WORK SMARTER WITH SECRETS FROM PRO SHOPS p.45

ISSUE 215 NOVEMBER 2012

Better Homes and Gardens®

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The World's Leading Woodworking Resource

Pub Table & Chairs p.50

Step-by-step plans make the set a breeze to build!

71 Shop Tips Inside!

Plus More Great Projects

- Puzzle Jewelry Box p.34
- Construction-Grade Dump Truck p.58
- Floating Shelves p.30
- Scrollsawn Toy Gears p.26
- Desktop Business-Card Holder p.38

Find the Best With Our Test of 6 Compact Routers p.64

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2 HP, LEFT-TILTING, SINGLE- PHASE

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10" HYBRID TABLE SAW
With Riving Knife

- Motor: 2 HP,110V/220V, single-phase
- Precision-ground cast iron table size w/ wings : 27" x 40" • Arbor: ⅝"
- Arbor speed: 3850 RPM
- Capacity: 3⅛" @ 90°, 2⅛" @ 45°
- Rip capacity: 12" L, 30" R
- Cast iron trunnions
- Approx. shipping weight: 354 lbs.

BEAUTIFUL WHITE COLOR!

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12" BABY DRUM SANDER

- Sanding motor: 1½ HP, 110V, single-phase
- Conveyor motor: ⅓ HP, 110V, single-phase, variable speed 5–35 FPM
- Max. stock thickness: 3½"
- Min. stock length: 8"
- Sanding drum size: 4"
- Sanding belt: 3" x 70" hook & loop
- Dust collection port: 2½"
- Approx. shipping weight: 160 lbs.

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8" JOINTERS

- Motor: 3 HP, 220V, single-phase, TEFC
- Precision ground cast iron table size: 9" x 72½"
- Max. depth of cut: ⅛"
- Max. rabbeting depth: ½"
- Cutterhead dia.: 3"
- Cutterhead speed: 5000 RPM
- Cuts per minute: weight: 500 lbs.

FREE SAFETY PUSH BLOCKS

BUILT-IN MOBILE BASE

WITH 4 KNIFE CUTTERHEAD

G0656P ~~$795.00~~ SALE **$715.00** $150 shipping

WITH SPIRAL CUTTERHEAD

G0656PX ~~$1195.00~~ SALE **$1075.00**

15" PLANERS

- Motor: 3 HP, 220V, single-phase
- Precision-ground cast iron table size: 15" x 20"
- Min. stock thickness: 3/16"
- Min. stock length: 8"
- Max. cutting depth: ⅛"
- Feed rate: 16 FPM & 30 FPM
- Cutterhead speed: 5000 RPM
- Approx. shipping weight: 660 lbs.

$150 shipping

BUILT-IN MOBILE BASE

WITH 3 KNIFE CUTTERHEAD

G0453P ~~$1050.00~~ SALE **$945.00**

WITH SPIRAL CUTTERHEAD

G0453PX ~~$1650.00~~ SALE **$1485.00**

20" PLANER

- Motor: 5 HP, 220V, single-phase
- Max. cutting width: 20"
- Max. cutting height: 8"
- Min. stock thickness: 3/16"
- Min. stock length: 7.5"
- Max. cutting depth: 1/8"
- Feed rate: 16 FPM & 20 FPM
- Cutterhead diameter: 3-1/8"
- Cutterhead speed: 5000 RPM
- Feed rolls: solid serrated steel
- Overall dimensions: 55-1/2"L x 39-1/2"W x 45-7/8"H
- Approx. shipping weight: 920 lbs.

BUILT-IN MOBILE BASE

$179 shipping

G0454 ~~$1575.00~~ SALE **$1417.50**

14" DELUXE BANDSAW

New!

- Motor: 1 HP, TEFC, 110V/220V, single-phase (prewired 110V)
- Amps: 11 at 110V, 5.5 at 220V
- Blade size: 93½" long (⅛" – ¾" wide)
- Cutting cap./throat: 13½"
- Max. cutting height: 6"
- Overall size: 67½"H x 27"W x 30"D
- Footprint: 23½" x 16½"
- Table height above floor: 43"
- Table tilt: 45° right, 10° left
- Approx. shipping weight. 247 lbs.

$79 shipping

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G0555LX ~~$545.00~~ SALE **$445.00**

14" BANDSAW

- Motor: 1 HP, TEFC, 110V / 220V single-phase, 1725 RPM
- 4" dust port
- Cutting capacity/throat: 13½"
- Max. cutting height: 6"
- Overall size: 66½"H x 26⅜"W x 30¼"D
- Precision ground cast iron table size 14" x 14"
- Table height: 43⅜",
- Tilt: 45° R, 10° L
- Fence construction: Deluxe extruded aluminum
- Blade speeds: 1500 & 3200 FPM
- Blade size: 92½ - 93½" (⅛" to ¾" wide)
- Approx. shipping weight. 198 lbs.

252923 LIMITED SUPPLIES

$79 shipping

G0555P ~~$495.00~~ SALE **$475.00**

2 HP DUST COLLECTOR
With 2.5 Micron Bag

- Motor: 2 HP, 220V, single-phase, 12A, 3450 RPM
- Air suction capacity: 1550 CFM
- Static pressure: 11"
- Bag capacity: 5.7 cu. ft.
- Impeller: 12¼" balanced steel, radial fin
- Height w/ bags inflated 78"
- Portable base: 21¼" x 33½"
- Approx. shipping weight: 126 lbs.

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G1029Z2 ~~$325.00~~ SALE **$275.00**

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November 2012 Issue 215

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PROJECTS

SKILL BUILDERS

TOOLS & MATERIALS

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DEPARTMENTS

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The *WOOD*® magazine difference:
We build every project, verify every fact, and test every reviewed tool in our workshop to guarantee your success and complete satisfaction.

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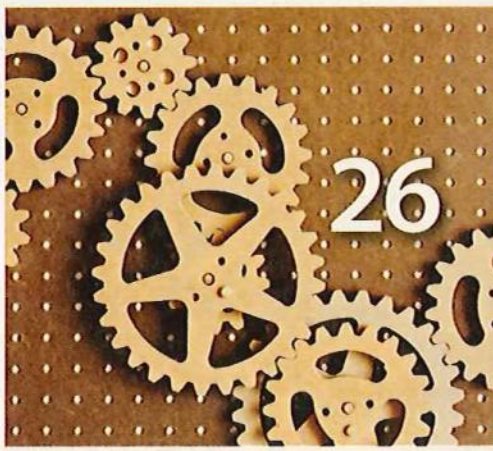

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On our website

woodmagazine.com

HOT NEW TOOLS ON VIDEO

At the 2012 International Woodworking Fair, toolmakers launched some of their best and most innovative products yet. Check out FREE VIDEO of the latest from Bessey Tools, Epilog Laser, Oliver Machinery, Osborne Wood Products, Quickscrews, SuperMax Tools, Teknatool, and Woodline at woodmagazine.com/IWF2012.

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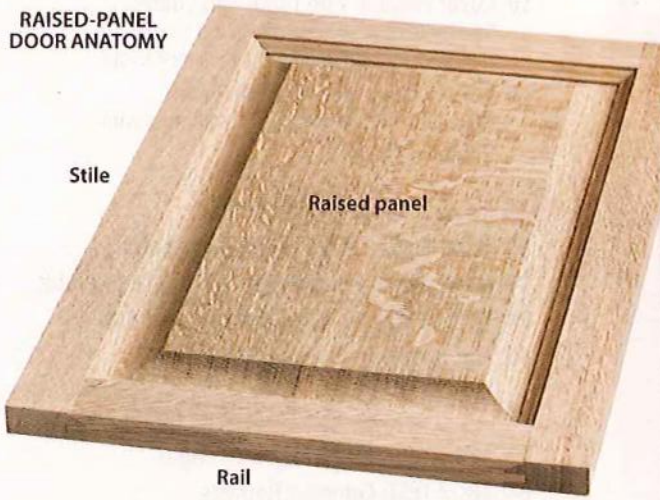

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Springfield, MA January 11-13	**St. Louis, MO** February 8-10	**TBD** March 8-10
Indianapolis, IN January 18-20	**Milwaukee, WI** February 15-17	**Tampa, FL** March 15-17
Kansas City, KS January 25-27	**Somerset, NJ** February 22-24	**Atlanta, GA** March 22-24

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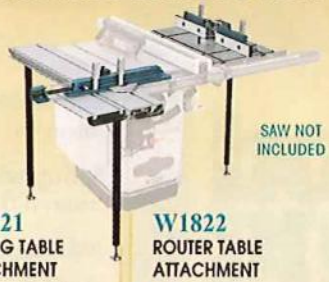
10" TABLE SAWS with Riving Knife

- 3 HP, 220V, single-phase motor
- Cast iron table size: 27" x 40¼"
- Max. rip capacity: (W1819) 29½", (W1820) 50"

Free 10" Carbide-Tipped Blade

W1819 10" Table Saw
W1820 10" Table Saw w/ Long Ext. Table

SLIDING TABLE and ROUTER TABLE ATTACHMENTS for W1819 & W1820



W1821
SLIDING TABLE ATTACHMENT
- Industrial grade anodized aluminum table size: 47" x 9"
- Max. cross cut: 48"

W1822
ROUTER TABLE ATTACHMENT
- Precision-ground cast iron table size: 27" x 20"
- Universal router mount

3 HP LOW PROFILE CYCLONE DUST COLLECTOR

- Motor: 3 HP, 220V, single-phase, TEFC class "F", 3450 RPM
- Air suction capacity: 1489 CFM
- Filter: 0.2–2 microns
- 55 gal. steel collection drum with casters

Only 80" Tall!

W1816
Cyclone Dust Collector

VARIABLE SPEED PLANER/MOULDER with Stand

- Motor: 2 HP, 220V, single-phase
- Precision ground cast iron table with wings: 36¼" L x 10" W
- Max. cutting width: 7"
- Max. planing height: 7½"
- Max. moulding depth: ¾"

We also carry an extensive selection of moulding knives for this machine!

W1812
Planer/Moulder

10" HYBRID TABLE SAW with Extension Table

New

Free 10" Carbide-Tipped Blade

- 2 HP, 110V/220V, single-phase motor
- Precision ground cast iron table measures 27" x 55" with phenolic extension
- Rip capacity 30" right, 12" left

W1824 10" Table Saw w/Extension Table

8" JOINTER with Parallelogram Adjustable Beds

- 3 HP, 220V, single-phase, TEFC motor
- Precision ground cast iron parallelogram design table measures 8" x 76⅝"
- Cutterheads: (W1741) 4 HSS knives (W1741S) spiral

Built-in Mobile Base

W1741 8" Jointer
W1741S with Spiral Cutterhead

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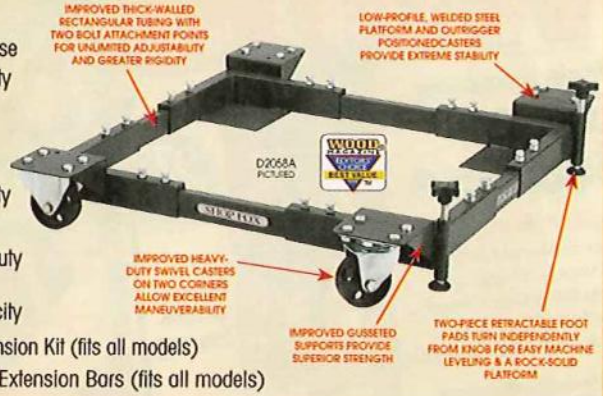
D2058A
Super Heavy-Duty Mobile Base
1300 lb. capacity



D2259A Extension Kit (fits all models)
D2246A 36" Extension Bars (fits all models)

TENONING JIG

- Heavy cast iron construction
- Precision adjustment points
- Adjusts for angled tenon cutting set-ups
- Standard ⅜" x ¾" miter bar fits all miter gauge slots including T-slots

Produces perfect tenons for mortise and tenon joinery.

D3246 Tenoning Jig

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Extruded Aluminum & Steel Contruction
Precision Right Angle Design

W1716 Aluma-Classic® Fence w/ standard 57" rails
W1720 Aluma-Classic® Fence w/ long 79" rails & legs (50" cutting capacity)
W1721 79" rails & legs (fence not included)
W1722 Set of 3 powder coated sheet metal wings

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WOOD®

November 2012 | Vol. 29, No. 6 | Issue No. 215

What in your shop are you most thankful for this year?

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Editor's Angle

'Tis better to give...

With Thanksgiving right around the corner, you're probably already in the shop, knee-deep in sawdust as you carefully craft gifts for friends and family. If so, more power to you. If not, you'll find this issue packed full of great giftable projects, from simple toy gears powered by an imaginative child (*page 26*) to the more ambitious pub table and chairs (*page 50*).

My favorite project in this issue, though, is the locking puzzle box on *page 34*, designed by *WOOD*® magazine reader John Rhyne. Using John's technique, you can make bandsawn boxes in virtually any shape, whether a favorite animal (see *below*), a kid's drawing, or a team logo. Personalizing a gift like this makes it more special. Give it a try—I think you'll be as delighted as the person who receives it.

...but receiving is pretty cool, too

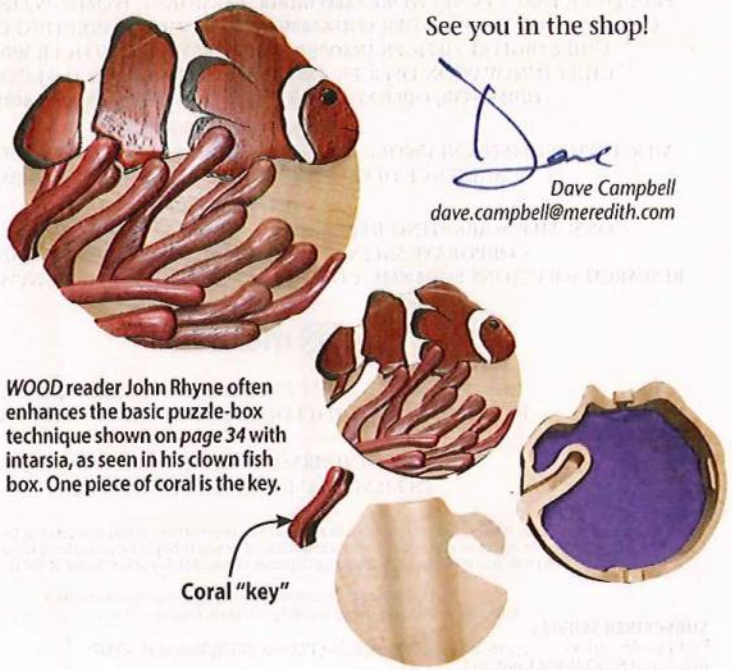
If what *you* want this Christmas is to become a better woodworker (shameless plug alert), ask for a gift card from the *WOOD* Store (**woodmagazine.com/store**). Available in amounts up to $100, you can piecemeal it on project plans and videos, or spend the whole enchilada on that *Complete* WOOD *Magazine Collection* DVD you've had your eye on.

Give the gift of *WOOD*—for free!

As woodworkers, we often share our time mentoring others who want to learn our hobby. How about sharing your favorite magazine with them, too? I'll make you a deal: Renew your *WOOD* magazine subscription for one year, and we'll send a free year of *WOOD* to anybody on your gift list. No strings attached, I promise. It only takes a couple of minutes at **woodmagazine.com/giftoffer**.

See you in the shop!

Dave Campbell
dave.campbell@meredith.com



WOOD reader John Rhyne often enhances the basic puzzle-box technique shown on *page 34* with intarsia, as seen in his clown fish box. One piece of coral is the key.

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Sounding Board

Our bulletin board for letters, comments, and timely updates

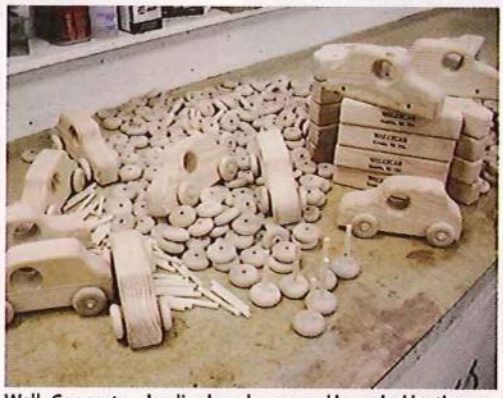
WOOD® readers pay it forward

Toy cars travel the world

I'd like to acknowledge the charitable efforts of some friends of mine, Wally and Marge Harrison of Poulsbo, Washington. The couple have combined their love for children and woodworking to hand-craft toy cars ("WallyCars", they call them) for nonprofit organizations. Their only demand is that these toys be given with no strings attached to kids in need. So far, they've produced 7,000 cars that have been sent to kids in over 20 countries around the world! Still, thousands of children worldwide go without the simple joys a toy can bring. Wally and Marge hope to inspire their fellow woodworkers to devote some of their time and talents to such a cause.

—Rodger Schmuck, Poulsbo, Wash.

Marge and Wally Harrison busily work on another batch of WallyCars.



WallyCar parts—bodies bandsawn and branded by the couple and purchased wheels and axles—await assembly.

Honoring the fallen

While deployed to Al Kut, Iraq, in 2011 as a civilian contractor, I attended several memorial services for fallen soldiers. As the proud father of three active-duty soldiers, I know the importance of providing these brave fighting men and women a place of honor. Using my woodworking skills and the limited number of tools at my disposal, I began building and donating simple memorial plaques *(right)* for use in those observances. I hope other woodworkers here at home will apply their talents to provide a similar service to the families of armed forces members.

—William Gerhardt Sr., Attica, N.Y.

That's one sharp article

I really appreciated your article "Sharpening Showdown" in issue 210 (March 2012). Had I read this article years ago, it would have saved me a lot of money and frustration sharpening tools. Following your recommendations to the letter, I achieved amazing results: My planes now produce thin, feathery shavings like never before.

—Ken Kramer, Cincinnati

You can download the article for $3.95 at woodmagazine.com/sharpshowdown.

—WOOD Editors

Article Update

▶ Issue 211 (May 2012)

In the article titled "Busting Dust in a Basement Shop" on page 64, using an air compressor to blow dust from your clothes can pose risks, including forcing a foreign object into the eyes, nose, or ears. Use a shop vacuum to remove dust, instead.

— PLEASE WORK SAFELY —

In order to show you precise details in photos, we frequently remove safety guards. In your work, be sure to use all safety devices, as well as wearing vision, breathing, and hearing protection.

—WOOD editors

HOW TO REACH US

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How Do You Create Unlimited Frame & Panel Possibilities?

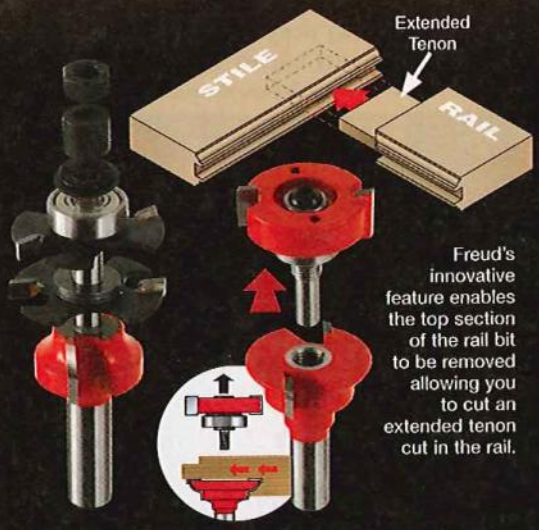
ANOTHER INDUSTRY 1st BY FREUD

With Freud's New Premier Adjustable Rail & Stile System

Freud's patented Premier Adjustable Rail and Stile router bit system is a simple, easy-to-use two piece solution that allows you unlimited creative freedom in frame and panel door construction.

This unique system allows you to create extended tenons for extra door joint strength, adjust groove width for different panel thicknesses and choose from a variety of material thicknesses for your stiles and rails (5/8" to 1-1/4"). As well as use optional add-on cutters to increase your bits' capabilities even more, by creating either glass panel or double-sided profile doors.

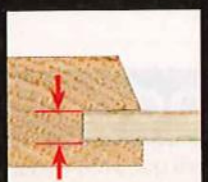
Five profiles are available; Round Over (#99-760), Ogee (#99-761), Round Over Bead (#99-763), Bevel (#99-764) and the NEW Shaker (#99-762).



Freud's innovative feature enables the top section of the rail bit to be removed allowing you to cut an extended tenon cut in the rail.

This New System Offers Unmatched Versatility in Cabinet Door Making with:


Extended Tenons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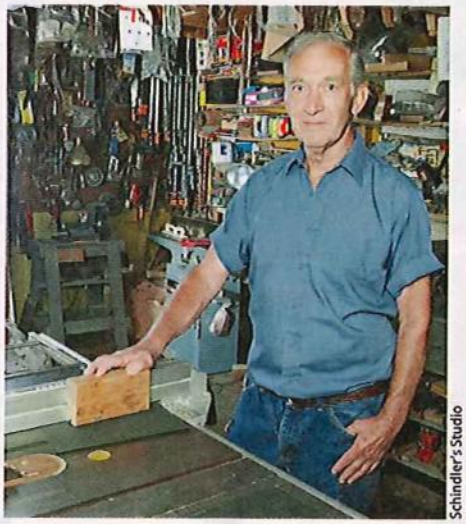
Saw fence rubdown sharpens knives quickly

I know the importance of keeping sharp knives in my jointer, but found honing them a pain. Here's an easy-to-build, shop-made jig that makes the job super simple.

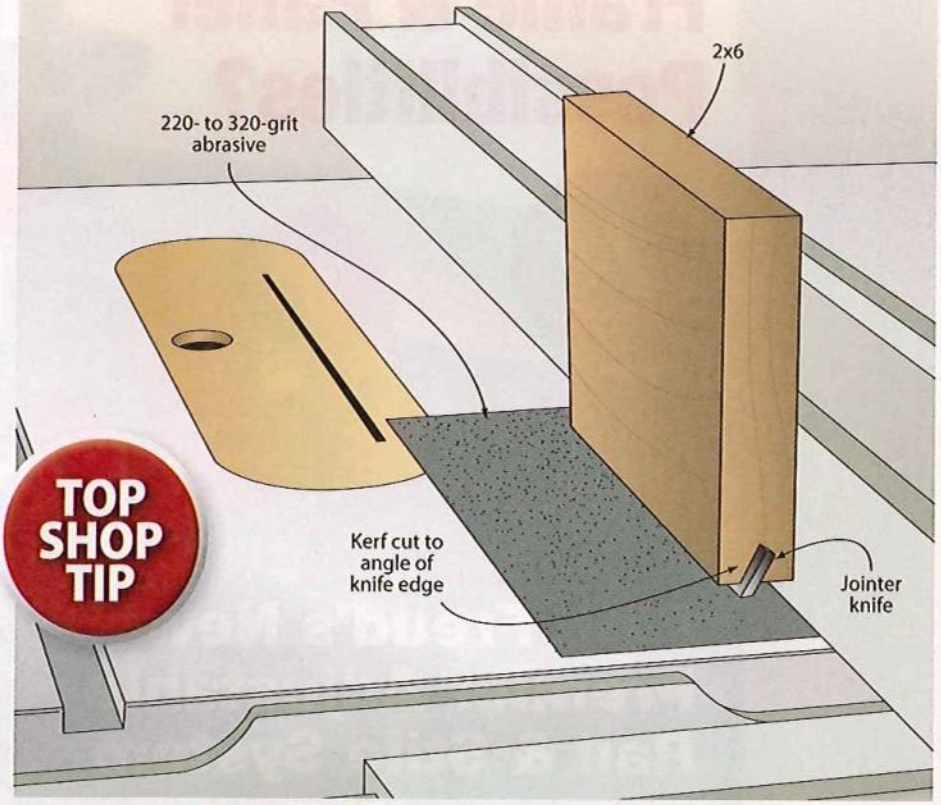
In a piece of 2×6 lumber about the same length as the knife, cut a groove to fit the blade, and matching the bevel angle of the knife edge. Jointer knives typically measure about ⅛"-thick, so a full-kerf cut should do the trick. (Add a layer of tape to tighten the fit in the groove if necessary.)

To use the jig, stick a piece of abrasive (220–320 grit) on your tablesaw's table. Move the saw's fence to cover part of the abrasive and lock it in place. With the knife in the jig (cutting edge-down), hold the jig as shown and rub the blade back and forth a few strokes, keeping the jig tight against the fence. A longer version of this jig works great for sharpening planer knives, too.

—George Clement, Northumberland, Pa.



Schindler's Studio



TOP SHOP TIP

For sending this issue's Top Shop Tip, George receives a Porter Cable 18V Drill/Impact Driver kit and corded Oscillating Multi-Tool worth about $330.

continued on page 12

YOUR TIPS EARN CA$H, TOOLS!

Tell us how you've solved a workshop stumper. If we print it, you'll get $100 and a DVD copy of Woodworking Secrets: Tips & Techniques (woodmagazine.com/tipsdvd). And, if the idea garners Top Shop Tip honors, we'll also reward you with a tool prize worth at least $300.

Send your best ideas, along with photos or drawings and a daytime phone number, to **Shop Tips, *WOOD* Magazine, 1716 Locust St., LS-221, Des Moines, IA 50309-3023.** Or, by e-mail: shoptips@woodmagazine.com. Include your contact info in the e-mail.

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Discover the joy of making this completely original and irresistibly fun Bolt Action pen, a gift that will be hard for any hunting or target-shooting enthusiast to put down.

Completely Authentic
Every detail, from the one of a kind bolt-action mechanism to the precisionengineered components, was carefully designed to ensure uniqueness and reliability. The realistic bolt-action handle smoothly advances and retracts to securely lock the refill in place. Includes a bolt-action rifle clip and replica 30 caliber cartridge and rose gold tip for added authenticity.

Our Customers Love Their Bolt Action Pens!
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Gun Metal shown with refill advanced


24kt Gold shown with refill retracted


Black Enamel with Gun Metal tip and clip

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Shop Tips

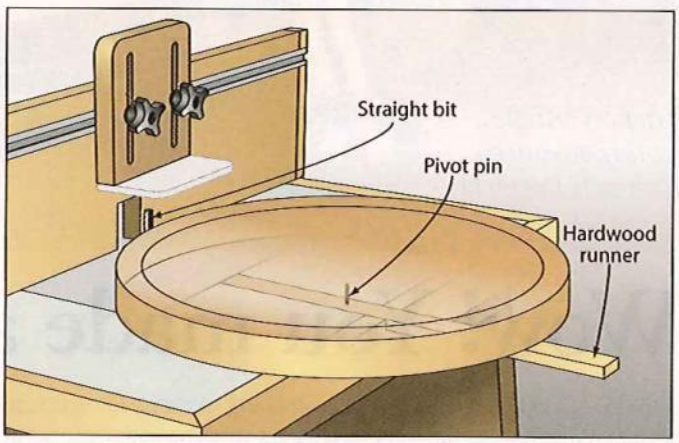
Router jig trims rough edge to a perfect circle

After roughing out a circular blank on my bandsaw for a Lazy Susan, I needed a way to clean up the edges while keeping the workpiece a perfect circle. To do that, I came up with a simple router-table jig.

To build it, first rout a slot in the router table, in line with the bit and perpendicular to the front edge of the table. Next, cut a hardwood runner to fit the slot. Butt the runner against the end of the slot and mark the radius of the workpiece on the runner, measuring from the edge of the installed straight bit.

Drill a hole and mount a pivot pin (a short length of a 10d nail works fine) in the runner at that location. Then, on the underside of your workpiece, drill a corresponding hole in its center. Slip the workpiece onto the pivot pin and pull the runner out slightly. Fire up the router, push the workpiece into the bit, and rotate it 360° to get rid of roughness.

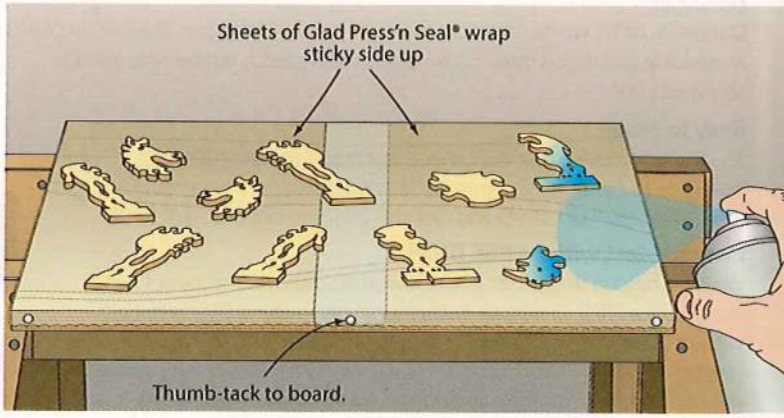
—Eugene Gustafson, Two Harbors, Minn.



Small parts won't fly away while you spray

Parts for small wooden toys can be a real hassle to finish—they tend to flip over or scoot around when applying a spray finish. But by tacking a couple of sheets of Glad Press'n Seal® wrap sticky-side-up on a piece of scrap, those little pieces stay put. And unlike some tapes, the wrap leaves no sticky residue on them.

—Louis Jacobi, West Chester, Pa.



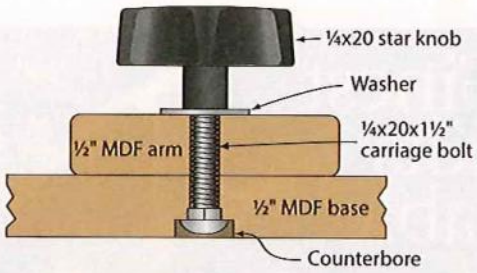
Triumph over tricky tapers with your tablesaw

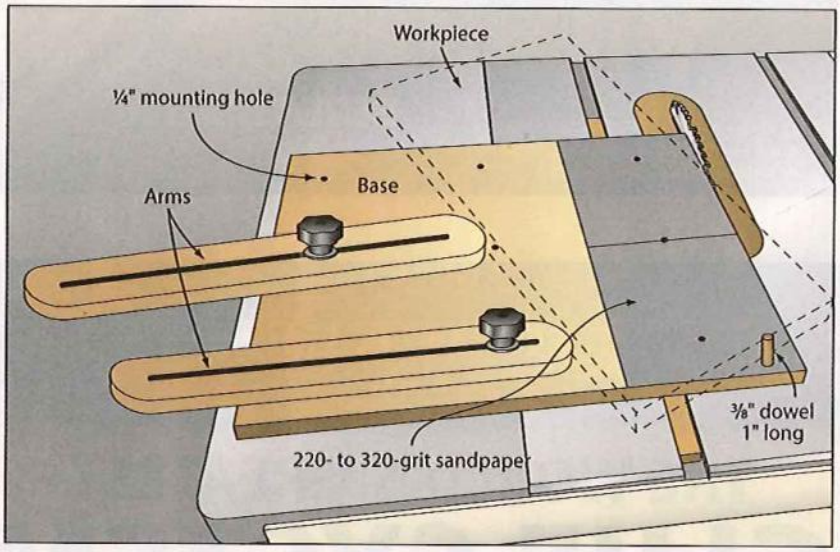
To cut a taper in a large panel, I always turned to my portable circular saw and a clamped-on guide. But that clumsy set-up rarely yielded the cut quality or accuracy I wanted. So instead, I designed and built this panel tapering jig for use on a tablesaw.

Adjust the two arms by tightening or loosening the ¼"-20 star knobs that hold them in place, and remount them in different holes if necessary. A 1" length of ⅜" dowel mounted to the jig's rear corner (where shown) backs and supports the workpiece, and 220- to 320-grit sandpaper on the face of the jig near the blade prevents the workpiece from shifting during a cut. Drill a grid of ¼" holes in the jig's base so the jig's arms can be moved to fit a range of workpiece sizes.

To use the jig, first lay out the taper on your workpiece. Align the layout line with the blade, butting the workpiece against the ⅜" dowel, adjust the jig's arms to support the workpiece, and make the cut.

—Serge Duclos, Delson, Que.





continued on page 14

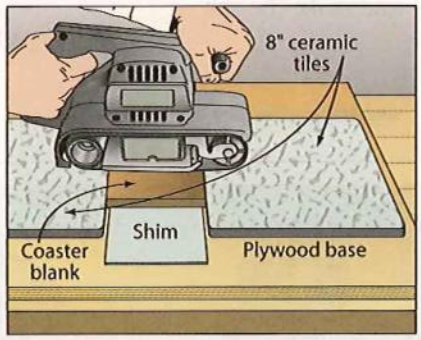
Shop Tips

Small part thicknessing jig: a bridge over ceramic tiles

When I set out to build the Classy Coaster Set from issue 207 (October 2011), I realized I didn't have a means to plane the coaster blanks to a common thickness. Using what I had handy in the shop, I fashioned a thicknessing jig using 8" ceramic tiles and my handheld belt sander.

First, using double-faced tape, I mounted two tiles on a sheet of plywood with a space between them to fit the coaster blank. Then, I slipped shims under the coaster blank to reveal the exact amount of material I wanted to remove and sanded until the blank was even with the tops of the tiles. During use, the tiles are virtually unaffected by the belt sander. The coasters turned out great!

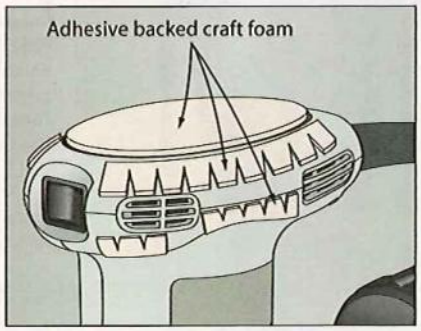
—Bill Wells, Olympia, Wash.



Foam blocks bad vibes while sanding

Using my orbital sander for extended periods made my hands numb from the vibration. But by adding adhesive-backed craft foam (available at most craft and fabric stores) to the sander's grip, I minimized those painful vibes and made long sanding sessions bearable.

—Joel Nowland, West Point, Utah

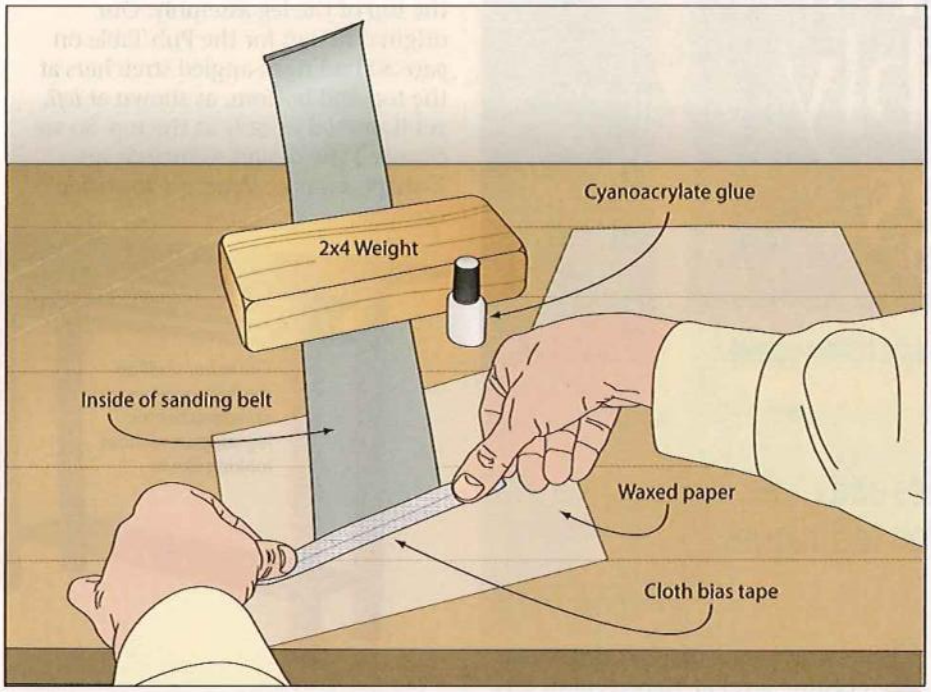


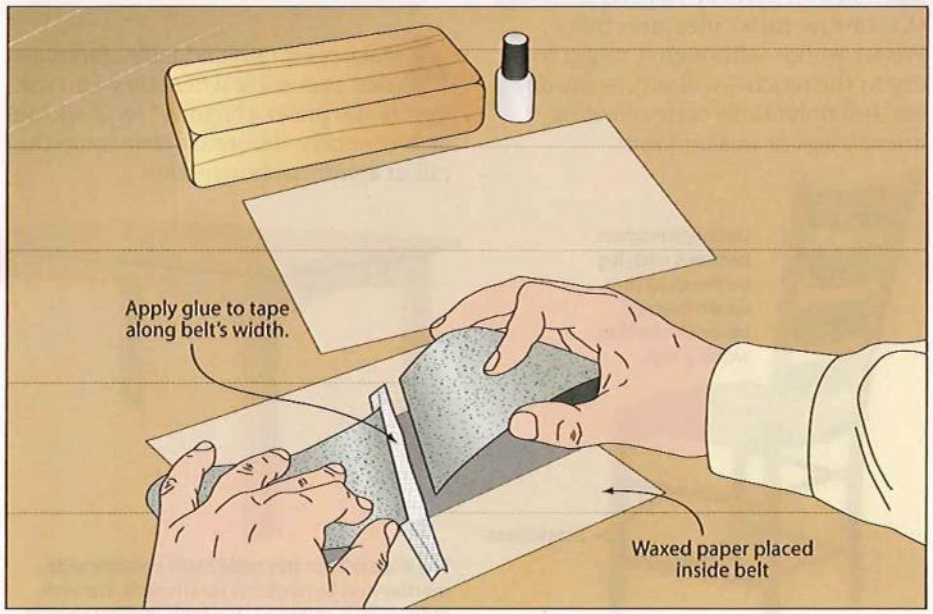
Easy fix for seam-split sanding belts

The humid Florida climate has never been kind to my sanding belts—if I store them for any length of time, they come apart at the seam as soon as the sander starts. Instead of throwing these new belts in with the scrap sandpaper, I came up with this trick to repair them.

First, peel the remaining factory tape off the belt splice. Cut a piece of cloth bias tape (wide single-fold type, available at fabric stores) about 2" longer than the width of the belt. Lay one end of the belt, grit-side down, on the bench; then apply cyanoacrylate glue to the end of the belt. Lay half of the bias tape's width on the glue, place waxed paper over the tape, and use a weight to press down on it for about 30 seconds, or until the glue sets. Wrap the belt around and repeat the gluing process to reconnect the ends of the belt. Trim off the excess tape, and the belt's ready to use.

—William Van Duyn, Orange Park, Fla.





Avoiding
Workshop Goofs

Ward Off Wobbly Legs

Build rock-solid tables and chairs with these shop-proven techniques.

1 A three-legged project will not wobble, regardless of slight differences in leg length, because the weight will always be distributed across all three. So consider this option for stools or small tables.

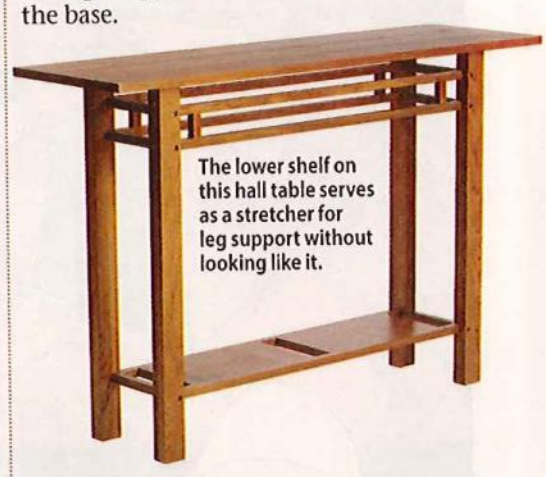
When using three legs for chairs or stools, canting the legs at an angle gives the project a wider footprint for better stability.

2 Use only wood that has dried to a moisture level of 10 percent or less. (A moisture meter measures this.) Wetter wood—although it might feel dry to the touch—will ultimately dry out and potentially warp, creating uneven legs or weaker joints.

Double stretchers between each leg on this chair firm up what would otherwise be thin, wobbly legs.

3 The taller you make a table or chair, the more likely it'll wobble unless braced, especially in narrow or top-heavy projects. Place stretchers as low as possible to achieve the best stability, such as with the dining chair, *bottom center*, and hall table, *below*.

But it can sometimes be the opposite. Thin legs and long, unsupported lengths can cause the wobble at the top. In these cases, use thicker legs or add extra bracing (stretchers or aprons) at the top of the leg assembly. Our original design for the Pub Table on *page 50* had right-angled stretchers at the top and bottom, as shown at *left*, yet it proved wobbly at the top. So we changed the design to include an X-shape support structure to stiffen the base.

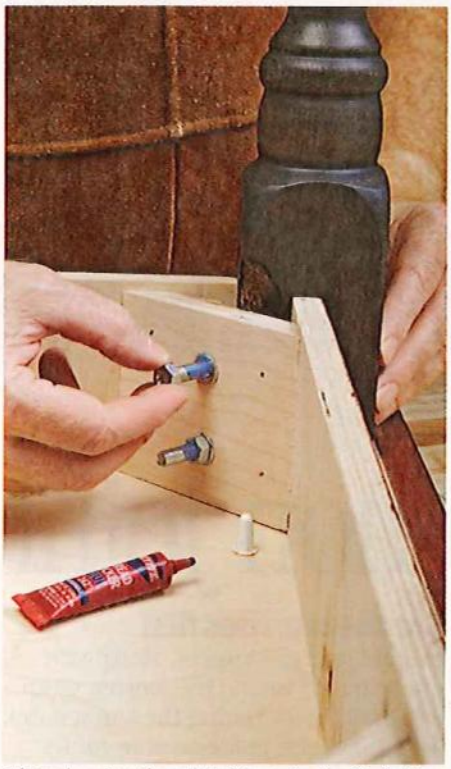


The lower shelf on this hall table serves as a stretcher for leg support without looking like it.

4 Make chair rails and table aprons as wide as possible where they join the legs. If you prefer a "lighter" look, add an arch or similar decorative element to the rail or apron, as shown *below*.

The wide rails on this table make possible wide mortise-and-tenon joints for strength. The arch reduces bulk and keeps the table looking elegant.

5 If you build a large table using hanger bolts or similar fasteners for easy disassembly, apply a thread-locking compound, shown *below*, to ensure the legs stay firmly attached.



When choosing thread-locking adhesive for joints you might disassemble someday, use the blue formula—red is for permanent joints.

6 Avoid scooting a table—especially across carpet—because any catch could damage or weaken a joint and cause the leg to wobble. Instead, always lift projects and carry them, even if it means getting a helper.

SHOP TIP

Make sure the floor's not the problem

So you've built a chair or table and, even though the construction seems solid, it wobbles. Before attempting any drastic fixes, try this: Move it to another location and check again for wobble. The problem might be an uneven floor. And remember that carpet proves a great equalizer, negating slight wobble with its padding.

Source

Loctite Threadlocker Blue 242: .2 oz tube, Lowe's Home Improvement, $5.97, lowes.com.

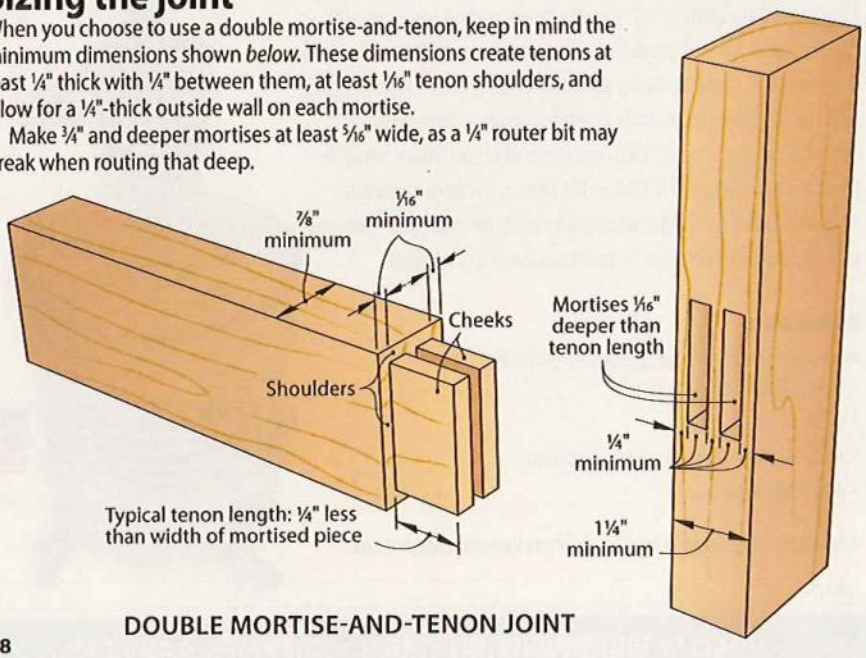
For maximum strength, try the Double Mortise-and-Tenon Joint

On long-legged projects, such as the Pub Table on *page 50*, any twisting force applied to the tabletop amplifies stress on the connections between the stretchers and legs. Although the simple notch-and-screw joints used for the table provide ample strength, a double mortise-and-tenon would be an even stronger choice. It provides more physical resistance to twisting, and twice the glue surface of a single mortise-and-tenon. To cut it, you need only a spiral upcut bit for your plunge router, a tablesaw saddle jig, a couple of hand chisels—and these easy-to-follow instructions.

Sizing the joint

When you choose to use a double mortise-and-tenon, keep in mind the minimum dimensions shown *below*. These dimensions create tenons at least ¼" thick with ¼" between them, at least 1/16" tenon shoulders, and allow for a ¼"-thick outside wall on each mortise.

Make ¾" and deeper mortises at least 5/16" wide, as a ¼" router bit may break when routing that deep.



DOUBLE MORTISE-AND-TENON JOINT

Cut the mortises first

Prepare your workpieces, along with one extra for testing the mortise setup and another for testing the tenon setup. Mount an edge guide on your router and install a spiral upcut bit to match the mortise width.

Lay out the mortises; then clamp two legs together to provide a broad surface for the router to ride on. Set the edge guide [**Photo A**], and double-faced-tape stopblocks to define both ends of the mortise. For mortises near the end of a

LAYOUT LINES HELP WITH SETUP

Position the bit within the layout lines of a mortise, set the edge guide, and secure stopblock(s) to fix the mortise's length.

continued on page 20

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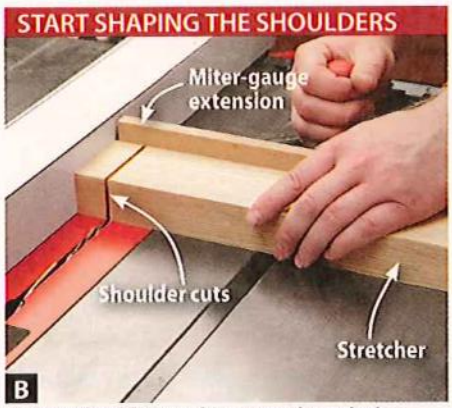
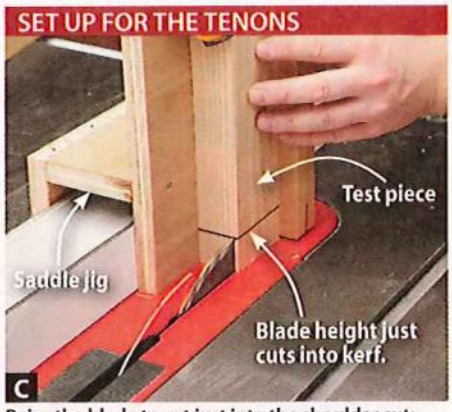
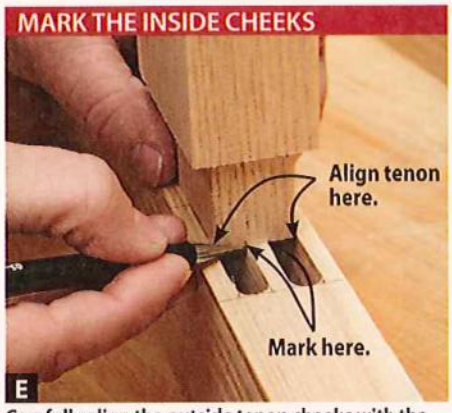


Prevent shoulder-cut chip-out and steady the workpiece by using an extension attached to your miter gauge.



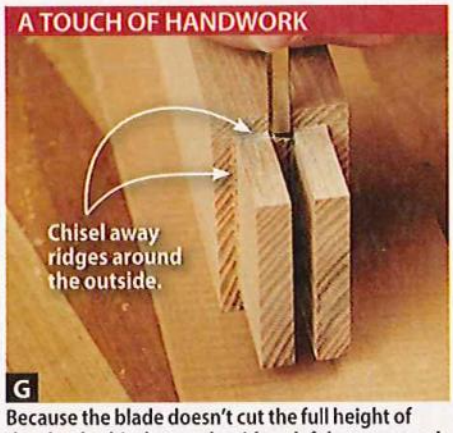
Raise the blade to cut just into the shoulder cut; then position the rip fence to cut a cheek on the outside face of the test piece.

Check the tablesaw setup for the wide cheeks by testing the fit of the test tenon into the test mortise cut earlier. Work for a snug, not tight, fit.



Carefully align the outside tenon cheeks with the mortise walls; then mark the inside cheek locations on the test tenon.

Make the first cuts for the inside cheeks inside the marks; then adjust the fence to gradually widen the gap until the tenons fit in a double mortise.



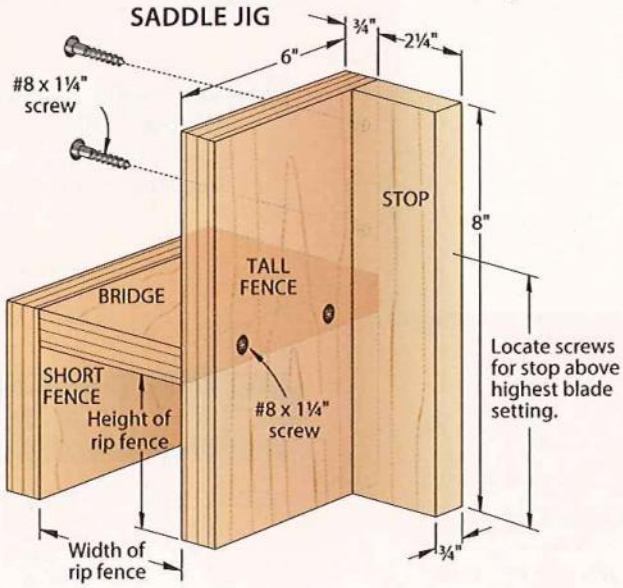
Because the blade doesn't cut the full height of the cheek, chisel away the ridges left between and around the tenons.

workpiece, there may not be room for a second stopblock; in this case, simply rout to the layout line.

Rout the inside mortise in each piece, reposition the workpieces so the edges that were inside are now outside, reclamp them, and rout the second mortise in each piece. Repeat these steps to rout mortises in all of the workpieces and the test piece.

Reset the edge guide to remove the waste between the mortises *in the test piece only*, making one large mortise. You'll use this when dialing in the setup for the tenons in the next step.

With a chisel, square up the ends of all the mortises, including the test mortise.



Tenons times two

Set the tablesaw blade height to match the depth of the tenon cheek. Measure from the far face of the blade and position the rip fence to match the length of the tenon [**Photo B**]. Make shoulder cuts on all four faces of the workpieces and test piece.

Build the saddle jig shown at *left*. Set the jig over the rip fence and position the fence to cut the wide cheek on the outside face of the test workpiece [**Photo C**]. Cut the two wide cheeks, flipping the test piece face-for-face between cuts, and check the fit of the tenon into the wide test mortise cut earlier [**Photo D**]. Make any adjustments needed to the fence position or blade height. When you achieve a satisfactory fit, cut the wide cheeks on the project parts.

Reset the rip fence and follow the same procedure to cut the narrow cheeks on the test tenon. Then cut them on the workpieces.

Transfer the locations of the inside cheeks from a mortised workpiece onto the test tenon [**Photo E**]. Set the rip fence to cut between these marks, and make cuts with each face against the saddle jig [**Photo F**], leaving the tenons a little too thick. Test the fit in a double mortise. Adjust the rip fence as needed to achieve a snug fit; then cut the inside cheeks on the project parts. Use a chisel to clean up the small ridge left between the tenons [**Photo G**].

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Get More Life From Abrasives

Sanding belts and discs can load up quickly with pitch and dust, especially when working with resinous woods, such as pine or cedar, reducing their effectiveness significantly. Pete Spuller, marketing manager for Klingspor Abrasives (a leading manufacturer and distributor based in North Carolina) provides simple tips on how to extend the working life of your abrasives.

Pick the 'true grit'

Sometimes smoothing out a workpiece takes an abrasive rougher than Rooster Cogburn. If you try to hog away lots of material with a fine grit, you'll waste three things: your time, energy, and money. To remove lots of material quickly, turn to a coarse grit, such as 40 or 60. Save grits 150 or higher for finer sanding applications, such as sanding veneered plywood.

Slow things down

High disc speeds create loads of friction, and the resulting heat draws resin from the wood, rapidly clogging the abrasive. A combination of a gummed-up disc and high RPMs can cause black marks or burnishing on the wood—where wood fibers compress until the surface becomes glossy and won't accept finish. Burn marks on your workpiece and black residue on your disc can also be signs of too-high speeds.

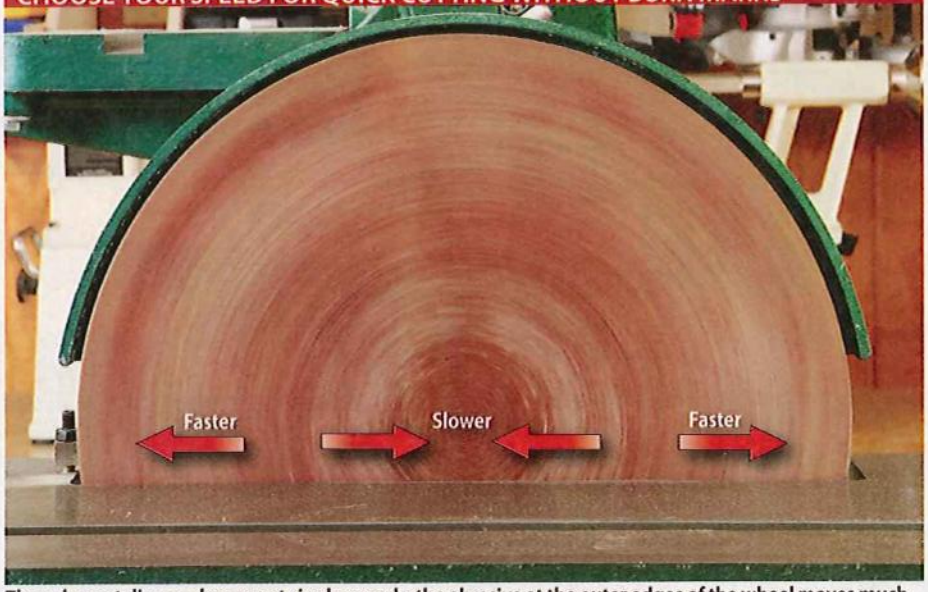
Apply a cleaning solution

If your abrasives have lost their bite, try cleaning them before sending them to the trash. Abrasive cleaning sticks work great for removing light pitch and sawdust buildup, as shown *below*. But for cutting through heavily built-up pitch and burns, soak cloth-backed belts or discs in a commercial blade and bit cleaning solution (such as CMT's Formula 2050 or Trend's Tool & Bit Cleaner).

Storage matters

Heat, cold, and humidity can negatively impact the longevity of your abrasives. In the case of abrasive belts, environmental extremes can cause the belt splice to fail. Optimum storage conditions are between 35% and 50% relative humidity at 60–80° F.

CHOOSE YOUR SPEED FOR QUICK CUTTING WITHOUT BURN MARKS



Though most disc sanders run at single speeds, the abrasive at the outer edges of the wheel moves much faster than the center. Simply adjust the position of your workpiece to eliminate burning.

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Cleaning stick worn down to a stub? Grip the stick with a clamp to keep your fingertips safe.

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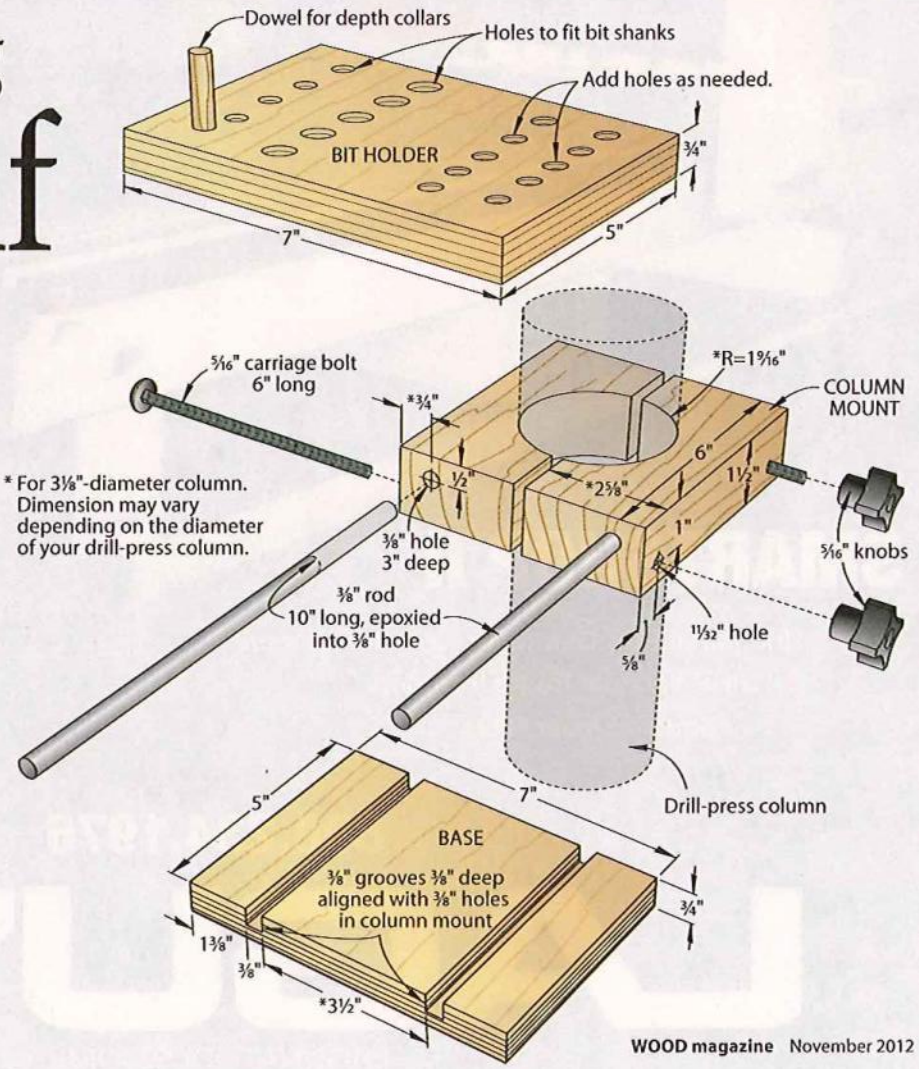
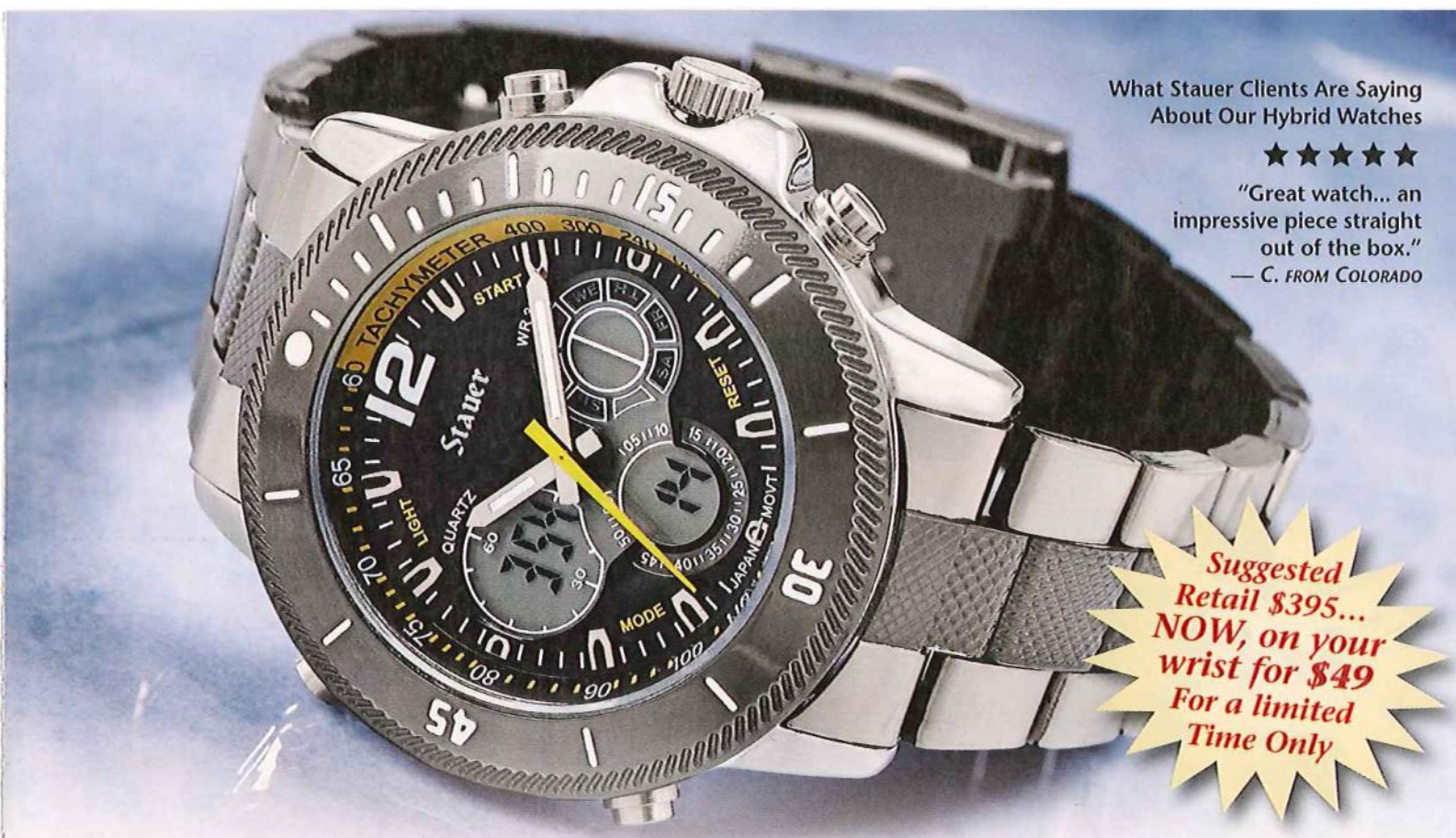
Our bit holder measures 5×7", but increase the size to hold more bits. The adjustable rods allow you to position the bit holder for easiest access and to clear the drill-press motor. You can easily remove the bit holder from the column mount to move the holder and bits to your workbench.



Project Design: **Craig Ruesgegger**
Illustration: **Lorna Johnson**



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The timepiece that works twice as hard. In designing the *Colossus Hybrid Chronograph*, our instructions to the watchmaker were clear: build it as tough as a battleship and fill it full of surprises. Make it a hybrid, because it should work twice as hard as a regular watch. And make it look like a million bucks, because when you put it on, you should get excited about rolling up your sleeves. Mission accomplished.

A toolbox on your wrist. It will keep you on schedule, but the *Colossus Hybrid* is about much more than time. The imposing case features a rotating gunmetal bezel that frames the silver, black and yellow face. You'll find a battalion of digital displays on the dial arranged behind a pair of luminescent hands and a bold yellow second hand. Powered by a precise quartz movement, the watch is doubly accurate in analog and digital mode. And it's packed with plenty of handy extras including a bright green EL back-light for enhanced nighttime visibility, a tachymeter along the outer dial and a full complement of alarms and split-second countdown timers. The *Colossus Hybrid* secures with a folded steel bracelet that highlights a row of striking dark center links. It's a rugged watch that's more than ready for your daily grind.

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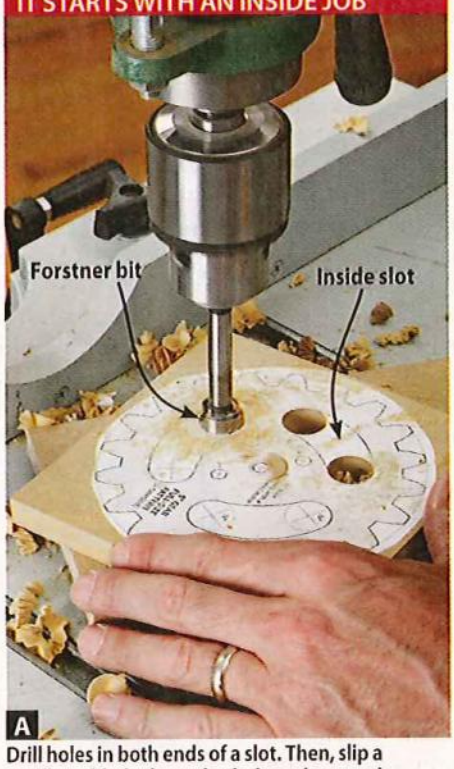
Power-up Playtime with Scrollsawn Gears

Turn the kids loose with a pile of these scrollsawn gears and let their imagination run through an infinite number of spinning setups and creative configurations. Each gear sits atop a movable gear base and mounts to perforated hardboard. With the gears interlocked, every turn of the crank produces a series of rousing revolutions.

1 Photocopy as many patterns for toy gears and gear bases as you like from the *WOOD Patterns®* insert, *page 42*. (You'll need one gear base for each gear.) We suggest making at least three of each gear size; but regardless, you'll need only one crank to turn them. Using spray adhesive, apply the gear and crank patterns to ½" medium-density fiberboard, and gear base patterns to ¼" birch plywood. Drill and counterbore the holes where shown on the patterns **[Photo A]**. Scrollsaw the perimeter of these parts.

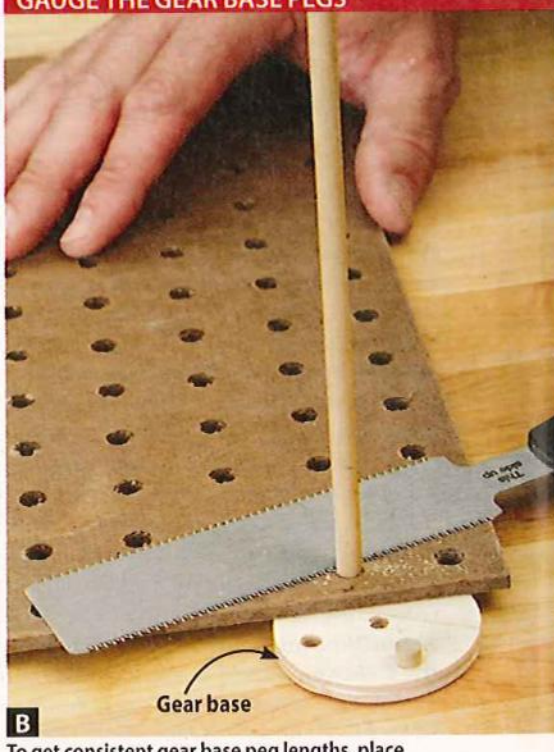
2 To complete the gear bases, glue a length of ¼" dowel in one of the ¼" holes indicated on the gear base pattern. Trim the dowel to length, as shown **[Photo B]**. Repeat the process for the gear base hole across from it.

IT STARTS WITH AN INSIDE JOB



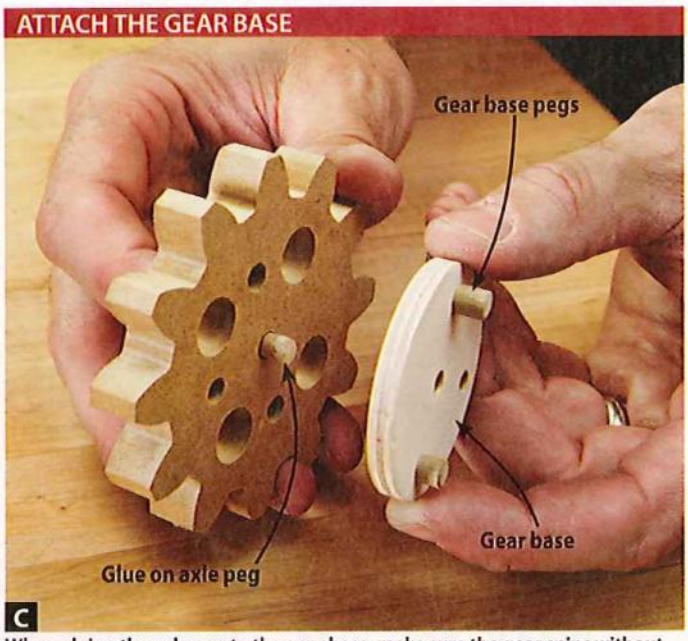
A Drill holes in both ends of a slot. Then, slip a scrollsaw blade through a hole and cut on the pattern lines from one hole to the next.

GAUGE THE GEAR BASE PEGS

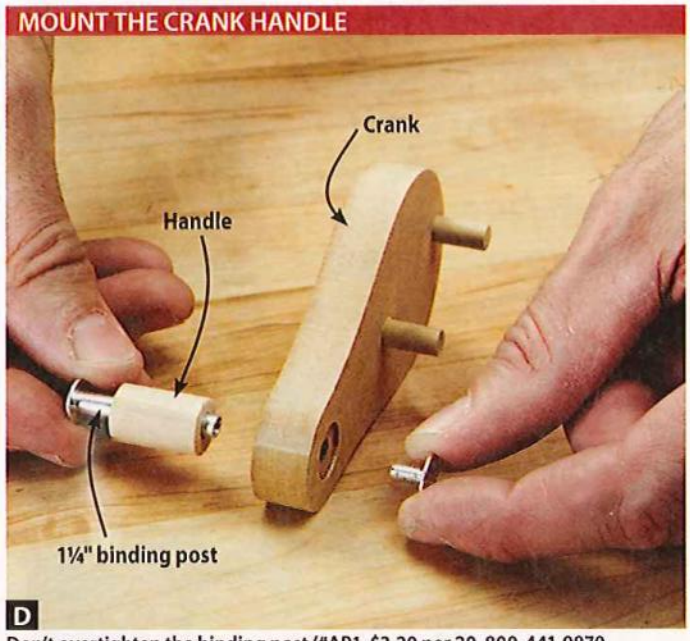


B To get consistent gear base peg lengths, place perforated hardboard over the dowel and cut the dowel off using a flush-cutting saw.

continued on page 28



When gluing the axle peg to the gear base, make sure the gear spins without binding before setting the assembly aside.



Don't overtighten the binding post (#AP1, $3.20 per 20, 800-441-9870, meiselwoodhobby.com). The crank's handle should spin freely.

3 For each gear, cut a 7/32" axle peg to ½" overall length. Insert an unglued axle peg through the gear's center hole and apply a drop of glue around the end, where shown **[Photo C]**. Glue the axle peg onto the gear base.

4 Cut two pieces of ¼" dowel 1" long and glue them into the crank's ¼" holes, flush with the top of the crank body.

To make the crank's handle, crosscut a piece of ½" dowel ¾" long. Drill a 13/64" hole through the center of the dowel. (See **More Resources** to learn how to center a hole in a dowel.) Use a 1¼" binding post to secure the handle to the crank **[Photo D]**.

5 Insert the dowels from the gear base into the holes of a piece of perforated hardboard (with ¼" holes) so the gear teeth interlock. You can stack gears, too—just lock them together by running a piece of ¼" dowel through the open ¼" hole in the stacked gears (and gear bases). Mount the crank atop any gear in the chain and give it a turn.

More Resources

- For free gear templates, visit **woodmagazine.com/geartemplates**.
- For a free article on drilling in the exact center of a dowel, see **woodmagazine.com/drilldowels**.
- For free tips to improve your scrollsawing skills, go to **woodmagazine.com/scrolltips**.

Produced by **Nate Granzow** with **Kevin Boyle**
Project design: **Lucas Peters**
Illustrations: **Lorna Johnson**

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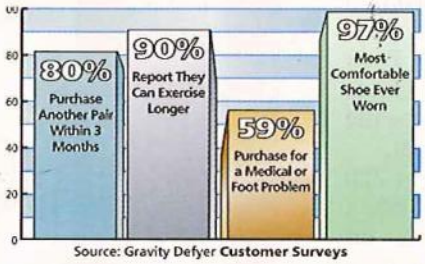

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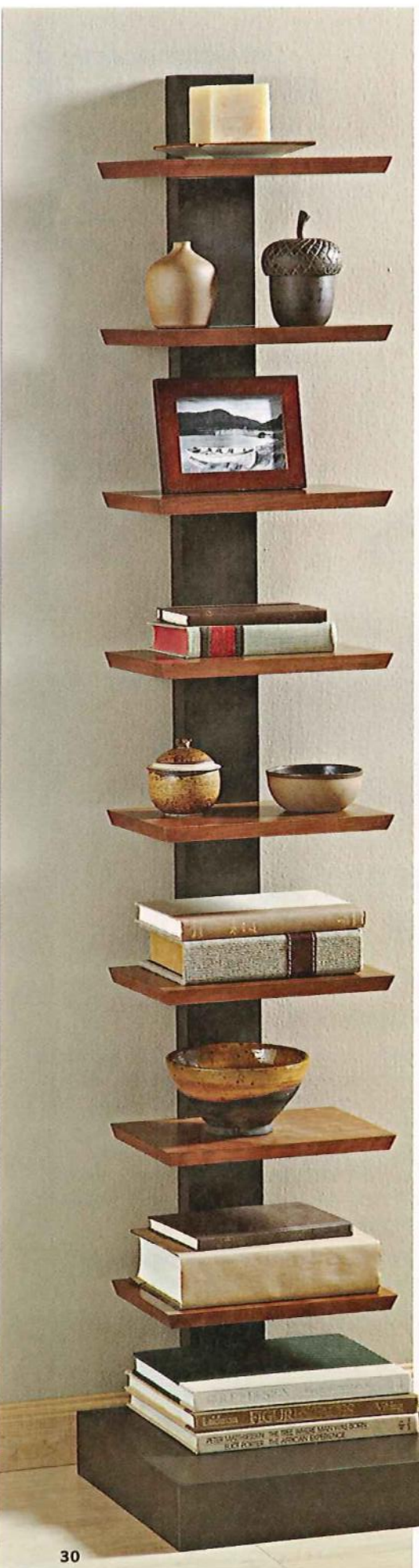


Floating Shelves

This gravity-defying display focuses attention on your favorite keepsakes.

BASIC-BUILT GREAT PROJECTS MADE SIMPLE.

TOOLS NEEDED

Approximate materials cost: $86
Dimensions: 67½"H × 16"W × 14¼"D

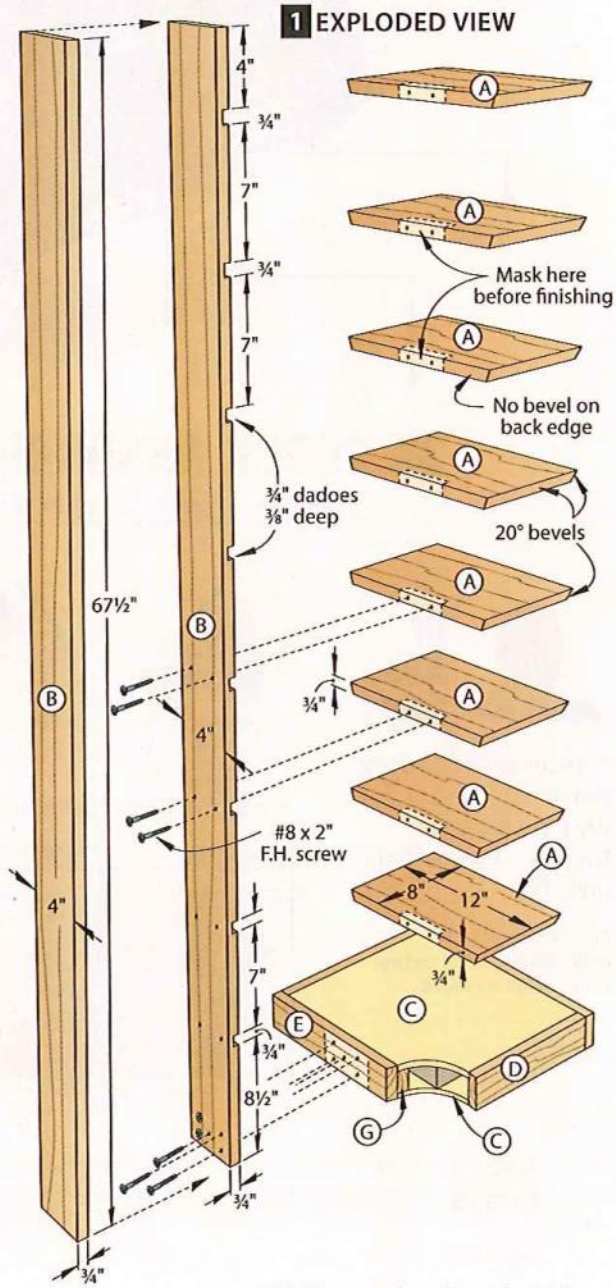
A weighted base and cantilevered shelves ensure that your collectibles sit on a secure foundation. And the simple joinery (made possible by an easy dado jig) makes this a weekend project that's sure to please.

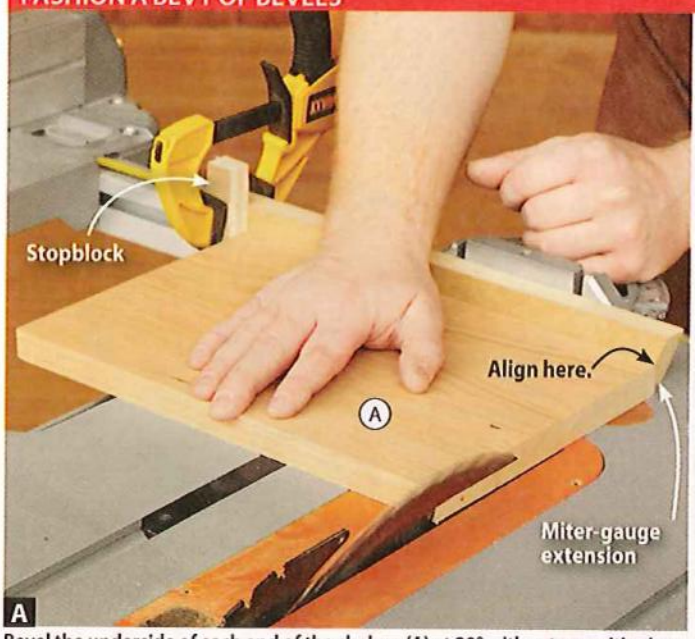
Whatever floats your boards

1 From ¾" cherry stock edge-glued to make slightly overwidth blanks, cut the shelves (A) to the size listed [**Materials List**, *page 33*]. Tilt the tablesaw blade 20°, double-faced-tape a sacrificial extension to your miter gauge, and cut through the extension to mark the blade location. Align the top edge of a shelf with the cut end of the extension, and clamp a stopblock against the opposite end [**Photo A**]. Then bevel both ends of all shelves [**Drawing 1**] before beveling the front edges [**Photo B**].

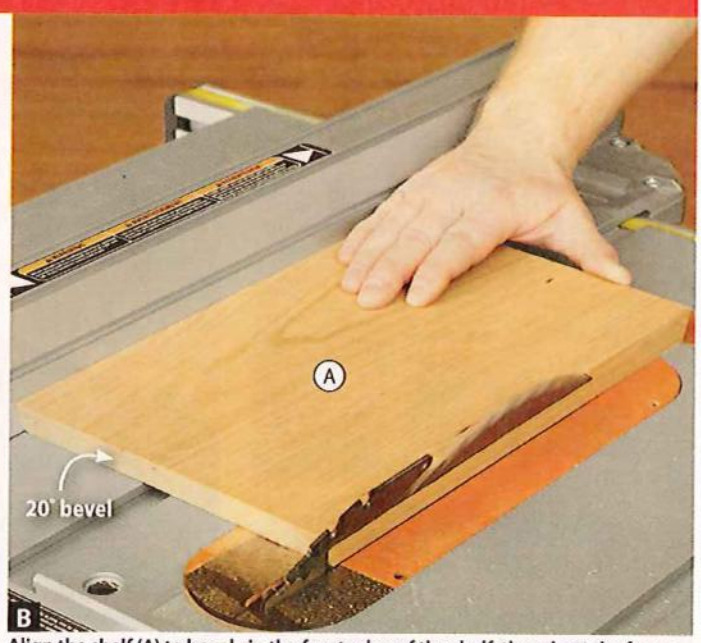
2 Sand the shelves to 220 grit. Then, mask off a 3" section, centered, on the back edge of each shelf (A) for gluing into the dadoed upright later. Stain and topcoat the shelves. (We used

1 EXPLODED VIEW





Bevel the underside of each end of the shelves (A) at 20° without repositioning the stopblock between cuts.



Align the shelf (A) to bevel-rip the front edge of the shelf; then, butt the fence against the shelf. Now, bevel the front edge of each shelf.

General Finishes Antique Cherry stain followed by three coats of General Finishes water-based satin polyurethane.) Remove the masking tape and set aside the shelves.

3 From ¾" stock, cut two spines (B) to size. Set aside one spine and one offcut the same width as the spine. Using a square, lay out the shelf locations on the other spine [**Drawing 1**].

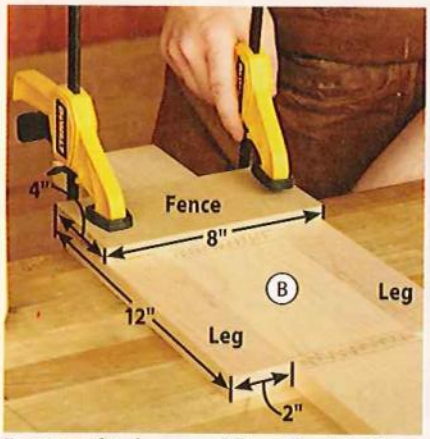
4 Create the dado jig and cut the dadoes in the spine (B), as shown in the **Shop Tip**, *below*.

5 Use a square to transfer the centerline of the dadoes to the back of the

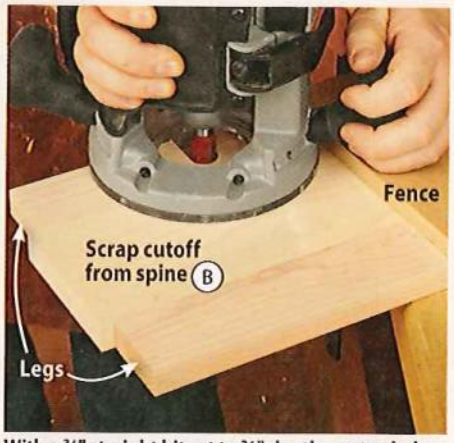
SHOP TIP

Zippity dadoes

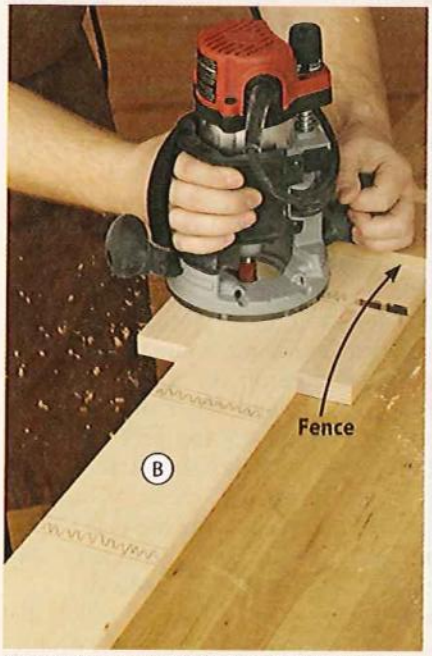
This speedy scrapwood dado jig is incredibly accurate and adapts to almost any project that requires dadoes. You'll need a scrap the same width as the part to be dadoed (a cutoff works perfectly) and some scrap stock of the same thickness (¾" in this case). Assemble the jig as shown *below left*; then, use it to rout the dadoes in the marked spine (B).



For a snug fit, glue up and clamp the dado jig parts using the spine (B) as a guide. Take care to avoid gluing the jig to the spine.

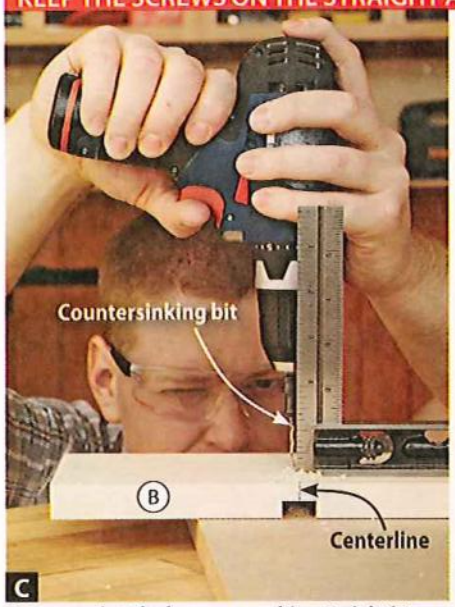


With a ¾" straight bit set to ⅜" depth, rout a dado through the jig's legs and the scrap, using the jig's fence to guide the router.

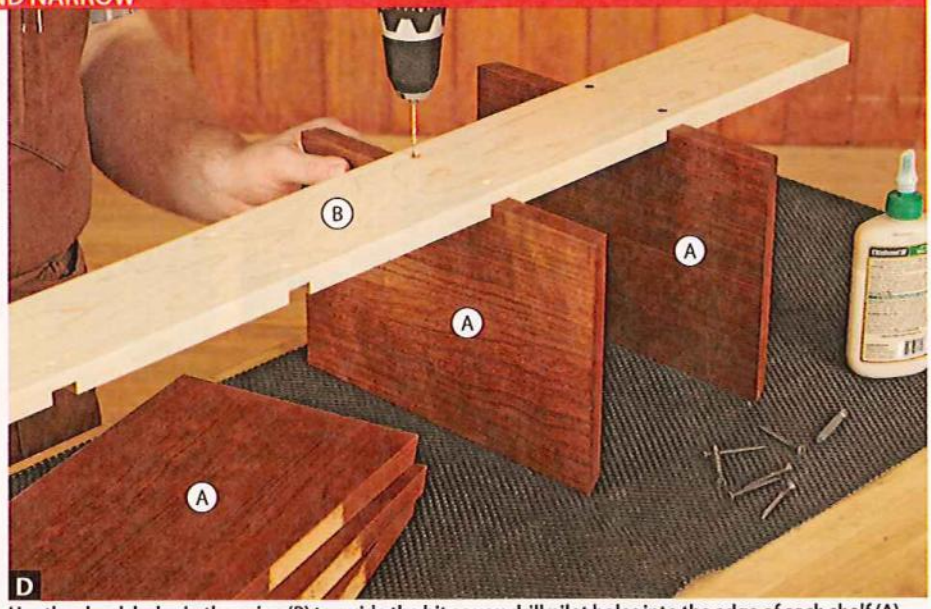


Line up the grooves in the jig with the marked dadoes on the spine (B), clamp both to a worksurface, and cut the dadoes.

KEEP THE SCREWS ON THE STRAIGHT AND NARROW



To ensure that the long screws drive straight into the shelves, use a square to line up the bit as you drill shank holes through the spine (B).



Use the shank holes in the spine (B) to guide the bit as you drill pilot holes into the edge of each shelf (A). Then, glue and screw the shelves into place.

spine (B). Then, drill and countersink screw holes on the centerlines [**Drawing 1, Photo C**]. Fit a shelf (A) into its dado and drill pilot holes into the shelf [**Photo D**]. Glue and screw the shelf in place and repeat with the remaining shelves. Set the shelf assembly (A/B) aside.

Build a beefy base

1 From ½" MDF, cut the top and bottom (C) to size. From ¾" stock, cut the sides (D), front and back (E), cleats (F), and spacer (G) to size.

2 Glue and clamp the sides (D) to the bottom (C) flush at their bottom edges [**Drawing 2**]. After the glue sets, glue and clamp the front (E) to the bottom.

3 Place a 2⅛×12×12" patio paver block in the base assembly (C/D/E) resting against the front (E) and centered side-to-side. Glue and clamp the cleats (F) and the spacer (G) in place, snug against the paver [**Drawing 2, Photo E**].

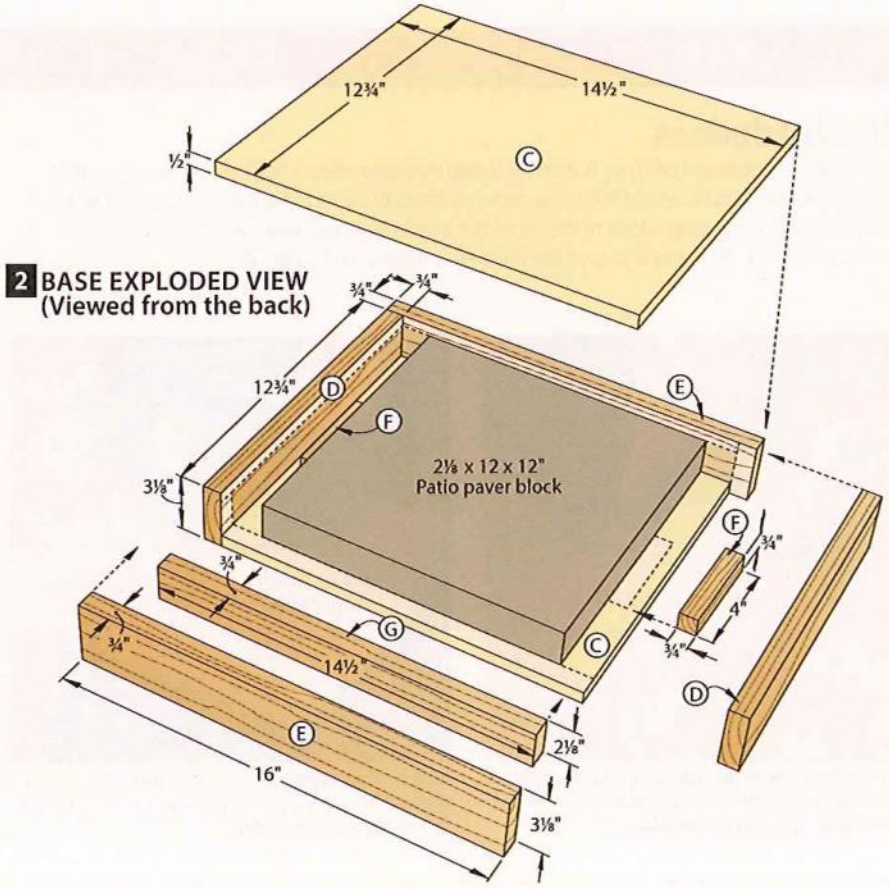
4 Spread glue on the top edge of the spacer (G) and the front and side edges of the top (C) and set it in place. Mark the back face of the back (E) with an X; then, glue and clamp it in place [**Photo F**]. When the glue has dried, sand the base to 220 grit, removing any uneven joint lines in the process.

Note: *As you sand, be sure to replace the marked X on the back (E) to serve as a reminder of the spine location later.*

Add shelves to base

1 To ensure that the spine (B) is plumb and the shelves (A) level, first level the base (C–G) on your worksurface, shimming where necessary. Use a helper to stand the shelf assembly in place, centered on the marked base back (E). Drill and countersink a screw hole, centered, in the spine. Attach the spine as shown [**Drawing 1, Photo G**].

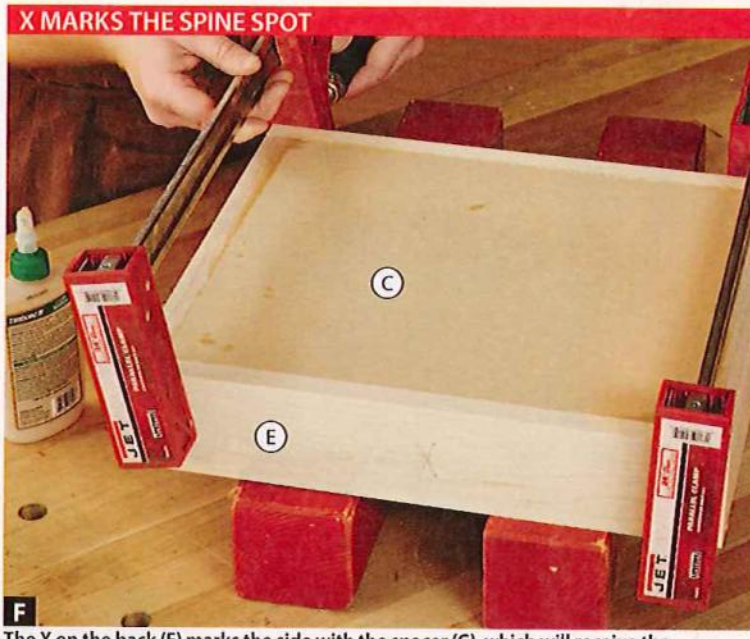
2 Retrieve the other spine (B) and glue and clamp it over the spine assembly



EMPLOY A COUPLE CLAMPING TRICKS

Riser blocks provide clearance for clamps, and cauls extend their reach to the cleats (F). While the glue sets, attach the spacer (G).

X MARKS THE SPINE SPOT

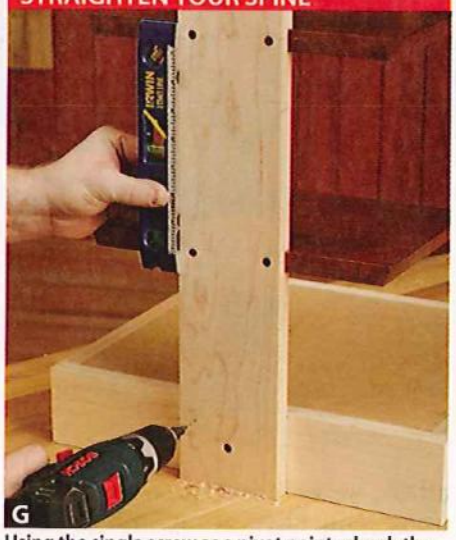


The X on the back (E) marks the side with the spacer (G), which will receive the long screws that secure the spine in place.

(A/B) **[Drawing 1]** to hide the screwheads and stiffen the assembly. When the glue has dried, remove the clamps and finish-sand any remaining parts.

3 To apply a painted finish to the spine (B) and base (C–G), first mask off the shelves with paper and painter's tape **[Photo H]**. Then, spray on a finish using aerosol paint. (We sprayed three coats of Rust-Oleum Bright Coat Metallic Finish.) Now just unwrap, fill it with your favorite collectibles, and bask in the compliments!

STRAIGHTEN YOUR SPINE

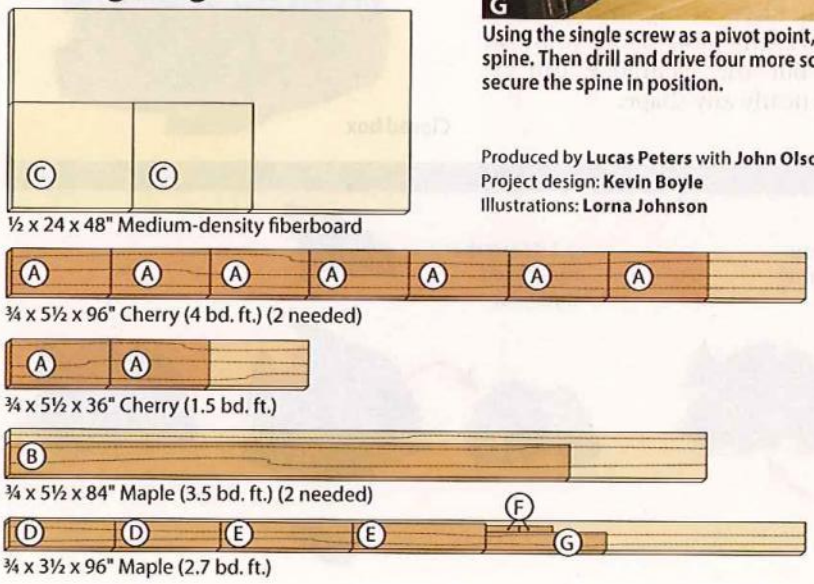


Using the single screw as a pivot point, plumb the spine. Then drill and drive four more screws to secure the spine in position.

BECOME A WRAP STAR

Carefully mask each shelf near the spine, before wrapping the entire shelf with kraft paper, overlapping the masking tape.

Cutting Diagram



Produced by **Lucas Peters** with **John Olson**
Project design: **Kevin Boyle**
Illustrations: **Lorna Johnson**

Materials List

Part		FINISHED SIZE T	W	L	Matl.	Qty.
A	shelves	¾"	8"	12"	C	8
B	spines	¾"	4"	67½"	M	2
C	top & bottom	½"	12¾"	14½"	MDF	2
D	sides	¾"	3⅛"	12¾"	M	2
E	front & back	¾"	3⅛"	16"	M	2
F	cleats	¾"	¾"	4"	M	2
G	spacer	¾"	2⅛"	14½"	M	1

Materials key: C–cherry; MDF–medium-density fiberboard; M–maple.
Supplies: #8×2" flathead screws, 2⅛×12×12" patio paver block.
Bit: ¾" straight router bit.

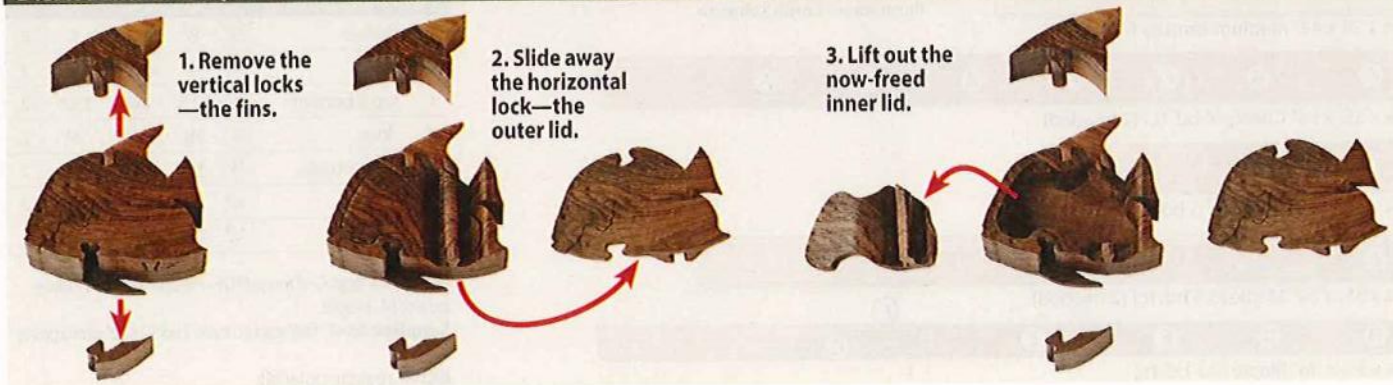
Double-locking Puzzle Box

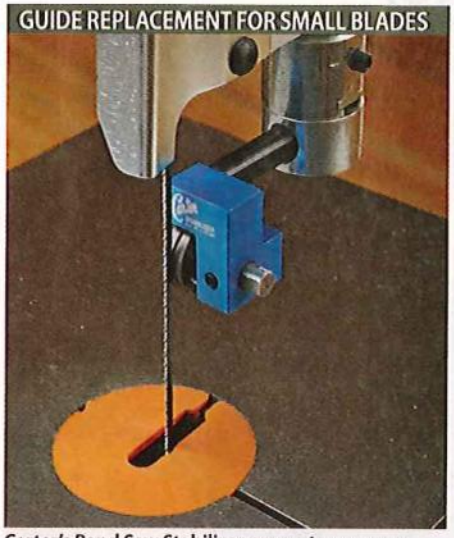
Use this fun technique to turn any shape into a keyed keepsake box.

Making a puzzle box couldn't be easier. Simply sketch in puzzle tabs on two protruding parts of your design; then, use your bandsaw and scrollsaw to shape the parts. In this article, we walk you through the steps using John Rhyne's angelfish pattern, *next page.* (Learn more about John on *page 37.*) But the technique can be applied to nearly any shape.

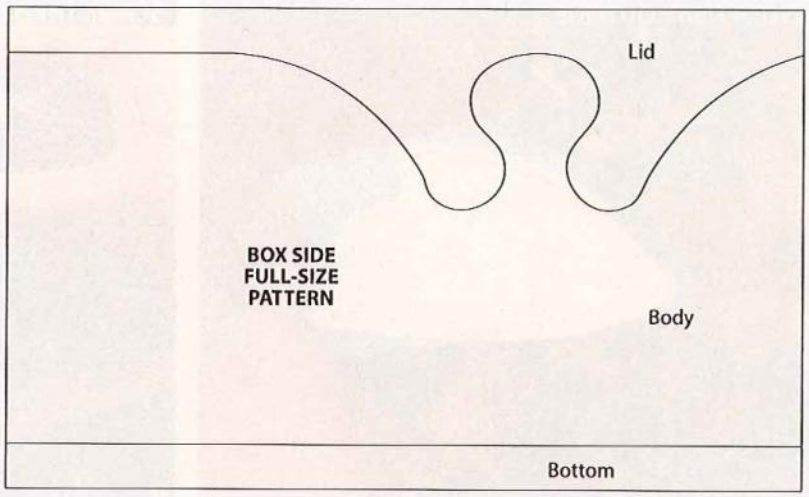
Closed box

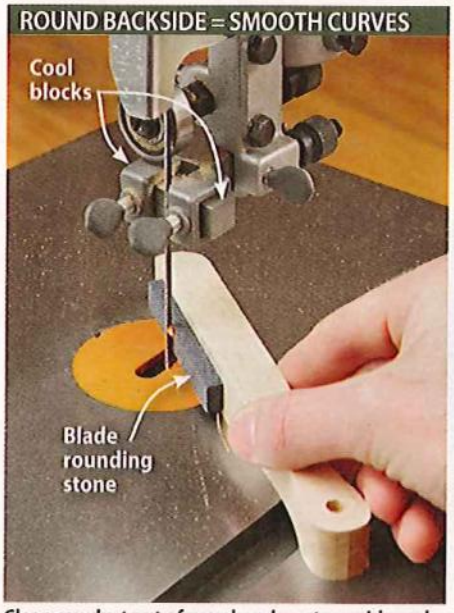
DISASSEMBLY SEQUENCE:



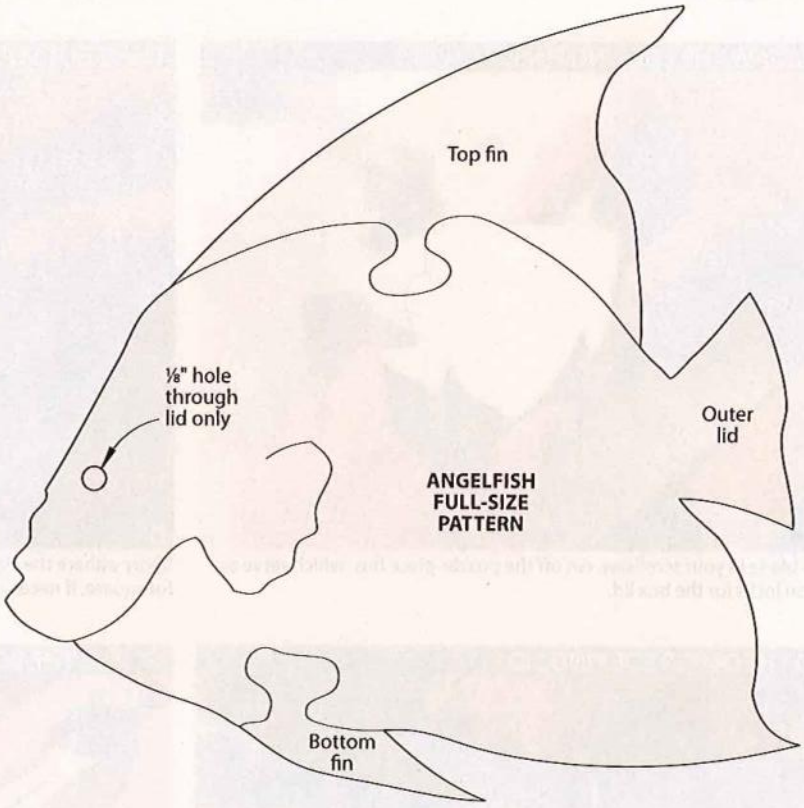


Carter's Band Saw Stabilizer prevents a narrow blade from deflecting, without the need for side bearings or guides.





Clean sawdust out of your bandsaw to avoid spark-ignited fires. Then, with the saw running, round the back of the blade for about two minutes.



First, prep your tools and materials

A ⅛" bandsaw blade best handles the tight curves in this project. Making those turns in thick wood will twist your blade more than normal cuts, so John suggests replacing your guide blocks with friction-reducing Cool Blocks ($17.50, rockler.com, 800-279-4441). If your saw uses guide bearings instead, consider purchasing a Band Saw Stabilizer ($80, carterproducts.com, 888-622-7837), *top*. Then, to help ease the blade around tight corners, round the back of your blade using a blade-rounding stone, like the one *above* ($13, highlandwoodworking.com, 800-241-6748).

Stock up on #5 blades for your scrollsaw. Measure the maximum-height cut you can make on your scrollsaw with its upper arm fully lowered; then, add ⅛" to that dimension to determine the maximum material thickness you can use for your box. (You'll cut off ¼" before you take it to the scrollsaw.) We used 2" walnut for the angelfish, but if this is your first bandsawn box, start with inexpensive scrap stock as practice material. Don't worry about staying too close to the lines on some of the tight curves. No one will ever know if you didn't precisely follow the pattern.

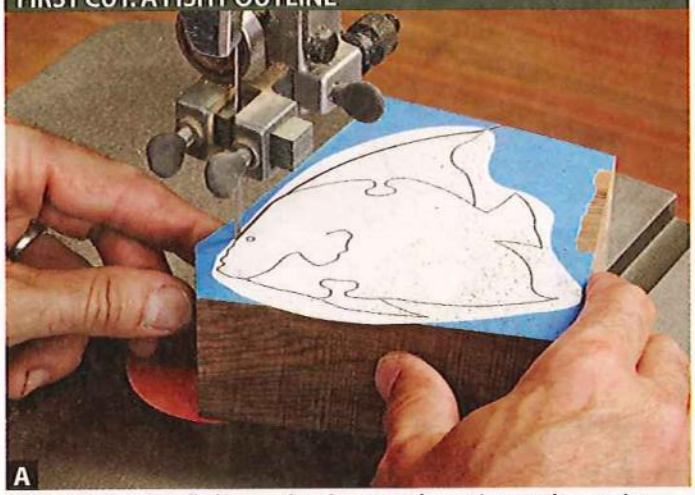
Now, spray-adhere a photocopy of the angelfish pattern, *above*, to the top face of your stock.

John's tip: ***To make it easier to remove the pattern later, before spray-adhering the pattern, mask the face of the entire block with painter's tape.***

Then, follow the instructions in **Photos A–K**, *next page*, to create the box.

Let's build a puzzle box!

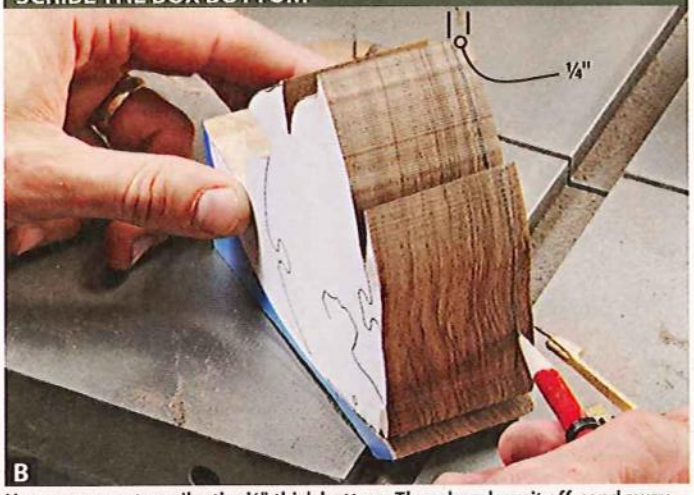
FIRST CUT: A FISHY OUTLINE



A

With a ⅛" blade installed in your bandsaw, start by cutting out the exterior shape of the angelfish.

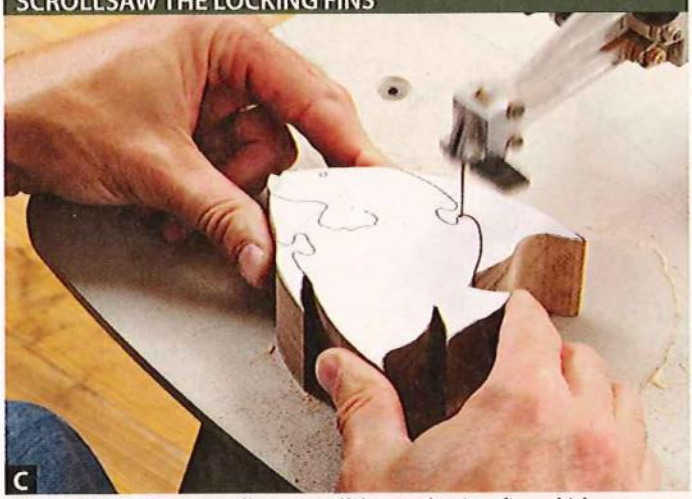
SCRIBE THE BOX BOTTOM



B

Use a compass to scribe the ¼"-thick bottom. Then, bandsaw it off, sand away blade marks from the body and the bottom, and set the bottom aside.

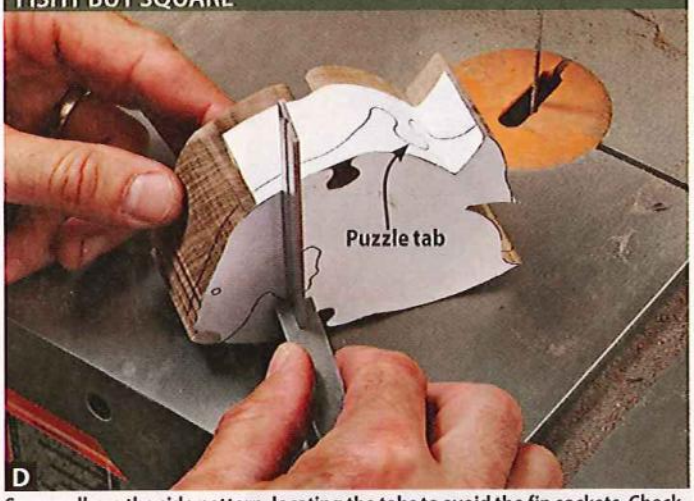
SCROLLSAW THE LOCKING FINS



C

With a #5 blade in your scrollsaw, cut off the puzzle-piece fins, which serve as the vertical locks for the box lid.

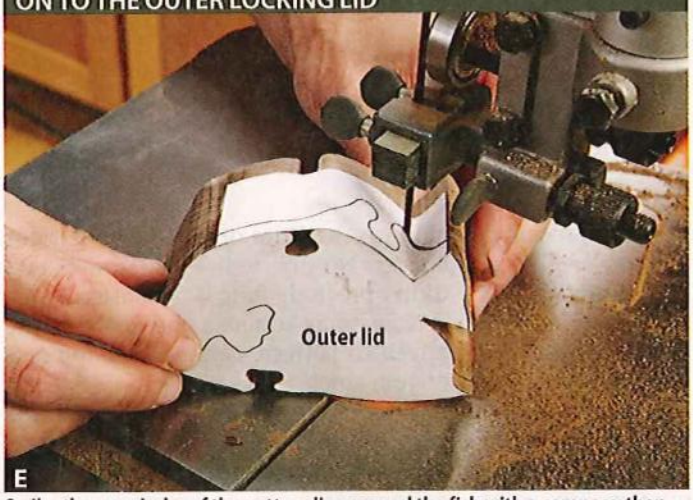
FISHY BUT SQUARE



D

Spray-adhere the side pattern, locating the tabs to avoid the fin sockets. Check for square. If necessary, hot-glue cutoffs to stabilize the box.

ON TO THE OUTER LOCKING LID



E

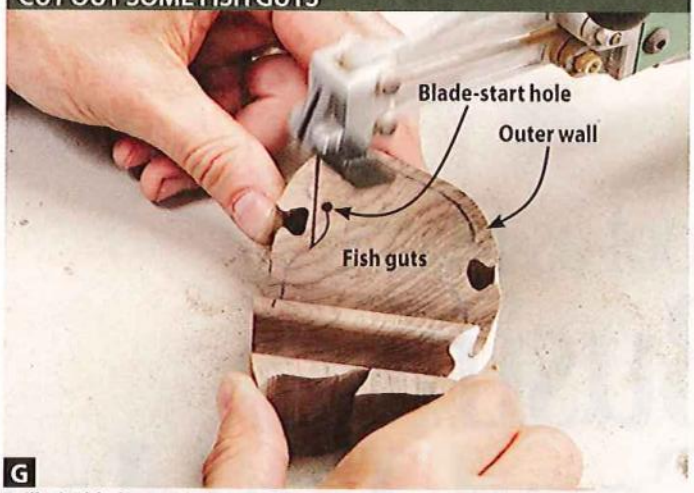
Scribe the remainder of the pattern line around the fish with a compass; then bandsaw and set aside the outer lid.

SCRIBE THE BOX INTERIOR

F

Scribe ¼" around the outside of the fish with a compass. Draw freehand around the puzzle sockets and other protrusions to smooth out the line.

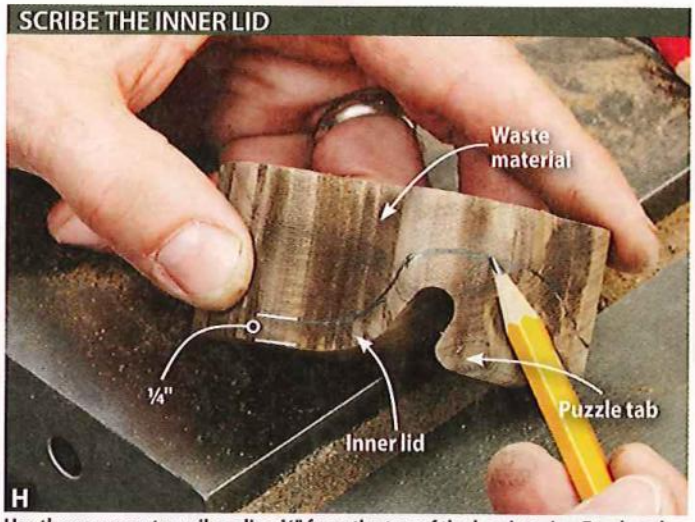
CUT OUT SOME FISH GUTS



G

Drill a ⅛" blade-start hole in an inconspicuous spot along the line. Cut out the box's interior and set aside the outer wall.

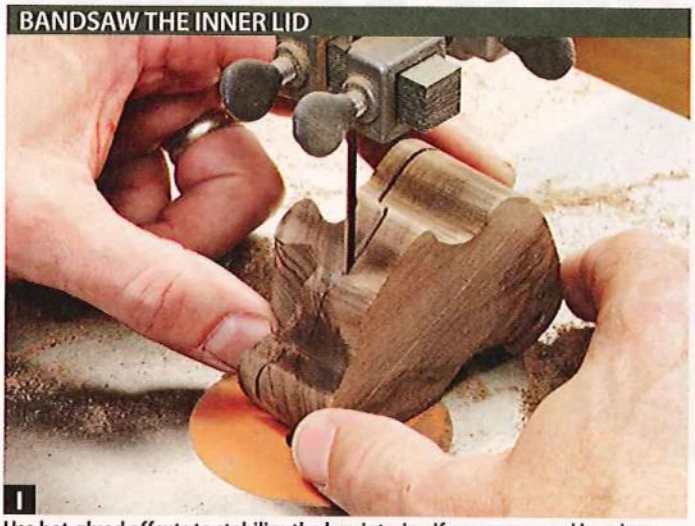
SCRIBE THE INNER LID



H

Use the compass to scribe a line ¼" from the top of the box interior. Freehand the line around the puzzle tab, as shown.

BANDSAW THE INNER LID



I

Use hot-glued offcuts to stabilize the box interior, if necessary, and bandsaw along the marked line to form the inner lid. Save the waste material for later.

DETAILS, DETAILS, DETAILS

J

Hot-glue wedges or offcuts to stabilize and level the outer lid. Scrollsaw the fin cutout detail; then, drill a ⅛" hole for the eye.

A FINNY FINISH

K

Sand away saw marks on all the pieces. Then, glue the outer wall to the bottom. Bandsaw small pieces of the interior waste material and glue them in place to support the inner lid. Apply finish and assemble.

About the boxmaker

John Rhyne teaches drafting and design in the same Knoxville, Tennessee, high school classroom where he learned the craft. His woodworking interests range from cedar-strip canoes to scrollsawn, geared, wooden clocks. But it's his skill at creating interlocking boxes that caught our attention. And to prove that his puzzle-box technique can be used on nearly any design, John made the box shown at *right*, based on a drawing by his daughter, 7-year-old Regan.

Produced by **Lucas Peters** with **Kevin Boyle** Project design: **John Rhyne**

Cool-as-Marble Business Card Holder

With a few exotic scraps and a marble, you can build this eye-catching desk accent. We used zebrawood and wenge on our holder, but any two contrasting species will make this holder stand out on a desktop.

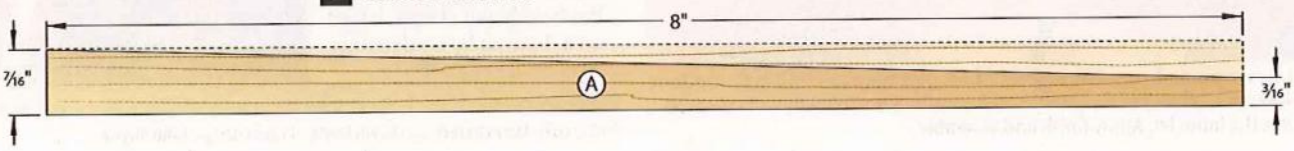
Prep the blank

1 Cut the wedge blank (A) to size **[Materials List]**. Lay out the taper on the edge of the wedge blank and cut it at the bandsaw **[Drawing 1]**. Sand out any machine marks and cut the trim (B) to size. Round over the top edges of the trim at the router table. Sand the wedge and trim to 150 grit.

2 On a flat surface such as your tablesaw, place the wedge (A) on ¼" spacer scrap. Glue and clamp the trim (B) to the wedge with the ends flush and rounded edges down **[Photo A]**. When dry, bandsaw away the overhanging bottom edge of the trim. Sand the bottom edge flush with the wedge body.

3 Use spray adhesive to apply a copy of the **Marble Business-Card Holder Cut Pattern**, found in the *WOOD Patterns®* Insert, to the wedge assembly (A/B), or, transfer the cut lines from the cut pattern directly to the workpiece using a pencil. Then, following the photos and tips, *opposite page*, cut the wedge into three pieces. ***Note:** Make all crosscuts with the assembly facedown against the tablesaw: Always cut the workpiece with the trim down, as shown.*

1 WEDGE BLANK



Prepare for careful crosscuts

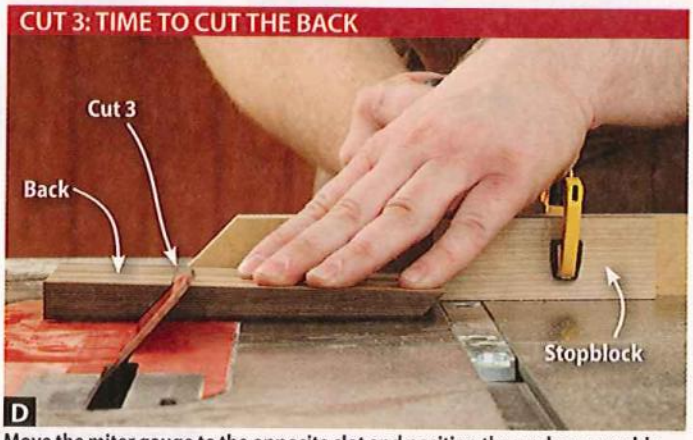
Before cutting the wedge assembly (A/B), try the following tips for superior results:

- Make a scrap wedge the same dimensions as the wedge assembly (including the trim). Use this wedge to practice cuts.
- Follow the cutting sequence carefully, and be prepared to move the miter gauge from one miter slot to the other after each cut.
- Attach a scrapwood extension to the center of your miter gauge with double-faced tape. It should be long enough to cross the blade from both miter slots. Cut through it with each blade angle adjustment, and use it to align the cut on the wedge assembly.
- Once you've aligned the workpiece with the miter-gauge extension, clamp a stopblock to the extension to prevent any accidental shifting.

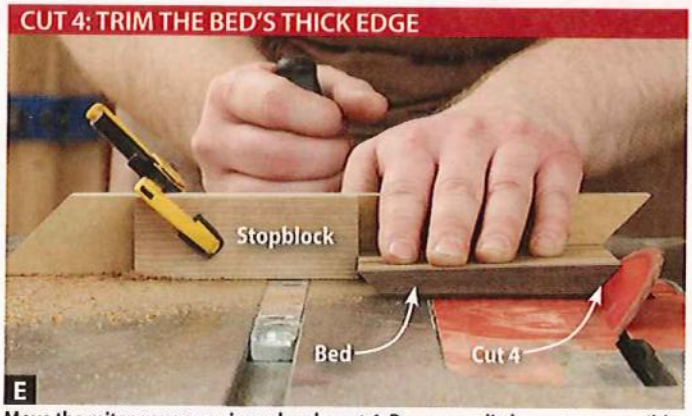
Simplify applying the trim: Use a ¼" spacer to situate the wedge (A) at the appropriate depth within the trim (B).

Tilt the blade to 15° and align the workpiece with the end of the extension along cut 1. Make the cut.

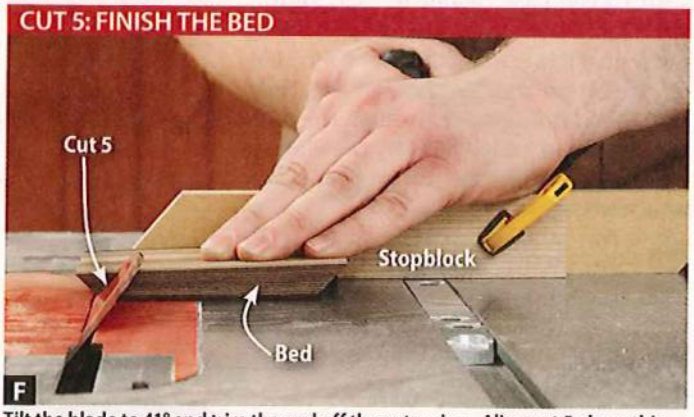
Tilt the blade to 45° and move your miter gauge to the other slot. Position the wedge assembly (A/B) so the second cut hits a blade's thickness from the cut end of the extension. Cut the toe and set it aside.



Move the miter gauge to the opposite slot and position the wedge assembly (A/B) so cut 3 sits a blade's thickness from the cut edge of the extension. Make the cut and set the back aside.

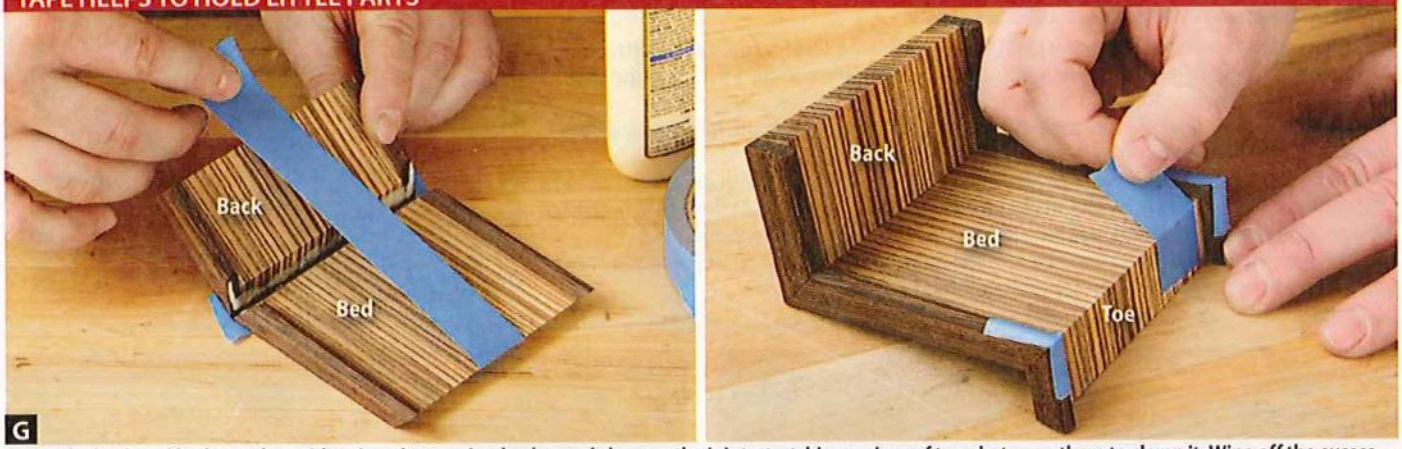


Move the miter gauge again and make cut 4. Remove as little waste as possible to get a sharp miter. Discard the offcut.



Tilt the blade to 41° and trim the end off the extension. Align cut 5 along this end and make the cut.

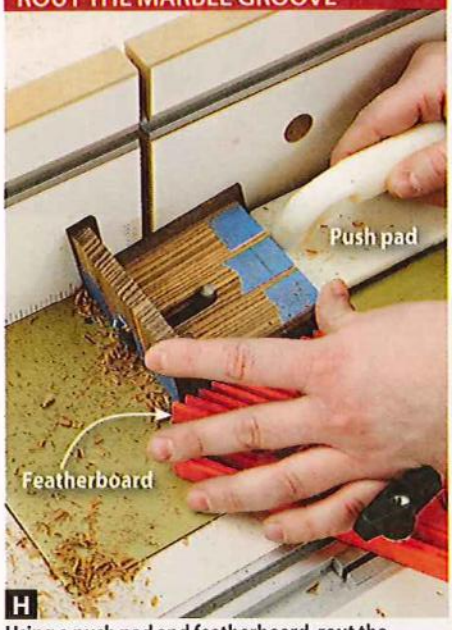
TAPE HELPS TO HOLD LITTLE PARTS



G

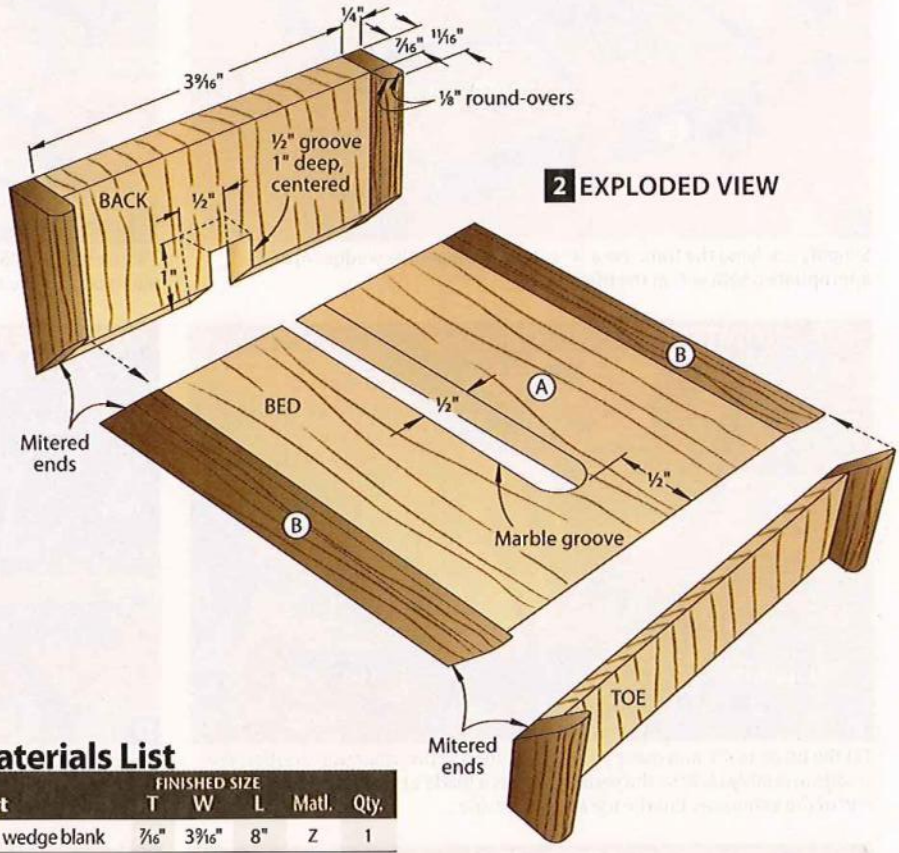
Hinge the back and bed together with painter's tape. Apply glue and close up the joint, stretching a piece of tape between them to clamp it. Wipe off the excess glue with a damp cloth. Later, repeat with the joint between the bed and toe.

ROUT THE MARBLE GROOVE



H

Using a push pad and featherboard, rout the marble groove; take shallow cuts and work up to full depth in ⅛" increments.



2 EXPLODED VIEW

4 Apply painter's tape to the miter joints as shown [**Photo G**]; then apply a thin, even layer of glue to each joint.

5 Install a ½" spiral upcut bit in your router table. Adjust the fence to center the bit on the card holder, and then rout the marble groove through the back and into the bed [**Photo H, Drawing 2**]. ***Quick Tip!*** *Practice this cut on your scrap-wood wedge first.*

6 Finish-sand all parts to 400 grit. Apply three coats of clear finish. (We used General Finishes Enduro-Var Satin Urethane Finish, #25451, $19.99 pt., 800-279-4441, rockler.com.)

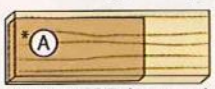
Produced by **Nate Granzow** with **John Olson**
Project design: **John Olson**
Illustrations: **Lorna Johnson**

Materials List

Part		FINISHED SIZE T	W	L	Matl.	Qty.
A	wedge blank	7/16"	3 3/16"	8"	Z	1
B	trim	¼"	1 1/16"	8"	W	2

Materials key: Z–zebrawood, W–wenge.
Blade and bits: ⅛" round-over bit, ½" spiral upcut bit.

Cutting Diagram



¾ x 4 x 12" Zebrawood (.33 bd. ft.)
*Plane or resaw to the thicknesses listed in the Materials List.

¾ x ¾ x 12" Wenge (.08 bd. ft.)

More Resources

- For free small-piece sawing strategies, see **woodmagazine.com/safesmallparts**.
- For free tips on gluing and clamping, go to **woodmagazine.com/glueandclamp**.
- $ For a small fee, download a video on getting more from your router here: **woodmagazine.com/routertips**.

Better Homes and Gardens®
WOOD®
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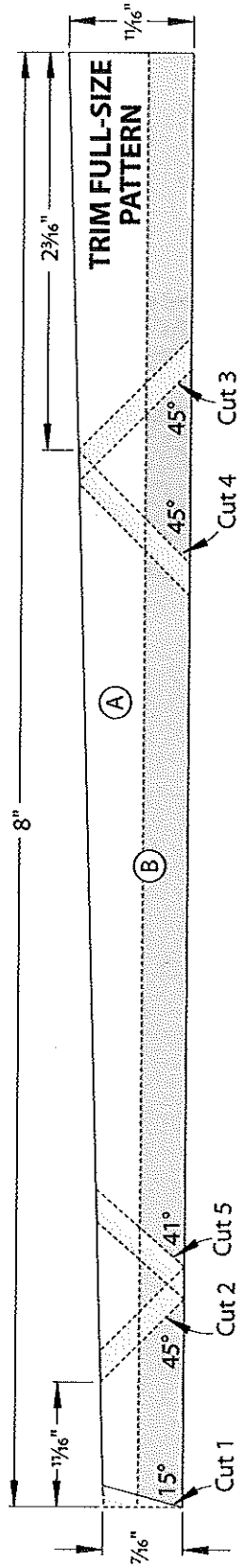
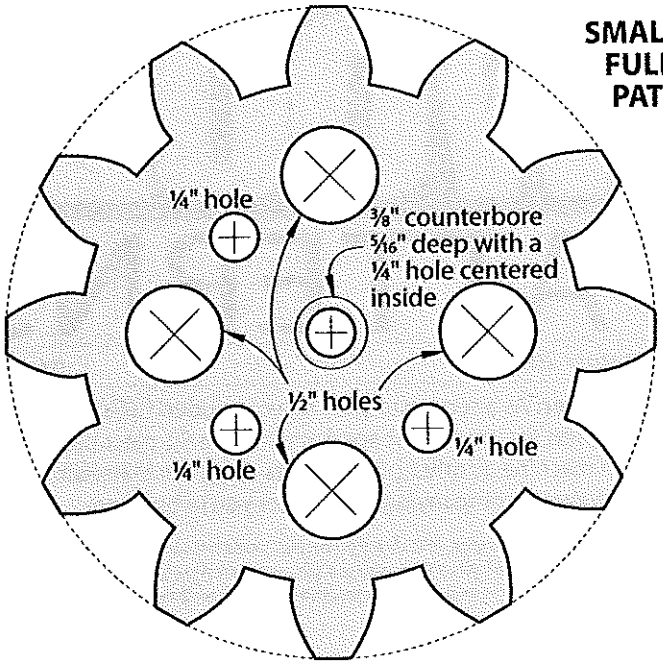
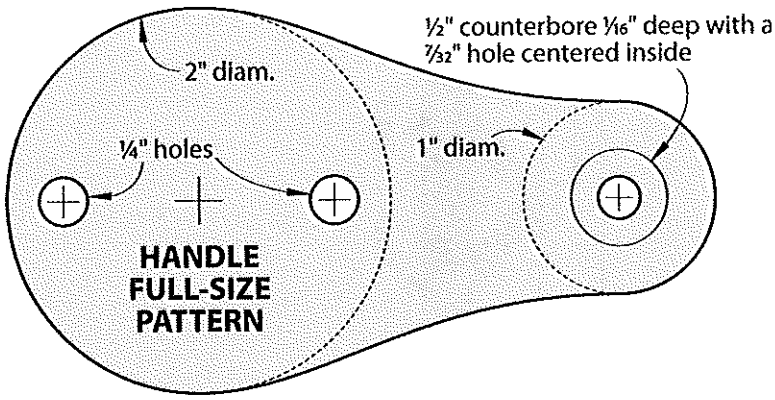
November 2012 Issue 215

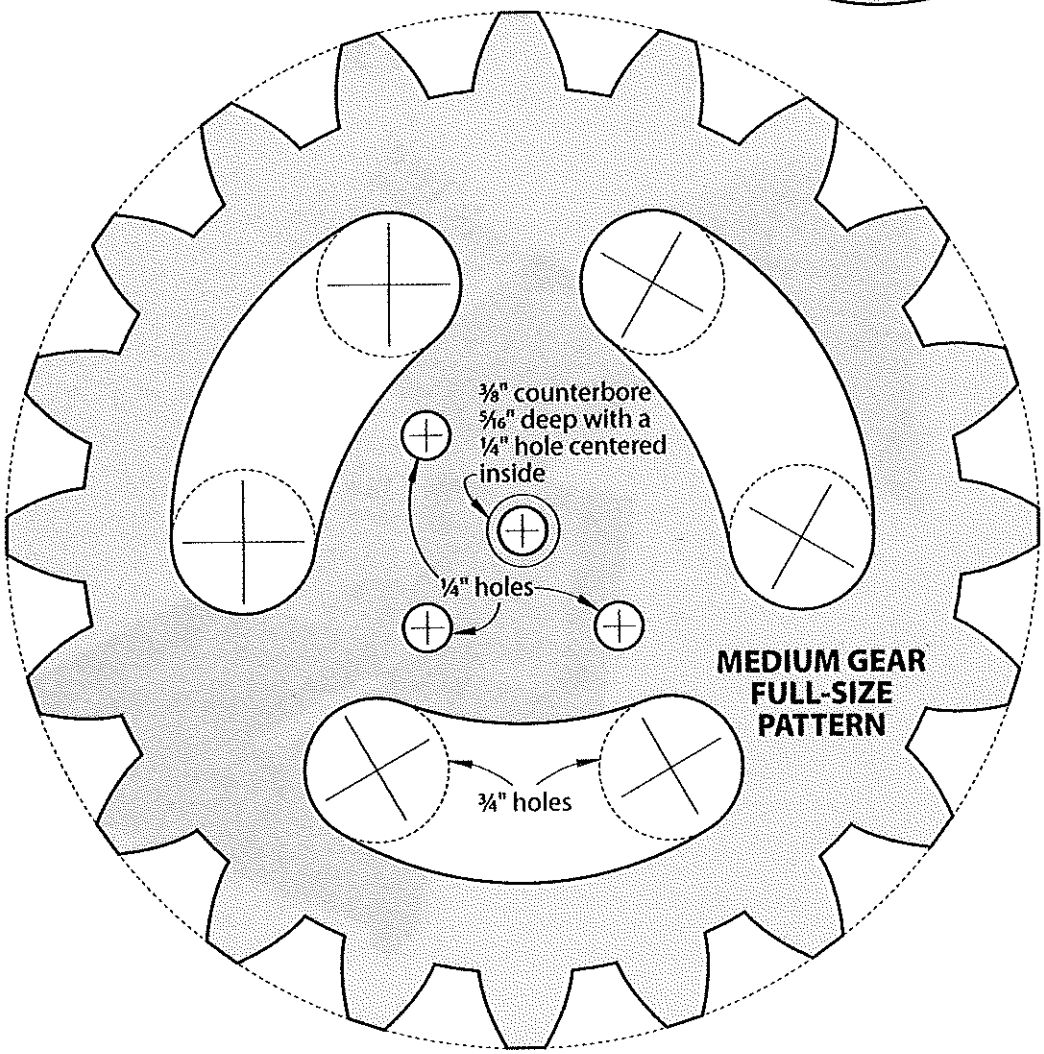
Dear Reader: As a service to you, we've included full-size patterns on this insert for irregular-shaped and intricate project parts. You can machine all other project parts using the Materials List and the drawings accompanying the project you're building.



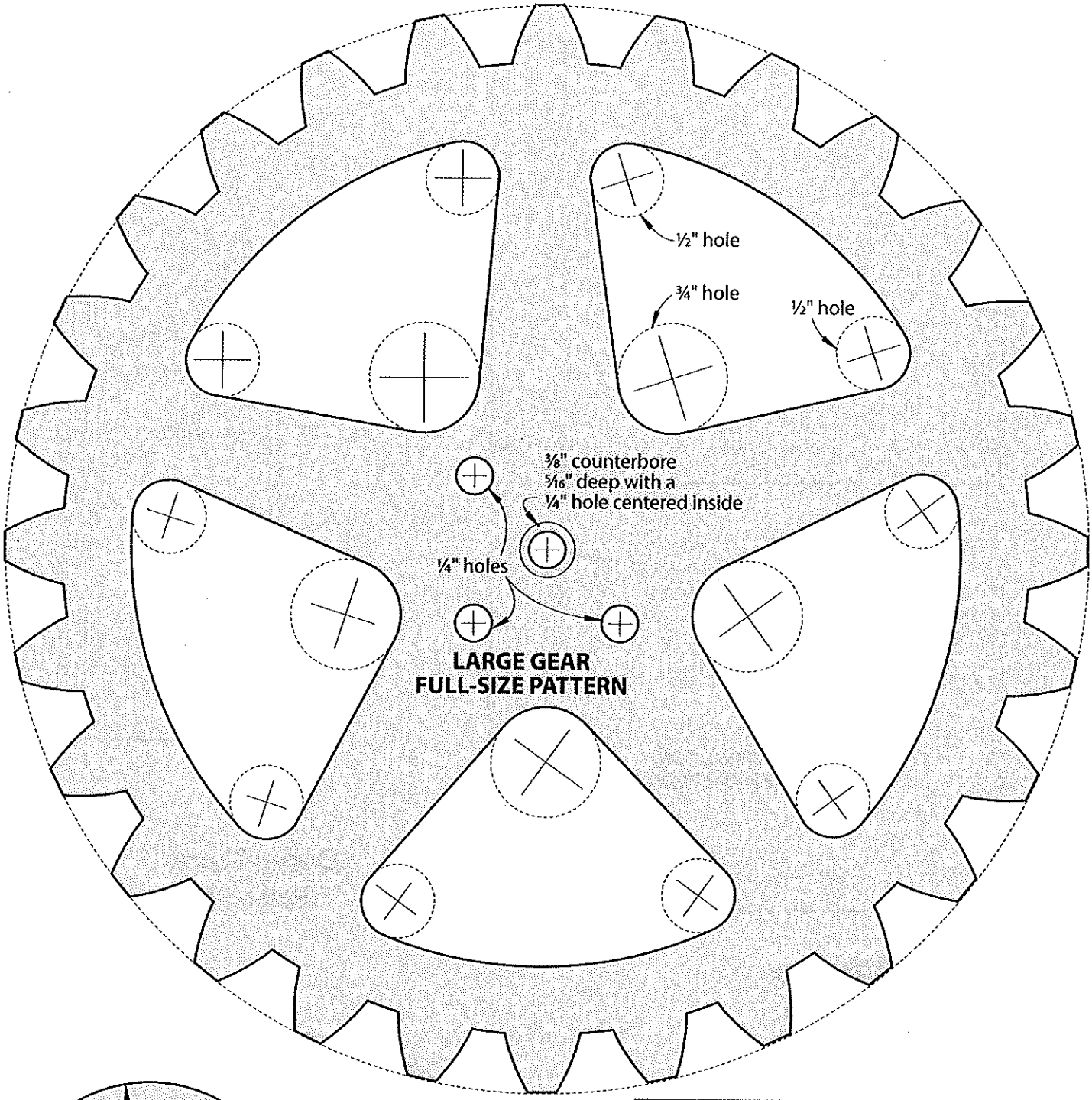
Business-card Holder Cut Pattern
Page 38

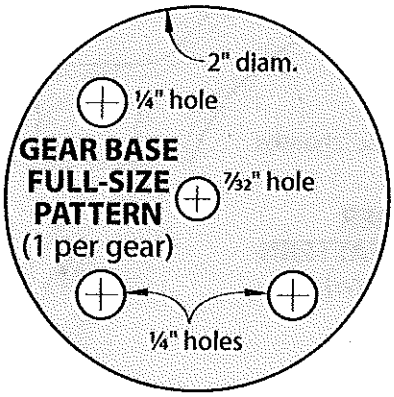




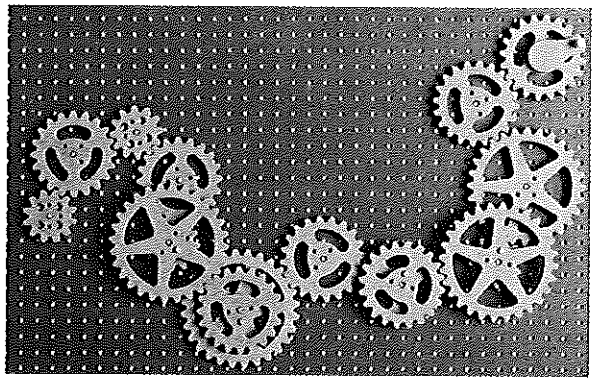


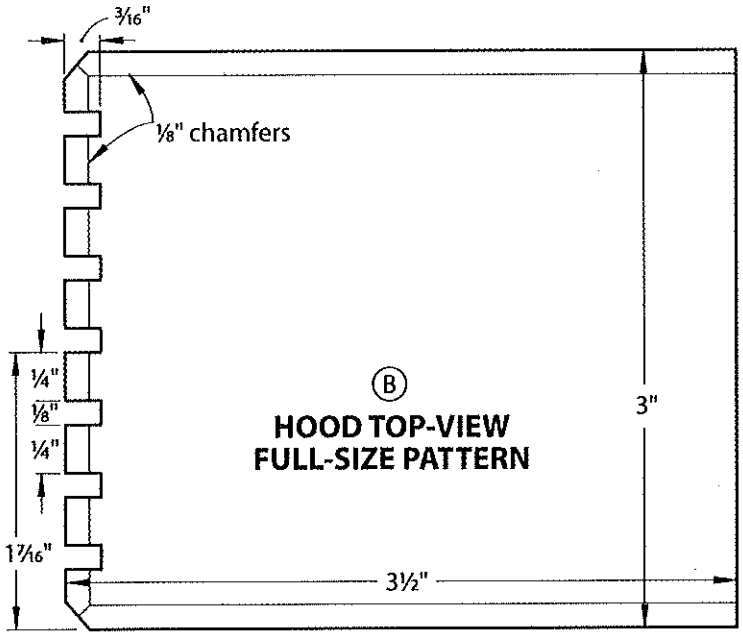
Toy Gears
Page 26



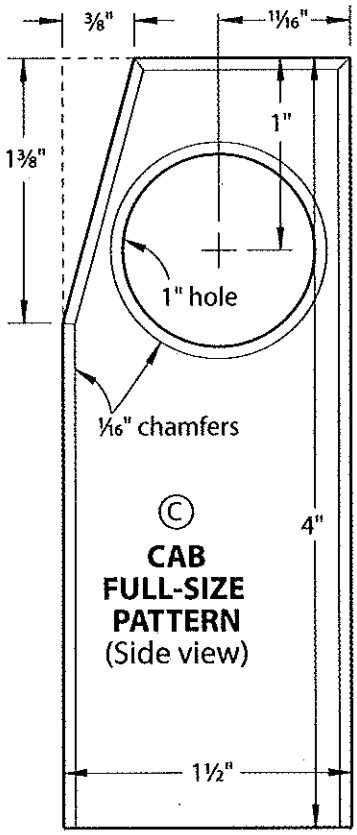


Toy Gears
Page 26

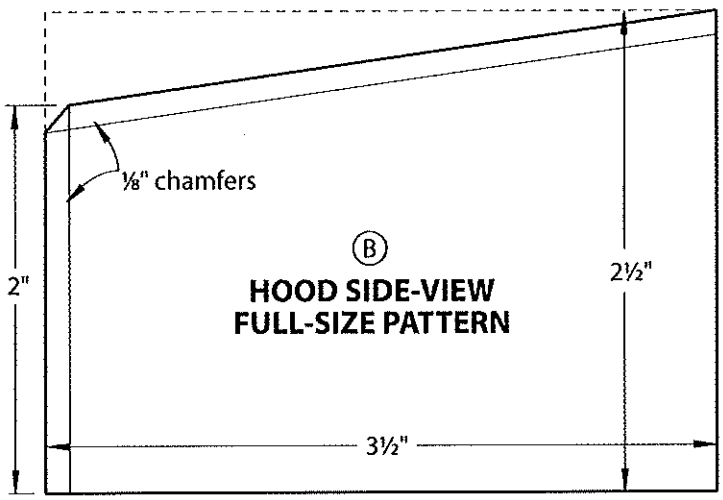




Ⓑ
HOOD TOP-VIEW
FULL-SIZE PATTERN

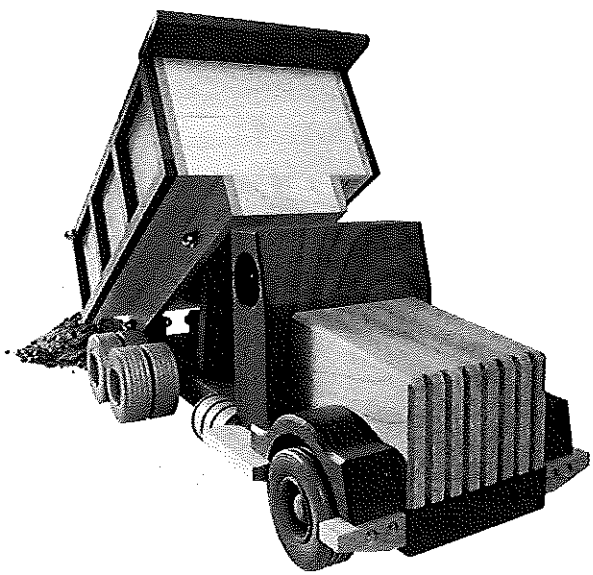


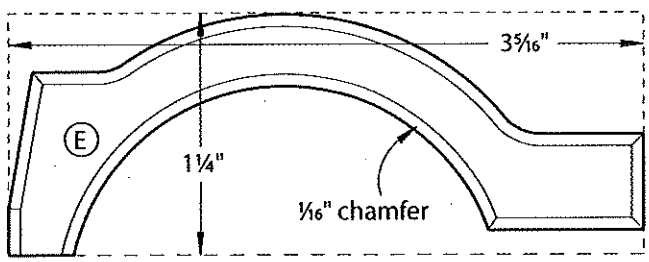
Ⓒ
CAB
FULL-SIZE
PATTERN
(Side view)



Ⓑ
HOOD SIDE-VIEW
FULL-SIZE PATTERN

Dump Truck
Page 58





FENDER
FULL-SIZE PATTERN
(Side view)

Tips and Tricks from One-Man Pro Shops

These guys learned the hard way—over time and on the job—but you can skip ahead and simply reap the benefits of their labors.

You don't have to be a professional woodworker to work like one. And you might be surprised to learn that the differences between you and someone making money in the shop are surprisingly few. As it does with you, efficient use of time and materials plays a daily role in every pro's routine. They perform regular tool maintenance, just as you must. And they crave the same things we all do: lower material prices, spectacularly figured wood, newer and better tools, get-there-quicker finishes, and less time spent sanding. To let you in on some of their secrets, we visited four accomplished makers of custom furniture and cabinets. We learned a thing or two, and so will you.

Matt Seiler: Getting it done in the garage

1. Because Matt's tablesaw outfeed support doubles as his workbench, he often has to **get creative when building a large project** on that surface. To make outfeed room for ripping long boards, he built a set of I-beam riser blocks, mounted on 2" swivel casters, shown on the *previous page*. With the project resting on the risers, Matt can roll it out of the way or simply feed boards beneath it.

2. Matt says dedicating wall space to perforated hardboard for hanging tools on metal hooks underutilizes that space. Instead, **build cabinets and shelves:** The depth gives you greater storage, and the doors keep out dust.

Matt custom-builds furniture from his two-car garage shop in suburban Chicago. Despite being in its fifth different layout, his shop still operates only on 110-volt circuits. But, Matt says, that keeps him "grounded," encouraging hand-tool use and often forcing him to think of more efficient ways to work. Visit his website at mswoodcraft.com

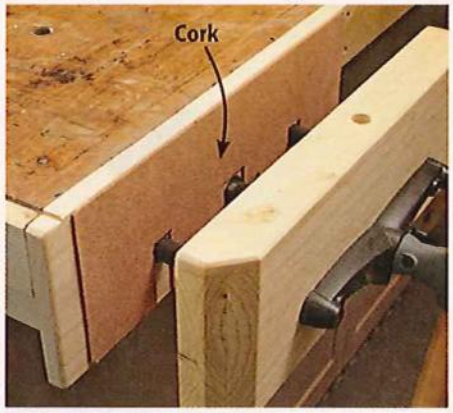
3. Plan your schedule around glue-ups to make efficient use of time and clamps. Schedule big glue-ups for the end of the day to give them 8–12 hours in clamps; they'll be ready the next morning.

4. Use lots of rubber mats on your shop floor. Besides protecting any dropped tools or project parts from damage, they also cut down on foot, leg, and back pain from standing all day.

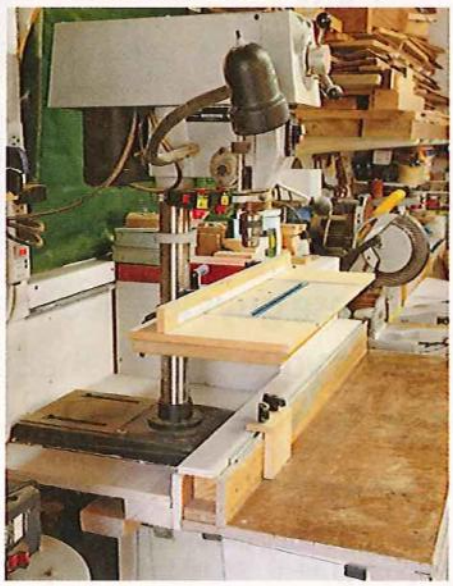
5. Anytime you're waiting on a clamp-up to dry before moving on to the next step in your project, **take advantage of the downtime** by sharpening a few tools or doing much-needed maintenance. Matt dedicates the first few hours of each Monday morning to tool maintenance, such as changing planer knives or aligning a tablesaw rip fence. That also gets him back into a woodworking frame of mind after the weekend.

6. Buy supplies and tools on the Internet to save time driving to a store; as a bonus, many sites don't charge sales tax. Take advantage of sites that offer free shipping for ordering a certain amount, even if it means adding to your order things that you use frequently but might not need at the moment, such as glue, sandpaper, screws, and finishes.

7. Line the jaws of your bench vise with thin, self-adhesive cork (available at office-supply and craft stores). The inexpensive sheets add grip and protect project parts from marring.

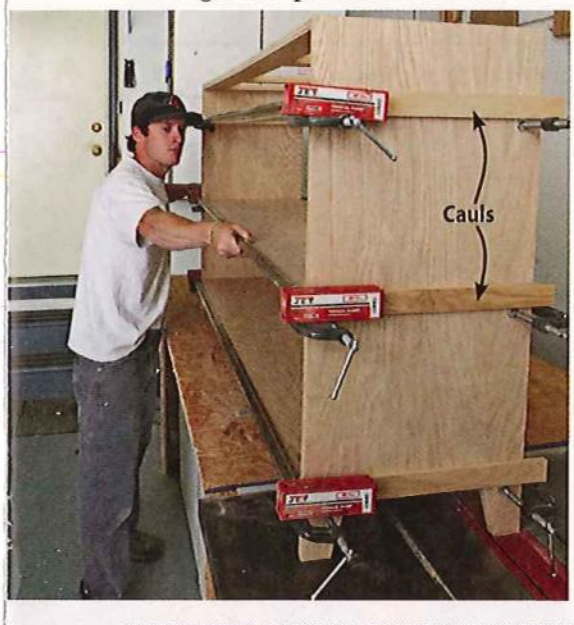


8. Make efficient use of every square inch in your shop. As shown *below*, Matt turned the base of his drill press 180° and then bolted it to the benchtop. Doing that freed up workpiece support space for his mitersaw without affecting the functionality of the drill press.

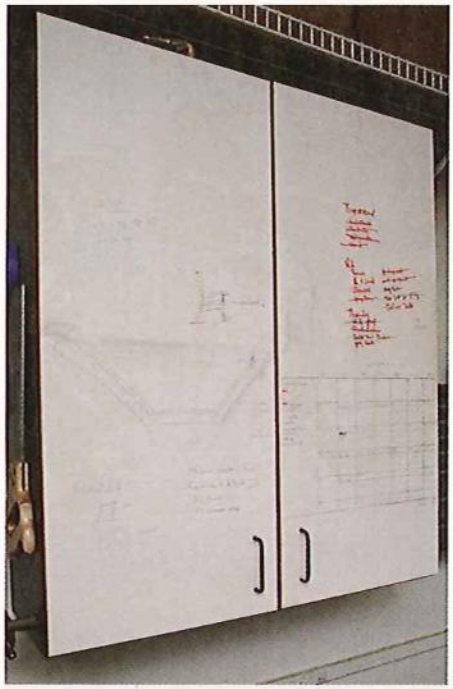


Steve Lamberti: Good ideas no matter the shop size

1. Keep control of large glue-ups. When clamping up a large case by yourself, it's difficult to hold bar or pipe clamps in place until tightened, especially if you're using cauls, too. To get things under control, *lightly* (so you don't mar the wood) secure C-clamps or one-hand ratcheting clamps to the case and rest the cauls on them. Then simply tighten the larger clamps onto the cauls.

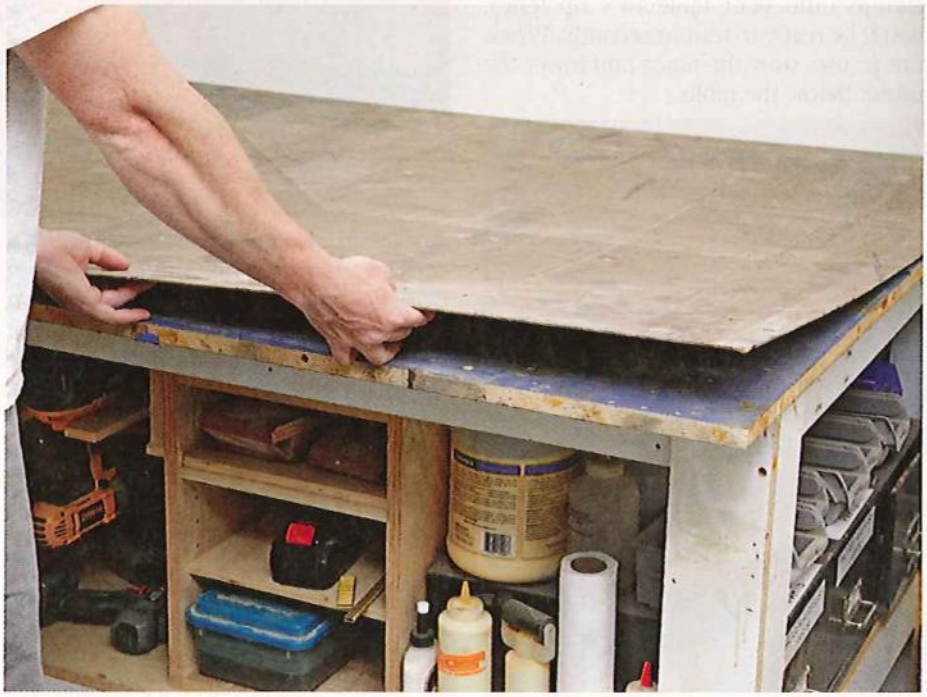


2. Make shop-cabinet doors from melamine-coated particleboard or MDF. Steve uses several of these in his shop for message boards, calendars, and even design doodles. Marker and pencil marks wipe off quickly with lacquer thinner and a rag.



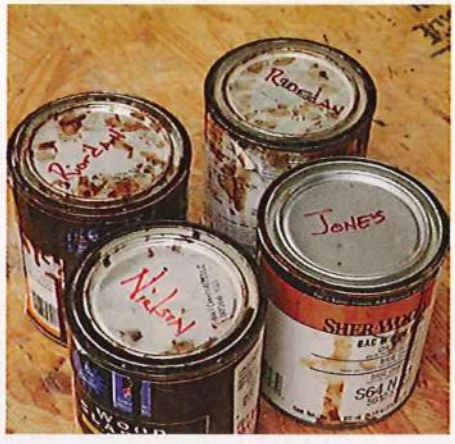
Steve learned the ropes in cabinet shops and as a furniture-maker's apprentice before breaking out on his own. He now specializes in Sam Maloof-inspired rockers and—what else?—cabinets. When we met with Steve he was working from his garage in Pleasant Hill, Iowa, while building a 30×40' dedicated shop. See his furniture at elementwoodworking.com

3. Top your workbench with a sheet of ¼"-thick hardboard. Flat and easy to mark on, it absorbs cuts, scratches, and stains. When the surface wears out, simply replace it. If it scoots around more than you'd like, tack it with brads.



4. Store seldom-used tools and supplies up high on wire shelves, taking advantage of wall space that seldom gets used. Label each box with its contents so you can quickly locate what you need.

5. Label cans of finish or stain to match the project you've just finished (or the customer's name, in Steve's case), especially if they're custom-blended finishes. This will help in the future if you need to make repairs to that project or finish another piece to match.

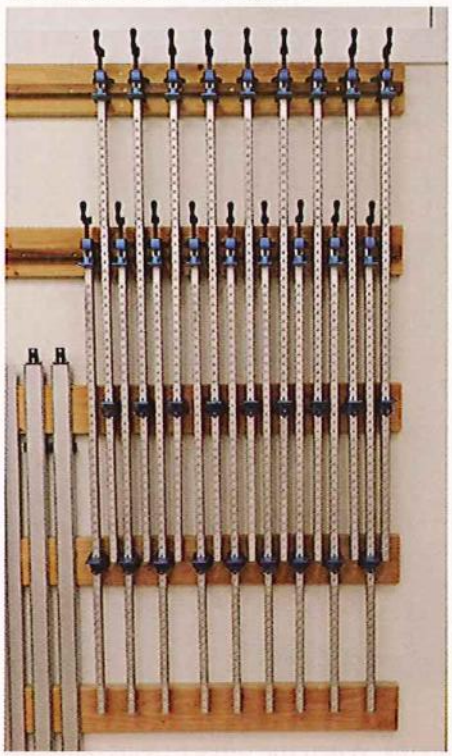


6. Spray finish first thing in the morning when there's no dust in the air. The night before, sweep and vacuum the floor and area around where you'll be spraying to avoid kicking up dust with your feet or the spray gun. Allow the finish to dry, or move the project to another location, before creating more dust.

Todd Clippinger: A pro in two fields

1. Keep jigs handy. The more projects you build, the more jigs and templates you'll create and want to hold on to for future use. But where to store them all? Todd labels and hangs them on pegs along the tops of walls. This space goes unused in many shops.

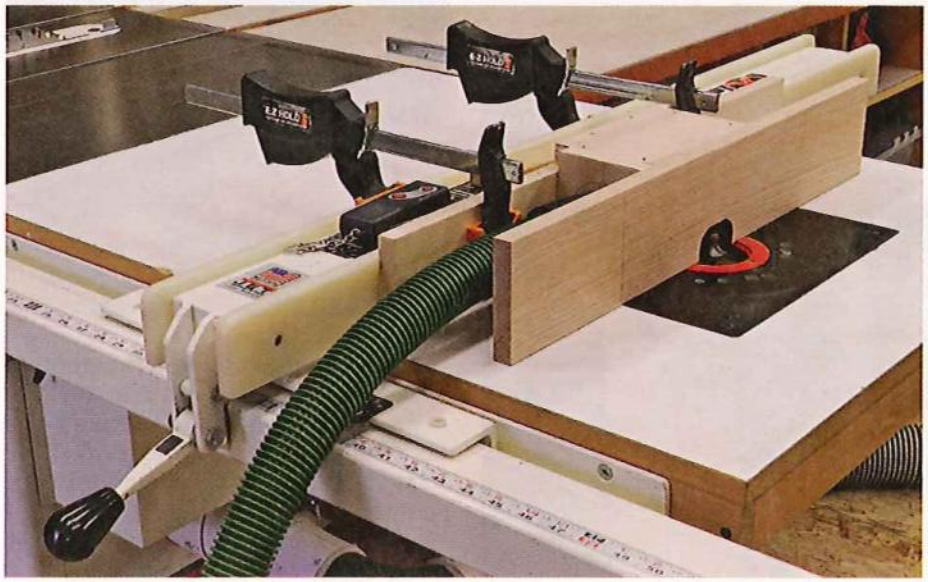
2. Economize wall space. Rather than spacing bar and pipe clamps side-by-side on a single rack, Todd discovered he could hang a second rack, with the slots centered between the bars of the top clamps, and get more clamps in the same amount of wall space.



Photos: Yasmin Marup

Todd worked as a trim carpenter, specializing in custom built-ins, before developing his skills as a furniture-maker and building his dream shop in Billings, Montana. These days he takes on both types of jobs. He's also a prolific video blogger on his website: americancraftsmanworkshop.com

3. Turn your tablesaw's extension table into a router table. Whether you use a router lift or the router's base, this makes efficient use of a surface that too often ends up a *de facto* clutter catcher. And, by building a simple router fence that clamps onto your tablesaw's rip fence, you'll be ready to rout in seconds. When not in use, stow the fence and lower the router below the table.

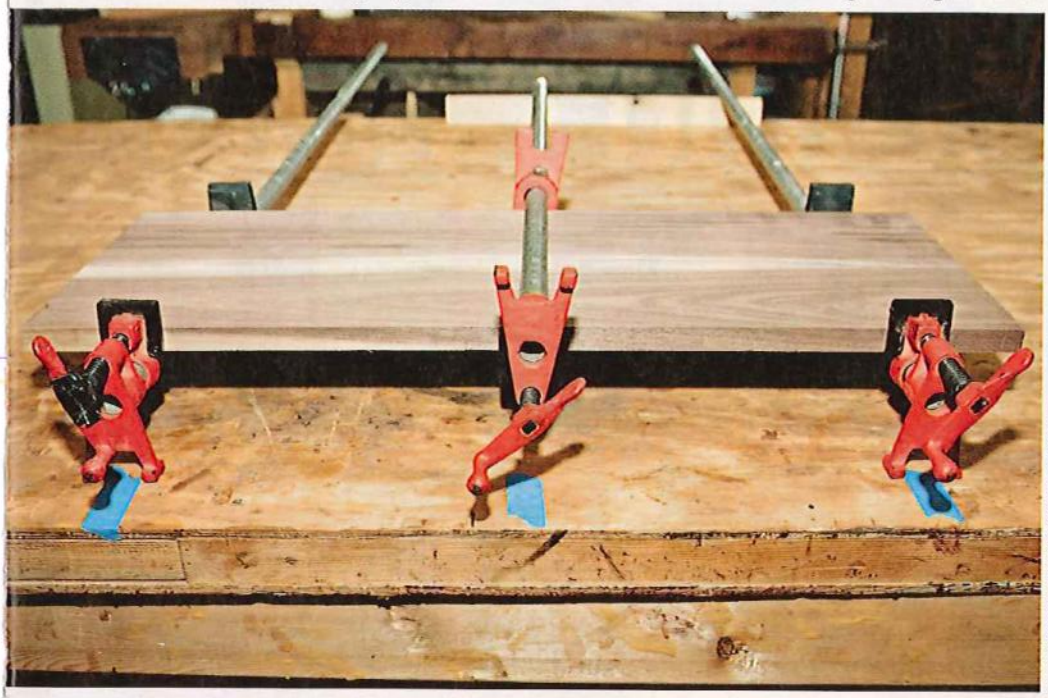


4. Remove dried glue squeeze-out with a card scraper before planing or sanding workpieces. This saves wear and tear on planer and jointer knives and sanding belts and discs, and the scraper won't gouge a board or lift grain the way a chisel can. Plus, you can quickly and easily resharpen a card scraper with no expense. (We have a video that shows how, available free for a limited time at woodmagazine.com/freevideos)

5. Use fast-drying finishes (lacquer, shellac, or water-based polyurethane) when spraying projects in your shop so dust won't settle and become embedded.

Matt Campbell: From DIY to pro

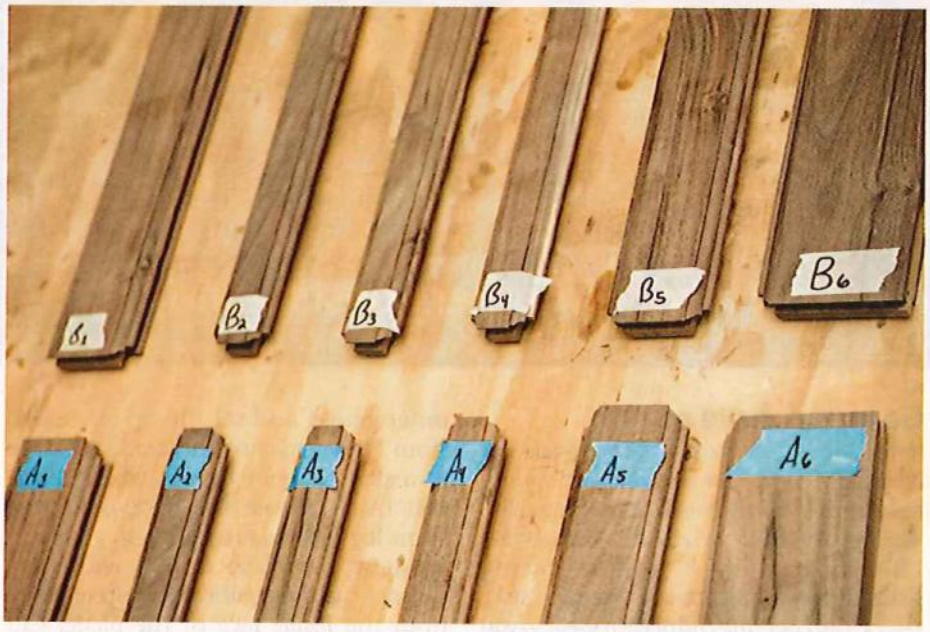
1. When doing multiple identical clamp-ups, mark the clamp locations on the bench with masking tape. That makes each subsequent assembly quicker to set up, saving you time and frustration, rather than scrambling while glue dries.



Photos: Diana Simpson

Growing up, Matt learned woodworking from his stepfather. An avid guitar player, Matt wanted to build his own. But after getting married, he began to build furniture and built-ins instead as he fixed up his first home. Over time, he began to sell pieces, and now builds commission furniture from his shop in Chattanooga, Tennessee. View his work at nooga-wood.com. (He still hasn't built that guitar, though.)

2. Label project parts for easier identification using masking tape and by writing letters or numbers on them. To avoid confusing parts that look similar, such as rails and stiles for doors, use different colors of tape. This way, you won't accidentally cope the end of a stile or rout a profile on the wrong edge.



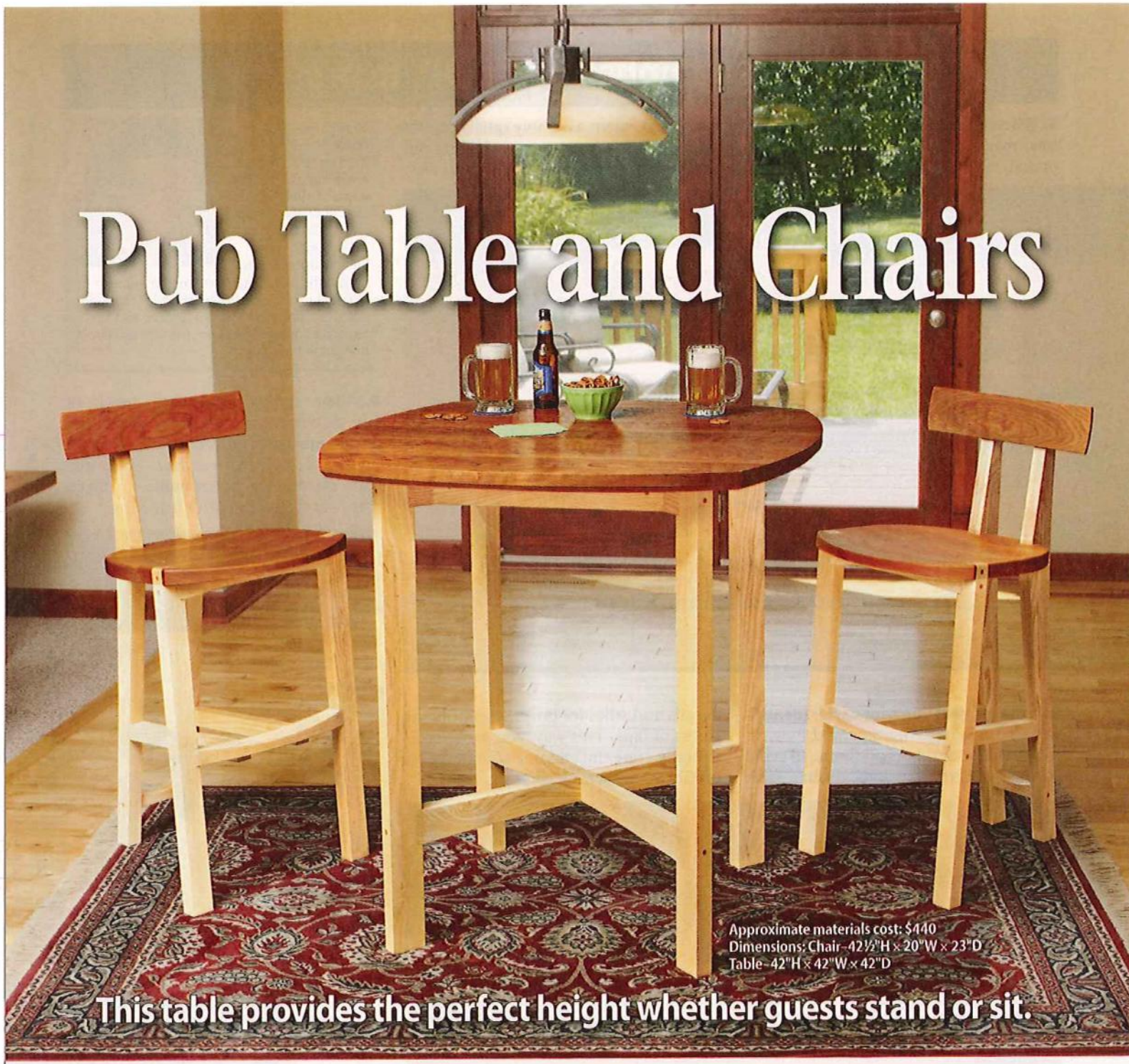
3. Multitask when possible. Working on two or three projects at a time might seem daunting or potentially confusing. But when possible, doing so can save time by taking advantage of common machine setups for tasks such as cutting dadoes, box joints, or dovetails—jobs that take longer to set up than perform.

4. When spray-finishing the inside of any case-type project, **spray it with the back removed** to prevent overspray from bouncing back in your face. Spray the back separately—horizontally, to avoid runs—and attach it after finishing.

5. Occasionally, **cull your leftover wood** to a manageable amount. Don't let it build up and take over your shop. Throw out pieces you don't need or will likely never use, and organize the keepers so they're more accessible for future use.

Produced by **Bob Hunter**

Pub Table and Chairs



Approximate materials cost: $440
Dimensions: Chair–42½"H × 20"W × 23"D
Table–42"H × 42"W × 42"D

This table provides the perfect height whether guests stand or sit.

Inspired by the furnishings found in many neighborhood watering holes, this cherry and ash set will serve well in a man cave or even on the patio if you bring it back inside when the party ends. The screw-and-dado joinery creates a solid, wobble-free table and chairs.

And don't sweat building the chairs. To create the slight tilt in the seat and back that makes a chair comfortable, you'll build everything square, then cut down the back legs slightly to provide a pleasant seating position.

Go ahead, have a seat

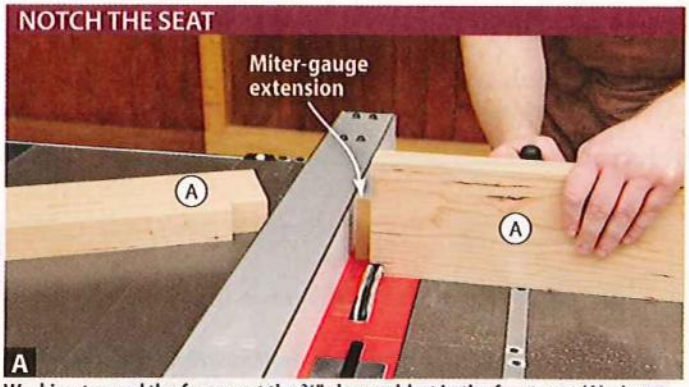
Note: *Quantities listed in the* **Materials List** *are for two chairs, but the table seats four so feel free to build two more chairs if you like.*

1 Prepare four 1½×5×20" boards for each seat (A)—8 total—matching grain as closely as possible for each seat. ***Quick Tip!*** ***Label the end of each piece so you can glue them up in the intended orientation.***

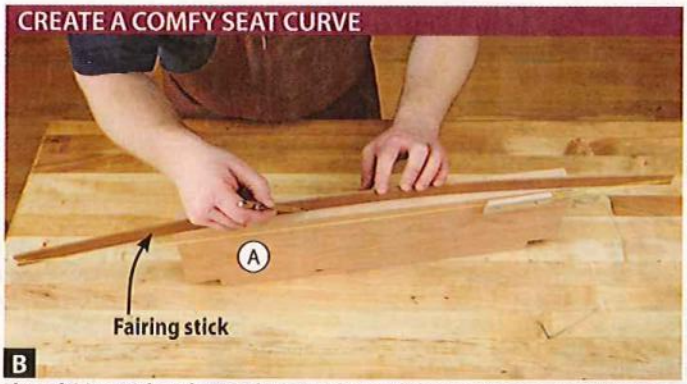
Lay out the locations of the dadoes for the front and back legs **[Drawing 1]**.

2 Install a ¾" dado blade in your tablesaw, attach an extension to your miter gauge, and set the rip fence 1¾" from the *outside* of the blade to serve as a stop. Rabbet two pieces for each seat (A) to create the dadoes for the front legs **[Photo A, Drawing 1]**.

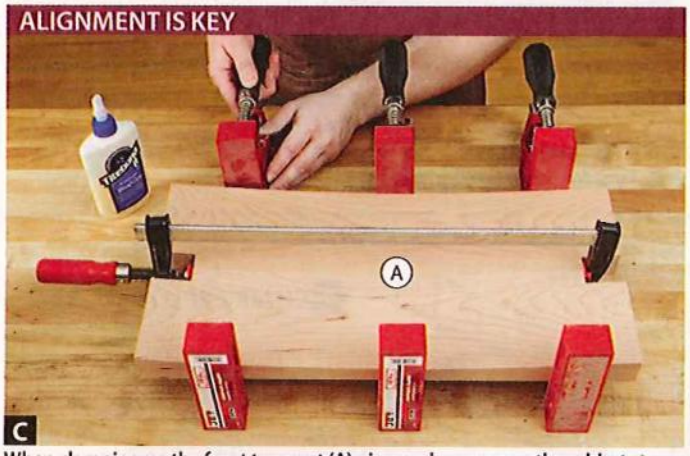
3 Raise the blade to 1¾" above the table and reposition the rip fence 6" from the *inside* face of the blade. Cut dadoes in one edge of each rear seat (A) piece by running each end against the rip fence **[Drawing 1]**. Reset the rip fence 7½" from the *outside* of the blade and widen each dado to 1½".



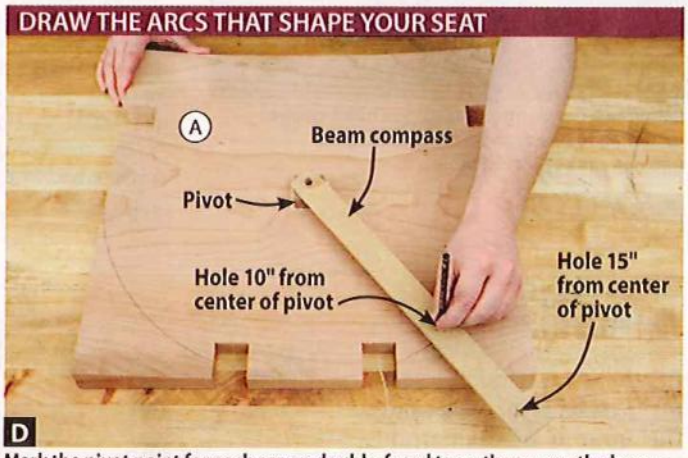
Working toward the fence, cut the ¾"-deep rabbet in the front seat (A) pieces by making several passes over the dado blade.



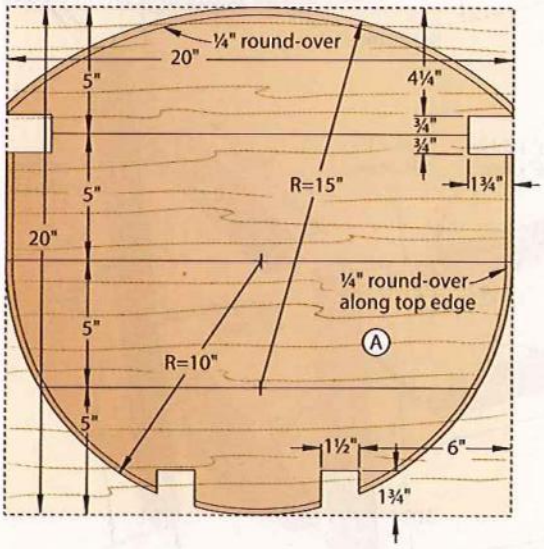
Flex a fairing stick and trace along it to lay out the curve on one seat (A) piece. Bandsaw just outside the line, then sand up to it.

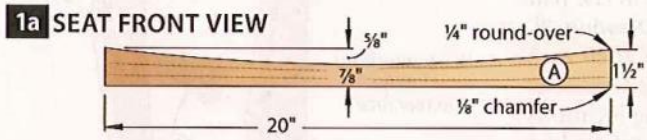


When clamping up the front two seat (A) pieces, clamp across the rabbets to keep the shoulders aligned.



Mark the pivot point for each arc on double-faced tape, then press the beam-compass pivot in place, sighting through the hole in the dowel.

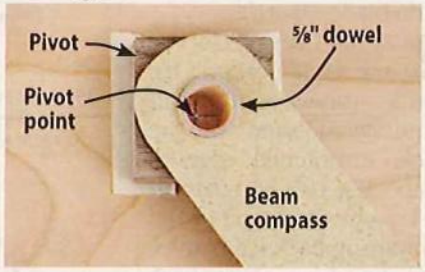




SHOP TIP

A beam compass with a sight

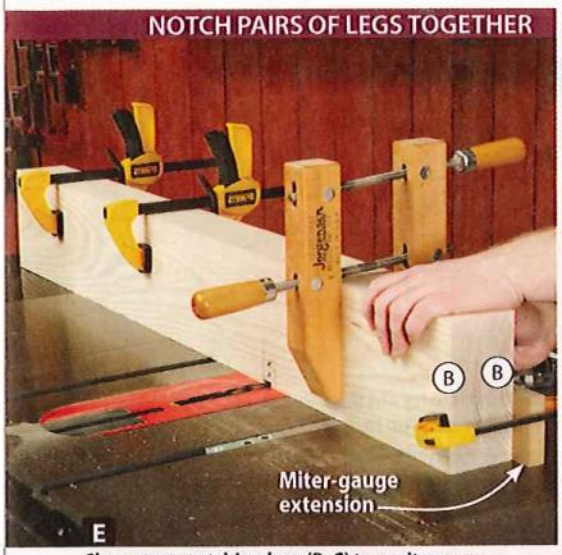
From a 1½×17" piece of ¼"-thick hardboard, make a beam compass as shown in **Photo D.** Cut a ¾×1½×1½" scrap for the pivot, and drill a ⅝" centered hole through it. Glue a 1¼" length of ⅝" dowel in the hole, flush with one face. After the glue dries, drill a 7/16" centered hole through the dowel to allow you to see the pivot point on the workpiece, *right.*



4 To create the dish in the seat, use a fairing stick [**More Resources,** *page 56*] to lay out the curve on one edge of one seat (A) piece [**Drawing 1a, Photo B**]. After shaping the curve, use this piece as a pattern to lay out the curve on the remaining seat pieces. Cut the curves.

5 Glue up each seat (A) in halves, beginning with the front pieces [**Photo C**]. Keep the bottom faces flush. After the glue dries, glue together the front and rear halves of each seat, again keeping the bottom faces flush. After the glue dries, remove the clamps, and scrape and sand both faces of the seats to 150 grit.

6 Using a beam compass [**Shop Tip,** *above*], lay out the arcs on the front and back edges of the seats (A) [**Drawing 1, Photo D**]; then bandsaw and sand the arcs to shape. Rout a ⅛" chamfer around the perimeter of each bottom face and a ¼" round-over around the back portion of the top face, stopping short of the dadoes for the front legs (B). You'll complete these round-overs after installing the front legs. Finish-sand the seats to 220 grit.



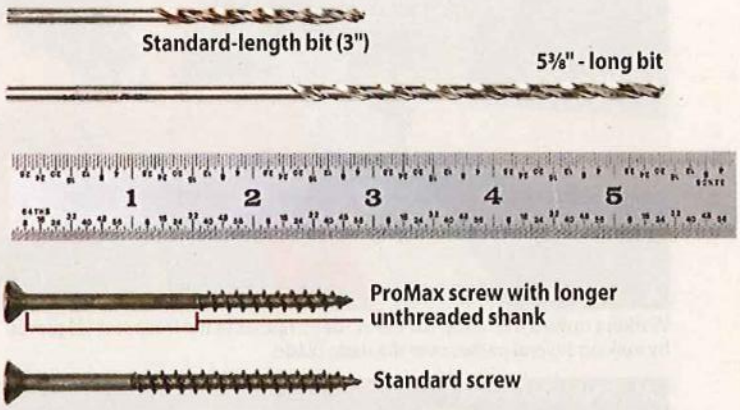
Clamp two matching legs (B, C) to a miter-gauge extension to steady them while cutting the notches, rabbets, and dadoes.

A bit about screws and bits

Drilling shank holes through the thick chair and table legs requires an extra-long drill bit, *right*. To ensure the pieces pull together tightly, we chose screws with a longer unthreaded shank than standard screws [**Source**]. Here's why:

On standard screws the threads extend ⅔ of the length of the screw. The threads toward the head can bite into the first workpiece, and once the head contacts the workpiece, they prevent the second from drawing tight.

The screws we used have threads only on the lower half, so once they bite into the mating piece, and the head bears down on the first piece, the unthreaded shank spins freely in the hole while the threads pull the two pieces together. Plus the self-drilling auger points eliminate the need for drilling a pilot hole.

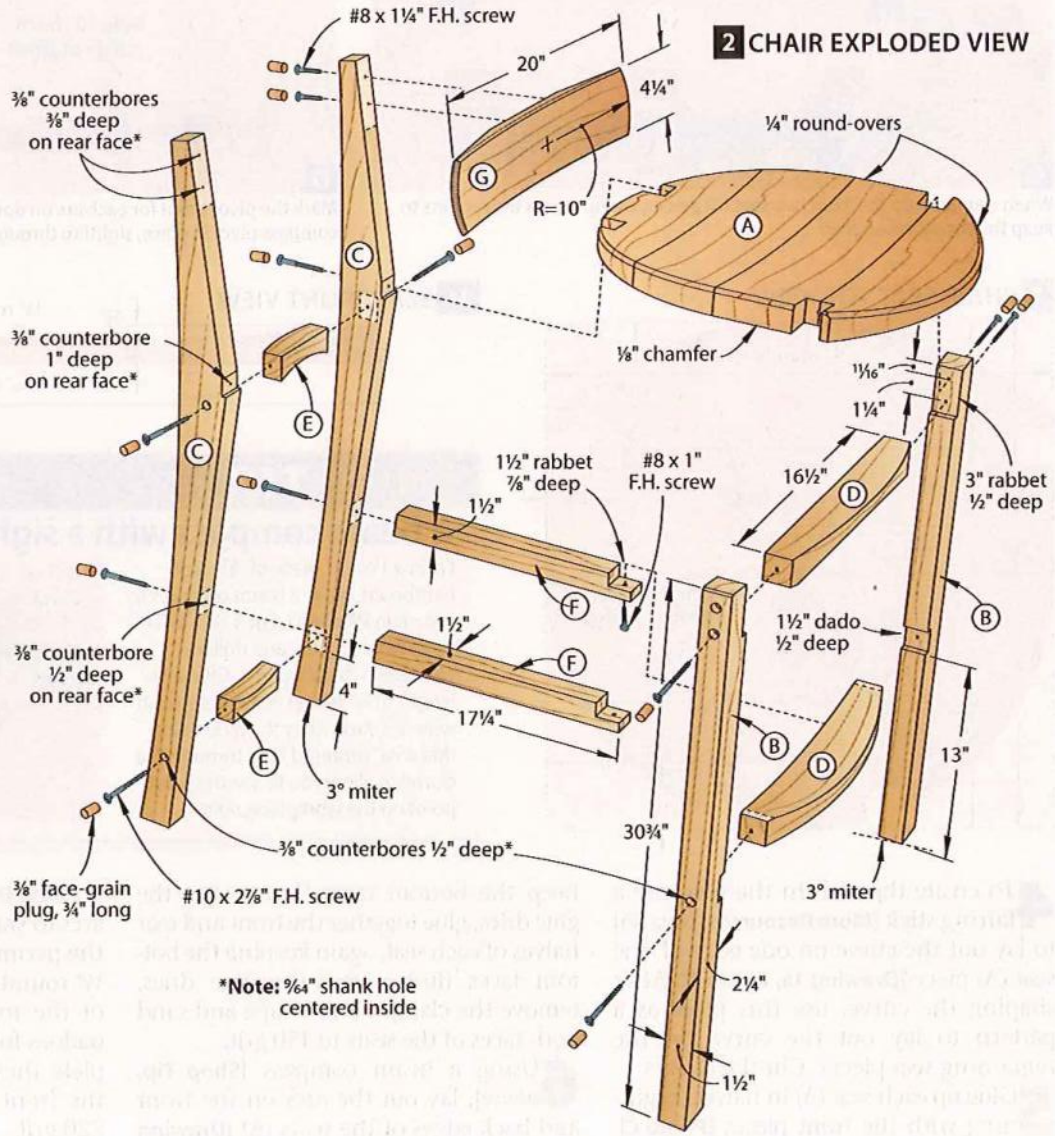


Give it legs

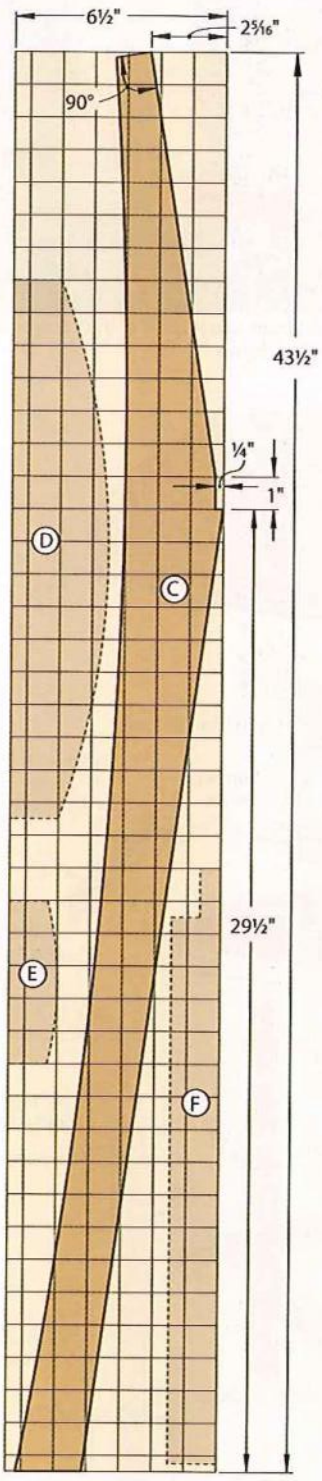
1 Cut the front legs (B) to size so their thickness fits the front dado in a seat (A) [**Drawing 2**]. Miter-cut the bottom of each front leg at 3°. Prepare a 6½×43½" blank for each back leg (C) to fit the dadoes in the rear of the seats [**Drawing 3**]. ***Note:*** *The offcuts from each back leg blank also yield other parts.* Lay out the locations of the rabbets and dadoes in the front legs, and the notch 29½" from the bottom of each back leg; then make these cuts with a dado blade [**Photo E**].

2 Lay out the shape of the back leg (C) on one leg blank [**Drawing 3**], and bandsaw and sand only the back, unnotched edge to shape. Use this as a pattern to lay out the shape of the remaining back leg blanks, and bandsaw their back edges to shape.

3 At the drill press, drill counterbores and shank holes in the back legs (C) [**Photo F**]. ***Note:*** *All screw holes through the front and back legs (B, C) consist of a ⅜" counterbore with a ¾" shank hole centered inside. (See* ***A bit about screws and bits****,* above.)

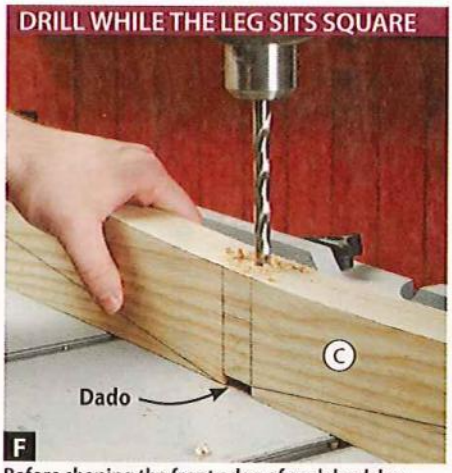


3 CHAIR BACK LEG GRID

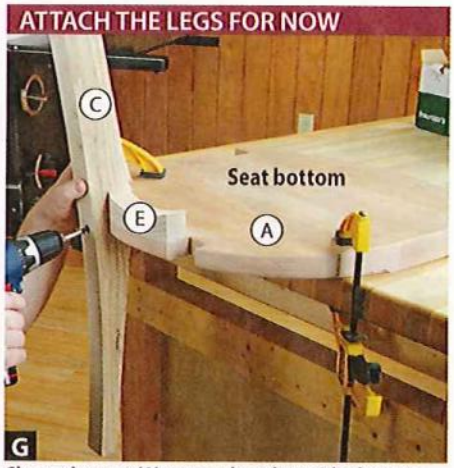


Each square = 1"

Refer to ***Drawing 2*** *for counterbore depths.* Drill counterbores and shank holes through the front legs (B) where shown.

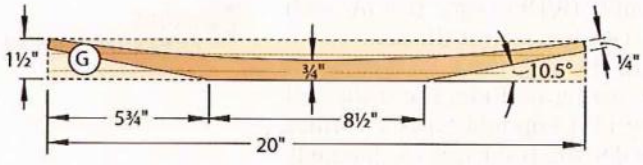


Before shaping the front edge of each back leg (C), drill the counterbores centered on the leg's thickness and the width of the dado.

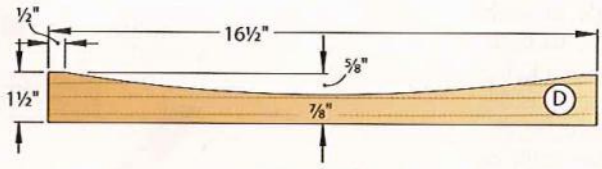


Clamp the seat (A) to your bench upside down to secure it while you drive #10×2⅞" screws through the back legs (C).

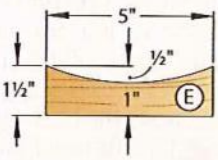
4 CHAIR PARTS VIEWS



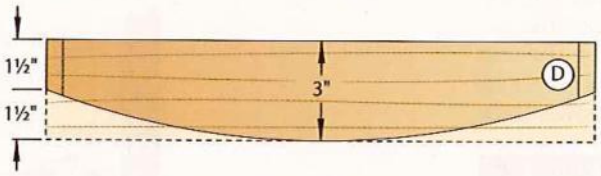
BACKREST TOP VIEW



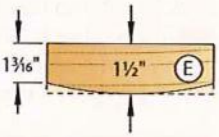
FRONT STRETCHER FRONT VIEW



BACK STRETCHER FRONT VIEW



FRONT STRETCHER TOP VIEW



BACK STRETCHER TOP VIEW

4 Bandsaw and sand the front edges of the back legs (C) to shape; then finish-sand the front (B) and back legs, easing the sharp corners of all the legs and the tops of the back legs. ***Note:*** *Do not round the edges of the notches, dadoes, or rabbets.* Set the legs aside for the time being.

Tie the legs together

1 Retrieve the offcuts from the back legs (C), and cut the front stretchers (D) and back stretchers (E) to size **[Drawings 3, 4]**. Cut the center stretchers (F) 1" longer than listed **[Drawing 2]**.

2 Lay out and bandsaw the curves on the faces of the front and back stretchers (D, E) **[Front Views, Drawing 4]**. Then lay out and bandsaw the curves on the fronts of the front stretchers and the backs of the back stretchers **[Top Views, Drawing 4]**. Sand the curves smooth; finish-sand all of the stretchers (D, E, F).

3 Glue and clamp a back stretcher (E) to the bottom of each seat (A) with their back edges flush. After the glue dries, temporarily screw the back legs (C) in place **[Photo G]** using #10×2⅞" screws **[Source]**.

ASSEMBLE THE FRONT LEGS

H

Keep the back edges of the front stretchers (D) flush with the back faces of the front legs (B). After the glue dries, screw the legs to the stretchers.

MARK THE FINAL LEG LENGTH

I

On a dead-flat surface, prop up the front legs (B) on a 1"-thick scrap. Mark the finished length of the back legs (C) as shown.

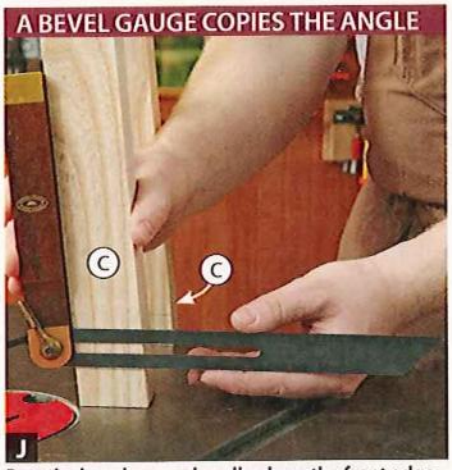
4 Glue and screw the front stretchers (D) between the front legs (B) [**Drawing 2, Photo H**]. Glue and clamp a front leg assembly (B/D) to each seat (A) with the top stretcher against the seat.

5 To tilt the chair back for a comfortable seating position, stand the seat assembly (A–E) upright with a 1"-thick scrap under the front legs (B) [**Photo I**]. Draw along the edge of a 1"-wide straightedge (such as the blade of a combination square) onto the side of each back leg (C). Set a bevel gauge to copy the angle of the mark on a back leg [**Photo J**] and set the bevel gauge aside. Remove the back legs from the seat (A).

6 Use the bevel gauge to set the angle of your tablesaw's miter gauge. Attach an extension to the miter gauge, attach a stopblock to the extension, and cut the back legs (C) to length along the line.

7 Apply glue in the dadoes in the seat (A), and screw the back legs (C) in place. Position the remaining lower back

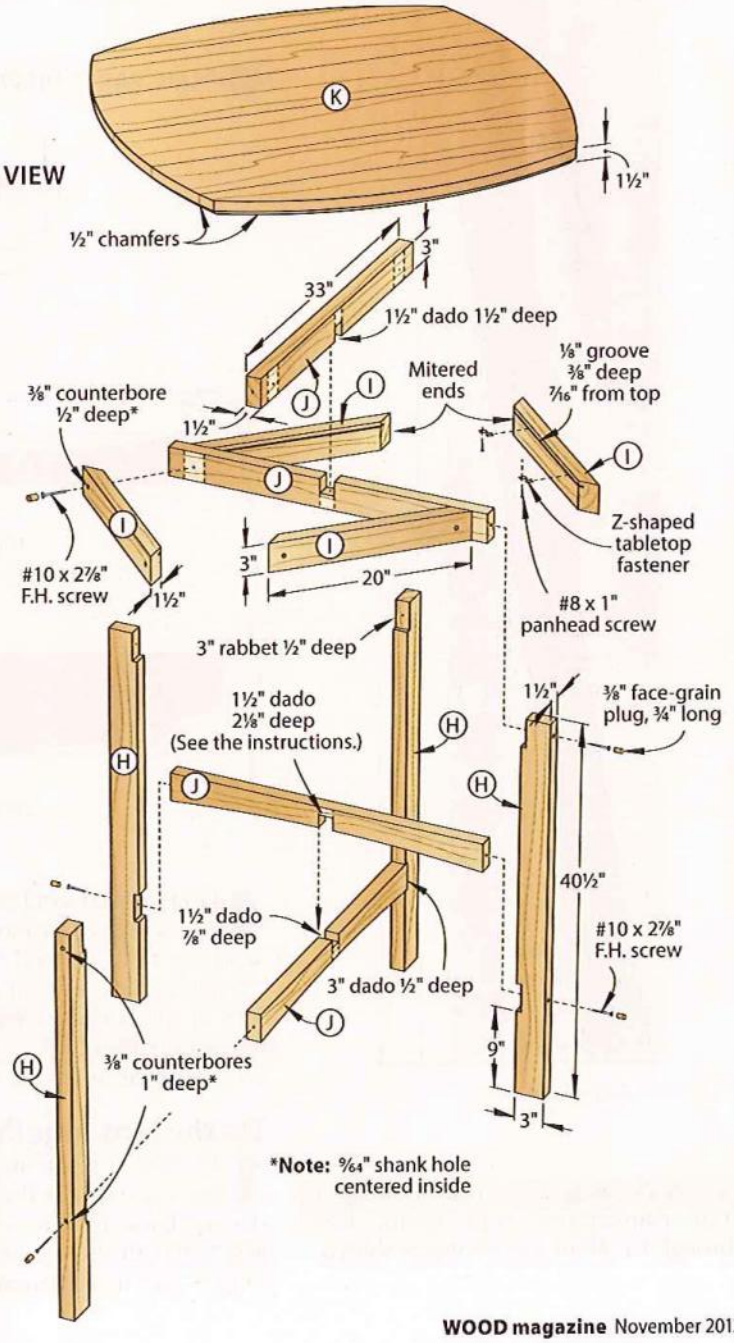
A BEVEL GAUGE COPIES THE ANGLE



J

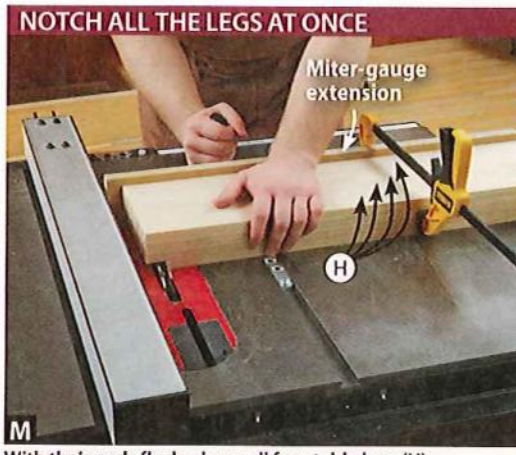
Butt the bevel-gauge handle along the front edge of a back leg (C), align the blade with the layout line, and lock the bevel gauge.

5 TABLE EXPLODED VIEW



Support the lower back stretcher (E) with a scrap block while drilling the counterbores and shank holes through the back legs (C).

Align the center stretcher (F) with the edge of the back leg (C), and clamp it to the front stretcher (D). Mark the center stretcher's length.



With their ends flush, clamp all four table legs (H) to the miter-gauge extension to steady them while cutting the dadoes and rabbets.

stretcher (E) between the back legs and drill counterbores and shank holes through the back legs **[Photo K]** and both back stretchers. Glue and screw the back stretchers in place.

8 Rabbet the front end of each center stretcher (F) **[Drawing 2]**. Working on each chair in turn, clamp the rabbeted ends of the center stretchers snug under the lower front stretcher (D), and mark off the final length of the center stretchers from the back legs (C) **[Photo L]**. Crosscut the center stretchers on the marks, then glue and clamp them to the front stretchers. Drill counterbored shank holes through the back legs **[Shop Tip,** *right***]** and drive the screws.

Work your way up

1 Plane and sand the front legs (B) flush with the top of the seat (A). Rout the rest of the ¼" round-over around the seat, filing and sanding the start and stop points to blend the round-overs together.

2 From 1½"-thick stock, cut the backrests (G) to size **[Drawings 2, 4]** and lay out on one edge the curve for the front faces and the bevels on the back faces. Bandsaw the curve and the bevels. Lay out the arc on each end of the backrests **[Drawing 2]** and bandsaw them. Sand the backrests to 220 grit, easing all of the edges.

3 Glue and clamp the backrests (G) to the back legs (C), flush at the top and centered. After the glue dries, drill counterbores and shank holes through the legs and drive screws into the backrests **[Drawing 2]**.

4 From scraps of ¾" cherry stock, cut face-grain plugs for the counterbores and glue them in place, orienting the grain direction to match that of the legs (B, C). Trim the plugs flush; then sand them smooth.

5 Apply a finish to the chairs. (We wiped on two coats of boiled linseed oil, then applied two coats of Old Masters satin, water-based polyurethane.)

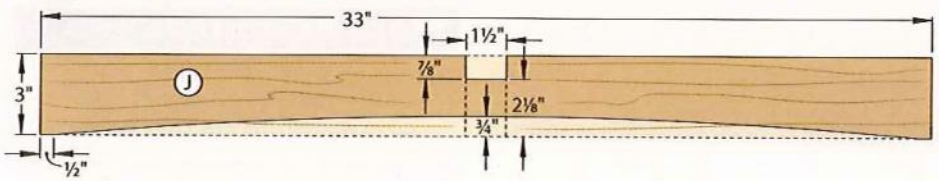
Set the table

1 Cut the table legs (H), aprons (I), and stretchers (J) to size from 1½"-thick ash **[Drawing 5]**. Tilt your tablesaw blade to 45° and bevel-cut one end of each apron. Attach a stopblock to a miter-gauge extension and bevel-cut the other end of each apron. Return the blade to 90°, and cut the kerf along the top inside edge of each apron.

2 Mount a ¾" dado blade in your tablesaw and set it ½" above the tabletop. Clamp the table legs (H) together with their ends flush and cut the dadoes and rabbets as you did with the chair legs (B, C) **[Photo M, Drawing 5]**. Drill counterbored shank holes where shown.

3 Retrieve the stretchers (J). Lay out the arc on the two bottom stretchers **[Drawing 6]**, and the locations and depths of the dadoes on all four stretchers. ***Note:*** *The bottom stretchers have dadoes of different depths (⅞" and 2⅛"). On the upper stretchers, cut both dadoes 1½" deep.* Set the dado blade ⅛" above the saw table, and position the rip fence so the blade cuts inside the dado layout marks. Cutting into the waste area in the arc of a bottom stretcher, make a pass with each end against the fence. Check the fit of the mating stretcher in this test dado and make any needed adjustments to the rip fence. Once you have a snug fit, adjust the blade height

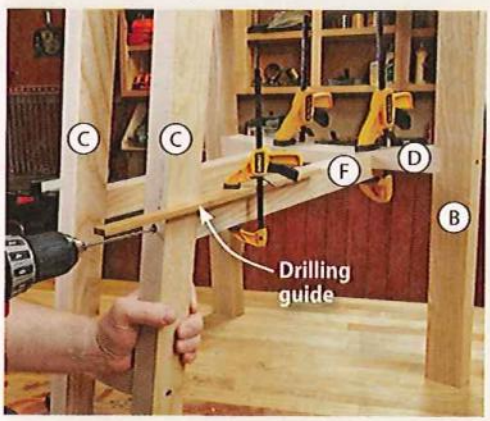
6 BOTTOM STRETCHER DETAIL



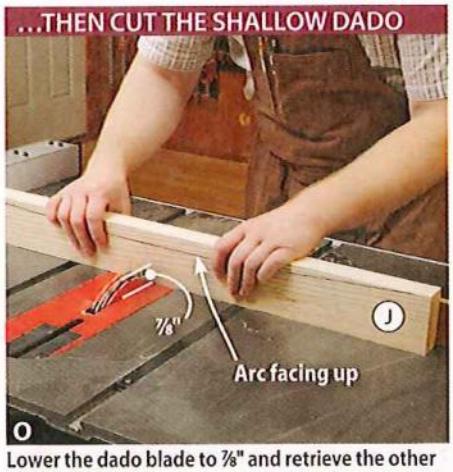
SHOP TIP

Make a guide for straight drilling

Notch a scrap of ¼" hardboard to fit around and beyond the back leg (C), and clamp it to each center stretcher (F) as you drill the counterbores and shank holes. Keep the drill bit parallel to the guide.

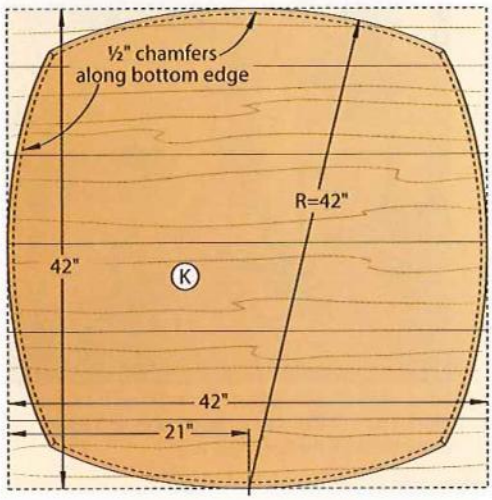


With the arc on one bottom stretcher (J) facing down, cut a 2⅛"-deep dado centered on the stretcher's length.



Lower the dado blade to ⅞" and retrieve the other bottom stretcher (J). Cut the dado in this piece with the arc facing up.

7 TABLETOP (Top view)



and cut the dadoes in the bottom stretchers [**Photos N, O**]. Reset the blade height to 1½" and cut dadoes in the two top stretchers.

4 Bandsaw and sand smooth the curve in the lower stretchers (J); then glue the stretchers together [**Drawing 5**]. Drill counterbored shank holes in the aprons (I) [**Drawing 5**].

5 Place the upper stretchers (J) on your bench and glue and screw the table legs (H) to them. Glue and screw the aprons (I) to this assembly [**Drawing 5**]. Fit the lower stretchers in the dadoes in the legs with the curved edges facing the bottom of the legs. Glue and screw the lower stretchers in place.

6 Fill the counterbores with cherry face-grain plugs and sand them flush and smooth.

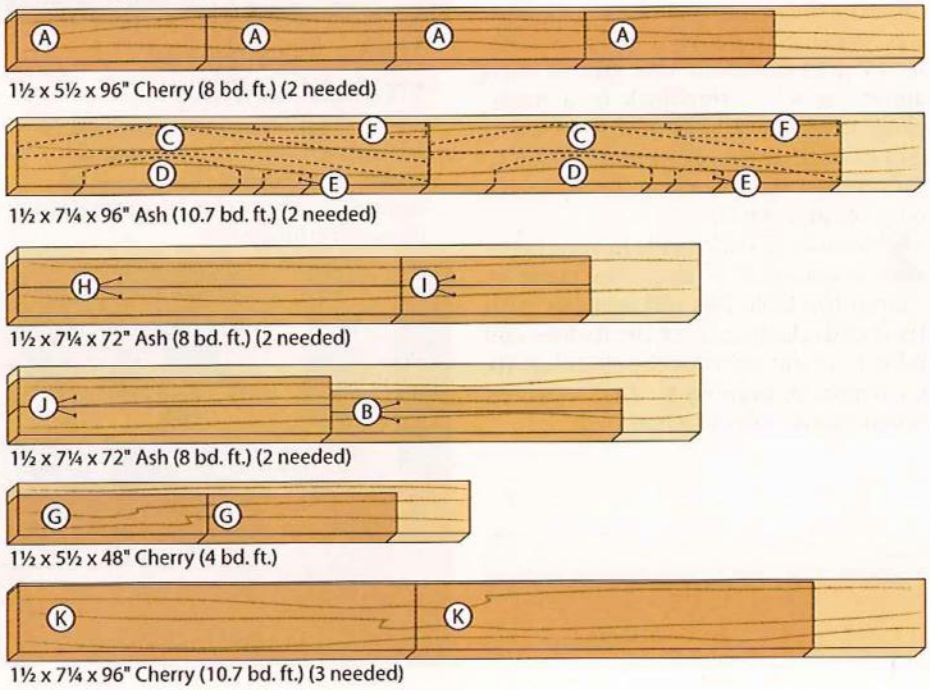
Shape the tabletop

1 Edge-glue a 1½×42×42" panel for the top (K). Make a 44"-long compass arm to fit the pivot made earlier and strike a 42" arc along each edge of the tabletop [**Drawing 7**]. Bandsaw or jigsaw the top to shape, and finish-sand it.

2 Rout a ½" chamfer around the bottom edge of the top (K); then apply a finish. After it dries, attach the top to the stretchers (J) with Z-shaped tabletop fasteners.

Produced by **Craig Ruegsegger** with **John Olson**
Project design: **Kevin Boyle**
Illustrations: **Lorna Johnson**

Cutting Diagram



Materials List

	Chairs (2)	FINISHED SIZE T	W	L	Matl.	Qty.
A	seats	1½"	20"	20"	EC	2
B	front legs	1½"	2¼"	30¾"	A	4
C*	back legs	1½"	6⅛"	42½"	A	4
D	front stretchers	1½"	3"	16½"	A	4
E	back stretchers	1½"	1½"	5"	A	4
F*	center stretchers	1½"	1½"	17¼"	A	4
G	backrests	1½"	4¼"	20"	C	2
	Table					
H	legs	1½"	3"	40½"	A	4
I	aprons	1½"	3"	20"	A	4
J	stretchers	1½"	3"	33"	A	4
K	top	1½"	42"	42"	EC	1

*Parts initially cut oversize. See the instructions.

Materials key: EC–edge-glued cherry, A–ash, C–cherry.
Supplies: #8×1" flathead screws (4), #8×1" panhead screws (8), #8×1¼" flathead screws (8).
Blade and bits: Dado blade; 9⁄64", ⅜" drill bits; ¼" roundover, 45° chamfer router bits; ⅜" plug cutter.

Source

Specialty fasteners and bits: #10x2⅜" flathead screws, no. 1027-FPL-CN [box of 100], $10.60; 9⁄64x5⅜" drill bit, no. LSTD-0140, $8.40; ⅜" tapered plug cutter, no. MS0324, $13.25; Z-shaped tabletop fasteners, no. TT-0104-D [pack of 25], $2.21, McFeely's 800-443-7937, mcfeelys.com.

More Resources

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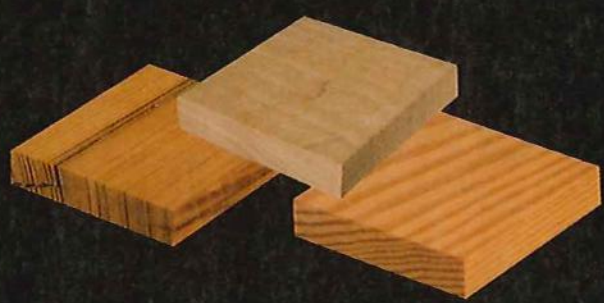

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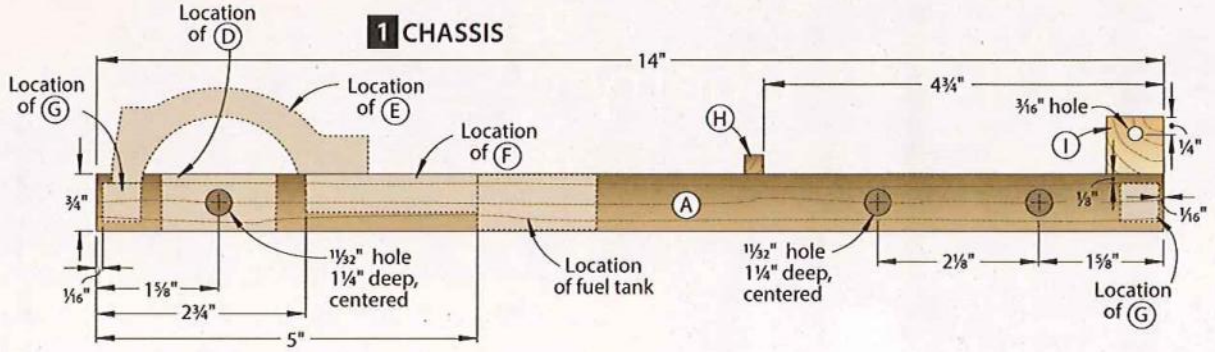
Construction-Grade Dump Truck

Dimensions: 5⅞"H x 6¼"W x 14⅝"L

Gravel, sand, dirt, or debris, this tabletop truck is built to haul it all. Lift the box to dump a load and the tailgate swings open. A support drops down to hold the box up until the cargo empties, or to simply prop it up for display. The dump truck becomes the ninth piece in our Construction-Grade fleet. (See the whole set on *page 62*.)

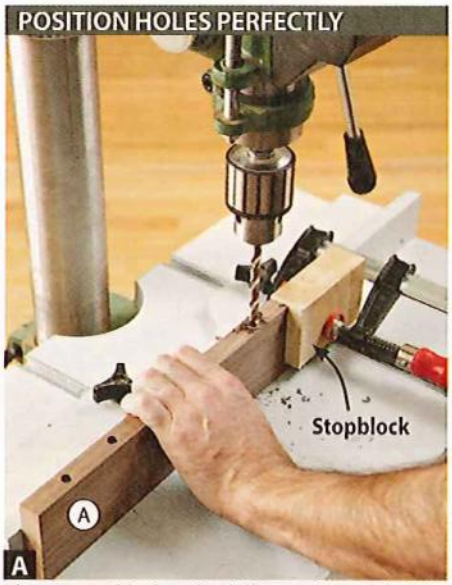


First, the undercarriage

1 Cut the chassis (A) to size [**Materials List**, *page 62*], then lay out and drill three 11/32" holes on each edge where dimensioned [**Drawing 1, Photo A**]. Finish-sand the chassis to 220 grit.

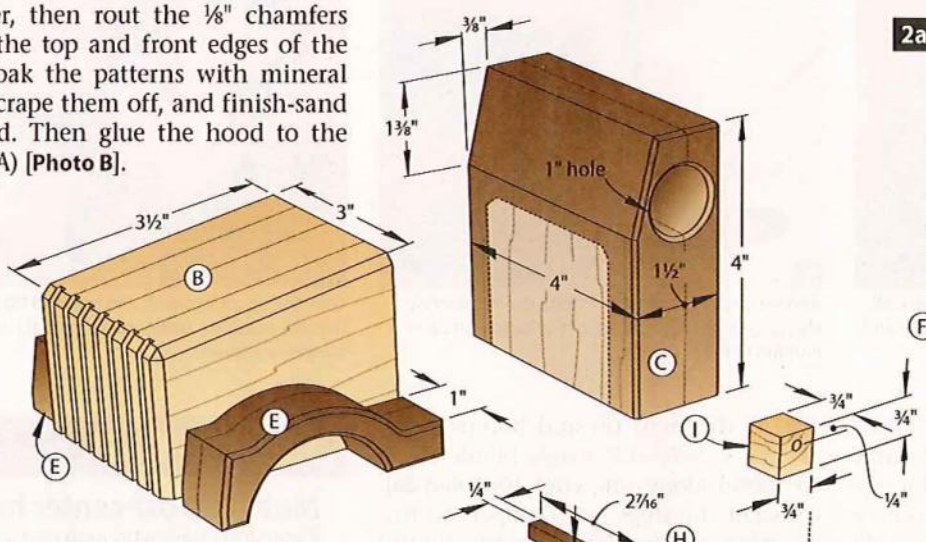
2 Laminate four pieces of ¾x2⅝x3½" maple to create the hood (B) [**Drawing 2**]. Clamp across the edges to align the pieces. After the glue dries, sand the bottom edge and the ends flush and smooth. Make a copy of the **Hood Top-View Pattern** from the *WOOD Patterns®* insert and spray-adhere it to the top edge of the hood blank. Attach an extension to your miter gauge, and cut the 3/16"-deep kerfs where shown.

3 Spray-adhere a photocopy of the **Hood Side-View Pattern** to the right side of the hood (B). Bandsaw and sand the taper, then rout the ⅛" chamfers around the top and front edges of the hood. Soak the patterns with mineral spirits, scrape them off, and finish-sand the hood. Then glue the hood to the chassis (A) [**Photo B**].



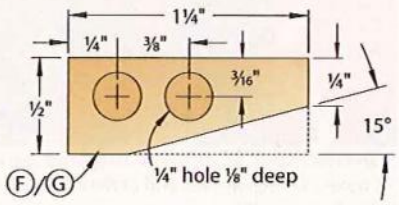
Clamp a stopblock to the drill-press fence to help drill matching holes for axle pegs on opposite edges of the chassis (A).

Glue the hood (B) above the front axle holes, aligning the front and edges of the hood with the front and edges of the chassis (A).

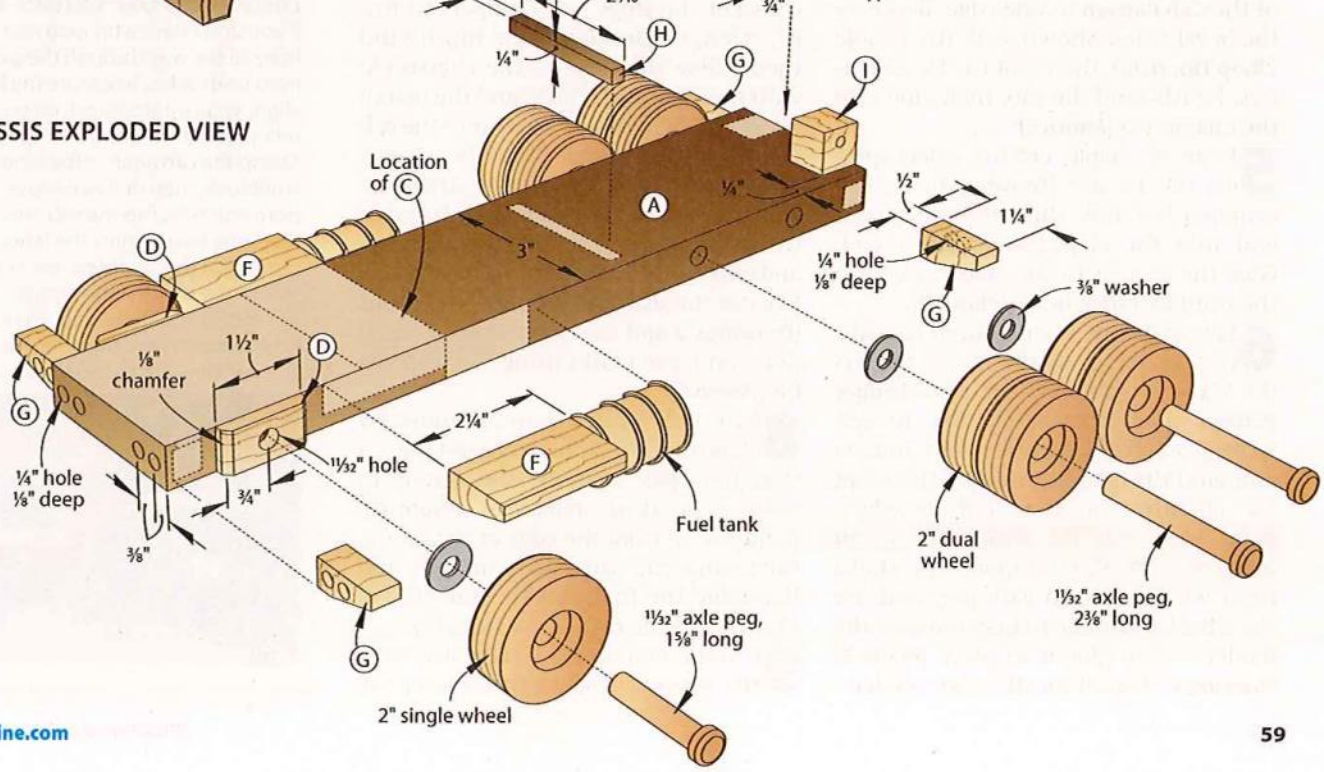


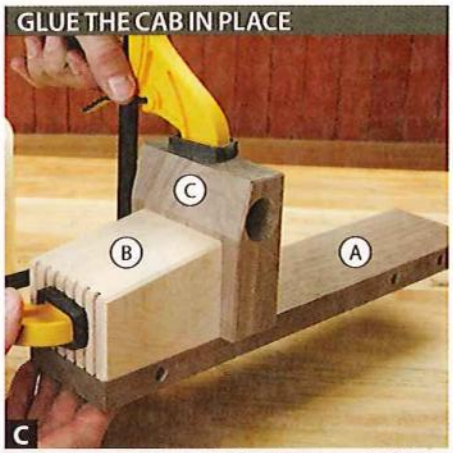
2a STEPS/BUMPERS (End view)

NOTE: Holes drilled in (G) only. See the instructions.

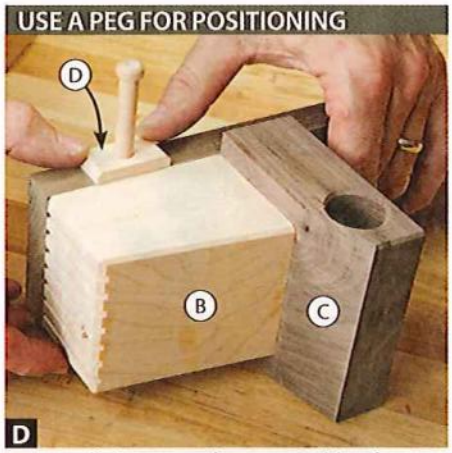


2 CHASSIS EXPLODED VIEW



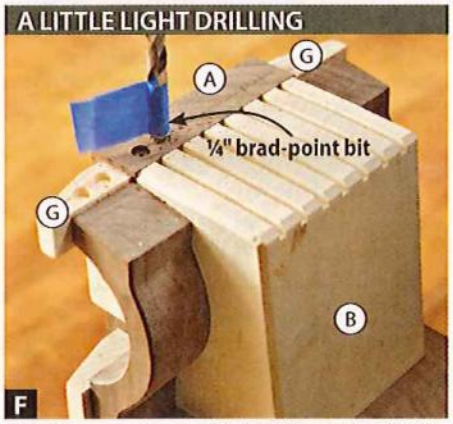


Apply glue to the center of the bottom end of the cab (C) and to the rear of the hood (B). Clamp the cab to the chassis (A) and hood.

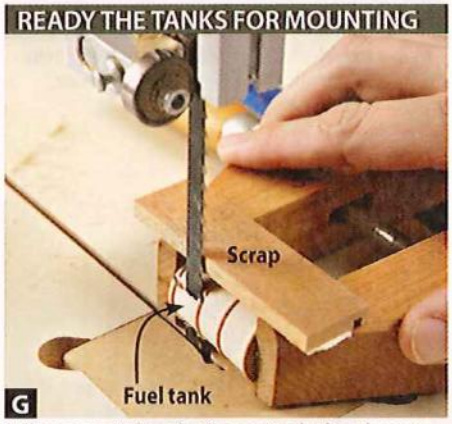


Temporarily insert an axle peg to position the spacer (D) on the chassis (A) and prevent glue from clogging the hole.

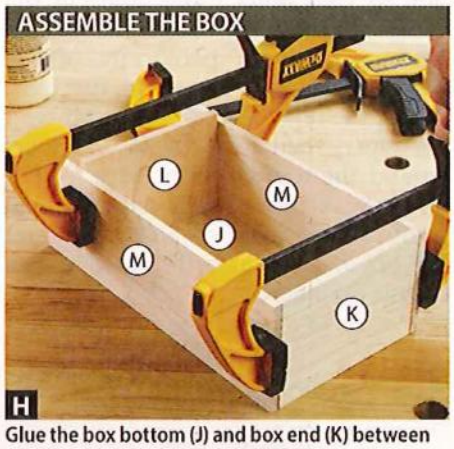
Position the back bottom face of each fender (E) flush with the top of the chassis. The front bottom face extends ⅛" below the top of the chassis.



Stand the chassis assembly (A–G) on end and drill ¼" holes ⅛" deep in each end of the chassis (A) and in the bumpers (G).



Adhere a straight-edged scrap to the handscrew clamp, parallel to the edge of the tank. Bandsaw parallel to the scrap.



Glue the box bottom (J) and box end (K) between the box sides (M), using the tailgate (L) as a temporary spacer.

4 Laminate two pieces of ¾×4×4" walnut for the cab (C) [**Drawing 2**]. After the glue dries, spray-adhere a photocopy of the **Cab Pattern** to one edge. Bandsaw the bevel where shown, drill the 1" hole (**Shop Tip**, *right*), then rout the 1/16" chamfers. Finish-sand the cab, then glue it to the chassis (A) [**Photo C**].

5 From ¼" maple, cut the wheel spacers (D) to size [**Drawing 2**]. Drill a centered 11/32" hole through each spacer, and rout the chamfers on each end. Glue the spacers to the chassis (A) over the front axle-peg holes [**Photo D**].

6 Laminate and plane walnut to make two 1×1¼×3½" blanks for the fenders (E). Make two photocopies of the **Fender Pattern**, and spray-adhere one to one face of each blank. Bandsaw or scrollsaw and sand the fenders to shape, then rout 1/16" chamfers on their outside edges. ***Note:*** *Make sure the fenders are mirror images of each other.* Temporarily install a front wheel with an axle peg, and use the wheel as a guide to help position the fender as you glue it in place [**Photo E, Drawing 1**]. Repeat for the other fender.

7 For the steps (F) and bumpers (G), cut a ½×1¼×12" maple blank. Rip a 15° bevel along one edge [**Drawing 2a**]. Crosscut the steps and bumpers to finished length [**Drawing 2**] and finish-sand them. Glue the steps to the chassis (A) with their top faces flush, and the rear of the steps aligned with the rear of the cab (C). Glue the bumpers to the chassis where shown in **Drawing 1**. After the glue dries, draw a line across each end of the chassis (A), centered on its thickness, and extend the lines across the bumpers. Lay out the placement of the headlights [**Drawings 2 and 2a**], then drill ⅛"-deep holes on these marks using a brad-point bit [**Photo F**].

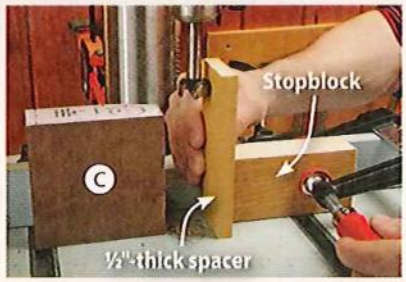
8 Grip the fuel tanks in a handscrew clamp and double-faced-tape a straight-edged scrap to the screw, to serve as a visual reference [**Photo G**]. Bandsaw ⅛" from the edge of each tank, then sand the sawn face smooth and flat. Glue the fuel tanks to the chassis (A), tight to the rear of the steps (F).

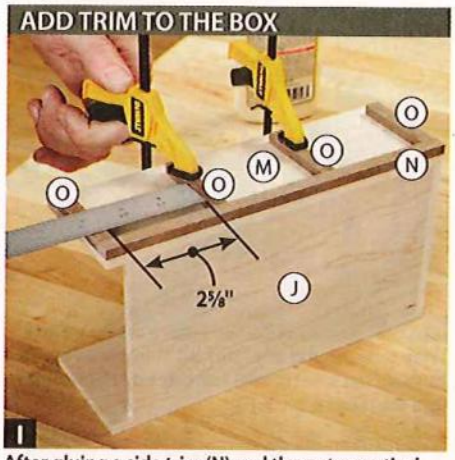
9 Cut the support stop (H) to size. Glue the support stop to the chassis (A),

SHOP TIP

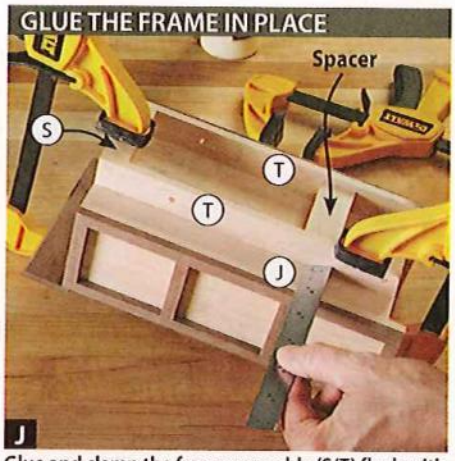
Match up off-center holes

If you don't have a bit long enough to bore all the way through the cab (C), drill from both sides. To ensure the holes align, secure a stopblock on your drill-press fence using a ½" spacer, *below*. Clamp the cab against the fence and stopblock, then drill as deep as you can from one side. Flip the cab over, keeping the same face against the fence, and reposition the stopblock on the opposite side of the bit. Drill the remaining distance through the cab. To smooth any slight ridge where the holes meet, use a ¾" or ⅞" dowel wrapped in sandpaper.

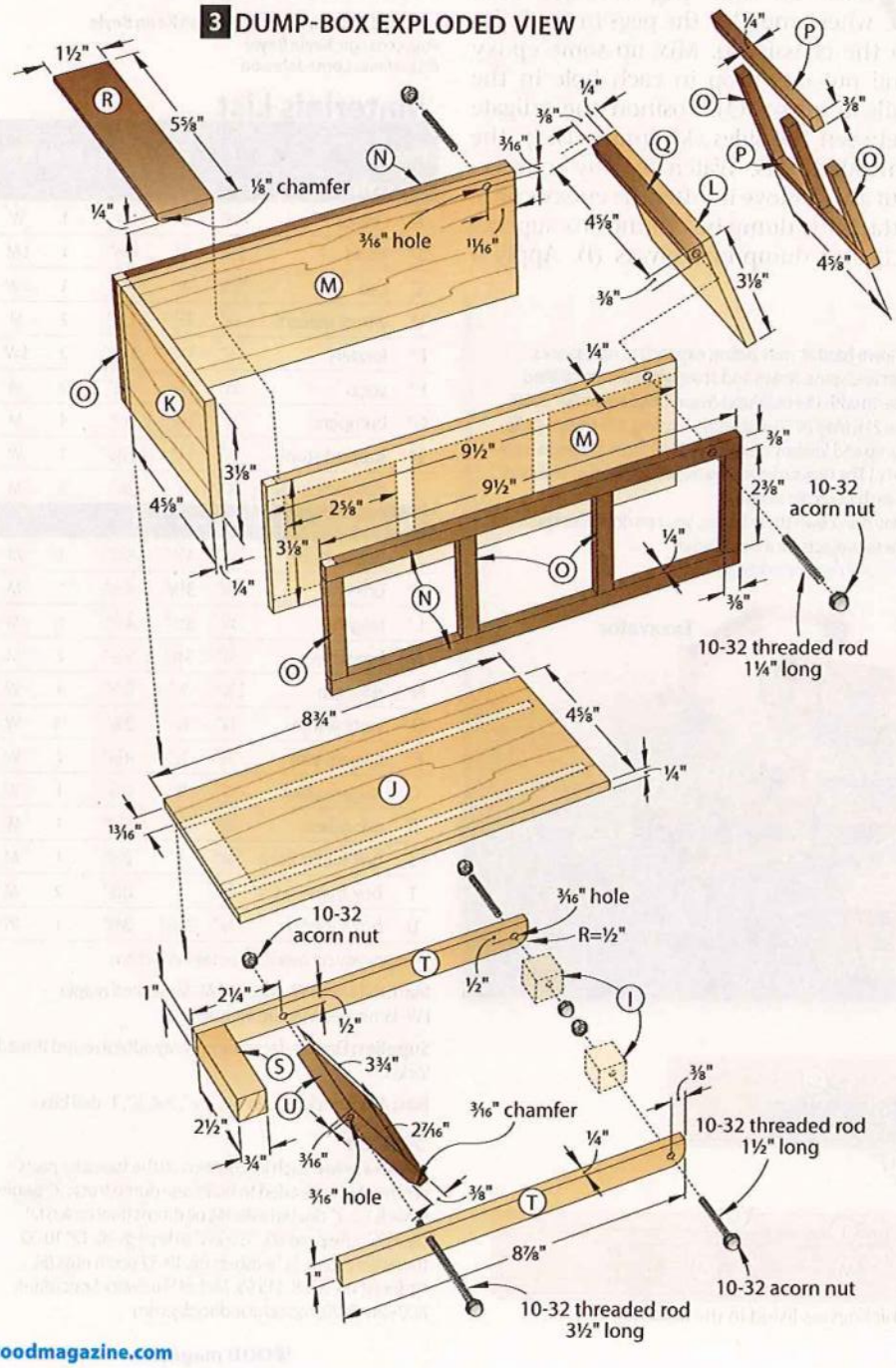




After gluing a side trim (N) and the outer vertical trim (O) to the box sides (M), add the vertical trim pieces toward the center.



Glue and clamp the frame assembly (S/T) flush with the front end of the box bottom (J) and centered side-to-side.



centered side-to-side [**Drawings 1 and 2**]. Cut the dump-box pivots (I) to size, drill the 3/16" hole where shown [**Drawing 1**], and glue the pivots in place [**Drawing 2**].

Build the dump box

1 Prepare a ¼x4⅝x19" maple blank. Crosscut the box bottom (J), box end (K), and tailgate (L) to length from the blank [**Drawing 3**]. Also from ¼" stock, cut the box sides (M) to size. Finish-sand the inside faces of the pieces, then glue up the box [**Photo H**]. After the glue dries, finish-sand the outside faces.

2 Cut seven ¼x⅜x12⅛" walnut strips and finish-sand them. From four of the strips, crosscut the side trim (N) to length [**Drawing 3**]. Trim the four cutoffs to length for vertical trim pieces (O), then cut seven more from the other blanks. Save the remaining strip for the next step. Glue one side trim to each box side (M), flush with the bottom edge and ends. Then glue a vertical trim piece flush with each end of a box side. After the glue dries, glue two more vertical trim pieces 2⅝" from the outside pieces [**Photo I**]. Add the top piece of side trim.

3 Retrieve the tailgate (L). From the leftover walnut strip, cut the tailgate trim (P) to match the tailgate's length. Glue a piece of tailgate trim flush to the bottom of the tailgate, add three pieces of vertical trim (O), then the top piece of tailgate trim [**Drawing 3**].

4 Cut the tailgate pivot (Q) to size [**Drawing 3**], finish-sand it, and glue it to the inside face of the tailgate (L/O/P) flush with the top edge and ends.

5 Cut the cab guard (R) to size [**Drawing 3**], and rout a ⅛" chamfer on the front bottom edge. Finish-sand the cab guard; then glue it to the top front of the dump box (J/K/M/N/O) with the guard's rear edge flush with the inside face of the box end (K).

Now, beef up the box

1 Cut two box-frame fronts (S) to size [**Drawing 3**]. (One is used only during assembly.) Cut the box-frame sides (T) to size, stack them with their edges and ends flush, and double-faced-tape them together. Drill the 3/16" hole where shown and sand the ½" radius on the back end. Separate the sides, finish-sand them and the box-frame front, and glue the box-frame front between the sides, using the extra front as a spacer at the rear.

2 Glue the frame assembly (S/T) to the box bottom (J) [**Photo J**].

3 From ⅜" stock, cut the box support (U) to size and chamfer one end [**Drawing 3**]. Ensure that your bit rests square to the drill-press table and bore a 3/16" hole through the edge where shown [**Photo K**].

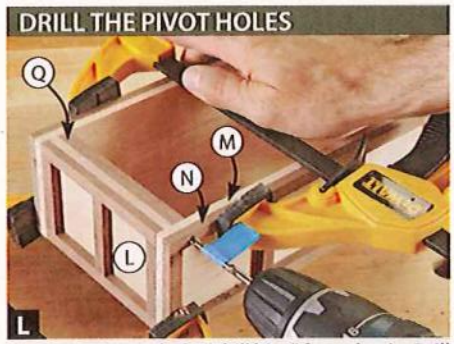
4 Retrieve the tailgate assembly (L/O/P/Q), clamp it between the box sides (M), and lay out the pivot-hole locations on the side trim (N) [**Drawing 3**]. Drill 3/16" holes 1" deep on these marks [**Photo L**].

5 Cut five pieces of 10-32 threaded rod to the lengths shown in **Drawing 3**. Attach the box support (U) between the box-frame sides (T), and the tailgate assembly (L/O/P/Q) between the box sides (M). If needed, sand the edges of the tailgate so it pivots smoothly. ***Note:*** *The tailgate should not swing freely; a bit of friction prevents the tailgate from opening before lifting the box.* Secure the dump box (J–U) to the dump-box pivots (I) and check that the box tilts easily.

6 Remove the hardware, tape off 2" on the ends of the axle pegs, and apply a finish to all pieces. We sprayed on three coats of satin-finish aerosol lacquer.

7 Push an axle peg through each wheel and glue the pegs in the holes in the chassis (A). Mix up some epoxy and put one drop in each hole in the tailgate pivot (Q). Position the tailgate between the sides (M) and twist in the threaded rods. Watch for any squeeze-out and remove it. After the epoxy cures, attach the dump box to the box support (U) and dump-box pivots (I). Apply a drop of red thread locker to the exposed ends of each threaded rod and twist on acorn nuts [**Drawing 3**].

Secure the box support (U) in a handscrew clamp while drilling the hole through the edge. Back the bit out frequently to clear chips.

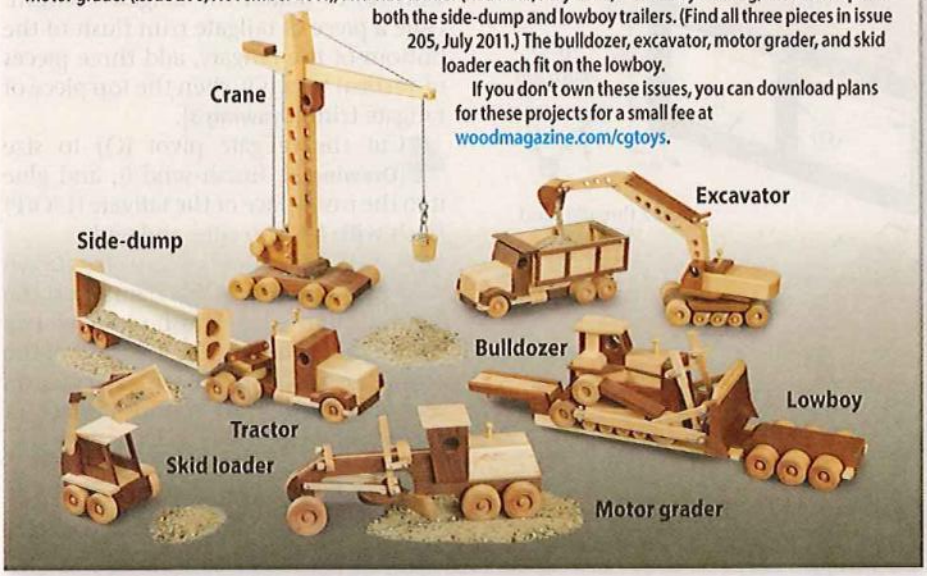


Wrap tape around a 3/16" drill bit 1" from the tip. Drill through the side trim (N) and box side (M) straight into the tailgate pivot (Q).

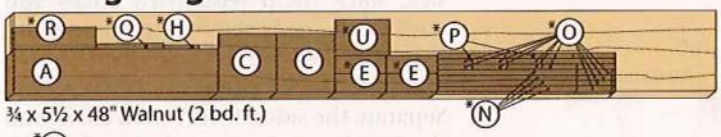
Build the whole crew

With the dump truck, our Construction-Grade toy collection, shown hard at work *below*, expands to nine pieces. The crane (issue 185, September 2008) lifts and lowers its bucket and spins. Reach and scoop with the articulated boom of the excavator (issue 194, November 2009). Move the earth with the bulldozer (issue 199, September 2010), motor grader (issue 208, November 2011), and skid loader (issue 211, May 2012). For heavy hauling, the tractor pulls both the side-dump and lowboy trailers. (Find all three pieces in issue 205, July 2011.) The bulldozer, excavator, motor grader, and skid loader each fit on the lowboy.

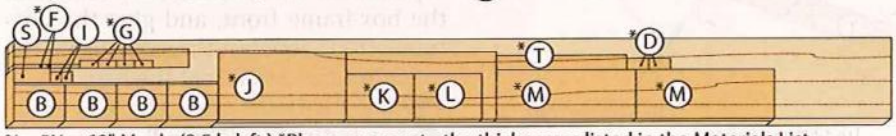
If you don't own these issues, you can download plans for these projects for a small fee at woodmagazine.com/cgtoys.



Cutting Diagram



¾ x 5½ x 48" Walnut (2 bd. ft.)



¾ x 5½ x 60" Maple (2.5 bd. ft.) *Plane or resaw to the thicknesses listed in the Materials List.

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

Materials List

Part		FINISHED SIZE T	W	L	Matl.	Qty.
Chassis						
A	chassis	¾"	3"	14"	1	W
B*	hood	2½"	3"	3½"	1	LM
C	cab	1½"	4"	4"	1	LW
D	wheel spacers	¼"	¾"	1½"	2	M
E*	fenders	1"	1¼"	3 5/16"	2	LW
F*	steps	½"	1¼"	2¼"	2	M
G*	bumpers	½"	1¼"	½"	4	M
H	support stop	¼"	¼"	2 1/16"	1	W
I	dump-box pivots	¾"	¾"	¾"	2	M
Dump box						
J*	box bottom	¼"	4⅜"	8¾"	1	M
K*	box end	¼"	3⅛"	4⅜"	1	M
L*	tailgate	¼"	3⅛"	4⅜"	1	M
M	box sides	¼"	3⅛"	9½"	2	M
N*	side trim	¼"	⅜"	9½"	4	W
O*	vertical trim	¼"	⅜"	2⅜"	11	W
P*	tailgate trim	¼"	⅜"	4⅜"	2	W
Q	tailgate pivot	⅜"	⅜"	4⅜"	1	W
R	cab guard	¼"	1½"	5⅝"	1	W
S	box-frame front	¾"	1"	2½"	1	M
T	box-frame sides	¼"	1"	8⅞"	2	M
U	box support	⅜"	2 1/16"	3¾"	1	W

*Parts initially cut oversize. See the instructions.

Materials key: W–walnut, LM–laminated maple, LW–laminated walnut, M–maple.

Supplies: Double-faced tape, spray adhesive, red thread locker.

Bits: 45° chamfer router bit; 11/32", 3/16", ¼", 1" drill bits.

Source

Hardware kit: Each kit contains all the specialty parts and hardware needed to build one dump truck: 2" single wheels (2), 2" dual wheels (4), oil drums (fuel tanks) (2), 11/32x1⅝" axle pegs (2), 11/32x2⅜" axle pegs (4), 12" 10-32 threaded rod (1), ⅜" washers (6), 10-32 acorn nuts (8). Order kit no. 2268, $15.95, Meisel Hardware Specialties, 800-441-9870, meiselwoodhobby.com

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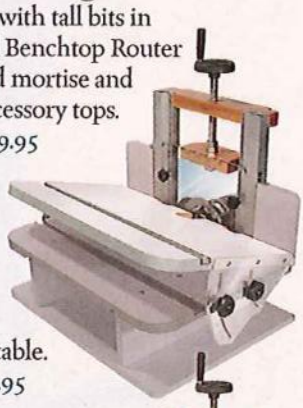

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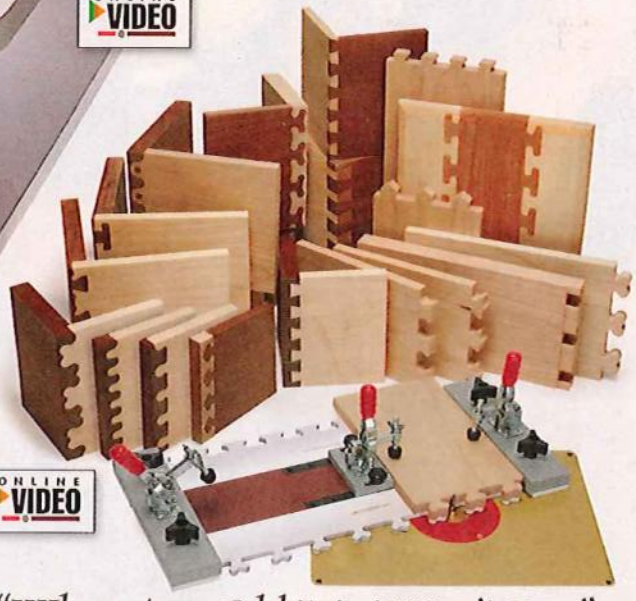

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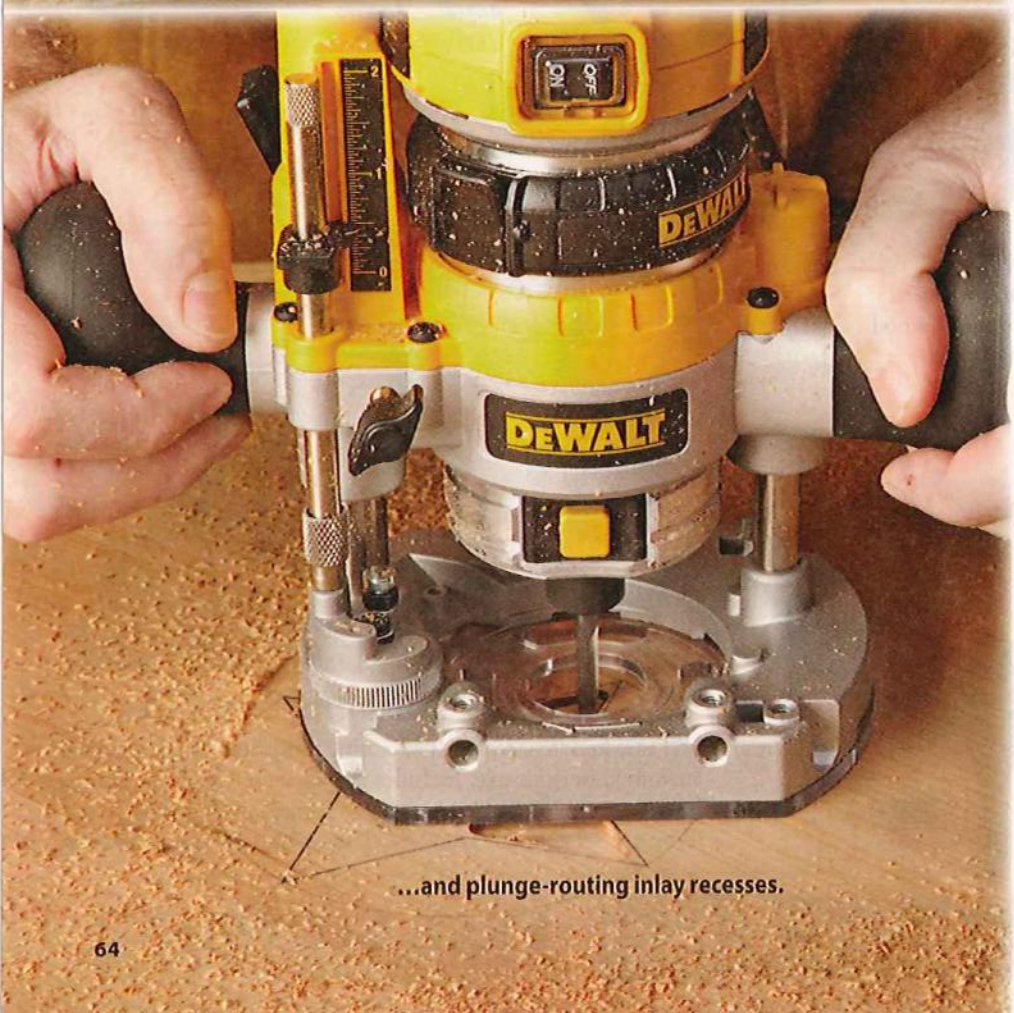


...and plunge-routing inlay recesses.

If you do a lot of handheld routing, especially edge profiles and shallow cutouts, you'll really appreciate one of these little/big routers. In fact, in the *WOOD*® magazine shop, we find them so handy and nimble that we reach for them more than any other router. But this new category of routers has a few limitations, so make one of these your second router purchase; your first should be a mid-size router or kit.

Here's what you need to know before buying one of the six compact routers we tested (four multibase combo kits and two dedicated plunge models).

▶ **Combo kits rule.** The ability to switch the motor between bases multiplies the capabilities of each kit compared to a plunge-only router. Three kits (Bosch Colt PR20EVSPK, DeWalt DWP611PK, and Porter-Cable 450PK) come with fixed and plunge bases, the best combination of price and versatility. The Makita RT0700CX3 kit has those bases plus tilting and offset bases (*next page*). You can also buy each of these four routers with only a fixed base. And Bosch sells a Colt three-base kit—with fixed, tilt, and offset bases, but no plunge—for $190.

▶ **Speed changes prove handy.** Sometimes you need to change the router speed to use bits larger than 1" in diameter or to avoid burning woods, such as maple or cherry. Only four tested models (Bosch, DeWalt, Makita's kit, and the Trend T4) have variable speed.

▶ **They're surprisingly stout.** We plunge-routed mortises in maple with each router using a ½" straight bit, and only the Bosch required a slightly slower feed rate than the others. Granted, that's a job better suited to a midsize router, but it's nice to know these tools have the muscle when

Meet the Router Family, from Baby to Big Daddy

Trim routers/laminate trimmers came out of the cabinetmaking industry as tools used primarily for flush-trimming countertops. But woodworkers appreciate them for their light weight, especially when edge-routing round-overs, chamfers, and coves. They typically have a small, fixed base and a ¼" collet, limiting your selection of bits.
HP rating: Less than 1 hp. **Weight:** 3–4 lbs. **Price:** $30–$125.

Mid-size routers, available in fixed and plunge bases—including many models in combo kits—have plenty of power for most woodworking tasks and a weight that's not cumbersome for handheld routing. Most routers in this class come with variable-speed motors and ¼" and ½" collets, opening you up to a greater selection of bits. They're suitable for almost any routing job, including mounting in a table.
HP rating: 1½–2¼ hp. **Weight:** 7–12 lbs. **Price:** $100–$300.

Compact routers combine the nimbleness of a trim router with much of the functionality of a mid-size fixed and plunge router, but in a body slightly larger than a trimmer. Whether in a combo kit (multiple bases sharing a motor) or a dedicated fixed or plunge base, these routers excel at signmaking and routing inlays and hinge mortises. They beat trimmers for jobs that require more muscle, such as mortising and routing profiles with larger-diameter bits. Most have ¼" collets—again, limiting your bit choices—but a few accommodate similar metric sizes, such as those used with some dovetail jigs.
HP rating: 1–1¼ hp. **Weight:** 4–6½ lbs. **Price:** $100–$240.

Full-size routers excel at demanding tasks, such as deep mortises or wide profiles for raised door panels and architectural moldings. Often unwieldy and heavy for handheld duties, these routers work best mounted in a table. Although most routers in this class are dedicated plungers, you'll find a couple of fixed-base models. They all come with ¼" and ½" collets.
HP rating: 3–3¼ hp. **Weight:** 10–18 lbs. **Price:** $200–$400.

TRIM HARD-TO-REACH EDGES

The Makita offset base—with a belt powering the collet—lets you keep the weight of the motor solidly on the workpiece as you trim the edges.

INSTALL BUSHINGS EASILY

Subbases on the DeWalt and Porter-Cable routers have molded openings with recesses for attaching standard P-C-style guide bushings.

DEMAND PRECISE DEPTHS

DeWalt's plunge base not only has a five-step turret for incremental routing, but also has an easy-to-use scale and a fine-depth adjuster.

you need it. We also like soft-start motors, which eliminate the sudden jerk at start-up. All but the Makita RP0900K and Trend T4 have soft start.

▶ **Gear up for guide bushings.** If you plan to use these routers for closed-template routing, such as for signs or inlays, you'll want the ability to use guide bushings, shown *center.* So at least one base, preferably the plunge, should be so equipped. But some models require proprietary bushings, an adapter, or an additional subbase for use with bushings. To learn the specifics of each model, read the summaries on the following pages.

▶ **Plunge levers must be easy to use.** We prefer plunge bases where you depress the lever to lower the bit because they default to locked when released, avoiding accidental plunges. The Bosch, DeWalt, and Porter-Cable routers function in this manner. The other models stay in free-plunge mode until you push or lift their levers to lock them.

▶ **Accuracy proves crucial.** This router class excels at fine-detail handheld work because of each unit's light weight, so the tools must be capable of delivering pinpoint accuracy. The plunge-base depth-control mechanism (scale, stop rod, and turret) makes sure you maintain cutting depth whether locked in or making repeated plunges, and the Bosch, DeWalt (*above*), and Porter-Cable routers do this best. The other models were finicky or had no fine adjustment.

Compact yet capable: The lowdown on six small-size routers

Bosch Colt PR20EVSPK, $190

877-267-2499, boschtools.com

Bosch launched the Colt in 2005 with only a fixed base; to this day it still proves easy to grip and use. The new plunge base mirrors Bosch's mid-size plunger (MRC23EVS, launched in 2011), only smaller. This base has the greatest plunge travel and tied for best fine-depth adjustment in our test. But, because the motor fits into the bases only one way and the handles on the plunge base (though comfortable) angle back, it's not practical to operate the router from its "back" side. (Sometimes we like to angle the power cord toward us.) Neither base comes equipped for using guide bushings—you need to buy an optional attachment (#RA1126, $8) to use Bosch's proprietary bushings. The kit comes with an edge guide for the fixed base, but you must buy an optional guide (#RA1054, $45) for the plunge base. Also optional: plunge-base dust-collection hoods (#PR012, $15; #RA1175, $18).

DeWalt DWP611PK, $200

800-433-9258, dewalt.com

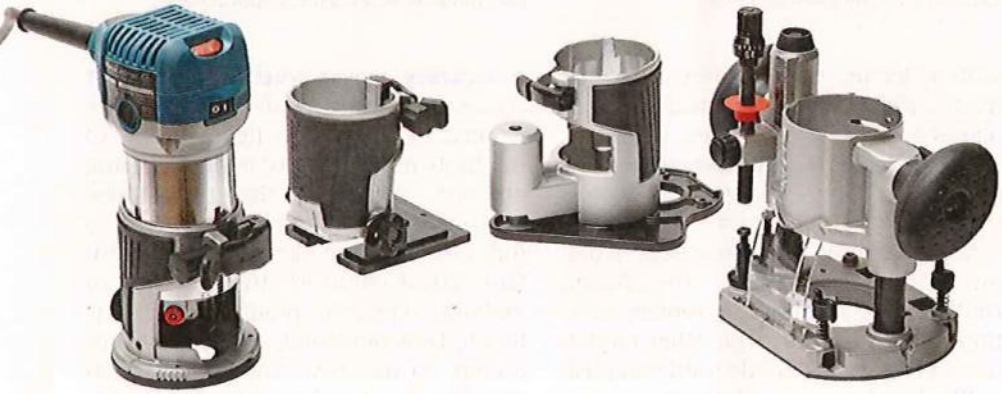
Our favorite kit for a lot of reasons: LED lights around the collet and clear subbases help you see your work better than with other models we tested; the motor slides into both bases in two positions, letting you angle the power cord toward you or away from you when routing. On the fixed base, you adjust bit depth by turning a ring, making fine adjustments easy; and its D-shaped subbase adds stability and gives room to hold with a second hand when needed. The plunge base comes with a molded guide-bushing opening in the subbase, has the best depth scale, and tied with the Bosch for best fine adjustment. We'd prefer a two-wrench bit-changing system to this model's one wrench and push-button collet lock, especially when changing bits with the motor removed from its bases. Edge guide (#DW6913, $45) and dust-collection hoods (#DNP615 and DNP616, $6 each) are sold separately.

Makita RT0700CX3, $240

800-462-5482, makitatools.com

This kit includes fixed and plunge bases as well as tilting and offset bases. The latter two, used primarily for trimming laminate countertops, serve cabinet installers best. But you can save money by purchasing the fixed-base router (#RT0700C, $130) and then getting the plunge base (#196563-0, $80) separately.

In addition to the bases, you get a fixed-base edge guide, two dust-collection hoods, a proprietary guide bushing for each base, ¼" and ⅜" collets, and a picnic-basket-sized fabric bag to carry it all. The router worked well in the fixed base, although its slim body felt awkward to grip at times. (You might prefer this if you have small hands.) The plunge base has a low starting height, a short plunge range, a complicated depth-stop system, and a difficult-to-use plunge-lock lever that worked loose on several occasions during our testing.



Makita RP0900K, $150

800-462-5482, makitatools.com

One of two dedicated plunge routers in our test, this model bested the field in our power testing (routing ½" mortises and dadoes), but lacks variable speed. We like the trigger-type power switch on one handle—with the other models you have to let go of one handle to turn power on and off—but it lacks a lock, leading to finger fatigue on lengthy jobs. With a low starting bit height, short plunge, no fine adjustment, and a plunge lever that easily pops loose from the machine, this plunger lacks the user-friendly features of other routers in the test. It comes with an edge guide, but a guide-bushing subbase and dust hood will cost you extra.

Porter-Cable 450PK, $190

888-848-5175, portercable.com

This kit is nearly identical to the DeWalt DWP611PK with the following differences:

- It lacks LED lights and variable speed, although it does have a soft-start motor.
- The fixed base has a differently textured (and not as effective) grip and a smaller, round subbase.
- Both subbases have guide-bushing-ready bit openings.

Trend T4, $100

877-918-7363, trend-usa.com

You get a lot for this price, with included edge guide (and the longest rails in our test), guide bushings, dust hood, and 6mm and 8mm collets (some router jigs come with metric bits) to go with the ¼" collet. This dedicated plunge router finished just slightly behind the Makita RP0900K in our power test, has variable speed (but no soft start), and its handles and power switch proved easy to use. But it has the stiffest plunge action, a short plunge range, no fine adjustment, and a metric scale that's difficult to read. The collets have a spring inside for easier bit removal, but it also limits how deep you can insert the bit.

WOOD MAGAZINE'S REVIEW-A-TOOL

Add your own review of these routers and read more reviews from your fellow woodworkers at **toolreviews.woodmagazine.com**.

When it's time to buy, yellow means speed up...

...and get the DeWalt DWP611PK, our Top Tool. This kit proved the easiest to use—in both fixed and plunge bases—for jobs best suited to a compact router. And even though it doesn't include an edge guide or dust hood, we'd gladly buy them later, if needed, to get its user-friendly features.

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

COMPACT ROUTERS: BIG PERFORMANCE IN SMALL PACKAGES

		PERFORMANCE RATINGS (1)								ACCESSORIES (3)				WEIGHT, LBS-OZ			
BRAND	MODEL	POWER	OVERALL PERFORMANCE: PLUNGE BASE	OVERALL PERFORMANCE: FIXED BASE	EASE OF CHANGING BASES	EASE OF CHANGING BITS	SPEED, RPM × 1,000	SOFT-START MOTOR? YES/NO	MAX. PLUNGE DEPTH (INCHES)	BIT-CHANGE METHOD (2)	STANDARD	OPTIONAL	CORD LENGTH	NOISE LEVEL, DECIBELS	MOTOR IN PLUNGE BASE	MOTOR IN FIXED BASE	WARRANTY, YEARS	SELLING PRICE (4)
BOSCH COLT	PR20EVSPK	B	A	B+	A	A	16–35	Y	2¼	2L	C, FE	A, D, G, O, PE, T	10'4"	88	6	3-6	1	$190
DEWALT	DWP611PK	A-	A	A	A	B+	16–27	Y	2⅛	1	B	D, FE, G, PE, S	8'	89	6-5	4-4	3	200
MAKITA	RT0700CX3	A-	C	B-	A	A-	10–30	Y	1½	2L	B, D, FE, G, O, T	PE	8'	90	6-3	4	1	240
	RP0900K	A	C+	N/A	N/A	A-	27	N	1⅜	2	C, PE	D, G, S	8'	99	6-3	N/A	1	150
PORTER-CABLE	450PK	A-	A-	A-	A	B+	27	Y	2⅛	1	B	D, FE, G, PE, S	8'	88	6-5	4-2	3	190
TREND	T4	A	B	N/A	N/A	A-	11.5–32	N	1 1⁵⁄₁₆	1	A, C, D, G, PE		6'2"	97	6-1	N/A	1	100

1. A Excellent; B Good; C Fair; N/A Not applicable
2. (1) One wrench with spindle lock; (2) 2 wrenches; (2L) 2 wrenches plus spindle lock
3. (A) Guide-bushing adapter; (B) Fabric storage bag; (C) Plastic storage case; (D) Dust-collection hoods; (FE) Fixed-base edge guide; (G) Guide bushings; (O) Offset base; (PE) Plunge-base edge guide; (S) Specialty subbases; (T) Tilt base
4. Prices current at time of article production and do not include shipping, where applicable.

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LOT NO. 47257

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OSCILLATING SPINDLE SANDER

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ADJUSTABLE SHADE AUTO-DARKENING WELDING HELMET

CHICAGO ELECTRIC WELDING

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SUPER COUPON!

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10" SLIDING COMPOUND MITER SAW

LOT NO. 98199/69681

Item 98199 shown

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SAW BLADE INCLUDED

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SUPER COUPON!

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4" x 36" BELT/ 6" DISC SANDER

LOT NO. 97181/93981

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Item 97181 shown

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SUPER COUPON!

90 AMP FLUX WIRE WELDER

CHICAGO ELECTRIC WELDING

LOT NO. 68887

NO GAS REQUIRED!

SAVE $60

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SUPER COUPON!

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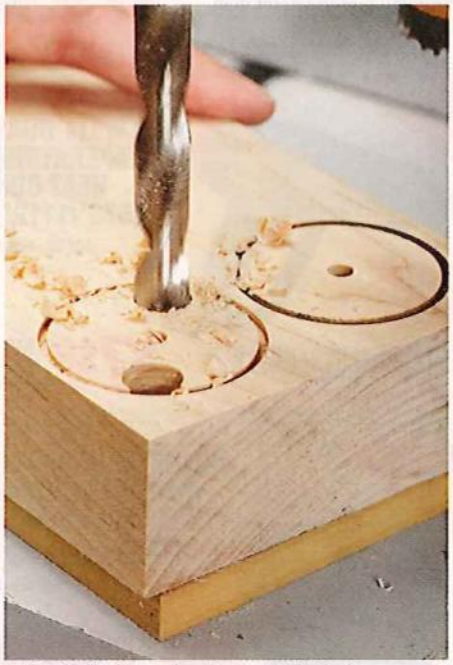
Beat holesaw burn

How can I bore with a holesaw without burning the wood? I don't have any drill bits large enough to use in place of the holesaw.

—Steve Fuller, Ellsworth, Maine

It's an inherent problem with holesaws, Steve. With no built-in way to eject debris from the cut, the saw continuously builds up friction as it spins, resulting in burns.

To combat this, first make a 1/16"-deep cut with your holesaw, then stop. Use a Forstner bit or brad-point bit to drill a pair of relief holes just inside the rim cut. Now, spray your holesaw with a quick-drying lubricant, such as Bostik DriCote. Resume cutting the hole with the holesaw, periodically recoating it when it shows signs of heating up. If you want to keep the *inside* portion of the hole—making toy wheels, for example—simply drill the relief holes to the *outside* of the circle.



Drill relief holes so they intersect the holesaw cut, but don't go beyond. Debris from the holesaw will slip out these relief holes.

With the drill press running, spray the lubricant onto the holesaw's outer and inner walls and teeth. Leave it running until dry.

In maple, we made the hole on the right using a new holesaw. The unburned hole (left) was made using relief holes and dry lubricant.

Choose the best bearing bit for pattern routing

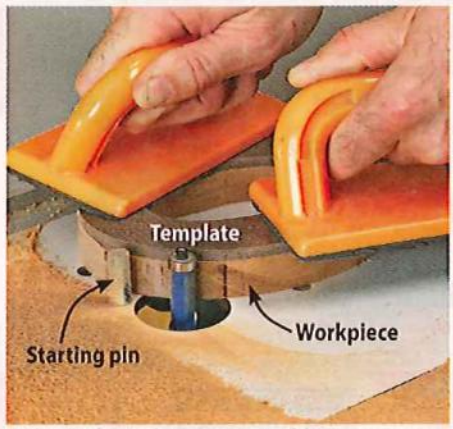
After seeing photos of template routing, I've begun using this technique for making duplicate project parts. But how do I know whether to use a bit with the bearing on top or a bit with the bearing on the bottom?

—Brian Quick, Morgantown, W. Va.

Both bits work essentially the same, Brian, although they go by different names. A flush-trim bit has a bearing *below* the cutters, while a pattern bit has a bearing *above* the cutters. Before using either bit, you first bandsaw the workpiece to rough shape, slightly larger than your template. For trimming to size, we prefer to position the template on top for better visibility, as shown *near right*. Use the pattern bit for handheld routing—remembering to elevate the workpiece to avoid cutting into your workbench. But when trimming edge banding flush with plywood, use a flush-trim bit in a handheld router. For router-table use, go with the flush-trim bit because, when inverted, the bearing sits above the cutters (*above right*), an extra bit of safety.

In most cases, both types of bits have straight cutters. For about a 30–40 percent upcharge, you can buy bits with angled, downshear cutters or solid-carbide spiral bits that reduce tear-out. And, you can buy bits with top *and* bottom bearings to get the best of both types in a single bit; these sell for about 50 percent more than single-bearing bits.

Handheld routing with a pattern bit keeps the template on top, improving visibility and avoiding potential marring from the router's subbase.



With a flush-trim bit in a router table, you can see the template edge clearly. Always use a starting pin to leverage into a cut.

continued on page 72

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Weight 31.101g
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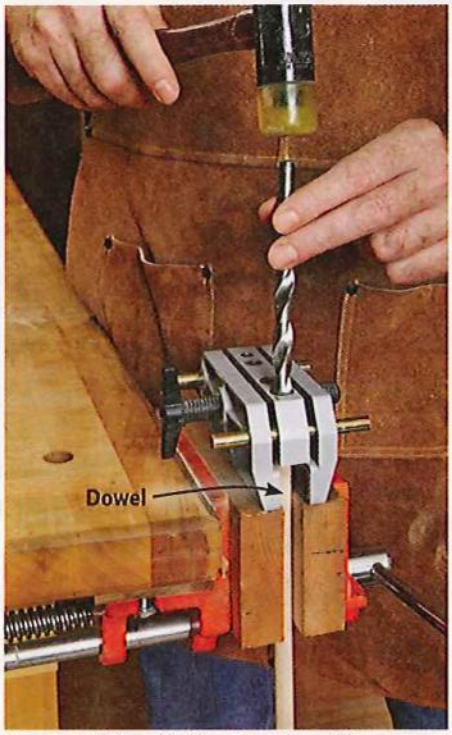
Ask WOOD

Tiny dowels create big problems

I have several dowel issues that came up while building a project. First, I can't find 3/16"-diameter dowels at the home center. Second, I need to drill holes for these dowels into the edges of several project parts too large to fit on my drill press, but my doweling jig works only for 1/4" to 1/2" holes. Finally, how can I keep the dowel holes centered while drilling?

—Perry Franklin, Shreveport, La.

You'll find small-diameter dowel rods like this at crafts stores, such as Michael's or Hobby Lobby. As for drilling the holes, Perry, you can temporarily modify your doweling jig to bore holes for these small dowels. Start by center-marking a 1/2" dowel in your guide, as shown *right*, and cutting it to the length of the drill guide. Next, drill a centered 3/16" hole into the 1/2" dowel as shown *above*. Now you have a self-centering jig for 3/16" dowels.



Secure a 1/2" dowel halfway into the guide on your jig, and mark the center with a 1/2" brad-point bit and a light mallet tap.

With your drill-press table squared to the bit, use the jig to hold the dowel and bore a 3/16" hole down its center.

Match the bevel angle to your type of chisel

With so many books, magazines, videos, and websites describing different ways to sharpen tools—and each proclaiming theirs as the best way—I'm more confused than ever. I just want to know what bevel angle makes the most sense for my wood chisels. Can you cut through the murk and provide some clarity?

—Hank Stephenson, Layton, Utah

Most woodworkers have one or two types of chisels, Hank: bench and paring. Bench chisels, the most common, have blades about 4–6" long, and can be struck with a mallet. They come with blades of either O1 steel, a soft grade that's easier to sharpen, or A2, a harder alloy that holds an edge longer. Sharpen bench chisels with a 25° bevel angle for best results. If you want to add a microbevel (a thin, secondary edge right at the tip that makes touch-up honing easier), then go with 30° for O1 and 35° for A2.

Paring chisels should be used only for hand-guided work, never struck with a mallet. These chisels have 6–10"-long blades and excel at trimming and shaping wood rather than chopping. To make these types of cuts easier, sharpen a 20° bevel on these chisels, adding a 25° microbevel if you want one.

25° bevel on a bench chisel

20° bevel on a paring chisel

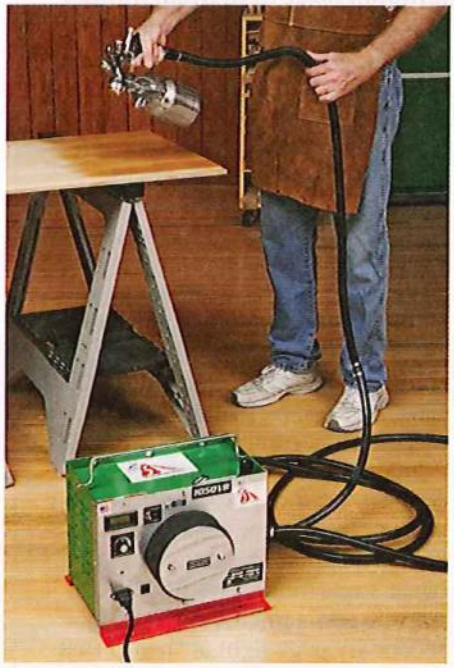
Shop-Proven Products

These woodworking wares passed our shop trials.

About our product tests

We test hundreds of tools and accessories, but only those that earn at least three stars for performance make the final cut and appear in this section. Prices are current at the time of article production and do not include shipping, where applicable.

HVLP unit makes quick work of finishing



In the past, compressed-air spraying finishes left me frustrated and my projects plagued with runs. As a result, I preferred to brush or wipe on finishes because it gave me better control. But spraying with Apollo's 1050VR HVLP system has made me put away my brushes. Now I confidently spray on fast-drying finishes in about half the time it used to take.

I like three things best about the 1050VR. First, the five-stage turbine (five internal fans) provides enough power to atomize thick finishes, such as polyurethane and paint, without thinning. Second, the turbine's variable-rate adjustment lets me dial in the perfect pressure for each finish, without having to adjust the spray gun. And third, the Atomizer gun (model A7500QT) feels like a natural extension of my hand and sprays an ideal pattern without the cloud of overspray typical of compressed-air guns. It comes with a 1-quart suction cup, but you can also outfit it with a gravity-fed cup if you prefer. (I can't say one works better than the other; it's just a preference.)

—Tested by John Olson, Design Editor

HVLP spray gun and turbine, #1050VR

Performance	★★★★★
Price	$1,600

Apollo Sprayers
888-900-4857; hvlp.com

Slide-on battery packs optimize new drills' grip

DeWalt's newest line of cordless drills, dubbed 20-Volt Max, features slide-on lithium-ion battery packs, giving each tool a slimmer, more comfortable grip, which equates to less user fatigue. (DeWalt markets this line of tools as 20 maximum volts on a full charge, although just a few years ago we'd have called this an 18-volt tool based on the number of cells in the packs.)

I used both the compact and full-size drill/drivers in this line, putting each through a series of tests. The full-size model (DCD980L2) trumps the compact in torque and, because it comes with 3-amp-hour battery packs, run time. It has three speed ranges from zero to 2,000 rpm and a metal ratcheting chuck that grips bits better. But at nearly 6 lbs, it's a big tool to lug around the shop.

For general workshop use, I prefer the compact DCD780C2 that comes with 1.5-amp-hour battery packs, has just two speed ranges, and a lighter-duty chuck. It weighs 2 lbs less than the DCD980L2, and has plenty of power to handle all the jobs I threw at it. That said, its batteries heated up while drilling 1" holes in 2×6 pine, causing the built-in electronics to shut it down. Once it cooled off, this drill picked up where it left off.

—Tested by Steve Feeney, a woodworker with 27 years experience and a 7-year WOOD magazine tool tester

20-Volt Max drill/drivers

Performance		★★★★★
Price	#DCD980L2	$270
Performance		★★★★☆
Price	#DCD780C2	$220

DeWalt
800-433-9258; dewalt.com

WOOD MAGAZINE'S REVIEW-A-TOOL

Add your own review of these tools and read more reviews from your fellow woodworkers at toolreviews.woodmagazine.com.

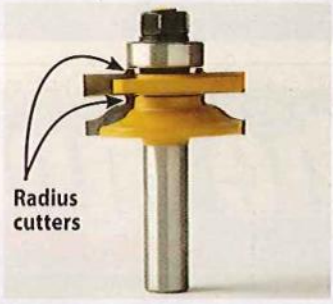
continued on page 76

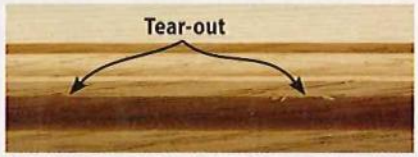
Shop Proven Products

Rout rails and stiles without edge tear-out

I never thought a tiny radius could make such a huge difference, but it does. Sommerfeld's Chip-Free Rail-and-Stile bit sets have two small radius cutters on the stile bit of this two-piece set that follow the primary profile cutters, slightly rounding over the top and bottom edge along the panel groove. This innovative feature virtually eliminates tear-out along the profile edges, helping you create cleaner, more attractive cabinet doors. I've battled this problem for years with a number of different rail-and-stile cutters with no good solution to fix the tear-out; these bits just do away with the problem up front.

—Tested by Bob Hunter, Tools Editor





We routed this profile with a standard stile bit, and found consistent tear-out, as shown.

We routed this stile with the Sommerfeld Chip-Free bit and found no tear-out.

Chip-Free Rail-and-Stile router bit sets

Performance	★★★★★
Price	$100

Sommerfeld Tools For Wood
888-228-9268;
sommerfeldtools.com

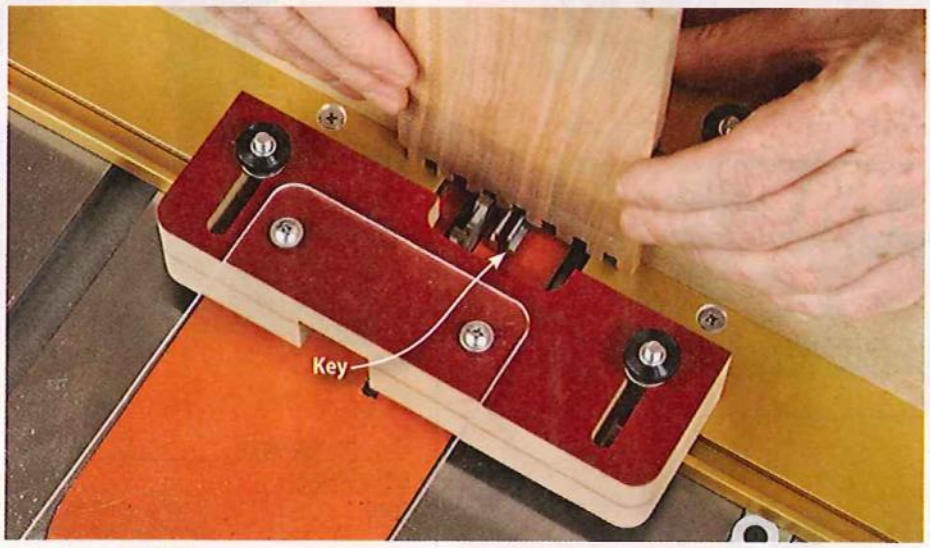
Safer, hyper-accurate box joints? Sign me up!

Box joints are not complicated to make, whether on a tablesaw or router: It's a simple matter of step and repeat using a shopmade keyed jig for consistent spacing. But Incra's I-Box makes the process even easier and safer. And don't let its complicated appearance intimidate you—it's incredibly simple to use.

The I-Box's adjustable metal key lets you set the finger width to any measurement between ⅛" and ¾", and the microadjuster fine-tunes both the key width and spacing for a perfect fit. The jig rides in your saw's (or router table's) miter slot on an adjustable-width miter bar. It has an aluminum slotted fence, workpiece support, backer board, and guard to register and capture your workpiece, holding it securely with no need for clamping while also preventing tear-out. (When you close the jig up against your workpiece, the cutter is fully guarded, keeping your fingers safe.)

I made dozens of joints in multiple sizes and never had to make more than one test cut and adjustment each time. And I quickly and easily calibrated it to my router table after starting out on the tablesaw; it works equally well on both.

—Tested by Tom Brumback, a woodworker with 30 years of experience building furniture



Box-joint jig, #I-BOX

Performance	★★★★★
Price	$170

Incra Precision Tools
888-804-6272; incra.com

continued on page 78

Shop Proven Products

Pint-sized jig delivers heavy-duty performance

Kreg Tool's new shelf-pin drilling jig has six steel drilling guides (on 1¼" centers), a fence, and ¼" drill bit with stop collar. (An optional 5mm drill bit sells for $8.) And it's just as accurate—and simpler to use—than jigs costing twice as much.

To use it, you install the fence along one side of the jig body for a 1" inset from the workpiece edge, or along the other for a 2⅛" inset. Then you just clamp it and drill. For more holes in the same row, drop the included indexing pin through one of the guides and into the last hole you drilled. You're ready to drill again—repeat for as many holes as you need.

—Tested by Bob Hunter, Tools Editor

Shelf-pin drilling jig

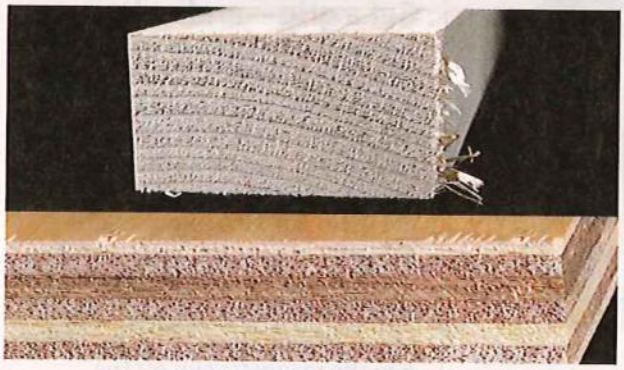
Performance	★★★★★
Price	¼" jig (#KMA3200) $35 5mm jig (#KMA3220) $35

Kreg Tool Co.
800-447-8638; kregtool.com

continued on page 80

Forrest Sharpening

Helps Prevent Bad Cuts Like These



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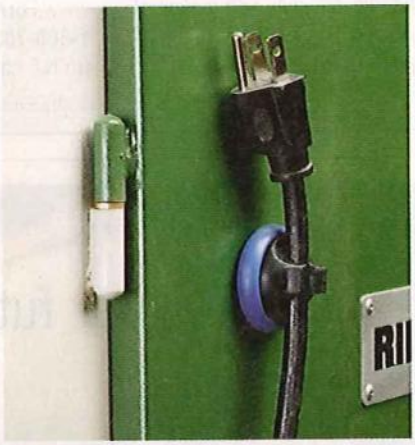
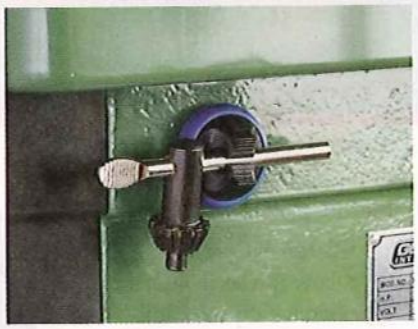
You can't get any more no-frills than this, but that's the beauty of Rockler's Magnetic Cord Clips. For just $8 you get two clips that simply work well at holding power cords, pencils, or drill-press chuck keys. I use them with machines that I regularly unplug (bandsaw, scroll-saw, lathe) to secure their cords at a convenient no-stoop height. When I need to plug them in again, I just pop the magnetic clip off the machine and plug the cord in—no need to remove the clip. (Warm up a clip to loosen it if it's stiff.)

—Tested by Lucas Peters, How-To Editor





Magnetic cord clips, #42388

Performance	★★★★★
Price	$8

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A glimpse inside the Dec/Jan issue (on sale November 27)

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Using easy biscuit and butt joinery, this weekend project brings a little of the vineyard to your home.

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Multi-picture frame
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Better Homes and Gardens® WOOD® magazine (ISSN-0743-8834); November 2012, Volume 29, No. 6, is published 7 times a year in March, May, July, Sept, Oct, Nov, Dec/Jan by Meredith Corporation, 1716 Locust Street, Des Moines, IA 50309-3023. Periodicals postage paid at Des Moines, IA, and at additional mailing offices. Subscription prices, $28.00 per year in the U.S.; $41.00 (U.S. dollars) in Canada; $49.00 (U.S. dollars) overseas. POSTMASTER: Send all UAA to CFS. (See DMM 707.4.12.5); NON-POSTAL AND MILITARY FACILITIES: send address corrections to (Better Homes and Gardens WOOD), P.O. Box 37508, Boone, IA 50037-0508. In Canada: mailed under Publications Mail Sales Product Agreement No. 40069223; Canadian BN 12348 2887 RT. Return undeliverable Canadian addresses to (Better Homes and Gardens WOOD), PO Box 882 STN Main. Markham ON, L3P 9Z9. Printed in the U.S.A.

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