EDTIOR'S CHOICE: Our Favorite Tools of 2021

Popular Woodworking

DECEMBER 2021 | #262

SHAKER SIDE TABLE

V-BACK BAR STOOL
An Arts & Crafts Take on Bar Seating

INDUSTRIAL BOOKCASE
The Perfect Workstation Build

PLUS:
Tune-Up Your Band Saw

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PURVEYORS OF FINE MACHINERY® SINCE 1983

Quality Machines, Great Prices!

8" BENCHTOP DRILL PRESS

- Motor: 1/3 HP, 120V, single-phase, 2.3A
- Swing: 8"
- Spindle taper: JT33
- Spindle travel: 2"
- Spindle speeds: 5, from 740 - 3140 RPM
- Drilling capacity: 1/2"
- Max. distance from spindle to table: 7 1/2"
- Table dimensions: 6 1/2" x 6 1/2"
- Table tilt: 45° left/right
- Table swivel around column: 360°
- Overall dimensions: 9" W x 17 1/2" D x 23 1/2" H
- Approx. shipping weight: 36 lbs.

MADE IN AN ISO 9001 FACTORY

⚠WARNING! †1

G0925 ONLY $109.95

14" HEAVY-DUTY BENCHTOP DRILL PRESS

- Motor: 3/4 HP, 120V, single-phase, 7.5A
- Swing: 14"
- Head swivel: 360°
- Drill chuck: 3/64"–5/8"
- Drilling capacity: 3/4" steel
- Spindle taper: MT #2
- Spindle travel: 3 1/4"
- Spindle speeds: (12), 140 - 3050 RPM
- Table swing: 360°
- Table tilts: 90° left & right
- Footprint: 18" x 11"
- Overall dimensions: 14 1/2" W x 24" D x 38" H
- Approx. shipping weight: 148 lbs.

MADE IN AN ISO 9001 FACTORY

⚠WARNING! †1

G7943 ONLY $525.00

$149 SHIPPING

1/2 HP BENCHTOP MORTISING MACHINE

- Motor: 1/2 HP, 110V, single-phase, 6A
- Spindle speed: 1725 RPM
- Spindle taper: JT #2
- Spindle travel: 3 1/4"
- Chuck size: 3/8"
- Collar size: 5/8"
- Max. stock width: 8 1/2"
- Max. stock thickness without extension block: 4 1/4"
- Max. stock thickness with extension block: 6"
- Max. mortising depth: 3"
- Max. chisel travel: 4 5/8"
- Max. distance column to chisel: 5"
- Chisel size range: 1/4"-1/2"
- Overall dimensions: 13 3/4" W x 29" D x 32" H
- Approx. shipping weight: 76 lbs.

⚠WARNING! †1

G0645 ONLY $409.00

$49 SHIPPING

1 HP WALL-MOUNT DUST COLLECTOR WITH CANISTER FILTER

- Motor: 1 HP, 120V/240V (prewired 120V), 7A/3.5A
- Air suction capacity: 537 CFM
- Static pressure: 7.2"
- Filter rating: 1-micron
- Bag capacity: 1.5 cubic feet
- Intake hole size: 4"
- Impeller: 10" balanced cast aluminum radial fin
- Canister filter size (diameter x length): 15" x 16-3/16"
- Height with bag inflated: 46"
- Approx. shipping weight: 62 lbs.

MADE IN AN ISO 9001 FACTORY

⚠WARNING! †1

G0785 ONLY $395.00

2 HP CANISTER DUST COLLECTOR

- Impeller Motor: 2 HP, 220V, single-phase, 9A
- Main inlet size: 6" with three 4" adapter inlets
- Airflow capacity: 1103 CFM @ 3.5" SP
- Max. static pressure: 11.95"
- Filtration rating: 1-micron
- Filter surface area: 80 sq. ft.
- Impeller: 12 3/4" radial fin
- Machine collection capacity at same time: 3
- Collection capacity: 3 3 1/2 gallons
- Dimensions: 39" W x 31 1/2" D x 76" H
- Approx. shipping weight: 165 lbs.

2-Year Warranty!

⚠WARNING! †1

SB1100 ONLY $1249.00

$179 SHIPPING

3 HP PORTABLE CYCLONE DUST COLLECTOR

- Motor: 3 HP, 220V, single-phase, 15.9A
- Intake hole size: 8"
- Impeller: 15" aluminum
- Airflow capacity: 1941 CFM @ 2.9" SP
- Sound rating: 79 dB
- Max static pressure: 11.0"
- Filter surface area: 45 sq. ft.
- Filtration: 1-micron
- Collection size: 35-gallon drum
- Overall dimensions: 31" W x 54" D x 82" H
- Approx. shipping weight: 376 lbs.

MADE IN AN ISO 9001 FACTORY

⚠WARNING! †1

G0862 ONLY $1795.00

$179 SHIPPING

13" 2 HP BENCHTOP PLANER WITH HELICAL CUTTERHEAD

- Motor: 2 HP, 120V, single-phase, 15A
- Max. cut width: 13"
- Min. stock length: 6"
- Min. stock thickness: 1/8"
- Max. stock thickness: 6"
- Max. cut depth full width: 1/32"
- Cutterhead speed: 8500 RPM
- Feed rate: 25 FPM
- Overall dimensions: 25 1/2" W x 28" D x 19" H
- Approx. shipping weight: 82 lbs.

MADE IN AN ISO 9001 FACTORY

⚠WARNING! †1

G0940 ONLY $895.00

$69 SHIPPING

15" 3 HP HEAVY-DUTY PLANER

- Motor: 3 HP, 240V, single-phase, 14A
- Maximum stock width: 15"
- Maximum stock thickness: 6 3/8"
- Minimum stock thickness: 1/4"
- Minimum stock length: 6 3/8"
- Maximum cutting depth: 3/16"
- Cutterhead diameter: 3"
- Cutterhead type: 3-knife
- Cutterhead speed: 5000 RPM
- Feed rate: 16 & 30 FPM
- Table size: 15" x 20 1/8"
- Dust port size: 4"
- Footprint: 20" x 20 1/2"
- Overall dimensions: 32" W x 28" D x 23 1/2" H
- Approx. shipping weight: 382 lbs.

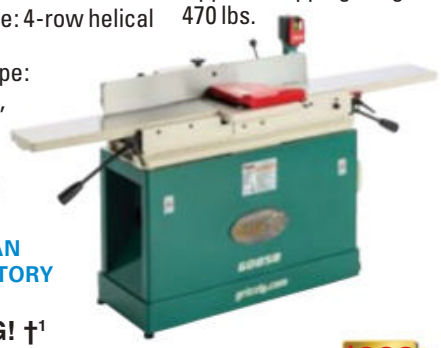
⚠WARNING! †1

G0815 ONLY $1350.00

$229 SHIPPING

8" X 76" PARALLELOGRAM JOINTER WITH HELICAL CUTTERHEAD & MOBILE BASE

- Motor: 3 HP, 230V, single-phase, 12A
- Maximum width of cut: 8"
- Maximum depth of cut: 1/8"
- Maximum rabbeting depth: 1/2"
- Cutterhead diameter: 3 1/16"
- Cutterhead type: 4-row helical with 36 inserts
- Insert size & type: 15 x 15 x 2.5mm, indexable carbide
- Cutterhead speed: 5500 RPM
- Table size: 8" x 76"
- Fence size: 38" x 4 1/2"
- Approx. shipping weight: 470 lbs.



MADE IN AN ISO 9001 FACTORY

⚠WARNING! †1

G0858 ONLY $2395.00

$229 SHIPPING

***To maintain machine warranty, 440V operation requires additional conversion time and a $250 fee. Please contact technical service for complete information before ordering.**

1-800-523-4777

TECHNICAL SERVICE: 570-546-9663

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Some products we sell can expose you to chemicals known to the State of California to cause cancer and/or birth defects or other reproductive harm. For more information go to www.P65Warnings.ca.gov/product

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22055

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THE CLASSIC 14" BANDSAW

- Motor: 1 HP, 110V/220V (prewired 110V), single-phase, 11A/5.5A
- Max. cutting width left of blade: 13½"
- Max. cutting height (resaw capacity): 6"
- Table size: 14" x 14"
- Table tilt: 15° left, 45° right
- Floor-to-table height: 43⅝"
- Blade size: 93½" (⅛" - ¾" wide)
- Blade speed: 1500 and 3200 FPM
- Overall dimensions: 26⅜" W x 30¼" D x 66½" H
- Approx. shipping weight: 199 lbs.

CSA C US 252923

⚠WARNING! †[1]

G0555 ONLY $850.00 $149 shipping

17" 2 HP BANDSAW

- Motor: 2 HP, 110V/220V (prewired 220V), single-phase, 19A/9.5A
- Cutting capacity/throat: 16¼" left of blade
- Max. cutting height: 12⅛"
- Table size: 17" x 17" x 1½" thick
- Table tilt: 10° left, 45° right
- Floor-to-table height: 37½"
- Blade length: 131½"
- Blade speeds: 1700 & 3500 FPM
- Overall size: 32" W x 32" D x 73" H
- Approx. shipping weight: 342 lbs.

CSA C US 181721

MADE IN AN ISO 9001 FACTORY

⚠WARNING! †[1]

G0513 ONLY $1595.00 $179 shipping

10" 2 HP BENCHTOP TABLE SAWS

- Motor: 2 HP, 120V, single-phase, 15A
- Table size: 26⅜" W x 32¼" D
- Arbor speed: variable, 2000-4000 RPM
- Blade tilt: Left, 45°
- Max. depth of cut: 3⅛" @ 90°, 2¼" @ 45°
- Rip capacity: 28" right
- Dado capacity: 13/16"
- Dust port: 2½"
- Overall size: 28" W x 37½" D x 20½" H (G0869); 41½" W x 37½" D x 41" H (G0870)
- Approx. shipping weight: 72 lbs. (G0869); 106 lbs. (G0870)

G0869 shown

c UL us LISTED Table Saw 93K7 E98714

MADE IN AN ISO 9001 FACTORY

⚠WARNING! †[1]

G0869 ONLY $489.00 $49 shipping

WITH ROLLER STAND

G0870 ONLY $599.95 $69 shipping

16" X 46" WOOD LATHE WITH DRO

- Motor: 2 HP, 110V, single-phase, 14A
- Swing over bed: 16"
- Swing over tool rest: 13½"
- Spindle taper: MT#2
- Spindle thread size: 1" x 8 TPI RH
- Tailstock taper: MT#2
- Spindle speeds: variable, 600 - 2400 RPM
- Headstock rotation: 0°, 60°, 90°, 120°, and 180°
- Overall dimensions: 72½" W x 19" D x 48"H
- Approx. shipping weight: 354 lbs.

MADE IN AN ISO 9001 FACTORY

⚠WARNING! †[1]

G0462 ONLY $1195.00 $179 shipping

18" X 47" HEAVY-DUTY WOOD LATHE

- Motor (with inverter): 2 HP, 220V, 3-phase, 5.6A
- Swing over bed: 18"
- Swing over tool rest base (banjo): 14"
- Distance between centers: 47"
- Spindle speed: Variable, 100 - 3200 RPM
- Tailstock taper: MT#2
- Overall dimensions: 81" W x 19½" D x 48 1/16" H
- Approx. shipping weight: 550 lbs.

ETL C US Intertek 4000909

MADE IN AN ISO 9001 FACTORY

⚠WARNING! †[1]

G0733 ONLY $2395.00 $229 shipping

10" 5 HP SLIDING TABLE SAW

- Motor: 5 HP, 230V, single-phase,19A
- Rip capacity: 33"
- Crosscut capacity: 63"
- Blade tilt: 0 - 45°
- Max. depth of cut @ 90°: 3⅛"
- Max. depth of cut @ 45°: 2¼"
- Floor-to-table height: 33⅝"
- Main blade size: 10"
- Main blade arbor: ⅝"
- Scoring blade arbor: 22mm
- Max. width of dado: 13/16"
- Overall dimensions: 76" W x 125" D x 46" H
- Approx. shipping weight: 688 lbs.

CSA C US 181721

MADE IN AN ISO 9001 FACTORY

⚠WARNING! †[1]

G0623X ONLY $4795.00 $229 shipping

6" X 48" BELT/12" DISC COMBO SANDERS

- Motor: 1 HP, 110V/220V, single-phase, 1725 RPM (G1276), 3450 RPM (G1183)
- Belt table size: 7" x 12½"
- Disc table size: 7" x 16½"
- Dust ports: 2½" and 3"
- Base measures: 16½"W x 14"D
- Belt speed: 2500 FPM (G1276), 5000 FPM (G1183)
- Approx. shipping weight: 149 lbs.

MITER GAUGE INCLUDED!

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⚠WARNING! †[1]

3450 RPM

G1183 ONLY $925.00

1725 RPM

G1276 ONLY $995.00 $149 shipping

22" OPEN-END DRUM SANDER

- Motor: 2 HP, 230V, single-phase, 7.5A
- Feed motor: 50W, 1A
- Max. stock thickness: 5"
- Min. stock thickness: ¼"
- Max. sanding width: 22–44"
- Min. sanding width: 2"
- Min. board length: 9"
- Sandpaper speed: 2300 FPM
- Conveyor feed rate: Variable, 0–20 FPM
- Sandpaper type: 3" width roll, plain backed
- Drum Size: 5"
- Overall dimensions: 42½" W x 43½" D x 61" H
- Approx. shipping weight: 341 lbs.

⚠WARNING! †[1]

G0920 ONLY $2120.00 $179 shipping

6" X 108" VS OSCILLATING EDGE SANDER

- Motor: 3 HP, 220V, 3-phase, 9.5A
- Sanding belt size: 6" x 108"
- Sanding belt speed: Variable, 600–6000 FPM
- Oscillations: ¼"
- Platen size & type: 6¾" x 39¾", graphite coated
- Sanding head tilt: 90°–180°
- Main table size: 12" x 35½" x 1½" thick
- Main table vertical travel: 8"
- Approx. shipping weight: 597 lbs.

2-Year Warranty!

⚠WARNING! †[1]

SB1097 ONLY $3145.00 $229 shipping

Due to rapidly changing market conditions, our advertised prices may be changed at any time without prior notice. Please visit grizzly.com for up-to-date pricing.

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AS SEEN IN THE
December to Remember
SWEEPSTAKES

PantoRouter®

Precision woodworking has never been easier.

The PantoRouter® will help you create the projects you've dreamed of—quickly and easily.

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- Mortise & Tenon
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Truly a brilliant machine! Incredibly versatile, lightweight but rigid. I generally don't recommend products – with few exceptions, and this is one of them.

-Michael Fortune, Michael Fortune Studios

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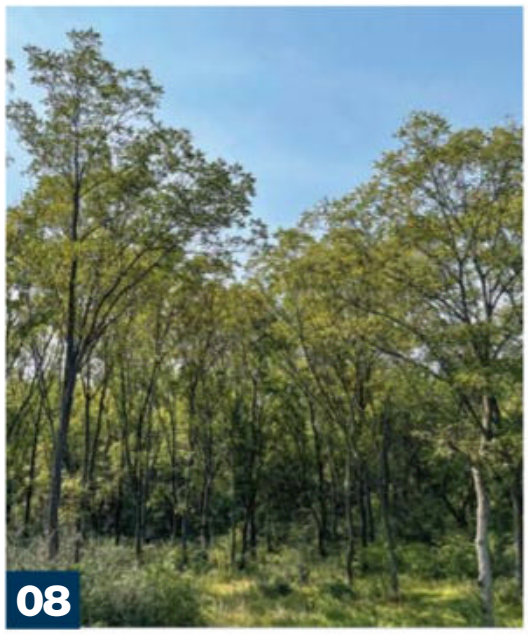

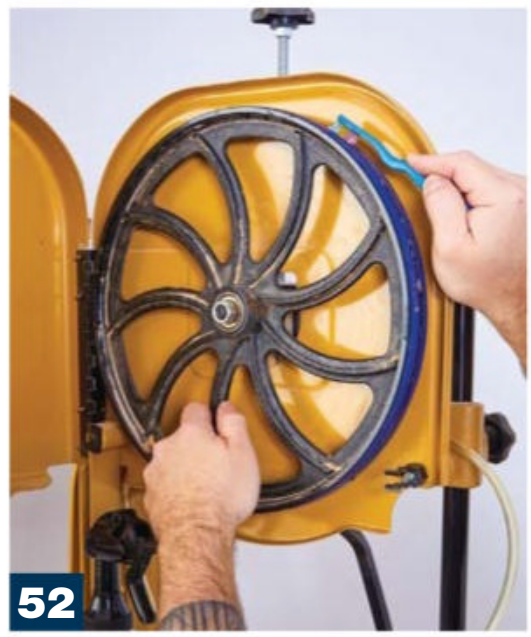

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Craft

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Precision Woodworking Squares

- One-piece central core machined to exacting tolerance.
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Precision Woodworking Square
Includes a Woodpeckers wall-mountable wooden case
12" 1281....**$129.99**
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- Precisely spaced 1mm holes machined every 1/16".
- Laser engraved scale accurate to ±.004".
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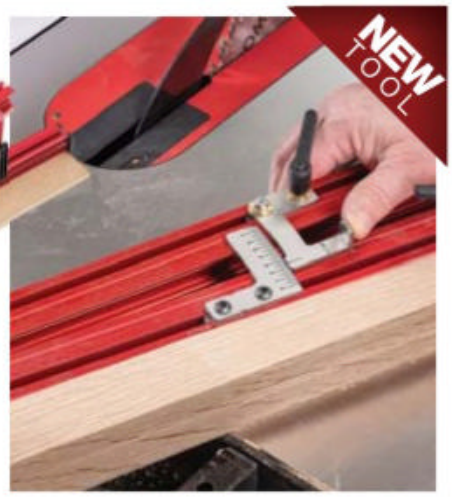
- 600mm metric version available.

Precision T-Square
Includes a wall-mountable Rack-It™
TS-12 12"....**$89.99**
TS-24 24"....**$124.99**
TS-32 32"....**$154.99**

Precision Taper Jig

- Produce tapers from 0° to 15° safely & accurately.
- Clamp material securely to sacrificial base.
- Standard 32" capacity can expand to 48".
- Clamp handles provide safe & secure gripping points.



Precision Taper Jig
32"....**$279.99**
48"....**$399.99**

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- Positions stock at right angles for joinery & fastening.
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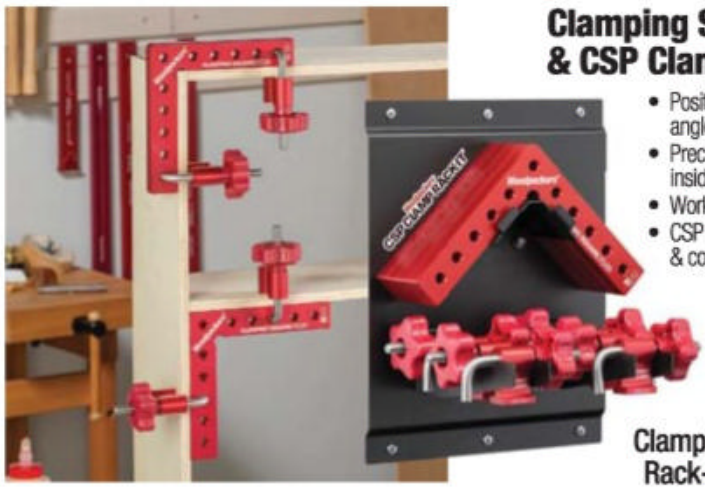
- Works with any clamp.
- CSP Clamps add speed & convenience.



Clamping Squares PLUS Rack-It™ Kit....**$259.99**

in-DEXABLE™ Combination & Double Squares

- Push-button index locks head at any full-inch.
- Laser-cut scribing guides for precision parallel lines.
- Retractable support keeps head aligned to your stock.
- Combination & Double Squares in two sizes.

***in-DEXABLE* Squares**
Includes a wall-mountable Rack-It™
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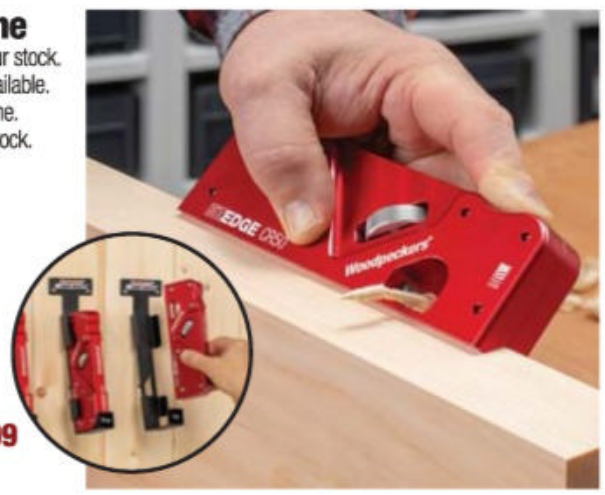
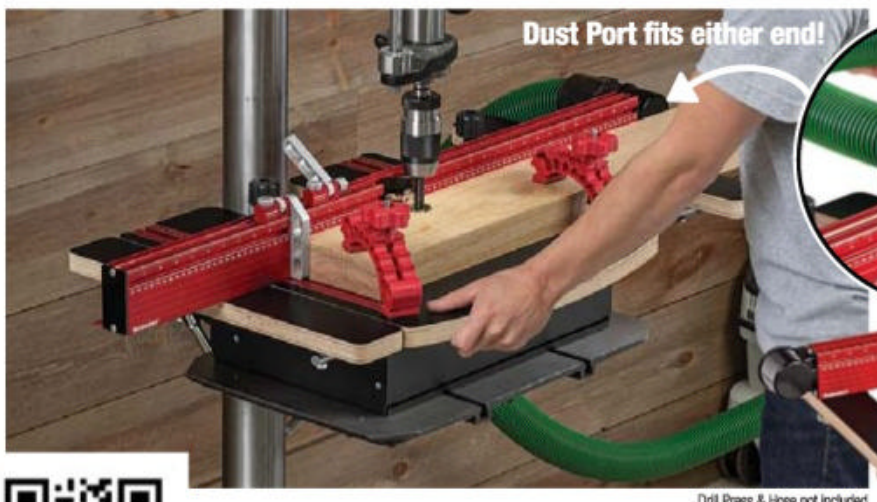
EZ Edge Corner Plane

- Plane sole is a perfect 90° to fit your stock.
- 3 radius profiles & 45° chamfer available.
- Hardened blades are easy to re-hone.
- Profile perfectly centered on your stock.



EZ Edge Corner Plane
Includes a wall-mountable Rack-It™
1/8", 3/16", 1/4" Radius
-or- 45° Chamfer....**$159.99**
Deluxe Set....**$569.99**



Drill Press & Hose not included.

DP-PRO Drill Press Table System

- DP-PRO Fence integrates dust collection & delivers accuracy.
- Micro-adjustable DP-PRO Flip Stops.
- DP-PRO Drawer Base simplifies installation on any drill press.
- DP-PRO Tables are full 1" thick with laminate top & bottom.
- Extension Wings for long material support.
- Drawer Base and Fence compatible with all drill press tables.

DP-PRO Drill Press Table Master System
36" Table, 24" Fence.....**$399.99**
36" Table, 36" Fence.....**$419.99**
48" Table, 36" Fence.....**$449.99**
48" Table, 48" Fence.....**$469.99**

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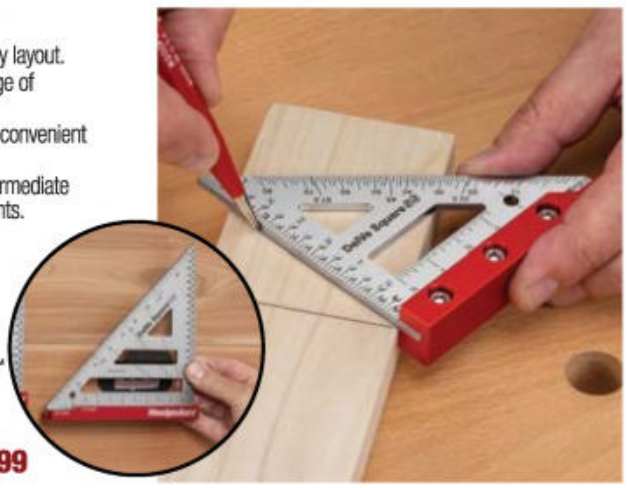
- Offset base for convenient joinery layout.
- Mark perfectly parallel to the edge of stock with the scribing guides.
- Machined steps in base provide convenient set-up blocks.
- 45° & 90° fixed references; Intermediate angles graduated in 1° increments.



DelVe Square SS
Includes a wall-mountable Rack-It™
3-1/2"....$99.99
6"....$129.99
3-1/2" & 6" Set....$199.99

AUTO-LINE DRILL GUIDE™

- Drill perfectly perpendicular holes anywhere.
- Fence fits on all 4 sides & works 4 different ways.
- Laser-engraved target lines indicate center of bit.
- Works with nearly all 1/2" & smaller drills.
- 1" capacity inside frame & 2" capacity outboard.
- Optional extensions & stops available.

Auto-Line Drill Guide
Drill Guide....$259.99
Deluxe Kit....$369.99

Drill not included.

Multi-Function Router Base

- Micrometer adjustment positions cutter perfectly.
- Cut parallel to existing edge or pivot in a perfect arc.
- Wide, stable base improves routing accuracy.
- Works with most routers that have guide rod holes.

Multi-Function Router Base
Includes 1 Pair Extension Rods
w/ 5/16" Guide Rods....$239.99
w/ 3/8" Guide Rods....$239.99
w/ 10mm & 1/4" Guide Rods....$239.99

Router not included.

Table Saw not included.

Exact-90 Miter Gauge

- Perfectly square cuts every time.
- Patent pending miter bar adjusts to any 3/4" miter slot.
- Graduated fence with micro-adjustable flip stop & 45" extension.
- Extra-long miter bar increases cross-cut capacity of most saws to 24".
- Miter Bar available separately to build jigs & cut-off tables.

Exact-90
Miter Gauge....$329.99
25.5" Miter Bar....$69.99

Table Saw not included.

RIP-FLIP Fence Stop System™

- Bring your rip fence back to the same spot each & every time you need it.
- Stop drops out of the way when not needed, flips up when you want it.
- Couple two stops together for perfect fitting dadoes in two cuts.
- Models available for Powermatic/Biesemeyer and SawStop T-Glide Fences*.
- Extra stops & dado couplers available. Add as many as you need!

RIP-FLIP Fence Stop System
36" Capacity - *Fits SawStop**....$209.99
30" Capacity - *Powermatic/Biesemeyer**....$219.99
52" Capacity - *Fits SawStop**.....$219.99
50" Capacity - *Powermatic/Biesemeyer**.....$229.99

Slab Flattening Mill-PRO

- Wider, thicker, thinner & cleaner than the original.
- Router carriage now has adjustable height & built-in dust ports.
- Standard width of 48-1/2" expands to 62" with optional extension.
- Standard length of 59" expands to 132" with optional extension.
- Flatten stock as thin as 3/4" & up to 3-7/16" without shimming.
- Straight-line edges on stock up to 2" thick.

Rail can be positioned for narrower slabs or all the way to the edge!

Slab Flattening Mill-PRO
Basic.....$899.99
Extended.....$1199.99

Router not included.

For more sizes & ordering options for these tools plus hundreds more, visit ***Woodpeck.com***

**NOTE: The SawStop, Powermatic & Biesemeyer brand names are the registered trademark of the respective company and is not associated with Woodpeckers, LLC.*

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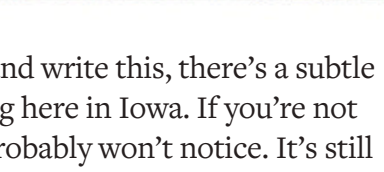
FROM THE EDITOR

Whispers of Change

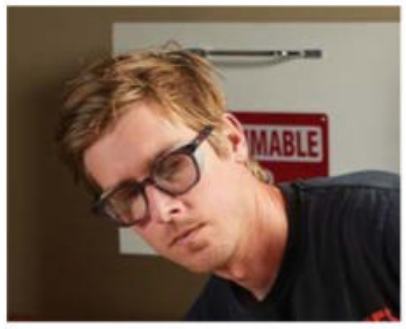
By Logan Wittmer

As I sit here and write this, there's a subtle change happening here in Iowa. If you're not from here, you probably won't notice. It's still hot and muggy. But it's not as sticky as it was a few weeks ago. The leaves are still green but the walnut trees outside my window look droopy and have started to turn ever-so-slightly yellow. And I know what it is: it's the first whispers of fall rolling in. For me, that means football, brisk days, hunting season, flannel, and cutting wood (insert Tim "the tool man" Taylor growl here).

But there are also whispers of change happening here at *Popular Woodworking*. A few issues ago, I eluded getting back to some fundamental woodworking techniques and projects. I'm working on a lineup of contributing writers for next year that I think you'll enjoy. There will be new faces and old ones. In accompaniment to the new (in some cases, returning) writers, you'll hopefully notice a few improvements in other areas as well. I will take a little bit of a burden by traveling to take photos for some of the articles and projects. Finally, something that's needed attention for a while now is the paper this magazine is printed on. Now, don't start feeling these pages yet. We're a few issues away from that change (contracts, bean-counters, and such). With these small changes and more on the horizon and a fresh content lineup, I feel like it's needless to say that I'm excited for where we're heading. Cheers.



ABOUT THE AUTHORS



Dillon Baker

Shaker Side Table *– pg. 18*

Dillon Baker attended Iowa State University and majored in Studio Arts. For the past five years, Dillon has been a Project Designer and Design Editor for *Woodsmith Magazine. Recently,* he's been contributing to *Popular Woodworking Magazine* as the Project editor. Dillon's favorite furniture style to design and build is a toss up between Art Nouveau and Postmodern. Outside of the shop, Dillon's often found with a book in his hand or cycling around town.

Christopher Walker

Yakisgui *– pg. 60*

After spending two years in Kanagawa, Japan with the United States Marine Corps, Christopher Walker resides there full time with his wife, a Japanese citizen. Christopher strives for simple but beautiful furniture. Because Japanese homes tend to be small, Christopher designs furniture with compactness in mind. Christopher would describe himself as a hybrid woodworker but relies heavily upon hand tools to mitigate noise and dust in the home.

Willie Sandry

V-Back Barstool *– pg. 32*

Hailing from the Pacific North West, Willie Sandry is a long time fan of Arts and Crafts furniture. He enjoys taking inspiration for his projects from antique furniture exhibitions as well as "old barn finds." Never one to do a job part-way, Willie has developed a vast skill set to elevate his projects. From sawing lumber and kiln drying it to finishing a chair with top-notch upholstery, Willie sees a project through from the start until finish. *YouTube: The Thoughtful Woodworker*

Jason Stephens

Industrial-Style Bookcase *– pg. 40*

In a roundabout way, Jason Stephen's woodworking stemmed from his 24-year career with the United States Army. After seeing a friend walk through the barracks with a shop-built cabinet, Jason dove in feet-first, spending the following years in the on-base workshop. Jason draws inspiration from Maloof and Krenov, but takes many design cues from Asian-style furniture. Residing in Coastal Virginia, Jason cites his grandfather as one of the most influential people in his working life.

PHOTOS PROVIDED BY THE AUTHORS

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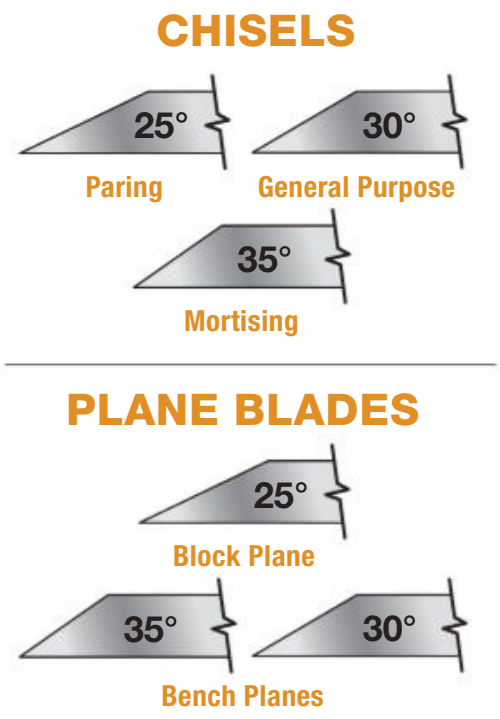
WORKSHOP TIPS

Angles to Remember

To keep things simple, burn these three numbers in your memory banks: 25°, 30°, and 35°. These are the three most commonly used angles when grinding and honing chisels and plane blades.

- If you prefer to grind and hone your tools with a single bevel, just remember one number for each type of tool.
- If you prefer a double bevel, make the grinding angle 5° less than the honing angle. For example, a general purpose chisel is ground at 25° and honed at 30°.
- The most widely used honing angle for a bench plane's blade is 30°. I prefer 35°, because a steeper edge lasts longer.

— *Tom Casper*



Iron Out Those Dents

Here's a classic tip that *everyone* should know: It's not hard to make a dent in wood, but fortunately it's not hard to get one out, either. All you need is a household iron and a damp clamp. Put a couple of drops of water onto the dent and let it soak for a minute. Then lay the damp cloth over the dent and press the hot iron over it. The water in and around the dent is heated to steam which quickly swells the wood fibers back to their original shape. Don't over do it with the iron. Once you see the steam, remove the iron and cloth and give the fibers a little time to swell. If the dent isn't completely gone after the first try, repeat the process. A little light sanding completes the repair.

— *Dave Munkittrick*

PHOTO PROVIDED BY THE AUTHOR

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WORKSHOP TIPS

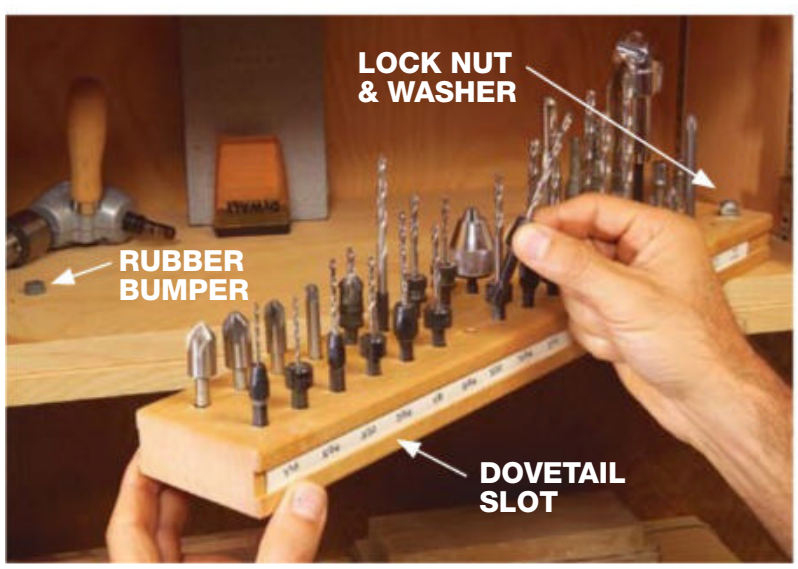
Remove Water-Soluble Dye

It happens to everybody. On your sample, the color was perfect, but on your piece, it doesn't look right. Don't despair. There's an easy way to remove water-soluble dye color so you can try again. Sponge the surface liberally with regular household chlorine bleach. Almost instantly the color will lighten and begin to disappear. Two coats of bleach may be necessary, and the process may slightly change the color of the raw wood. Rinse everything with water, sand the raised grain, and you've got a second chance.
— *Tim Johnson and Dave Munkittrick*

Swing-Out Drill Bit Rack

This swing-out drill bit rack means no more peering into a dark cabinet or trying to reach over a forest of sharp bits to get the one way in the back. Instead, just swing out the block and all your drill accessories are right where you can easily and safely reach them.

The rack is 1 1/4" thick by 3" wide with a 17/64" pivot hole. The rack pivots on a 1/4" bolt mounted through the bottom shelf with a lock nut and washer. A rubber bumper acts as a stop. A couple of 1/8" deep x 1/2" wide dovetail slots are routed on the front and back edges of the rack to hold labels. — *Bruce Kieffer*



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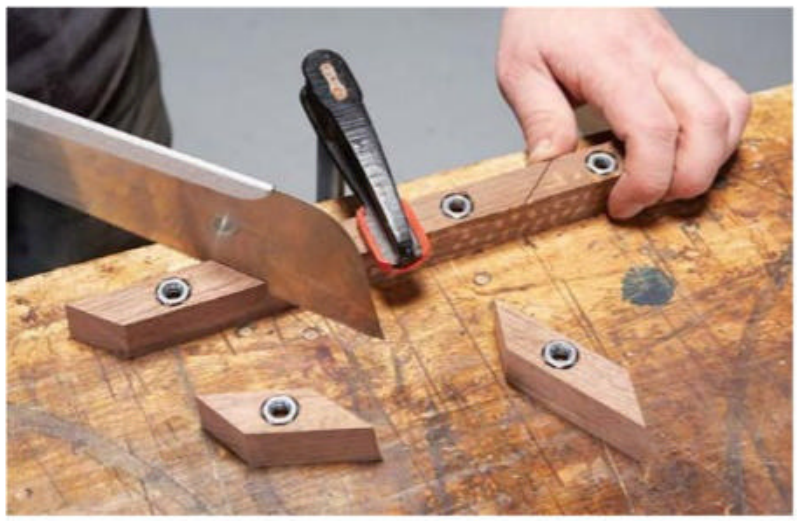

Shop-Made Wing Nuts

Wooden wing nuts are much easier on your hands than metal ones. Making them is a great way to use up shop scraps and leftover hex nuts—and avoids a trip to the hardware store.

Start with a strip of wood that's about 3/4″ thick, at least 1/8″ wider than the hex nuts, and long enough to work with safely. Using a Forstner bit, drill holes at the exact depth of the hex nuts. Size the holes so that the nuts fit snug. Drill a hole sized for a bolt the rest of the way through. Dab some petroleum jelly on the threads with a Q-tip, then apply epoxy around the holes' shoulders and insert the nuts. The petroleum jelly keeps the epoxy from sticking to the threads. To make sure each nut is level, thread in a bolt. It should stand straight up. When the epoxy has cured, cut and shape the individual wing nuts. — *Mark Young*

Perfect Glue Bottle

I buy glue in gallon jugs and have tried every glue bottle on the market. None of them worked how I wanted and I thought I would never find the perfect one. However, my search ended one evening while I was washing dishes with my wife. The dish-soap bottle was empty, so I rinsed it out thoroughly and filled it with wood glue. Just the ticket!
— *Phillip Draper*

PHOTOS PROVIDED BY THE AUTHORS

Richard Smith

Interview by Collin Knoff

How did you get started woodworking? Who were your mentors?

It was only three years ago — I was moving into a new apartment with my girlfriend in Brooklyn and she would not stop showing me furniture that was upwards of $3,000. As two people who have worked in the luxury fashion industry for over 10 years, we have expensive taste. I get that. But, I was confident that I could create something on my own that would be just as good, if not better than what she was looking for. I may have had zero experience or interest in woodworking at the time, but I was determined to make our space look great, and Home Depot was within walking distance. I spent my downtime watching YouTube videos and researching how-to and DIY woodworking, and in less than a month, I made our dining and coffee tables using Douglas fir and plumbing pipe. Over the next two years, I redid those projects three times to adjust the style, material, and finish to match my progress as a woodworker. Today, I make everything out of my make-shift (yet sufficient) 10' x 7' workshop on the second floor of my Brooklyn apartment.

What is your favorite piece? What kind of work do you do the most?

In all honesty, the last or current project I'm working on is always my favorite. I haven't been doing this for a long time, so every time I have the opportunity to create a custom piece of furniture for a client, I try to push myself to be better. Whether than meant perfecting my design skills or trying a new technique. I'm growing and learning every day, so I get excited to work with different species of lumber and experiment with different types of joinery every chance I get. Not going to lie, if I could, I would only make dining tables and dressers because those are my favorite, but I can't be picky with commissioned projects.

Any advice for new woodworkers?

Learn to be patient. I, by no means, am an expert at this point, but I have learned a lot in a short amount of time doing this. Things will never be perfect on the first try, and sometimes not on the second, and that's ok. It's important to take your mistakes as opportunities to learn and try to refine them as you go.

Also, make sure any work that you give to a client is something you're proud of. I can't tell you the amount of times I've spent extra money buying new material just to make sure the client project would come out how I truly wanted instead of making a larger profit. It can be annoying during the process, but it is absolutely worth the reward of knowing your client is happy and you did the best work you could put forth.

Any hands-on tips or woodworking techniques?

Make repeatable cuts. It's better to consistently miss by 1/64" rather than to try to nail a dimension 100%.

Any recommendations?

I haven't discovered anyone you guys don't already recommend — but I really enjoy watching anyone and everyone who is working towards their craft and genuinely enjoying what they do. I spend a lot of time watching YouTube videos, from uber-talented to slightly janky woodworkers, and I'm still able to take in the same amount of practical information to help advance my own skills, for better or worse. **PW**

See more of Richard Smiths' work on his Instagram page @xx44woodworks.

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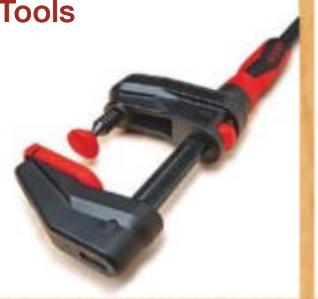

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Registration starts midnight EST, November 25, 2021 and ends 11:59 PM EST, December 31, 2021.

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Shaker Side Table

This Shaker classic will put your woodworking skills to the test.

By Dillon Baker

As a design student, one of the first woodworking projects assigned to me was a Shaker side table. It seemed ambitious at first, although the challenge became less daunting as the project progressed. And like most assignments of the time, the merit of its intention was lost on me until long after the conclusion of the project.

Twelve years later, the nostalgia of my collegiate years, as well as my initial exposure to woodworking, have become the inspiration for a similar project for this magazine. After receiving a positive response from our readership upon completing the Shaker Daybed for Issue #255 (November 2020) of *Popular Woodworking*, it seemed inevitable that a companion project would follow.

One of the main reasons for revisiting this project (besides sentiment) is that it serves as an introduction to various joinery methods. Whether you are a novice to the craft or a well-seasoned woodworker, this project will help hone or develop a skill set essential to the practice of woodworking.

PHOTOS BY LOGAN WITTMER & AUSTIN DAY

PROJECT #2116

Skill Level: Intermediate
Time: 3 Days
Cost: $250

Make It Your Own. Nothing personalizes a project more than simple details. Whether it be a particular finishing application or the introduction of hand-cut joinery—you can transform a traditional piece with the choices you make.

Turning the Legs

Start off with four turning blanks, oversized in length by about 1". Follow up by laying out the transitions where the square top meets the ogee profile (a serpentine or sigmoid-shaped architectural curve) as well as the subtle taper that extends to the bottom of the leg. For this step, a parting tool was used with a set of calipers to designate the layout progression. Once this is complete, grab a spindle gouge and create the ogee profile starting from the top. The direction in which the gouge moves in relation to the grain is deliberate as you want to "lay down" the grain rather than work against it. Following this advice prevents tear-out and allows for a much smoother cut.

With the profile complete, establish the bottom of the leg using the same layout method as before. Next, grab your roughing gouge and begin to work the taper from top to bottom. The transition is subtle, so work slowly and let the gouge do the work. Finish up the taper using a scraper followed by some light sanding.

Two-part Mortising

When it comes to mortises, I like breaking the process into two steps. First, use a drill press to establish the depth of the mortise while removing the bulk of the material. Second, pare up the walls of the mortise using a bench chisel, followed by a mortise chisel. Repeat this step for all aprons as well as stretcher mortises.

If you look at the two front legs, you will notice there is a dovetail-shaped recess on top of each leg. This is what is known as a lapped, or half-lap, dovetail joint—not to be mistaken for a half-blind dovetail. Start by sawing the cheeks on the sockets down to where your layout lines appear. Once this is complete, use a bench chisel to make a small incision at the scribe line. Follow this step by removing the material from the end grain. Repeat until you reach the scribe line on the end grain.

Once all your mortising is complete, finish up the legs by cutting the 1/2" or so of waste left behind from turning. Set the legs aside and turn your attention towards the aprons.

TURNING THE LEGS

1 Crank up the RPMs and slowly move your parting tool into the piece. This will help prevent tear out when creating a shoulder on a hard edge.

2 To allow room for the roughing gouge, broaden the shoulder of the initial layout cut.

3 Calipers are a great tool for checking accuracy between profile transitions.

4 Since the taper is subtle, turn the spindle portion down to the maximum diameter.

5 Work the taper down towards the foot. This process makes for a cleaner cut by "laying down" the grain.

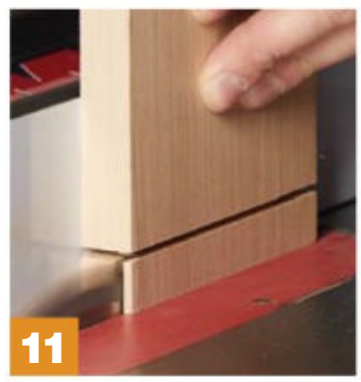
TWO-PART MORTISING

6 Use a drill bit about 1/16" smaller than the width of your mortise. This allows for fine-tuning of the mortise walls.

7 The broad surface of a bench chisel helps establish a straight mortise wall. Conquer the end grain with a mortise chisel.

8 Scribe the layout lines before sawing the socket cheeks. This small incision creates a channel which guides the blade.

9 To prevent tear-out, remove about an 1/8" of material at a time.



Aprons & Stretchers

Mill all the necessary parts so that you end up with three aprons and two stretchers cut to their final dimensions. Using the table saw, start by cutting the shoulders on all three aprons as well as the top and bottom stretcher. Then, adjust your fence and begin to cut the cheeks. Rotate your board so that it's perpendicular to the fence and proceed to cut the short-end shoulders on both sides. Reset your fence once again and waste out the middle section to create the twin tenon on the aprons. With the table saw still set up, cut a 1/4" groove on the top of all three aprons, along with the top stretcher—you will see why later. To finish off the stretchers, cut the half-lap dovetail tails using a hand saw. Since the bottom shoulder has already been established, cut the waste on the short shoulder free.

10 Since the shoulder cuts are the same depth, using a table saw makes this process quick and accurate.

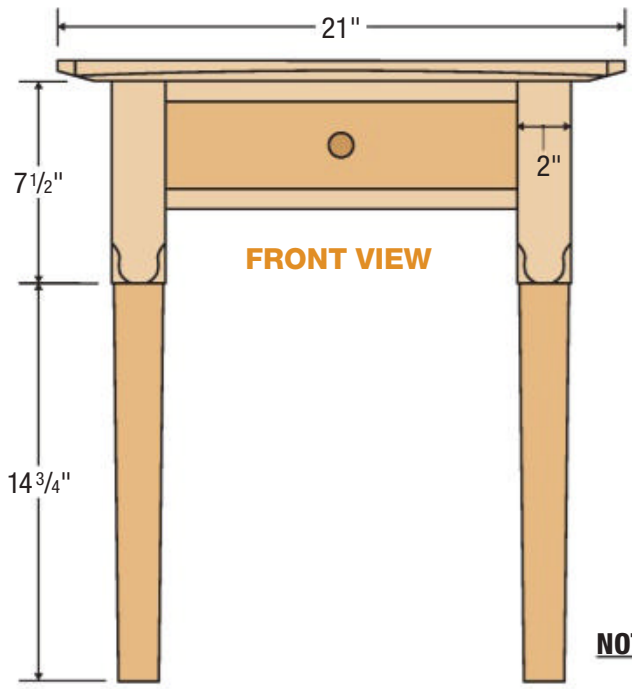
11 Make the cheek cuts just shy of where they meet the shoulder. Use a chisel to cleanup the remainder.

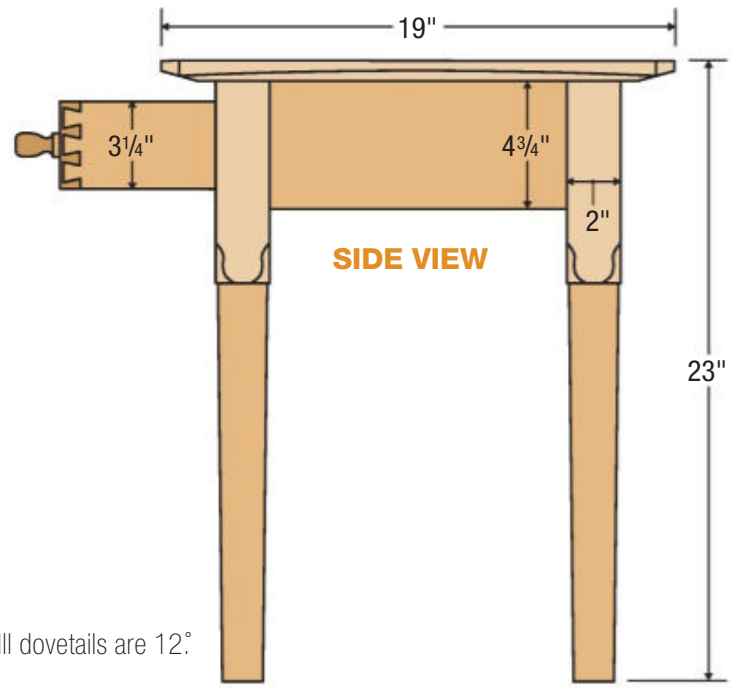
12 With the blade height the same, go ahead and cut the cheeks of the double tenon.

13 Instead of replacing the blade, I chose to make the 1/4" groove cut in two passes.

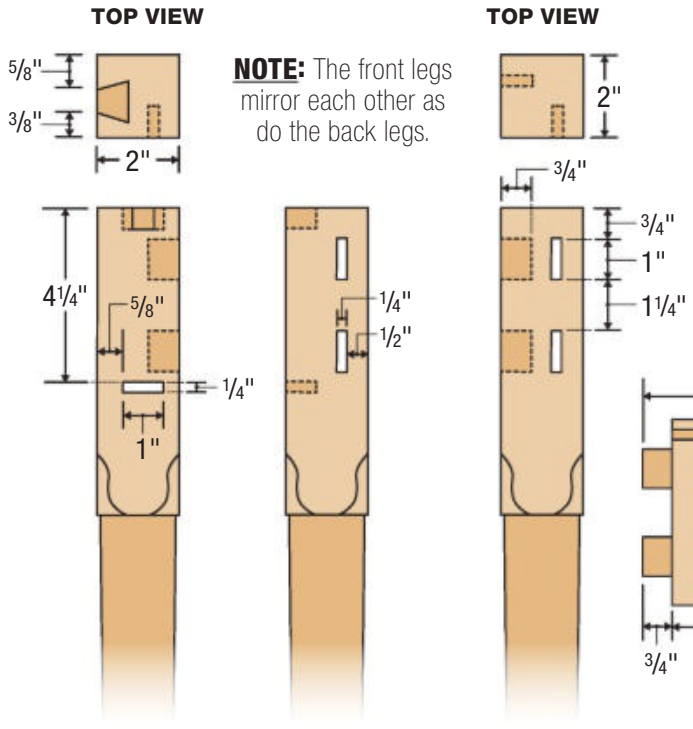
14 To account for the angle of the tail, a handsaw was used to remove the remaining shoulder waste.

Shaker Side Table

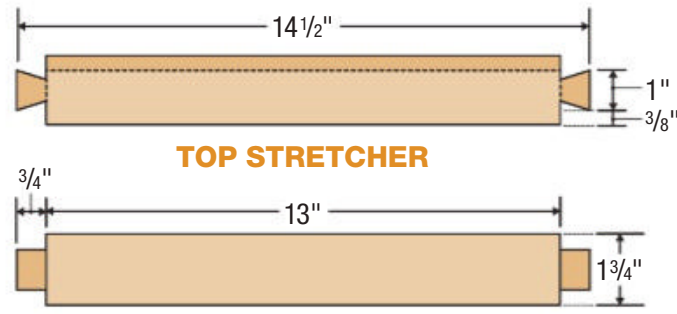


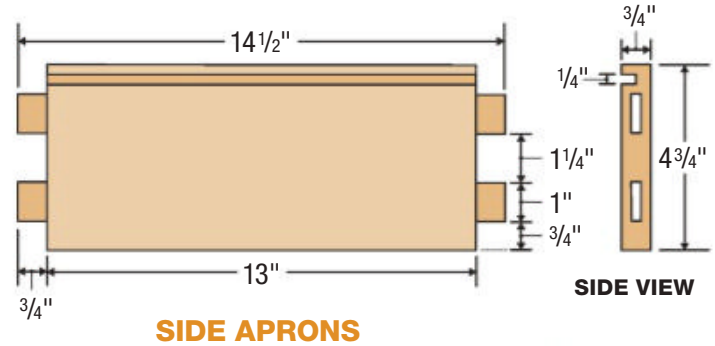


NOTE: Alll dovetails are 12˚.

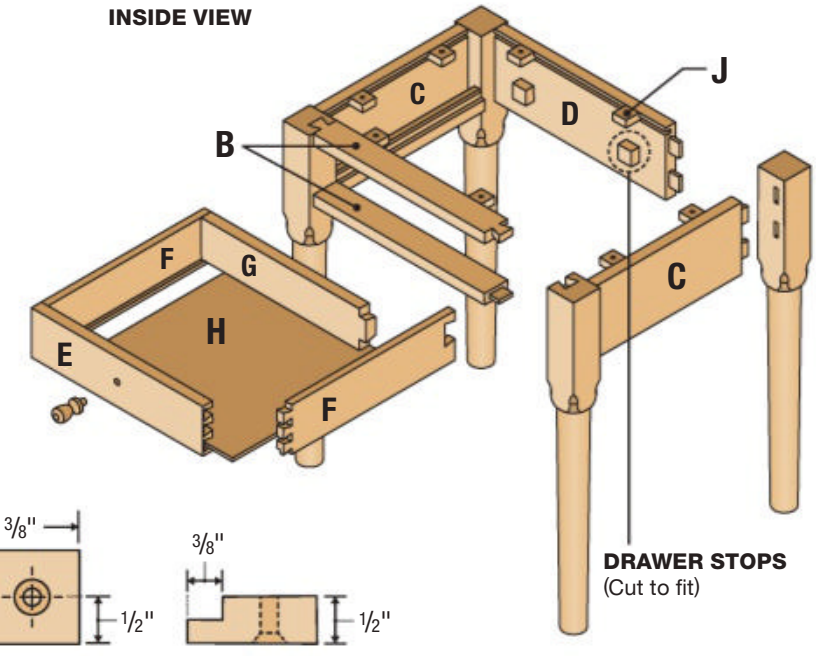


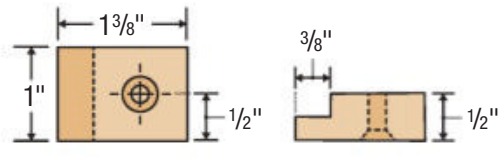
NOTE: The front legs mirror each other as do the back legs.





NOTE: The back apron is 2" wider than the side aprons.





Cut List

No.	Item		Dimensions (in.) T	W	L
4	A	Leg blanks	2	2	23 1/4
2	B	Stretchers	3/4	1 3/4	14 1/2
2	C	Left/right aprons	3/4	4 3/4	12 1/2
1	D	Back apron	3/4	4 3/4	14 1/2
1	E	Drawer front	3/4	3 1/4	13
2	F	Drawer sides	1/2	3 1/4	13
1	G	Drawer back	3/4	2 3/4	13
1	H	Drawer bottom	1/4	12 1/2	12 5/8
1	I	Top	3/4	19	21
8	J	Button tabs	1/2	1	1 3/8
2	K	Drawer guides	1/2	3/4	11
2	L	Drawer cleats	3/4	1 1/4	11

15

16

15 Dry-fitting before a glue-up can never be overstated—especially when going in alone. Clean out the mortises and undercut the tenon shoulders to ensure a smooth assembly.

16 Curb your pre-assembly anxiety and glue up the front and back assemblies first, followed by the two side aprons.

17 Drawing layout lines on both sides of the piece allows it to be flipped for one-side dominant sawing.

18 A fretsaw or a coping saw is used to remove a bulk of the pin waste.

17

18

Stress-free Glue-up

Before you commit to your glueup, take this time to ensure all your joints fit properly by conducting a dry assembly. A table of this size is best assembled in stages to ensure all parts come together level and square.

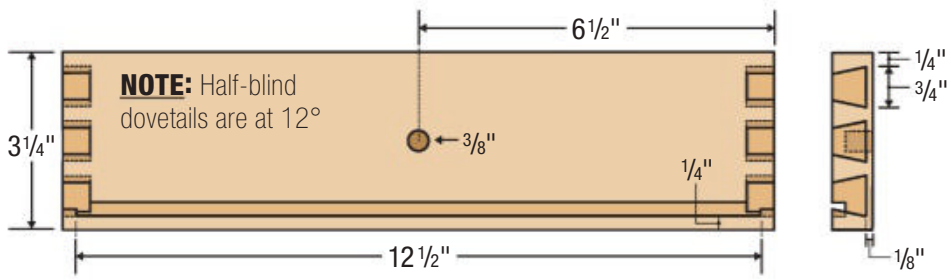
Begin by creating the back and front assemblies. Once the assemblies are dry, bring the table together by introducing the two side aprons. Then, add the drawer cleats to the inside of each left and right apron. Since the grain runs parallel to that of the aprons, these were just "scabbed on" using wood glue.

Drawer, Not Drawers

Applying similar methods used in the half-lap dovetail for the top stretcher, start by creating the tails on the drawer sides. Once these are modified to your satisfaction, use them as templates to layout the sockets on the drawer front. Make the initial cheek cuts down to the scribe line and finish the waste-removal process off with a sharp bench chisel and a heavy mallet.

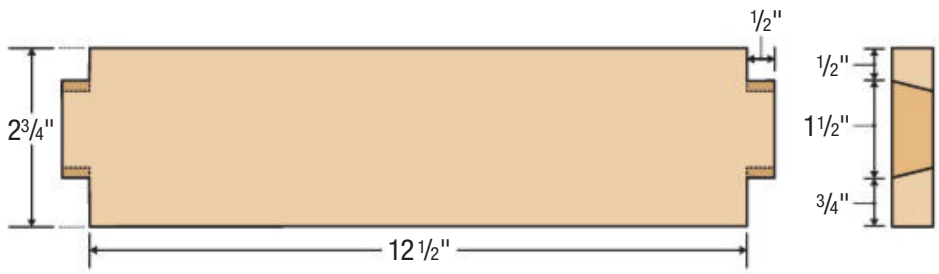
The back of the drawer gets an unusual treatment, as you can see from the illustration on the next page. An oversized through-dovetail was created to secure the back. Implementing similar processes, create the tail on the drawer back, first. Once again, lay out the socket locations using the tail as a template. Waste out the material with a fret or coping saw and pare up the shoulders with a bench chisel.

Drawer



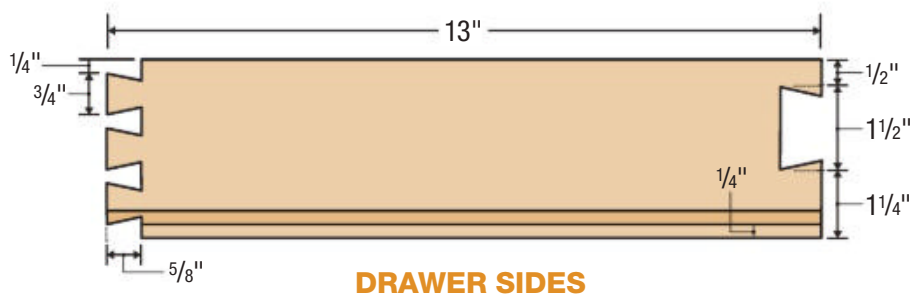
DRAWER FRONT
FRONT VIEW

SIDE VIEW

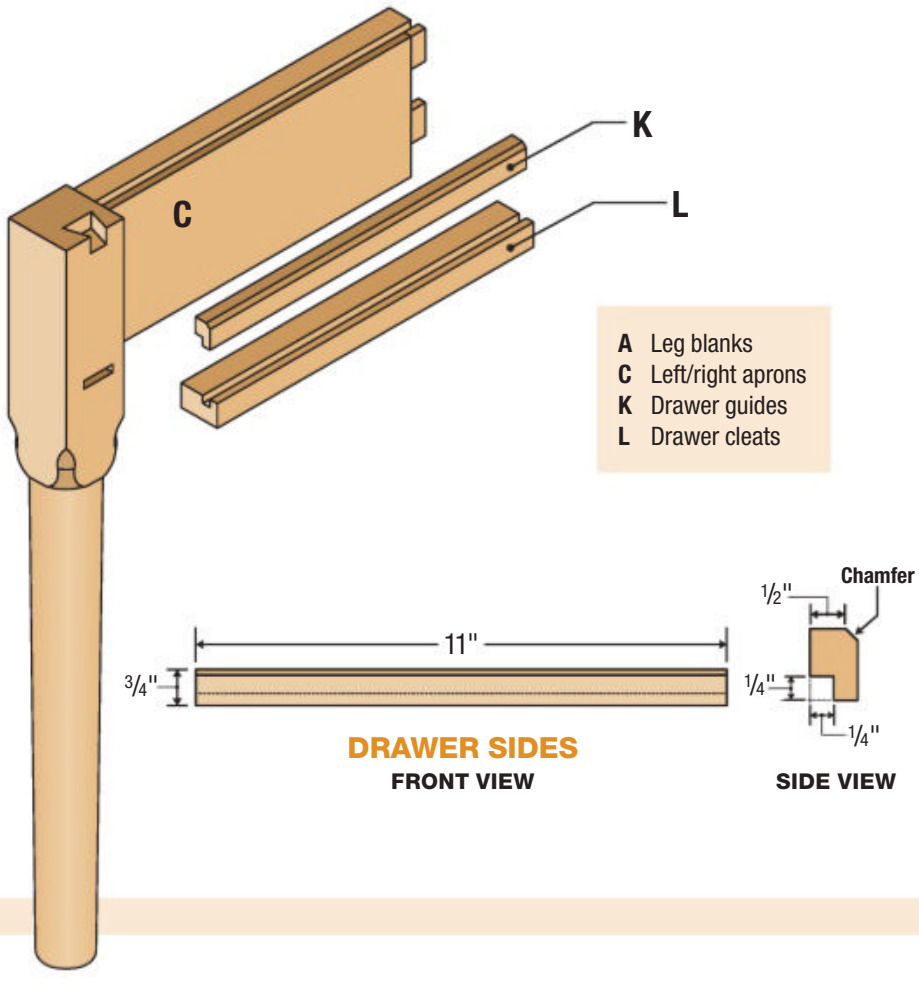


DRAWER BACK
FRONT VIEW

SIDE VIEW



DRAWER SIDES



DRAWER SIDES
FRONT VIEW

SIDE VIEW

After you have checked the fit of your "perfectly" hand-cut dovetails, create a 1/4" groove on both drawer sides as well as the front. The groove for the two sides can be done at the table saw, but you will notice that the front has a stopped groove. This was done by first creating a 1/4" pilot hole on one side using a drill press, then finishing it over at the router table. Glue it up and then add the drawer bottom. With the drawer complete, you can go ahead and attach a knob of your choosing.

A Top to Talk About

Now, we could have settled for a traditional square Shaker top. However, this felt like a great opportunity to distinguish it from its predecessors. Start by creating a rectangular blank cut to its final dimensions, then create a bevel on the bottom as well as on all four sides using a low-angle Jack plane. If you lack confidence in your hand planning skills or would like to expedite the process, you can make the cut at the table saw—no judgment. If you do decide to use a plane, make "shearing cuts" at a 45° angle to prevent tear out on the end grain (see Photo 21).

With the bevels complete, make a template with an arc on all four sides. Attach the template to the top using double-sided tape and proceed to cut the subtle curve over at the band saw. With the template still attached, clean up the edges at the router using a pattern bit. This simple, two-part procedure yields visual results that will be sure to invoke inquiry.

Button Tabs and Drawer Fitting

To attach the top, I went ahead and created my own button tabs. As mentioned earlier, a groove was cut into the inside of each apron in addition to the top stretcher. This was done to house the tabs and allows for seasonal movement of the tabletop. Make sure to oversize the screw

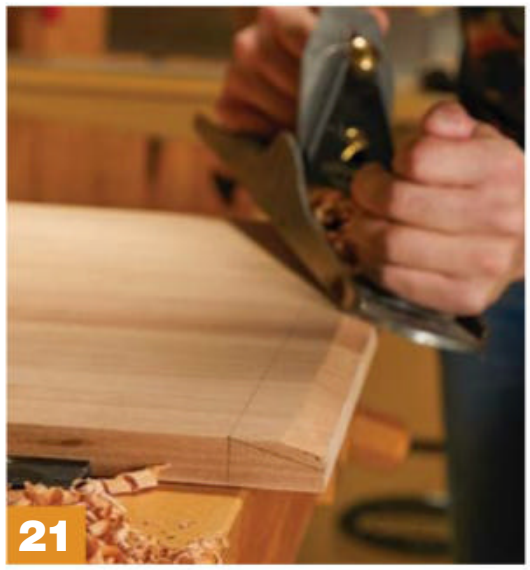
19 Apply glue to the tails rather than the sockets. This forces the glue to the outside of the joint—expediting cleanup.

20 Adding a removable drawer bottom allows for necessary seasonal movement as well as hassle-free repair.

holes on the tabs so that the threads only engage with the top.

There are many ways to fit a drawer (enough to fill an entire article), so I'll attempt to keep it brief. With the drawer cleats already installed, go ahead and insert the runners. I like to leave about a 1/32" reveal on all four sides of the drawer front. To account for the 1/4" recess of the drawer, install a couple of stop blocks to the inside of the back apron.

Once you get close to the desired fit and your finish has been applied, add a bit of paraffin wax to the area of contact to ensure a smooth operation when opening the drawer.



21 Starting with the end grain, make the bevel cuts using your layout lines as a guide.

22 To establish consistent curves, I created a hardboard template.

23 Using the same template, flush trim the outer profile using a pattern bit.

A Touch of Color

With the construction of the table complete, it's time to decide what to use for finish. I went ahead and employed the use of milk paint on the legs as well as the drawer knob. A common application for the Shakers, milk paint has a uniquely intense depth of color with a muted sheen. Touted for its rugged and long-lasting durability (due to the bonding agents), adding milk paint to a project is a great way to personalize as well as modernize a more traditional form.

To further protect the longevity of the paint, apply a liberal coat of paste wax to the surface and then buff it out. Continue this process for the remainder of the table and the drawer. Since the top will be more vulnerable to wear and tear, a pre-catalyzed lacquer is applied to ensure a durable and moisture-inhibiting finish. **PW** – *Dillon Baker*

Popular Woodworking

2021 EDITOR'S CHOICE TOOLS

From the Editors and Contributors

Like most of the woodworking community, I spent more time in my shop during 2020 and 2021. Over the last two years, I used a variety of tools and gained new appreciation for a handful of them. Some of these are new tools, others are ones that I've simply come to appreciate more. Following, you'll find a variety of tools that really stood out this year.

Ridgid 12" Miter Saw

Ridgid
R4251
HomeDepot.com
Price: $499

I've long had a love of *Ridgid* power tools. The first miter saw I bought (early 2000's) was a 12" *Ridgid* slider. It has been used and abused, but it keeps on trucking. Heck, my dad still uses it to this day. When *Ridgid* announced a new articulating version of their miter saws, I was excited to try them out. And, I must say, I've been impressed. The action of the saw is tight with no slop. The articulating saw head allows almost 18" of cross cut capacity, all while being able to be pushed tight against a wall. Unlike other articulating saws on the market, the new *Ridgid* uses two separate articulating arms to control the saw head. This, combined with a great feeling handle and trigger assembly, make it a sheer joy to use. *Ridgid* has also announced some updates to some of their other bench-top power tools, so keep a look out for more on those in a future issue.

SBS Sharpening System

Over the years, I've tried almost every sharpening medium that you can think of. Finally, I've settled on diamond stones, as they cut fast and a quality stone starts and remains flat. The new SBS sharpening system from *M-Power* has a couple of features that I really enjoy. First, all three stone grits are replaceable once they wear, and are mounted on an extruded aluminum base. Second, the stones have three magnetic strops that attach to the tops of the stones, providing a place to apply the supplied high-grit polishing wax. It's a great way to get your tools sharp.

M-Power
SBS Sharpening System
MPower-Tools.com
Price: $249

Benchtop DC

With my home shop located in my basement, dust collection is not only a safety concern, but it's also important to keep dust from traveling through the home. *Oneida's* Benchtop Personal Dust Collector is a great addition to my shop. The dust collector can be placed on the workbench and moves a large volume of air, collecting dust that escapes on-tool dust collection. I find it particularly useful when sanding, but I also like to use it any time fine dust is created. And if you're a turner, it's the best way to capture dust when you're sanding on the lathe, in my opinion. The dust collector comes with an on-board outlet to plug in tools such as a sander.

Oneida
Benchtop Personal DC
Oneida-Air.com
Price: $599

Rip-Flip

Like many tools in the shop, a table saw is only as precise as the user. A recent add-on that I purchased for my table saw was the Rip-Flip from *Woodpeckers*. The T-track type rails attach on the bottom side of the fence and feature two flip stops. The flip stops can be used to reposition the rip fence in precisely the same spot. This is great when working on a project that has parts with the same measurement. You can set the fence, position the stop, and flip it out of the way. Then, when you need to return to the original setting, flip the stop and move the fence into place. The pair of stops allows you to keep two measurements set, and can be used to fine-tune fence settings as well.

Woodpeckers
Rip-Flip
Woodpeck.com
Price: $219

Festool TSC 55 K

Over the last several years, track saws have gained a lot of traction in the woodworking world. One of the top names in the track saw market is *Festool*. Their new TSC 55 K cordless track saw really adds some great features to an already impressive tool. The TSC 55 K features an anti-kickback sensor that shuts the blade off if the saw detects kickback. The saw utilizes a high-torque brush-less motor running off of two 18v batteries. The TSC 55 K (and other *Festool* cordless tools) can interface with one of the *Festool* Bluetooth capable dust extractors to remotely turn on the extractor when the saw is turned on.

Festool
TSC 55 K
FestoolUSA.com
Price: $499

Kreg Tool 720Pro

For years, the *Kreg Tool* k-series of pocket hole jigs have adorned the toolboxes and shops of woodworkers, handymen and home owners across the country. Early this year, *Kreg* released their redesigned line of pocket hole jigs, and I immediately snagged a 720Pro (seen here). What I like about the 720Pro over the others is that the work holding level is self-regulating. With one push it will hold material from 1/2" up to 1 1/2" thick. The Pro version includes the folding wings that have storage, but are more importantly (in my opinion) extra support for wide work pieces. One of the most convenient features of the 720 is that it holds all of the accessories (bits, wrenches, etc.) on the backside of the jig. Overall, *Kreg* has made some great improvements to an already great tool.

Kreg 720Pro
720Pro Pocket Hole Jig
KregTool.com
Price: $149

Teknatool
NOVA PRO-TEK G3 Chuck
Teknatool.com
Price: $149

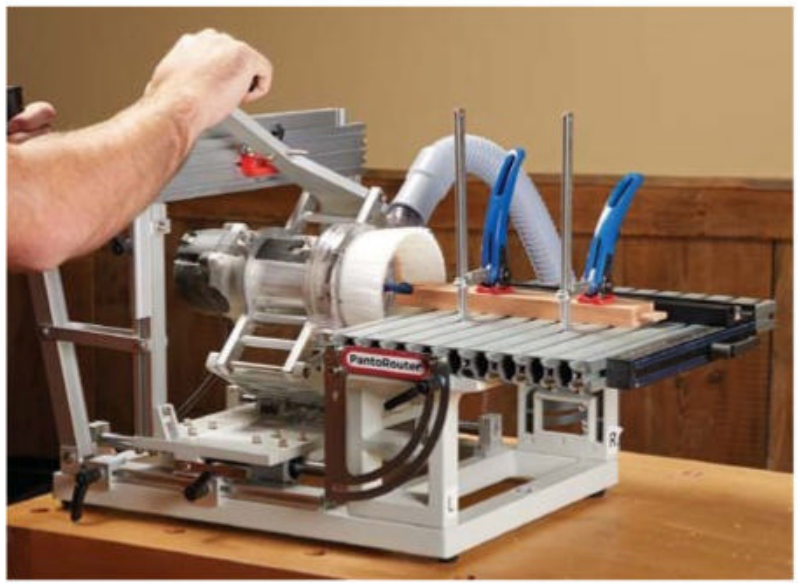
NOVA PRO-TEK G3 Chuck

One of the places that I'm happiest in this world is standing at the lathe. It feeds my soul. In the vast amount of turning gadgets and accessories, it's easy to overlook chucks. A good quality chuck often goes unnoticed, but you'll sure know a bad chuck when you find one. For the last year or so, the chuck that's been on my headstock is the *NOVA* PRO-TEK G3 chuck. Designed for lathes with a swing up to 16" (perfect for my *NOVA* Comet II), this little chuck is a tank. The chuck key quickly opens and closes the jaws, and each jaw is marked to keep them in the same location every time you switch jaws. The PRO-TEK G3 comes with a handful of accessories and a case to house everything, but once it's mounted to the lathe, I don't think you'll ever have a need remove it.

General 1HP DC

Building upon a long legacy of high-quality woodworking tools, *General* is once again producing the tools they've built their reputation on. In addition to some pretty awesome air cleaners (stay tuned for more on those in the future), I've fallen in love with the *General* 1HP dust collector. The small footprint makes it the perfect size for a small shop like mine. The small size also makes it easy to roll to other tools as needed. Apart from the size, one of the best features about this dust collector is that you can get it equipped with an auto on/off switch. When a tool is plugged into the dust collector, the dust collector will automatically turn on and off with the machine. I love this feature, and it saves me from searching for the dust collector remote I just sat down.

General
1HP Dust Collector
GeneralToolsUSA.com
Price: $449



PantoRouter

I have said it before, and I will say it again. There are very few tools in my shop that are one-trick ponies. If a tool has the ability to perform multiple functions, the odds of it earning a spot in my small shop goes up. The *PantoRouter* is one of those. On the surface, it may seem like a glorified slot mortiser, but it's so much more than that. By following a template, not only can the *PantoRouter* create mortise and tenons (lower photo) in a total of 154 sizes, but you can cut dovetails, finger joints, and more. And because everything is referenced off the centerline, it makes setting up the *PantoRouter* straight forward, even when cutting joinery on the ends of workpieces with compound angles. The function is simple: one lever controls the plunge action, while the other controls the movement of the motor around a template. The machine itself is one of the better built pieces of equipment that I have used in a long time, and has one of the most robust assembly and how-to manuals around. The best feature of all may be that the *PantoRouter* has dust collection on it that actually works.

PantoRouter
PantoRouter
PantoRouter.com
Price: $1395

Alfie Shine

One of the smaller items on this list, but one that I use on a weekly basis, is a hard wax product called *Alfie Shine*. The brain child of a tool collector from the UK, it's made with a mixture of ingredients that is applied, left to dry, then buffed off. You're then left with a layer of resins that not only nourish wood and add a layer of protection, but smells amazing as well (seriously, thank the frankincense that's in the mixture). *Alfie Shine* has become one of my favorite treatments for almost all of my hand tools, wood and metal alike. Even though it's made in the UK, *Alfie Shine* is available on Amazon here in the USA.

Alfie Shine
Workshop Heaven
Amazon.com
Price: $14.95

Rikon Bench Top Jointer & Planer

The final tool on the 2021 Editor's choice tool list is not one tool specifically, but a pair of them that works in tandem—the *Riko*n 13" helical head planer and 8" helical head jointer. While I'm sure that most of us can see the benefit and would make the argument to get as big of jointer and planer as you possibly can, not everyone has the floor space to dedicate to a stand-alone unit. And while I'm spoiled with a large *Rikon* jointer/planer combination unit at our studio (it packs two machines into one footprint), I've come to appreciate how much work I can get done in my shop with these little guys. Each tool features helical style cutting heads. The jointer comes with carbide inserts that can be rotated when dull or chipped, while the planer has high-speed steel cutters that are sharp on two edges.

In the past, I wouldn't have given the time of day to a bench top jointer, but I now see that was a result of poorly designed and cheaply produced jointers. While the 20-800H is small, it's mighty. Being bench-top, the jointer bed is fairly small (about 30" or so), but it has wings that extend out to a hair over 50". Does it take the place of a full-size jointer? No, but that's not its purpose. What it does well is provide smooth, clean and accurate results when flattening board faces on workpieces that are in the 30" range. This covers about 90% of my flattening needs. With the planer and jointer coming in at 68 and 49lbs respectively, they're easy to store on the floor under the bench when not in use.

Rikon
25-135H & 20-800H
Rikon.com
Price: $699 & $649

The Best is Now Even Better...

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NEW TOOL

Wider, Thinner, Thicker & Cleaner...

Woodpeckers Slab Flattening Mill·PRO has all the best features of our original Slab Flattening Mill, but with a new router carriage that has an amazing range of adjustment, working with stock as thin as 3/4" and up over 3" without spacers or shims. Dust collection is now built right into the carriage with twin collection ports that collect equally well on push or pull cuts. We reinforced the frame of the router carriage for even better surface flatness and finish.

Like the original, the Slab Flattening Mill·PRO and your router can surface irregularly shaped and twisted slabs into stunning table, counter and shelf surfaces. With a standard width capacity of 48-1/2" and optional extensions available, there's no slab project you can't master.

Learn more about Woodpeckers Slab Flattening Mill·PRO at ***woodpeck.com***

Woodpeckers, LLC • Strongsville, Ohio • 800.752.0725 • ***woodpeck.com***

V-Back Barstool

By Willie Sandry

This Arts and Crafts barstool draws inspiration from traditional billiards chairs.

PROJECT #2117

Skill Level: Intermediate
Time: 4 Days
Cost: $250

PHOTOS BY THE AUTHOR

I asked my wife whether our next project should be a Morris chair or a small side table. She said "Barstools." And so, we set out to design counter-height barstools for seating at the kitchen island. The design is pure Arts & Crafts style, and draws inspiration from old-fashioned billiards chairs. Gustav Stickley, Charles Limbert, and L & JG Stickley all produced versions of billiards chairs, which featured a comfortable footrest. Unfortunately, they also had bulky armrests that wouldn't work for a barstool application, so some design changes were in order. Unlike a dining chair, where the seat height is the primary design concern, with a bar stool you also need to determine the height of the footrest and its relationship to the seat height. Design highlights include the V-back shape incorporated into the crest rails and side rails, decorative spade-shaped cutouts, and long gracefully-tapered legs.

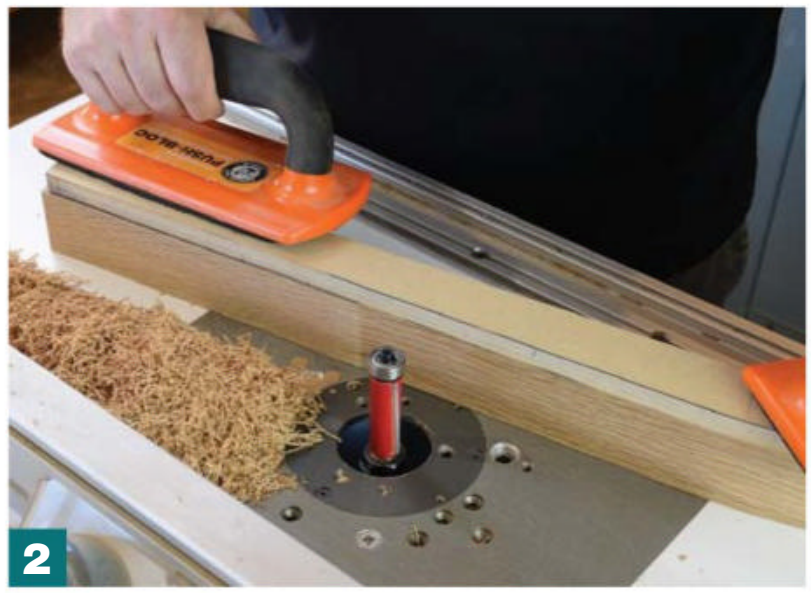
Master Template

Dive into this project and make a master template for the rear legs using a piece of 1/2" MDF that is 43" long x 3 1/2" wide. The most critical part of the template is the front lower edge. It must be perfectly straight at the intersection of the rails and the back legs. To ensure its correct, simply use a straight edge when laying out the template. Then cut the template free and sand it smooth.

Lay the template on your 8/4 stock and trace out the shape. Band saw the legs free, staying just outside your pencil line. With the rough-cut legs in hand, head to the router table for final shaping. Attach the master template to your workpiece with double-sided carpet tape, and tool-up your router table with the right bit. I use a helix flush trimming bit as its a good compromise between cost and performance. Solid carbide spiral bits are still expensive, especially when the cutting diameter is 1/2" or larger. The helix bit is carbide tipped and features an angled cutting edge to minimize tear-out. Rout down each long edge to trim the leg flush with the master template. Don't attempt to rout the end grain at the top and bottom of the leg. It's not safe and the cut quality would suffer. Instead, just mark the leg length from the template and trim them to length at the table saw. You could cut the top of the legs at an angle, like the template, but I chose to cut them square at the front of the leg surface.

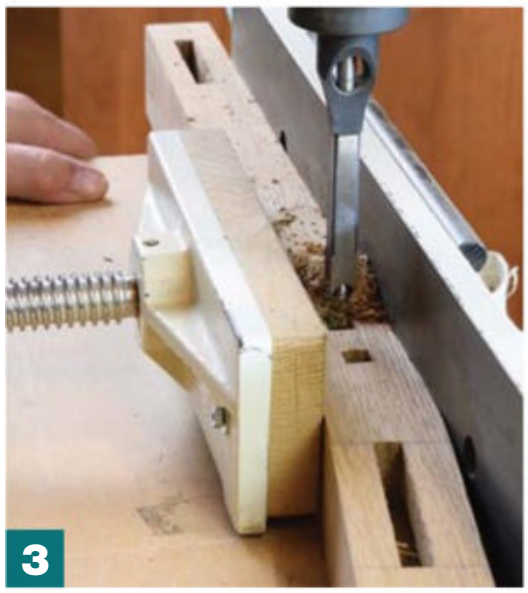
Mortises First, Please

If you are building a barstool, you're probably not just building one. Two or three are more likely, so it pays to have an efficient way to cut mortises. I use a dedicated mortising machine, but the plans could easily be adapted to router-based mortises or loose tenon joinery. Any way you slice it, you'll make the mortises first. It's tempting to chop mortises very quickly when you're making a batch of chairs. It's also quite easy to cut a mortise where it doesn't belong. For this reason, I recommend a numbering system and detailed layout of each mortise. My leg numbers system is quite simple ... the legs are numbered 1-4 starting with the front leg and progressing clockwise. Each leg gets its own number, labeled on the top and oriented from the front. With this simple numbering scheme, I know which leg I'm looking at and its exact orientation in the chair.



1 The master template shapes the rear legs. First make the master template from 1/2" MDF and then trace the shape on 1 3/4" thick stock.

2 A special helix shear-cutting bit completes the final trimming. Select a bit with an angled cutting edge to avoid tear-out.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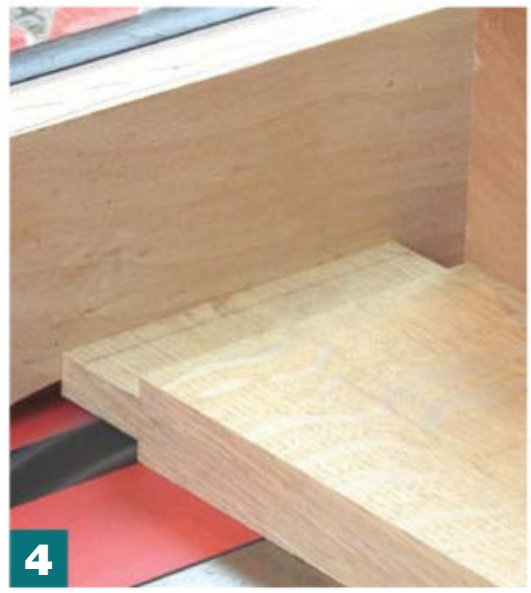
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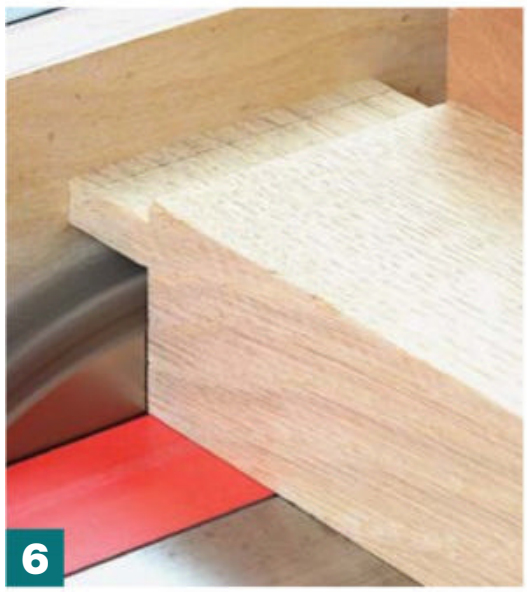
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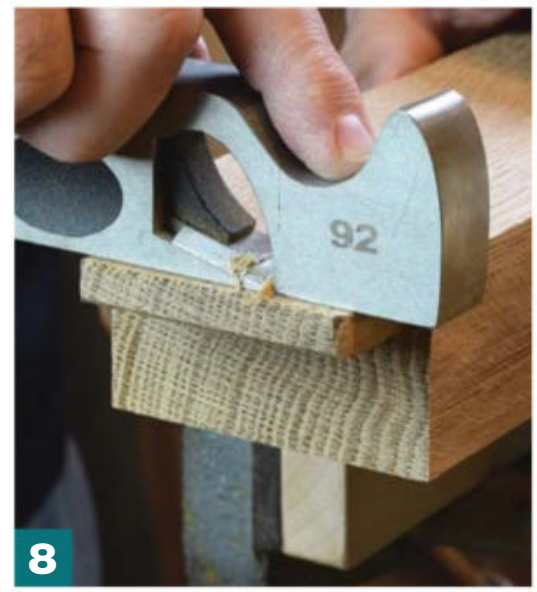


8

3 Mortise the legs with your preferred method. Just remember there are 26 mortises per barstool. Reference the back rest mortises off the front side of the legs.

4 With the blade height set to 3/16" and the tenon length at 1", batch out all of the standard tenons. A fine-tooth dado set with 6 tooth chippers will yield the best result.

5 Start with the shallow cheek cut on each backrest tenon. Then mark the 3/8" tenon thickness.

6 Now raise the dado blade to make the second pass.

7 Miter the intersecting tenons as required for a proper fit. The side seat rails have a stopped miter where they meet the front seat rail.

8 Trim the tenons with a shoulder plane as needed to achieve snug fitting joints.

The leg mortises are all 3/8" wide and 1" deep. This greatly simplifies the layout and construction of the barstools. However, the size of the rail varies, as do the mortise lengths. A key point when cutting mortises is to reference the inside face of the leg towards the mortiser fence. The outside two faces of the front and rear legs feature long, subtle tapers. To keep the joints aligned properly, reference the mortises off the inside, straight edges.

Tenons are Next

Cut all the tenons except the backrest slats at this time with the method of your choice. I use a dado stack setup and miter gauge on the table saw. Since all of these tenons have the same table saw settings you can batch them out very quickly. The mortises are 3/16" deep cheek cuts and 1/4" deep shoulder cuts. Be sure to leave the tenons slightly thicker than required, and fine tune the joint fit with a shoulder plane.

Most of the tenons for this project are centered on the thickness of the stock. The backrest rails are a little different and require offset tenons. Just like the other tenons, the front cheek cuts need to be 3/16" deep. To complete the tenon, flip the rail over and mark the 3/8" tenon thickness directly on your workpiece. Raise the blade to your pencil line and trim until the tenon fits neatly into its respective mortise. At this point in chair building, I like to test each joint individually.

Once satisfied with the joint fitment, dry assemble and check the seat height and comfort level. At this point, I also mock-up a seat to determine how high the finished cushion should sit.

9 Dry assemble the chair and make any necessary reference marks. Be sure to confirm that the distance between the crest rail and belt rail is 9 ¼".

Backrest Rails are Cut to a Curve

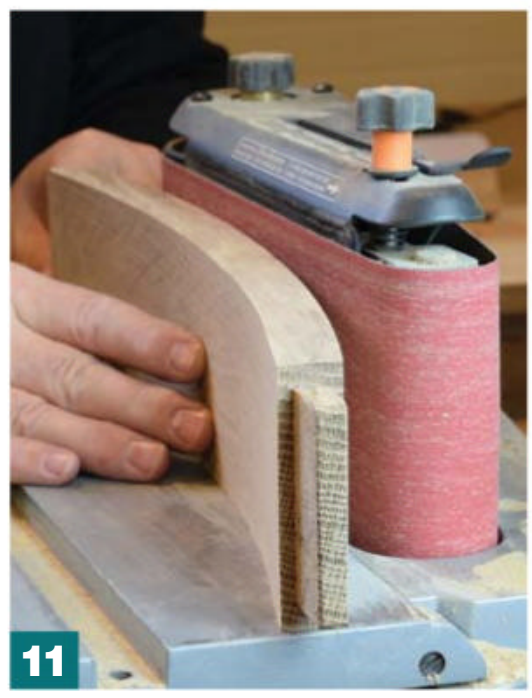
I enjoy steam bent or laminated curved furniture parts, but for chair components with joinery involved, it's best to cut the curve from thick stock. Mark the desired curve on both the crest rail and belt rail with a bending stick. When I marked my curve, I aimed for the rails to finish at 3/4" thick, not the 1 1/4" thickness of the stock used. It's easier to band saw a line that stays within the boundary.

A Few More Joints to Cut

Layout and mill the three 5/16" x 2" mortises after cutting the curve, but before cutting the V-shape. I didn't find it necessary to support the curved rails at the mortiser to make the 1/2" deep cuts. If your machine requires more support, the concave offcuts make perfect cauls to position the it on the mortiser.

Now cut tenons on the end of each slat and fit the joints. Before removing the dado stack from the table saw, cut a 3/4" wide shallow groove at 1/4" deep that extends the full length of the component in the footrest board.

10 With a freshly tuned band saw and a sharp blade, cut the backrest rails free from the thick board. (For tips on tuning your band saw, check out the article on page 52).



11 To smooth the curves, start with a 50-60 grit belt on an edge sander. This fairs the curve and removes band saw marks. Progress to 80 and 120 grit belts and finish smoothing.

12 Position the back of the crest rail against the fence and center the mortise on the face clamp. Use a sliding table (X-Y table) to cut mortises in curved parts as usual.

Spade Shaped Cutouts Decorate the Slats

I've been using spade shaped cutouts and inlays in my Arts & Crafts furniture for years. It's a timeless shape that fits well into many designs. I chose cutouts over inlays in this case, so the shape could be appreciated from almost any viewing angle. Start by making two routing templates, one for the longer central spade and one for the shorter spade. Make the templates from 1/2" MDF, cut to 10 1/4" long and 2 1/2" wide. Drill the template with a 3/8" Forstner bit to establish the two lobes of the spade pattern. Complete the templates by cutting to your line with a jigsaw or scroll saw and sand the opening smooth. Attach the template to the appropriate slat with double-sided carpet tape and mount it in a vise.

Cutting out the shape is a two-step process, with one bit and two guide bushings. Remove most of the waste in the first pass using a 1/4" spiral bit and a 7/16" O.D. guide bushing. Be sure to follow the template in a clockwise direction. Switch to a 3/8" guide bushing for a very light final trimming pass to help minimize the amount of finish sanding required.

Let's Talk Tapers

This chair design has tapered front and rear legs. One rear leg taper is built into the leg routing template and is already complete. The second taper trims the width of the legs from 1 3/4" wide at the bottom, to 1 1/4" wide at the top. These rear leg tapers are completed in two passes with a tapering sled at the table saw. At some point the saw blade will exit the bent leg. At that point you can trim away most of the waste with a hand saw and reset the leg on the tapering sled to complete the cut. The front legs are tapered on two outside faces in a similar manner. Plan ahead anytime you make tapered leg cuts. Usually there is a "preferred order" of cuts, to avoid cutting away your reference edge for the next cut.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13 Attach template to a slat with carpet tape and mount it in the vise.

14 With a 1/4" spiral bit and a 7/16" guide bushing, rout at multiple depth settings until you rout through the slat.

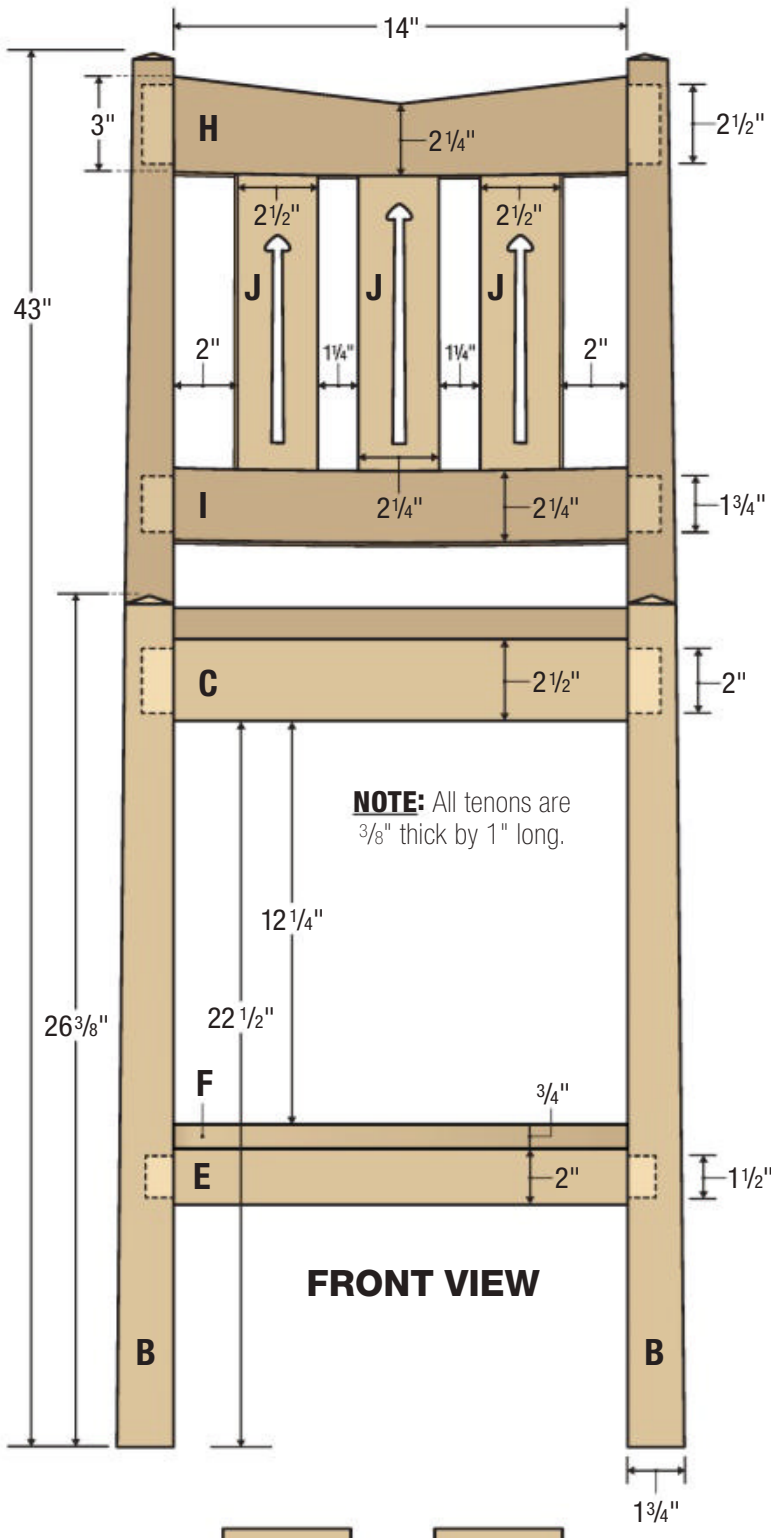
15 The end result is a crisp spade detail that requires only minimal sanding.

Cut List

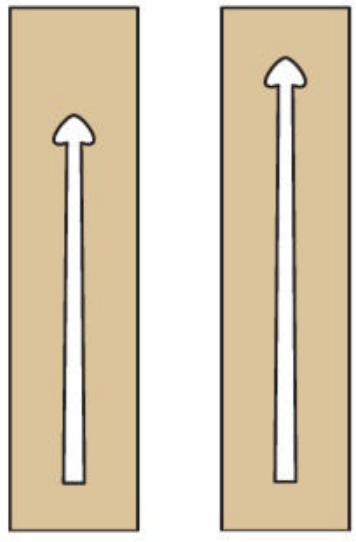
No.	Item	Dimensions (in.) T	W	L
2	**A** Rear leg blanks	1 3/4	3 1/2	43
2	**B** Front legs	1 3/4	1 3/4	26 3/8
1	**C** Seat rail (front)	3/4	2 1/2	16
3	**D** Seat rails (sides/back)	3/4	3 1/2	16
3	**E** Lower rails (front/sides)	3/4	2	16
1	**F** Lower rail (rear)	3/4	2 1/2	16
1	**G** Footrest	3/4	2 1/2	14
1	**H** Crest rail	1 3/4	3	16
1	**I** Belt rail	1 3/4	2 1/4	16
3	**J** Slats *	1/2	2 1/2	10 1/4
2	**K** Cleats *	3/4	3/4	14 3/4
4	**L** Seat frame *	3/4	1 3/4	14 1/4
MDF Templates				
1	**M** Rear leg template	1/2	3 1/2	43 1/4
2	**N** Spade templates	1/2	2 1/2	10 1/4

* All **rails** are 14" shoulder-to-shoulder in length. **Slats** are 9 1/4" shoulder-to-shoulder in length. **Cleats** are notched to fit cleats around legs. **Seat frame** is built with half-lap joinery.

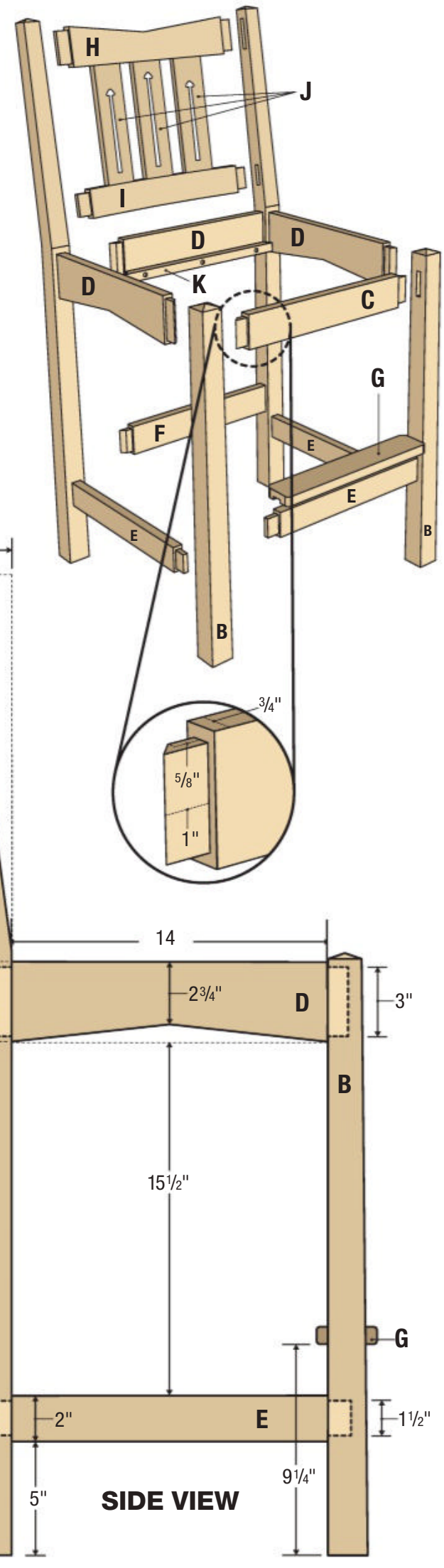
V-Back Barstool



FRONT VIEW



SLATS
(SPADE TEMPLATES)



SIDE VIEW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Add the "V-Shape"

Circle back to the "V" shape cuts on the crest rail and side rails. You'll need a flexible straightedge to layout the cut atop the curved crest rail, but completing the cut is easier than it looks. I made these cuts at the band saw, slowly rotating the curved part to keep it in contact with the table. Round over the edges of all component parts as needed and finish sand. Finally, add a shallow pyramid shape to the top of all the legs and soften them with a piece of sandpaper.

Chair Assembly

To assemble the chair, start with the back legs and all the rails that connect them. Then glue the front legs to the two front rails and set these sub-assemblies aside to dry. Once dry, bring these sub-assemblies together with the side rails. Place heavy-duty clamps across the joints to help apply just enough pressure to bring the shoulders and legs together.

Next attach 3/4" square cleats at the front and rear of the stool with glue and screws. I recommend using #8 x 1 3/4" long pocket-hole

16 Pencil the "V" shape onto the crest rail. Make a relief cut at the center and cut in from both ends.

17 Assemble and glue the backrest, seat, and lower rail between the rear legs. Use offcuts of the "V" as cauls to help with the backrest assembly.

18 Glue the seat rail and lower rail to the front legs. Remember to orient the two safe (sharp) edges which will connect to the footrest.

19 Glue the two sub-assemblies together with the side rails.

Creating Custom Cushions

STEP 1: Upholstery Prep Work

To save a little money, you can complete the jute webbing and cushion buildup before taking your seat frame to the upholster. A goose-neck webbing stretcher and a magnetic tack hammer are all your need to complete the job. I use a basket weave pattern to ensure the best results.

STEP 2: Building the Cushion

You'll need spray contact adhesive (like 3M 90 high strength), 3 pieces of foam, and some high-loft polyester batting (Dacron™).

1. Orient the jute webbing face down to allow for more foam padding.
2. Attach the base foam directly onto the jute webbing with spray adhesive. It should be 1" thick, firm yet dense, and sized at a 10 3/4" square. I use "2955" upholstery foam which is very dense and extra-firm.
3. The middle is 2" thick and is a medium firmness that is sized to 14" wide and 13" long. Adhere it 1" back from the seat frame to allow the top piece to form the rounded profile. For this I use "1834" foam which is still fairly forgiving.
4. The top layer is 1" thick and very soft. It adds to the plushness of your cushion. I recommend a piece of "1818" foam.
5. Cover your stacked foam cushion with a single layer of batting and staple it to the underside of the seat frame. It'll further help to shape and unify the foam.

STEP 3: Sew the Cushion Cover

The only remaining step is to measure the top and side panels and sew the cushion cover. I made my own leather cushions and used firm 5/32" welting cord, but a simple blind seam would be handsome as well.


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style square drive screws. They support the seat frame and run the full width, requiring them to be notched to fit around the leg. Lastly, round the corners of the foot rail as desired and glue it in place over the front lower rail. Leave the stool in clamps overnight to cure.

Final Touches

All that is left is a nice finish and a comfy seat. I decided to use my old standby—an oil-based stain with a lacquer topcoat—but choices are plentiful when it comes to finishing.

For your seat, you can either make your own cushion or bring it to an upholsterer. Either way, begin by building a simple half-lapped frame using 3/4" thick stock. Size the seat frame 14 1/4" square, which leaves 1/4" space for the upholstery on each side. Also required are small notches (about 1/2" square) on each corner to clear the legs. Once finished, you can read more about creating custom cushions above or take it to a professional upholsterer.

Once you have your cushions completed, simply drop the cushions in place and bring your new barstools in the house to enjoy at the kitchen island. **PW** —*Willie Sandry*


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20 We cannot wait to use our new barstools at our kitchen island!

Industrial-style Bookcase

From the Landfill to the Living Room.

By Jason Stephens

PHOTOS BY THE AUTHOR

PROJECT #2118

Skill Level: Intermediate
Time: 6 Days
Cost: $500

One of the coolest things about this project is that every piece of wood and metal I used in its construction (with the exception of the hinges) was destined for the landfill. All the quartersawn white oak came from a massive tree that had decided to use Hurricane Florence as a flimsy excuse to destroy my neighbor's house (no one was harmed). I'm no psychologist, but I image that, as my neighbor surveyed the destruction, his thoughts were more centered on how best to resurrect his house from the dead than on extracting beautiful boards from a monstrous tree. I helped him move his family out of the house, and he was kind enough to allow me to cart away the largest tree I've ever milled!

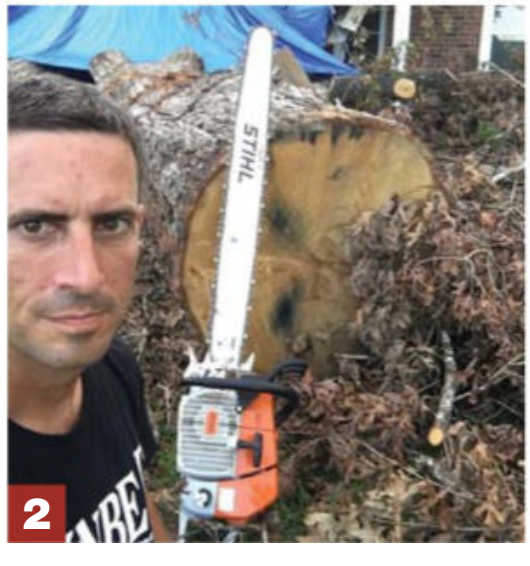
The metal I used for the base of the cabinet had, until very recently, lived out its life in the form of an overhead projector table. The welding technical school I attended was cleaning out its old building, and they asked for volunteers to help move some of the bigger stuff to the scrap heap. I brought home quite a bit of steel that day and it resided in my yard for a few months while I thought about how I could use it. Then one day, Andrew Zoellner, the former editor of Popular Woodworking, suggested an article on the incorporation of metal work and woodwork. As I pondered the idea, I have to admit my first conclusion was "Why?" But as I mulled the idea over, I began to get excited about it.

I wanted to create something that combined elements of fine woodworking with metal fabrication, the goal being partly to elicit the same feelings of nostalgia one might experience when gazing at an old iron factory press or a train bridge from the industrial age (or a train from that time, for that matter) — visible rivets, massive arched I-beams, giant bolts, that kind of thing. At that time wood was often incorporated as well, because it has fantastic engineering properties: strength-to-weight ratio, flexibility, beauty, and in the case of white oak and other select species, natural resistance to rot. There's something truly magical about studying that period of history — there's the sense of frenetic energy and excitement about the future and you can almost see those things reflected in the materials and designs of the living monuments from that time. I wanted to attempt something that in some way hearkened back to that fascinating time period.

1 A stately giant laid down by Hurricane Florence. This tree was destined for the landfill when my wife saw it from the road. "Get it!" she said. "Okay!" I replied.

2 I asked the owner's permission to take the tree. Helping him move out of his recently destroyed house likely aided him in his decision.

3 The base of my cabinet lived out its previous life in the form of an overhead projector table.



Metal Base — Or Maybe Not for You?

Let's just get this out of the way right up front—the metal base I made for this cabinet might controversial. For example, my wife flat-out hates it. That's mildly inconvenient considering the fact that the cabinet resides in our living room. I have a number of sarcastic and undiplomatic friends who apparently are unconcerned with the delicacy of my feelings, and they have been rather forthcoming with their opinions as well. I guess what I am saying is that the style I chose is not for everyone, so it might be worth considering other options, if you happen to be on the side of my friends and wife.

The bottom line is the metal base is actually not an obligatory feature of this design; I think the classic rectangular framework would work well on its own. You could add crown and base moldings, or possibly a larger wooden base with a couple of drawers. Whatever you decide to do, I'm quite certain my wife will prefer it over my own design choices, since she clearly has dismal taste in everything (with the possible exception of men).

4 Here are some other base options for you to consider: The left bookcase is simply just the classic rectangular framework with no base. In the middle is more of an elegant option with crown and base molding. Lastly, the right bookcase has a larger wooden base with a couple of drawers, which gives you more storage.

ONLINE EXTRA

Would you like to build the metal base or the door handles?

Considering the fact that not everyone is pro metal base, I'm focused on the woodworking aspect with this article. Not to worry though. You can find a step-by-step guide to making this metal base online, as well as the door handles.

Though if you're a first time metal worker, you may be thinking ... this is WAY TOO expensive for me to do! In fact, one of the main themes here was to not have to buy any specialized equipment other than a MiG welder and an angle grinder to supplement the tools that the average woodworker already has. A basic welder (meaning good quality, but without all the bells and whistles) can be bought new for only a few hundred dollars, and a 4 ½" angle grinder is just about the most absurdly inexpensive tool I can think of, considering how fantastically useful and versatile it really is. If I don't have you interested yet, well... read on for a unique industrial bookcase build.

PopularWoodworking.com/Industrial-Bookcase-Extra

Preparing the Case

I chose to mill the top and sides to about 15/16" in thickness, and the bottom to about 1 1/8". I generally prefer not to use standard thickness such as 3/4" in my furniture, because I think using non-standard dimensions helps achieve the custom look. I choose to mill the bottom to a higher level of thickness for two reasons. I like the visual effect, especially as you look at the larger and more tapered dovetail pins. The second reason has to do with the way the metal base attaches. It's attached with countersunk coarse-thread screws that thread up through the metal portion and into the wooden bottom. I wanted to have more material to bury those screws into.

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5 Experience has made me pretty paranoid about measuring, ever since I discovered my measuring tools seem to take great pleasure in embarrassing me in front of my friends. "Measure once, cut thrice," I believe they say and for good reason. With that in mind, I helped myself out and used one of my physically largest books to help with shelf spacing and accuracy.

6 As shown here, I use the drill press to drill the holes for the shelf supports on the inside of the sides.

7 Cut the dado for the middle shelf then clean up the saw blade marks with a shoulder plane as shown.

8 I marked the depth of the dovetails and cut the tails using my favorite dovetail saw. Then I transferred the tails to the pins and cut those.

9 Over the years I've experimented with different ways of removing the waste between the pins. In terms of hand tools I personally prefer to use a coping saw to remove the waste. However, I longingly look forward to the day when someone shows me a faster hand method.

Onto the Assembly

Keep in mind, when it comes to the glueup, it's best to have everything prepared in advance. There's a lot that can go wrong at this stage, and if you don't prepare, it very likely will. It helps to anticipate aspects of the glueup process, such as the route you'll be using to zip back and forth like an electrified squirrel, so maybe don't leave a bunch of clamps blocking the path!

10 Another thing to keep in mind during the glueup is how delightfully effective the process can be for inducing cardiac arrest. If you'd like to put that off, however, simply glueup in stages. In this case, I applied glue to 2 of the 4 sets of dovetails then clamped the whole thing together as if glue had been applied to all joints. Once it dried, I disassembled the unglued half, applied glue, and put the clamps back on. And just like that, heart attach averted!

11 Just one more glueup tip — use a pre-positioned bucket of water and a rag to remove every last trace of glue.

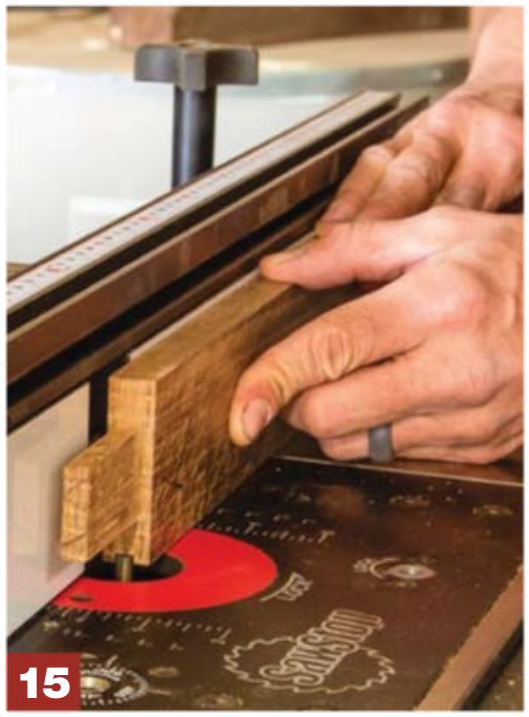
Building the Back Frame

It's a human failing (or just my own) to want to cut corners on parts we don't think others will see, in life and in woodworking. I think it's important to resist the temptation for multiple reasons. The obvious reason is that it's kind of disingenuous to do. It's not a mark of achievement when you manage to successfully fool yourself and/or someone else. For example, we modern woodworkers tend to only dovetail where the joints will be visible, forgetting that visibility of the joint isn't the only consideration, or even the primary one. Oftentimes dovetails are the only joint that makes sense. As Jim Tolpin pointed out in his astonishing book, "The Toolbox Book," you can sometimes look underneath the veneer of an old tool chest and discover well-hidden dovetails that were beautifully cut by a craftsman who'd never expected them to be seen. I'm not trying to make the case that if you don't

12 I begin by scribing the tenons. Then to cut them, I first dialed in my bandsaw using a sacrificial piece of the same dimensions and cut the tongues. Lastly, I used a tenon saw to crosscut most of the waste.

13 I finished removing the waste to the scribed line with a chisel and a mallet.

14 Onto the mortises. I placed my tenons against the mortises, scribed, and cut with a mortiser.



always use dovetails, you've sold out somehow. I'm just saying that because a particular element of a piece of furniture isn't visible doesn't mean it's not worthwhile to ensure it's just as well-built as the other elements are. I suppose this is a lengthy way of saying I did wrestle a little with how best to treat the back, because it's the back, after all — no one's likely to see it! I eventually decided on frame-and-panel construction with book-matched raised panels and through mortise tenons.

15 Once all my joints fit properly, I took my rails and stiles to the router and milled the grooves for the raised panels.

16 Now for a couple of dry fittings before glue-up. It's worth noting that there's a lot of potential leverage on the tenons during the assembly and therefore it's in a weakened state. Once assembled, it'll be very strong.

17 Once dry, screw (not glue) it to the carcase which allows for seasonal movement. I sunk the screws and placed end grain white oak plugs. The end grain absorbs more finish giving it a darker color and that industrial "riveted" look.

Cut List

No.	Item		Dimensions (inches) T	W	L
1	**A**	Carcase top	15/16	12	28
2	**B**	Carcase sides	15/16	12	60
1	**C**	Carcase bottom	1 1/4	12	28
2	**D**	Back frame rails	3/4	2	60
1	**E**	Back frame middle divider	3/4	1 1/4	60
1	**F**	Back frame top stile	3/4	2 3/8	28
1	**G**	Back frame bottom stile	3/4	2 1/2	28
2	**H**	Back frame panels	5/8	12 1/8	55 7/8
2	**I**	Front frame rails	3/4	1	60
1	**J**	Front frame top stile	3/4	1	26
1	**K**	Front frame bottom stile	3/4	1 1/4	26
4	**L**	Door rails	3/4	2	57 3/4
2	**M**	Door top stiles	3/4	2 5/8	13
2	**N**	Door bottom stiles	3/4	4 1/2	13
2	**O**	Door panels	5/8	9 3/4	51 3/8
1	**P**	Fixed shelf	13/16	26 3/4	12
*	**Q**	Adjustable shelfs	13/16	26	12

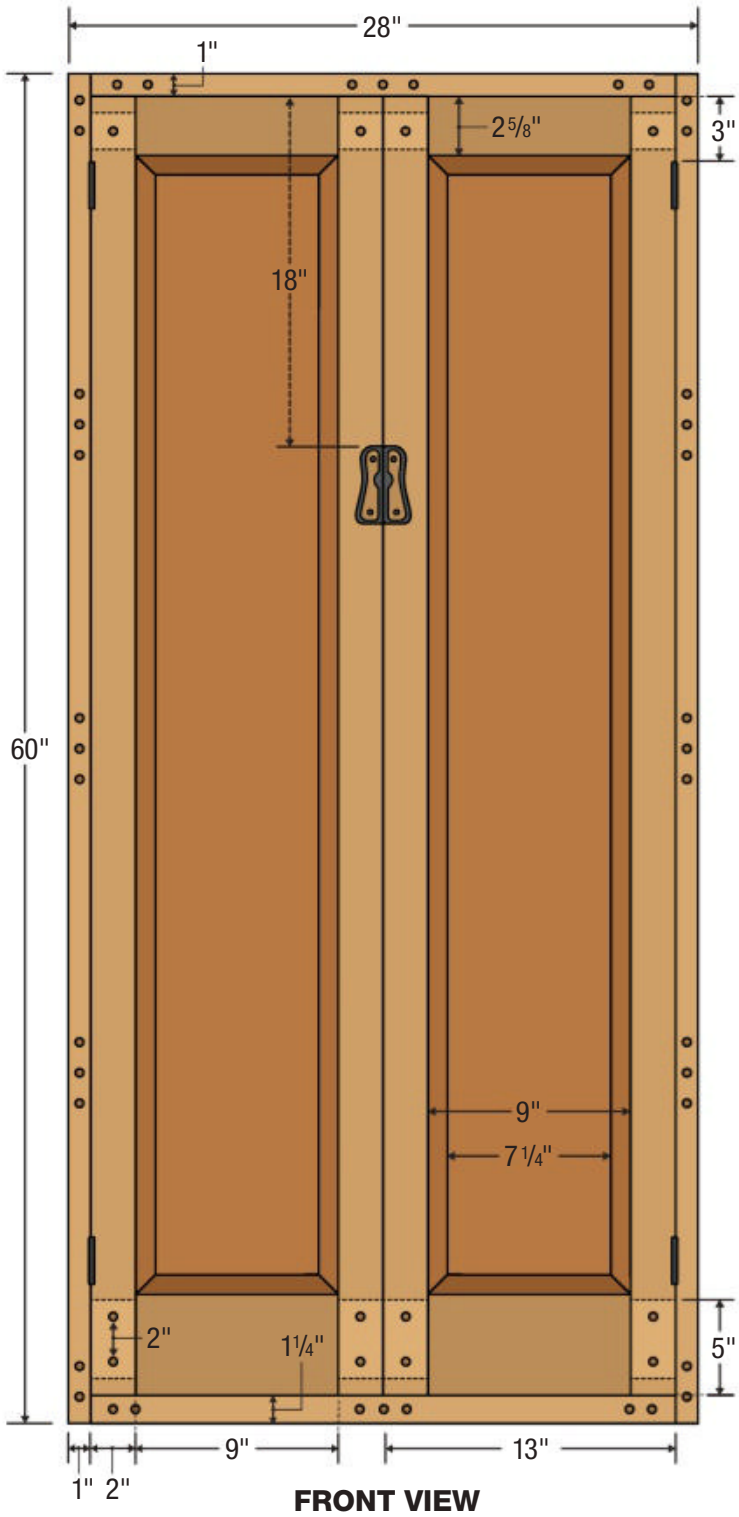
* Number of shelves depends upon your needs

Supplies List

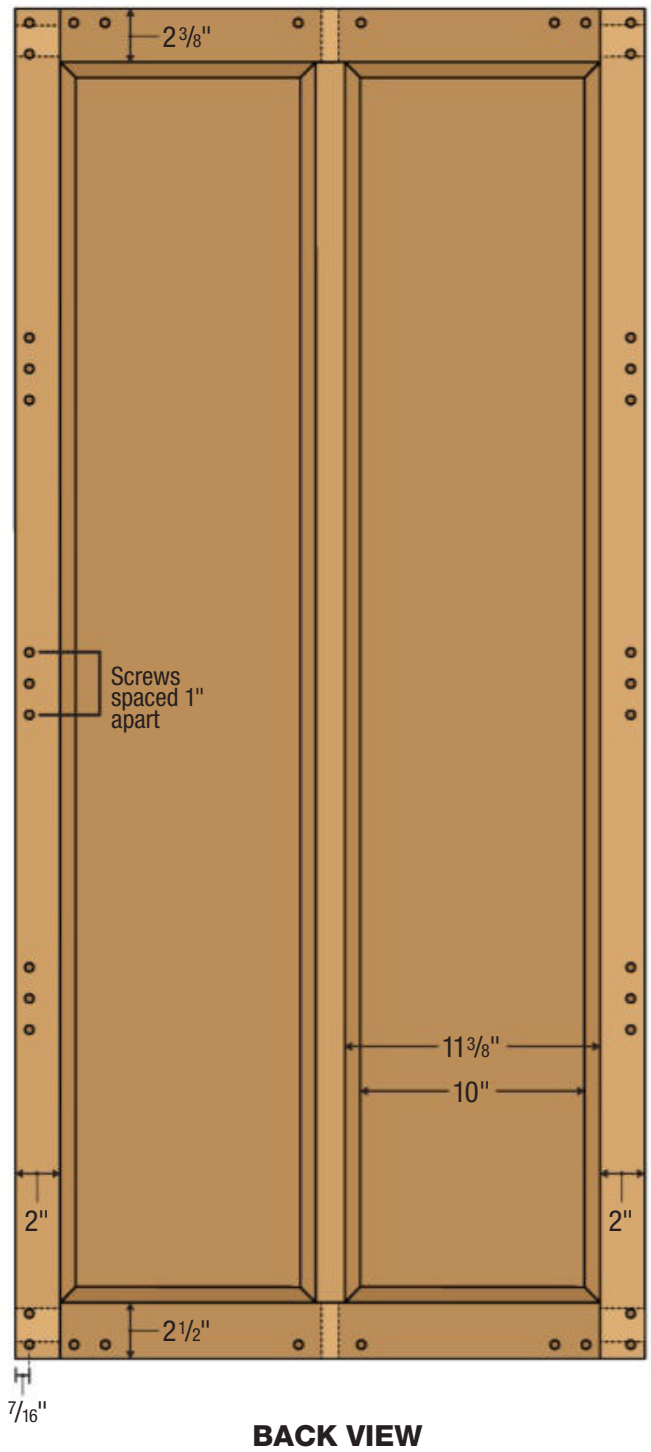
- **Metal shelf brackets** (1/4" diameter) – 4 for each shelf
  * Used to attach adjustable shelves to carcase
- 80 **screws** (3/8" diameter, 1 1/2" long) – 40 per side
  * Countersunk into frames to adhere them to the carcase
- 80 shop-made **end grain white oak plugs** (1/4" diameter)
  * Each plug covers the screw heads
- 12 **door pegs** (1/4" diameter, 2 3/4" long)
  * Strengthens the tenons in the doors
- 4 **Brusso® CB-407 butt hinges** (expensive but the quality is worth it)
- **Door handles** (mine are shop-made, but store bought would work too)
- 2 **magnetic stopper plates** (I used 1 1/2" W x 3" long iron plates, folded at 90° with rounded top corners.)
- 2 **door catches** (I used neodymium cup rare earth magnets, 1 1/4" dia.)

NOTE: All items are Quartersawn White Oak except the door panels (O) which are Quartersawn Red Oak.

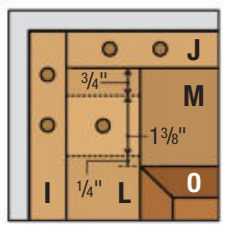
Industrial Bookcase



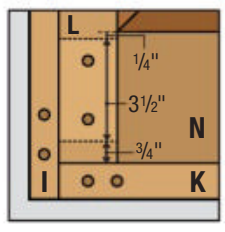
FRONT VIEW



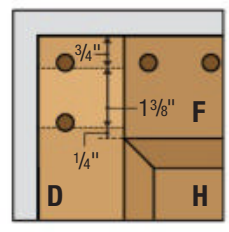
BACK VIEW



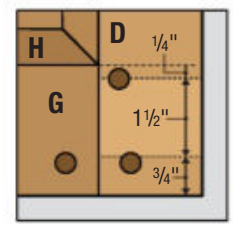
FRONT VIEW
TOP STILE



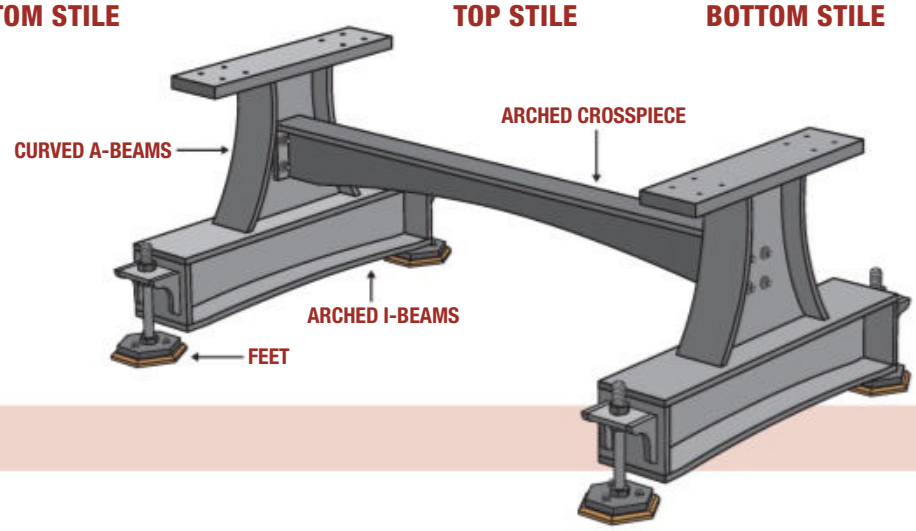
FRONT VIEW
BOTTOM STILE



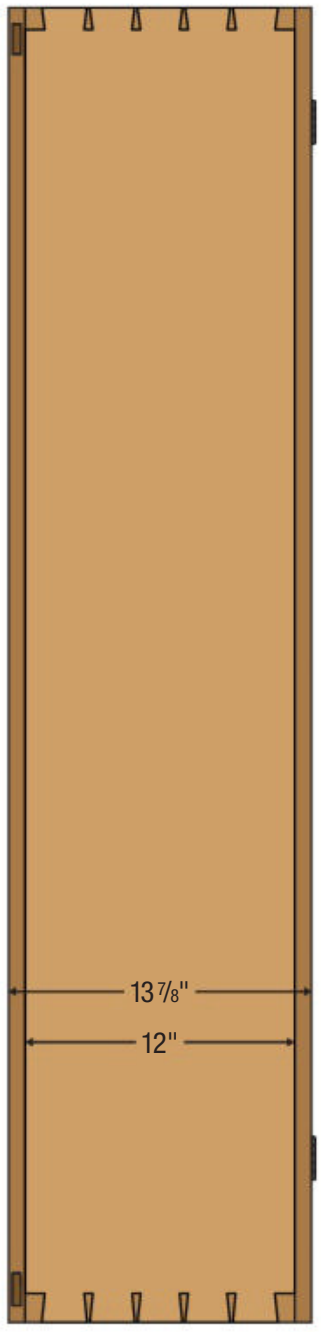
BACK VIEW
TOP STILE



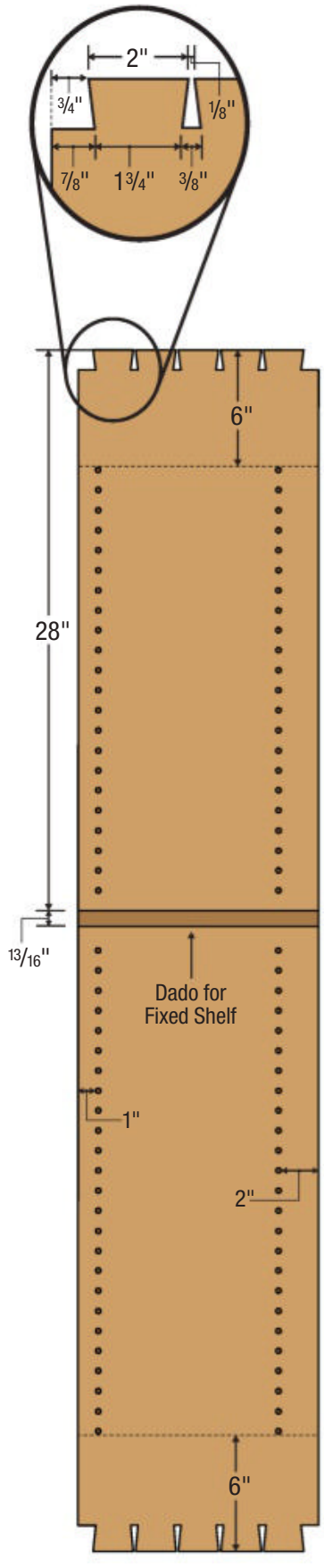
BACK VIEW
BOTTOM STILE



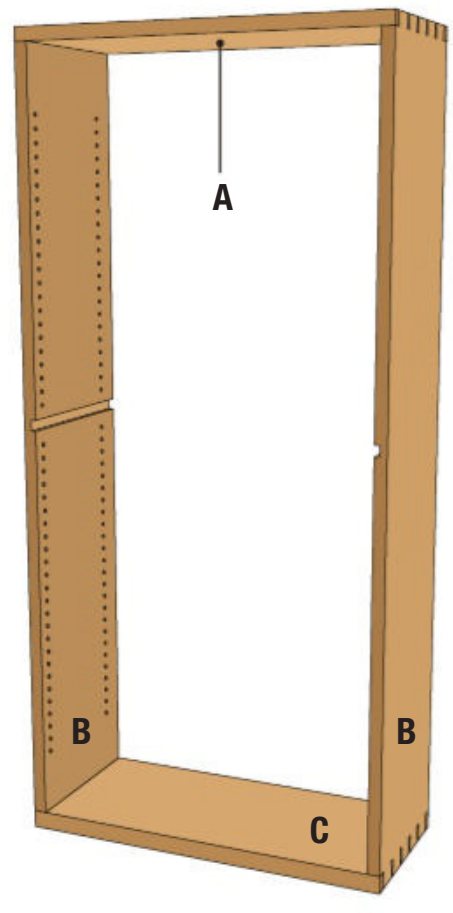
NOTE: For more information on the metal base, visit *PopularWoodworking.com/Industrial_Bookcase_Extra*



SIDE VIEW



CARCASE SIDE



- **A** Carcase top
- **B** Carcase sides
- **C** Carcase bottom

- **D** Back frame rails
- **E** Back frame middle divider
- **F** Back frame top stile
- **G** Back frame bottom stile
- **H** Back frame panels

- **I** Front frame rails
- **J** Front frame top stile
- **K** Front frame bottom stile

- **L** Door rails
- **M** Door top stiles
- **N** Door bottom stiles
- **O** Door panels

- **P** Fixed shelf
- **Q** Adjustable shelves

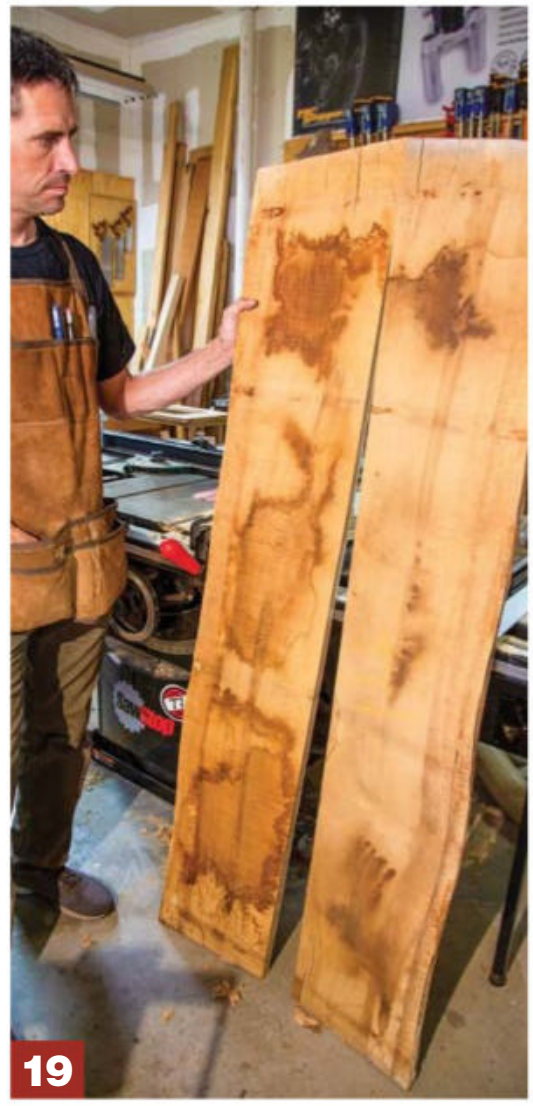
Making the Doors

I have to admit, fitting these doors to their frame was a bit excruciating, mostly because of the sheer amount of times I had to remove them, make two or three passes here and there with a hand plane, and put them back on. This tested my patience, but even at the time I knew it would be worth the effort when it was done and the doors fit perfectly.

Although the bulk of this cabinet is quartersawn white oak, I chose to use quartersawn red oak book-matched boards for the panels. These had existed as logs in the first stages of spalting when I found them in 2018 and cut them into slabs. After a couple of years of drying I decided to mill one side to see what kind of grain patterns they would yield. I was delighted with that I found. The grain was gorgeous and they were very stable. I also noticed their weight; these were noticeably heavier than equally sized white oak.

Additionally, I also worried about color contrast. I have lifelong issues with distinguishing certain colors, and I wasn't sure if the frame along with these panels would contrast nicely, or if they would conflict after I applied the finish. I briefly toyed with the idea of using stain and even went and brought some home. Applying a few different shades of stain to cut-offs from the panels I'd cut reminded me why I actually loathe the effects stain has on grain, and have avoided using it my entire woodworking life. I decided to take a chance and apply natural oil to both surfaces. I am thrilled with the results!

18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20

18 I carefully matched grain for the frame piece. I wanted smooth lines that did not visually conflict with the panel.

19 These two are book matched panels from the red oak logs given to me by Bernie and Louise, a couple I met on Craigslist after I responded to their "free logs" ad. I only met them once, but that didn't stop us from talking about *Lonesome Dove* for three hours over coffee.

20 You might not notice the stunning grain patterns under the stains of two years' outdoor drying, but a few passes with a jointer reveals the treasure that lies beneath.

21 I marked out the through mortises in the rails before cutting to ensure well-fitted through joints.

22 Putting a small bevel around the perimeter of your panels will help with smooth assembly of your frame and panel. It'll also help prevent splintering as you assemble it.

23 Always do a dry run in preparation for the glue-up!

24 I chose to use glue and drawbore pegs in the joints for additional strength (plus that industrial look). I carefully drilled 1/4" holes in the mortise rails, assembled the frame, and clamped it together.

25 Next, I pushed the 1/4" drill bit that I just used into the pre-dilled holes until it made a small indentation in the tenon. This helps to indicate the peg's center in the tenon.

26 Lastly, I dissembled the frame and used an awl to slightly offset the marks I made in the tenons. Then I drilled to create the drawbore effect. Be sure you're offsetting in the correct direction, or instead of drawbore joints, you'll have repel-bore joints ... which makes you realize those anger issues you thought you'd banished are still around!


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28

Lastly, the Shelves

If you're building this bookcase to house your Harlequin Romance collection, you'll likely need 12 or 13 shelves, but for my purposes 3 shelves was perfect. I wanted the middle shelf to be joined to the case for stability, so that meant two needed to be adjustable. This variability is accomplished with the use of metal shelf brackets, which through the use of pre-drilled holes, can be adjusted in 1" increments as needed. I put a stopped ogee profile on the edge of each of the shelves.

Final Details

All that's left now is to finish the rest of the cabinet using natural oil, attach the hardware, and place the shelf. For the door, you'll need 2 door pulls and 2 magnetic stopper plates to keep the door closed. First the door pulls — I made those myself. I always struggle with finding the perfect hardware and end up spending countless hours going down the rabbit hole of unlimited door handles to choose from. Instead, I almost always make my own handles, so I ensure the handles fit the style of the other parts of the project.

For this particular case, I made door handles that resembled the body of an acoustic guitar when the doors are closed.


29

27 Lower the adjustable shelf onto the pins, whose position I determined based on the height of the books.

28 If you'd like to learn to make these door handles, visit the online extra link seen on page 42.

29 Chop out the recess to accommodate the door catch. These don't absolutely have to be recessed, but I wanted to minimize interference with the books, and there's no doubt the recess adds strength.

Second are the magnetic stopper plates, which I also made. They're simply two pieces of shaped angle iron inset into the top and bottom of the cabinet with a magnet mounted to each one.

Lastly, it all comes down to spacing the shelves according to the height of your books. I used 1/4" diameter shelf brackets to install the shelves. You can easily purchase them from any local hardware store or online. Remember that you will need 4 per shelf. Now just find a good home to place your new bookcase and fill it up with all your *Twilight* novels! **PW** - ***Jason Stephens***

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Band Saw Tune-up and Upgrades

Give one of the most versatile tools in your shop a little love.

By Logan Wittmer

The amount of well known "master" woodworkers that I've heard say the one tool in their shop that they wouldn't live without is a band saw has always amazed me. That is, until I really spent some time with mine and came to understand how versatile of a tool it can be. Now, I get it. If I was going to only keep one (powered) saw in my shop, it would be my band saw.

A well-tuned band saw can make accurate rip and cross cuts, resaw wide boards, cut tight curves, and even perform joinery tasks. With all of that being said, like any tool, it needs to be set up correctly. Here are my steps for calibrating (or re-calibrating) my band saw, and a couple of simple upgrades you can do to give your old band saw a new lease on life.

First Things First

Calibrating your band saw really needs to start with a good base line. What I mean by that is the saw needs to run without any outside force. In most cases, this is going to be years of gunk and dust that's accumulated inside the saw. So, the first order of business is to give your saw a good, careful cleaning.

I tackle the easiest, most direct task first. That's vacuuming out the saw case. As you can see in Photo 1 and 2 below, dust gets everywhere. Spend some time with a vacuum and get as much of the dust out as you can. Pay special attention to the table trunnions, the band wheels, motor housing, and bearing areas. A little extra dust packed on the wheels or under the tires can lead to some headaches down the road as you're trying to dial the saw in. And the dust in the case... well, that's just to save you a headache if you drop a bolt later.

As you see in Photo 2 below, I like to remove the band saw table. This does a few things. First, like I mentioned before, it allows you to clean up any dust and pitch around the bearings. Second, and more importantly, it gives you good access to the bearings. We'll address the bearings in a bit. Now, let's concentrate on where the rubber meets the road... or the blade in this case.

1 Band saws aren't known to be the leaders in dust collection. With that in mind, spend some time cleaning out all the excess dust in every nook and cranny you can find.

2 Removing the band saw table will often unveil more packed-in dust, as well as give greater access to the bearings later.

PHOTOS BY JACK COYIER

Re-Tread

One of the easiest, and most often overlooked aspects of your band saw is the tires that ride on the (often) cast iron wheels. Start by removing the blade, as you see in Photo 3. If you haven't cleaned your tires recently, you'll probably notice they are packed with gunk. This is usually a mixture of pitch and sawdust that's transferred from the blade to the tire. This hard buildup can cause blade tracking issues, so it needs to go. I start by cleaning off as much of the loose debris as possible with an old tooth brush, as seen in Photo 4. For the real sticky bits however, you'll need something a little stronger.

You might often hear about people using a solvent, such as naptha or turpentine to clean the tires. However, I'm hesitant to use these solvents on rubber (or urethane). While it might appear they clean and rejuvenate the rubber, I've been informed by people much smarter than myself that instead the chemicals melt down the top layer of compound and re-flow it. So, I tend to stay away from it. Instead, I prefer to use Simple Green. It's much gentler on the tires and does the job of softening the pitch. After soaking the tires down, I'll use a rag to wipe away the softened pitch (Photo 5). For extra stubborn areas, you can use a card scraper or ScotchBrite pad.

Now that both the top and bottom tires are clean, it's time to give them a good inspection. You're looking for cracking, missing parts of the tire, grooves worn in the tire, etc. Also inspect the tire shape. It should be slightly crowned in the center of the tire. If they don't pass inspection, it's time for new tires.

Just a quick note on replacing tires. When purchasing new band saw tires, you'll likely find two choices available: urethane or rubber tires. Rubber tires are usually easier to install, less prone to grooving, but can dry rot. They'll also need to be glued in place, as the centripetal force from the tires will cause the rubber to sag as they spin. Urethane on the other hand tends to last longer, doesn't dry rot, and doesn't require glue. But, urethane tires are a little more difficult to install. To make them a little easier to slip in place, soak the urethane tire in hot soapy water for a few minutes, then use a handful of clamps and dowels to slip the tire over the wheel.


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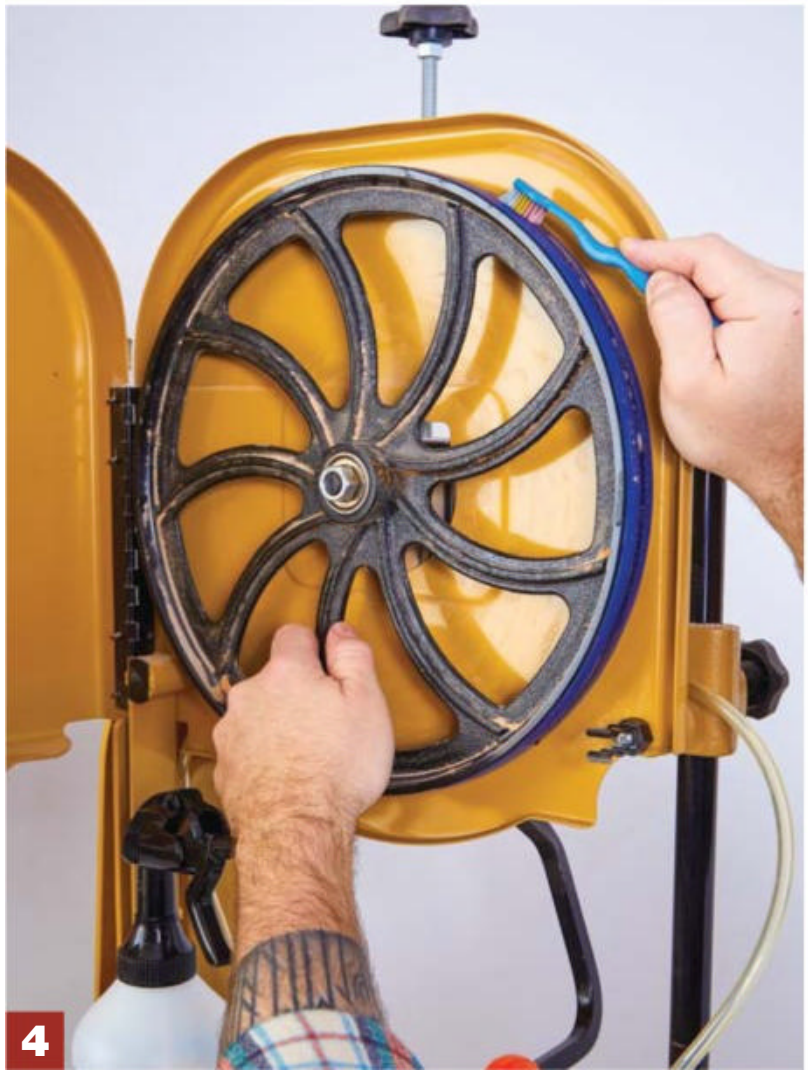
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3 Remove the current blade from the band saw. If you don't recall when you purchased it, or if it's seen a lot of use, now's a good time to get a new one.

4 Clean all loose debris from the band saw tires.

5 Any sticky areas of pitch or sawdust build up can be removed by spritzing the problem areas with Simple Green and allowing it to soften for a few minutes before wiping it away. Make sure to clean up any overspray, especially off of metal parts.


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6 Remove original guides and inspect them for wear.

7 Install new bearings (or complete bearing units) in both upper and lower locations if needed.

8 Don't forget to reinstall the blade guard when changing bearings.

9 An aftermarket fence will often bolt right to the factory holes.

10 Spend a few minutes calibrating the fence for squareness.

Guides and Fence

With the tires inspected, now it's time to look at some of the "peripheral" parts of the saw, mainly the fence and the guides. The performance of most older saws, and even some newer models, can be greatly improved by making a few aftermarket upgrades in these two areas. The first thing to look at is the guides.

With a well-used saw, you'll want to make sure the bearings, if equipped, spin freely without sticking. If they stick, grind, or scream at you, replace them. Some saws come equipped with block or ceramic guides. Personally, I'm not a fan of them, even though I know some users love them. If you're looking to swap out your block guides, or old guides, a great option is shown to the right. The guides made by *Carter Products* are a great upgrade to almost any saw. You simply remove the old guides (Photo 6) and install the new guide and guard (Photo 7 and 8). *Carter* makes guides to fit almost any saw, and in my opinion they're one of the best upgrades you can give your old saw.

While most band saw fences are serviceable, and you can often get away with a simple clamped on fence, I like one aftermarket option in particular. The band saw fence from *Kreg Tool* bolts directly on to almost any saw, as you see in Photo 9. Some of the features of the fence that I appreciate are the fine-tuning adjustments you can make to the fence skew and alignment. These adjustments are all done with Teflon grub screws. In addition, the aluminum fence accepts various accessories, such as flip stops (great for cutting tenons on the band saw), as well as re-saw guides. While the fence may not be a necessary upgrade for your saw, I find it makes my band saw experience more enjoyable. It locks tight, and I have confidence that it's aligned to the blade and it's not going to slip as I'm making a cut.

11 Some saws come with quick-release tension arms, but they can also be added aftermarket.

12 The gullet of the teeth should be just in front of the crown on the wheels.

13 Adjust the thrust bearing so it's ever-so-slightly behind the blade.

14 Doubled up painter's tape provides the perfect clearance between the guides and blade.

Calibration

With the saw mechanically sound, now it's time to set it up. Move the upper and lower guides far out of the way and load up a new blade. If you have a quick tension arm (like in Photo 11), engage the tension. Now, use the tensioning knob to slowly add tension to the bade. I find the spring gauges on most saws to be a decent guide for starters. Ultimately however, I adjust the tension so that the blade will only deflect about 1/4" when you push laterally on the blade with moderate pressure (make sure the guides are out of the way while testing this). Over tensioning a blade can lead to stress on the saw frame, as well as extra stress on the blade.

Now, the goal is to set the tracking of the blade so that the gullet (the notch in the blade) rides just in front of the crown on the wheel. You can adjust this by turning the tracking knob on the top wheel. As you adjust,continue to spin the blade by hand, making sure it's riding correctly. A side note here, because I know someone will ask, I've never felt the need to adjust my band saw wheels to be coplanar. I know some people do, and that's great, but many manufactures don't design their saws with coplanar wheels for a reason.

Once the gullet of the blade is tracking in the center of the wheel, now you can adjust the bearings. First, set the entire bearing block so that the left and right guides are just behind the gullets. Now, tighten down the bearing block. Next, adjust the thrust bearing. This is the bearing behind the blade. The goal here is to get the bearing as close to the blade as you can without it actually touching. When you rotate the blade, you don't want the thrust bearing to spin until you put the slightest amount of pressure on the teeth. Once it's as close as you can get it, tighten it down.

The left and right guide bearings are next. Like the thrust bearing, your goal is to set them as close as you can to the blade without them touching. As soon as any pressure is put on the blade, left or right, the bearing should engage.

I usually adjust all of the bearings on my band saw by eye, and test it out by spinning the blade, applying light pressure to make sure the guides engage to keep the blade cutting straight. If you find that adjusting the guides using this method is a little too tedious, or you have a hard time seeing the guides, you can use a few little tricks to help. One trick is to use a business card in between the guide and blade as a spacer. Personally, I feel like this is just a little too much room. Instead, I like to use two layers of blue painter's tape. Wrapped around the blade, this provides a good space for the guides to be set. Simply position it as seen in Photo 11, then adjust the bearings until they're just touching the tape. You'll want to repeat the entire guide setup for both the top and bottom bearings.

After the bearings are set, it's time to close the covers, plug the saw in and give it a test cut. If you move the fence into place and make a cut with your workpiece against the fence, the blade should be cutting straight, with the back edge of the blade centered in the saw kerf.

Using this setup, you should never have to correct for "saw drift." Now, as you use your band saw, you'll be amazed at how cleanly the saw cuts, and how accurate your band saw can be. **PW** — *Logan Wittmer*

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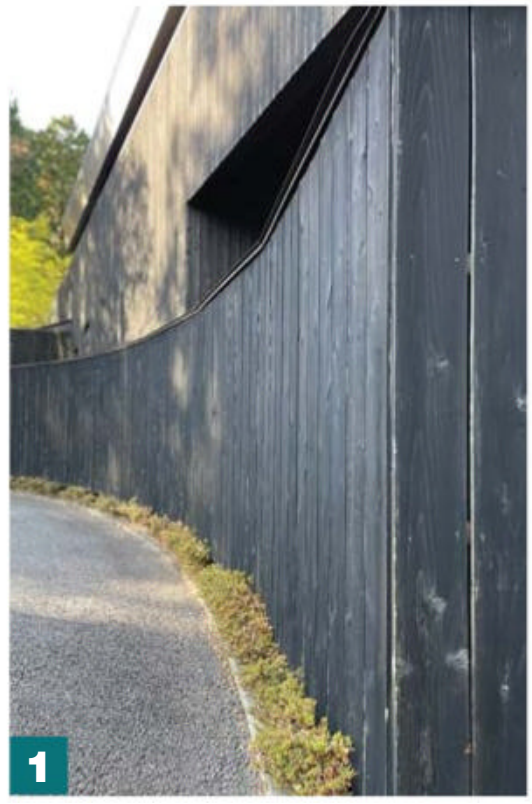
Myth-Busting the Meaning of Yakisugi

It isn't called shou sugi ban, nor is every charred workpiece in a project called yakisugi. It's simply a charred finish with its origins in Japan.

By Christopher Walker

An important lesson I learned during my five-year military enlistment was the concept of always leaving something better than it was. My unit would ensure a range used during a field operation was cleaner than it was before we came. When required to check out a vehicle as a command driver, upon return, it was cleaned and topped back up with fuel. Borrowing any gear from a fellow Marine or the local supply was always returned pristine and organized, regardless of the state of receipt. This principle remained with me, even after I transitioned out of the military.

As artisans, our development involves borrowing concepts and techniques from those who came before us. The hope is that, beyond making quality bespoke products, through our training and guidance, access to information about our craft will increase. In turn, this will help preserve knowledge for future woodworkers. This dedication should be extended to all forms and techniques, especially when borrowed from other cultures, and more so with those that become a trend.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1. This yakisugi covers an upscale hotel in the mountains of Kanagawa Prefecture.

2 Through years of exposure to the natural elements, the dramatic textures are presented while still providing ample protection.

Origins of Words: Shou Sugi Ban

Several years ago, I was introduced to something called the "shou sugi ban" technique via social media. Touted as a Japanese finishing technique, it simply involved charring wood with fire. It seemed deceptively simple. Proponents of shou sugi ban purported its ability to protect wood, yet gave no information as to the mechanism of how the protection occurred. Living in Japan, I chose to invest some of my time to learn about it. Yet, after significant research locally and on the internet, I learned that everything being taught to approach this technique was misguided. Even the name being used for the trending hashtag is inaccurate. Shou sugi ban, as it is known in the west, is an incorrect misreading of the Japanese kanji used to form the word.

In Japanese, there are four total writing systems if you count Romaji, which is the Romanic alphabet used to assist non-Japanese readers with spelling and pronunciation. The other three are hiragana, katakana, and the most daunting, Kanji.

Why is Kanji daunting? Kanji are characters that were adopted by Japan from China. They are logographic symbols that represent a concept or object. Kanji characters are written strokes. The shortest being one stroke (一 which means one) to 25 or more strokes. A proficient reader knows around 2100 Kanji.

Each Kanji can have multiple ways to be read. For the example of one (一), it can be read as ichi, itsu, or hito. The first two are called the on-yomi reading and this pronunciation derived from Chinese reading. The second is kun-yomi and these are Japanese-language-derived specific readings.

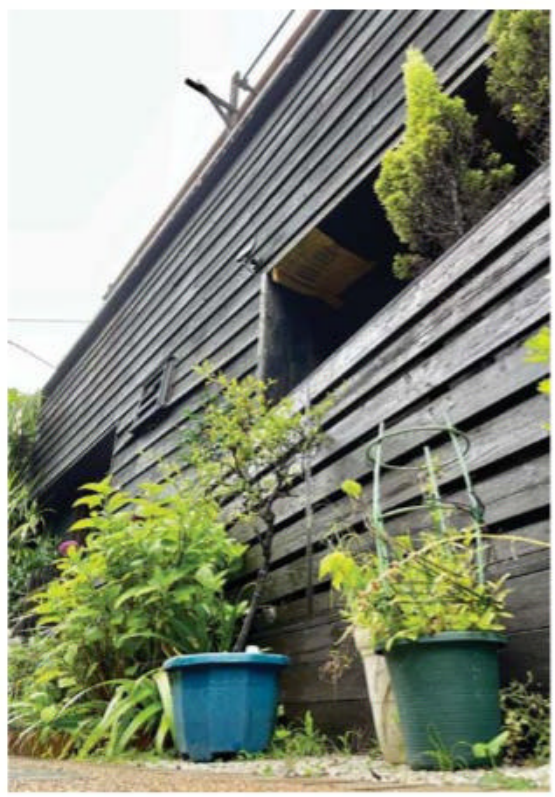
Shou sugi ban is an incorrect reading of the word 焼杉板 or, in Romaji, yakisugita. The first (焼) encompasses the concept of burning or heating up. It is read as either shou or yaku. The last kanji (板) means board or plank. It can be read as ita, ban, or han. Since yakisugi is a vernacular construction technique derived in Japan, it carries the kun-yomi reading. The tangible board is called yakisugita. The technique is called yakisugi. It has unfortunately trended under an incorrect name for many years.

PHOTOS BY THE AUTHOR

Yakisugi Examples in Japan

Yakisugi siding is common in rural areas of Japan. This house, close to my own, was built prior to World War II. The current resident's father purchased the house after the end of the war for his family. Though the house was not originally covered in yakisugi, it was added approximately 25 years ago.

The current resident, the original owner's daughter, has lived in the house for over 70 years. She is pleased with the yakisugi face that covers the house. Along with the beautiful texture of the burnt cedar boards, no maintenance has been required since hanging the siding.



Only Cedar for Yakisugi

Another unfortunate aspect of this technique lost with the trend is found in the translation of the middle Kanji—sugi (杉). Sugi means cedar; specifically a species called Cryptomeria japonica, the national tree of Japan. This means that yakisugi can only be correctly done on cedar. Charring other species besides sugi invalidates the use of the word "yakisugi."

Sugi is a popular species for siding in Japan. With a long rainy season in the middle of the year, Japan has relatively high humidity between April and November, depending on latitude. Bugs can also be overwhelming during their active months. This has varying negative effects to homeowners like rot, mold, and infestation. Among the native tree species in Japan, sugi has the best properties for rot resistance from bugs and moisture.

Prior to experimentation with burning, carpenters would harvest sugi trees that were close to ocean water. Salt penetrating the fibers of the tree would increase the rot resistance properties. Due to high demand, salt-penetrated sugi became unsustainable. Carpenters discovered that burning the faces of the siding achieved similar rot resistance protection.

Though slightly counterintuitive, setting fire to the outer layer of wood also provides a level of fire protection as well. Once the wood has already been charred, it does not combust as easily. With 2-3 millimeters of burn, the structural support of the wood remains, but the external layer of carbon provides fire resistance. This is a desirable protection for those living in the countryside who do not have quick access to fire emergency services.

How does it work?

Burning like this could be easily achieved close to the building site and directly hung once burned without further treatment. To achieve consistent and quick charring, triangular prisms of sugi would be laced together with string. Tinder was then stuffed into the center of the prism, lit on fire, and placed upright to form a smokestack. Once flames poured out of the top, it was brought down, unlaced, doused in water, and hung as siding. Done like this, it would last decades with no further intervention. This Yakisugi cladding requires little maintenance, and when it does it can be quickly completed by either burning a new layer or simply replacing worn out stretches of cladding.

In modern yakisugi manufacturing, automated machines achieve burning the planks of sugi in batches. With easier access to oil-based finishes and hardeners, once boards are burned, coats of these finishes may also be applied to add even more protection. It is still a vernacular construction technique used in the countryside for farmhouses and storerooms, but it has made a resurgence in living spaces and office buildings.

Yakisgui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3 Sugi planks are laid out and ready to be lashed together.

4 With ropes, a prism is made and the center cavity is filled with tinder.

5 The fire is lit from the bottom and the stack is engulfed in flames.

6 After burning for several minutes, the ropes are cut and planks doused in water.

7 For a deep burn, this method can be dangerous without taking safety precautions.

8 Alternatively, simple propane torches can be used to create a consistent burn.

9 This method requires more time but allows for more control and is slightly safer.

You do not need an industrial machine or a prism structure to experiment with the yakisugi technique at home. A simple propane or MAPP gas torch will work. True yakisugi requires Japanese cedar but similar results can be obtained on other cedar species. Different increments of burning along the grain provide different textures. The charred layer needs to be able 2-3mm deep for adequate levels of protection. Once completed, no wire-brushing is necessary. An oil finish can be applied but is also unnecessary.

More important than experimenting with and implementing yakisugi, we should understand its history. The hope is that we, the community of woodworkers, will leave the collective knowledge of woodworking techniques better off than what we received. The start of this goal is to appreciate, respect, and correctly use those techniques, including the name of the techniques themselves.

In the realm of those techniques is yakisugi; it is not called shou sugi ban, nor is every charred workpiece in a project called yakisugi, the name being reserved for a specific species. As an alternative, one can call it a charred finish or a carbon layer. Please join me and a growing number of woodworkers in correcting this inaccurate terminology. Help us leave woodworkers of tomorrow accurate and more robust knowledge than what we received—knowledge that will last longer than yakisugi siding, hung beautifully on the side of a country farmhouse in rural Japan.

PW — *Christopher Walker*

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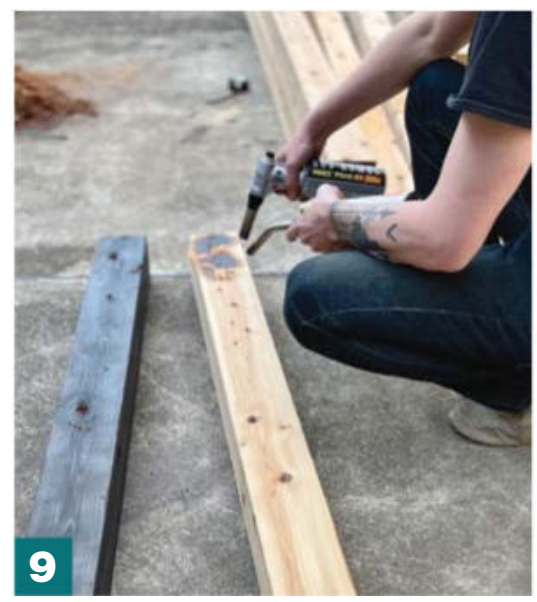
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Scott Grove

Coming from three generations of artists, Scott Grove blurs the line between art and woodworking.

I count myself lucky to meet some of the most outrageously talented people in the woodworking world. Amongst those is Scott Grove. Scott, hailing from western New York, is the unprecedented leader in compound (3D) veneering. And while Scott's often known as the master of veneer, he's so much more than that.

Having attended the *Rochester Institute of Technology* for Environmental Design, Scott is a self-taught woodworker. After leaving RIT, Scott launched a millwork and cabinetry business while still pursuing his real love: sculpture. Over the years, Scott's love of sculpture blossomed into a sculptural furniture business, and he began to sell his work to galleries across the country. During the peak, Scott employed over 20 talented woodworkers that helped him build furniture for clients all across the country.

While much of Scott's work is sculptural, Scott applies some of the same techniques to his furniture pieces. One of his most recognizable furniture features is asymmetrical veneer matching, but Scott also includes techniques such as cold metal bronze casting, exotic inlay, and filigree work.

Today, Scott splits his time between a handful of branches in his business. He teaches a number of classes each year at various woodworking schools, such as *Marc Adams School of Woodworking* and the *Chippendale School of Furniture in Scotland*. More recently, Scott has started hosting remote demonstrations for woodworkers from all walks of life.

A large portion of Scott's shop time (often 12-16 hours per day) is spent on any number of commission pieces that he's currently working on. Scott also recently launched an exotic inlay supply company with his wife and son. *Easy Inlay* is sold world-wide through various retailers, including *Woodcraft*, *Rockler*, and *Amazon*. In addition to his furniture work, Scott also does a large number of architectural restoration projects around the western New York area.

In the near future, I'm hoping to feature a handful of articles from Scott on his veneering techniques, but in the meantime you can find more of Scott's work at *ImagineGrove.com*. **PW** ***—Logan Wittmer***

"COMING TOGETHER". SPIRAL MATCHED BLACK WALNUT VENEER, GILDED SILVER LEAF TEXTURED CASE

"MELISSA". BLACK WALNUT COMPOUND VENEER OVER CAST TORSO.

PHOTOS COURTESY OF SCOTT GROVE

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