ISSUE 206 SEPTEMBER 2011

Better Homes and Gardens®

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WOOD®

Lessons from a War-Hero Woodworker

Breeze-to-Build Bookcase

Make it for less than $175! p.36

More projects

- Table and Chair Set *from ONE Sheet of MDF!* p.52
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- Custom-Fit Hand Plane p.62
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Get a Silky-Smooth Finish In *Any* Weather p.16

Must-Have Tablesaw Safety Gadgets p.30

Shop-Test: The Best Portable Air Compressors p.58

54 Shop Tips Inside!

Display until August 23, 2011

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10" HYBRID TABLE SAW

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- Motor: 2 HP, 110V/220V, single-phase
- Precision ground cast iron table with wings easures: 27" x 40"
- Arbor: 5/8" • Arbor speed: 3850 RPM
- Capacity: 3⅛" @ 90°, 2³/₁₆" @ 45°
- Rip capacity: 30" R, 12" L
- Quick change riving knife
- Cast iron trunnions
- Approx. shipping weight: 354 lbs.

INCLUDES BOTH REGULAR & DADO BLADE INSERTS

G0715P INTRODUCTORY PRICE **$765.00**

$89 shipping ANYWHERE IN LOWER 48 STATES

17" HEAVY-DUTY BANDSAW

BEAUTIFUL WHITE COLOR!



- Motor: 2 HP, 110V/220V, single-phase, TEFC
- Precision ground cast iron table size: 17" sq.
- Table tilt: 10° L, 45° R
- Cutting capacity/throat: 16¼"
- Max. cutting height: 12⅛"
- Blade size: 131½" L (⅛" - 1" W)
- Blade speeds: 1700 & 3500 FPM
- Quick release blade tension lever
- Approx. shipping weight: 342 lbs.

Product Reviews & Awards ONLINE grizzly.com

INCLUDES DELUXE EXTRUDED ALUMINUM FENCE, MITER GAUGE & ½" BLADE

$89 shipping ANYWHERE IN LOWER 48 STATES

G0513P INTRODUCTORY PRICE **$795.00**

10" LEFT-TILTING CONTRACTOR-STYLE TABLE SAW *with Riving Knife*

- Motor: 1¾ HP, 110V/220V, single-phase
- Precision ground cast iron table w/wings
- Table size: 27" x 44" • Arbor: 5/8"
- Arbor speed: 4200 RPM
- Capacity: 3⅛" @ 90°, 2¼" @ 45°
- Rip capacity: 36" R, 12" L • Approx. shipping weight: 342 lbs.

FREE 10" CARBIDE-TIPPED BLADE



CAST IRON TRUNNIONS & CAST IRON MITER GAUGE

MADE IN ISO 9001 FACTORY!

G0713 INTRODUCTORY PRICE **$850.00**

$89 shipping ANYWHERE IN LOWER 48 STATES

10" LEFT-TILTING TABLE SAWS *with Riving Knife & Cast Iron Router Table*

- Motor: 3 HP or 5 HP, 220V, single-phase
- Precision ground cast iron table size with wings: 27" x 48"
- Arbor: 5/8"
- Cutting capacity: 25⅝" R, 8" L
- Max. depth of cut: 3" @ 90°, 2⅛" @ 45°
- Approx. shipping weight: 546 lbs.



Product Reviews & Awards ONLINE grizzly.com

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G1023RLW *3 HP* ~~$1175.00~~ **SALE $1145.00**

G1023RLWX *5 HP* ~~$1295.00~~ **SALE $1225.00**

10" CABINET TABLE SAW *with Riving Knife & Extension Rails*

- Motor: 3 HP, 220V, single-phase
- Precision ground cast iron table
- Table size with extension: 27" x 74¾"
- Arbor: 5/8" • Arbor speed: 4300 RPM
- Max. depth of cut: 3⅛" @ 90°, 2³/₁₆" @ 45°
- Max. rip capacity: 50"
- Max. dado width: 13/16"
- Approx. shipping weight: 572 lbs.

WOOD MAGAZINE TOP VALUE APPROVED 2009

3 HP LEESON® MOTOR!



Product Reviews & Awards ONLINE grizzly.com

G0691
Reg. ~~$1395.00~~
SALE $1350.00

FREE 10" CARBIDE-TIPPED BLADE

$139 shipping ANYWHERE IN LOWER 48 STATES

MADE IN ISO 9001 FACTORY!

14" BANDSAW



- Motor: ¾ HP, 110V/220V, single-phase, TEFC
- Precision ground cast iron table size: 14" sq.
- Table tilt: 15° L, 45° R
- Cutting capacity/throat: 13½"
  - Max. cutting height: 6"
  - Blade size: 92½" - 93½" L (⅛" - ¾" W)
- Blade speed: 3000 FPM
- Cast iron fra e
- Steel open fra e stand
- Approx. shipping weight: 165 lbs.

CAN BE PLUGGED INTO ANY STANDARD HOUSEHOLD OUTLET

G0580
Reg. ~~$395.00~~
SALE $375.00

$69 shipping ANYWHERE IN LOWER 48 STATES

ULTIMATE 14" BANDSAW



- Motor: 1 HP, 110V/220V, single-phase, TEFC
- Precision ground cast iron table size: 14" sq.
- Table tilt: 10° L, 45° R
- Cutting capacity/ throat: 13½"
- Max. cutting height: 6"
- Blade size: 92½" - 93½" L (⅛" - ¾" W)
- Blade speeds: 1500 & 3200 FPM
- Approx. shipping weight: 196 lbs.

Product Reviews & Awards ONLINE grizzly.com

MADE IN ISO 9001 FACTORY!

G0555P
INTRODUCTORY PRICE
$425.00

$69 shipping ANYWHERE IN LOWER 48 STATES

19" HEAVY-DUTY EXTREME SERIES BANDSAW

EXTREME SERIES



- Motor: 3 HP, 220V, single-phase, TEFC
- Precision ground cast iron table size: 26¾" x 19"
- Table tilt: 5° L, 45° R
- Cutting capacity/throat: 18¼"
- Max. cutting height: 12"
  - Blade size: 143" L (⅛" - 1¼" W)
  - Blade speeds: 1700 & 3500 FPM
- Approx. shipping weight: 460 lbs.

DELUXE RE-SAW FENCE INCLUDED

MADE IN ISO 9001 FACTORY!

G0514X ~~$1250.00~~ **SALE $1195.00**

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Huge Price Increases on Materials & Labor Overseas
BUY NOW TO SECURE PRICES

12" JOINTER/PLANER COMBINATION MACHINE

New!

BEAUTIFUL WHITE COLOR!

- Motor: 5 HP, 220V, single-phase
- Jointer table size: 14" x 59½"
- Cutterhead dia.: 3⅛"
- Cutterhead speed: 5034 RPM
- Max. jointer depth of cut: ⅛"
- Max. width of cut: 12"
- Planer feed rate: 22 FPM
- Max. planer depth of cut: ⅛"
- Max. planer cutting height: 8"
- Planer table size: 12¼" x 23⅜"
- Approx. shipping weight: 734 lbs.



NEW END-MOUNTED FENCE

CARBIDE INSERT SPIRAL CUTTERHEAD!

FREE SAFETY PUSH BLOCKS

G0634XP INTRODUCTORY PRICE **$2195.00**

ALSO AVAILABLE

G0633 JOINTER/PLANER ~~$1995.00~~ **ONLY $1750.00**

G0634Z SPIRAL CUTTERHEAD MODEL ~~$2495.00~~ **ONLY $2250.00**

$139 Shipping ANYWHERE IN LOWER 48 STATES

CYCLONE DUST COLLECTOR

BEAUTIFUL WHITE COLOR!

- Motor: 1½ HP, 110V/220V, single-phase, TEFC, 3450 RPM
- Air suction capacity: 775 CFM
- Static pressure at rated CFM: 1.08"
- Intake port: 6" with included 5" optional port
- I peller: 13½"
- Height: 68½"
- Built-in re ote control switch
- Approx. shipping weight: 210 lbs.

New!

PLEATED FILTER IS PROTECTED BY A STEEL CAGE



FULLY MOBILE WITH BUILT-IN CASTERS

ONLY 68½" TALL!



G0703P INTRODUCTORY PRICE **$695.00**

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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 inute: 20,000
- Approx. shipping weight: 500 lbs.



FREE SAFETY PUSH BLOCKS

BUILT-IN MOBILE BASE

CHOOSE EITHER 4 HSS KNIVES OR SPIRAL CUTTERHEAD MODEL

G0656P INTRODUCTORY PRICE **$775.00**

$139 Shipping ANYWHERE IN LOWER 48 STATES

WITH SPIRAL CUTTERHEAD
G0656PX INTRODUCTORY PRICE **$1075.00**

12" x 60" SHORT BED JOINTER *with Spiral Cutterhead*

- Motor: 3 HP, 220V, single-phase, TEFC
- Precision ground cast iron table size: 13" x 60"
- Fence: 5⅜" x 31¼"
- Cutterhead dia.: 3¾"
- Cutterhead speed: 4,950 RPM
- Bevel jointing: 45°, 90°, 135°
- Max. depth of cut: ⅜"
- Approx. shipping weight: 832 lbs.

FREE SAFETY PUSH BLOCKS

MADE IN ISO 9001 FACTORY!



PARALLELOGRAM TABLE ADJUSTMENT

G0706 ~~$2195.00~~ **SALE $2150.00**

$169 Shipping ANYWHERE IN LOWER 48 STATES

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.



BUILT-IN MOBILE BASE

CHOOSE EITHER 3 KNIFE OR SPIRAL CUTTERHEAD MODEL

$139 Shipping ANYWHERE IN LOWER 48 STATES

G0453P INTRODUCTORY PRICE **$995.00**

WITH SPIRAL CUTTERHEAD
G0453PX INTRODUCTORY PRICE **$1475.00**

10" DRUM SANDER

New!

- Motor: 1½ HP, 110V, single-phase
- Conveyor otor: 1/10 HP
- Dru speed: 2300 FPM
- Dru size: 5⅛" x 10"
- Max. sanding width: 10"
- Max. workpiece height: 2 15/16"
- Min. workpiece height: 3/16"
- Variable feed speeds: 1-10 FPM
- 4" dust port
- Approx. shipping weight: 220 lbs.



WHEELS & STOWABLE TRANSPORT HANDLES FOR MOBILITY

REMOVABLE HEADSTOCK SUPPORT BRACKET ALLOWS SANDING UP TO 20"

G0716 INTRODUCTORY PRICE **$345.00**

$69 Shipping ANYWHERE IN LOWER 48 STATES

15" DISC SANDER *with Stand*

- Motor: 1½ HP, 220V, single-phase, 1720 RPM
- Cast iron sanding disc size: 15"
- Cast iron table size: 12" x 20"
- Table tilt: 0 - 45°
- Floor to table height: 37⅝"
- Dust port: 2½"
- Approx. shipping weight: 232 lbs.

New!

INCLUDES MITER GAUGE



MADE IN TAIWAN

FEATURES BUILT-IN MOTOR BRAKE & STORAGE CABINET WITH SHELF



G0719 INTRODUCTORY PRICE **$795.00**

$69 Shipping ANYWHERE IN LOWER 48 STATES

1 HP WALL MOUNT DUST COLLECTOR

- Motor: 1 HP, 110V/220V,single-phase
- A ps: 14/7
- Intake size: 4"
- Bag size (dia. x depth): 13½" x 24"
- Balanced steel, radial fin i peller
- Air suction cpacity: 450 CFM
- Max. static pressure: 7.2"
- Approx. shipping weight: 51 lbs.

SPECIAL WALL MOUNT DESIGN!



New!

EASY MOUNTING WALL BRACKET & LOCKING THUMB SCREW SECURES DUST COLLECTOR IN PLACE!



G0710
INTRO PRICE
$169.95

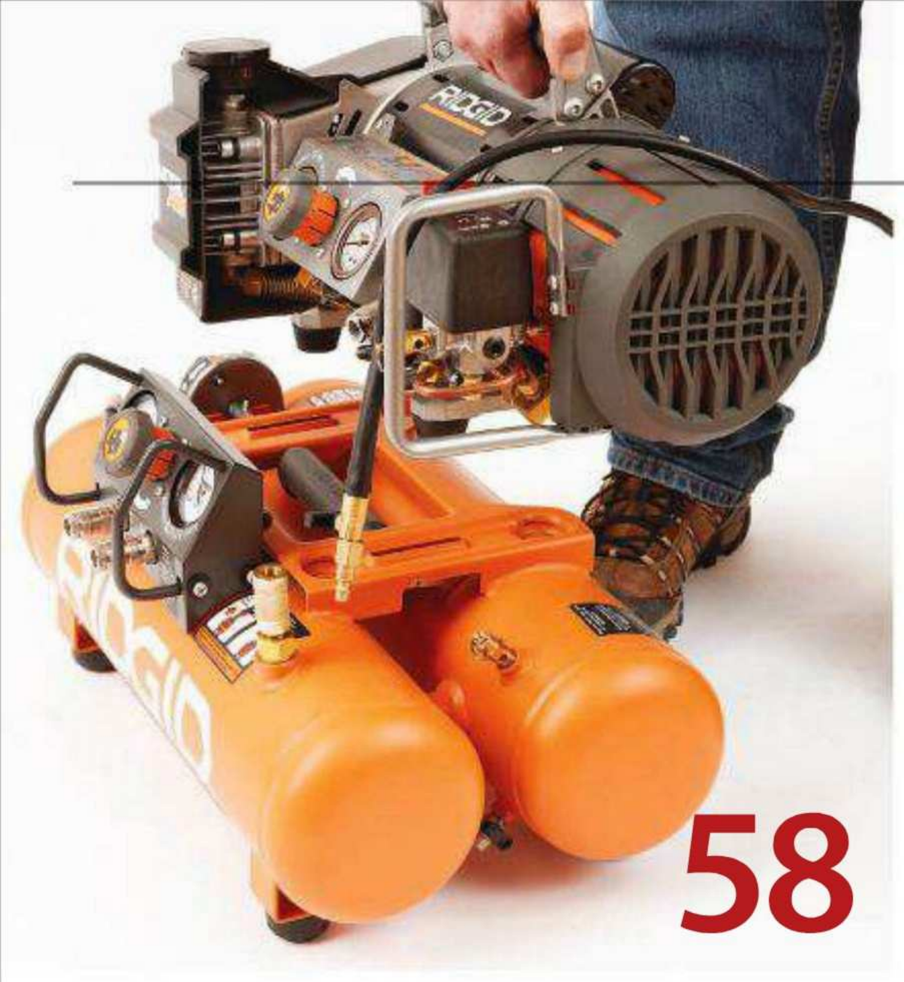


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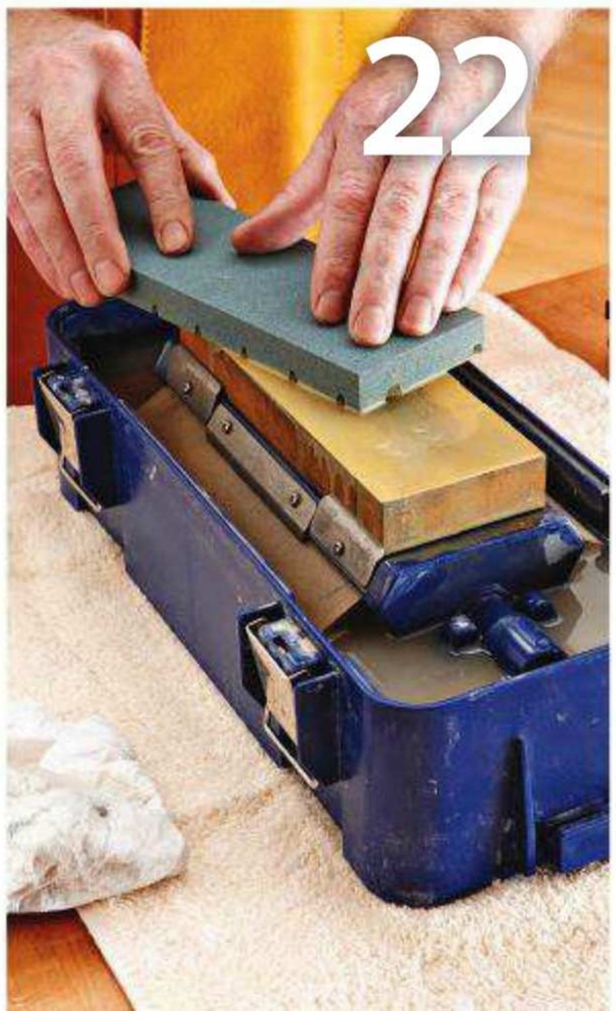
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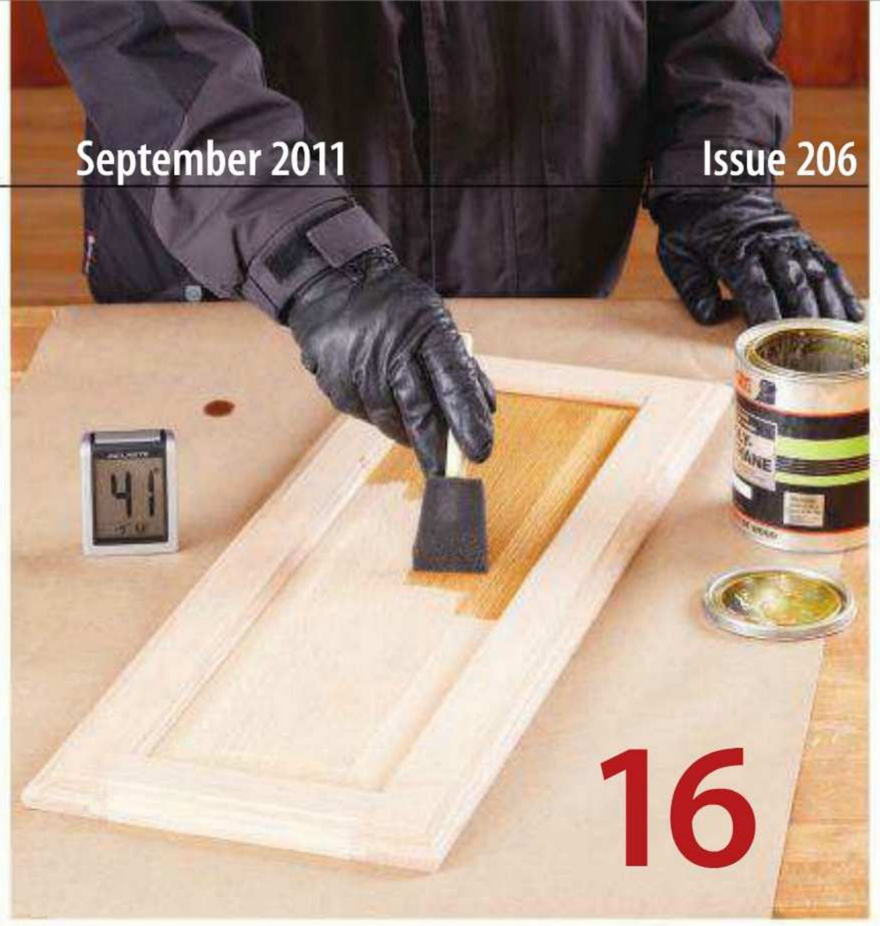


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September 2011 Issue 206



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This seal is your assurance that we build every project, verify every fact, and test every reviewed tool in our workshop to guarantee your success and complete satisfaction.

WOOD MAGAZINE SHOP TESTED APPROVED®



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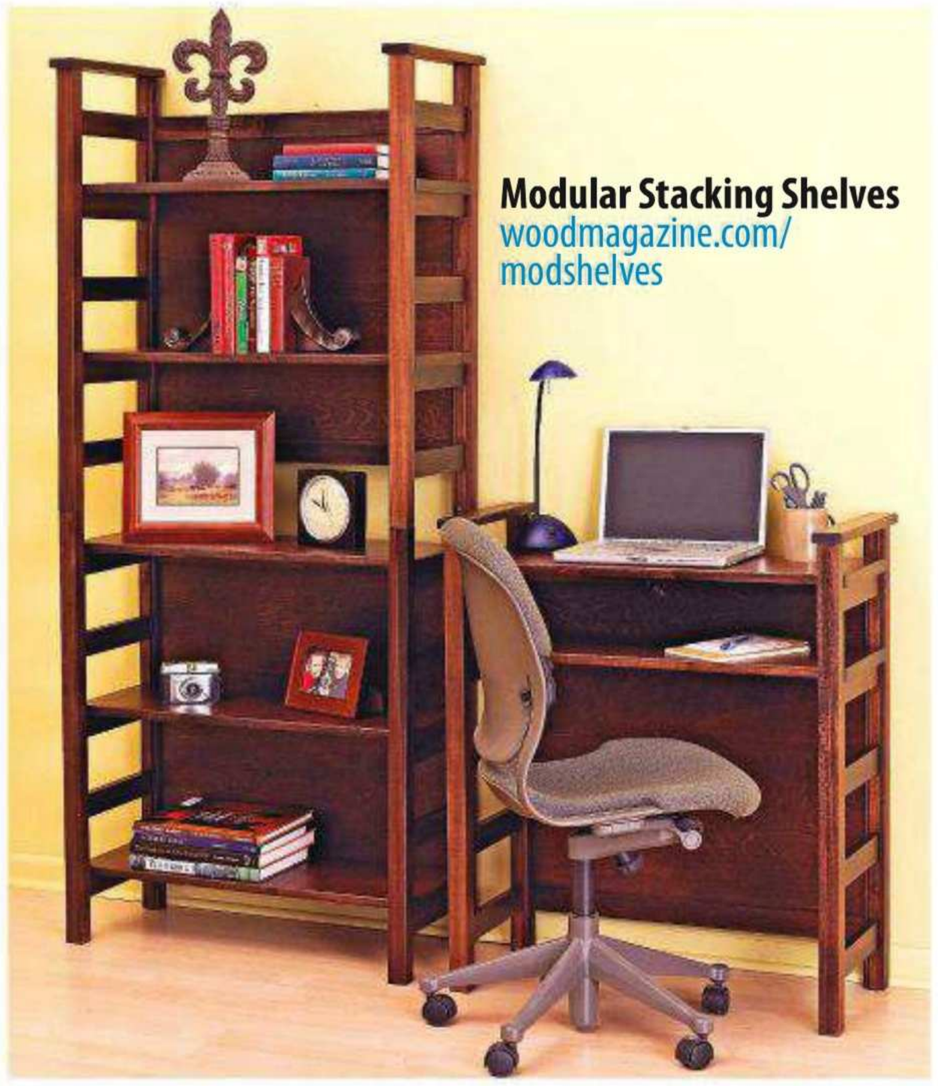


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on our web site

woodmagazine.com

BACK-TO-SCHOOL PROJECT PLANS*



Modular Stacking Shelves
woodmagazine.com/modshelves

On-the-Go Lap Desk
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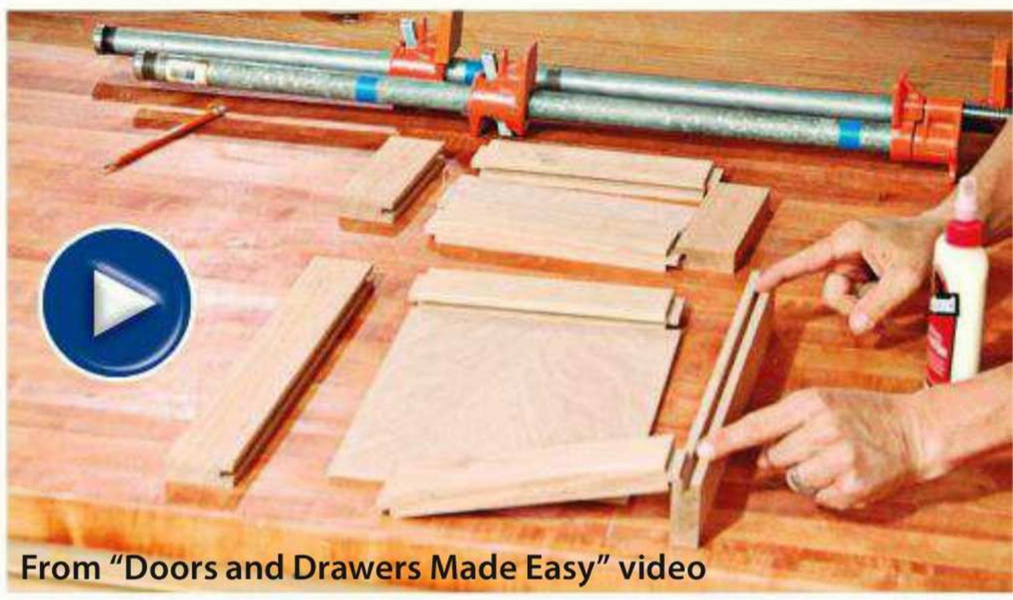
Fantastic Futon
woodmagazine.com/futonbed

Versatile Computer Desk
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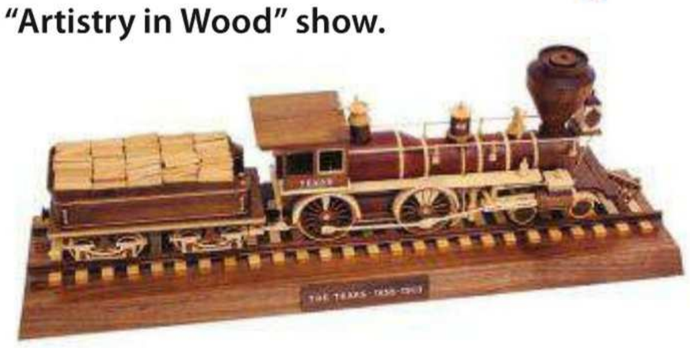
SEE READER CREATIONS GALORE

From club contest entries to pictures from proud woodworkers, you'll find inspiration for your next project at woodmagazine.com/galleries.





Some entries from the Des Moines (Iowa) Woodworkers Association's "Artistry in Wood" show.



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INNOVATIVE PRODUCTS SINCE 1989!

2 YEAR WARRANTY

SHOP FOX® machines are backed by a 2 Year Warranty!

10" TABLE SAWS with Riving Knife

Free 10" Carbide-Tipped Blade

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



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

New

SLIDING TABLE and ROUTER TABLE ATTACHMENTS for W1819 & W1820



SAW NOT INCLUDED

New

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

New

- 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

New

- 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" SLIDING TABLE SAW

New



- 5 HP, 220V, single-phase motor
- Precision ground cast iron table measures 47" x 40" with extension
- Sliding table measures 63" x 12¼"

BLADES NOT INCLUDED

Scoring blade eliminates cross grain tearout!

W1811 10" Sliding Table Saw

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

OUTSTANDING SHOP FOX® ACCESSORIES

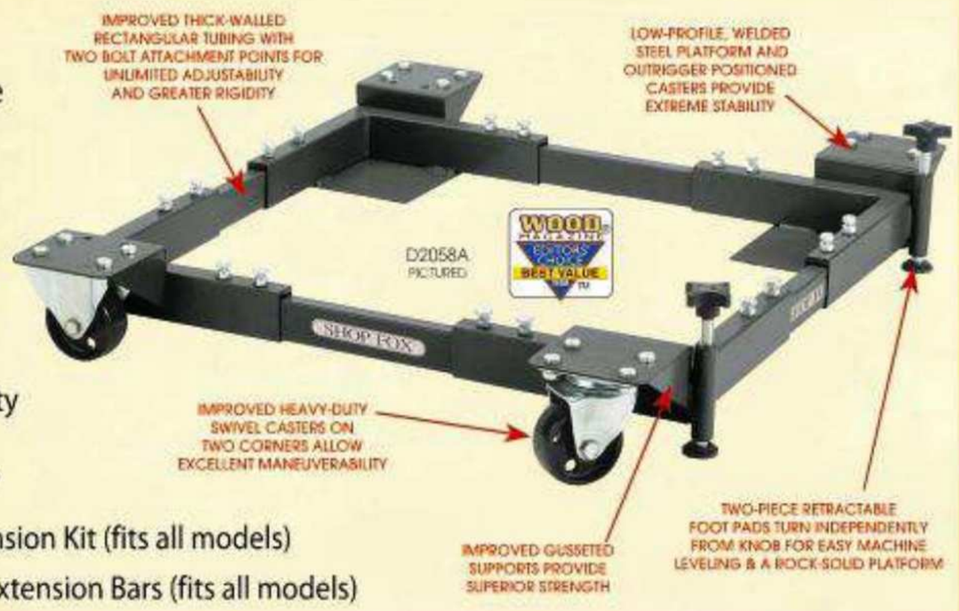
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STRONGER FRAME WITH IMPROVED WHEELS AND GUSSETED SUPPORTS!

D2260A Mini Mobile Base 600 lb. capacity

D2057A Heavy-Duty Mobile Base 700 lb. capacity

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Set jointer knives in perfect alignment every time!

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W1210 Polycarbonate jig for 4" - 8" jointers w/HSS knives
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W1212 Carbide jig for 4" - 8" jointers w/carbide or HSS knives
W1227 Carbide jig for 8" - 14" jointers w/carbide or HSS knives
W1228 Carbide jig for 12" - 18" jointers w/carbide or HSS knives



Aluma-Classic® FENCE

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

Self-adhesive measuring tape & adjustable magnified cursor for quick positioning.



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September 2011 **Vol. 28, No. 4** **Issue No. 206**



Kevin designed and built this mission server to hold wine bottles and tableware.



Dave built this mobile sheet-goods rack from plans in issue 205; also at woodmagazine.com/cuttoffstation.



Bob cut lots of mortises and tenons to make this bench.

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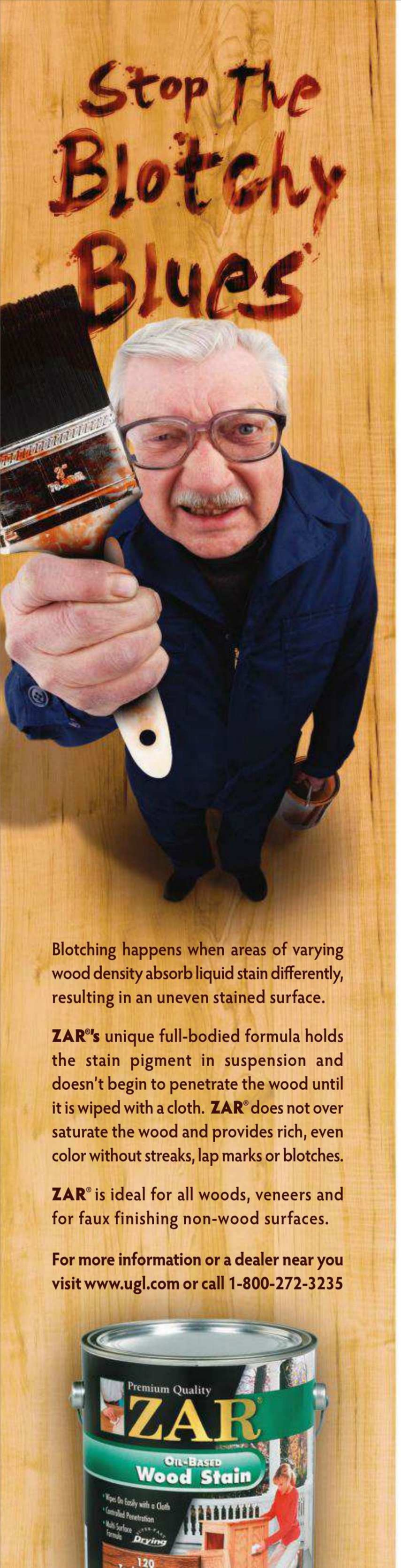
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Editor's Angle



2 New Ways to Faster Online Content

For some time now, in select articles, we have pointed you to free online videos that demonstrate key woodworking concepts. These videos show the craftsman's every move, down to the finest nuance of his hand movements, in real time, with helpful narrative. Handy, yes, but you still have to put down the magazine and type the address into your computer to see them.

Now, we're introducing a digital version of *WOOD* magazine that makes it even easier to access those videos. This e-version is much like the paper one you're used to, with a few key differences:

- You can view it on any computer or mobile device (smartphone, tablet computer, etc.) with Internet access.
- Clicking on a Web link in an article takes you directly to that Web page—no more typing in Web addresses. If you own an iPad, the videos come with the rest of the downloadable issue, so you can view them anytime, anywhere.
- For some large projects, iPad users can also pop up a slide show of all of the how-to illustrations, then enlarge them as desired.

I'm just scratching the surface of the available features. The best way to understand it: Watch a free demo at woodmagazine.com/ziniovideo. If you would like to get the magazine that way, you can buy single issues or subscribe by going to zinio.com/wood. It's an especially sweet deal for readers outside the U.S., who otherwise pay a premium due to mailing costs.

It's taken a fair amount of effort to get this new version of the magazine up and running, and I want to especially thank Deputy Editor Dave Campbell and Art Director Karl Ehlers for all of their hard work in making it happen.

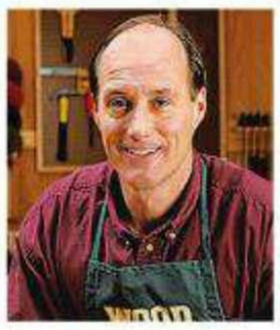
Those quilt-looking thingees

By now you've probably noticed those little squares that sometimes look like a quilting patch or circuit board, popping up in ads. They're called QR codes. QR stands for "quick response" because by simply "snapping" one of these with your smartphone's camera, you go directly to a Web site with more information about a product or service. With smartphones expected to be the majority of mobile phones used by the end of 2011, we think it's time to use QR codes to help you find more information about top-rated tools. So beginning in this issue, you'll find QR codes accompanying the tools reviewed in Wise Buys on *page 24* and Shop-Proven Products beginning on *page 84*.

Now, let me assure you that these changes only supplement the great coverage you're used to getting in the printed magazine. They don't replace our usual features, and you don't have to use them to get the whole story—we're still committed to every print article being complete and thorough in and of itself.

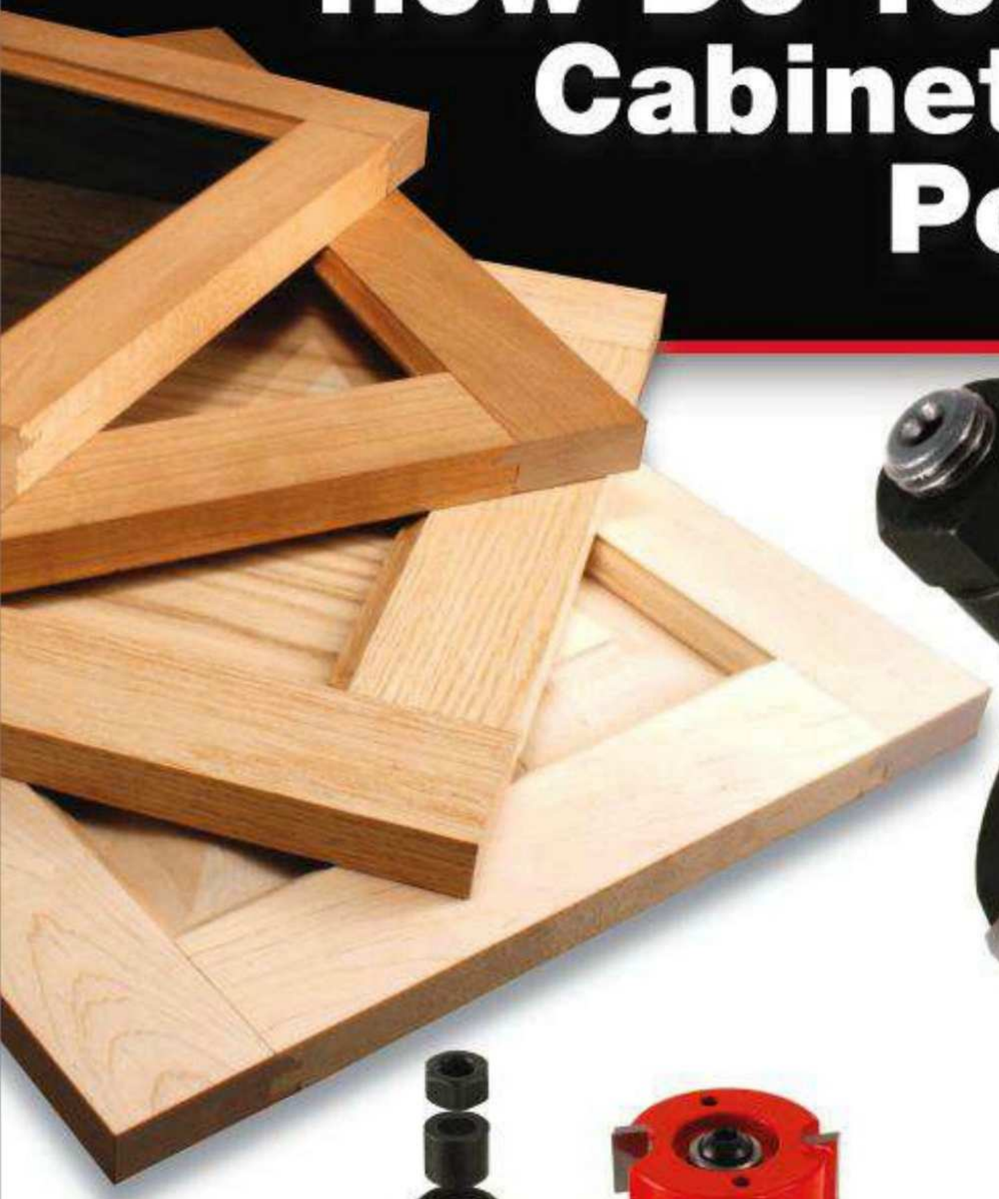
When you get a chance, drop me a line at bill.krier@meredith.com to let me know what you think. After all, what you want will continue to dictate what we deliver.

Bill Krier



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How Do You Create Endless Cabinet Door Making Possibilities?







Profile Shown:
Round Over
(#99-760)



Patented design allows for multiple rail & stile project combinations

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Four profiles are available; **Round Over** (#99-760), **Ogee** (#99-761), **Round Over Bead** (#99-763), and **Bevel** (#99-764).



Standard stub tenons in regular 3/4" stock

Extended tenons for strong joints in larger doors

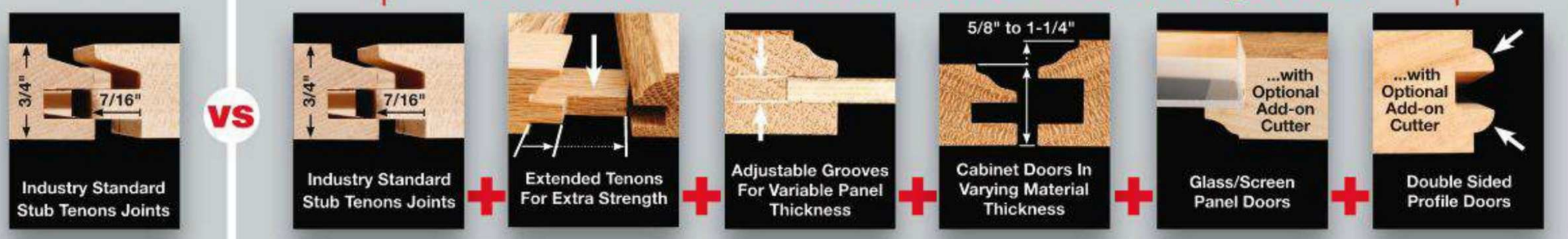
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Sounding Board

Our bulletin board for letters, comments, and timely updates

Readers rave over projected project costs

Approximate costs make *WOOD*® magazine stand out

After browsing through several woodworking magazines on a home-center newsstand, I decided to buy *WOOD* magazine instead of the others because I saw that it included an estimated material cost for all the projects. What a great idea! As soon as I got home, I began figuring out my local costs to build the cherry Corner Curio Cabinet from issue 203 (March 2011), and found them very close to your estimate. Thanks for the extra effort to help out readers like me.

—Sonny Rice, Del Rio, Texas

Estimates help guide my building choices

I'm really glad to see you include approximate costs for your projects. Of course, I realize that my costs might vary, but it's nice to have a ballpark idea before beginning. In the past I've sometimes gotten partially into building a project only to realize it's going to cost much more than I expected. Rather than scrapping it, I'd bite the bullet and plow ahead, vowing to get a better handle on costs the next time. Now, I don't have to because you've done that for me.

—Tony Fincannon, Laurel, Ind.



PROJECT HIGHLIGHTS

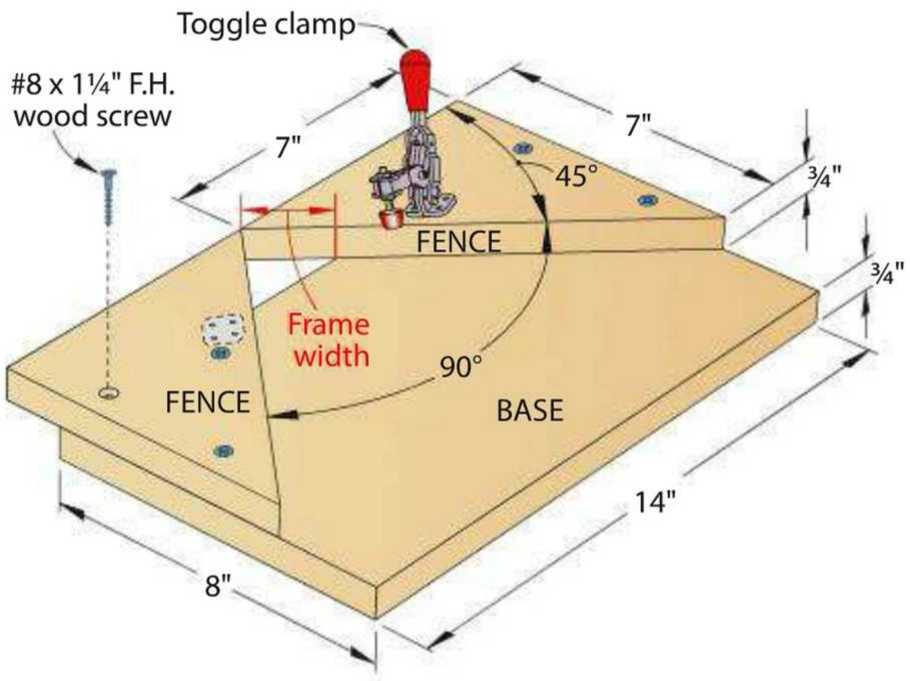
- Overall dimensions: 21⅝" wide along each side x 72½" high.
- Built from solid cherry and poplar, and birch plywood.
- Pocket lights and glass shelves brighten the inside of the cabinets.
- Cost of materials: $420 with mirrors, $380 with plywood panels.



Article updates

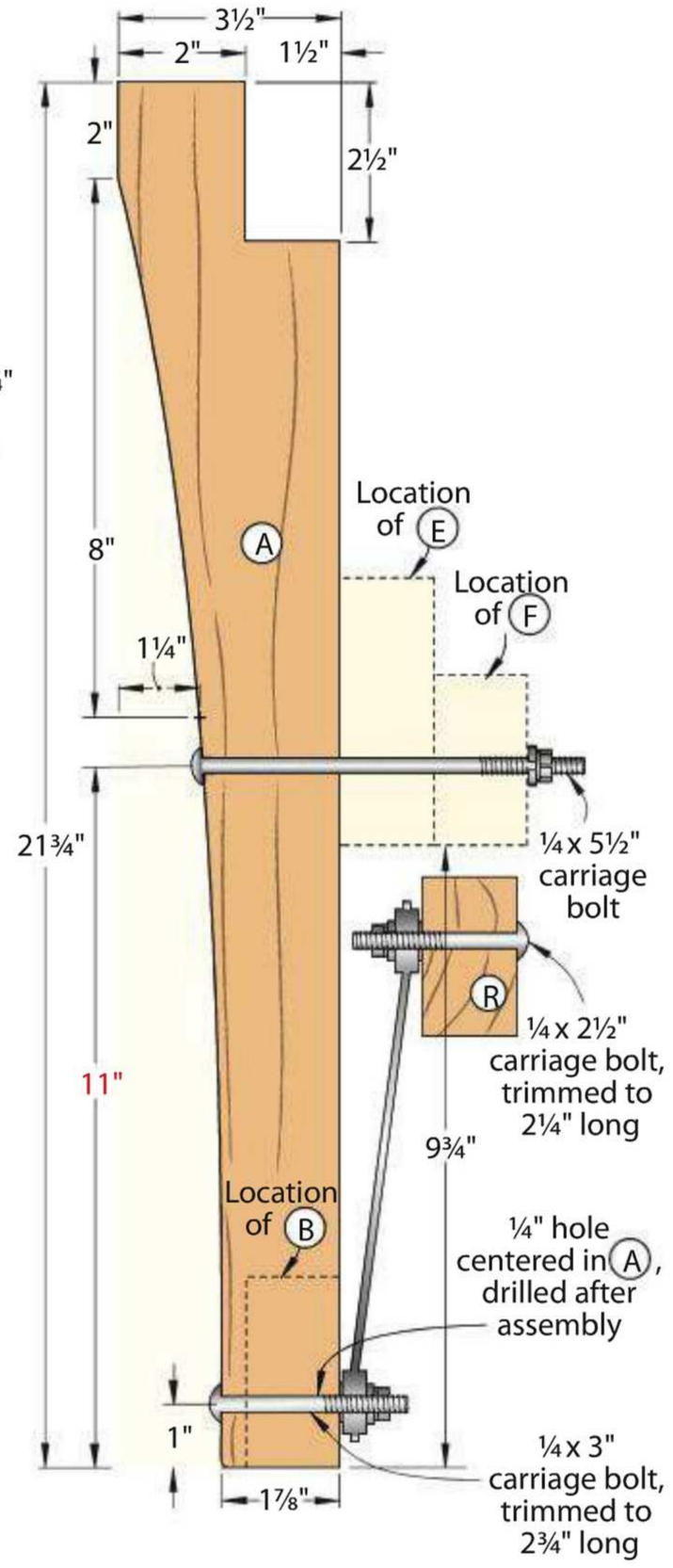
Issue 204 (May 2011)

■ Build the mitered half-lap jig on page 20 using the width of your frame as the length of fence reach beyond the base, as shown.



Issue 205 (July 2011)

■ For the outdoor glider on page 29, the ¼×5½" carriage bolt should be located 11" from the bottom of the leg in Drawing 1.



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 magazine editors

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Shop Tips

Helping you work faster, smarter, and safer

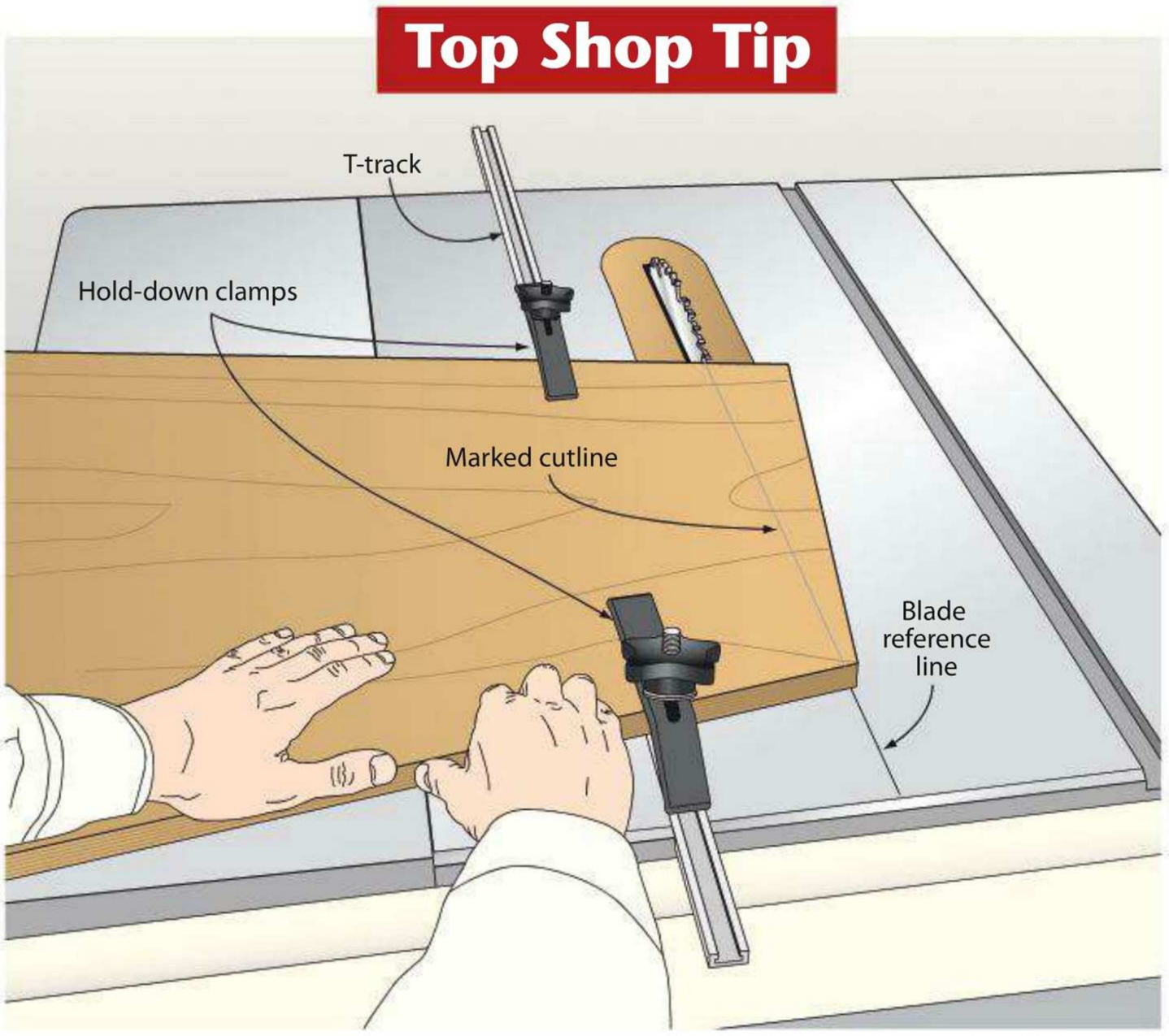
Minimalist sled for asymmetrical sawing

After reading Alan Schaffter's tip ("Arrow-straight cuts for odd-shaped parts," *WOOD* magazine issue 193, Oct. 2009), I thought I'd send in my own down-and-dirty "sled" for cutting irregular panels. Mine consists simply of two hold-down clamps attached to T-track with T-bolts and star knobs (Rockler item 25736, $31, 800-279-4441, rockler.com).

Before you use the sled, place a straight-edge against your saw blade to mark a reference line on your tablesaw table to show where the blade will cut. With the T-track in the miter slot, use the reference line to position your panel; then clamp it to the T-track. The panel becomes its own sled as you slide the T-track through the miter slot to make the cut.

—Gary Dean, Prince George, B.C.

Top Shop Tip



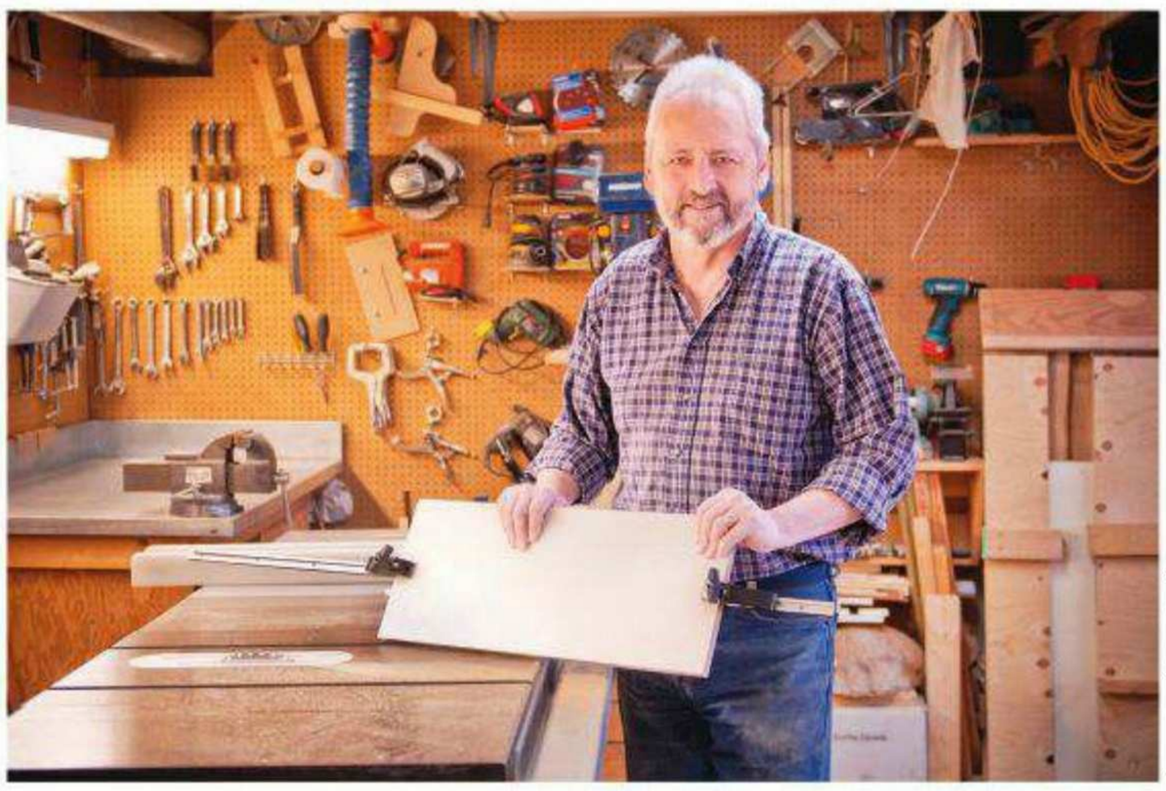


Photo: Focal Point Studios

For sending this issue's Top Shop Tip, Gary receives General International's Model 75-030, 12-speed Benchtop Drill Press.



continued on page 12

Your tips earn cash, tools!

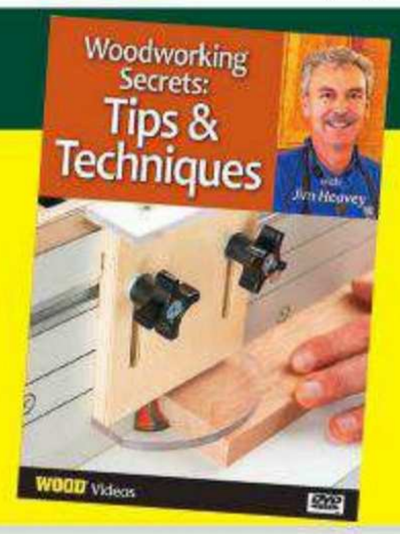
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Send your best ideas, along with photos or drawings and your daytime phone number, to **Shop Tips, *WOOD* Magazine, 1716 Locust St., LS-221, Des Moines, IA 50309-3023**.

Or, by e-mail: shoptips@woodmagazine.com. Include your contact info in the e-mail.

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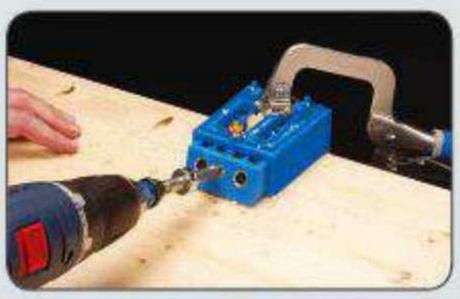
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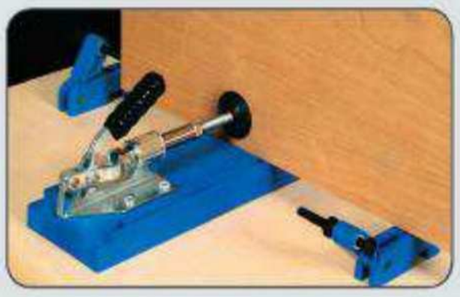
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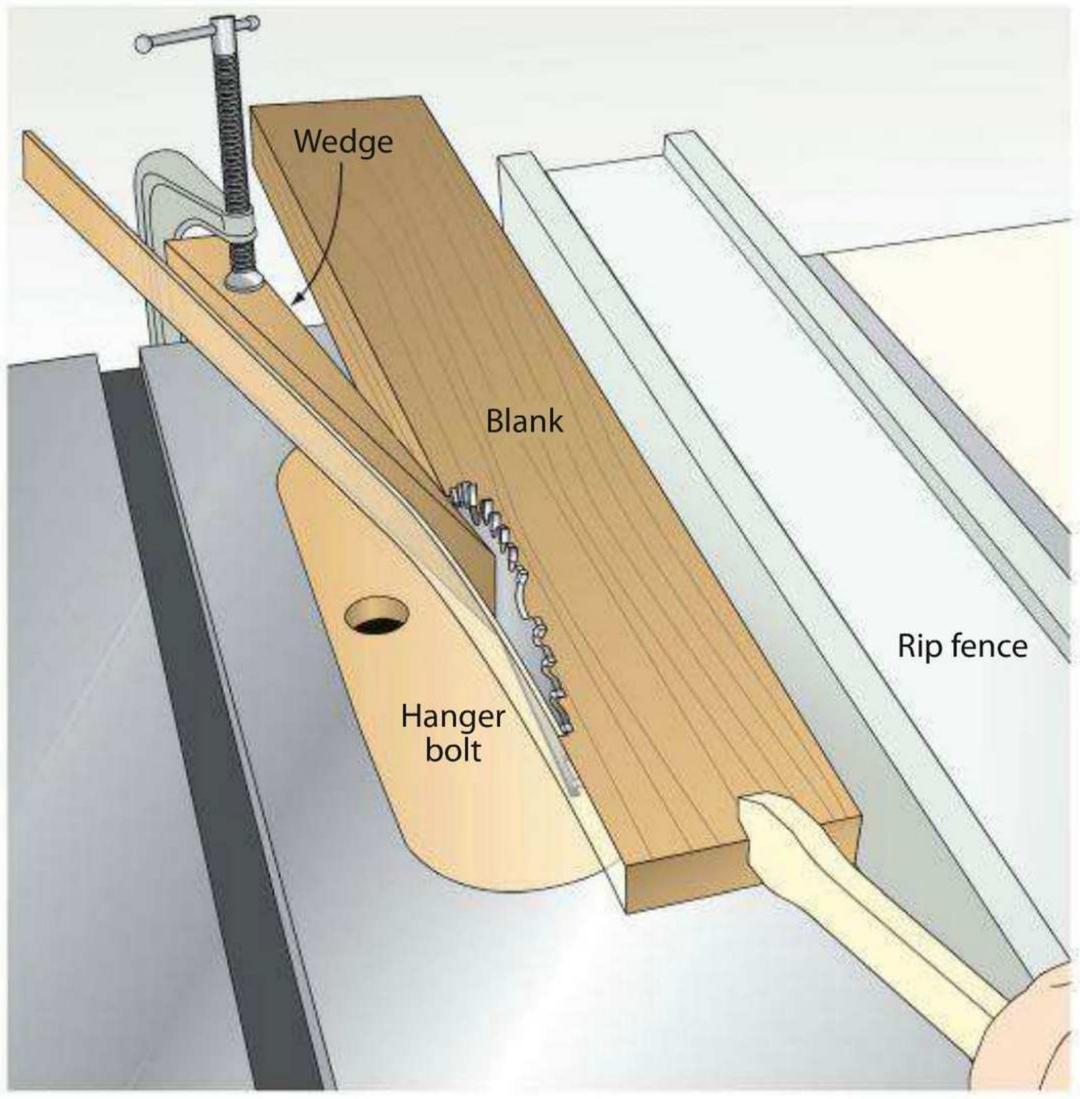
Shop Tips

Safely saw paper-thin veneer

Working off the "waste" side of a workpiece, it's possible to rip very thin strips from the edge of a board. But the teeth at the back of the blade tend to leave saw and burn marks on the strips.

To prevent this, I clamp a long, tapered wedge to the back of my saw. Set to rub lightly against the blade body, the wedge directs the veneer away from the back teeth. Using this method I've cut veneer strips as thin as 1/64" thick, and as clean as any manufactured veneer.

—Edwin Ritter, Westboro, Mass.



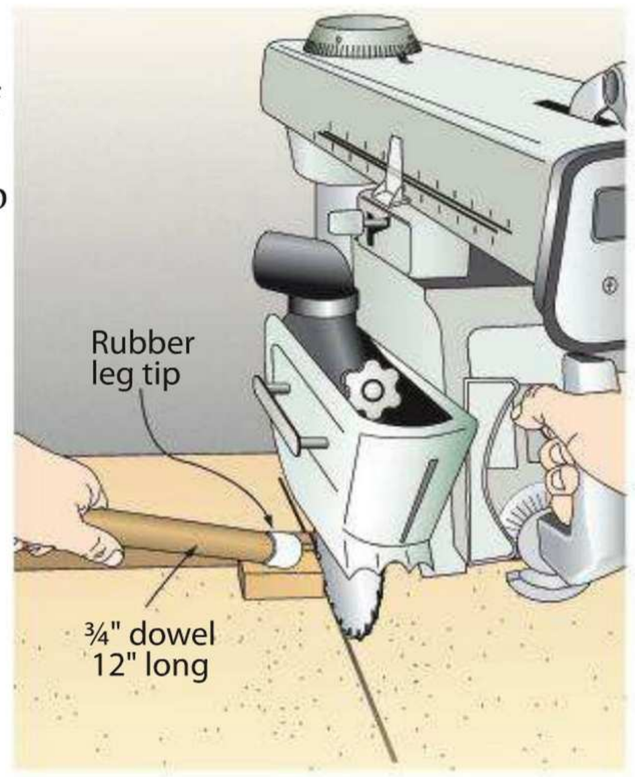
A rubber-tip tip helps to keep a woodworker's fingertips intact

I once saw a woodworker use the eraser end of a pencil as a hold-down to keep his fingers away from a rotating blade. Most of my pencils are too short or missing their erasers, and the pencil seems a bit fragile for some workpieces.

So, I beefed-up the concept with a set of rubber leg tips from the hardware store. They fit perfectly on a ¾" dowel—a lot stronger than a pencil. For comfort, I rounded over one end of the dowel, and then slipped the rubber leg tip over the other end.

I now keep several "finger savers" stashed around the shop: with my pushstick at the tablesaw, and others at the radial-arm saw, mitersaw, and bandsaw.

—Serge Duclos, Delson, Que.



continued on page 14

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✓Yes



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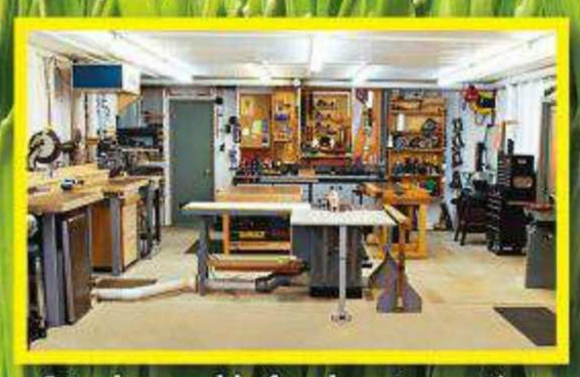
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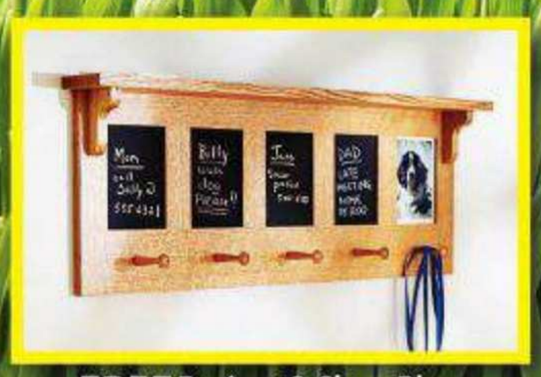
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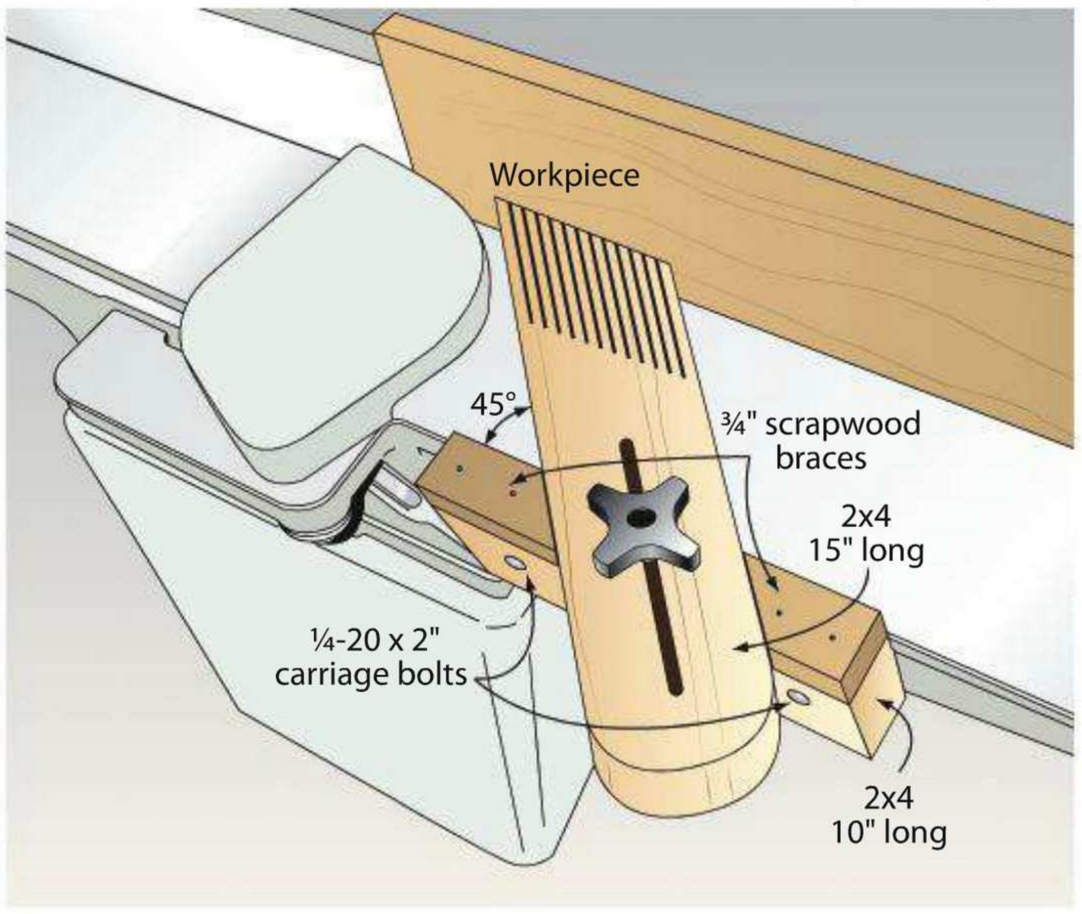
Beefy jointer featherboard adds a helpful hand

When jointing long or wide boards I find it difficult to keep the board tight against the fence and solidly against the bed. To solve this, I added a shop-made featherboard to hold the workpiece tight against the fence.

The featherboard sits on top of a 2×4 block bolted into holes drilled through the edge of the bed. Two ¾"-thick braces, miter-cut to 45° and nailed to the top of the block, keep the featherboard from pivoting.

I mounted the featherboard with a long bolt and a knob through a slot. Finally, I radiused the end of the featherboard so my shop apron won't catch on it while I'm jointing.

—Bill LaPrade, Westboro, Mass.



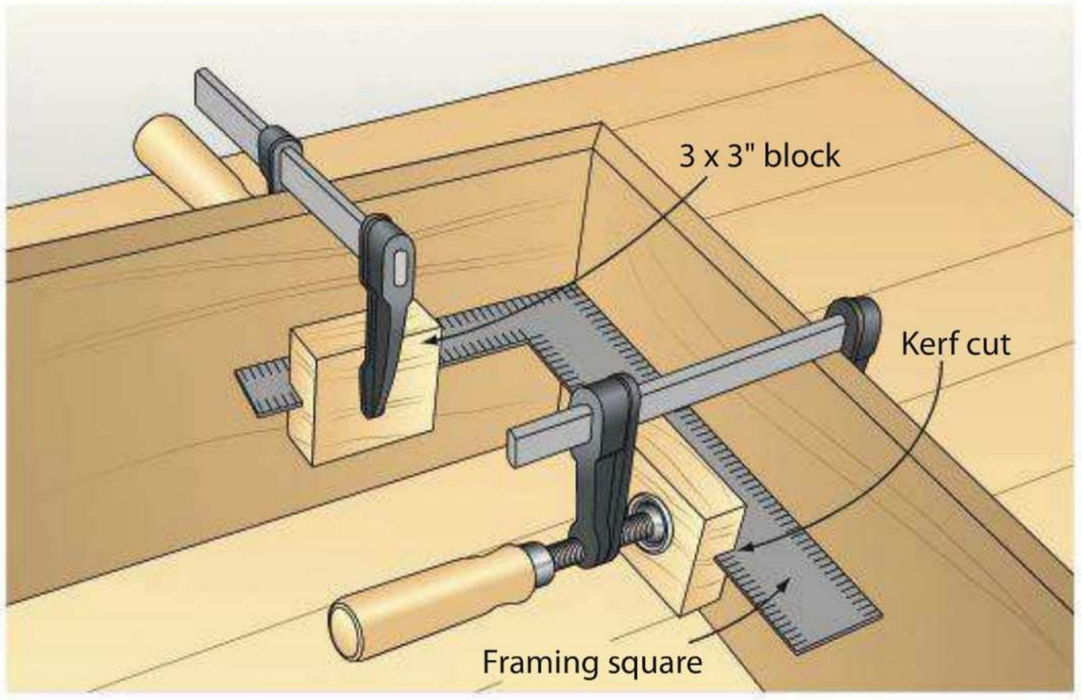
A quick scrap-block squaring system

While working on a cabinet I needed a quick way to square up the corners of some fairly large pieces. I found the answer in my scrap box.

Starting with a piece of ¾" hardwood about 3" wide and 8" long, I centered a ⅜"-deep kerf down the length of the piece to snugly fit the legs of my small framing square. Then I crosscut the blank in half.

To use the "jig," I simply fit the blocks on the square, as shown, and clamp them to the two pieces being assembled. This setup frees my hands, too.

—Gregory Hampton, Shoals, Ind.



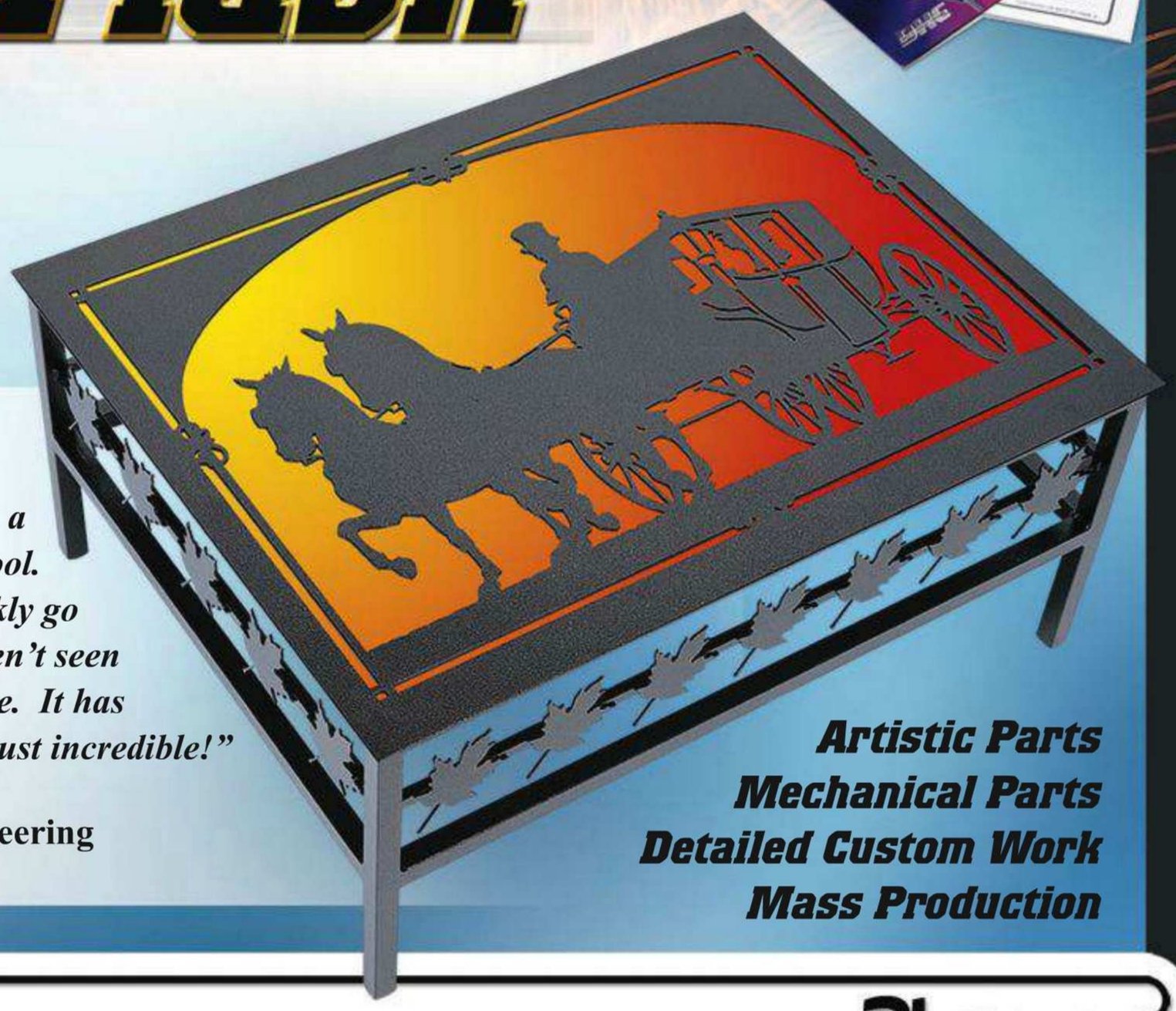
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Working Around the Weather

How to choose and apply a finish when you can't time it with the ideal climate.

Most cans of finish list optimal drying times as if we all lived in San Diego: a temperature of 70°F and 70 percent relative humidity. (See label *at right*.) But for the rest of us—in the arid Southwest, the muggy Southeast, the temperature-extreme Midwest or East Coast—how can we ensure that our finishes dry quickly, smooth, and dust-free?

Finishing in a cold shop causes brushed-on finishes to flow out slowly. And on a hot, dry summer day, finishes dry so fast that brush marks become a problem. Knowing how to work within the weather conditions, or alter them, gives better results. Here's how.



No uncertain terms

Although the terms "solvent" and "thinner" are often used interchangeably by woodworkers, they represent two different concepts. Solvents *dissolve* something; thinners just *spread it* around. For example, mineral spirits dissolves wax, so for wax, it's a solvent. However, mineral spirits doesn't dissolve varnish, it simply spreads the varnish molecules farther apart, making them easier to brush onto wood. So for varnish, mineral spirits acts as a thinner.

continued on page 18

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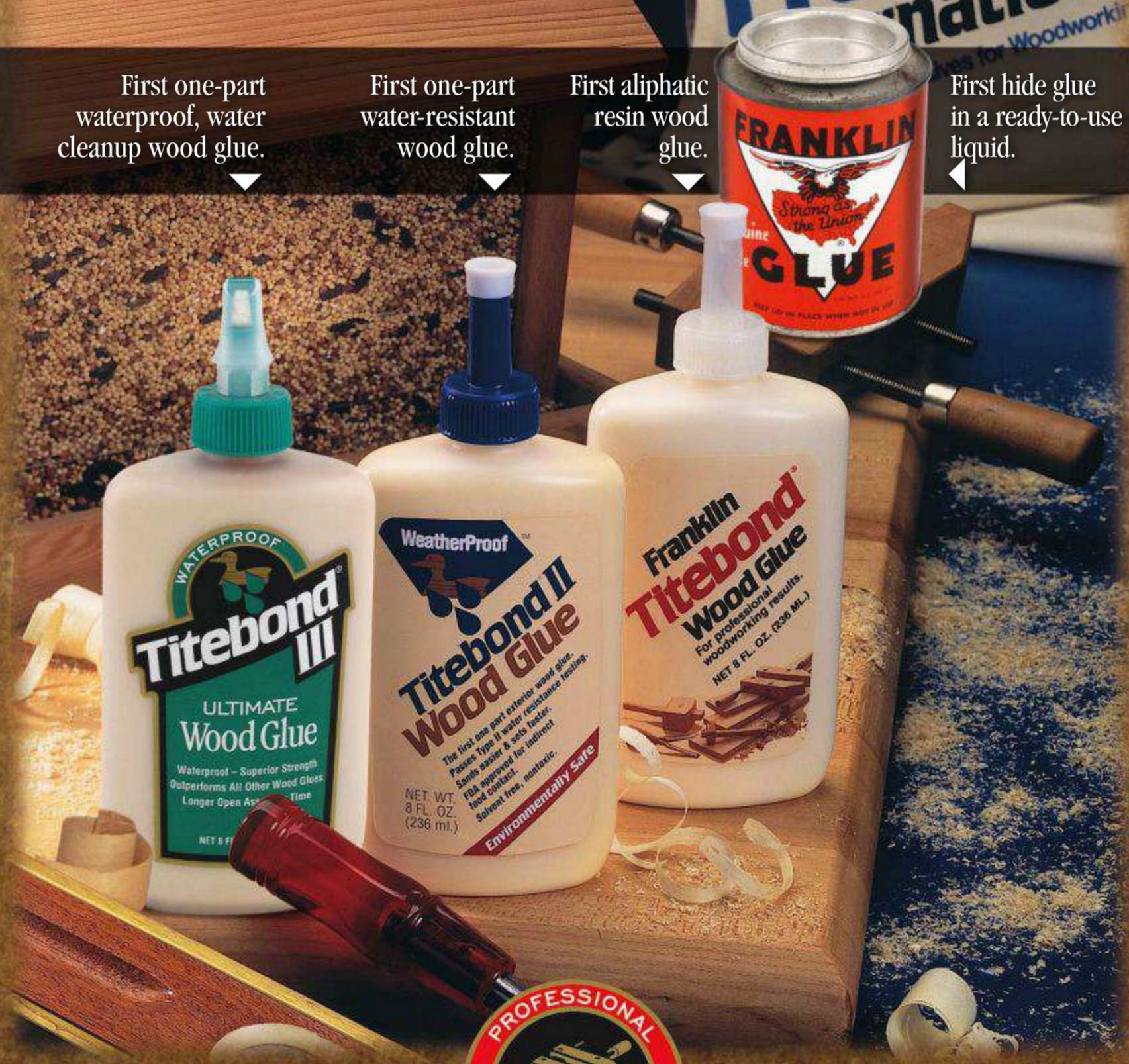
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A brief lesson in how finishes dry

Finishes dry by three different methods, and the more complex the method, the more finicky the finish when it comes to the weather. From least to most complex:

■ ***Evaporative*** finishes, such as shellac and lacquer, dry simply when the solvent evaporates, leaving a hardened finish film on the wood surface. Weather conditions affect their dry times the least.

■ ***Reactive*** finishes, such as oil-based varnish, dry in two steps: First, the thinner evaporates and the finish gets tacky. Then, a chemical reaction (polymerization) between the finish resins and oxygen in the air occurs, causing a hardened film to develop. In colder than ideal conditions, the reaction slows, delaying hardening.

■ ***Coalescing*** (water-based) finishes dry in three steps. First, the water (the thinner) evaporates quickly; then, the slower-evaporating solvent, which has softened the droplets of finish floating in it, evaporates. Finally, the droplets left behind join together and harden—or coalesce—into a film. Because of the delicate relationship between the thinner and solvent evaporation times, temperature and humidity levels greatly impact drying times. As you can see in the chart *above right*, water-based finishes prove the most difficult to apply at low temperatures, so follow the finish manufacturer's application recommendations as closely as possible. And know that, due to differences in finish formulas, those specs may vary widely from manufacturer to manufacturer or even among finishes from the same maker (brush-on poly vs. aerosol poly, for example).

The common denominator in all three types of finishes: The solvent or thinner must evaporate before the finish can dry. And this happens best with warm air and low humidity.

Cold air: Freshen it with motion

One way to help finishes dry faster in cold conditions is to create air movement. That's because on a hot day, warm air naturally rises, drawing in cool air to replace it at the surface of your project. But on a cold day, the air stagnates, so less air passes over the project, which slows drying.

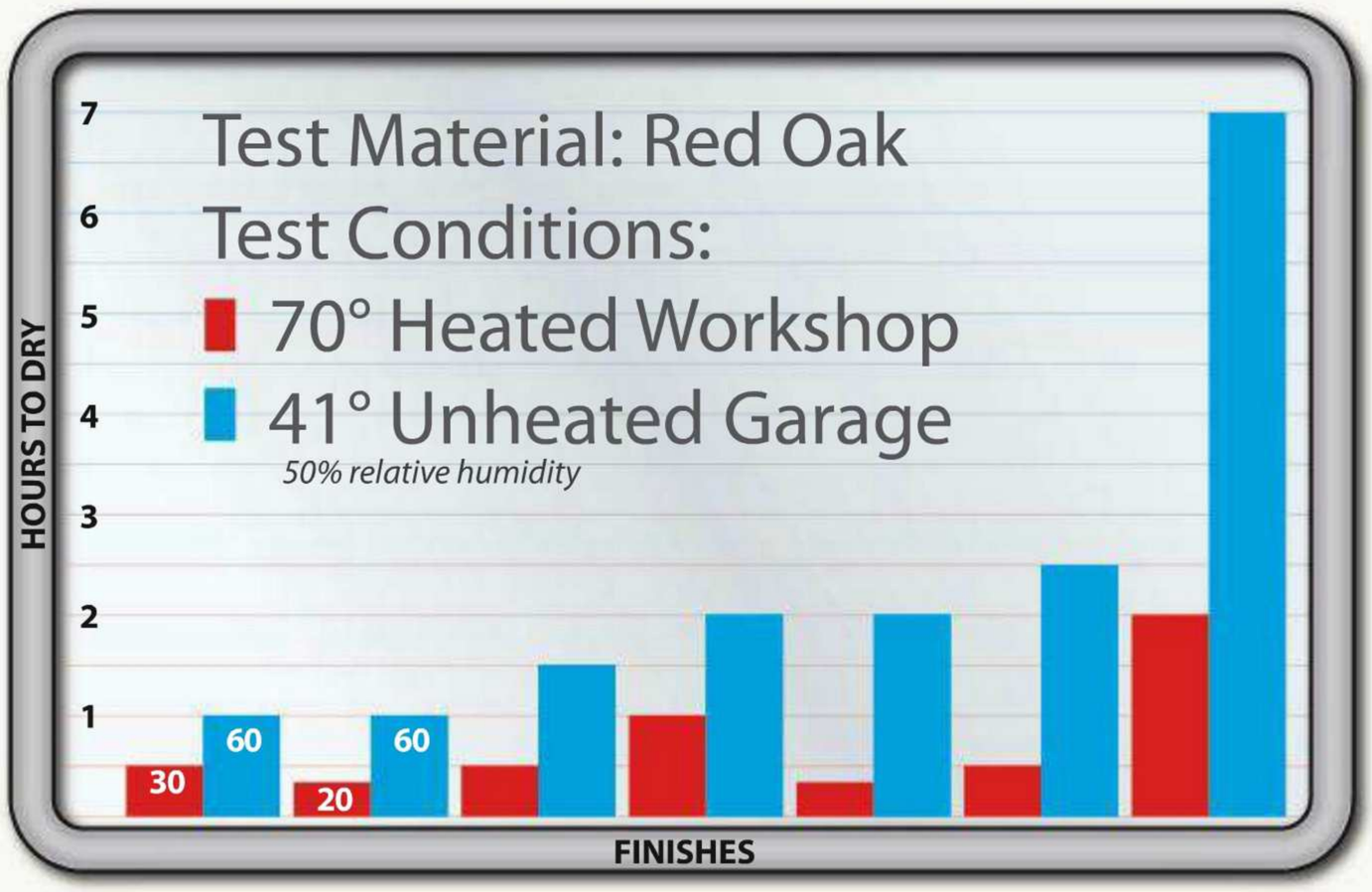
By establishing some airflow, even slightly, the air at the project surface remains fresh and able to absorb more thinner or solvent. This also ensures a fresh and constantly renewing source of oxygen to maintain the chemical reaction that occurs in reactive finishes. Get a steady air path going through your shop, but do it without aiming fans directly at your project, as shown in the drawing *above*.

Don't complain about the weather; do something

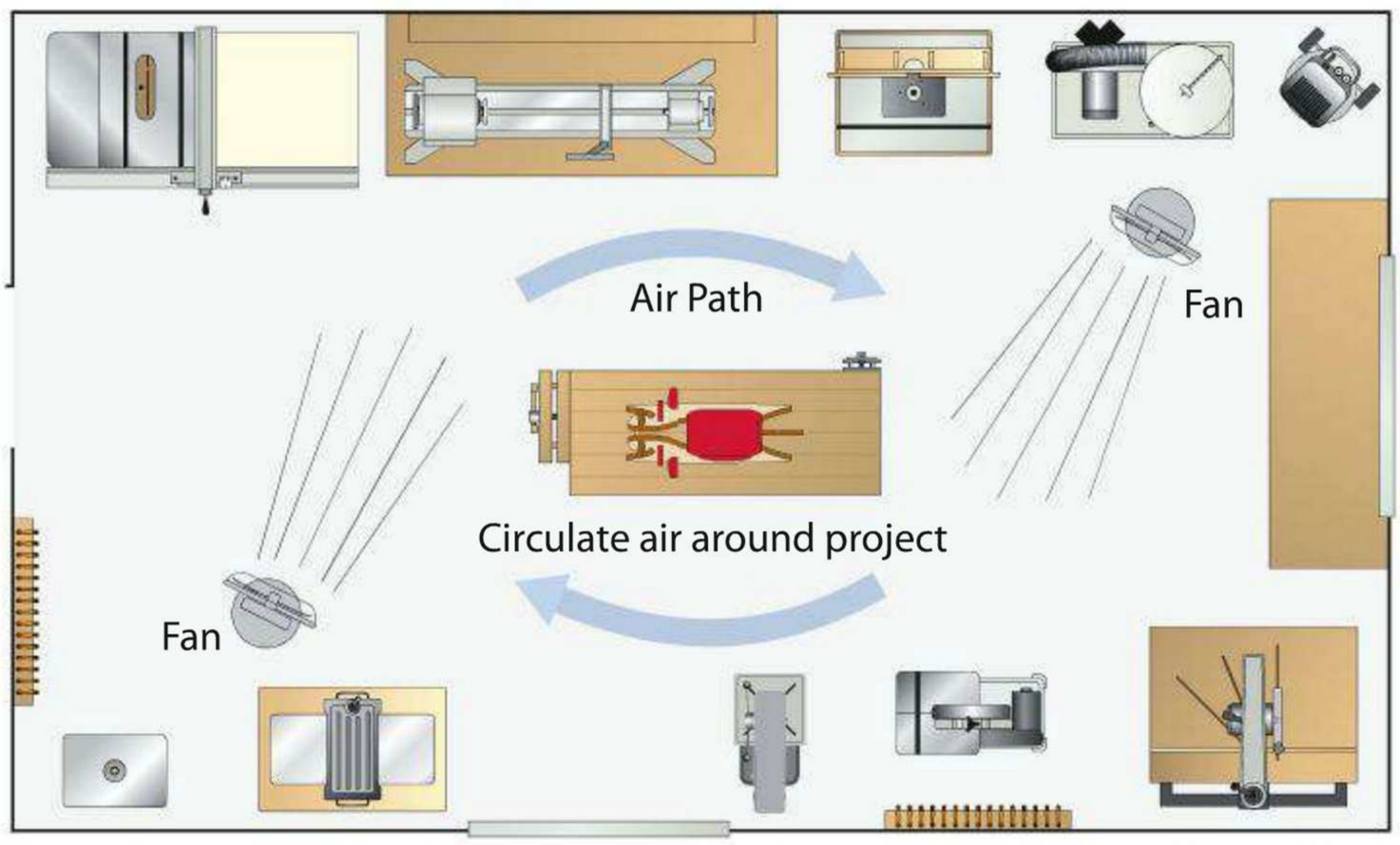
Take charge of the weather by altering your finish or your choice of finish. For example, in hot weather, you can thin a finish to allow greater time for flow-out and prevent brush marks. But remember that thinned finish means more coats to build up the film, and longer dry time means the possibility of more dust on the wet and tacky surface.

continued on page 21

Warm and Cool Temperatures = Varying Drying Times



We performed a series of tests on a cool fall day. First, we applied finish to sample pieces of ¾" oak in a 70° heated shop and then in a 41° unheated garage. All of the finishes eventually dried, but they were slower to dry when the temperature was lower. For example, it took up to three and a half times as long for oil-based polyurethane to dry when it was at 41° than at 70°. The quickest-drying finishes in both warm and cool conditions were shellac and lacquer in an aerosol spray can.



To prevent a sticky finish from picking up dust, don't blow directly on the project, but set two small fans blowing in opposite directions on either side of your project.

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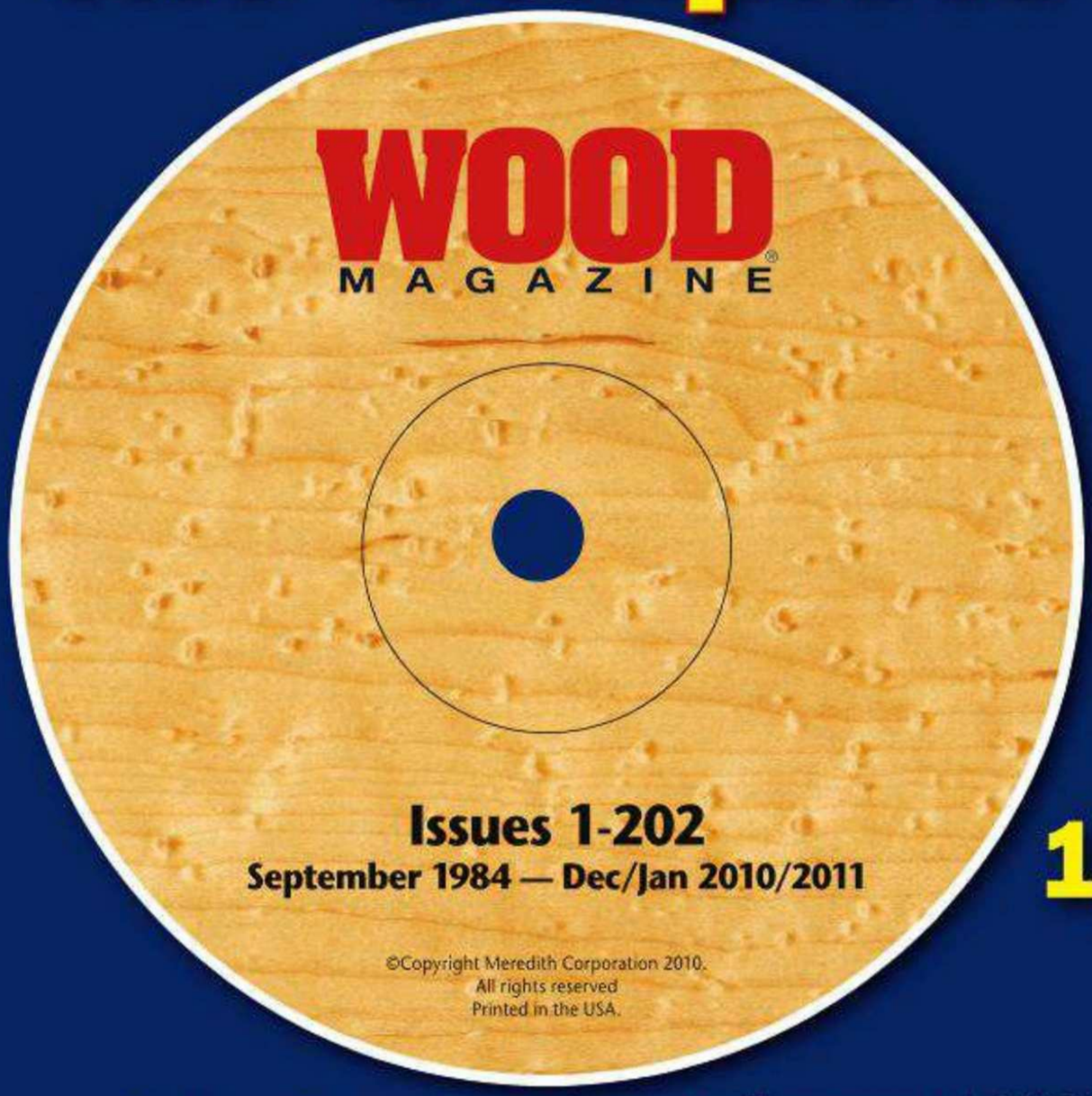




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To really speed up drying in cold months (think: it's Christmas Eve, and the projects have to be dry, wrapped, and under the tree the next morning), choose a different finish altogether. Shellac, a wiping varnish, and spray lacquer dry quicker than other finishes in cold weather.

The best solution, though: Wait for a day that's not too cold, too hot, or too humid. And then make sure the wood, the finish, and the air are all the same temperature before you start brushing or spraying.

Written by **Doug Hicks**
Illustrations by **Lorna Johnston** and **Tim Cahill**

SHOP TIPS

Do's and Don'ts for finishes, weather or not

- For an unheated shop in a cold climate, **DO** move finishes (especially water-based ones) inside in the fall and back out to the shop in the spring.
- **DON'T** store finishes (or glues) on a cold basement floor.
- To gently heat finish to room temperature, **DO** use a warm-water bath, such as the beverage warmer *below,* or put the can in front of a heat register for a few minutes. **DON'T** heat it above the temperature of the wood, nor use open flame.
- After applying finish, **DO** keep the heat on until the finish dries.
- For an air-conditioned shop, **DON'T** set the air conditioner to recirculate indoor air. Always pull in outside air.
- **DO** use a dehumidifier if your shop is in a damp or humid basement.
- **DON'T** apply finish when the previous coat is still tacky.
- **DO** decide when to finish. Temps and humidities tend to be lowest early in the day. And then **DON'T** allow your project to dry in the sun.



An electric beverage warmer gently warms a cold can of finish to room temperature. Loosen the can lid before heating.

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How to Flatten Sharpening Stones

Add water or oil to the stone when flattening. A rubber mat holds the glass firmly, and a towel below it soaks up any stray moisture.

Ditch the dished-out areas and keep your tools flat-out sharp.

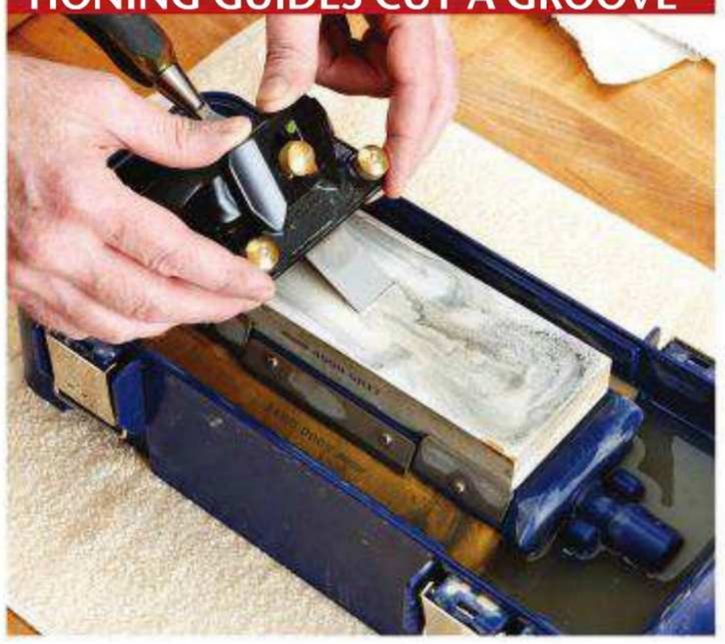
Over time, sharpening stones wear more in the middle than along the edges. If you continue to sharpen in the dished area of a stone, your tools' cutting edges will have slightly rounded edges. That's why it's critical to remove the high sides.

Waterstones and oilstones wear at greatly different rates: The softer of the two, waterstones, dish out faster and need to be flattened more often. We recommend flattening them at the beginning of every sharpening session—it's a 15-second job in most cases. Flatten oilstones about every 10 sessions. Another benefit of flattening your stones: You'll remove embedded metal filings that impair the stone's sharpening action.

Flat is where it's at

An easy, inexpensive option for flattening stones is to use sandpaper, as shown *above*. Start with a reliably flat surface, such as a piece of ½"-thick glass (with edges ground smooth). Apply 100-grit, self-adhesive, wet-dry sandpaper and rub the wetted (or oiled) stone over it until flat. Repeat with a few strokes on 400-grit paper to remove any coarse scratches. If you flatten your waterstones every time you sharpen and these stones show little wear, skip the 100-grit step.

HONING GUIDES CUT A GROOVE



Sharpening with a honing guide invariably wears the middle of your stones because the wheels run along the edges.

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A flattening plate—a harder, abrasive stone, shown at *far right*—also makes quick work of dished-out stones. If your sharpening stones did not come with a flattening plate, you can buy an effective silicon-carbide one for less than $30. [See **Sources**.] To flatten a stone, wet it with water or oil (depending on the type of stone) and rub the flattening plate evenly over its entire surface until all grayish evidence of previous sharpenings has disappeared. If you can't tell if it's flat, simply make a series of pencil marks across the stone, and then flatten until the marks vanish.

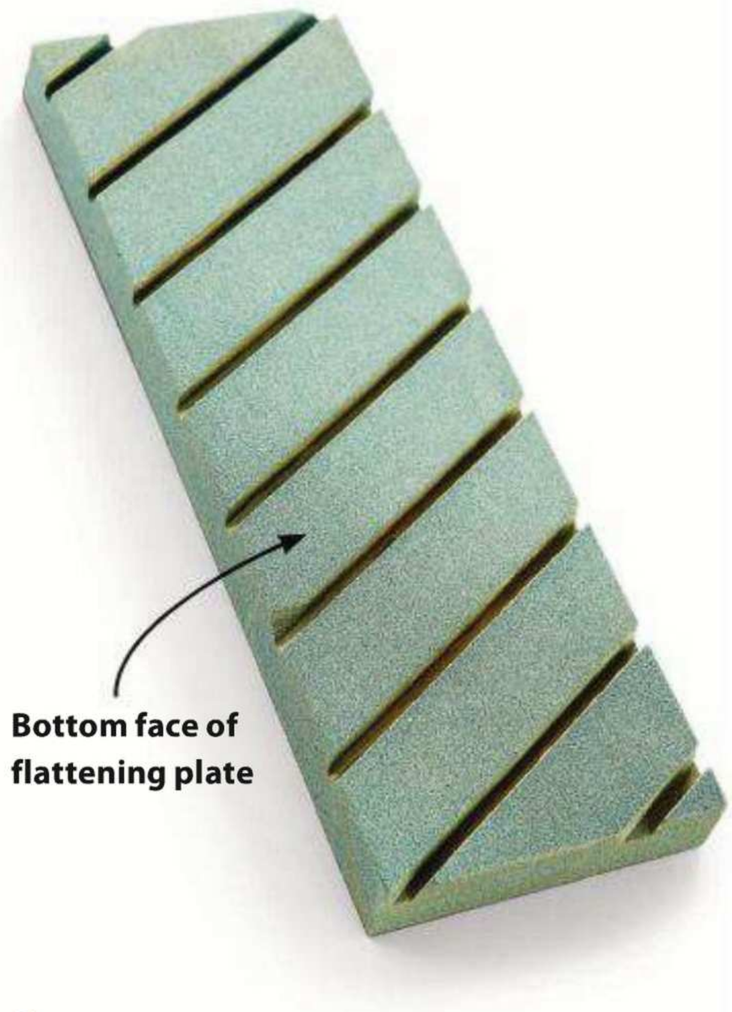
Finally, you must occasionally flatten your flattening plate as well. Use the sandpaper method described on *page 22*. Make pencil marks down its length and rub until gone.

For convenience and portability, we like Norton's three-waterstone kit, shown at *right*, because two stones soak while you sharpen with the one sitting on top.

FLATTENING PLATES WORK



Rub the flattening plate until the stone's darker low spot disappears. Grooves in the plate channel away waste material.



Sources

Flattening plate: #833914, $26.99, Woodcraft, 800-225-1153, woodcraft.com.

Norton waterstone kit: #IM83-W, $225, Sharpening-Supplies.Com, 800-351-8234, sharpeningsupplies.com.



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Wise Buys

Our Editors Test

Brad-Point Drill Bits

Why buy?



Twist bit

Brad-point bit

A workshop needs several types of drill bits: Forstner, standard twist, and brad-point bits. While Forstners start at ¼" diameter and excel at drilling flat-bottom holes, the other two get the bulk of the small-diameter work. Twist bits tend to wander off a center point and leave ragged edges, as shown *right*. But a brad-point bit, designed specifically for drilling wood, features a sharp center point for exact placement and spurs on the rim that cut crisp edges on holes. Although you can buy individual bits, brad-point sets prove a better value. After testing eight sets, we recommend the four below.

PEACHTREE WOODWORKING SUPPLY, #3341, $20



14 bits: two each in standard and 12" lengths, ⅛" to ½" diameters in 1⁄16" increments

Editor test-drive:

Although this set of bits won't handle all your drilling needs, you get the most common sizes, including a ⅛" bit that's perfect for drilling pilot holes for commonly used #8 production screws. I like the 12"-long bits for the occasional times I need to bore deep holes, such as down the length of a desk lamp blank. Adding to an already good value, this carbon-steel set comes with seven pinch-style stop collars that work well without marring the cutting edges.

—Tested by Dave Campbell, Deputy Editor



To learn more:
888-512-9069;
ptreeusa.com

WOODSTOCK INTERNATIONAL, #D2305, $28



25 bits: ⅛" to ½" in 1⁄64" increments

Editor test-drive:

Everyone should own this set because with it you can drill holes accurate to 1⁄64". That's nice because many times I've needed to drill a hole slightly larger or smaller than I could with my more common fractional bits (⅛", ¼", etc.). These bits are made of carbon steel, which doesn't maintain a sharp edge as long as high-speed steel, but they'll drill a lot of holes before I'll even have to think about replacing them. And the titanium-nitride coating helps reduce heat build-up, which should extend their life.

—Tested by Craig Ruegsegger, Projects Editor



To learn more:
800-840-8420;
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LEE VALLEY, #07J01.28, $175



28 bits: 5⁄64" to ½" in 1⁄64" increments

Editor test-drive:

Sure, $175 is a big investment; but these are incredible bits and in the broadest range of sizes in our test. They're made of high-speed steel for longer wear without dulling. I drilled more than 500 2"-deep holes in hard maple with two of the bits, yet they still cut crisp holes in birch plywood afterward. And they left nearly flawless exit holes on the bottom side of a workpiece not backed up by scrap. One warning, though: I poked and cut my fingers several times trying to remove the razor-sharp bits from the case.

—Tested by Bob Hunter, Tools Editor

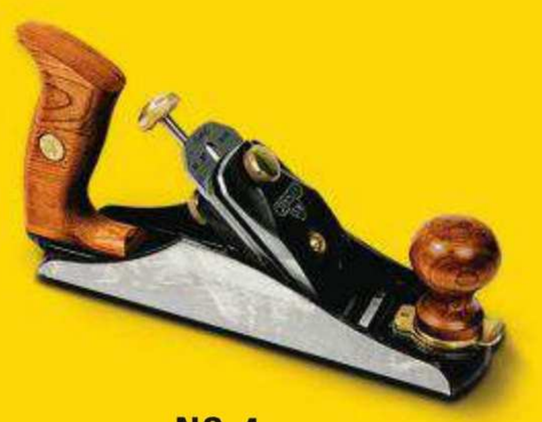


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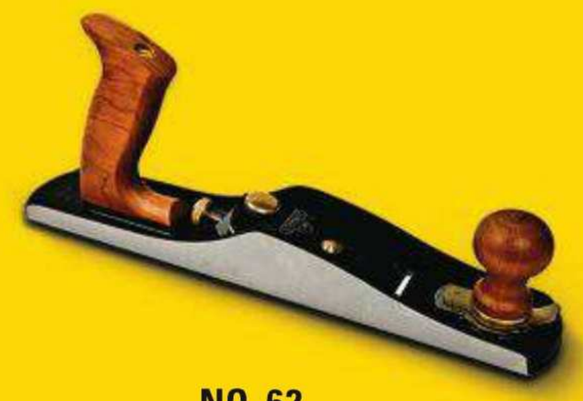
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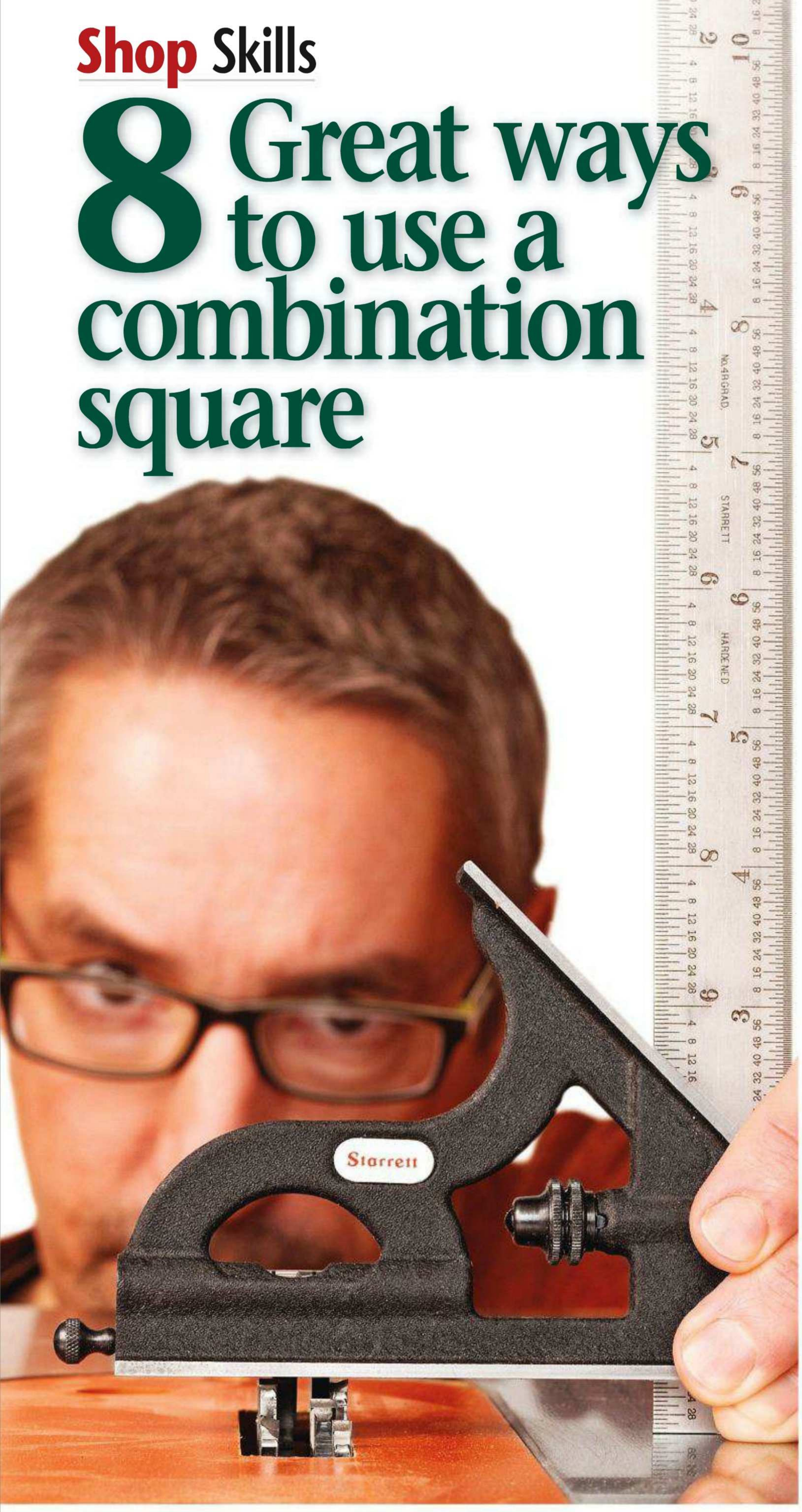
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Shop Skills

8 Great ways to use a combination square



Often underappreciated, a 6" or 12" combination square—we keep both on hand because they're handy for different project and tool-setup applications—does far more than just help you draw perpendicular lines. Here are some great ways to get the most from your combo square.

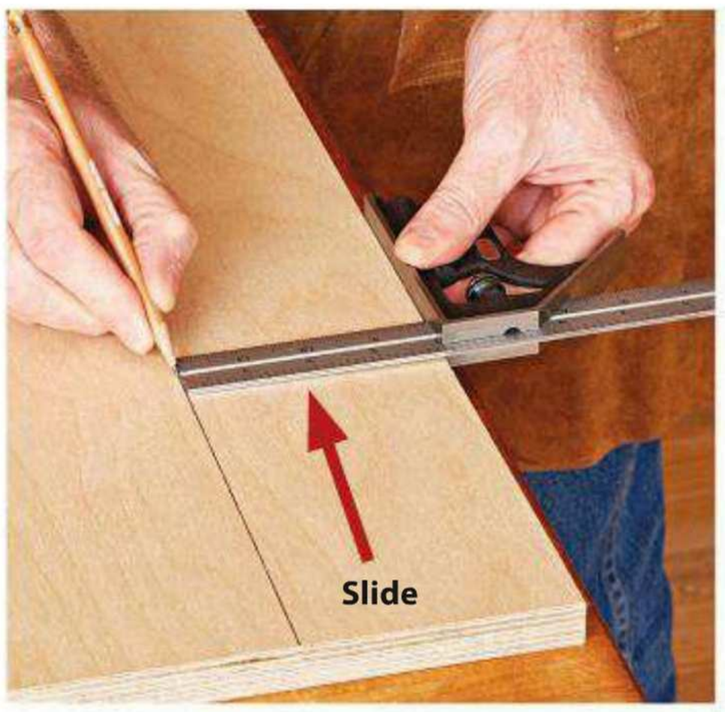
1. Locate and lay out joinery precisely

Because the head acts as a stop (compared to a floppy tape hook), a combo square measures more consistently and precisely than a measuring tape. And you'll know your layout lines are always square to the edges and ends.



2. Make a short rule work like a long one

For long layout lines, forget about marking two distant endpoints and then finding a long straightedge or messy chalk line to connect them. Instead, simply adjust your combination square so the rule's end indicates your layout line. Then hold a sharp pencil in the cup-shaped groove at the rule's end and slide the square and pencil together to connect the endpoints.



continued on page 28

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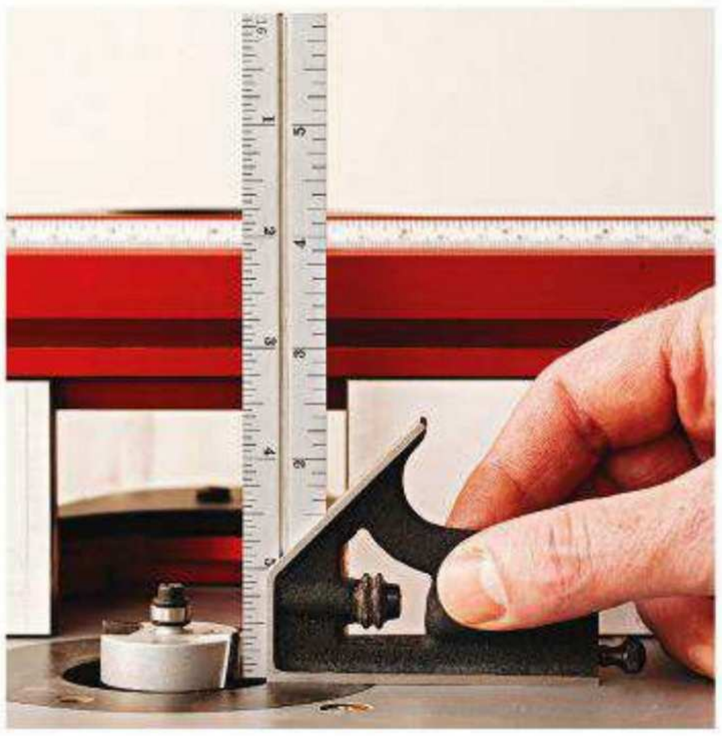
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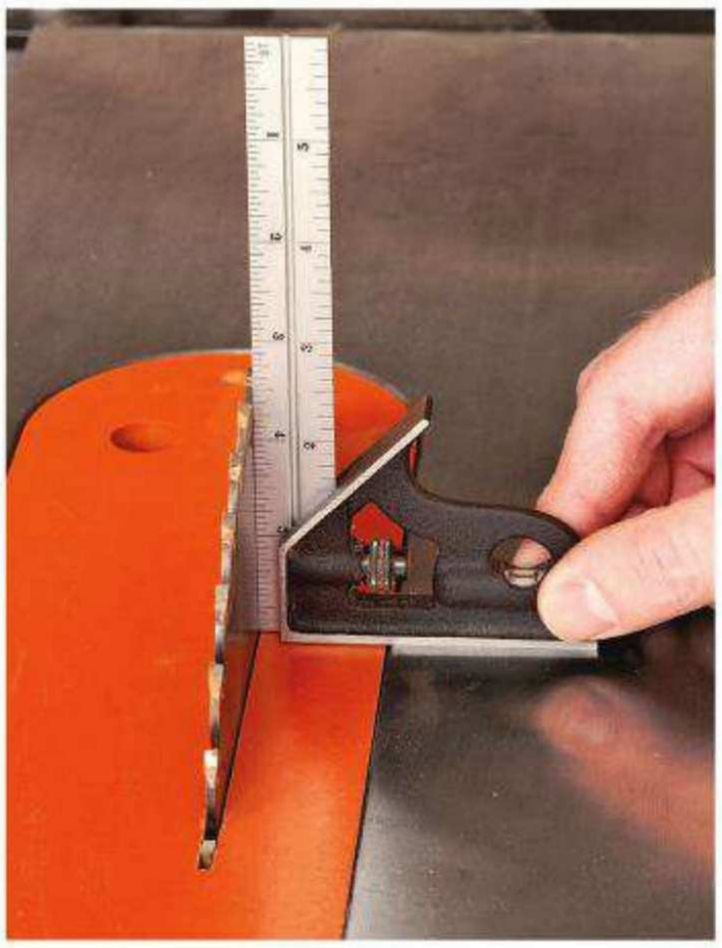
3. Accurately set heights for blades and bits

The photo at *far left* shows a method we like for setting tablesaw-blade and router-bit heights: Lock the head on the rule at the desired height, and then raise the cutter until it just kisses the head. Be sure to hold the rule end on the table surface rather than the throat insert. Adjust the blade or bit up or down as needed. Or, place the combo square's head on the table and slide the rule up against the cutter, as shown *below*.



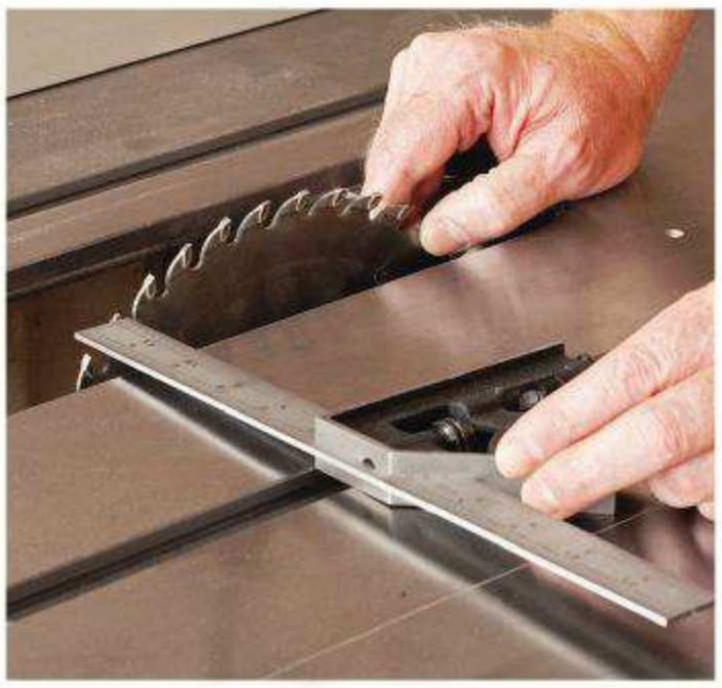
4. Calibrate a tablesaw's blade-tilt stops

You can only rely on your tablesaw's 0° and 45° blade stops if you've set them accurately to begin with. Use your combo square to set each angle precisely, adjusting the 0° stop before moving to the 45° stop. Place your square's head on the cast-iron top, as shown, rather than the throat insert for maximum accuracy.



5. Align your tablesaw for clean and safe results

A combination square helps with two critical tablesaw alignment steps: paralleling the miter-gauge slots and rip fence to the blade. To adjust the miter slots, raise the blade at least a couple of inches, place the square's head against the miter slot, and adjust the rule until it touches a tooth at the front of the blade. Slide the square to the back of the blade, and rotate the blade until that same tooth touches the rule. Adjust the top or trunnion (depending on the saw) until the tooth just ticks the rule front and back. Now, likewise align your saw's rip fence parallel to the miter slot.



6. Parallel a router-table fence to its miter slot

Nearly all router-table fences have independent locks on each end, and the fence doesn't self-square to the miter slot. But parallelism proves critical if you use a miter gauge in conjunction with the fence, such as for routing coped door-rail ends or dadoes in narrow stock, using the fence as a stop. Begin by locking your square's rule to the desired length. Place the square's head against the inner wall of the miter slot and bring the end of the fence forward until it touches the rule. Repeat for the other end, and then lock the fence in place.



7. Set the limits for stopped router-table cuts

When making stopped cuts on the router table, you need to mark the stop points, or clamp stopblocks to prevent routing past those points. To do that, use your combination square to mark both stop points, as shown. Extend the marks on the fence above the workpiece thickness, again using your square resting on the tabletop.



8. Square the chisel and fence on a mortiser

Before cutting mortises on a dedicated mortising machine, you must square the hollow chisel to the fence to ensure that the necessary repeated cuts are parallel. With the chisel (and its matching drill bit) snugged in the chuck, use your combination square to set the distance between the chisel and fence while simultaneously squaring the chisel against the rule. Then lock in both the fence and chisel.



Produced by **Bob Hunter** with **Kevin Boyle**



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Our 3 Favorite Tablesaw Safety Gadgets

Working safely at the tablesaw means keeping your workpiece under control and your hands a safe distance from the blade. These three hard-working gadgets do just that.

1 Magnetic featherboard: Improve workpiece control

Featherboards provide consistent pressure against a workpiece in spots where you wouldn't dare place your hands. The problem with most featherboards is securing them in those spots. Powerful magnets hold the MagSwitch Pro Table Featherboard, *above* and *below*, anywhere on a cast-iron table. Twist a pair of knobs to engage the magnets and lock the featherboard in place, or twist them again to release it.

A vertical attachment kit adds a second featherboard, spacers, and brackets that provide a variety of work-holding options. Extend the top featherboard to apply pressure above the blade, but not against it (*above*), or mount the second featherboard to press downward while the lower one holds the workpiece against the fence (*left*).

(Featherboard, about $55; vertical attachment, about $17; Magswitch, 303-468-0662, magswitch.com.au.)



Apply pressure alongside and in front of the blade to cut a rabbet of consistent depth and width.

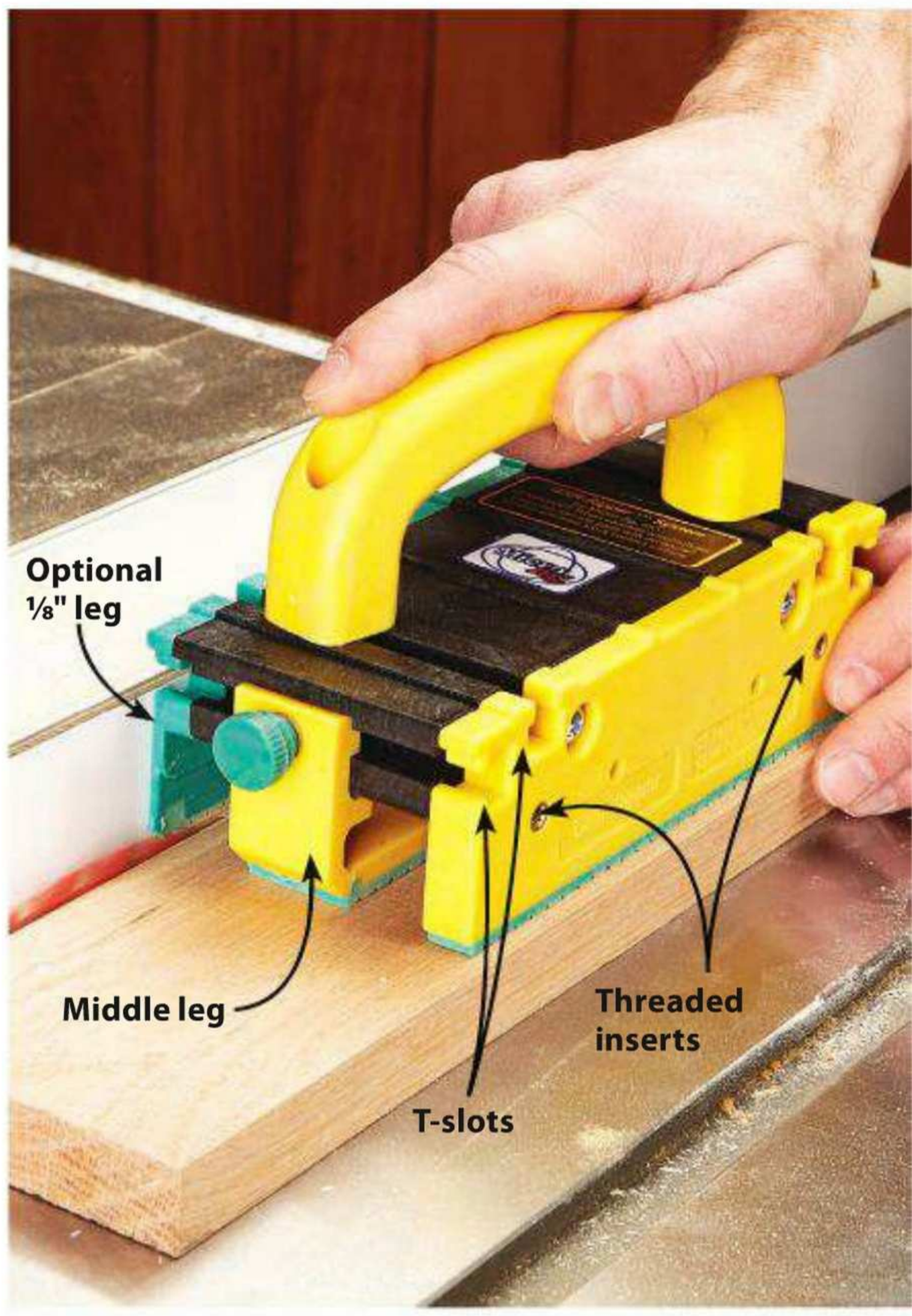
2 Deluxe pushblock

Ripping narrow strips or narrow stock can be a challenge. The GRR-Ripper pushblock, *below*, makes those jobs easy. With one edge riding against the rip fence, its rubber-coated feet straddle the blade to push both the keeper and cutoff pieces past the blade, while also allowing you to apply pressure against the fence.

The manufacturer offers a variety of accessories, including a leg that allows for ripping strips as narrow as ⅛" (shown *below*), and outriggers for steadying the pushblock when ripping workpieces narrower than the pushblock. For specialized tasks, make your own accessories and attach them using #10-32 screws that fit into threaded inserts in the sides or with ¼"-20 hexhead bolts that slide into T-slots in the top and ends.

The $60 price tag might seem hefty, but you'll find it useful at the router table, jointer, and bandsaw as well.

(Pushblock GR-100 $60; ⅛" side leg, about $14, Micro-Jig, 407-696-6695, microjig.com.)



Push workpieces while keeping your hands well away from the blade. The middle leg slides to accommodate rips of various widths.

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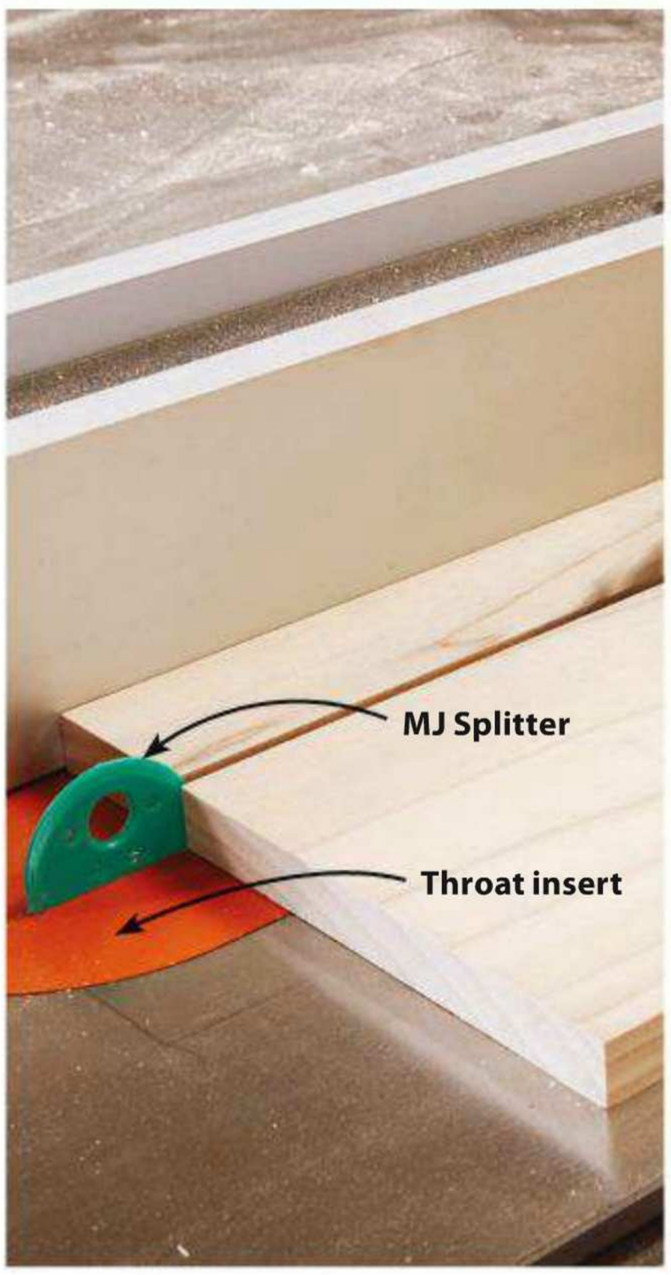
3 Low-dough splitter

For saws without a built-in riving knife, a splitter reduces the chance for kickback by preventing the saw kerf from pinching behind the blade. The MJ Splitter—a semi-circular plastic disc—mounts in a zero-clearance throat insert, as shown *below*. A simple drilling jig and clear instructions included with the splitter make installation easy.

Each kit (available for thin-kerf or full-kerf blades) comes with two splitters, each offset slightly different distances from the center of the mounting pins. Because of this offset, the splitter presses the keeper piece against the rip fence as a featherboard would. A greater offset provides increased pressure toward the fence.

Unlike a riving knife, the splitter does not tilt with the blade, so it can be used only for 90° cuts. Remove the splitter by simply lifting it up and out of the holes in the insert.

(SP-0125 standard kerf, about $19, SP-100 thin kerf, about $23, Micro-Jig.)



The inexpensive MJ Splitter keeps the saw kerf open and also presses the workpiece against the rip fence.

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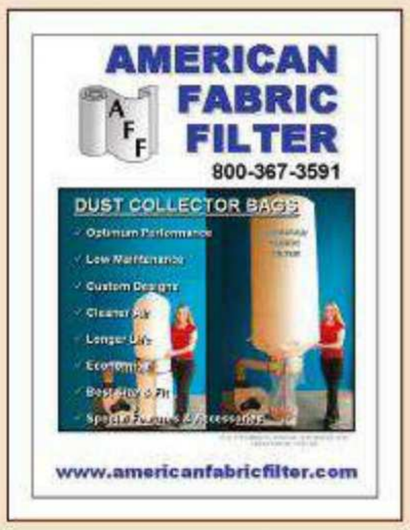
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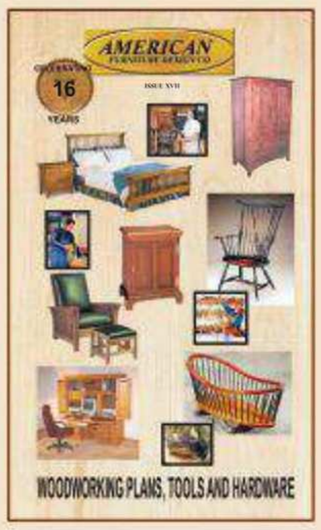
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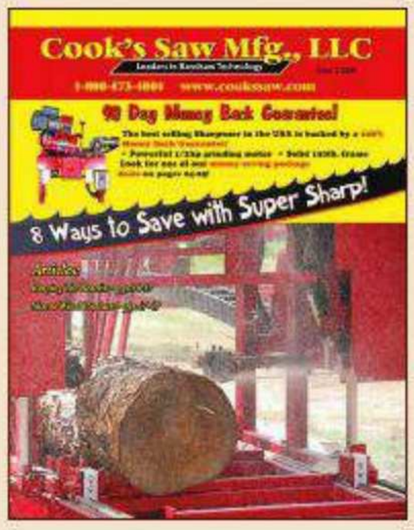
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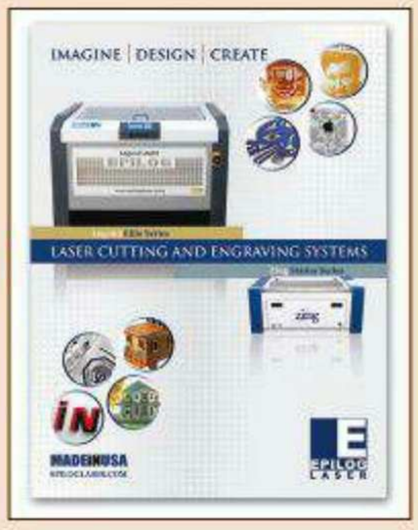
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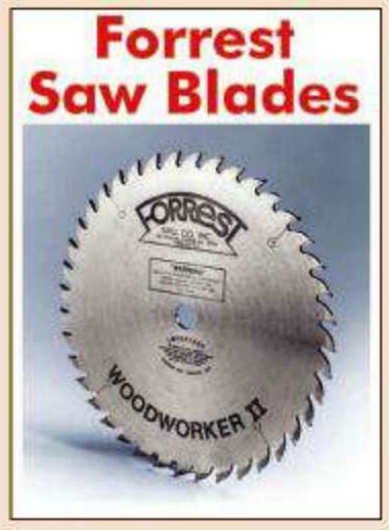
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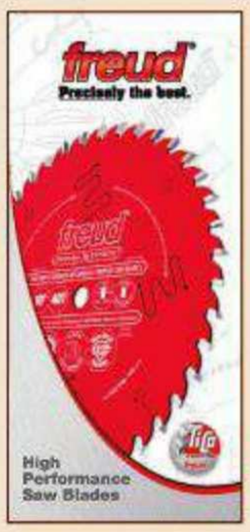
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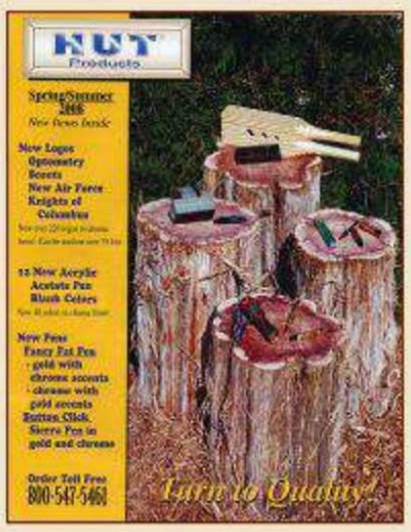
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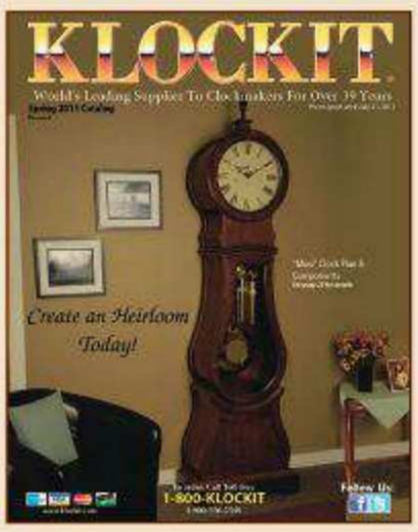
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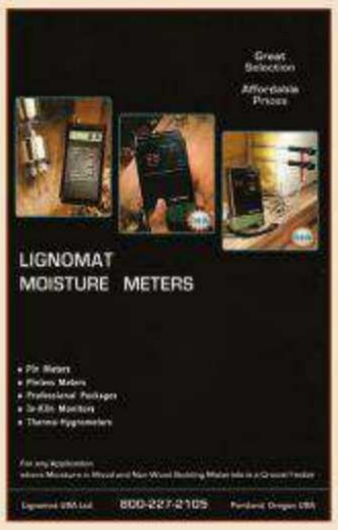
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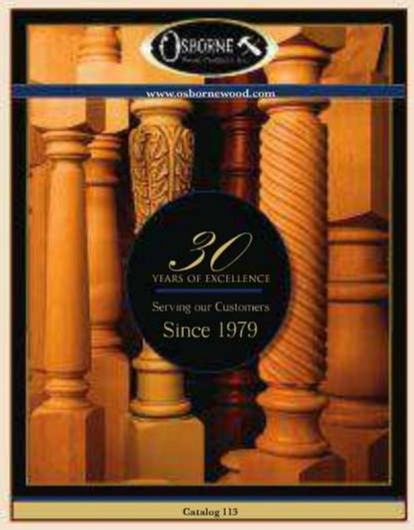
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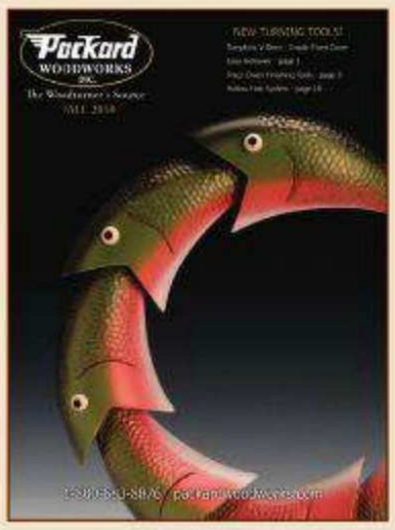


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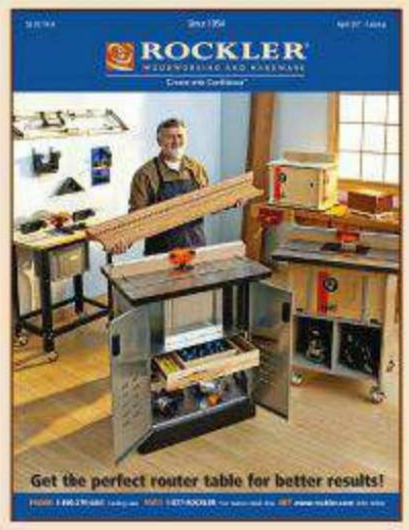
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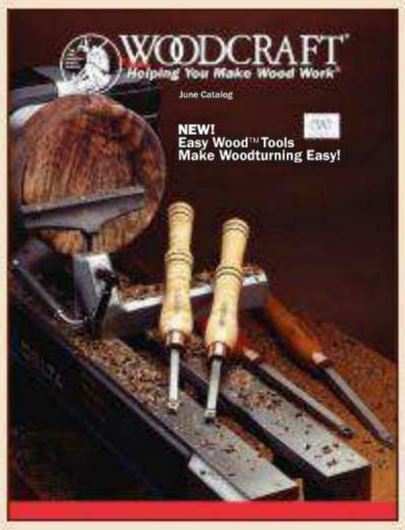
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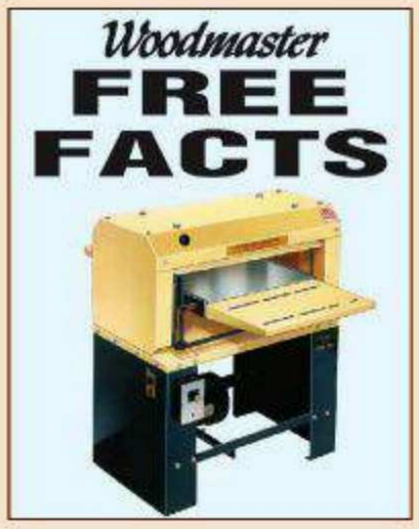
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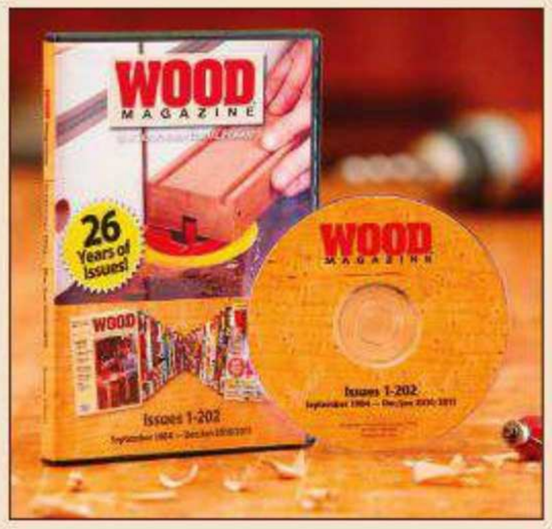
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Quick & Easy Jig

Perfect-fit Dado Guide

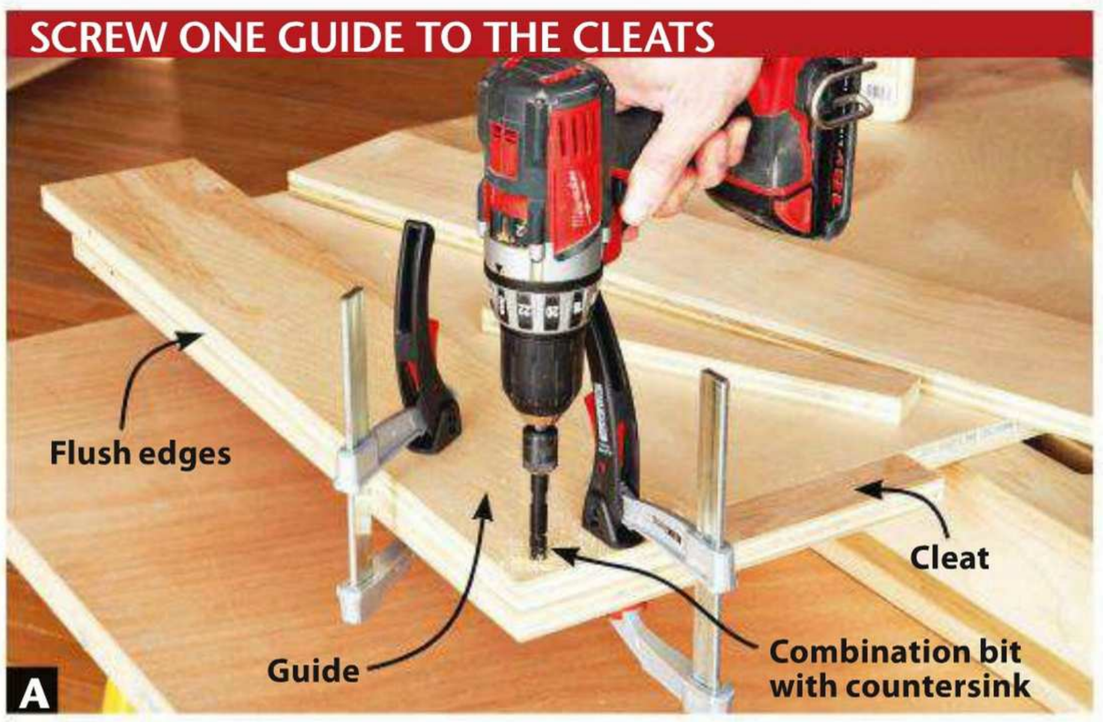
Construct this jig in a few minutes from scraps of plywood or hardwood, then use it to cut dadoes that fit the mating pieces snugly.

First, cut two 1½×10¾" cleats and two guides 5" wide and 3" longer than the width of the panel you'll be routing. Clamp one of the guides flush with the end of the panel and overhanging one edge by 1½" [**Photo A**]. Clamp one of the cleats to the guide tight against the edge of the panel. Drive screws to connect the pieces, as shown. Then screw the other cleat to the opposite end of the guide tight against the panel.

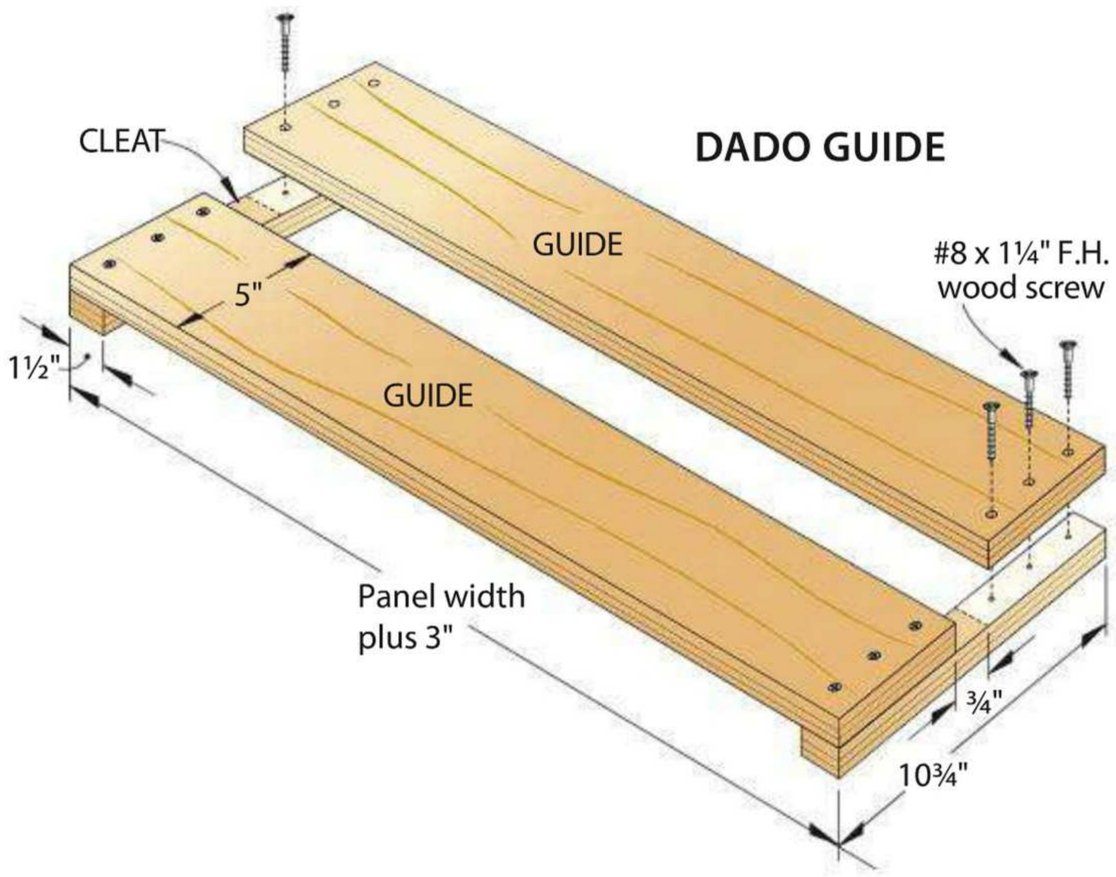
Cut some small pieces of scrap from the stock that will fit in the dadoes, and place these spacers tight against the edge of the first guide [**Photo B**]. Slide the second guide against the spacers, and clamp and screw the guide to the cleats.

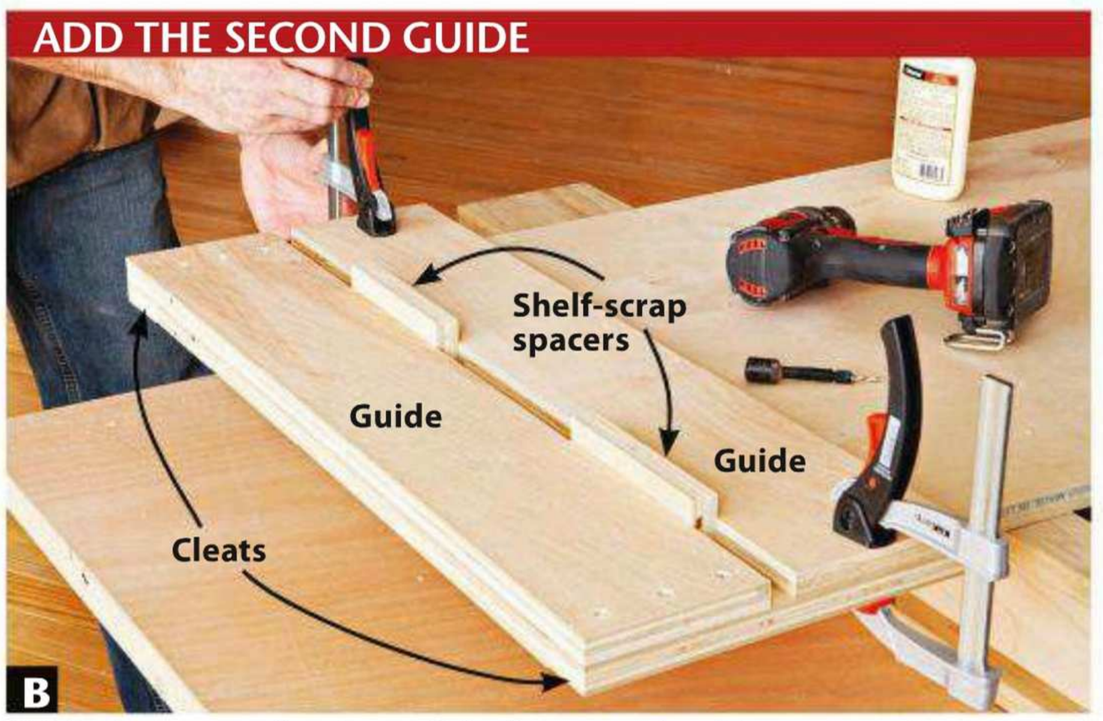
To use the jig, align the inside edges of the guides with the layout lines on a workpiece and clamp it in place, *top*. Install a bearing-guided hinge-mortising bit in the router, set it to the desired depth, and push the router along the left guide and pull it back along the right guide.





Drill screw holes to connect the first guide to the cleats. Countersink the holes so the router won't hang up on the screwheads.

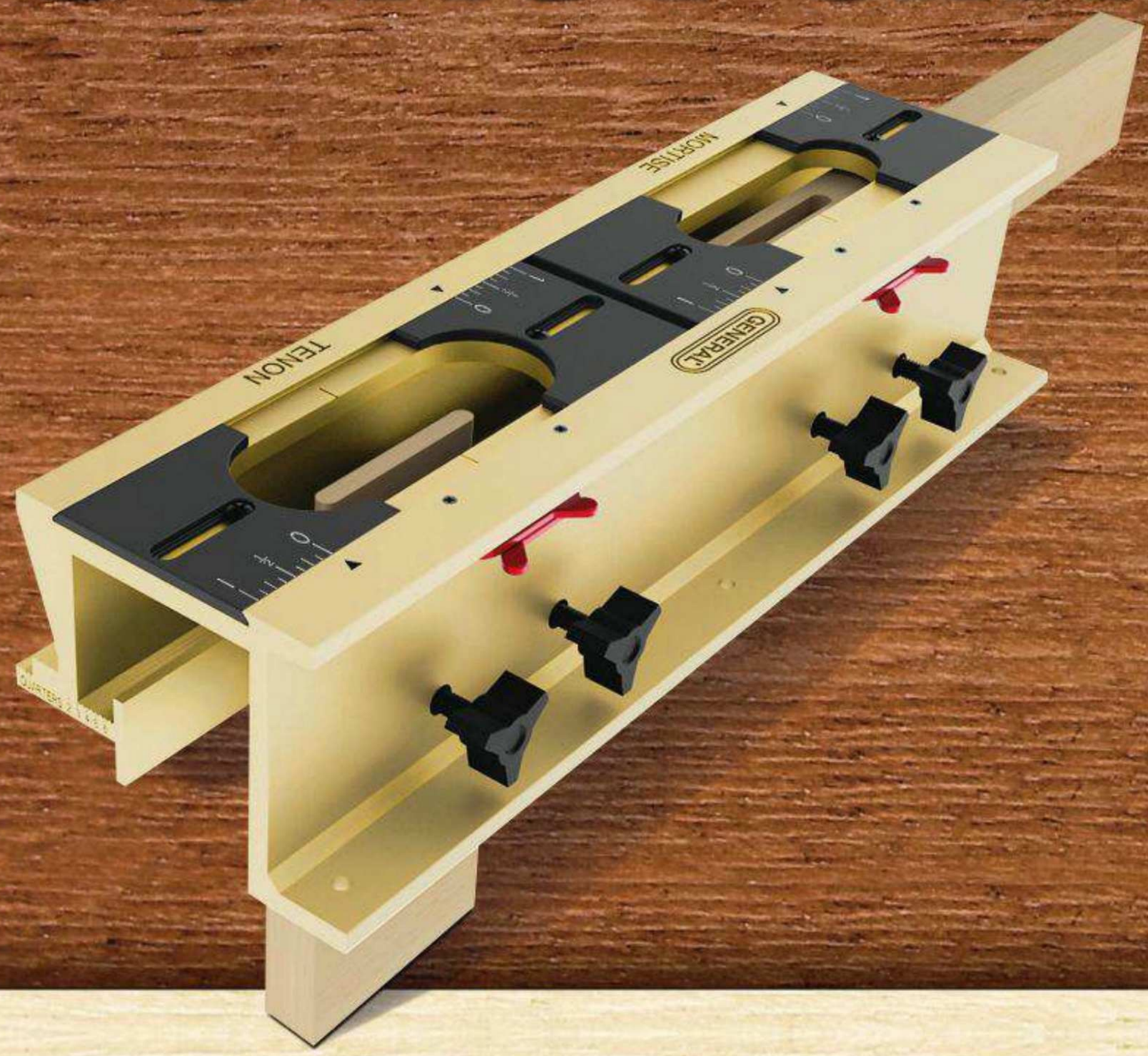




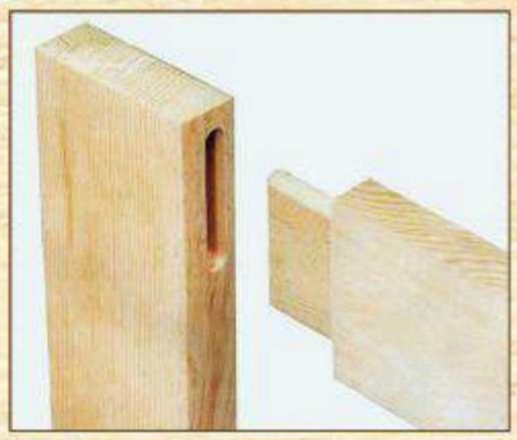
With the spacers in place, slide the second guide against them, and clamp and screw the guide to the cleats.

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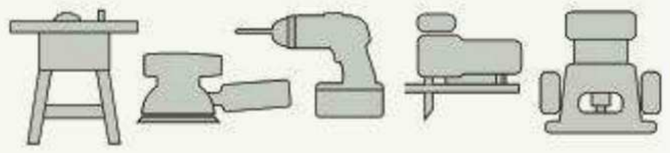
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Classic Bookcase

Build this simple and sturdy cabinet with only two joints: dadoes and rabbets cut with your router.

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What You'll Need



■ See the router bits and bushing used for this project on *page 40*.

PROJECT HIGHLIGHTS

- Overall dimensions: 38⅛" wide × 14¾" deep × 73½" high.
- A simple jig (*page 34*) guarantees perfect-fitting dadoes and rabbets.
- Optional decorative rosette blocks.
- Cost of materials: $160.

This project contains a number of duplicate parts that make it easy to cut and assemble. The two sides, for example, start as one wide plywood blank. After you rout the joinery, ripping the blank in half produces two mirrored sides with dadoes that align.

Start with a blank and jig

1 From ¾" plywood, cut one 23¾×72" blank for the two sides (A). Lay out the rabbets and five dadoes on the side (A) blank [**Drawing 1**], then set it aside for the moment.

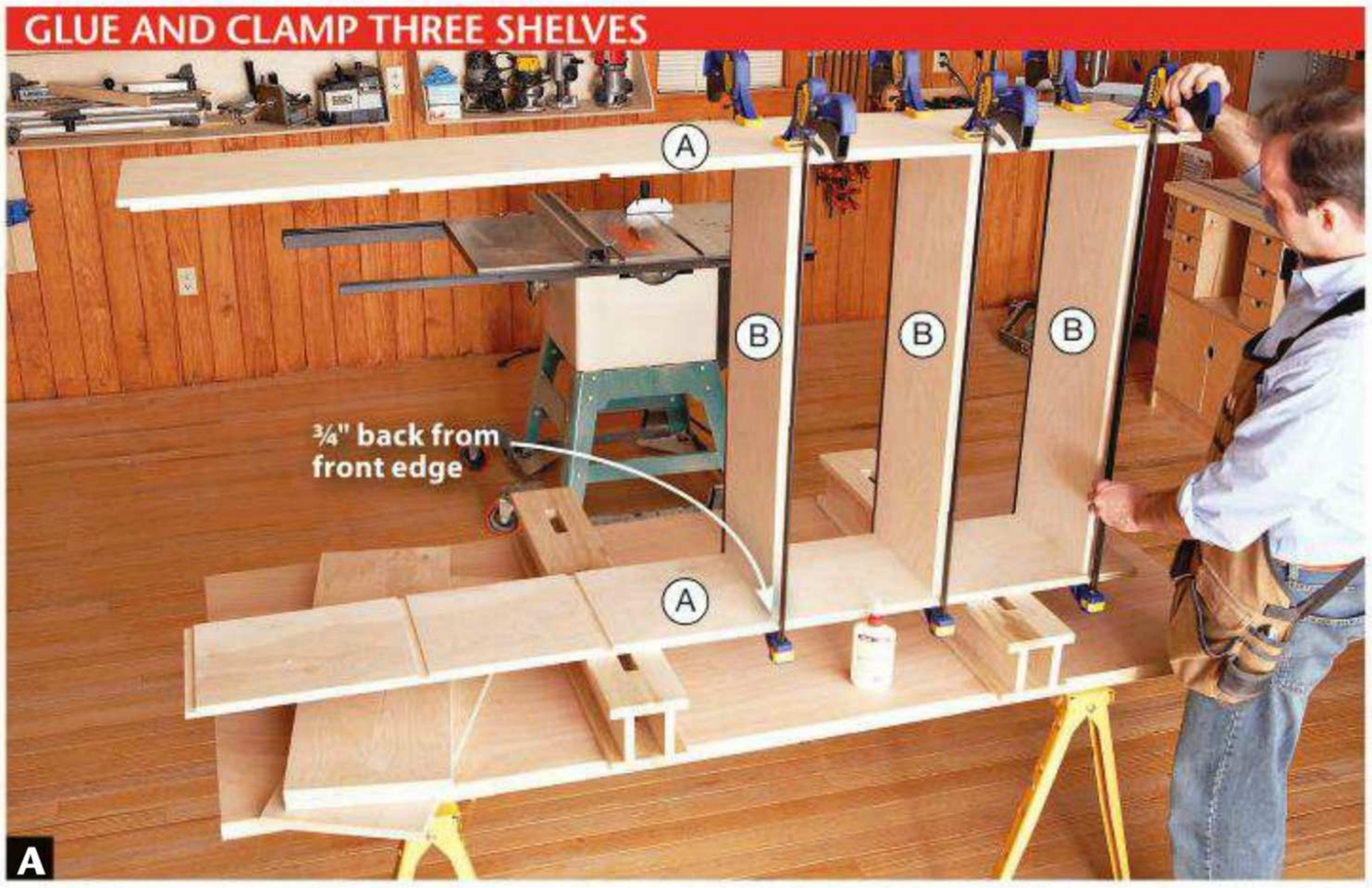
Quick Tip! Show off your best face. Pick the most attractive face for the outside of the bookcase, then make your layout marks on the opposite face.

2 To cut the dadoes and rabbets in the sides (A) **[Drawing 1]**, make the Quick and Easy Jig shown on *page 34*.

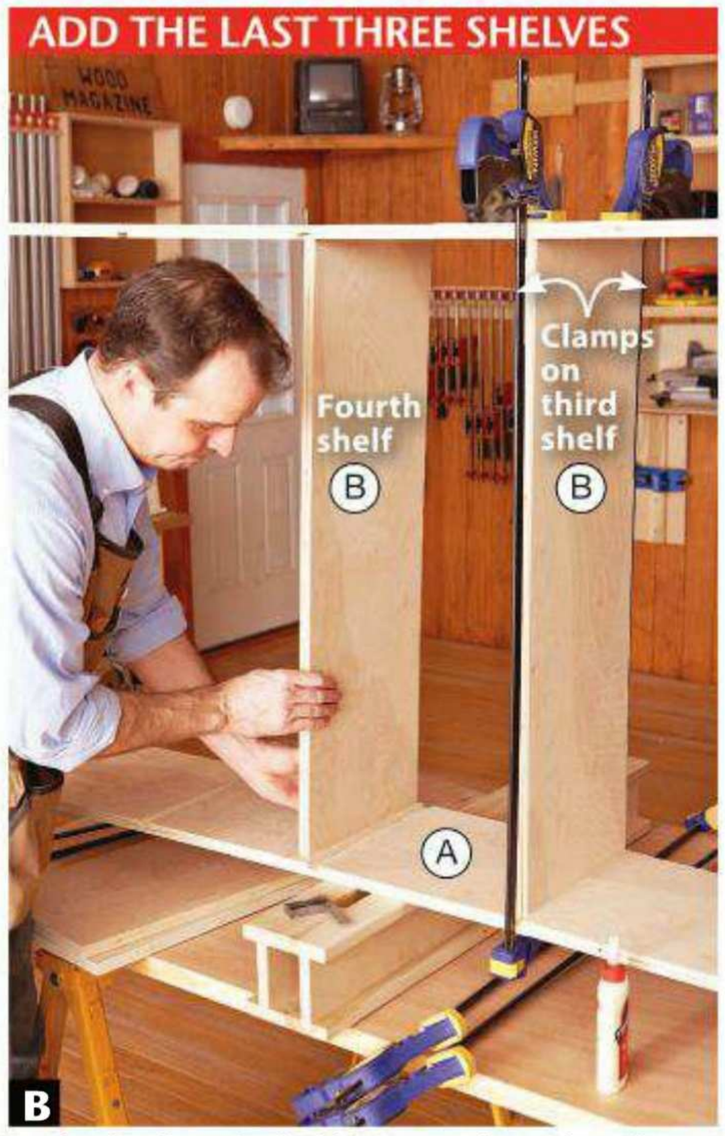
3 Position the jig over your layout lines and clamp it in place. Mount a bearing-guided ½" hinge-mortising bit (see *page 40*) in your router and set it to cut 5/16" deep. ***Note:*** *When setting this depth, add the thickness of the jig guides.* Then rout the dadoes and top rabbet.

4 Along both outside edges of the side (A) blank, rout rabbets [**Drawing 1**] to

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When clamping the shelves (B), align their back edges flush with the rabbets in the back of the case. The front of the shelf ends up ¾" from the front edge of the side (A).



To fit the fourth shelf (B) in without breaking the glue bond, keep the third shelf clamped, spread the sides (A), and slide the shelf in.

house the back (K). Use either a rabbeting bit or an edge guide on your router.

5 Rip the blank into two 11¾"-wide sides (A). The sides should mirror each other and be identical widths.

Quick Tip! Two rips to identical-width sides. To cut the two sides (A) the same width, set the rip fence 11¾" from the blade and rip the first side (A) off the blank. Then, turn the blank end for end so the rabbet is against the rip fence and rip the second side (A) the same width as the first.

Add the shelves and rails

1 Cut six shelves (B) to size [**Materials List** on *page 40*; **Drawing 2**]. Sand the shelves and the inside face of the sides (A) to 150 grit.

2 Glue and clamp the shelves (B) between the sides (A).

Quick Tip! Use fewer clamps by gluing in two steps. To keep the glue-up (and the number of clamps) manageable, start by gluing only the bottom three shelves (B) [**Photo A**]. After the glue dries, repeat the process for the other three shelves [**Photo B**].

3 Cut four shelf edges (C) and the top and bottom rails (D) to fit between the sides (A).

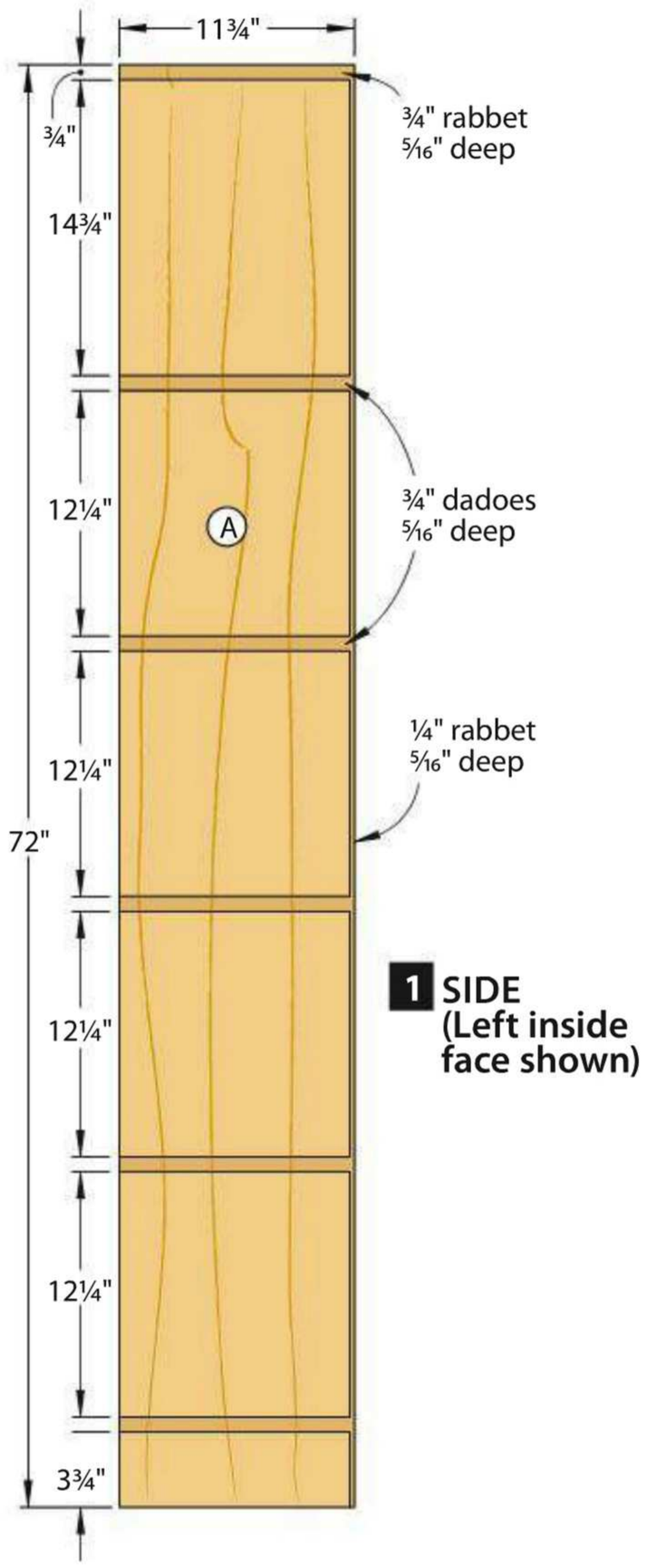
4 Lay out the arch on the bottom and top rails (D) [**Drawing 3**] using a fairing stick. (To learn about fairing sticks, visit woodmagazine.com/fairing.) Use a jigsaw with a 10 tpi blade and cut just outside the line. Then sand up to the line.

Quick Tip! Easy-to-make, perfect-fit sanding block. Stick sandpaper to a section of the waste piece from cutting the arch and use it as a sanding block. Use self-adhesive sandpaper or apply spray adhesive to regular sandpaper.

5 Glue and clamp the shelf edges (C) and rails (D) to the shelves (B) [**Drawing 2**; **Photo C**].

Move on to the stiles

1 Cut the stiles (E) to size, checking that they match the height of the case (A–D) [**Drawing 2**]. Glue the stiles to the front edge of the case sides (A).

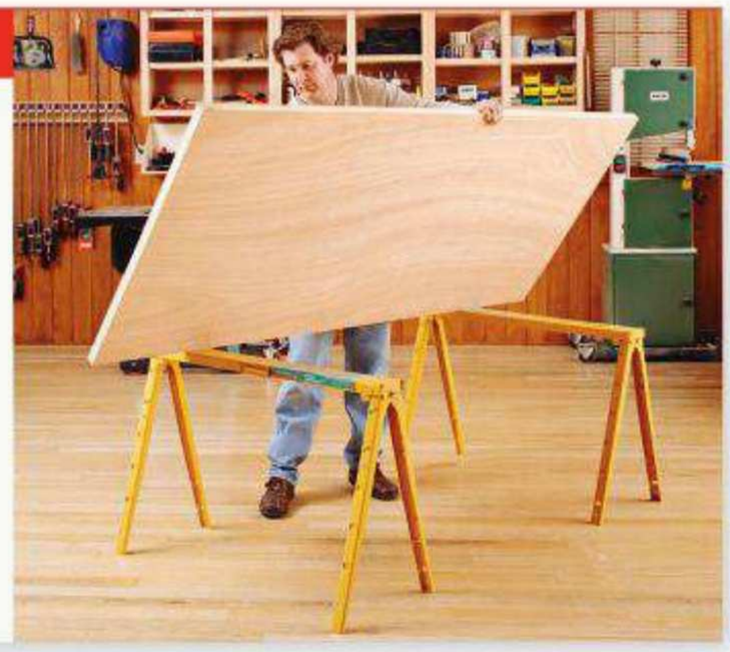


SHOP TIP

Open the door to a quick, flat assembly table

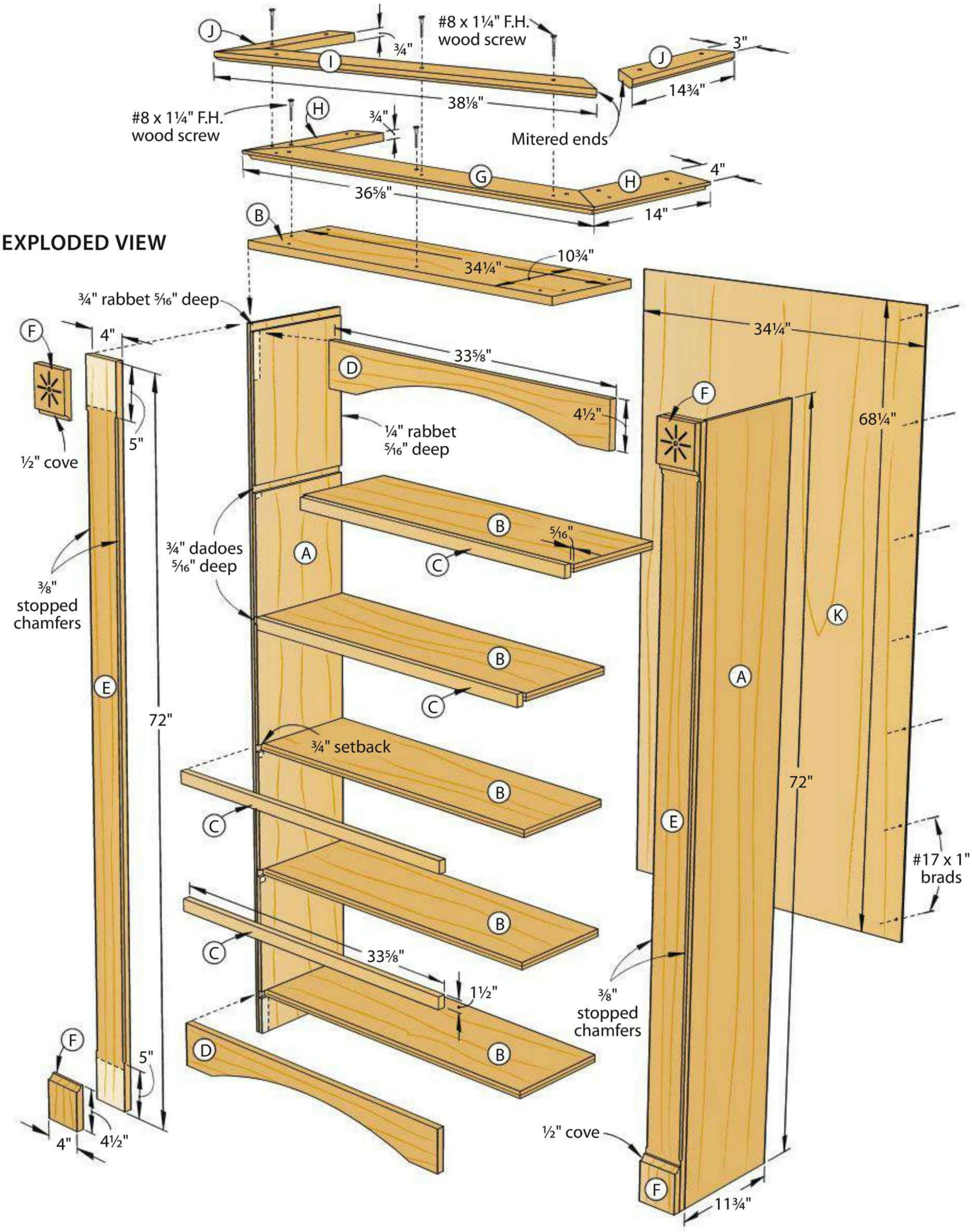
Flat, square projects start with a flat worksurface. Make one by laying a door across two sawhorses. A hollow-core door is stiff and flat, yet light enough so one person can lift it easily. And it stores flat against a wall.

Check for slightly damaged stock at a home center—it will serve well as a temporary workbench and cost less.



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2 EXPLODED VIEW



Quick Tip! Easy flush edges. Gluing two long pieces perfectly flush is tough. Instead, let the stiles overhang the sides about 1⁄32". After the glue dries, sand, or use a flush-trim bit in a router to trim the stiles flush with the sides.

2 To add decorative stopped chamfers to the front of each stile (E) [**Drawing 2**], first mark a line 5" from each end of the stiles. Then measure the distance on your router from the cutting edge of the bit to the edge of the router base. Clamp a stopblock this distance away from each line. Rout the ⅜" chamfers, moving the router between the blocks [**Photo D**].

3 Cut a 4×19" blank for the pilaster blocks (F). ***Note:*** *To add decorative rosettes on the top pilaster blocks, follow steps 4–6 below. If you don't want rosettes, skip to step 7.*

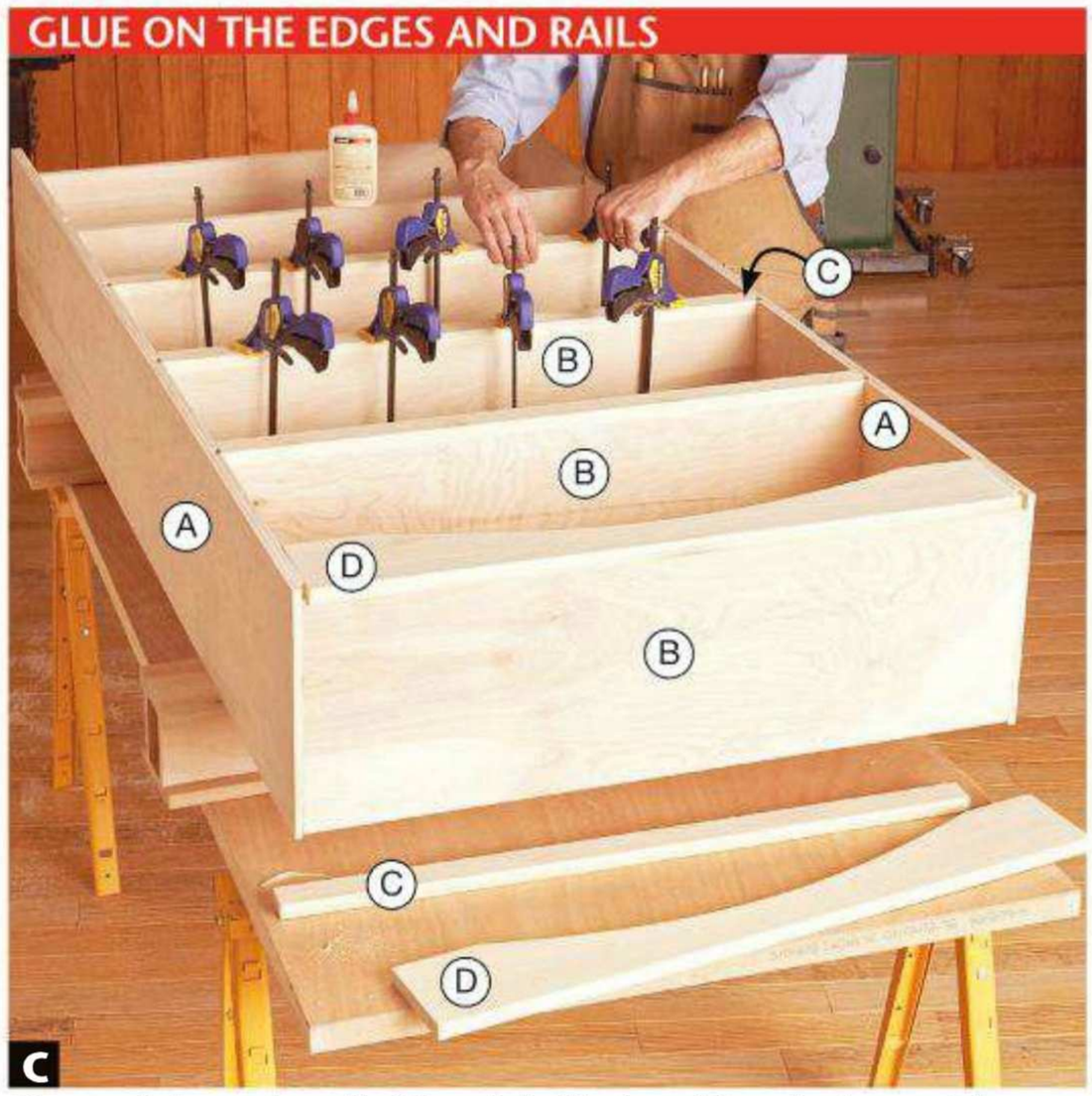
4 Photocopy the **Pilaster Block Pattern** in the *WOOD Patterns®* insert in the center of this issue. Spray-adhere it to a 4×4" piece of ¼" hardboard. Mark the indicated centerpoints with an awl and drill the 5⁄16" holes.

Quick Tip! Pick a stay-put bit. Precision counts here, so use a brad-point bit to prevent the bit from wandering.

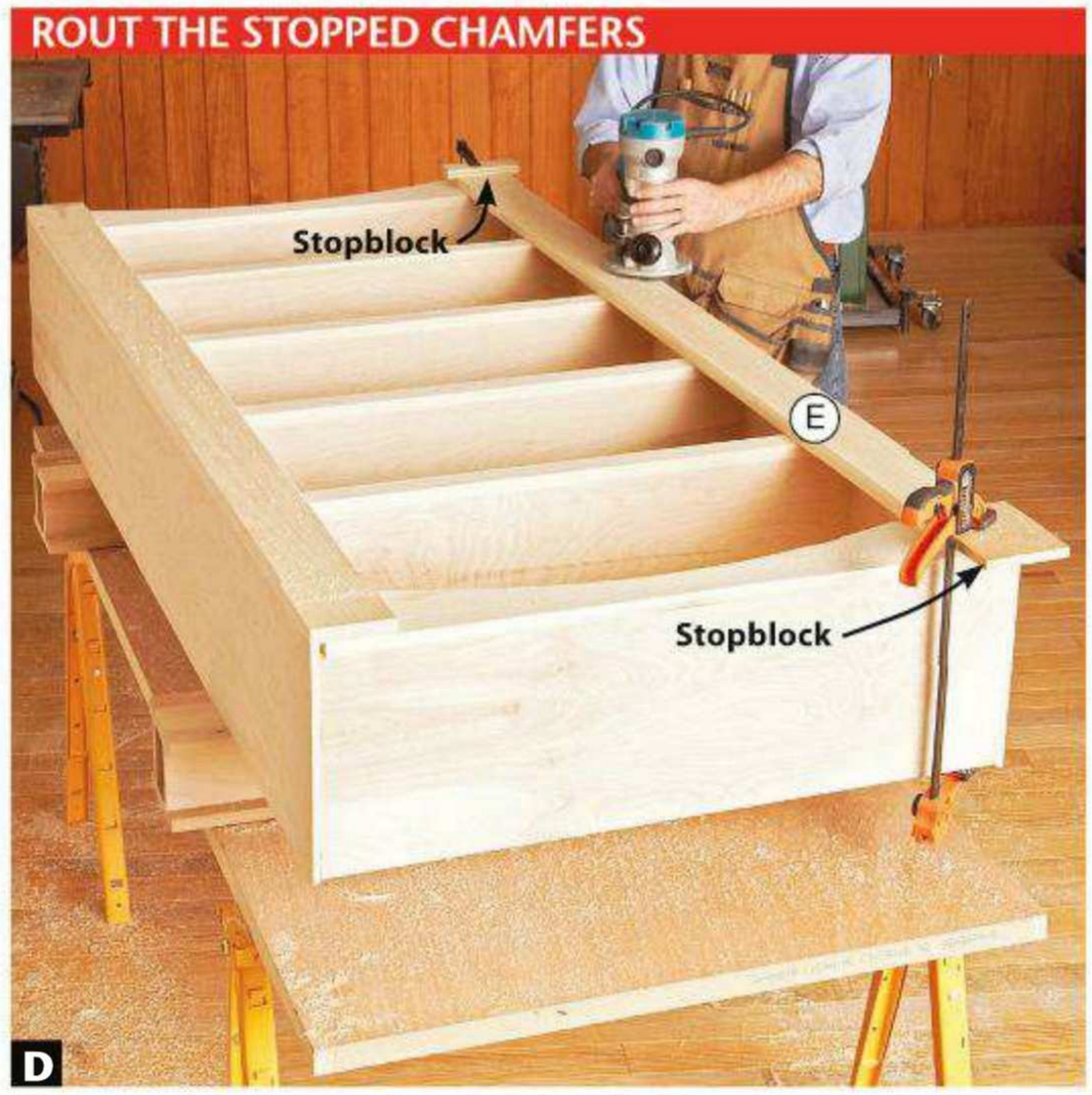
5 After drilling the holes, carefully cut out the remaining material using a coping saw (or scrollsaw) [**Photo E**]. Smooth out any irregularities with a rasp. Check the width of the groove with a 5⁄16" outside-diameter router guide bushing: It should fit and slide easily in the grooves without slop.

6 Secure the template to the workpiece with double-faced tape. Install the

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Glue and clamp the rails (D) and shelf edges (C) to the front of the shelves flush with the sides (A) and top edges of the shelves.



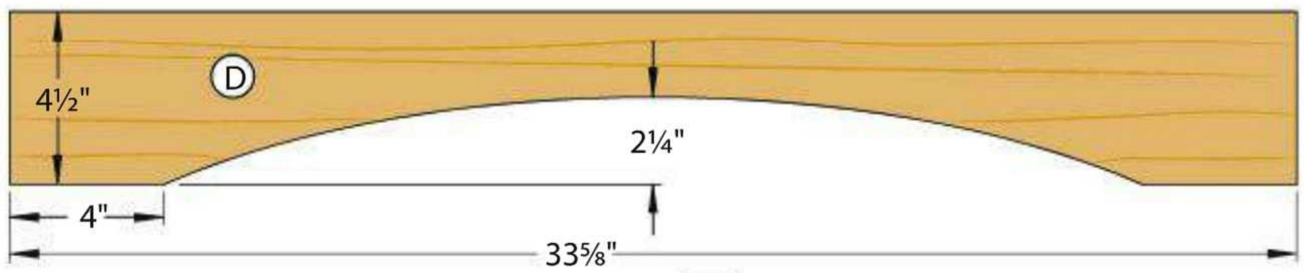
Clamp stopblocks to each end of the stile (E) and rout both edges before moving the blocks to rout the other stile.

guide bushing and a ¼" core-box bit in your plunge router, and set the depth stop to rout ⅛" into the workpiece. Slip the guide bushing into one end of a groove, start the router, plunge the bit into the workpiece, and move the router back and forth between the ends. Repeat for each groove and the center hole, then move the template to the opposite end and rout the other rosette.

7 Cut four pilaster blocks (F) 4½" long from the blank and rout a ½" cove across an end of each block [**Drawing 2**]. Glue the blocks to the stiles (E) with their ends and edges flush.

Top it off with moldings

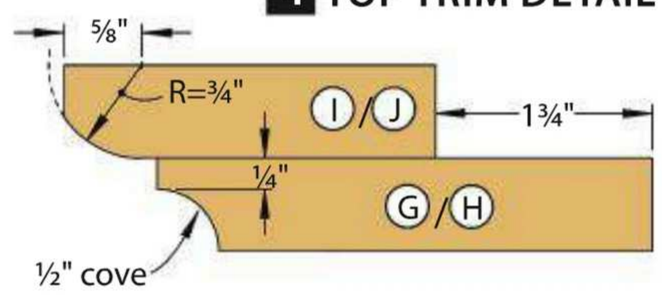
1 To make the top trim, cut blanks for all of the moldings (G, H, I, J) to final width and 2" longer than listed in the **Materials List**.



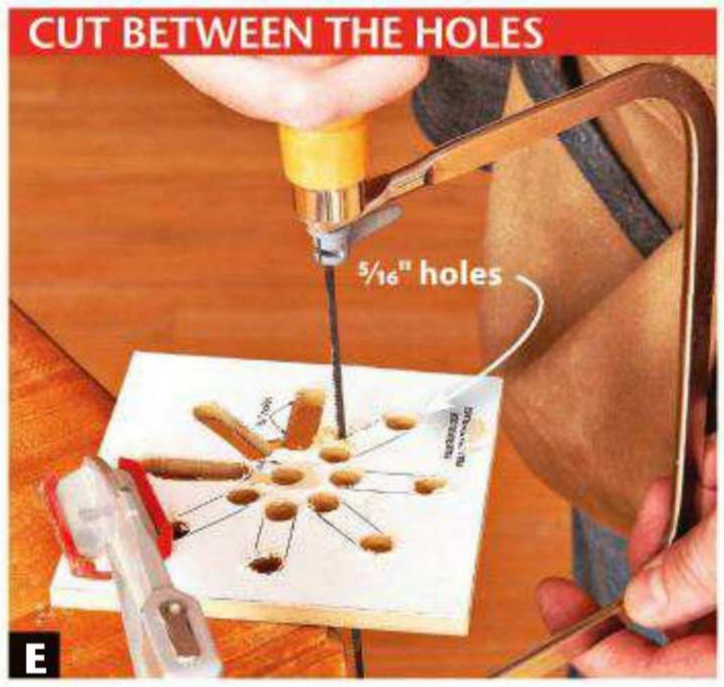
3 TOP/BOTTOM RAILS

2 Rout the cove on the front (G) and side (H) lower moldings [**Drawing 4**]. To steady the router while routing the profile on the top moldings (I, J), clamp the molding to a wide scrap using a handscrew, then clamp the handscrew to your bench [**Photo F**]. Set a ¾" round-over bit ⅝" below the router subbase and rout the profile.

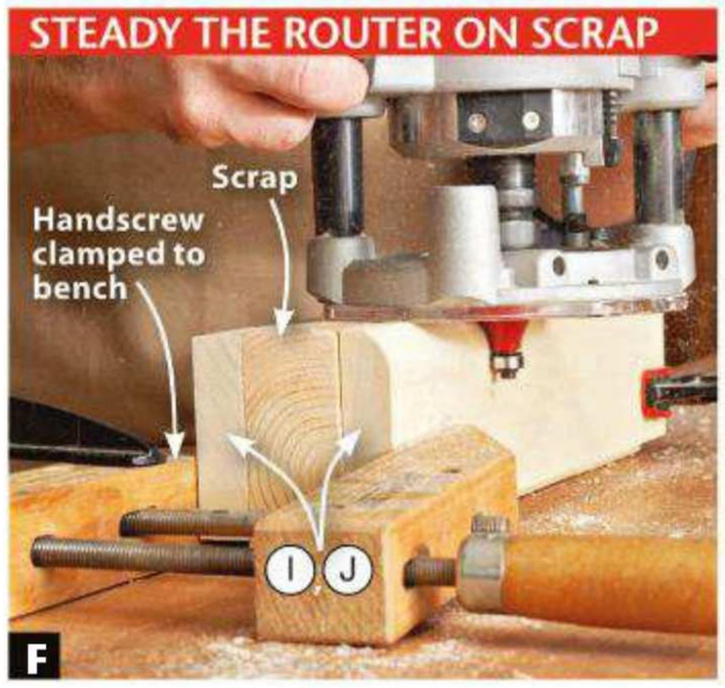
4 TOP TRIM DETAIL



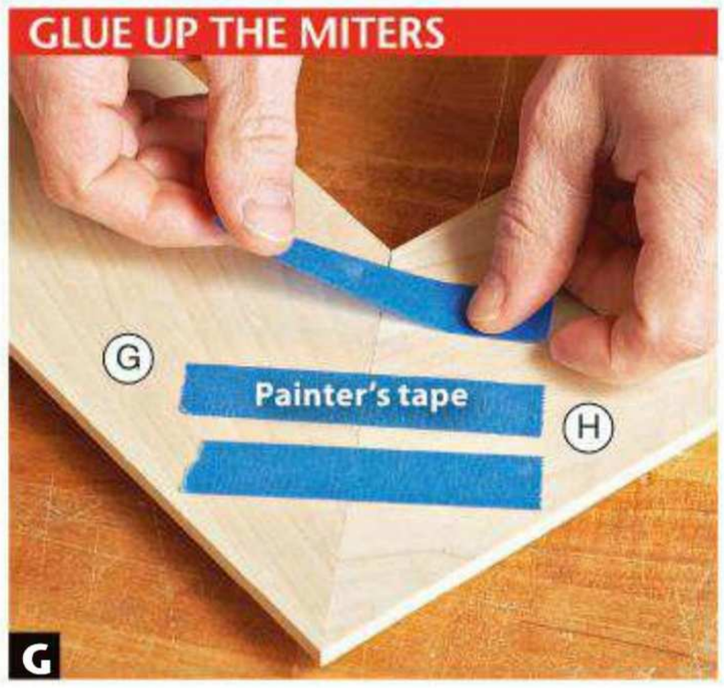
3 Measure the distance across the front of the case and add 1½" to allow for a ¾" overhang on each side.



Assemble the coping saw so the teeth cut on the downstroke. Cut inside the lines, then smooth the edges up to the lines.



Sandwich a wide scrap with the top moldings (I, J), clamp the assembly to your bench, then rout the partial round-over.



To secure the mitered corners while the glue dries, work on a flat surface and apply painter's tape across the joint.

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Miter both ends of the front lower molding (G) to this length. Follow the same procedure for the side lower moldings (H), but this time only add a ¾" overhang on the front end. (They're flush on the back.) Cut the side lower moldings to length, and glue the corners together [**Photo G**] to form a U-shaped assembly.

4 After the glue dries, lay the bookcase (A–F) on its back on a flat surface. Glue and screw the lower-molding assembly (G/H) centered on top of the case and ¾" from the front face of the pilaster blocks (F) [**Drawing 2, Photo H**].

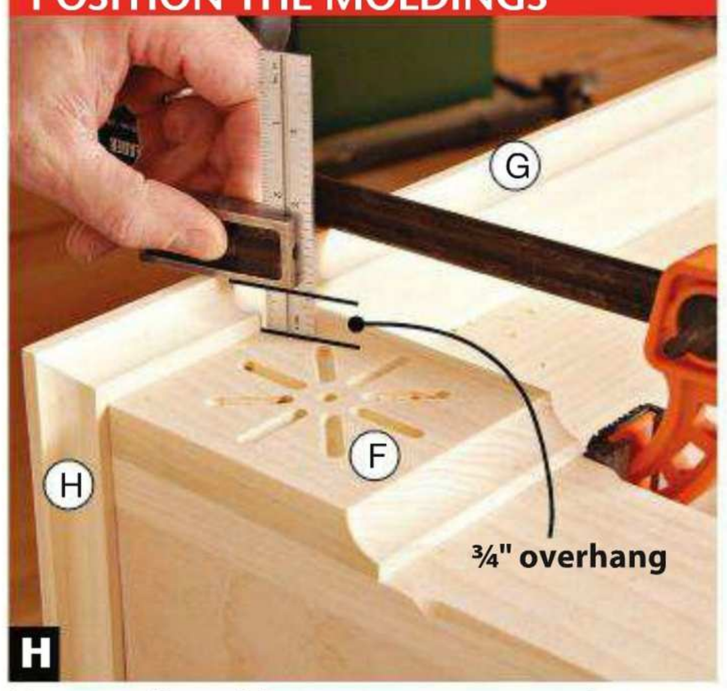
5 Follow the same procedure to build the top-molding assembly using a front top molding (I) and a pair of side top moldings (J).

6 Glue and screw the top-molding assembly (I/J) centered on top of the lower assembly (G/H) [**Drawings 2** and **4**].

7 Cut the back (K) to fit between the rabbets but don't nail it in place until after the finish has been applied.

8 Finish-sand the whole project with 220-grit sandpaper. To give the light-colored birch and poplar a dark, rich appearance, apply stain and a clear topcoat. (We used General Finishes Java Gel Stain and then three coats of General Finishes PolyAcrylic Semi-Gloss, sanding between coats with 320-grit sandpaper.) After the finish dries, nail on the back (K) and fill your sturdy new bookcase with reading materials and decorative items.

POSITION THE MOLDINGS



Use an adjustable square as a convenient way to keep the molding (G/H) even on both the right and left ends.

Produced by **Doug Hicks** with **Kevin Boyle**
Project design: **Kevin Boyle**
Illustrations: **Lorna Johnson**

A bit about the bits and bushings you need

Find the router bits used in this project at most home centers. A guide bushing (*lower right*) screws into the router subbase and rides against a pattern to guide a bit (as with the optional rosettes on the pilaster blocks). Bushings with sleeves of various diameters are typically sold in sets.



Materials List

Part		FINISHED SIZE T	W	L	Matl.	Qty.
A*	sides	¾"	11¾"	72"	BP	2
B	shelves	¾"	10¾"	34¼"	BP	6
C	shelf edges	¾"	1½"	33⅝"	P	4
D	top/bottom rails	¾"	4½"	33⅝"	P	2
E	stiles	¾"	4"	72"	P	2
F	pilaster blocks	¾"	4"	4½"	P	4
G*	front lower molding	¾"	4"	36⅝"	P	1
H*	side lower molding	¾"	4"	14"	P	2
I*	front top molding	¾"	3"	38⅛"	P	1
J*	side top molding	¾"	3"	14¾"	P	2
K	back	¼"	34¼"	68¼"	BP	1

*Parts initially cut oversize. See the instructions.

Materials key: BP–birch plywood, P-poplar.
Supplies: #8×1¼" flathead screws for jig and bookcase, #17×1" brads.
Bits and guide bushing: ½" bearing-guided hinge mortising, flush-trim, ¼" rabbeting, 45° chamfer, ½" cove, ¾" round-over router bits. For decorative rosette: 5/16" brad-point drill bit, ¼" core-box router bit, 5/16" outside-diameter guide bushing.

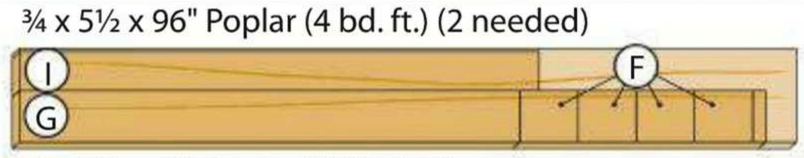
Cutting Diagram



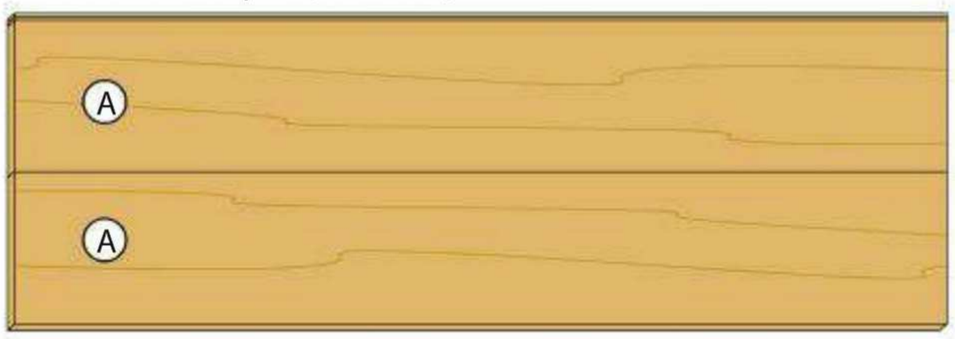
¾ x 5½ x 96" Poplar (4 bd. ft.) (2 needed)



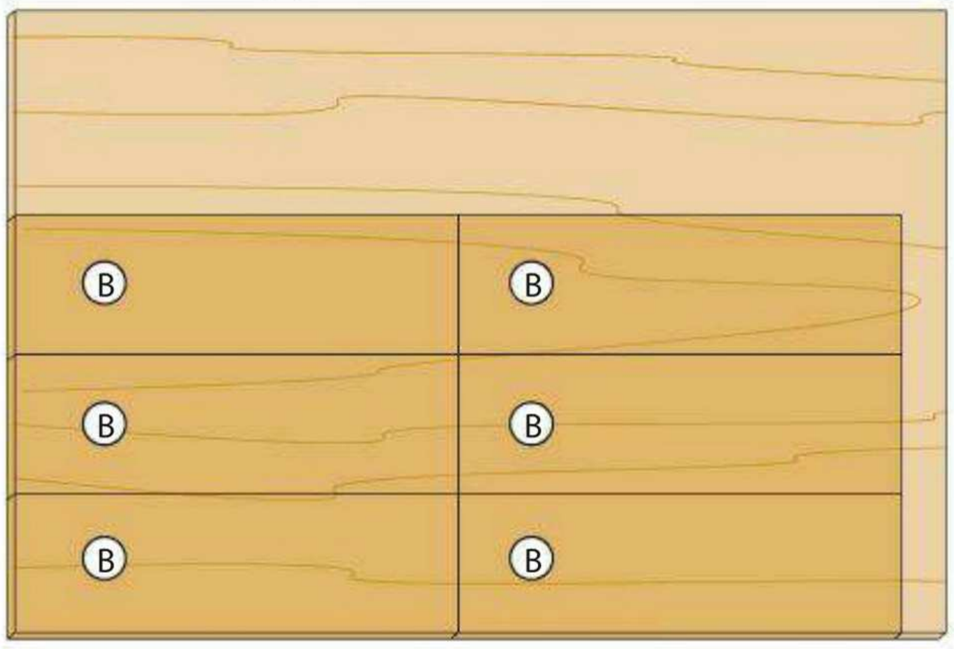
¾ x 5½ x 96" Poplar (4 bd. ft.) (2 needed)



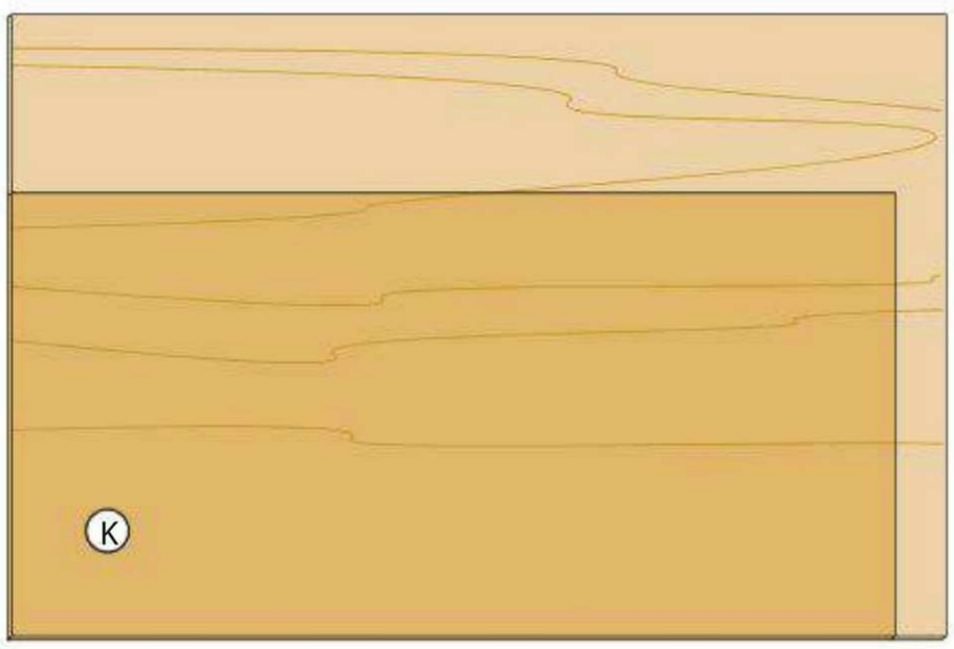
¾ x 7¼ x 60" Poplar (3.3 bd. ft.)



¾ x 24 x 72" Birch plywood

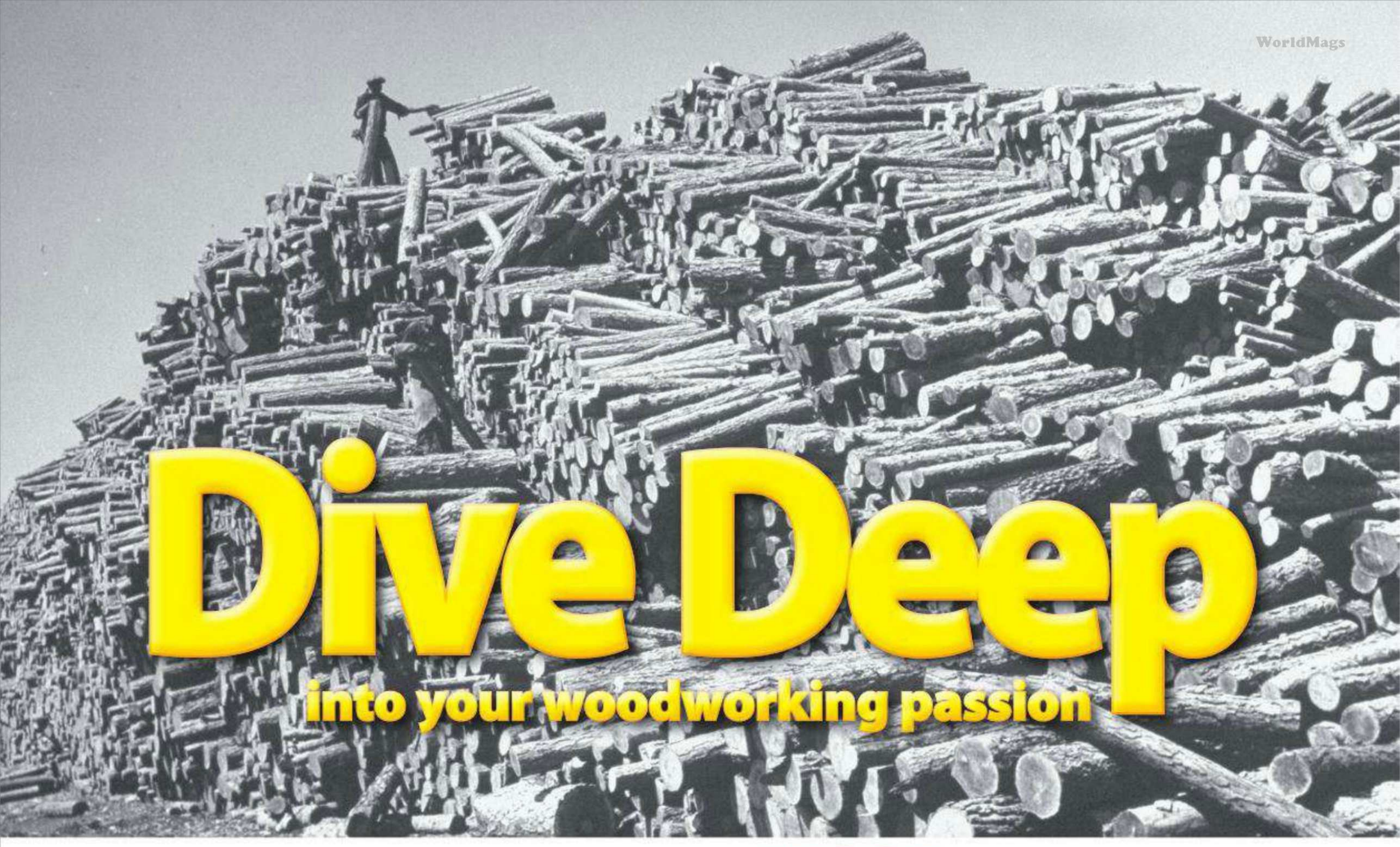


¾ x 48 x 72" Birch plywood

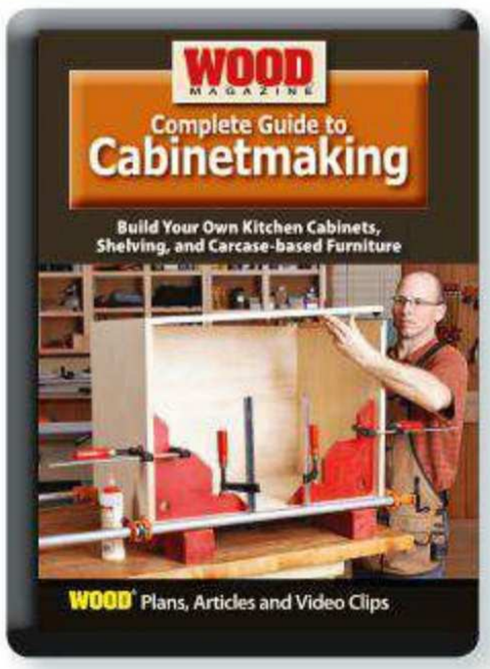


¼ x 48 x 72" Birch plywood

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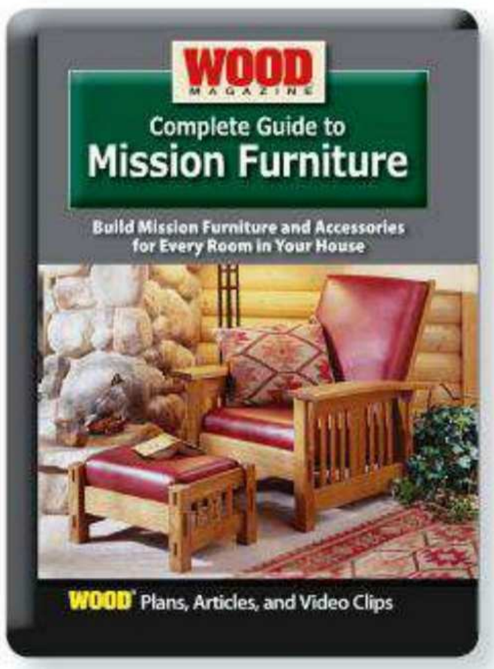
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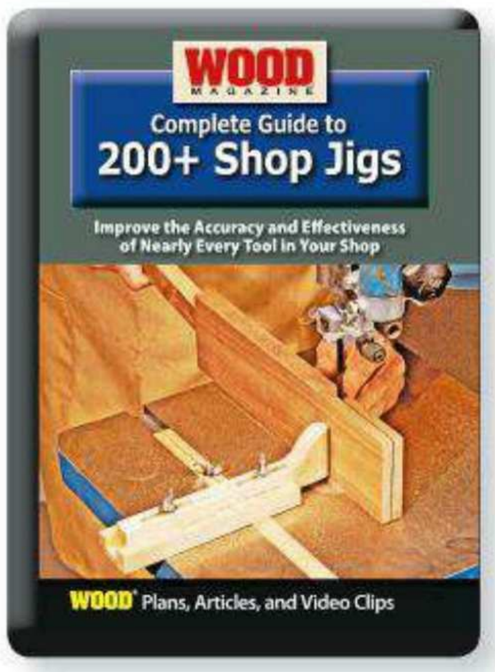
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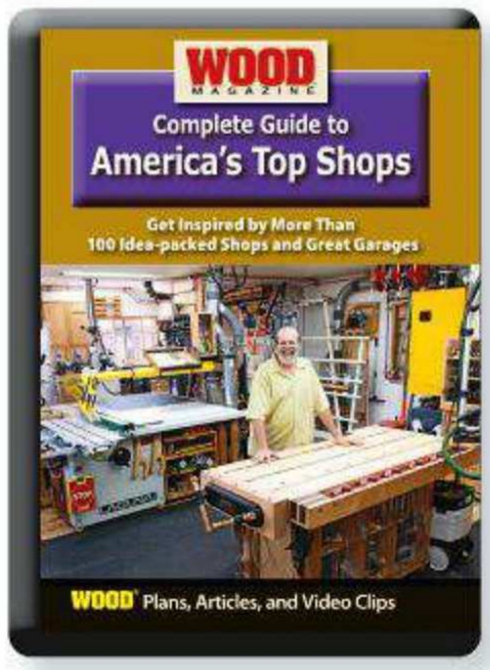
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SHOP TESTED

Sanding Discs

We reduced 2 cubic feet of poplar to dust—literally—to find the top-performing abrasives for your random-orbit sander.

Most hook-and-loop sanding discs look alike except for their color, so how can you tell which ones give the best value? You can't unless you test 'em, so that's what we did with 15 popular brands. Here's what we learned.

The best abrasives start fast, then last and last

To quantify the aggressiveness and durability of the discs, we sanded a single poplar board with 100- or 120-grit abrasive (depending on what the maker offers) for 15 minutes with each disc, weighing the board after every minute. A 1-pound weight affixed atop the sander provided consistent downward pressure. Then, we repeated the test with two more discs of each brand and averaged the results. (That's more than 11 hours of sanding for those of you keeping track at home.)

The chart on the *next page* shows the results of that test. In the first minute, Craftsman Professional, Klingspor Stearate, Norton 3X, and Bosch came strong out of the gate when the abrasives were factory-sharp. But by the end of the first five minutes, Bosch had slipped to the middle of the pack.

In the second five-minute interval, all of the discs removed less wood than in the first five minutes as they began to dull or load with dust. Again, Klingspor Stearate's performance fell off the least—only 11 percent. And during the final five minutes, most discs leveled off, removing 3–10 percent less than in the middle five minutes. Bottom line: The top discs abraded more wood in their first five minutes than the Ace Hardware discs did in 15.

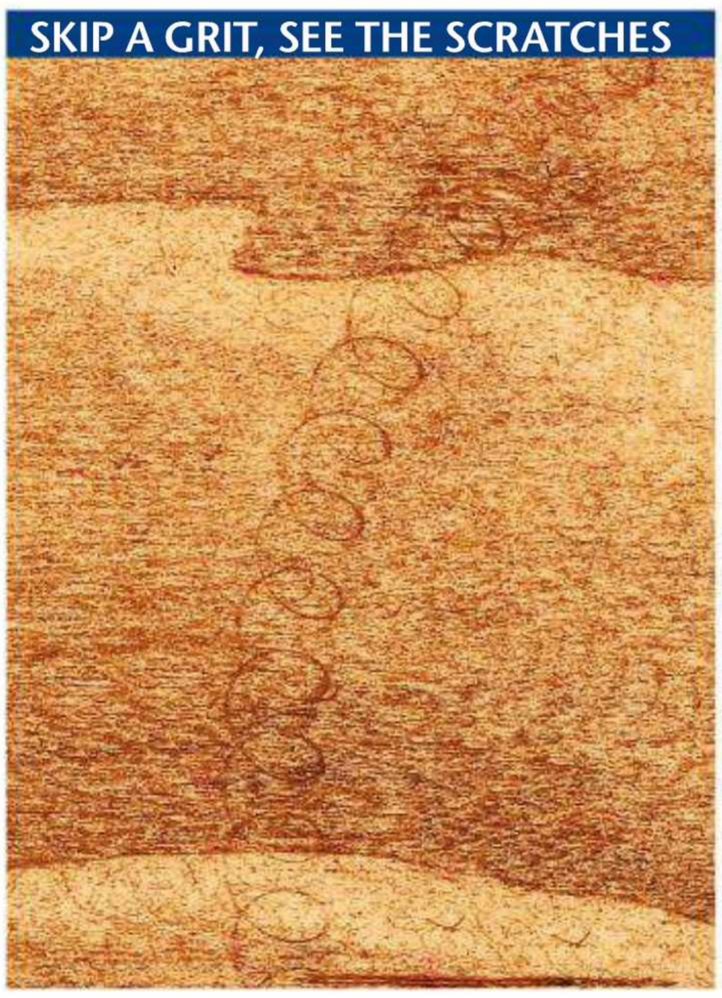
But is an aggressive, durable disc a good value? That depends on the price of the disc. When purchased in a box of 50, Klingspor Stearate costs about 25 cents for every gram of wood removed if you used the disc for 10 minutes, making it a terrific value compared to the similar-performing Craftsman Professional discs at $1.10 per gram of wood removed. Bosch Standard, Mirka Gold, Gator Ultra Power, and Makita also provide above-average value at 43–58 cents per gram removed. When you look at the chart column on *page 44* that shows the selling price for all brands, you'll see that those sold in packages of 15 or fewer discs tend to also have the highest cost-per-gram.

Fast is fine, but which discs leave a scratch-free finish?

Starting with 100- or 120-grit discs, we sanded pine boards with equal strokes through each grit up to 220 (or 240 for brands without 220-grit discs), then applied stain to each sample to show any scratching left behind. Most of the discs left only minor scratching visible to the naked eye after the highest grit, although Gator's Ultra Power left more prominent scratches. (See *above right.*)

We were pleased to see that a handful of 180-grit discs—Bosch, Gator Power, Makita, Mirka Abranet, and Norton 3X and MultiAir—delivered a near scratch-free finish that would be acceptable to all but the fussiest of woodworkers. These discs save you time by not having to sand to a higher grit.

SKIP A GRIT, SEE THE SCRATCHES



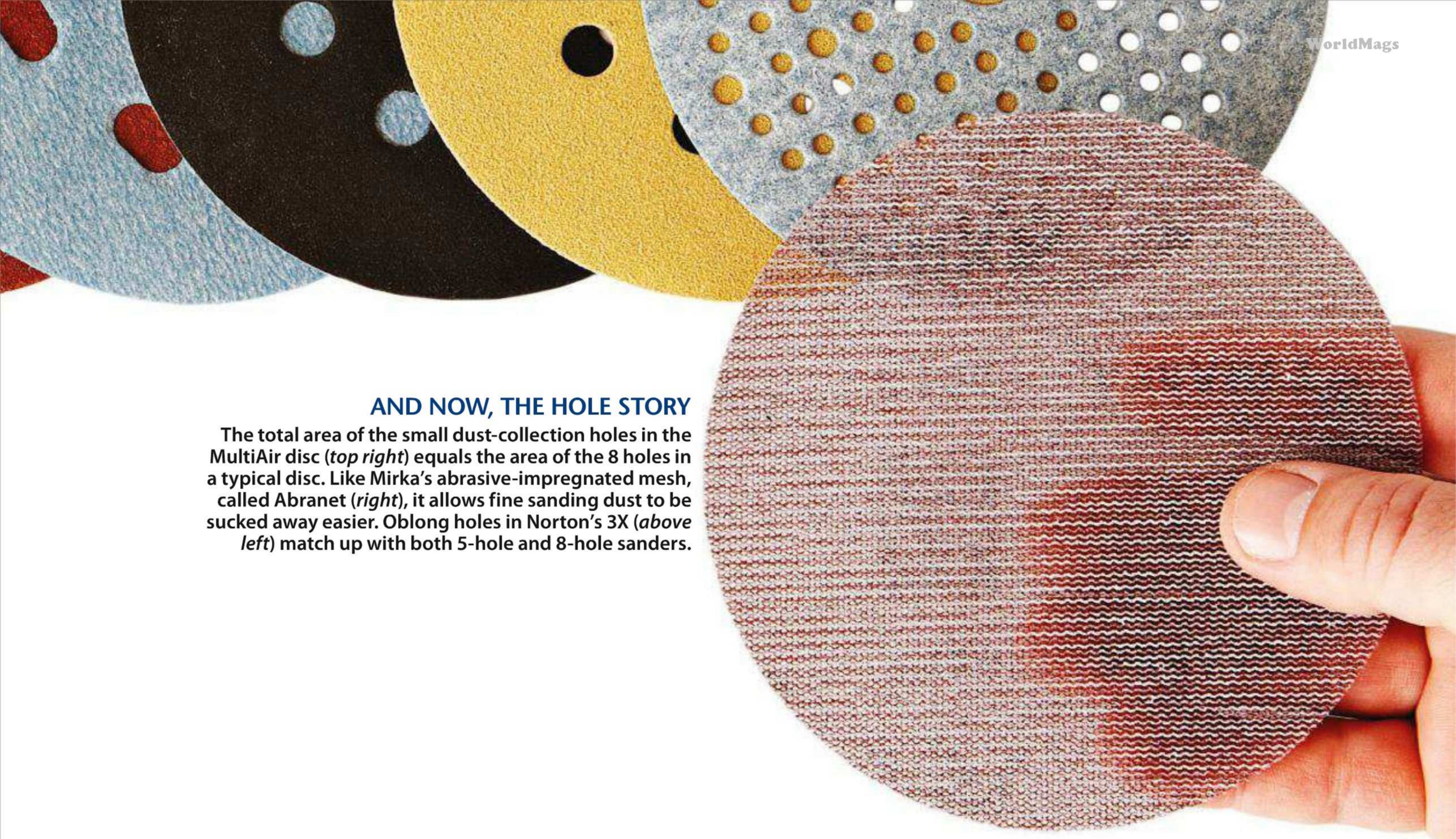
Without an intermediate grit of 150 or 180, Gator's Ultra Power 220-grit discs didn't remove all the scratches left behind by its 120-grit discs, despite sanding twice as long.

More considerations

■ ***Dust collection.*** We observed better-than-typical dust collection from two distinctly designed discs, shown at the top of the *next page*: Mirka's Abranet and Norton's MultiAir. These holes-everywhere configurations allow fine sanding dust to migrate to the sander's vacuum holes through the hook-and-loop backing. (We could see the dust path on the back of the discs after use.) If you're particularly sensitive to dust, these discs may be worth the extra money.

■ ***Grit readability.*** If you forget which disc grit is on the sander, you should be

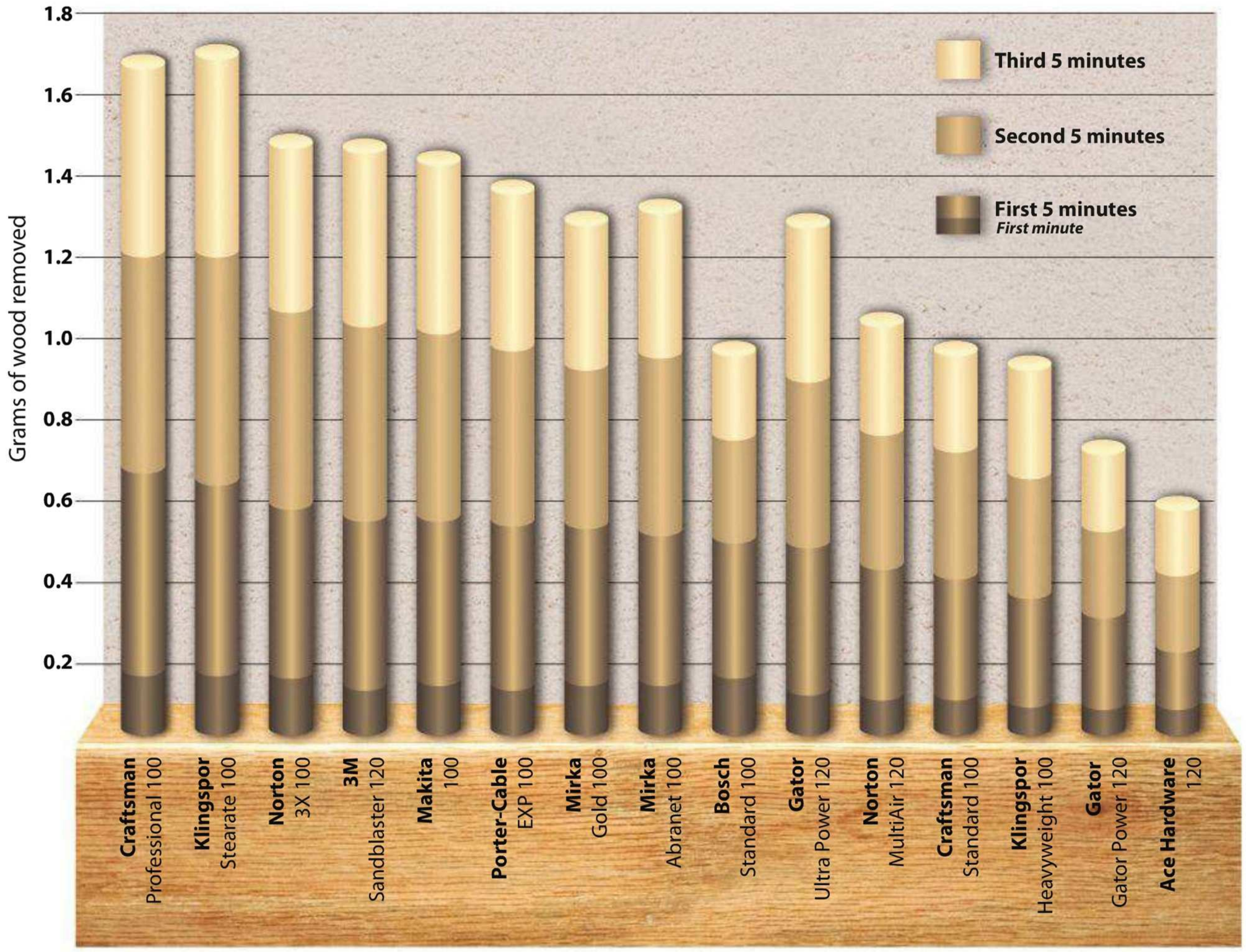
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AND NOW, THE HOLE STORY

The total area of the small dust-collection holes in the MultiAir disc (*top right*) equals the area of the 8 holes in a typical disc. Like Mirka's abrasive-impregnated mesh, called Abranet (*right*), it allows fine sanding dust to be sucked away easier. Oblong holes in Norton's 3X (*above left*) match up with both 5-hole and 8-hole sanders.

EARLY AGGRESSIVENESS: AN INDICATOR OF OVERALL ENDURANCE



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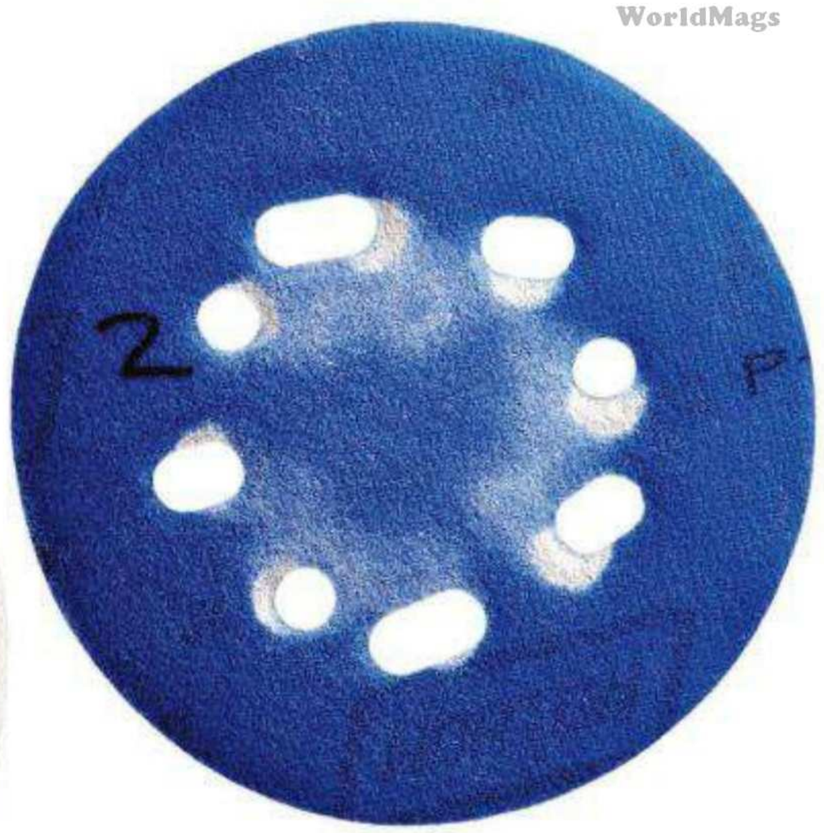
able to peel it back and read the grit markings on the back. On the Craftsman Professional and both Norton discs, dark print against a dark blue background (*far right*) made reading the disc label a challenge.

These discs deserve your dollars

Klingspor's Stearate discs, with the most aggressive and durable abrasives in the test and the lowest cost per disc, proved the perfect storm of material removal. But several other discs finished finer. So, for our money, we'd use Klingspor Stearate for initial sanding and then switch to one of the disc brands that left no visible scratches at 180 grit: Bosch, Gator Power, Makita, Mirka Abranet, or Norton 3X or MultiAir.

If you want to stick with one brand, Makita, Mirka Abranet, and Norton 3X do the job admirably from start to finish, but cost about twice as much per gram removed as Klingspor Stearate.





DARK AND DIRTY DISCS DEMAND DECIPHERING

Discs with light-colored backs read easier, even dirty, than the black-on-blue printing found on a few of the discs.

Written by **Dave Campbell** with **Bob Baker** Illustration: **Tim Cahill**

SANDING DISCS: THE NITTY-GRITTY

BRAND	MODEL	GRIT USED FOR AGGRESSIVENESS/ DURABILITY TEST	GRIT MATERIAL (1)	PERFORMANCE GRADES (2) PRIMARY AGGRESSIVENESS	PRIMARY DURABILITY	PRIMARY FINISH QUALITY AFTER 180 GRIT (3)(4)	PRIMARY FINISH QUALITY AFTER 220 GRIT (3)(5)	SECONDARY DUST-COLLECTION EFFECTIVENESS	SECONDARY DISC READABILITY AFTER USE	COST PER GRAM OF DUST REMOVED (6)	COUNTRY OF MANUFACTURE (7)	GRITS ABOVE 60 AVAILABLE	SELLING PRICE (8)	PHONE	WEB SITE
3M	Sandblaster	120	C	A-	A-	**C	B	A-	A	$1.60	U	80,120,220	3/$5	800-494-3552	3m.com
ACE HARDWARE	Hook and Loop	120	AO	C	C	C	B	A-	A	$1.11	U	80,120,180,220,320	15/$7	866-290-5334	acehardware.com
BOSCH	Standard	100	AO	A-	B	A-	*A-	A-	A-	$0.53	I	80,100,120,180,240	50/$20	877-267-2499	boschtools.com
CRAFTSMAN	Standard	100	AO	B	B	*C	A-	A-	A	$0.69	C	100,150,220	4/$2	800-349-4358	craftsman.com
	Professional	100	C	A	A	*C	B	A-	B	$1.10	C	100,150,220	3/$4		
GATOR	Gator Power	120	AO	B-	C	A-	A-	A-	A	$0.72	U	80,120,180,220	50/$19	800-255-4748	gatorfinishing.com
	Ultra Power	120	Z	A-	A-	**C	C	A-	A	$0.55	U	80,120,220	40/$20		
KLINGSPOR	Stearate	100	AO	A	A	C	B	A-	A	$0.25	P	80,100,120,180,220	50/$16	800-228-0000	woodworkingshop.com
	Heavyweight	100	AO	B	B	C	B	A-	A	$0.67	P	80,100,120,180,220	50/$25		
MAKITA	Hook and Loop	100	AO	A-	A-	A-	*A	A-	A	$0.58	I	100,120,180,240,320	50/$30	800-462-5482	makitatools.com
MIRKA	Abranet	100	AO	A-	A-	A-	A-	A	A-	$0.75	F	80,100,120,150,180,220,240	50/$36	800-843-3904	mirka-usa.com
	Gold	100	AO	A-	A-	C	A	A-	A	$0.43	F	80,100,120,150,180,220,240	50/$20		
NORTON	3X	100	C	A-	A-	A-	A-	A-	B	$0.65	C	80,100,120,180,220	50/$35	254-918-2306	nortonconsumer.com
	MultiAir	120	C	B	B	A-	A-	A	B	$1.16	C	120,150,180,220	100/$90		
PORTER-CABLE	EXP	100	AO/Z	A-	A-	C	B	A-	A	$0.90	P	80,100,120,180,220,320	25/$22	800-848-5175	portercable.com

NOTES

1. (AO) Aluminum oxide
   (C) Ceramic
   (Z) Zirconium

2. A Excellent
   B Good
   C Fair
   D Poor

3. A No scratches visible under 2x magnification
   B Minor scratches visible to naked eye
   C Scratches apparent

4. (*) No 180 grit, 150 grit used
   (**) No 180 grit, 120 grit used

5. (*) No 220 grit, 240 grit used

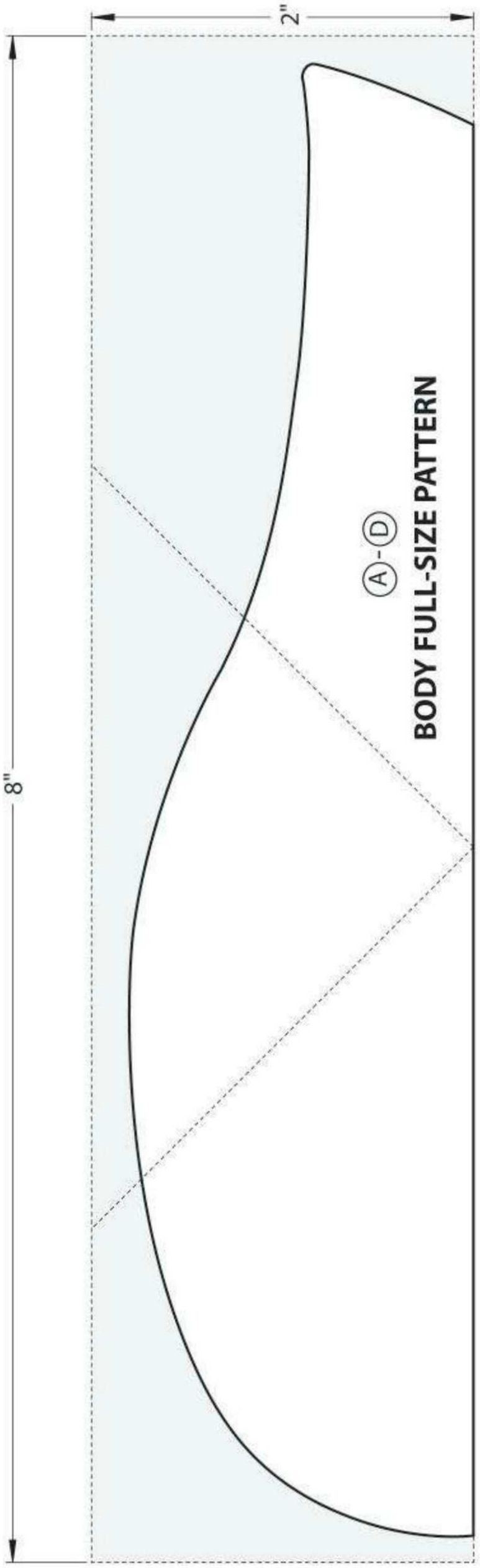
6. Based on ten minutes of sanding

7. (C) Canada
   (F) Finland
   (I) Italy
   (P) Poland
   (U) United States

8. Number of discs per pack as typically sold at retail/cost per pack. Prices current at time of article production and do not include shipping, where applicable.

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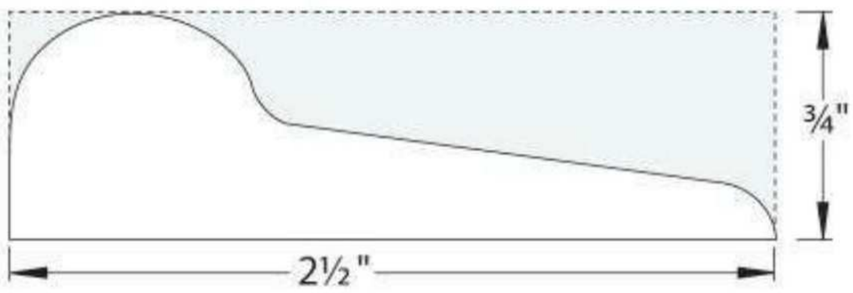
Dear Reader: As a service to you, we've included full-size patterns on this insert for irregular-shaped and intricate project parts. You can machine all other project parts using the Materials List and the drawings accompanying the project you're building.

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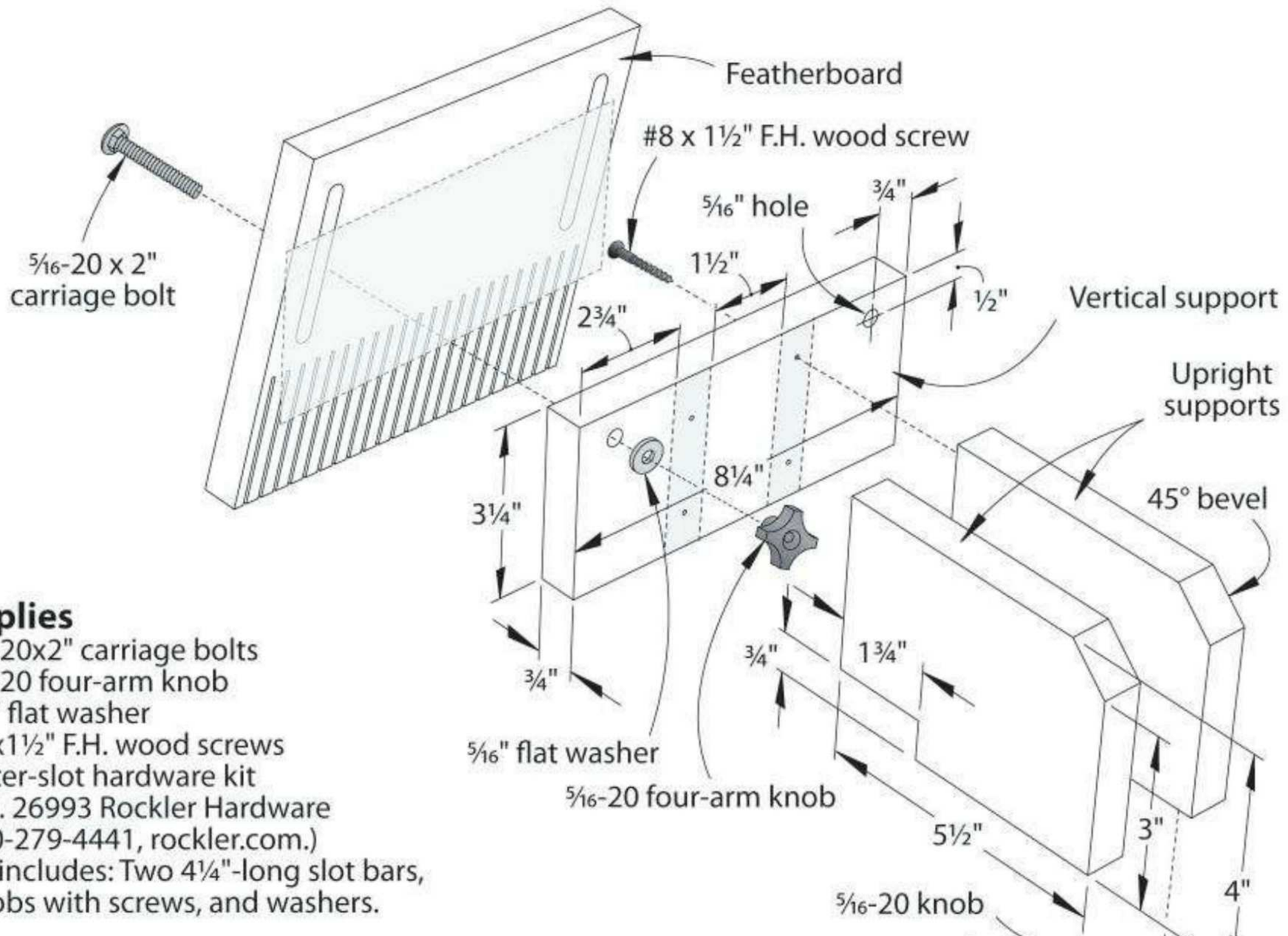
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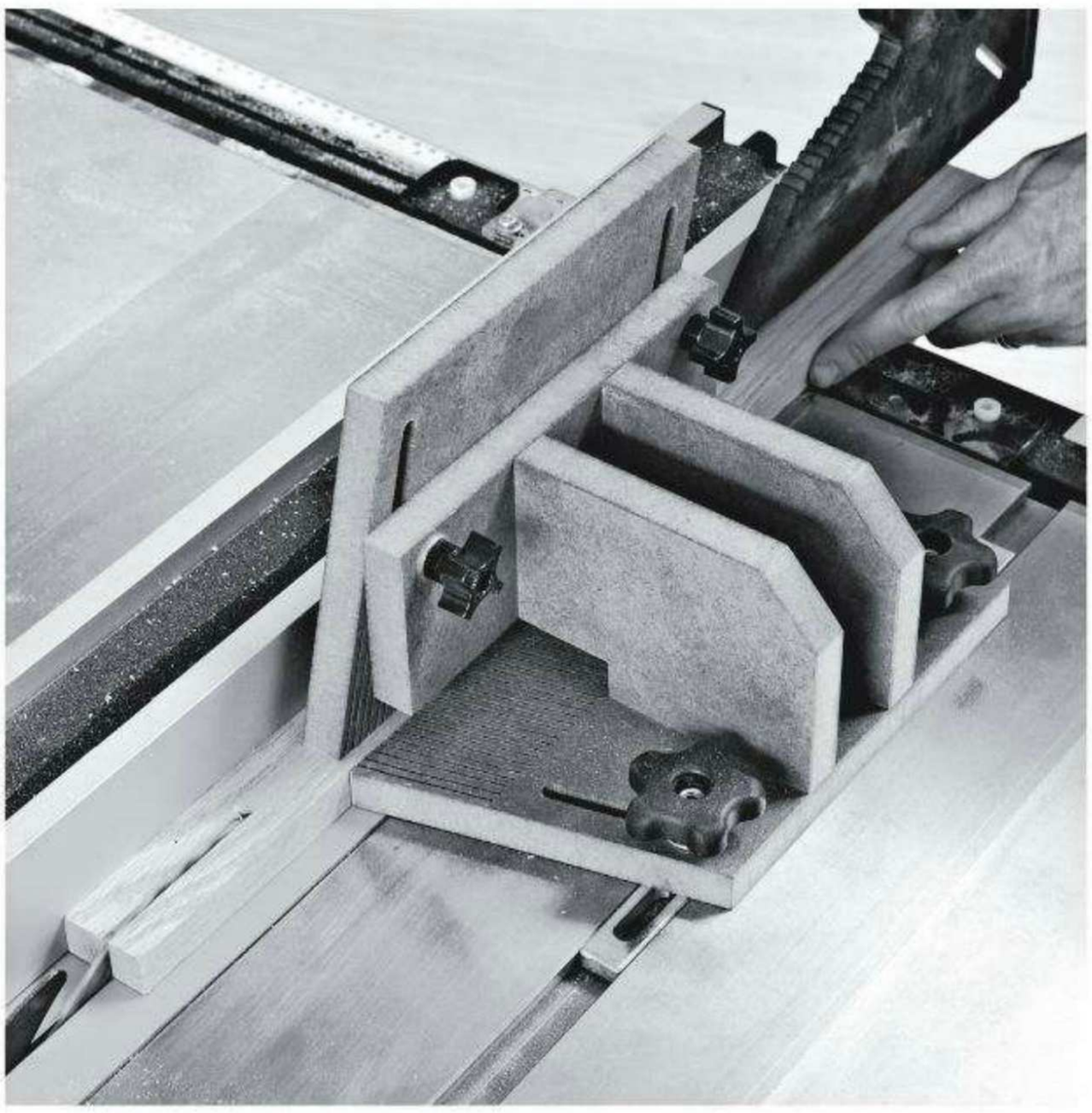
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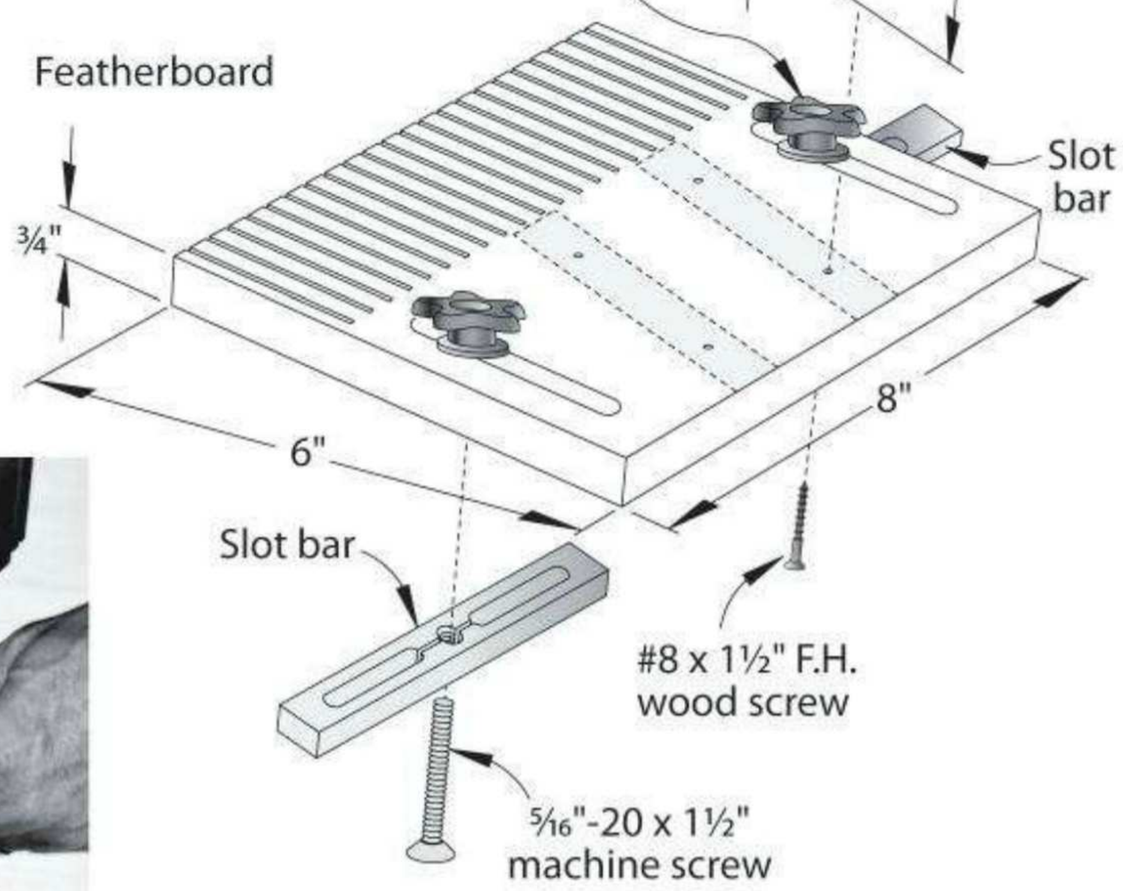


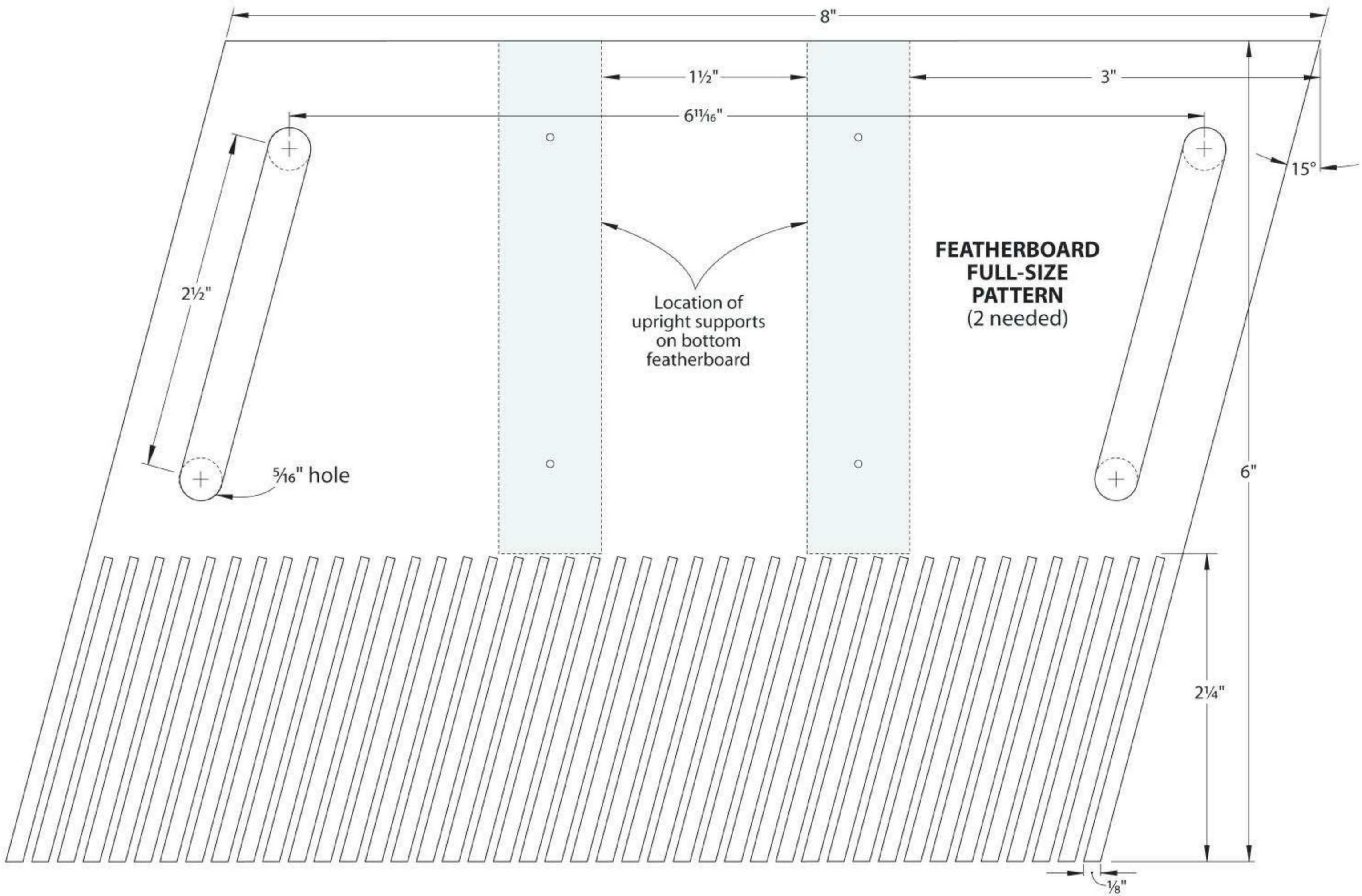
Supplies

2 5/16-20x2" carriage bolts
2 5/16-20 four-arm knob
2 5/16" flat washer
8 #8x1½" F.H. wood screws
1 Miter-slot hardware kit
(no. 26993 Rockler Hardware
800-279-4441, rockler.com.)
Kit includes: Two 4¼"-long slot bars,
knobs with screws, and washers.

BONUS PLAN: Featherboard Jig

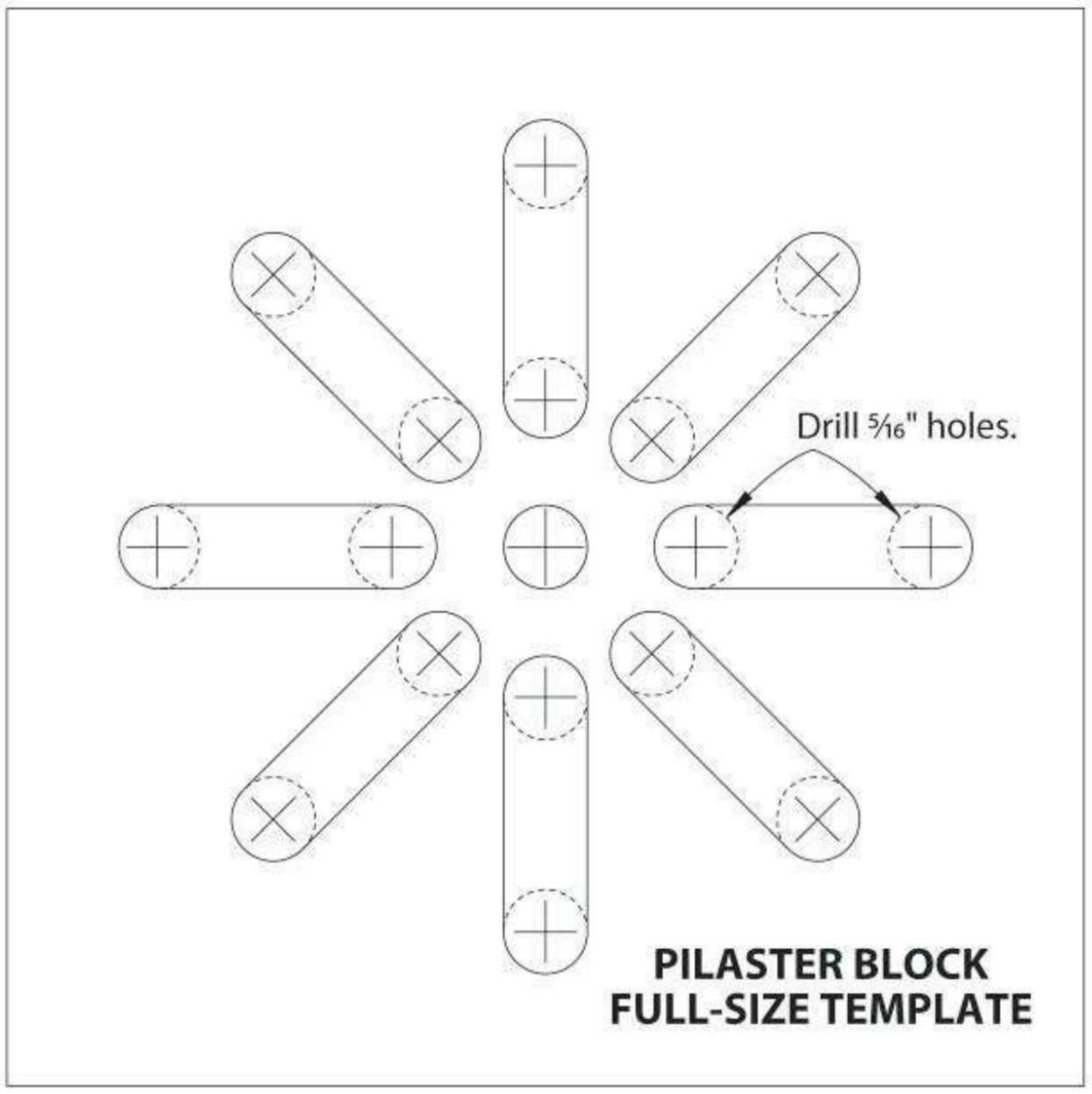




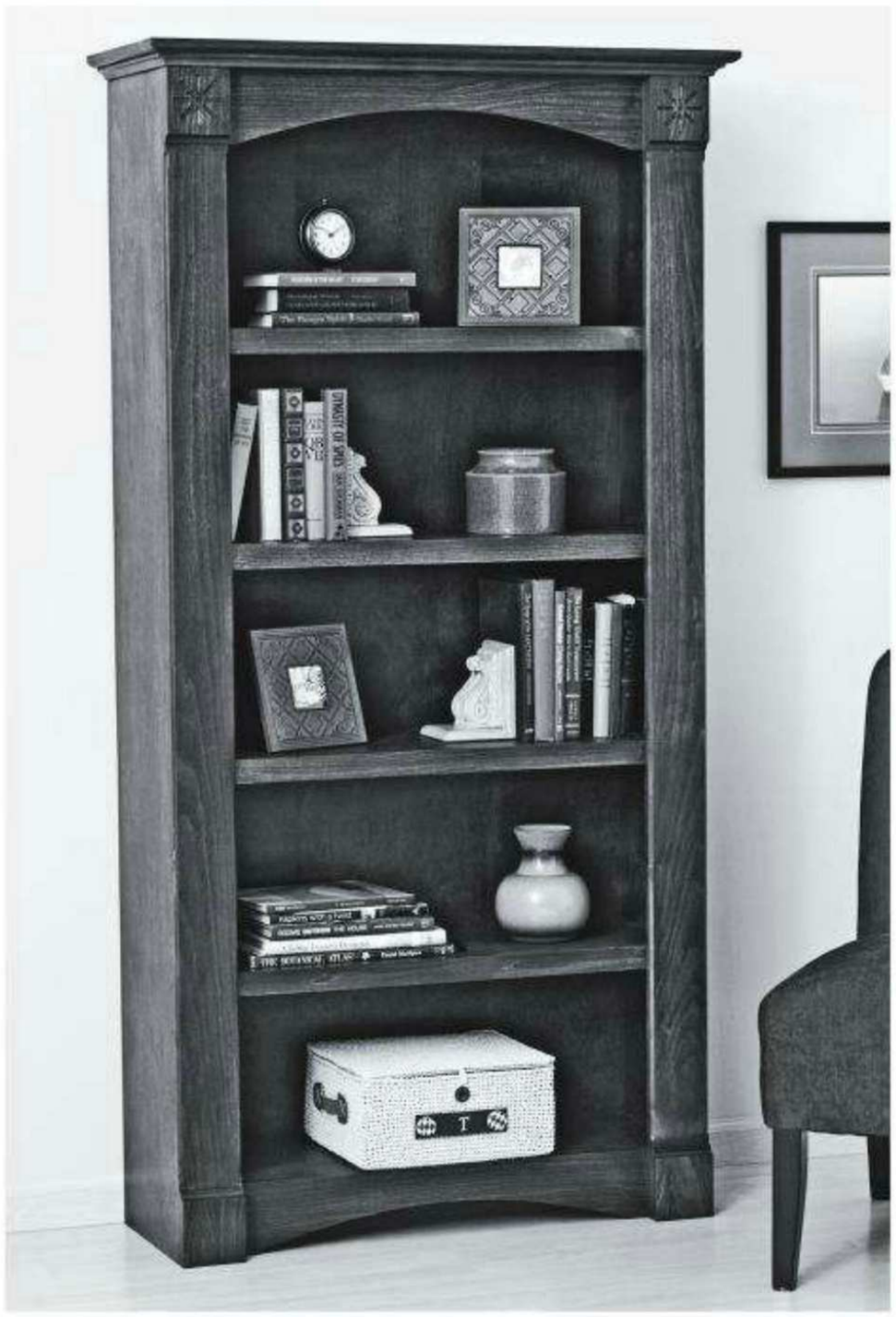

8"
1½"
3"
6¹¹⁄₁₆"
15°
2½"
5⁄16" hole
Location of upright supports on bottom featherboard
FEATHERBOARD FULL-SIZE PATTERN
(2 needed)
6"
2¼"
⅛"

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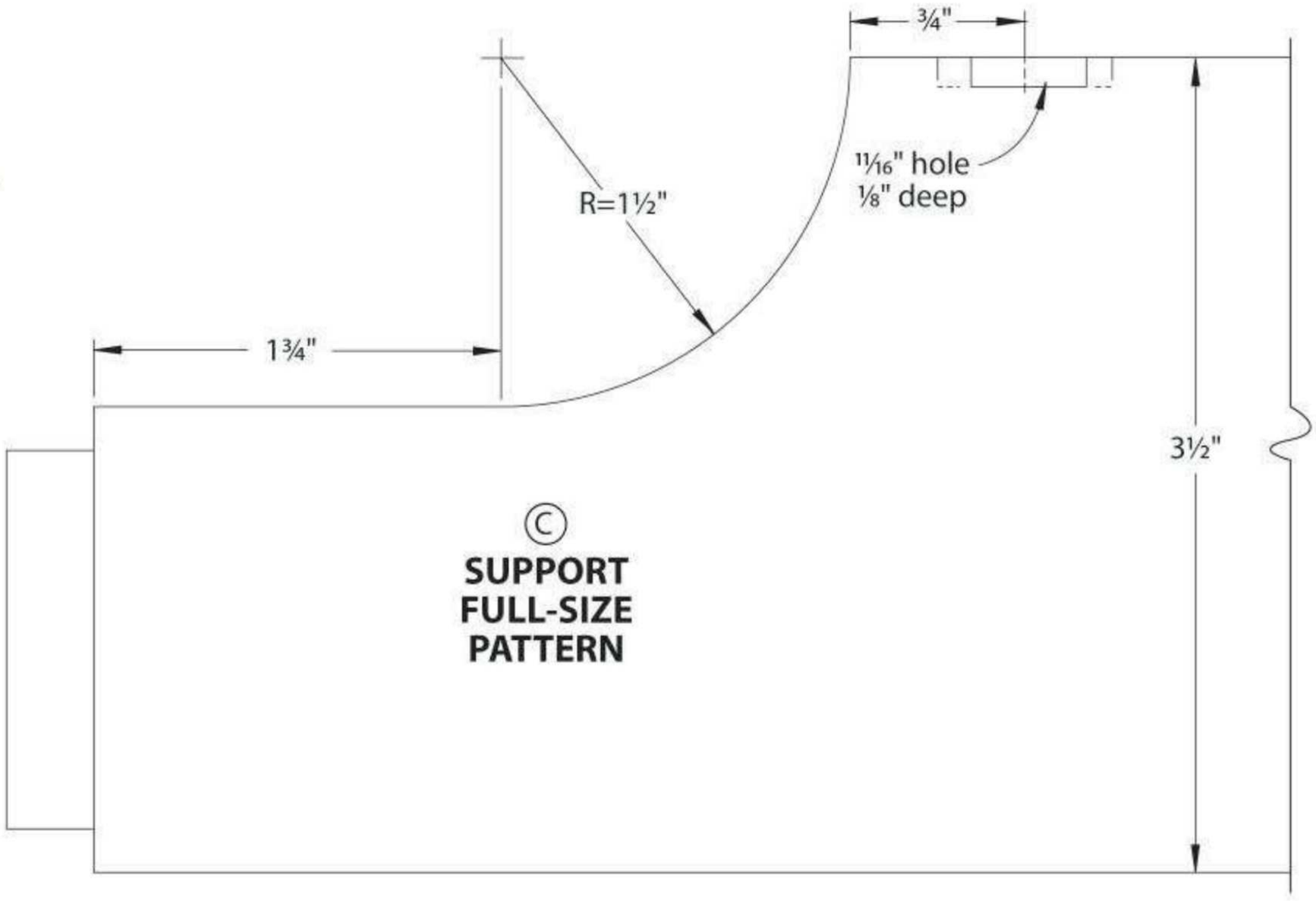


Basic-Built Bookcase
Page 36



Floating-Top Table Page 72





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Bonus Offer
$50 Savings Card



"We have had the Sleep Number bed for a few years now and can say it is the very best investment we have ever made. Back pain was a fact of life for me for years. After sleeping on the Sleep Number bed, I have improved significantly. It is amazing to go to bed in pain and wake up refreshed and pain free."

Janet D., Mt. Vernon, WA

Sleep Better On Air®

Are You Frustrated by the Quality of Your Sleep?

Do you toss and turn at night? Can't seem to find a comfortable position? Does your back ache when you awake? These are signs that your mattress may not be supporting you properly, robbing you of the sleep you need. SUFFER NO MORE!



FIRMNESS ADJUSTS ON EACH SIDE

The Sleep Number® Bed Makes Innersprings Obsolete

A traditional innerspring mattress offers only hard metal coils for support. By contrast, the *Sleep Number* bed's revolutionary design features air-chamber technology that adjusts to your ideal level of firmness and support.



An innerspring mattress creates uncomfortable pressure points that can disrupt sleep.

A Sleep Number® bed adjusts to your body, relieving pressure points.

You Customize the Firmness

The Sleep Number Bed by Select Comfort™ is unlike any other. It's the bed you adjust to your exact comfort and firmness preference, your SLEEP NUMBER® setting. Our easy-to-use handheld remote and advanced air-chamber technology allow you to quickly adjust the firmness from extra firm to feather soft at the touch of a button.

Each Side of the Bed Adjusts Independently

Best of all, each side of the SLEEP NUMBER® bed adjusts independently, making it the perfect bed for couples.

TRY IT FOR 30 NIGHTS, RISK FREE!†

We're so sure you'll sleep better, you can take up to one month to decide, or your money back!† You've got to sleep on it to believe it.

Receive a Special Thank You Gift!

For a limited time, inquire about our revolutionary bed and we'll send you a special **$50 Savings Card** to use toward the purchase of any *Sleep Number* bed or accessory items of $100 or more.‡

Get Relief from Back Pain



It's the bed clinically proven to relieve back pain and improve sleep quality. Clinical studies show an amazing 93% of participants reported back-pain relief while 90% said other aches and pains were reduced.*

*Descriptions of clinical studies conducted on the *Sleep Number* bed are available at 1-800-831-1211.
†If not satisfied after 30 nights, call within 45 days of delivery to arrange return. We'll reimburse the purchase price less your initial shipping or Home Delivery and Setup fees. You pay return shipping. No returns or exchanges on adjustable bases, closeout or demo bed models.
‡Restrictions apply. See card for details and expiration date.
©2009 Select Comfort

Call Now! 1-800-831-1211 ext 39767
sleepnumber50.com



❑ **YES!** Please send me a FREE Brochure, DVD and Pricing.

❑ **Limited-Time Bonus!**
$50 Thank You Savings Card!‡

Name_____
(Please print)
Address_____
City_____ State_____ Zip_____
Daytime Phone_____ Ext. 39767
Email_____

Mail to: *Select Comfort, 9800 59th Avenue N., Minneapolis, MN 55442*

sleep number

‡Restrictions apply. See card for details and expiration date.

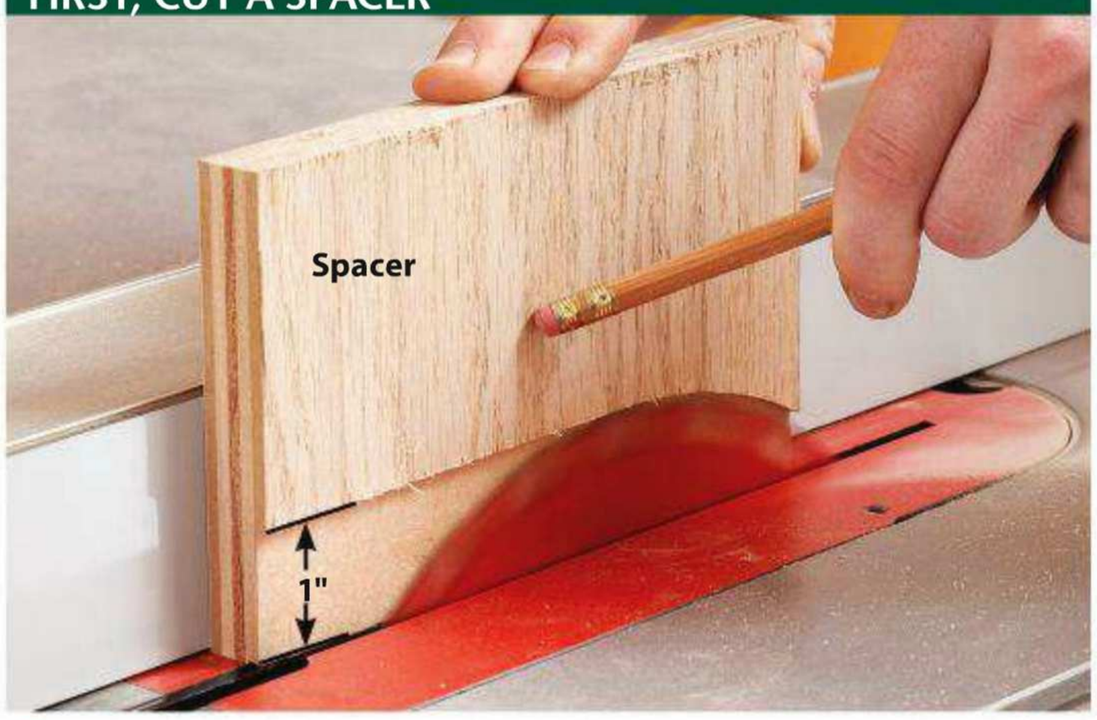
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Cut Perfect Grooves & Rabbets Without a Dado Set

Save time and hassle by making the cuts with a combination or rip blade.

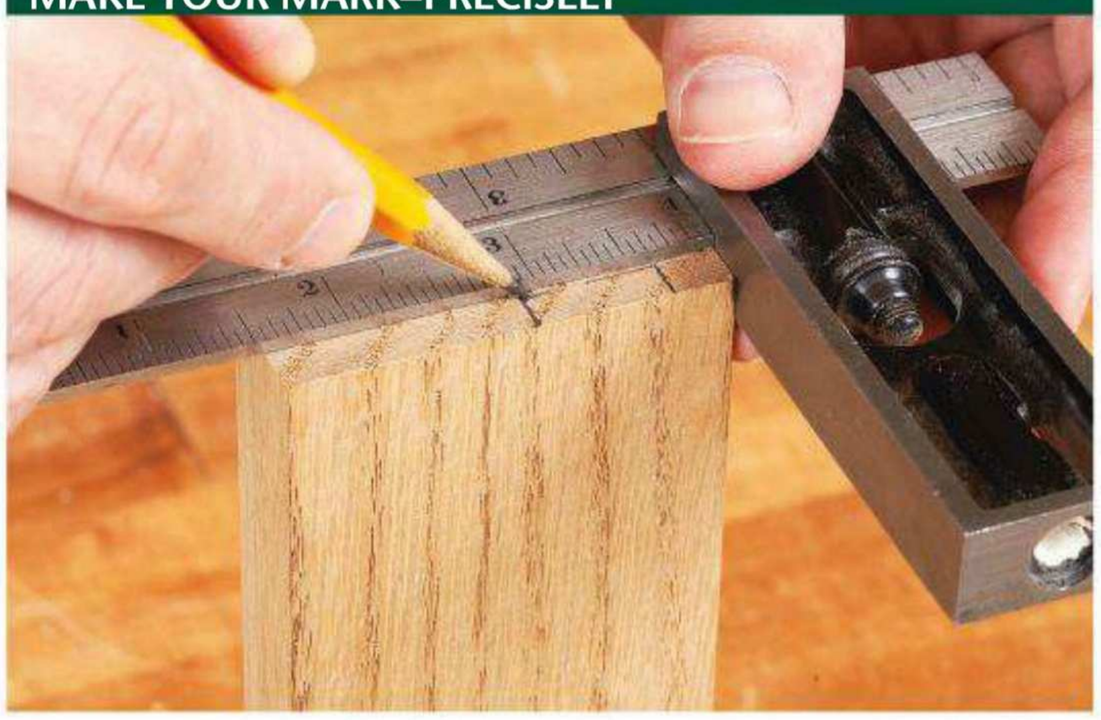
Every once in a while, a project plan calls for a quick groove or rabbet; but installing and fine-tuning the width of a dado set really kills your momentum in the shop. This simple method for cutting grooves and rabbets guarantees a perfect fit, even in odd-size plywood, using the blade already in your saw.

FIRST, CUT A SPACER



1 From a scrap of the stock you want to fit into the groove, carefully rip exactly a blade's thickness from one face. Make the cut about 1" deep, as shown.

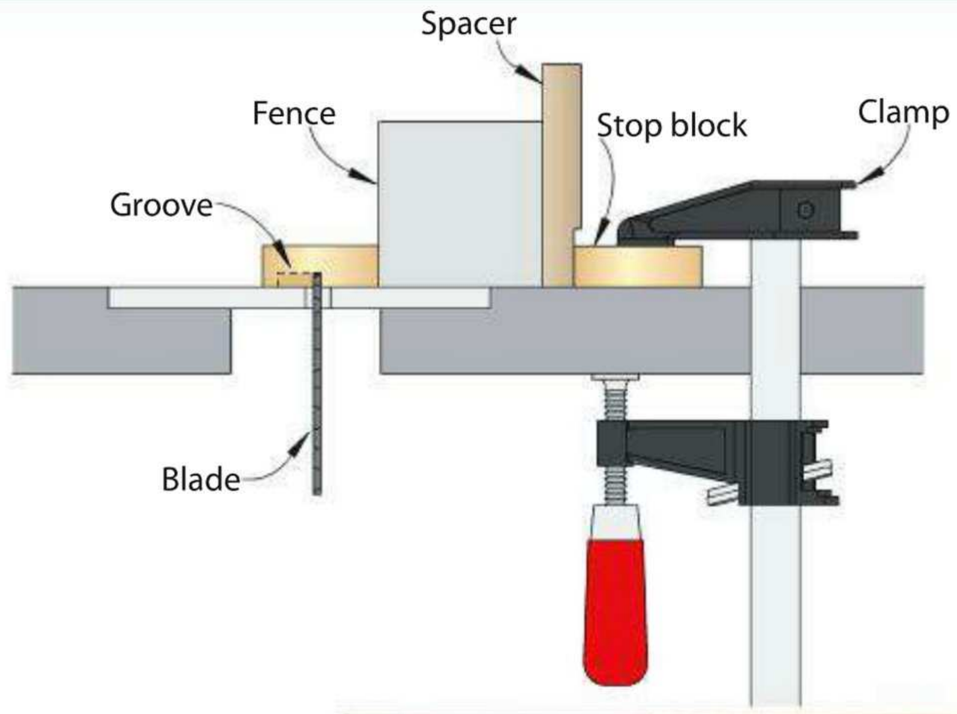
MAKE YOUR MARK–PRECISELY



2 Now mark the location of the groove using a scribing knife or sharp pencil. Set the blade depth to match the depth of your groove—no more than one-third the thickness of the stock.

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ESTABLISH ONE EDGE OF THE GROOVE



3 Adjust your fence so the blade aligns with the near side of the marked groove, and lock it in place. Place the spacer against the outside of your fence, butt and clamp a stop block against that, and make the first cut.



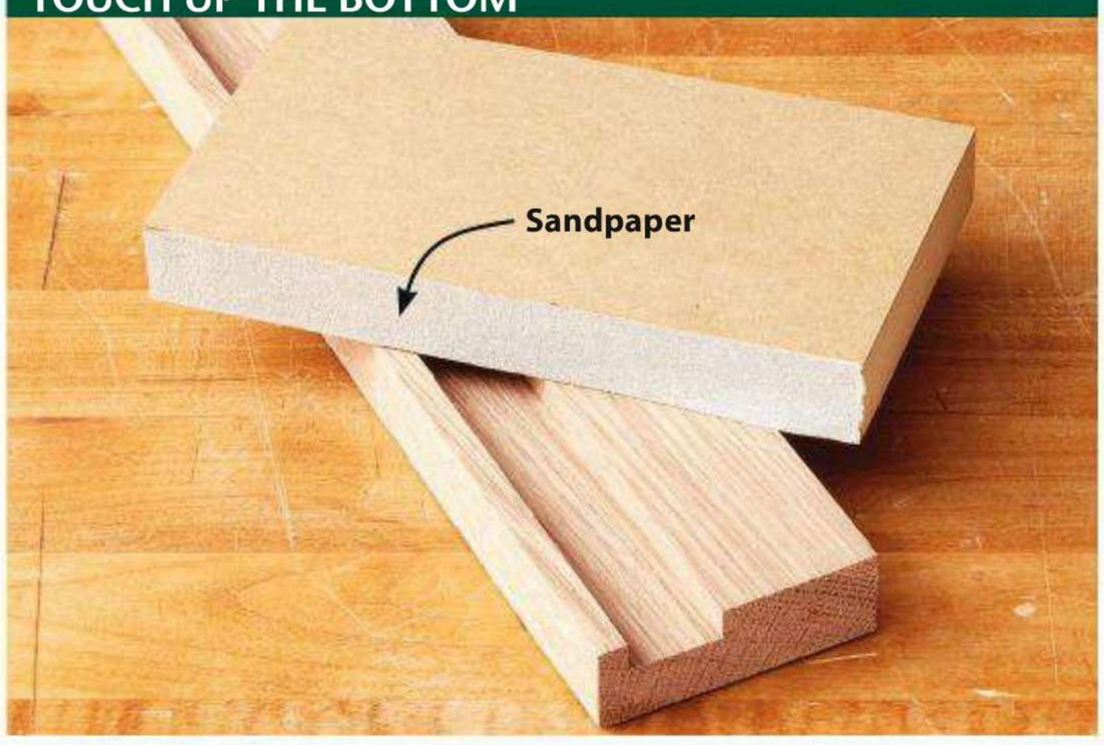
CUT THE SECOND EDGE



4 Remove the spacer, and butt the fence against the stop block. Make your second cut (right). Now, make repeated cuts to clear the waste between them. (See opening photo, *previous page.*) Move your saw fence over the thickness of your blade's kerf after each cut.

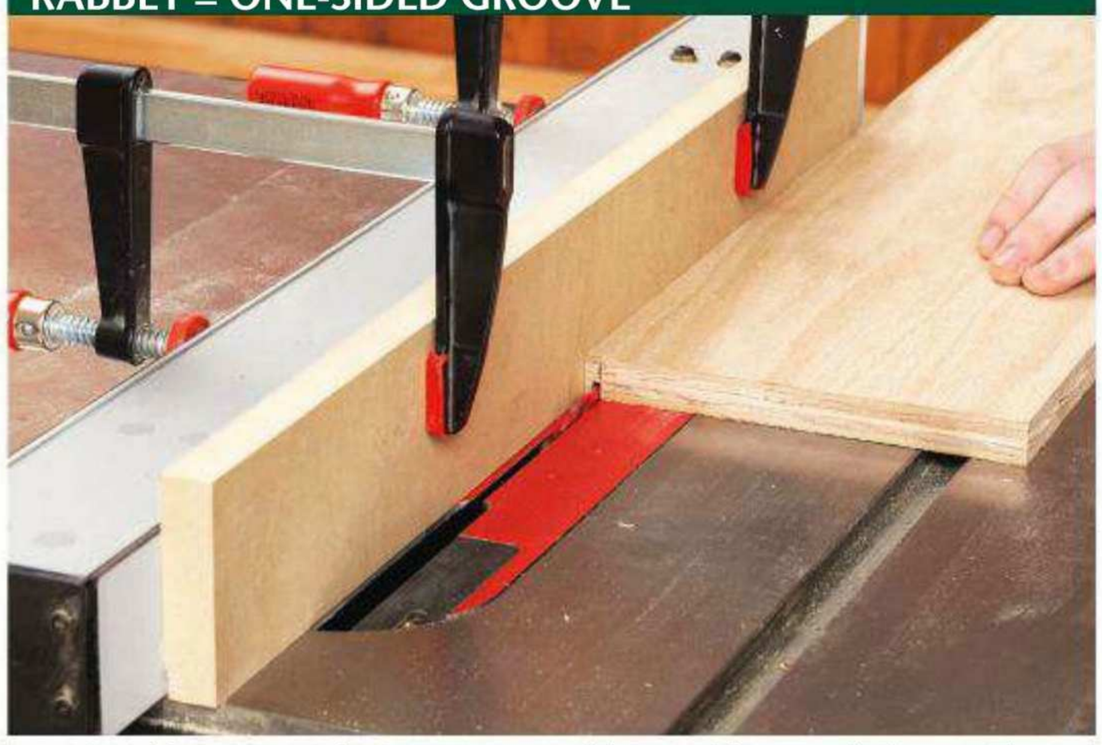


TOUCH UP THE BOTTOM



5 After clearing the groove, remove any ridges at the bottom with a chisel of the same width as the groove or with a strip of adhesive sandpaper applied to the edge of scrap shelf stock.

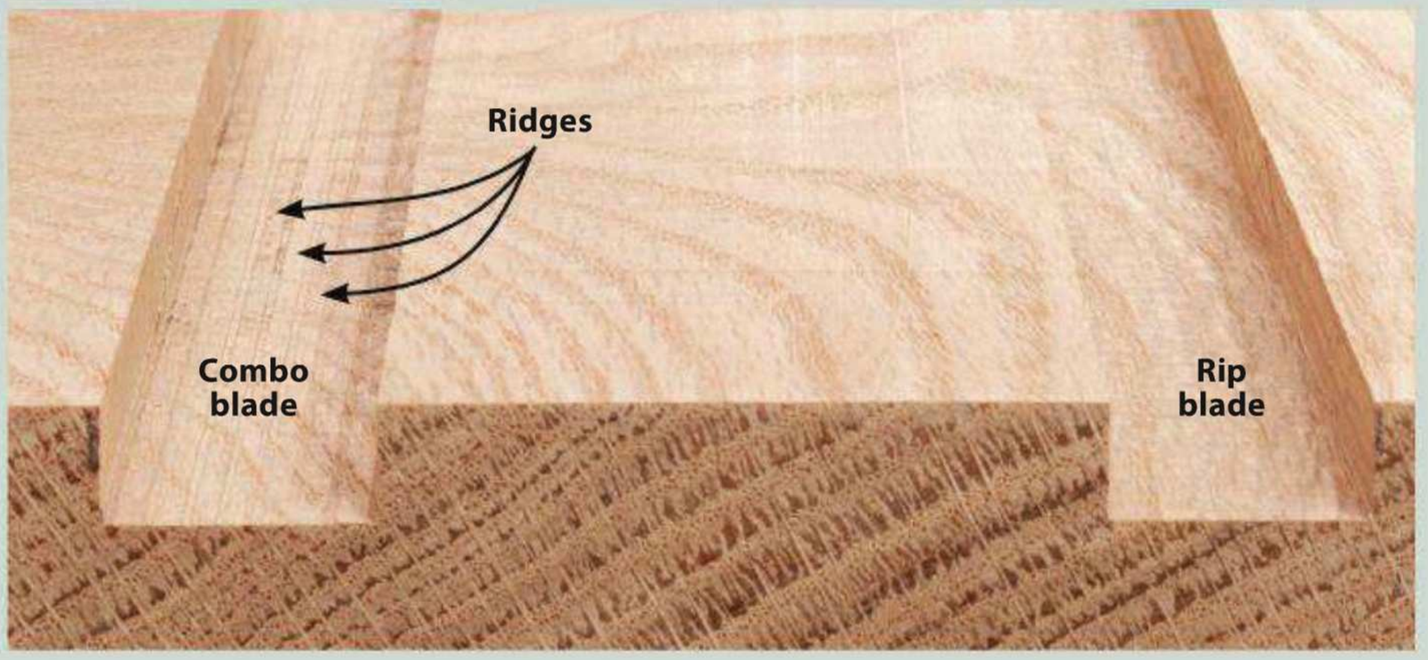
RABBET = ONE-SIDED GROOVE



6 Use this same technique to cut rabbets without a dado set. The addition of a sacrificial wooden fence prevents the blade from cutting into your tablesaw's metal fence.

Combo vs. Rip Blade

Rather than using a combination blade for cutting grooves, switch to a rip blade. The alternating top-bevel teeth of a combination blade leave ridges that weaken a glue joint if not flattened. The flat-ground teeth on a rip blade leave a smoother cut. When cutting dadoes across grain, however, a rip blade will cause chip-out—use a combination blade in this instance for the best results.



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Children's Table and Stools

Build the entire set in one day from a single $25 sheet of MDF!

Dimensions: Table, 22"H × 24" Diam.
Stool, 14"H × 12" Diam.

Approximate sheet-goods cost:
$25, plus $8 in screws.

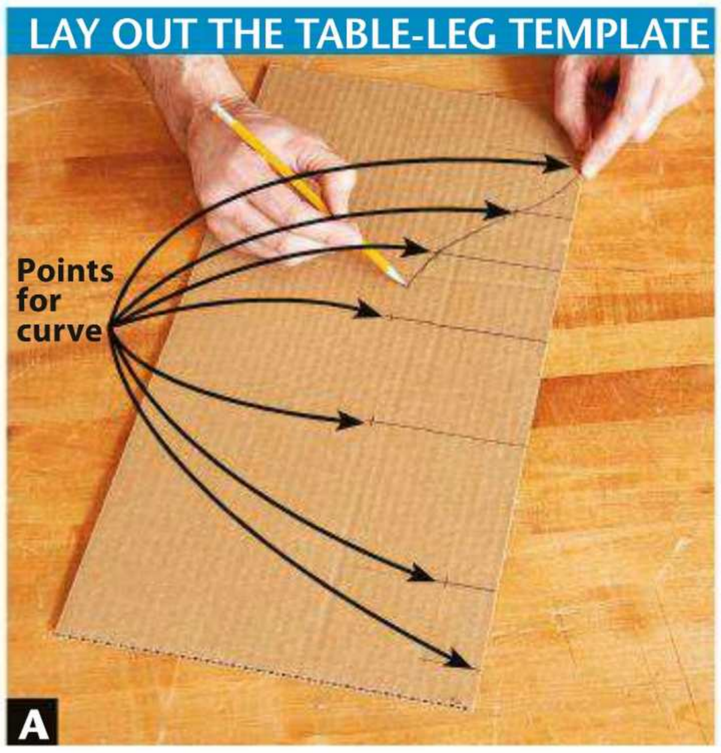
Construct this project, perfect for tea parties or coloring, using just a circular saw, jigsaw, router, and drill. We chose MDF because it won't splinter, paints easily, and offers a flat, smooth surface. If the adults want a version for their playtime, refer to the instructions starting on *page 55*. That set requires just two sheets of pine plywood.

8 simple steps build a table

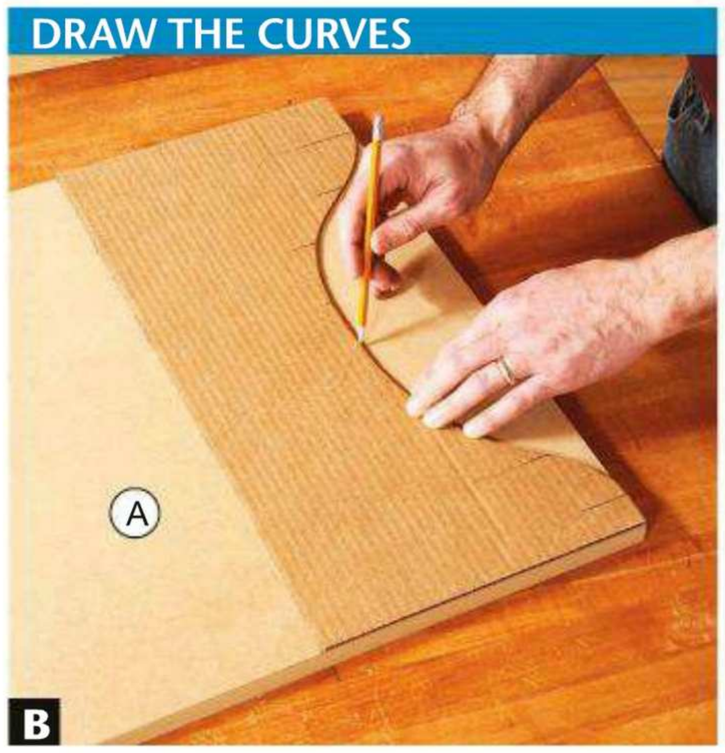
1 On a 21¼"-long piece of cardboard or hardboard, plot the points for the curve in the sides of the table legs (A) [**Drawing 1**]. Connect the points [**Photo A**], then cut and sand to the line to make a template for the table legs.

2 Following the **Cutting Diagram** and **Materials List** on *page 54,* lay out the table and stool parts on a sheet of MDF. (See **More Resources** on *page 57* for free

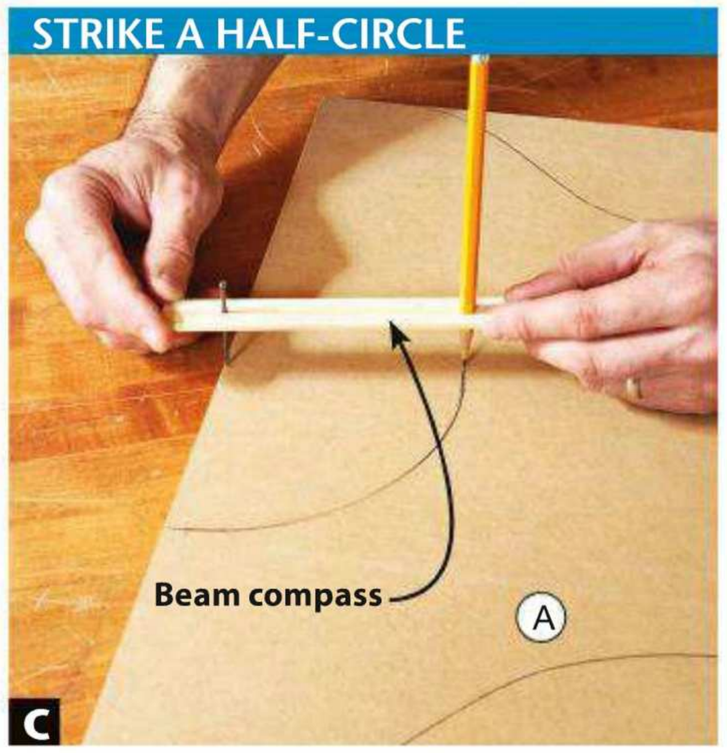
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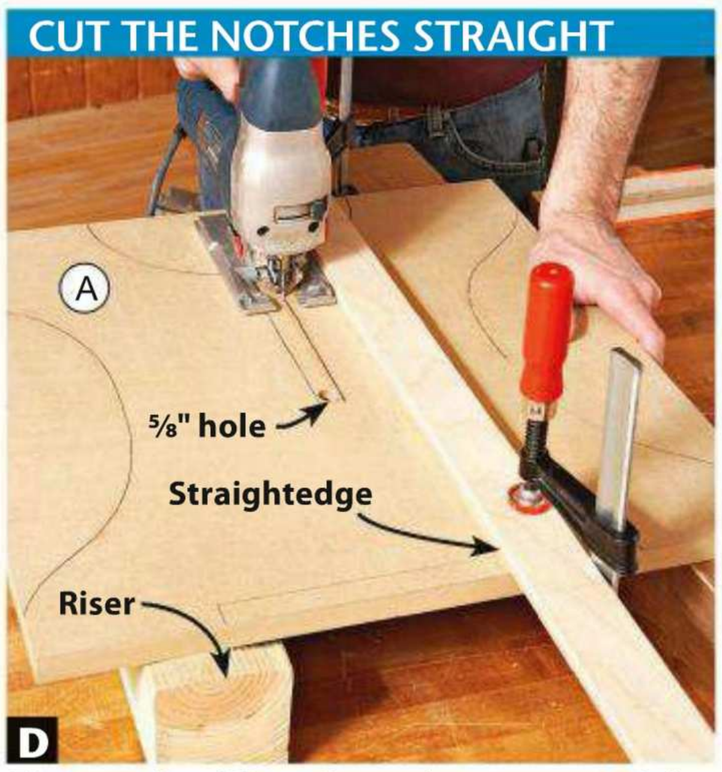
After laying out the seven points, connect them with a flowing line. Cut close to the line, then sand the template edge smooth.



Align the template flush with the ends and an edge of each leg (A). Trace the curve, then flip the template to lay out the other edge.



Place the nail of the beam compass at the center of the bottom edge, then strike an arc on each leg (A).



Elevate a leg (A) on risers, then use a straight-edged scrap to guide your jigsaw. Cut slowly to avoid twisting or bending the blade.

videos about handling sheet goods and cutting them to size.) Cut the table legs (A) to size, then use the template and a pencil to draw the curve on each side of the legs [**Photo B**]. To lay out the arch along the bottom, make a simple beam compass by driving a nail through one end of a scrap, then drilling a hole to fit a pencil [**Photo C**].

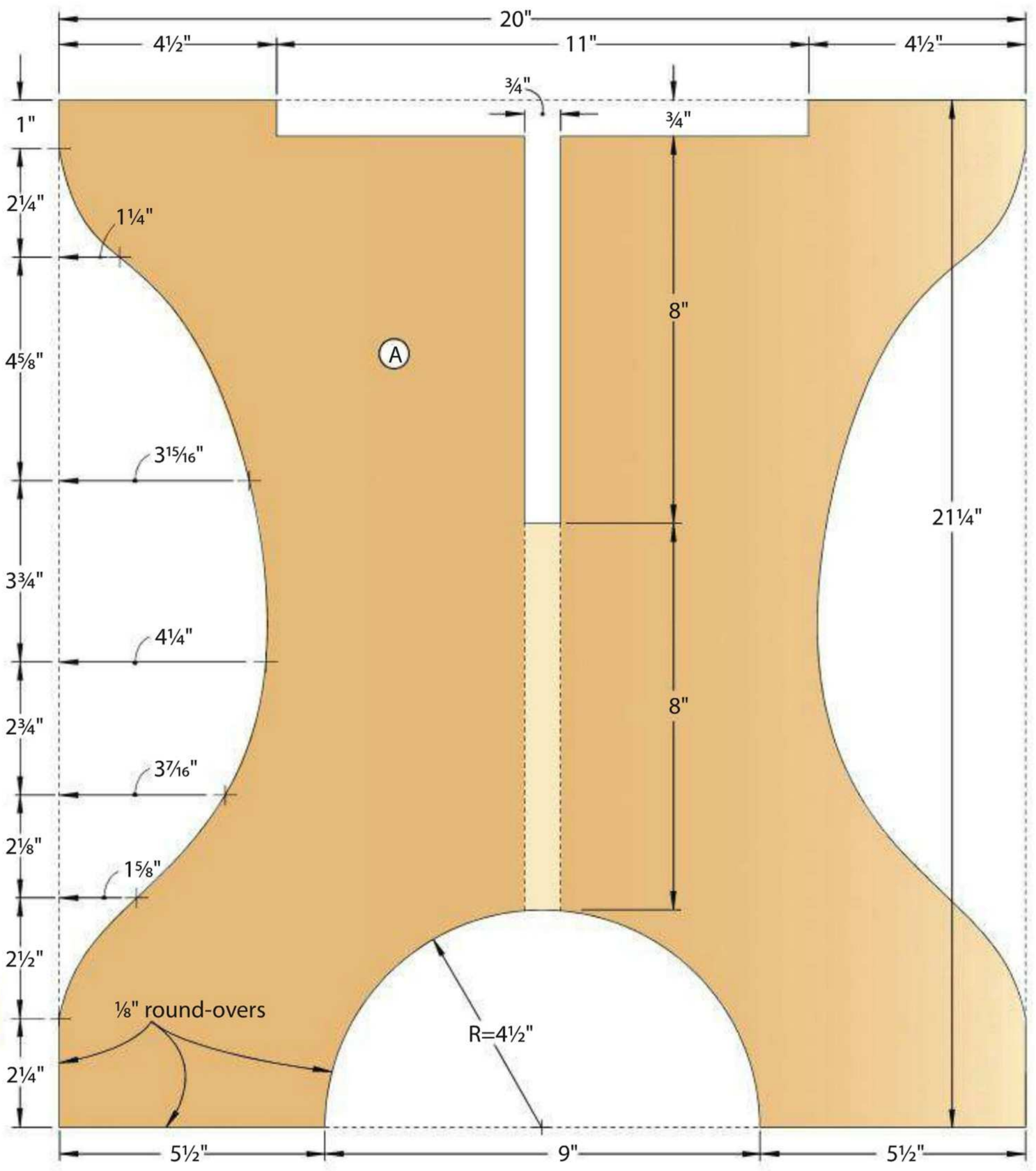
3 Next, lay out the vertical and horizontal notches in the legs (A). ***Note:*** *One leg has the vertical notch at the top, the other has it at the bottom* **[Drawing 2].**

Quick Tip! Get the width perfect. Mark one side of each notch, then place a scrap of MDF (on edge) along the line and trace along the MDF.

4 To define the end of each vertical notch, drill a ⅝" hole in each leg (A). Then, to help position a straightedge to guide your jigsaw, measure from the edge of your jigsaw base to the near edge of the blade. Clamp a straightedge this distance from and parallel to a layout line and cut the notches [**Photo D**].

Quick Tip! Better under than over. It's better to cut the notches too narrow than too wide. You can file a narrow notch wider, but too-wide notches mean sloppy-fitting legs. Slide the legs together to test the fit of the notches. Separate the legs, and jigsaw the curves and the arch in each one.

1 CHILD'S TABLE LEG



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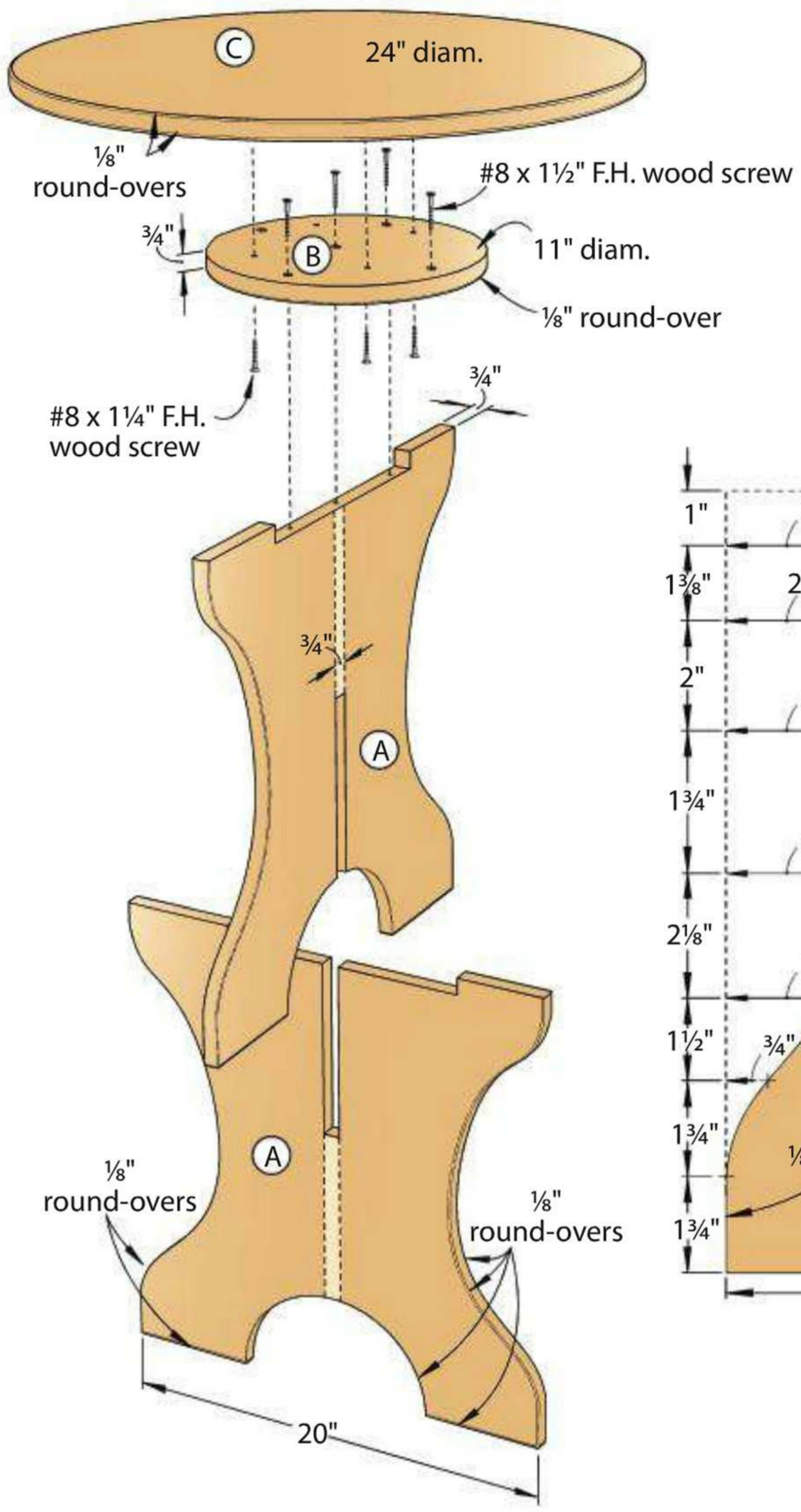
5 Carefully cut and sand the top support (B) and tabletop (C) to shape [**Drawing 2**]. Using 150- and 220-grit sandpaper, sand the edges of the legs (A), top support, and tabletop smooth, and rout ⅛" round-overs where indicated.

6 Assemble the legs (A), and position the top support (B) in the recess. Drill and countersink 3/32" pilot holes, and screw the top support to the legs using #8×1½" wood screws. Center the tabletop (C) on the support and drive #8×1¼" wood screws through the top support into the tabletop.

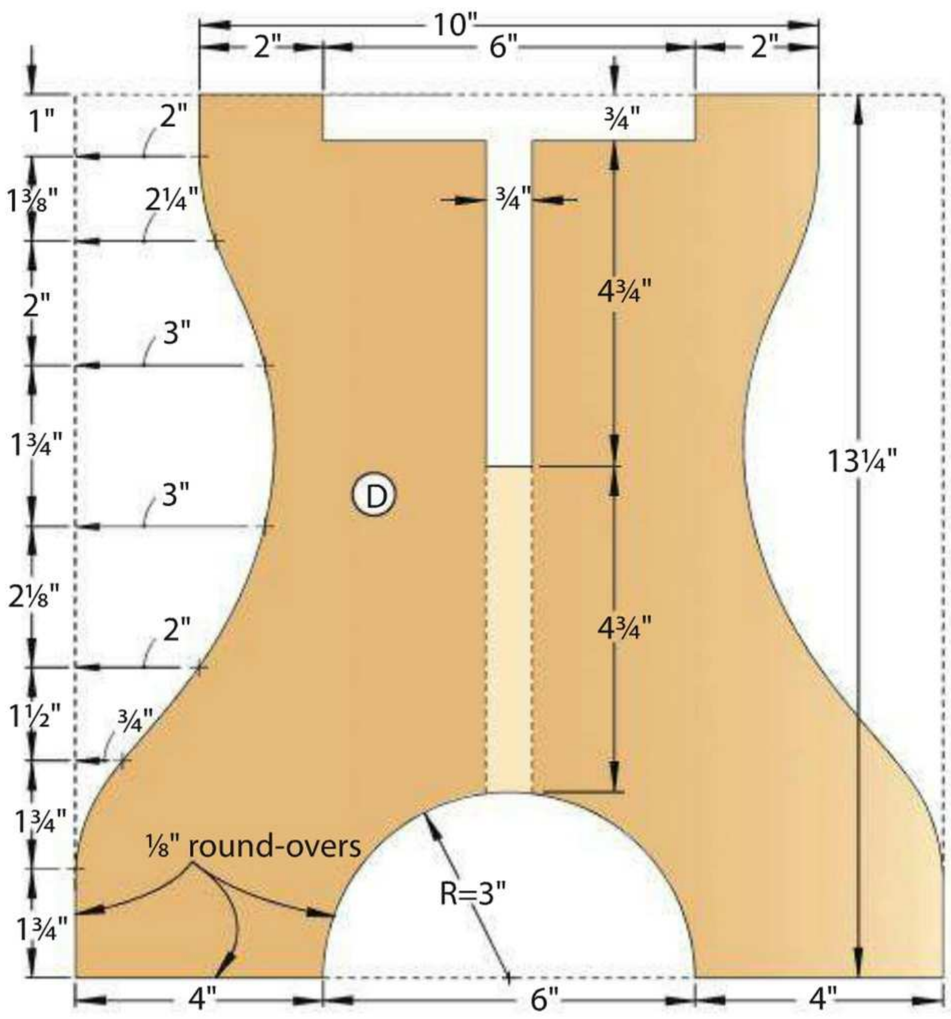
7 Build the stools using the same methods used for the table, referring to **Drawings 3** and **4**.

8 Apply a finish. We used Sherwin-Williams satin-finish paints: 6133 Muslin for the legs; 6969 Indulgent for the tabletop; and for the stools, 6885 Knockout Orange, 6933 Clean Green, 6897 Sundance, and 6953 Candid Blue.

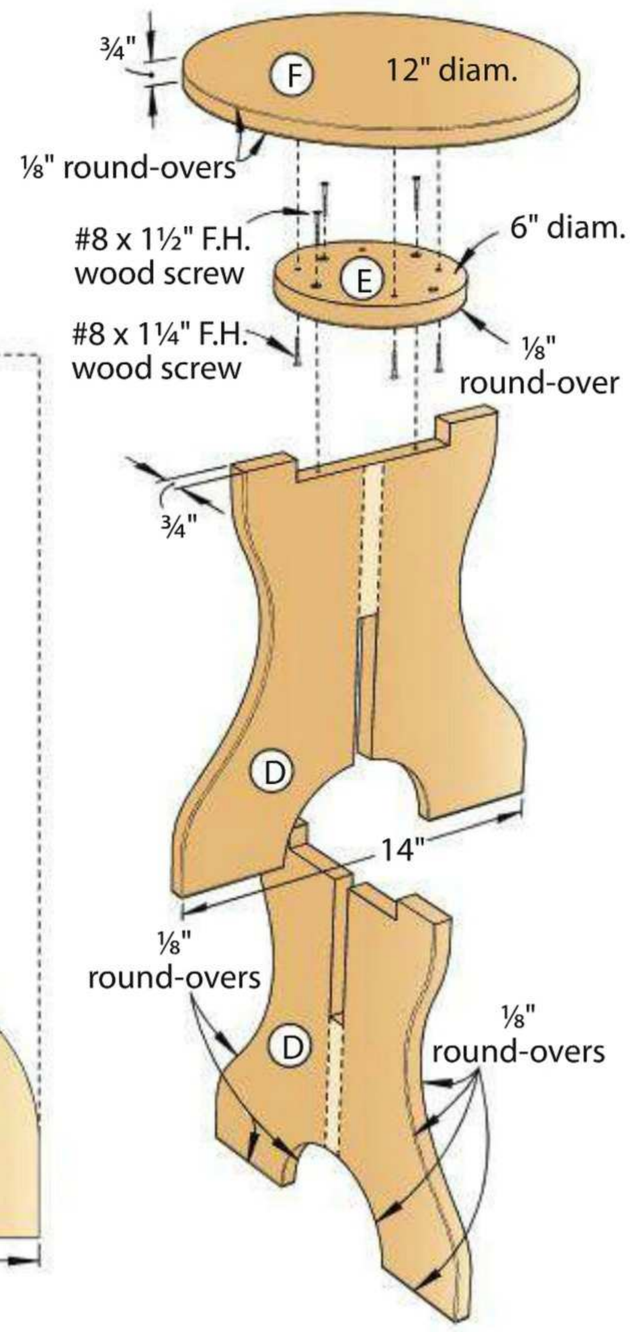
2 CHILD'S TABLE EXPLODED VIEW



3 CHILD'S STOOL LEG



4 CHILD'S STOOL EXPLODED VIEW



Materials List

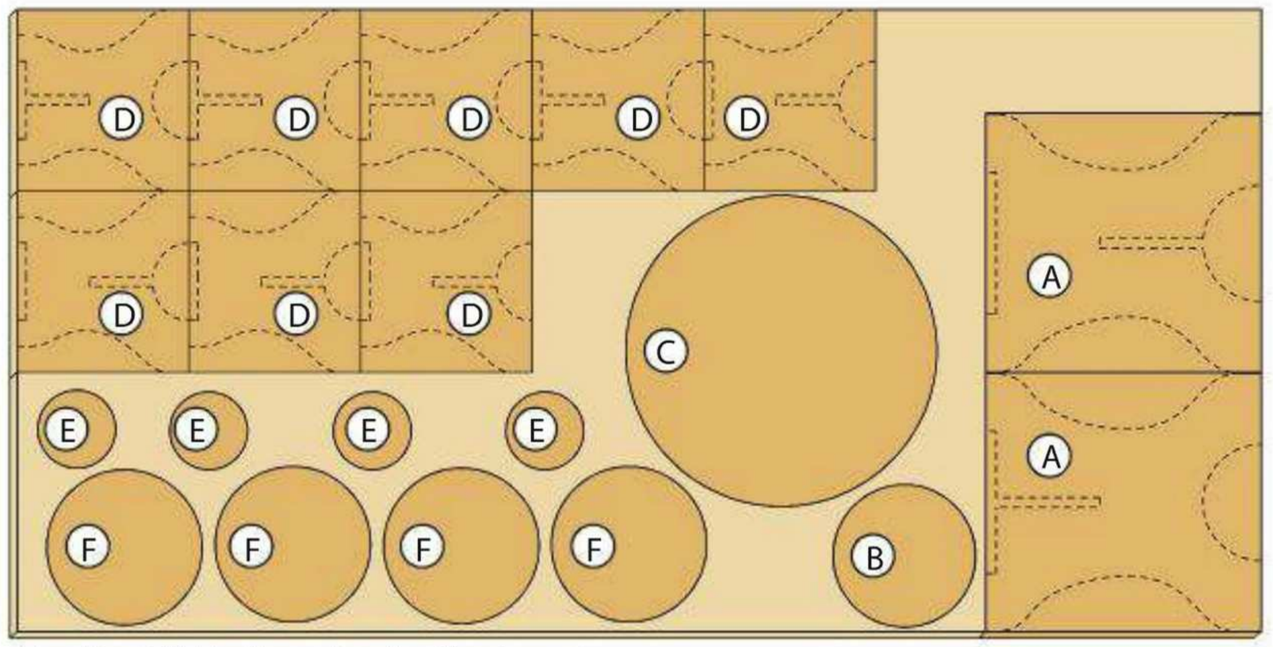
Child-size Table and Stools

		FINISHED SIZE T	W	L	Matl.	Qty.
Table						
A	legs	¾"	20"	21¼"	M	2
B	top support	¾"	11" diam.		M	1
C	tabletop	¾"	24" diam.		M	1
Stools						
D	legs	¾"	14"	13¼"	M	8
E	seat supports	¾"	6" diam.		M	4
F	seats	¾"	12" diam.		M	4

Materials key: M–Medium-density fiberboard (MDF).
Supplies: #8×1¼" flathead wood screws (20), #8×1½" flathead wood screws (21).
Bits: 3/32", 5/8" drill bits; ⅛" round-over router bit.

Cutting Diagram

Child's Table and Stools



¾ x 48 x 96" Medium-density fiberboard

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Now Make A Set For Grown-ups

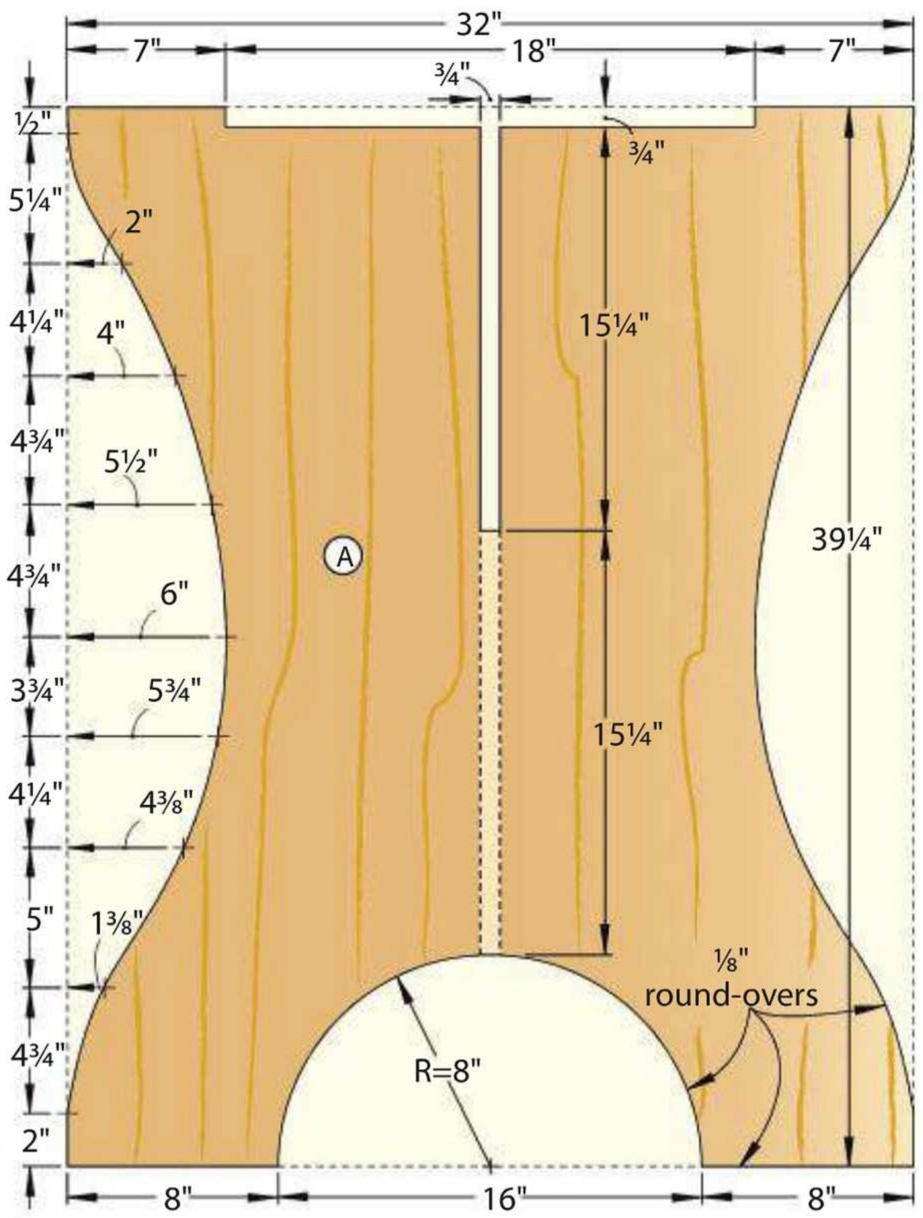
Stylish when you need it, stores flat when you don't.



Dimensions: Table, 40⅜"H × 35" Diam.
Stool, 29⅜"H × 13" Diam.

Approximate sheet-goods cost:
$90, plus $13 in hardware and screws.

5 ADULT TABLE LEG



Built larger, the table and stools serve as casual party furniture that lies flat for storage in the off-season, *below right*. To better support adult weights, we used ¾" plywood instead of MDF for this version. Cut the entire set from just two sheets [**Cutting Diagram**, *page 57*]. We found AC-grade plywood with two smooth faces at a home center.

Use the same techniques used on the previous pages for building the child-size table and stools. Refer to **Drawings 5–8** for dimensions and note the following additional steps:



The stools nest between the legs, reducing the footprint of the adult-size set to the tabletop diameter.

DISASSEMBLE IT 1–2–3, THEN STACK IT TO STORE IT

1) Unscrew the tabletop to remove it.



2) Unscrew the support from the legs.



3) Slide the legs apart. That's it!



Everything stores flat. Keep the hardware in a zippered plastic bag.



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■ After cutting and shaping the parts, sand the faces and edges to 220 grit.

■ Slide the legs (A) together, and secure the bottom intersection with a T-strap [**Photo E**].

■ Because the adult stools are taller, we added footrests (G). Cut the slot for each footrest in the leg (D) that has the vertical notch at the top [**Drawings 7, 8**].

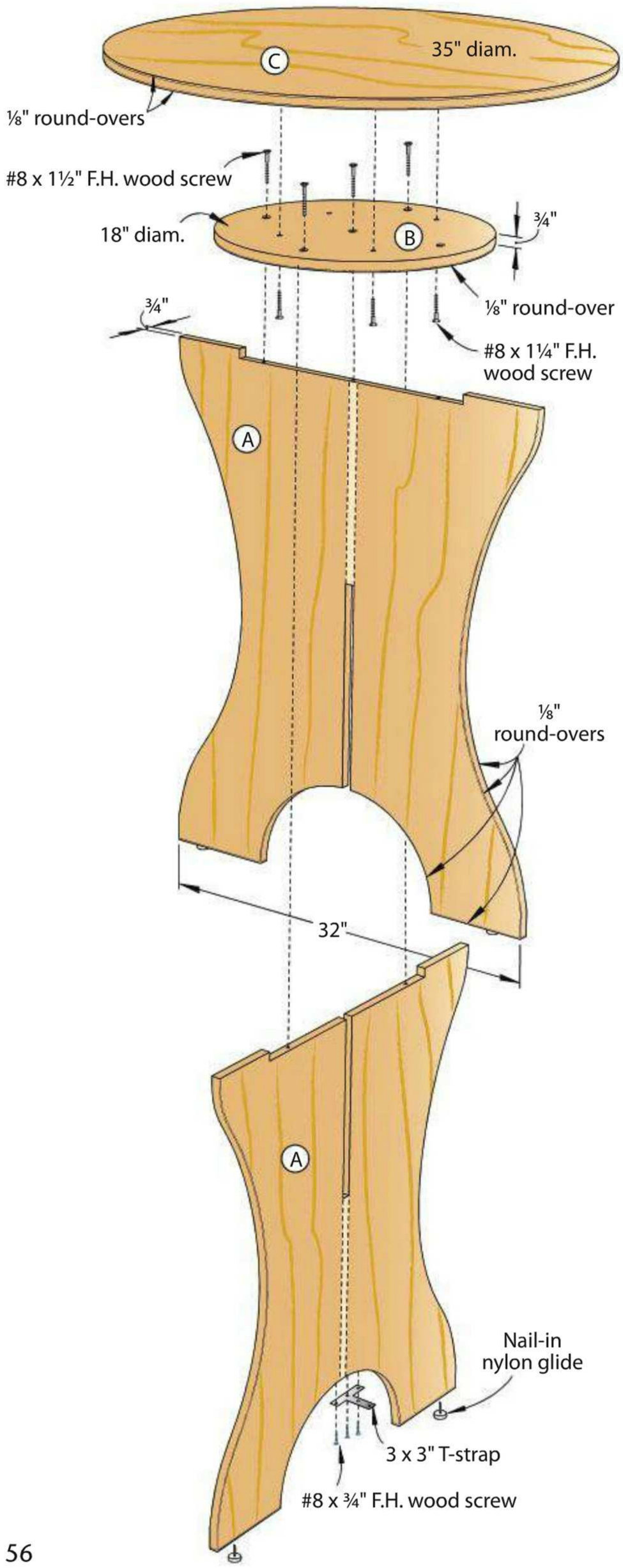
■ Secure each footrest (G) in its slot with #8×1½" wood screws [**Drawing 8**].

■ Disassemble the pieces, marking them to help with reassembly later, and apply an outdoor finish. We used Behr semi-transparent deck stain, choosing Cedar Tone for the legs, and Woodbridge for the tops. If you paint yours, the interlocking slots on the legs must fit loosely enough to allow them to slide back together after applying paint.

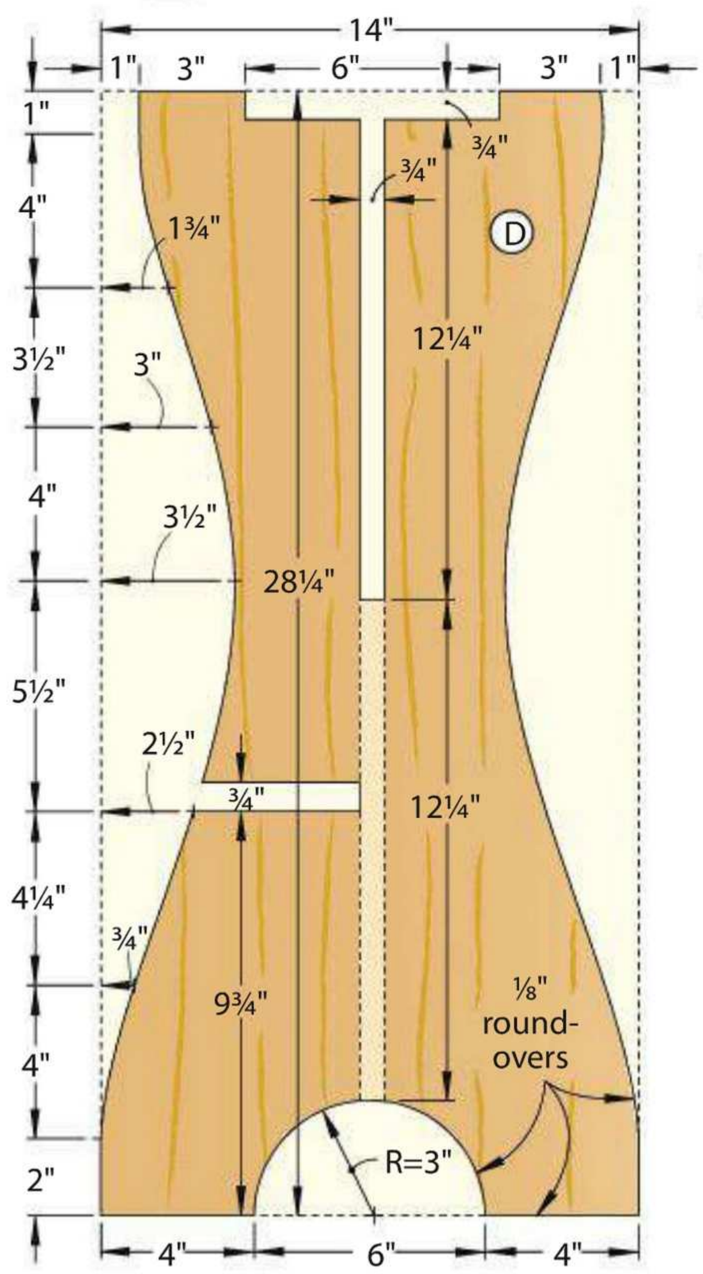
After the finish dries, reassemble the set, hammer in the nylon glides centered on the width of each foot [**Drawings 6, 8**], and get the party started.

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

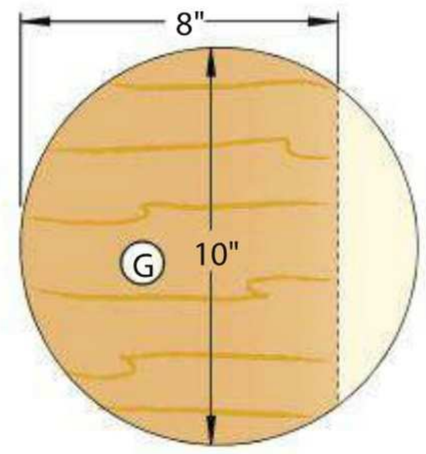
6 ADULT TABLE EXPLODED VIEW



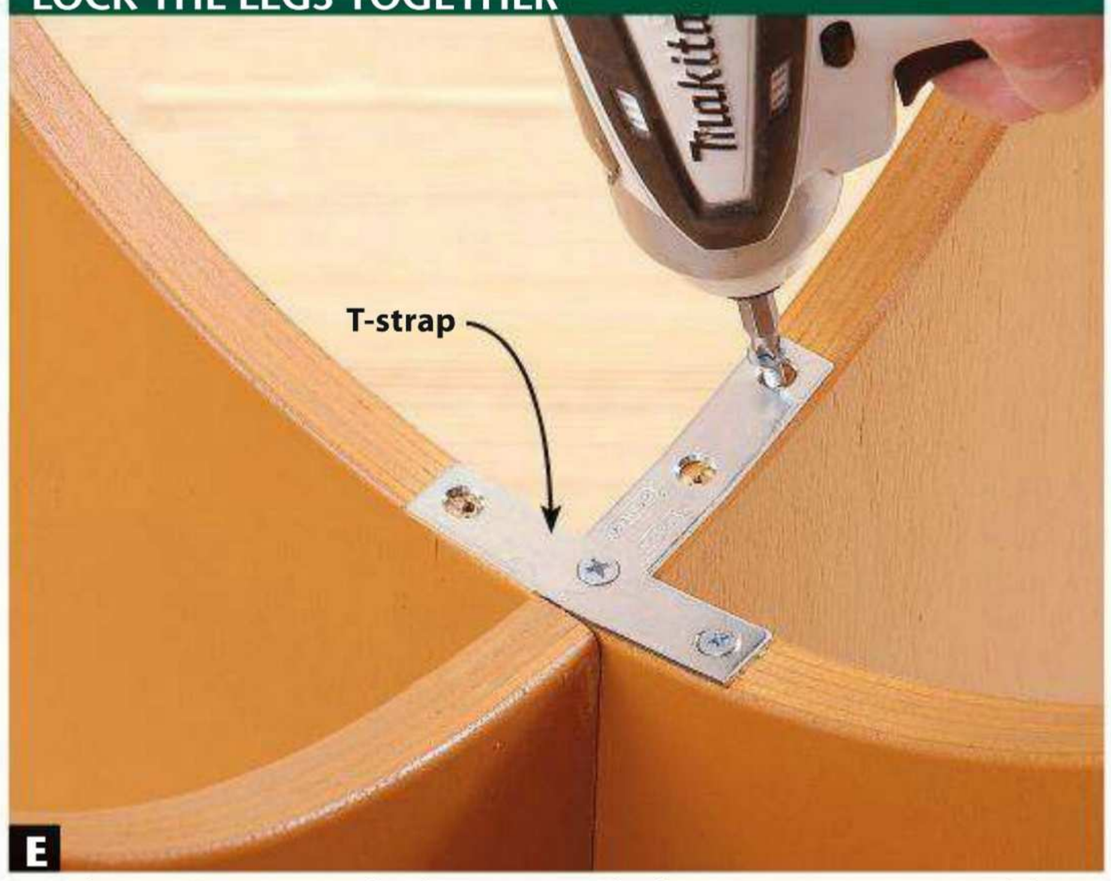
7 ADULT STOOL LEG



7a FOOTREST DETAIL



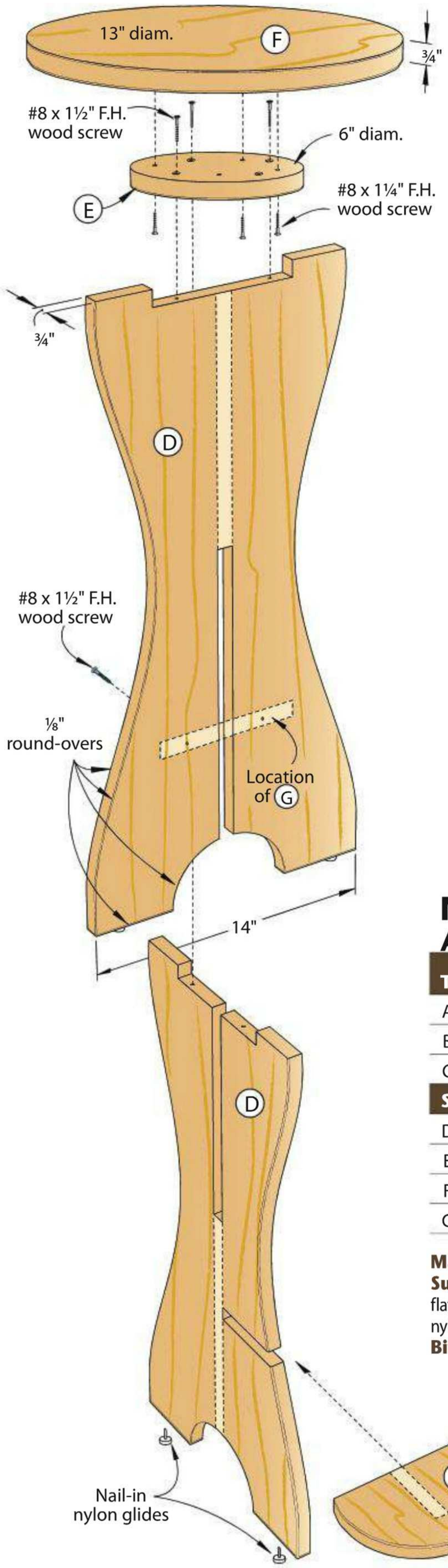
LOCK THE LEGS TOGETHER



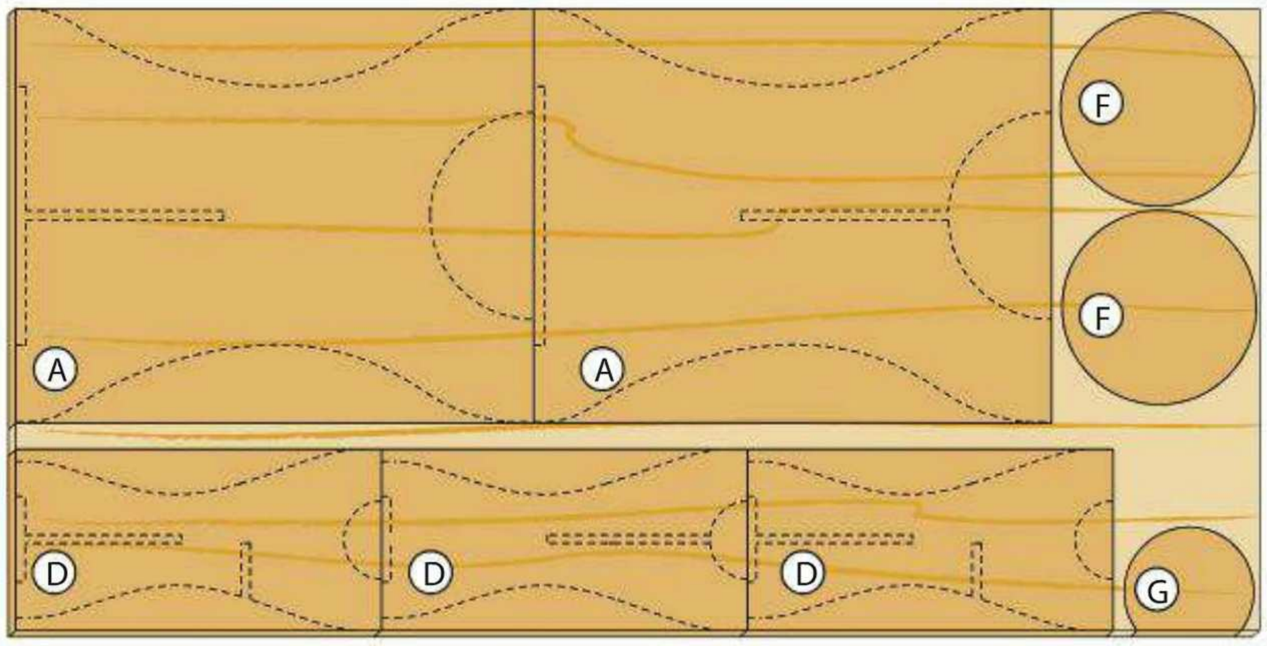
Bend a 3×3" T-strap to fit the curve at the bottom intersection of the legs (A). Drill pilot holes and screw the strap in place.

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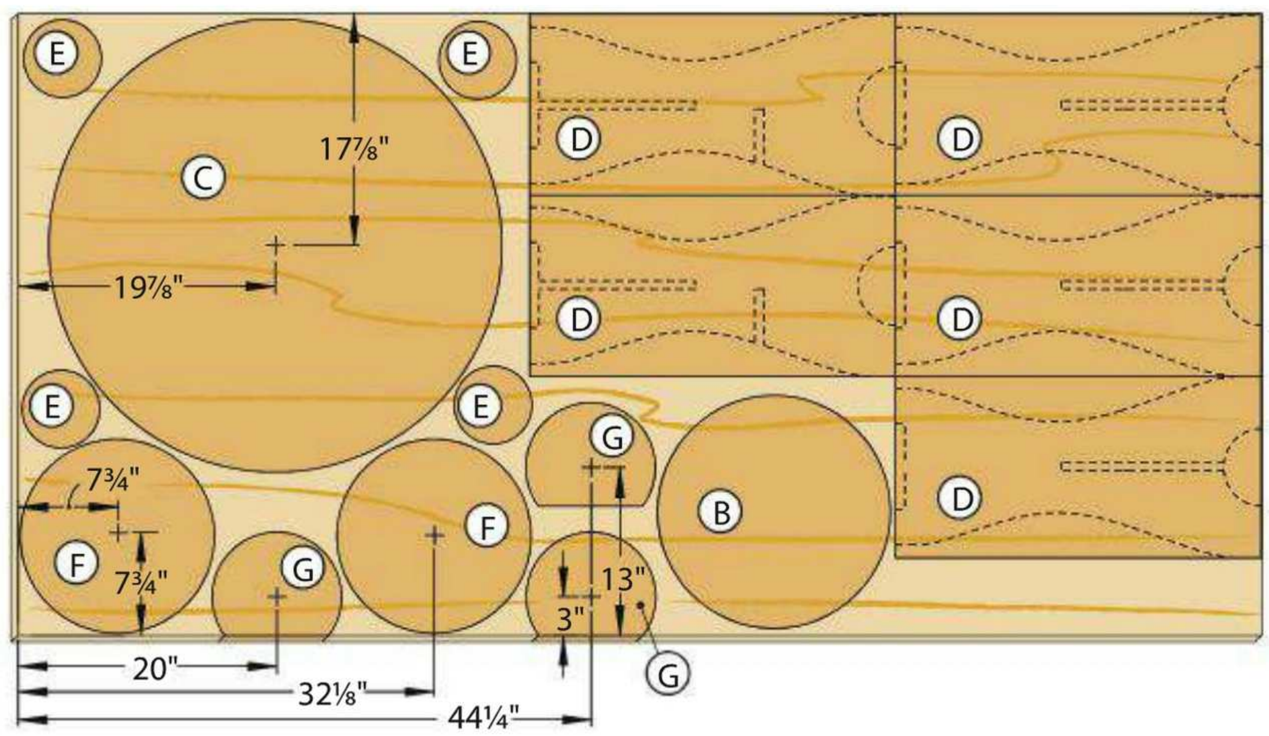
8 ADULT STOOL EXPLODED VIEW



Cutting Diagram
Adult-size Table and Stools



¾ x 48 x 96" Pine plywood



¾ x 48 x 96" Pine plywood

Materials List
Adult-size Table and Stools

		FINISHED SIZE T	W	L	Matl.	Qty.
Table						
A	legs	¾"	32"	39¼"	PP	2
B	top support	¾"	18" diam.		PP	1
C	top	¾"	35" diam.		PP	1
Stools						
D	legs	¾"	14"	28¼"	PP	8
E	seat supports	¾"	6" diam.		PP	4
F	seats	¾"	13" diam.		PP	4
G	footrests	¾"	10" diam.		PP	4

Materials key: PP–pine plywood.
Supplies: #8×1¼" flathead wood screws (20), #8×1½" flathead wood screws (29); 3×3" T-strap (1); ¾" nail-in nylon glides (20).
Bits: 3/32", ⅝" drill bits; ⅛" round-over router bit.

MORE RESOURCES

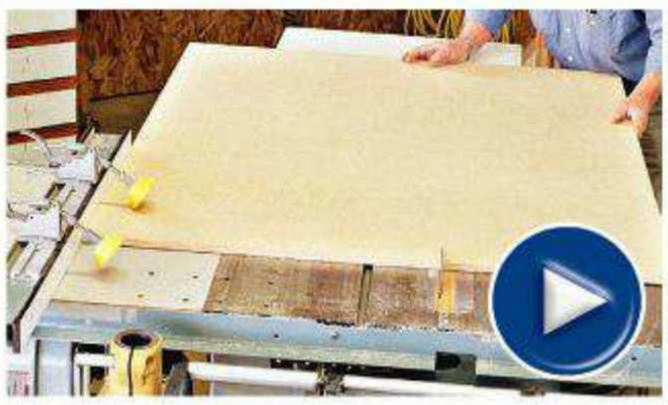
MORE PLANS

- Find more children's furniture and toy plans at: woodmagazine.com/kidsfurn $
- Find more easy-to-build furniture plans at: woodmagazine.com/basicbuilt $

$ – Download these plans for a small fee.

FREE VIDEOS

- Break down sheet goods precisely with a circular saw and router: woodmagazine.com/straightedge
- Get tips for comfortably handling heavy, awkward sheet goods at: woodmagazine.com/sheetgoods



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Portable Air Compressors

We tested 11 units priced from $130 to $325 in search of one that will handle most woodworking-shop needs.

A portable air compressor won't cut, shape, or join wood, but it's one of the handiest tools you'll ever own. You can use it to power pneumatic nailers and other tools in your home, shop, or job site; to inflate all sorts of things; and to blow away wood debris. We like the 3- to 6-gallon size for its all-around usefulness, ease of moving from place to place, and affordability.

Nailers: No problem
Sanders: Sorry

Each of the tested compressors easily powered a brad nailer, finish nailer, roofing nailer, and framing nailer as we drove nails into dimensional pine lumber. To our surprise, all the compressors maintained the required air pressure for our one-nail-per-second testing pace—even with the framing nailer shooting 3½" ribbed nails! In fact, we emptied the nailer's magazine of finish and roofing nails as each compressor's pump kept the tanks supplied with adequate pressure. Only the 3-gallon Husky H1503TP ran out of the pressure needed to drive a full magazine of framing nails at that pace—but it still sank 65 nails before we had to stop and wait for it to replenish the tank.

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Next we used each compressor to spray polyurethane finish with a 600cc gravity-fed spray gun. The best units could spray two minutes before falling short of the requisite air pressure—not long enough for medium- and large-size projects. However, you can successfully spray small projects with one of these compressors if you switch to a detail sprayer with a 100–200cc cup that requires less air volume.

If you plan to run a pneumatic sander, impact wrench, or large spray gun, get a 30-or-more-gallon-capacity stationary compressor. The compressors we tested simply lack the air storage and pump capacity to power these air-hungry tools.

Just because an air compressor pump will run continuously as long as there's demand doesn't mean it should. Each compressor has a "duty cycle," the manufacturer's rating for how long its pump should run. For example, if your unit rates at a 50 percent duty cycle, it should not run more than half of the time you use it. If it exceeds that limit it could overheat and shut down; you need a larger compressor. Four of the models rate as continuous duty, meaning they can run nonstop without overheating. All of these have oil-lubricated motors—more on that next.

Oil-lube or oil-free pump? Both have advantages

The 11 compressors we tested have either oil-lubricated pumps or oil-free pumps. Oil-lube models feature an induction motor with either a cast-iron or aluminum pump housing and twin-stacked tanks. These units run 2–4 times quieter than the oil-free units and generally have less tank capacity, but weigh about twice as much. You'll also need to change the oil a couple of times a year.

Most oil-free compressors have universal motors and a single pancake-style tank. (The oil-free Ridgid OF50150TS has an induction motor and three stacked tanks.) With the lighter weight of the pump and motor comes a lighter price, up to a third less.

Also consider your electrical supply in choosing between the two types of compressors. Oil-lube models require more amps at start-up. Four tested units (Bosch CET3-10, Hitachi EC12, DeWalt D55151, and Senco PC1131) require a 20-amp circuit; those models would not start on some 15-amp circuits in our tests. And, the Bosch and Hitachi failed to start in a 30°F garage. So if you routinely work in a cold environment, opt for an oil-free compressor.



CHECK YOUR OIL

Like an automobile, an oil-lubricated compressor needs to maintain an oil level. Check that with the dipstick.



DO THE THREE-TANK TWO-STEP

Undo one quick lock and one hose coupler to free the Ridgid pump and 1-gallon tank from the pair of 2-gallon tanks.

Some units stretch the term "portable"

If the ability to lift, carry, and transport your compressor matters, here's where you can quickly pare your list of potential purchases. The oil-lube models weigh 20–40 pounds more than the oil-free pancake units, and their designs make them more difficult to carry because they're typically not balanced well. The Ridgid, though oil-free, tops our test at 77 pounds. But the 74-pound Makita MAC2400 proved the most difficult to carry because it's more stretched out with the handle in the center.

Ridgid offsets its weight by breaking down into two smaller units, as shown *above right*. After using it with all three tanks connected, simply unhook the pump and 1-gallon tank from the two larger tanks. Carry one unit in each hand and it doesn't seem as heavy or cumbersome overall. We found the smaller module great for such jobs as nailing up trim in a house or inflating a flat tire, where you don't need the larger tanks' storage. And because each unit has its own valves and hose connections, you can also use the two larger tanks to transport air when you don't need the pump.

Other points worth noting

■ **Readability and placement of gauges and switch.** Only a few compressors have pressure gauges you can read from a standing position. We like the ones on the Campbell Hausfeld MW250000, *below left*, and the Husky

LOOK FOR EASY-TO-USE, WELL-PROTECTED CONTROLS



Campbell Hausfeld's controls are protected within the plastic housing. The hose regulator and gauge sit together to avoid confusion.



Hitachi's tank- and hose-pressure gauges look alike and lack protection against accidental bumps.

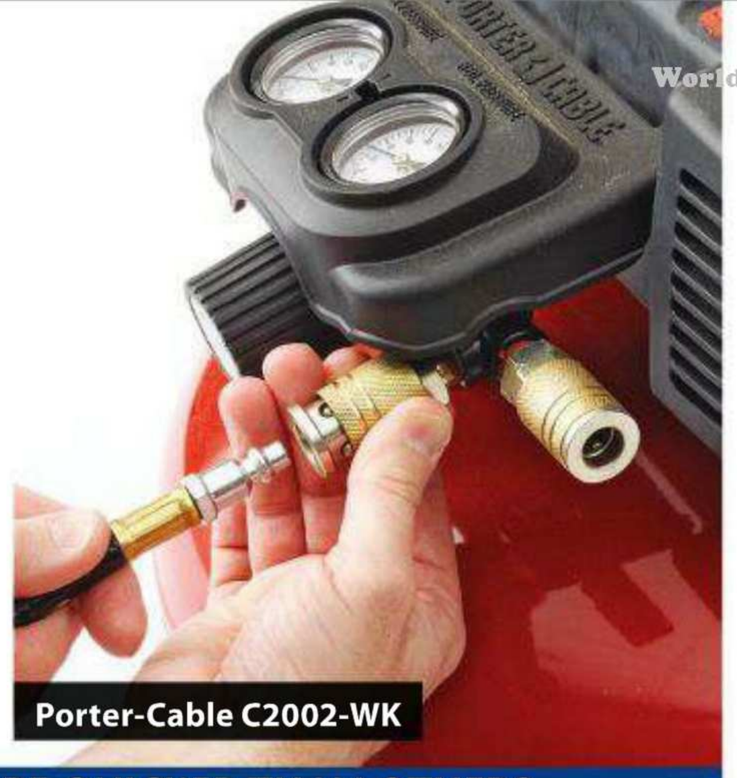
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because they use a larger gauge for the regulated hose pressure—the gauge you need to see most often because it's the one you adjust for different tools—than for the tank pressure. Most of the others have identical gauges that can't be as easily read.

And both of those units, as well as the Bosch and Bostitch CAP2000P-OF, nicely position the gauges and on/off switch so they're easy to reach yet well protected against damaging blows. On the other hand, we found the gauge-and-switch assemblies on the twin-stack compressors from DeWalt, Hitachi, and Senco difficult to use and more exposed to potential damage.



Makita MAC2400


Porter-Cable C2002-WK

SOME QUICK-CONNECT COUPLERS ARE QUICKER THAN OTHERS

Most of the test compressors have hose couplers that hold in a retracted position, making one-handed hose connection easy.

Three compressors in the tets have hose couplers with sleeves you must retract to hook up an air hose.

■ **Hose couplers.** We like the quick-connect couplers, shown *above left*, that stay retracted when not hooked to a hose, because you can make easy one-handed hookups. With the others you must manually retract the sleeve on the compressor coupler with one hand and, with the other hand, insert the hose nipple. (You must use two hands to uncouple the hose from all the compressors.) As with the gauge-and-switch assemblies, beware of hose couplings that stick out beyond the compressor's protective zone, setting them up for potential damage.

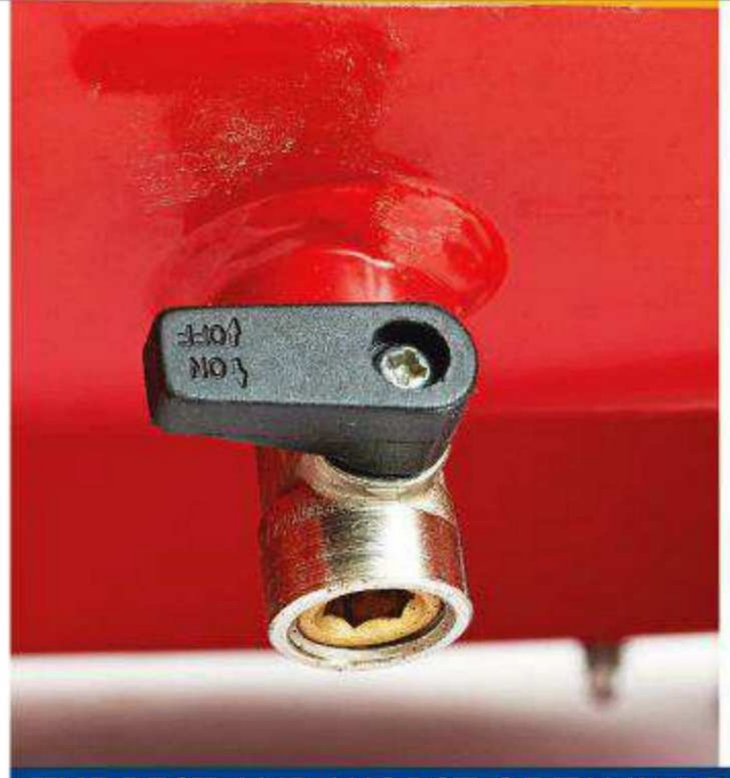
THESE PORTABLE AIR COMPRESSORS PACK A POWERFUL PUNCH

		PERFORMANCE RATINGS (1)									MOTOR/PUMP			TANK(S)					FITTINGS		HOSE		ACCESSORIES (10)		NOISE LEVEL, DECIBELS (11)	
		PRIMARY				SECONDARY																				
BRAND	MODEL	DURATION OF USABLE AIR PRESSURE	RECYCLE TIME (seconds) (2)	FILL-FROM-EMPTY (minutes:seconds)	PORTABILITY	PRESSURE GAUGE READABILITY	POSITION OF CONTROLS	EASE OF ADJUSTING HOSE REGULATOR	EASE OF CONNECTING HOSE (3)	QUALITY OF INCLUDED HOSE	MOTOR TYPE (4)	DUTY CYCLE (5)	LUBRICATION (6)	CAPACITY (gallons)	NUMBER OF DRAINS	DRAIN TYPE (7)	KICK-OFF SETTING (psi)	KICK-ON SETTING (psi)	NUMBER OF HOSE HOOKUPS	TYPE OF QUICK-CONNECT COUPLER (8)	MATERIAL (9)	DIAMETER × LENGTH	STANDARD	OPTIONAL	5' FROM COMPRESSOR	25' FROM COMPRESSOR
BOSCH	CET3-10	C	20	1:36	B	B-	B+	C	A	N/A	I	C	O	3	1	Q	125	100	1	L	N/A		O		79	73
BOSTITCH	CAP2000P-OF	A	54	2:59	A-	B	A-	B+	A-	B-	U	50	F	6	1	Q	150	110	2	L	V	¼"×25'	H	A, B, C, N	84	78
CAMPBELL HAUSFELD	MW250000	A	30	2:15	A-	A	A	A	B	B-	U	50	F	6	1	Q	150	120	2	M	V	⅜"×25'	A, C, H, T	B, G, N	83	78
CRAFTSMAN	15216	A-	28	2:30	A	B-	C+	B-	B	B-	U	50	F	6	1	T	150	120	2	M	V	¼"×25'	A, B, C, H, N	G, M	84	79
DEWALT	D55151	B	16	1:08	C	C-	C-	C-	B*	N/A	I	C	O	4	2	Q	125	100	1	N/A	N/A		O	H, M	82	76
HITACHI	EC12	B	16	1:15	C	B	C-	B+	B*	N/A	I	C	O	4	2	Q	125	95	1	N/A	N/A		O	A, M, T	85	81
HUSKY	H1503TP	C	27	1:46	A	A	A	A	A	C	U	50	F	3	1	Q	155	125	1	L	P	¼"×25'	A, B, C, G, H, N, T		89	84
MAKITA	MAC2400	B+	19	1:24	C-	A-	B+	B+	A	N/A	I	50	O	4.2	1	Q	130	100	2	L	N/A		A, O	A, H	81	75
PORTER-CABLE	C2002-WK	A-	30	2:36	A	B-	B	B	B-	B-	U	50	F	6	1	T	150	120	2	M	V	¼"×25'	A, B, C, G, H, N		84	79
RIDGID	0F50150TS	A-	18	1:15	C+	C	B	A	A	N/A	I	50	F	5	3	Q	150	110	3	L	N/A			H	90	85
SENCO	PC1131	B	16	1:08	C	C-	C-	B+	A	N/A	I	C	O	4.3	2	T	125	95	1	L	N/A		A, O		82	76

NOTES

1. A Excellent; B Good; C Fair; N/A Hose not included
2. Time required to refill tank from pump "kick-on."
3. (*) Hose couplings not included with these machines.
4. (I) Induction; (U) Universal
5. (C) Continuous duty; (50) 50 percent
6. (F) Oil-free; (O) Oil-lubricated
7. (Q) Quarter-turn ball valve; (T) Threaded stem valve
8. (L) Sleeve locks in retracted position; (M) Sleeve must be manually retracted; (N/A) Quick-connect fittings not included
9. (P) Plastic; (V) PVC-reinforced
10. (A) Threaded quick-connect fittings & adapters; (B) Blow gun; (C) Tire inflation chuck; (G) Inflation pressure gauge; (H) Hose; (M) Multiple-port dock with quick-connect fittings; (N) Inflation needle; (O) Pump oil; (T) Thread-sealing tape

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THE BEST AND WORST OF TANK DRAIN VALVES

Quarter-turn ball valves (shown on the Husky) allow you to drain tank moisture quickly and easily.

Brass threaded stem valves (shown on the Senco) can be difficult to operate, especially if corrosion builds up on the threads.

Six of the 11 tested compressors have two or more hose connections, so you can operate two tools at the same time (on separate hoses). As you'd expect, two tools drain the tanks faster than a single tool. Still, all six maintained sufficient air pressure to power two large nailers at a normal work-application rate.

■ **Drain valves.** To avoid rusting inside, drain the compressed air (and unavoidable moisture) from the tanks at the end of each work session. For this easy task, we prefer the quarter-turn ball valves, shown *above left*, found on all but three models. The Craftsman 15216, Porter-Cable C2002-WK, and Senco compressors use a threaded stem valve, shown *above*, that's more difficult to open and close.

Don't Get Hosed by a Poor Hose

Only five of the compressors we tested come with a hose, and those left us wanting a better one than the included plastic or PVC-reinforced hoses. So keep the following in mind:

■ Supple polyurethane and rubber hoses tend to lie flatter on the floor after uncoiling than stiff plastic or PVC-reinforced hoses. (Learn about our new favorite hose, the bright neon-green Flexzilla, on *page 84*.)

■ For nearly every tool we used, including all nailers, a ¼"-diameter hose proved slightly better than a ⅜" hose in replenishing air pressure after a nail shot. This is because the compressor could refill the smaller capacity of the ¼" hose quicker. It also weighs less. (High air-demand tools, such as sanders and impact wrenches, work better with a ⅜" hose because they need a steady flow.)

■ Long extension cords—especially those with insufficient gauge wire—add resistance that hurts compressor motor performance; but air pressure to the tool is unaffected by hose length. So if you need to work far from an outlet, plug the compressor directly into the outlet and run a long hose to the tool. To prevent air leaks and couplers snagging, avoid linking hoses together.

	WEIGHT, POUNDS	CORD LENGTH	WARRANTY, YEARS	COUNTRY OF ASSEMBLY (12)	SELLING PRICE (13)	CONTACT INFORMATION	
						PHONE	WEB SITE
	57	6'	1	C	$300	877-267-2499	boschtools.com
	37	5'4"	1	C	180	800-556-6696	bostitch.com
	39	6'	1	C	170	800-543-6400	chpower.com
	29	6'	1	U	170	800-697-3277	craftsman.com
	56	6'	1	C	230	800-433-9258	dewalt.com
	60	6'4"	1	C	250	800-829-4752	hitachipowertools.com
	30	6'	1	C	130	800-466-3337	homedepot.com
	74	6'	1	T	300	800-462-5482	makitatools.com
	29	6'	1	U	180	888-848-5175	portercable.com
	77	6'4"	3	C	280	866-539-1710	ridgid.com
	60	6'	1	C	200	800-543-4596	senco.com

11. Measured at operator's standing ear level with compressor sitting on the floor

12. (C) China
(T) Taiwan
(U) United States

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

Here's what we'd buy

The Campbell Hausfeld MW250000 oil-free unit delivers the test-highest air-flow, weighs less than 40 pounds, and has thoughtfully designed controls—including a lighted on/off switch. Its $170 price tag includes a PVC-reinforced hose, quick-connect couplers that require two hands, and an inflation chuck.

If you prefer a quieter (albeit less portable) oil-lubricated unit, opt instead for the Makita MAC2400. It ranks second quietest in our test and half as loud as the Campbell Hausfeld. With a robust cast-iron pump and induction motor, this $300 compressor should last for many years. Its 4.2-gallon twin tanks need to fill more often than the 6-gallon Campbell Hausfeld, but the pump does this quickly. It comes with self-locking quick-connect fittings, but no hose.

If you'd like to save a few more dollars, consider the Husky H1503TP for $130. Its small 3-gallon tank will have to refill more often (and loudly), but its overall performance surprised us. It's our Top Value.

Produced by **Bob Hunter** with **Jan Svec**







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Shop-made Hand Plane

Build an heirloom-quality tool using just scraps and an $11 plane iron.



There's a certain satisfaction that comes from using a tool you made yourself. And when it's as easy and inexpensive to make as this plane, you'll find yourself reaching for it (and smiling) again and again.

Find and prepare your iron

We used a plane iron from a Buck Bros. 6½" block plane (Model C2, about $11) purchased at The Home Depot. The iron measures 1⁹⁄₁₆" wide × 4⅛" long; any similar-size iron will work. Using a hacksaw, we cut the iron to 3" long, then ground the cut end smooth, rounding the top corners. Flatten the iron back and sharpen the iron on sharpening stones or by using sandpaper on a flat surface. (See **More Resources** for a free video to help with these steps.)

Laminate the body

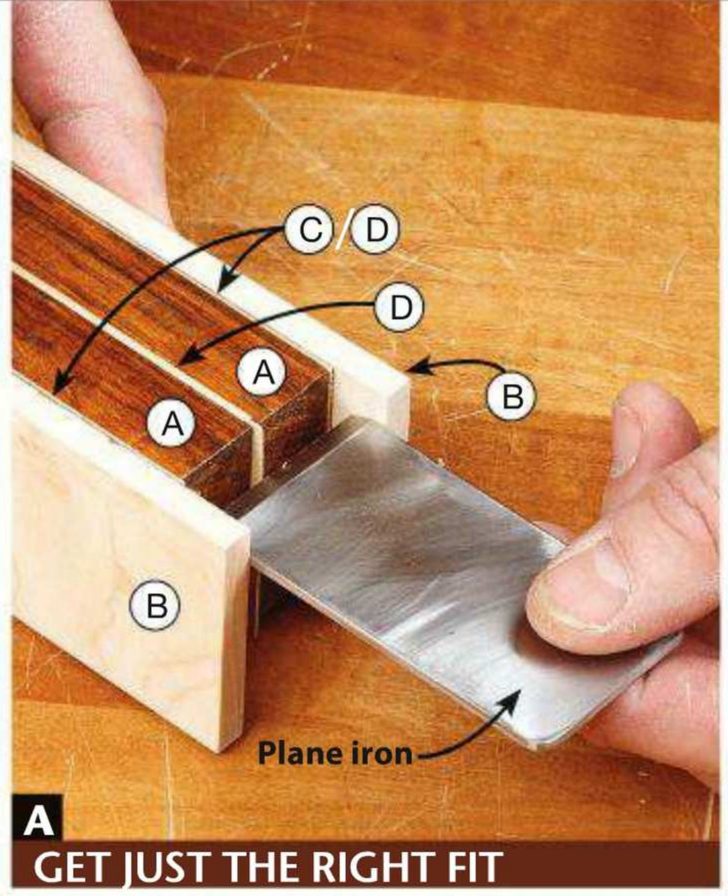
We built this plane from solid cocobolo and maple, with walnut and maple veneers, but any dense, tight-grained wood is suitable for the core (A) and cheeks (B). Any species of veneer will work as accents.

1 Start by preparing the blanks for the body. Cut two core pieces (A), two contrasting cheeks (B), two pieces of dark veneer (C), and four pieces of light veneer (D) to 2¼×9".

2 Sandwich all the pieces (A–D) together and test the fit of the iron between the cheeks (B) [**Photo A**]. The iron should fit with about ¹⁄₆₄" of clearance. If needed, add or remove veneer, or lightly grind the edge of the iron.

3 Laminate the cores (A) and veneers (C, D). We used two layers of light veneer between the cores and alternated

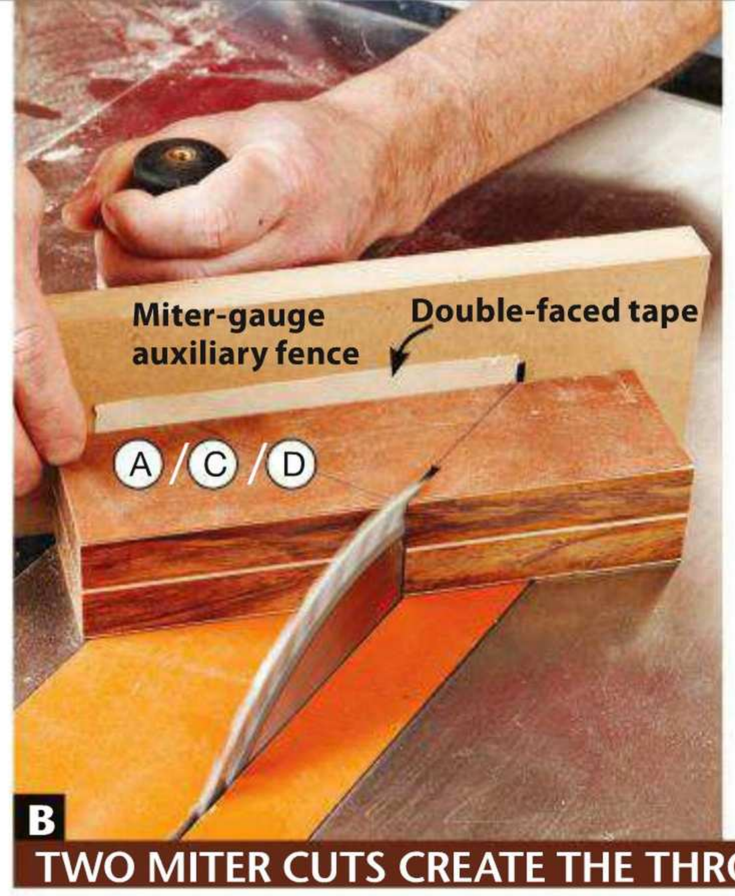
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A

GET JUST THE RIGHT FIT

With the cores (A) and veneers (C, D) between the cheeks (B), check the fit of the iron. Add or subtract veneer to get a good fit.



B

TWO MITER CUTS CREATE THE THROAT OPENING

Cut away the 1¾"-long rear of the core (A/C/D) first. Double-faced tape keeps the core in place during the cut.



C

With a fresh strip of double-faced tape holding the core to the fence, cut the front of the plane body from the core.

the remaining veneers on the outside of the cores [**Drawing 1**]. Clamp the core, using the cheeks (B) and scraps as clamping cauls to keep the edges flush.

Quick Tip! Keep the cauls from sticking. Place sheets of waxed paper between the core, the cheeks, and the cauls to prevent these pieces from being glued to the core.

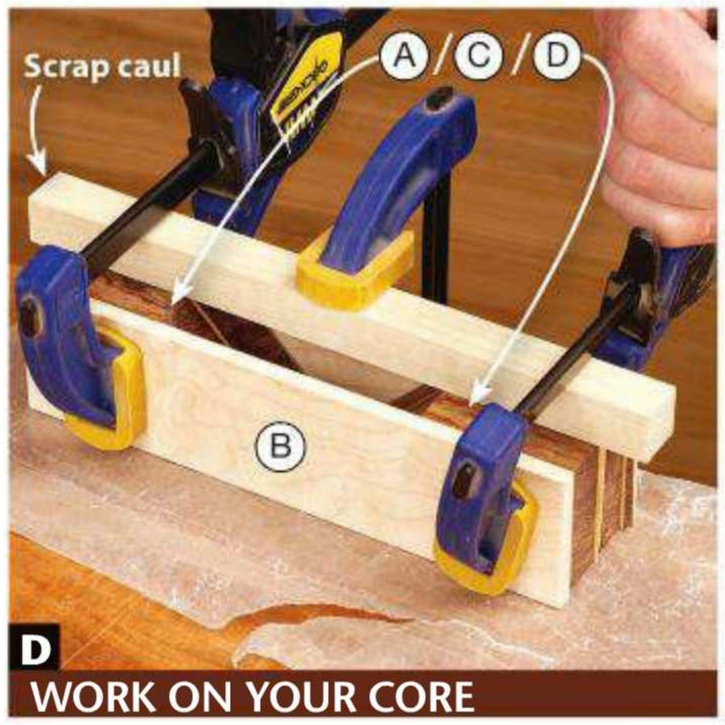
4 After the glue dries, joint the bottom of the core (A/C/D) smooth and square to the sides.

Quick Tip! "Joint" short pieces safely. Apply self-adhesive sandpaper to the cast-iron top of your tablesaw and place the rip fence next to the sandpaper. Sand the core with a side riding against the rip fence.

5 Lay out the throat opening [**Drawing 1**]. Attach an auxiliary fence to your miter gauge, pivot the head to 45°, and cut a kerf through the fence. Using a strip of double-faced tape, firmly stick the core (A/C/D) to the fence, aligning a layout line with the kerf. Cut the core into three pieces [**Photos B, C**]. Keep the triangular waste piece—the wedge (E) will be cut from it later.

6 Set the core (A/C/D) pieces on a sheet of waxed paper on your bench, with the mitered points touching. Glue and clamp the cheeks (B) to the core [**Photo D**] and clamp the core to the bench.

7 After the glue dries, joint the top of the plane body (A–D), then lightly crosscut each end to even them up. To open the mouth of the plane, set the rip fence to take a 1/32" or less cut, and then rip the bottom face [**Photo E**]. Make fine adjustments to the fence position as needed until the iron, sitting bevel down, fits through the opening with an additional 1/32" gap.



D

WORK ON YOUR CORE

Lay waxed paper on your bench, then glue the cheeks (B) to the core (A/C/D), keeping the ends and bottom edges flush.

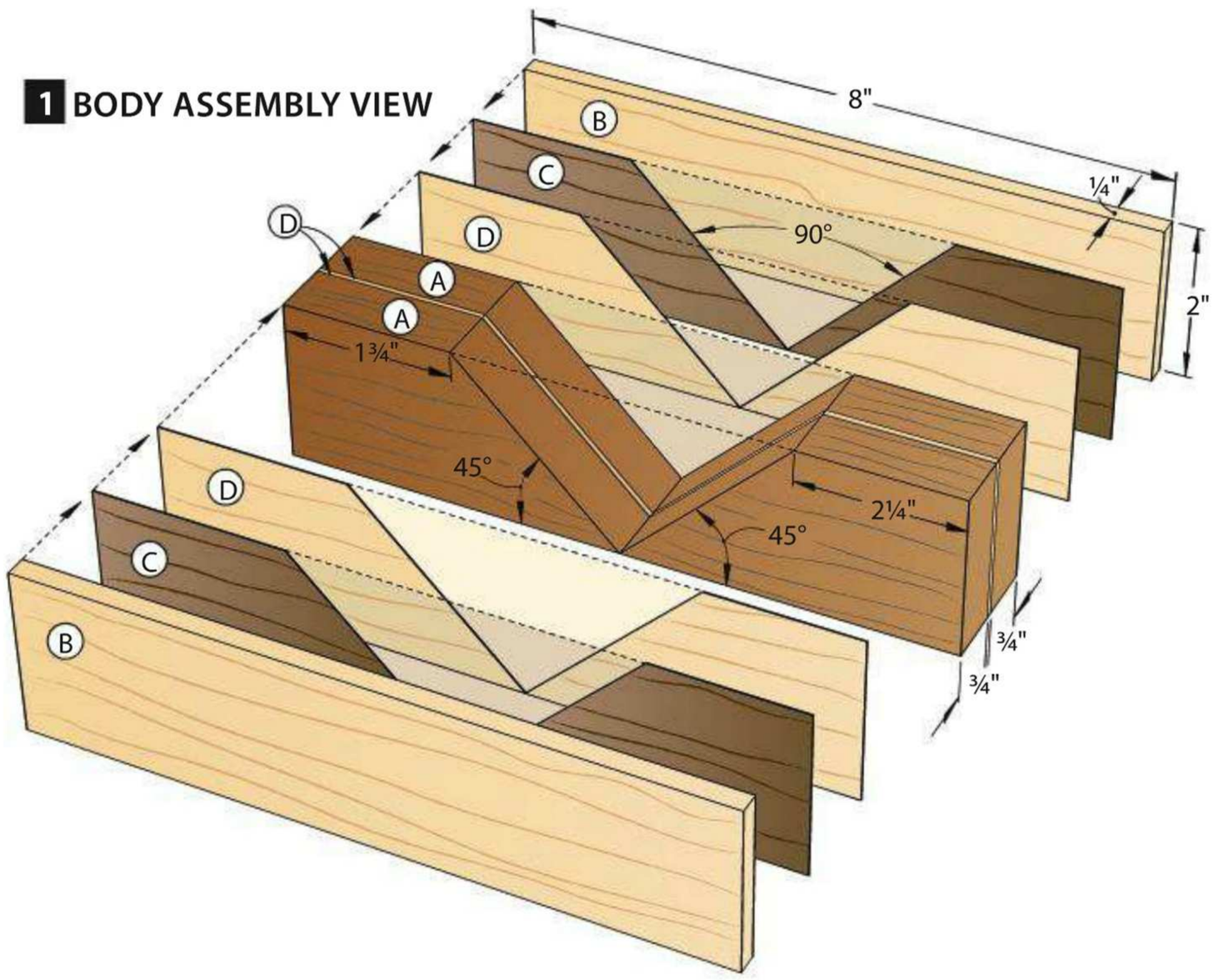


E

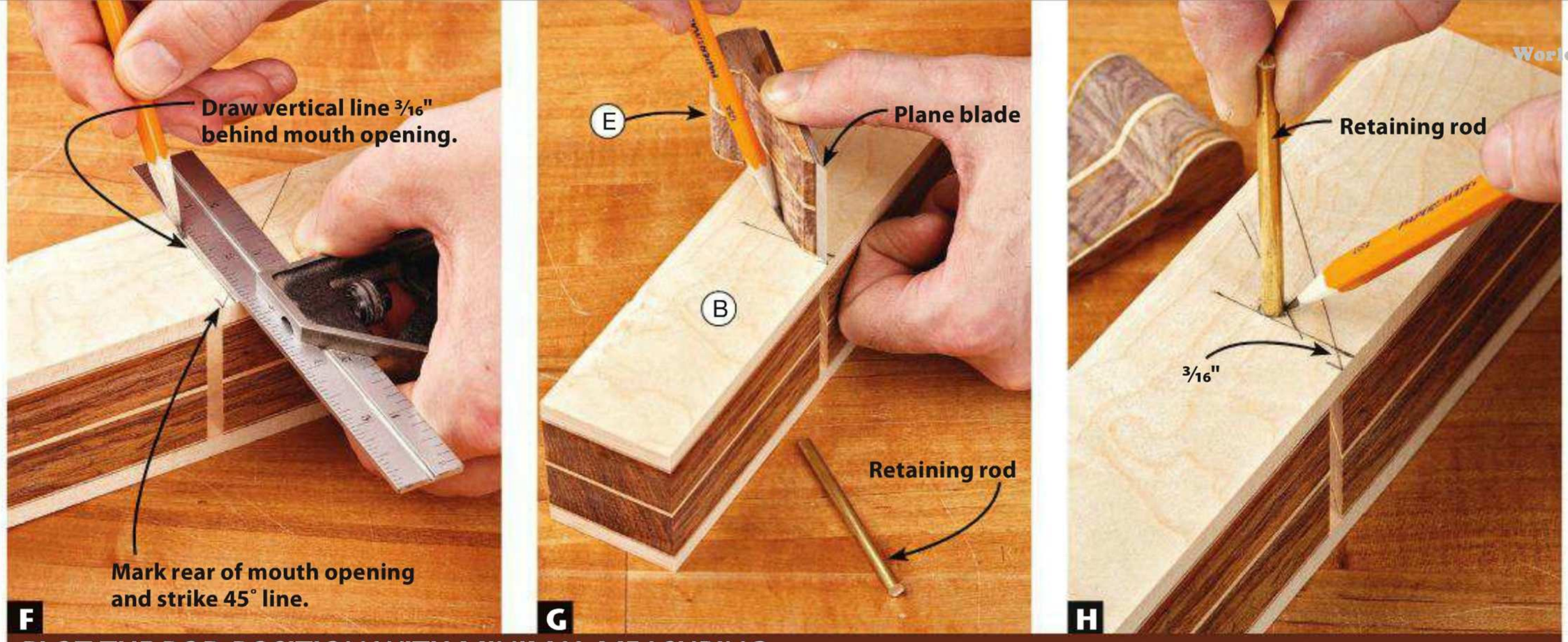
OPEN THE MOUTH A LITTLE

Guide the plane body with a pushstick and make very light passes across the bottom face, sneaking up on the final mouth width.

1 **BODY ASSEMBLY VIEW**

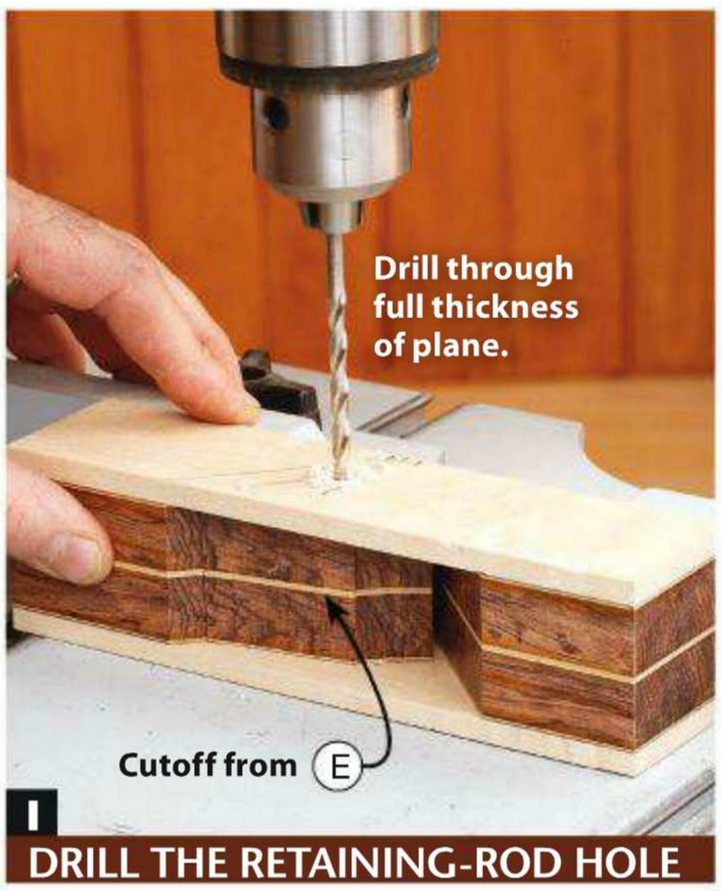


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PLOT THE ROD POSITION WITH MINIMAL MEASURING

Draw a vertical line 3/16" behind the first line [**Photo F**]. Align the wedge (E) and plane iron with the diagonal mark, with the iron's tip flush with the bottom of the cheek (B) [**Photo G**]. Trace along the top of the wedge. Place the rod tangent to the two lines [**Photo H**], and trace around it.



DRILL THE RETAINING-ROD HOLE

Prevent chip-out by using the wedge (E) cutoff as a backer block while drilling the ¼" hole for the retaining rod.

Quick Tip! For precision, shim the adjustments. Instead of making small adjustments by moving the rip fence, try adding strips of 2"-wide masking tape to the rip-fence face.

Add the wedge and iron

1 Make a copy of the **Wedge Pattern** from the *WOOD Patterns*® insert, and spray-adhere it to the side of the wedge (E) blank, with the straight edge flush with the long edge of the blank. Bandsaw and sand the wedge to shape, saving the cutoff for use later.

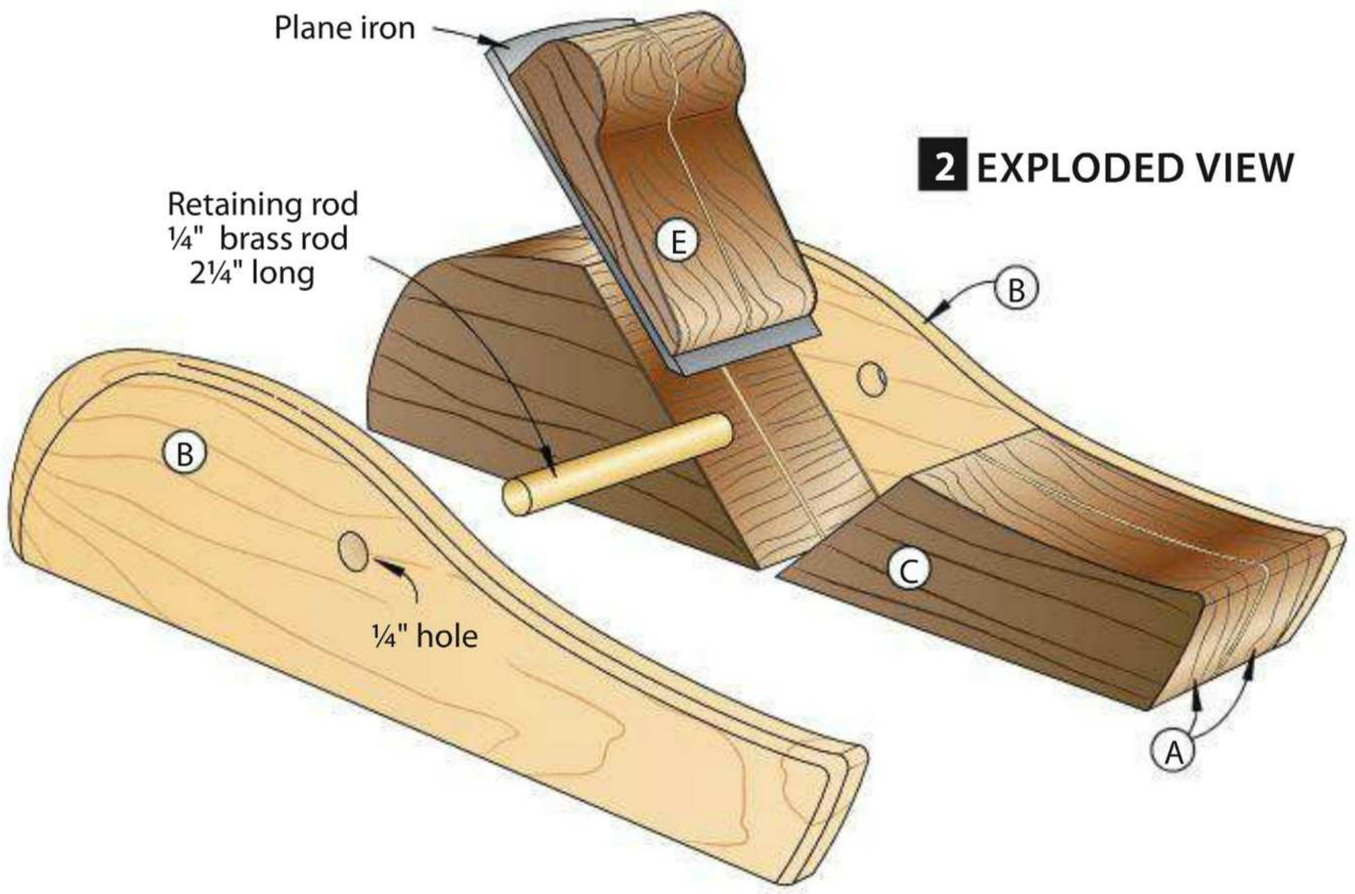
2 To locate the hole for the brass retaining rod [**Drawing 2**], plot on a cheek (B) the location of the rear angled bed. To do this, make a vertical mark on a cheek aligned with the rear of the mouth opening. Extend a line 45° from that mark. Then follow the steps in **Photos F, G,** and **H**.

3 Drill the hole for the retaining rod [**Photo I**], then tap the rod in place and sand it flush with the cheeks (B). If the rod doesn't fit snugly, secure it with a dab of epoxy.

Shape a feel-good body

1 Make a copy of the **Body Pattern** from the *WOOD Patterns*® insert, and spray-adhere it to a cheek (B), flush with the bottom edge and aligning the highest rear point of the profile with the top of the angled bed. This position isn't critical; just get it close. Bandsaw the body (A–D) to rough shape, cutting 1/16" outside the line.

2 Draw a curve for the heel of the plane [**Photo J**], then begin shaping the heel on a disc sander [**Photos K, L**]. Finish shaping the heel and smoothing the curves by hand-sanding to 150 grit.



2 EXPLODED VIEW

MORE RESOURCES

FREE VIDEO

- Watch a free video on sharpening at: woodmagazine.com/sharpenvid.

RELATED ARTICLES AND VIDEO

- Download Matt Seiler's video on building this hand plane and another at: woodmagazine.com/seilervid. $
- "Low-tech, Foolproof Sharpening," issue 149 (July 2003) woodmagazine.com/sandsharp. $
- "Get Sharp, Stay Sharp," a look at three different sharpening methods, issue 186 (Oct. 2008) woodmagazine.com/sharpeners. $
- Interested in making more of your own hand tools? Find plans at woodmagazine.com/handtools. $

$ = Download these items for a small fee.

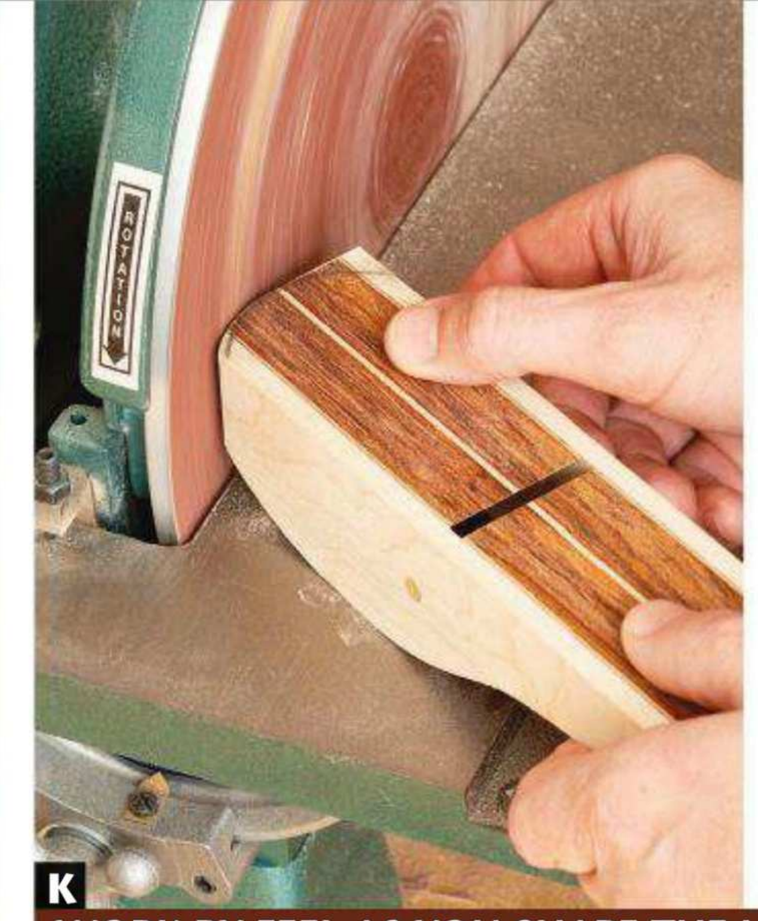
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J

USE A SHOP-FOUND TEMPLATE

To lay out the curve for the heel of the plane, trace around a glue bottle or any other item with an appropriately rounded end.



K



L

WORK BY FEEL AS YOU SHAPE THE HEEL

Begin by sanding to the layout line [Photo K]. Then round the heel from top to bottom and blend it into the cheeks [Photo L]. Test the feel of the plane in your hand frequently as you work. Stop when you have a smooth curve that feels comfortable.

3 Retrieve the wedge (E) and plane iron, and place them in the throat of the plane. With the plane resting on a piece of scrap, tap the wedge down firmly to burnish the area under the retaining rod. The burnished area should extend across the full width of the wedge. If not, sand the top of the wedge to flatten it. Then, working on self-adhesive sandpaper on a flat surface, sand the bottom face of the wedge until it seats firmly under the rod, and the end sits ⅜" from the tip of the iron.

4 Finish-sand the plane and wedge to 320 grit, then apply a finish. We wiped on boiled linseed oil, rubbing it out with a cotton cloth. After the finish dries, refer to the instructions *below* to learn how to adjust the plane's cutting depth and blade alignment. Keep your plane within easy reach; you'll enjoy looking at it as much as using it.

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

Materials List

Part		BLANK SIZES T	W	L	Matl.	Qty.
A*	core	¾"	2"	8"	C	2
B*	cheeks	¼"	2"	8"	M	2
C*	dark veneer	1/64"	2"	8"	W	2
D*	light veneer	1/64"	2"	8"	M	4
E*	wedge	¾"	1 19/32"	2½"	C/M/W	1

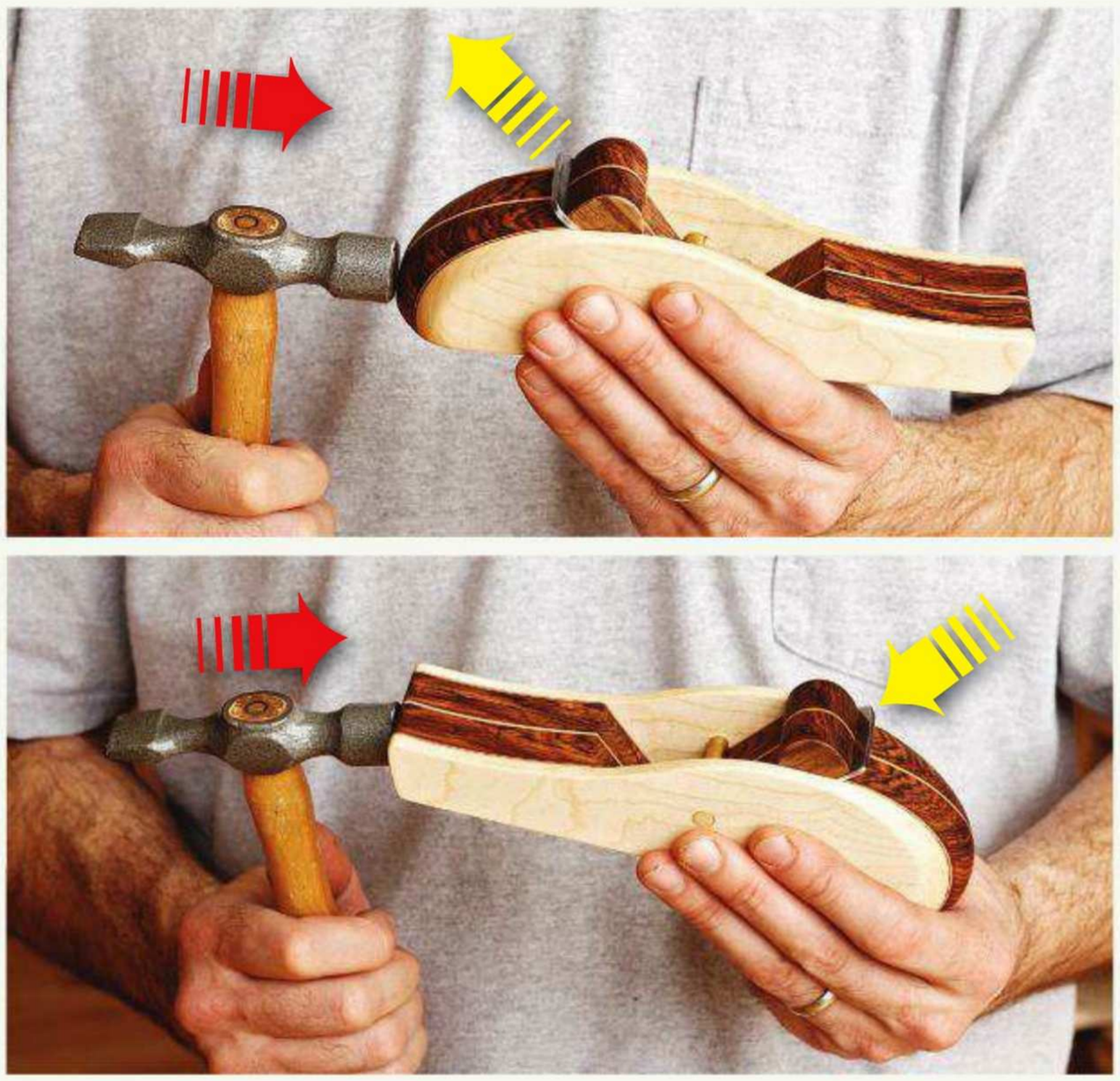
*Parts initially cut oversize. See the instructions.

Materials key: C–cocobolo; M–maple; W–walnut.
Supplies: Double-faced tape, spray adhesive, 1 9/16 × 4⅛" plane iron, ¼ × 2¼" brass rod.
Bit: ¼" drill bit.

Iron adjustments: Plane and simple

To set up your new plane, you'll need a wood mallet or lightweight hammer. Place the plane on your bench and insert the iron into the body with the bevel down. Slide in the wedge on top of the iron and under the retaining rod. Press the plane against the bench, and give the wedge a light tap to secure it. At this point, the iron should not extend below the sole of the plane.

Adjust the iron forward and back with light taps on the plane body. A tap at the rear (*above right*) retracts the iron for a lighter shaving. A tap at the front (*right*) increases the depth of cut. Sight down the sole to see if the iron projects evenly across its width. Tap a top corner of the iron to adjust it parallel to the sole.



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Woodworking on Wheels

When this soldier had to trade motorcycle thrill-riding for a wheelchair, he jumped into woodworking with both feet.

A tragic helicopter crash left U.S. Army Flight Engineer Chuck Isaacson paralyzed from the chest down in 2007. Despite multiple surgeries and a grueling rehab, Chuck barely slowed down as he settled into life, and woodworking, in a wheelchair.



Chuck takes you on a video tour of his shop.
woodmagazine.com/chuck

Becoming a wood Chuck

An avid hunter before the crash, he took up the sport again post-rehab, with the help of an all-terrain, powered chair. "I started shooting bow and arrow." Chuck says. "It's a great way to develop back muscles. I got my first buck with a bow in 2008, and shot two more in gun season." Faced with a long off-season, Chuck accepted father-in-law Ed Mockler's invitation to come over to make mounts for the antlers in his shop.

"I made seven that weekend. And I thought, 'Hey this is kind of fun; I wonder what else can I build.' So I started reading his copies of *WOOD*® magazine, five to six years, cover-to-cover. I read every project, every tip, every technique. And I started playing around in Ed's shop."

And then Chuck experienced kickback for the first time—frightening for any woodworker, but especially so from a seated position that puts your face closer to the blade. It was enough to rattle even this former motorcycling speed junkie with years of wartime helicopter flights under his belt.

"I thought, 'I gotta figure something out that works for me.' So I started researching how to build an accessible shop." Chuck scoured the Internet for resources on wheelchair woodworking, with little success. "There was almost nothing out there," he recalls. "That's when I wrote a letter to Bill Krier [Editor-in-Chief] of *WOOD* magazine."

"I was impressed with how much thought Chuck had put into it," recalls Bill. "It was clear he was committed to building a shop that suited his needs in every respect. He was dedicated to build-



ing it—with or without our help—and ready to do the hard work himself. That, and the sacrifice he made for our country, made it an easy decision to lend him a hand. Winding up with a great resource for our readers is icing on the cake." With input from the *WOOD* design team and several tool manufacturers, Chuck's accessible shop took shape.

Shop setup that works for Chuck—and you

Chuck wasted no time building his 24×30' shop addition, breaking ground immediately after his house was built. Here are five guidelines Chuck offers that work for him and can make your shop work harder (and more safely) too:

1. Locate workstations to ease your woodworking. Maneuvering both his chair and boards around tools can become unwieldy, and retrieving dropped materials is an inconvenience. So Chuck's shop features wide, unobstructed paths with multiple staging surfaces, *above*, for project parts. Lumber enters the shop through the double doors leading from the garage and travels from station to station with an entry and exit staging surface for each machining operation.

In your shop: Diagram your workflow around a sketch of your shop. Ask yourself: Where does wood enter the shop? Where must it travel for breakdown, machining, and final sizing? Are there obstacles in the way? Do I have enough staging surfaces to accommodate project parts? If project parts must make circuitous routes to their next stations, reimagine your layout.

A Fateful Flight

The freak snowstorm that knocked the CH-47 Chinook helicopter out of the February Afghanistan sky hadn't been in the day's forecasts. On board, weather was the farthest thing from Flight Engineer Chuck Isaacson's mind. Just days away from the end of his eighth tour of duty with the Army's Bravo Company 2nd Battalion, 160th Aviation Regiment, Chuck was considering applying for flight school—a move that would put him in the front seat of the aircraft that he meticulously maintained and accompanied on every mission. He was anticipating his last assignment of his current tour: tearing down an aircraft that he would shepherd home. And he was certainly thinking about some well-deserved time stateside with Brenda, his wife of two years.

The weather wouldn't be ignored, though. "When we punched into the snowstorm," recalls Chuck, "our number-two engine went offline. All I remember is the helicopter starting to fall."

Miraculously, Chuck survived the 400-foot drop that killed the rest of his six-man crew and three of the 16 passengers they were transporting.

The impact left the helicopter an unrecognizable mangle and wreaked similar havoc on Chuck's body. His back and neck suffered multiple breaks, with compression fractures throughout his spine. Both lungs collapsed, and he had several shattered ribs and a broken leg.

"I remember waking up outside the helicopter. I was still tethered to the aircraft. I told one of the other survivors to cut me away. I could still hear guys alive inside."



Staff Sergeant Chuck Isaacson poses in his dress greens in 2006, months before the crash.

WorldMags

2. *Reign in your reach.* In Chuck's shop, you'll see tools and storage lowered to put them within easy reach. Tools specific to each workstation remain close at hand—clamps near the assembly table, hand planes at the workbench, drill/drivers near the hardware bins—reducing the fatigue of frequent movement around the shop.

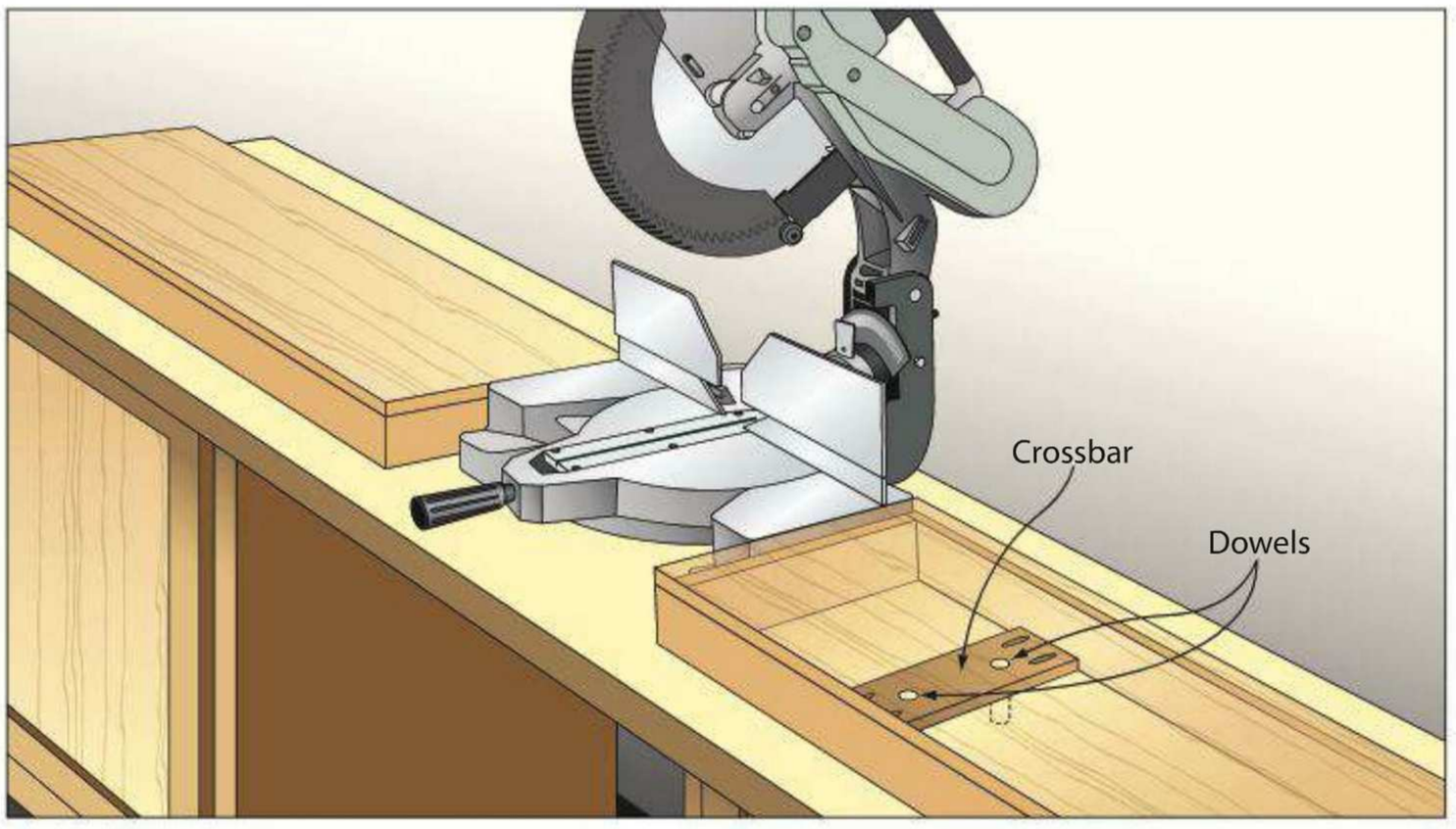
In your shop: Save your feet and back by keeping tools where you use them the most. Double up on the inexpensive tools—steel rules, pencils, and screwdrivers—and hardware that you use in multiple locations.



Chuck's shop displays a distinct "waterline" showing the extent of his 6' reach from a sitting position. Wide roll-under spaces keep him close to tools and workpieces.

3. *Make horizontal space serve double duty.* Because available vertical space is cut in half by the limit of his reach, and ladders are out of the question, Chuck makes his worksurfaces and storage space work harder. These handy mitersaw stock supports use pegs to line them up and hold them in place, but lift off easily when Chuck needs to reclaim the countertop.

In your shop: To make Chuck's mitersaw supports, construct the frame first, attaching the crossbars with pocket screws. Clamp the frame in position on your benchtop and drill through the crossbar and into the benchtop. Finally, attach the top, and glue dowels in the crossbar holes.



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Air rescue was impossible in the heavy snow. And the dispatched rescue and recovery convoy took three hours to arrive, delayed by the storm that dumped 10 inches of snow on Chuck in the meantime.

The journey home

Airlifted from Afghanistan, Chuck spent the next six weeks rushing from surgery to surgery, first in Landstuhl, Germany, and then Walter Reed Army Medical Center in Washington, D.C.

"My spine is fused from C3 to L4. Basically, it's one solid, unmoving piece," Chuck says. "There is no feeling in my legs. I can move my right leg slightly, so I can drive. But I'll be in this chair for the rest of my life. In the grand scheme of things, that's nothing compared to some of these guys. I'm fortunate."

Following a grueling nine-month rehab, Chuck returned to an apartment completely unsuited to his new situation. "I couldn't get up the stairs. I could barely fit in the bathroom," he recalls.

But finally, some good news: Homes For Our Troops, a non-profit organization dedicated to providing specially adapted homes to severely injured veterans, offered to build a fully accessible home for Chuck and Brenda, and present it to them for free. (Learn more at homesforourtroops.org, or by calling 866-787-6677.)

"I'll be in this chair for the rest of my life. But in the grand scheme of things I'm fortunate."

Chuck and Brenda's 2,400-square-foot home was built on a one-acre lot in Sun Prairie, Wisconsin, just outside Madison. It includes roll-under cabinets, an accessible shower, and even an elevator to the full basement.



The Isaacson home proudly waves the American flag that was presented—along with the house itself—to Chuck by Homes For Our Troops at the key ceremony. Chuck's shop addition dominates the garage end of the house.

4. Overhead and overweight is off limits. With limited leverage from a seated position as well as no opportunity for fancy footwork should something heavy take a tumble, Chuck carefully considered his storage methods to reduce the chance of a mishap.

In your shop: Simply put: If you have to strain to lift it overhead, it's dangerous to store it up high. Store heavy tools and workpieces below shoulder level for maximum handling control. Recruit a helper when lifting or moving heavy or awkward items.



Because he stores his lumber upright, Chuck never has to lift it far when he pulls it from the rack. This arrangement also preserves valuable horizontal real estate.



Chuck stores unwieldy clamps heads down in a Woodpeckers clamp rack. With centers of gravity closer to the ground, the clamps are less top-heavy as he pulls them from the rack.

5. Right-size your surfaces. Chuck lowered his tools and worksurfaces to approximately 30", with plenty of roll-under access points. This keeps the workpieces in easy reach while keeping his chest well above the worksurface should he need to bear down.

In your shop: Don't be afraid to stray from "standard" height to make woodworking more comfortable for your height or woodworking preferences. Lower surfaces provide more leverage for hand-tool work, while raised surfaces put assembly operations closer to your eyes.



The low-riding assembly table, from issue 196 (March 2010), was designed with Chuck's needs in mind. But it works well in any shop to bring large projects down to a manageable height or let you work while seated.

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Modified machines meet his needs

As the shop progressed, Chuck turned his attention to tool acquisition. First on the list was, of course, a tablesaw. Chuck bought the AC650R-T50 from General's Access line of woodworking machinery that features low worksurfaces for wheelchair users (888-949-1161, general.ca). The 29" height of the tablesaw gives Chuck more control because he can bear down on the workpiece. And the nearly 500-pound weight keeps the saw immobile while he uses the tool itself for leverage to rip long workpieces. See "The Tablesaw Tango," *below.*

To round out his shop setup, Chuck sought out more tools that feature low tables or bases that could be easily modified. He unbolted the Grizzly G0555 bandsaw (800-523-4777, grizzly.com), *next page, center,* from its factory base and mounted it onto a low, shop-made base. And at 31", the Grizzly G0609X jointer, *next page, left,* features one of the lowest tables on the market.

To keep his pathways clear of obstructions, overhead ductwork attached to a whole-shop collector is the only viable option for dust management in Chuck's shop. He chose a 2½-hp Tempest from Penn State Industries (800-377-7297, pennstateind.com), which provided the cyclone collector and ductwork at a discount, along with a free ductwork plan customized for Chuck's shop.



A day of tool shopping at Grizzly's Springfield, Missouri, tent sale ended with a surprise: Vice-president Don Osterloh heard about Chuck and gave him all of his selected tools—nearly $1,000 in machinery—free of charge.

How Chuck Tackles 4 Vital Tools

1. The Tablesaw Tango. While standing, your weight and the friction of the floor generates the leverage necessary to guide a large workpiece over the tablesaw, maintain pressure against the fence, and push it through the blade. But because the wheel axles of Chuck's chair trade friction for mobility, he must make up for the lost leverage in a careful sequence of maneuvers. While he still relies on help from friends (as should you) for ripping heavy or unwieldy workpieces, such as sheet goods, this procedure allows him to cut most large project parts on his own.



A Positioned an arm's length from the tablesaw, with the brakes of his chair partially engaged to hold him in place, Chuck begins guiding the workpiece through the blade.



B Seated on the edge of his chair, Chuck leans forward as he feeds the workpiece until it is fully supported by the table and at the limit of his reach.



C Then he uses the saw to pull himself, chair and all, up to the table. The weight of the saw allows him to overcome the chair's loosely locked brakes.



D Finally, Chuck completes the cut, relying on his ample outfeed table to support the workpiece. For narrow pieces, he finishes with a pushstick.

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2. *Increase leverage on a just-right-height jointer.* The low table on Chuck's jointer lets him hold the material down. To help with forward force, Chuck added a heel to his pushblock.

In your shop: Don't make the mistake of compensating for pushblock slippage by adding more downward force. This only increases the tendency of the jointer to remove more material at the pressure points, turning your workpiece into a wedge. Instead, add a heel, like Chuck's, to the rear of your pushblock to ensure smooth passage over the cutterhead.



Leverage is critical when jointing. Chuck increases his with locked brakes and a heeled pushblock.

3. *Practice makes perfect on the bandsaw.* Because Chuck can't sidestep or shift position in the middle of a bandsaw cut, he performs a dry run of the complete cut. This way, he ensures he is in the optimum position before he begins.

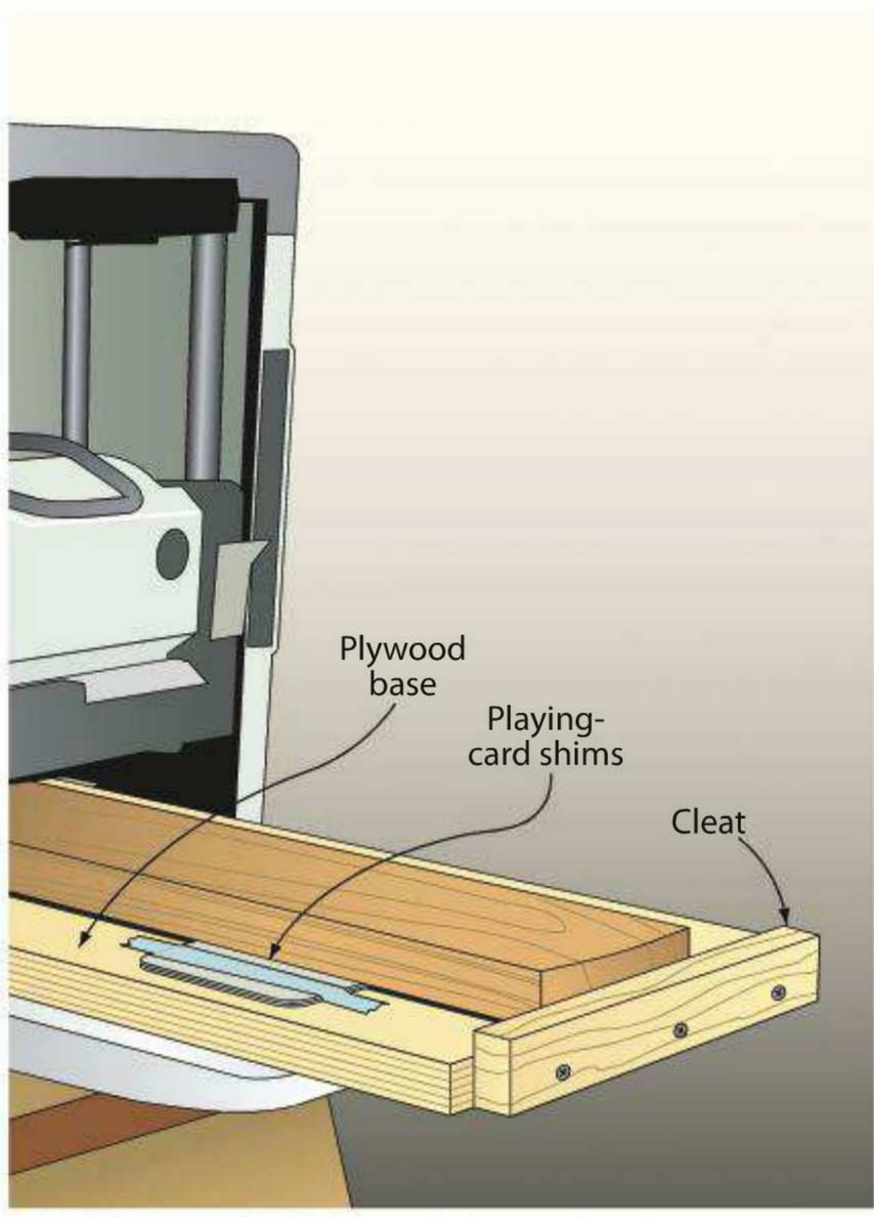
In your shop: Follow Chuck's lead by practicing your complete cut before you turn on the saw. Minimizing the number of times you must shift positions or reposition your hands results in more accurate cuts with fewer tooth marks to sand away and increases your safety along with your confidence.



Tricked out with a riser block and a precision fence donated by Kreg, Chuck's bandsaw sits on a custom lowered base.

4. *The planer plays jointer.* For boards that are too long to safely face-joint on the jointer, Chuck suggests a planer sled for jointing. The sled can be as simple as a plywood base with a cleat on the trailing end. Tape playing-card shims in place to compensate for any twists or thickness variations. Once the top side is flattened, take it off the sled, flip the board, and thickness it as usual.

In your shop: Chuck's sled technique lets you face-joint boards too wide for your jointer, potentially doubling your jointing capacity.



Build this simple sled out of plywood and a scrapwood cleat. The flat plywood becomes the reference for flattening the board's face.

Up next for Chuck

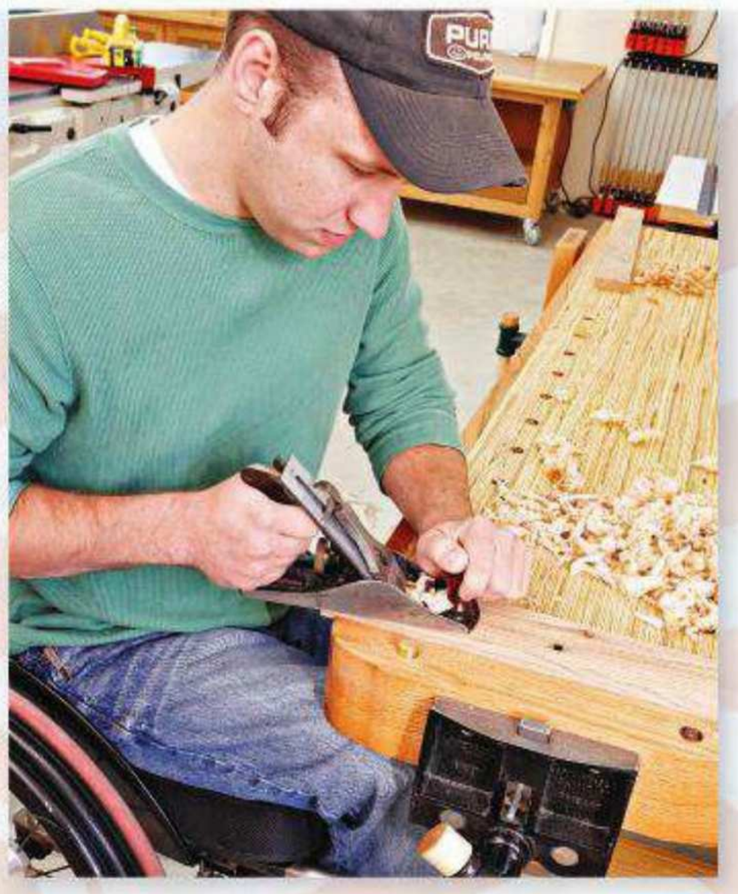
With his shop finished, there remains a long list of honey-do projects for Chuck and Brenda's new home. But between projects, the soldier that's already given so much for his country continues to give. He's opened his shop to the local woodworking club, trading tips with members on accessible shops. He's a fixture in online forums and chat rooms, even streaming his own shop online. Recently, he and a fellow Veterans of Foreign Wars member used his shop to machine parts for 19 benches bound for a local veterans park.

As if that weren't enough to keep him busy, Chuck and Brenda welcomed a new member to the Isaacson family, their first child, Kylee Grace, in March.

Written by: **Lucas Peters**



Chuck broadcasts his shop live at woodmagazine.com/chucklive, pausing to answer questions in the online chatroom.



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Floating-Top Table

A top rising above the base caps a light and airy look.



Dimensions: 27"H × 22"W × 22"D

PROJECT HIGHLIGHTS

- The contrast between walnut and ash emphasizes the space between the tabletop and the base.
- Approximate materials cost: $50

Okay, the top doesn't really float. But it *appears* suspended above the legs and rails thanks to a couple of supports with elevated centers that extend between two rails.

Start with legs to stand on

1 From 8/4 ash (or laminated ¾" stock) cut the legs (A) to size [**Materials List,** *page 75*]. Choose and label the two best faces for the outside faces, then lay out a ⅜×2⅛" mortise on each of the two *inside* faces [**Drawing 1**].

2 With a 5⁄16" Forstner bit in your drill press, rough out the mortises by drilling overlapping holes. (The bottoms of the mortises intersect.) Chisel the walls of the mortises square and perpendicular to the face of the leg (A).

Quick Tip! Let a scrap be your guide. Clamp a scrap with square edges along the mortise layout line to guide your chisel straight down. Also, to create the truest edge, use the widest chisel you can.

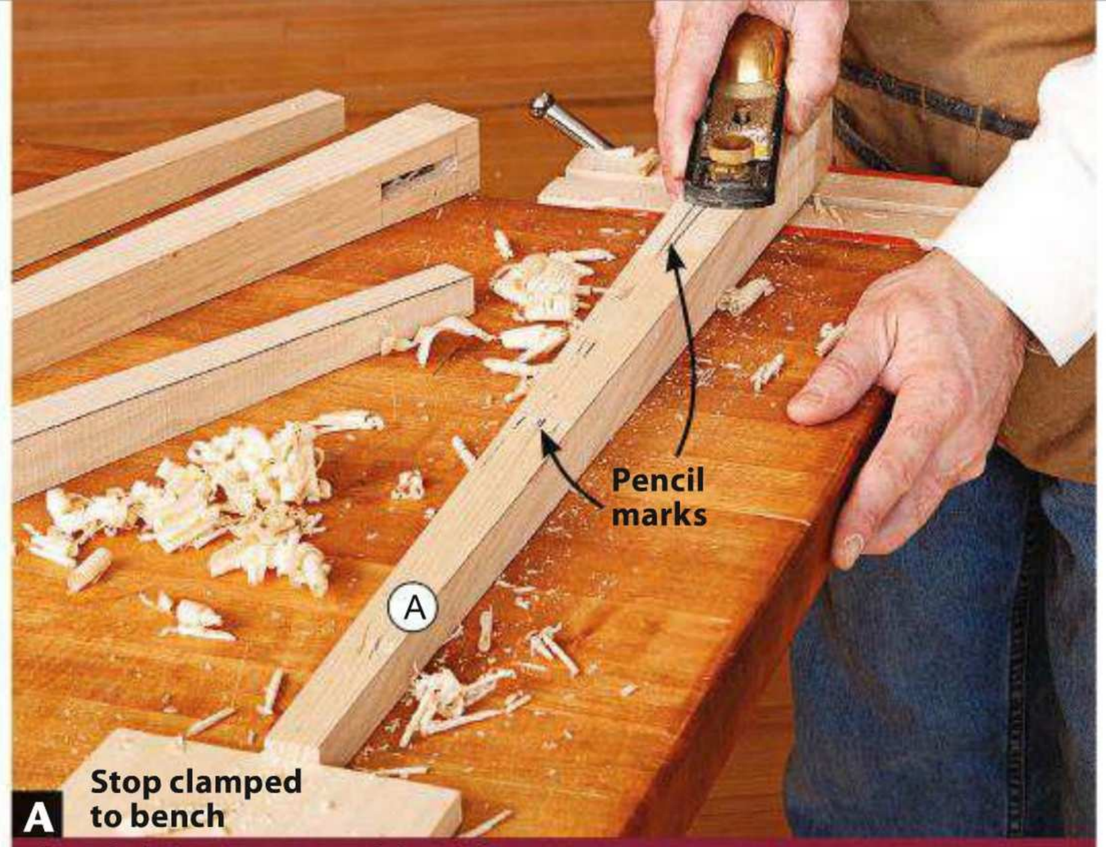
3 Lay out a taper on one outside face of each leg (A) [**Drawing 1**], and bandsaw 1⁄16" outside the lines. (Save the cutoffs for use later during assembly.) Lay out the second taper on the just-cut faces and bandsaw them. Smooth the tapers up to the layout lines using a block plane [**Photo A**], jointer, or belt sander with 120-grit sandpaper.

4 Lay out the bevel on the top of each leg (A) [**Drawing 1**]. Bandsaw the bevels [**Photo B**] and sand the legs to 220 grit. Try to maintain crisp edges where the bevels meet and at the peak of the leg.

Aprons and supports come next

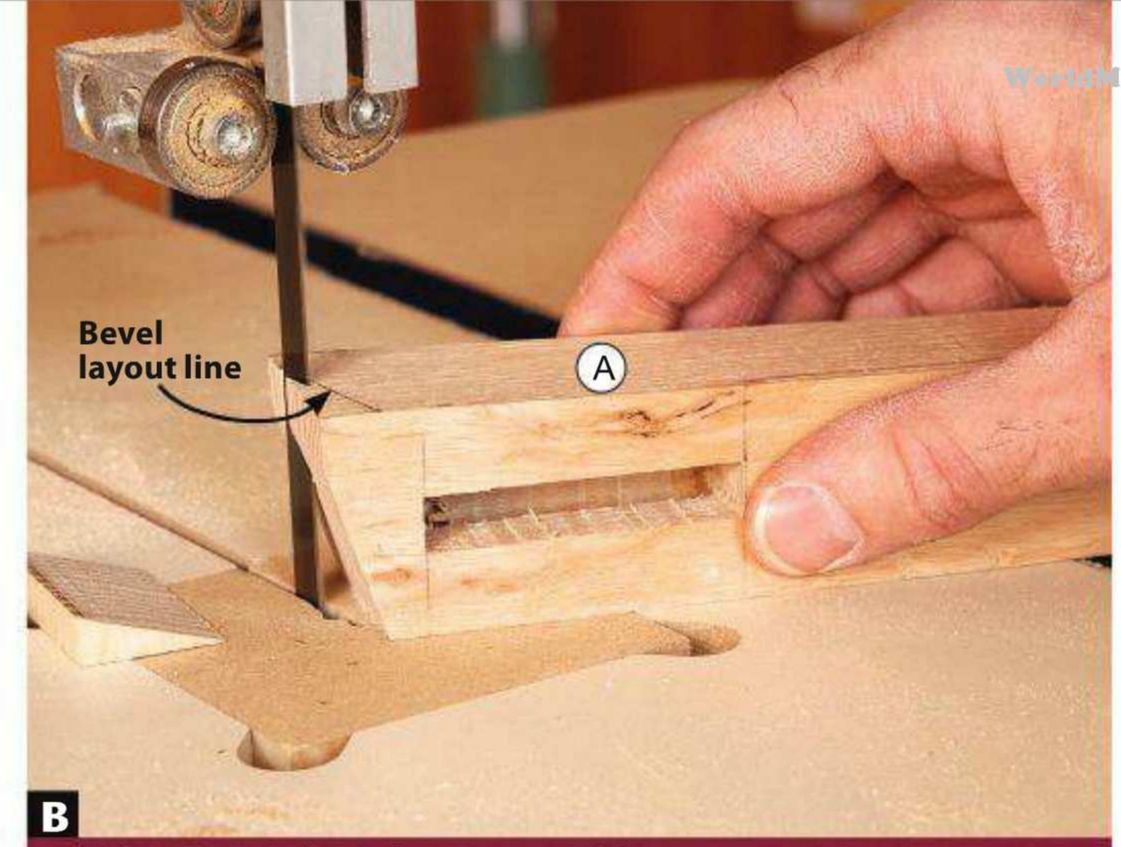
1 Cut the aprons (B) and supports (C) to size [**Drawings 2, 3**]. Set the supports aside for the moment. In your tablesaw, set up a ¾" dado blade, attach an auxiliary face to your rip fence, and position the auxiliary fence next to the blade. With the blade set just less than 3⁄16" above the table, cut a ⅛"-long test tenon on an apron by making a pass on all four faces. Test the fit of the test tenon in a leg (A) mortise. If needed, adjust the blade and repeat the test to get a snug fit, then cut ¾"-long tenons on the aprons. Leave the tablesaw setup for later.

2 Lay out the mortises on two aprons (B) as shown in the **Shop Tip** on *page 74*, then drill and chisel them out.



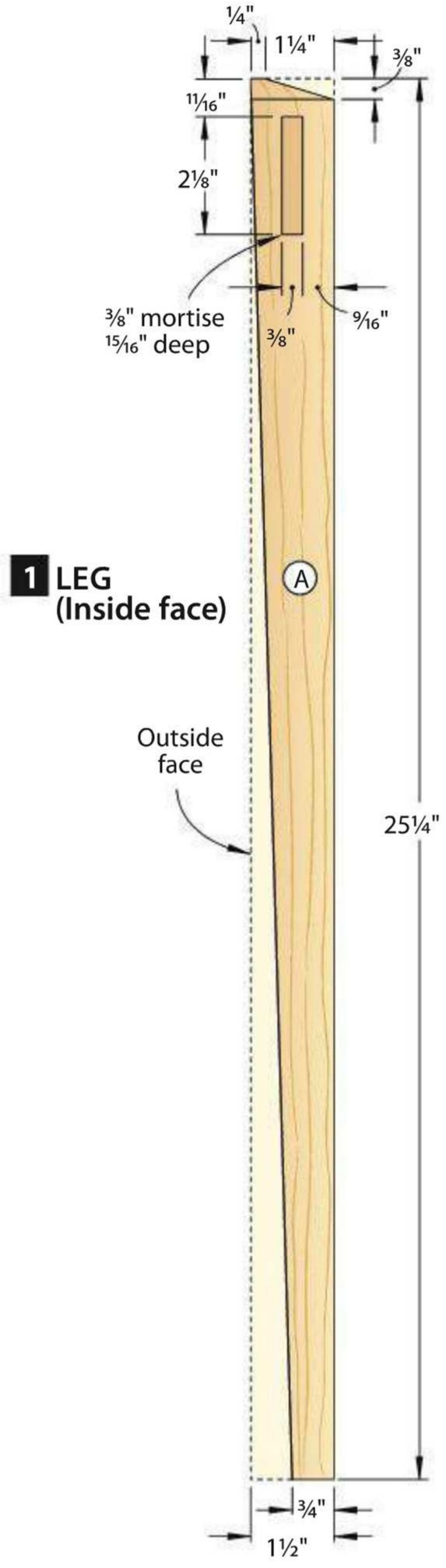
A SMOOTH THE LEGS

Scribble pencil lines on the tapered faces of each leg (A), then plane those faces until the marks disappear.

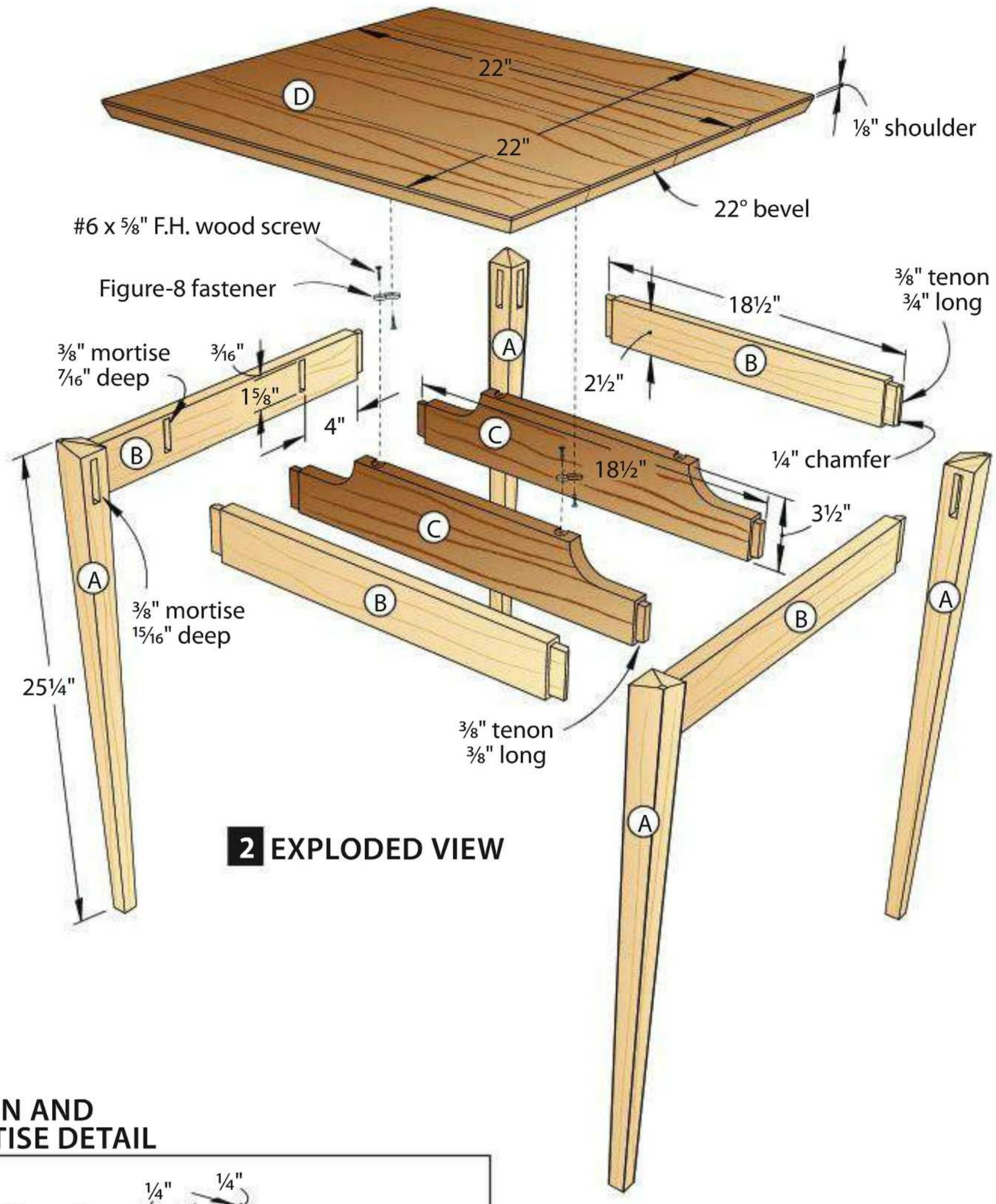


B BEVEL THE TOPS OF THE LEGS

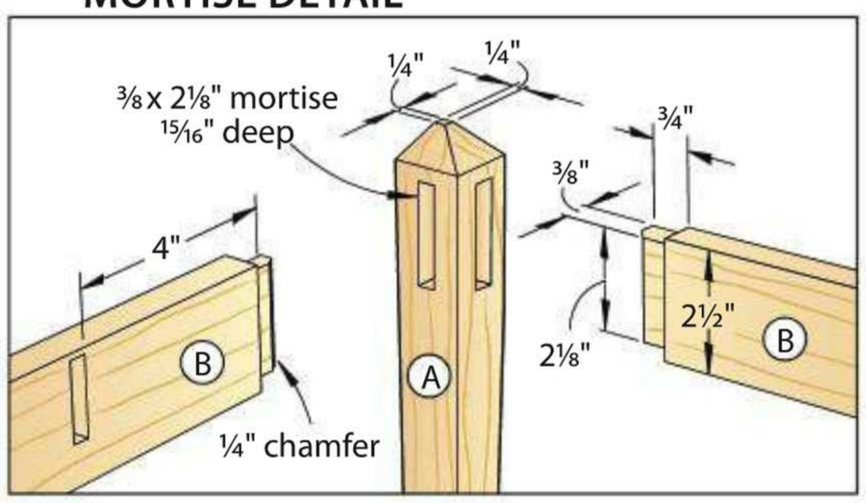
Draw layout lines for the bevels on the outside faces of the legs (A). Cut as close to the lines as possible to minimize sanding.



1 LEG (Inside face)

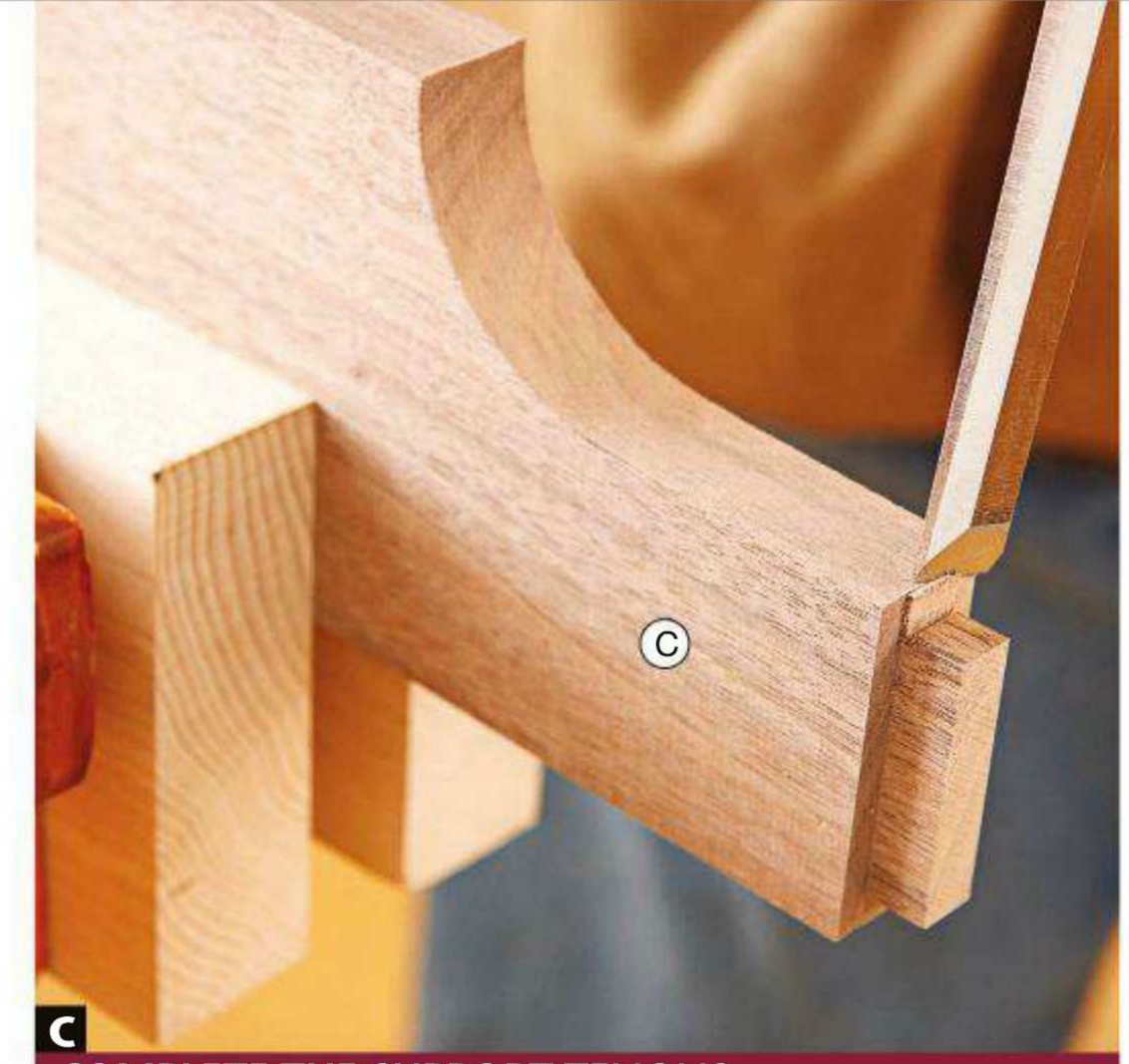


2 EXPLODED VIEW



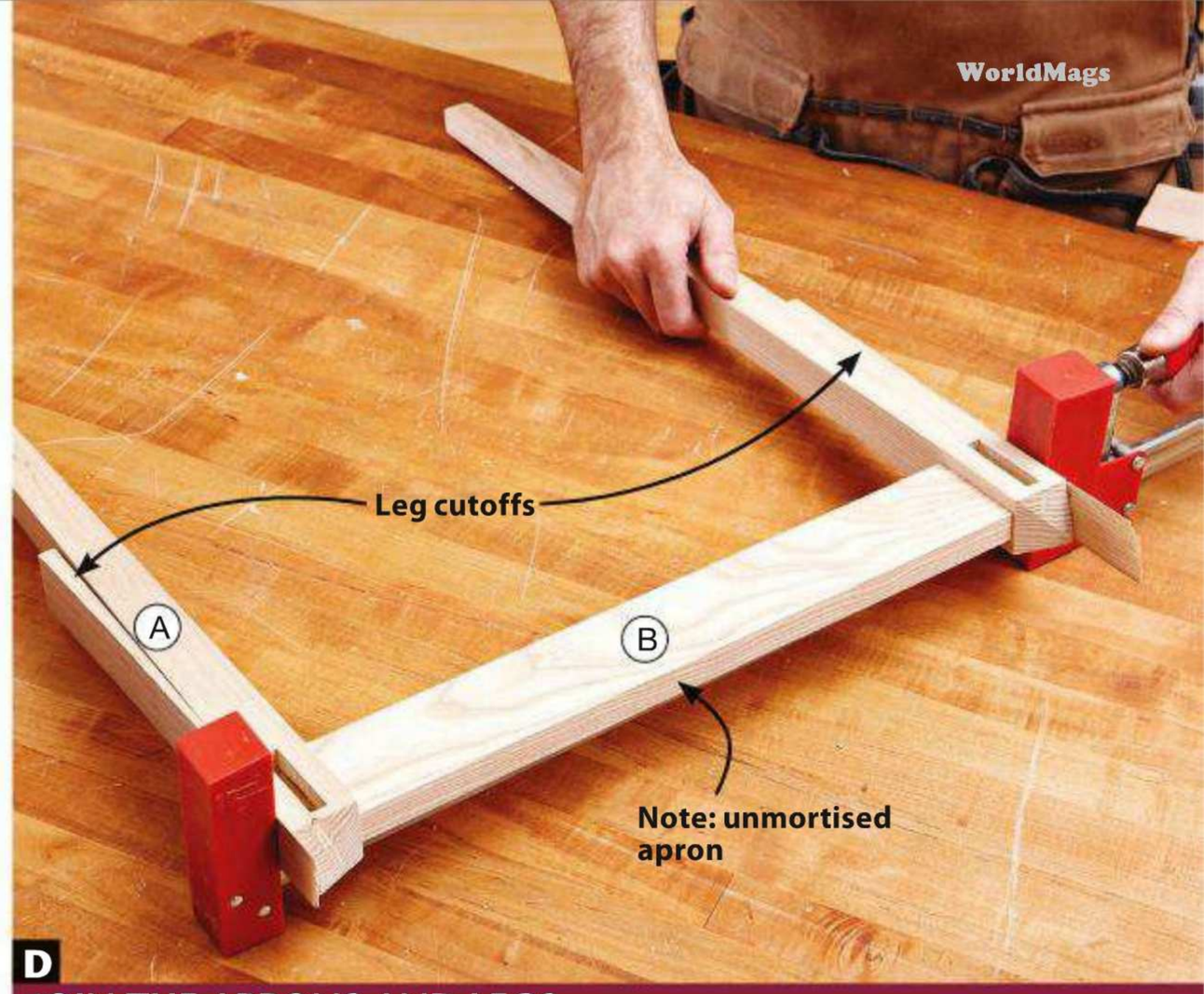
1a TENON AND MORTISE DETAIL

3 With the tablesaw running, reposition the auxiliary rip fence to reveal 3/8" of the dado blade. Retrieve the supports (C) and, as before, cut a stub test tenon to check the fit in the apron (B) mortises. When the thickness of the test tenon fits, cut the 3/8"-long tenons on the supports [**Drawing 3**].



C COMPLETE THE SUPPORT TENONS

After shaping the curved shoulders of the supports (C), recut the top shoulder of each tenon with a chisel.



D JOIN THE APRONS AND LEGS

Use a single clamp in line with the apron (B). Make sure the other mortise on each leg (A) faces the inside.

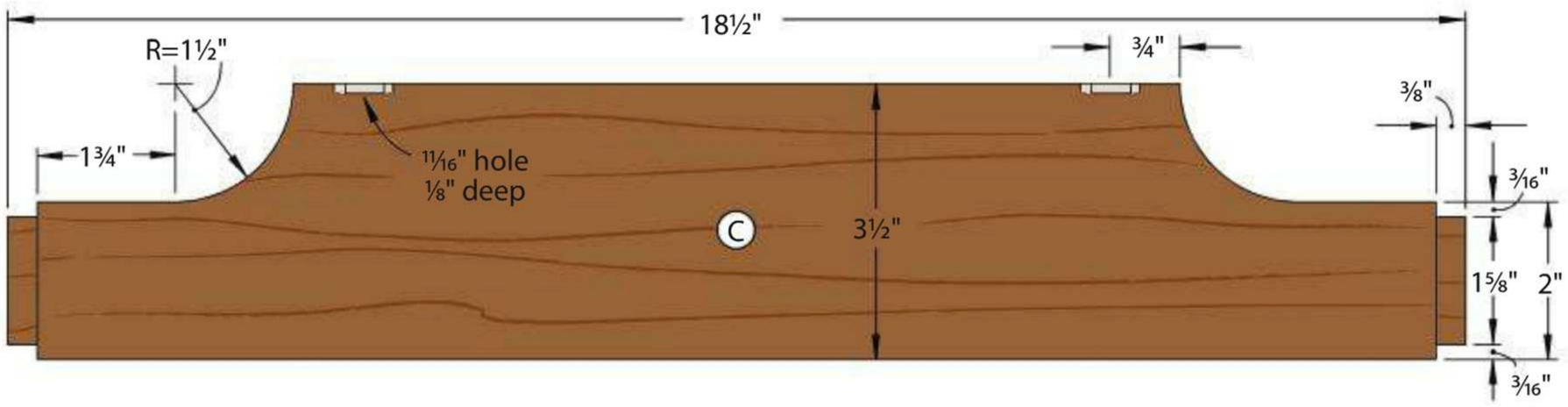
4 Photocopy the **Support Pattern** from the *WOOD Patterns®* insert, and use it to lay out the shoulders on the supports (C) [**Drawing 3**]. Bandsaw and sand them to shape. Pare the top shoulder of each tenon to fit the mortises [**Photo C**].

5 Finish-sand the aprons (B) and supports (C) to 220 grit.

The base takes shape

1 Using a block plane or sanding block, chamfer the inside corner of each apron (B) tenon to create clearance

3 SUPPORTS DETAIL

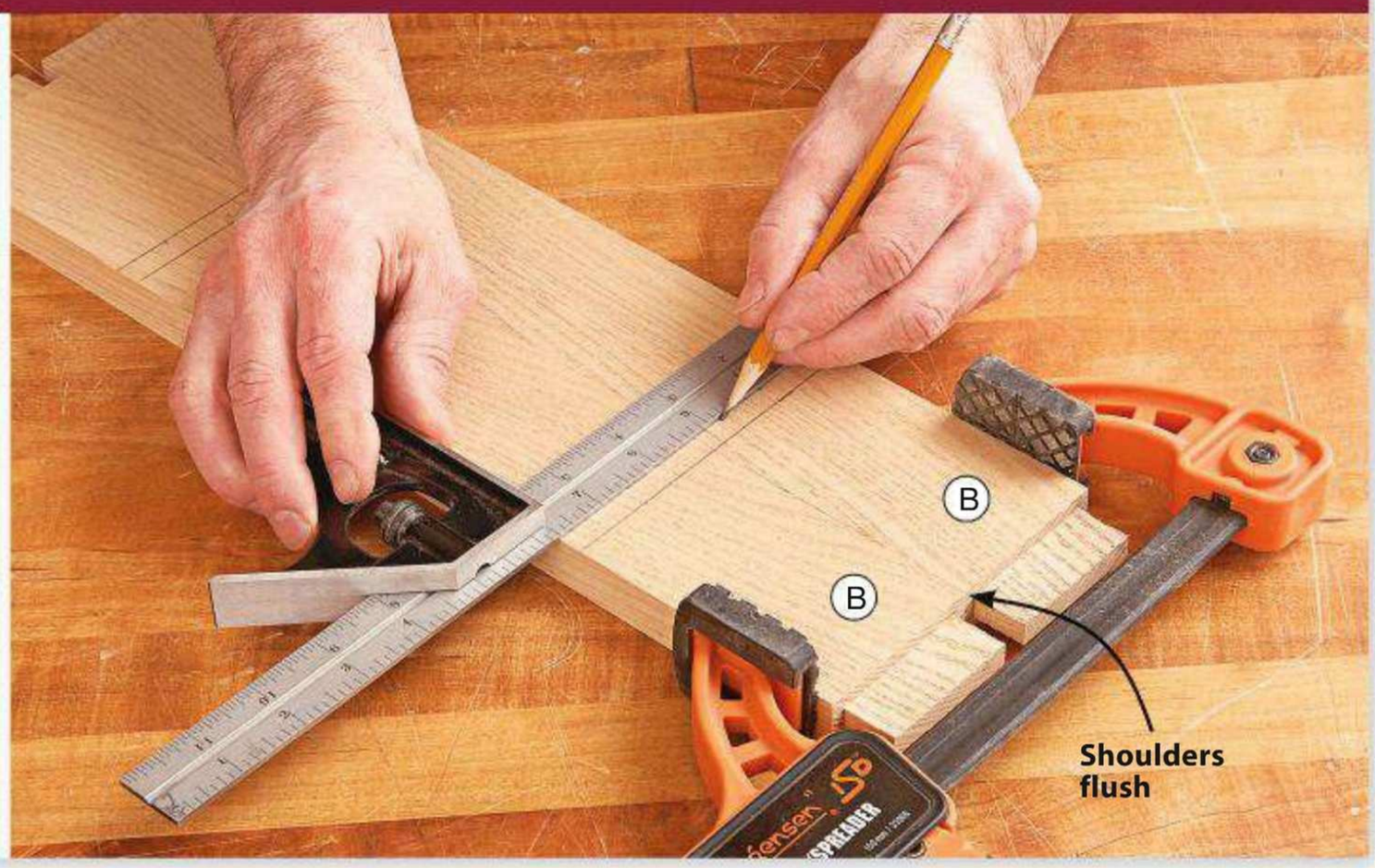


SHOP TIP

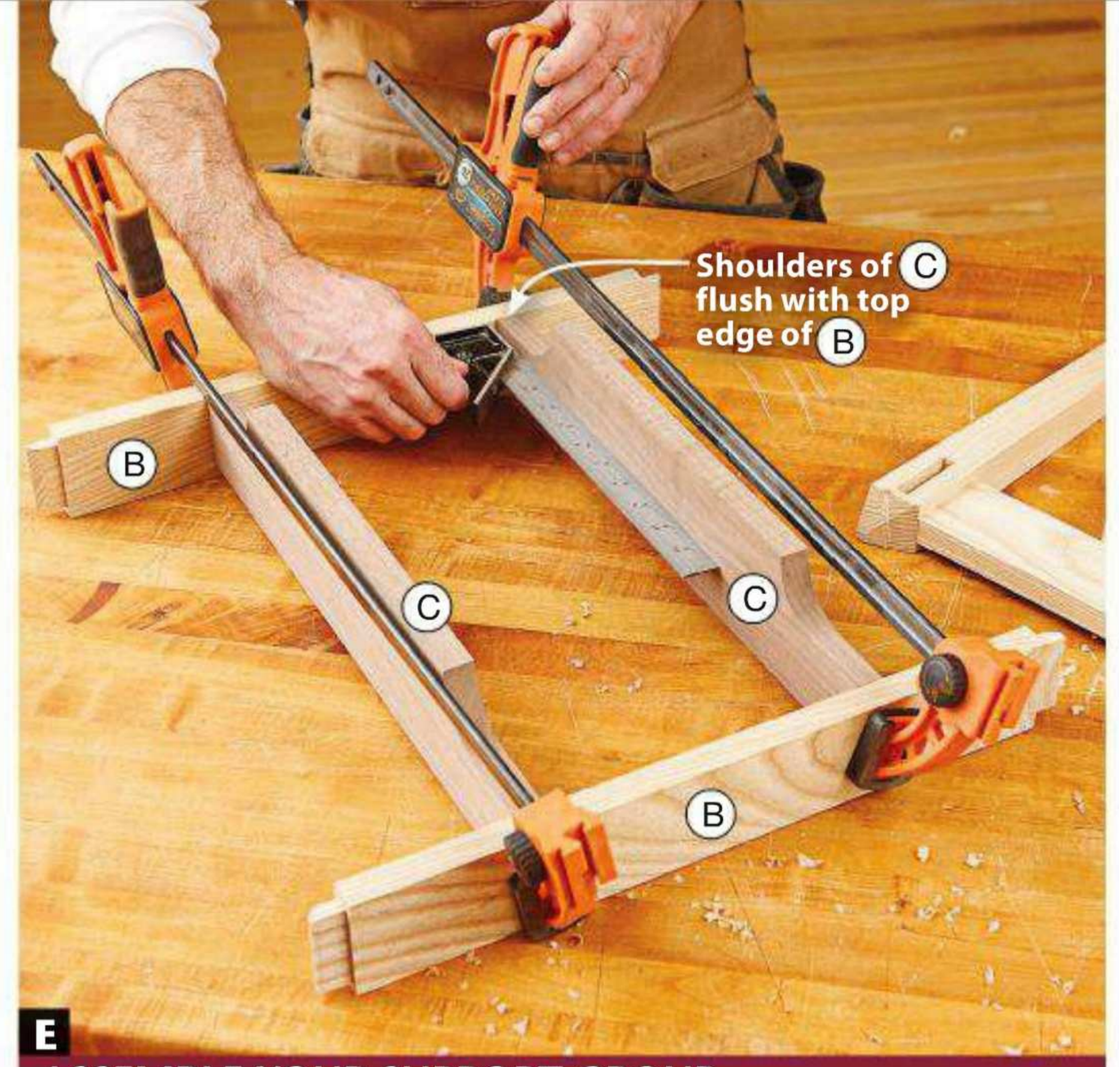
Mark matching mortises

Mortises cut in two aprons (B) on opposite sides of the table accept tenons cut in the supports (C). The opposing mortises must align or the supports won't fit in place.

To accomplish this, clamp the two aprons together edge to edge with the shoulders of the tenons flush. Lay a combination square across both pieces, and mark out the long edges of the mortises [**Drawing 2**]. Then reset the square to mark the top and bottom edges of each mortise.



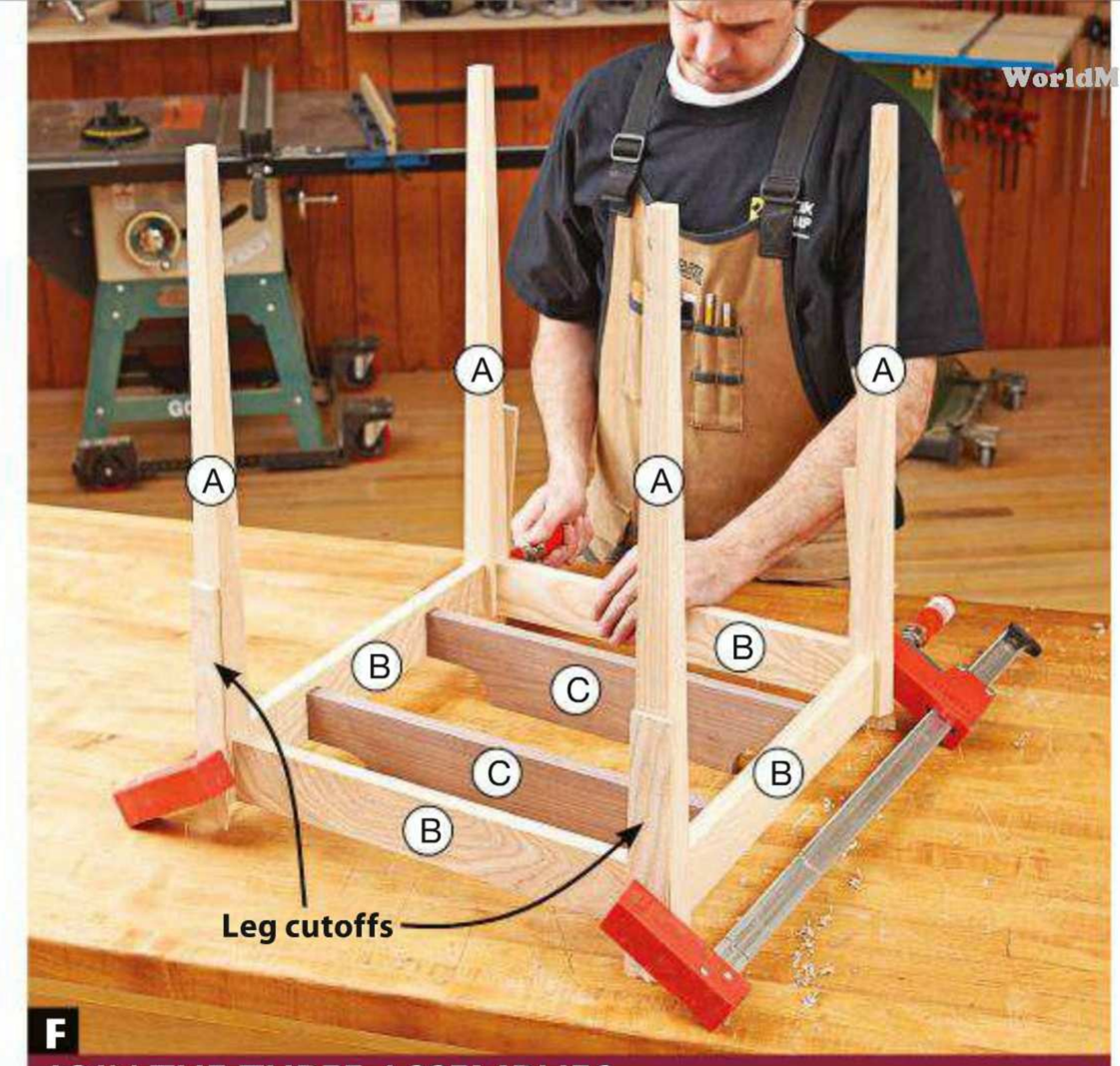
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E

ASSEMBLE YOUR SUPPORT GROUP

The shoulder of the support (C) should sit flush with the top edge of the apron (B). Check for square at the inside corners.



F

JOIN THE THREE ASSEMBLIES

Glue the leg assemblies (A/B) to the upside-down support assembly (B/C). Flip the base right side up to check that the legs sit flat.

[**Drawing 1a**]. Dry-fit the legs (A) and aprons to make sure the tenon shoulders seat tightly against the legs.

2 Retrieve the tapered cutoffs from the legs (A) and use them to create parallel clamping surfaces as you glue each unmortised apron (B) between two legs (A) [**Photo D**]. Compare diagonal measurements to check for square.

3 After the glue dries, dry-fit the leg assemblies (A/B) with the remaining aprons and the supports (C) to check the fit. Make any adjustments needed, then glue and clamp the supports between the aprons [**Photo E**].

4 Complete the table base by gluing the support assembly (B/C) between the leg assemblies (A/B) [**Photo F**].

Make a top and finish it

1 Glue up a blank for the top (D) [**Drawing 2**]. After trimming it to size, tilt your tablesaw blade to 22° from vertical. Set your rip fence to chamfer the underside of the top, leaving a ⅛" shoulder, and cut the chamfers. Finish-sand the top to 220 grit.

2 Using an 11⁄16" Forstner bit, drill ⅛"-deep counterbores in the supports (C) for the figure-8 fasteners [**Drawing 3**]. Screw the fasteners to the supports, then center the top (D) on the base and secure it by driving #6×⅝" wood screws through the fasteners.

3 Remove the top (D) and figure-8 fasteners and apply a finish. We wiped on three coats of General Finishes Arm-R-Seal, sanding lightly between coats with 320-grit sandpaper. After the finish dries, reattach the top.

Materials List

Part		FINISHED SIZE T	W	L	Matl.	Qty.
A	legs	1½"	1½"	25¼"	A	4
B	aprons	¾"	2½"	18½"	A	4
C	supports	¾"	3½"	18½"	W	2
D*	top	¾"	22"	22"	EW	1

*Part initially cut oversize. See the instructions.

Materials key: A–ash, W–walnut, EW–edge-glued walnut.
Supplies: #6×⅝" flathead wood screws (8), figure-8 fasteners (4).
Blade and bits: Stack dado blade; 5⁄16" and 11⁄16" Forstner bits.

MORE RESOURCES

FREE PLAN AND VIDEO

- A simple jig makes easy work of tapering legs: woodmagazine.com/taperjig1.
- Watch a free video on using the taper jig at woodmagazine.com/taperjig2.

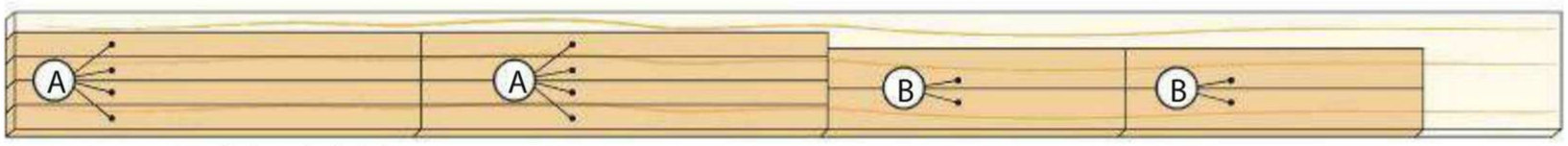
MORE PLANS

- Find more table plans at woodmagazine.com/tables. $

$=Download these plans for a small fee.



Cutting Diagram



¾ x 7¼ x 96" Ash (5.3 bd. ft.)



¾ x 7¼ x 72" Walnut (4 bd. ft.) (2 needed)

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

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Ask WOOD

Answers to your questions from letters, e-mails, and WOOD Online®

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For an answer to your woodworking question, write to **ASK WOOD, 1716 Locust St., LS-221, Des Moines, IA 50309-3023** or e-mail us at **askwood@woodmagazine.com**. For immediate feedback from your fellow woodworkers, post your questions on one of our woodworking forums at **woodmagazine.com/forums**.

How to hook up a humongous handrail

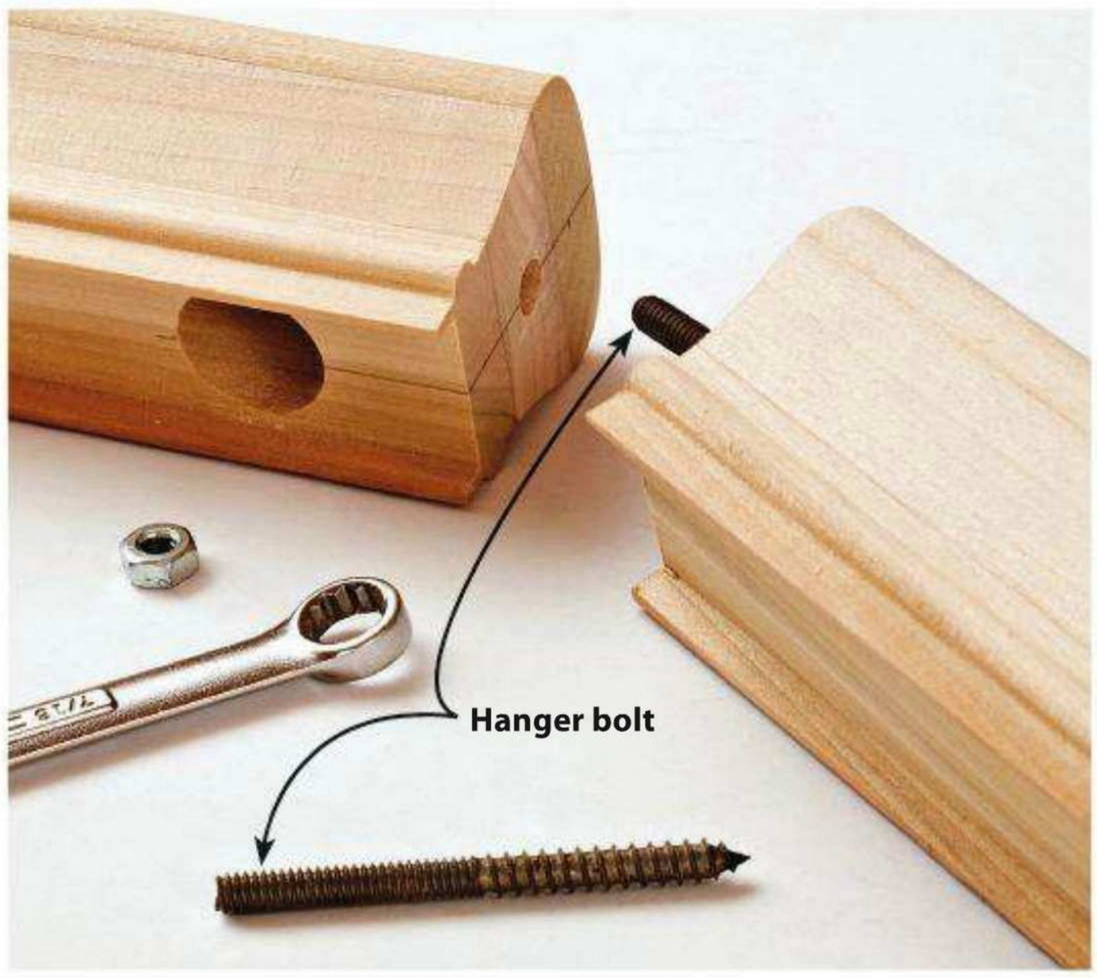
Q: For a ramp leading to the entrance of my shop, I need a handrail more than 20' long. But the handrail stock at my home center measures only 8' long. How can I join the rails end-to-end to create a tight, water-resistant seam?

—Ralph Kimbrel, Poquoson, Va.

A: The humble hanger bolt comes to your rescue, Ralph. These headless fasteners have one end threaded like a screw, the other like a bolt. You'll find them in various sizes at the home center or hardware store, and for exterior use, they come in stainless steel or galvanized versions.

To join rails end to end, square cut your rails, making certain the joints land on or near one of the rail's supports. Mark the center of the mating ends and drill a pilot hole sized for the screw end of the hanger bolt in one of the handrail ends. Use two nuts on the bolt threads to drive the screw into the pilot hole. On the mating rail end, drill a hole for the bolt end sized about ⅛" larger than the bolt, as shown at *right*. Then use a 1" spade or Forstner bit to bore an access hole in the bottom of the rail that intersects the bolt hole you just drilled.

Insert the protruding hangar bolt into the bolt hole. Add a washer and thread the nut through the access hole. Finger-tighten the nut and line up the rail ends. Then tighten the nut with a small wrench.



An end-to-end handrail joint works much like a bed-frame joint. The nut on the hanger bolt pulls the butt joint tight.

Finally, no exterior joint will be completely watertight, but you can increase the handrail's chances with a couple coats of exterior-grade paint.

How much wood would I need for waste?

Q: When buying wood for a project, how many additional board feet should I purchase to account for cutoffs and defects?

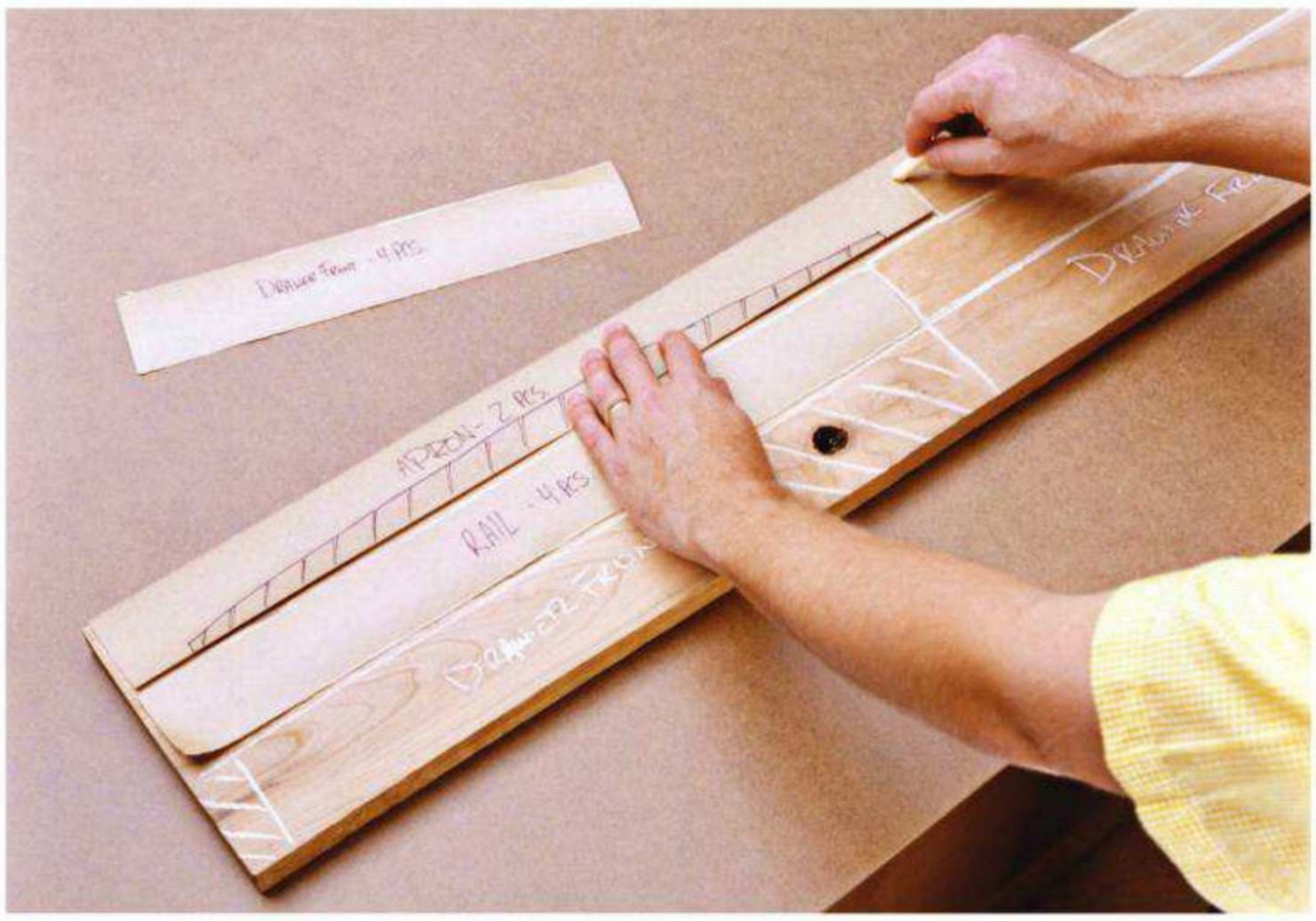
—Alex Downing, Jacksonville, Ill.

A: As a starting point, Alex, add 15 percent to your bill of materials.

Then consider your project design. If there are odd-shaped parts, add 5 to 10 percent to that number. Add to that another 5 to 10 percent if you'll use sapwood-prone species, such as walnut or cherry.

If you're shopping in the lower grades of wood—No. 1 or 2 common—you'll need to tack on an additional 30 percent to your order due to defects. That may sound like a lot, but it really makes sense when you realize that you could save up to 50 percent over Firsts and Seconds (FAS) lumber.

Finally, keep in mind that the wood you see in the bin at your hardwood store today could come from a different, mismatched source tomorrow. So buy a little extra—being too obsessive about avoiding all waste could hurt the look of your project when you need to make a return trip.



The ideal cutting lists that you see at the end of project plans don't take defects into account. Mark out parts on actual boards to maximize your yield.

continued on page 78

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Skip the sandpaper and wipe away pencil marks

Q: I tried to sand some pencil marks off plywood and ended up sanding through the veneer. Nuts! How do I remove pencil marks without ruining the plywood?

—Richard Brown, Spirit Lake, Minn.

A: Sorry about the plywood, Richard. Veneer on modern plywood can be as thin as 1/50". It doesn't take long for a power sander to eat through that. Next time, dab a shop towel in denatured alcohol and use it to wipe off the pencil marks. The alcohol acts as a solvent for the graphite in pencil leads and evaporates without leaving a residue. Let the project piece dry completely before applying finish.



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Truly Unique



Time travel at the speed of a 1935 Speedster?

The 1930s brought unprecedented innovation in machine-age technology and materials. Industrial designers from the auto industry translated the principles of aerodynamics and streamlining into everyday objects like radios and toasters. It was also a decade when an unequaled variety of watch cases and movements came into being. In lieu of hands to tell time, one such complication, called a jumping mechanism, utilized numerals on a disc viewed through a window. With its striking resemblance to the dashboard gauges and radio dials of the decade, the jump hour watch was indeed "in tune" with the times!

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SAVE 33%

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LOT NO. 96289



SAVE 55% **$8.99** REG. PRICE $19.99

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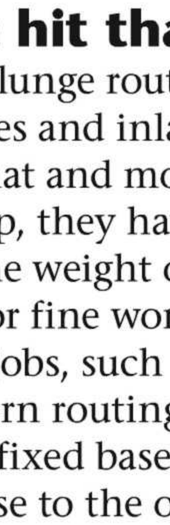
Palm-size router kit is a hit that fits

I've always wanted a lightweight plunge router for delicate jobs, such as hinge mortises and inlays. DeWalt and Porter-Cable have delivered that and more with these compact router kits. At 1¼ hp, they have more power than a trim router at half the weight of a midsize router. That makes them nimble for fine work, yet stout enough for many routine routing jobs, such as edge profiles, rabbets, dadoes, and pattern routing.

I used each kit with plunge and fixed bases, slipping the motor effortlessly from one base to the other. I routed dadoes and rabbets and keyhole slots for a bookshelf, 1"-deep mortises in table legs, and multiple edge profiles, and the routers never bogged down. You get 1½" of height adjustment on the fixed base and 2" on the plunge base. The plunge base also has four fixed turret depth stops and one adjustable stop.

The two kits are nearly identical, but the DeWalt proves a better buy. It has a variable-speed motor (16,000 to 27,000 rpm), LED lights around the collet, and a D-shaped clear-plastic subbase on the fixed base with a bit opening of 1½". The plunge subbase has a smaller, molded opening to fit guide bushings; to use guide bushings on the fixed base, though, you'll need to buy an optional subbase for $8. The single-speed Porter-Cable costs $10 less, but lacks the features listed for the DeWalt.

—Tested by Bob Hunter, Tools Editor







DeWalt 1¼-hp compact router, #DW611PK

Performance	★★★★★
Price	$200

DeWalt
800-433-9258; dewalt.com

Porter-Cable 1¼-hp compact router, #450PK

Performance	★★★★☆
Price	$190

Porter-Cable
888-848-5175; portercable.com

Finally—a flexible air hose that won't fight back

While testing the portable air compressors for this issue (*page 58*), I tried several air hoses in search of the best one. And I found it in the neon-green Flexzilla. Made from a polymer that stays pliable even in sub-zero cold, this hose doesn't kink or retain its coiled form, and it does it without sacrificing sufficient rigidity in the hose wall.

I used the Flexzilla hose with multiple pneumatic nailers, and it performed exceptionally every time. Although it doesn't come with quick-connect couplers, you can buy a pair for about $6 and attach them yourself.

—Tested by Jan Svec, a former WOOD® magazine project designer, builder, and editor



Flexzilla air-compressor hose

Performance		★★★★★
Price	¼"×25' hose (#HFZ1425YW2)	$22
	⅜"×25' hose (#HFZ3825YW2)	$31

Legacy Manufacturing
800-645-8258; legacymfg.com

We hooked up the Flexzilla and five other air hoses to a compressor, laid them in a coil, and pulled them 15'. The Flexzilla (right) shed its coil best.



continued on page 87

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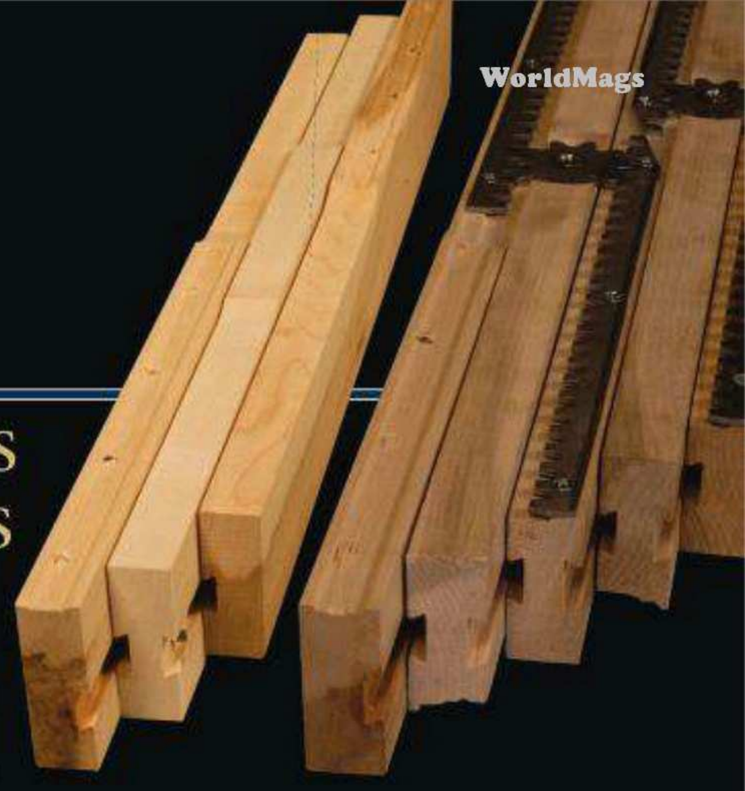
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Until recently, dust collection for home woodworkers came in the form of affordable roll-around units (usually with porous-filter bags) or pricey, bulky cyclone collectors powering a central system. Now Oneida bridges that gap with its 110-volt Mini-Gorilla portable cyclone dust collector. Standing just 5' tall, it produces a mere 77 dB—quieter than my tablesaw—making it perfect for basement shops.

The Mini-Gorilla's powerful 1½-hp Baldor motor, fan, and 10'-long, 5"-diameter flex-hose sucked up all the dust I could make with my tablesaw, bandsaw, and combination belt/disc sander. And what little dust made it past the heavy-steel cyclonic separator was trapped in the fine-filtering canister.

That said, I would not recommend this collector for use with a planer or jointer, because chips quickly fill up the 17-gallon drum. And even though the optional mobile stand rolls smoothly on its three wheels, the wide stance makes it clumsy to move among machines in a tight shop.



—Tested by Bob Baker, a three-decade woodworker and former woodworking-store manager

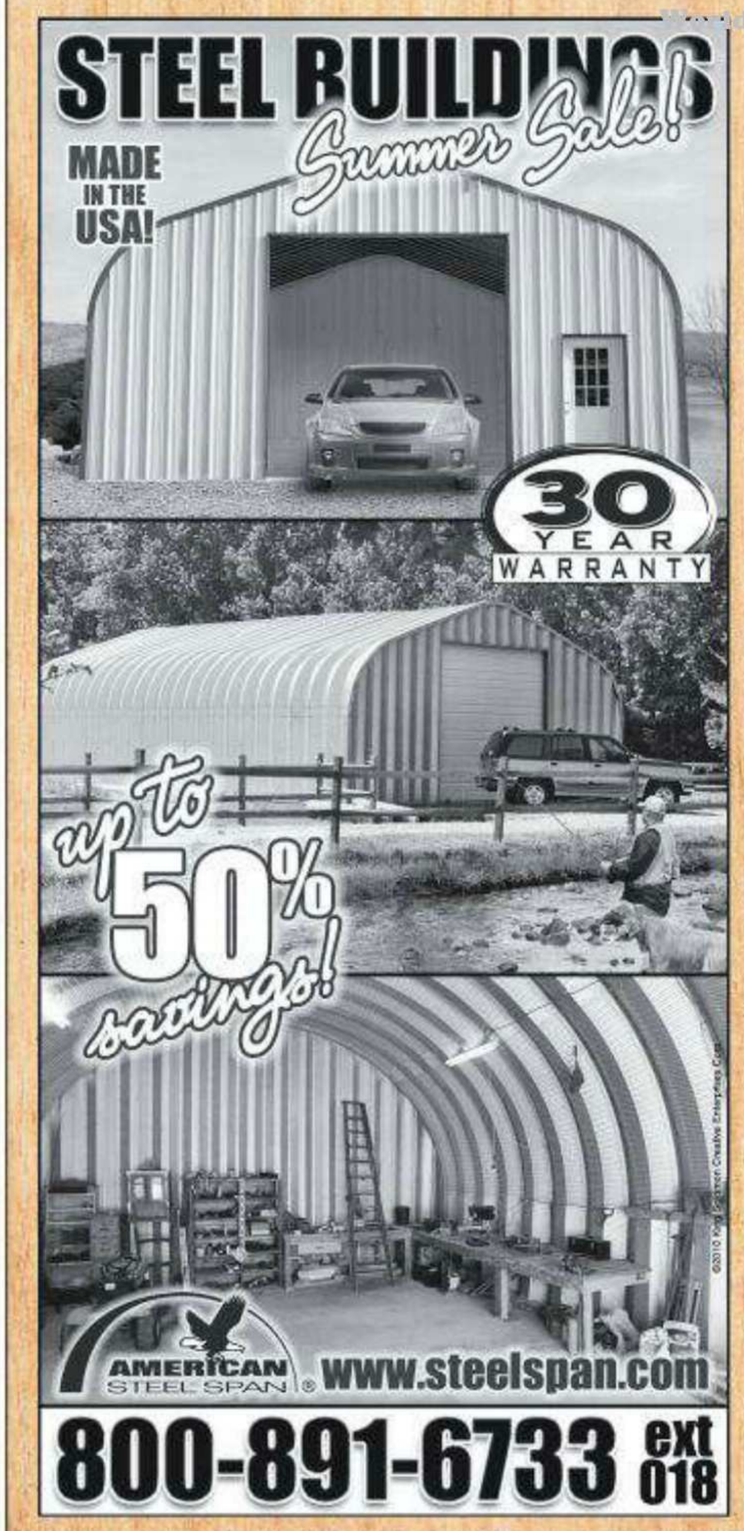
Mini-Gorilla portable cyclone dust collector

Performance		★★★★½
Price	(collector with filter)	$780
	(including stand and drum)	$980

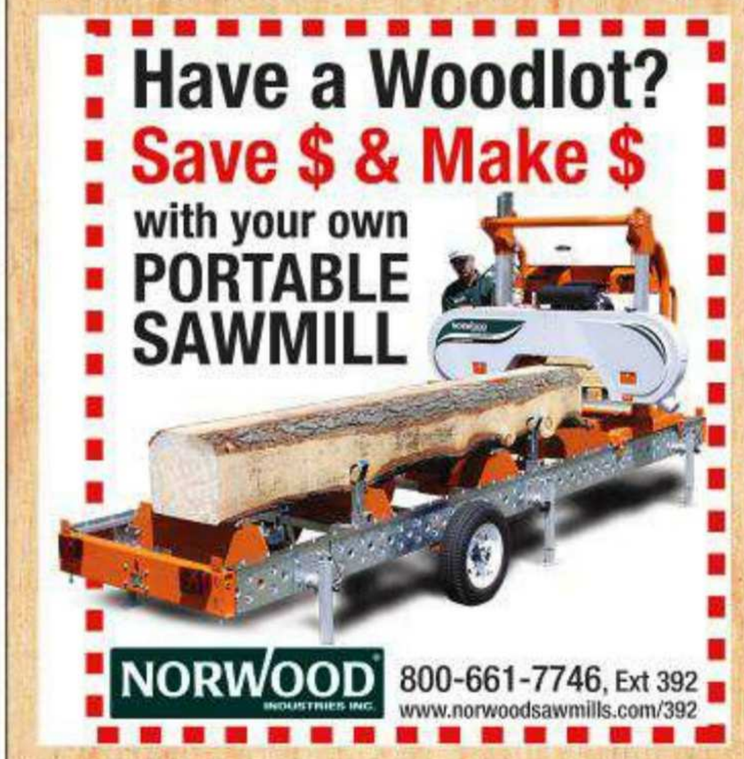
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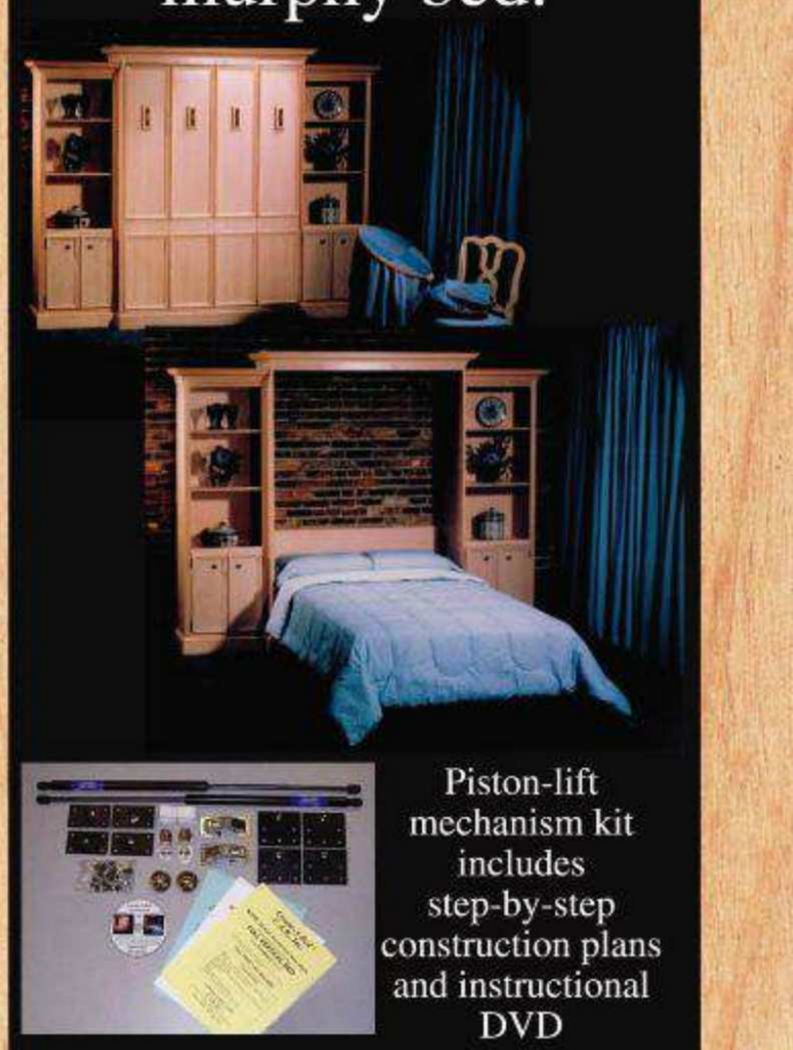
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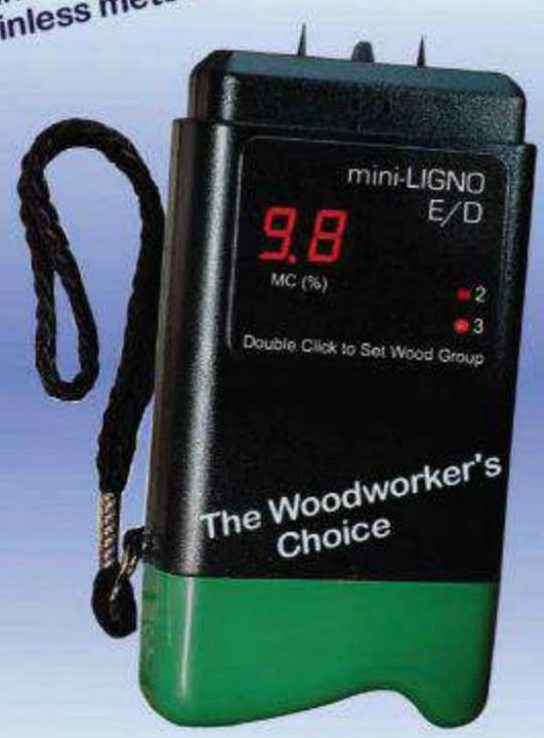


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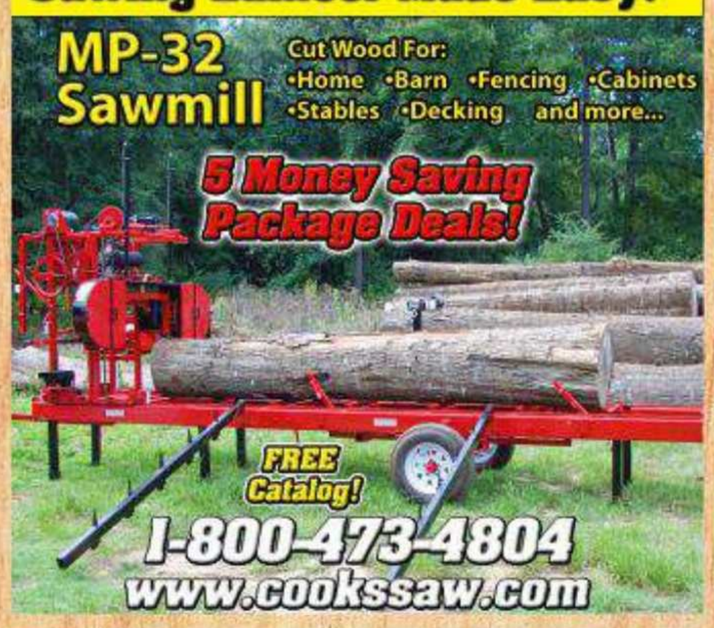
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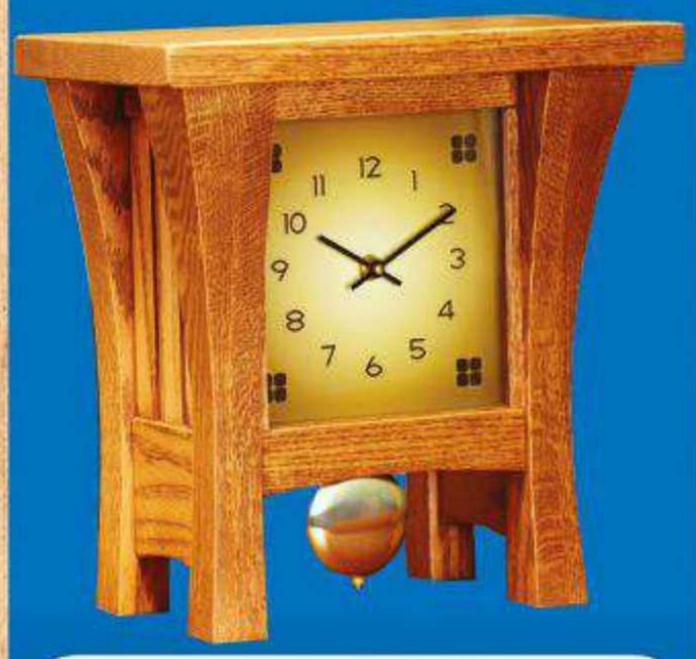
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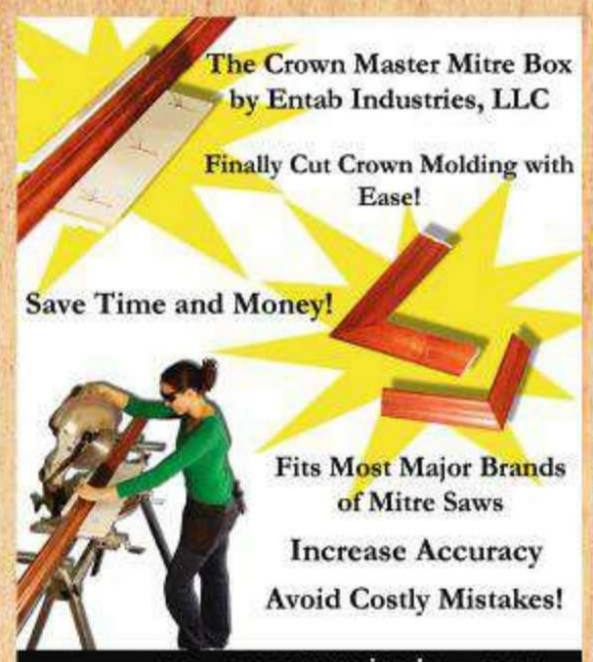
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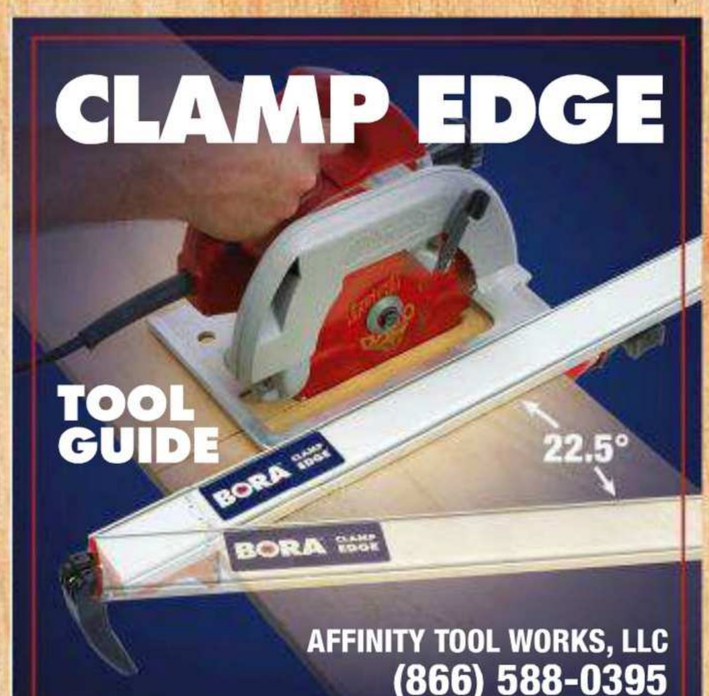
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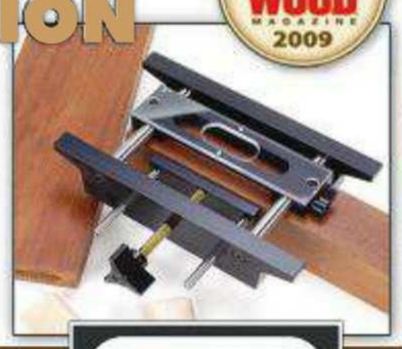
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What's Ahead

On deck in the October 2011 issue (on sale August 23rd)



Super-simple wall desk
Create a laptop-sized workspace in just a weekend. Knock-down hardware makes this desk easy to transport and store.



Sideless side table
There's less to this table than meets the eye. The drawers do double-duty, serving as the side and back panels when pushed into place.



Fold-away workbench
This sturdy, mobile, easy-to-build workbench collapses for convenient storage.



How to buy a dust collector
Learn why this may be the most important purchase you make for your shop, and what to look for.



Made-to-order dovetailed drawers
We compare drawer boxes from several manufacturers so you can decide if they make sense for you.



Avoid router and tablesaw scorch marks
Use these seven simple tips (like the painter's tape trick above) to keep from getting burned.

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