

ISSUE 241 SEPTEMBER 2016

Better Homes and Gardens®

WOOD

The World's Leading
Woodworking Resource

Assembly Table

p.56

▶ **Pine Bookcase** p.22

▶ **Krenov-style Cabinet** p.48

▶ **Nanny Rocker** p.32

▶ **Cupcake Tree** p.60

▶ **Plus 3 Free Shop Plans**

See page 45 for details

**Choosing a Tablesaw &
Bench for Idea Shop 6** p.44

**Shop-test:
Drill Presses** p.38





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- Rewired voltage: 110V
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- Number of knives: 3
- Cutterhead speed: 5000 RPM
- Cutterhead diameter: 2 1/2"
- Max. depth of cut: 1/8"
- Max. rabbeting depth: 1/2"
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- Fence size: 29 1/2" L x 4" H
- Approx. shipping weight: 252 lbs.



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- Amps: 20A at 110V, 10A at 220V
- Precision-ground cast iron table size: 17" x 17" x 1 1/2" thick
- Table tilt: 10° left, 45° right
- Floor-to-table height: 37 1/2"
- Cutting capacity/throat: 16 1/4"
- Blade size: 131 1/2" L (1 1/8"-1" W)
- Approx. shipping weight: 342 lbs.



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- MT#2 spindle & tailstock tapers • Spindle bore: 3/8"
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- Includes 6" faceplate, cup live center, and spur center
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- Min. board length: 6"
- Min. board thickness: 1/8"
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- Approx. shipping weight: 374 lbs.



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Retreat!

Because I was born and raised in the Catholic Church (including 12 years of parochial schools), I'm what some people call a "cradle Catholic." So this past spring, when I accepted an invitation to attend a weekend retreat at my church, I was surprised to find out how much I'd forgotten, or never fully understood, about my faith. The whole experience renewed and reinvigorated me, reaffirmed many of the good things I'd already been doing, and reminded me of some important things I should be doing.

It occurred to me that Weekend With WOOD, our three-day woodworking seminar that wrapped up just a few days ago, inspires the same kind of feeling. At the end of the weekend, many of our guests described to me how they'd been woodworking most of their lives and still learned a lot in every session. After taking Kevin Boyle's cabinetmaking class, a 30-year carcass-building veteran confessed he'd been "doing it wrong all these years." One long-timer offered a firm handshake, thanked me for the great event, paused, and said, "This weekend changed my life," as his eyes welled up. These cradle woodworkers left our shops feeling renewed, reinvigorated, reaffirmed, and reminded.

Thankfully, the analogy ends there. ("Bless me, Editor, for I have sinned. It's been 6 months since I last used my table-saw's blade guard...") But I have a feeling the effects of the weekend will linger long in the

minds of those who participated. I know they will for me.

A huge note of thanks to all of the WOOD and Meredith staff, many of whom are listed on the right side of this page, for helping put together this event. We'll take a few weeks now to get caught up on our magazine duties, and then begin planning the 2017 Weekend With WOOD. I invite you to treat yourself to a real woodworking retreat.

See you in the shop!



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IN THIS ISSUE OF **WOOD**[®]

SEPTEMBER 2016 • ISSUE 241

PLANS

- 22 Pine Bookcase**
Build this classic faux frame-and-panel home for your tomes in a weekend.
- 32 Nanny Rocker**
Rock-a-bye baby while you rest, read, or regroup. Super-simple joinery!
- 48 Krenov-inspired Cabinet**
Clean lines and prominent grain characterize his work and this piece.
- 56 Shop Project: Assembly Table**
You'll find this dead-flat, right-height helper invaluable for furnituremaking.
- 60 Cupcake Tree**
Turn this treat tree's center spindles on a mini lathe; rout the round platters.

TOOLS & TECHNIQUES

- 28 Amp Up Your Workbench**
It's the only tool in the shop that every project will touch; learn to maximize it.
- 38 Tool Test: Benchtop Drill Presses**
Looking for an affordable, yet capable, drill press? One of these will do.
- 44 Idea Shop 6: Get Jiggy with It**
Build three must-have woodworking jigs, and add a versatile workbench.
- 66 Join the Rotary (Tool) Club**
Properly tricked-out, a high-speed rotary tool works woodworking miracles.
- 70 Shop-vacuum Dust Collection**
Make the most of your vac with these tips, and top accessories.
- 78 Tools & Materials**
Shipshape shop aprons and more.

DEPARTMENTS

- 1 Taking Measure**
A real retreat reignites your passion.
- 4 Wood-Wide Web**
Alcohol. Tobacco. Firearms.
- 6 Sounding Board**
Your voice, your projects, your shop.
- 12 Ask WOOD**
The goop in the can of finish.
- 14 Shop Tips**
Multiport dust blast gates and more.
- 20 Unvarnished**
Teach woodworking to young 'uns.
- 88 What's Ahead**
A sneak peek at your next WOOD.





38



48



32



60

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Whitney loves woodworking

About a year ago, I started to do some basic woodworking and fell in love with it. Since then, I have been slowly piecing together a shop so that I can start building furniture. The other day, I saw WOOD® magazine on my in-laws' counter, started to read the Idea Shop 6 series, and found it perfect for me. Armed with your ideas, I'll be making furniture in no time! Now I just need a bigger garage... Thanks!

—Whitney Moulton
Hugo, Minn.

Can't stop talking about just shutting up

I loved Jim Heavey's article "Just Shut Up!" in issue 239 (May 2016). Last year, when I gave my granddaughter a hope chest I built for her high-school graduation, the first words out of my mouth were, "It isn't perfect." Her reply was priceless: "It's perfect enough for me, Papa!"

—Mark Nygard
Hazen, N.D.

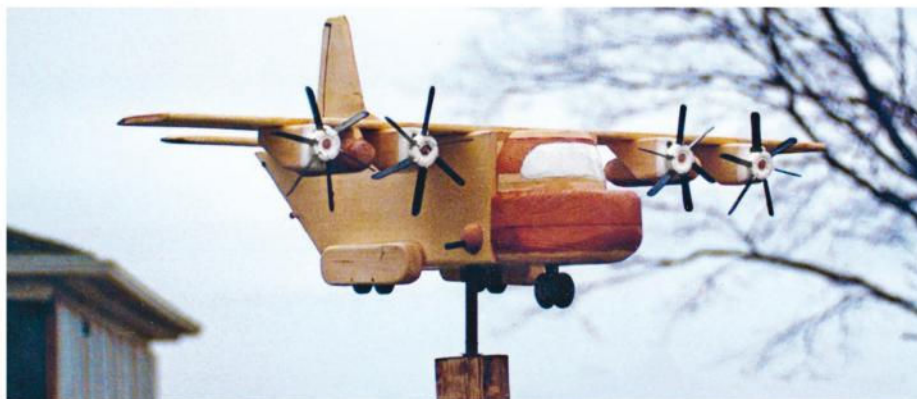
Having been a machinist for 27 years, where perfection was always the goal, I find it relaxing to work with wood, where everything doesn't have to be "perfect." We woodworkers should hold our heads up high, accept that not everyone can do what we do, and say, "You're welcome."

—JoLynn Baumann
Eaton, Ohio

First airborne (we've seen)

I really liked the AC-130 plans in issue 236 (November 2015), so I made one out of poplar to use as a wind vane, shown below. I modified the props so they counterrotate; the wings and stabilizer are airfoil-shaped and work well. Thanks for a good set of plans.

—Doug Shoop
Klemme, Iowa



Weight ratings demystified

My compliments on the excellent article about drawer slides ("Drawer Slides Demystified") in issue 239. It's important to know that ALL the screws that come with the slides need to be installed for the slide to handle the weight specified.

—Don Doss
Greenfield, Wis.

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Watch for the info about the 2017 event soon at weekendwithwood.com!

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YOUR PROJECTS



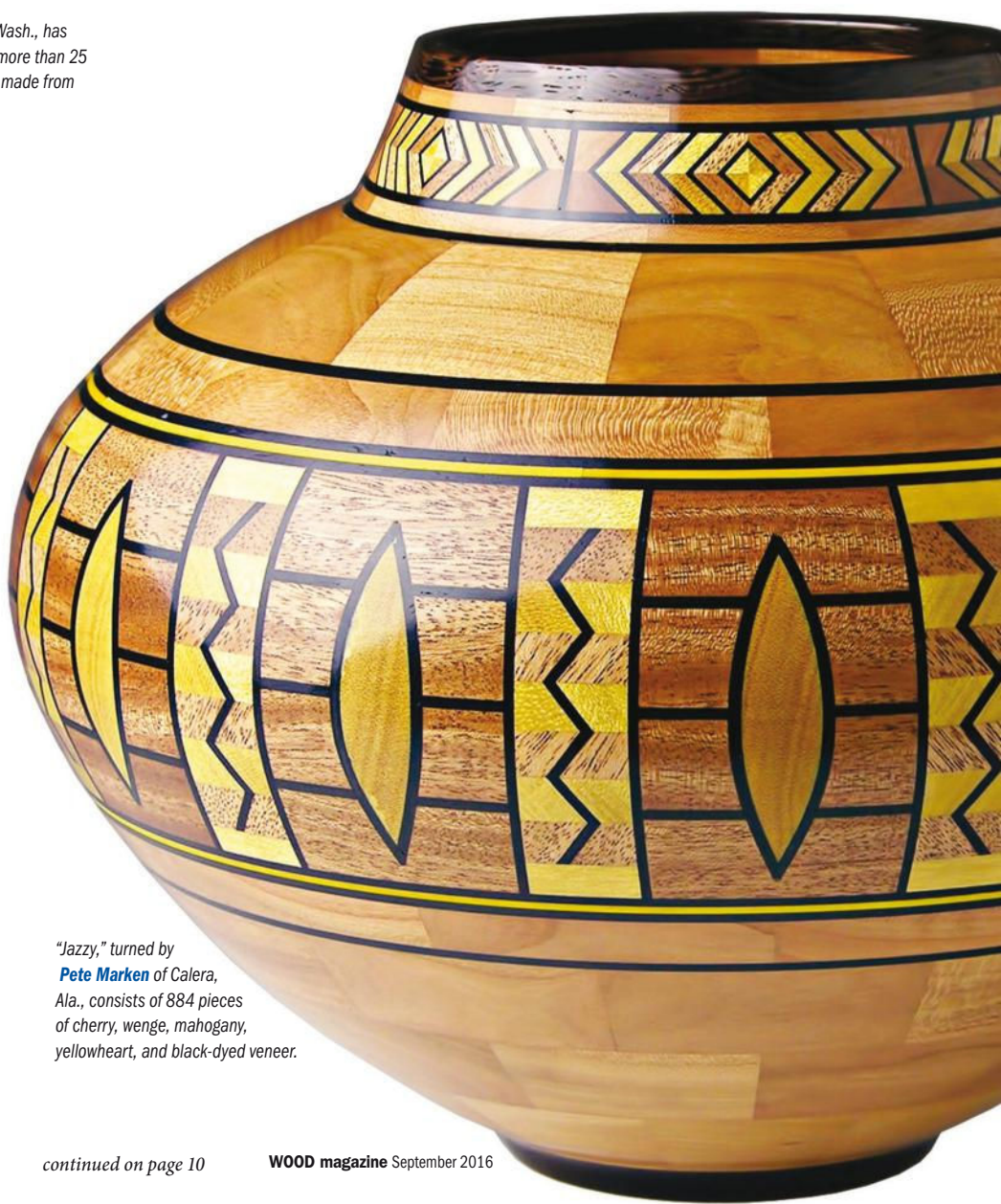
Michael Redmond, of Brinnon, Wash., has been making kaleidoscopes for more than 25 years, including this recent one, made from figured maple and black walnut.



Like a patchwork quilt that reflects a family's history, **Tony Burgess'** dining table includes 35 different species of wood—all left over from projects he's built over the past 25 years in his Broken Arrow, Okla., shop.



Inspired by one he saw in a movie, **Cliff Sundin** of Kenmore, Wash., designed and built this adjustable music stand for his band-director daughter.



"Jazzy," turned by **Pete Marken** of Calera, Ala., consists of 884 pieces of cherry, wenge, mahogany, yellowheart, and black-dyed veneer.

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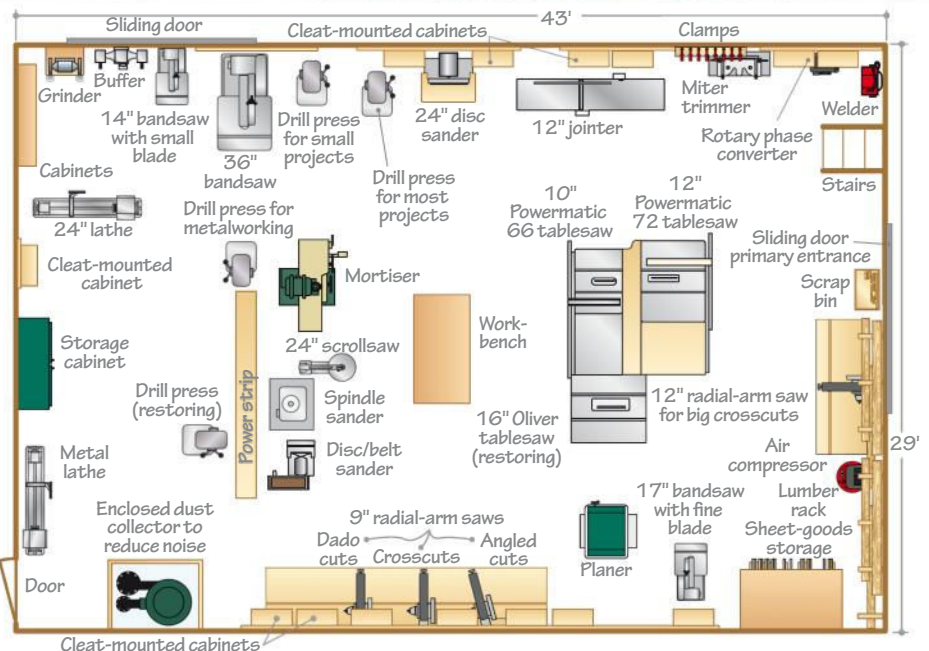


At a 6'7" x 6'5" tablesaw island, an 11"-wide leaf separates two Powermatic machines. Frank generally uses the model 66 (yellow cabinet) for crosscuts and the model 72 (behind the 66) for ripcuts.



As an architect, Frank Howarth knows how to design, and he put his skills to use in building his 1,247-square-foot shop. Originally a deteriorating indoor pool, Frank's shop occupies the pool's original hole in the yard, which helps minimize its overall height. The tallest walls soar 16' inside, but the floor rests 3' below the surrounding yard. The only downside is getting heavy equipment in and out of the shop. "When I moved in equipment," Frank says, "I rented a skid-steer loader, but a forklift would have been better."

While the exterior of Frank's shop may look mid-20th-century modern, you may feel like you're stepping back in time when you enter. Frank loves older woodworking equipment; for example, his 1948-era 36" bandsaw. Nevertheless, he's incorporated 21st-century touches. Plenty of natural light





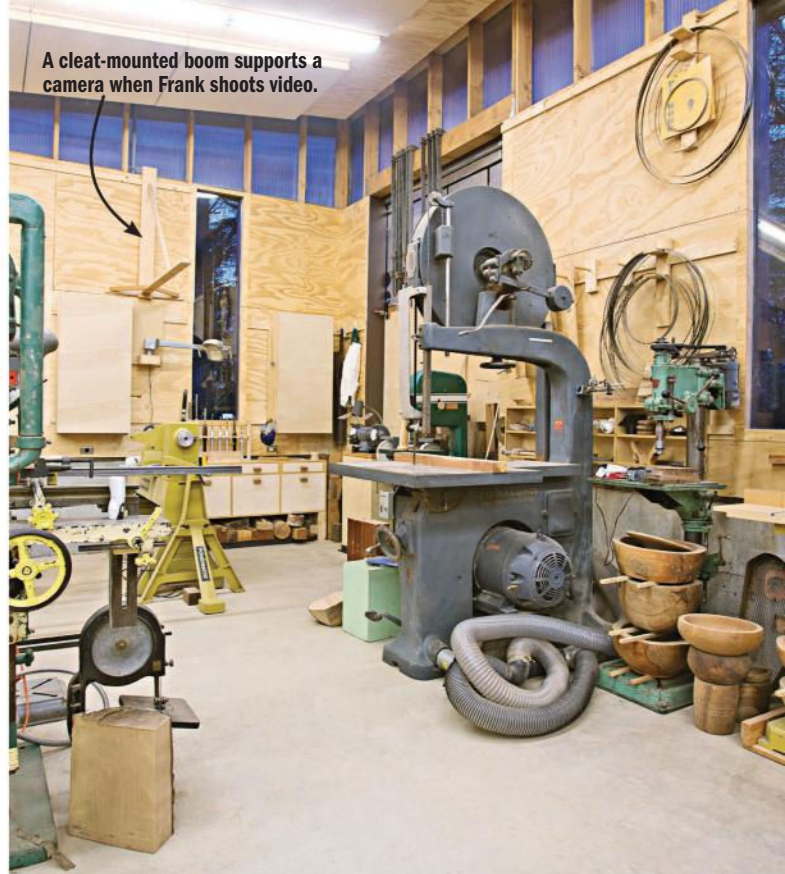
Frank likens his sloped-roof shop to a toolbox with a partially opened lid.

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floods the shop, and in-floor dust ducts keep everything tidy—a good thing, considering Frank, an accomplished videographer, shoots many videos of his projects and his shop (see youtube.com/urbantrash). To create a video-friendly environment, Frank built sound-deadening ceiling frames that reduce echoes so he can record audio right in the shop. “I stretched burlap over wood frames,” Frank says, “much the same way one makes a canvas for painting. Then I put batt insulation behind the burlap and hung the panels. It’s a quiet shop!” 🌲



A cleat-mounted boom supports a camera when Frank shoots video.

Plywood-covered walls make it easy to secure anywhere the cleats that support cabinets, shop-made pegs, and other fixtures.

11

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Q **Stirring film finishes keeps flatteners floating**
I got to the bottom of a can of satin finish and found a thick layer of sediment, which apparently means I neglected to stir it enough. Does it also mean the finish I applied will fail?
—Scott Finney, Montecito, Calif.

A Your finish will hold up just fine, Scott, but you might notice that it's glossier than you expected. The sediment in the can is a flattening agent (usually tiny particles of silica) that changes the way light reflects off the surface of the dried finish, resulting in the "satin" look. Without a flattening agent, most finishes dry to a glossy sheen.
All film-building finishes, including polyurethane and lacquer, include flattening agents, which dull the "shine." So stir these finishes thoroughly before and frequently during use to keep the silica particles in suspension. And if you want to rid your project of a too-glossy sheen, simply apply one more coat of satin finish from a new, properly stirred can. 🌲



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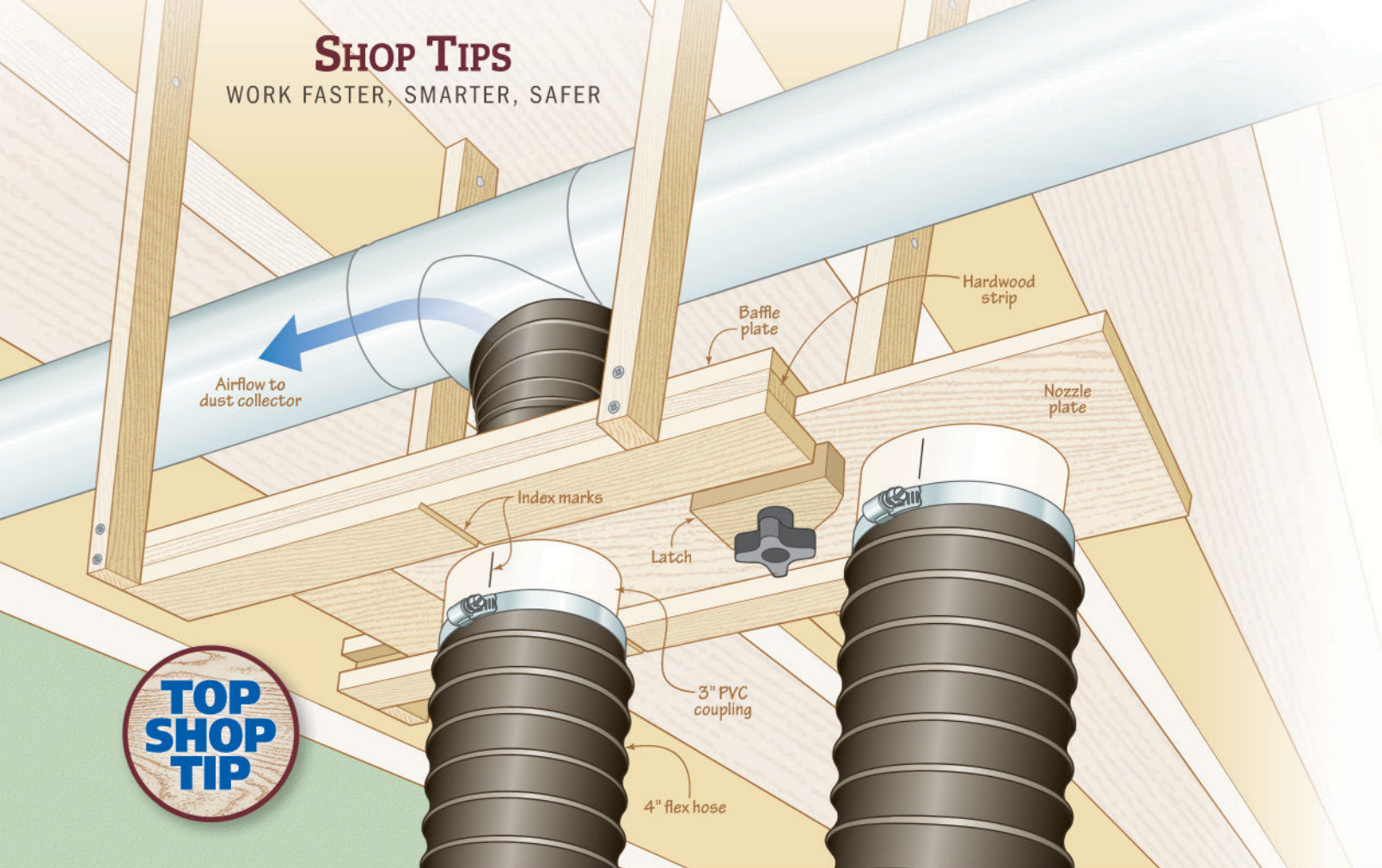


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SHOP TIPS

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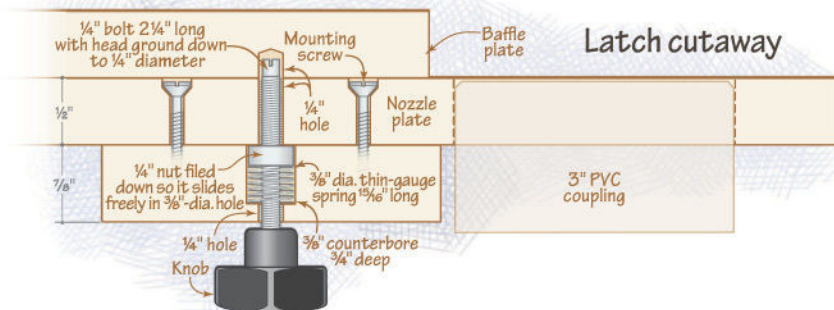
Because I work alone in my shop, and never need dust collection at more than one machine at a time, I developed a single blast gate that controls airflow to two machines. (My two-gate system is shown; I have a similar three-gate setup, too.)

It's made almost entirely of $\frac{1}{2}$ " plywood except for the slightly thicker hardwood strips that enable the nozzle plate to slide. Slide the plate to align either nozzle with the dust-collection hole in the baffle plate; the middle position blocks airflow altogether. Index marks show you when the holes, as

well as the blocked position, align so that you can release the latch, catching the tip of its bolt in a hole in the baffle plate. You'll

likely have to do some fine-tuning to the hole and nut diameters, as well as the spring strength, to ensure the latch works smoothly.

—Peter Huckstep, Albion, N.Y.



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



For sending this issue's **Top Shop Tip**, Peter receives a Ridgid 18-volt, Gen 5X cordless tool kit valued at \$500.

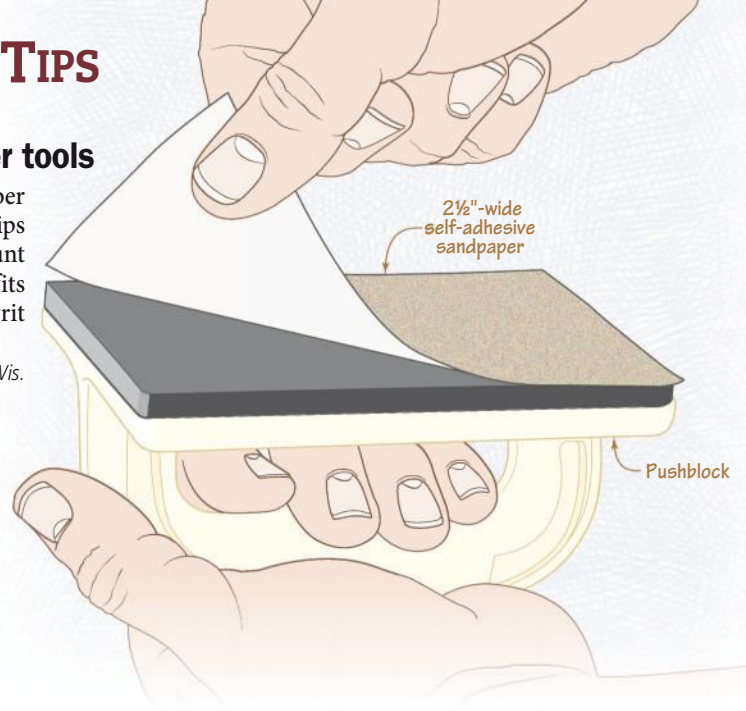


SHOP TIPS

Low-dough pushblocks make great hand-sander tools

Widely available plastic pushblocks, the kind with foam-rubber bottoms, serve as effective and affordable sanding blocks. Their grips nicely fit most hands, the soft bottoms provide the right amount of cushion for abrasives, and 2½"-wide self-adhesive sandpaper fits perfectly. I keep several blocks on hand, and mark each one with its grit for quick identification.

—Don Miller, Oshkosh, Wis.

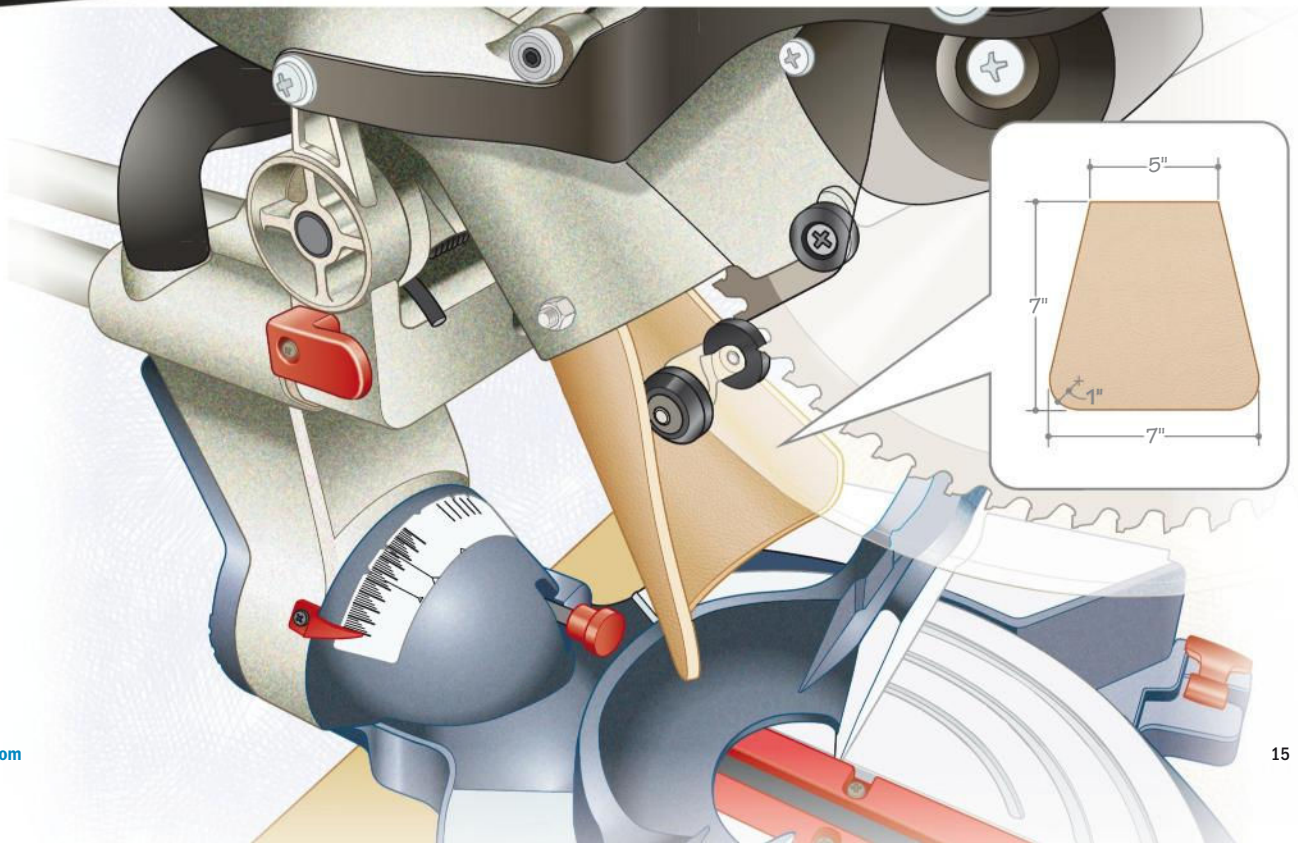


Simple add-on improves mitersaw dust collection

While using my new mitersaw, it quickly became apparent that the machine was only capturing half of the dust it created, even when connected to a shop vacuum. This simple fix greatly improved that collection efficiency.

I cut a ⅜"-thick scrap of rubber from a discarded insulating mat used by electrical linemen—any thick but supple rubber will do—to the shape shown to fit my mitersaw. (Your saw may require a slightly different size and shape.) Drill a hole on each side of the saw's dust chute and attach the new deflector with nuts, bolts, and washers. The pliable rubber bends harmlessly out of the way if it touches wood during the cut.

—Randy lamurri, Saginaw, Michigan



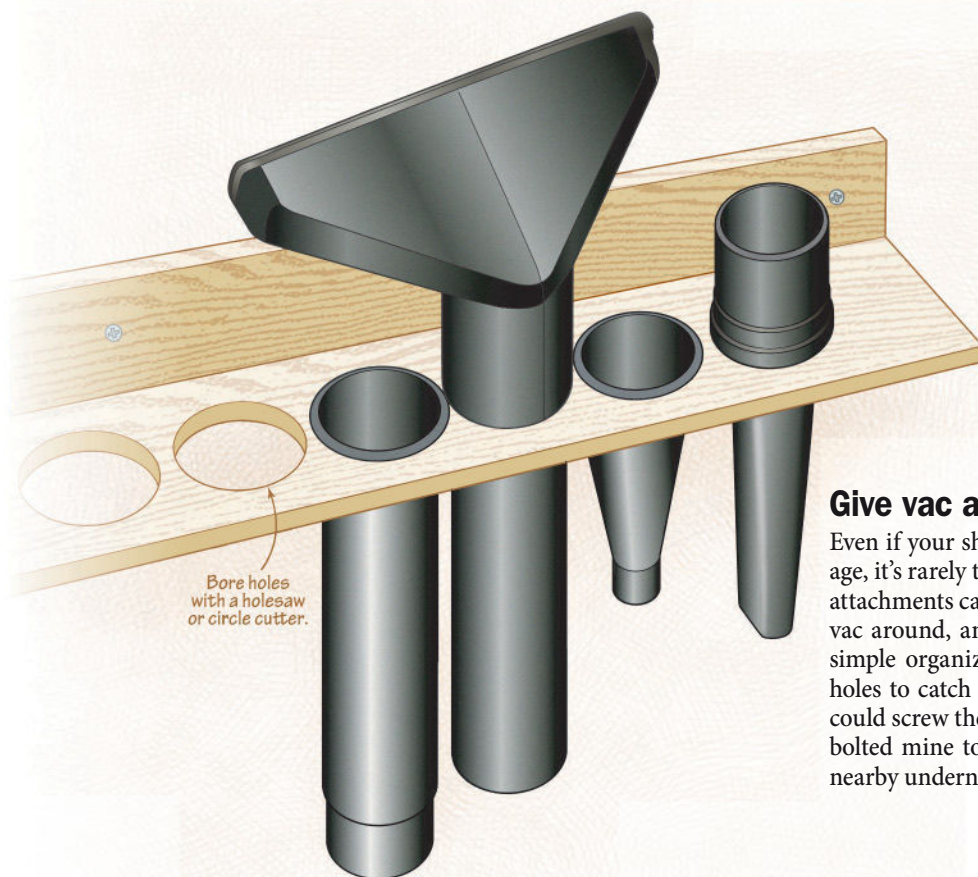
SHOP TIPS



Easy-on, easy-off, tall fence

Anytime you saw a workpiece on edge at your tablesaw or bandsaw, you'll appreciate the extra support you get from a fence at least twice as tall as the standard fence. I made this one from 2x4 scraps and 3/4" plywood, and use it for resawing. Best of all, it goes on and off in seconds, with no need for drilling or tapping the factory fence.

—Rob Cairns, Nevada City, Calif.



Give vac attachments their own home

Even if your shop vacuum has on-board attachment storage, it's rarely the best place to store those accessories. The attachments can fall off, snag on objects when you pull the vac around, and require bending over for retrieval. This simple organizer keeps them readily accessible. Size the holes to catch the molded bead on each attachment. You could screw the organizer to a wall or the end of a bench. I bolted mine to a tablesaw fence rail, with the vac stored nearby underneath the saw's extension table.

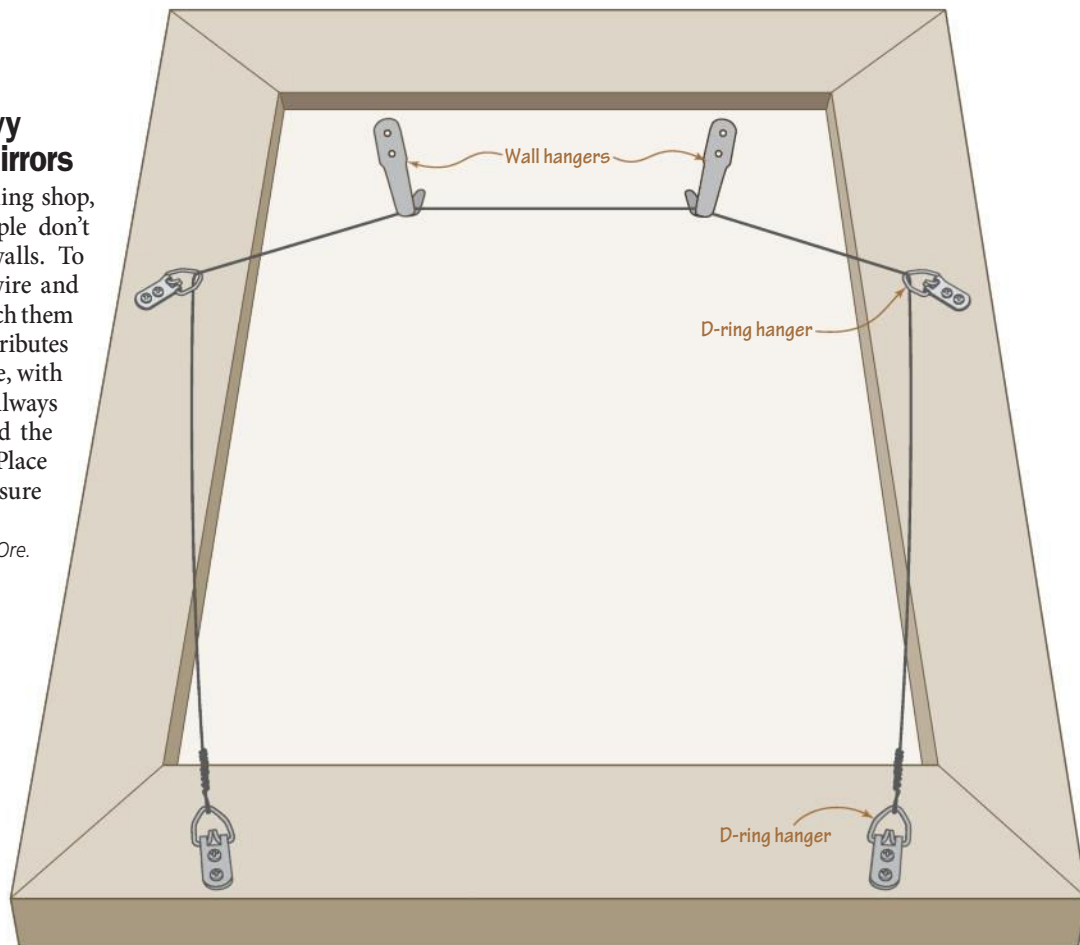
—Ed Winfrey, Sibley, Mo.

SHOP TIPS

A better way to hang heavy framed art, photos, and mirrors

Having owned and operated a framing shop, I've seen what happens when people don't properly hang heavy frames on walls. To avoid such calamities, always use wire and hangers rated for the load. Then, attach them in the arrangement shown. This distributes the weight to the bottom of the frame, with tension pulled only from the sides. Always angle the hangers on the frame and the wall to properly spread the weight. Place at least two hangers in the wall to ensure the frame stays level. 🌲

—Tony Rush, Springfield, Ore.



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17



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24kt Gold	#PKCP8000	\$14.95	\$13.95	\$12.95	\$11.95
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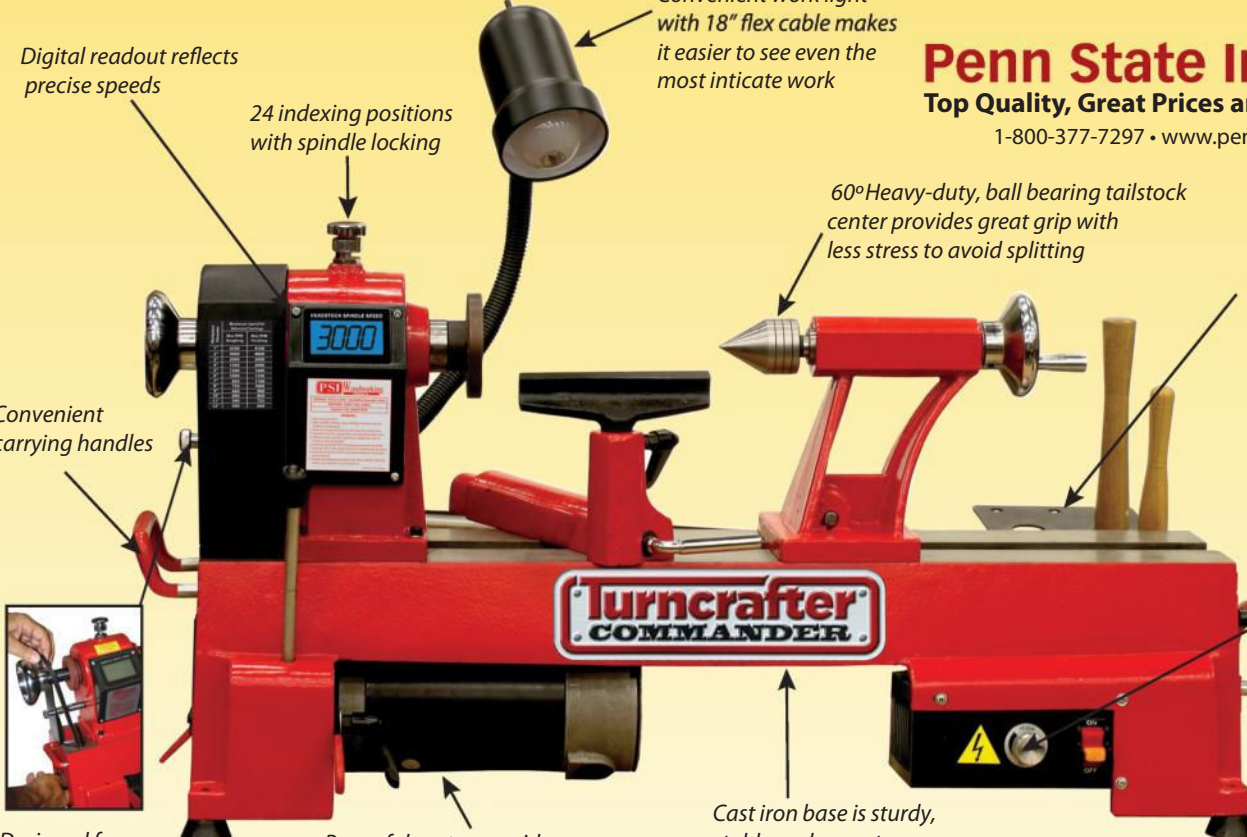


Antique Brass



Antique Pewter

	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



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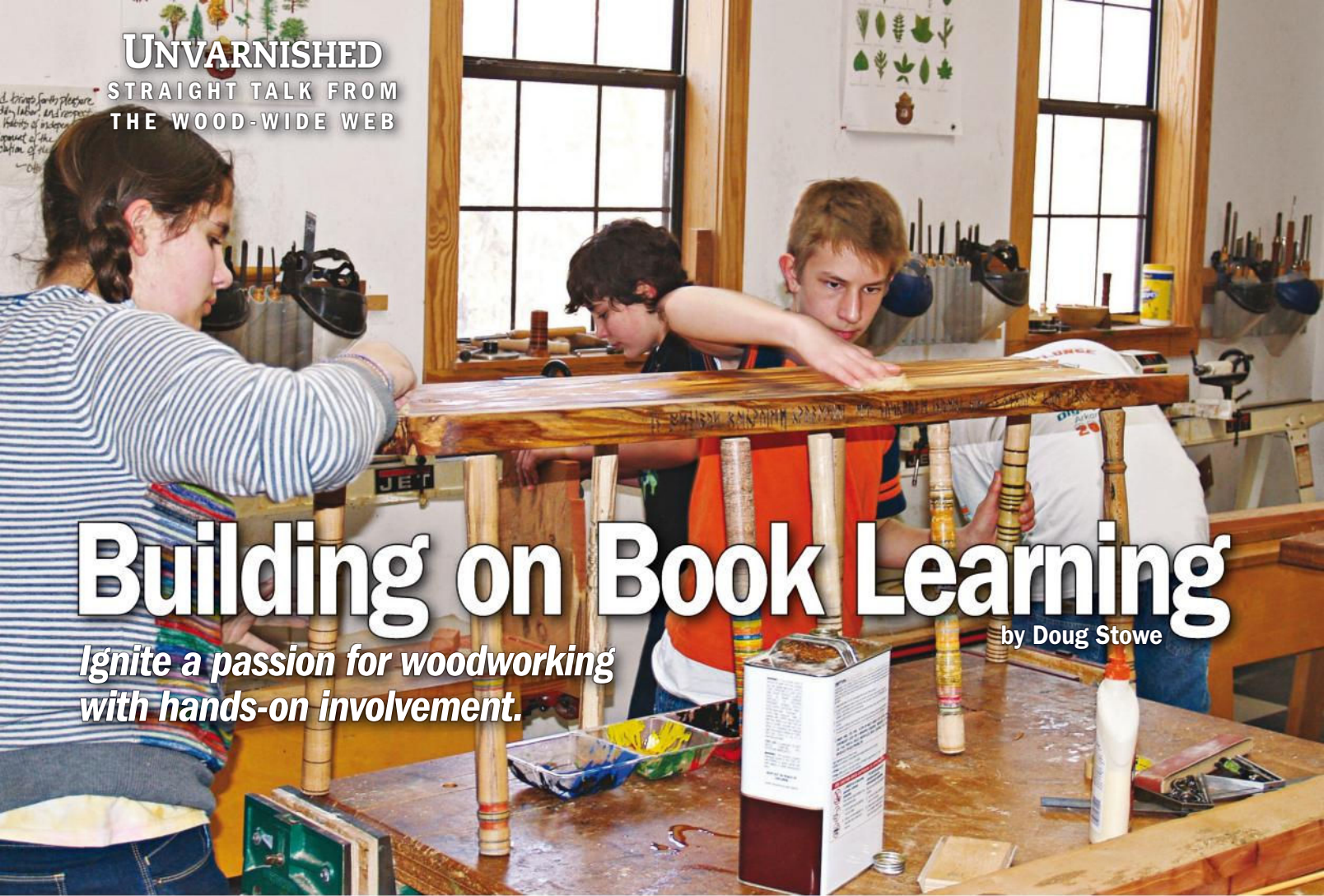
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UPS Shipping Cost	\$50	\$58	\$60	\$55	\$65	\$65
Item #	TCLC10VS	TCLC10VS-B	TCLC10VS-A	TCLC12VS	TCLC12VS-B	TCLC12VS-A
Lathe	✓	✓	✓	✓	✓	✓
Slimline Pen Kits		5 (24 kt Gold)	20 (Variety)		5 (24kt Gold)	20 (variety)
Slimline Pencil Kits		5 (24 kt Gold)	20 (Variety)		5 (24kt Gold)	20 (variety)
Pen Mandrel		✓	✓		✓	✓
Mandrel Wrench			✓			✓
3pc Carbon Steel Chisels		✓			✓	
Mini Pen Blank Mix		✓ (Makes 10 kits)	✓ (Makes 40 kits)		✓ (Makes 10 kits)	✓ (Makes 40 kits)
Mid Cure Epoxy Glue		✓	✓		✓	✓
7mm Barrel Trimmer		✓	✓		✓	✓
Tube Insertion Tool			✓			✓
Shellawax Creame		✓ (30ML)	✓ (250ML)		✓ (30ML)	✓ (250ML)
Pen Assembly Press			✓			✓
Pen Making DVD		✓	✓		✓	✓

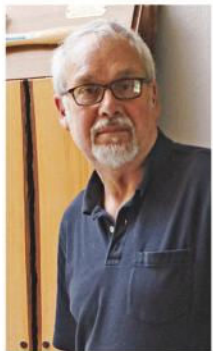


Building on Book Learning

by Doug Stowe

Ignite a passion for woodworking with hands-on involvement.

► Teacher and woodworker Doug Stowe writes about the need for hands-on learning. He's the author of eight woodworking books and a prolific blog, which you can follow at wisdomofhands.blogspot.com.



You've probably noticed that there are few school woodshops left. And while there's some buzz developing about the maker movement and maker shops, there is a great and growing need for both children and adults to slow down and engage deeply and skillfully in making beautiful and useful things.

My "Wisdom of the Hands" program at the Clear Spring School marks its 15th anniversary this year. In it, I have high-school students who started working with me in first grade, and if you don't think there's some real magic in that, think again.

For example, just the other day I was able to work quietly on my own project while one of my students, Rosie, turned wood on the lathe. I invite others who love woodworking to do just what I did—invite in a child. There is no better thing in the world than to share what you know and what you love with a younger generation.

As an active shop teacher, I was quoted by Matthew Crawford in his best-selling book, *Shop Class as Soulcraft*: "In schools we create artificial learning environments for our

children that they know to be contrived and undeserving of their full attention and engagement. Without the opportunity to learn through the hands, the world remains abstract, and distant, and the passions for learning will not be engaged."



When working with youngsters, don't rush. Provide guidance and encouragement without taking over the task.

There is no better thing in the world than to share what you know and love with a younger generation.

Although Crawford does not seem to agree that the engagement of the hands is an absolute necessity for all students, he notes that most of us, particularly in this digital age, would benefit greatly from becoming engaged as creators of the objects that have significance in our own lives. And he agrees with me that schools should play a much greater role in fostering tangible, personal creativity.

It used to be that schools offered all kinds of learning opportunities for children of every possible inclination. But of late, they've become so focused on standardized test scores and academic-style learning that, unless your children are lucky enough to learn in a school like mine, you'll need to take matters into your own hands. So invite your own child, grandson or granddaughter into your woodshop and learn firsthand—the experience will benefit the both of you. 🌲



Turning provides tangible results quickly, and allows for unbridled creativity, as a young woodworker sees the workpiece change shape under their tool.



Freeform building without plans allows a child's imagination to flourish and guide the process, providing a true start-to-finish accomplishment.

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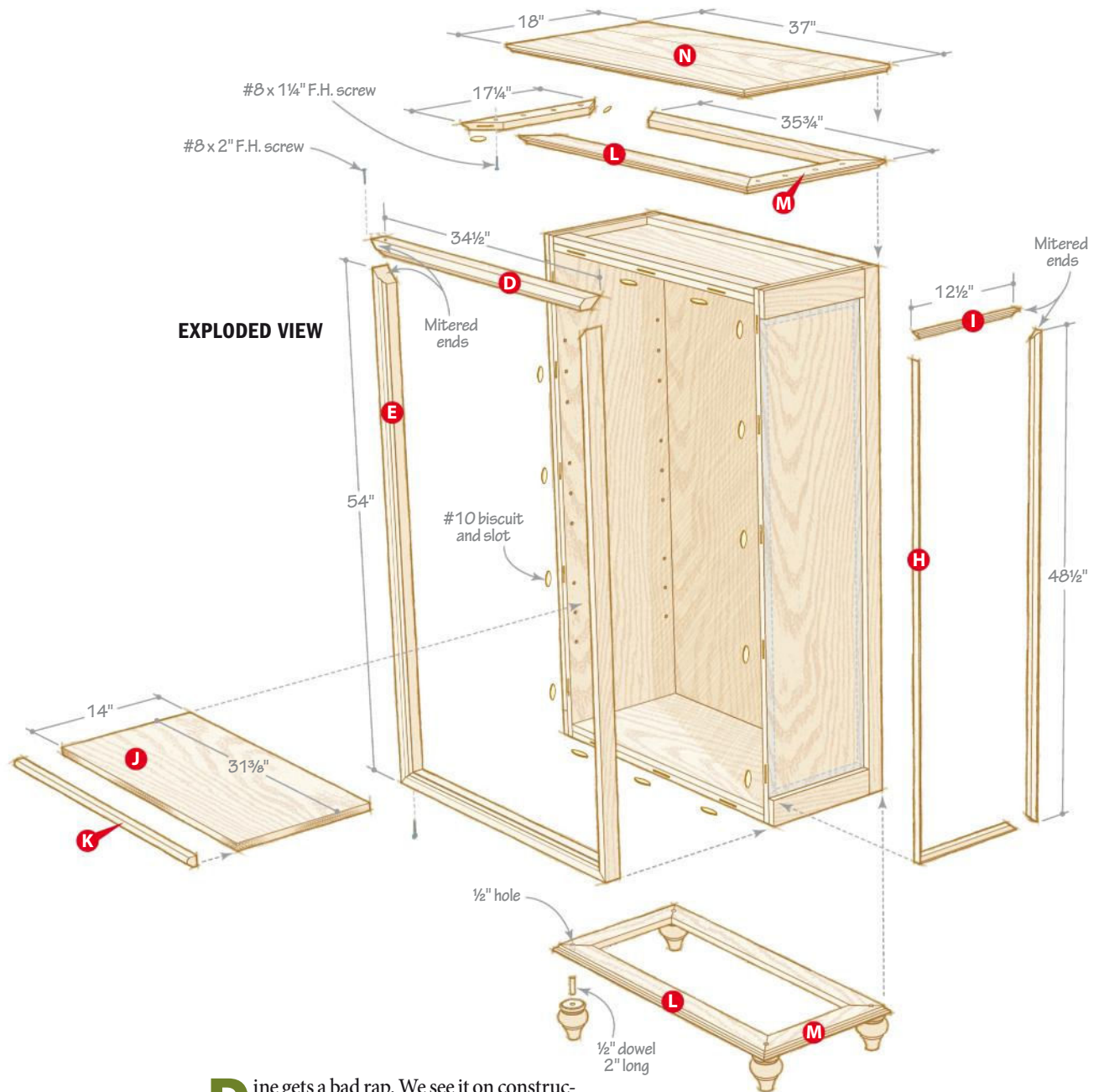
D I M E N S I O N S
59½" H x 18" D x 37" W

Approximate
materials cost:

\$275

Use
2
router bits to
make custom
edge profiles

Simple and Stylish Bookcase



Pine gets a bad rap. We see it on construction sites and piled up in stacks of twisted 2x4s at the home center. And sure, we might use it to build shop fixtures where aesthetics don't matter. But if you avoid the big-box store and track down finish-grade white pine (solid and plywood) for this bookcase, you'll find the results stunning.

Tip! To simplify sanding the bookcase, sand all parts to 220 grit prior to glue-up.

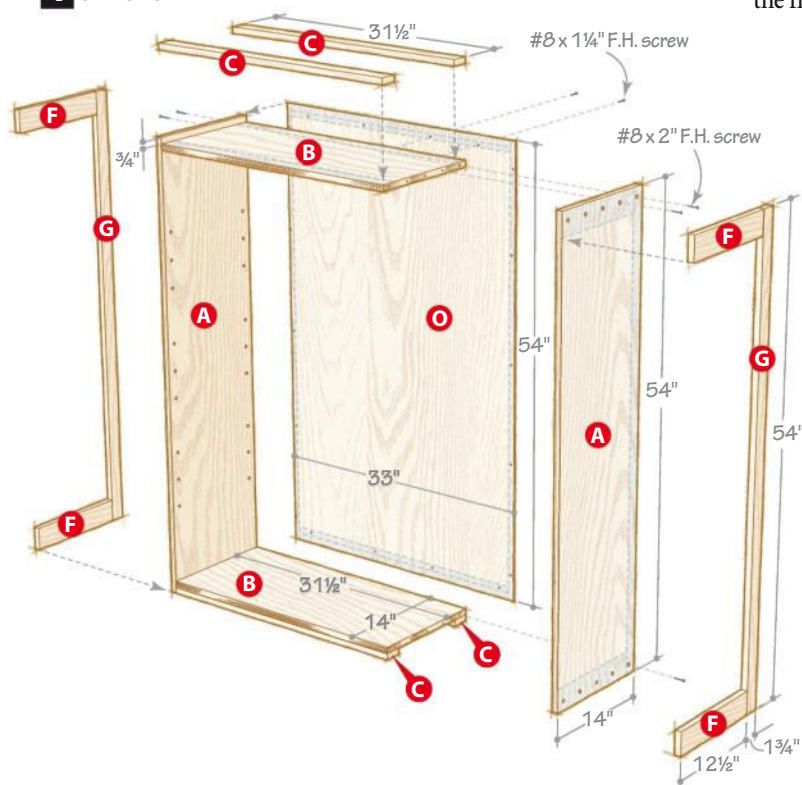
Start with the top and bottom

1 Cut to size all the parts made from 3/4"-thick grade-A pine plywood: the sides (A), case top/bottom (B), and the shelves (J) [Materials List, Cutting Diagram]. Cut the spacers (C) to size.

2 Glue the spacers (C) to the case top and bottom (B), flush to the edges [Drawing 1]. To make the front rails (D) and stiles (E) [Exploded View], laminate $\frac{3}{4}$ " pine boards, 4" longer than listed, face-to-face. After the glue dries, rip the pieces to finished width.

3 Use the case top/bottom assemblies (B/C) to scribe the front rail (D) miters to length [Photos A and B]. Attach the front rails to the case top/bottom assemblies [Photo C].

1 CARCASE

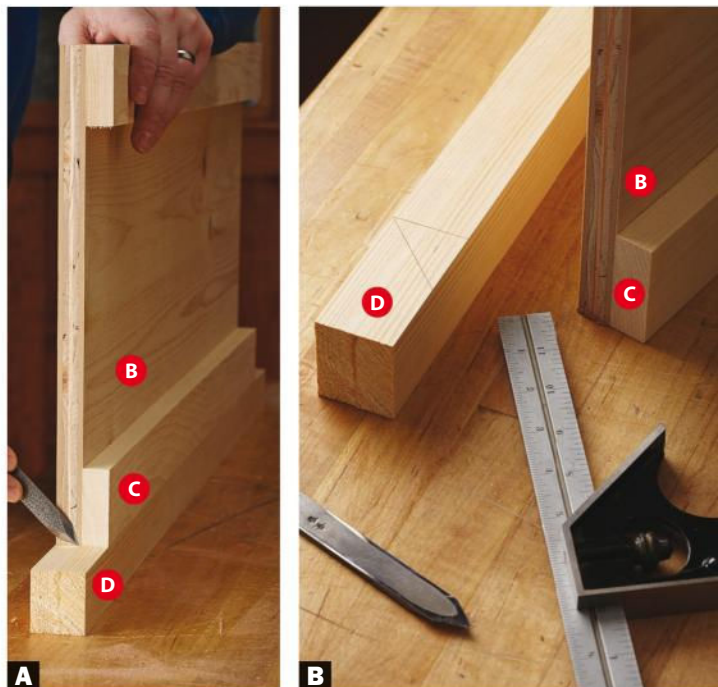


Build up the body

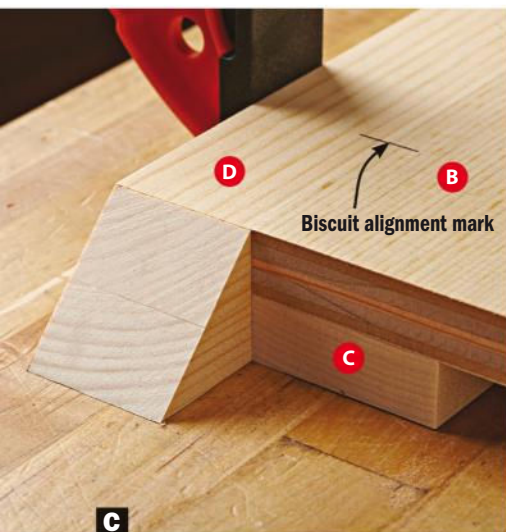
1 Clamp the top and bottom assemblies (B/C/D) between the sides (A). Check for square, then mark the locations of the front rail (D) miters on the edges of the sides. Next, miter-cut the front stiles (E) to length after marking directly from the case [Photo D].

2 Unclamp the case assembly and cut biscuit slots in the sides (A) and front stiles (E). Glue the stiles to the sides, aligning the ends of the stiles with the marked miters. After those assemblies dry, rout a decorative profile on the front molding (D, E) [Sources, Photo E].

Tip! Rout the same profile in a piece of scrap to help recreate this setup later.



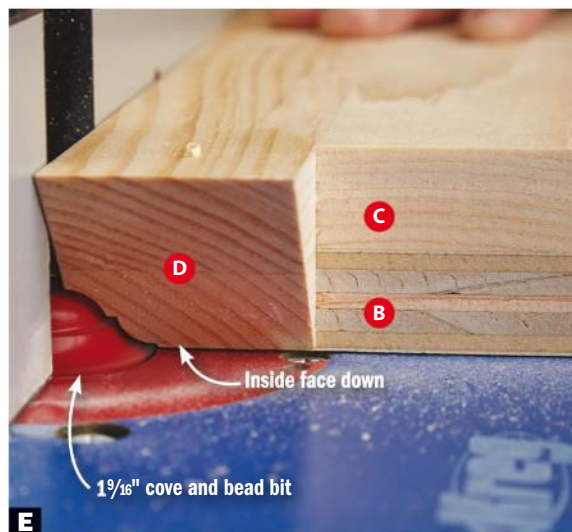
Don't just measure and mark. Use the case top/bottom assemblies (B/C) to mark the miters on the front rails (D) to ensure the rails will be the perfect length. Using a marking knife in place of a pencil further boosts precision.



C **Align with biscuits.** Glue the front rails (D) to the case top/bottom assemblies, using biscuits to aid alignment and give additional strength to the joint.



D **Check the fit of the front stiles (E).** When the miters fit tightly, mark the locations of biscuit slots in the sides (A) and stiles (E).



E **Rout a cove and bead.** With the bit bearing flush with the router-table fence, rout the profile on the inside edge of the front rails (D) and stiles (E).

3 Glue and clamp together the case assembly [Photo F]. Drive screws through the sides (A) and into the ends of the case top/bottom (B) [Drawing 1]. Drive a single screw through the front rails (D), into the stiles (E) to ensure the miters stay tight over time [Exploded View].

Fashion a faux frame and panel

1 Cut to size the trim (F, G). Glue and clamp the trim rails to the case assembly [Drawing 1]. After the glue dries, attach the trim stiles [Photo G].

2 Cut blanks at least 4" wide for the stile and rail molding (H, I). Rout an ogee profile in that stock [Photo H], then rip the molding to final width [Photo I].

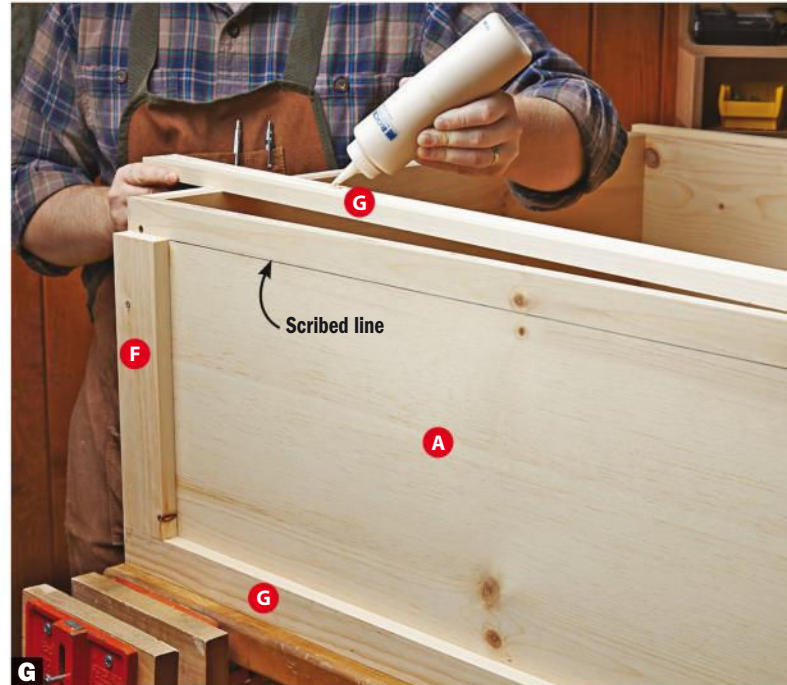
3 Miter-cut the molding (H, I) to length to fit between the trim rails and stiles (F, G). Glue the molding in place [Exploded View], then sand the rails, stiles, and molding flush.

Tip! Here again, rout the profile in a piece of scrap for use as a gauge later.

Tip! When cutting the molding (H, I) to length, sneak up on the final size, checking the fit on the bookcase between cuts.



F **Watch your corners.** When gluing up the case assembly, focus on tightly pulling together the mitered corners to prevent unsightly gaps.



G **Scribe a straight line** between the ends of the trim rails (F) to help align the stiles. They could bow under clamping pressure, so use this line as a guide to ensure they stay true during clamping.



H **With the bearing flush with the router-table fence,** rout a profile along both edges of the molding (H, I) blank. Doing so in a wider piece like this is safer, more efficient, and yields better cuts than machining a narrow piece.

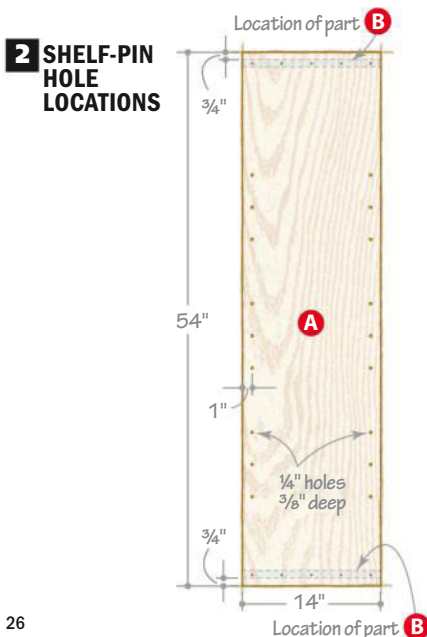


Make the shelves

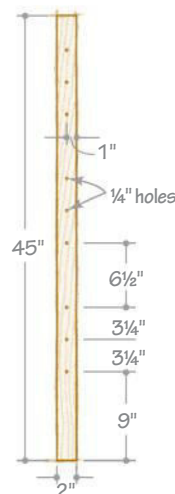
- 1 Build a shelf-pin drilling guide [Drawing 2a] and use it to drill the holes in the sides (A) [Drawing 2, Photo J].
- 2 Laminate stock for the shelf trim (K) and cut it to size. Glue the trim to the front edge of each shelf, flush with the shelf's ends and top face.
- 3 Mount the cove and bead bit in your router table and profile the front edge of the shelf assemblies (J/K) [Photos K and L]. Clean up the profile if necessary [Photo M].



J Be consistent with guide placement. To drill the columns of holes toward the back of the bookcase, clamp the guide flush with the bookcase's back edge. To drill the front columns of holes, clamp the guide where the front stile (E) meets the side (A).



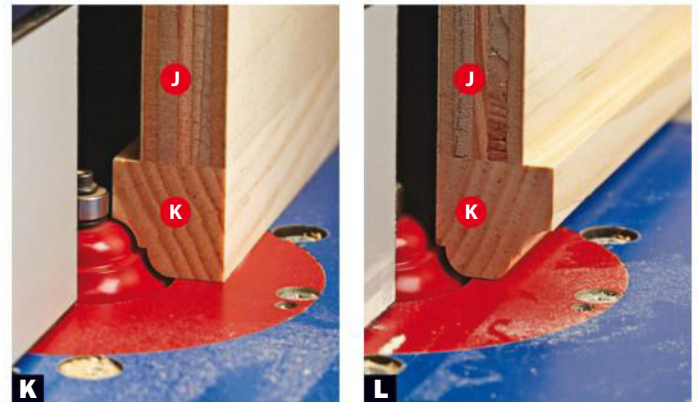
2a SHELF-PIN DRILLING GUIDE



Add the base and the top

- 1 Cut the molding frame pieces (L, M) to length, mitering their ends. Glue the frames together, using biscuits to aid alignment.
- 2 Use the ogee bit to rout a profile like the one in the side molding (H, I) around the outside of the molding frames (L/M).
- 3 Using 1/2 inch dowels and glue, attach the bun feet [Sources] to each corner of one molding frame (L/M) [Exploded View, Drawing 3]. After the glue dries, screw this molding frame to the case assembly.

Tip! To help you pull together a mitered frame like the base/top frames (L/M), use a band clamp.

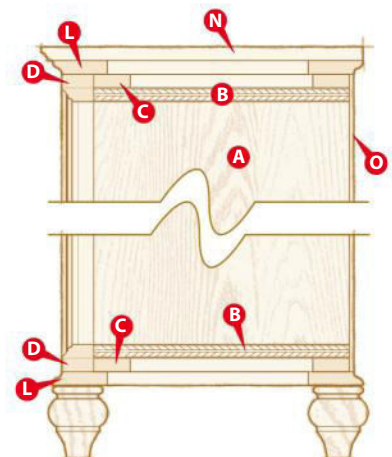


One profile, two cuts. First, shape the bottom edge of the shelf trim (K) to match the front rails and stiles (D, E). Then, move the router table fence forward so the bit's bell-shaped cutting edge no longer contacts the workpiece and rout the top edge.



M Round the outside. The bullnose profile formed where the two cuts meet will likely have flat spots. Round it over using a block plane, followed by light sanding.

3 TOP/BOTTOM



4 To attach the top frame, rout slots in the top frame's (L/M) bottom face [Photo N] using a screw slot bit [Sources].

5 Glue up and cut the top (N) to size. Using the cove and bead bit, rout the top's front and side edges to match the profile cut in the front rails and stiles (D, E). Screw the top to the top frame (L/M) [Exploded View]. Then, glue the top frame to the top of the bookcase [Drawing 3]. This allows the top (N) to float and hides the screwheads.

6 Cut the back (O) to size. Finish-sand any unsanded parts to 220 grit before applying a clear finish. Finally, screw the back in place and install the shelves. Now, you're ready to stack up some books. 🌲

► Get a perfect finish on pine.
woodmagazine.com/
finepine

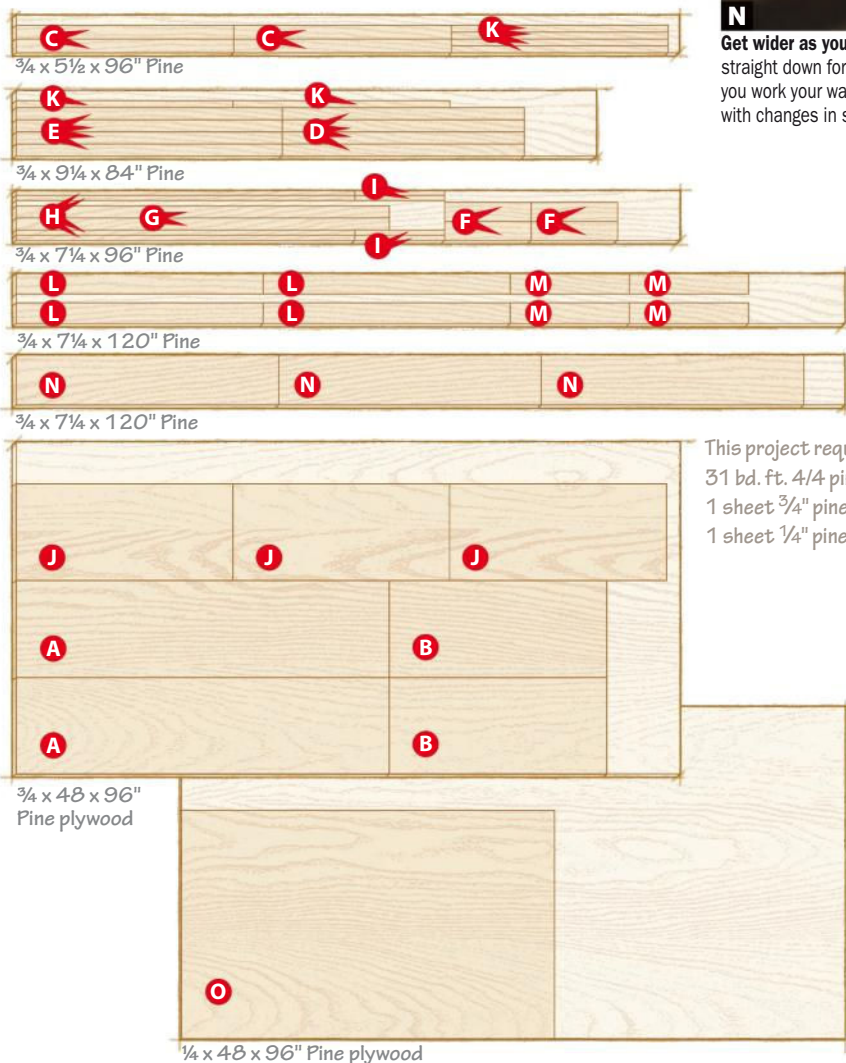
Produced by **Nate Granzow** with **John Olson**
Project design: **John Olson**
Illustrations: **Lorna Johnson**



N

Get wider as you go. When routing the screw slots in the top frame, begin by plunging straight down for the front hole. Expand the slot length $\frac{1}{8}$ " with each subsequent slot as you work your way toward the back edge. This allows the top (N) to expand and contract with changes in seasonal humidity.

Cutting Diagram



Materials List

Part	FINISHED SIZE			Matl.	Qty.
	T	W	L		
A sides	3/4"	14"	54"	Ply	2
B case top/bottom	3/4"	14"	31 1/2"	Ply	2
C spacers	3/4"	2"	31 1/2"	P	4
D* front rails	1 1/2"	13 3/4"	34 1/2"	LP	2
E* front stiles	1 1/2"	13 3/4"	54"	LP	2
F trim rails	3/4"	23 3/4"	12 1/2"	P	4
G trim stiles	3/4"	13 3/4"	54"	P	2
H* stile molding	3/4"	3/4"	48 1/2"	P	4
I* rail molding	3/4"	3/4"	12 1/2"	P	4
J shelves	3/4"	14"	31 3/8"	Ply	3
K* shelf trim	1"	1"	31 3/8"	LP	3
L molding frame front/back	3/4"	3"	35 3/4"	P	4
M molding frame ends	3/4"	3"	17 1/4"	P	4
N top	3/4"	18"	37"	P	1
O back	1/4"	33"	54"	Ply	1

*Parts initially cut oversize. See the instructions.

Materials key: Ply-pine plywood, P-pine, LP-laminated pine.
Supplies: #8 1 1/4" flathead screws; #8 2" flathead screws; 1/4" shelf pins (12); 1/2" dowel, 12" long; #10 biscuits.

Sources:

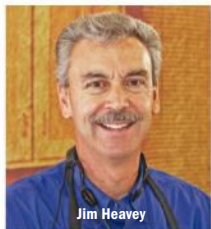
Freud 38-314 Quadra-Cut 1 1/8" cove and bead router bit, no. 828870, \$50; Freud 99-006 Quadra-Cut 1 1/2" ogee router bit, no. 828912, \$66, 800-225-1153, woodcraft.com.
English Country round bun foot, knotty pine, no. 4045, \$6.45 ea. (4), 800-849-8876, osbornewood.com.
Eagle America 7/16" solid-carbide screw slot bit, no. 143-0105, \$31, 800-872-2511, eagleamerica.com.

Amp up your Workbench

By Jim Heavey

Bench pucks

Bench-dog hole



Jim Heavey

Every shop has some form of a workbench, but have you maximized yours to its full potential? The addition of a few well-chosen accessories really helped boost my bench's usefulness.

I began with a workbench placed behind my cabinet saw to act as an outfeed table; its 30×60" size works well for that purpose. As a worksurface, though, that large expanse makes clamping and holding projects and odd stock a bit awkward [Photo A].



A

I bought the top. For my workbench's top, I used a 1¾"-thick glued-up maple tabletop (no. G9914, \$265, 800-523-4777, grizzly.com) that came without any holes. I mounted it to a wood frame and ran electricity to one end for powering benchtop tools.



Add a vise

Next, I added a simple vise to the workbench [Photo B]. Although the vise could clamp material between its jaws, I needed a way to hold pieces along the length of the bench, too, and bench dogs—removable posts that drop into holes aligned with the vise [Photo C]—are the perfect solution. The vise had a pop-up dog, but my bench didn't have dog holes to work with it, so I set out to change that using the two following methods.

► Check out this buyer's guide to bench vises.

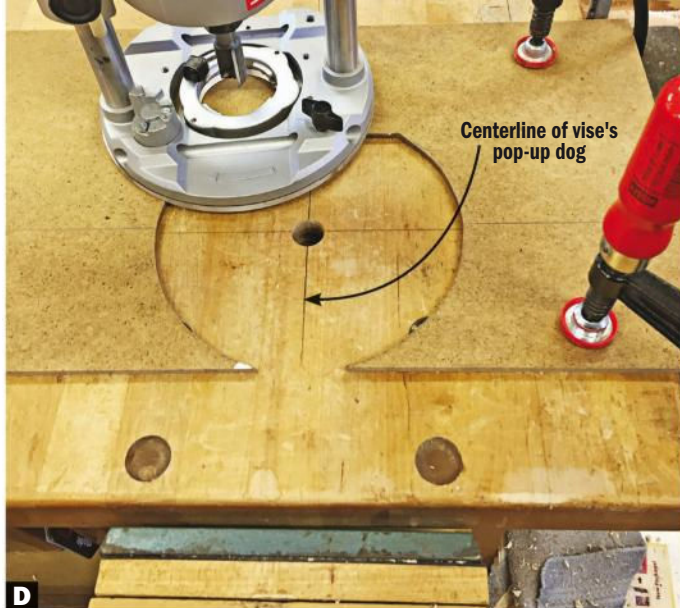
woodmagazine.com/benchvises



B Bench vises come in a number of styles and price ranges. This one has wooden faces that attach to the metal jaws using a magnetic-backed adhesive plate.



Every dog has its day. You can find bench dogs made from brass, plastic, or wood. Those shown here are made by Veritas and Sjoberg.



D

Try this affordable alternative to a spiral bit. A $\frac{3}{4}$ " spiral upcut bit can be pricey. If you don't have one, try a standard straight bit instead, and plunge in multiple passes to reduce burning. Drilling a $\frac{3}{8}$ " or $\frac{1}{2}$ " pilot hole first helps remove some of the waste so the router doesn't have to work so hard.

Note: To determine the spacing of your dog holes, measure the maximum distance between your vice jaws and subtract $\frac{1}{2}$ ".

Bore the dog holes

Routing: This method, using a plunge router and a $\frac{3}{4}$ " upcut spiral bit, keeps the dog hole perfectly vertical. To keep the router from moving sideways during the plunge, create a template from a piece of $\frac{1}{4}$ " hardboard cut out to match the router base [Photo D]. Align and clamp that template to the benchtop, then rout.

Drilling: The second method uses a drill and an auger-style bit in combination with a simple jig [Photo E]. Start by boring a $\frac{3}{4}$ " hole in 2x4 scrap with the drill press. (I used a Forstner bit and a backer board to prevent blow-out.) Now, simply clamp that 2x4 jig to the benchtop, centering the hole over the dog-hole location, and drill through the benchtop with the auger bit. If, after drilling several holes, the jig gets reamed oversize, simply bore a new hole in it.

After machining the holes with either method, use a 45° chamfer bit with a bearing to ease the top edge of each hole. This removes any tear-out and prevents future tear-out caused by inserting and removing dogs. Finally, buy a batch of bench dogs and fill those holes.

Consider adding T-track

For added versatility, I also routed a groove to accept T-track down the center of my benchtop. Now I can use any of a number of compatible hold-downs, too [Photo F].

Add a layer of protection

I know my workbench will get its share of scars under normal use, but I still cover the top with builder's paper when not using



E

Follow the walls on your way down. The full $\frac{3}{4}$ " flutes on the auger bit follow the sidewall of the starter hole perfectly. A Forstner bit may make a cleaner hole, but its narrow shank can wander off true plumb when drilling.

bench dogs. It protects against scratches, gouges, and glue drips. You can find it in rolls at home centers.

To round out this list of accessories, I like to keep a set of bar and F-clamps nearby for glue-ups, and a couple of short lengths of 4x4 stock to use as risers, elevating the workpiece to make room for clamp heads under it. A set of bench pucks (page 28) comes in handy when you just need a little lift, such as when applying a finish to edges.

Tip! Whether drilling or routing, clamp a backer board on the underside of the benchtop to reduce tear-out.

► Want to build your own workbench? From simple to elaborate, we've got plans for you. woodmagazine.com/benchplans



F

Fleece the flange. I removed about an inch of the flange from the end of the track to ease insertion and removal of the hold-down bolts. Extending the routed groove by an inch accomplishes the same thing.

Here's that extra set of hands you've been looking for.



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Approximate materials cost:

\$200

Accommodates babies up to about 26" long (baby not included).

No need for fancy finials and ornate carvings here: The contemporary design and tried-and-true glue-and-screw joinery pair with affordable materials for a cool look and sturdy construction to ensure this piece will create memories for years to come.

One pattern: three parts

1 You can make the ends and divider (A, B, and C) using one template, made by enlarging the **Gridded Pattern** on *page 37* to replicate part A. Or download and print a full-size pattern from woodmagazine.com/241patterns. After making the template, cut plywood blanks to size for the chair end, cradle end, and divider [**Materials List**, **Cutting Diagram**]. Lay out the parts on each blank by tracing around the template. (For the cradle end, you'll have to extend the front curved edge to 26½" and then draw lines across the blank to define the top and bottom ends.) Jigsaw them to rough shape, then attach the template to each part and flush-trim to final shape.

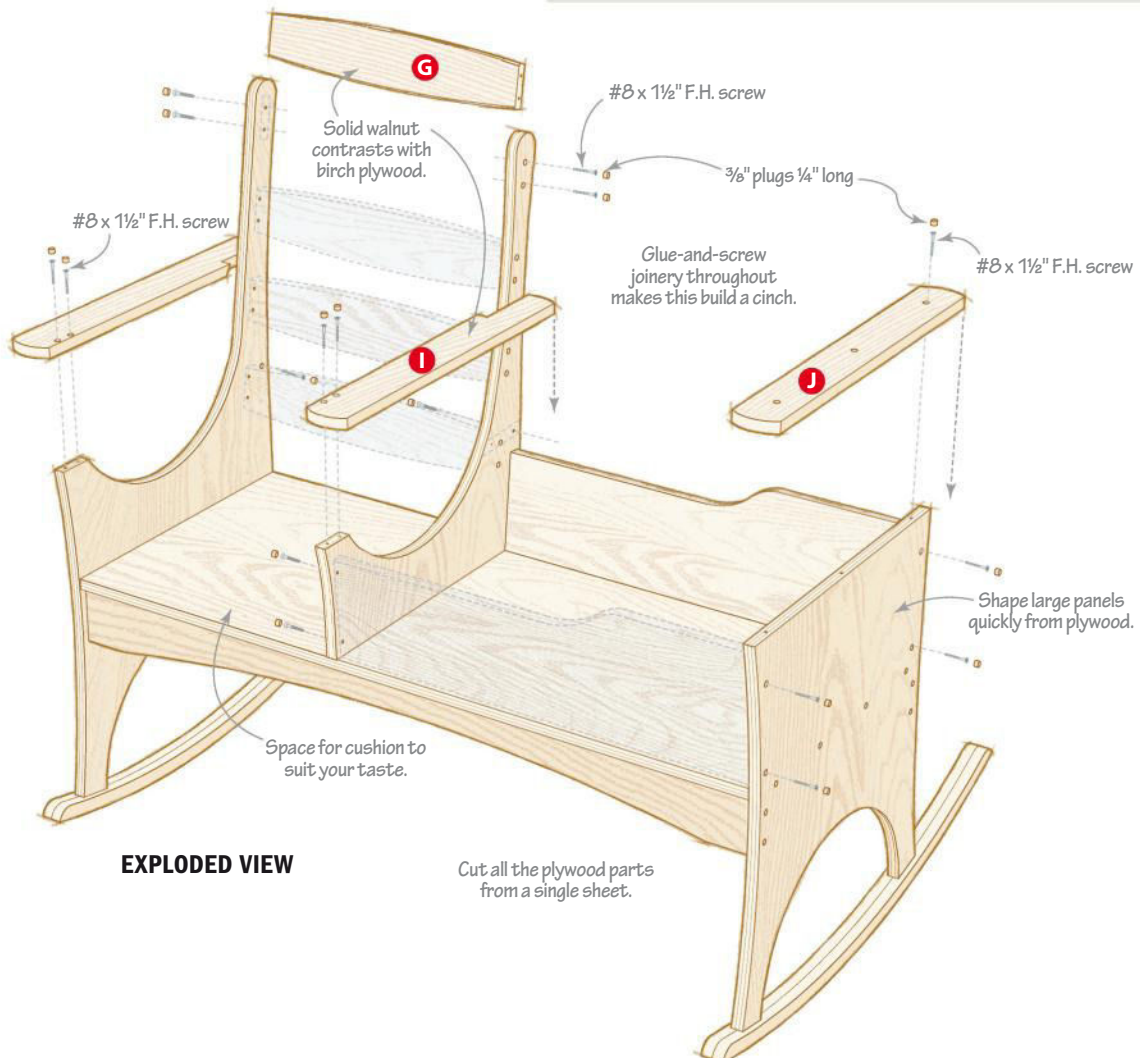
SKILL BUILDER

Overcome grain tear-out with good technique

Thin surface veneers can tear out when cutting or routing plywood. To avoid this, work the tool "downhill" on curves, cutting with the grain rather than into it. And choose a jigsaw blade appropriate for the job: One with 20 teeth per inch (tpi) will cut smooth curves and reduce chances of tear-out.

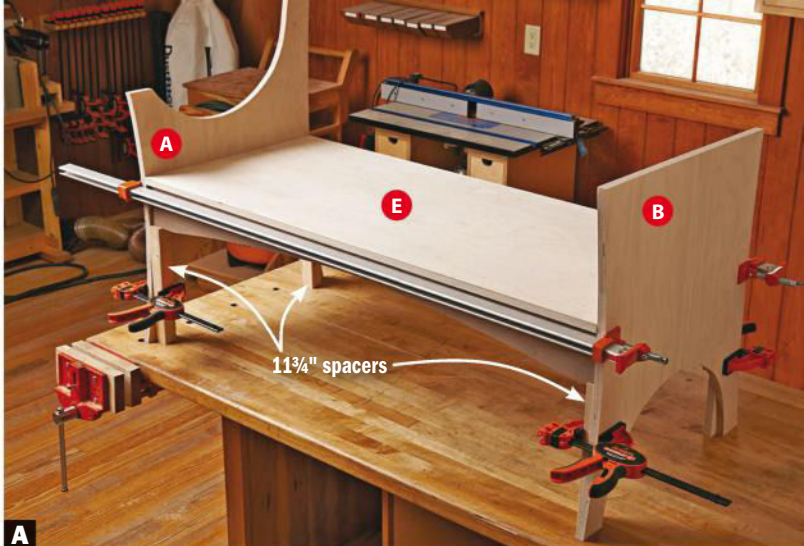


Map out your plan after laying out the pattern. Drill a blade-start hole on the waste side of the arch's apex, and mark arrows to show cut direction.



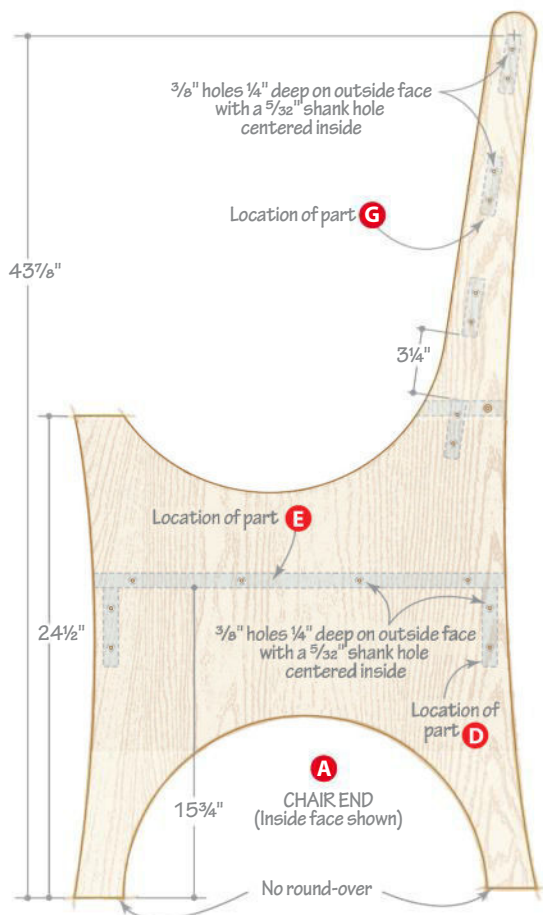
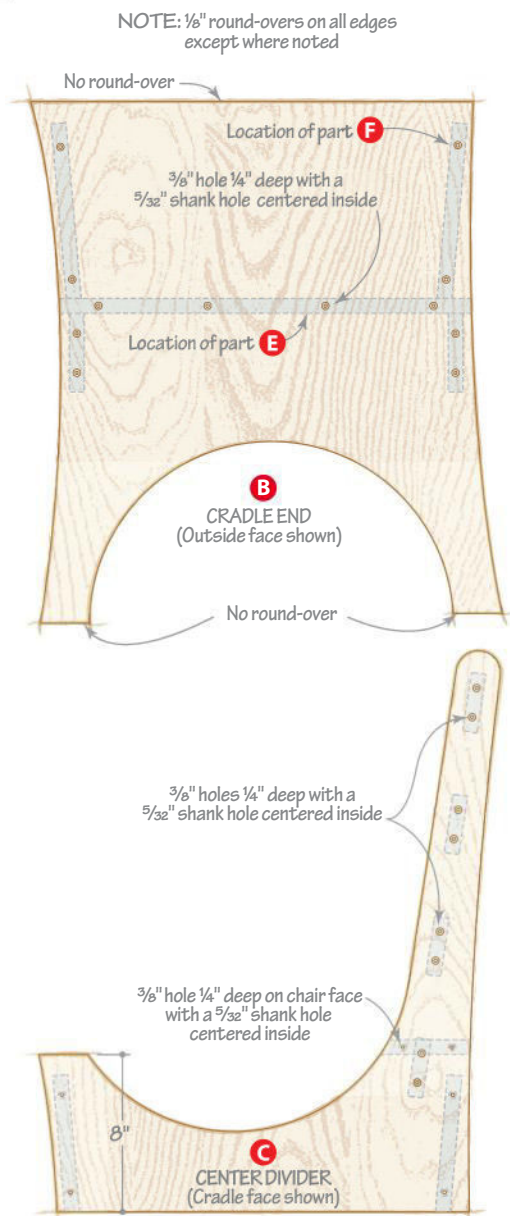
Tip! Make your stretchers (as well as the back slats [G] in Step 6, next page) identical by securing them together with double-faced tape before cutting and sanding.

- 2 Sand the edges smooth, and round over all edges except where shown in Drawing 1.
- 3 Jigsaw two stretchers (D) to shape and sand smooth [Drawing 2]. Cut the bottom (E) to size [Drawing 3] and round over the front top edge. Finish-sand all parts.
- 4 Glue the stretchers (D) onto the bottom (E), set back $\frac{1}{2}$ " from each edge, with the ends flush [Drawing 3]. When that dries, clamp the ends (A, B) to the bottom assembly [Photo A, Drawing 1]. Drill $\frac{3}{8}$ " holes $\frac{1}{4}$ " deep (counterbores) in the ends where indicated, drill pilot holes into the bottom assembly, and secure with glue and screws.
- 5 Cut out the cradle sides (F) [Drawing 4], ripping a 5° bevel on the bottom edges, creating a mirrored pair. Identify these parts



A Clamp the ends and bottom together, using spacers at each leg to support the bottom/stretchers assembly at the correct height.

1 ENDS AND DIVIDER



2 STRETCHER

► Build two other projects—a child's rocker and toy chest—designed in the same walnut-and-plywood style.
woodmagazine.com/plywalnut



D **Mark the legs to match the rockers.** Align the legs of each end (A, B) with the markings on the rocker pattern, then clamp and trace the curve onto the legs.

2 Clamp a rocker to the legs of the chair end (A) [Photo D], mark the curve, and cut the legs along those lines. Round over the rockers' edges, and then screw them to each leg from underneath.

3 Cut the armrests (I) and end cap (J) to size and round the ends on each [Drawings 6 and 7]. Identify left and right armrests, and then mark and cut the notches to fit around the chair uprights [Photo E]. Rout $\frac{1}{8}$ " round-overs around all three pieces except the notches. Screw each armrest in place [Exploded View]. Center the end cap on the cradle end (B), and glue and screw it in place.

4 Using a $\frac{3}{8}$ " plug cutter, cut enough walnut plugs to fill all the counterbores. Glue



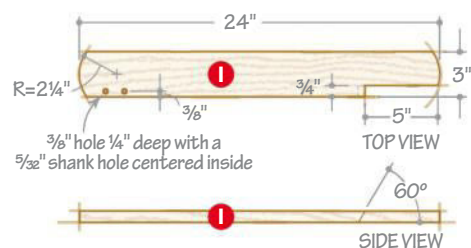
E **Mark the armrest notches.** Clamp an armrest (I) to the front of the divider (C), with that edge flush with the chair face, and mark where it intersects the divider. Repeat for the chair end (A).

these in place, allow to dry, then trim and sand flush.

5 Before you put this baby to bed, apply finish. We sprayed on three coats of General Finishes Enduro-Var water-based polyurethane, sanding between coats with a 320-grit sponge. 🌿

Produced by **Bob Hunter** with **Kevin Boyle**
Project design: **Kevin Boyle**
Illustrations: **Roxanne LeMoine**, **Lorna Johnson**

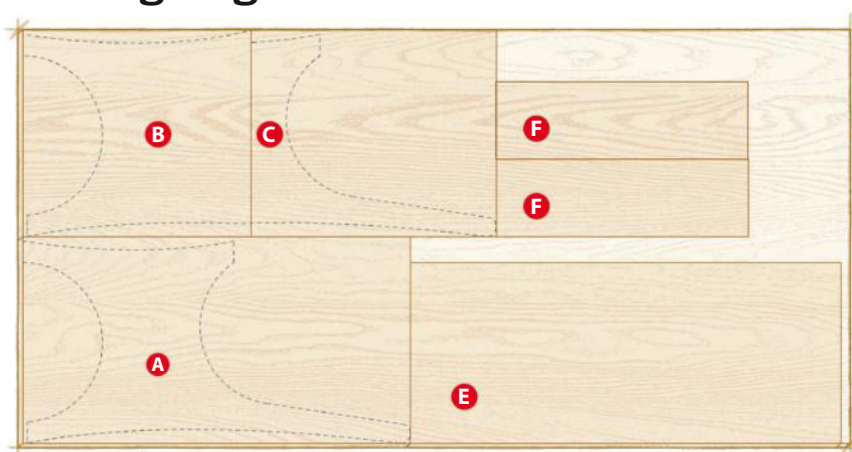
6 **LEFT ARMREST**
(Chair side;
right armrest is
a mirror image)



7 **CRADLE END CAP**



Cutting Diagram



$\frac{3}{4}$ x 48 x 96" Baltic birch plywood



$\frac{3}{4}$ x 5 1/2 x 108" Walnut



$\frac{3}{4}$ x 8 x 96" Walnut



$\frac{3}{4}$ x 7 1/4 x 96" Walnut

Materials List

Part	FINISHED SIZE			Matl.	Qty.
	T	W	L		
A* chair end	$\frac{3}{4}$ "	24"	45"	P	1
B* cradle end	$\frac{3}{4}$ "	24"	26 1/2"	P	1
C* divider	$\frac{3}{4}$ "	24"	28 1/2"	P	1
D stretchers	$\frac{3}{4}$ "	4"	50"	W	2
E bottom	$\frac{3}{4}$ "	21"	50"	P	1
F cradle sides	$\frac{3}{4}$ "	9"	29 1/4"	P	2
G back slats	$\frac{3}{4}$ "	4"	20"	W	4
H* rockers	1 1/2"	6"	37"	LW	2
I armrests	$\frac{3}{4}$ "	3"	24"	W	2
J end cap	$\frac{3}{4}$ "	3"	24"	W	1

*Parts initially cut oversize. See the instructions.

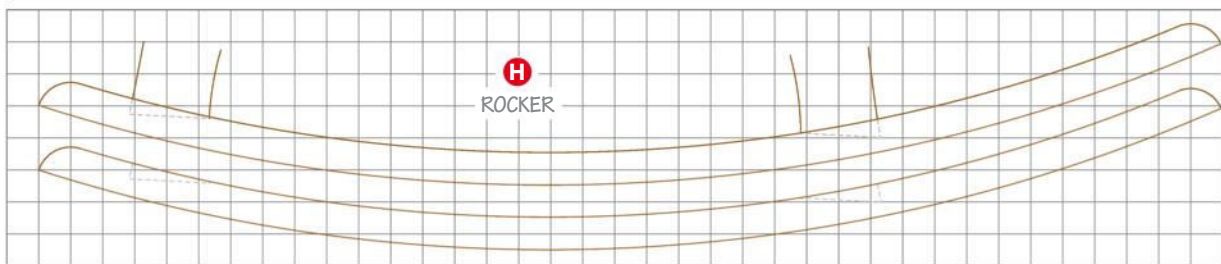
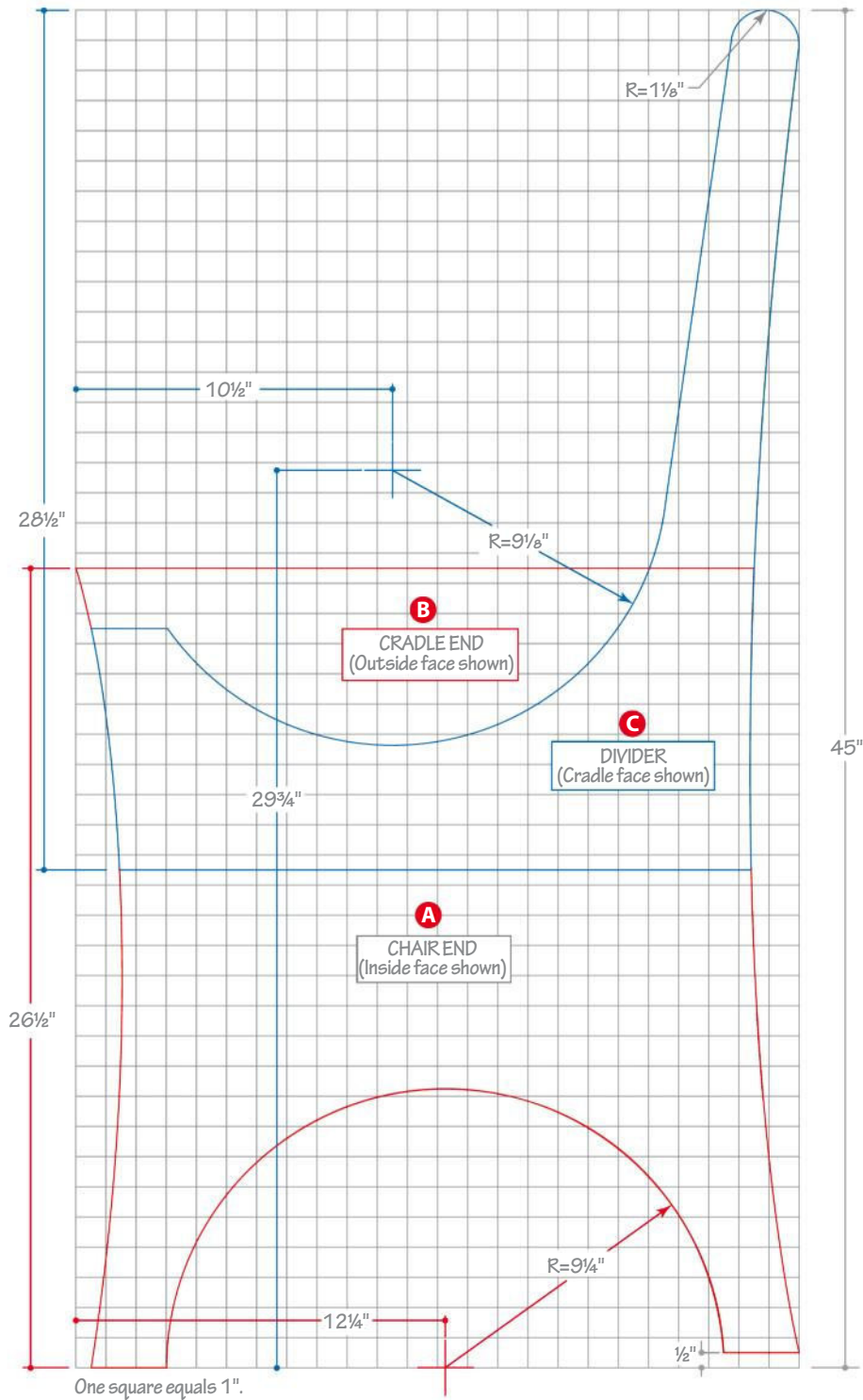
Materials key: P-Baltic birch plywood, W-walnut, LW-laminated walnut.

Supplies: #8x1 1/2" flathead screws, #8x2 1/2" flathead screws.

Bits: 1/8" round-over router bit, 3/8" plug cutter.

GRIDDED PATTERNS

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241patterns](http://woodmagazine.com/241patterns)



Benchtop Drill Presses

One of these “abbreviated” models could likely handle all your drilling needs.



Anatomy of a drill press

Long a cornerstone woodworking machine, a drill press safely and repeatably bores holes with great precision and power. When buying one, make your decision by finding the right balance of size and useful features while staying within budget. The eight bench-top drill presses we tested, though not as powerful or feature-laden as most floor-standing models, perform well—and all for less than \$400.

Uncork the torque

If you seldom drill with large bits (over 2"), all of these machines have ample power. We started our testing by drilling with a 1" Forstner bit in oak and hard maple, an easy task for each machine. As we stepped up to larger bits, the Craftsman 34983 and Ryobi DP103L stalled regularly, but we could nurse them along with a light touch. Three models (General International 75-010 and 75-030 and Grizzly G7943) continued to perform well with bits up to 2". Although we were able to stall even these models with 2" Forstner bits, backing off to a less-aggressive feed rate got the job done.

In addition to the torque generated by the motor and pulleys, keep in mind that longer quill-feed handles help you leverage more downward force on the bit. The short handles on the Craftsman 34983 and Ryobi make sense given the overall size of these smaller, light-duty machines. But the short, hooked quill-feed handles on the Rikon 30-120 limited the amount of leverage we could muster.

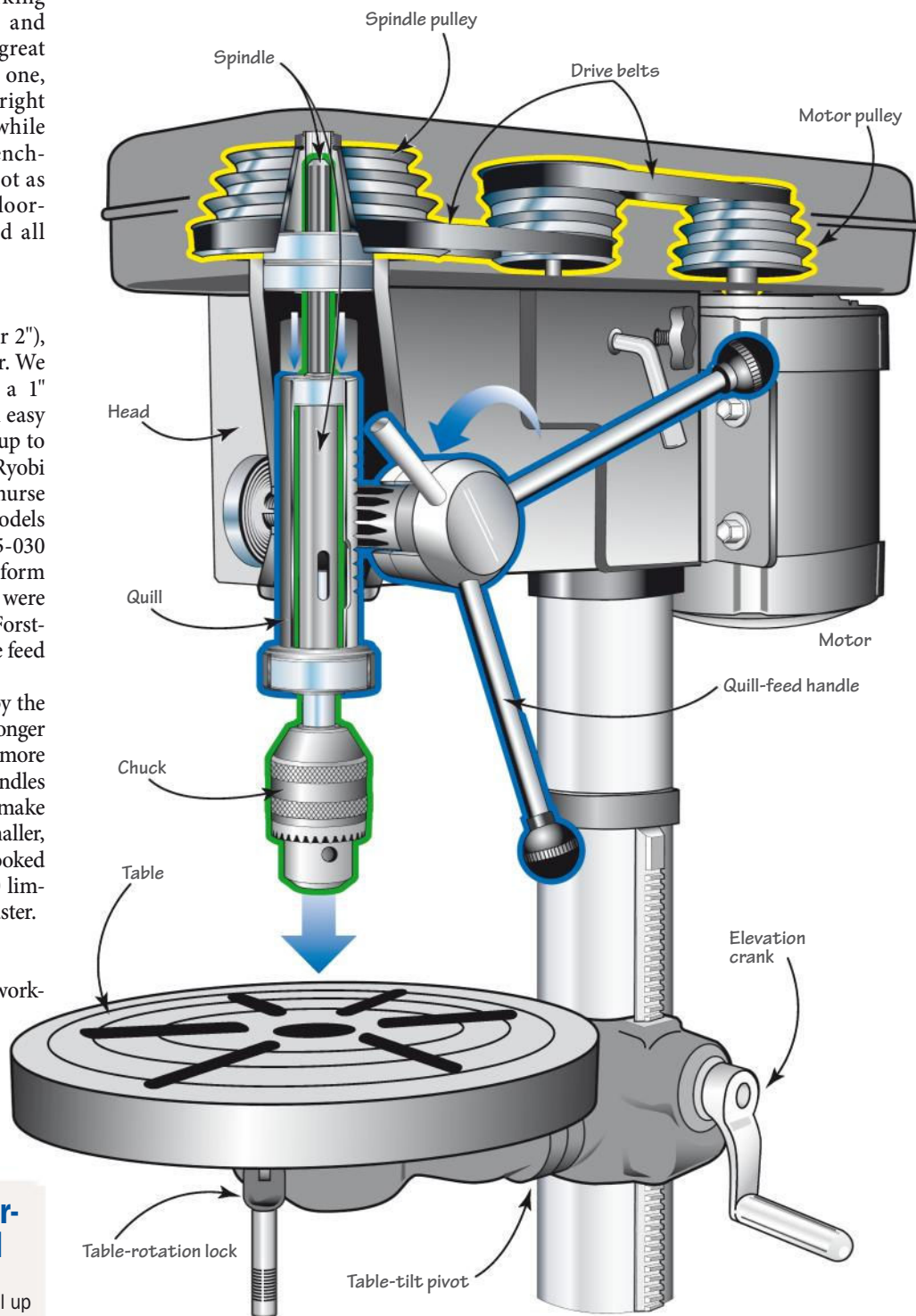
It's all about that swing

Consider, too, the width and length of workpieces you might need to drill into. Greater capacities typically come with higher price tags. Drill-press manufacturers classify a drill press by its "swing": the maximum width of workpiece into which you can drill to

Three reasons to buy a floor-standing drill press instead

1. You need more than 14" of swing, 3½" or more of quill stroke (chuck travel up and down), or more than 25" of vertical drilling capacity (chuck to table or base).
2. You need enough power to bore holes larger than about 2" in diameter.
3. You want a table better suited for clamping and supporting workpieces.

Read reviews of floor-standing drill presses at reviewatool.com/drillpress.



COLOR KEY

Up-and-down stroke

Rotation

Rotation and up-and-down stroke

the center (twice the measurement from the chuck's center to the column). The Grizzly topped this field with a 14" swing; the Craftsman 34983 and Ryobi measure at least 3" less. (See the chart on *page 42* for complete specs on all the tested machines.)

In vertical capacity, five units have a quill stroke—the maximum plunge of the chuck—of at least 3". But the Craftsman models and Ryobi deliver only 2½" and 2", respectively. As for workpiece capacity between the chuck and table or base, the Craftsman 34983 has about one-half the capacity of the Rikon, which has the largest vertical depth in our test. You might never need this extra depth, but it comes in handy when drilling into a long or tall workpiece.

► Download plans for drill-press-related shop projects.

woodmagazine.com/drillplans

On-target accuracy

We drilled hundreds of holes of varying sizes with each drill press, and none demonstrated any runout (bit wobble). That allowed us to repeatedly and precisely drill into fine cross-hair markings.

Good lighting helps, too. Task lights on all but the Rikon and Shop Fox W1668 illuminated layout marks well; the gooseneck LED lamps on the Craftsman models were our favorites because we could position them where most needed.

Five models have crossed laser guides to align with layout marks. We prefer the hard-wired lasers on the General 75-010 and Ryobi because they provide pinpoint accuracy and protection against bumping. On the other hand, the battery-powered lasers on the Craftsman machines work okay with bits 1" or less in diameter, but bumped out of alignment easily. We found the General 75-030's battery-powered laser too faint and difficult to use.

Reliable stops a must-have

For holes that must be drilled to a precise depth, the slip of a depth stop can prove disastrous. For example, if you're boring holes for Euro-style cup hinges on cabinet doors, a too-deep hole can break through the front stile, ruining the door.

The tested drill presses have two types of stop systems, as shown at *right*. To test the reliability of each machine's depth stop, we drilled 100 holes with the same bit, and measured the depth of each. Those that fared best: Craftsman 34985, General 75-010, Grizzly, Ryobi, and Shop Fox. The Craftsman 34983 slipped ⅓₂", the General 75-030 ⅓₁₆", and the Rikon nearly ⅓₈". In general, locking nuts proved more reliable than locking collars.

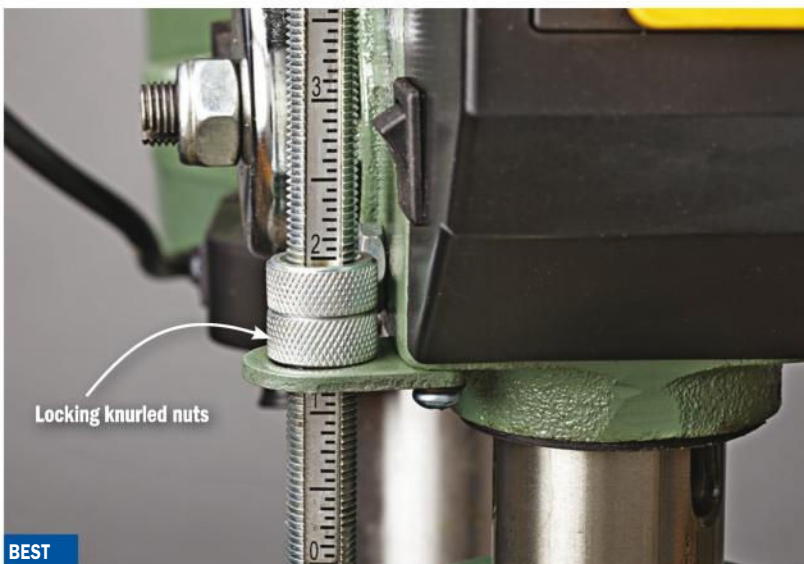
Look for a depth-stop system you can count on



Locking collars can be fussy to set and slip more than other styles.



Locking hex nuts hold well, but work best when you tighten with wrenches.



Locking knurled nuts require only finger pressure to tighten and hold securely.

► Download plans for a pair of great coin-collecting projects that require drilling multiple holes to equally precise depths.

woodmagazine.com/coinprojects

Changing bits should be easy

All the tested models use a key to tighten and loosen their chuck jaws. The Grizzly, Rikon, and Shop Fox chucks accept bit shanks up to $\frac{5}{8}$ " in diameter. The others max at $\frac{1}{2}$ ". The Rikon and Ryobi chucks proved difficult to open and close by hand, requiring the use of the key, especially as the jaws get closer to tightening on bit shanks $\frac{1}{4}$ " and smaller. To avoid misplacing the chuck key, all but the Grizzly and Shop Fox provide a storage spot on the machine. The General 75-030 has a holder, but we could not get the key to fit.

If it's easy to do, you'll change speeds

As a rule, larger bits require slower speeds. With all but one machine, you change belt position on the pulleys manually. This proved easiest on the Craftsman 34985, Grizzly, and Rikon machines. Only the General 75-010 has a speed-adjustment lever, shown at *right*, so you can change spindle speeds easily without touching a drive belt.

We found changing belts on the other models cumbersome because the motor did not slide forward enough to adequately relieve belt tension, shown *below*. Or, we had trouble getting sufficient tension on the belt after the change.

Three machines (Craftsman 34983, General 75-010, and Ryobi) will not go slower than 600 rpm. We recommend speeds as low as 250 rpm for 1" or larger Forstner bits and holesaws. (Rikon provides a helpful chart under its hood with recommended speeds for various bits.)



Infinite variable speed and digital readout make for easy speed changes on the General International 75-010.



Fully compressing this motor-tension spring proved difficult, making it a chore to change belt position for a different spindle speed.

► Download a free chart of recommended drilling speeds for different bits.
woodmagazine.com/drillpresschart

► Make a small table better: Download plans to build a more functional drill-press table. woodmagazine.com/dptable

Setting the table

None of the tested drill presses have what we would call a woodworker-friendly table. Half of them are too small to be practical for most woodworking tasks, but the General 75-030, Grizzly, Rikon, and Shop Fox are of respectable size. All the tables have slots for attaching hold-downs or fences, but only the Craftsman models come with a fence. Clamping workpieces around the edges of the tables can be frustrating because hollow spots between gussets underneath the tables make it difficult to seat clamps. All of the tables tilt at least 45° left and right, but the Grizzly tilts 90° each way. This lets you clamp a workpiece to the tilted table for end-drilling.

Weight equates to stability

The top-heavy nature of these machines means they can be tippy if not anchored to a bench. Nevertheless, models weighing more than 90 lbs proved the most stable in use when not anchored, thanks to larger, weightier bases and columns.

Shop Fox press not just a one-trick pony

All of these drill presses can be turned into sanders when you chuck in a sanding drum. But only the Shop Fox W1668 converts into an oscillating spindle sander in just a couple of minutes. By engaging the oscillating pulley with a third belt (not used for drilling), the spindle travels up and down ¾" while also spinning (at a slow speed you set manually). The table has a cutout for the included sanding drums and a dust port for attaching a shop-vacuum hose. Watch a video of converting this machine into a sander: woodmagazine.com/sfsander.



A benchtop drill press may be all you need

MODEL	PERFORMANCE RATINGS (1)									CAPACITIES, INCHES			
	PRIMARY				SECONDARY					SWING (TWICE THE DISTANCE FROM CHUCK TO COLUMN)	MAXIMUM QUILL STROKE	MAXIMUM DEPTH FROM CHUCK TO TABLE	DEPTH FROM CHUCK TO BASE
	DRILLING TORQUE	BIT-PLACEMENT PRECISION	DEPTH-STOP RELIABILITY	EASE OF CHANGING SPEEDS	EASE OF USING AND ADJUSTING TABLE	EASE OF USING CHUCK	EASE OF USING QUILL HANDLE	EASE OF OPERATING POWER SWITCH	OVERALL STABILITY				
CRAFTSMAN 34983	C	B	B	C	C	A	C	A	B+	10¼	2½	8⅞	13½
CRAFTSMAN 34985	B	B	A	B+	B-	A	B	A	B+	11½	2½	14½	20½
GENERAL INTERNATIONAL 75-010	A	B+	A	A	A	A	A	B	B+	12	3⅞	13¼	18⅞
GENERAL INTERNATIONAL 75-030	A	B-	C	C	A	A	A	B	A	12	3⅞	14⅞	21¼
GRIZZLY G7943	A	A-	A	A-	A	A	A	A	A	14	3¼	12⅞	19¼
RIKON 30-120	B+	B-	D	B+	A	B-	C	A	A	13¼	3⅞	16½	24⅞
RYOBI DP103L	C+	A-	A	D	C	B	C	A	B+	10½	2	12¼	16⅞
SHOP FOX W1668	A-	A-	A	B	A	A	A	B	A	13¼	3⅞	13¼	21½

► Read reviews of other drill presses and add your own reviews. reviewatool.com/drillpress



Put your benchtop-drilling bucks here

Although we liked the variable-speed drive of the General International 75-010, it lacks the low-end speed a woodworker needs for big bits. Instead, we'd accept the manual belt changes and get the Grizzly G7943, the Top Tool. The heaviest (and most stable) tested machine, it has the greatest swing capacity and speed range, excellent torque, and a price that won't break the bank.

The Top Value award goes to the Shop Fox W1668. It's a good-to-excellent drill press, and the fact that it becomes an oscillating spindle sander, too, makes it a great value for \$420, saving you the cost of buying a separate sander. 🌲

Produced by **Bob Hunter** with **Steve Feeney**
Illustration: **Tim Cahill**



NUMBER OF SPINDLE SPEEDS	MINIMUM/MAXIMUM SPINDLE SPEEDS, RPM	CHUCK SIZE (SHANK CAPACITY), INCHES	DIMENSIONS, INCHES		ACCESSORIES (2)		WEIGHT, LBS	POWER CORD LENGTH	WARRANTY, YEARS	COUNTRY OF ASSEMBLY (3)	SELLING PRICE (4)	CONTACT INFORMATION
			OVERALL, H x W x D	TABLE, W x D (DIAMETER FOR ROUND TABLES)	STANDARD	OPTIONAL						
5	680-3,150	½	27¼ × 15 × 18¾	7⅞ × 7⅞	F, L, R		57	5'	1	C	\$150	800-349-4358, craftsman.com
11	355-3,065	½	36½ × 15 × 23½	10⅞	F, L, R		72	6'	1	C	\$230	
variable	600-2,960	½	35 × 12¾ × 20¾	9⅞ × 9⅞	G, K, L, R	S, T	74	5'8"	2	C	\$320	888-949-1161, general.ca
12	280-3,000	½	38½ × 14 × 23¾	11⅞	G, L, R	S, T, Y	93	5'	2	C	\$350	
12	140-3,050	¾	38½ × 14½ × 26⅞	11¼ × 11¼	G, K, L	S, V, Y	142	8'4"	1	C	\$335	800-523-4777, grizzly.com
16	220-3,600	¾	41⅞ × 15¼ × 25¼	11¾	K	M, V	105	5'10"	5	C	\$330	877-884-5167, rikontools.com
5	610-2,800	½	30 × 12 × 19½	6½ × 7½	L, R		50	6'	3	C	\$130	800-525-2579, ryobitools.com
12	250-3,050	¾	38¾ × 14½ × 24½	12⅞	D, G, S	V, W	122	9'	2	C	\$420	800-840-8420, shopfox.biz

1. A Excellent
B Good
C Fair
D Poor

2. (D) Table dust-collection port
(F) Fence
(G) Chuck guard
(K) Chuck knockout tool
(L) Light
(M) Mortising chisel kit
(R) Laser guide
(S) Sanding drums
(T) Auxiliary table with fence
(V) Workpiece vise
(W) Workholding clamp
(Y) Keyless chuck

3. (C) China

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

Idea Shop 6:

Jig up the tablesaw and build a bench

Because the tablesaw serves such a central role in a woodshop, continue building accessories, such as crosscut and miter sleds, that improve your results with that essential tool. Then, add a much-needed workbench with customizable storage, and a shop vacuum to help keep things tidy.

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

Learn through this series of Idea Shop 6 articles how to set up a shop by working within a budget of \$150 every two weeks over 26 pay periods. Coinciding with each paycheck, we provide online a collection of related articles, plans, and videos. To get an e-mail reminder of that posting, sign up for our newsletter at woodmagazine.com/newsletter. The first article in this series appeared in WOOD® 238 (March 2016). Catch up with the previous installments at woodmagazine.com/ideashop6.



Paycheck 13

For about \$50, pick up a half sheet of ¾" AC plywood (we used birch) and about four board feet of 4/4 maple stock. You'll make several jigs from these materials during the next several weeks.

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

► Looking for projects to build with your new tools and skills?
woodmagazine.com/bbprojects

First, build a crosscut sled that rides in the tablesaw miter-gauge slot and provides far more stability for crosscuts than the short, narrow face of a miter gauge. The sled's long fence and wide platform steady large workpieces for absolute accuracy. It also carries small pieces past the blade while keeping your fingers well away from spinning teeth. Clamping a stopblock (simply a piece of scrap) to the fence makes easy work of cutting pieces to identical length.

Sock away the remainder of this check to save for the purchase of workbench materials in a few weeks.



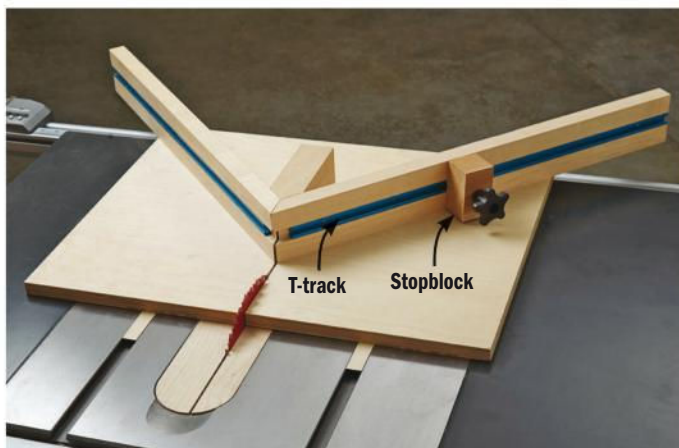
An easy-to-make crosscut sled outperforms a miter gauge for many cuts. The fence and platform back up the workpiece, preventing chip-out. While the platform does reduce maximum cutting depth, that's a concern only on pieces more than 2¾" thick.

Paycheck 14

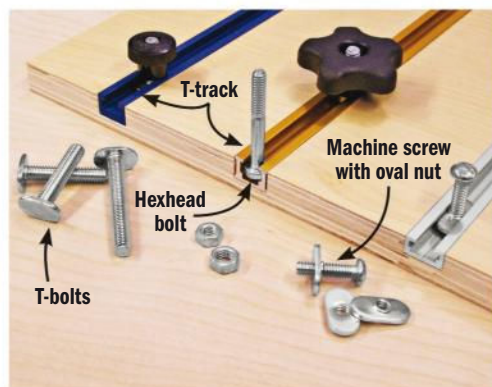
Like the crosscut sled, a miter sled carries workpieces past the blade, but at a 45° angle instead of 90°. A precisely built sled means you'll spend less time on trial-and-error setups and instead jump right into cutting tight miter joints. A stopblock locks securely into T-track in each fence so you can cut identical-length pieces.

► T-track traps the head of a bolt or a nut, allowing you to position items along the track before securing the item by tightening a knob or nut.

This check also purchases a random-orbit sander and sanding discs. Some consider sanding tedious, but it is a necessary part of woodworking. We provide several articles online that help you get the best results quickly.



Set it up once for precision every time. The plan for this sled provides a foolproof method for setting up the fences exactly 45° to the blade so every miter comes out perfect.



This Milwaukee 5" sander (no. 6021-21) and a collection of sanding discs make quick work of sanding chores.

Paycheck 15

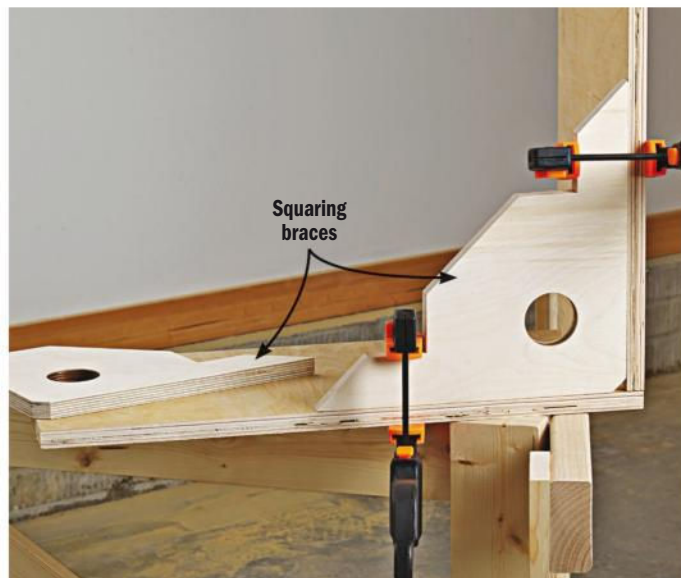
By now you should be comfortable making sawdust using any of your tools. A shop vacuum makes cleaning up that dust easier. It can also collect dust right at the tool, keeping it out of your shop's air. It won't serve as well as a regular dust collector (that comes later), but see *page 70* for more information



Keep dust in the shop with this Craftsman 12-gallon shop vacuum (no. 12006). Its wide-set wheels prevent tipping when rolling the vac around. Accessories store onboard, and the motor also lifts off for use as a blower.

abouts maximizing a shop vacuum for dust collection.

For a quick project, cut a couple of squaring braces from plywood scraps. You will find these braces invaluable when assembling two pieces at a right angle. Bank about half of this paycheck.



Easy to make from leftover plywood, squaring braces serve as a third hand to hold workpieces at 90° during project assembly. Clamp a brace to one panel, then position the mating panel against the brace and clamp it in place.

Turn a bar clamp into a vise

Instead of a pricey vise, shop-made clamp blocks under this bench transform a one-hand bar clamp into an end or face vise for securing workpieces. After removing the fixed clamp jaw, the bar fits into the groove of the clamp block, and the bar's roll pin holds the clamp in place once inserted.

The design of the clamp blocks works with the ToolShop clamps from Menards (menards.com) recommended for purchase with paycheck 4. Suitable substitutions are Jorgensen ISD-3 (shown at *right*) and Irwin SL300.



Paycheck 16

With your tool collection and skills both growing, build a sturdy bench where you can work while keeping hand tools and accessories close by. Construct this model from inexpensive “1-by” and “2-by” lumber. Shop-made tool hangers lock onto, and lift easily off of, the wall-mounted French cleats (like the one used to hang the clamp rack made with paycheck 9 in issue 240 [July 2016]). This allows you to add and customize storage as your needs change.

Pick up a set of chisels as well. The set we chose includes a mallet, but the narrowest chisel is $\frac{1}{2}$ ". A set that includes $\frac{3}{8}$ " and $\frac{1}{4}$ " blades provides more options but also costs more. Find reviews of chisels to guide your choice at reviewatool.com.

These items take all of this check plus a bit out of the savings jar. 🌱

► New chisels need sharpening. Learn how to do it with sandpaper in this free video. woodmagazine.com/sharpenvid

► Learn to use chisels. woodmagazine.com/chisels

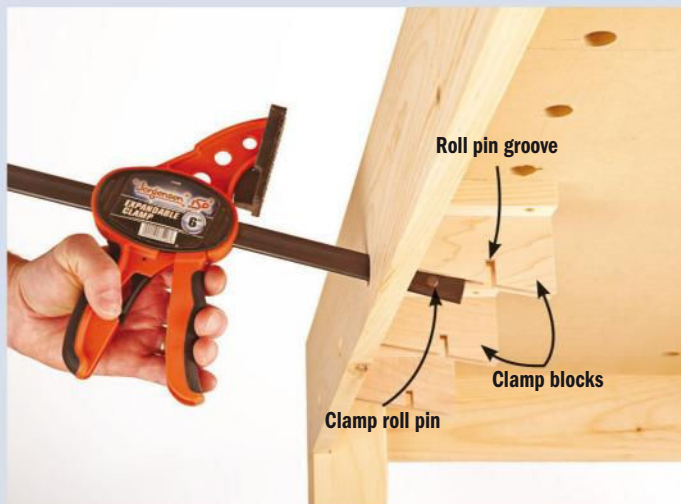


Irwin's chisel set (no. 1788114) includes a wood mallet for striking them. Wood won't damage plastic- or wood-handled chisels as a steel hammer will.



Customize racks and their positions to suit your storage needs. Holders with through-holes trap chisels, squares, and screwdrivers, a slotted hanger keeps clamps close at hand, and boxes serve as two-tiered shelves.

Produced by Craig Ruegsegger with Lucas Peters



Krenov-inspired Tall Cabinet

Design influences from a noted American woodworker create a dramatic, but surprisingly easy-to-build, cabinet.



James Krenov

Born in Siberia to parents who fled St. Petersburg for Alaska during the Russian Revolution, James Krenov gravitated to Sweden after WWII. There he studied with Carl Malmsten, often considered the father of Scandinavian furniture design, and later taught at Malmsten's school. In 1981, famous in his own right with four influential books in print [Sources], he was invited to start a fine woodworking program at the College of the Redwoods in Fort Bragg, Calif. He instilled in his students the idea that "wood is a vastly rich material" that deserves the respect accorded by inspired design and craftsmanship. He retired from the college in 2002, but continued making furniture and hand planes until he died in 2009 at age 88.

► View some James Krenov cabinets at jameskrenov.com

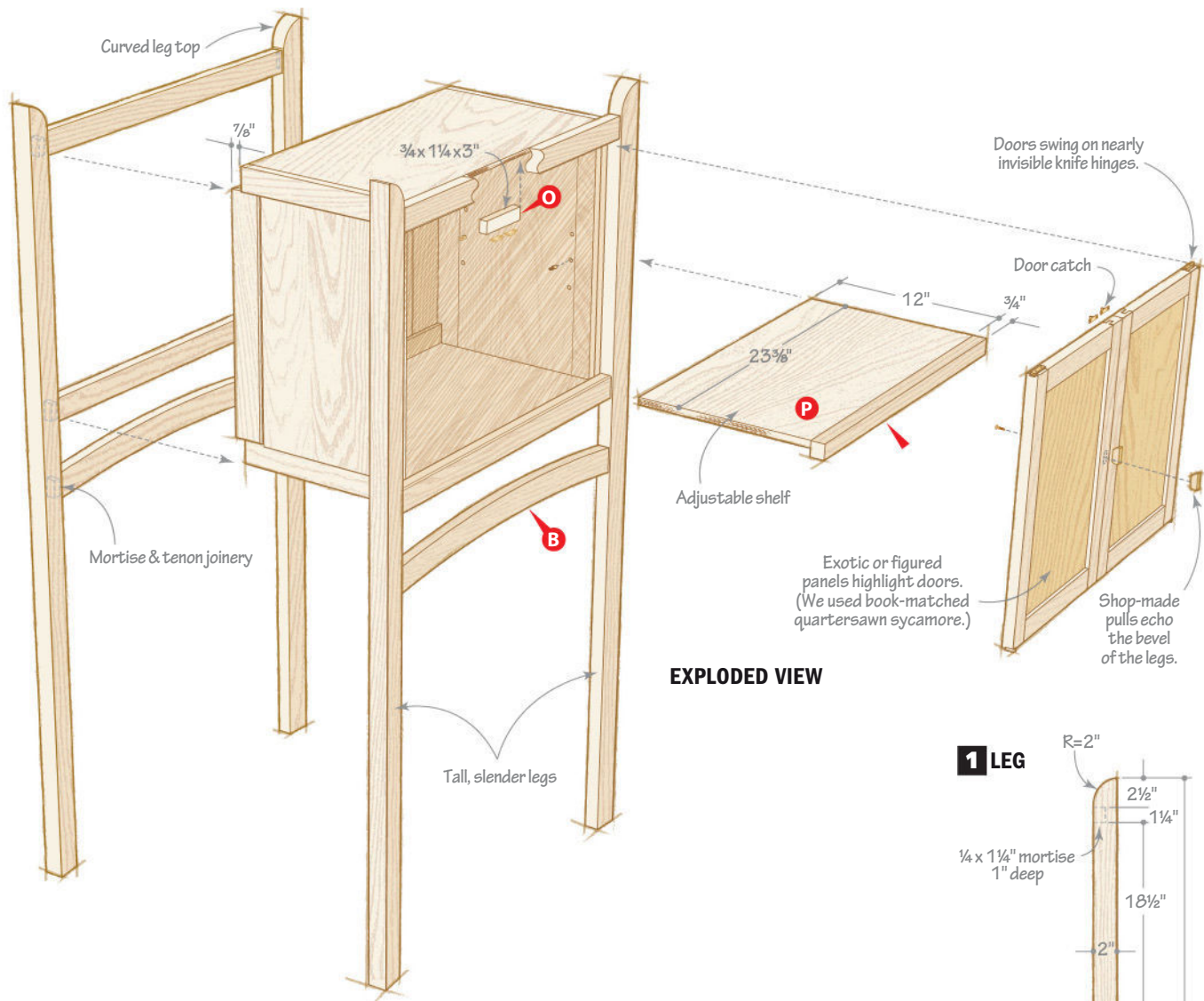
*"The understanding eye sees
the maker's fingerprints.
They are evident in every detail...
Leave fingerprints."
James Krenov*

D I M E N S I O N S
60" H × 15½" D × 31" L

Approximate
materials cost:

\$250

Wood with
distinctive
grain or
color adds
impact to
the doors
and back



EXPLODED VIEW

Tall, slim legs, curved lower stretchers, and distinctive grain on the door panels of this cabinet reflect the design philosophy of celebrated American woodworker James Krenov. Despite its high-style lineage, the project goes together without tricky joinery.

Start with those lanky legs

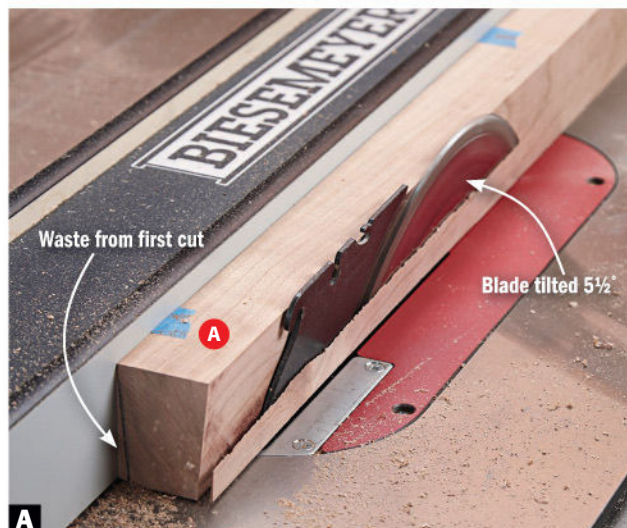
1 Mill four leg blanks (A) [Materials List, page 54] from 8/4 stock. Mark cutting lines for the beveled faces on the leg ends [Drawing 1], but don't cut them yet.

2 Lay out and form the leg mortises, centered on the narrow edges of the legs.

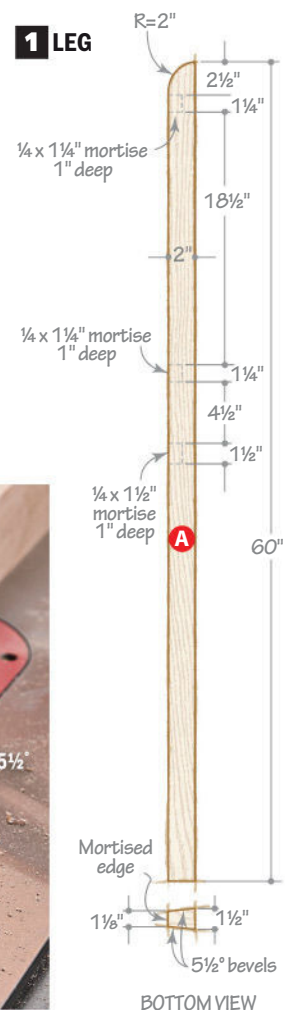
3 Rip 5 1/2° bevels on the legs [Photo A]. Cut slightly outside the lines so that after removing saw marks each leg will have a 1 1/8" edge with the mortises centered on it.

4 Lay out the curved leg tops, bandsaw to shape, and sand smooth. Remove the taped-on cutoffs, and hand-plane or sand the legs smooth, maintaining the 1 1/8" edges. Finish-sand the legs as needed with progressively finer grits to 220 and set them aside.

► See methods for making mortises and tenons.
woodmagazine.com/mt4ways



A Tape the cutoff from the first bevel back onto the leg (A) before ripping the second bevel. Leave the cutoff attached for making the curved cuts on the leg tops, too.



BOTTOM VIEW

Fashion the frame members

1 From 5/4 stock, mill the stretchers (B, C) [Drawings 2 and 3], including the tenons [Drawings 2a and 3a].

Note: You'll cut the curve on the bottom stretchers later.

2 Bandsaw and sand smooth the curved edges on the bottom stretchers (B) [Drawing 2]. Finish-sand the stretchers and set them aside for now.

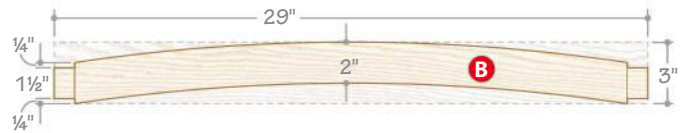
3 Saw the panel rails (D) to size and rout or saw the edge grooves [Drawing 3].

4 Cut the top and bottom panels (E) to size. Make sure the panel width exactly matches the length of the rails (D).

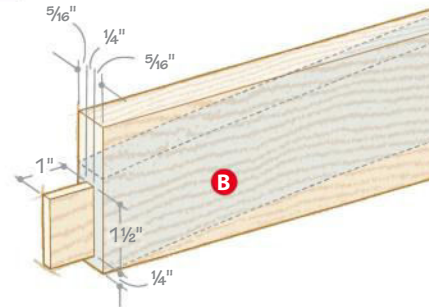
5 Glue the rails (D) to the ends of the panels (E). The top and bottom rail/panel (D/E) assemblies differ slightly: For the bottom assembly, align the grooved edge of the rail flush with the inside panel face [Drawing 3]; for the top assembly, align the ungrooved rail edge flush with the outside panel face.

6 Glue the top/center stretchers (C) to the rail/panel assemblies [Drawing 3, Photo B].

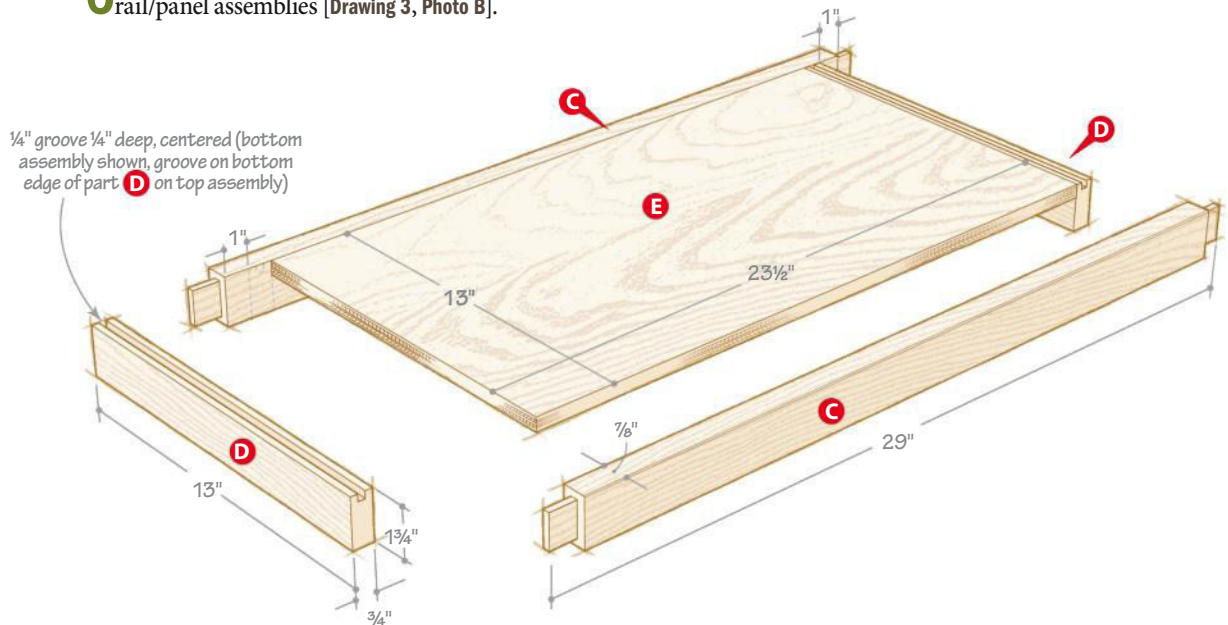
2 BOTTOM STRETCHER



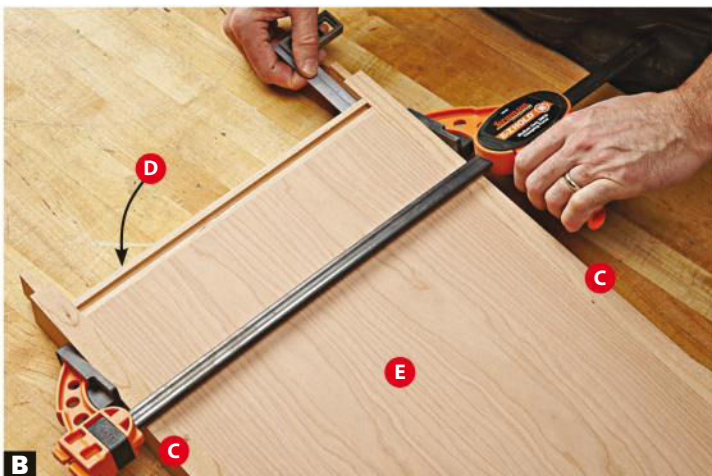
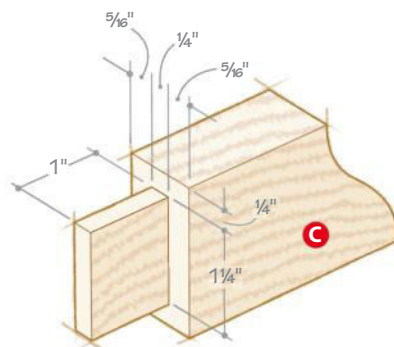
2a BOTTOM STRETCHER TENON



3 CABINET BOTTOM ASSEMBLY



3a TOP/CENTER STRETCHER TENON



B

When gluing the stretchers (C) to the rail/panel assemblies (D/E), maintain 1" spacing from the tenon shoulders to the face of the rail at both ends.

4 CABINET CASE

1 Cut the cabinet stiles (F, G) to size. Rab-
bet the back stiles (G)
and rout the round-overs 5/8" brad nails
[Drawing 4].

2 Saw the side panels (H) to size and rabbet the ends [Drawing 4].

3 Glue the stiles (F, G) to the side panels (H), making sure you create a left/right pair [**Drawing 4**]. Drill the shelf-pin holes. Finish-sand the side assemblies (F/G/H).

4 Cut the back rails (I) to size. Rabbet one edge and both ends of each rail [Drawing 4a] to create a top/bottom pair [Drawing 4]. Finish-sand the rails.

5 Cut the back slats (J, K) to size and rabbet the edges [Drawing 5]. Notice that the narrow slats (J) receive rabbets on only one edge and on opposite faces. Finish-sand the slats.

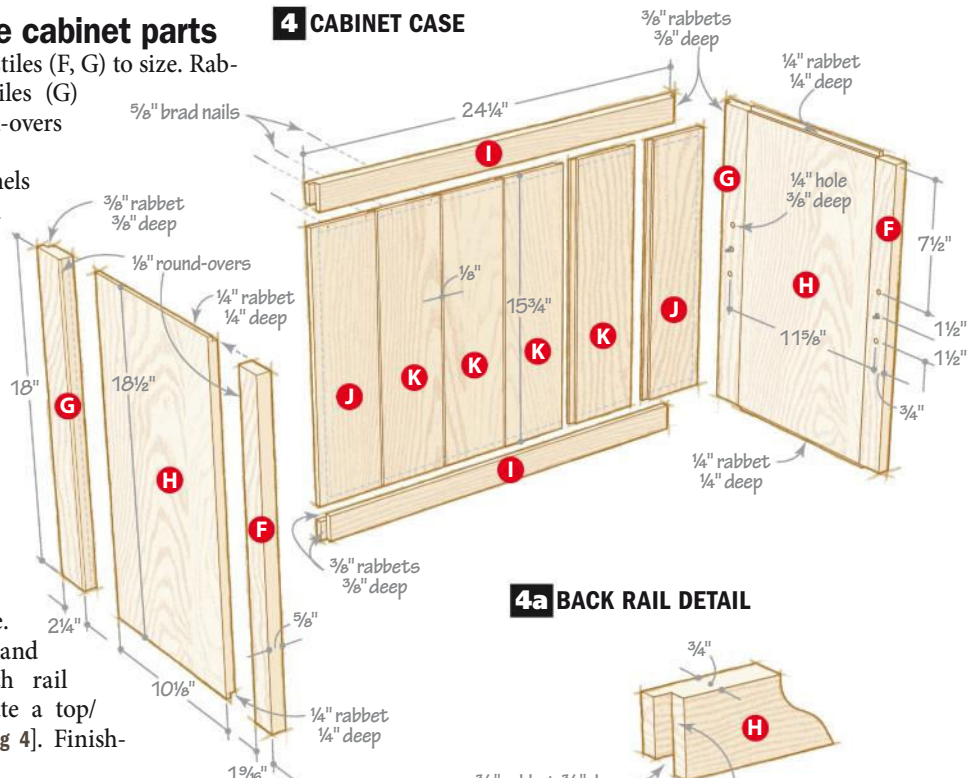
Put together a pair of doors

1 Cut the door stiles (L) and rails (M) to size. Groove the inside edges and form the tenons on the ends of the rails [Drawings 6 and 6a]. Finish-sand the stiles and rails.

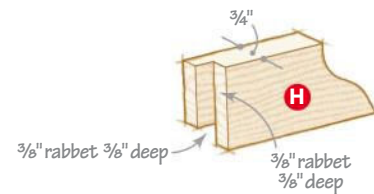
2 Make the door panels (N) from 1/4" material. Because the panels highlight the finished piece, strive for distinctive—even dramatic—figure or color. The panels shown are book-matched, quartersawn sycamore. Veneered panels would also work.

3 Finish-sand the panels, and apply an oil finish before you assemble the doors.

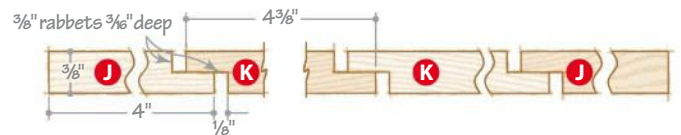
4 Glue the doors together [Drawing 6]. As you install the panels, press ¼" (they're actually a bit bigger) Space Balls into the grooves. (Not *Spaceballs*, the classic Mel Brooks sci-fi movie, but resilient spacers



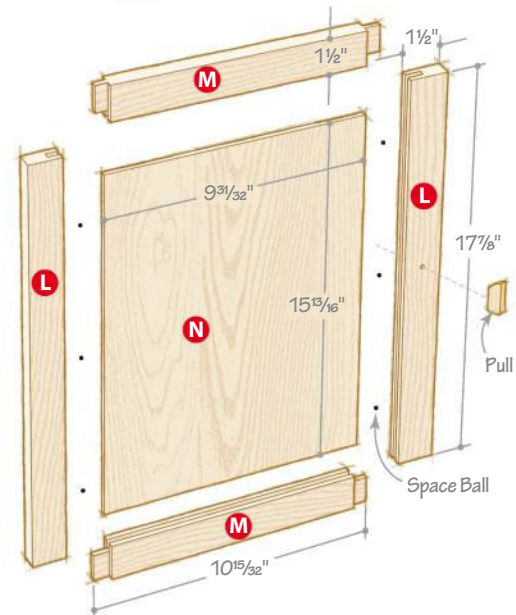
4a BACK RAIL DETAIL



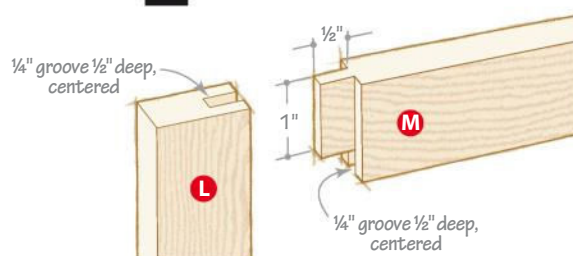
5 BACK SLAT DETAIL



6 DOOR



6a DOOR JOINT DETAIL



Note: The distance between the rabbit shoulders on the side panels must exactly equal the length of the stiles (F, G).

► Watch a free video
about accurately
drilling shelf-pin holes.
[woodmagazine.com/
shelfpin](http://woodmagazine.com/shelfpin)

► Watch a video about selecting grain for best appearance.
woodmagazine.com/woodgrainselection

► Book-match panels
for your doors.
[woodmagazine.com/
bookmatch](http://woodmagazine.com/bookmatch)

Tip! Measure both diagonals on each door as you clamp it to check for square.

that prevent the panels from rattling in the grooves while allowing solid-wood panels to expand and contract with seasonal humidity changes [Sources.] Finish-sand the doors.

5 Cut the catch block (O) to size [Exploded View], finish-sand it, and set it aside.

Fit the doors and hinges

1 Dry-assemble the legs (A), bottom stretchers (B), top/bottom panel assemblies (C-E), and side assemblies (F-H) [Exploded View].

2 Transfer the outside edges of the front stiles (F) to the top and center stretchers (C) [Photo C]. Disassemble the cabinet.

3 Lay out and rout the mortises for the knife hinges in the doors [Drawing 7] and top/center stretchers [Drawing 8]. See the Skill Builder, below.

4 Dry-assemble the cabinet (A-H) again. Fit the doors and hinges and check for smooth operation and correct door hang. The gap between the doors should be about $\frac{1}{8}$ ". Disassemble the case, and touch-up or finish-sand the parts as necessary.

5 Cut the shelf (P) and shelf trim (Q) to size. Glue the trim to the front edge of the shelf, flush at the top [Exploded View]. Finish-sand the shelf assembly.

► Watch a video about installing knife hinges.
woodmagazine.com/knifehinge



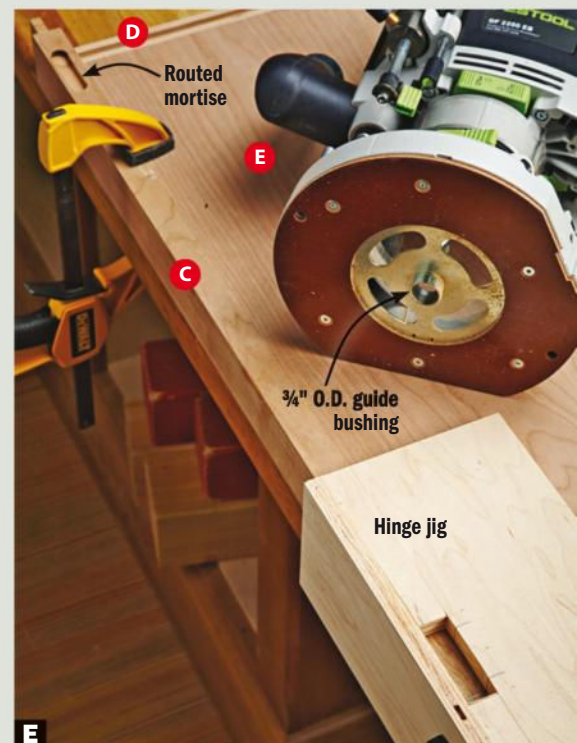
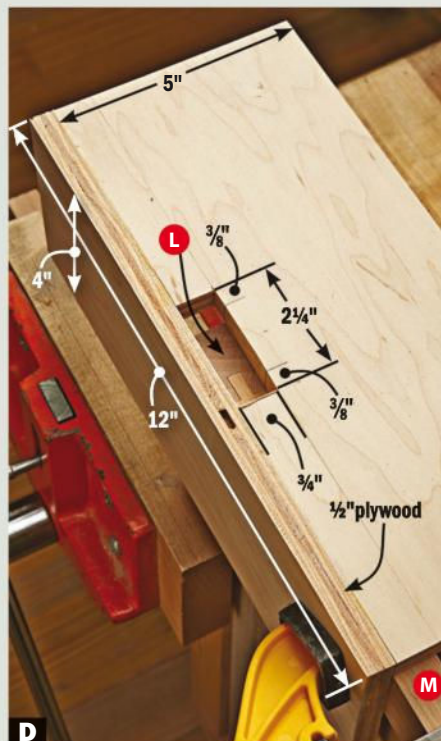
A small square aids in marking the front stile locations on the stretchers (C). These marks indicate the outer edges of the doors for locating the hinges on the stretchers.

SKILL BUILDER

Knife hinges make sharp cabinets

Knife hinges, also called pivot hinges, barely show when installed, making them ideal for projects where visible hinges could spoil the lines of the furniture. On this cabinet, the hinges fit into shallow mortises in the top and bottom edges of the doors and the inside edges of the top/center stretchers, leaving the faces of the doors unmarked by hardware.

To make mortises for the hinges, build a jig like the one shown [Photo D]. When you draw the index marks $\frac{3}{8}$ " from each end of the slot, extend the lines to the bottom of the slot to help you accurately place the jig on the cabinet parts. Then, equip your router with a $\frac{3}{4}$ " OD guide bushing and a $\frac{1}{2}$ " upcut spiral bit [Photo E]. Adjust the router depth stop to $\frac{3}{16}$ " plus the thickness of your jig. (The setup described and the jig shown produce mortises for hinge leaves that measure $\frac{3}{16}$ "T x $\frac{1}{2}$ "W x 2"L. If yours differ, modify the size of the jig slot or the router cutting depth accordingly.)



► Make your own squaring braces. woodmagazine.com/clampingbrace

Tip! Dry-fit the legs on the opposite side for easier clamping when you install the first pair of legs.

Assemble the cabinet

1 Glue the top/bottom panel assemblies (C-E) to the side panel assemblies (F-H) [Photo F].

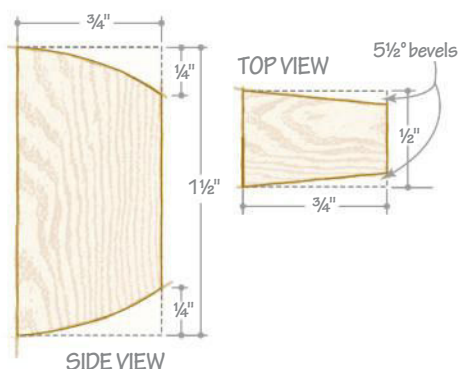
2 Apply glue to the tenons on one side of the case assembly (C-H). Then, clamp the legs (A) in place on that side. After the glue dries, glue on the remaining legs plus the bottom stretcher (B).

3 Glue on the catch block (O), centered on back of the top front stretcher (C).

4 Glue the back rails (I) into position on the cabinet case (C-H) [Drawing 4].

5 Make a pair of door pulls [Drawing 9] or purchase suitable commercial ones. To make pulls like the ones shown, bevel-rip a

9 FULL-SIZE PULL PATTERNS



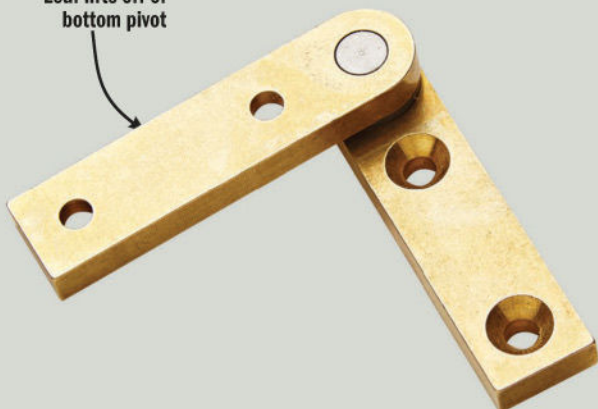
F

Square up the case as you assemble it. Apply glue to the tenons formed by the rabbets on the side assemblies (F/G/H), and clamp the case together with squaring braces.

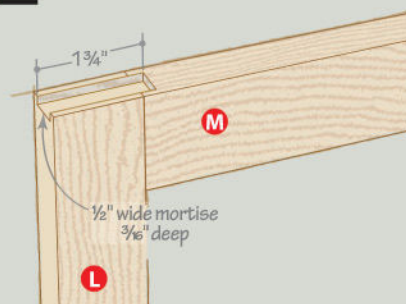
To mortise the door edges, align the index mark with the outside edge of the door stile (L) [Photo D]. Position the router on the jig and plunge the bit into the door edge. Rout each mortise in a single pass. Square the nonpivot end of each mortise with a chisel.

Similarly rout the front top and middle stretchers. On the stretchers, align the jig index mark with the lines drawn on the stretchers in Photo C.

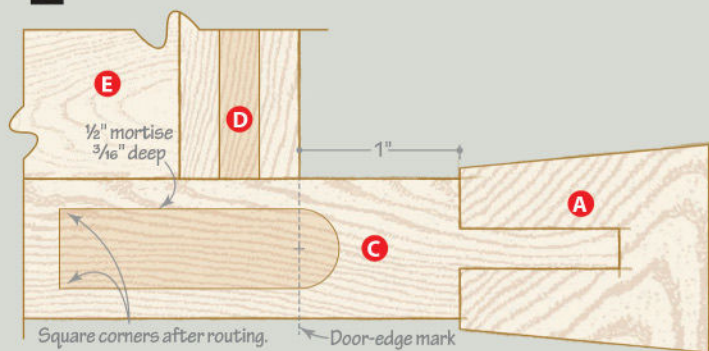
Leaf lifts off of bottom pivot



7 HINGE MORTISE DETAIL



8 STRETCHER HINGE MORTISE



12" length of stock (scraps of exotic wood are ideal) at 5½" on each side. Scrollsaw or band-saw the pulls to shape, sand, and finish.

6 Apply finish to the cabinet, back slats (J, K), and shelf. Install the doors and hinges, install the door pulls, and nail the back slats in place [Drawings 4 and 5]. Add ball catches to the doors and catch block. Position shelf pins and slide the shelf in place to complete your designer cabinet. 🌳

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



Cutting Diagram



2 x 5½ x 72" Cherry (2 needed)



1¼ x 7¼ x 96" Cherry



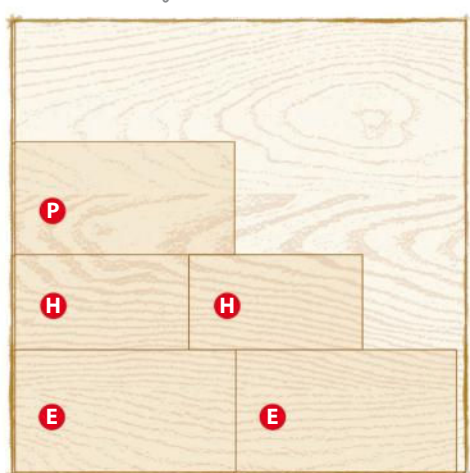
¾ x 7¼ x 96" Cherry * Plane or resaw to the thicknesses listed in the Materials List.



¾ x 5½ x 36" Sycamore



¾ x 5½ x 96" Sycamore



½ x 48 x 96" Cherry plywood

This project requires
11 bd. ft. 8/4 cherry
7 bd. ft. 5/4 cherry
5 bd. ft. 4/4 cherry
2 bd. ft. 4/4 sycamore
2 bd. ft. 3/8" sycamore
half sheet ½" cherry plywood

Materials List

Part	FINISHED SIZE			Matl.	Qty.	
	T	W	L			
Frame						
A	legs	1½"	2"	60"	C	4
B	bottom stretchers	⅞"	3"	29"	C	2
C	top/center stretchers	⅞"	1¾"	29"	C	4
D	panel rails	¾"	1¾"	13"	C	4
E	top/bottom panels	½"	13"	23½"	CP	2
Cabinet						
F	front stiles	⅝"	1⅞"	18"	C	2
G	back stiles	⅝"	2¼"	18"	C	2
H	side panels	½"	10⅞"	18½"	CP	2
I	back rails	¾"	1½"	24¼"	C	2
J	narrow back slats	⅜"	4"	15¾"	QS	2
K	wide back slats	⅜"	4⅜"	15¾"	QS	4
Doors						
L	stiles	¾"	1½"	17⅞"	C	4
M	rails	¾"	1½"	10⅞"	C	4
N	panels	¼"	9⅜"	15⅜"	QS	2
O	catch block	¾"	1¼"	3"	C	1
Shelf						
P	shelf	½"	12"	23⅞"	CP	1
Q	shelf trim	¾"	1"	23⅞"	C	1

Materials key: C-cherry, CP-cherry plywood, QS-quartersawn sycamore or other distinctive wood.

Supplies: Shelf pins (4), #6x½" brass flathead wood screws (16), #6x1¼" flathead wood screws (2), ⅝" brad nails (24), ½x¾x12" exotic hardwood for pulls.

Blade and bits: Dado set; ¼" and ⅜" rabbet, ⅝" round-over, and ½" upcut spiral router bits.

Sources

Books by James Krenov: "A Cabinetmaker's Notebook" (1976); "The Fine Art of Cabinetmaking" (1977); "The Impractical Cabinetmaker" (1979); "Worker in Wood" (1981); "With Wakened Hands" (2000), various prices, amazon.com

Space Balls: package of 100, no. 12386, \$6.49, Rockler, 800-279-4441, rockler.com

Brass straight knife hinges: ½x2x⅞", no. 05H01.08, \$23.30/pair (2 pairs needed), Lee Valley, 800-871-8158, leevalley.com

Brass ball catches: 38mmx7mm, no. 00W12.00, \$1.80 each (2 needed), Lee Valley.



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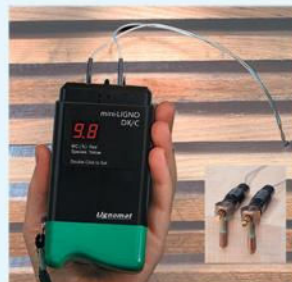


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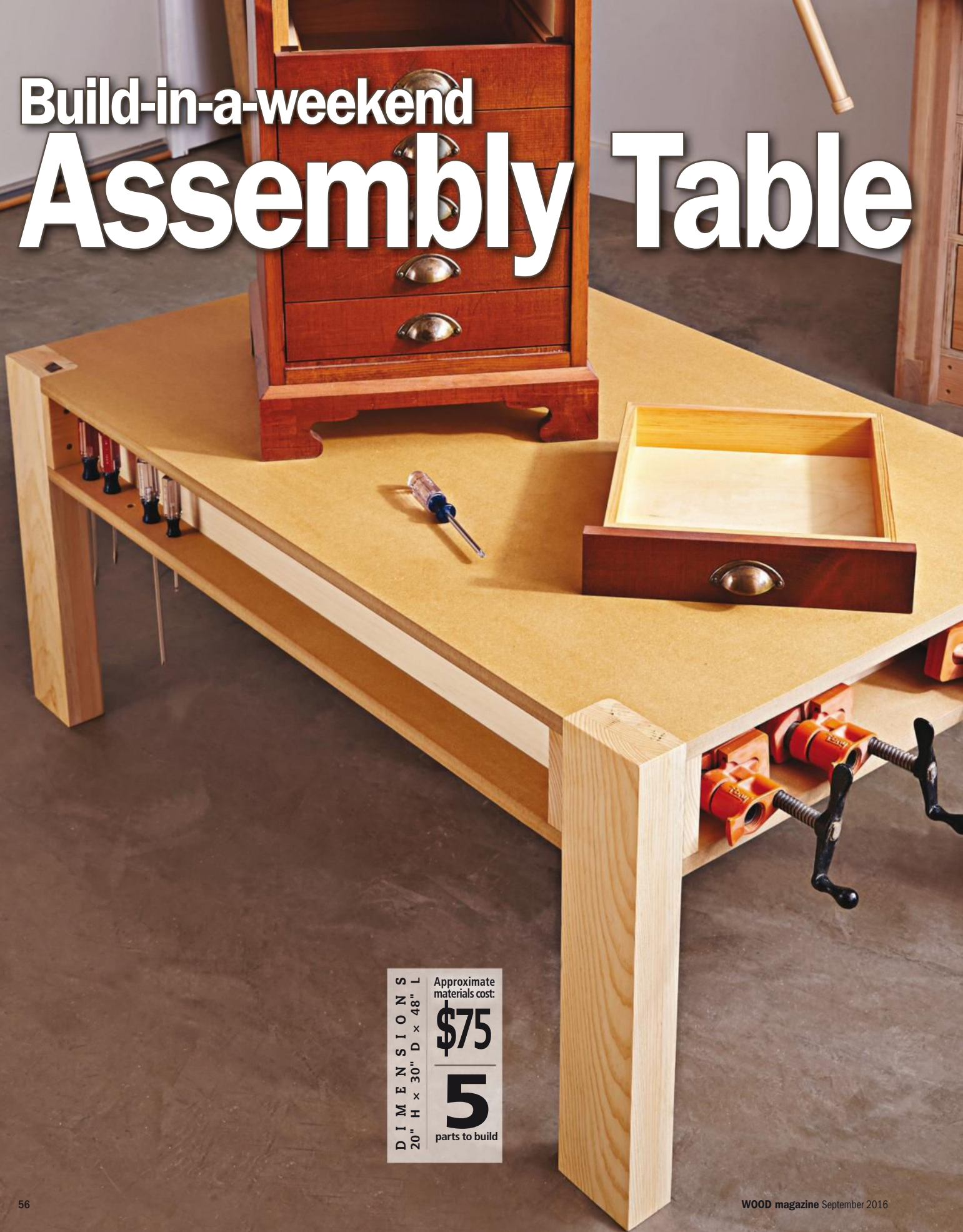


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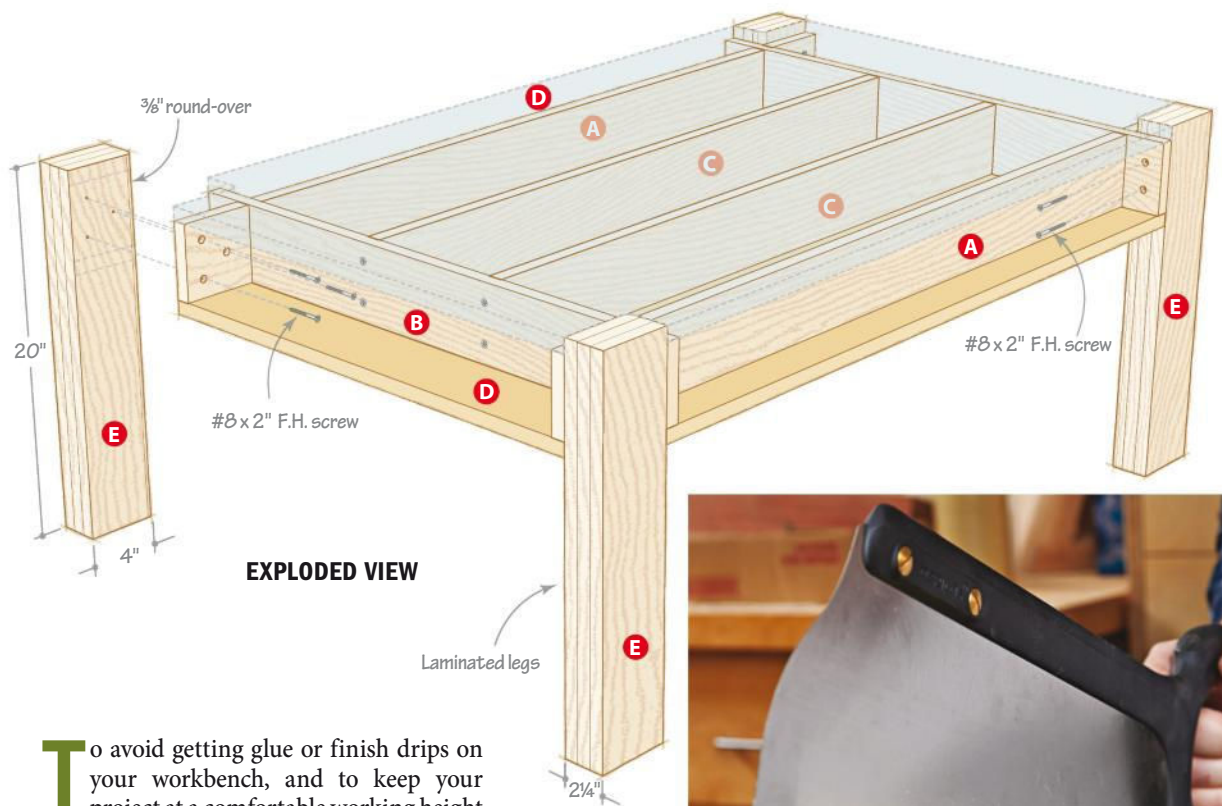
D I M E N S I O N S
20" H x 30" D x 48" L

Approximate
materials cost:

\$75

5

parts to build



EXPLODED VIEW

To avoid getting glue or finish drips on your workbench, and to keep your project at a comfortable working height during assembly, build this generously sized, dead-flat shop table. Construction takes only a few hours, and requires only a handful of common tools—perfect for those just getting started in woodworking.

Start with the framework

1 Cut the rails (A–C) to size [Materials List]. Mark out and cut the notches in the side and end rails [Drawing 1, Photos A and B]. Assemble the table's frame [Photo C].



A

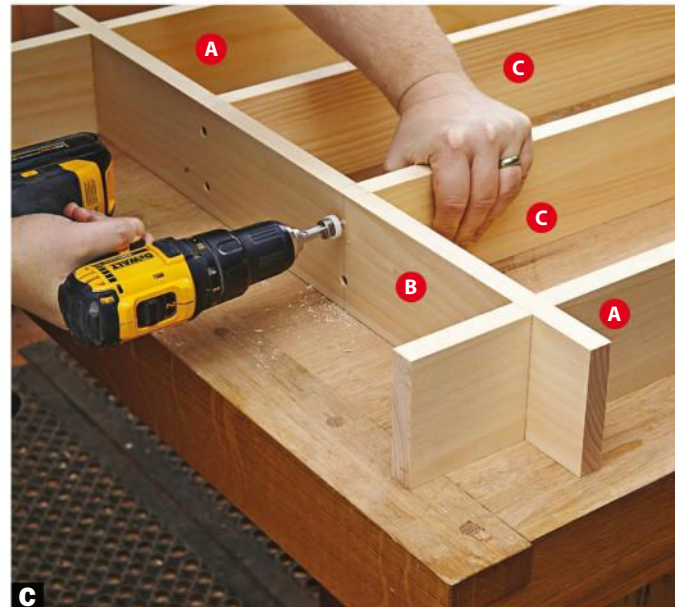
By tablesaw or by hand, cut the notches. If you don't have a tablesaw (preferably with a dado set), use a handsaw.

► Pick the best handsaw for the job.
woodmagazine.com/handsaws



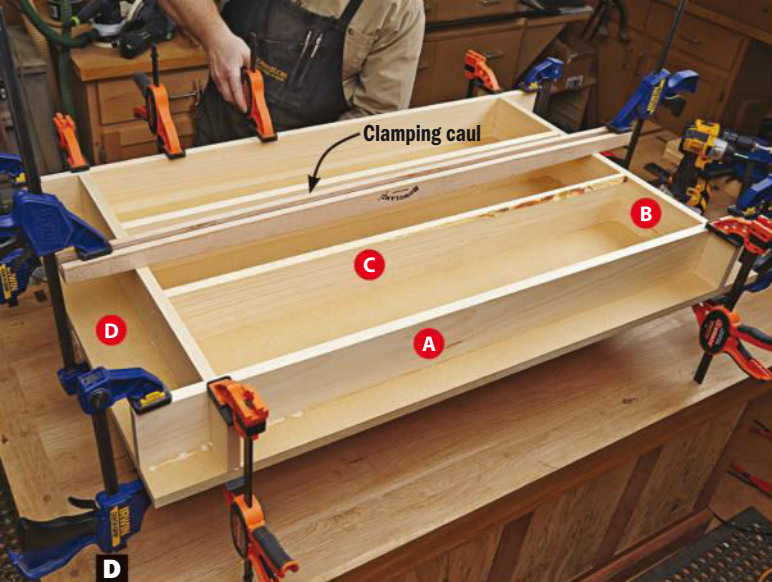
B

Cut the sides of each notch, and use a chisel to pop out the waste.



C

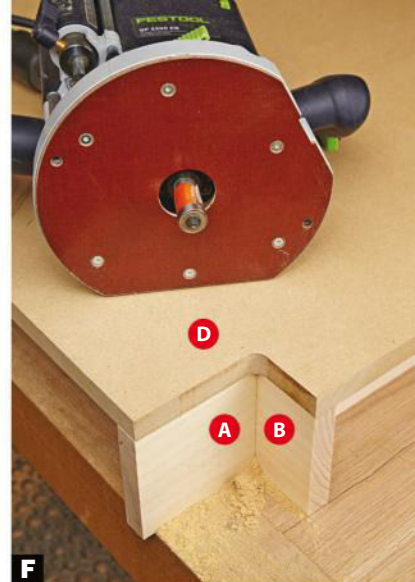
Tie it all together. Hook the side rails (A) and end rails (B) together to form a frame. Then, screw the center rails (C) in place between them. Make sure all edges are flush and that the assembly is flat and square.



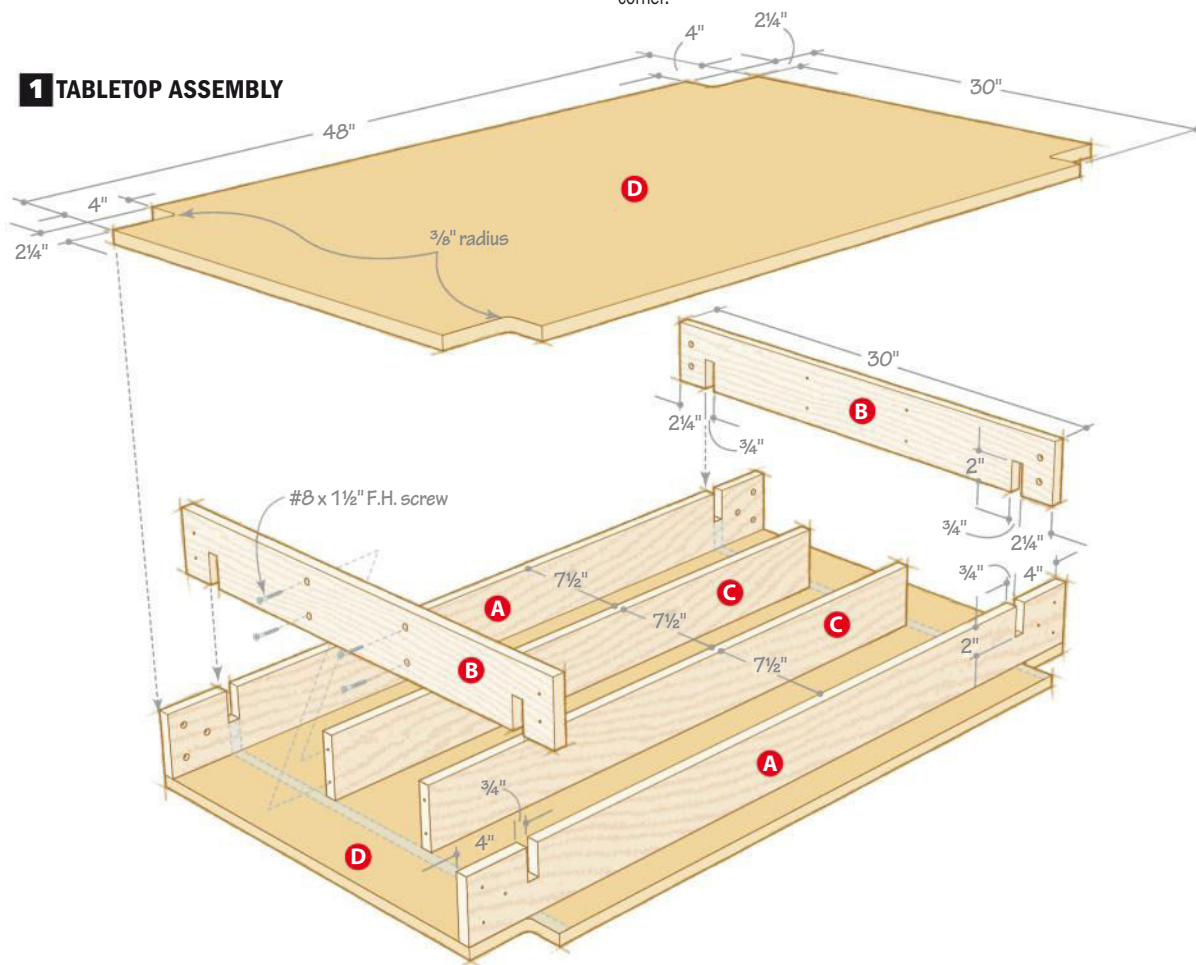
Put the top down. Apply glue to the top edges of the frame (A/B/C), then flip it over onto the top (D). Make any minor alignment tweaks, then clamp the assembly.



Rout out the corners. With a flush-trim bit in your router, cut out the corners flush with the side rails (A) and end rails (B). There's no need to square the small radius on the inside corner.



1 TABLETOP ASSEMBLY



► Learn to cut sheet goods in tight quarters.
woodmagazine.com/cutsheetgoods

2 Cut the top and bottom (D) to size. Glue and clamp the top to the frame (A/B/C) [Photo D]. Then, cut away the MDF from the corners of the assembly to make room for the legs (E) [Photos E and F]. Repeat for the bottom.

3 Laminate (glue face-to-face) $\frac{3}{4}$ " stock for the legs (E), then cut them to size. Along the inside corner of each leg, rout a round-over to match the radius of the flush-trim bit

you used in Step 2. Glue and screw the legs to the side and end rails (A, B) [Exploded View].

4 Accessorize the table as shown on the *next page*, if you like. You can apply a clear finish such as drying oil or polyurethane for added drip and ding protection, but no finish is necessary on this utilitarian piece. It's ready to work!

Maximize the table's potential

Add tool and clamp storage to your assembly table by utilizing the open areas beneath the tabletop. For storing clamps, drill through an end rail (B) using a Forstner bit. Slide the clamp shafts in between the table's rails (A, C) so only the clamp jaws are exposed. For screwdriver storage, drill

through the MDF bottom (D) at an angle from above. Then, flip the table over and, using a round file, make the holes perpendicular to the bottom so the screwdrivers sit upright. 🌱



Cuttin Diagram



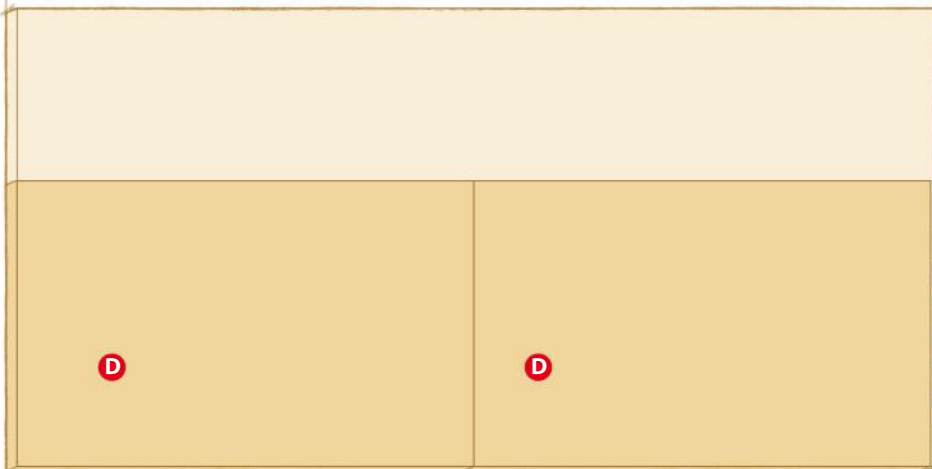
3/4 x 9 1/4 x 96" Pine



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



3/4 x 9 1/4 x 72" Pine



3/4 x 48 x 96" Medium-density fiberboard

This project requires
18 bd. ft. 4/4 pine
1 sheet 3/4" MDF

Materials List

Part		FINISHED SIZE			Matl.	Qty.
		T	W	L		
A	side rails	3/4"	4"	48"	P	2
B	end rails	3/4"	4"	30"	P	2
C	center rails	3/4"	4"	38 1/2"	P	2
D	top/bottom	3/4"	30"	48"	MDF	2
E*	legs	2 1/4"	4"	20"	LP	4

*Parts initially cut oversize. See the instructions.

Materials key: P-pine, MDF-medium-density fiberboard, LP-laminated pine.

Supplies: #8x2" flathead screws.

Bit: 3/4" flush-trim router bit, 3/8" round-over router bit.

Produced by **Nate Granzow** with **John Olson**
Project design: **John Olson**
Illustrations: **Lorna Johnson**

Cupcake Tree

Turn this sweet little project on a benchtop lathe.



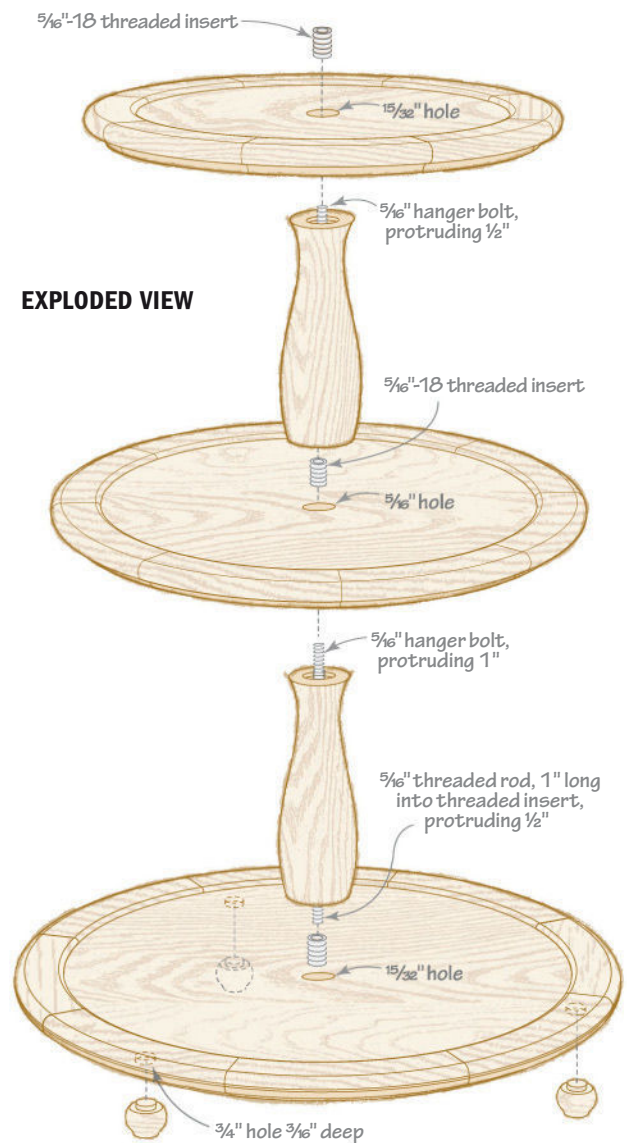
How do you make a project with a 16"-diameter platter when your lathe doesn't have that much swing? Turn the spindles and feet on your lathe and do the big stuff with a plunge router and circle jig. And speaking of big stuff, you don't have to worry about the cupcake tree hogging space when not in use. It disassembles for storage.

The key trick to this project: Make plywood disks that fit perfectly into rabbets routed around the inside edges of segmented rings. To do this, fit a plunge router with a 1/2" straight bit and a Jasper Model 200 Circle Guide [Sources]. It helps you cut circles in fixed increments to form disks and rout rabbeted rings that fit together flawlessly.

Start with the platter edging

1 From 3/4x2 1/2" boards (we used maple) miter-cut 6 1/2"-, 5 3/4"-, and 5"-long ring segments—eight each—with 22 1/2° angles at both ends. Glue and clamp each set of segments to form octagons for the top-platter, middle-platter, and bottom-platter edging [see Skill Builder].

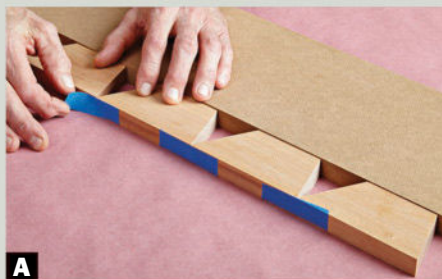
2 Adhere the top-platter octagon to a spoil board with double-faced tape. At the center of the octagon, adhere a scrap of the



SKILL BUILDER

Tape and trim to solve a sticky glue-up

With eight mating miters, even minute variations in the miter cuts can add up to an octagon with an ill-fitting joint. To avoid problems, glue up half-octagons [Photos A, B, C]. Then trim the halves [Photo D] and glue them together.



A Tape together four edging segments point to point. Butt the pieces against a straight scrap to help with alignment.



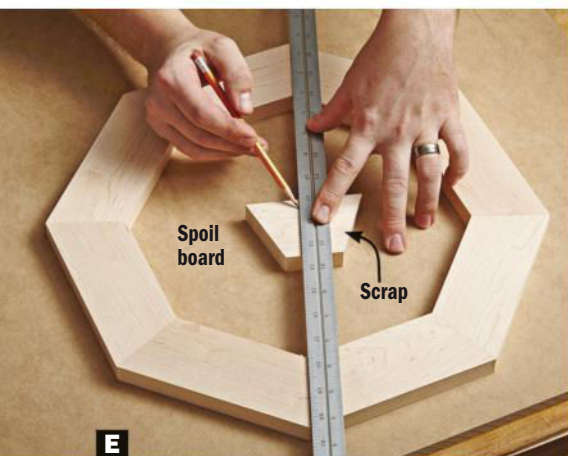
B Flip the joined segments upright and apply glue to the miters.



C Pull the miters together with a piece of tape.

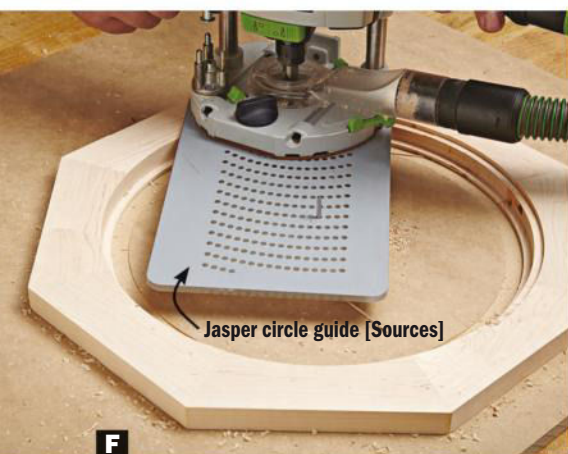


D Mount the half-octagon to a carrier board with double-faced tape with the ends overhanging the edge just slightly. True up the end miters.



E

Align a straightedge with the miter joints and mark the center of the octagon onto the scrap block.



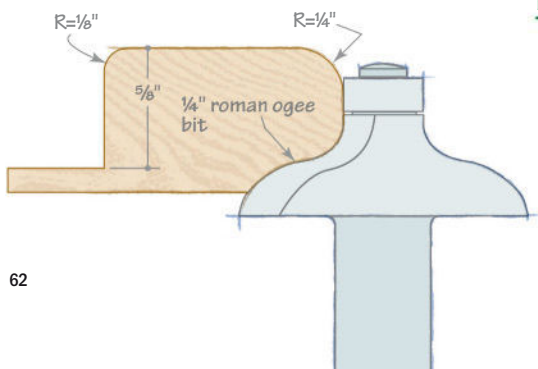
F

Making progressive $\frac{1}{8}$ "-deep passes, rout a $\frac{1}{2}$ " rabbet $\frac{3}{8}$ " deep around the inside of the edging. The first pass in the second (final) series of rabbet cuts is shown.

Don't want to invest in a Jasper Jig? Here's another way.

If you already have a circle-cutting attachment for your router, use it to rabbet the edging rings. Then rout slightly oversize disks. Now adjust the circle attachment in small increments to sneak up on a good fit between the disks and the ring rabbets.

2 PLATTER PROFILE SECTION VIEW

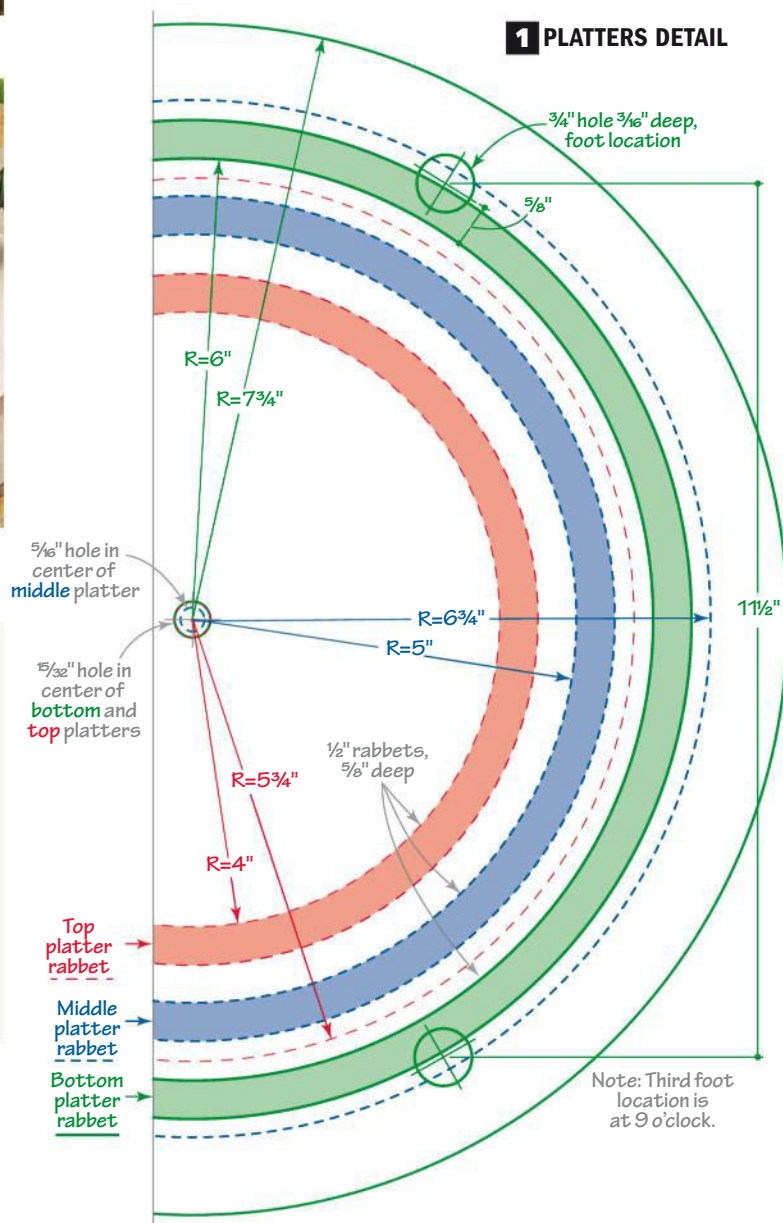


frame material to the spoil board. Mark the center of the octagon on the scrap [Photo E]. Drill a $\frac{1}{8}$ " hole for the circle-guide pivot pin. Set your circle guide for a 4" radius to the *outside* of the bit and rout the interior of the edging round, cutting through the blank. **3** Rout a rabbet, working down in $\frac{1}{8}$ " increments, then outward in $\frac{1}{4}$ " increments [Drawings 1 and 2, Photo F]. Reset the circle guide and rout the outer diameter of the platter, cutting through the blank. Repeat these steps with the octagons for the middle and bottom edging [Drawing 1].

4 At the router table, round over the top inside edge of each edging ring [Drawing 2]. Switch to a $\frac{1}{4}$ " roman ogee bit (Freud no. 38-154) and using just the round-over portion, rout the top outside edges of the rings. Using more of the profile, rout the bottom outside edges.

► A *spoil board* is a waste piece, usually particleboard or MDF, placed under a routed part to allow cutting through without damaging your worksurface or bit.

1 PLATTERS DETAIL



Make three disks

- 1 From $\frac{1}{2}$ " maple plywood, rout 9"-, 11"-, and 13"-diameter disks [Photo G].
- 2 Enlarge the pivot hole of the 11" disk to $\frac{5}{16}$ " and the pivot holes of the 9" and 13" disks to $\frac{15}{32}$ ". Install $\frac{5}{16}$ "-18 threaded inserts in the 9" and 13" disks. Finish-sand the disks and glue them into the ring rabbets.
- 3 Lay out and drill three equally spaced holes for the feet on the bottom of the bottom platter [Drawing 1]. Finish-sand the edging of all three platters.

Install the hardware

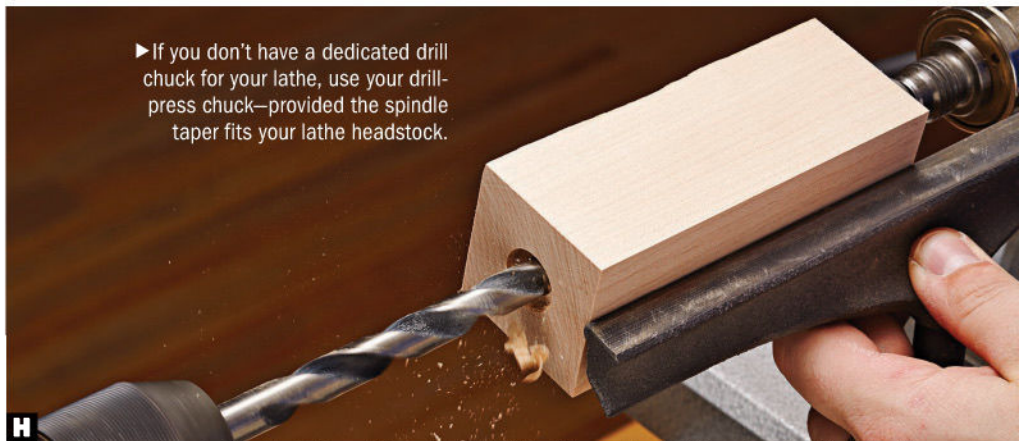
- 1 Cut two 2x2x5" blanks for the spindles and mark centers on the ends. Install a drill chuck into the lathe headstock and a live cone center into the tailstock. Working at 500 rpm, bore a $\frac{3}{4}$ " hole $\frac{1}{8}$ " deep in one end of each blank.
- 2 Switch to a $\frac{15}{32}$ " drill bit and drill holes $\frac{1}{2}$ " deeper, centered in the $\frac{3}{4}$ " holes [Photo H]. Install $\frac{5}{16}$ "-18 threaded inserts in the holes, flush with the bottoms of the $\frac{3}{4}$ " holes.
- 3 Switch back to the $\frac{3}{4}$ " drill bit and flip each blank end for end with the tip of the cone center in the threaded insert. Drill a $\frac{3}{4}$ " hole $\frac{1}{8}$ " deep in each blank.
- 4 Switch to a $\frac{1}{4}$ " drill bit and drill holes $1\frac{1}{2}$ " deeper, centered in the $\frac{3}{4}$ " holes. Thread $\frac{5}{16}$ " hanger bolts into the holes, letting the machine threads of one hanger bolt protrude $\frac{1}{2}$ " and the other protrude 1".

Turn the spindles

- 1 Make a copy of the **Spindle Full-Size Pattern** on page 64. Adhere it to a piece of $\frac{1}{8}$ " hardboard with spray adhesive, and cut and sand it to shape.
- 2 Grip the protruding hanger bolt of one blank with the drill chuck and support the other end with the cone live center in the threaded insert. Turn the blank into a cylinder using a spindle roughing gouge.
- 3 Set the lathe speed at 1,500 rpm and use the roughing gouge and a spindle detail gouge to shape the spindles [Drawing 3, Photo I]. Finish-sand the spindle. Repeat with the second spindle.



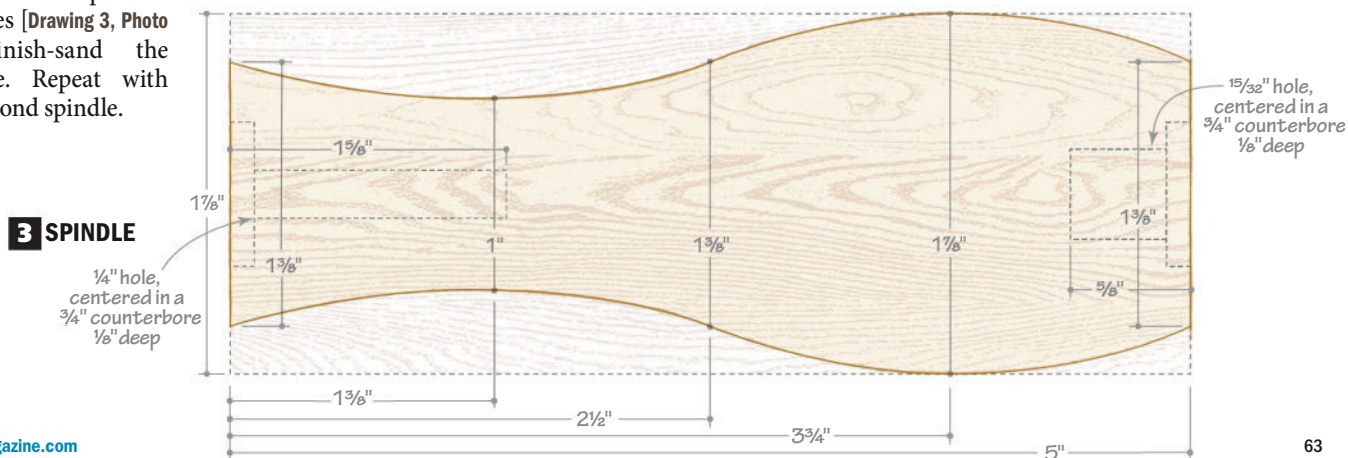
G Mount each plywood disk blank to a spoil board with double-faced tape. Use a plunge router and circle jig to cut the disks.



H If you don't have a dedicated drill chuck for your lathe, use your drill-press chuck—provided the spindle taper fits your lathe headstock. Position the tool rest against the blank to keep it from turning. With the lathe running at 500 rpm, turn the tailstock quill-feed handle to slowly feed the blank onto the drill bit.



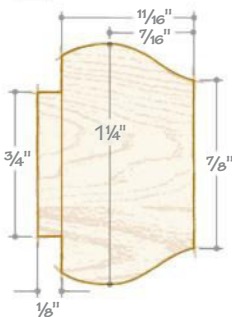
I Turn the spindles to shape, checking the profile with the pattern template.



Make the feet

- 1 Make a copy of the **Foot Full-Size Pattern** below. Adhere it to a piece of $\frac{1}{8}$ " hardboard with spray adhesive, and cut and sand it to shape.
- 2 Clamp a 2×2×4" blank into a four-jaw chuck. Turn it into a cylinder using a spindle roughing gouge, working to within 1" of the jaws.
- 3 Turn a tenon on the end of the cylinder with a parting tool. Flip the blank and grip the tenon with the chuck. Finish turning the blank into a cylinder. Reduce the rough cylinder to $1\frac{1}{4}$ " diameter with the roughing gouge and flatten the end with a skew chisel.
- 4 Mark pencil lines on the cylinder $\frac{1}{16}$ " and $\frac{1}{8}$ " from the end and scribe a $\frac{7}{8}$ "-diameter circle on the cylinder end [Drawing 4, Skill Builder].
- 5 Using a parting tool, form a $\frac{3}{4}$ "-diameter tenon at the $\frac{1}{16}$ " mark. With a spindle detail gouge, form the ogee profile [Photo J]; then, round over the top edge of the foot, starting at the $\frac{1}{16}$ " mark.
- 6 Check the profile with the pattern template. Finish-sand the foot and part it off. Repeat Steps 4–6 to form two additional feet.

4 FOOT



J Use a spindle detail gouge to form an ogee from the $\frac{1}{16}$ " mark on the side of the blank to the $\frac{7}{8}$ "-diameter circle scribed on the end.

Finish and assemble

- 1 Glue the feet into the holes in the bottom platter. Apply a food-safe finish such as General Finishes Salad Bowl Finish [Sources] to the platters and spindles.
- 2 Cut a piece of $\frac{5}{16}$ " threaded rod 1" long. Epoxy it into the threaded insert in the bottom of the spindle with 1" of hanger bolt protruding from the top, letting $\frac{1}{2}$ " of the threaded rod protrude at the bottom. (This is the lower spindle.) With the epoxy cured, assemble the cupcake tree [Exploded View]. 🌳

Sources

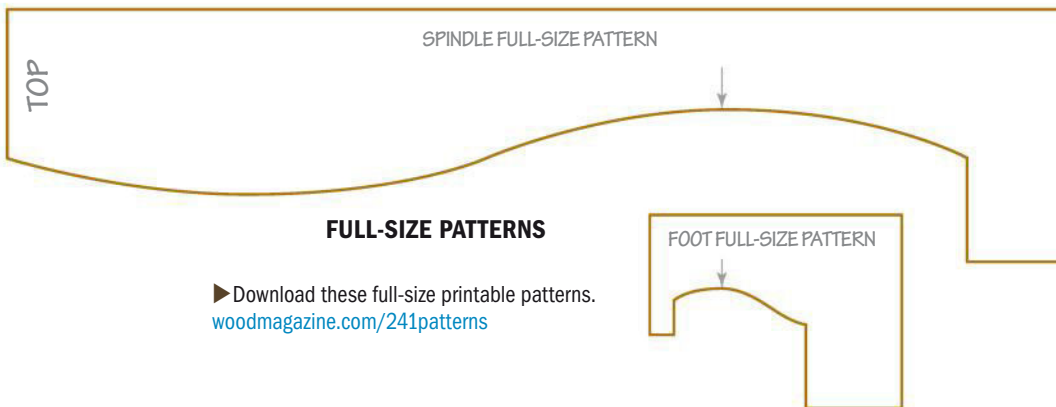
Jasper Circle Guide no. 200, \$36.86, woodmagazine.com/jasper. $\frac{5}{16}$ "-18 threaded inserts no. 28811, pack of 8, \$7.99; $\frac{5}{16}$ "-18×2" hanger bolts no. 24414, pack of 8, \$2.99; General Finishes Salad Bowl finish no. 12196, pint, \$11.99, Rockler Woodworking and Hardware, 800-279-4441, rockler.com

► Watch FREE videos with turning tips and techniques. woodmagazine.com/turningvideos

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



► Download these full-size printable patterns. woodmagazine.com/241patterns

SKILL BUILDER

Measure and mark with calipers

You could find the center of the cylinder and use a ruler and pencil to mark the $\frac{7}{8}$ " circle on the end, but here's a faster and more accurate way. Set your calipers to $\frac{7}{8}$ " and lock the jaws. Position the tool rest across the end of the cylinder and adjust the height to the cylinder center. With the lathe running, rest the inside-diameter caliper jaws on the tool rest. Starting near the edge of the cylinder, scribe *only* with the left-hand jaw point. The right-hand jaw point must not contact the cylinder end. Move the left-hand point toward center until the right-hand point aligns with the scribed line. Hold the calipers in this position to scribe the circle.



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12" rails (no. 05N29.06), \$14

Complete kit (no. 05J65.07), \$169 (includes both rail sizes)

This robust aluminum base threads directly onto the tool. (It fits most rotary tools.) Once installed, it works great for routing field cuts (no exit point along an edge or end), such as inlays, stopped grooves, and letters or numbers. The base has 1¼" of plunge travel with a depth-stop rod, and a 1" bit opening with great visibility. The edge guide tracks the bit parallel to an edge, and its optional microadjuster helps fine-tune bit position.

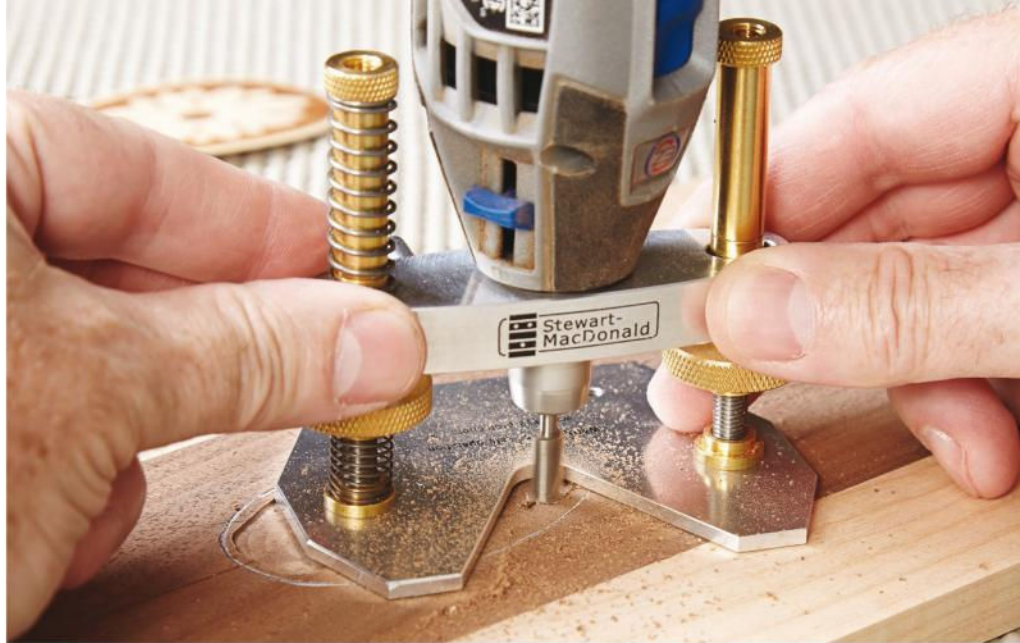
Lee Valley, 800-871-8158, leevalley.com

Precision router base (no. 5260), \$53
Edge guide (no. 4324), \$35

This fixed base threads in the same way as the plunge base. After installing a bit, you simply set the cutting depth by adjusting the knurled posts, and begin routing. Sold primarily to luthiers, this largely aluminum base works perfectly for routing fine details or inlays. Instead of plunging the bit into the wood, simply rest one edge against the workpiece and angle the bit in. The optional edge guide has an adjustable bearing for routing along an edge—such as inlaying stringing around a guitar body—but with only $\frac{3}{8}$ " of lateral movement, it's limited.

Stewart-MacDonald, 800-848-2273, stewmac.com

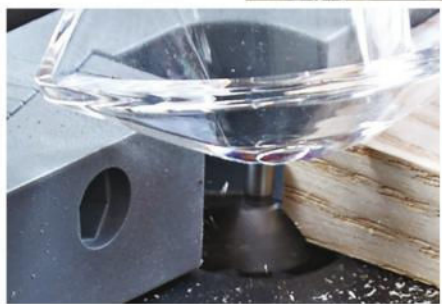
► A luthier makes or repairs wooden stringed instruments, such as guitars, violins, and cellos.



Shaper/router table (no. 231), \$30

Here's a great first router table, especially if you're not yet familiar with routers. You thread the rotary tool into this base (mounted to a workbench or larger wood blank you can clamp to a bench), and start working. With its tiny table and fence, this workstation has limitations, but if you work with small parts, it can be a good (and inexpensive) gateway to table routing.

Dremel, 800-437-3635, dremel.com



Circle cutter/edge guide (no. 678-01), \$12

This jig's greatest value is in helping you cut perfect circles $\frac{3}{4}$ –12" in diameter. It comes with a $\frac{1}{8}$ " downcut spiral bit, ideal for cutting holes and round channels without tear-out. This jig also has 6" of reach as an edge guide, but because it's so lightweight and the mounted tool is top-heavy, you can easily wiggle the tool and mess up a straight-routed line. Practice in scrap stock to get a feel for it.

Dremel, 800-437-3635, dremel.com



Best “baby” bits

► Stewart-MacDonald carbide downcut spiral bits (for tear-out-free routing and long-lasting sharp edges) with 1/8" shanks, five sizes from 1/32" to 1/8", \$18 each; \$82 for 5-pack set



► Dremel high-speed-steel 1/4" V-groove bit, no. 640, \$5 (carving and sign-making)



► Dremel high-speed-steel round-tipped carving/engraving bit 2-pack, no. 107, \$3 (carving on wood projects)



► Dremel diamond carving/engraving bit 2-pack, no. 7150, \$9 (engraving metal)

► Dremel high-speed-steel 6-bit set, no. 692, \$22



Chamfer



1/4" round-over



1/8" round-over



Core-box



1/4" straight



1/8" straight

Don't forget the sanding!

Sanding wheels won't make your rotary tool work more like a router, but we find them indispensable for cleaning and smoothing tight details. We especially like them when working with natural-edge slabs, for sanding in and around small protruding burly spikes, voids, splits, and bark inclusions. We recommend the following sanding attachments from Dremel (\$3–\$15 each):

- 3/8" flapwheel, 80 grit, no. 502
- 3/8" flapwheel, 120 grit, no. 503
- 3/16" flapwheel, 80 grit, no. 504
- 3/16" flapwheel, 120 grit, no. 505
- Detail abrasive brush 2-pack, 36 and 220 grit, no. EZ474SA-01
- Detail abrasive brush, 36 grit, no. EZ471SA
- Detail abrasive brush, 120 grit, no. EZ472SA
- Detail abrasive brush, 220 grit, no. EZ473SA
- EZ Lock mandrel (for abrasive brushes), no. EZ402, \$10

3/8" flapwheel



3/16" flapwheel



Detail abrasive brushes



EZ Lock mandrel



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Small-scale dust

Dust collection is essential to keeping your shop and lungs clean, but not every shop has the space, nor every craftsman the budget, for a large dust collector. Most shop vacuums can be had for under \$150, substantially less than many dust collectors.

Although a shop vacuum can't substitute for a whole-shop dust collector (it's limited by its capacity, power, and filtration), it excels at capturing dust from a single tool. In fact, for portable power tools requiring a small-diameter hose, a shop vacuum might be your only dust-collection option. Plus, it's highly mobile, so it scoots easily around a small shop.

When selecting a vacuum, consider the size you'll need. You can find models in sizes as large as 22 gallons or as small as 1½ gallons. Although larger, more powerful vacuums work with even the small-

est tools, they may prove unwieldy in some situations—such as when sanding a panel with a random-orbit sander—whereas a smaller vacuum can be easily carried or placed atop a workbench. Here, we show how to use a vac in three different dust-collection situations, plus some of our favorite accessories.

For chip-making machines

A large-volume vac can service a router table or portable planer. One with a 2½"-diameter hose reduces clogs, works well for general cleanup, hooks to benchtop and stationary machines, and can handle large wood chips.

► On the hunt for a shop vacuum? Start here.
woodmagazine.com/shopvacreviews



Ridgid 14-gallon vacuum, no. WD1450, \$100, 800-466-3337, homedepot.com

collection



Dust Right Dust Separator, no. 45556, \$80,
800-279-4441, rockler.com

Recommended accessory: Chip separator

A separator traps heavier dust and chips in a secondary container, allowing only the finest dust to reach the vacuum. This means your filters stay cleaner for a longer time, ensuring maximum air flow, and reduces the frequency of vacuum-bag changes (saving money). Place a separator in line with a tool that generates lots of chips, such as a router table or portable planer.



Capture coarse sawdust

Connect tools generating dust of smaller size than that of a planer or router table to a smaller vacuum and smaller-diameter hose. However, a long run of flexible vacuum hose (*above*) creates more air resistance your vacuum must overcome to draw air through it. Corrugated hose is already more likely to become plugged up by chips and shavings than straight-walled pipe, or 6" hoses found on larger dust collectors. Short runs of corrugated hose offer their own advantages, though: They can be coiled up tightly, and their flexibility makes them ideally suited for mobile tools.

Craftsman 5-gallon vacuum, no. 16825,
\$120, 800-349-4358, craftsman.com

Recommended accessory: Auto-switch

To make turning the vac on and off completely automatic, consider a tool-triggered switch. The vacuum fires up when you turn on the connected tool, then runs a few extra seconds after the tool is turned off to clear the hose of dust and chips.

Above left: i-socket 110m tool and vacuum switch, no. 20890, \$40, 800-279-4441, rockler.com.

Above right: iVAC automated shop vacuum switch, no. 149950, \$55, 800-225-1153, woodcraft.com

continued on page 74

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Dust Right Universal Small Port Hose Kit, no. 48212, \$40, 800-279-4441, rockler.com

Recommended accessory: Port adapters

With no industry standard for hose diameters (you'll find 2½", 1⅞", 1½", and 1¼" diameters), it's no surprise that there are no universal standards for dust-collection ports on small tools, either. An adapter, such as this one, connects mismatched hoses and ports.

Best for fine dust

Tiny dust, such as that generated by sanders, moves easily through hoses and requires little airflow. A small vacuum with a 1¼" hose will do the job, cost less, and take less space.



Shop-Vac 2.5-gallon vacuum, no. 549704, \$35, 800-445-6937, lowes.com

► HEPA stands for "high-efficiency particulate arrestance."



HEPA filter

Cloth filter bag



Disposable collection bag

Vac intake port

Recommended accessory: Finer filter

To improve the dust collection of your shop vacuum, replace the factory air filter with a HEPA filter. These use a superfine mesh to trap even the smallest airborne particulates. Many manufacturers carry HEPA filter replacements on their websites.

A disposable collection/filtration bag (above) mounts to the vacuum's intake port and wraps around the filter to trap most of the debris. Using one, or a cloth filter bag (left), in tandem with a fine filter greatly reduces the amount of dust particles returned to the air. 🌳

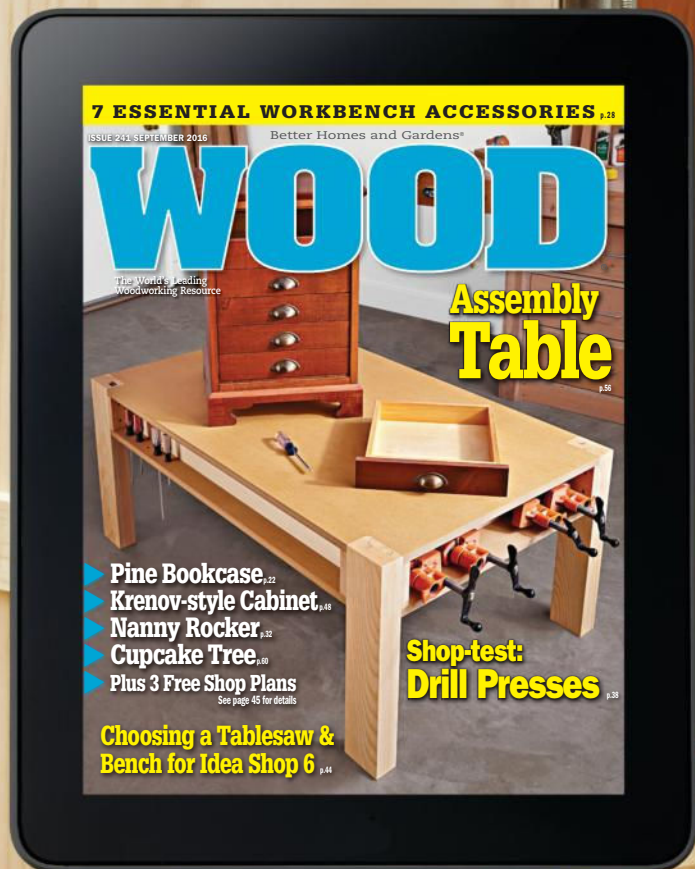
► Dust will cake on a filter's pleats over time—this actually helps improve filtration. It's still a good idea to periodically clean off loose dust when it builds up, but don't bother to shake out every crack and crevice.

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LOT 69031/69030 shown

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RETRACTABLE
AIR HOSE REEL WITH
3/8" X 50 FT. HOSE

LOT 93897 shown
69255/62344



SAVE
\$106

Customer Rating
★★★★★

\$59.99
comp at \$166

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16575135

6" DIGITAL CALIPER
PITTSBURGH
LOT 47257 shown
61585/62387



\$9.99
comp at \$29.99

Customer Rating
★★★★★

Includes two 1.5V SR44 button cell batteries.

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16530493

SAVE 12" THICKNESS PLANNER
PITTSBURGH
LOT 62555/95082 shown



\$239.99
comp at \$369

Customer Rating
★★★★★

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16527149

WOW SUPER COUPON

2-IN-1 FLOORING
NAILER/STAPLER

LOT 69703/61689 shown



SAVE
\$100

Customer Rating
★★★★★

\$99.99
comp at \$199.99

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16497358

26" 16 DRAWER
ROLLER CABINET



Customer Rating
★★★★★

\$329.99
comp at \$952.99

• 1060 lb. capacity
• 14,600 cu. in. of storage

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16533337

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\$5.99
comp at \$17.97

• 42304/63282
• 42305/69044

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16571614

WOW SUPER COUPON

2 HP INDUSTRIAL
5 MICRON
DUST COLLECTOR



SAVE
\$200

\$179.99
comp at \$379.99

• 70 gallon capacity
LOT 67790
97869 shown

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16551093

4-1/2" ANGLE GRINDER
drillmaster



Customer Rating
★★★★★

\$17.99
comp at \$20.76

• 60625 shown

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16493566

4" X 36" BELT/6" DISC SANDER



Customer Rating
★★★★★

\$84
comp at \$144.10

LOT 62502
97181 shown

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16575527

WOW SUPER COUPON



10" 12 SPEED
BENCHTOP
DRILL PRESS

LOT 62409/44836
60237 shown

\$109.99
comp at \$199.99

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SANDING SPONGES
PACK OF 10



COARSE
LOT 46751

MEDIUM
LOT 46752

FINE
LOT 46753

Customer Rating
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comp at \$18.27

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16500459

50" CLAMP AND CUT EDGE GUIDE
PITTSBURGH
LOT 66581



Customer Rating
★★★★★

SAVE
65%

\$16.99
comp at \$49.95

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16510360

60 LED SOLAR SECURITY LIGHT
SEKUR HILL Security
LOT 62534/6943 shown



Customer Rating
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SAVE
52%

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comp at \$69.99

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Smock Talk

WOOD's project design/build team of Kevin Boyle and John Olson tested a bunch of work aprons over several months to find the best one. Here are the front-runners.

veritas
Innovation in tools

Veritas Canvas Apron
(no. 67K10.10), \$40
Lee Valley

800-871-8158, leevalley.com

This proved to be the guys' favorite overall. Its criss-cross straps stay put and hold the apron comfortably. It has seven pockets for tools, pencils, and such, and flaps block sawdust from falling in. A loop on each side holds a hammer or cordless drill.

Firehose Bib Apron
(no. 85021), \$35
Duluth Trading Company

866-300-9719, duluthtrading.com

Mesh-bottom pockets hold tools while letting sawdust sift through. Besides its two sturdy hammer loops, it has six large pockets—including two with hook-and-loop flaps—and 10 narrow pockets for pencils, screwdrivers, and narrow tools. Nylon straps provide plenty of adjustment, so you'll have no trouble finding a comfortable fit.



Cross-Back Shop Apron
(no. 53853), \$30
Rockler Woodworking & Hardware

800-279-4441, rockler.com

This superwide apron provides the most wraparound protection for your clothes. The open pockets store a lot of tools (but also catch lots of sawdust).



Duckwear Supershop Apron
(no. 80300), \$15
Bucket Boss

888-797-7855, bucketboss.com

With a wide, cushioned pad on the yoke strap behind your neck, Kevin and John found this apron most comfortable to wear. But they'd like more than two pockets, and because it's narrow, it might not fit or protect a larger person.





✓Yes



✓Yes



xNo



✓Yes



✓Yes

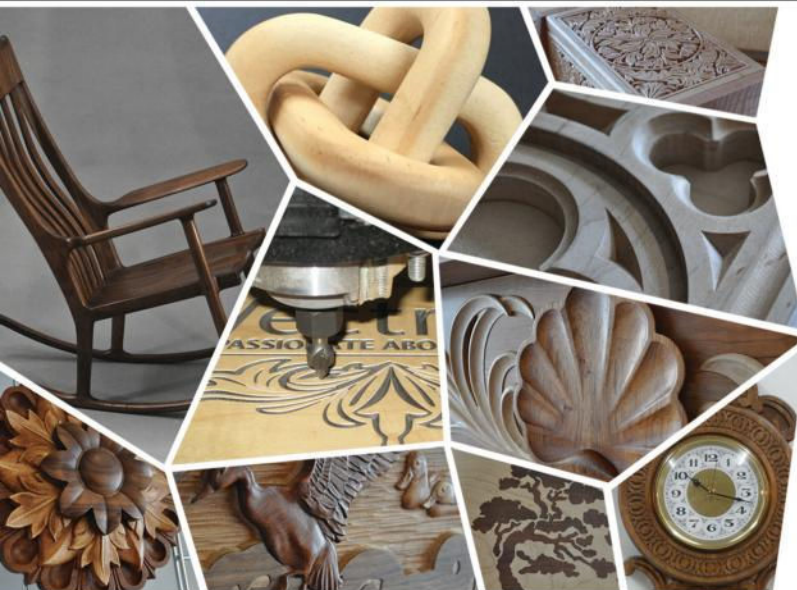


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Take your sheet goods for a back-saving ride

Speed Skate sheet-goods mover, \$25

Sounding more like the name of a 1970s roller rink than a handy tool for moving sheet goods, FastCap's diminutive Speed Skate gets the job done. A 1¾"-wide sturdy plastic yoke between 3" rubber wheels easily supports full sheets of heavy plywood, MDF, or particleboard, and makes it easy, when centered on the sheets, to move

them around the shop. As you might expect, the wheels tend to catch on floor cracks and electric cords, requiring a foot bump to hop over them.

—Tested by Bob Hunter, Tools Editor

FastCap
888-443-3748, fastcap.com



Get power and finesse in this sander

1-hp oscillating spindle sander (no. JOSS-S), \$1,500

This Jet spindle sander delivers strong, steady performance in a sleek package. Try as I might, I could not bog down the machine. And with 10 spindle sizes up to 4" (including five under 1" in diameter), I had no trouble finding the perfect size for any contour. The 2'-square cast-iron table provides plenty of workpiece support, and it tilts 45° to the front and 15° to the rear. Unlike many spindle sanders of this size, it has excellent dust collection (when hooked to at least a 1-hp machine with 4" hose).

—Tested by Bob Hunter

Jet
800-274-6848, jettools.com



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Cast pedestal feet

Pewter (no. 05H31.50), \$8.90 per 4-pack

Antique English brass (no. 05H31.52), \$8.60 per 4-pack

If you build small boxes, these zinc-alloy pedestal-style feet add a refined look. They measure $1\frac{1}{4} \times 1\frac{1}{4}$ " at the top with a curved inner edge and stand $\frac{1}{2}$ " tall. The bottom of the foot accepts an optional $\frac{3}{8}$ "-diameter felt or rubber pad (not included). Fasteners are included.

Lee Valley

800-871-8158, leevalley.com

Powermatic drum sander stretches wide

PM2244 drum sander, \$2,500

This 22" drum sander handles 44"-wide panels if you rotate the workpiece end for end. Its LED control panel displays speeds for both the sanding drum and conveyor belt. The Feed Logic controller automatically slows the conveyor speed when excessive sanding depth causes the drum to bog down.

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800-274-6848, powermatic.com



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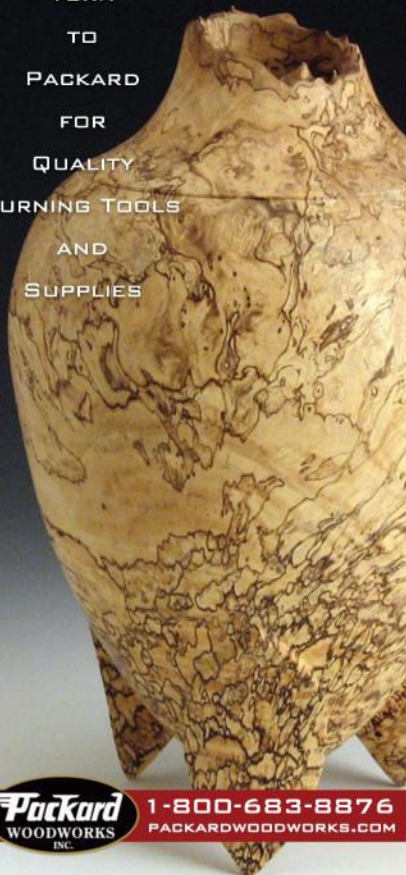
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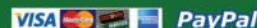
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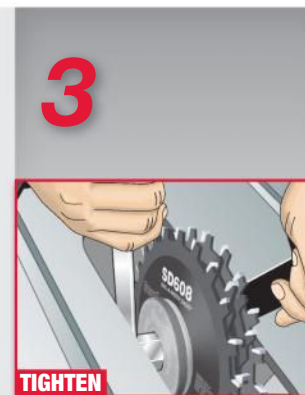
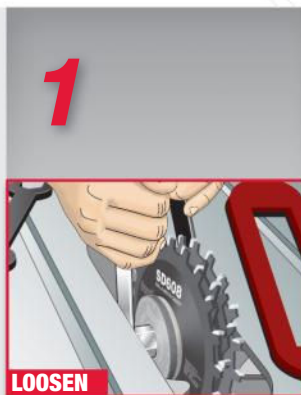
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