

Popular Woodworking

AUGUST 2023 | #273

PLUS:

- Shop Lighting
- Hammer Veneered Box
- Sliding Door Sideboard

Arts & Crafts Bookcase

WITH WILLIE SANDRY

10" 2 HP HYBRID TABLE SAW 40TH ANNIVERSARY EDITION

NEW!

- Motor: 2 HP, 120V/240V (prewired for 120V) single-phase, 15A/7.5A
- Rip capacity: 30"
- Max. depth of cut @ 90°: 3¼"
- Table size: 40¼" W x 27" D
- Floor-to-table height: 35¾"
- Arbor: 5⁄8", 3450 RPM
- Overall dimensions: 64" W x 40½" D x 36" H



MADE IN AN ISO 9001 FACTORY

G0962A40 ONLY \$995

⚠ WARNING! †¹

17" 2 HP BANDSAW 40TH ANNIVERSARY EDITION

NEW!

- Motor: 2 HP, 110V/220V (prewired 220V), single-phase, 20A/10A
- Cutting capacity: 16¼" left of blade
- Max. cutting height: 12⅝"
- Blade size: 131½" long
- Blade width range: ⅝"–1" wide
- Blade speeds: 1700, 3500 FPM
- Table size: 17" x 17" x 1½" thick
- Table tilt: 10° left, 45° right
- Fence size: 6" H x 23" L
- Floor to table height: 37½"
- Footprint: 27" W x 18" D
- Overall dimensions: 32" W x 32" D x 73" H



MADE IN AN ISO 9001 FACTORY



G0513A40 ONLY \$1450

⚠ WARNING! †¹

1 HP DELUXE 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: 10° left, 45° right
- Floor-to-table height: 43"
- Blade size: 93½" (⅝"–¾" wide)
- Blade speed: 1800, 3100 FPM
- Overall dimensions: 27" W x 30" D x 67½" H



MADE IN AN ISO 9001 FACTORY



G0555LX \$895⁰⁰ SALE \$785

⚠ WARNING! †¹

10" 5 HP 240V TABLE SAW 40TH ANNIVERSARY EDITION

NEW!

- Motor: 5 HP, 240V single-phase, 23A
- Rip capacity: 32"
- Max. depth of cut @ 90°: 3"
- Table size: 48" W x 27" D
- Floor-to-table height: 34"
- Arbor: 5⁄8", 4200 RPM
- Overall dimensions: 66" W x 47" D x 40" H



MADE IN AN ISO 9001 FACTORY

G1023RLA40 ONLY \$2125

⚠ WARNING! †¹

3 HP SHAPER

- Motor: 3 HP, 240V single-phase, 12A
- Max. cutter height: 2½"
- Max. cutter diameter: 5½"
- Spindle diameters: ½", ¾", 1"
- Spindle lengths: 2¾", 3", 3½"
- Spindle capacity under nut: 2", 2¼", 2½"
- Spindle speeds: 7000 & 10,000 RPM
- Spindle travel: 3"
- Spindle openings: 1½", 3", 4", 7"
- Table counterbore: 7" dia. x 5⁄8" deep
- Table size: 28¼" W x 30½" D
- Floor-to-table height: 34"
- Footprint: 21" x 23½"
- Overall dimensions: 30" W x 30½" D x 39½" H



MADE IN AN ISO 9001 FACTORY



G1026 ONLY \$1595

⚠ WARNING! †¹

3 HP PORTABLE CYCLONE DUST COLLECTOR

- Motor: 3 HP, 220V single-phase, 15A
- Main inlet size: 8"
- Impeller: 16" aluminum
- Airflow capacity: 1941 CFM @ 2.9" SP
- Max static pressure: 11.0"
- Filtration: 1-micron
- Filter surface area: 45.2 sq. ft.
- Collection capacity: 45-gallon
- Sound rating: 79 dB
- Overall dimensions: 31" W x 54" D x 82" H



MADE IN AN ISO 9001 FACTORY

G0862 \$2250⁰⁰ SALE \$2025

⚠ WARNING! †¹

6" JOINTER 40TH ANNIVERSARY EDITION

NEW!

- Motor: 1½ HP, 110/220V* (prewired 110V) single-phase, 18A
- Table size: 7¼" x 60"
- Max. width of cut: 6"
- Max. depth of cut: ⅛"
- Cutterhead type: 4-row V-helical, 24 inserts
- Fence size: 29¼" L x 4" H
- Overall Dimensions: 60" W x 20½" D x 40½" H



*Machines made before 3/2023 have 110V only

MADE IN AN ISO 9001 FACTORY

G0526A40 ONLY \$1550

⚠ WARNING! †¹

10" ½ HP BANDSAW

- Motor: ½ HP, 120V, single-phase, 3.5A
- Max. cutting width left of blade: 9¾"
- Max. cutting height (resaw capacity): 6⅝"
- Blade speeds: 1520 and 2620 FPM
- Blade size: 71½"–72½" (⅝"–½" wide)
- Table size: 14¾" x 12⅝"
- Table tilt: 0–45°
- Footprint: 24½" x 20½"
- Overall dimensions: 28" W x 21½" D x 58½" H



MADE IN AN ISO 9001 FACTORY

G0948 ONLY \$459⁹⁵

⚠ WARNING! †¹

1 HP WALL-MOUNT DUST COLLECTOR

- Motor: 1 HP, 120/240V (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 16⅜"
- Height with bag inflated: 46"
- Sound level: 77–79 dB



MADE IN AN ISO 9001 FACTORY

G0785 ONLY \$399⁹⁵

⚠ WARNING! †¹

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⚠ WARNING! †¹: Cancer & Reproductive Harm

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10" 2 HP BENCHTOP TABLE SAW

- Motor: 2 HP, 120V, 15A
- Table size: 26³/₈" W x 22¹/₄" D
- Arbor speed: V variable, 2000–4000 RPM
- Blade tilt: Left, 45°
- Max. depth of cut: @90°: 3¹/₈"
- Rip capacity: 28" right
- Overall Dimensions: 28" W x 37¹/₂" D x 20¹/₂" H (G0869)
- 41¹/₂" W x 37¹/₂" D x 41" H (G0870)



MADE IN AN ISO 9001 FACTORY

G0869 ~~\$595⁰⁰~~ SALE **\$550**

G0870 ~~\$649⁹⁵~~ SALE **\$585⁹⁵**
WITH STAND



⚠ WARNING! †¹

10" HYBRID TABLE SAW

- Motor: 2 HP, 115V/230V (prewired for 115V), single-phase, 16A/8A
- Rip capacity: 31¹/₂"
- Max. depth of cut @ 90°: 3¹/₈"
- Total Table size: 40¹/₈" W x 27" D
- Floor-to-table height: 34¹/₄"
- Arbor diameter: 5¹/₈"
- Arbor speed: 4000 RPM
- Main dust port size: 4"
- Overall dimensions: 66" W x 40" D x 48" H



MADE IN AN ISO 9001 FACTORY

G0899 ~~\$1825⁰⁰~~ SALE **\$1695**

⚠ WARNING! †¹



15" 3 HP PLANER

- Motor: 3 HP, 230V single-phase, 12A
- Max. stock width: 15"
- Max. stock thickness: 6"
- Min. stock thickness: 3¹/₁₆"
- Min. stock length: 6"
- Max. cutting depth planing full width: 3³/₃₂"
- Max. cutting depth planing 6" wide board: 1⁵/₈"
- Cutterhead diameter: 3"
- Cutterhead type: 3-Knife
- Knife size & type: 15" x 1" x 1⁵/₈", HSS
- Cutterhead speed: 5000 RPM
- Feed rate: 16 and 28 FPM
- Table size with extensions: 15" x 48"
- Footprint: 21¹/₂" x 21"
- Overall dimensions: 32" W x 48" D x 44" H

MADE IN AN ISO 9001 FACTORY



G1021Z ~~\$2350⁰⁰~~ SALE **\$2095** ⚠ WARNING! †¹



1¹/₂ HP WALL-MOUNT DUST COLLECTOR

- Motor: 1¹/₂ HP, 110V, single-phase, 15A
- Airflow capacity: 1250 CFM
- Max. static pressure: 10.4"
- Filtration rating: 1-micron
- Filter surface area: 38.75 sq. ft.
- Impeller: 12³/₄" radial fin
- Machine collection capacity: 2
- Bag capacity: 15-gallon
- Sound rating 75–77 dB
- Overall dimensions: 22¹/₂" W x 23¹/₂" D x 77¹/₂" H



G0944 **ONLY \$715**

⚠ WARNING! †¹

14" X 20" VARIABLE-SPEED BENCHTOP WOOD LATHE

- Motor: 3/4 HP, 110V, 8A
- Swing over bed: 14"
- Swing over tool rest: 10"
- Dist. between centers: 20"
- Spindle: 1" x 8 TPI RH
- Spindle speed: Variable, 250–3550 RPM
- Spindle taper: MT#2
- Indexing spindle: 15°
- Tool rest width: 8"
- Tool rest post size: 1"
- Footprint: 35¹/₂" W x 9" D
- Overall dimensions: 41¹/₂" W x 17¹/₂" D x 18" H



MADE IN AN ISO 9001 FACTORY

G0844 ~~\$779⁰⁰~~ SALE **\$725** ⚠ WARNING! †¹



1/2 HP BENCHTOP MORTISING MACHINE

- Motor: 1/2 HP, 110V, 6A
- Spindle speed: 1725 RPM
- Spindle taper: JT #2
- Spindle travel: 3¹/₄"
- Max. stock width: 8¹/₂"
- Max. stock thickness without extension block: 4¹/₄"
- Max. stock thickness with extension block: 6"
- Max. mortising depth: 3"
- Max. chisel travel: 4⁵/₈"
- Chisel size range: 1/4"–1/2"
- Chuck size: 3/8"
- Collar size: 5/8"
- Table size: 10¹/₂" x 12¹/₄"
- Overall dimensions: 13³/₄" W x 29" D x 32" H



G0645 ~~\$499⁹⁵~~ SALE **\$399⁹⁵** ⚠ WARNING! †¹

13" 2 HP BENCHTOP PLANER WITH HELICAL CUTTERHEAD

- Motor: 2 HP, 120V, 15A
- Max. cut width: 13"
- Min. stock length: 6"
- Min. stock thickness: 1/8"
- Max. stock thickness: 6"
- Max. cut depth full width: 1¹/₃₂"
- Max. cut depth 6" wide: 3³/₃₂"
- Cutterhead type: 2" helical with 30 indexable carbide inserts
- Cutterhead speed: 8500 RPM
- Feed rate: 25 FPM
- Table size with: 13" x 28"
- Dust port size: 2" with 4" adaptor
- Overall dimensions: 25¹/₂" W x 28" D x 19" H

MADE IN AN ISO 9001 FACTORY

G0940 ~~\$895⁰⁰~~ SALE **\$825**

⚠ WARNING! †¹



18" 1¹/₂ HP OPEN-END DRUM SANDER

- Motor: 1¹/₂ HP, 120V single-phase, 13A
- Drum surface speed: 2600, 3400 FPM
- Conveyor feed rate: Variable, 0–12 FPM
- Max. stock dimensions: 36" W x 4¹/₂" H
- Min. board length: 6"
- Min. board thickness: 1/8"
- Sanding drum size: 4"
- Dust collection port: 4"
- Overall Dimensions: 35¹/₂" W x 22¹/₂" D x 50" H



G0458Z **ONLY \$1095**

⚠ WARNING! †¹



13" PLANER/MOULDER

- Motor: 1¹/₂ HP, 110V/220V (prewired 110V) single-phase, 15A/7.5A
- Max. stock width: 13"
- Max. stock thickness: 6"
- Max. planing cutting depth (full width): 1¹/₁₆"
- Max. planing cutting depth (6" wide board): 1/8"
- Max. moulding profile depth: 3/4"
- Max. moulding width: 4⁹/₁₆"
- Feed rate planing: 24 FPM
- Feed rate moulding: 12 FPM
- Cutterhead speed: 5000 RPM
- Overall dimensions: 23¹/₂" W x 23" D x 44¹/₂" H

MADE IN AN ISO 9001 FACTORY

G1037Z ~~\$1325⁰⁰~~ SALE **\$1195**

⚠ WARNING! †¹

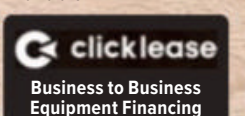


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FROM THE EDITOR

Custodite Aedificium

By Logan Wittmer

It's spring time in Iowa. We've been through false spring and the second spring. (If you're from the Midwest you'll understand it—the few hot days before two additional weeks of snow and sleet). I feel as though the last 6 months are leading up to a crescendo, as we're starting to wrap up construction on the new *Popular Woodworking* shop. The workbench to the right has been my homebase for the last several months of construction. Over the next several issues, you'll start to see some photos in the new shop. In fact, the lighting article in this issue came out of building the planning and construction phase.

To give you some idea on the shop, it's approximately 1,600 square feet (including an office and restroom). When it comes to equipment, I think it's obvious that a lot of companies support our magazine through advertising. However, instead of filling out this new shop with new brand-name machinery, we decided to keep with the vintage tool theme—that was in thanks to you folk... I had more emails about the jointer restoration than any-



PHOTOS PROVIDED BY LOGAN WITTMER

thing else I've published. (And yes, part 2 will be coming shortly; we needed warm weather for sandblasting.

So in short, I want to extend an open invitation to everyone—if your travels find you traveling through central Iowa, please feel free to reach out and stop by. We love visiting subscribers and giving tours. Heck, I'd even love to pour you a drink. Until our paths cross, *custodite aedificium*—keep building.

A handwritten signature in black ink that reads "Logan Wittmer".

ABOUT THE AUTHORS



PHIL HUBER: *Sliding Door Sideboard*—pg. 40

Phil Huber has been an editor at *Woodsmith* and *ShopNotes* magazines for the better part of 20 years. In his free time, he can't stop building projects for friends and family. More than likely, he has a few in various states of construction as you read this—and probably has started on a few Christmas gifts (already). He works in a small, back-of-the-garage shop that could use heat and AC. He teaches classes for local clubs focusing on the skillful use of tools while making practical projects.



KENAN ORHAN: *Veneered Box*—pg. 52

Kenan Orhan is an author and studio furniture-maker based out of Kansas City. After receiving his MFA in Fiction while living in Boston, he moved back to Kansas City. Almost by accident, he joined the Kansas City Woodworker's Guild. Now, in his free time, he designs and makes custom and reproduction furniture out of the guild's workshop while volunteering and teaching traditional joinery classes, focusing on hand tool techniques. You can find much of Kenan's work on his Instagram: [@orhanwoodwork](#)

WILLIE SANDRY:

Arts & Crafts Bookcase—pg. 30



Living in the Pacific Northwest, Willie Sandry is a long time fan of Arts & 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 partway, 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.

■ Popular Woodworking

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NEW TOOLS

WOODYAH

A new company, *Woodyah* tools, headed by Anthony Cimaglia, has started producing accessories for hand tools. *Woodyah*'s tote turner (shown at right) rotates the tote of a number 5 hand plane to be used as a shooting plane. If you've ever tried to use a standard plane as a shooting plane, you'll know that there's not a good (comfortable) way to hold the plane. The tote turner presents the handle at 45° for easy holding, and includes all the necessary hardware.

In addition to the tote turner, *Woodyah* is offering a squirrel tail handle for block planes (below). All of the *Woodyah* tools are made by 3D printing, out of a high-quality polymer resin (these aren't your low-end, cheap printed parts that are brittle). The squirrel tail handle works on all post-adjuster style block planes. Other accessories include an extended side fence for *Stanley* and *Miller Falls* rabbeting block planes. All of the *Woodyah* products, including the packaging, is produced in the USA. — *Logan Wittmer*



■ **TOTE TURNER**
WoodYah Tools
WoodYah.com
Price: \$39.99+

WhiteSide CNC Router Bit Set

Whiteside Machine Company has announced a release of a new set of router bits, aimed at the production shop and serious home woodworkers. The sets, available in 9 piece (shown here) or 14 piece sets, have nearly every bit that a woodworker needs for their CNC.

The 9 piece set is designed to meet the needs for cutting natural and composite woods, as well as plastics and even thin aluminum. The set includes two v-groove bits, two ball-nose spiral bits, two each of down-cut and up-cut spiral bits, and a 4-flute tapered ball-nose spiral bit. This set includes most bits need for a variety of projects including cutting out work, mortising, sign making, and engraving.

For the serious shop, the works set contains a total of 14 bits, including additional compressions spirals, O-flutes for plastics, as well as large surfacing bits. — *Chris Fitch*



■ **SET #709**
WhiteSide
whitesiderouterbits.com
Price: \$232.90

PHOTOS BY THE AUTHORS



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Doyle 7" Bench Vise

I recently saved an old workbench from the scrap heap, and the first thing I knew it needed (after a good cleaning and flattening) was a vise. I wondered aloud to Logan if *Harbor Freight* had anything, then decided to check online. Just my luck, they had just released a new 7" vise from the DOYLE brand. (The DOYLE line is one of their higher-end lines).

I know that *Harbor Freight* has worked over the years to position itself as an affordable option that still offers quality products, and since I didn't have any specific vise needs I figured it would be the perfect fit without having to spend a lot of money. The DOYLE vise features an 8" jaw capacity, clamping force of up to 4,600 lbs., and a retractable vise dog, which is perfect because my bench doesn't have any dog holes yet.

While I haven't put the vise through any serious stress tests, I'm very happy with the initial quality. The mechanism feels mostly solid, and the operation is smooth. The quick release feature is nice, if a bit



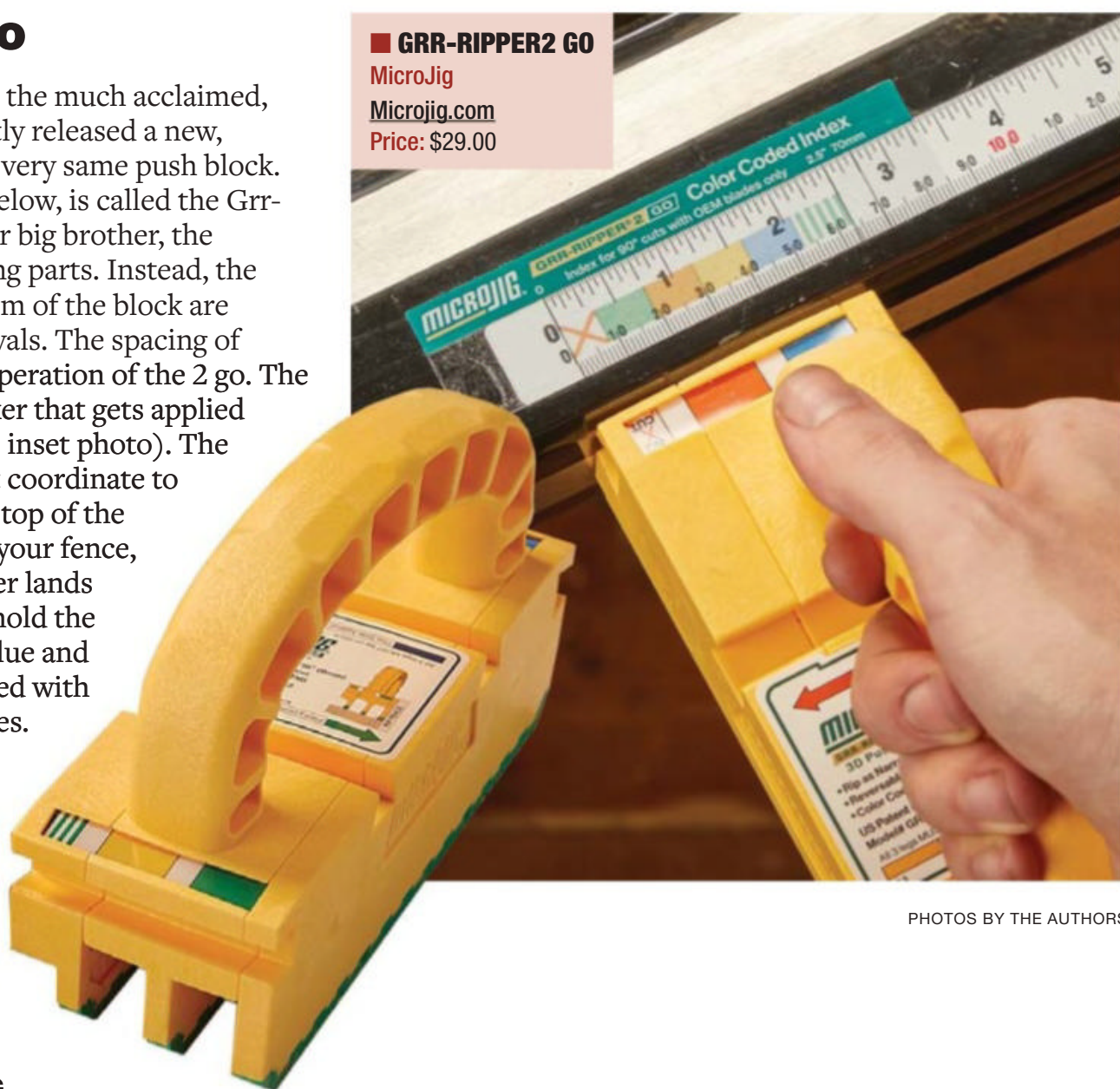
■ **DOYLE VISE**
Harbor Freight
HarborFreight.com
Price: \$69.99

notchy so far, though that's not entirely unusual based on the design. With a price that undercuts the competition, the few small issues are well worth living with. — *Collin Knoff*

Grr-Ripper 2 Go

MicroJig, the company behind the much acclaimed, Grr-Ripper push block, recently released a new, trimmed down version of the very same push block. The new push block, shown below, is called the Grr-Ripper 2 Go. Unlike its heftier big brother, the Grr-Ripper 2 Go has no moving parts. Instead, the rubber lined legs on the bottom of the block are spaced out in particular intervals. The spacing of these legs are the key to the operation of the 2 go. The push block comes with a sticker that gets applied to the tape on your fence (see inset photo). The sticker has color markers that coordinate to colors that are located on the top of the push block. When you locate your fence, the color that the fence marker lands on will tell you which way to hold the push block — on one end is blue and orange, and the other is marked with green, yellow, and green hashes. By holding the push block in the correct orientation, you're guaranteed that the blade will clear the push block legs.

— *Logan Wittmer*



■ **GRR-RIPPER2 GO**
MicroJig
Microjig.com
Price: \$29.00

PHOTOS BY THE AUTHORS



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-Adam D.

I have a clean shop!

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-Dale M.

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30 gallon
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Veritas Box Maker's Plane

One of the stand out hand tools of recent years was *Veritas's* release of their plough plane. It's the perfect tool for cutting grooves in all sorts of parts. However, it tended to be just a tad too large for small projects like boxes. With that in mind, *Veritas* just released their small Box Maker's Plough Plane, shown here.

The box maker's plough plane, which resembles a vintage record 043, comes in both right and left handed versions. The key features of this little guy are the short fence and narrow blade (it comes with a 1/4", but 1/8" and 3/8", are available as well). These, combined with it's small stature, makes it work well for cutting grooves on small parts. The fence is adjusted with a pair of Allen wrenches, although it would be easier with knurled knobs. However, the small size of the plane make that impossible. The blade is held in with two thumbs screws — one on the lever cap, and one to hold the blade tight to the body.

While the plane works great for small grooves, it also does well creating small profiles. Swapping the

BOX MAKER'S PLOUGH PLANE

Veritas

LeeValley.com

Price: \$159.00



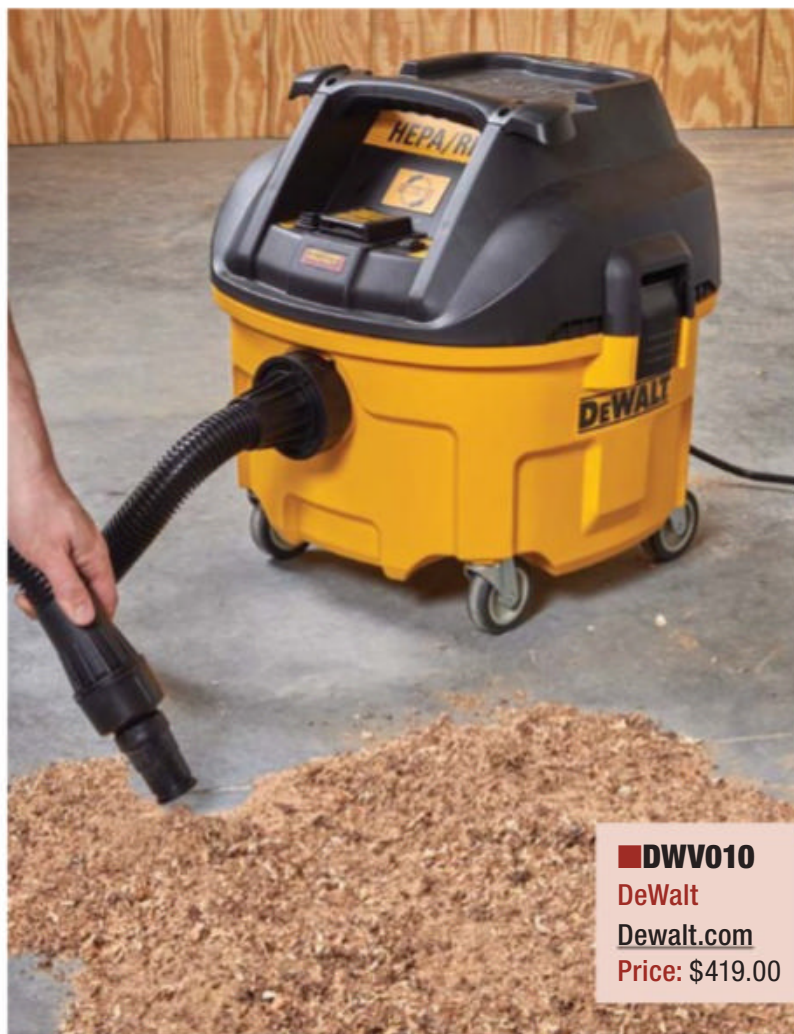
blade for a small bead cutter, you can quickly add decoration to the edges of the work pieces. You can see the 1/8" bead cutter in the photo to the bottom left. As with all *Veritas* brand tools, it's available from LeeValley.com — *Collin Knoff*

8 Gallon Dust Extractor

A true dust extractor with HEPA-level (removes at least 99.97% of dust, pollen, mold, bacteria, and any airborne particles with a size of 0.3 microns) filtration is one of the most effective shop safety upgrades a woodworker can make. The *DeWalt* DWV010 has nearly all the features of the top models but in a smaller, less expensive package.

DeWalt checks all the major boxes you'll want — anti-static hose, automatic filter cleaning, wet/dry functionality, and an on-board power outlet that can turn the extractor on and off when a tool is plugged in. That last bit is especially nice when sanding. Unlike some models with a power outlet, there's no way to adjust the amount of power the attached tool can draw, so you'll want to make sure you're paying attention to the amperage limits that *DeWalt* recommends for tools plugged into the outlet. You should be fine with most sanders and smaller handheld tools though.

One of the things I was pleasantly surprised by was how useful the smaller size was. Most dust extractors are fairly bulky, but the DWV010's short stature means it fits under counters or work surfaces with room to spare. The compact size, plus the rubber castors means it's a snap to maneuver, a useful trade-off in my garage shop where I'm constantly moving things around as I work. —*Collin Knoff*



DWV010

DeWalt

Dewalt.com

Price: \$419.00

PHOTOS BY THE AUTHORS



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WORKSHOP TIPS

Packaging Tape and Web Clamps



The strong adhesive and tough plastic of packaging tape allow it to work as a hinge on long, mitered corners. After carefully cutting the miters, lay the boards outside-face up and side by side so their sharp edges touch. Apply strips of tape along each joint, pressing the tape firmly onto the wood, then flip the boards and apply glue. Use web clamps to tightly hold the joints together, and wipe the squeeze-out from the inside corners. Again, allow the glue to dry thoroughly before removing the clamps and tape. — *Bruce Wiebe*

PHOTOS BY BILL ZUEHLKE

Choosing Glue for Repairs

Strong and convenient, yellow wood glue is a good choice for most repairs. But there are glues that offer advantages for special situations:

SLOWER GLUES: Depending on factors like temperature and wood species, standard wood glue can set in as little as five minutes. When you need more time for complex assemblies such as chairs, try liquid hide glue or *Titebond's* Extend, a slower-setting version of yellow glue. Both offer about twice the open time of regular wood glue.

FASTER GLUES: Cyanoacrylate, often referred to by the brand name “Super Glue,” is perfect for small repairs because it sets in minutes or even seconds depending on the formulation. Instead of finding ways to clamp small or odd-shaped parts, you can hold a repair together by hand until the glue sets.



GAP-FILLING GLUE: Although mixing is a pain, two-part epoxy is the best choice for a joint that doesn't fit quite right. Epoxy makes sloppy-fitting joints strong because it becomes a firm, strong-bonding gap filler

as it cures. Standard wood glues shrink as they dry and are too brittle to bridge gaps. Polyurethane glue expands to fill gaps, but doesn't cure hard enough to become a sturdy gap filler. — *Tim Johnson*

PHOTOS BY MIKE HABERMANN



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Router not included.

Reuse Your Mineral Spirits

When you use solvent-based finishes, brush cleaning is a pain. It's costly and the dregs you end up with are more than a nuisance — they could be toxic. Luckily, you can save the dirty spirits and use them over and over. You'll get clean brushes, save money and practice conservation at the same time. Here's how:

It takes three rinses and lots of mineral spirits to clean varnish from a brush. But, if you save the spirits from previous cleanings and reuse them as the first two rinses, you'll only need a small amount of clean spirits for the final rinse.

Keep separate sealed containers for each rinse of recycled spirits. Because the first rinse removes most of the varnish, its container accumulates most of the sludge and the spirits take longer to renew themselves. The spirits in the second rinse contain less residue, and revive quickly. Pour the spirits used for the final rinse into the second-rinse container. Numbering helps you keep the containers straight.

The first rinse container eventually gets full of sludge. Dispose of it properly (see recommendation at the right) and replace it with the second-rinse container. Then start a new container for the second rinse.

WARNING: Be sure to provide adequate ventilation whenever you work with mineral spirits. Store them in a safe place, away from the risk of fire and out of the reach of kids and pets.



Varnish settles out of mineral spirits quickly. Within a couple of days after cleaning out a brush the spirits are clean enough to use again. Repeated reuse of the same spirits results in a layered buildup of sludge.



Disposing of Mineral Spirits

Most of us don't think twice about tossing out small amounts of mineral spirits. We should, however, because mineral spirits release smog-producing and ozone-deestroying volatile organic compound (VOCs) when they evaporate. Small amounts of mineral spirits tossed out by individual woodworkers (there are over 17 million of us in the USA!) add up. The EPA recommends that all used mineral spirits be disposed of at a hazardous waste collection facility. For professional woodworkers and finishers, the transportation and disposal of mineral spirits and other solvent wastes may be regulated. Check with the appropriate state agency for more information or any questions.

PHOTOS BY MIKE HABERMANN



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New Book

Except from the author

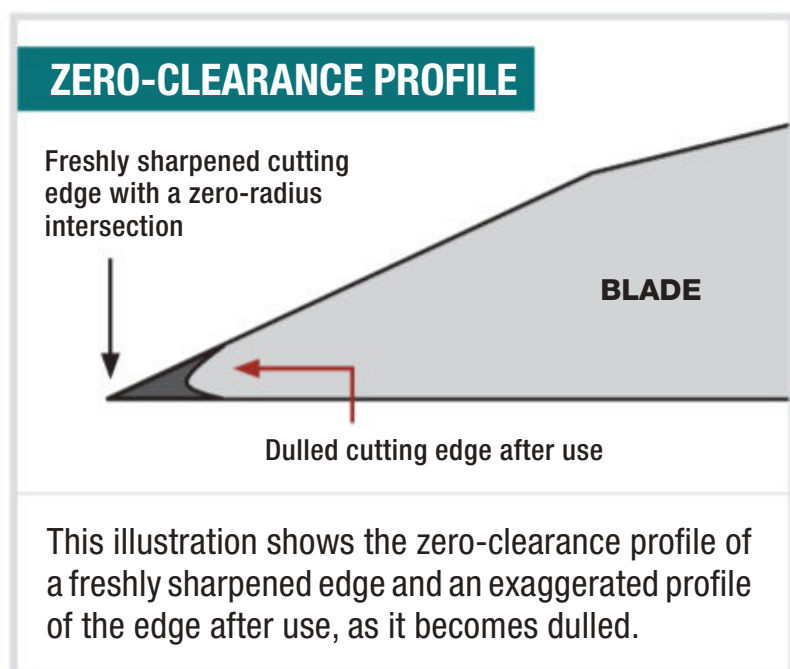
If there's one thing to be said about woodworkers, it's that we're old school and prefer to pick up a book (or a magazine). With that in mind, I'm thankful for the community of master woodworkers that put forth a great effort to put some of their knowledge down into the pages of a book to share with all. Here is a small sample of a recently published book that I believe you will enjoy as much as I did.

What is Sharp? Ask a dozen people what sharp means and you will get numerous answers; all may be valid, and all based upon their individual frames of reference from their own experience. A common comparison is made to a razor, such as "razor sharp" or "sharp as a razor," evoking an image of the slicing action of a razor and, for certain generations, that sight of the barber honing the straight razor on the leather strop.

We sharpen an implement to prepare it for a specific task. Abraham Lincoln has been quoted as saying something like, "Give me six hours to chop down a tree, and I will spend the first four sharpening my axe." You can be certain that while Abe may have spend that much time to sharpen his axe, it would still not be as sharp as the barber's straight razor, but both would be suited to the task they are designed for. I am not really sure what one could do for four hours to sharpen an axe.

Much has been written about the science of sharp, and many books are devoted to the topic; however, the notion of "sharp enough" is key for woodworkers to understand what they need to do to prepare their tools for use. We have all seen the wood show trick of a plane sharpened to 30,000 grit producing micron-thick wispy shavings of amazing lengths. While very cool, this is not practical, nor useful for most woodworkers.

Sharp is defined as the intersection of two planes at zero radius—well, what does that mean? In practical terms the "pointier" the edge, the sharper it is as it approaches the mythical razor's edge, which in most



A Sharpening Handbook

What Every Woodworker Needs to Know About Sharpening



Excerpt from Chapter 2: What is Sharp?

Richard has directed his book at the novice to intermediate sharpener, aiming to enhance their experience with advice on guides, new and traditional media, and techniques.

Author: Richard D. Wile

From: LeeValley.com

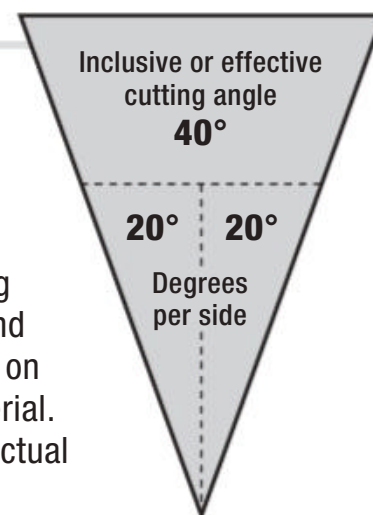
Price: \$18.50

TOPICS INCLUDED in Richard's Book:

1. **Why Worry If My Tools Are Sharp?**
2. **What is Sharp?**
3. **Steel and Metallurgy:** What is steel; Hardness
4. **Basics of Sharpening:**
4 steps to a sharp edge; Stropping
5. **Abrasives and Sharpening Media**
Abrasive grits (including grit size); Abrasive media options (including film, paper, oil stones, water stones, ceramic water stones, and diamond stones)
6. **Basic Knife Sharpening**
Basic knife geometry; Abrasive media options for knives; knife blade bevels; basic knife sharpening with stones
7. **Card Scraper Sharpening**
What happens when you prepare the edge of a scraper?; Prepare the sides and edge; Burnish the face and edge; Tilt the Burnisher; Use the scraper
8. **Basic Carving Tool Honing**
Basic carving tool shapes; sharpening stage; honing or stropping stage, maintaining the edges
9. **Tips & Tricks**
Marking knives; Ruler trick; Hollow grind; Removing a nick in an edge; Cambering a Blade

INCLUSIVE OR EFFECTIVE CUTTING ANGLE

Most knives and axes have double-beveled blades, meaning there is a bevel on both sides, so the inclusive angle, also known as the cutting angle of the blade, is the sum of the two angles, making the effective cutting angles of cleavers and splitting axes around 50°. Some knives are designed to be used only right- or left-handed and have a bevel on only one side. Some axes, such as hewing axes, have the bevel on one side, so the blades ride against the flat face of the wood when slicing off material. When we say that we are sharpening a knife, or face; even though the inclusive or actual angle is 40°, we still say it is sharpened to 20°.



cases is just a few atoms wide. But to really understand sharp we must discuss purpose, or what the edge will be used for, before determining if it is sharp enough.

Let's Talk About Bevel Angles...

When discussing sharpness, one must consider the shape of the bevel, which is heavily influenced by the intended use of the edge. The angle at which the surfaces meet to form the edge of a tool is matched to the tool's intended purpose. Whether it is a knife, an axe, or a woodworking tool, the geometry of the edge is tailored to its intended use.

In a knife suited to slicing meat or fish, the blade is quite thin and the angle of the edge is as low as 10° per side (20° inclusive angle), while a chopping knife such as a chef's knife will be thicker and the angle of the blade higher, often in the 20° per side range for edge durability. Kitchen tools designed for chopping or cutting bones, such as a cleaver, are usually 25-30° per side, making the edge very durable.

Axes also have edges of varying shapes and angles depending upon their intended purpose. A hatchet designed for carving or shaping has a thinner blade and

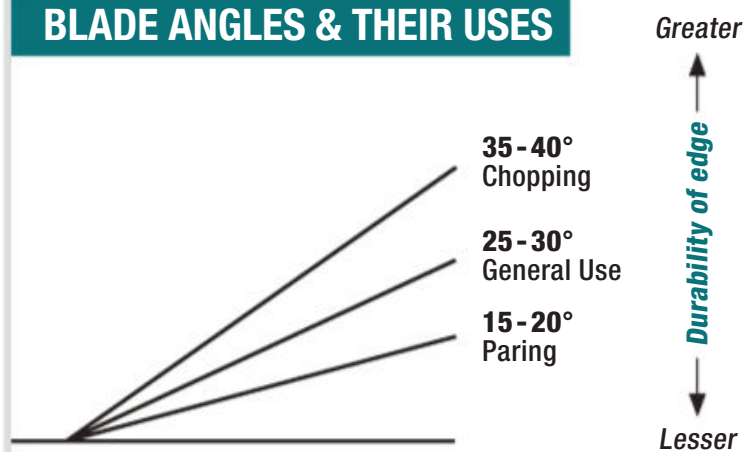
is sharpened to a shallow angle, sometimes as low as 20° per side so it can be used as a precision tool, while splitting axes have angles above 25° per side, often a convex shape. The high angle, blade shape, and heavy weight help the splitting axe drive the wood apart and remain sharp while doing so.

Much of the same as other tools such as knives and axes, woodworking tools have varying bevel angles which are adapted to the use of the tool. Most woodworking tools have a single bevel and a flat back, except carving and turning tools, which come in a huge variety of shapes and sizes.

So why not make all tool edges with the same angle to cut the easiest? In a word, durability—the lower the angle of the edge, the thinner the material is near the tip and the more susceptible it is to wear or damage. We know how great a sharp razor feels when shaving, yet it often does not take much use before we feel the pull of a dull blade that needs replacing. This is because a razor blade is very thin; the angle is very low, perhaps as low as 7-8° making a delicate edge that is easily worn in use. Most woodworkers would rather spend time woodworking than sharpening their tools, so the blade angle is often a compromise to ensure the edge is durable enough to be used without frequent re-sharpening. Wood is an abrasive material that will wear down the edge of a blade in use, so we want an edge that will perform the task, yet remain sharp for a reasonable time.

Chisels and plane irons with a relatively low angle of 20° are designed for paring or slicing operations and act most like a knife in slicing the wood fibers. These chisels should never be struck with a mallet. Paring chisels or low-angle block planes designed to pare end grain are often set with a 20° bevel. This angle is ideal for paring or slicing operations in softer woods, but may not be durable enough for hardwoods or hard exotics, necessitating a step up to 25° or more to protect the edge. The most common angles for woodworking tools are 25° and 30°, as the best compromise for slicing wood fibers and edge

BLADE ANGLES & THEIR USES



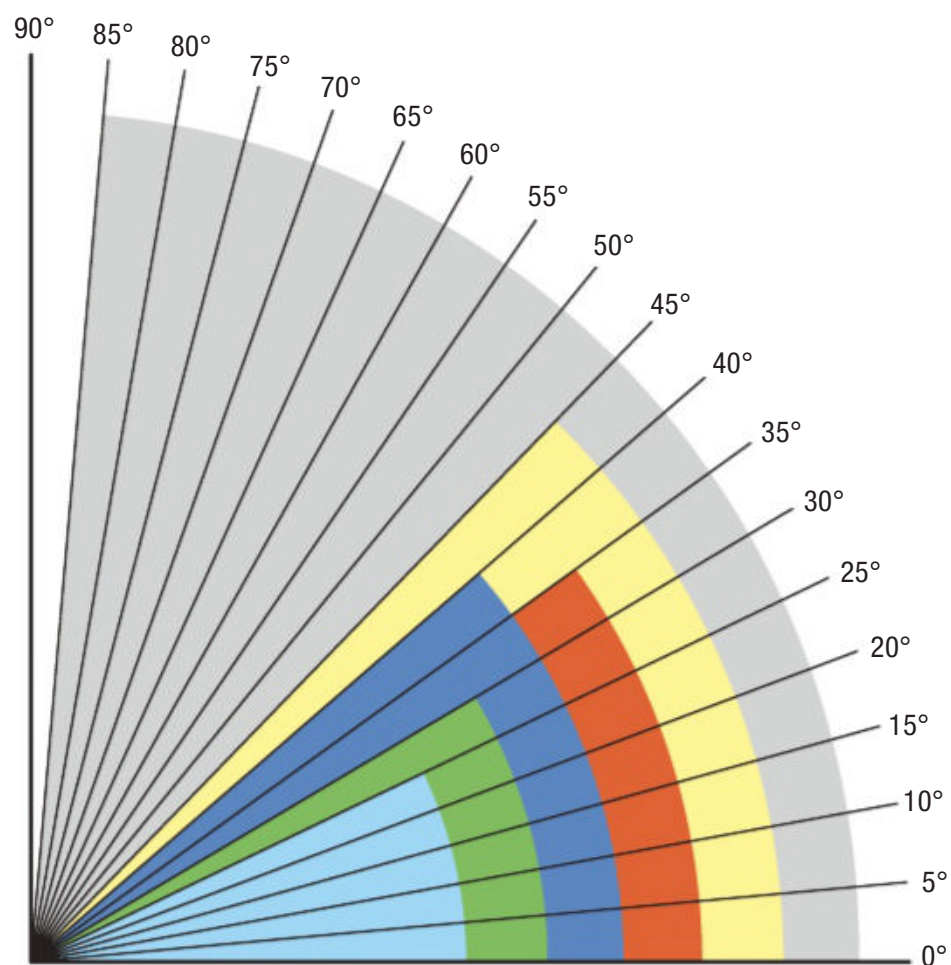
This chart shows the relative profile of common angles. The durability of the edge increases with the angle.

BLADE ANGLE CHART

The angles in the chart are a guide; angles may vary.

- Scrapers up to 85°
- Scissors 25-45°
- Chisels and plane blades 20-35°
- Splitting axes 30-40°
- Forestry and carving axes 25-30°
- Knives and carving tools 15-25°

The different color wedges show the relative angle of various types of edges commonly used.



retention. Bench chisels, spokeshaves, and many bench planes will mostly use a 25° or 30° angle for the primary bevel. Higher angles exist in woodworking tools in special cases where required. Mortise chisels are often ground to a very durable 30° or 35° angle, because they are less about cutting and more about wedging material out when struck by hammer blows, much like an axe.

The Angle the Blade is Held at Matters too...

The angle the blade is held at also has an impact on performance, measures from the material (wood) to the back of the blade. The effective angle in this case is the sum of the angle from the workpiece to the back of the blade PLUS the angle of the bevel at the cutting edge. When a chisel is used for paring, the angle between blade back and workpiece is close to zero degrees, as the back of the blade rides against the material with a slicing action, as with a knife, to pare away the material in thin slices. In many cases the paring chisel is honed to 20° (effective angle 20°) which emulates a knife's slicing action even more.

Low-angle planes have become popular again, styled after some of the old-style planes that used

this bedding angle. This style of plane has a few advantages, mostly relative to the orientation of the blade, which has the bevel facing up. With the blade completely supported by the plane body, the blade will stay bedded and not move or chatter in use. The angle of the cut can easily be varied by changing the bevel of the blade, allowing the user to tailor the set-up to the task at hand. Bevel down planes, on the other hand, have the angle to the work set by the plane. With a standard angle or pitch of 45°, regardless of bevel angle the effective angle will always be 45°. In a bevel down plane the bevel is unsupported, so in difficult material the blade can chatter in use. A chip breaker is often used to stabilize the blade and to direct the chips or shavings away from the blade.

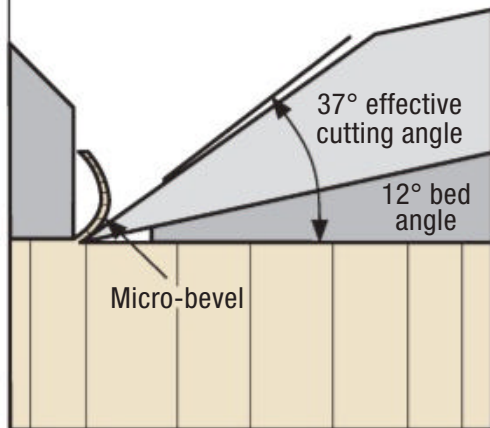
The blade setup, either bevel-up or bevel down, does not impact how a blade is sharpened. What constitutes a sharp blade and how to achieve it is unaffected by which way it sits in the plane.

Many good resources exist that discuss and debate the bevel and bedding angles of plane irons. Explore these if you wish to change the configuration of a tool to fine-tune it for your own use. Most tools comes with the angles set for optimal use, so most woodworkers will simply go with that.

ALTERING ANGLE OF BLADE CHANGES PERFORMANCE IN DIFFERENT MATERIALS

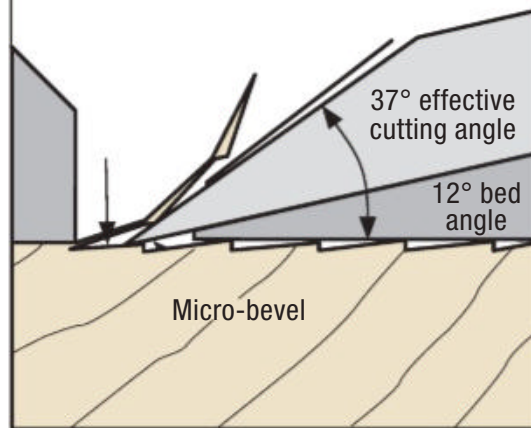
25° Blade

in end grain – no tearing



25° Blade

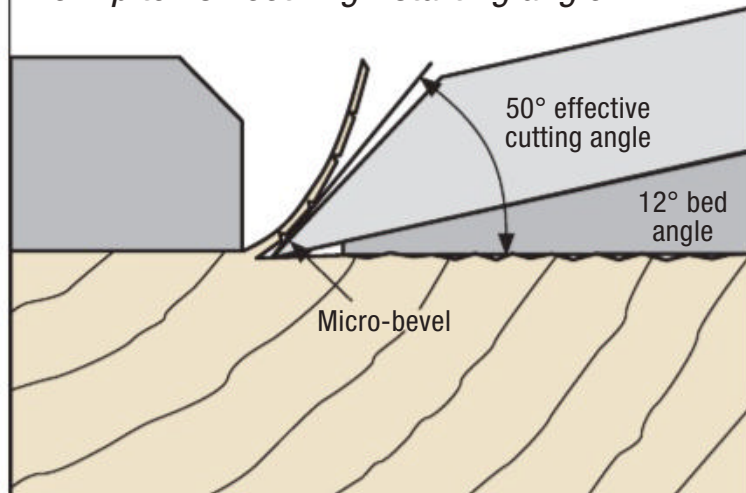
in difficult grain – tearout



This series shows how altering the angle of the blade in a bevel up plane changes its performance in different materials. Lower effective cutting angles work well when cutting across the grain, as in end-grain, and less efficiently when cutting along the grain, creating tear out. The 50° York Pitch smoother creates a chip that splits smoothly ahead of the cutting edge, while the higher 62° effective angle setup shears the wood cleanly.

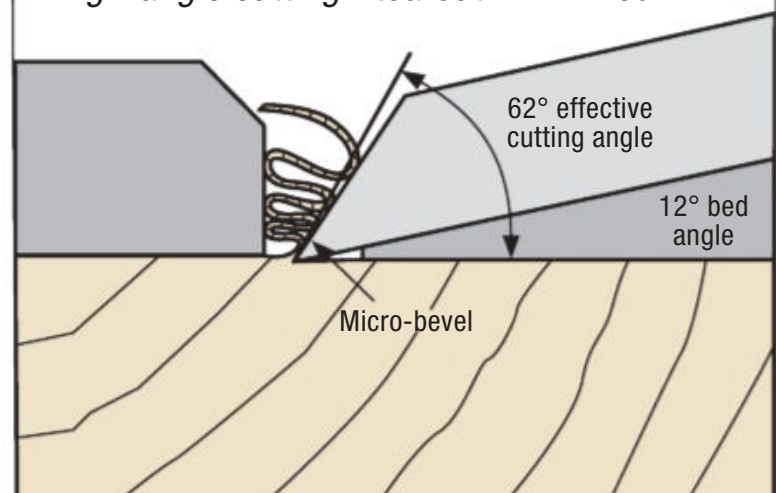
38° Blade

York pitch smoothing – starting angle



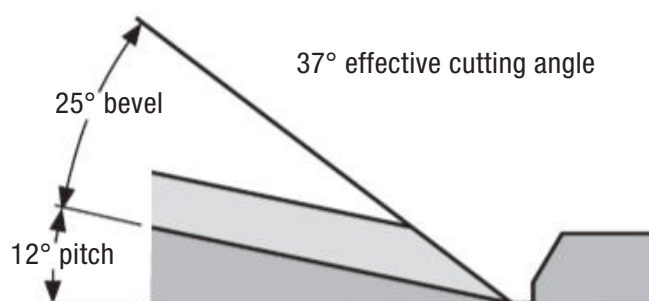
50° Blade

High-angle cutting – tearout minimized



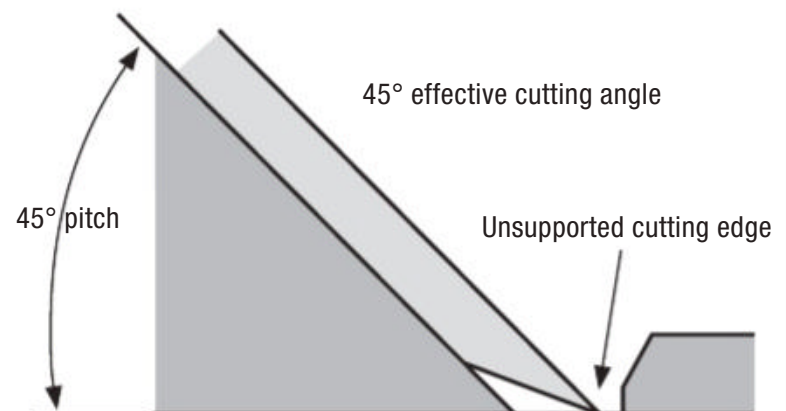
BEVEL-UP VS. BEVEL-DOWN PLANES

Low Angle (bevel-up) Bench Plane



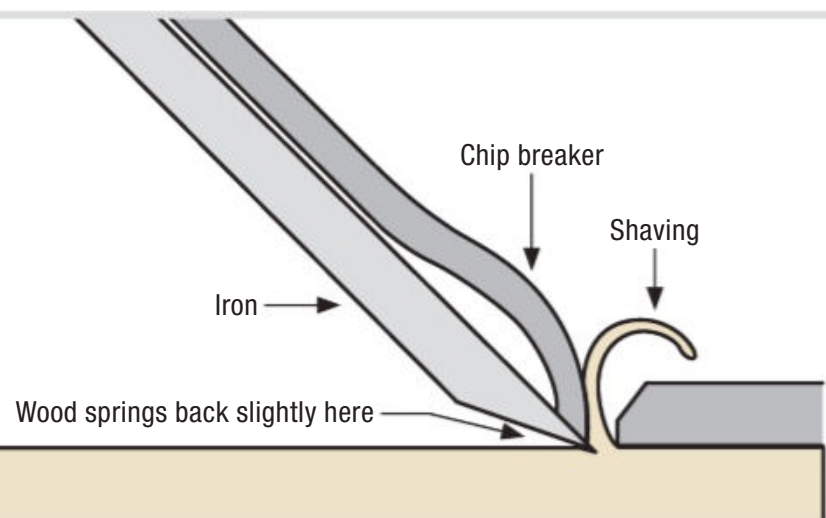
Close-up of bevel up and bevel-down planes showing design differences.

Traditional (bevel-down) Plane



BEVEL-DOWN PLANE

In a bevel-down plane the chip breaker stabilizes the blade, reducing chatter and also clears the shavings away to avoid clogging the mouth of the plane.



How Sharp is Sharp Enough?

The angle of the blade determines its suitability for a given task (paring, cutting, chopping). How keen the edge is influences how well the blade performs, and how long it will perform the task before needing to be resharpened. The keenness of the edge is defined by a couple of factors, the fineness of the abrasive grit used to sharpen and the type of steel in the tool. Both of these are explored in detail in future chapters, but generally the use of finer grits of abrasive sharpening media will produce a keener edge. For example, a 10,000 grit stone will produce an edge that is keener (sharper) than an edge sharpened with a 5,000 grit stone. However, much the same as the trade-off with blade angles, what grit to use when honing an edge should be dictated by the anticipated use. A blade's edge will degrade in use as the wood abrades the edge, so only honing or polishing the edge to the degree necessary for the task will ensure an edge that will last a reasonable amount of time before needing another honing.

Generally speaking, a blade that is considered sharp enough for general woodworking, carpentry, and home improvement tasks would be sharpened on a fine stone (2,000-5,000 grit), while a blade for fine woodworking would be finished on an extra-fine stone (8,000-12,000). Blades for special purposes such as final smoothing or working difficult material may require honing on an extra-fine stone, up to 30,000 grit. See more on choosing the right grits for a given task later in the book.

So What Do I Need to Know?

Sharp is defined as the intersection of two surfaces at a point (zero radius). These surfaces converge at an angle suited to the task the edge is designed to perform. Woodworking tools such as chisels or plane irons mostly have a flat back and a bevel angle of 20° and 50°; exceptions do exist, but this covers most

situations the average woodworker will encounter. Decisions on the angle of the blade and keenness to which a blade is prepared are based upon the needs of the task at hand. A block plane to trim a pine door casing to fit does not have the same requirements as that same block plane used to trim maple end grain on a dovetailed cabinet project. The following chapters will provide the guidance and examples necessary to help woodworkers get their tools sharp enough. **PW** – *Richard D. Wile*

A FINAL WORD FROM THE AUTHOR

A need for sharp tools is one of the truisms of woodworking; using tools that have not been properly prepared by sharpening can make woodworking a frustrating craft. My principal objective with this book is to provide a simple and repeatable methods that will get your tools sharp, backed by a solid foundation of understanding. Of course, these are not the only methods that will work, but if you are looking for improvement to your sharpening workflow, these methods should help.

Woodworking technology and techniques have evolved over time, and so have sharpening aids and media choices. Increasingly, expertise has been engineered into guides and jigs, making it easier to achieve sharp edges efficiently and with accuracy. Indeed, efficiency and repeatability, both key aspects of a successful sharpening workflow, are much easier to achieve today with an open-minded approach to this new technology.

I encourage you to try these approaches and techniques and evaluate how they can be incorporated into your own woodworking. As you develop along your own sharpening journey, I trust the tips and insight from this book will increase your enjoyment of the craft.



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■ In the Shop

Shop Lighting

By Logan Wittmer

Upgrade your shop lighting to help you see what you are working on and to make your shop more inviting.



PHOTOS PROVIDED BY LOGAN WITTMER & AMERICAN GREEN LIGHTS

Did you know that at age 60, you need approximately 3x the amount of light to see as you did at age 20? Lighting is, I think, something that most of us take for granted. Just jump on *Amazon* and order some or run to *Home Depot* and grab the highest lumen 5000K lights that they have in stock, right? Well, I thought so too—at least until I started planning the lights that we'd need in our new *Popular Woodworking* shop. When I started researching lighting, I came across the company *American Green Lights*, and upon browsing their website, I realized that there's so much more that goes into properly lighting a woodworking space than just hanging up lights. So, I reached out to Jim Uno, the president of *American Green Lights* to pick his brain on shop lighting, and to order lights for our shop. (And no, this

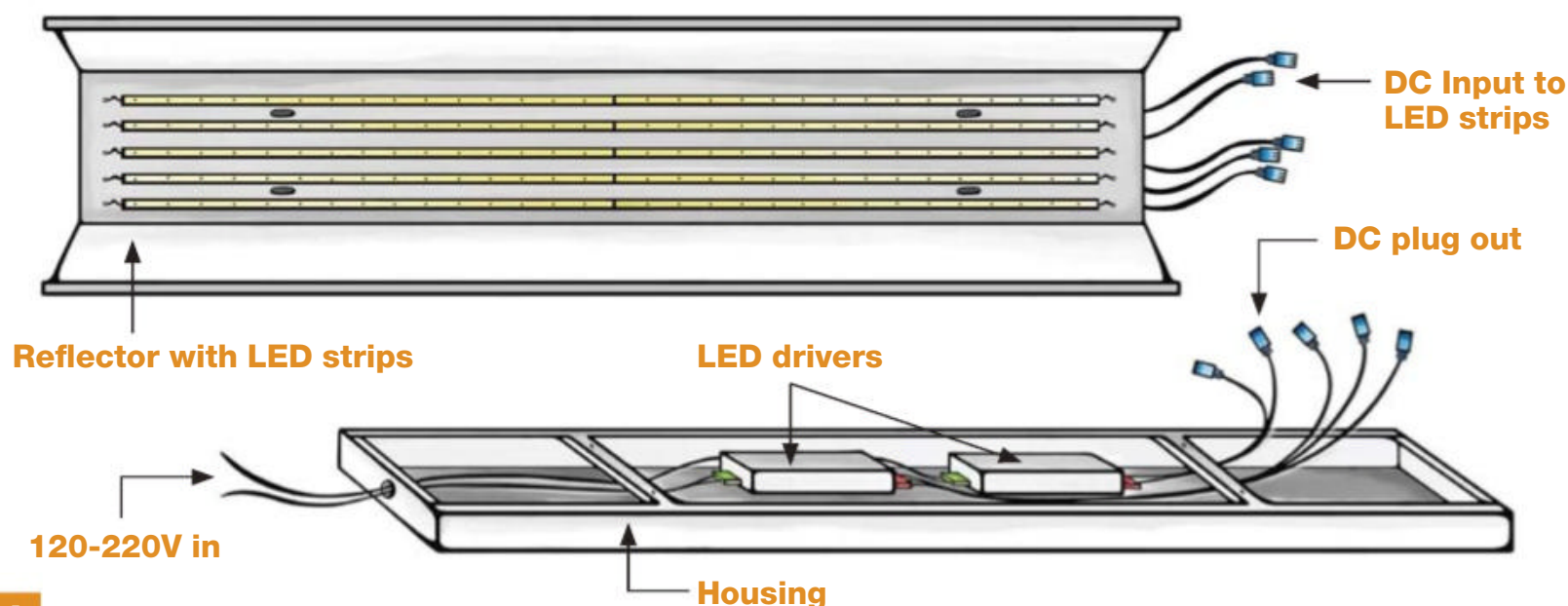
is not sponsored by *American Green Lights* in any way—I just like their products, services, and support).

Importance of Lighting

I think that the importance of good shop lighting cannot be overstated. Being able to see what you're working on is crucial to being able to make accurate parts. In some instances, proper lighting may reveal some things

While appearing similar, the difference between LED and fluorescent fixtures is drastic, and worth the investment.





1

that your wish it hadn't — a dent here, or those milling marks that you thought you had gotten out. Plus, with the proper lighting, your shop will feel much brighter and will lead to less eye strain.

Good Light

When we start talking about lighting, we really need to consider what makes good light? In reality, the purpose of the room which you're lighting will dictate what makes "good" light. But, in the woodworking shop we're looking for a few things:

- First, we're looking for even light — everywhere you work, you want a consistent amount of light and to not cast shadows on your workpieces.
- Next, we want to have a bright, but not too bright, light. We need to be able to see what we're working on, see layout lines, etc. However, lights shouldn't be so bright that they cause eye strain.
- Finally, lights should not effect color of items in the room. Rather, lights should show colors as they are, instead of giving a color cast to the items they shine on. This may not seem important, but as you're trying

to match wood tones, you'll see why this is important.

Types of Fixtures

Before we talk about designing a shop lighting system and choosing lights, let's first make sure we're all on the same page with the types of lights available. I'm sure you're familiar with incandescent bulbs — an incandescent bulb passes power through a resistor (the filament). As the resistor heats up, it glows and produces light.

Now, most of the working world has shifted away from incandescent bulbs, at least in a work setting. Instead, the industry has given way to two different types of fixtures over the years. You can see these to the previous page — fluorescent fixtures (bottom) and more recently, LED fixtures (top).

Fluorescent fixtures consist of a ballast that regulates the flow of power to the fluorescent tubes. They provide the correct amount of power to start it, and the correct amount to keep the tube lit. The fluorescent tube is a glass tube containing some nasties — mercury, phosphorous, and an inert gas. The power supplied through the electrodes causes the mixture of elements to glow (in

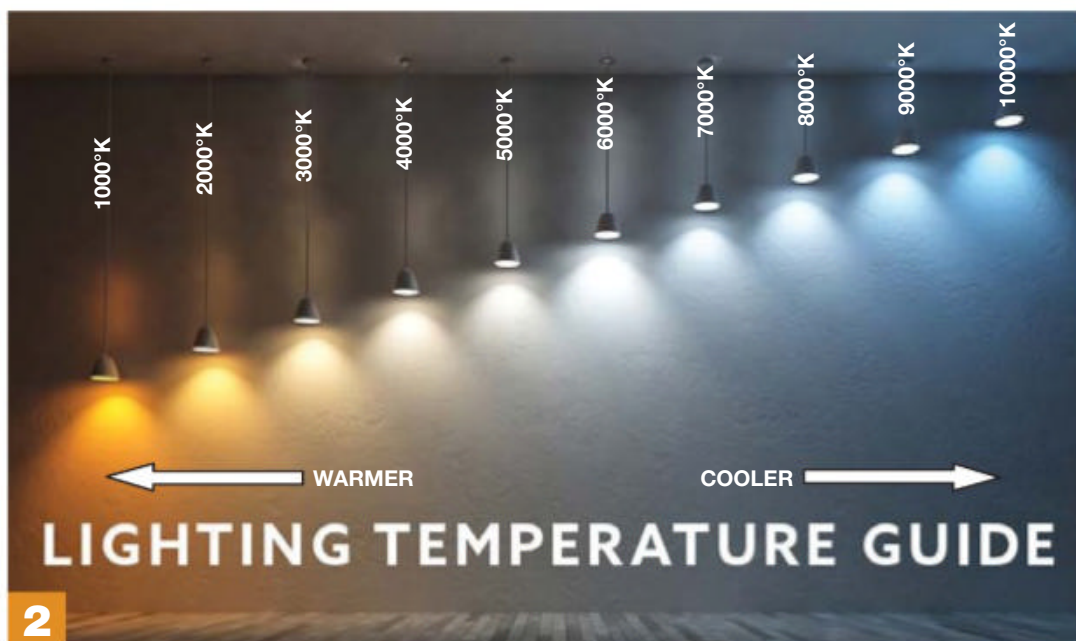
1 The internal works of an LED fixture may look like a fluorescent, but they have different functions.

layman's terms). This is important to remember for later.

A LED fixture on the other hand looks similar to a fluorescent, but instead of a ballast and tubes, it contains a driver and several strips of LEDs. The driver converts the AC current from your house and turns it into DC power. This low-amp power illuminates the LEDs. As a side note — there are other types of LEDs. Those that screw into incandescent fixtures, UFO (round) lights, etc. For this article, we'll concentrate on the Fluorescent style ones — simply because they give a more even light that is hard to block with your body (causing a shadow).

The Amount of Light

Now, let's dig into some of the things that will effect the lights in our shop. Starting with the power of the lights, and how we measure that. I'm sure that most of you are familiar with the light measurement called "lumens." A lumen is the measure of how much visible light a fixture (or bulb) produces.



2 The K value of a light tells you what color the fixture emits. A 5K light is neutral colored, while 1K is yellow and 10,000K is blue.

While this is a good measurement to know—it's only half of the puzzle. In reality, you should only care about how much of that light reaches your working level.

This is where we need to understand the idea of foot-candles (fc). A foot-candle is defined as one lumen per square foot (65 foot-candles would measure as 65 lumens per square foot). This is the more important measurement, because it gives us an actual way to measure how much light reaches us as we work. Think of it this way—you could have a one-million lumen light bulb, but it doesn't do good if it's 50 miles away.

So how many foot candles do you need? That all depends on what task you're doing. A classroom, for example, will need about 30-50fc. An average residential garage is between 5 and 15fc. For a woodworking shop, the IES (Illuminating Engineering Society—yes, that's a thing) states you should shoot for 60-100fc. For reference, an overcast day (with no shadow from the sun) is about 900-1200fc. (Your eyes truly do an amazing job adjusting for various light conditions). Understand that the higher wattage a fixture, the more powerful it is.

Color

The final thing to look at with lights is going to be the color of the lights. This is a two-fold item though—you want to not only look at the color temperature of the light (K), but also the fixture's CRI—the color rendering index.

Lights always have a color value assigned to them. The color of the lights is expressed as a Kelvin value. I'm sure you've seen this when buying lights. As you can see above, the lower the K value, the more yellow the light is. The higher the value, the more blue it is. In your house, you may have a warm, inviting 2700 to 3500k light. But in the shop, we want to have a 5000k color. This is the most neutral of all of the colors.

The second half of the color puzzle is the CRI of the light, or the color rendering index. *Warning—a large portion of my college career was focusing on color theory, so I can get really nerdy on color.* The CRI is a measurement of how many colors are visible under the light fixture. To wrap your head round this, you have to first come to understand that you see color based on wavelengths. If a light source emits zero

American Green Lights

95 CRI LED Shop Lights



LED lit - Camera exposure at f5, 1/50 shutter speed, ISO 100



Fluorescent lit - Camera exposure at f5, 1/50 shutter speed, ISO 100



Fluorescent lit - Camera exposure at f4, 1/50 shutter speed, ISO 100

These photos compare the same items under the *American Green Light* LED shop lights vs. fluorescent lamps. The top and middle photos use the same camera setting for both our LED and the old fluorescent lamps. The 2 fluorescent photos are the same except the F-Stop is adjusted to compensate for the lower light levels of the fluorescent.



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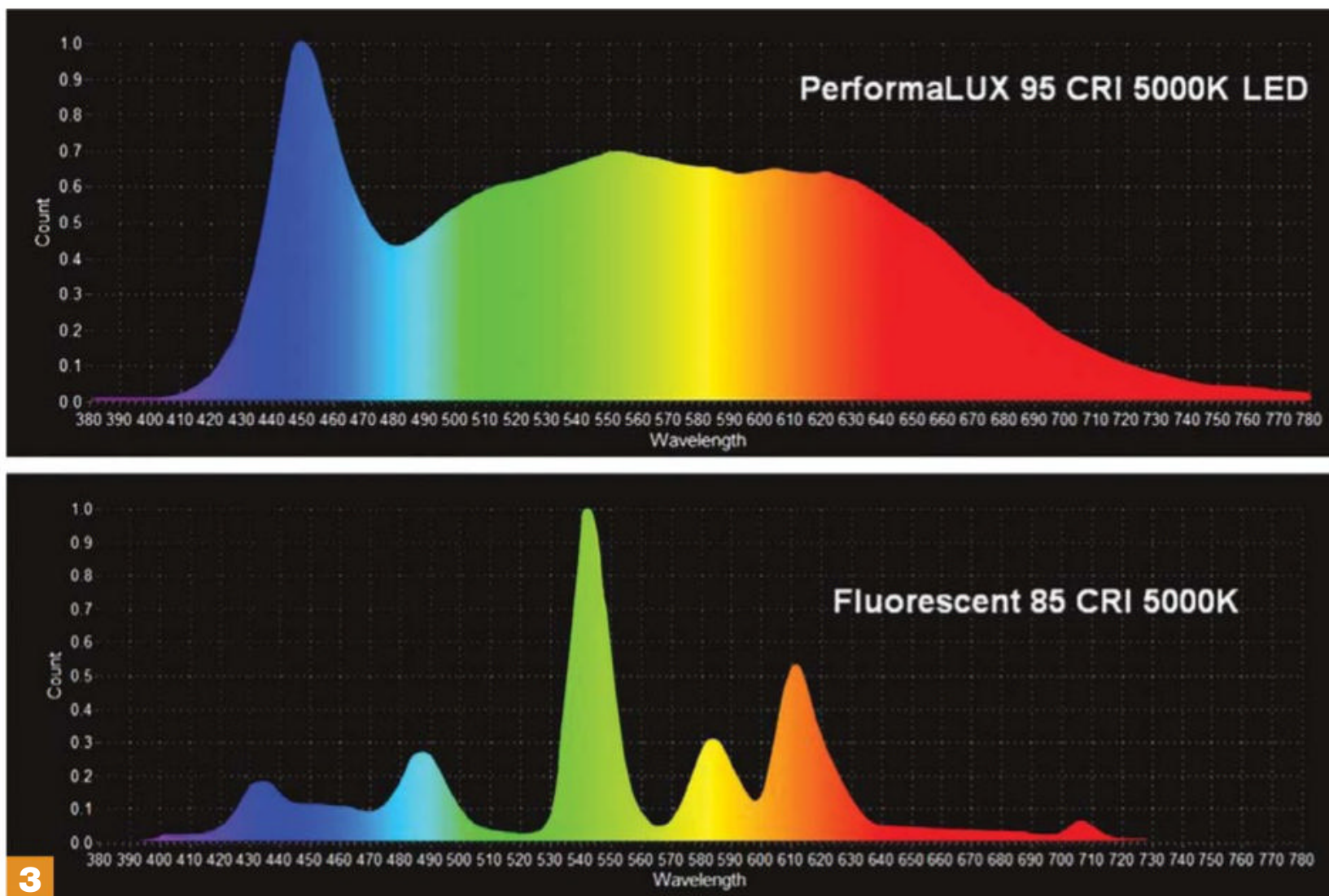
Speed: 50,000 RPM



Images Courtesy of Chris Wilson @wilsonwildlifesculpture



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3-4 In operation, fluorescent and LED lights will render colors differently. The color gamut above shows the amount of each wavelength the lights emit. The image to the right shows the difference between a photo taken with fluorescent and LED tubes. While these are photos, your eyes pick up the difference in color as easily as a camera lens does.

TOP: 95 CRI PerformaLUX shop light, **BOTTOM:** 85 CRI Fluorescent tube

green wavelengths, nothing will appear green (it will appear a shade different than green). The diagram above shows color gamuts for two different lights. You'll notice that the high CRI LED Light emits a full spectrum of light, instead of only spikes of certain colors. Remember the nasties I said fluorescent bulbs contain? Each compound adds a little color, depending on the compound. The compound that creates green light is cheap, so the tubes generally contain a lot of it. Likewise, the compounds that produce the red light waves are expensive, so there are fewer of them within the tube. A real-life example of this

can be seen to the right—notice how the top image appears much more “real.” The fluorescent is missing a lot of red light waves and the hand appears sickly and pale. This is particularly importance when working with wood or finishes that has rich tones, such as mahogany, walnut, cherry, etc.

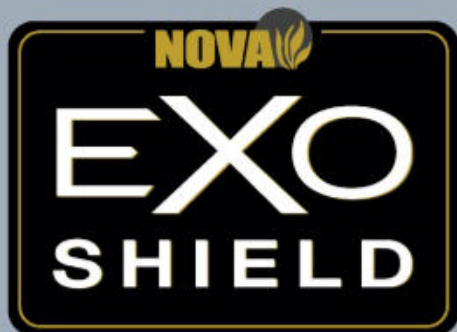
Build a Plan

So, how does all of this come together to get you a good set of lights in your shop? Well, this is where *American Green Lights* steps in. The folks over at *American Green Lights* will take your shop layout and build you a lighting



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model. This is a service they offer hobbyist for free (they do charge industrial clientele for this service, as they're more complex). When I reached out to Jim, he asked me to send him a rendering of our new shop, so I sent him a rough sketch-up model of the space.

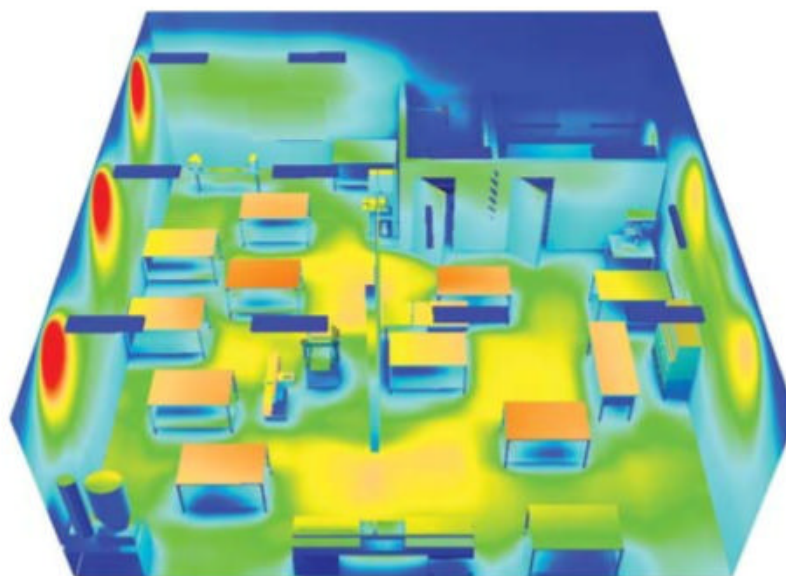
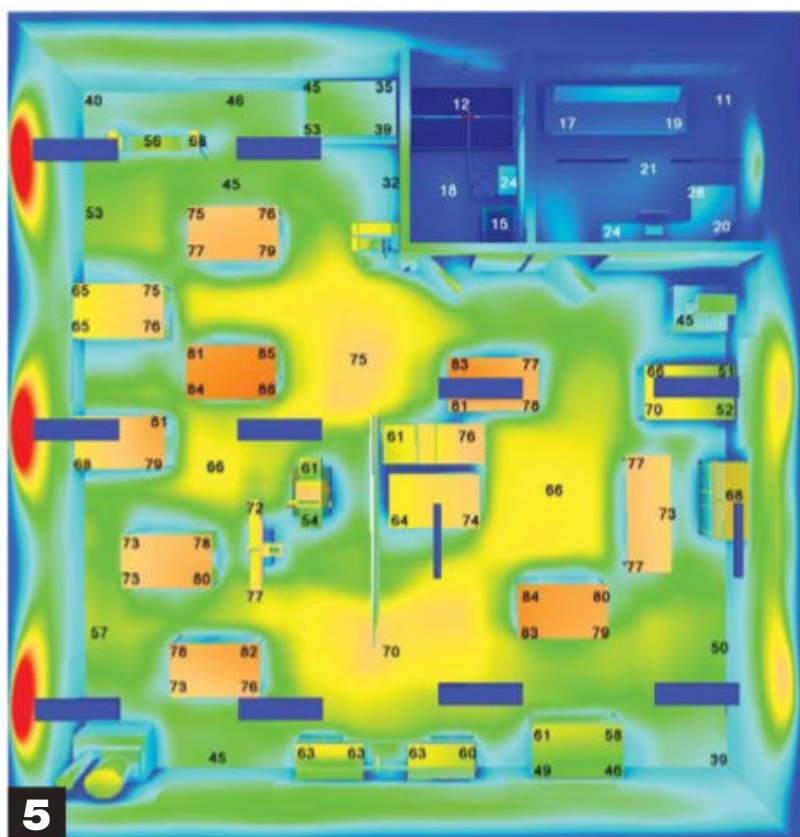
What Jim and his team does is rebuild this in a lighting simulation software—they're looking to hit that 60-100fc level everywhere in the shop. See the light intensity map below. This is a model that allows you to see how fixtures will light a space, and how much overlap or there will be between fixtures (or where there may not be enough light). While it may be hard to read on this page, there are number that represent the FC ratings at working level. They range from about 40-96. Of course, there's a little variance through the space—light is concentrated around the workbench, table saw, and various other “tool spots.” By contrast, you can see the lower level of lighting that's been positioned in the office and the restroom—there's a much lower lighting requirement for those spaces.

For our particular shop, *American Green Lights* suggested a series of 10, 144-watt fixtures, supplemented by two 48-watt fixtures. These are commercial, higher powered lights, as we have a 14' ceiling in the shop—most home shops would be lower wattage lights as the ceilings are lower. Even though these are “high-bay” style lights (high watt), they don't take a ton of power. With all of the lights on, they draw 12 amps, which is pretty dang good considering the size of the space.

Now, we have a unique situation in our shop—it's being built from the ground up, so these were new installs. We bought the entire fixture from the *American Green Lights*. However, if you already have some form of fluorescent or LED lights in your shop, and you want to upgrade, *American Green Lights* offers retrofit kits that will fit in old fixtures. In fact, the retro lights from *American Green Lights* are super low-profile. So, if you work in a basement shop that has low ceilings, you can actually install the strips directly to the bottom of a joist and save yourself a lot of room.

Of course, as you might expect, lights from *American Green Lights* are more expensive than going to the big-box store. The thing that is important to remember is that not all LEDs are created equal. Cheap LEDs can have low CRI values, they may flicker (which will really effect video quality if that's your thing), and cheaper lights could be considered disposable—once a part goes bad, there's no support for the product.

American Green Lights toured over four hundred factories until they decided one was up to their quality needs, in both parts and manufacturing. Because of the quality of the parts, the lights from *American Green Lights* will last—unlike the phony light ratings on bulbs from the store. And, serving large industrial and commercial clients, they stock parts to repair lights (in case a driver goes out), and their customer service is second to none. If you're working in a cave of a workshop, and are ready to do yourself a favor, consider upgrading your shop lights—I think that your eyes will thank you. **PW** — *Logan Wittmer*



5 The model *American Green Lights* produced for our shop shows fixtures placed around tool locations. The goal is that the working level is between 60-100 fc, while the floor may be closer to 40-50.



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■ Limbert Style #357 Bookcase

Traditional construction techniques make this medium-sized bookcase a real gem.

By Willie Sandry

Original Limbert case pieces are really something to behold. Black and white catalog pictures rarely do them justice, but if you get the chance to see one in person, you instantly understand why people are drawn to them. I first realized this when bidding on a small Charles P. Limbert bookcase at an auction in Oregon. The fit and finish of his surviving cabinet work is truly remarkable. Unfortunately, I lost my bid on the antique, but I have owned two double-door Limbert #358 cases since then. The project at hand is the #357 single-door version and is a wonderful introduction to building glass door bookcases.

The form of this bookcase is perhaps more feminine than other square Limbert cabinets due to the long, tapered legs and

decorative corner cutouts. Many woodworkers shy away from glass door bookcase projects, fearing the perceived complexity. I've built several glass door cases of varying complexity, including ten-pane leaded glass doors, and can say the #357 is surprisingly manageable to build. Since there are no horizontal glass dividers, building the glass door is greatly simplified. Table saw joinery techniques will be presented here, allowing construction of the door without chiseling any corners. Once you bring the door parts together, the glass recesses are formed automatically.

Start with the Panels

Like many antique style cases, this one uses mostly solid wood panels. You'll need a top panel, two side panels, and four shelves.

Three of the shelves are adjustable, while the bottom shelf is fixed.

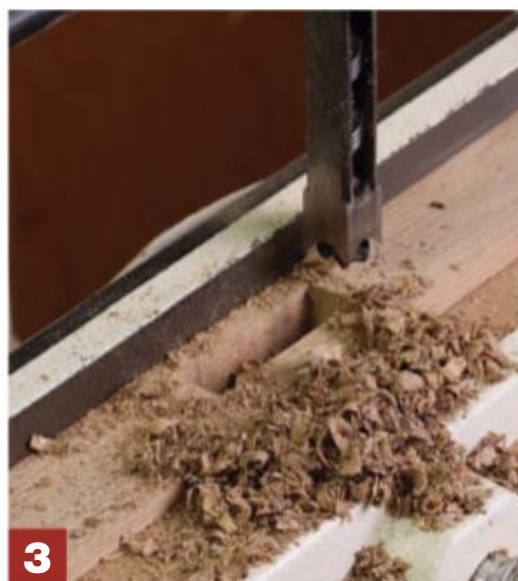
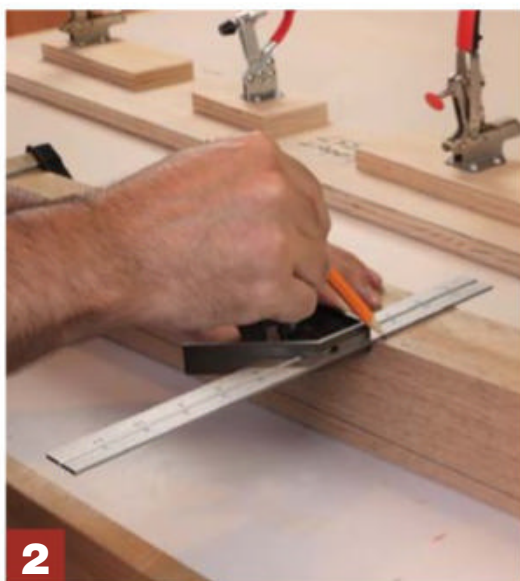
Get your project out of the gates by building all the panels at once. Leave the shelves a little oversize for now but go ahead and trim the side panels to final size.

Make Leg Blanks

The impressive 1 1/4" thick legs are next and feature a long, graceful taper from top-to-bottom. There's also a short taper on the lower inside edge, so it makes sense to rout the shaped leg with a jig and large pattern routing bit. "Joinery before curves" as the saying goes, so we'll need to knock out the pair of mortises in the front legs, before routing them to shape. These mortises are 1/2" wide and it's important to note that they're offset towards the front of the leg. Layout the mortises 1/4" from the front face of the leg and sized according to the detailed rendering on page 36.

Shape the Legs

Once the mortises in the front legs are complete, it's time to shape the four legs of the bookcase. Start by making a routing jig to handle both the long outsider taper and short inside taper, as shown on page 36. Once the jig is constructed, use it



1 Start by making all the solid panels for this project, which include top and side panels, and four shelves. Trim the side panels to the size noted on page 37.

2 Layout the two mortises on each front leg with a combination square. A pattern routing jig will be used to draw the tapered shape on the legs.

3 Cut mortises in the front legs only. The back legs have no mortises. Note these mortises are offset and not centered on the leg stock. For proper reveal, position the mortises 1/4" from the front face of the legs.

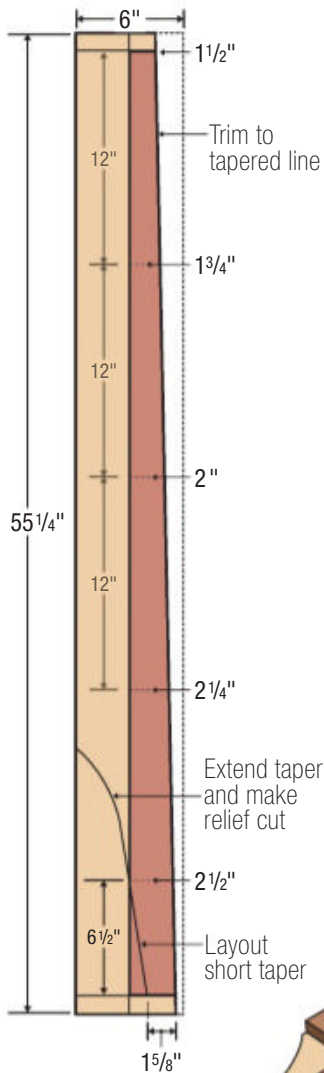
to draw cut lines on each leg and head over to the bandsaw. With a $\frac{1}{2}$ " wide bandsaw blade, trim just outside your pencil lines to remove most of the waste.

Next toggle-clip the leg blank into the jig and rout it to shape with a large diameter bearing-guided bit. Since the grain is continually changing, it's particularly important to choose the right router bit for the job. Ideally, select a bit with compression style geometry for clean cuts on both the top and bottom edge.



4 Bandsaw close to your line to establish the basic shape of the tapered leg. Cut the long and short inner taper.

■ Routing Template



1 Make the template from a 6" wide by $55\frac{1}{4}$ " long piece of plywood or MDF. This allows 1" of extra length on both ends for safe and clean routing of leg components.

2 Strike a long center line 3" from one edge of the template base. Layout the long taper and short inside taper.

3 Cut just outside the layout lines at the bandsaw and sand the template to your line.

4 Finally, add clamping blocks positioned on your center line. Glue and brad nail the blocks in place and mount 3 toggle clamps to the jig. Attach a reference block, which will locate each leg consistently 1" from the top of the jig.

Cutlist

No.	Items	Dimensions (in.)		
		T	W	L
1	A Jig body	$\frac{3}{4}$	6	$55\frac{1}{4}$
3	B Clamp blocks	$\frac{3}{4}$	3	5
1	C Reference block	$\frac{3}{4}$	$1\frac{3}{8}$	$\frac{5}{8}$

Also needed is 3 toggle clamps.



5 Insert the rough-sawn leg blank into a routing jig and secure it with 3 toggle clamps.

6 Trim the leg to final shape with a large diameter pattern-routing jig. Note blocks on the jig register the leg in position, for repeatable results.

7 Select a large diameter compression bit such as *Infinity* 06-695 Mega Flush Tri bit with $1\frac{1}{2}$ " diameter and 2" cutting length.

Side Assemblies

The next order of business is joinery for the side assemblies. Start by making a $\frac{1}{2}$ " wide dado in the side panels to receive the fixed shelf. This is a simple through dado and can either be made at the table saw or with a router and straightedge. Make sure to locate the lower extent of the dado exactly $2\frac{5}{8}$ " from the bottom of the side panels, so the fixed shelf will sit flush with the lower rail.

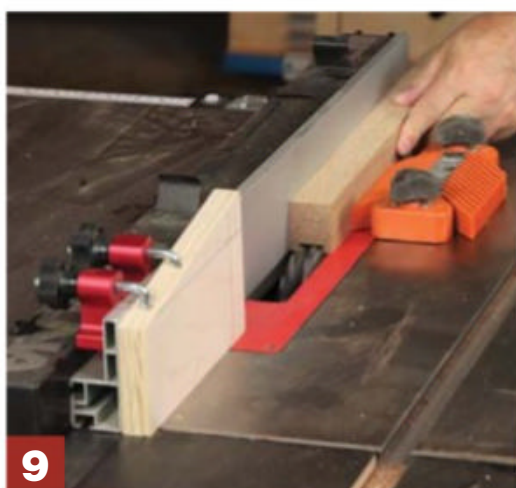
There are a couple additional leg details to take care of at this point. Mill a stopped groove in the top of each leg to receive the slender corbels. This groove can easily be made at the table saw with a $\frac{3}{4}$ " wide dado in a single pass. Set blade height to $\frac{1}{4}$ " and mount a stop block to your rip fence to control length of the cut. The rear legs also need a stopped rabbet for the back panel, which I cut with a router and edge guide. These rabbets are $43\frac{1}{2}$ " long and $\frac{5}{8}$ " wide, with the depth set to match your $\frac{1}{2}$ " plywood. Square the corner of the rabbet with a chisel.

When it comes to the joinery connecting the legs to the side panels, you have several good options. Limbert likely used hide glue and perhaps splines to align the parts. Because this is a long grain joint, modern glue alone is sufficient for strength. However, biscuits or loose tenons are great help with aligning the parts. Plunge biscuit slots centered on the thickness of the side panels but offset on the legs.

8 Create a $\frac{1}{2}$ " wide dado on the inside face of the side panels. Locate the dado $2\frac{5}{8}$ " from the bottom of the panel. If you have a large, sturdy miter gauge this can be done at the table saw.

9 Increase the dado width to $\frac{3}{4}$ " and create a stopped groove for the corbels. The groove is centered on the thickness of the leg stock and stops $7\frac{7}{8}$ " from the top of the leg. Clamp a stop block to your rip fence for consistent results on all four legs.

10 Rout a stopped rabbet on the back two legs with a router and edge guide. Square up the corner with a chisel.



11 Cut biscuit slots centered in the $\frac{3}{4}$ " wide side panels. Avoid the dado in the side panel.

12 Use a piece of $\frac{1}{2}$ " MDF as a spacer to cut the mating biscuit slots in the leg components.



Connect the Sides

You'll feel momentum building at this point as you make the upper and lower rail parts. Create 1" long tenons on these rails and confirm a snug fit in their mortises. Likewise, use a dado blade set-up at the table saw to form stub tenons on the fixed shelf. Finally, notch the corners of the shelf to fit the carcass and give the parts a good sanding before gluing them together. One interesting detail is apparent when inspecting this antique case piece. There are no rear rails, and the back of the bookcase is simply held together by the back and top panels. I think it's a smart design that requires fewer parts yet doesn't compromise strength.

13 Add #20 biscuits and glue the side assemblies together. Align the top of the legs as you clamp the side assemblies together. Alternate the clamps on either side of the assembly for even clamping pressure.



13



14



15

14 Make the upper and lower rail components and tenon them to fit. Note the upper rail has $\frac{3}{16}$ " shoulders on three sides and $\frac{1}{2}$ " shoulder on the top edge.

15 After tenoning the lower rail with uniform $\frac{3}{16}$ " shoulders, cut the arched shape to leave $2\frac{1}{8}$ " at the apex.

16 Measure for the fixed shelf directly from the carcass, which is dry assembled for this step.

17 Create $\frac{3}{8}$ " long x $\frac{1}{2}$ " thick tenons on the fixed shelf and notch all four corners to fit.



16



17

18 Permanently assemble the case and check it for square.

19 Glue a pair of corner blocks behind the lower rail and clamp in place.



Glass Doors Made Easy

My favorite way to build glass doors is to create the rabbet before assembling the door. It's an easy process to learn and saves you from chiseling all the corners square. Start by sizing the rails and stiles, as well as a vertical glass divider. Then use a dado blade to cut a $\frac{5}{16}$ " wide rabbet in all the parts. It's important to set the blade height to exactly half the thickness of your stock or $\frac{7}{16}$ " in this case. All the door parts receive a rabbet on one edge, except the vertical divider which needs a rabbet on both edges.

Next, set the rip fence for 1" long tenon and position a rail show-face down on the table saw. With the same "half-lap" blade height from the previous setup, cut the rails

and vertical divider in this manner. In fact, every tenoning step that's done to the rails will be done to the vertical divider as well.

Layout the two mortises in each stile and one mortise in each rail. Cut them with a $\frac{1}{4}$ " hollow chisel. The mortises all need to be $\frac{11}{16}$ " deep. Now take the parts back to the table saw and begin to form tenons. Lower the dado blade and adjust the rip fence so the cut length is slightly less than $\frac{11}{16}$ ". Gradually raise the blade until the tenon slides into the mortise. Then adjust the rip fence and make multiple passes until the offset shoulders fit perfectly with their mate.

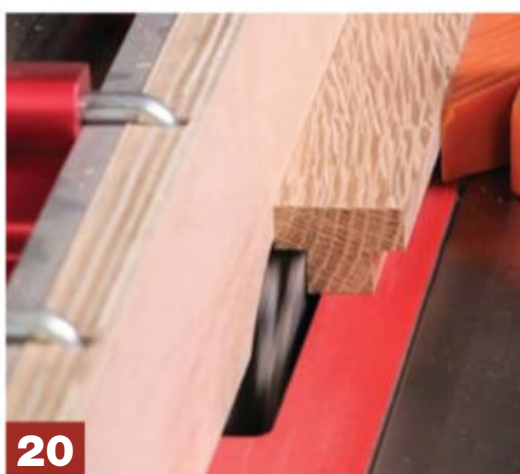
Maintain the rip fence setting from the previous step and raise the dado blade to $\frac{1}{2}$ " and haunch

the rail tenons. The vertical divider doesn't require this step. This entire process works best if you make each cut on some scrap boards as you work. That way, you can proceed confidently with each new blade or fence setting.

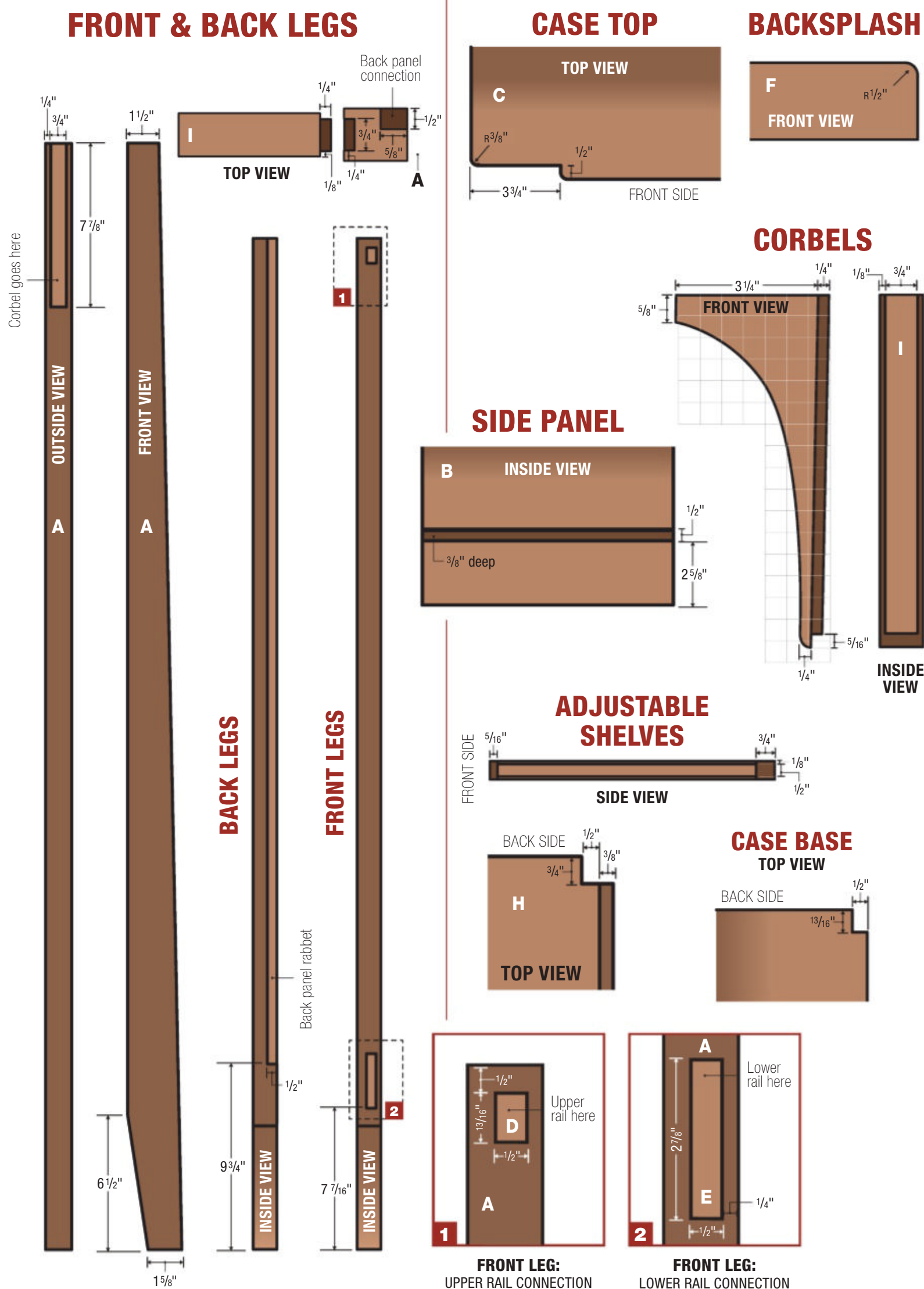
20 Rabbet all the door parts. The vertical divider gets a rabbet on both edges. Set the blade height to $\frac{7}{16}$ ".

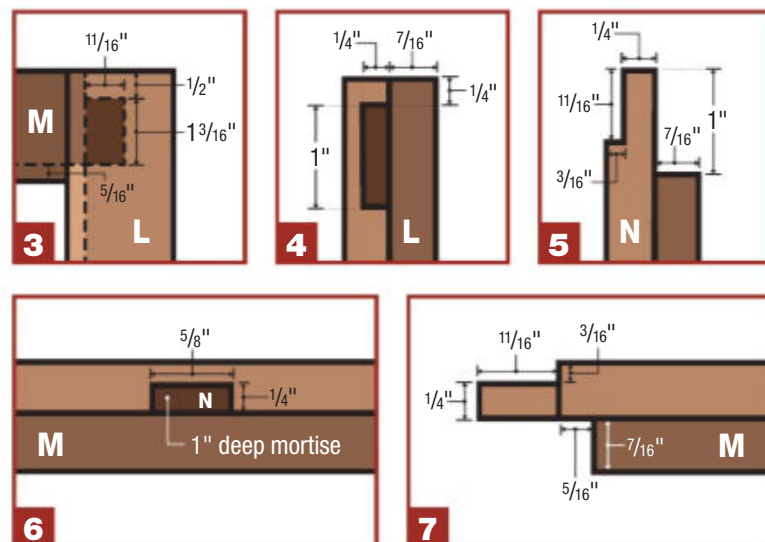
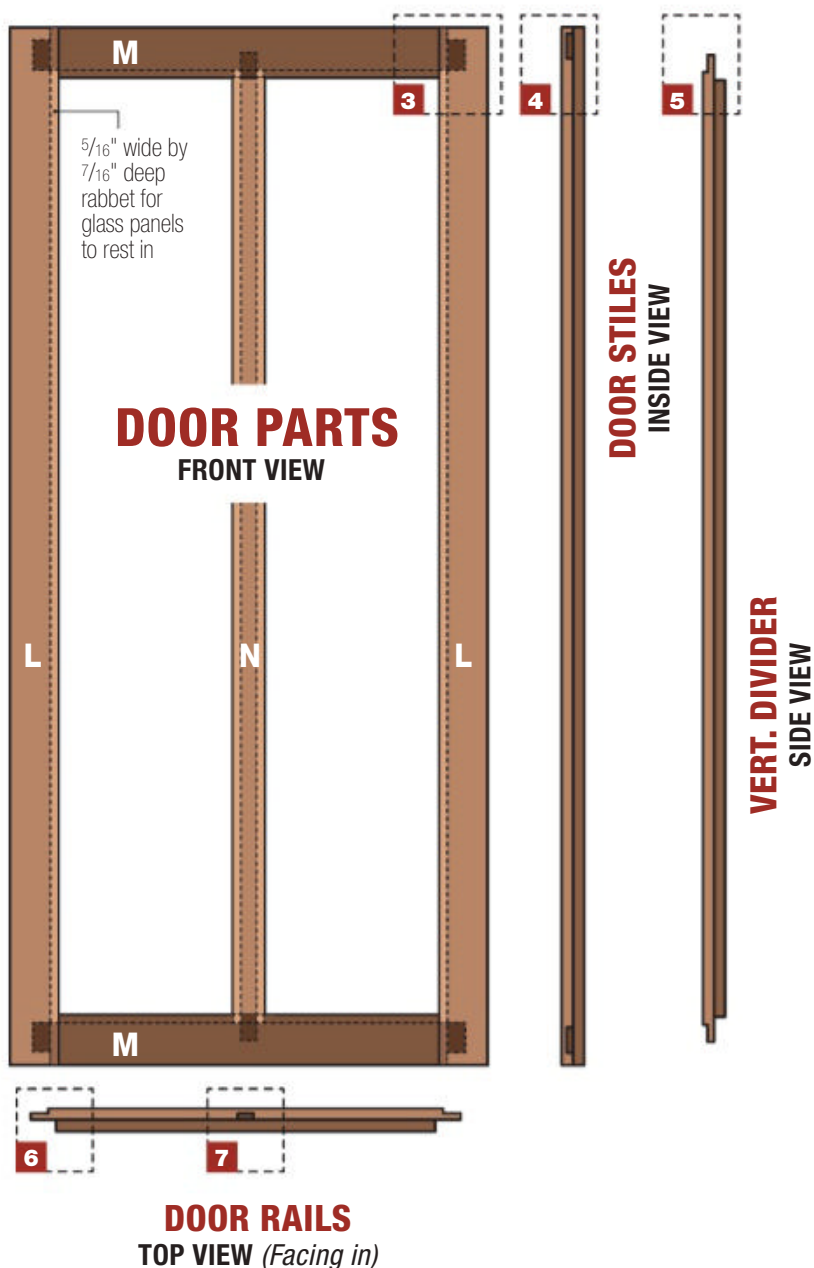
21 With the same "half lap" blade height, create a 1" long cheek on the show-face of the rails and vertical divider.

22 Mortise the rails and stiles. Note how the wall of the rabbet is used to align the hollow chisel for these cuts.



■ Limbert Style No. 357 Bookcase





Material List:

- 2 glass panels, approx. 1/8" T x 7 1/4" W x 37 7/8" L
- **Glass stops**, 5/16" square x 16"
(Finish, cut to fit, and install with pin nailer)
- **Routing jig materials** (see page 32)
- **TransTint**, dark mission brown color
(1.5oz mixed with one quart of thinner/solvent)
- **Bullseye Shellac Sealcoat**, applied with a sprayer
- **General Finishes**, antique walnut
- Items from HouseofAntiqueWarehouse.com:
No mortise cabinet hinges, 3" overall length with slotted holes, oil-rubbed bronze finish; Item RS-08SCH-1100B-10B
Vertical pull with round ring, Arts & Crafts style, forged brass; Item R-08BM-1019AC

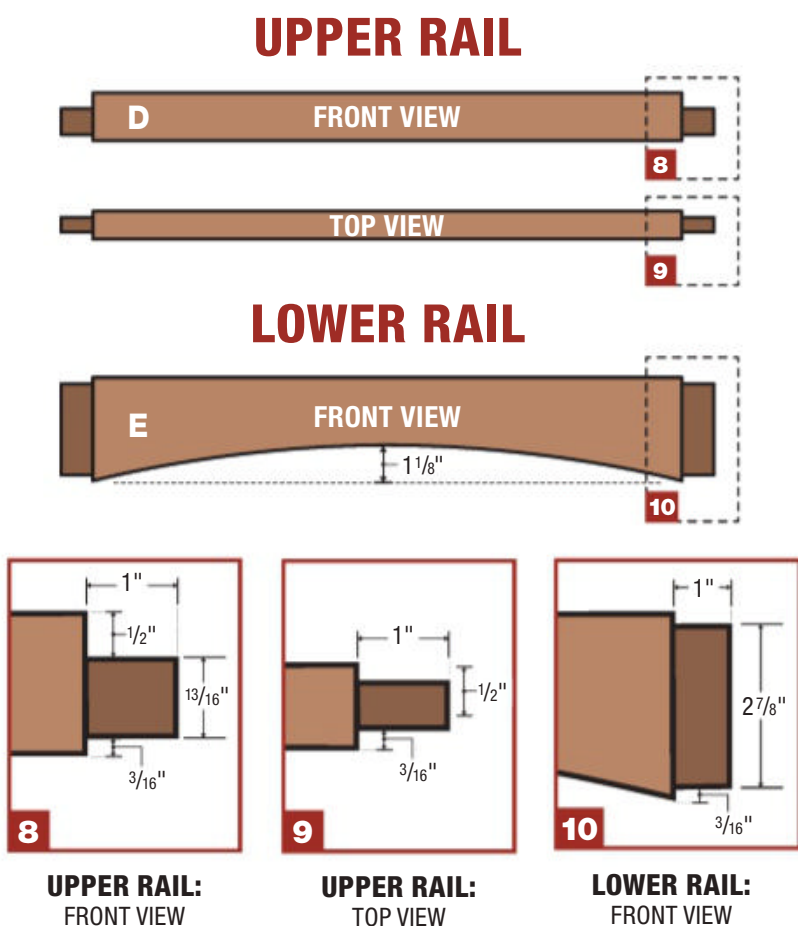
Cutlist

No.	Items	Dimensions (inches)		
		T	W	L
4	A Legs	1 1/4	3	53 1/4
2	B Side panels	3/4	10 1/2	46
1	C Top	3/4	14 1/4	30
1	D Upper rail*	7/8	1 1/2	20 1/2
1	E Lower rail*	7/8	3 1/4	20 1/2
1	F Backsplash	3/4	3	28
1	G Case base	3/4	11 9/16	20 1/4
3	H Adjustable shelves	3/4	11 1/4	19 1/2
4	I Corbels	1	3 1/2	8 1/8
2	J Corner blocks**	1 1/4	1 1/4	4
1	K Back panel (plywood)	1/2	19 3/4	43 1/2
2	L Door stiles	7/8	1 7/8	41 1/4
2	M Door rails	7/8	2	16 3/4
1	N Vertical door divider	7/8	1 1/4	39 1/4

* Upper (D) and lower (E) rails are 18 1/2" shldr-to-shldr.

* Fixed shelf (G) is 19 1/2" shoulder-to-shoulder.

** Corner blocks (J) are cut lengthwise at 45°.



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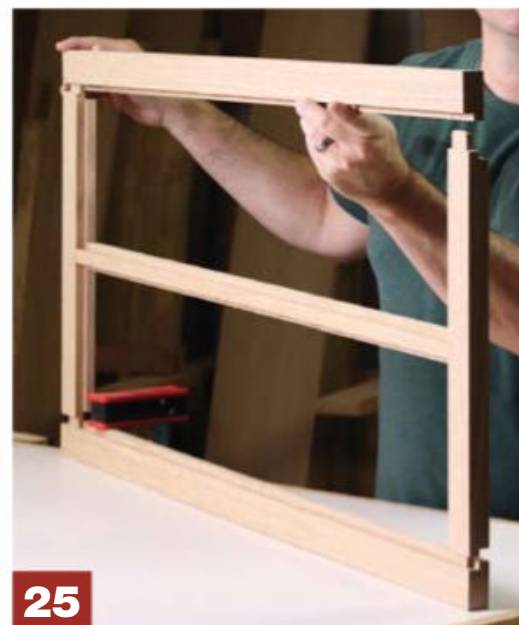
23

23 Lower the blade and adjust the fence for a shorter cheek. Make incremental adjustments to the blade height until the tenon fits into the mortise. Then, adjust the rip fence until the offset shoulders seat fully.



24

24 Maintain the rip fence setting from the previous step and raise the dado blade to 1/2" to haunch the rail tenons.



25

25 Assemble the door to reveal the ready-made rabbets.

Distinctive Double Corner

Small details such as the double corner treatment on the top panel can't be appreciated with the small black and white pictures in Limbert catalogs. Just like Gustav Stickley or Greene and Greene designs, it's the details that make the difference. Use a scrap of 1/2" MDF to make a double corner template and sand or file it to shape. Note that the inner corner has a larger radius than the outside corner. Bandsaw the rough shape on the top panel and clamp the template in place. A good flush trimming bit makes quick work completing this shaped detail. Finish the look by squaring the inside corner with a file to match the antique.



27

26 Using 1/2" thick MDF, notch the corner 3 3/4" long x 9/16" wide. File the outer corner to a 3/8" radius and the inner corner to a 1/2" radius.

27 Trim the top panel close to the cut line and clamp the template to the workpiece. Use an appropriate bit such as *Infinity* mini-Mega flush trim 5/8" diameter bit and rout in a counterclockwise direction.

28 File the inside corner square to complete this signature detail.



28



26

Wrapping Things Up

I only altered two details from the antique bookcase. I changed the back panel from 1/4" to a more robust 1/2" thick plywood panel. The second change was to improve a common failure on antiques like this. The corbels were typically nailed in place with a dab or two of

hide glue. To improve the integrity of the corbels, I use stub tenons that fit into the grooves in the legs. This interlocking joinery, along with the improvements in modern glue should yield better results over time. Plus, the extra depth of the stub tenon gives the slender corbel a little more substance.

Ease the edges of the corbels with a $\frac{1}{8}$ " radius router bit at the router table and see how they fit. You'll notice that the top of the corbels need to be marked and cut flat with the top of the bookcase. Mark this line with a straightedge in situ and trim the corbel to final size.

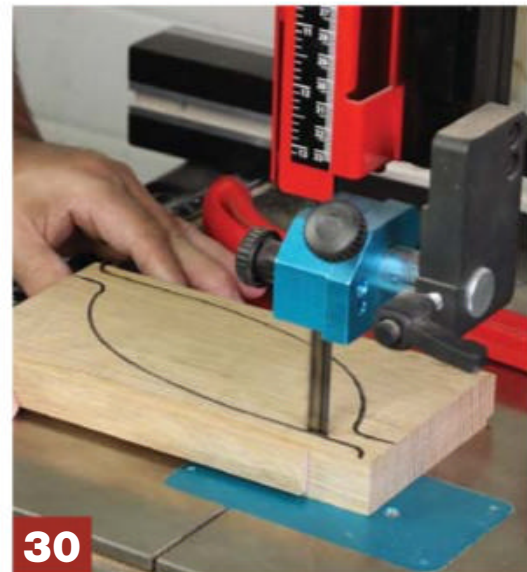
Once the corbels are glued in place, it's time to apply the finish. I used a *TransTint* Dark Mission Brown dye, mixed 1.5oz per quart of non-grain-raising (NGR) thinner. The NGR thinner is simply a 50/50 mixture of lacquer thinner and denatured alcohol. Wipe the dye with a staining sponge and apply it sparingly. Then seal in the dye with a light coat of *Bullseye* Shellac Sealcoat, which must be sprayed on. I don't recommend wiping or brushing shellac over an alcohol-based dye. Doing so will reactivate the dye and can lead to streaking. Scuff sand the shellac and stain with a layer of gel stain. The one I used on this is the *General Finishes* Antique Walnut. Let the stain dry overnight and spray two coats of satin lacquer for the topcoat. Although this finishing schedule is a bit labor intensive, it produces a rich finish that instantly looks antique. For spraying and finishing techniques, check out Willie's *YouTube* channel, *The Thoughtful Woodworker*.

The hardware for this project includes a pair of non-mortise hinges to hang the door and a period-appropriate ring pull. Because the door is set back $\frac{1}{16}$ " from the legs, the knuckle of the hinges needs to be oriented towards the door on this particular bookcase. Otherwise, non-mortise hinges are pretty easy to install, especially if you buy the type with slotted holes. After installing these type of hinges, you can move the door a bit in almost every direction. Finish up by installing a $\frac{7}{16}$ " brass ball catch to hold the door shut.

PW– Willie Sandry



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29 Make corbel blanks large enough to yield two finished parts. Raise a stub tenon on both edges using a dado blade buried in an auxiliary fence. Then turn the blank on end. Raise the blade to about 1" and make another pass on each end to remove the waste.

30 After creating the stub tenons on the corbels, head over to the band-saw and cut the corbel free. To smooth out the shape, use a spindle sander if you have one. Otherwise, rasps and a curved sanding block will smooth everything out and have them ready for finish.



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31 Stain-over-dye finish for an instant antique. The left side of this board has been dyed and sealed with shellac. The right side is being wiped with a gel stain for a darker, richer color. The final step is a topcoat with lacquer.

32 Cut glass to fit inside the rabbet and secure the panes with glass stops and a 23 gauge pin nailer. The glass stops are simple $\frac{5}{16}$ " square stock that's prefinished and cut to fit.



PROJECT #2313

Skill Level:

Intermediate

Time: 60 hours

Cost: \$1,000

All the flavors of walnut shine in this versatile storage and serving piece.

Mid-Mod Sideboard



PHOTOS BY LOGAN WITTMER &
CHRIS HENNESSEY





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1 There are a lot of panels to glue up for this project. Be sure to set aside the best for the top and sides.

2 Take the tool to the work and cut the top and bottom with a track saw. Support the workpiece on a piece of foam insulation

3 The case is joined with rabbets cut with a router and edge guide.

4 Switch out to a smaller bit for the door grooves.

My sister asked me to make a dining table and sideboard for her house. She was ready to move on from garage sale finds and inherited pieces that filled the dining room but didn't suit the house or the way she wants to use the room. She's drawn to the crisp cool of Mid-Century furniture. But she also gave me an opening to come up with an "inspired-by" look rather than a "copy-of" knock-off.

The design I came up with combines strong geometric shapes. The case is divided into thirds: banks of drawers flank a center section of open shelving. Two bypass sliding doors aren't strictly necessary, however I like a sense of motion and transformation in otherwise static furniture. A separate base assembly lifts the case off the floor and allows light and shadows to play in the openings.

For the materials, I worked with a co-worker who happens to be a sawyer, who happens to be the editor-in-chief of this magazine. That gave me access to plenty of air-dried walnut. Slow, natural drying preserves the range of colors and tones in walnut: chocolaty browns, veins that lean toward purple, and midnight mineral streaks. An added benefit is that the air-dried stock works much easier (in my opinion) than its kiln-dried brethren.

Working with wide rough sawn planks holds particular delight. I get to find project parts within the board to fulfill project needs. Sometimes it's color, other places grain pattern takes priority. Even the leftover sections can be used in the unseen parts of a project. I'll highlight a few of these decisions as we go along with this project.

There is a down side to using rough boards. You'll end up spending more time in stock prep: cutting planks apart, jointing and planing parts to size, and gluing up panels. A quick glance at the final result shows you that I find this well worth the effort.



4

Making the Case

A large case piece like this requires quite a few glued-up panels. So long as I have the necessary clamps available, I'll prep panels right away. First up is to find the longest, best-looking pieces to make the top. The next priority is the sides. For the bottom, only the first few inches are visible. The same goes for the two vertical dividers.

The overall length of the top and bottom was 63". It's crucial that these parts are the same length. It's possible to crosscut this on the table saw, but the width and length turn this into an awkward task. Instead, I used a track saw. You could cut both parts at the same time or singly. I marked the cut lines squaring the line off the back edge.

A lot of Mid-Century case pieces are joined with miters at the corners. This gives a clean, flowing look to the grain. Personally, I dislike miters. On large solid wood parts in a home shop, these joints are problematic to get seamless and stay tight.

Instead, I like rabbets on case pieces, especially when cutting a deep rabbet on each end of the top and bottom. When it's assembled, the thin line that's visible punctuates the ends of the sideboard.

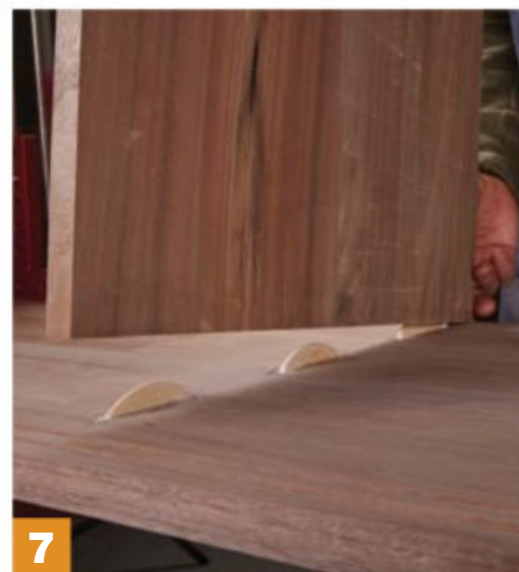
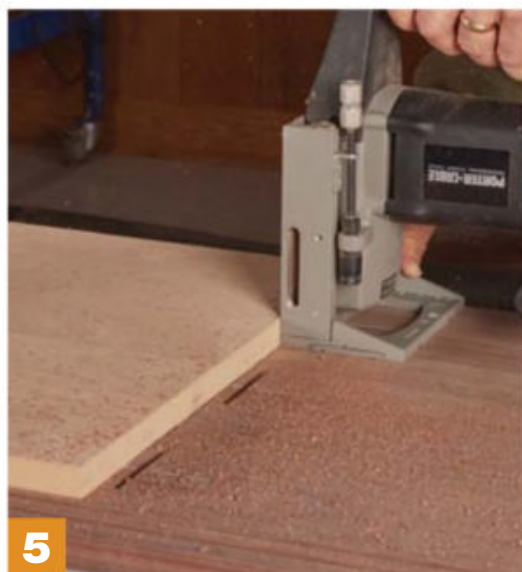
Power Tool Joinery

Cutting joinery on large pieces means a hand-held router to me. Fitted with an edge guide and straight bit, I can tackle all the rabbets and grooves necessary while also reducing the amount of heavy lifting of panels or parts. For the end rabbets, I worked down to the final depth in several passes. This eases the strain on the bit and router motor. With a depth and edge guide adjustment, you can cut the smaller rabbet that's needed for the case back.

Keep the wrenches close by, so you can cut the two grooves for the sliding doors. The grooves in the bottom are much shallower than the matching grooves cut in the underside of the top. This allows the doors to be slipped into place (and removed, if necessary).

Inside the case, 2 dividers organize the space. They are flush with the rabbet in the back and stop short of the door grooves. I installed these using biscuits. I have two reasons for this approach: I have a biscuit joiner that I love using. Second, using biscuits means I only need to focus on getting the length of the dividers right without factoring joinery into the process.

I cut a piece of plywood to use as a spacer so that the rows of biscuits slots in the top and bottom are con-



5 Biscuits offer a simple way to install the divider panels. The plywood guide registers the tool and ensures a consistent spacing on the top and bottom.

6 Run a bead of glue in the slots in the case bottom. Press the biscuits into the slots, then butter the exposed portion. You don't need to add glue between the biscuits.

7 The biscuits secure the parts, but you'll still need to watch the front-to-back alignment.

8 Assembly squares provide the extra set of hands necessary to get the sides glued into place while keeping them perpendicular.



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9 My goals here are keeping the joints tight and the case square while the glue dries.

10 The end and center holes house long wood-screws in order to add strength to the rabbets.

11-13 I used liquid hide glue to install the plugs and dowels. A block plane trims them flush.

14 In keeping with the clean mid-century look, a simple chamfer eases the edges while adding a subtle facet to catch light.

sistently located. To cut the slots in the dividers, I laid those down on the bench with the outside face down. I glued the biscuits into the top and bottom prior to gluing up of the main case. It's one less thing to juggle.

Case Assembly Details

Large cases can easily turn into unintended parallelograms during assembly. A set of assembly squares counteracts any tilt. A side benefit is that the squares hold parts steady while I'm working at the other end. *Titebond's* liquid hide glue offers plenty of open time to



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15 Loose tenons join the components in the base assembly. A Festool Domino is one way to do it.

16 Clamp narrow parts together in order to provide support to the joiner while forming mortises.



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brush glue onto the rabbets, get clamps in place, parts aligned, and everything cinched down before seizing up (my patience included). The extra drying time (24 hours) required is a small penalty I'm willing to pay. That doesn't mean progress grinds to a halt.

After allowing the glue to cure a few hours, I marked and drilled holes to reinforce the rabbets. I drilled five holes in each joint. The end and center holes are for woodscrews for the mechanical connection. The other two holes are pinned with dowels. You could easily go with dowels for all five. But I liked the insurance of the screw threads.

The screws are concealed with end grain woodplugs to match the dowels. I used walnut to make a low-key contrast with the wood that adds to the exposed rabbet on end. The final decorative element is routing a chamfer around all the edges. This surface catches light and eases sharp edges.

This is a good point to pause and apply finish to the case. I used tung oil to bring out the colors in the walnut. Then two coats of spray lacquer add shine and maximum protection.

Elevated Base

Years ago, I made a small Mid-Mod cabinet for one of my sisters-in-law. The base was more like a short stand. Curved feet and cutaway rails added some liveliness to the square case. I've always liked how that looked, so I refined the design and scaled up the components for my sister's sideboard. I used 1 1/4"-thick stock for the base. I cut these from the straightest grain stock. Four front-to-back rails attached to the case are cutaway on the ends to create a gap between the case



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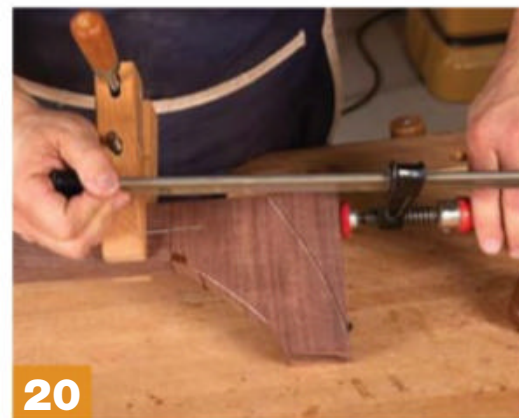


19

17 The closer you can cut to your layout lines, the easier the flush trimming.

18 A flush trim bit following a template creates identical feet.

19-20 Clever clamping is necessary for gluing long parts.



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21 Thick, dark tinted veneer glue minimizes how much bleed through you get ... and see.

22 Chalk marks keep your head in the game to eliminate mix-ups.

23 Two pieces of melamine particleboard resist glue and distribute clamping pressure.

24 Pack in as many clamps as you can so that you get a flat, smooth panel.



and the long side-to-side stretchers. Two of the rails are located directly under the dividers in the case in order to provide sag-free support.

The curved feet attached on each end raise the base off the floor. The gap functions like molding to transition from case to base. The raised base allows light and shadow to change the look of the sideboard throughout the day. And keeps this from looking like a blocky safe.

In keeping with a power tool joinery theme, the base pieces are all connected with loose tenons. In this instance I borrowed a Domino joiner to form the mortises. I had never used one and I'm considering its possibilities. The tool worked exactly the way it should — and frankly very similar to my biscuit joiner. It just causes severe discomfort in my wallet area.

The mortises are cut in the feet prior to shaping. Doing this gives me a larger bearing surface for the joiner. I made a template for shaping the feet. I traced the template onto the foot and cut it slightly oversize at the band saw. The template is then used as a guide for a flush trim bit in the router table.

At this point, I glued the feet to the stretchers. Then I rounded over the outside edge of the foot on each face. The other surfaces have a small chamfer before gluing the stretchers to the rails.



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25 Set off the panel with a shallow rabbet.



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26 Next, join the panel to the frame with grooves and splines. I cut these at the router table with a slot cutter.



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27 After gluing on the stiles, cut grooves for the door rails.

28-30 Once the rails are glued on, rout slots for the runners on the top and bottom. The outside edge of each door gets a cove to act as a handle.



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Sliding Doors

The doors on this sideboard are more like jewelry. The idea is to dress up the front by concealing the drawer banks, giving the center shelves a showcase effect. However, you can also slide the doors to the middle and cover the shelves for a totally different effect. The doors show off some delightful burl veneer and add a tip of the hat to George Nakashima.

The door construction is a little different than the typical arrangement. It goes like this. The veneer is applied to a 1/2" plywood panel. A shallow rabbet routed around the panel transitions to the frame pieces. The two stiles are the same length as the panel. The rails run the full width of the door. (Take note that the lower rails are wider.) Since the veneer is the focal point, the frame pieces should feature straight, uniform grain lines.

All the parts are joined with hardboard splines. Think of these as long loose tenons. I used a slot cutter in the router table to form the grooves and keep the

front faces flush.

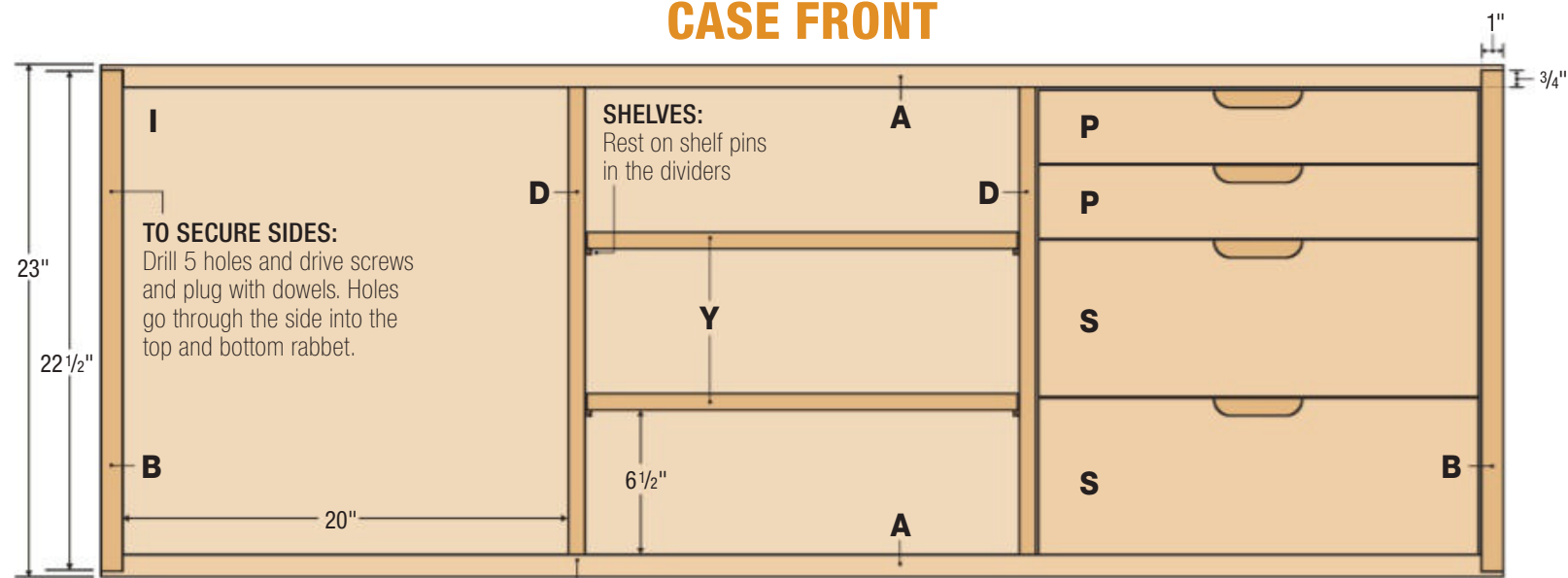
Finishing note. Before glueup, I used a brown marker to color in the rabbet on the veneered panel. Now it reads as a mysterious shadow line rather than a far more tan line.

Trim the door so that it's about 3/8" shorter than the opening. This allows it to tilt into the grooves cut earlier. Fire up the slot cutter again to cut a groove along the top and bottom edge of the door. A narrow hardboard runner glued in the bottom is wide enough to bottom out in the groove and raise the door 1/16" off the case bottom. The upper runner is wider so that it still catches in the upper groove when the door is settled in place. It's a good idea to leave this extra wide and trim it down with some test fitting.

Due to the veneer pattern, I definitely had a left and right door. To make this clear-ish, I routed a cove along the outside edge of each door. This acts as a pull as well as a transition between the door and the side of the case. The inner edge of the door is square.

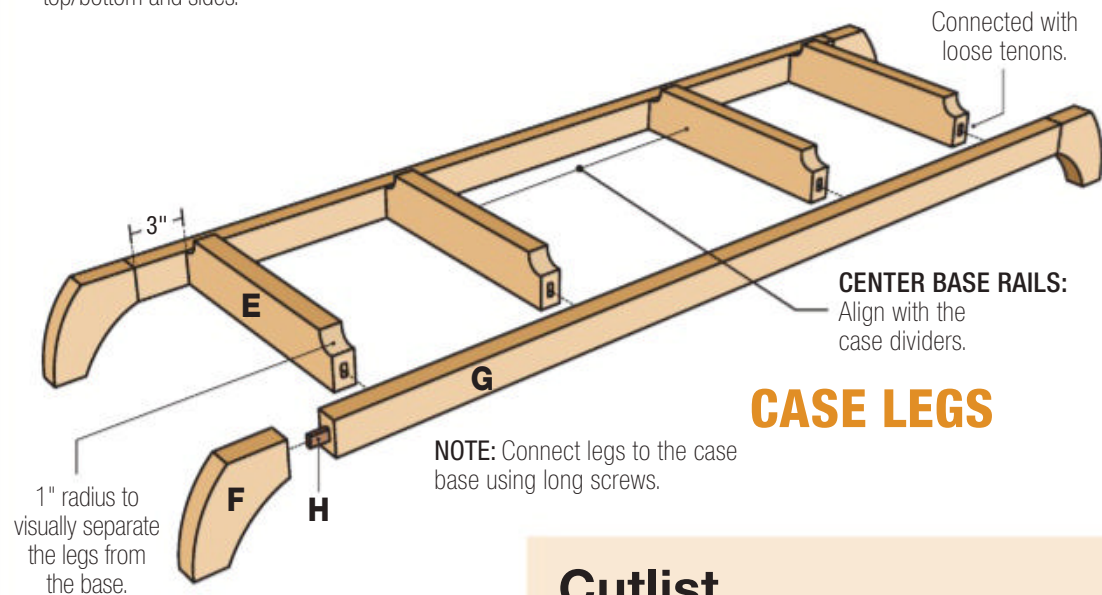
Mid-Mod Sideboard

CASE FRONT



CASE BACK:

Rout a 1/2" wide by 1/4" deep rabbet on the back side of the top/bottom and sides.

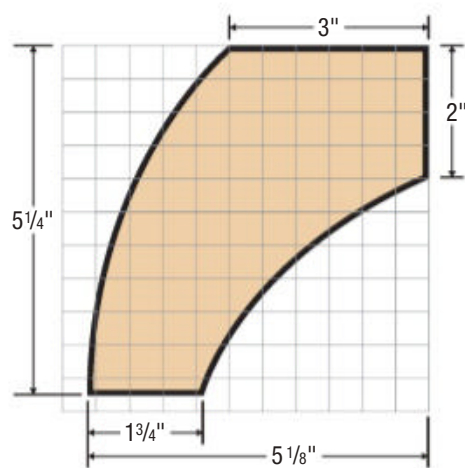
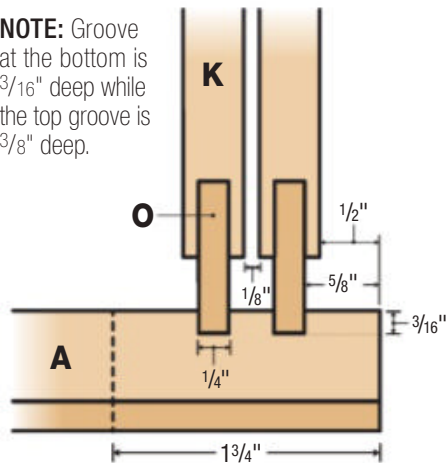


CASE LEGS

CASE SIDE

GROOVES FOR SLIDING DOORS

NOTE: Groove at the bottom is 3/16" deep while the top groove is 3/8" deep.

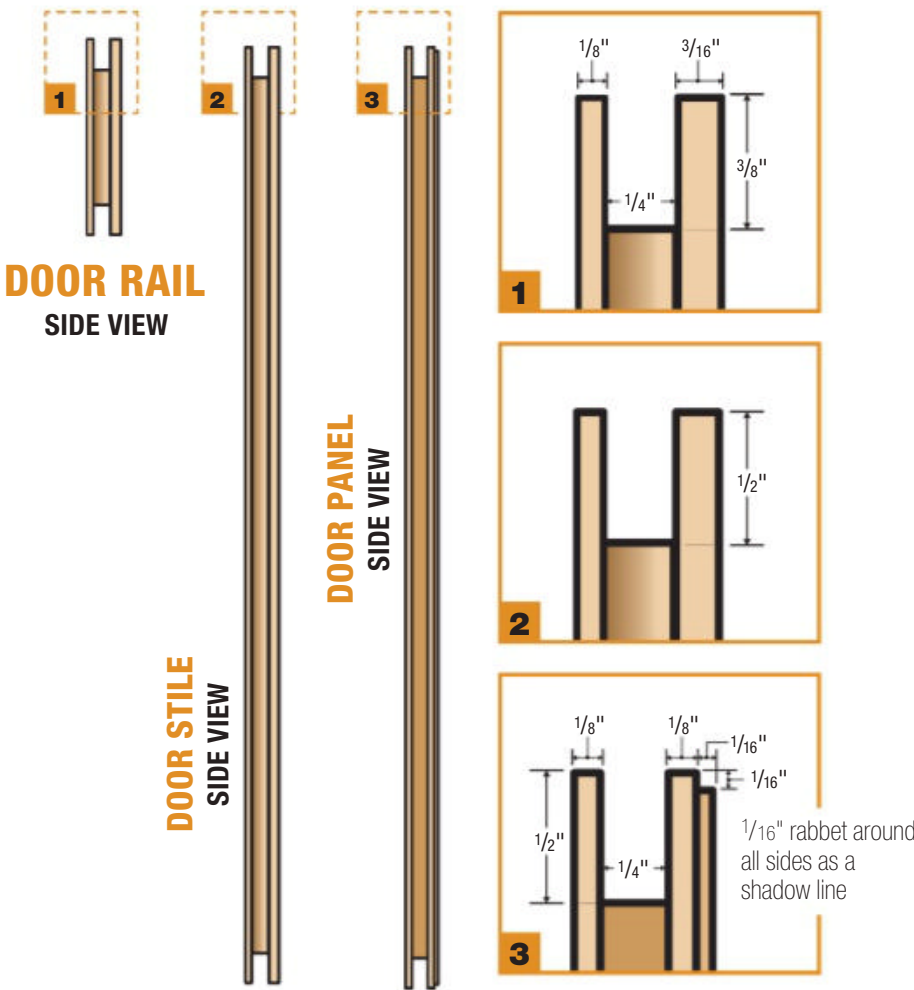
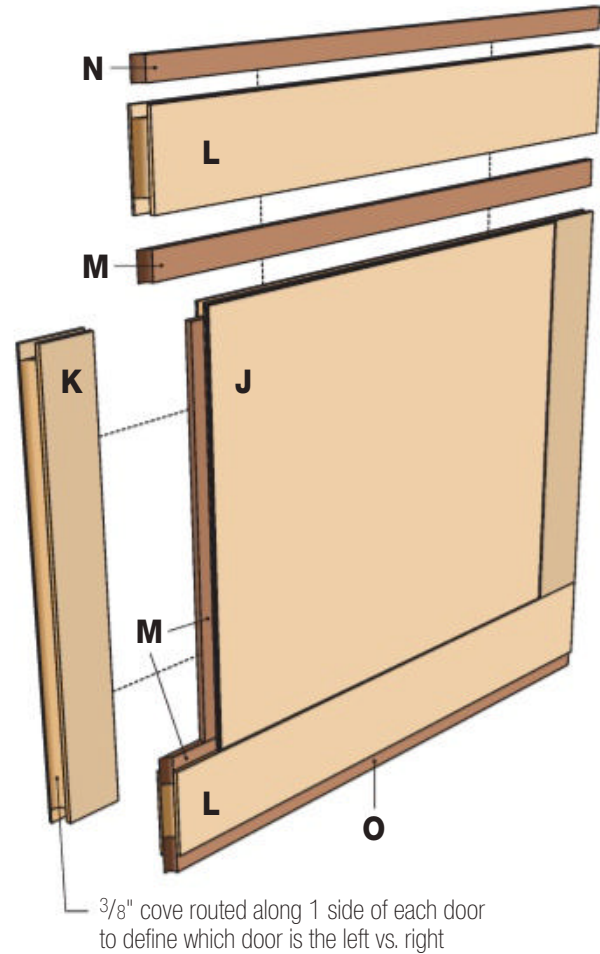


FOOT PATTERN FRONT VIEW

Cutlist

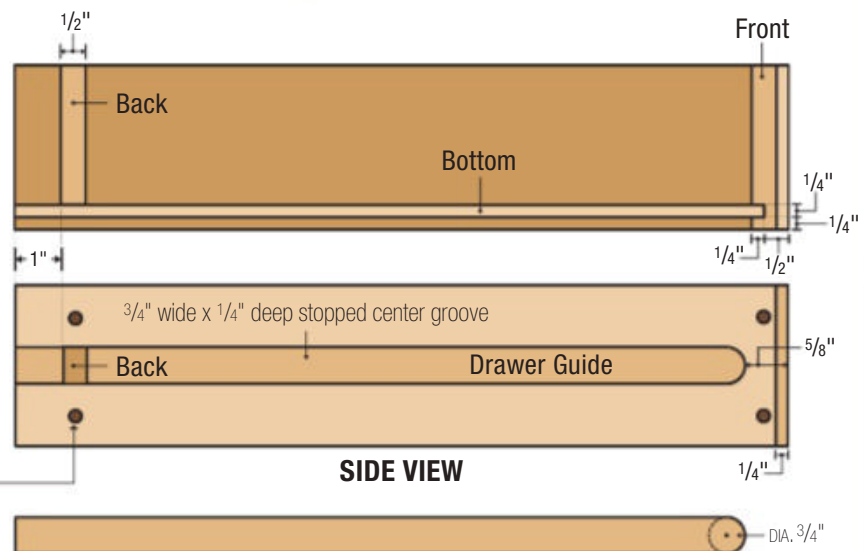
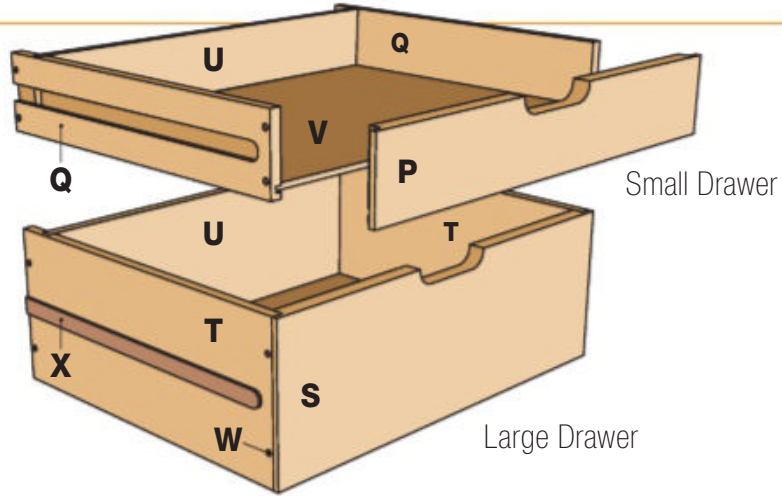
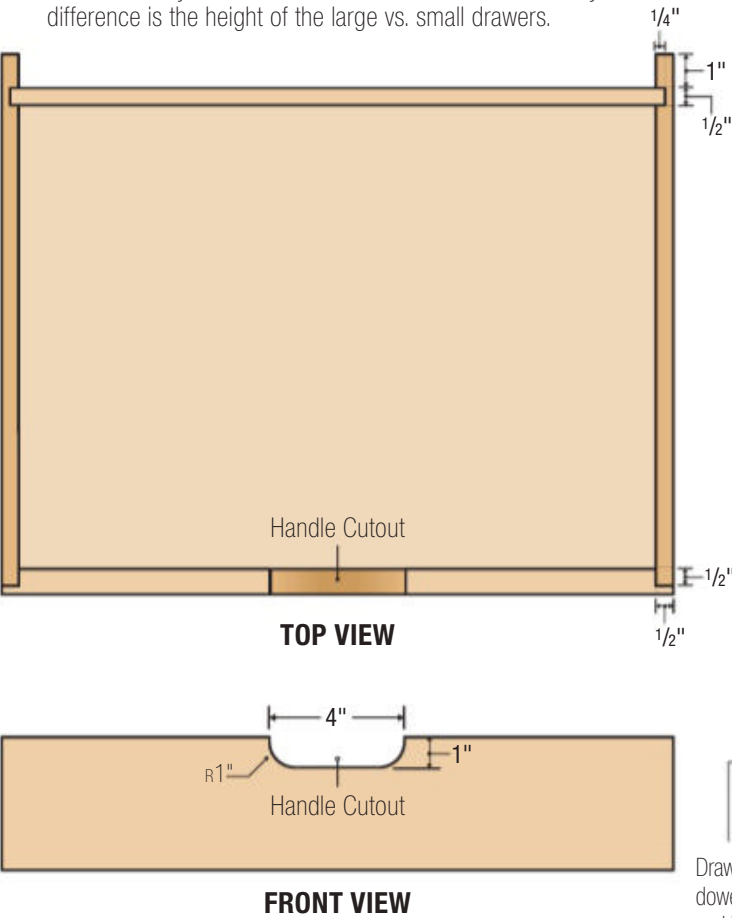
No.	Items	Dimensions (inches)			Comments
		T	W	L	
2	A Top and bottom	1	18	63	
2	B Sides	1	18	22 1/2	
2	C Dowels to secure case	1/4	1/4	2 1/2	
2	D Dividers	3/4	16	21	Joined to top/bottom with biscuits
4	E Base rails	1 1/4	3	14	Connect to bottom with screws
4	F Feet	1 1/4	6	5	Loose tenons connect feet to stretchers
2	G Stretchers	1 1/4	2	52	
12	H Loose tenons	5/16	11/16	2	
1	I Case Back	1/4	22	62	Plywood
2	J Door panels	1/2	16	14 9/16	Plywood
4	K Door stiles	1/2	2 1/8	14 9/16	
4	L Door rails	1/2	3	20 1/4	
1	M Door splines	1/4	15 5/16	160	Rough hardboard; cut to length
2	N Upper door runners	1/4	1 1/4	20	Hardboard
2	O Lower door runners	1/4	3/4	20	Hardboard
4	P Small drawer fronts	3/4	3 15/16	19 7/8	
8	Q Small drawer sides	1/2	3 15/16	15 5/8	
4	R Small drawer backs	1/2	3 15/16	9 3/8	
4	S Large drawer fronts	3/4	7	19 3/4	
8	T Large drawer sides	1/2	7	15 5/8	
4	U Large drawer backs	1/2	7	19 3/8	
8	V Drawer bottoms	1/4	14 3/8	19 3/8	Hardboard
48	W Dowels to secure drawers	1/4	1/4	1	
16	X Drawer guides	5/16	3/4	15	Screwed to case sides and dividers
2	Y Shelves	3/4	15 3/4	19	Rests on shelf pins in dividers

SLIDING DOORS



LARGE & SMALL DRAWERS

NOTE: Joinery is the same for both size drawers. The only difference is the height of the large vs. small drawers.



Drawers secured with dowels through the side and into the front and back

DRAWER GUIDE



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31 Rabbet the ends of the drawer fronts. The drawer sides will be doweled to the front and back.

32 A template and flush trim bit clean up the handhold opening on the top edge of the drawer fronts.

33 I made this setup gauge to position the router fence and stop blocks to cut the groove for the drawer runners.

Side-Mounted Drawers

Over time, I've developed preferences for drawer construction. I like the smooth feel of drawers that ride on wood guides that fit into grooves in the drawer sides. And as often as possible, I like drawer pulls that are integrated into the construction rather than applied hardware.

Several of the walnut boards I had featured fun sections of pale sapwood running like rivers. I decided to use these for the drawer fronts as a surprise once the doors were opened. For the sides and back, I used quartersawn white pine for contrast and a bright drawer interior.

Like the case, I assembled the drawers with rabbets reinforced with dowels. The drawer back fits into a dado and grooves in all the parts house the hardboard bottom.

The drawer guides act as stops in addition to providing the running surface for the drawers. For this to work, the stopped grooves on each side have to be located consistently. That's not as easy as it sounds. I wanted to use stop blocks on the router table fence to control the length of cut. But with a groove stopped on one end, half the drawer sides are routed in from the end. The others begin with a plunge cut and run out the back (so to speak).

My solution is a hardboard setup gauge. A hole in the gauge fits over the bit. The long edge is used to position the router table fence. One edge of the gauge is used to center the groove on the narrow drawers. The other edge shifts the fence for the four larger drawers.

The end of the gauge indicates the location for the stop block on the outfeed side of the fence (for the right hand drawer sides). Once you rout half the drawer sides, flip the gauge end for end to set up the stop block on the infeed side for the left sides.

Your biggest challenge is organizing your drawer sides. You're making mirrored pairs of sides. Frankly, I was surprised by how well this worked out.

The guides should be cut slightly narrower than the width of the groove. I also left them a little thick. This way, I could attach them to the case (with the back off) and use a shoulder plane and block plane to fine tune the fit and operation of each drawer.

Shelves & Finish

The center section combines both storage and display. I glued up two shelves that rest on adjustable shelf pins. This allows the shelves to accommodate whatever you want to show off. The front of the shelf features a slight chamfer and it's set back from the leading edge of the dividers as well.

I pre-treated the walnut on this project with



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34 On half the fronts, you rout in from the end of the side, finishing at a stop block.

35 The remaining sides begin with a plunge cut using a stop block as a pivot point.



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Tung oil to enhance the colors and grain. Then I sprayed catalyzed lacquer over the top to create some shine and add protection. The sideboard will be used for entertaining (with trivets, of course) and the top is a working surface just much as it a show piece. The drawers just have a single coat of lacquer to make cleaning easier. In my opinion, ap-

plying a heavy finish inside drawers often results in lingering chemical odors.

My sister lives in another state, so I have yet to see this piece in person in her house, but I'm sure it fits right in. My woodworking is a gift that I am able to share by building projects for family and friends.

PW — *Phil Huber*



Veneered and Dovetailed Box

PROJECT #2314

Skill Level:

Beginner

Time: 1 Day

Cost: \$35

A box like this one is the perfect way to polish your hand tool skills and play with new techniques.

By Kenan Orhan



PHOTOS BY LOGAN WITTMER

Looking for a good wedding gift

for family or friends? How about a wedding box such as this one I designed for very dear friends of mine? I wanted to spiff up a simple box just a bit so instead of miters, I used trusty dovetails (decorative and utilitarian!) and settled on veneering a gorgeous bit of tiger maple I had lying around to the lid. To compliment this, I was also careful in choosing my stock. Cherry is a dream to work with and its warm tones complement maple as well. I found a great bit of grain with a



wistful strip of sapwood at one edge and set to work.

I dimensions the lumber in the machine room of my local guide, but the rest of the box is made without electricity. This guide is about using hand tools to make all the components, but it is a fantastic hybrid project if

you find you do not have a tool I mention or want to save time.

Joinery Work

With any dovetail box, the first thing I do is figure out the position of any grooves that will be in the box so I can place the tails and pins accordingly. In this instance, I am making $\frac{1}{8}$ " grooves that are inset $\frac{1}{8}$ " from the top and bottom so I made my half pins about $\frac{5}{16}$ " (maybe a smidge more just to be safe) to allow for hiding the groove that holds the lid and bottom.

There area bunch of great dovetail guides out there so I will only mention the tips that I find really help the workflow and keep the joint really nice and crisp. I layout tails first and gang cut them to cut down on time. While cutting them, I angle the boards so that I am cutting perpendicular to the floor (gravity helps me keep straight this way). I like to remove most of the waste with a coping saw first and chisel to the baseline. When removing the half-pin voids from the tail board, I try to saw as close to the scribe line so that paring is only a matter of registering against the half scribe line remaining and giving a good but controlled push. When chiseling out the waste, go halfway through and then flip the board over and finish removing the waste to avoid blow out. And finally, when transferring tails to pins, use whatever method you like to make sure the boards are square (I like to use a bit of tape at the baseline of the tailboard so that I register the baseline directly to the tail board) but do make sure you use one of them!

With the joints cut, it's time to plow the grooves which I do with

a combination plane, but you can just as easily do this on the table router with a $\frac{1}{8}$ " bit. It is a lot easier to do the stopped grooves that go in the pin board on the router table, but if you do it by hand like me, you can drill $\frac{1}{8}$ " holes at the beginning and end of your grooves so that your combo plane doesn't go past its mark or use a router plane with a fence (which is what I finished the groove with because the combo plane was too long for the short board).



1 Start by laying out the tails on one end of the front and back piece.

2 Clamping both of the pieces in the vise provides consistently spaced dovetails with minimal effort.



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3 Gang cut the tails with a dovetail saw.

4 Saw away the waste.

5 Use a back saw to cut the shoulders.

6 Chisel down the line of the shoulders.



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7-8 Pare back to the line on the tails, then transfer the tail shape to your pinboard..

9 Drawing vertical lines on your pinboard can help give you a visual reference if your cut is plumb.

10 The the pins. Carefully lower the toe and the heel of the saw down until the kerf just kisses the line. Then, level the saw and complete the cut.



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11 The waste is once again cut away with a fret saw. This time, make sure to angle the saw frame to match the angle of the pins.

12 Test your fit and make any necessary adjustments with a chisel or file.

13 Using a plow plane, cut grooves for the top and bottom.

Up Next, the Lid

Next is making the lid. I used maple as the core to keep it the same as the veneer material and because I had a small scrap of some not particularly attractive maple available that would benefit from some fancying up. I used an old technique here for veneering because for a project of this scale it's faster, easier, and much cheaper than bothering with vacuum bags or presses. In an old point, I

warm up some hide glue granules and water until it's viscous (there are a lot of guides on hide glue to consult but a double pot, an old meat thermometer, and a hot plate are pretty much required, but thankfully you can get a small pot and hot plate from *Lee Valley*).

With the glue prepared, we can begin the process of hammer veneering, which though it sounds like we'll be whacking a mallet at our veneer, instead it's really more of a squeegee motion. I apply a little glue to the core and underside of the veneer and then place them together. I add a layer of glue on the top face of the veneer as well to stabilize the veneer. It is wood after all and if its bottom half gets moist and glued but the top is left open and unsealed, air and water move out of it unevenly which accounts for warp. I use a veneer hammer to squeeze out the excess glue between the two pieces and remove the excess glue from the top. (My veneer hammer is one I put together with a scrap of walnut I rounded and stuck a brass bar in.) Pressing firmly removes the air that is between the veneer and the core and since creating a seal, we've essentially got a little vacuum between the pieces now. This is the same way a sweating pint glass creates a seal around a tabletop and gives a little pop when you lift it. The veneer hammer activates atmospheric pressure (which in my neck of the wood is a little over 14 psi) and literally uses the earth's atmosphere to clamp the veneer to the core until the glue dries, which it does quickly. You'll want to repeat the process for the underside of the lid to prevent warp like I mentioned above.

Once the glue is dry, you can use a knife to slice off the excess veneer, then a block plane can flush everything up. Lastly, you'll rabbet all four sides of the lid so that it'll fit into our box grooves and leave



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14 To veneer the top, start by brushing glue on your top pane. Here, I'm using hot hide glue.

15 Apply a healthy layer of hide glue on the veneer as well. As soon as you introduce the moisture from the glue, the veneer will probably want to start to curl.

16-18 Position the veneer and stick it down to your lid core. Apply an additional layer of glue over the top of the veneer, before using a veneer hammer to stick it down. The veneer hammer is used similar to how you'd use a squeegee, applying pressure and a slight scraping motion, which sucks the veneer in place.



15

about a $\frac{1}{16}$ " shadow gap. Just be a little careful rabbeting as you'll want a sharp knicker tool or a good scribe line to prevent any damage to the delicate veneer. You can repeat the process for the bottom, or you can opt out of using veneer and just rabbet the base. Either way, use a piece thicker than the distance of the far groove wall to the bottom of the box so that the box appears to float a little.



16



17

Assembly & Finish

With the parts all made, glue the lid and base into the grooves and the pins into the tails. Clamp the box up for about an hour. Afterwards, you can flush up the tails and pins and then, very carefully, use a straight and square batten as a guide to cut the box open. I unfortunately didn't have the flattest workbench, so I had to be a little careful and I had to enlist the help of an extra set of hands to get the batten directly over my scribe line and clamped down without shifting (fortunately at the guild, there is always a helpful face hanging around!) Use a very thin plated saw (I'm using a Japanese saw) to cut the box in half. Use the other hand to keep the plate flush against the batten. You'll have to cut one side of a box at a time, and so the best thing to do is use the bit of kerf you've created in the previous side as a guide to wrap around the next side and so on but always set your batten on the halfway scribe



18



19



20

19-20 After rabbeting the top, you can assemble the box. Apply a little glue between each dovetail joint and press the box together. Make sure to slip the top and bottom in place.

21-22 With the joints flushed, it's time to cut the box apart. Here, I use a pull saw and a scrap wood fence to help guide my cut. For this box, I split it right down the center.

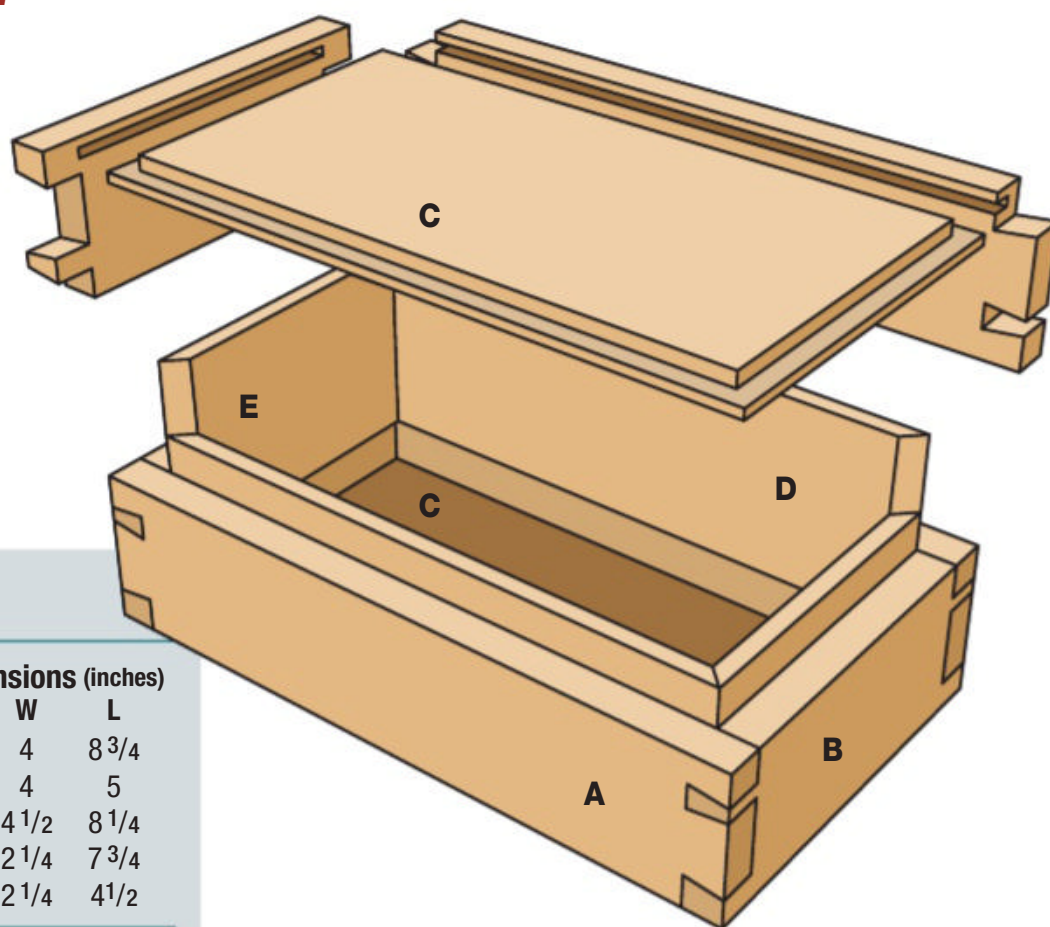
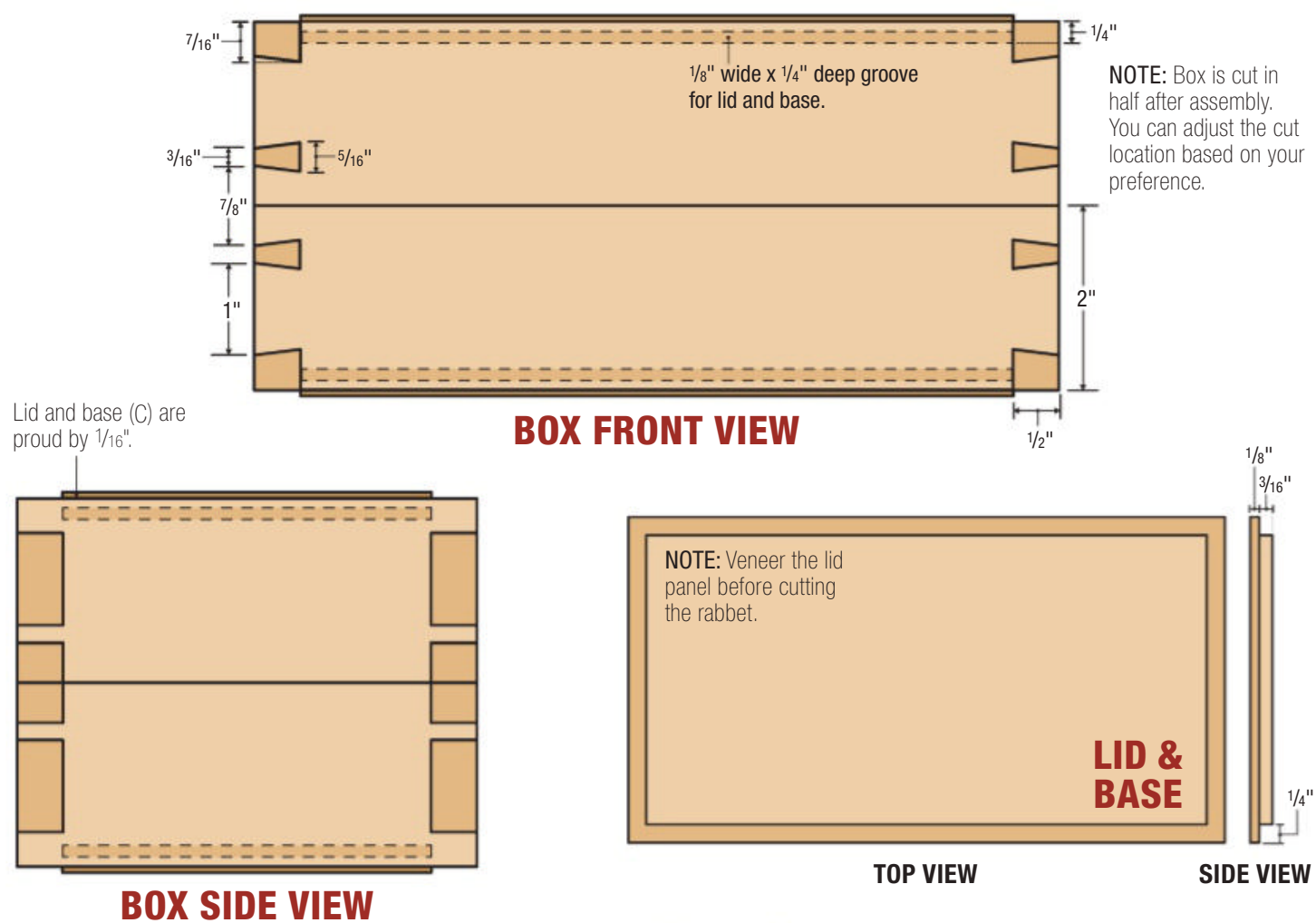


21



22

■ Veneered & Dovetailed Box



Cutlist

No.	Items	Dimensions (inches)		
		T	W	L
2	A Long box walls	1/2	4	8 3/4
2	B Short box walls	1/2	4	5
2	C Lid/base	5/16	4 1/2	8 1/4
2	D Box insert (long)	1/4	2 1/4	7 3/4
2	E Box insert (short)	1/4	2 1/4	4 1/2

*Veneer should be slightly larger than the lid.



23



24



25

23-24 To help register the lid on the bottom, I added a set of thin liners. These liners are cut to size and mitered on the corners to fit. A shooting board is a great way to fine-tune the length of the parts as well as the miters.

25 I use natural mineral oil as a finish — apply it liberally by hand and let it soak into the wood.

26 After sitting, the finish can be buffed to a light sheen.



26

line. If you prefer, this can be done on the bandsaw but there will be a little extra waste to account for the bandsaw blade thickness.

All that's left is planning the saw marks away and adding mitered inserts to the bottom of the box. You can fine-tune the fit of the inserts with a shooting board. The shooting board will help sneak up on the length and provide a tight miter. A little glue will allow for a friction fit that doesn't pull them out when you pull the top of the box off. I then use mineral oil and wax for a nice, non-toxic finish that leaves a mellow sheen and maintains the natural wood feel.

PW – Kenan Orhan

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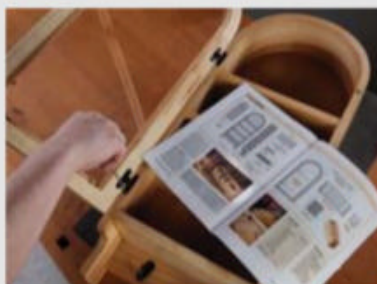
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Amanda Ewing

Interview By Collin Knoff

Amanda Ewing, a Nashville based violin maker, is carving her own path in the world of lutherie. This is her story.



I was chosen by my path not so long ago. Thanks to all of the twists, turns, and detours along the way, lutherie is where I find myself now. Back in 2018 I was really trying to figure shit out. (Sometimes one must use the right four letter expletive to become aware of a reality we have longed for but wasn't able to choose because of fear). During that year I was living by the YES. I said yes to everything as long as it resonated with me. This led me to dusting off my dance shoes, prying my violin from its case, and exploring the world through travel.

I've always adored the sound of the stringed instruments: violins, cellos, harps. As a former gymnast, my floor routine music was often classical with a heavy string presence. I use this as a reference because it helps me realize how long string music has been in my life. My first faint calling came one Saturday morning after I arrived at my community center to exercise. After waking up early and finding out the class was canceled, I just weaved in and out of the hallways to get back to my car to travel home.



The sound of music could be heard clearly as I passed through one hallway. Seeing as I had nothing else to do, I decided to investigate the source of the sound. The sight of string players from all backgrounds, genders, and ages caught my eye as I peeked through a classroom door. Little did I know that within a year, I'd not only be a student in the program — partly due to a corporate layoff. It would also present the path to become a luthier.

In response to my persistent curiosity, I was offered the opportunity to learn how to make a violin from scratch, and it is safe to say that I did not fully understand what I agreed to. In spite of this, I could not deny my desire to explore something largely unknown to me, as well as the bragging rights that come with making such a majestic instrument. In short, I figured it would elevate my cool factor and I couldn't resist!

It was not long after that first violin, built under the guidance of Ray DeMeo, that my path found me that I realized why. After traversing down the violin making path, casual conversations began swirling around me about black instrument makers past and present. I never gave it much thought before, but after the seed was planted, I began to wonder who came before me. Honestly, I wanted to see a face like mine — any shade of Black or brown. At that time, my searches only led me back to myself. I found it both strange and disappointing.

PHOTOS PROVIDED BY AMANDA EWING



■ Get Social

Check out *Amanda's* instagram at:

@thelutherielounge

@blackinlutherie

There are those who have shown up in my space authentically loving with a heart to help and an intention to encourage me, and for that I am truly grateful. It is my hope that you all know who you are. This journey has been exciting and rewarding because of you all and my internal impulse to ensure a safe space for Black and brown instrument makers to thrive. It's rewarding because a path has been revealed for me to pursue what I really enjoy, and because I get to create impact and display representation along the way to those who are destined to come after me. The importance of representation is undeniable, though not enough by itself, but it serves as a pivotal starting point.

In my newly created online community, *Black in Lutherie*, I hope to document and expand dialogue about black creatives' contribu-



tions to instrument making in the past and present. In addition to this, I have a desire to expand *BIL* into an incubator for aspiring black instrument makers. Helping them learn lutherie through direct financial, informational, emotional, and social support. I admit I don't have everything figured out, but what I do know is that every journey starts somewhere.

What I also know for sure is that I didn't come this far just to

go this far. The purpose of my life reaches beyond my own: to show others that they can live the life they envision for themselves despite being underrepresented in a particular field. Beyond that, I desire to inspire courage and confidence to help people live the most meaningful lives of their choosing. Could anyone have imagined that instrument making would lead to such a powerful life mission? It's a magical endeavor indeed.

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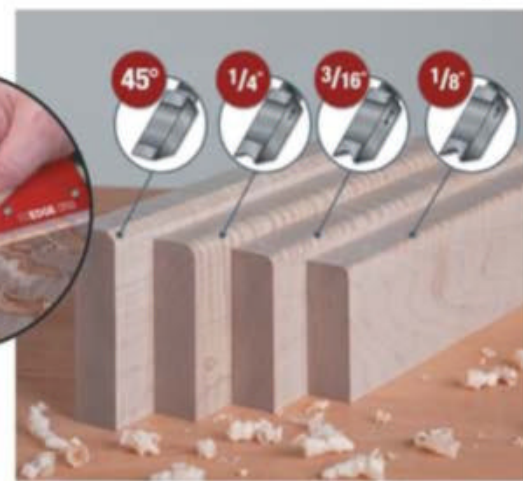
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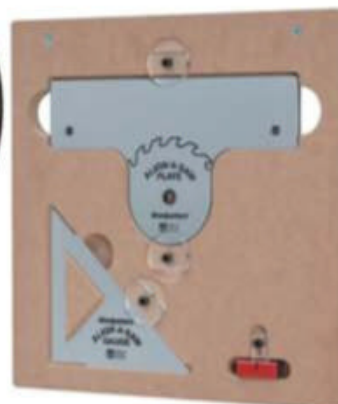
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