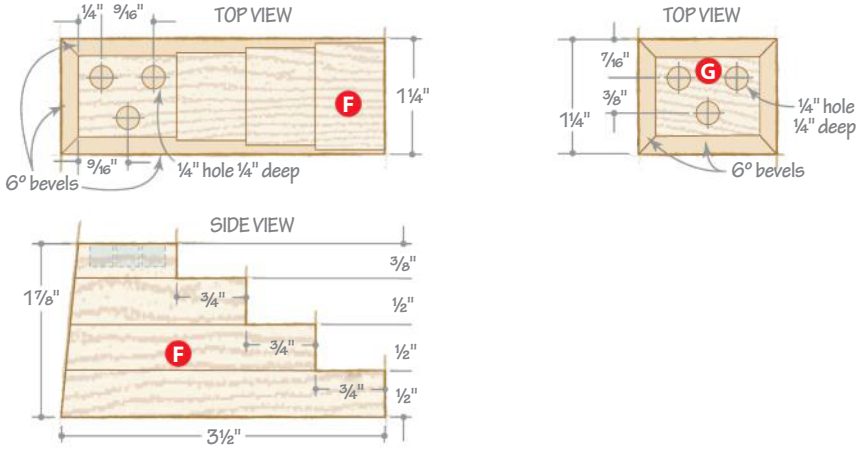
2 AFT DECK



3 TURRET GUN



4 EXHAUST TOWERS



E

Create the angle for the tower by resting the rear con tower (J) blank on a 1/16"-thick ruler or scrap.

F

Secure the tower with double-faced tape in a V-block. Drill 1/8" holes.

4 Rip the rear con tower (J) to width from the maple blank. Place the tower base (H) on the con tower blank and trace around it [**Photo D**]. Drill the holes [**Photo E, Drawing 7**], then cut and sand the rear con tower to shape. Glue it to the tower base (H), with their rear faces flush.

5 Cut the con decks (K) to size and glue them to the sides of the tower base (H), flush with the top. Sand bevels on their ends to match the shape of the tower base.

Put it together

1 Glue the phalanx platform (I) flush to the front edge and centered on the width of the fore deck (B) [**Exploded View**]. Glue the tower assembly (H/J/K) behind it, followed by the exhaust towers (F, G).

2 Cut the con tower (L) to size, miter the corners, and sand the bevels [**Drawing 7**]. Glue it against the front of the tower base (H) [**Exploded View**].

3 Cut the con tower top (M) to size and bevel the front end [**Exploded View**]. Glue it to the con tower (L), against the rear con tower (J).

4 Cut the torpedo mounts (N) to size [**Drawing 8**]. To make the torpedoes, adhere four 3/4" lengths of 1/8" dowel together, stacked two by two, using cyanoacrylate (CA) glue [**Exploded View**]. Use CA glue to adhere one of these assemblies to each torpedo mount. Glue the torpedo mounts to the aft deck.

5 Cut and drill a 1/4" dowel for the tower [**Exploded View, Photo F**]. Use CA glue to secure the 1/8" cross dowels. Then glue the tower to the rear con tower (J).

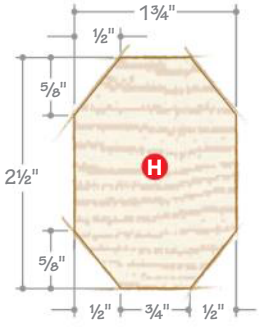
6 Drill holes in four 3/8" wooden balls, glue in lengths of dowel, and glue these to the rear con tower and con tower [**Exploded View**]. Apply a finish and put your destroyer on patrol.

▶The Arleigh Burke class was commissioned on July 4, 1991, and is still in production.

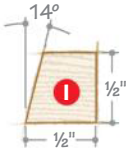
▶Four gas-turbine engines generate 100,000 shaft horsepower, turning two shafts.

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

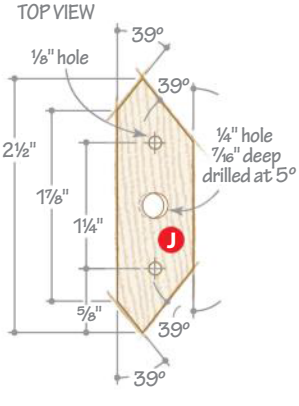
5 TOWER BASE

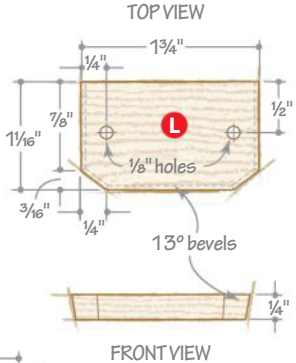


6 PHALANX PLATFORM

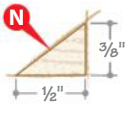


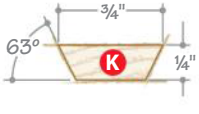
7 CON TOWERS

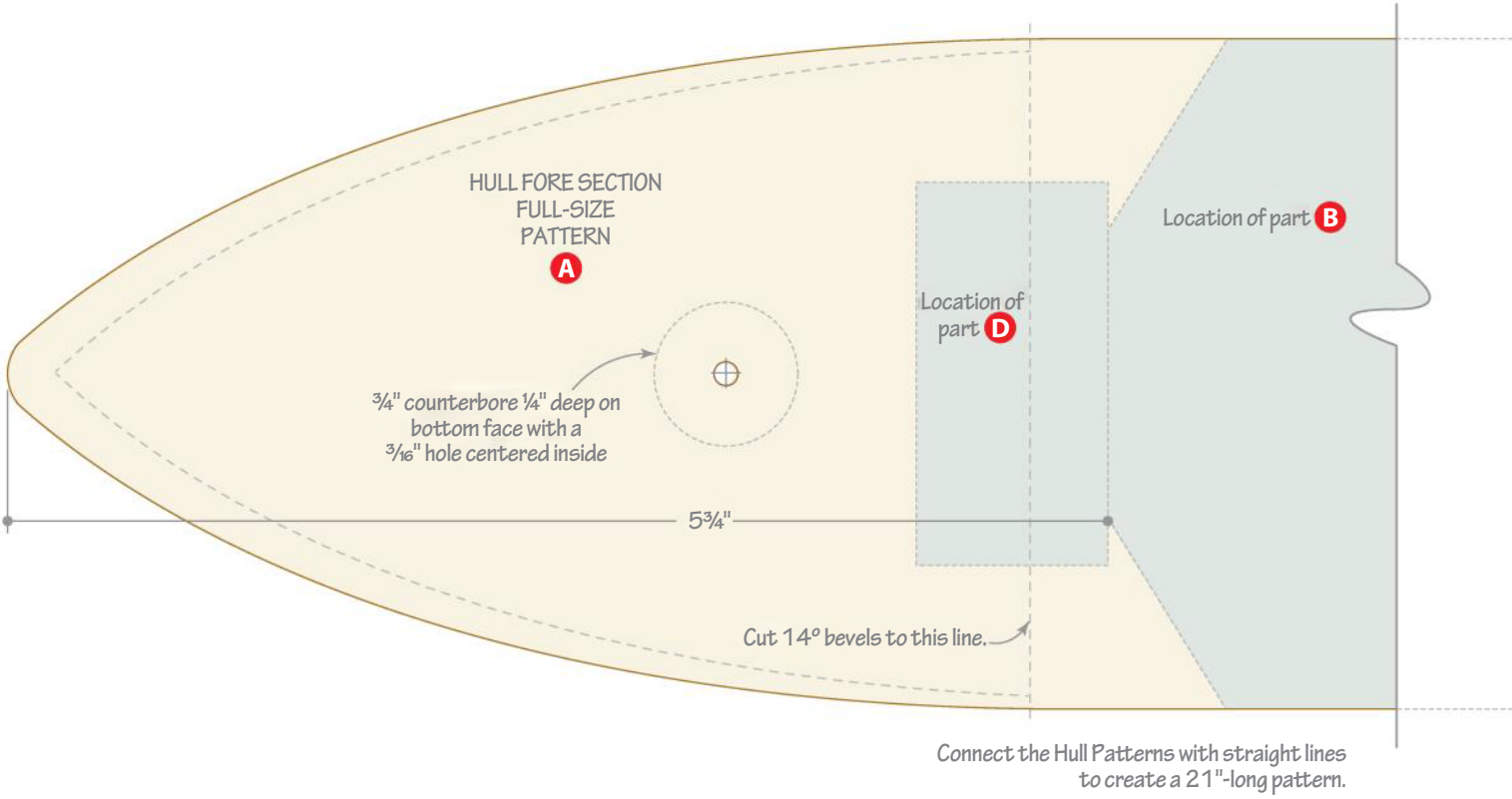




8 TORPEDO MOUNT







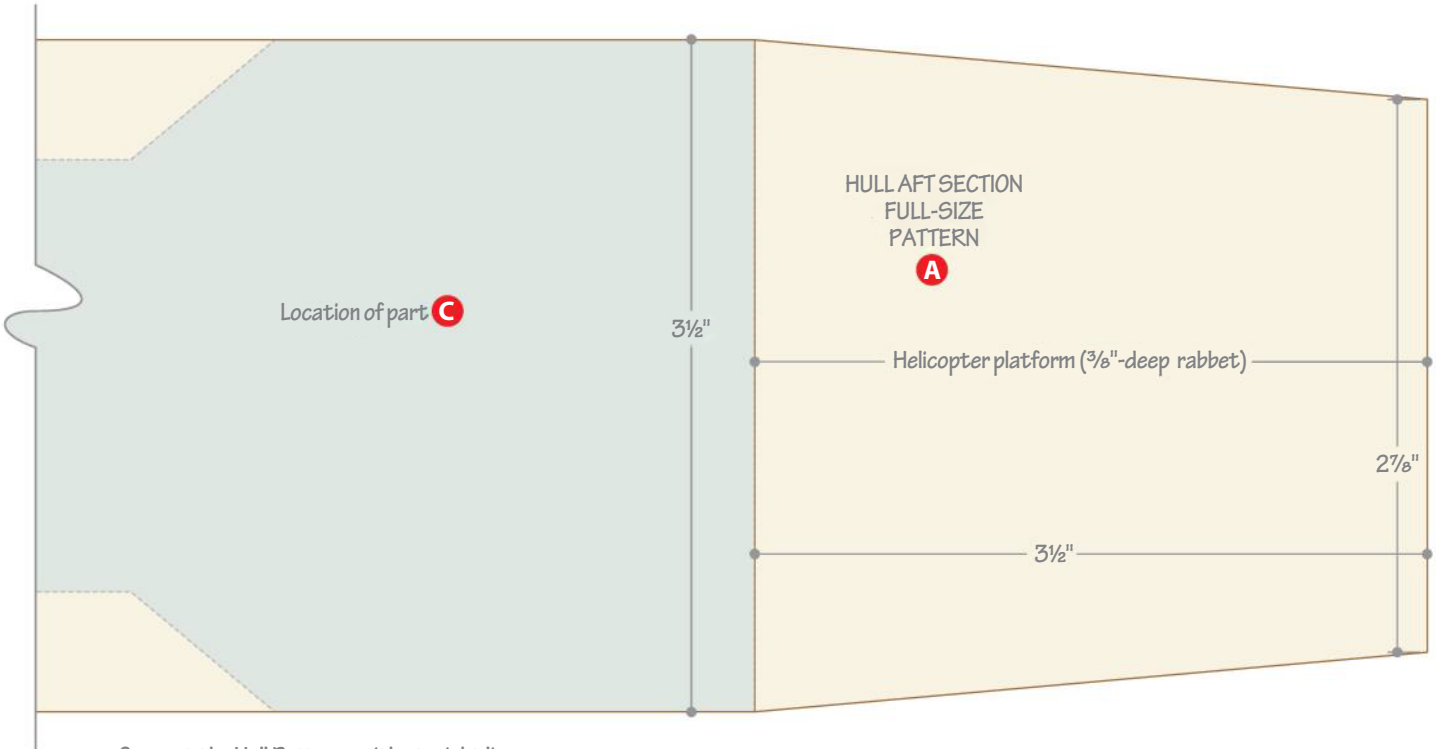
Connect the Hull Patterns with straight lines to create a 21"-long pattern.

Build the rest of our Mil-spec series

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

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

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



Connect the Hull Patterns with straight lines to create a 21"-long pattern.

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

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

Materials List

Part		FINISHED SIZE T	W	L	Matl.	Qty.
A*	hull	1¼"	3½"	21"	C	1
B*	fore deck	½"	3½"	4"	M	1
C*	aft deck	½"	3½"	6¾"	M	1
D	missile tube covers	⅛"	1"	2"	M	2
E	turret gun	⅝"	½"	⅞"	M	1
F*	aft exhaust tower	1¼"	1⅞"	3½"	C	1
G*	forward exhaust tower	1¼"	1⅞"	1¼"	C	1
H	tower base	1½"	2½"	1¾"	C	1
I	phalanx platform	½"	½"	1"	M	1
J*	rear con tower	½"	¾"	2½"	M	1
K	con decks	¼"	¼"	¾"	C	2
L	con tower	¼"	1 1/16"	1¾"	M	1
M	con tower top	½"	½"	⅞"	M	1
N	torpedo mounts	¼"	⅜"	½"	M	2

*Parts initially cut oversize. See the instructions.

Materials key: C-cherry, M-maple.
Supplies: Cyanoacrylate glue, ⅜" wooden balls (4), ¼x4" dowel, ⅛x16" dowel, 8-32 machine screw and nut, #8 washers (2).
Bits: ¼", ¾" Forstner bits.

Portable Mitersaw Stand

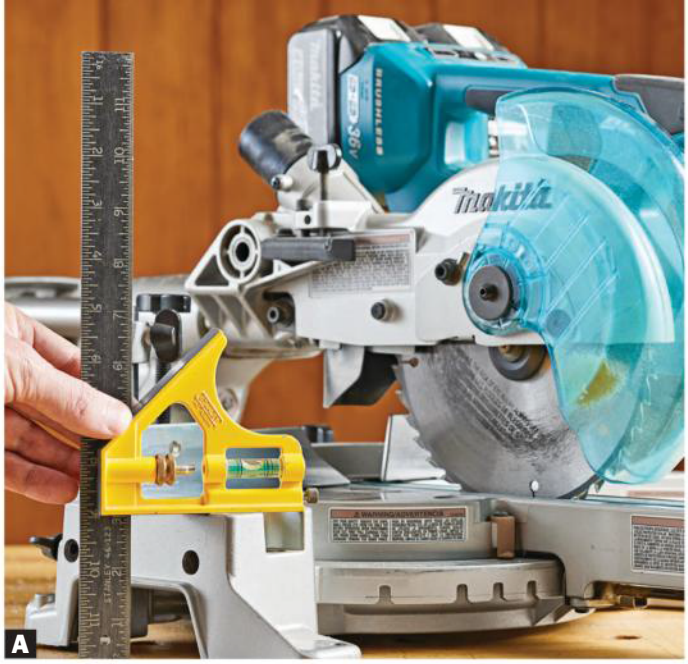
Designed for today's ultra-compact battery-powered mitersaws but customizable to your saw, this slender stand boasts ample outfeed when in use, but politely stays out of your way when not needed.

Tip! *Big-box store materials often ship with high moisture content and can experience multiple climates traveling across the country. For carcase-based projects, cut parts quickly after purchase and assemble them quickly after cutting to lock them in place, reducing warping as they acclimate.*

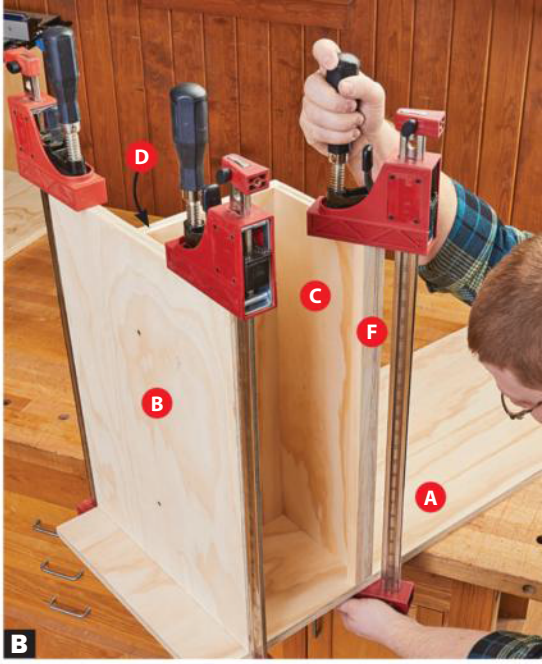
DIMENSIONS:
40" H × 20½" D × 34¾" L

Approximate materials cost:
$99
for all lumber

Wingspan:
96"



To ensure the outfeed wings match the height of your mitersaw's table, use a combination square to measure and transfer the table's height to the sides (A).



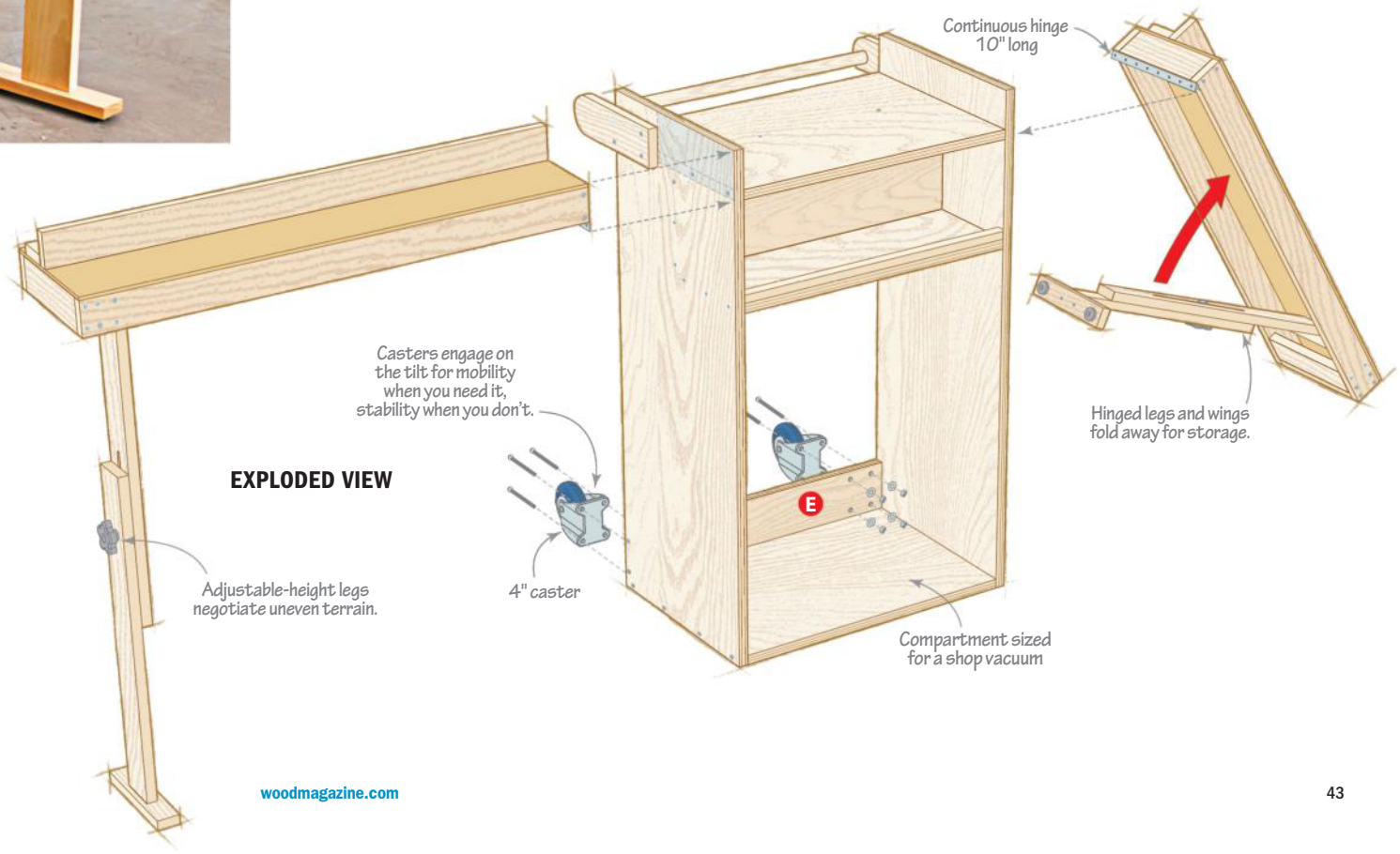
Glue and clamp the top assembly (B/C/D/F) to one side (A) where marked, starting with the top (B) and taking care to square the assembly as you clamp and screw it in place.

Note: *Before beginning, measure the width of your mitersaw's base, including its maximum swing and bevel. Our saw fit between sides set 22½" apart. If yours is wider, lengthen parts B, C, D, E, F, and the handle's dowel, as necessary.*

Make a case

1 Cut the carcase parts (A–F) to size [**Materials List**]. Glue and clamp the shelf trim (F) to the shelf (C) [**Drawing 1**]. After the glue dries, glue and clamp the shelf assembly (C/F) to the back (D). Then, glue and screw that assembly to the top (B). Glue the caster mount (E) to the bottom (B).

2 Attach the top assembly (B/C/D/F) to one side (A) [**Photos A, B**]. Glue and screw the bottom assembly (B/E) in place. Allow the glue to dry before attaching the second side.



Supports elevate the wing frame assembly (G–I), allowing you to continue the glue-up without having to wait for the clamped sub-assemblies (G/H) to dry.

Align the bit to one side of the starter hole and lock in your router edge guide. Rout one side of the slot from hole to hole. Rotate the leg and rout from the opposite edge to center the slot. Flip and repeat from the opposite face to complete the slot.

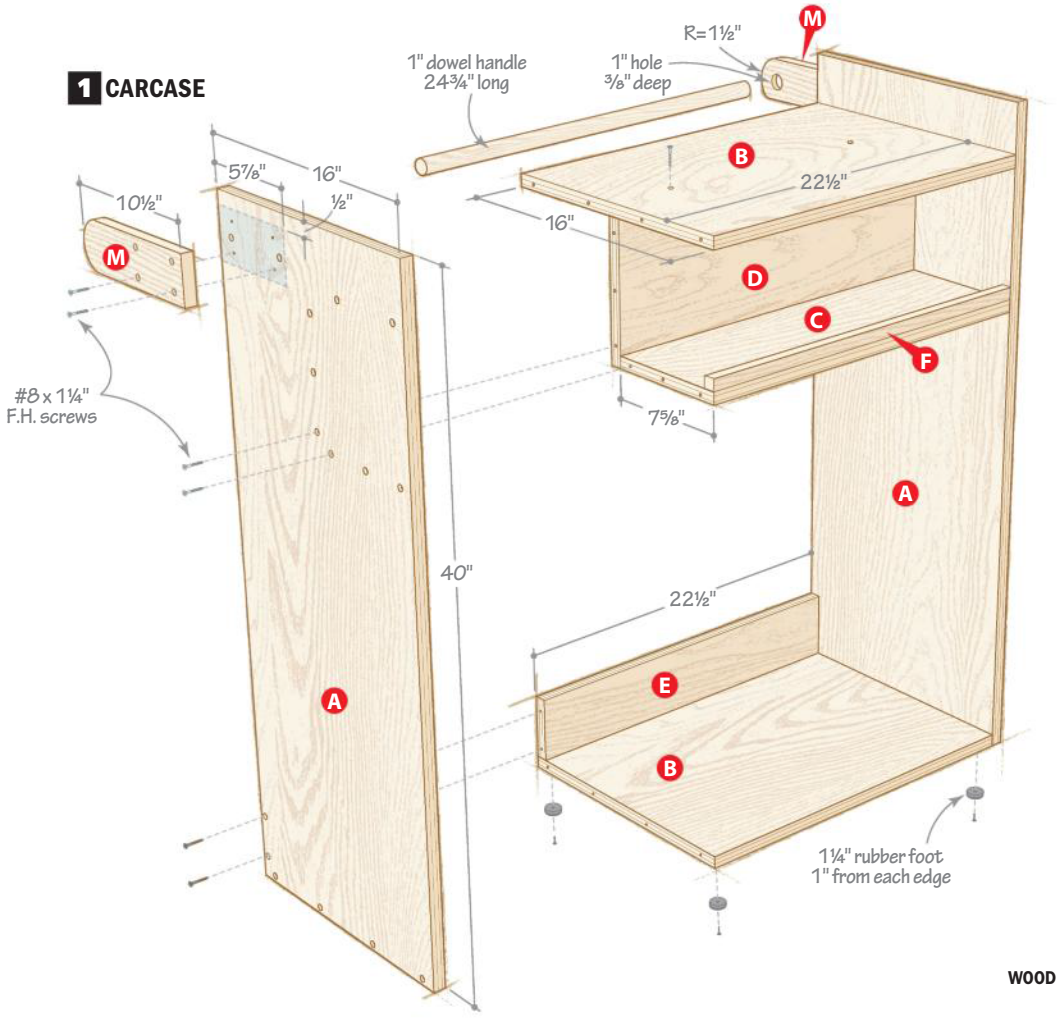
Give it wings

1 Cut parts G–K to size [**Drawing 2**]. Glue and clamp two leg supports (G) to an end (H). To that assembly, glue and clamp a front and back (I) [**Photo C**]. Then, glue and clamp the opposite end in place. Repeat for the other wing. After the glue dries reinforce the joints with screws.

2 Measure the wing frame assemblies (G–I) and cut the top panels (L) to fit. Glue them in place.

3 Mark the slot location in two of the legs (J) [**Drawing 2**]. Start each slot by drilling a 5/16" hole at each end. Chuck a ¼" straight bit in your edge-guide-equipped router, set the

Tip! *Find free plans for this router edge guide.* *woodmagazine.com/edgeguide*



E

Temporarily affix the hinge, centered, to the leg support (G) with double-faced tape. Then use a self-centering drill bit to drill the screw holes. Remove both the hinge and the tape.

SKILL BUILDER

Make clean cuts in continuous hinge

Cutting the thin metal of continuous hinge can sometimes leave a mangled mess. For clean cuts, support the hinge by sandwiching ⅛"-thick scrap between the leaves. Clamp the hinge in a vise with the cutline extended just beyond the jaws. Then, use a hacksaw to make the cut. File off any burrs.

bit depth to just over half the thickness of the leg, and rout between the holes to complete the slot [**Photo D**].

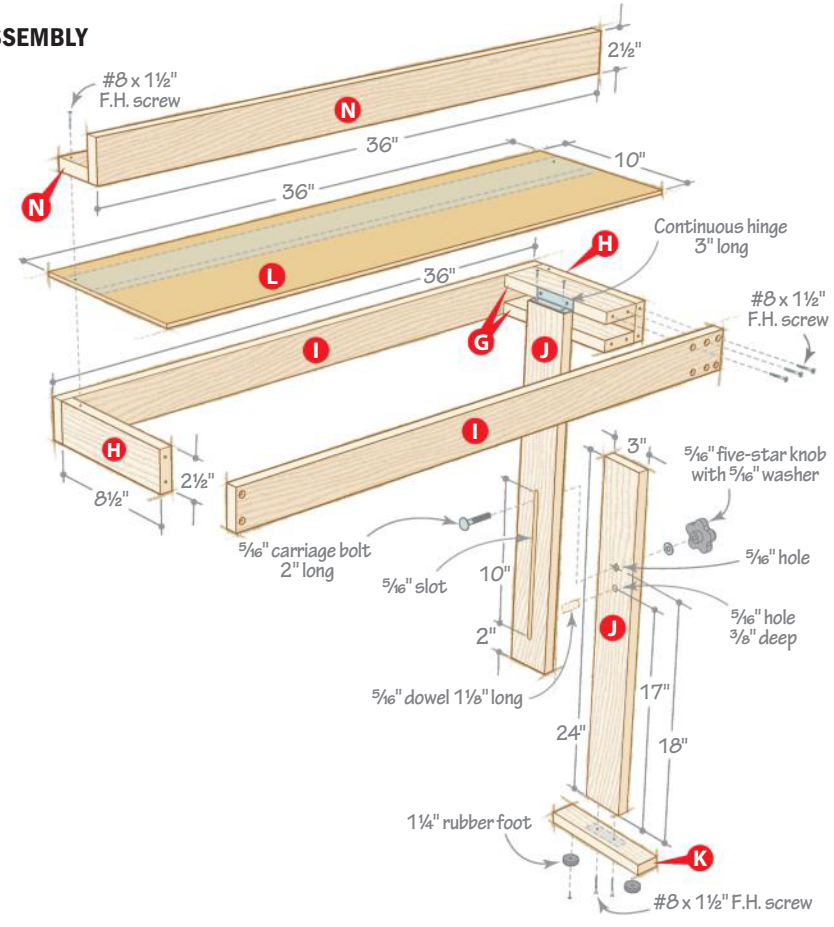
4 In each of the remaining lower legs, drill two holes [**Drawing 2**] and glue a dowel into the lower ones.

5 Cut two 3" lengths of 1½" continuous hinge, leaving at least two screw holes for attachment [**Skill Builder**, *above*]. Drill screw holes for the hinge in the leg support (G) [**Photo E**] and in the upper leg (J) ends. Screw the hinges to the leg, then to the leg support.

6 Glue and screw the feet (K) to the lower legs (J), centered [**Drawing 2**]. Fasten one lower leg to each upper leg with a five-star knob, washer, and carriage bolt.

▶Purchase a self-centering bit. woodmagazine.com/hingebit

2 WING/LEG ASSEMBLY



F

Butt one wing against the upside-down carcase. Hold a length of continuous hinge in place while drilling. Then, screw it in place. Repeat with the opposite wing.

Put it all together

1 Cut two 10" lengths of continuous hinge and use them to attach the wings to the carcase [**Exploded View, Photo F**].

2 Cut and shape the handle supports (M) [**Drawing 1**]. With a 1" Forstner bit, drill a ⅜"-deep hole at the center point of the radius.

3 Clamp the handle supports in place and measure from hole to hole to determine the handle length. Cut and test-fit the handle from 1" dowel. Glue and screw one handle support in place at a height that won't interfere with your saw's rearward travel. Add glue to the supports' holes, insert the dowel, and attach the remaining support.

4 Cut the fences (N) [**Drawing 2**] and glue them together. While the glue dries, position your mitersaw on the stand. Mark the locations of the mounting holes in its base. Drill bolt holes and attach your mitersaw. Use a straightedge to align the fence assemblies to the mitersaw fence and attach them to the wings, screwing into the wing ends (H) where the screws will hold securely.

5 Remove the knobs and mitersaw and apply your favorite clear-coat. Drill and bolt 4" casters to the caster mount (E) [**Exploded View**] positioning each 1" above floor level. Attach 1¼" rubber feet to the bottom (B) and feet (K) [**Drawings 1** and **2**]. Reattach your mitersaw and the knobs. Now cut away.

Materials List

Part		FINISHED SIZE T	W	L	Matl.	Qty.
	Carcase					
A	case sides	¾"	16"	40"	Ply	2
B	top/bottom	¾"	16"	22½"	Ply	2
C	shelf	¾"	7⅝"	22½"	Ply	1
D	shelf back	¾"	8½"	22½"	Ply	1
E	caster mount	¾"	4"	22½"	Ply	1
F	shelf trim	¾"	¾"	22½"	P	1
	Wings					
G	leg supports	¾"	2½"	8½"	P	4
H	ends	¾"	2½"	8½"	P	4
I	front/back	¾"	2½"	36"	P	4
J	legs	¾"	3"	24"	P	4
K	feet	¾"	1⅝"	8"	P	2
L*	top panels	¼"	10"	36"	MDF	2
M	handle supports	¾"	3"	10½"	P	2
N	fences	¾"	2½"	36"	P	4

*Cut to fit. See the instructions.

Materials key: Ply-plywood, P-pine, MDF-medium-density fiberboard.

Supplies: #8 × 1½" flathead wood screws; 1½" continuous hinge, 36" long; ⅝" dowel; 1" dowel; ⅝" carriage bolt, 2" long (2); ⅝" washer (2); ⅝" 5-star knob; 4" casters (2) with mounting bolts, nuts, and washers; 1¼" rubber feet with screws (8).

Blade and bits: Self-centering drill bit, 1" Forstner bit, ¼" straight router bit.

Supplies on Demand: Purchase the casters, star knobs, and feet. woodmagazine.com/249msstand

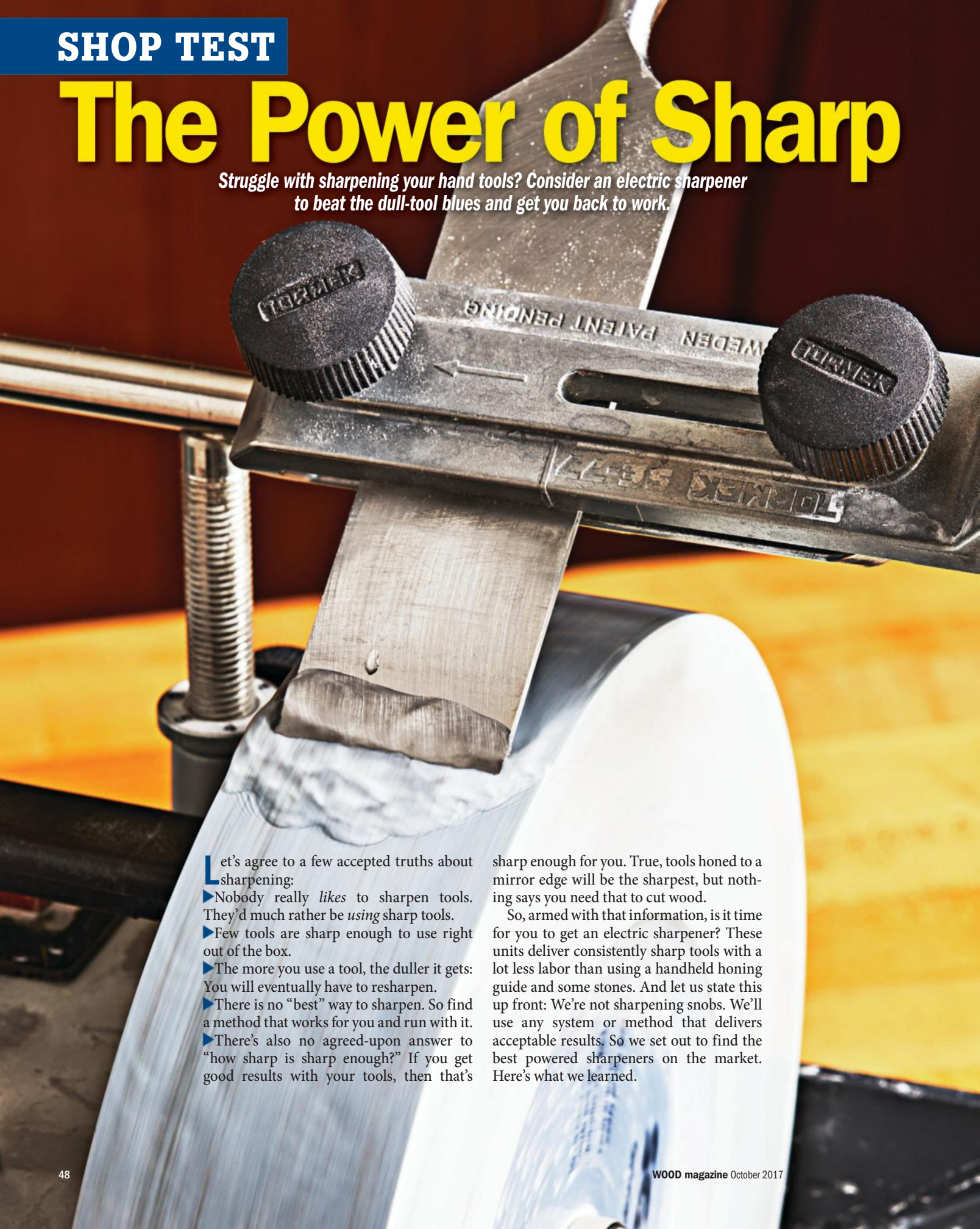
▶Download the cutting diagram for this project. woodmagazine.com/249msstandcd

Produced by **Lucas Peters** with **John Olson** and **Joshua Steele**
Project design: **Kevin Boyle**
Illustrations: **Lorna Johnson** and **Roxanne LeMoine**

SHOP TEST

The Power of Sharp

Struggle with sharpening your hand tools? Consider an electric sharpener to beat the dull-tool blues and get you back to work.

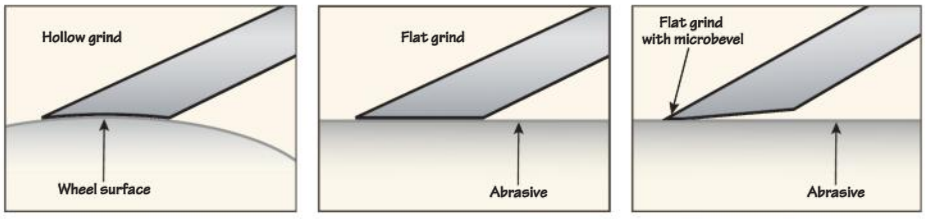


Let's agree to a few accepted truths about sharpening:

- Nobody really *likes* to sharpen tools. They'd much rather be *using* sharp tools.
- Few tools are sharp enough to use right out of the box.
- The more you use a tool, the duller it gets: You will eventually have to resharpen.
- There is no "best" way to sharpen. So find a method that works for you and run with it.
- There's also no agreed-upon answer to "how sharp is sharp enough?" If you get good results with your tools, then that's sharp enough for you. True, tools honed to a mirror edge will be the sharpest, but nothing says you need that to cut wood.

So, armed with that information, is it time for you to get an electric sharpener? These units deliver consistently sharp tools with a lot less labor than using a handheld honing guide and some stones. And let us state this up front: We're not sharpening snobs. We'll use any system or method that delivers acceptable results. So we set out to find the best powered sharpeners on the market. Here's what we learned.

Getting to know the grind



▶A microbevel is a 1–2° variation from the primary bevel at the tip. This allows you to resharpen only this tip when dull, saving time versus resharpening the entire bevel.

▶For testing consistency, we used Irwin Marples chisels and Veritas plane irons in three steel alloys with each sharpener.

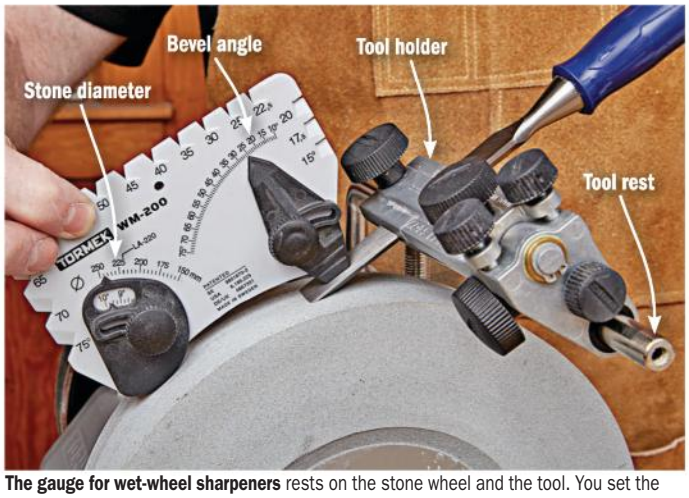
Wet or dry?

With all of these machines, you can sharpen most widths of bevel-edge chisels and plane irons. For plane irons 2" or wider, for most machines, you'll need to sharpen freehand or slide the blade side-to-side as the abrasive spins. You also can sharpen carving chisels, turning tools, and nearly any cutting-edge tool minus a flat edge, although you might have to freehand them. The nine tested machines all delivered sharp tools, but by quite different means.

The six wet-wheel sharpeners use a stone wheel (*previous page*) turning at 90 to 125 rpm. A water bath keeps the stone lubricated as it turns and washes away metal filings (swarf), while also keeping the tool from overheating. With these units you can secure the tool in a holder to sharpen at an angle of your choice, rest the tool against the

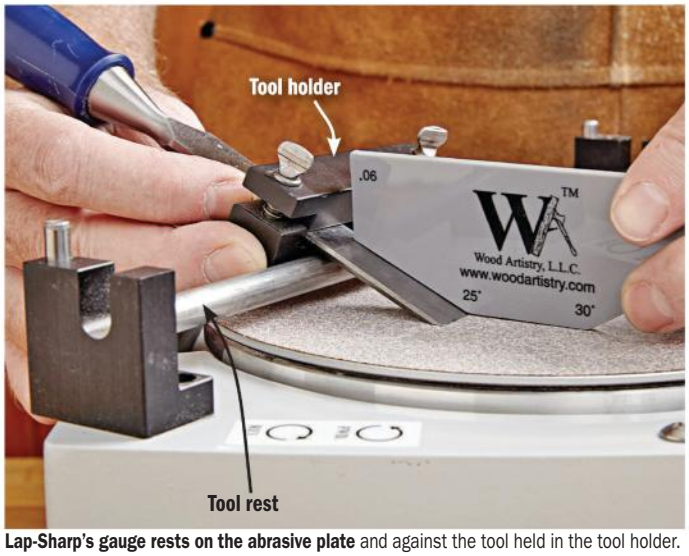
Note: *When emptying a water tray, never dump the contents down a drain. The fine stone sludge will act like cement and plug your drain.*

Gauges and holders make setting bevel angles easy (and repeatable)



The gauge for wet-wheel sharpeners rests on the stone wheel and the tool. You set the gauge for the desired tool angle, and then raise the tool rest until the gauge sits flat on the tool. This Tormek gauge also accounts for the diminishing diameter of the wheel.

WorkSharp's tool rest tilts to the desired bevel angle and locks in place. You then insert the tool bevel up and sharpen against the bottom face of the plate.



Lap-Sharp's gauge rests on the abrasive plate and against the tool held in the tool holder. You raise the tool rest until the gauge rests flat on the tool.

The Veritas tool holder hooks over the tool rest (set to the desired angle height), and you extend the tool until the bevel rests flat on the abrasive plate. An included gauge makes it easy to establish a new bevel angle.

tool rest, or simply freehand the tool. No matter the method, the result is a hollow-ground bevel, shown *previous page*. Three machines (the Tormek T4 and T8 and the Triton TWSS10) come with accessories for cleaning or grading their stone wheels. All three have a two-sided dressing stone, with which you can flatten the stone and change the abrasive level to either coarse (about 220 grit) for shaping a tool edge or fine (about 1,000 grit) for sharpening. The T8 also comes with a diamond-tipped jig for trueing the wheel parallel to the tool rest.

After sharpening the tool on the stone wheel, you finely hone the edge on the leather strop wheel using honing compound. Bottom line: This method produces edges sharp enough to cut wood, but generally not as sharp as those sharpened with machines using sandpaper abrasives because of the many finer grits available. In our experience, a tool with a finely polished and refined edge stays sharper longer than one not sharpened to that degree.

The three sandpaper machines use aluminum or glass plates with abrasive discs adhered to both faces. You then sharpen on the top or bottom of the plate at 180–650 rpm, flipping the plates as you progress through finer abrasives. By doing this, you get sharp tool edges as refined as you want to continue honing. The Veritas MK.II and WorkSharp WS3000 sharpen only with dry abrasives, but the Lap-Sharp LS-200 can be used dry or with a water/dish-soap mixture. This keeps tools cooler, but creates a bit more mess than dry sharpening. We found no sharpness advantage between the dry and wet methods.

Obviously, you'll need to replace abrasives as they wear out, so plan on that ongoing cost. Sandpaper discs will generally sharpen 2–4 tools before needing replacement, depending on how much material you remove from each tool. And you might not use the full width of the disc if you sharpen in the same spot all the time (as with the WorkSharp). A stone wheel should last several years in a typical home shop.

▶Read reviews of other sharpening tools from the *WOOD*® shop and the shops of other readers. You can also post your own reviews. woodmagazine.com/sharptools

Grizzly T10097A, $130

800-523-4777, grizzly.com

High Points

▲Despite its small size, it displayed good torque and never bogged down.

▲A microadjuster makes it easy to fine-tune the tool rest's height.

Low Points

▼Although rated at 220 grit, the stone wheel was the roughest and most porous of those in the test. As a result, it did not sharpen as well as the other models.

▼The tool rest was not square to the stone wheel, requiring adjustments to the mounting screws (a process not detailed in the owner's manual).

▼The seam in the leather strop wheel has a bump, resulting in a "hop" each time the tool hits it. And the provided honing compound, more greaselike than others, proved ineffective.

▼Its water tray was difficult to remove and clean.

▼It does not come with a stone-dressing tool, but one is available as an optional accessory (no. T24707, $11.50).

Rikon 82-100, $250

877-884-5167, rikontools.com

High Points

▲Its angle-setting jig compensates for reduced wheel diameter for reliability as the wheel wears over time.

▲With better mounting tabs than the Grizzly and Triton models, the water tray was easier to remove and install.

▲A wide, sturdy handle makes it easy to lift and carry this unit.

Low Points

▼The tool rest lacks a microadjuster.

▼The stone wheel had a noticeable side-to-side wobble, but once we dressed it, we could sharpen effectively on its face.

▼It does not come with a stone-dressing tool.

Grizzly T10010ANV, $200

800-523-4777, grizzly.com

High Points

▲It displayed good torque, never bogging down.

▲Its leather strop wheel performed nicely, and comes with a better honing compound than the T10097A.

Low Points

▼The tool rest lacks a microadjuster.

▼When sharpening plane irons, water dripped off the blade's edges, missing the tray.

▼It does not come with a stone-dressing tool, but one is available as an optional accessory (no. T24707, $11.50).

More Points

▶The water tray was easy to clean, but fussy to remove and attach.

▶In use, the stone wheel ran longer than most before needing to be dressed.

More Points

▶The motor has an audible "throb" to it, and it heats up more than the other units. Still, it was not a problem in our testing.

▶Its leather strop wheel is spongier than others, but honed tools nicely.

▶You can run this unit either forward or backward, but we can't come up with a reason why that's an advantage.

WET-WHEEL SHARPENERS

2017 WOOD Magazine TOP TOOL Power Sharpener

Tormek T8, $700

866-588-0395, tormekus.com

High Points

▲It displayed excellent torque and never bogged down.

▲We found the numbered microadjuster on the tool rest easiest for fine-tuning the tool rest's height.

▲The water tray was easiest to use among the wet sharpeners: It adjusts up and down after sliding onto a pair of arms, and has a magnetic scraper to clean the tray.

▲It comes with a diamond trueing jig (*below*) and stone-dressing tool.

▲We liked its robust tool holder best, with adjusters that allow you to grind a slight camber (slightly rounded corners) on tools, if desired.

▲Its angle-setting jig compensates for reduced wheel diameter for reliability as the wheel wears over time.

▲The stone wheel did not seem to load up with tool filings the way others did.

▲It has the best carrying handle of the group.

▲The leather strop and honing compound delivered the best final finish of the water sharpeners.

▲Includes a test-best 7-year warranty.

More Points

▶This unit has the most optional accessories available for sharpening other tools for the shop and home (many of which also fit the Grizzly and Rikon sharpeners).

Nothing trues up a stone wheel better than the Tormek T8's diamond-tipped jig. It attaches to the tool rest, then you turn the thumbwheels to guide it across the spinning stone surface. The slower you go, the smoother the surface will be.

Tormek T4, $400

866-588-0395, tormekus.com

High Points

▲This model shared the T8's attributes for torque, tool-rest adjustment, tool-angle setting, leather stropping, and warranty.

▲The water tray is easy to install, remove, and clean.

▲The included two-sided grading stone flattens and cleans the stone wheel, letting you change the wheel's abrasive level to coarse or fine.

Low Points

▼The tool holder does not come with the machine, but is available as an optional accessory (no. SE-77, $66).

More Points

▶The smaller-diameter wheel spins faster than the Tormek T8, but it's hardly noticeable in use.

▶Accessories sold for the Tormek T8 also work on this unit.

Triton TWSS10, $340

800-624-2027, tritontools.com

High Points

▲The 10" stone wheel seemed to be of a finer grit than its rated 220, and it sharpened tools better than all the wet-wheel units except the Tormeks. But this also resulted in longer sharpening times for harder steel alloys.

▲The included two-sided grading stone flattens and cleans the stone wheel (*below*), letting you change the wheel's abrasive level to coarse or fine.

▲A microadjuster on the tool rest lets you better fine-tune a tool's bevel angle.

▲A torque adjuster lets you increase or reduce the motor's ability to spin the wheels as resistance calls for it.

▲Its angle-setting jig compensates for reduced wheel diameter for reliability as the wheel wears over time.

▲A sturdy handle makes it easy to lift and carry this unit.

Low Points

▼The water tray is difficult to install and remove, resulting in a mess when removing it full of water.

More Points

▶The owner's manual has good directions and tips, but it's written in such small type you'll likely need magnification.

A grading stone flattens the surface of a wheel and clears away metal filings. Use the coarse side to create a more aggressive surface, or the fine side for a smoother surface for honing.

SANDPAPER SHARPENERS

Lap-Sharp LS-200, $800

707-527-3358, woodartistry.com

High Points

▲The direct-drive disc never bogged down.

▲You can sharpen wet or dry with this unit; the manufacturer recommends spritzing the disc with a mixture of water and a few drops of dishwashing soap.

▲Running at the lowest speed (180 rpm) of the sandpaper sharpeners, tools heat up less.

▲Aluminum discs maintain a flat surface for sharpening.

▲A foot switch controls the on/off function, letting you keep both hands on the tool. (You can also use the unit without this switch.)

Low Points

▼The plastic angle templates make setting tool angles fussy, and tiny thumbscrews on the tool holder can be difficult to operate.

▼Stubby butt chisels can be difficult to sharpen with the tool holder.

▼Ongoing cost of abrasive discs: selling in multipacks or singles from about $1 to as much as $25 per disc, depending on the abrasive type.

More Points

▶A reversible switch lets you operate this sharpener backward or forward, but we can't see an advantage in this.

2017 WOOD Magazine TOP TOOL Power Sharpener

Veritas MK.II, $380

800-871-8158, leevalley.com

High Points

▲Stops for setting the tool rest to common bevel angles make angle setting easy and precise.

▲Securing the tool in the holder proves easy, and the holder grips solidly against the tool rest for quick, repeatable honing.

▲Two aluminum discs come with this unit: a thick disc for coarse abrasives on each face, and a thin one for fine abrasives. Switching to the thin disc automatically creates a 1° microbevel on the tool you're sharpening.

▲Comes with a 5-year warranty.

Low Points

▼Ongoing cost of abrasive discs: selling for $3.70 to $6.90 per replacement disc.

▼Running at a higher speed (650 rpm) than the Lap-Sharp, this dry-sharpening unit heats up tools more quickly.

More Points

▶We could not bog it down, so power is not a concern, but you might have to replace the drive belt down the road.

To sharpen tools with curved cutting edges on the WorkSharp, use its slotted disc. The abrasive on the underneath side hones the edge as you roll the tool, viewing it through the slots as the disc spins.

2017 WOOD Magazine TOP VALUE Power Sharpener

WorkSharp WS3000, $200

800-597-6170, worksharptools.com

High Points

▲Stops for setting the tool rest to common bevel angles make angle setting easy and precise.

▲You get two glass plates, allowing you to use four different abrasives—a handy and quick way to sharpen through several grits.

▲A small strip of fine-grit abrasive on the tool holder removes the burr from the back of the tool as you slide the tool in and out.

▲An included gum eraser cleans metal residue from the abrasive.

Low Points

▼Discarded metal residue created during sharpening builds up beneath the abrasive wheel and must be cleaned periodically.

More Points

▶Ongoing cost of abrasive discs: selling in multipacks for a little more than $1 per disc. And if you sharpen tools of mostly the same width, you'll use only that corresponding portion of the disc before wearing it out. Still, they're the lowest-priced discs, and for the lowest-priced sandpaper sharpener.

▶It can be tippy when not secured to a workbench, but built-in bolt holes on the base make it easy to attach to a solid surface.

▶Using the included slotted plastic disc and abrasives, you can freehand-sharpen tools, such as carving and turning gouges, *left*. It takes some getting used to and longer time, but is effective.

Get powerfully sharp in no time

BRAND	PERFORMANCE RATINGS (1)					ABRASIVE	ACCESSORIES (2)		WEIGHT, LBS	CORD LENGTH	WARRANTY, YEARS	COUNTRY OF ASSEMBLY (3)	SELLING PRICE (4)
	PRIMARY		SECONDARY										
	EASE OF SHARPENING CHISELS	EASE OF SHARPENING PLANE IRONS	EASE OF CHANGING ABRASIVES	EASE OF CLEANING ABRASIVE AND MACHINE	EASE OF FILLING/EMPTYING WATER TRAY	SIZE OF ABRASIVE WHEEL, INCHES	STANDARD	OPTIONAL					
WET-WHEEL SHARPENERS													
GRIZZLY T10097A	C	C-	B	B	C	8 × 1½	H, T	D, K, P, R	21	6'	1	CH	$130
GRIZZLY T10010ANV	B	C+	B	B	B-	10 × 2	H, T	D, K, P, R	41	6'8"	1	CH	$200
RIKON 82-100	B	B	B	B	B	8 × 1 9/16	H, T	G	23	6'	2	CH	$250
TORMEK T4	B	B	A-	A	A-	8 × 1⅝	D, H	K, L, P, R, T	18	7'	7	S	$400
TORMEK T8	A	A-	A-	A	A	10 × 2	D, G, H, T	K, L, P, R	32	7'	7	S	$700
TRITON TWSS10	A	B	B	B	D	10 × 2	D, H, T	C, G, K, R	32	6'3"	3	CH	$340
SANDPAPER SHARPENERS													
LAP SHARP LS-200	B+	A	A	A	N/A	8	T	O	25	7'4"	2	US	$800
VERITAS MK.II	A-	A	A	A	N/A	8	B, T		23	3'	5	CA	$380
WORKSHARP WS3000	B	B	B	B	N/A	6	S, T	K, W	15	6'	2	US	$200

1. A Excellent; B Good; C Fair; D Poor; N/A Not applicable

2. (B) Bevel-angle gauge; (C) Carving-tool jig; (D) Dressing stone; (G) Diamond stone-grading jig; (H) Honing compound; (K) Knife jig/system; (L) Drill-bit jig; (O) Honing guide; (P) Planer/jointer knife jig; (R) Scissors jig; (S) Slotted plastic plate; (T) Tool holder; (W) Wide-blade holder

3. (CA) Canada; (CH) China; (S) Sweden; (US) United States

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

▶Interested in what sharpening systems the *WOOD* editors use in their own shops? woodmagazine.com/sharpeditors

Gain your edge with these sharp machines

The Tormek T8 was a runaway Top Tool among the wet-wheel sharpeners. It comes with the most and best accessories, made sharpening chisels and plane irons easiest, and cleans up best. Granted, $700 is a big investment, but this machine should reward you for many years.

All three sandpaper sharpeners fared well, but the Lap Sharp LS-200 and Veritas MK.II rose to the top. Ultimately, we like the Veritas unit best for its easier-to-use tool holder and fast results, and it sells for $420 less than the Lap Sharp. It wins the Top Tool honor by a nose.

Earning the Top Value award is the Work-Sharp WS3000. Selling for $200, this machine delivers quick, consistent, sharp results with little setup or learning curve.

Produced by **Bob Hunter** with **Peter Kasper**

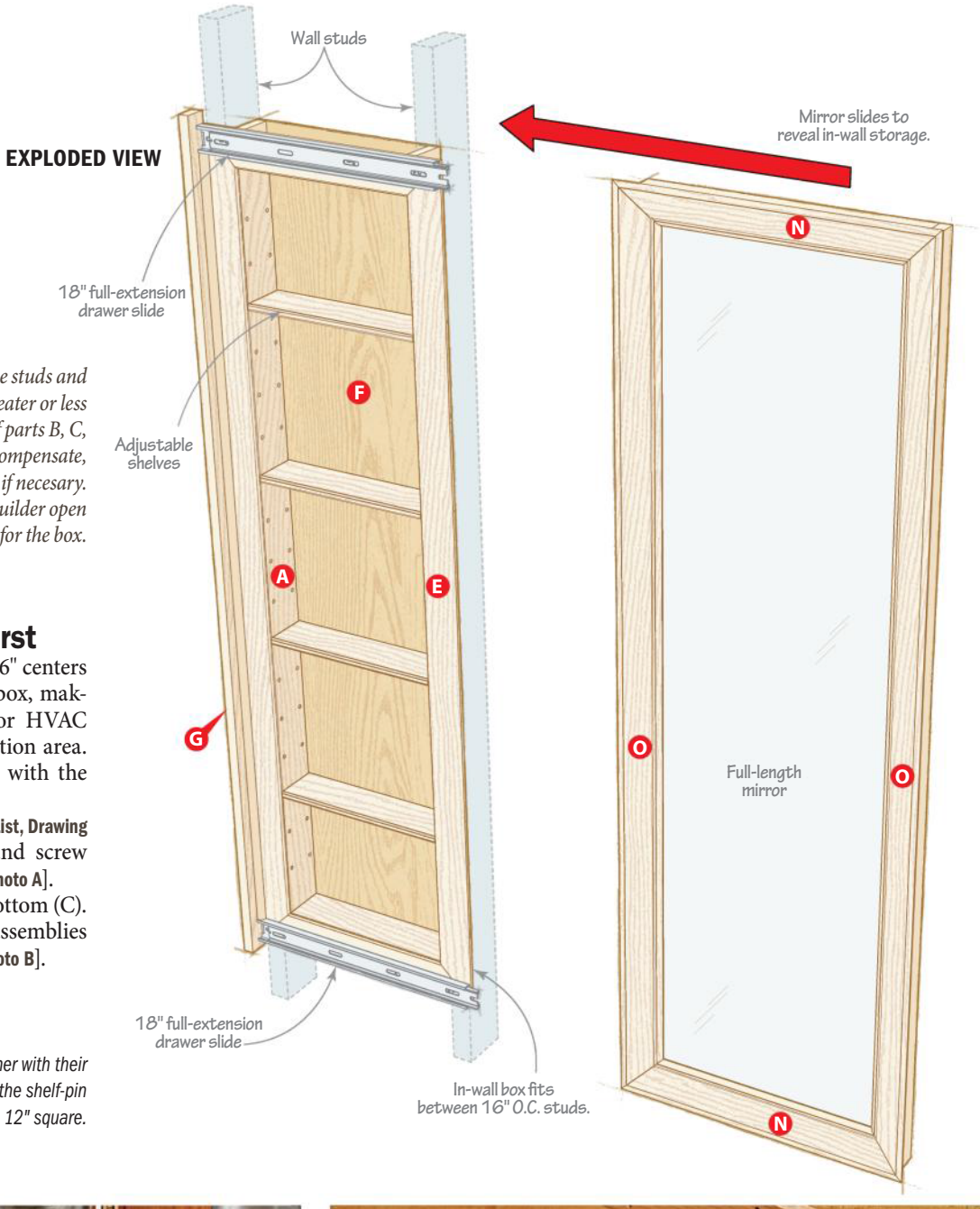
Slide-away Hideaway

What's behind the mirror? This one hides a storage compartment.

DIMENSIONS: 62½" H × 5⅝" D × 20½" W

Approximate materials cost: **$175** excluding mirror glass

16" Typical mounting height.



Note: *Measure the distance between the studs and verify that they are plumb. If they are greater or less than 14½" apart, adjust the lengths of parts B, C, and I, and the width of part F to compensate, allowing space to shim the box plumb if necesary. You may want to have a professional builder open up the wall for the box.*

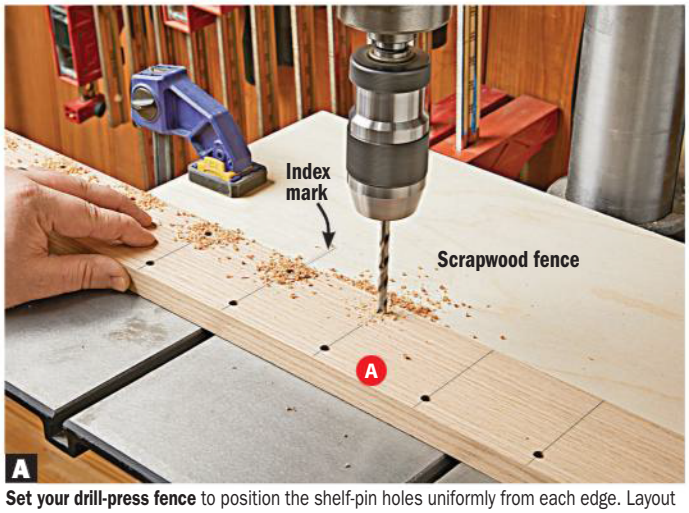
Build the hiding place first

1 Locate a pair of wall studs on 16" centers where you want to install the box, making sure no plumbing, wiring, or HVAC ducting runs through the installation area. Cut away the finished wall flush with the inside of the studs.

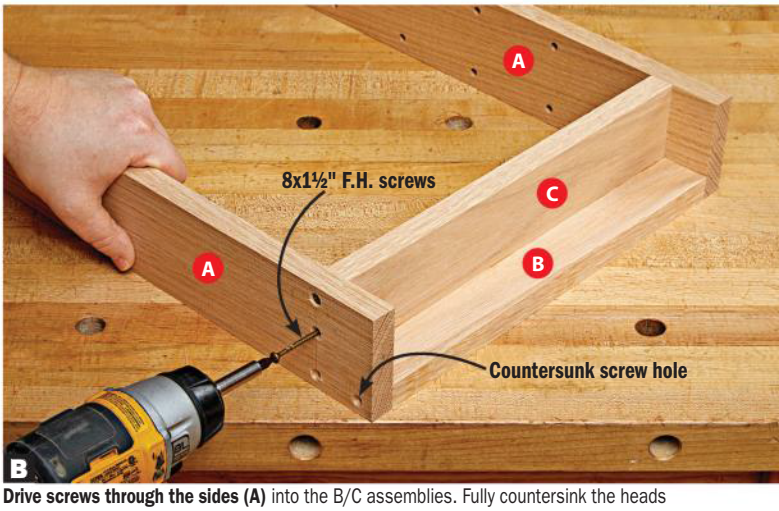
2 Cut parts A–C to size [**Materials List, Drawing 1**]. Drill the shelf-pin holes and screw holes in both sides (A) [**Drawing 2, Photo A**].

3 Glue a spacer (B) to each top/bottom (C). Glue and screw the B/C assemblies between the sides (A) [**Drawing 1, Photo B**].

Tip! *Lay the sides flat next to each other with their ends flush. Then, lay out centerlines for the shelf-pin holes across both sides at once using a 12" square.*



Set your drill-press fence to position the shelf-pin holes uniformly from each edge. Layout lines on the part and an index mark on the fence keep spacing even.



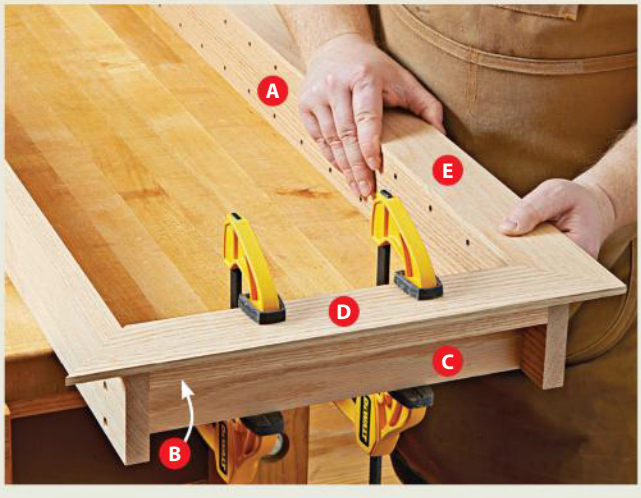
Drive screws through the sides (A) into the B/C assemblies. Fully countersink the heads so the box slides easily between wall studs at installation time.

SKILL BUILDER

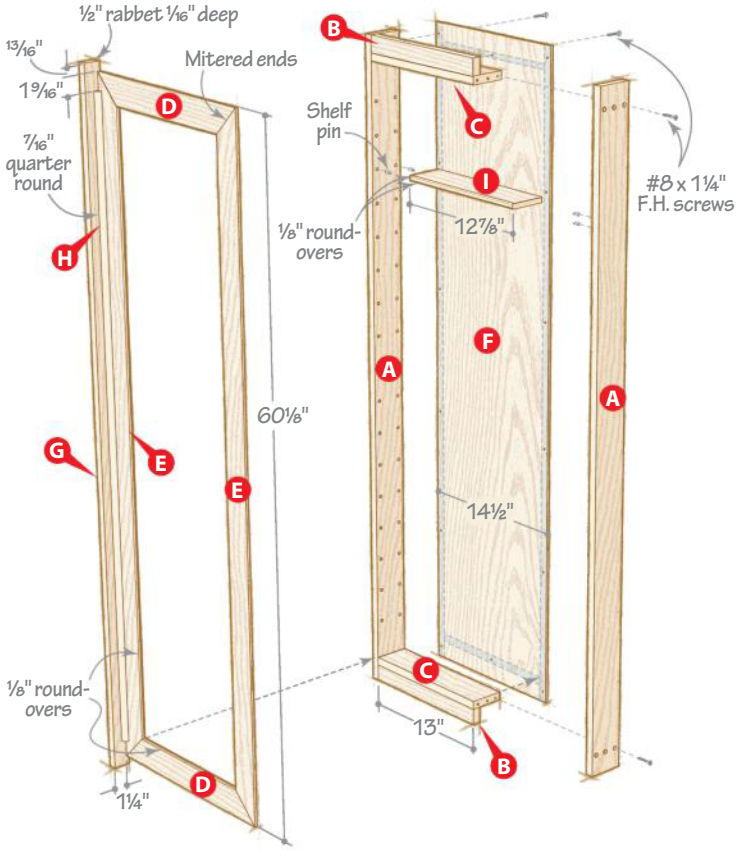
Mark miters directly for superior cornering

For tight-fitting mitered corners on the rails and stiles, don't try to cut the parts to measurements. Instead, cut each one to fit. Start by miter-cutting one end of one rail. Lay that rail across the top of the box assembly (A–C) [*top* photo, *below*].

Then, scribe the second miter location directly from the box corner. A sharp pencil or marking knife ensures maximum accuracy. Cut the miter, test its fit, and glue the rail to the box. Next, cut one end of a stile and mate it to the rail [*bottom* photo]. Again, mark the bottom miter directly from the box. Miter-cut the stile to length and glue it on. Similarly, cut and attach the other stile followed by the bottom rail.

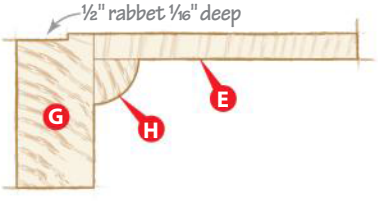


1 WALL BOX (viewed from front)



▶See more about making miters.
woodmagazine.com/mastering-miters

1a TOP SECTION VIEW



Tip! *Without the back in place, you can clamp the stiles and rails with clamps inside the box for a firmer grip.*

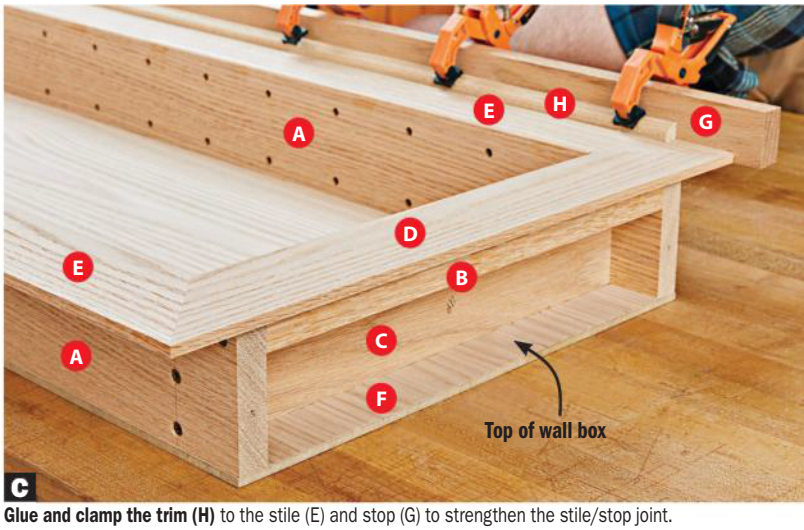
Note: *The mirror slides open to the right. To make it open to the left, glue the stop (G) and trim (H) to the right-side stile (E) and the inner stile (M) to the left side of the mirror frame* [**Make the sliding mirror, Step 3,** *and* **Photo E**].

4 Cut the rails and stiles (D, E) a few inches longer than listed. Miter-cut the ends [**Skill Builder**], and glue the rails and stiles around the opening, flush on the inside. Round over the inside edges [**Drawing 1**].

5 Cut parts F–I to size. Glue and screw the back (F) to the box [**Drawing 1**]. Round over the front edges of the shelves (I) and set them aside for now.

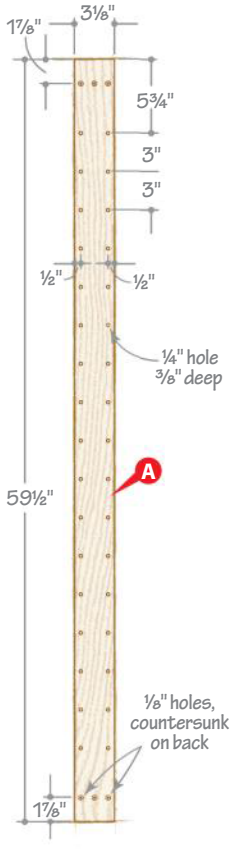
6 Rabbet the stop (G) [**Drawing 1a**] to provide a shadow line when installed. Glue it to the edge of the left-side stile (E).

7 To make the quarter-round molding (H), plane a 5' length of 2"-wide stock to 7/16" thick. Then, rout one edge with a ½" round-over bit and rip off that edge. Attach the quarter-round trim molding [**Photo C**].

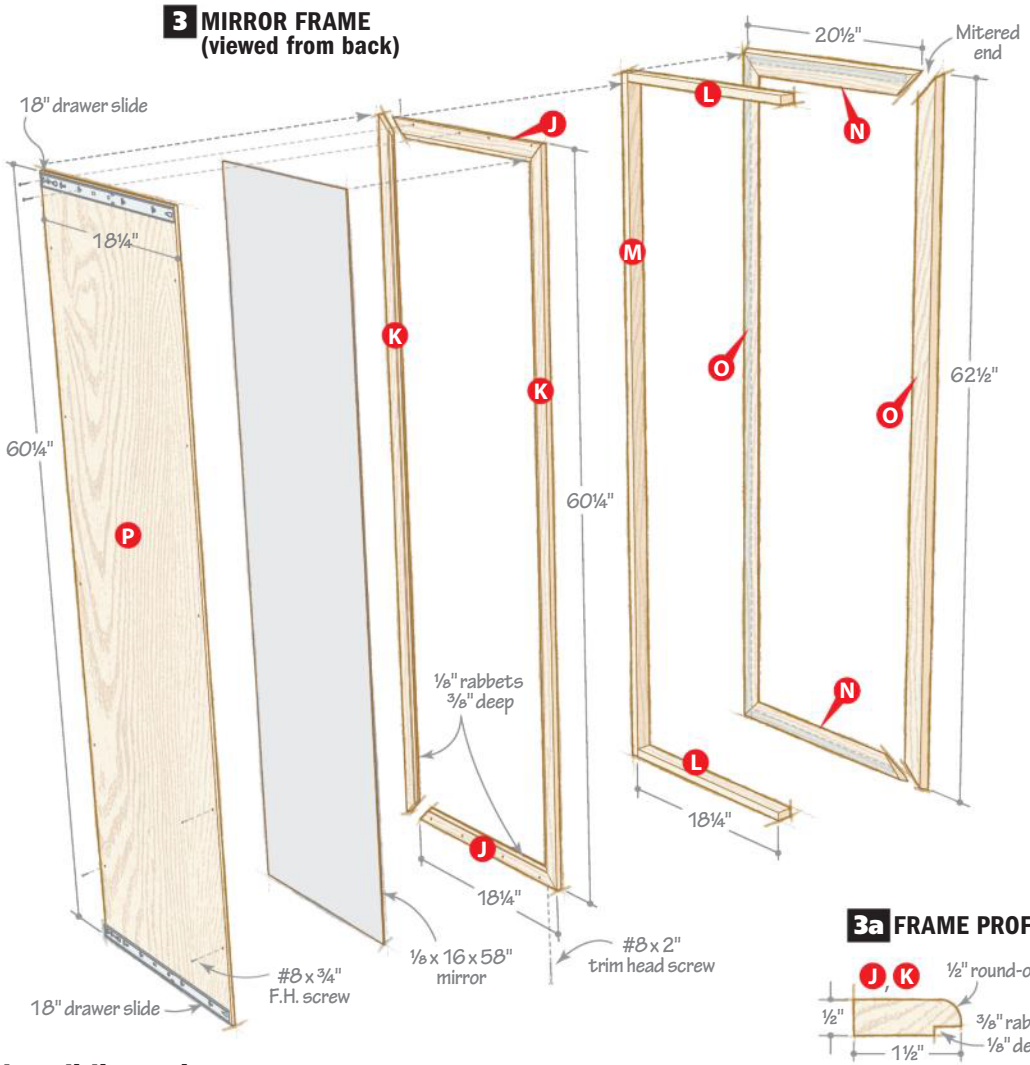


Glue and clamp the trim (H) to the stile (E) and stop (G) to strengthen the stile/stop joint.

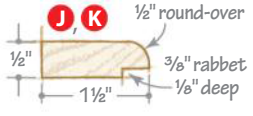
2 WALL BOX SIDE



3 MIRROR FRAME (viewed from back)



3a FRAME PROFILE



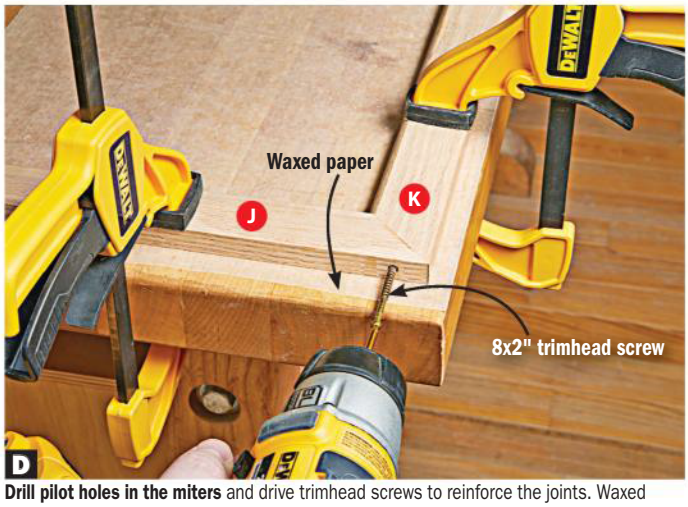
Make the sliding mirror

1 Cut the frame rails and stiles (J, K) to size. Rabbet and round over the edges [**Drawings 3** and **3a**]. Then, miter-cut the ends.

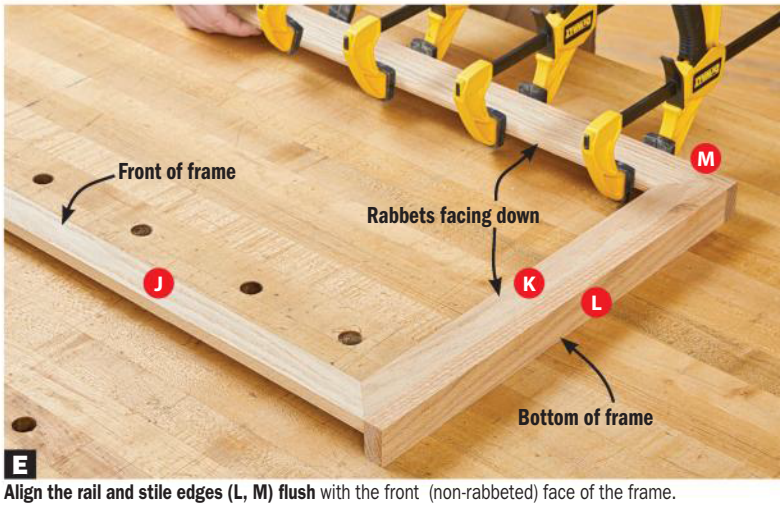
2 Glue the frame together on a flat surface. After the glue sets, drive a screw into each joint [**Photo D**].

3 Cut the inner rails and stile (L, M) to size. Glue them to the mitered frame (J/K) [**Drawings 3** and **4**, **Photo E**].

4 Cut stock for the molding rails and stiles (N, O) ½" wider and 4" longer than indicated on the **Materials List**.



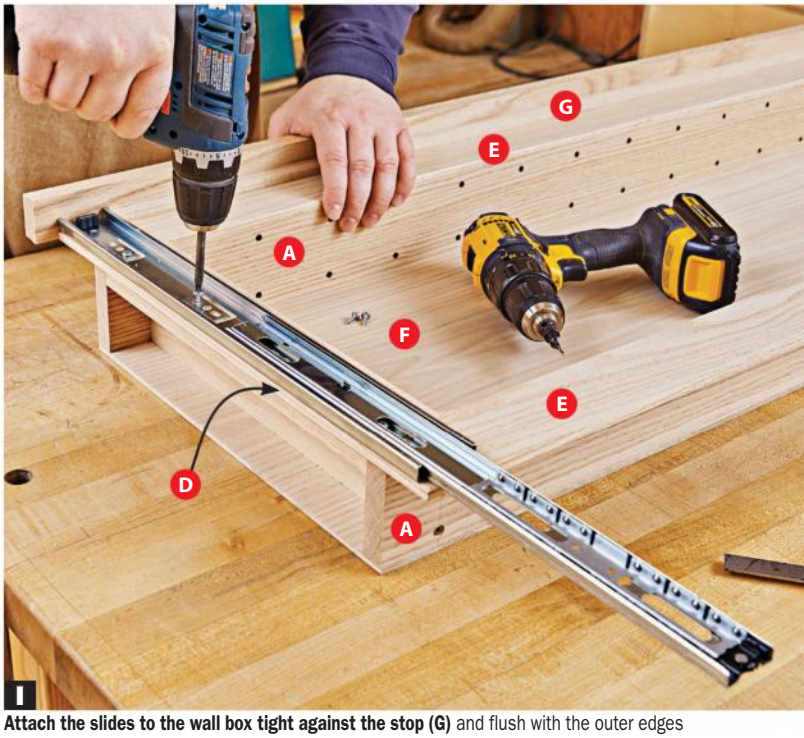
Drill pilot holes in the miters and drive trimhead screws to reinforce the joints. Waxed paper laid on the bench before assembly prevents gluing the frame to the worksurface.



Align the rail and stile edges (L, M) flush with the front (non-rabbeted) face of the frame. The stile (M) goes on the right side as you look at the front of the frame.

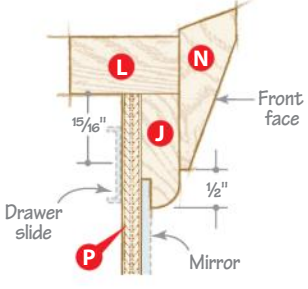
With the tablesaw blade tilted to 20°, rip the molding face (*left*) and edge (*right*). Allow enough extra thickness and width to sand out saw marks as these moldings show prominently on the installed project.

Glue the moldings in place, maintaining a ½" reveal around the opening. **Tip!** Attach self-adhesive sandpaper to scraps of bevel-cut stock to make effective clamp blocks.

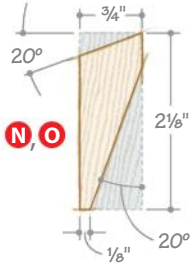


Attach the slides to the wall box tight against the stop (G) and flush with the outer edges of the rails (D). Make sure the slides are parallel.

4 SIDE SECTION VIEW



4a MOLDING



5 Install a zero-clearance insert in your tablesaw and rip the bevels on the moldings [**Drawing 4a, Photos F** and **G**].

6 As you did with the wall-box rail and stiles, miter-cut and glue the moldings around the frame assembly (J–M), starting with a rail [**Drawings 3** and **4, Photo H**].

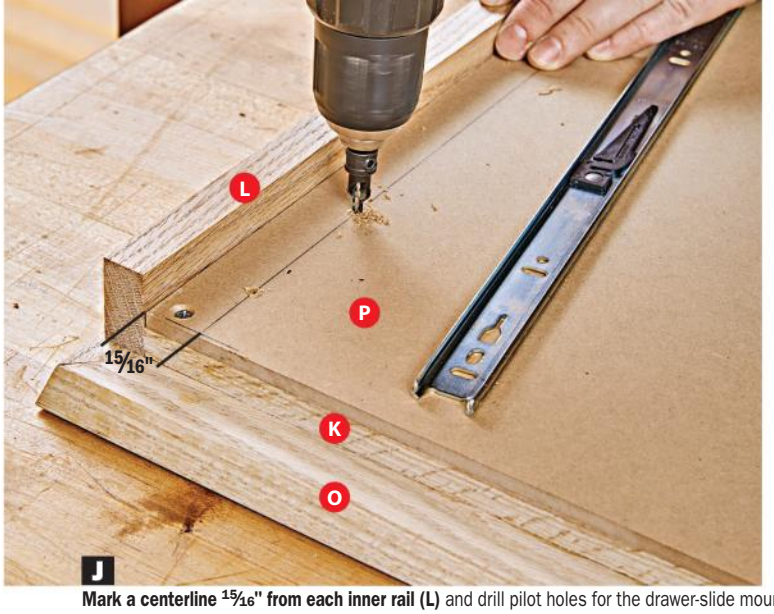
7 Cut the mirror back (P) to size and screw it to the frame assembly (J–O). Leave the mirror out for now.

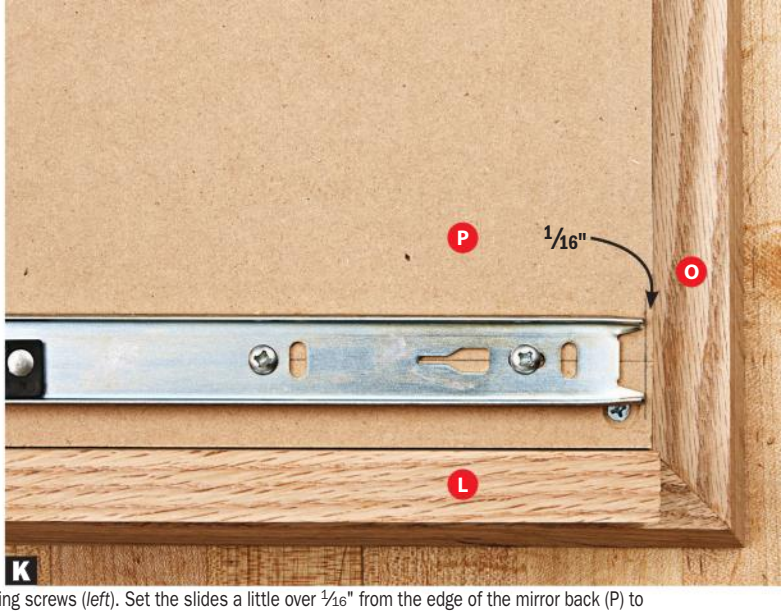
Add the sliding hardware

1 Screw the main body (cabinet side) of an 18" drawer slide to the top and bottom of the wall box [**Exploded View, Photo I**].

2 Attach the removable parts of the drawer slides to the back (P) of the mirror frame [**Drawing 3, Photos J** and **K**].

3 Slide the two assemblies together (you may need a helper) and check for free motion. Then, remove the hardware and apply a finish of your choice. (We sprayed the box interior and frame with clear lacquer.)





Mark a centerline 15/16" from each inner rail (L) and drill pilot holes for the drawer-slide mounting screws (*left*). Set the slides a little over 1/16" from the edge of the mirror back (P) to allow for slack (*right*).

Installing the secret wall box

Tip! You can fasten the box in place with screws through the stiles (E) into the studs if that makes installation easier.

1 Slide the box into the cavity, pushing the rails and stiles (D, E) flush against the wall surface. Plumb the box, and secure it with screws driven through the sides (A) into the wall studs.

2 Remove the mirror back (P), fit the mirror glass in the frame, and reinstall the back. Reinstall the drawer slides and join the frame to the box. Install the shelves. Then, reflect on your work as you hide some things away.

Produced by **Larry Johnston** with **John Olson**
Project design: **John Olson**
Illustrations: **Roxanne LeMoine, Lorna Johnson**

Cutting Diagram

¾ x 3½ x 96" Oak (2 needed)

¾ x 3½ x 72" Oak

¾ x 3½ x 96" Oak (2 needed)

½ x 3½ x 96" Oak (2 needed)

½ x 3½ x 60" Oak *Plane to the thickness listed in the Materials List.

¼ x 3½ x 96" Oak (2 needed)

¼ x 48 x 96" Oak plywood

This project requires 12 board feet of 4/4 oak, 5 square feet of ½" oak, and 5 square feet of ¼" oak.

Materials List

Part		FINISHED SIZE T	W	L	Matl.	Qty.
Wall box						
A	sides	¾"	3⅛"	59½"	O	2
B	spacer	¾"	1½"	13"	O	2
C	top/bottom	¾"	3⅛"	13"	O	2
D*	rails	¼"	2 9/16"	18⅛"	O	2
E*	stiles	¼"	2 9/16"	60⅛"	O	2
F	back	¼"	14½"	59½"	OP	1
G	stop	¾"	1½"	61¾"	O	1
H*	trim	7/16"	7/16"	57"	O	1
I	shelves	½"	3¼"	12⅞"	O	4
Mirror						
J	frame rails	½"	1½"	18¼"	O	2
K	frame stiles	½"	1½"	60¼"	O	2
L	inner frame rails	¾"	1 7/16"	18¼"	O	2
M	inner frame stile	¾"	1 7/16"	61¾"	O	1
N*	molding rails	¾"	2⅛"	20½"	O	2
O*	molding stiles	¾"	2⅛"	62½"	O	2
P	back	¼"	18¼"	60¼"	OP	1

*Parts initially cut oversize. See the instructions.

Materials key: O-oak, OP-oak plywood.
Supplies: 18" full-extension drawer slides (1 pair), ⅛x16x58" mirror (1), shelf pins (16), #8x1¼" flathead screws, #8x2" trimhead screws, #16 x1" brads.
Bits: ⅛", ⅜", and ½" round-over bits.

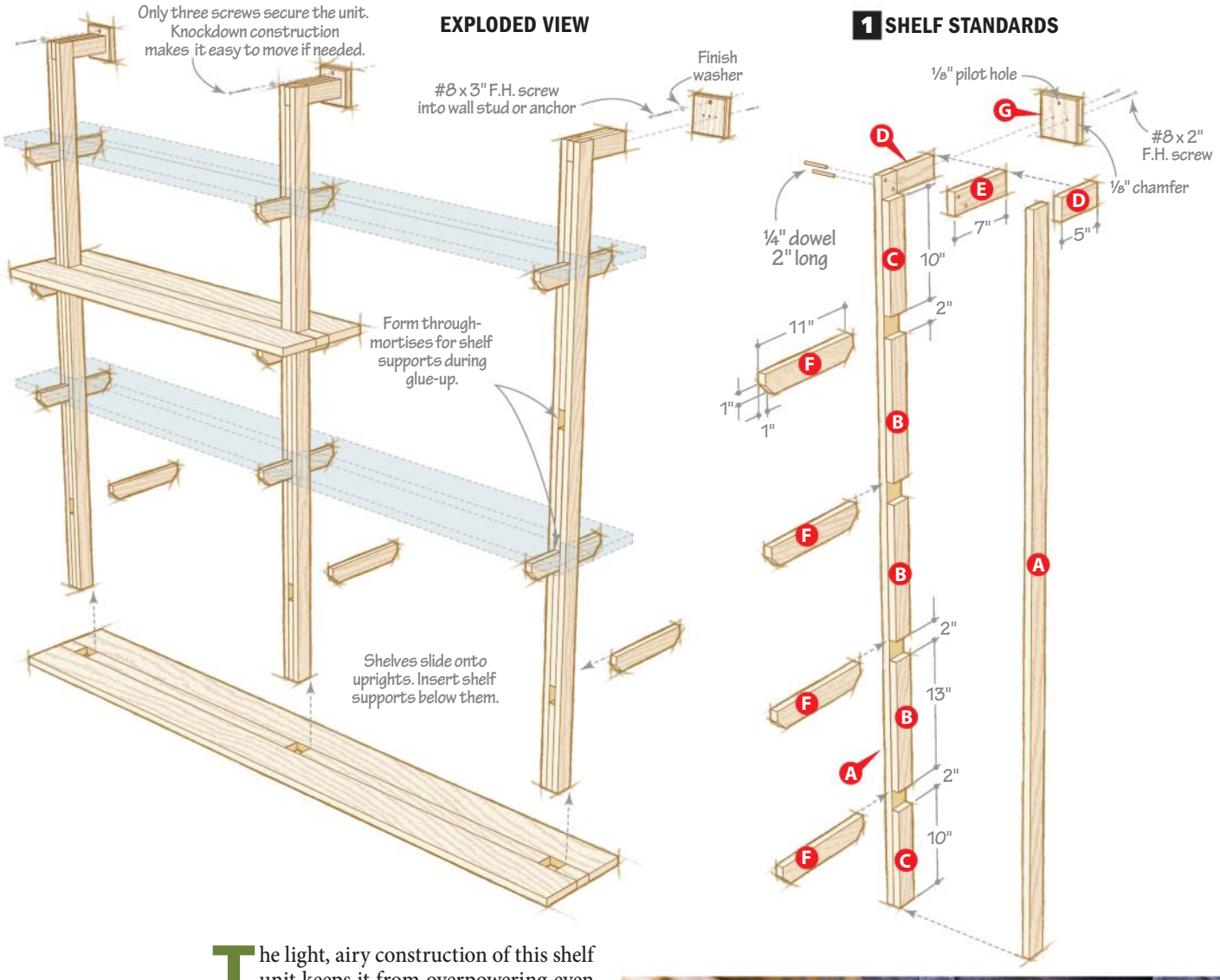
Built-to-fit Stand-up Shelving

Outfit any room with maximum shelf space using minimum materials.

DIMENSIONS: 72⅝" W × 12⅞" D × 70" H

Approximate materials cost: **$350**

17 linear feet of unobstructed display



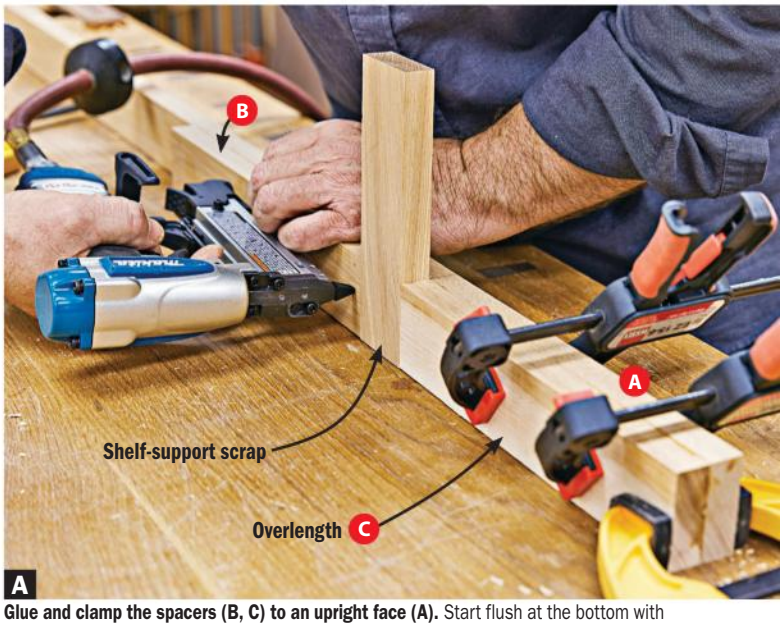
The light, airy construction of this shelf unit keeps it from overpowering even small rooms. Shelf standards fall on 32" centers for secure fastening to wall studs. Build the unit as shown or make it longer or shorter to fit your needs by adding or eliminating shelf standards and customizing the shelf lengths.

Build the shelf standards

1 Cut ten ¾×2⅛×70" blanks for parts A–E [**Drawing 1**]. Set six blanks aside for the upright faces (A). From three remaining blanks, cut the long spacers (B) and three short spacers (C) [**Materials List**]. Cut another three short spacers to 10½" long. From the last blank, cut the brace faces (D) and brace spacers (E) 1" longer than listed. Cut the shelf supports (F), retaining a 6"-long scrap of shelf-support stock to use in assembling the uprights and braces. Set the brace parts and shelf supports aside.

2 Assemble the uprights [**Drawing 1, Photo A**]. With the glue dry, glue and clamp a second face to each assembly.

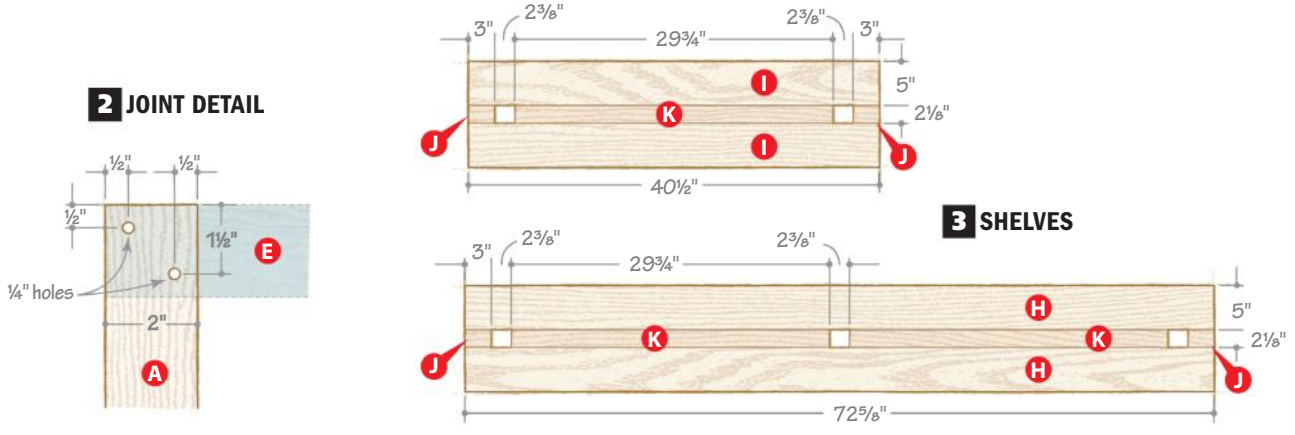
Tip! *For consistent color, cut the spacers (B, C) from the blanks in the sequence in which they will be assembled. As you cut the parts, mark the part letters and their assembly order. Make sure the overlength short spacers (C) are at the bottom of each upright.*



Glue and clamp the spacers (B, C) to an upright face (A). Start flush at the bottom with the overlength spacer (C). Position the remaining spacers by temporarily inserting the shelf-support scrap between them. A couple of 23-gauge pin nails keep the spacers from shifting when applying clamps.

Dry-assemble the upright and brace. Drill 2"-deep holes for ¼" dowels.

Apply glue, reassemble the parts, and drive in ¼" dowels. Trim the dowels flush.



Note: *If you don't have a jointer and planer, simply rip the uprights to width, removing material from both edges, and then sand them smooth.*

3 Remove glue squeeze-out from the notch at the top of each upright and from the mortises. Joint one edge of each upright and plane them to width. Measure 10" from the upper end of the lower short spacer (C) and trim the end of each upright [**Drawing 1**]. Insert the shelf-support scrap between the upright faces at the top of each upright and mark a cutline. Cut the uprights to finished length.

4 Glue the brace faces (D) to the brace spacers (E) [**Drawing 1**], using the shelf-support scrap to position the faces on the spacers. Joint and plane the braces to width and cut them to finished length.

Note: *The upright/brace joints should be self-squaring, but verify before drilling the dowel holes.*

5 Assemble the uprights and braces [**Drawing 2, Photos B, C**]. Finish-sand the shelf standards.

6 Cut and chamfer the mounting plates (G) [**Drawing 1**]. Drill in each one a pilot hole for the wall-mounting screw and two countersunk holes for brace-mounting screws. Finish-sand the plates. Pin-nail the plates to the braces, drill pilot holes, and screw the plates to the braces.

7 Plane just enough (about 1/64") from one edge of each shelf support (F) to allow you to push them through the shelf-standard mortises by hand. Bevel-cut the bottom corners of the supports [**Drawing 1**] and finish-sand them.

Make the shelves

1 Cut the shelf rails (H, I) and shelf short spacers (J) 1" longer than listed. Cut the shelf long spacers (K) to finished length and three 2⅜"-wide scrapwood assembly spacers about 6" long.

2 For each shelf, glue and clamp the spacers (J, K) to one rail [**Drawing 2**], inserting

Lay the shelf standards on the floor with the braces up. Slide each of the shelves onto the standards, and insert the shelf supports.

the assembly spacers to make openings for the shelf standards. Remove the assembly spacers and let the glue dry. Glue and clamp a second rail to each shelf. Remove squeeze-out from the openings.

3 Sand both faces of the shelves flush. Measure 3" from the inside ends of the short spacers and mark cutlines [**Drawing 2**]. Trim the shelves to finished length and finish-sand them.

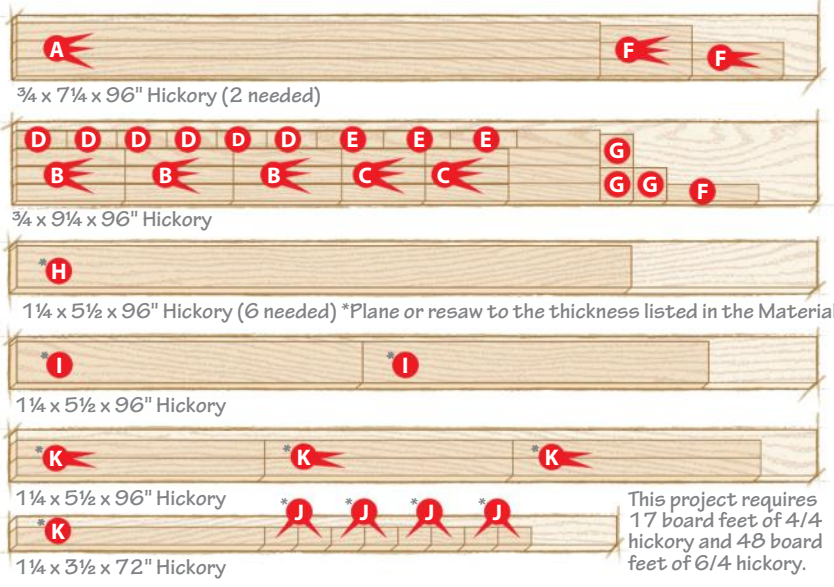
Finish it up

1 Examine all parts and finish-sand where needed. Apply a clear finish to all parts.

2 Mark 32"-on-center wall-stud locations 70" from the floor. Install the shelves and supports [**Photo D**].

3 Stand the shelf unit against the wall. (There should be a small gap between the rear edges of the shelves and the wall.) Center the mounting plates on the marked stud locations and plumb the shelf standards in both directions. Using the holes in the mounting plates as guides, drill pilot holes into the wall studs and drive screws capped with finish washers. Get all that really cool stuff out of the closet and arrange it on the shelves for everyone to admire.

Cutting Diagram



This project requires 17 board feet of 4/4 hickory and 48 board feet of 6/4 hickory.

Materials List

Part		FINISHED SIZE T	W	L	Matl.	Qty.
A*	upright faces	¾"	2"	69"	H	6
B*	long spacers	¾"	2"	13"	H	9
C*	short spacers	¾"	2"	10"	H	6
D*	brace faces	¾"	2"	5"	H	6
E*	brace spacers	¾"	2"	7"	H	3
F	shelf supports	¾"	2"	11"	H	11
G	mounting plates	¾"	4"	4"	H	3
H*	long shelf rails	1"	5"	72⅝"	H	6
I*	short shelf rails	1"	5"	40½"	H	2
J*	shelf short spacers	1"	2⅛"	3"	H	8
K	shelf long spacers	1"	2⅛"	29¾"	H	7

*Parts initially cut oversize. See the instructions.

Materials key: H-hickory.

Supplies: ¼" maple dowel 24" long, #8×2" flathead wood screws (6), #8×3" flathead wood screws (3), #8 finish washers (3).

Produced by **Craig Ruegsegger** with **Kent Welsh** and **Jan Svec**
Project design: **Kevin Boyle**
Illustrations: **Roxanne LeMoine, Lorna Johnson**

Make smoothing wood just Plane Simple

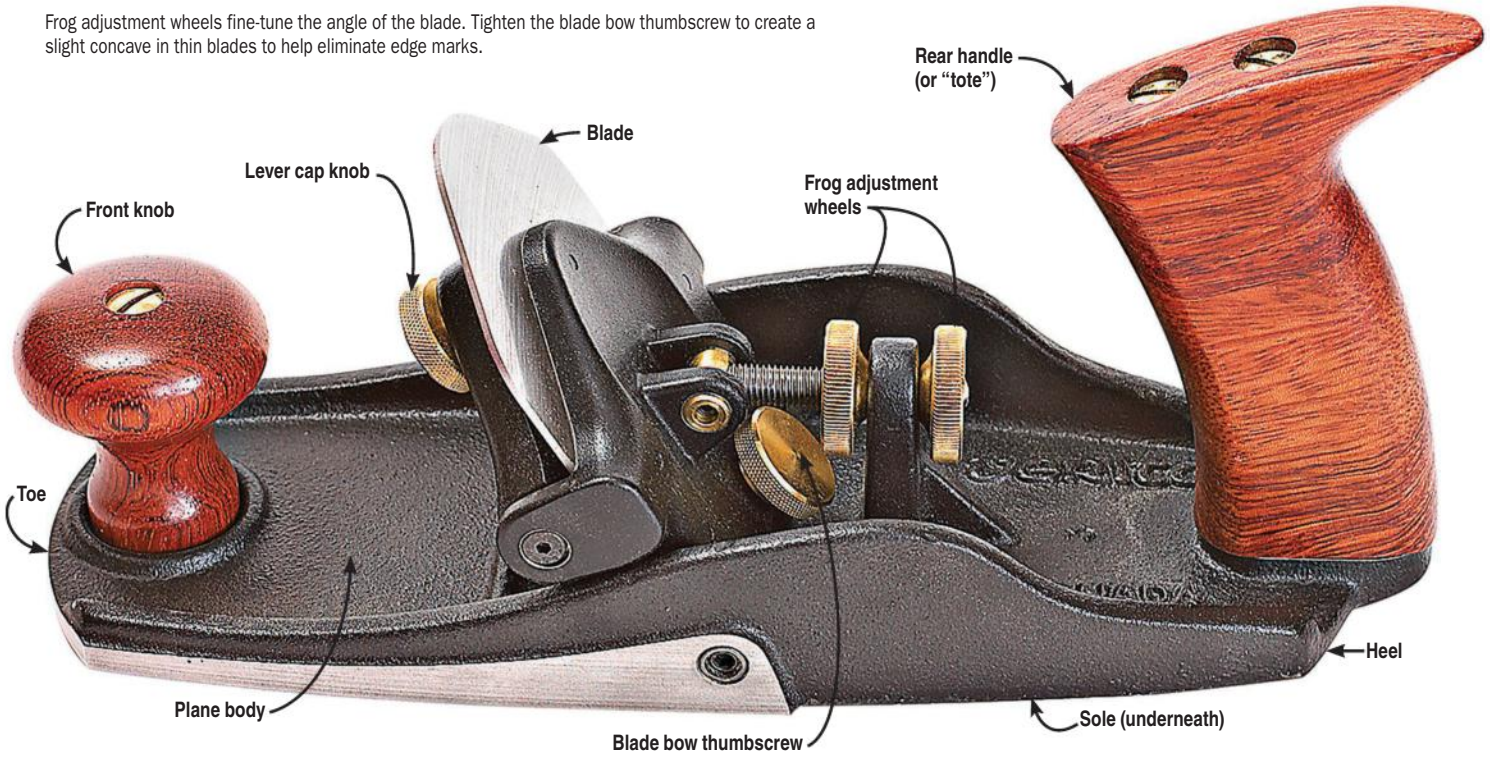
Sand less by tackling tricky wood grains with a scraping plane.

Before sandpaper, craftsmen turned to a card scraper when they needed a silky-smooth surface. Today, scrapers still work wonders for taming wild wood grain, and provide you with a welcome break from the noise and dust of sanding.

Unlike handheld card scrapers, a scraping plane requires less effort, especially on large surfaces, and holds the blade at a consistent angle. (It also costs 10–20 times more than a $10 card scraper.)

Anatomy of a Scraping Plane

Frog adjustment wheels fine-tune the angle of the blade. Tighten the blade bow thumbscrew to create a slight concave in thin blades to help eliminate edge marks.

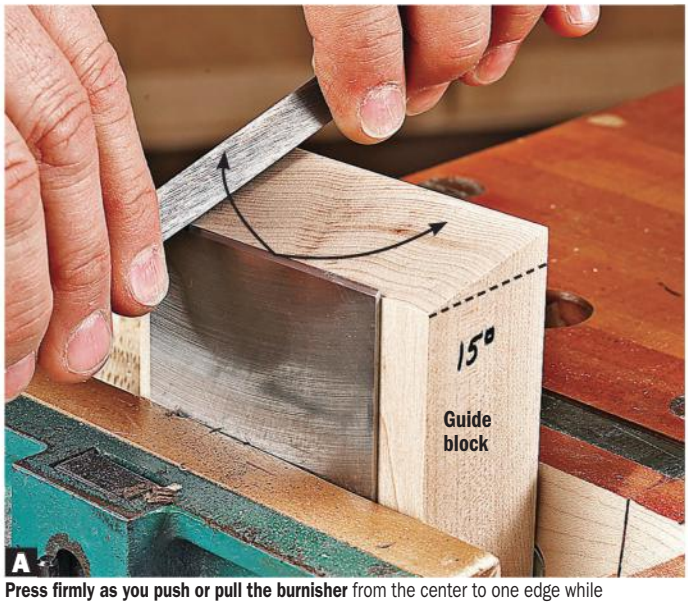


First, burnish the blade

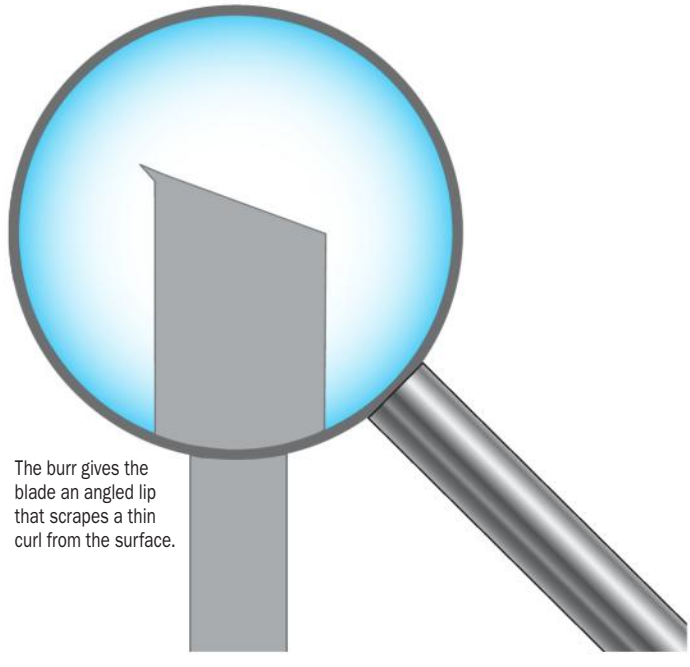
As with any bench plane, clean cuts depend on a sharp blade, so sharpen a scraping plane blade as you would a conventional blade. Slightly round the ends of the bevel to keep the blade from leaving marks with each pass.

Next, form a burr on the sharpened edge. To do this, make a guide block from a 2"-thick scrap about 6" long and ½" wider than the blade. Bevel-cut one end at 15° or the angle specified for your plane. Clamp the guide block and blade in a vise with the blade about 1/64" proud of the block [**Photo A**]. With the block as your angle guide, use a burnisher [**Sources**] or the hardened shaft of a screwdriver or chisel to roll the burr [**Photo A**].

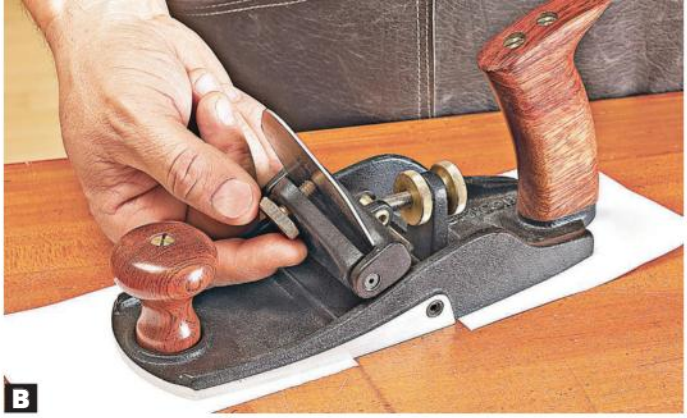
▶Find details on several sharpening methods. woodmagazine.com/sharpening



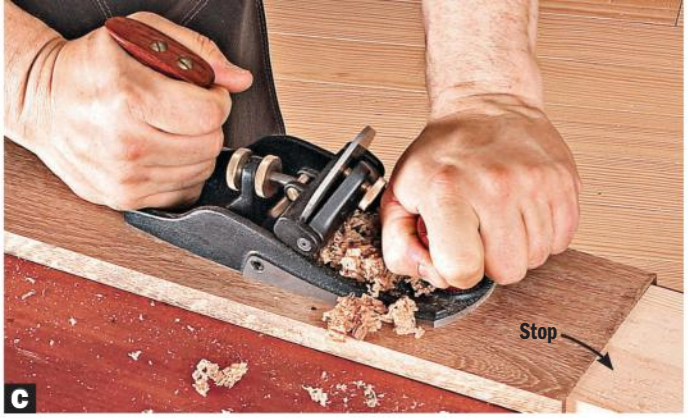
Press firmly as you push or pull the burnisher from the center to one edge while simultaneously sliding it diagonally. Then slide the burnisher from the center to the opposite edge. Repeat until you feel an even burr form as the edge rolls over.



The burr gives the blade an angled lip that scrapes a thin curl from the surface.



Place two pieces of typing paper about 2" apart on a flat wooden surface such as your workbench. Then rest the sole of the plane on the papers with the opening in the sole (called the "throat") between them.



Keep the worksurface clear by clamping a stop just thinner than the workpiece to your benchtop. Butt the workpiece against the scrap.

Install and adjust the blade

A properly burred and installed scraping blade should remove a paper-thin shaving. Open the lever cap knob and insert the blade with the burr facing forward (avoid dinging the burr against the plane body) and resting on the benchtop [**Photo B**]. Then adjust the frog angle until it's about 80° to the sole. Tighten the lever cap knob.

For a shallower cut, use just one piece of paper beneath half the plane sole. For the shallowest cut, place the sole directly on the benchtop and press down on the blade while tightening the lever cap knob.

Now test the setting on a piece of scrap, but don't be surprised if nothing happens. To peel off an even curl of wood, the frog must be adjusted to an angle where the burr snags the wood.

The blade changes depth as you change the frog angle, so loosen the lever cap knob just enough to free the blade. Then back away the two frog adjustment wheels by about ⅛". After you secure the frog, retighten the lever cap knob. Repeat this process until the blade bites into the wood and shaves thin curls from your scrap (see *below*).

Using a scraping plane

Scraping planes work slowly by taking thin curls, so start with a surface flattened with a power planer or hand plane. As when using a smoothing plane, grip the scraping plane by the front knob and rear handle [**Photo C**].

Working in the direction of the grain, hold the plane with the blade off the worksurface and the toe firmly pressed against it. Push against the rear handle hard enough to begin cutting and build momentum to complete the stroke. For hard or difficult woods, such as quilted maple, start the cut while holding the plane at roughly a 25° angle to the grain for a shearing motion.

Equalize your hand pressure on the toe and heel by midcut. At the opposite end of the workpiece, shift pressure to the heel as the blade nears the edge. That reduces the chance of rounding over the worksurface.

Take the next stroke so it slightly overlaps the previous one. Test your work periodically by wiping the surface with mineral spirits to reveal any plane marks. If you notice any, reduce the depth of cut, round over the blade edges, or use the blade bow thumbscrew to eliminate the problem.

▶See a video demonstrating how to use a scraping plane. woodmagazine.com/scraperplane

Sources

Scraping planes. No. 85 Cabinet Maker's Scraper, $215. Lie-Nielsen Toolworks, 800-327-2520, lie-nielsen.com. Kunz No. 112 scraping plane, $130. Highland Hardware, 800-241-6748, highlandwoodworking.com. Veritas scraping plane (05P29.01), $179. Lee Valley Tools, 800-871-8158, leevalley.com

Triangular burnisher. Two Cherries triangular burnisher (520-5085), $28. Di Legno Workshop Supply, 412-331-1236, dlws.com.

Shavings tell how you're scraping by

Examine the wood and your plane shavings to diagnose problems. If the blade cuts too deeply, *left*, loosen the lever cap knob and reduce the blade depth. If a freshly sharpened blade still leaves just tiny curls and sawdust, *center*, adjust the pitch of the frog until the burr bites into the wood surface. If a worn blade goes from making curls to making sawdust, resharpen the blade and restore the burr. Aim for long, wide, and thin shavings, like the one shown *right*.

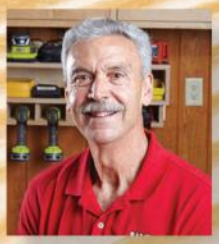
6 Essential Drill Bits

Good advice for boring jobs


Twist bit


Brad-point bit


Spade bit



by Jim Heavey

Woodworkers have come a long way since the days of the bit and brace. Though we may romanticize those times, limited bit options meant craftsmen often settled for holes that were "good enough." Today, we can choose from specialized bits, many of which create clean, tear-out-free holes, and others that drill specially shaped holes, something that eluded woodworkers of long ago. These bits fit most of the needs of today's woodworker.

▶Prevent overdrilling with these tips. woodmagazine.com/drillstop

continued on page 70

Tip! *The larger the bit, the slower the drill-press speed to prevent overheating the bit. Secure the workpiece against a fence or to the table with clamps.*

BRAD-POINT BITS. Guided by a centerpoint, these bits resist wandering. Sharp corners, or spurs [**Photo A**], cut cleanly across the grain, eliminating tear-out and producing a hole with clean side walls. The deep flutes clear chips quickly. You'll find these bits in diameters ranging from ⅛" to 1".

FORSTNER BITS. For drilling flat-bottomed holes, overlapping holes to create mortises, or partial holes that extend off the edge of a board, use a Forstner bit. Here again, a center spur ensures an accurate start. The sharpened rim produces clean edges, and angled cutters between the spur and rim plane away waste. Because of the large shavings they create, occasionally retract the bit from the hole while drilling to clear chips and reduce the chance of the bit binding or overheating. These bits may have a smooth rim or a saw-tooth rim [**Photo B**] and come in diameters from 3/16" to 4". Use bits larger than ⅜" in a drill press to control the rotational torque created by the large cutting surface.

Learn to sharpen Forstner bits. woodmagazine.com/sharpforstner

TAPER AND COUNTERSINKS. Ideal for drilling pilot holes for screws, they create a hole for the screw shank as well as a recess that allows the screwhead to sit flush with the wood surface, or be counterbored as needed. Adjust the collar around the bit up or down to match the screw length. Find bits sized to match #4–#12 screws.

SELF-CENTERING BITS. The spring-loaded nose, sized to fit the screw hole on a hinge leaf, retracts when drilling, centering the pilot hole. That ensures hinge screws seat fully in the countersink in the leaf, and hinges end up where intended. Bits sized for #4, #6, and #8 screws prove most useful.

TWIST BITS. Wander into any woodshop and you'll find common twist drill bits, the utility players of drilling. Available at hardware stores, this versatile bit has a 118° tip [**Photo C**] that drills into wood, plastic, and metal. Because the cut begins at the center of the tip and moves to the outside edge, wood fibers on the periphery of a hole suffer tear-out.

SPADE BITS. Though generally not used in furnituremaking, these bits make short work of drilling holes in construction-grade wood projects. Again, a centerpoint guides the bit, and outside spurs reduce tear-out on the edge of the hole. Find these in diameters from ¼" to 1½". Back up the material when drilling a through-hole to reduce blow-out as the bit exits the board.

Download a free drill-press speed chart. woodmagazine.com/dpspeed

So there's the drill. Add these bits to your workshop to open up a "hole" world full of boring possibilities.

A

The brad point starts the bit on target, and the spurs cut clean edges, but they leave a ridge in the bottom of a counterbore (a hole that doesn't go through a workpiece).

B

Saw-tooth rims dissipate heat better than smooth rims, so larger-diameter bits typically use this design.

C

Twist bits typically tear out most across the grain. The bottom contour of a counterbore matches the bevel of the drill-bit tip.

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There's a simple, understated elegance to tapered legs. They appear light, yet have the strength to solidly support a table, sideboard, or desk. And for some projects and furniture styles, that's all you need. But a little extra pizazz can push a good project to stunning. Try these four ways to add sex appeal to your legs.

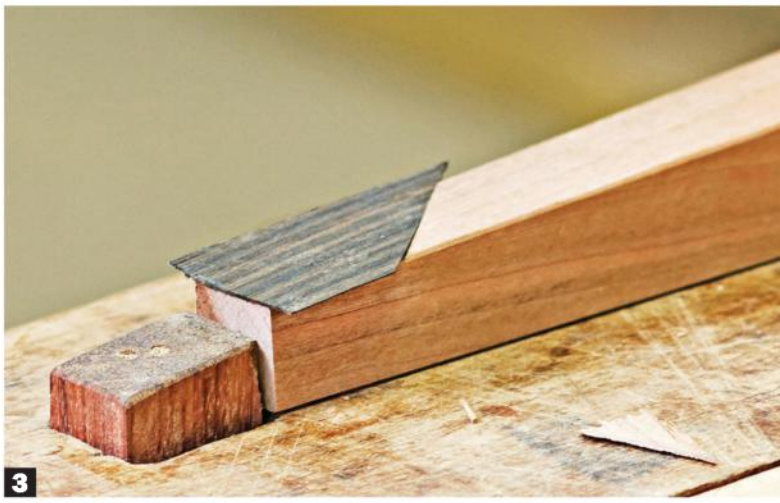
▶Download a free article on making and using a simple tablesaw tapering sled. woodmagazine.com/taper

Slip into some slippers

This technique calls for simply inlaying veneer around the feet on all four faces. Two pieces angle upward to form a pinnacle at the outermost corner of each leg. Two other pieces wrap the leg's inner faces to connect the lower corners of the outer pieces.

On an outer face of the leg, lay out and score the inlay's top edge with a sharp knife and a sliding T-bevel set to the angle of your choosing (45° shown here).

Chisel out a recess equal to or just less than the thickness of your veneer from the toe up to the scored line. Keep the recess at a consistent depth for best glue adhesion.



Cut a piece of veneer slightly wider and longer than the recess, and with an angled top that perfectly matches the recess.

Glue the veneer in place and speed up the glue set by holding a dry iron on it for 10–15 seconds. This evaporates moisture from the glue for a quick hold, letting you do all four sides in minutes.

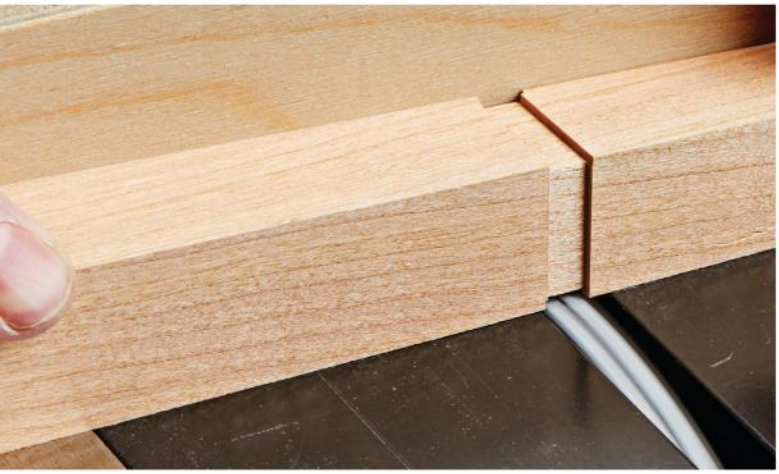
Trim the veneer flush with the leg once the glue dries, and then sand or scrape the top surface flush with the leg face. Repeat the process for the other faces.

Wrap your legs

Inlay banding adds instant attraction to a leg, especially when it's made of sharply contrasting woods. You can buy ready-made banding or use a strip of contrasting solid wood or veneer.

Sources: Inlay banding, $6.69–$32.99, Woodcraft Supply, 800-225-1153, woodcraft.com; $6.49–$21.99, Rockler Woodworking and Hardware, 800-279-4441, rockler.com.

Dado all four faces of the leg so that the inlay banding fits flush and snug. If the banding will be above the leg's taper, cut the dadoes before the tapers.



For inlay bands on tapered surfaces, cut the tapers first and plane or sand smooth; then cut the dadoes.

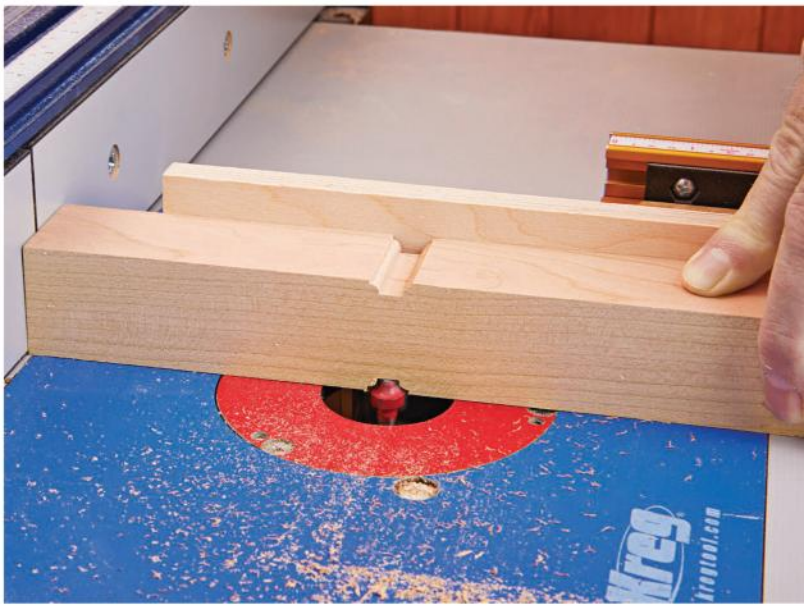
Apply the inlay banding starting on an outer face, and centering the banding's pattern. Glue it in place, allow to dry, then trim with a chisel or flush-cut saw, and sand flush. Repeat for the other faces, wrapping the banding so the pattern looks continuous.

Sculpt in shadowy appeal

A shapely recess, such as a profiled dado, adds eye-catching detail. Experiment on scrap stock with router bits without a bearing at the end until you find a pleasing profile, or purchase a bit with a profile you like.

Rout a dado with ⅛" shouldered beads by using an ovolo bit like this one. You could also use round-nose bits or straight bits—any profile you like.

Source: ⅛" radius ovolo router bit, no. 39-202, $21, Freud Tools, woodmagazine.com/ovolo.



Rout dadoes on each face with the profile bit of your choice. Install an auxiliary fence on your miter gauge to prevent tear-out, and hold the stock securely to it. Use the fence as a stop to ensure the dadoes line up precisely.

continued on page 76

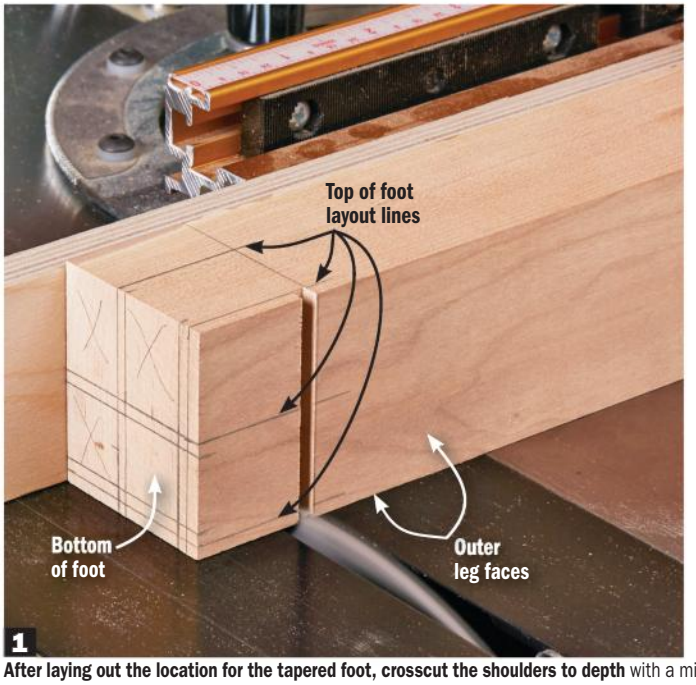
They're not high heels, but...

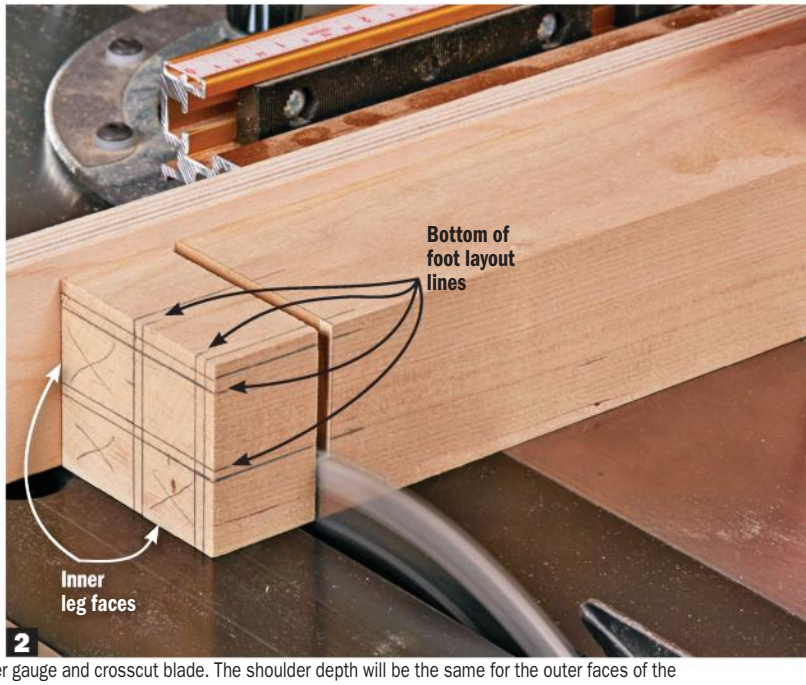
With furniture, brass cup feet add classy elegance. You can buy cup feet in various styles, shapes, and metal finishes to complement your project. We prefer to make a cup foot fit flush with the leg's faces rather than simply slipping it over the foot. This integrates it into the leg, rather than appearing to be an afterthought.

To do this, cut a shouldered foot to fit the cup (essentially a tapered tenon, as this cup foot is tapered). Cut the foot first on a leg blank a few inches longer than final length, and taper the legs after crosscutting to length. Why? Do the difficult parts first: If you mess up, simply cut off the mistake and try again.

Source: Brass cup feet, seven sizes in two finishes (antique brass and old brass), $6.80–$12.30 each, Lee Valley, 800-871-8158, leevalley.com.

Produced by **Bob Hunter** with **Terry Moore**





After laying out the location for the tapered foot, crosscut the shoulders to depth with a miter gauge and crosscut blade. The shoulder depth will be the same for the outer faces of the leg, but deeper for the inner faces to allow for the tapers, which you'll cut later.

Bandsaw the tapered foot to shape, staying just outside the layout lines. Repeat for all four sides of the foot.

Trim the foot until the cup fits snugly. Use a shoulder plane, rabbeting plane, sanding block, or a chisel wider than the foot.

Secure the cup foot with the included brad nail or screw on an inner leg face. If none was included, drill a hole for one and use a close-matching fastener. A friction fit might seem good enough at first, but could loosen with seasonal humidity changes.

Grind Away ANY Size Stump FAST!

LOWEST PRICE EVER!

The **DR® STUMP GRINDER** uses carbide-tipped cutting teeth (taking 360 "bites" per second) to reduce any stump to a pile of woodchips. Grinds stumps below ground level so they are gone forever!

DRstumpgrinder.com

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SIMPLER STRONGER FASTER

NEW Models
Now Starting at $499.99

...than any Hydraulic Log Splitter!

DR® RAPIDFIRE™ *FLYWHEEL* SPLITTER

SO SIMPLE it's practically maintenance free. There are no hydraulic pumps, valves, pistons, hoses or fluids to leak or replace—EVER.

SO STRONG its cast iron flywheel and hardened steel components show almost no wear after splitting hundreds of cords.

SO FAST it is the world's fastest splitter. Splits anything a hydraulic splitter will—but in one-sixth the time!

TRACTOR OWNERS:
NEW 3-Point Hitch Splitters!

DRlogsplitters.com

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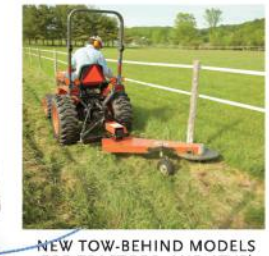
The DR® TRIMMER MOWER gives you 5X the power and NONE of the backstrain of hand-held trimmers!

NEW LOW PRICE!

TRIMS & MOWS thick grass and weeds without bogging down—the only trimmer guaranteed not to wrap!

ROLLS LIGHT AS A FEATHER on big, easy-rolling wheels!

THICKEST, LONGEST-LASTING cutting cord (up to 225 mil) takes seconds to change.



NEW TOW-BEHIND MODELS FOR TRACTORS, AND ATVS!

DRtrimmers.com

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All-New DR® CHIPPERS
Larger Capacity, Lower Prices!

2016 MODELS!
NOW Starting at just $699.99

CHIP BIG BRANCHES up to 5.75" thick!

SELF-FEEDING models available. No more force-feeding!

POWERFUL ENGINES spin big flywheels (up to 62 lbs.), generating massive chipping force!

MODELS THAT SHRED yard and garden waste as well as CHIP branches.

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PROFESSIONAL POWER DR DONE RIGHT

Fave Finishes

While building 40 or so projects a year for *WOOD*® magazine, design editors Kevin Boyle and John Olson spend a great deal of time in the finishing room. They build everything from small toys and keepsake boxes to large furniture pieces, and have different go-to finishes, depending on the project characteristics, such as the wear the piece might get, or the time they have to apply the finish. Here are four of their favorites.

Watco Danish Oil Finish

It doesn't get easier than this. Danish Oil, like most varnish/oil blends, can be all you need, especially for small- to medium-size projects. Simply brush or wipe it on, and the oil will both deepen the appearance of any figure and add a warm, amber tone. Wipe off the first coat after a few minutes, then after it dries, follow up with one or two more coats that you don't wipe off. When building coats, it's best to apply on horizontal surfaces to avoid runs.

Watco
quart $16
877-385-8155, watco.net

Bulls Eye SealCoat

Although this dewaxed shellac is marketed as sanding sealer, it makes a great base coat for almost any project. It's especially helpful in preventing blotchiness with some wood species, such as pine and cherry. Just brush or spray on a coat, sand smooth, and cover with a stain or dye for an even coating. Every topcoat finish sticks to it well, and it can be its own topcoat, but it will take 3–5 applications to build a good protective finish.

Zinsser
quart $15, gallon $40
877-385-8155
zinsser.com

▶Read more about finishing techniques. woodmagazine.com/finishing

Enduro-Var Water-Based Urethane

Water-based topcoats provide a key advantage over oil-based products: fast dry time. That's important for two reasons. First, the faster it dries, the fewer airborne dust particles will settle on the wet finish. And second, you can apply two or three coats in a day. Enduro-Var provides great protection for wear surfaces, such as tables, desks, and chairs. Plus, it adds a slight amber tone we like. It's best to spray Enduro-Var because it dries quickly, but if you must apply it by hand, use a foam brush to prevent streaks.

General Finishes
quart $35, gallon $100
800-783-6050
generalfinishes.com

MagnaMax High Performance Precatalyzed Lacquer

Here's another fast-drying topcoat that's best sprayed. MagnaMax creates a glassy-smooth finish that's very durable, perfect for furniture and cabinets. Two coats is often all you need. As with all precatalyzed lacquers, it must be used within a month or so before it becomes unuseable. So don't buy it unless you know you'll use it soon. MagnaMax can only be bought through paint stores and woodworking retailers; check the dealer locator on the company's website.

M.L. Campbell
gallon $45
800-364-1359
mlcampbell.com

continued on page 82

HARBOR FREIGHT

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CENTRAL MACHINERY — SUPER COUPON

2 HP INDUSTRIAL 5 MICRON DUST COLLECTOR

- 70 gallon capacity

ITEM 61790/97869 shown

Customer Rating ★★★★½

$169.99

SAVE $215

~~$199.99~~ Compare $384.99

21796750

LIMIT 4 - Coupon valid through 12/15/17*

CENTRAL MACHINERY — SUPER COUPON

UNIVERSAL TOOL STAND

- 500 lb. capacity

Customer Rating ★★★★½

SAVE 57%

ITEM 69805

$29.99

~~$39.99~~ Compare $69.99

21806343

LIMIT 5 - Coupon valid through 12/15/17*

SUPER COUPON

FREE

WITH ANY PURCHASE

1" x 25 FT. TAPE MEASURE

PITTSBURGH

ITEM 69030/69031 shown

$6.99 VALUE

21794504

LIMIT 1 - Cannot be used with other discount, coupon or prior purchase. Coupon good at our stores, HarborFreight.com or by calling 800-423-2567. Offer good while supplies last. Shipping & Handling charges may apply if not picked up in-store. Non-transferable. Original coupon must be presented. Valid through 12/15/17. Limit one FREE GIFT coupon per customer per day.

SUPER COUPON

20% OFF

ANY SINGLE ITEM

21792839

Limit 1 - Coupon per customer per day. Save 20% on any 1 item purchased. *Cannot be used with other discount, coupon or any of the following items or brands: Inside Truck Club membership, Extended Service Plan, gift card, open box item, 3 day Parking Lot Sale item, compressor, floor jacks, saw mills, storage cabinets, chests or carts, trailers, trenchers, welders, Admiral, Bauer, Cobra, CoverPro, Daytona, Earthquake, Hercules, Jupiter, Lynx, Pevlan, Predator, StormCat, Tailgator, Viking, Vulcan, Zurich. Not valid on prior purchases. Non-transferable. Original coupon must be presented. Valid through 12/15/17.

Lifetime CARBIDE — SUPER COUPON

ALUMINUM OXIDE SANDING SPONGES - PACK OF 10

COARSE ITEM 46751 63918

MEDIUM ITEM 46752 63915

FINE ITEM 46753 63912

SAVE 16%

YOUR CHOICE $3.99

~~$4.99~~ Compare $4.80

Customer Rating ★★★★★

21822181

LIMIT 9 - Coupon valid through 12/15/17*

CENTRAL MACHINERY — SUPER COUPON

2.5 HP, 12" THICKNESS PLANER

SAVE $129

ITEM 95082

Customer Rating ★★★★½

$239.99

~~$299.99~~ Compare $369

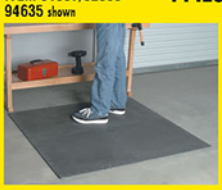
21830951

LIMIT 5 - Coupon valid through 12/15/17*

SUPER COUPON

4 PIECE ANTI-FATIGUE FOAM MAT SET

ITEM 61607/62389 94635 shown



SAVE 65%

$6.99

Customer Rating ★★★★★

- Each pad measures 25" x 25"

~~$8.99~~ Compare $19.98

21833971

LIMIT 7 - Coupon valid through 12/15/17*

CENTRAL MACHINERY — SUPER COUPON

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

SAVE $68

ITEM 34706

$219.99

Customer Rating ★★★½☆

~~$319.99~~ Compare $347.99

21838971

LIMIT 5 - Coupon valid through 12/15/17*

CENTRAL MACHINERY — SUPER COUPON

4" x 36" BELT/ 6" DISC SANDER

ITEM 62502/97181 shown

Customer Rating ★★★★½

$59.99

ITEM 62502 97181 shown

SAVE 35%

~~$79.99~~ Compare $92.59

21839078

LIMIT 4 - Coupon valid through 12/15/17*

PITTSBURGH — SUPER COUPON

24" CLAMP AND CUT EDGE GUIDE

Customer Rating ★★★★½

ITEM 66126

$7.99

SAVE 83%

~~$12.99~~ Compare $49.23

21841385

LIMIT 5 - Coupon valid through 12/15/17*

WINDSOR DESIGN — SUPER COUPON

NO. 33 BENCH PLANE

ITEM 97544

SAVE 82%

Customer Rating ★★★★½

$7.99

~~$9.49~~ Compare $45.78

21848649

LIMIT 8 - Coupon valid through 12/15/17*

PORTLAND — SUPER COUPON

14" ELECTRIC CHAIN SAW

Customer Rating ★★★★½

ITEM 61592/67255 shown

SAVE 38%

$39.99

~~$49.99~~ Compare $64.99

21849628

LIMIT 5 - Coupon valid through 12/15/17*

PITTSBURGH AUTOMOTIVE — SUPER COUPON

PNEUMATIC ADJUSTABLE ROLLER SEAT

- 300 lb. capacity

ITEM 46319 shown 61160/61896/63456

Customer Rating ★★★★½

SAVE 42%

$19.99

~~$25.99~~ Compare $34.99

21854554

LIMIT 5 - Coupon valid through 12/15/17*

BADLAND — SUPER COUPON

Battle Tested

12,000 LB. ELECTRIC WINCH WITH REMOTE CONTROL AND AUTOMATIC BRAKE

SAVE $410

ITEM 61256 61889/60813 shown

$289.99

Customer Rating ★★★★½

Voted Best Winches

- Weighs 83.5 lbs.
- 21-1/4" L x 10-1/8" H

~~$389.99~~ Compare $699.99

21561662

LIMIT 4 - Coupon valid through 12/15/17*

PREDATOR — SUPER COUPON

6.5 HP (212 CC) OHV HORIZONTAL SHAFT GAS ENGINE

SAVE $230

ITEM 60363/69730

ITEM 69727 shown CALIFORNIA ONLY

$99.99

Customer Rating ★★★★★

~~$119.99~~ Compare $329.99

21862274

LIMIT 3 - Coupon valid through 12/15/17*

WINDSOR DESIGN — SUPER COUPON

11 PIECE WOOD CARVING SET

$5.99

ITEM 60655/62673 shown

SAVE 71%

~~$20.99~~ Compare $21

21867938

LIMIT 5 - Coupon valid through 12/15/17*

HaulMaster — SUPER COUPON

72" x 80" MOVING BLANKET

Customer Rating ★★★★★

ITEM 69505 62418/66537 shown

SAVE 66%

$5.99

~~$17.99~~ Compare $17.97

21874286

LIMIT 8 - Coupon valid through 12/15/17*

CENTRAL MACHINERY — SUPER COUPON

10", 12 SPEED BENCHTOP DRILL PRESS

Customer Rating ★★★★½

ITEM 63471/60237 shown

$109.99

SAVE $67

~~$139.99~~ Compare $177.59

21878829

LIMIT 5 - Coupon valid through 12/15/17*

HaulMaster — SUPER COUPON

MOVER'S DOLLY

- 1000 lb. capacity

ITEM 93888 shown 61899/62399/63095/63096 63098/63097

SAVE 59%

$7.99

~~$19.99~~ Compare $19.97

Customer Rating ★★★★★

21889790

LIMIT 7 - Coupon valid through 12/15/17*

FRANKLIN — SUPER COUPON

HEAVY DUTY PORTABLE SCAFFOLD

SAVE $70

Customer Rating ★★★★★

$179.99

NEW

~~$199.99~~ Compare $250

ITEM 63051/69055/63050 shown

21896358

LIMIT 5 - Coupon valid through 12/15/17*

CENTRALPNEUMATIC — SUPER COUPON

Customer Rating ★★★★★

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

ITEM 93897 shown
69265/62344

SAVE $170

$59.99

~~$89.99~~ Compare $229.99

21903116

LIMIT 5 - Coupon valid through 12/15/17*

PREDATOR — SUPER COUPON

Customer Rating ★★★★★

SUPER QUIET

7000 RUNNING WATTS 13 HP (420 CC) GAS GENERATOR

ITEM 68530/63086/69671/63085 shown

Wheel kit and battery sold separately.

ITEM 68525/63087/63088 CALIFORNIA ONLY

SAVE $2170

$529.99

- 76 dB Noise Level

~~$699.99~~ Compare $2700

21905657

LIMIT 4 - Coupon valid through 12/15/17*

HaulMaster — SUPER COUPON

Customer Rating ★★★★★

STEP STOOL/ WORKING PLATFORM

SAVE 65%

- 350 lb. capacity

$19.99

~~$29.99~~ Compare $57.55

ITEM 62515/66911 shown

21906051

LIMIT 5 - Coupon valid through 12/15/17*

WINDSOR DESIGN — SUPER COUPON

Customer Rating ★★★★½

DOVETAIL JIG

ITEM 34102

SAVE 45%

$27.99

~~$34.99~~ Compare $51.72

21912325

LIMIT 5 - Coupon valid through 12/15/17*

Bauer — SUPER COUPON

SAVE $199

10 AMP DEEP CUT VARIABLE SPEED BAND SAW KIT

ITEM 63763/63444 shown

NEW

Customer Rating ★★★★★

$99.99

~~$139.99~~ Compare $299

21913481

LIMIT 5 - Coupon valid through 12/15/17*

KRAUSE&BECKER — SUPER COUPON

AIRLESS PAINT SPRAYER KIT

SAVE $124

Customer Rating ★★★★★

$174.99

~~$219.99~~ Compare $299

ITEM 62915/60600 shown

21929987

LIMIT 3 - Coupon valid through 12/15/17*

CENTRAL MACHINERY — SUPER COUPON

14" OSCILLATING SPINDLE SANDER

ITEM 95088
62146
69257 shown

SAVE $53

Customer Rating ★★★★½

$99.99

~~$139.99~~ Compare $152.99

21934928

LIMIT 5 - Coupon valid through 12/15/17*

SUPER COUPON

SOLAR ROPE LIGHT

Customer Rating ★★★★½

SAVE 66%

$9.99

- Great outdoor accent lighting
- Super bright light

ITEM 63941/62533/68353 shown

~~$13.99~~ Compare $29.97

21935992

LIMIT 8 - Coupon valid through 12/15/17*

HARDY — SUPER COUPON

POWDER-FREE NITRILE GLOVES PACK OF 100

SAVE 53%

- 5 mil thickness

Item 68498 shown

YOUR CHOICE $5.99

SIZE	ITEM
MED	68496/61363
LG	68497/61360
X-LG	68498/61359

~~$7.99~~ Compare $12.99

Customer Rating ★★★★★

21942537

LIMIT 8 - Coupon valid through 12/15/17*

CENTRALPNEUMATIC — SUPER COUPON

21 GALLON, 2.5 HP 125 PSI VERTICAL OIL-LUBE AIR COMPRESSOR

ITEM 69091/61454
61693/62803
63635/67847 shown

SAVE $49

Customer Rating ★★★½☆

$149.99

~~$179.99~~ Compare $199

21948608

LIMIT 5 - Coupon valid through 12/15/17*

PORTLAND — SUPER COUPON

9.5", 7 AMP ELECTRIC POLE SAW

Customer Rating ★★★★★

SAVE $34

$64.99

~~$84.99~~ Compare $99.98

ITEM 68862
63190/62896 shown

21948934

LIMIT 4 - Coupon valid through 12/15/17*

PORTLAND — SUPER COUPON

1750 PSI PRESSURE WASHER

Customer Rating ★★★★★

NEW

- 1.3 GPM
- Adjustable spray nozzle

SAVE $99

$79.99

~~$99.99~~ Compare $179.33

ITEM 63255/63254 shown

21959040

LIMIT 5 - Coupon valid through 12/15/17*

CENTRALPNEUMATIC — SUPER COUPON

3/8" DESICCANT DRYER WITH OIL REMOVAL FILTER

ITEM 69923

SAVE $75

$39.99

~~$59.99~~ Compare $115.50

21960226

LIMIT 5 - Coupon valid through 12/15/17*

PITTSBURGH — SUPER COUPON

4 PIECE WOOD CHISEL SET WITH CLEAR PVC HANDLE

Customer Rating ★★★★★

ITEM 42429/69471 shown

SAVE 83%

$4.99

~~$7.99~~ Compare $29.97

21968957

LIMIT 8 - Coupon valid through 12/15/17*

CENTRALPNEUMATIC — SUPER COUPON

WE CARRY A FULL LINE OF NAILS

23 GAUGE PIN AIR NAILER

ITEM 60241/60664/68022 shown

SAVE 66%

Customer Rating ★★★★★

$19.99

~~$24.99~~ Compare $59

21972966

LIMIT 5 - Coupon valid through 12/15/17*

U.S. GENERAL — SUPER COUPON

44", 8 DRAWER ROLLER TOP TOOL CHEST

- 11,700 cu. in. of storage
- 559 lb. capacity
- Weighs 172 lbs.

Customer Rating ★★★★★

SAVE $632

$229.99

ITEM 62500/68787 shown

Compare ~~$862.49~~ ~~$299.99~~

85852166

LIMIT 3 - Coupon valid through 12/15/17*

CHICAGO ELECTRIC WELDING — SUPER COUPON

ADJUSTABLE STEEL WELDING TABLE

ITEM 63069
61369 shown

Customer Rating ★★★★★

SAVE $80

$59.99

~~$74.99~~ Compare $139.99

21973743

LIMIT 3 - Coupon valid through 12/15/17*

PITTSBURGH AUTOMOTIVE — #1 SELLING JACKS IN AMERICA — SUPER COUPON

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

- Weighs 73 lbs.

Customer Rating ★★★★★

SAVE $69

$19.99

~~$94.99~~ Compare $149.98

ITEM 61282 shown
61253/62326

21977438

LIMIT 5 - Coupon valid through 12/15/17*

CHICAGO ELECTRIC POWER TOOLS — SUPER COUPON

HEAVY DUTY MOBILE MITER SAW STAND

Customer Rating ★★★★★

SAVE $29

$99.99

- 400 lb. capacity

~~$119.99~~ Compare $129

ITEM 63409/62750 shown

21989584

LIMIT 4 - Coupon valid through 12/15/17*

ADMIRAL — SUPER COUPON

12", 80 TOOTH FINISHING SAW BLADE

Customer Rating ★★★★★

ITEM 62725

SAVE 54%

$24.99

~~$29.99~~ Compare $54.97

21995603

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Bore perfect dog holes with ease

¾" dog hole bushing, no. 15J79.03, $8.40; ¾" brad-point drill bit, no. 07J02.48, $32.90

This bit-and-bushing set eliminates the biggest problems with drilling bench-dog holes in a workbench top: imperfectly sized or misaligned holes. Here's how it works. You make a simple jig (such as ours, at *left*). Using a drill press, bore a 1" hole in your jig. Tap the bushing into the hole. Then lay out the locations for the holes, and drill as shown. This setup produces precisely perpendicular holes without tear-out, thanks to the high-speed-steel brad-point bit. You might use this tool only once—unless you or a friend build another workbench—but it's well worth the investment.

—Tested by Bob Hunter, Tools Editor

Lee Valley
800-871-8158, leevalley.com

Big power gets smaller

18-volt subcompact drill/driver and impact driver combo kit, no. CX200RB, $230

I own Makita's full-size 18-volt drill and impact driver, and work them like crazy. But when it comes to building furniture and small projects, they're simply too big. That's why I love this subcompact combo kit: These tools have nearly all the power of the larger 18-volt tools, but at the size of 12-volt tools. What's more, the battery packs are fully compatible with all Makita 18-volt tools and chargers. The smaller size makes these tools easier to maneuver, resulting in less arm fatigue. The drill has a ½" chuck, brushless motor, and two speed ranges; the impact driver has a slow spin mode, for starting screws, that ramps up as they gain purchase.

—Tested by Kevin Boyle, Senior Design Editor

Makita Tools
800-462-5482, makitatools.com

continued on page 84

FIRST EVER SILVER KRUGERRAND
OFFICIAL GOVERNMENT RELEASE

FIRST YEAR ISSUE

Actual size is 38.725 mm

How Can a Silver Coin be Over 60 Times Rarer than a Gold Coin?

JUST RELEASED: The Silver Krugerrand

The South African Gold Krugerrand is the most famous gold coin in the world. That's because it was the very FIRST modern gold bullion coin—and is still the most widely traded gold coin on the planet. The Gold Krugerrand is the model for every other gold coin that followed it, including the American Eagle.

Now, to mark the 50th anniversary of the first Gold Krugerrand, you can help us celebrate *another* landmark FIRST...the first ever SILVER Krugerrand!

World's Most Famous Gold Coin Now Shines in Silver!

Krugerrands have never been struck in silver before—making this first-ever release a once-in-a-lifetime opportunity you won't want to miss! Issued by South Africa, the Silver Krugerrand is an official legal-tender coin, struck in a full ounce of 99.9% pure silver in stunning Premium Uncirculated collector condition. This stunning silver coin bears the classic original design: former South African President, Paul Kruger on one side, and the symbolic South African Springbok antelope on the other. In addition, each one-ounce silver coin features a special 50th anniversary mint mark.

Over 60 TIMES More Scarce

Over 60 million Gold Krugerrand have been issued in the past 50 years. But the first and only 2017 Premium Uncirculated Silver Krugerrand is strictly limited to only one million for the entire world. This means you can buy a Gold Krugerrand that numbers over 60 million (*and spend up to $1300 each*) *OR* you can secure the first ever Silver Krugerrand for as low as $47.95!

Official Release

GovMint.com is the exclusive North American distributor for the 2017 Silver Krugerrand. Don't miss out on this once-in-a-lifetime opportunity!

2017 One-Ounce Silver Krugerrand

1-4 Coins -	$49.95 each
5-9 Coins -	$49.50 each
10-19 Coins -	$49.00 each
20-49 Coins -	$47.95 each
50+ Coins -	Call for pricing

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Take the plunge with a trimmer

1-hp trim router with fixed and plunge bases, no. 9060, $95; plunge base only, no. 9064, $39.95

MLCS launched the Rocky 30 trim router a few years ago, outfitted with a fixed base. Now you can buy a plunge base for the Rocky 30 that features 1½" of vertical travel and three turret depth stops. The base comes with an edge guide and dust-collection hood.

MLCS Router Bits & Woodworking Supplies
800-533-9298, mlcswoodworking.com

These ear plugs can be your jam

Music ear plugs, no. 425-0400, $25

Protect your hearing while also listening to your favorite tunes, without bulky muffs. These ear plugs have a noise-reduction rating of 25 decibels—ample protection for most shop noise—and a 3.5mm audio plug. Silicone and foam ear plugs are included.

PlugFones
800-872-2511,
eagleamerica.com

Small-parts crosscut sled

Small-parts tablesaw sled, no. 55916, $70

Guided by a single tablesaw miter slot, this sled provides zero-clearance crosscuts for workpieces too small for a miter gauge or larger sled. It comes with a miter-slot stop to limit forward travel in order to prevent exposure to the blade behind the sled. (Hold-down clamps, $5–$10 apiece, not included.)

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

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Not shown actual size.

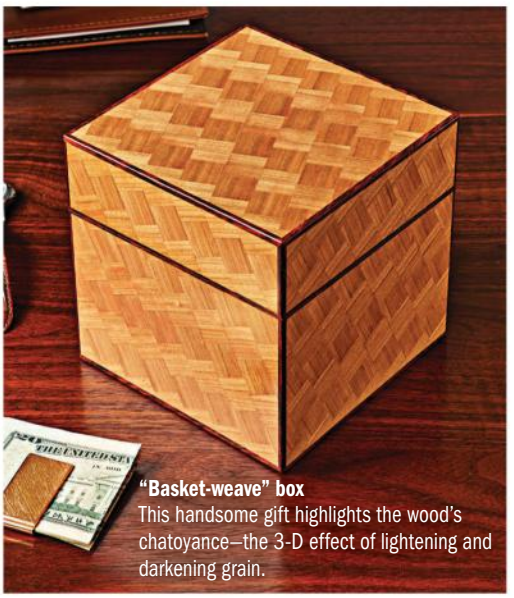
- 5 ¼" 420HC stainless steel blade • Full-tang design with gut hook
- Pakkawood handle with brass pins • Bonus heavy duty nylon sheath

What's Ahead

A GLIMPSE INSIDE THE NOVEMBER ISSUE (ON SALE OCTOBER 4)

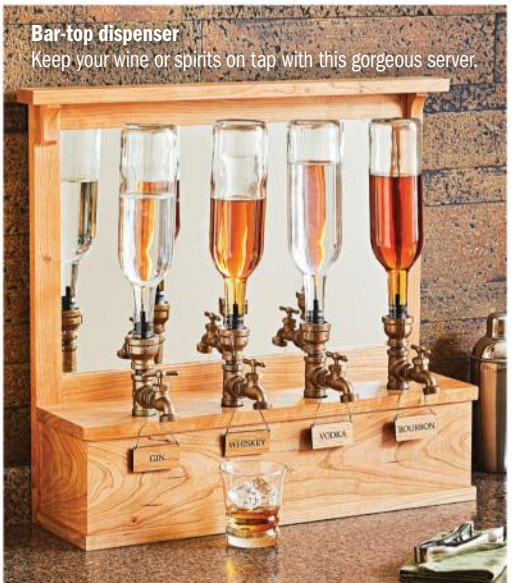
Lighted curio
Learn the secret for making perfectly matching rails and stiles when you build this glass-shelved beauty.

Attractive message center
Keep the kids on schedule with this magnetic dry-erase board.



"Basket-weave" box
This handsome gift highlights the wood's chatoyance—the 3-D effect of lightening and darkening grain.

Learn to turn hollow vessels
Turning expert Brian Simmons gives you a unique inside peek at the process of turning narrow-neck vessels.



Bar-top dispenser
Keep your wine or spirits on tap with this gorgeous server.

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