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Router Table Organizer



INSIDE!

- Drilling on the Lathe
- Krenov-like Cabinet
- Make a Marking Knife
- **New!** Scroll Saw Department

February 2019

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Walnut Hall Table



Page 60



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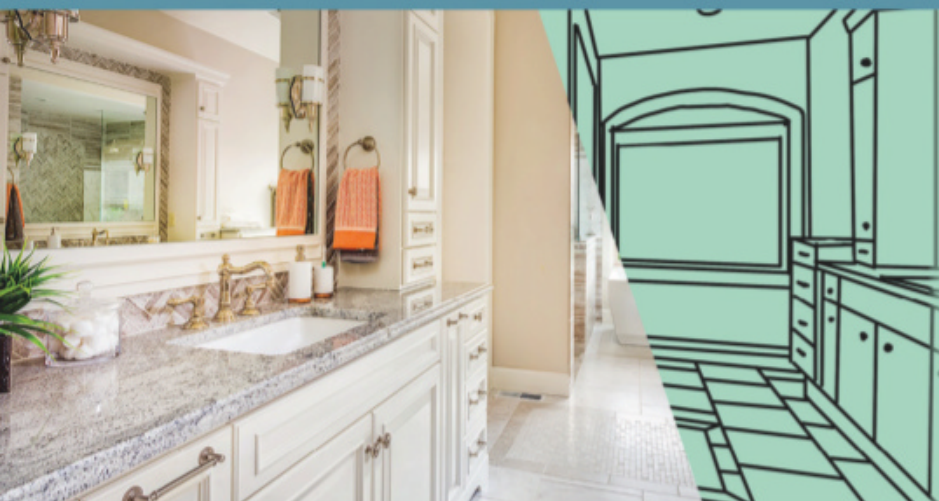
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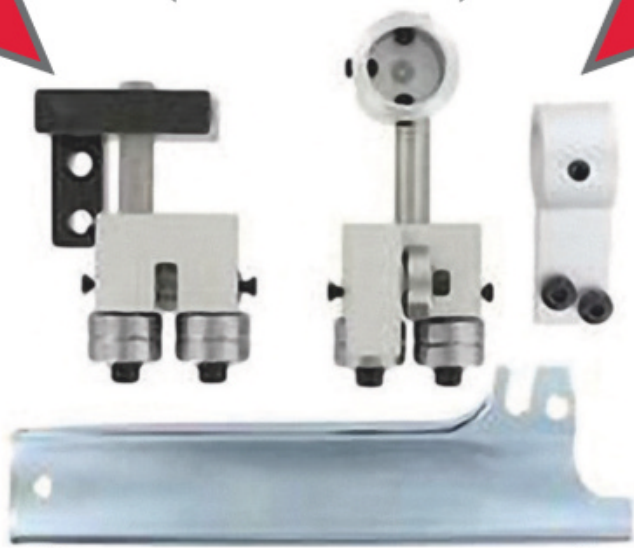
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WOODWORKER'S JOURNAL

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Krenov-inspired Shop Cabinet

By Charles Mak

Knife hinges and hand tool woodworking define this simple shop addition.



Shop-made Marking Knives

Page 40

By Teresa Audet

A practical repurposing project to take your mark-up accuracy to the next level.



Router Table Organizer

By Chris Marshall

Page 44

Basic construction techniques make efficient use of the space that may be going to waste on your router table.



Contemporary Hall Table

By Chris Salomone

Page 60

Beautify your hallway with a walnut hall table. Lovely and functional, this project is likely to become a family heirloom.

NEW

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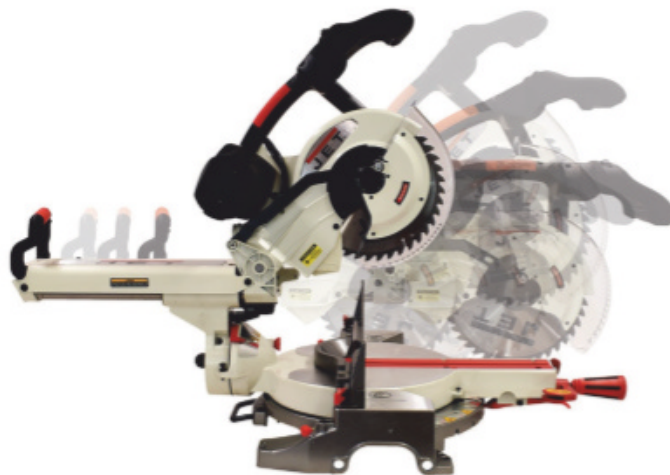
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Want more in-depth details and demonstrations about the projects and skills in this issue? Head over to *woodworkersjournal.com*, where we bring the articles to life with our More on the Web video features.

- Want a closer look at the Router Table Organizer? Chris Marshall walks through all his favorite features.
- Intrigued by using your lathe as a drill? Ernie Conover demonstrates many of his lathe drilling techniques.
- Interested in upping your miter saw skills? Watch a short video with tips for cutting crown molding.

Those are just a few examples of the latest More on the Web videos you'll find on our site right now. Just pull up the site on your phone, tablet or desktop computer and start watching now.

— Dan Cary



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LETTERS

Scroll Away Home



IT'S TIME TO SAY GOODBYE TO 2018 ...

With this first issue of the year, we have made a few changes in the magazine, in response to research that we've done over the past year. For one thing, when we asked readers about scroll sawing, I confess to being surprised at how highly popular it appears to be. The outcome of that research? We have a new department called, um ... Scroll Sawing (I'm clever like that). Check it out, and also go online to find a free scroll saw

plan from our archives. Ready, set ... SAW!

And don't worry if you're still easing into the new year: our focus on bread-and-butter woodworking projects and information remains the same. It is our goal to give you high quality woodworking content that entertains, inspires and educates all at the same time. With that in mind, if you would give us some feedback on how we are doing, it would be very much appreciated. Here's to 2019!

— Rob Johnstone

Pilot Hole Pinheads

As a former high school woodworking teacher, I would like to comment on the "Pilot Hole Smackdown!" article in the October 2018 issue [*Questions & Answers*]. In this article, three different writers correctly explained how to install wood screws, but they incorrectly described the term "pilot hole."

Traditional screws consist of three parts — the head, the

shank and the threads. The shank is the smooth part of the screw between the head and the threads. To install a screw, a hole equal in diameter to the shank of the screw (sometimes called a shank clearance hole) is drilled in the top board. The article incorrectly referred to that hole as a pilot hole. The pilot hole is the smaller hole that is drilled into the bottom board (also called an anchor hole). The pilot hole is drilled with a bit equal to the smallest diameter of the threaded part of the screw.

Paul Meisel
Spring Park, Minnesota

The name "pilot hole" comes from its function of steering the screw into the right entry point in the wood and also to prevent splitting. The clearance hole should be large enough to just clear the largest part of the screw shank. The upper piece should not have threads cut by the screw. This can result in the screw being driven tight into the upper piece and yet not having drawn the lower piece tight against the upper piece. The pilot hole in

Continues on page 10 ...



According to many readers, the term "pilot hole" has a specific application — and, therefore, ALL of our staff were wrong.

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February 2019 Woodworker's Journal



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- Min. stock length: 6"
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- Number of knives: 3
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- Min. stock length: 6 $\frac{1}{2}$ "
- Max. cutting depth: $\frac{1}{8}$ "
- Feed rate: 16 FPM & 20 FPM
- Cutterhead speed: 5000 RPM
- Table measures 15" x 19 $\frac{5}{8}$ " (15" x 51 $\frac{1}{8}$ " with extension)
- Approx. shipping weight: 581 lbs.

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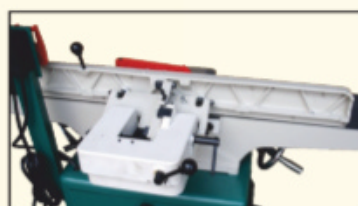


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- Total table size: 8" x 72"
- Fence size: 4 $\frac{5}{8}$ " x 38"
- Maximum depth of cut: $\frac{1}{8}$ "
- Rabbeting capacity: $\frac{1}{2}$ "
- Cutterhead speed: 5500 RPM
- Cutterhead diameter: 3"
- Cutterhead knives: 3 (G0855)
- Cuts per minute: 16,500
- Number of cutterhead inserts: 36 (G0856)
- Insert size: 15.0 x 15.0 x 2.5mm
- Power transfer: V-belt drive
- Switch: standard push-button type switch with large off paddle for safety
- Fence size: 4 $\frac{5}{8}$ " x 38"
- Fence system: positive stops @ $\pm 45^\circ$ & 90°
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- Maximum depth of cut: $\frac{1}{8}$ "
- Rabbeting capacity: $\frac{1}{2}$ "
- Cutterhead speed: 5500 RPM
- Cutterhead diameter: 3"
- Cutterhead knives (G0857): 3
- Cuts per minute: 16,500
- Number of cutterhead inserts (G0858): 36
- Insert size: 15.0 x 15.0 x 2.5mm
- Power transfer: V-belt drive
- Switch: standard push-button type switch with large off paddle for safety
- Fence system: positive stops @ $\pm 45^\circ$ & 90°
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Drilling on the lathe (video)

Scroll Sawing (page 32):
Downloadable plan for Scroll-Sawn Nightlights (PDF)

Router Table Organizer (page 44): *Overview of project features and add-ons (video)*

Tool Tutorial (page 52):
Cutting crown molding on the miter saw (video)

A Maker's Project (page 60):
Building the Contemporary Hall Table (video)

What's in Store (page 68):
Featured tools in action

the lower piece should have a diameter close to the root diameter of the screw. At least one-third to one-half of the threaded length of the screw should be in the bottom piece.

Stan Bonnesen
Faribault, Minnesota

When I took eighth grade woodshop in the fall of 1957, the screws of the day matched your first picture. Our class instruction and the textbooks of the time called for drilling two holes. The “pilot” hole [and] “anchor” hole. Admittedly, some of the modern screws, with threads larger than the upper shank in the Chris and Rob pictures, may negate the need for different hole sizes. But I still use pilot and anchor holes to allow the threads to pass through the pilot hole area without binding.

Richard W. McLellon
Aliquippa, Pennsylvania

Tall Outdoor Chairs

After seeing the pictures of other people's versions of the “Tall Outdoor Chairs” [April 2018], I thought I



Dave Burt finished his versions of the Tall Outdoor Chairs in barn red, to match the traditionally styled Adirondacks he had built two years earlier.



should send you a picture of mine. I made them as a gift for a friend. The only thing I changed was that I did not add the tables, as I felt they would be too difficult to move easily. But I did add a drink holder on each one. Hope you enjoy the pictures. My friend enjoyed the gift!

Becca Miller
Keene, Texas

I also omitted the middle tray, as it is difficult to move the three connected pieces. This spring I completed the pair, using cedar and staining in barn red to match the two traditional Adirondacks I had made two years prior. Both sets anchor our patio for the summer, but we store them in a nearby shed through the Pacific Northwest rainy months.

I have received many compliments on both projects, so thank you for the plans and suggestions.

Dave Burt
Albany, Oregon

Becca Miller's poolside tall Adirondacks in Texas make a nice sight for winter-weary eyes in Minnesota.



Complex Feelings

Have you people lost your minds? Just because someone had a wonderful experience with complex shapes while living in France does not mean that the rest of the world has any interest in reading or spending 450 hours building a complex sawhorse! [“As Complex As Possible,” *Shop Talk*, October 2018]

A.E. Waterhouse
New Boston, New Hampshire



I thoroughly enjoyed the article. The reference to “Art Du Trait” brought back some fond memories. Here in the U.S., we call that art “De-

Continues on page 12 ...

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scriptive Geometry,” which I studied many years ago. Contact your local community college for available classes. The sawing and fitting is remarkable and takes a steadier hand than mine.

George Hojnacki
Commerce Township, Michigan

Aluminum Cutting Tip

I know I’m a little late reviewing your presentation on cutting aluminum with a router [“Tabletop Fire Pit,” June 2018]. I own a company that fabricates aluminum products, mostly truck bodies. We have been using woodworking machines for well over 30 years.

Whenever you cut aluminum, you are creating a fine dust, not unlike wood, and this dust will find its way into the motors of your machines

and short them out. For years, we just figured it was the cost of using such an economical machine — until about eight years ago, when we discovered a simple trick of covering the end of the motor with a form of insulation. We use a synthetic type, but you could even use regular fiberglass. Just wrap a piece of it around the motor end where the air goes in to cool it and hold it in position with, say, a hose clamp. It’s not pretty, but we have not had to purchase a router or 12” miter saw in years.

Joe Messmer
Edgewood, Kentucky

Band Saw Praise

As a retired metalworking machine tool sales manager of some 40-plus years, I wanted to comment on the article

by Mr. Nagyszalanczy [Tool Tutorial, October 2018].

All of the principles he defined were accurate and provided good points for selection, application and care required in using such a machine. A point such as “a minimum of three teeth in the workpiece” at all times is the same for cutting steel or other such materials. The fewer the teeth, the faster: the less time it takes to make the cut.

Since I retired in 2005, I have become a woodworker as well, and the transition from working with metal all those years to wood has been very easy from the tool standpoint.

I love your magazine.

Bruce B. Klassen
Fort Myers, Florida



READER PROJECTS

Scrap Wood Tool Chest

Just wanted to share a tool chest that I recently built with my own design from some scrap pieces in my shop.

Doug Chasse
Kittanning, PA

First Try with Live Edge

My German grandfather was a cabinetmaker. The genes went to work, and I made my first piece of furniture in eighth grade shop class. For a long time, I thought antique reproductions were the thing to make. Then, about the time “free edge” pieces started showing up, a builder friend gave me a walnut tree from a lot he was clearing. I harvested it, had it slabbed and ended up

with some really pretty pieces of wood. The first use of the wood was to make some coffee tables (one for the builder also). I thought you might enjoy the photo, below. The “key” in the middle of the crotch is there to stop a slight split from growing.

Ed Willer
Raleigh, North Carolina



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TRICKS OF THE TRADE

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Router Guide Bushing Organizer

I've discovered that an inexpensive plastic cutlery tray is a tidy way to organize my collection of router guide bushings. Strips of 3/4" stock cut to size and counter-bored with a 1 1/4" Forstner bit are perfect holders for all different sizes of guide bushings. The tray's end compartment is also handy for keeping collets and wrenches. I store the locking rings for the guide bushings on end behind the bushing holders so they're easy to grab.

Serge Duclos
Delson, Quebec

Ball-and-Dowel Push Stick

Sometimes typical push sticks don't work for certain cuts, particularly when I'm feeding thin workpieces along the router table fence or making narrow rip cuts at my band saw. In these situations, I'll often reach for a dowel-style push stick instead. Mine are simple to make and comfortable in hand: I drill a hole into a large wooden ball you can find at craft stores and glue a length of dowel into it.

Dan Martin
Galena, Ohio



Clogged Abrasives Need a Little Sole

When your sanding abrasives get clogged with sawdust and resin, it reduces their effectiveness. But, don't just throw the sandpaper away. Oftentimes you can clean up the disc, belt or drum for re-use, and there's an easy way to do it with an old rubber-soled shoe. Run the sander, holding the edge of the shoe's sole firmly against the abrasive, and watch the debris disappear. Works great!

Daniel Brenneman
Westville, Oklahoma



Office Supply Nailing Guide

Here's a guide for your brad or pin nailer that can help you drive nails in a straight line — and you've probably already got it in your desk drawer. Just attach a large paper binder clip to the bottom edge of your nail gun's magazine. You can slide and position it anywhere along the bottom of the magazine to allow for various nailing distances. It's got more than enough tension to stay in place and, while

it does interfere with loading nail clips, it can be quickly and easily removed and repositioned.

Jim Wilson
San Marcos, Texas

Caster Release Tool

I agree with a fellow reader from the August issue ("Better Bench Casters") that swiveling, locking casters are the way to go — I've added them to all of my tool carts. The only negative is that, when unlocked by hand, they can spring back and snap against your fingers. It's not a terrible feeling, but still uncomfortable. Here's a tool I've made that allows me to unlock the casters quickly without having to bend over. I used a block of scrap hardwood, a 4'-long, 1 1/8"-dia. wood dowel and a 5/16" closed eye hook. The dowel is mounted at a 55° angle in the block. Tipping the tool backward, with the block braced against the floor, unlocks the casters easily.

Michael R. Long
El Paso, Texas



PICK OF THE TRICKS



Simple Arc-drawing Jig

Bending a batten is one way to draw arcs of various curves, but here's another method I find even easier to use. Just fasten two long, thin scraps together with a bolt and lock knob to form an adjustable angle, similar to a giant bevel gauge. Once you've determined the span of the arc you need and its height, nail a brad at each end of the span and mark the arc's

height at its centerpoint. Now, set the arms of the jig against the brads and lock the apex of the jig at the height mark. Holding a pencil against the jig's apex and the arms against the brads, slide the jig from one brad to the other, and you'll draw a perfect arc.

Tom Flader
Fond du Lac, Wisconsin



In addition to our standard payment (below), Tom Flader of Fond du Lac, Wisconsin, will also receive a **Milwaukee Tool M18 Fuel Barrell Grip Jig Saw** for being selected as the "Pick of the Tricks" winner. We pay from \$100 to \$200 for all tricks used. To join in the fun, send us your original, unpublished trick. Please include a photo or drawing if necessary. For your chance to win, submit your Tricks to Woodworker's Journal, Dept. T/T, P.O. Box 261, Medina, MN 55340. Or send us an email: tricks@woodworkersjournal.com

Safety First Learning how to operate power and hand tools is essential for developing safe woodworking practices. For purposes of clarity, necessary guards have been removed from equipment shown in our magazine. We in no way recommend using this equipment without safety guards and urge readers to strictly follow manufacturers' instructions and safety precautions.

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QUESTIONS & ANSWERS

Butterflies and Batteries

THIS ISSUE'S EXPERTS

Tim Inman is the owner of Historic Interiors (restoration and reproduction) and author of *The Art of Classical Furniture Finishing*.

Chris Marshall is senior editor of *Woodworker's Journal* and the author of several woodworking books.

Contact us

by writing to "Q&A,"

Woodworker's Journal,

4365 Willow Drive,

Medina, MN 55340,

by faxing us at (763) 478-8396

or by emailing us at:

QandA@woodworkersjournal.com

Please include your home

address, phone number and

email address (if you have one)

with your question.

Q I have a large piece of live-edge cherry that I want to make into a coffee table. It has been cut and stored for more than 10 years. There are a few cracks opening up on the end, and I was going to use a bow tie/butterfly joint. I am going to ask an Amish friend to run it through his thickness sander because of the hills and valleys from where it was cut on a portable sawmill. It is about 2½" thick, and it might need an eighth inch or more taken off to get it smooth. Would you put it through the thickness sander first and then do the joint, or do the joint first? Does it matter?

Duane Bailey
Bland, Virginia

A Functionally, I don't think it really matters whether you put the butterfly in before or after surfacing. What does matter is that this wood is showing you it is full of internal stresses and is moving! Why? Wood that thick takes forever to dry and equalize all the way to the core.

If this is an important project, you might consider taking out a small core drilling near the center of the wood which, if measured quickly, can tell you the estimated moisture content (EMC) at the center of the piece. You must be ready to test that core immediately,



though! I would use an electronic moisture meter to do the test. There are other ways, but not for here. Once you know the EMC, the core can then be replaced and bonded with epoxy almost invisibly. A little art from your brush and box of pigments, and nobody (but you) would be the wiser — except you will be much wiser, and you will know what you are working with.

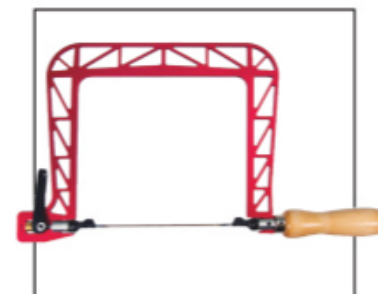
If the EMC is "normal" in the center as well as the outside, then I would trust the butterfly to be strong enough to hold. If not, then nothing short of steel will ever hold. Even then, the steel will hold, but the wood will just crack someplace near the butterfly and away you go again. So, put the fix in whenever you feel led, but don't feel confident in your repair, unless you know the EMC is the same inside and out.

— Tim Inman

Q I read with much interest your August 2018 article on cordless drill/drivers [*Tool Tutorial*]. With few exceptions, there is nothing like the convenience of the current (no pun intended) line of battery-powered tools. However, I am not ready to put a tool with remaining life in the trash because the manufacturer no longer supports the original battery chemistry. Have third-party suppliers filled this gap with lithium-ion batteries that are compatible with a tool designed for NiCad power?

— Tim Babcock
Blairsville, Georgia

A I can understand your plight, Tim. You've got an older NiCad tool that still works fine, but those infernal batteries are worn out. Trouble is, buying



Winner!

For simply sending in his question about when to make a butterfly joint, Duane Bailey of Bland, Virginia, wins a **Knew Concepts Coping Saw.**

Each issue we toss new questions into a hat and draw a winner.

the NiCad replacements, if they are even still made by the tool's manufacturer, is expensive. You rightly point out that lithium-ion batteries offer many advantages over NiCad: they're lighter weight, more compact and hold their charge much longer than NiCad will. Why

not "trade up" to the next generation of cell chemistry? It seems like a smarter move than sticking with NiCad.

I wish it were that simple. Here's one explanation for why it isn't: lithium-ion tool batteries and their internal electronics are designed to work together with more

sophisticated electronics than your NiCad tool probably has. That's especially true for cordless tools with brushless motors, because these "smarter" motors are interacting with the battery constantly during use. The battery electronics also interact with the charger, which

Continues on page 18 ...

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STUMPERS

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What's
This?



According to Robin Porter of Jackson, Michigan, "My son has this gizmo we can't figure out." Can you? Send your answer to stumpers@woodworkersjournal.com or write to "Stumpers," Woodworker's Journal, 4365 Willow Drive, Medina, MN 55340 for a chance to win a prize!



Woodworker's Journal editor Joanna Werch Takes compiles each issue's Stumpers responses — and reads every one.

The mystery tool from our October 2018 issue, belonging to **Ray Consilvio** of Croton-on-Hudson, New York, "looks like a bottle capper or corker," said **Randy Waldrip** of Metamora, Illinois. "The bottle capper would be smaller, as the corker would be tall enough to fit a wine bottle under the plunger," said **Bruce Dumelin** of Hinesburg, Vermont.

Uses? **Randall Wood** of Cockeysville, Maryland, says, "homemade ketchup." **Victor Frausini** of Waterford, Connecticut, guesses, "probably used by moonshiners." **Larry White** of Delta, Colorado, remembers that, "We'd make homemade root beer." And **Jim Davis** of Charlottesville, Virginia, said, "looks like what my dad used to put the caps on his good ol' homebrew."

Back to the tool, which is most likely "a vintage French style wine bottle corker," as identified by **Ben Hughes** of Red Bluff, California. "Looks like it might be missing the part that the bottle would sit on," said **Barbara Eiler** of Wallace, North Carolina. That little pad, says **Pete Brown** of Gambrills, Maryland, "attaches where that little metal toe is sticking up." Then, said **Rebecca Kelly** of Towson, Maryland, "The

Winner! Rebecca Kelly of Towson, Maryland, wins a **Wagner Meters Orion 930 Moisture Meter**. We toss all the Stumpers letters into a hat to select a winner.



Feeling thirsty? This tool seems to have been used for a bevy of beverages — plus some condiments.

pedal at the bottom would press the bottle upwards to hold it in place during corking."

To use the tool, said **Norm Skrenes** of Meridianville, Alabama, "You would place a bottle in the tray, insert a sterile bottle cork into the neck, adjust the length of the plunger using the screw, and press the cork into place by pressing down on the lever." The cork, said **Rich Owczarzak** of Rochester, New York, "is squeezed down so small that once it enters the bottle, it expands completely, sealing your choice of spirits."

That might be the home-made wine from **Ralph McNabb** of Livonia, Michigan's Ukrainian immigrant grandparents, the apple cider from **Charles Kuney** of Renton, Washington's grandfather's orchard, or another choice. Although Pete Brown does note: "After all, the fun is in removing the cork, not in putting it in."



QUESTIONS & ANSWERS CONTINUED

is designed specifically for lithium-ion, so it can monitor and replenish them more efficiently, cell by cell.

Three years ago, DeWALT came out with an adapter that attaches to its 20V Max* lithium-ion batteries to retrofit them to older DeWALT NiCad tools with post-style battery packs. RYOBI's One+ 18-volt, post-style lithium-ion batteries also retrofit to older NiCad RYOBI tools. However, most tool companies are phasing entirely out of NiCad and don't offer lithium-ion battery upgrades that fit their older NiCad tools.



If replacement NiCads might still work for you as an option, but you're having trouble finding the specific batteries, Batteries Plus Bulbs offers quite a selection of replacement tool batteries for 25 different tool brands on their website (www.batteriesplus.com). The site also claims that technicians in these stores can rebuild older tool batteries. I'm presuming this means they can swap out the internal cells with new ones of the same chemistry and use the original battery case. I'm not sure if that means lithium-ion cells could be substituted for NiCad cells, but it's certainly worth exploring.

— Chris Marshall



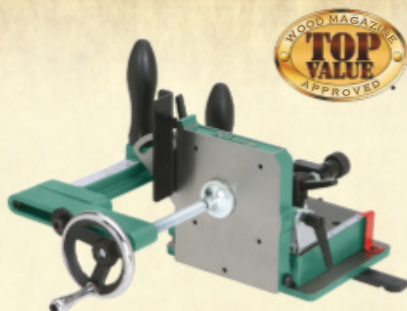
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- Footprint: 20 1/2" x 20 1/2"
- Approx. shipping weight: 550 lbs.



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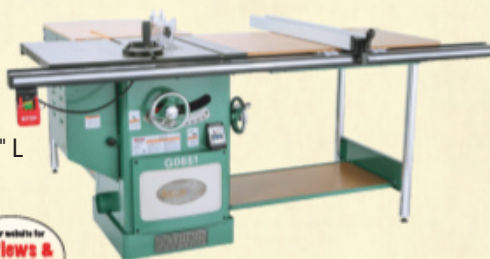


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- Motor: 3 HP, 220V, 13A, single-phase
- Precision-ground cast iron table w/ extension: 27" W x 75 3/4" D x 34 7/8" H
- Arbor: 5/8"
- Arbor speed: 4000 RPM
- Max. dado width: 3/4"
- Capacity @ 90°: 33 1/16", @ 45°: 2 3/16"
- Max. rip capacity: 52" R, 18" L
- Approx. shipping weight: 702 lbs.



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- Amps: 16A at 110V, 8A at 220V
- Precision-ground cast-iron table with wings measures 40" W x 27" D
- Table height: 34" • Arbor: 5/8"
- Arbor speed: 3850 RPM
- Capacity @ 90°: 3 1/8"
- Capacity @ 45°: 2 3/16"
- Cutting capacity: 30" right, 12" left
- Overall size: 62" W x 39" D x 48" H
- Footprint: 20 1/2" L x 19 1/2" W
- Approx. shipping weight: 416 lbs.



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- Precision-ground cast iron table with extension measures: 27" x 74 3/4"
- Floor-to-table height: 34"
- Arbor: 5/8"
- Arbor speed: 4300 RPM
- Max. dado width: 1 3/16"
- Capacity @ 90°: 3 1/8", @ 45°: 2 3/16"
- Max. rip capacity: 50"
- Approx. shipping weight: 557 lbs.



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10" CABINET LEFT-TILTING TABLE SAW WITH RAILS & EXTENSION TABLE

- Motor: 3 HP, 240V, single-phase, 3450 RPM, 14A
- Precision-ground cast iron table with extension: 74" W x 27" D
- Cutting capacity: 8" L, 53" R of blade
- Maximum depth of cut @ 90°: 3"
- Maximum depth of cut @ 45°: 2 1/8"
- Footprint: 20 1/2" x 20 1/2"
- Approx. shipping weight: 550 lbs.



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12" EXTREME TABLE SAW

- Motor: 5 HP, 220V, single-phase, 18A
- Precision-ground cast-iron table
- Floor-to-table height: 35 3/4" • Blade tilt: Left, 45°
- Arbor: 1" • Arbor speed: 3600 RPM
- Max. dado width: 3/4" • Max. rip capacity: 52"
- Table size with extension: 69 1/2" x 78 3/4"
- Capacity @ 90°: 4", @ 45°: 2 3/4"
- Overall dimensions: 91 1/2" W x 79 1/2" D x 42 1/2" H
- Approx. shipping weight: 854 lbs.



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Warped: Name the Distortion

Three unavoidable conditions: death, taxes and wood movement.

Every time a board is sliced away from a log, there is a chance it will distort — either from internal stresses developed while growing or as the fibers shrink as the board continues to dry. A flat, straight board can become anything but. Identifying the specific defect can help a woodworker make the most of the stock in hand.



1. What's in a name? To say that your board has “warped” is not really very descriptive nor useful. There are specific names that help us understand what type of movement is occurring, and that helps to define how to deal with the distortion. The bad news is that these conditions are not rare. The good news is that once a piece of wood gets to about a 12% moisture content, the gross movement stops — it has “stabilized.”

2. Our first term is “cup.” This is most common in flat or plainsawn lumber. The board stays reasonably flat in its length, but it curves across its width, away from the heart of the tree. Simply put, there is more shrinkage on one face of the board than the other. Once the wood stabilizes, use a jointer to flatten the face opposite the crown of the cup. Then run the board through a planer.

3. “Bow” describes a board that is flat across its width but curves in length: like a classic bow that powers an arrow. Once this board reaches equilibrium, the best way to make use of it is by cutting the board into very short pieces. The short length lessens the effect of the bow. You will still need to prepare the stock to be useable, but by starting with the short pieces, more material will remain useable.

4. “Spring,” often called “crooked,” means the board faces are flat in length and width, but from above the edges look a bit like a stream meandering around a bend. To produce the most material from this distortion, cutting the board to shorter pieces is again a first step. Then, straighten an edge, on a jointer or with a straight-line jig, so you can complete your stock preparation.

5. A “twist” is just what it sounds like. The board curves both in length and width, a bit like a corkscrew. This is perhaps the worst of all the possible distortions, and there is little to do to salvage a large, twisted board. You can, of course, chop it into small enough pieces so that the distortion is not evident (and there is always the fireplace or woodburning stove).



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SHOP TALK

American Craft Collection's 25th Anniversary

All photos: Courtesy of the Clinton Presidential Center



"It's Magic"
by Frank E. Cummings III



"Beau Couple" from the Chaos and Order Series by Mary Ann Toots Zynsky

White House Collection is on Display Again

The White House Collection of American Crafts: 25th Anniversary Exhibit," is on display for the first time in 18 years until March 31.

The collection features 73 works created by 78 American artists, who ranged from emerging to established in the 1990s. Among those artists are woodworker Sam Maloof and glass sculptor Dale Chihuly. Clay, fiber and metal works are also represented.

Assembled in 1993, the year designated "The Year of American Craft: A Celebration of the Creative Works of the Hand," by a Joint Resolution of Congress and a Presidential Proclamation by President George H.W. Bush, the exhibition debuted during the Clinton family's first holiday season in the White House. Objects were installed in public and private rooms.

The exhibit is on display at the Clinton Presidential Center in Little Rock, Arkansas. For more information, visit clintonpresidentialcenter.org or call 501-374-4242.

"New Beginnings" by Ronald F. Fleming in the Red Room at the White House



"Pierced Geode #336" by Robyn Horn



*"Man in Lion Costume"
by Akira Blount*



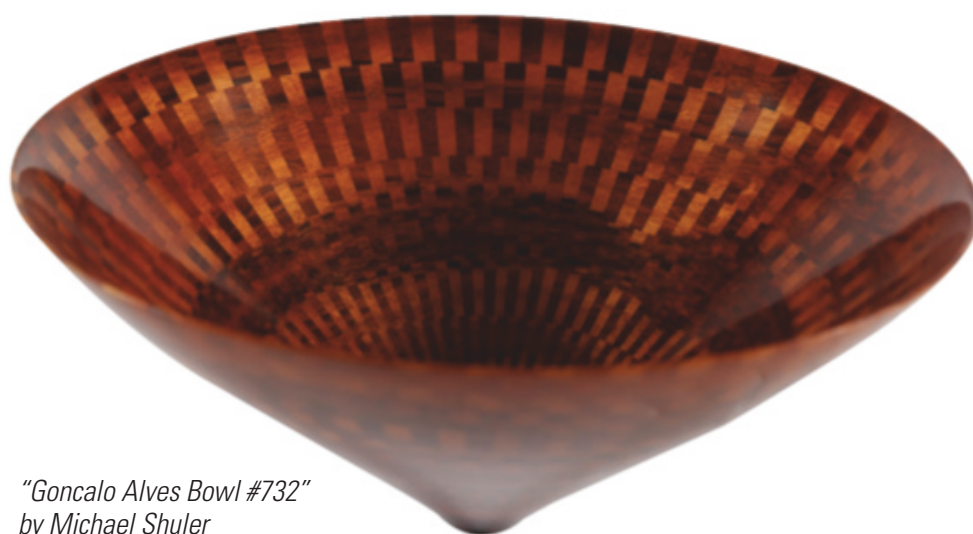
*"White Pine Mosaic Bowl"
by Philip Moulthrop*



*"White Pine Mosaic Bowl" by Philip Moulthrop (top of table) and
"Translucent Wood Bowl" by Ronald E. Kent (bottom of table) in
the Grand Staircase at the White House*



"Imago Bag" by John Littleton and Kate Vogel



*"Goncalo Alves Bowl #732"
by Michael Shuler*



"Translucent Wood Bowl" by Ronald E. Kent



*"Centerpiece Bowl on
Three-Legged Stand"
by Randy J. Stromsöe*

WOODTURNING

Drilling in the Lathe

By Ernie Conover

A lathe is about as good as a drill press at sinking straight, accurate holes.

Need to drill a series of holes with your lathe? See the sidebar on the last page of this article for information on this shop-made jig that helps with that task.



When it comes to woodturning, ironically, drilling is actually a common task. You might need to drill the hole that will accept a new tool in a freshly turned handle, or you might need to drill three or four evenly spaced and correctly angled holes in the seat of a stool to accept the legs that you've turned.

Then there's the process(es) of actually doing the drilling in your lathe. In this article, I'll cover those methods, the types of drill bits that work best for different tasks, plus some shop-made jigs to make things easier.

Drilling in Tail-, Headstocks

What most people think of as "drilling in a lathe" is when the work is mounted on a faceplate or in a chuck, being drilled by a drill mounted in the tailstock. As the work revolves on the headstock spindle, turning the tailstock handwheel advances the drill to the required depth — which is indicated on most lathes by a scale on the quill.

An advantage to this method is that having the work revolving, with the drill stationary, tends to yield straighter holes. Very large holes may be drilled by this method.

When you're drilling holes with a drill press or handheld drill, a cardinal rule is to center punch the intended hole location. This somewhat holds true when you're doing your drilling in the lathe, but rather than center punching, it is better to use the point of a skew to turn a dimple at the exact center. Placing the point of the drill in this depression ensures an exact, on-center start.

A second method of drilling in the lathe is to chuck the drill in the headstock spindle and push the work into this spinning drill with the tailstock ram. This is

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MORE ON THE WEB



For a video on the topic of drilling in the lathe,

visit woodworkersjournal.com and click on "More on the Web" under the Magazine tab.

usually the best way to drill spindle turnings, with some good examples of this being drilling a tool handle or drilling the center out of a pepper mill.

Since either of those two items is turned between centers, the centers would have been center punched during blank preparation. Place the end you want to drill against the drill and catch the other end with the tailstock live center. Starting the lathe and turning the tailstock hand-wheel advances the work into the drill. Holding the work with the other hand prevents it from spinning.

Exercise care to grip the piece farther back than the depth the drill can reach, and keep speeds moderate. If you desire a through hole, you can reverse the piece and push it from the drilled end; however, it may be necessary to turn a tapered plug if you do not have larger cones for your live center.

Pick the Right Bit

As you're employing any method of drilling in the lathe, it's important to pick the right drill bit for the job. Clearing chips is an essential part of the process, and some bits do this better than others.



When drilling in a lathe, use a skew to turn a dimple on exact center to ensure the drill has a clean start.

Still, with any drill, it will be necessary to frequently clear it by backing partially or completely out of the hole, allowing the chips in the flute of the drill to drop away. Don't wait too long to clear, because this can compact the chips so tightly that they do not drop away readily. If you do get into this situation, spraying WD-40® or rubbing some paraffin on the drill can help greatly. (However, I have seen drills so impacted that the workpiece needed to be split with a chisel to recover the drill!) Smaller drills will need to be cleared more frequently than larger ones.

Here's a rundown on some bits and what they're best for.

Auger Bits: Auger bits drill deep holes while readily clearing chips. Only brad-pointed augers should be used in a lathe. While auger bits are available on the



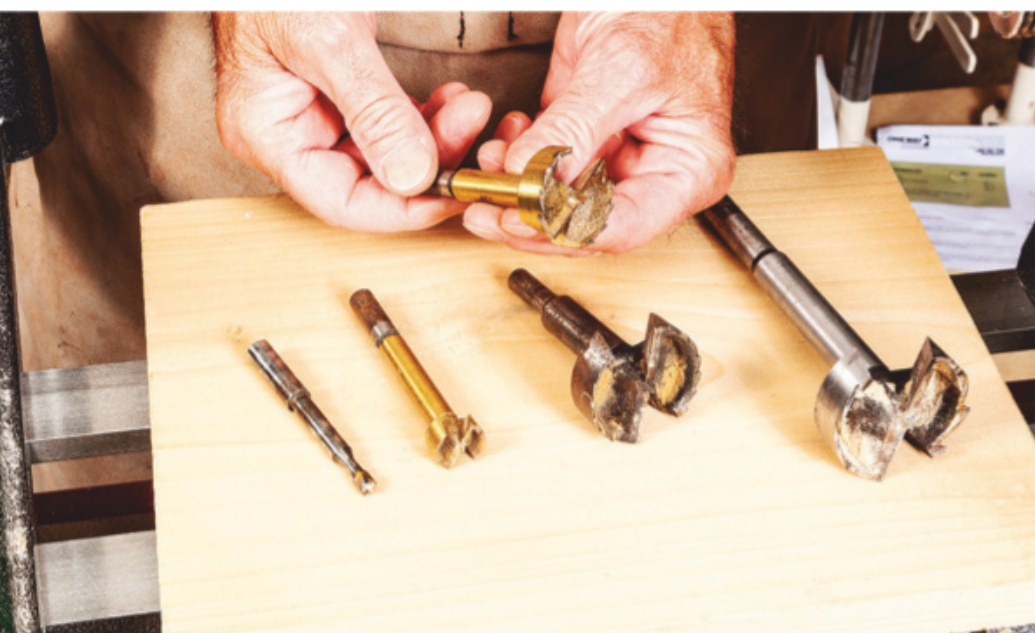
Using a drill mounted in the tailstock quill to drill a piece mounted in a chuck or on a faceplate is the most common lathe drilling task.



Mounting the drill in the headstock spindle and pushing the part into it with the tailstock ram is the best way to drill this blank for a tool handle on the center axis.



Auger bits tend to be the most expensive type of bit, but they drill deep holes quickly and require less clearing.



Forstner bits are perfect for drilling recesses for clock movements or for hollowing forms. They do not work as well on deep holes.



market with a screw point that draws the auger into the work, these are dangerous for lathe drilling.

Auger bits sized at 1/4" to 1/2" will need some clearing, but larger bits need little or none. High quality augers tend to drill deep, straight holes. If you're drilling through the work, drilling until the brad point just comes through, then reversing the piece, leaves very good breakout. Auger bits can easily be sharpened with a warding file.

Forstner Bits: The bits originally patented by Salem, Oregon, gunsmith Benjamin Forstner in 1886 are still a winner today. They cut flat-bottom holes — except for a small dimple at the center left by the short brad point — with extremely clean sides. They are great for cutting perfect shallow holes for watch or clock movements and are available in extremely large sizes. They will quickly remove much of the interior for hollow forms such as the inside of boxes, pepper mills and other containers. Their only drawback is that they do not clear well, thus requiring more and more frequent clearing as the hole gets deeper. End users can sharpen Forstner bits with a rotary tool.

High-speed machinist's twist drills (left) are inexpensive and available in the widest range of diameters of all drills. Brad-point bits (right) are a twist drill ground to a brad point. The author uses this high-speed steel metric set for making metric parts for his wife Susan's Swedish looms.

Machinist's Twist Drills:

Twist drills take two forms: machinist's twist and brad-point. Machinist's twist drills are the most widely used of all drill types; they will cut anything from wood and plastic to steel and concrete. They are most frequently used for metal cutting, so they are generally made from M2 high-speed steel. At diameters up to about 1/2", machinist's twist drills are not only the cheapest of all bits a woodworker could use, but they also offer the widest selection of sizes.

For instance, fractional size twist drill assortments are commonly offered in sizes between 1/16" and 1/2" in 1/64" increments. Number drills, numbered between 1 and 80, cover sizes between the fractional diameters below 1/4". They start at .228" (#1) down to .0135" (#80). Letter drills cover sizes between the fractional diameters from 1/4" to 1/2". An A drill is .234" and a Z drill is .413" diameter. This is somewhat confusing because the number series becomes smaller from 1/4" as the numbers increase, and letter series get larger from 1/4" as the letters increase. Twist drills are also offered in metric sizing, so just about any diameter desired can be obtained. Jigs are widely available to sharpen twist drills.

Brad-point Twist Drills:

Brad-point twist drills are designed to cut wood. If sharp, they cut clean, straight holes

Continues on page 28 ...

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Carbon steel spade bits are available in 1/16" sizing at very reasonable pricing. They are the author's least favorite bit option for lathe drilling.



The author chose a durable hardwood (maple or oak are good choices) to build this drill pad by turning a Morse taper with a 1/2" tenon on the end and gluing it into a disk of wood.



Here, the author is cross drilling a 1"-square blank, using a drill pad. Another option for cross drilling round bars on perfect center, every time, is to make a second pad with a "V" centered in the block.

and do not wander with grain irregularities, although they do require frequent clearing. They are sold in all grades of quality, from carbon to high-speed steel. While machinist's twist, auger and Forstner bits can be user-sharpened, brad-point twists cannot. The carbon steel variety are so cheap that you can throw them away, and high-speed examples can be sent to a sharpening service. Brad-point drills are available in sizes from 1/4" to 1/2" by 1/64" increments and to 1" by 1/16" spacing.

Spade Bits: Spade bits are my least favorite bit type, but they are inexpensive and can be user-sharpened easily. Made of carbon steel, they are sold by 1/16" increments between 1/4" and 1 1/2".

Your Lathe, the Drill Press

So, with all that said, how do you actually turn your lathe into a drilling machine? Well, you can make it into a drill press by making a wood table (or pad) with a Morse taper that mounts in the tailstock, as shown at bottom left.

Choose a hard, durable wood such as maple or oak and turn a Morse taper to size, checking the fit by striping the taper with chalk and turning it in the spindle. Notice where the chalk smears and use a scraper to refine the taper until the chalk smears the length of the taper. Add a 1/2" tenon to the end of the taper and glue it into a 4"-diameter round block of wood. Insert the taper into your headstock spindle and scrape the pad's face flat.

You now have a "drill press" lying on its side; it's just that the table moves up and down, rather than the spindle. To use, center punch the spot you want to drill a hole, slide the tailstock up until you just clear the drill you have selected, turn on the lathe, and advance the quill. This arrangement will not work for heavy or overly big parts, but it works for a host of common drilling jobs.

Then there is the process of drilling the periphery or face of a turning. To drill regularly spaced holes on the face (such as a stool seat) or on the margin (such as a hub to accept the spokes of a wheel), you'll need a jig.

Continues on page 30 ...

Precision lap joints are easy with this jig!



Make torsion boxes, lattice, wine racks and so much more with this easy-to-set up and use Rockler Cross Lap Jig. The jig's indexing key is infinitely width-adjustable for stock ranging from 1/8" to 3/4" thick. Once set, push your cut onto the key and you'll get perfectly-spaced cuts. Just think of all of the projects that could incorporate this sturdy joint and *create with confidence*.

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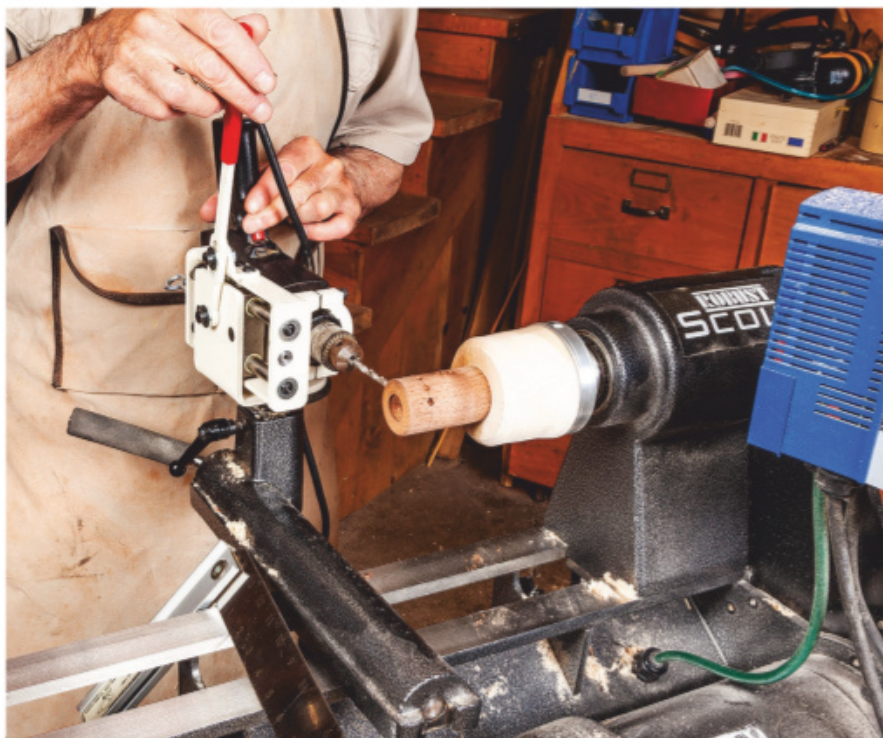
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The Drill Wizard from Oneway accepts most commercial electric drills and places countless holes accurately without wear.

A commercial option is the Drill Wizard made by Oneway Manufacturing in Stratford, Ontario, Canada. It accepts most electric drills and will fit any lathe that accepts tool-rests with 1" necks. Or, you can make a shop-built jig, which I give instructions for below.

Safety Tips

It's important to follow a few safety precautions when drilling on the lathe. First, keep speed moderate (especially with 3/4" drills and larger) when performing any of the

methods I have outlined above. Always use a sharp drill, and clear it often.

When drilling a spindle, always hold well back to the tailstock end, pushing with the tailstock against a drill in the headstock. You want your hand well clear of the maximum depth the drill will reach, should it not drill down the center but rather wander out the side of the turning.

Ernie Conover is the author of The Lathe Book and The Frugal Woodturner.

Building a Drilling Jig

This very simple jig can be made in a few minutes. The upright should be about 1 3/4" wide by 2" deep and about 6" longer than the center height of your lathe. For the 7" center height of this lathe, the author made the upright 12" long; he attached the upright to the base with drywall screws.

To use the jig, find your lathe's center height by inserting a 60° center in the spindle, placing the jig on the bed and dragging it across

the center. Center punch the middle of this line. Now, drill on the punch mark through the upright with a drill press or a drill pad in the tailstock. Drill to the diameter you are going to drill the part to.

This jig, used in tandem with a handheld drill, will drill about 25 holes, but the hole wears bigger and its accuracy will be lessened.



With a 60° center in the spindle, the author dragged the upright portion of the jig across it and center punched the middle of the line this created (photo above). After using this punch mark as a guide to drill a square hole through the upright with the drill pad mounted in the tailstock, he was ready to use the drilling jig (photo at left). The author's Robust Scout lathe has an indexing mechanism in the headstock for spacing holes equally.

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SCROLL SAWING

Scroll Saw: A Serious Tool for a Serious Shop

By Carole Rothman

Which of these are scroll sawn projects? The answer might surprise you!



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To save time and protect fingers, think "scroll saw" when cutting keys for miter slots.

Does a scroll saw sit in a corner of your woodshop, covered by dust, unused and unloved, serving as a storage shelf or coffee cup holder? Do you consider it one step up

from a sewing machine, because it looks like one and relies on hands to position the workpiece and guide the cut?

In the world of tools, where bigger often means better, this small-sized saw gives little evidence of its large-sized capabilities. Because many types of projects can be cut with the scroll saw (a good thing), it's defined primarily by what it can make, rather than by what it can do (a not-so-good thing). As a result, its use as a

versatile shop tool is largely ignored. Here's some information to fill in the gaps and motivate you to dust off, and perhaps even upgrade, your scroll saw.

Scroll Saw or Band Saw?

When making curved cuts, most woodworkers think "band saw," rather than "scroll saw." Both use a variety of blades, and both can make angled cuts of up to 45°. The band saw clearly has the advantage in power and size of stock that can be

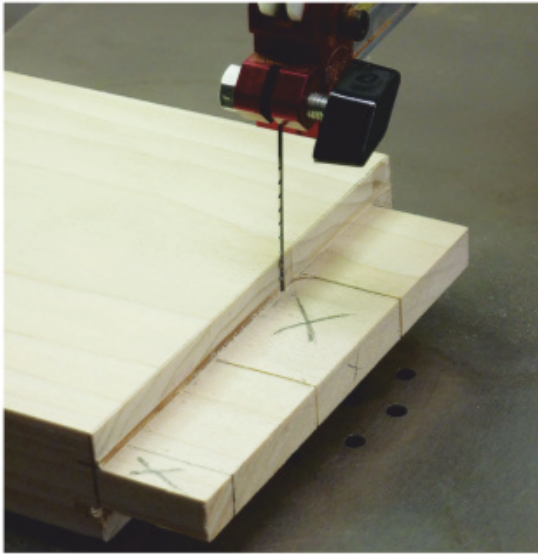
handled. However, it cannot make internal cuts without cutting in from the edge. Even if made with the grain and glued carefully, such cuts remain visible on the sides of the wood. In addition, setup and blade changes are time-consuming, and the sharp blade can inflict damage if handled improperly.

The scroll saw is the tool of choice if workpieces are small or if fingers come close to the blade. Tasks such as cutting keys for miter slots are performed quickly, accurately and safely, requiring only two simple cuts per key.

The scroll saw also makes internal cuts and cutout areas with ease. To cut out an area, drill a blade entry hole, insert the blade, cut along the line, then smooth the edge with a spindle sander.



The scroll saw excels at making internal cutouts, as for this jewelry box insert.



Use a simple corner-cutting technique to create neat, accurate divided tenons.

Additional Uses

The scroll saw can be used to cut the cheeks of a dovetail and to divide a wide tenon into two smaller ones. It can also cut the bottom curve of an apron for a small table or étagère. Use the saw to cut veneer for marquetry or to cut thin stock for double-bevel inlays. Give a box a decorative edge or integral feet, or simulate an inlay on

a lid. You can even scroll a custom chain support.

As if this weren't enough, you can always try a puzzle or other scrolled project, or make one with your child or grandchild. Unlike other power tools, the scroll saw provides a safe and engaging way to introduce a youngster to woodworking.

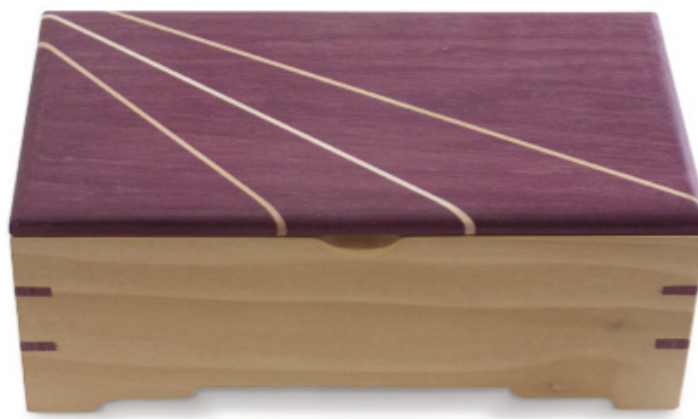
Before dusting off your scroll saw, assess the state of

your scrolling skills.

If they are rusty or nonexistent, bring them up to speed.

Once learned, they can open the door to many fresh and exciting possibilities in your woodshop.

Oh, and the answer to the original question? All of these projects were made with the scroll saw.



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A Krenov-inspired Cabinet for the Shop

By Charles Mak



Knife hinges and an inset door are precise details that elevate your cabinet work to the next level of craftsmanship.

James Krenov was renowned for his elegant cabinet work, and he used mostly knife hinges (custom-made by a small shop) for hanging cabinet doors. In *The Fine Art of Cabinetmaking*, he notes that such hinges “are easy

to fit neatly, and give me a wide choice in the way I fit and hang my doors — which in turn allows me more freedom in composing cabinets and the like.” When I build heirloom quality cabinets, I follow his knife-hinged approach, but I only use double-offset knife hinges because I prefer inset doors, a hallmark of fine cabinetry. The trick to mastering the knife hinge installation is to use a pair of

marking gauges, as you will see.

Here is a Krenov-style cabinet I recently made using mostly hand tools — just like Krenov when he built his — to give a proper home for my spokeshaves and carving chisels. In my spare time, I teach a seminar on knife-hinged cabinets. Here you can learn the basics of my cabinet boot camp without leaving the comfort of home! The only power tool you would need, if you prefer a hybrid tooling approach, is a drill press or a palm router.



Design Considerations

The cabinet is sized at 5" x 12" x 27" — big enough for a dozen tools, but small enough to fit in the wall space I had available. Holders for the shaves and chisels are screwed to the back panel, which can be replaced if the cabinet is reorganized for other uses in the future. I included a middle shelf to provide even more storage space.

When joinery was not a design feature, Krenov often chose dowels to assemble his cabinets. I, too, went with dowel pins for this shop cabinet, and I used a French cleat system so the joint tension won't be in line with the dowel pins when the cabinet is mounted.

Preparing the Stock

Cut all the pieces to their final sizes, except the door and the rear panel



A doweling jig is a modest but valuable investment: it guarantees perfectly centered dowel holes, and you can drill them by hand or with a drill/driver.

(see the *Material List* on page 37). The door is a glue-up of two panels, and it is slightly oversized for final fitting after the carcass is completed. The back panel is cut oversized for the same reason. The next step is to mark out all the workpieces in their proper orientation. Skipping this step is a recipe for all kinds of blunders, similar to gluing up an assembly without any dry fitting.



Lining up the stock for marking with dowel centers can be tricky. A shop-made right-angled brace can help minimize your margin of error.



Select flat, stable stock for the door panel. When gluing it up, clamped cauls can help to level the joint.



Drawing cabinetmaker's triangles ensures that all the parts will go together in the correct orientation, eliminating potential cutting and assembly errors.

Making the Carcass

The carcass consists of the top, bottom and two sides. Here, the top and bottom are joined to the sides with dowels. I used a doweling jig to bore the end grain holes. Make sure the holes are located away from where the rabbet will be cut.

I insert dowel centers into the end grain holes of the side panels to accurately align the workpieces for proper dowel placement. The trick, however, is to ensure the mating boards are flush on the front and on the side as well as being perpendicular to each other. My foolproof solution: use a right-angled brace so the mating boards are held flush and at a right angle when the indentation marks are made, as seen in the photos at right.

Unless you have more than a pair of dowel centers, mark the three dowel holes in each joint in two steps. First, mark and drill for two



The author cut a small notch on a teaspoon to turn it into a prying tool that helps him remove the metal dowel centers more easily.



A pair of dowel pins hold the mating boards in place while a dowel center precisely marks the middle dowel's location in the joint.

of the dowels in the joint parts, then dry assemble the joint with dowels so you can mark for the last dowel placement with one of your dowel points.



You can drill out the stopped rabbet's waste, or hog out some of the waste with a rabbet plane (top) before chiseling the ends. Clean up the rabbet's bottom with a paring chisel or a router plane (left). Using a palm router skips these steps.

are cut, drill holes for shelf pins before a dry assembly. Then cut the rear panel to the exact size of the back opening. Set the carcass aside for now.

Cutting the Rabbets

To recess the back panel, cut through rabbets (3/8" wide x 5/8" deep) on the cabinet sides and stopped rabbets on the top and bottom pieces. I rabbeted the sides with a skew rabbet plane and the top and bottom with a router plane and chisel. I have included a few rabbeting tips in the *sidebar* "Using a Rabbet Plane," found on page 38.

You can, of course, cut all the rabbets with a router or remove the bulk of the waste on a drill press, then chisel them the rest of the way. Once all the rabbets

Installing the Door Hinges

To install the door hinge leaves (the ones with pivot holes), first clamp the door vertically with the front face toward you in a vise. Center the hinge leaf, making it flush with the door's end, and scribe out the perimeter of the hinge with a marking knife. Use a pair of marking gauges to complete the front and back edges of the hinge mortise. Keep the gauge settings, as you'll use them again to mark out the carcass hinges later.

Chisel or rout out the hinge mortise to depth. Finally, drill pilot holes for the hinge screws before installing the hinge leaf. Repeat the same process for installing the other door hinge leaf.



Check the dry-assembled carcass for squareness — the author uses both a tape measure and a square for this job. Then trim the rear panel for a snug fit in the back rabbets.



Center the hinge, butt it flush with the door's edge, and scribe the end of the hinge leaf.



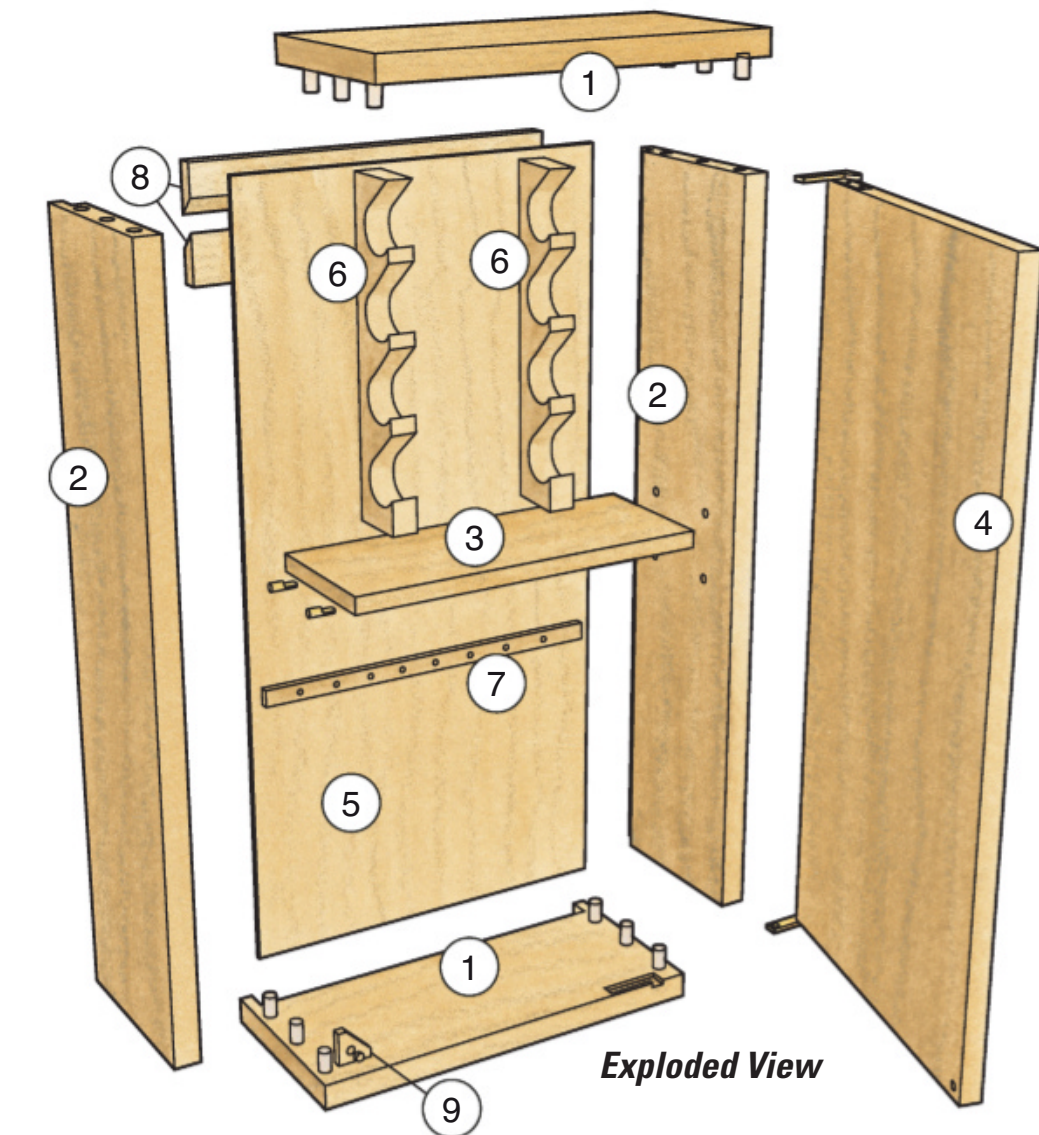
Carefully mark out where the hinge's elbow crosses the edge of the door.



Make knife marks to register the front and back edges of the hinge leaf before removing it from the door panel.



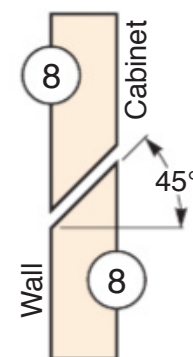
Set the two marking gauges a hair narrower than the hinge knife marks in order to define the mortise lines.



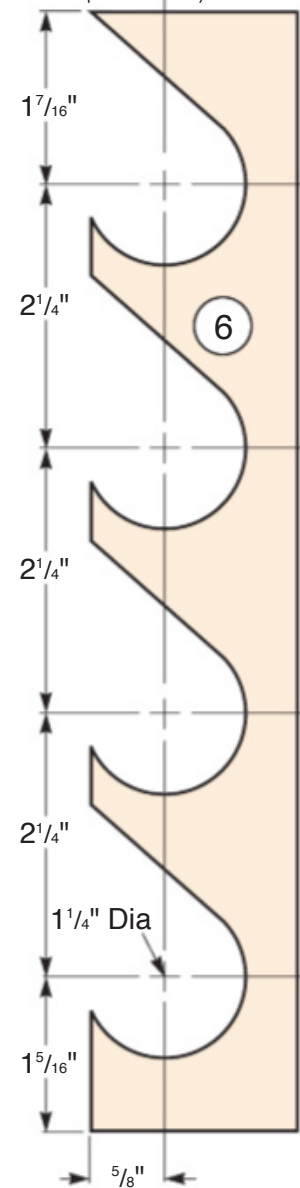
MATERIAL LIST

	T x W x L
1 Top and Bottom (2)	3/4" x 5 1/2" x 12"
2 Sides (2)	3/4" x 5 1/2" x 22"
3 Middle Shelf (1)	1/2" x 4" x 10 1/2"
4 Door (1)	5/8" x 10 1/2" x 22"
5 Back Panel (1)	1/8" x 11 1/4" x 22 3/4"
6 Spokeshave Holders (2)	3/4" x 1 3/4" x 9 1/2"
7 Chisel Holder (1)	1/4" x 1 1/2" x 10 1/2"
8 Cabinet and Wall Cleats (2)	1/2" x 1 1/2" x 11 1/4"
9 Door Catch Block (1)	1/4" x 1" x 1"

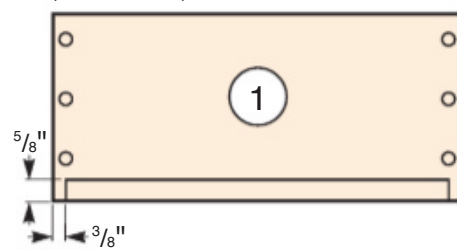
Cabinet and Wall Cleats (Side View)



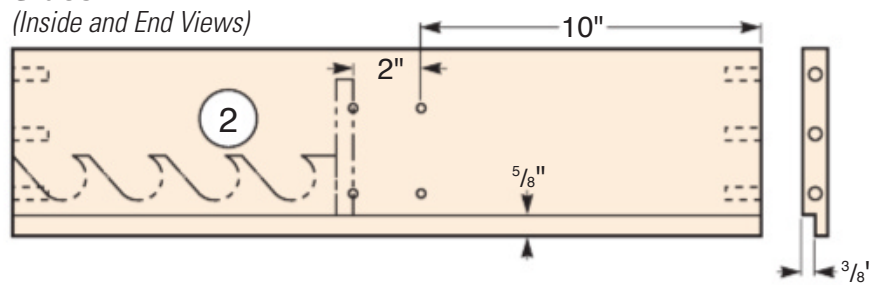
Spokeshave Holders (Side View)



Top and Bottom (Inside View)



Sides (Inside and End Views)



A pair of scrap blocks clamped to the door support the thin mortise walls during chiseling.



When chopping, always finish the cross-grained end first to avoid splitting the wood.



Mark for the hinge screws with a self-centering Vix bit, and drill their pilot holes. The author bores them by hand.



Set and scribe the carcass hinge slightly away (1/32" here) from the hinge side wall. A plastic gift card makes a handy spacer.



The marking gauges, previously set for the door hinge leaf, are re-used to mark the mortises on the carcass.



A palm router will get the mortises cut in no time, but careful chisel work keeps one in tune with Krenov's methods.

Installing Carcass Hinge Leaves

The carcass-side hinge leaves are the ones that have the pins and washers on them. The pin hinge leaves are to be mounted slightly away from the hinge side to leave a gap between the side and the door. For most cabinets, I set a gap of about 1/32", which is about the thickness of a plastic gift card.

With the carcass still clamped in place, insert a gift card between a pin

hinge leaf on the bottom piece and the side where the door is to be hung.

Hold down the pin hinge leaf and scribe across the end of the hinge, and also across the elbow, to mark the hinge location from the side.

The next step is to mark the pin leaf location from the front face with the two marking gauges used in the door hinge steps. After mortising the hinge recess on the bottom, drill for screws and install the pin hinge leaf. Repeat the same steps to install the other hinge leaf.

Using a Rabbet Plane

- Start the cuts from the far end of the stock in short strokes. Lengthen them progressively until you can make full-length passes.
- Place your non-dominant hand on the fence rather than on the front knob, which is used only when making scoring cuts across grain.
- Set the blade for lighter cuts, especially if cutting against the grain.
- Remove the shavings often and wax the sole to reduce friction.



Begin at the far end with short forward strokes, extending them progressively until eventually you are making full-length strokes along the edge.



Hold the fence tight to the work and extend your index and middle fingers forward to prevent tilting the plane as you push it.



Remove any dents with a clothes iron and wet rag — a step that should be done before final surface planing or sanding.



Clamp the spokeshave holders together, and rasp or hand-sand them to a uniform shape. This small detail will give your work a neat look.

Gluing Up and Installing Holders

Inspect the cabinet parts for any dents that might have occurred during the construction process, and fix them before final assembly. They're usually easy to steam out with a household iron and damp rag. Glue up the carcass (but not the rear panel), and install the door temporarily. Here is my secret to getting a perfect side reveal on cabinet doors: Close the door and trace along the inside edge of the side to find out how much to trim the oversized door for the reveal. Depending on the seasonal wood movement in your setting, a reveal of 1/32" to 1/16" is about right. You can, of course, unhinge the door and shave more off later, if it expands across the grain.

I use a wooden strip with rare-earth magnets glued to it to serve as a chisel holder. Screw it to the lower part of the rear panel. An elegant way to display the spokeshaves is to hang them between two slotted posts, which are likewise screwed to the rear panel. These are just ideas, of course, because how you parcel out the internal areas of the cabinet will depend on the hand tools you plan to display.

Finishing Up

Ease all the sharp edges if you prefer, and apply finish before assembling everything. When the finish cures, install a door catch and knob. *Voila!* You have just completed



Nail or screw a French cleat to the side rabbets so the cabinet's weight will be supported by the side panels, not the top.

your first-ever handmade knife-hinged cabinet. Now choose just the right wall space for it — a task that can take as much deliberation as the building process! Install the cleats, and hang up a cabinet that Krenov himself would be proud to see!

Charles Mak, semi-retired in Alberta, Canada, is a hobbyist woodworker, tipster, teacher and writer.



After the finish dries, nail or screw the back panel into place. Notice how the rabbeted depth leaves room for recessing a pair of hanging cleats.



Install the bottom door hinge to the carcass, followed by the top hinge.

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Shop-made Marking Knives



By Teresa Audet

Repurpose your saw blades into this useful hand tool for the shop.

A marking knife is a simple tool that every woodworker needs for accurate scribing and cutting of joinery. There is a wide variety of marking knives available, ranging from a \$250 kiridashi handmade by Japanese artisans to a \$10 tool bought on the Internet. Although a high-end blade can be well worth the money, there is a sense of pride that comes from making

and using your own tools. The marking knife outlined in my process is, of course, no comparison to blades made by master craftsmen, but for \$3.50 and a few hours of time, it is a trusted tool that performs well for me.



Some of the author's marking knives are seen in the photo directly above. From left to right: a sheathed kiridashi purchased from a blacksmith in Japan, a knife the author made from a Japanese utility blade, two knives she made from reciprocating saw blades and a small blade made from an old jigsaw blade by the Japanese furniture maker Tak Yoshino.

I was first introduced to handmade marking knives while studying under Tak Yoshino at the Mount Fuji School of Fine Woodworking in Yamanashi, Japan.

Tools required for this project include an angle grinder fitted with a 100-grit sanding disc or flap wheel, a permanent marker, a straightedge, a protractor, a diamond-coated sharpening stone, water or oilstones in 1,000- and 6,000-grit and saw blade "blanks."

Safety First

Ensure proper safety by working in a well-ventilated area clear of any flammable items. Wear safety goggles and a respirator. Wear gloves and use pliers when handling hot blades. Wear nonflammable clothing, such as cotton, and tie back long hair.



Clamp the saw blade you start with securely into a vise while you are removing the teeth and paint from it.

He had made marking knives for his students out of some dull jigsaw blades he had lying around. When it came time for me to teach a class of my own, I decided to make a set of marking knives for my students just as Yoshino-San had done for me.

As blacksmiths are well aware, standard knife making involves a technical process of heat-treating and tempering to very specific degree to ensure strength and Rockwell hardness. For this reason, we will start with a prefabricated steel blade that has already gone through those technical processes in a factory. Blades for a reciprocating saw (Sawzall®), a jigsaw or a band saw work perfectly. To keep its temper, it is important not to overheat the blade as we are shaping it, just as when sharpening a chisel or any other tool.

For a standard sized marking knife, I start with a 6"- or 8"-long reciprocating saw blade that is around 3/4" wide. Use one with smaller teeth, as they are easier to remove and leave you with more material in the end. A great option is an all-purpose bimetal blade that has 10 or 14 teeth per inch. You can also use an old dull blade of any size; use a jigsaw blade for a tiny tool or cut out a blank from a table saw blade for a heavy-duty knife. Stay away from anything carbide-tipped, as it will make the teeth much harder to remove.

Preparing the Blade

The first tool we will use in this process is an angle grinder fitted with a 100-grit sanding disc or a flap wheel. Use extreme caution when working with this

tool and always wear proper safety gear. Clamp the workpiece securely in a metal vise when working. When grinding material, move the tool in slow, steady motions from one end to the other; a rapid back-and-forth grinding motion will create an uneven edge.

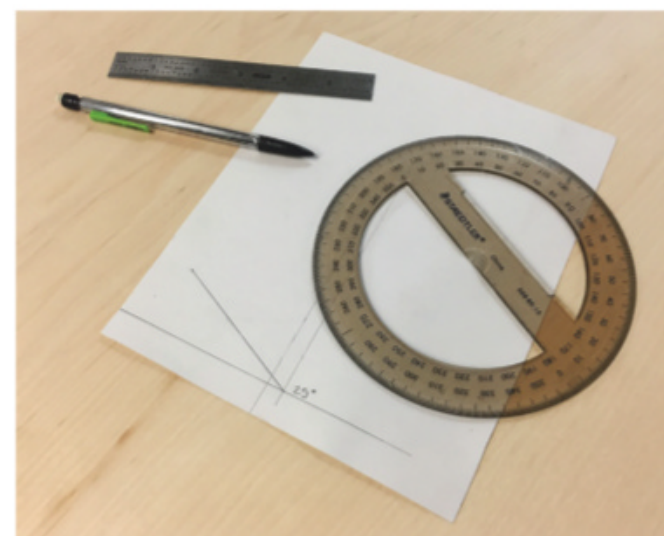
The first step is removing the teeth and any paint or finish from the blade. Be sure to work in a well-ventilated area when removing paint. Clamp the blade in a heavy vise and remove the teeth with an angle grinder. Depending on the length of your blade and the size of your vise, you may need to reposition the blade several times to ensure strong pressure. Once the teeth are removed and the blade is safe to handle, strip the paint or finish from the blade. This can be done with an angle grinder while the blade is clamped in a vise or onto a table, or with the use of chemical strippers or other means of paint removal. Once the blade is free from paint and teeth, we can start to shape the blank into what will become the marking knife.

Shaping the Blade

Start by using a permanent marker to outline the general shape of the blade. If you have an existing knife that you are duplicating, you can trace the angle and shape of the blade directly onto your blank or onto a template. I like to start by making a template out of cardstock with the proper angles cut into it so that I can easily create multiple matching tools.

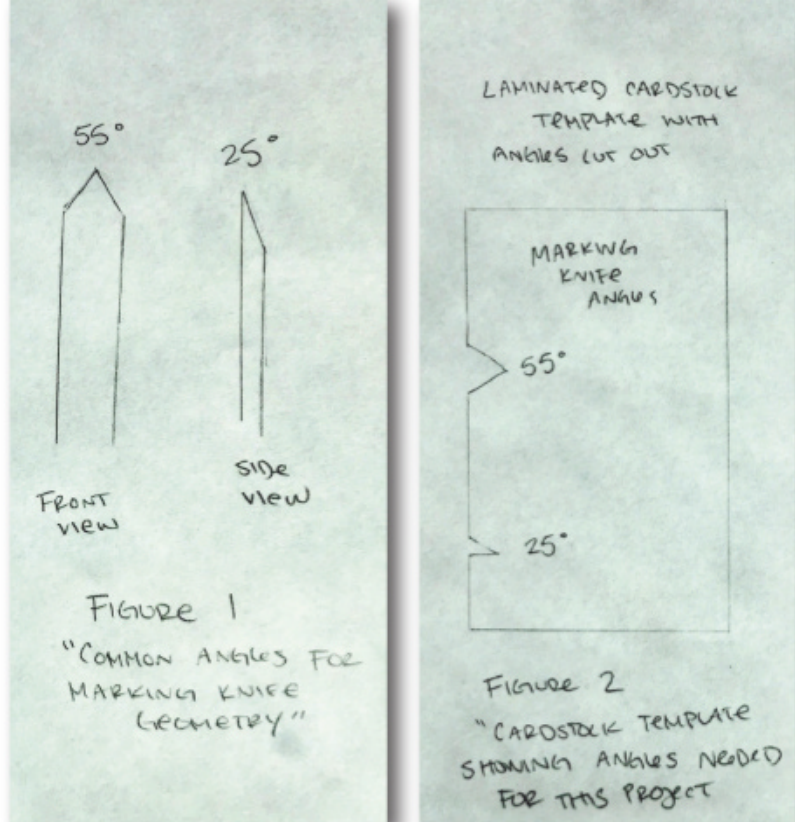


You can trace an existing knife's blade and grind angle onto a cardstock template.



You can also mark the desired angle on cardstock with a protractor, then cut out a template with a utility knife.

During the process of forming and sharpening the blade, it is helpful to refer to a template or guide to ensure the accuracy of the blade and grind angle. Marking knife angles generally range from 55° to 75°, with the angle of the ground edge ranging from 25° to 35°. I've found a 55° angle with a 25° grind makes a great all-purpose tool. Using a protractor, mark the angle on a piece of cardstock and cut it out with a utility



Check the accuracy of the blade angle often against the cardstock template.

The author's drawings show (left) common marking knife angles and (right) the angles needed for this tool.

knife. Laminate the cardstock with clear packing tape to strengthen and keep the template clean. You will now be able to trace your angles directly onto your knife blank material.

Once you've drawn your outline, clamp the blank back in the vise. Using your angle grinder, grind away the blade material down to your lines, leaving a generous border on the pointed tip. Smooth the edges and round over the handle side of the blade using an angle grinder, a belt sander or a file. Your blade should now mostly resemble your desired shape. Hold the tool in your hand to ensure its comfort and smoothness, and take down any rough spots with a file. From this point forward, we will focus on the cutting edge of the blade.

Sharpening Your Knife

The next tool in this process is a bench grinder, just like one that you may use to sharpen your other shop tools with. Wear safety goggles and a facemask as well as gloves while working on a bench grinder. Ensure the flatness of the wheel

using a grinding wheel dressing stick before beginning. It is very important to keep the blade cool while working to avoid overheating and weakening the steel. Any change in color of the steel is a sign that the metal has been compromised and will not hold a sharp edge. Some bench grinders have built-in coolant systems. If yours does not, keep a jar of water near your grinding station and quench the blade tip every few seconds.

Check the angle of the blade using the cardstock template and re-mark if necessary. Grind the tip down to the marked line, checking the angle accuracy often. Once the proper angle has been achieved, check the flatness of each side with a straightedge. Depending on the quality of your grinding wheel, you may have to use a diamond-coated sharpening stone to flatten each side, ensuring the correct angle in the process. Once the sides are flat and true, the next step is to remove material and shape the blade angle.

Leave a generous edge on the tip of the blade when working with an angle grinder. Fine-tune the angle on the bench grinder.



Ensure the flatness of each side of the blade tip using a small square or straightedge.

On the bench grinder, set the guide to the grind angle (25°) with the help of a sliding protractor. Grind away the material in small passes, taking care not to overheat the blade. Use the template you made earlier to check the angle of the blade. Do not remove the blade material down to the very edge at this time, but instead leave a hair's width so that a burr does not begin to develop on the back side. The rest of the process will be done with sharpening stones, so try not to leave so much excess that it will take a long time to remove with a stone.

Sharpening with stones by hand requires intense focus as well as a sensitive touch, so take a few deep breaths before this next process. Find a comfortable body stance and be sure that the height of the work surface does not lead to pain in the neck or shoulders. Find a smooth, rhythmic process, gliding the tool back and forth along the stone. My teacher, Yoshino-San, used to tell us to "put your eyes and ears on the tips of





Set the guide on the bench grinder to 25° and remove material in small passes, taking care not to overheat the blade. Cool it often with water.



Flatten the back of the blade on a diamond-coated sharpening stone. You want the back of the blade area to display consistent markings.

your fingers” when sharpening. This process gets easier with practice, so if you are feeling frustrated at this point, stretch your arms and take several deep breaths before starting again.

Choose a coarse diamond-coated sharpening stone to use first. Applying even and gentle pressure, flatten the back side of the tool until the back of the blade area shows consistent markings. Turn the blade over and focus on the tip edges, next. Sharpen each edge, aiming for one flat surface. Do not yet go all the way to the edge of the blade, as the diamond stone is too coarse and will break the tip on a microscopic level. Check the angle of the edge against the cardstock guide often and, once the tool is flat and true, move to using a series of waterstones.

Starting with a 1,000-grit waterstone, sharpen each blade edge until a burr forms on the back. Move in steady motions, focusing on keeping the blade edge flat against the stone. Once a small burr has formed along the back edge of the blade, move to a finer 6,000-grit stone. Begin on the fine stone by removing the burr on the back side. Use gentle pressure to slide the blade back-and-forth several times along the stone, keeping the length of the blade flat against the stone. Just as before, sharpen each edge of the blade on the fine stone until a small burr forms.

Repeat this process of sharpening the edge, then removing the burr, a total of three times on the finest stone or until the knife’s edge holds a mirror polish. You’ll know you’re done when there’s no burr left on the final finish.

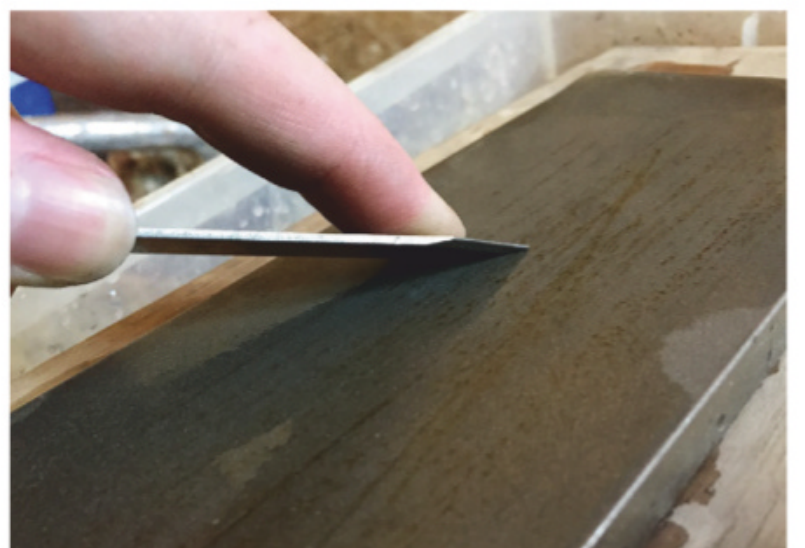
Finishing Steps

The marking knife is complete! Coat the blade with a tool oil such as camellia or jojoba oil to prevent rusting. (Camellia oil, also known as tea seed oil, comes from the seeds of *Camellia sinensis*, the plant that produces the tea we drink. It can prevent rust and lubricate machine parts — and it is also used frequently for cooking in southern China.)

Routinely hone the edge using the waterstones. If used properly and the tip remains unbroken, it will not have to be taken to a diamond stone or grinder again.

You can make a handle for your blade by epoxying wooden scales to the sides of your knife or by wrapping the handle area with leather cord. Make a small sheath out of cardstock, canvas or leather scraps to cover the tip of the blade.

Teresa Audet is a Minneapolis artist and educator working in wood, metal and fibers. She has taught at the Minneapolis Women’s Woodshop and was recently a Studio Fellow at the Center for Furniture Craftsmanship in Maine. Her website is teresaaudet.com.



Sharpen each side of the blade’s edge until a burr forms. Start with a diamond stone and work down to an extra-fine water- or oilstone; there should be no burr on the final finish.

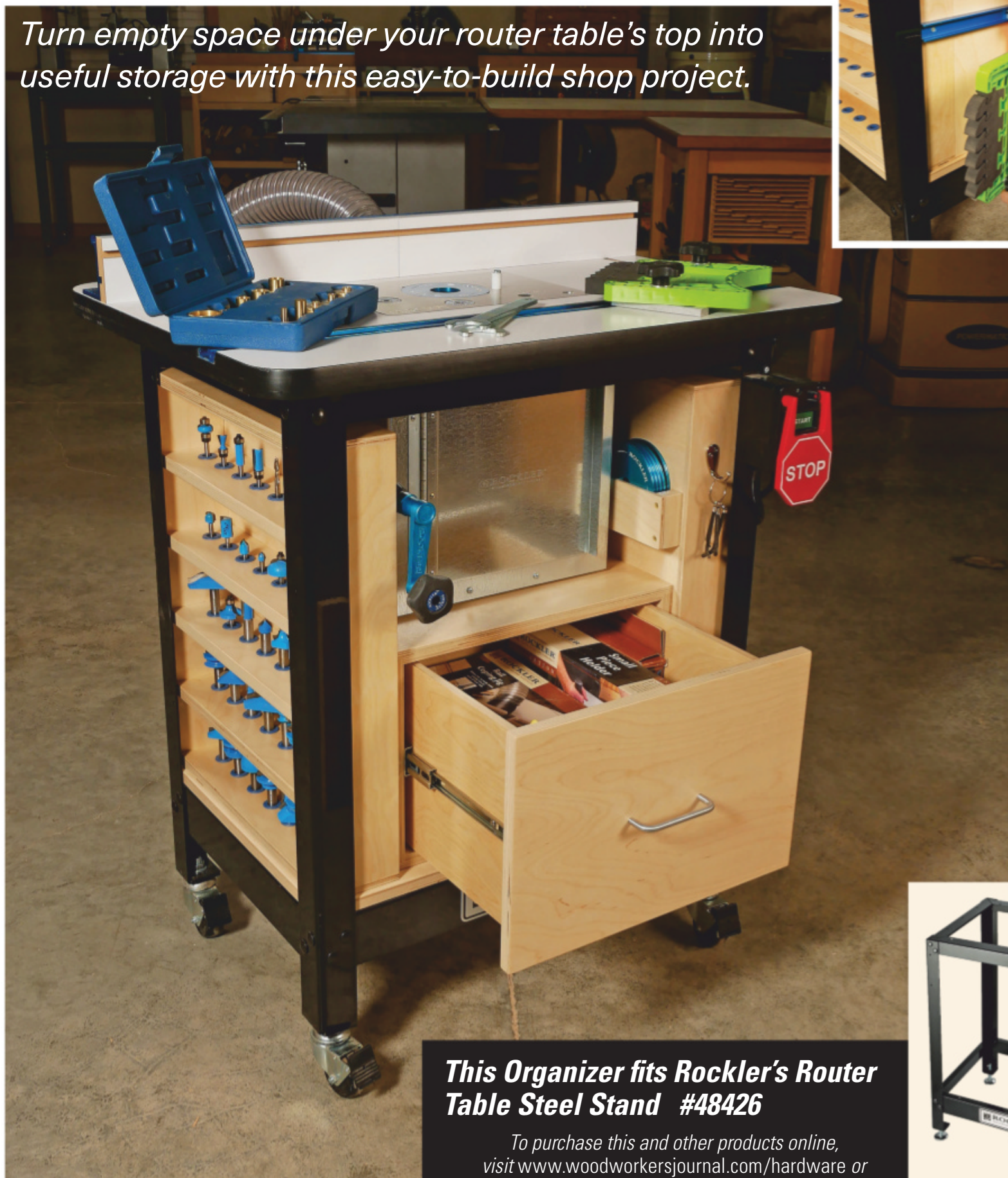


Hone the edge on an extra-fine water- or oilstone until you achieve a mirror polish.

Router Table Organizer

By Chris Marshall

Turn empty space under your router table's top into useful storage with this easy-to-build shop project.



This Organizer fits Rockler's Router Table Steel Stand #48426

To purchase this and other products online, visit www.woodworkersjournal.com/hardware or call 800-610-0883 (code WJ1577).



If the area inside the base of your router table is empty, you're missing an opportunity for better storage. After all, there are accessories that go along with table routing — bits, wrenches, bit insert rings and featherboards, to name a few. You might also have a box joint jig, other boxed sets of specialized bits or guide collars, push pads and various odds and ends that could really use a drawer.

While sizing up my Rockler router table recently, I set out to give that empty “real estate” under the tabletop more productive purpose. Made of 1/2" and 3/4" Baltic birch plywood, this organizer provides a catchall drawer, a place to stow necessary tools and two racks that can hold 70 router bits. A metal track in back (see inset, above) offers a spot to hang featherboards when they're not needed. The project's design

is modular, too: the base, drawer cabinet and two bit racks can slide into place without having to take the router table's base apart.

Building the Center Drawer Cabinet

Let's kick this project off by cutting the drawer cabinet's top, bottom and sides to size. You'll notice in the *Drawings* that the top and bottom panel require 3/4"-wide, 3/8"-deep rabbets milled into their ends to fit the side panels. Cut those rabbets now with a wide dado blade buried partially in a sacrificial fence at the table saw.

Dry assemble the top, bottom and sides so you can take final measurements for the back panel — it simply butts against the back of the cabinet rather than fitting into it. Cut the back panel to final size.

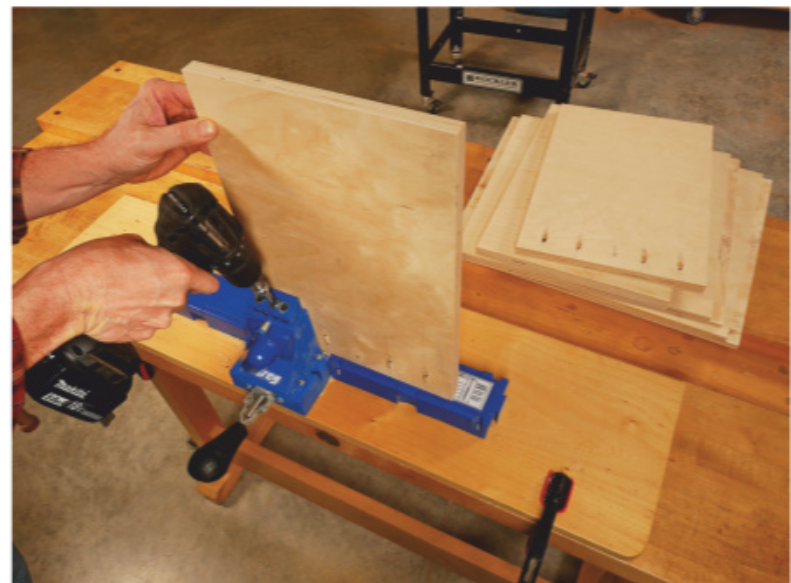
I decided to install the cabinet back using pocket screw joints, so I bored four holes into the inside faces of each cabinet side for this purpose. If you don't have a pocket screw jig, you could attach the back with brads, screws or even glue alone, if you'd rather not see fasteners. Give the cabinet part surfaces a light sanding, then spread glue along the top and bottom panel rabbets, and assemble the carcass with clamps.

When the glue dries, attach the cabinet-side drawer slide components to the side panels with screws. Center them vertically, making sure they're parallel with the cabinet top and bottom so the drawer will slide smoothly. A couple of scrap spacers can make this process easier and more foolproof than aligning the hardware by measuring.

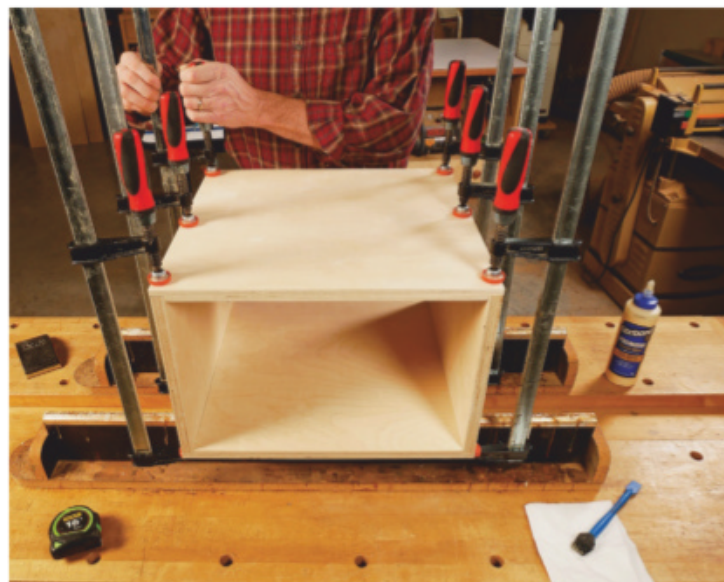
Install the back panel on the cabinet. Its edges should be flush with the outside edges of the carcass.



Form 3/4"-wide, 3/8"-deep rabbets along the ends of the cabinet's top and bottom panels with a wide dado blade.



Hidden pocket screw joints attach the back panel and remain accessible from inside the cabinet.



Spread glue on the rabbets and assemble the cabinet's top, bottom and sides with clamps.



Scrap spacers ensure that the drawer slides are centered and parallel inside the cabinet.

Making the Drawer

On a shop project like this, I like to keep drawer construction simple but strong, and there are other options besides dovetails. While they aren't the fanciest choice, rabbet-and-dado joints have stood the test of time for me, so that's what I used for this drawer. Start the construction process by cutting the front, back and side panels to shape.

A 1/4"-wide dado blade, raised 1/4", will take care of all the cuts you'll need to make for the corner joints and drawer bottom groove. Set your table saw's rip fence 1/4" away from the blade, and cut a dado across the inside face of the side panels on both ends. Now, without moving the fence, cut a drawer bottom groove along the inside face of the front, back and side panels.

Rabbet-and-dado joints are easy to mill at the table saw with a 1/4"-wide blade, and their ample glue surface area makes them strong.

Install a sacrificial facing on the rip fence, and slide it over until the dado blade just "kisses" the fence facing; this sets up the rabbet cuts for the corner joints. Make a test cut on a scrap piece of 1/2" plywood, and see if it fits the drawer side dadoes. Raise or lower the blade a nudge, if needed, so the rabbets will fit their dadoes snugly. Cut rabbets across the ends of the outside faces of the drawer front and back, to complete these joints.

Dry assemble the drawer box, and measure the length and width of its





Assemble the drawer components all at once with glue and clamps. Check for matching diagonals to ensure the box is square.



Washerhead screws are designed for installing drawer faces. Driving them through oversized holes allows for final adjustment.



Cut four 1/8"-deep dados across the bit rack sides for storage shelves. Set the dado positions using a clamped stop block.

inside opening. Add 1/2" to each of these dimensions, and you'll have the final proportions for the drawer bottom panel. Cut it to size.

Reinstall the 1/4" dado blade and sacrificial fence again and, with it raised 1/4" above the table, mill a rabbet around all four sides of the bottom face

opening to provide clearance when the drawer is opened and closed.

I attached the drawer face to the drawer box with several strips of double-sided tape to align it right where I wanted it, checking its position with the drawer installed in the cabinet. Then, I marked the face for the drawer pull

of the drawer bottom panel. Test your setup first on a scrap to be sure the rabbet proportions are dialed in correctly; you want the drawer bottom rabbets to fit their grooves so

the panel seats inside the drawer box but still allows the corner joints to close completely.

Sand the drawer parts smooth, and assemble the drawer with glue and clamps. All the surface area of these joints will ensure that the drawer will be plenty strong without any added fasteners. Check it for square by measuring the diagonals. Adjust your clamps, if needed, until the diagonal measurements match.

When the clamps come off, attach the drawer-side slide components to the drawer sides, centering them vertically and making sure they're parallel. Now install the drawer in the cabinet to check its sliding action. If all is well, cut a drawer face to size; the *Material List* dimensions account for the drawer face having 1/16" of inset on the sides and bottom of the cabinet

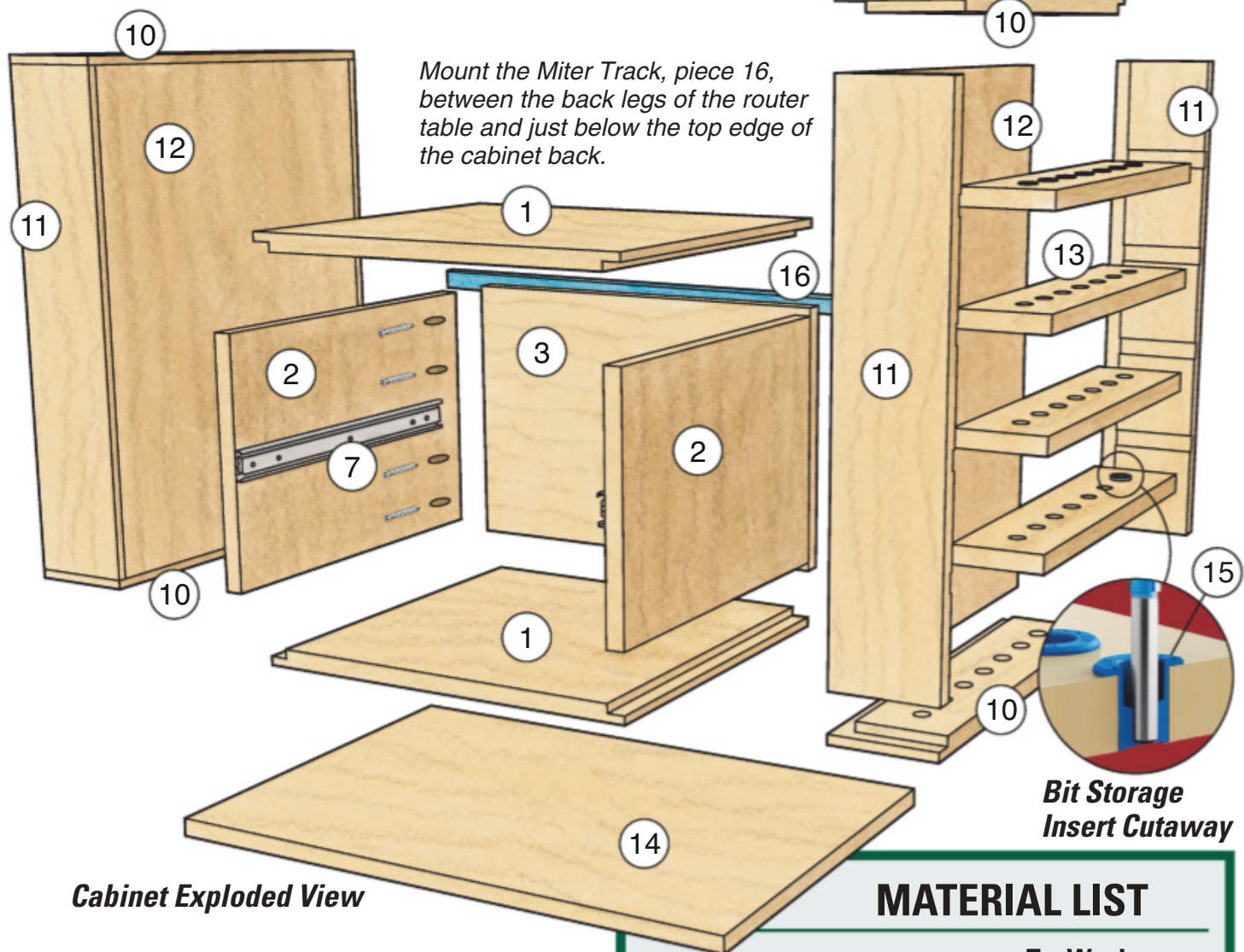
and drilled a pair of 3/16"-dia. holes through both the drawer face and the drawer front. The holes in the drawer face, of course, allow for the wire pull's installation screws. The holes in the drawer front serve a different purpose: here, I enlarged these holes with a 1/2" Forstner bit. This way, once the wire pull is installed and the drawer face is mounted on the drawer, I'll always have access to the wire pull's screw heads from inside the drawer, should they ever loosen up (and often, they do). I used four 1"-long washerhead screws to attach the drawer face permanently. The top two screws were installed first into oversized holes in the drawer front to give me a final bit of adjustability before driving the bottom two screws into regular screw clearance holes.

Constructing the Bit Racks

The two bit racks are identical, so go ahead and cut four tops, bottoms and sides to size. Then, just as you did for the drawer cabinet, load a wide dado blade in the table saw to cut 3/4"-wide, 3/8"-deep rabbets. Cut rabbets in the top and bottom panels for the side panels, then cut a rabbet along the inside back edge of the tops, bottoms and sides for the back panels.

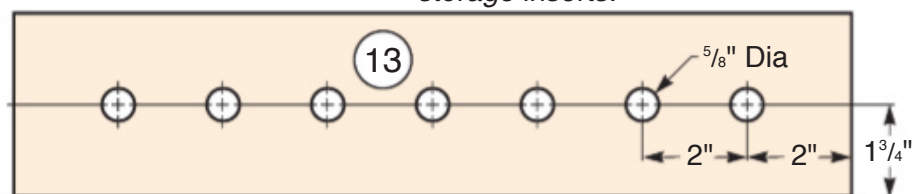
Each side panel also receives 1/8"-deep, 3/4"-wide dados cut across the inside face for four bit shelves. Make sure to adjust the width of your dado blade, as needed, to match the thickness of the 3/4" plywood you're using for this project — its thickness is probably closer to 23/32", and you want the bit shelves to fit their dados without gaps. Follow the *Elevation Drawings* on the next page to space these dados apart evenly. I cut them with the shelves backed up against a long fence attached to my saw's miter gauge, using a stop block to set the position of each cut. Flipping the side panels end for end will enable you to make two dado cuts per stop block setting.

(Inside View)

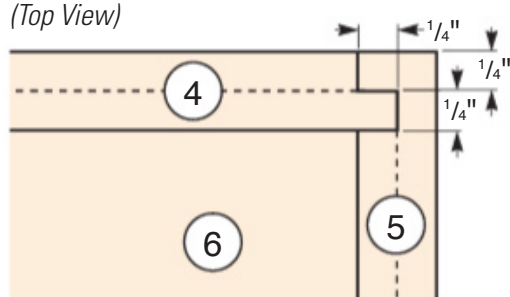


(Top View)

The 5/8"-dia. holes accommodate Rockler's plastic router bit storage inserts.



(Top View)



MATERIAL LIST

	T x W x L
1 Cabinet Top, Bottom (2)	3/4" x 15 ³ / ₄ " x 16 ³ / ₄ "
2 Cabinet Sides (2)	3/4" x 10 ³ / ₄ " x 15 ³ / ₄ "
3 Cabinet Back (1)	3/4" x 11 ¹ / ₂ " x 16 ³ / ₄ "
4 Drawer Front, Back (2)	1/2" x 9 ³ / ₄ " x 13 ³ / ₄ "
5 Drawer Sides (2)	1/2" x 9 ³ / ₄ " x 15 ¹ / ₂ "
6 Drawer Bottom (1)	1/2" x 13 ³ / ₄ " x 15"
7 Slides (1 Pr.)	14" Full Extension
8 Drawer Face (1)	3/4" x 11 ⁷ / ₁₆ " x 16 ⁵ / ₈ "
9 Wire Pull (1)	4" Satin Nickel
10 Bit Rack Tops, Bottoms (4)	3/4" x 4 ¹ / ₄ " x 17 ¹ / ₄ "
11 Bit Rack Sides (4)	3/4" x 4 ¹ / ₄ " x 21 ¹ / ₄ "
12 Bit Rack Backs (2)	3/4" x 16 ¹ / ₂ " x 21 ¹ / ₄ "
13 Bit Storage Shelves (8)	3/4" x 3 ¹ / ₂ " x 16"
14 Base (1)	3/4" x 17 ³ / ₄ " x 25 ³ / ₄ "
15 Router Bit Storage Inserts (70)	Rockler #57223
16 Miter Track (1)	Rockler #48037

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Bore holes for router bit inserts into the shelves. The author recommends a 2" spacing, which allows for seven bits per shelf.



A few parts attached to the bit racks can add storage options for bit insert rings and a router lift adjustment wrench.



Rockler's new plastic Router Bit Storage Inserts simply press into 5/8"-dia. holes and can hold either 1/4" or 1/2" bit shanks.

With the joinery completed, fit the bit racks together temporarily so you can determine the final dimensions of the back panel and the length of the shelves. Cut the two back panels and eight shelves to size.

All that's left to do before final sanding and assembly is to drill holes in the shelves and bottom panel for router bit shanks. I'm using Rockler's new plastic Router Bit Storage Inserts, which will hold either 1/2"- or 1/4"-shank bits.

Over the years, I've found that 2" spacing between bits works well for storing practically any router bit you'll run across, and that spacing will fit seven bits per shelf here. Mark the shelves and bottom panel according to my spacing (or your own, as you see fit), and drill centered

holes for the bits. If you use Rockler's inserts, these holes are 5/8" dia. and should be bored all the way through the shelves and bottom panels.

Sand the bit rack components, and assemble the tops, bottoms, sides and back panels with glue and clamps.

Finishing and Installation

Next, I cut a base panel to size. This was also a good time to build a small holder from scrap for storing my router lift's five aluminum insert rings. After that, I laminated three pieces of 1/2" plywood together, with a 5/16" x 5/16" groove cut along the length of the center piece, to stow my router lift's height adjustment wrench. It's easier to install features like these before the racks are in place on the router table, so consider doing the same for your orga-

nizer now, with any add-ons.

Remove the drawer slides and wire pull, and you're ready to apply finish. I used General Finishes water-based High Performance varnish, which applies beautifully with a brush or foam roller and dries quickly.

This project's base, cabinet and bit racks are modular, making them easier to install without needing to dismantle the router table's leg base.

When the finish cures, push the plastic bit inserts into their shelf holes.

To install the organizer, first remove your router lift. I also removed the metal Dust Bucket enclosure around the router motor. Fit the base into place on the router table's lower cross supports. Rockler provides screw holes if you want to fasten the base to these supports, as I did, driving 1/2" panhead screws up into it from below. Slide the bit racks and drawer cabinet into place on the base; they're inset 1/4" from the base's edges and ends. Mark the location of the components on the base, and drill pilot holes down through the cabinet bottom into the base for screws. If you have an enclosure around your router, pull the cabinet back out and re-install the enclosure now. Then slide the cabinet back into position, and fasten it to the base with countersunk screws. Drive more screws through the side walls of the cabinet and into the backs of the bit racks to secure them.

Sooner or later, you'll want to have a pair of featherboards close at hand for router table operations, and here's an easy way to store them. I fastened a length of Rockler's extruded aluminum miter track to the cabinet back, 1 1/2" down from its top edge (see the top inset photo, page 44). It makes a simple holder for several large featherboards: just tighten one of their expanding miter bars into the track, and they'll be at the ready when you need them.

Chris Marshall is a senior editor at Woodworker's Journal.



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DOVETAIL JIG



SAVE 40%
COMPARE TO GENERAL TOOLS \$46.99
MODEL: 861
NOW \$27.99
COMPARE TO \$34.99
ITEM 34102



16760714

LIMIT 3 - Coupon valid through 4/20/19*

200 LUMENS LED SUPER BRIGHT FLIP LIGHT



COMPARE TO PREMIER \$6
MODEL: SW-SWITCH-12/24
NOW \$2.99
COMPARE TO \$4.99
SAVE 50%
ITEM 64189/64723/63922 shown



16765711

LIMIT 4 - Coupon valid through 4/20/19*

MECHANIC'S ROLLER SEAT



250 lb. capacity
Tools sold separately.
COMPARE TO ACDELCO \$44.99
MODEL: 34903
NOW \$19.99
COMPARE TO \$24.99
SAVE 55%
ITEM 61653/3338 shown



16769433

LIMIT 7 - Coupon valid through 4/20/19*

350 LB. CAPACITY FOLDABLE SAWHORSE



NOW \$8.99
COMPARE TO \$12.99
SAVE 30%
COMPARE TO STANLEY \$17.99
MODEL: STST11200
ITEM 61979/46762/60710/69446 shown



16769756

LIMIT 4 - Coupon valid through 4/20/19*

U.S. GENERAL **SUPER COUPON**

Customer Rating ★★★★★

44" x 22" DOUBLE BANK EXTRA DEEP CABINETS

NEW

YOUR CHOICE \$449.99

COMPARE TO SNAP-ON \$2,605 **SAVE \$2,155**

MODEL: KRA4812P80

BLACK ITEM 64441 64442/64443 shown

RED ITEM 64134 64281/64133 shown

BLUE ITEM 64444 64445/64446 shown

16785952

LIMIT 3 - Coupon valid through 4/20/19*

PITTSBURGH #1 SELLING JACKS IN AMERICA **SUPER COUPON**

Customer Rating ★★★★★

RAPID PUMP® 1.5 TON LIGHTWEIGHT ALUMINUM FLOOR JACK

- 3-1/2 pumps lifts most vehicles
- Lifts from 3-1/2" to 14-1/8"
- Weighs 34 lbs.

SAVE \$65 **NOW \$59.99**

COMPARE TO K TOOL \$125.68 **SAVE \$65.69**

MODEL: KT183094

ITEM 64545/64552/64832 68053/62160/62496/62516/60569 shown

16790885

LIMIT 3 - Coupon valid through 4/20/19*

Pierce BEATS HITACHI **SUPER COUPON**

Customer Rating ★★★★★

2", 18-GAUGE BRAD NAILER

YES	ACCEPTS 5/8" TO 2" 18-GAUGE FASTENERS	YES
YES	DEPTH OF DRIVE DIAL	YES
YES	TOOL-LESS EASY TO CLEAR NOSE	YES
YES	LIGHTWEIGHT ALUMINUM BODY	YES
YES	CARRYING CASE INCLUDED	YES
SEQUENTIAL	TOOL ACTUATION MODES	SELECTIVE

COMPARE TO \$59.99 **PRICE \$69.98**

ITEM 64255

LIMIT 3 - Coupon valid through 4/20/19*

*HITACHI NT50AE2 stated specs.

PITTSBURGH **SUPER COUPON**

Customer Rating ★★★★★

24" CLAMP AND CUT EDGE GUIDE

LIFETIME WARRANTY

NOW \$7.99

COMPARE TO BORA \$70.28 **SAVE 88%**

MODEL: S43030K

ITEM 66126

16792431

LIMIT 8 - Coupon valid through 4/20/19*

HARDY **SUPER COUPON**

Customer Rating ★★★★★

POWDER-FREE NITRILE GLOVES PACK OF 100

12¢ PER PAIR

• 5 mil thickness

SAVE 59% **NOW \$5.99**

COMPARE TO VENOM \$14.97 **SAVE \$8.98**

MODEL: VEN1415

ITEM 37050, 37051, 37052, 64417, 64418, 61363, 68497, 61360, 61359, 68498, 68496 shown

16797011

LIMIT 8 - Coupon valid through 4/20/19*

CENTRAL MACHINERY **SUPER COUPON**

Customer Rating ★★★★★

8", 5 SPEED BENCHTOP DRILL PRESS

SAVE \$55 **NOW \$54.99**

COMPARE TO BUFFALO BLACK \$110.95 **SAVE \$55.96**

MODEL: DPSLX

ITEM 62520/60238 shown

16807346

LIMIT 5 - Coupon valid through 4/20/19*

WARRIOR **SUPER COUPON**

Customer Rating ★★★★★

18 VOLT LITHIUM CORDLESS 3/8" DRILL/DRIVER KIT

NOW \$29.99

COMPARE TO RYOBI \$69 **SAVE 56%**

MODEL: P1610

ITEM 64118

16812075

LIMIT 5 - Coupon valid through 4/20/19*

CHICAGO ELECTRIC POWER TOOLS **SUPER COUPON**

Customer Rating ★★★★★

2.5 HP, 10" INDUSTRIAL TILE/BRICK SAW

NOW \$219.99

COMPARE TO KOBALT \$429 **SAVE \$209**

MODEL: KWS S10-06

ITEM 62391/69275 shown

16816520

LIMIT 4 - Coupon valid through 4/20/19*

luminaR OUTDOOR **SUPER COUPON**

Customer Rating ★★★★★

24 FT., 18 BULB, 12 SOCKET OUTDOOR STRING LIGHTS

NOW \$19.99

COMPARE TO PORTFOLIO \$54.98 **SAVE 63%**

MODEL: SLC12BK

ITEM 64486/63483 shown

16821210

LIMIT 7 - Coupon valid through 4/20/19*

CENTRAL PNEUMATIC **SUPER COUPON**

Customer Rating ★★★★★

3/8" x 50 FT. RETRACTABLE AIR HOSE REEL

NOW \$59.99

COMPARE TO KOBALT \$99 **SAVE \$39**

MODEL: SDY-AIR184

ITEM 46320/69265/62344/64685/93897 shown

16824737

LIMIT 5 - Coupon valid through 4/20/19*

CENTRAL PNEUMATIC **SUPER COUPON**

Customer Rating ★★★★★

21 GALLON, 2.5 HP, 125 PSI VERTICAL OIL-LUBE AIR COMPRESSOR

• Air delivery:
5.8 CFM @ 40 PSI
4.7 CFM @ 90 PSI

NOW \$149.99

COMPARE TO HUSKY \$229 **SAVE \$79**

MODEL: C201H

ITEM 61454/69091/62803/63635/67847 shown

16971647

LIMIT 4 - Coupon valid through 4/20/19*

HaulMaster **SUPER COUPON**

Customer Rating ★★★★★

4 PIECE, 1" x 15 FT. RATCHETING TIE DOWNS

• 400 lb. working load

NOW \$6.99

COMPARE TO ATE TOOLS \$54.88 **SAVE 87%**

MODEL: 33079

ITEM 63094/60405/63056/63057 63150/61524 shown

16835582

LIMIT 8 - Coupon valid through 4/20/19*

PORTLAND **SUPER COUPON**

Customer Rating ★★★★★

7 AMP ELECTRIC POLE SAW 9.5" BAR

NOW \$59.99

COMPARE TO WORX \$99.98 **SAVE \$39**

MODEL: WG309

ITEM 68862/63190/62896 shown

16845276

LIMIT 4 - Coupon valid through 4/20/19*

WINDSOR DESIGN **SUPER COUPON**

Customer Rating ★★★★★

11 PIECE WOOD CARVING SET

SAVE 33% **NOW \$5.99**

ITEM 60655/56186/62673 shown

16848950

LIMIT 8 - Coupon valid through 4/20/19*

Bauer **SUPER COUPON**

Customer Rating ★★★★★

15 AMP, 12-1/2" PORTABLE THICKNESS PLANER

NOW \$249.99

COMPARE TO DEWALT \$399 **SAVE \$149**

MODEL: DW734

ITEM 63445

16853002

LIMIT 5 - Coupon valid through 4/20/19*

HaulMaster **SUPER COUPON**

Customer Rating ★★★★★

700 LB. CAPACITY BIGFOOT HAND TRUCK

SAVE \$60 **NOW \$39.99**

COMPARE TO ROUGHNECK \$99.99 **SAVE \$60**

MODEL: 40546

ITEM 37520/97568/62974/62900 shown

16864131

LIMIT 6 - Coupon valid through 4/20/19*

drill master **SUPER COUPON**

Customer Rating ★★★★★

4-1/2" ANGLE GRINDER

SAVE 65% **NOW \$9.99**

COMPARE TO PERFORMAX \$28.99 **SAVE \$19**

MODEL: 2411-1

ITEM 69645/95578/60625 shown

16866237

LIMIT 8 - Coupon valid through 4/20/19*

CENTECH **SUPER COUPON**

Customer Rating ★★★★★

2/10/50 AMP, 12 VOLT BATTERY CHARGER/ENGINE STARTER

SAVE 50% **NOW \$29.99**

COMPARE TO SCHUMACHER ELECTRIC \$59.99 **SAVE \$30**

MODEL: SE-1-250

ITEM 60581/3418/60653 shown

16871633

LIMIT 5 - Coupon valid through 4/20/19*

HaulMaster **SUPER COUPON**

Customer Rating ★★★★★

1000 LB. CAPACITY SWING-BACK TRAILER JACK

• Height range: 12-1/2" to 24"

SAVE 60% **NOW \$17.99**

COMPARE TO REESE \$45.99 **SAVE \$28**

MODEL: 74410

ITEM 69780/41005 shown

16873644

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TOOL TUTORIAL

Miter Saws: Accurate, Safe and Handy!

By A.J. Hamler



Woodworking expert A.J. Hamler looks at the miter saw from every angle.



www.woodworkersjournal.com
MORE ON THE WEB



For a video on cutting crown molding with a miter saw, please visit woodworkersjournal.com and click on "More on the Web" under the Magazine tab.

Although originally more common in the construction trades, miter saws have easily earned their place in the home workshop. While not as universal as a table saw, a miter saw does a very specific set of cutting tasks faster and, in many cases, better than a table saw. For example, for simple 90° cuts, there's no need for a miter gauge or fence as with a table saw, and you don't have to set the blade height. You just place the stock on the saw, line up the blade, and make the cut. Job done.

And, while it's possible to make a compound cut on a table saw by using a miter gauge and tilting the blade, it takes time to set that up and execute accurately. With a miter saw, it's a simple matter of tilting the blade, twisting the table and cutting.

If you have the space and budget, a miter saw should be on every woodworking tool short list.

What's Out There

There are three distinct types of miter saws.

Basic miter-only saws. Once common, these have become rarities. With the addition of beveling action to even inexpensive saws, miter-only saws have become specialized. Most have larger blades (14" and 15" are typical), as well as larger tables and higher fences. Favored by trim carpenters, these machines are pricey — especially the blades — and aren't that useful for home shops.

Compound miter saws. These machines rule the category and feature cutterheads that tilt in addition to rotating tables, allowing them to make cuts in two planes at once, hence the "compound" moniker. The most commonly found in home shops are single-bevel machines with 10" blades, although almost all manufacturers also offer 12" versions. There are also a few 7¼" and 8½" machines out there, but those are strictly light-duty machines unless they're sliding models. Non-sliding saws in this size range are disappearing.

The cutterheads on these machines tilt at least 45° to the left, and usually a bit more. Because of the compound capability, they can cut crown molding flat on the saw table instead of angled up against the fence, sometimes a tricky task. Cutting matching/mating angles requires that the workpiece be flipped the other direction.

Dual-bevel compound miter saws have cutterheads that tilt both ways, meaning workpieces don't have to be flipped to produce mating angles. In addition, many dual-bevel saws are heavier, with a larger table and footprint, and they frequently offer more features. As a result, dual-bevel machines are a bit more expensive. Machines with 10" and 12" blades are offered by most manufacturers.

Single- and dual-bevel machines have similar capacities. Expect 10" saws to make 90° cuts in a 2x6 and 45° cuts in a 2x4. Meanwhile, those with 12" blades make the same cuts in a 2x8 and 2x6, respectively.

Sliding compound miter saws. These are essentially compound saws that bring

a sliding cutterhead to the party, greatly increasing cutting width. Using a rail system (or, in some models, articulated arms), the cutterhead not only cuts vertically like a regular compound saw, but linearly like a radial-arm saw. As a result, cutting width is a factor of the blade size and length of slide, but most 10" sliders can easily crosscut 2x12s at 90° all day long, while 12" models can typically handle boards from 14" to 16".

Because the slide length automatically increases cutting width, a number of manufacturers offer sliding saws with smaller blades of 7¼" and 8½". These workhorses still have the width capacity of non-sliding 10" and 12" saws, but in a smaller, lighter package — even a 7¼" slider easily handles 90° cuts in a 2x8.

With advances in lithium-ion battery technology,

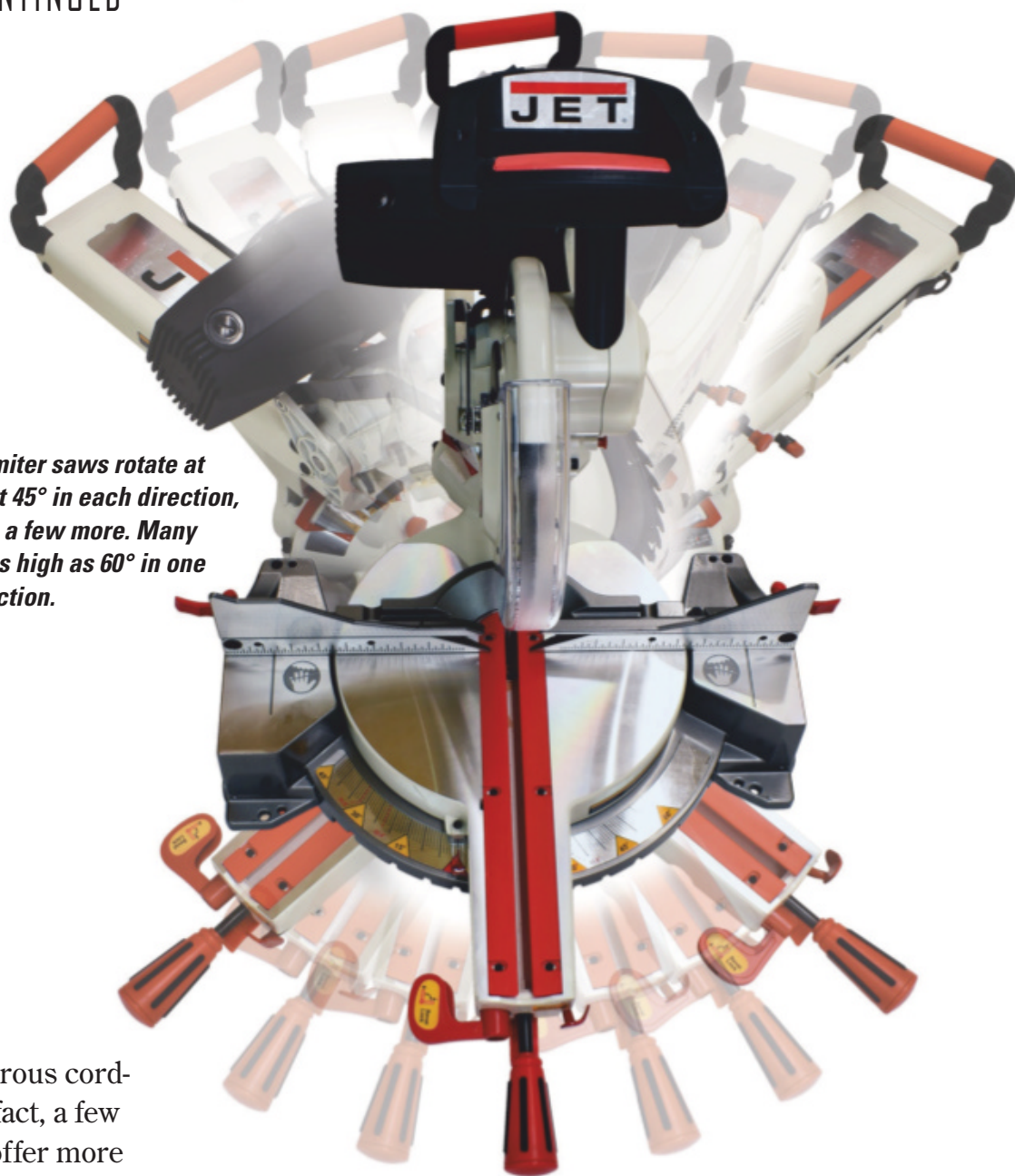


TOOL TUTORIAL CONTINUED



Instead of rails, Bosch's Model GCM12SD 12" dual-bevel "axial-glide" miter saw uses cantilevered arms that allow the cutterhead to move through a full range of motion when cutting.

All miter saws rotate at least 45° in each direction, plus a few more. Many go as high as 60° in one direction.



you'll find numerous cordless options. In fact, a few manufacturers offer more battery-powered miter saws than corded ones. Most use a single 18-volt (or 20-volt max) battery, but some machines feature dual batteries or elaborate circuitry techniques — or both — that bring power levels up to those of corded miter saws.

By the way, old-timers sometimes use "chop saw" synonymously for miter saws, but the description is incorrect. While the term might have seen more com-

mon use several years ago, today's chop saws comprise a specialized set of similar tools intended to cut metal and other materials. Those machines — sometimes called "cutoff saws" — are

What a Miter Saw Does

You'd probably suggest this is one of those as-the-name-implies things, and you'd be right: A miter saw cuts miters, but that's really a poor name for the tool. "Crosscut saw" is far more descriptive, as the saw can make any kind of crosscut, not just miters. Of course, it excels at miters, so let's start there.

A miter saw's table rotates left and right which, in turn, angles the cutterhead. A pointer on the graduated scale across the front shows the miter angle. Set the table to the angle you want, lock it down, and make the cut. Virtually all miter saws have permanent detents for the most common angles of 45°

and 22.5° in both directions, but better saws throw in a couple more, such as 15° and 30°. For cutting crown molding — a task for which the miter saw is especially prized — most saws have a table detent for 31.6°. (See more about cutting crown molding in the *sidebar* on page 58 and online.)

Because a miter saw's arbor is forward of the fence, the cutterhead angle can go a bit beyond 45° in each direction. The amount varies from saw to saw, but a few degrees past 45 is typical. This can be useful for cutting household trim: it's a rare room that has nothing but perfect 90° angles and corners, and a degree or two past 45 can be a lifesaver. Some higher-end larger saws go farther on one side (the side depends on the motor location), allowing up to 60° cuts.



Milwaukee's Model 2734-20 M18 Fuel 10" dual-bevel cordless compound miter saw has a cutting capacity of 2" x 12" at 90°.



A good miter scale will include easy-to-see markings plus positive stops for the most common cutting angles.

Most miter saws today also make bevel cuts in one or both directions, depending on the saw. For this, the saw's cutterhead is tilted to the side, altering the vertical angle of the cut. This is great for cutting things like box corners, baseboards and other molding. And, as noted earlier, by combining both table angle and blade tilt, you have the ability to make compound cuts.

With some sliding saws, you can even lock the cutterhead to a specific depth of cut and, with two passes across your work, define the sides of a perfect dado joint. You can then clean out the waste in the center with a chisel, or even nibble out the waste with a few more passes of the blade.

Setup Basics

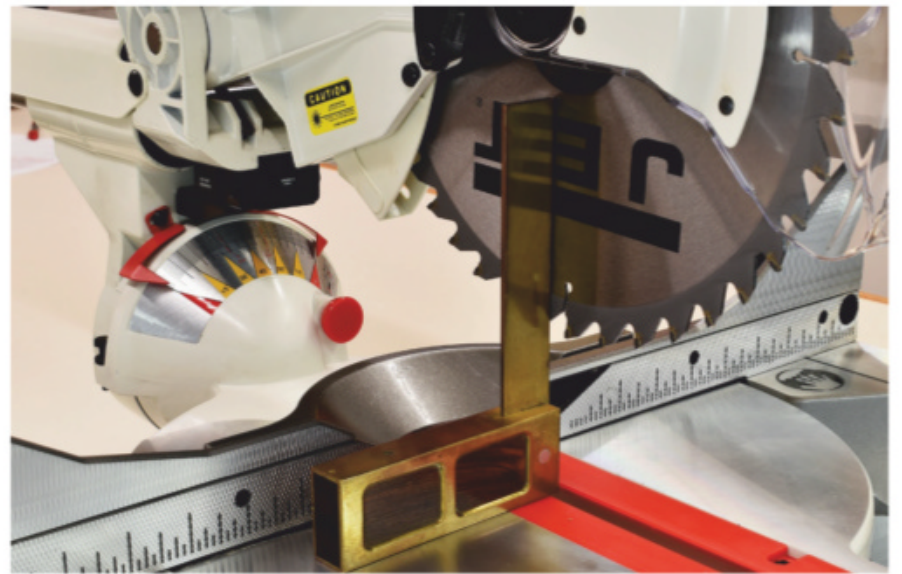
A miter saw requires little more than a flat surface and a power source (battery or cord) to be up and running, with very little assembly needed. Typically, you'll only need to attach the front handle, table clamp and dust bag, and you're good to go.

Manufacturers have been really good about fine-tuning these machines before leaving the factory, with most units square and true out of the box. Likewise, positive

stops have been factory-calibrated for common angles for both table and cutterhead. But since everything these saws do is based entirely on accurate angles, it's best to check a new machine's settings and adjust as needed — factory settings can drift if the box was mishandled during shipping.

First, use a reliable square to check the blade's 90° vertical alignment. Adjustment methods for verticality (usually involving a stop on the cutterhead pivot) vary among models and manufacturers, so be sure to check the manual for your specific machine, but stops are typically adjustable with a hex wrench, adjustable wrench or screwdriver.

Now check the miter stops on the table, using a combination square for common angles and a protractor or digital bevel gauge for others. If these are off, you'll need to reset the stops according to your particular machine's manual. Once you have them spot-on, lock them in and reset the miter pointer/indicator, and perhaps the miter scale on the table surface. For both tasks, you usually just loosen a few screws or hex nuts, shift the pointer or scale to match the corrected angle, and retighten.



Check any new miter saw to be sure that all angles and positive stops are accurate. As you use the saw, recheck it from time to time.

Speaking of those miter pointers, here's a tip: Check them frequently! You'll probably rely on your positive stops for common angles, but for all others you'll line up that pointer on the miter scale. Be aware that these pointers — often held by a single screw — can be knocked out of adjustment very easily.

Miter saws are easiest and most efficient to use when placed at a comfortable working height. In the shop, a benchtop or dedicated miter saw station is best — not only can the machine be securely mounted, but a permanent location also allows for more effective dust collection and work support. If you plan



If you frequently use your saw as a portable machine, consider getting a lightweight folding stand. This Makita unit weighs less than 34 pounds (without saw), but it can support up to 500 pounds.

TOOL TUTORIAL CONTINUED



The saw should always sit without wobbling, no matter where you use it — even on the ground. The author keeps a couple of cabinet shims in his pocket to firm up the saw's footing when using it outside the shop.

to move the saw around a lot, a collapsible miter saw stand — typically made of aluminum or other light-weight materials — is a good investment.

Wherever you set up, check for clearances. For the machine itself, make sure it can go through any cutter-head or table reorientation

without bumping anything — this is especially true of the rails on sliding miter saws. Also, ensure that any workpiece you'll cut has enough clearance left and right without hitting anything.

While it's not recommended to use these on the floor or bare ground, depending on the task and location, sometimes there's no choice. If so, make sure there are no obstacles where you're setting up the saw (rocks, wood scraps, dropped objects, etc.). Likewise, be sure that any high spots on the ground don't interfere with the workpiece anywhere along its length. If so, move the saw to a flatter location. Most household floors are nice and flat, but chances are good that if you're setting up on bare ground or concrete (such as on a driveway or patio), you won't have a perfectly flat surface. Keep some wooden shims in your toolbox or back pocket, and slip one under the feet as necessary to keep the saw solid and stationary.

The blades included with saws from the major makers have gotten pretty good in recent years — most manufacturers have a full line of blades now, which wasn't always the case — so the blade your machine comes with probably isn't bad. Still, supplied blades are fairly basic, so if you're not satisfied with the quality of the cuts you're getting, replace it with something better.

Use only a crosscut blade in a miter saw and, for the cleanest cuts, don't skimp on tooth count. A 40-tooth blade (which is what most saws ship with) is about the minimum you'd want in a woodshop. These are workhorse blades and fine for general work. For construction and framing, you may prefer going down to a 24-tooth blade, but for furniture making and other fine woodworking, you'll get far better and cleaner cuts bumping up to a 60-, 80- or higher tooth count. Keep blade size in mind when counting teeth: A saw with a 7¼" 40-tooth blade makes a cleaner cut than a larger blade of the same tooth count.

Finally, before use, attach the dust bag that came with the saw. Sadly, these aren't very good and won't capture all the dust you'll produce, or even most of it. However, they do keep dust from shooting straight back behind the saw by several feet. They can also catch, or deflect, small pieces of cutoff that fly in that direction.

A better choice is to attach the hose from a shop vacuum. Dust bags rely entirely on the saw throwing dust in their direction, while the suction from a vacuum helps pull dust into the small dust shroud at the back of the blade and on out the dust port in the cutterhead.

While a bag or vacuum is your best bet when using a miter saw away from the



Miter saw dust is difficult to catch, but a dedicated collection hookup maximizes the amount of dust and debris kept out of the air and off your work area.



Always support the ends of long stock. The author's clamp/tool caddy, designed to be the same height as his miter saw's table, does double duty as a workpiece support.

shop, the optimum choice for a permanently located miter saw is to connect it to a shop dust collection system. The higher level of suction and air movement makes a huge difference, especially if you can keep the ducting as large as possible as close as you can to the saw itself.

Safety

In general, all the safety rules for any other saw apply to miter saws: Always unplug the machine when changing blades or making adjustments. Wear eye protection and hearing protection (miter saws have universal motors and are louder than stationary saws). Avoid dangling jewelry, hair, clothing or anything else that can get in the blade. Keep your hands away from the blade, and leave guards in place.

Speaking of guards, those on miter saws are a marvel of integrated design and, unlike some other saw guards, don't hinder your view when cutting. These guards are attached to the cutterhead with levers that pivot the guard up and away as the blade nears the wood, exposing very little of the blade. Raise the cutterhead, and the guard pivots back around the blade.

Beyond these basics, there are some safety practices specific to miter saws:

- Don't attempt to hold small workpieces for cutting. If the piece is too short to be engaged by the saw's clamp (about 7" to 9", depending on saw size), your hands will be too close to the blade.
- Support long stock at the same level as the saw table. Long, drooping workpieces are difficult to hold, especially once the cut is complete and the unbalanced long end succumbs to gravity. Sagging workpieces also cause blade binding and pinching.
- After completing a cut, don't raise the cutterhead or move your hands until the blade stops.
- Larger saws often have two-part adjustable fences. When making bevel cuts, make sure the sliding part of the fence (typically the left) is clear of the blade path.
- Allow the saw to come up to full speed and then make cuts in a smooth, steady motion. Do not "chop" the wood. Not only can this cause blade binding or grabbing, but it also gives a terrible cut.
- Cut only wood or wood-based materials.
- Don't cut PVC pipe. The high blade speed can "catch"



Two-part fences are a wonderful feature on high-end saws, but be sure to pull the movable top portion out of the blade path when making bevel cuts.

in the plastic, shattering the pipe into flying shrapnel.

- Always clamp irregularly shaped workpieces.
- For sliders, always cut on the push stroke; never pull the saw through the wood.
- Also for sliders, keep the rail lock engaged unless making a sliding cut to prevent accidentally pulling the cutterhead for simple cuts.
- For all types of miter saws, check the throat plate frequently for small offcuts. Anything small enough to fit through that slot *will* fall through that slot. Count on it. These can go flying if the blade contacts them. Even if they don't, they can easily startle you when hit by the blade during a cut.



Cutoffs small enough to fall through the throat plate opening will quickly build up in there. Clean it out regularly so the blade doesn't send these small pieces flying.

TOOL TUTORIAL CONTINUED



NEVER DO THIS! Always keep your left hand on the left side and your right hand on the right side. You can operate a miter saw easily with either hand, so there's never a cause to cross hands.

Finally, never cross hands while cutting. This is an odd one — in setting up the photo (above), crossing my hands felt truly odd and foreign to me, and yet I see people do this all the time. Even if you're not ambidextrous, the miter saw is a tool that can easily be operated with either hand, so there's no need to ever do this.



The most accurate way to set up a cut is to lower the cutterhead and adjust the workpiece so it just touches the teeth.

Making Cuts

Miter saws are intuitive, probably more so than other cutting tools, and basic cuts are very straightforward. Still, you'll need to follow some tool-specific steps.

First, set the miter angle as needed. For simple 90° cuts, no adjustment is necessary. For miter cuts, unlock the saw table and rotate it left or right to the desired angle. If it's a common angle, the positive stop will engage; if not, use the miter pointer/indicator to set the angle. Lock the setting in place.

For bevel cuts, the process is about the same except the tilt angle is controlled by loosening the cutterhead and swinging it to the desired angle shown on the pivot scale. As with miters, lock everything down when you have the angle you want.

Before putting the workpiece in place, make a "dry" cut by pulling the saw through the full motion of the cut. This not only ensures that the blade is free to move unimpeded through the full motion (which it won't if the secondary fence hasn't been moved out of the way), but you'll also be able to tell if any hidden offcuts that might interfere with the blade have fallen into the throat plate.

Place the workpiece on the saw table, holding it firmly against the fence, and bring the cutline to the edge of the blade. Most miter saws now sport lasers or other means of indicating where the blade will fall, allowing you to line this up with your cutline. Personally, I think these are difficult to use (and you might not be able to see a laser line outdoors on a bright day). Instead, before cutting, I find I get better results by pulling the cutterhead down to the workpiece, then adjusting the workpiece till the edge of the teeth just kisses the cutline.

Is the offcut side of the workpiece supported adequately? Short offcuts will stay on the saw table, but longer offcuts will fall to the floor. Not only can this damage the waste side of the workpiece (which I assume you'll want to use later), but the lifting end can also contact the blade as it tilts. For long pieces, use some kind of support on the offcut side to keep it from falling. Don't neglect supporting the

Beyond the Basics: A Crowning Achievement



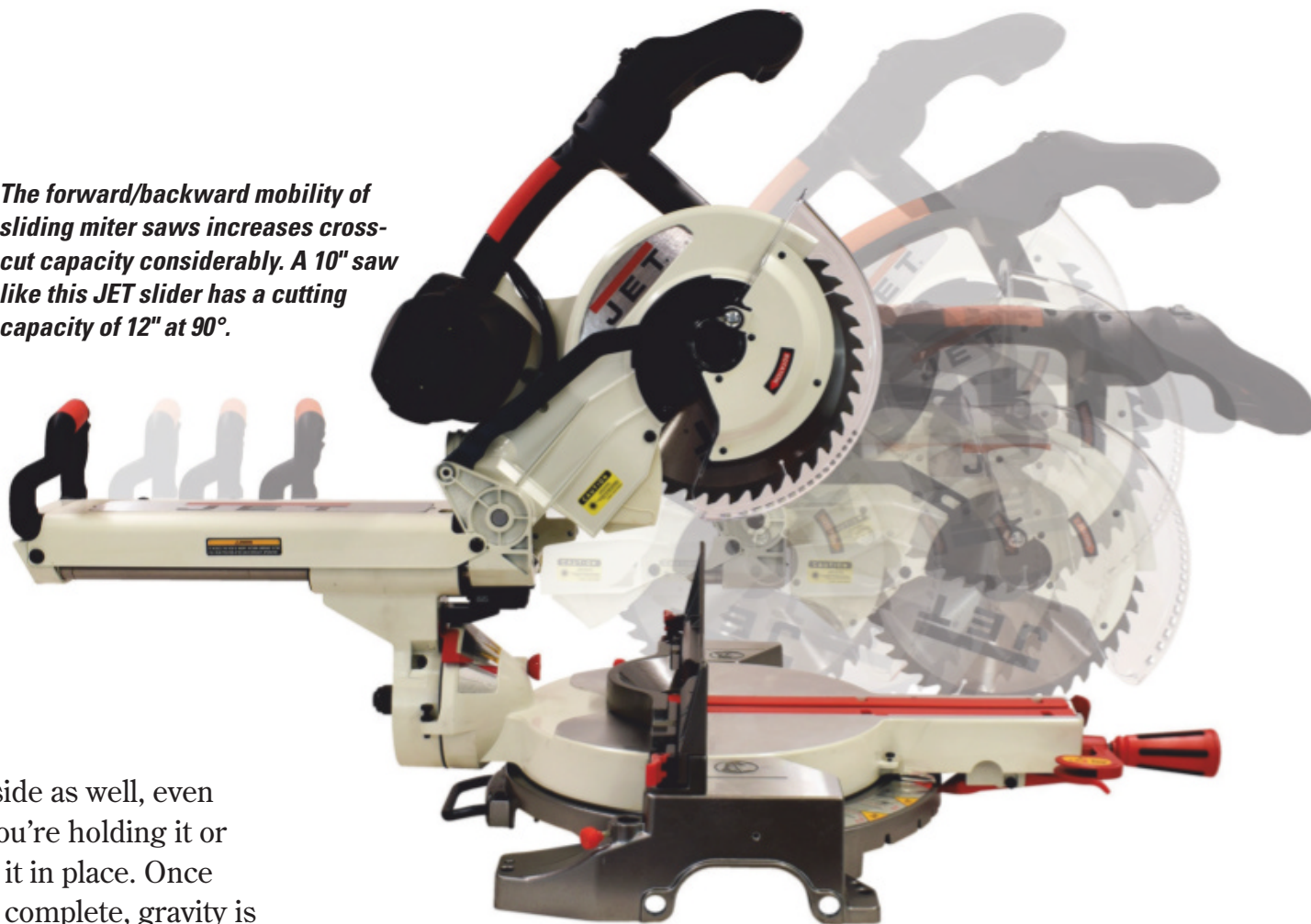
ONLINE
VIDEO!

Crown molding can be tricky. Multiple angles, inside or outside, left or right — no wonder it's confusing. If your miter saw has a tall fence, you simply place the molding against the fence exactly as it will mount on your wall, adjust the miter angle to 45°, and cut. But that does require enough fence and clearance under the cutterhead, and holding the molding at the correct orientation against the fence isn't always easy.

But with the most common miter saw around — a single-bevel compound model — you cut molding with the back side flat on the table, meaning it's easier to hold and you can cut moldings a lot wider than many saw fences can handle. Assuming your walls have accurate 90° corners, for the most frequently used type of crown molding (known as 52/38 due to the angles where it meets wall and ceiling), it's easy as 1-2-3.



The forward/backward mobility of sliding miter saws increases cross-cut capacity considerably. A 10" saw like this JET slider has a cutting capacity of 12" at 90°.



“infeed” side as well, even though you’re holding it or clamping it in place. Once the cut is complete, gravity is going to do its thing, and that side will want to tilt to the floor, too.

With everything set, power up the saw and let the blade come up to full speed, then pull the cutterhead smoothly down through the stock to make the cut. Don’t chop! (In case you haven’t noticed, I absolutely hate the term “chop” saw.) With the cut made, release the trigger and maintain position until the blade comes to a full stop, then lift the cutterhead. Safety aspects aside, lifting the blade while it’s still spinning can also cause tearout on the top surface of the workpiece.

All the same steps apply when using a sliding miter saw, with a few differences. Just before cutting, release the rail lock so the cutterhead slides smoothly. Pull the cutterhead toward you until the blade sufficiently clears the front edge of the workpiece before triggering the power on. Pull the cutterhead down into the workpiece, and then smoothly push the blade forward and through the wood. As

before, maintain position and let the blade come to a full stop. With the cut complete, don’t forget to engage the rail lock.

A few final tips:

- To prevent splintering on the underside of your workpiece, place a strip of masking tape where the blade will come through.
- A piece of 1/4" plywood affixed to the saw table makes a perfect zero-clearance surface. Cut the plywood to the size and shape of the saw table, and hold it in place with double-stick tape somewhere outside the moving turntable.
- Use a stop for repeating cuts. You can clamp a stop directly to the saw fence for short cuts. For miter saw stations, create a fence extension with an adjustable stop for long cuts.
- It’s difficult to accurately trace a cutline on molding held in place where it’s going to go — the line may be slightly off. When cutting, cut slightly wide of the line and see if the piece fits. If

not, “sneak up” on the line with a bit of trial and error for a perfect fit.

- Have plans to make a rolling clamp rack or tool caddy? Design it so the over-



Masking tape on the underside of workpieces helps to prevent tearout.

all height exactly matches the miter saw table where it’s usually used (benchtop, stand, miter saw station, etc.), and use it for supporting long workpieces.

A.J. Hamler is the former editor of Woodshop News. He is the author of several woodworking books, including Civil War Woodworking.

A MAKER'S PROJECT

Contemporary Hall Table



By Chris Salomone

Tables like this one can go by several names: hall table, a console table or a sofa table. Well, *po-tay-to, po-tah-to; to-may-to, to-mah-to*; it doesn't really matter what you call it — I'm going with "hall table," since I'm putting it in the hall. Overall, it just matters that it looks good. Plus, it's a nice exercise in basic woodworking.

I chose to make my table out of walnut. After cutting my walnut lumber



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MORE ON THE WEB



For a video of the author building his Hall Table, visit woodworkersjournal.com and click on "More on the Web" under the Magazine tab.

Chris Salomone got into woodworking and designing furniture in 2008, when he and his wife bought a house and needed to fill it. This led to community college woodworking classes, then to building custom furniture through his *foureyesfurniture.com* business, and then to his YouTube channel, youtube.com/c/chrissalomone1, where he hopes to entertain and inspire you with the videos of his designs and builds.

into manageable sized chunks, my first building task was to work on the legs. I ripped a board of walnut into two pieces, each of which could yield two legs for this pretty standard style of four-legged

table. I first crosscut the boards to the legs' finished length of $29\frac{5}{8}$ " on the table saw. I made these cuts with my miter gauge set to 5° , which is the angle of splay I wanted to maintain.



The tapers on the inside edges of the legs are started by marking the leg blanks at the top and bottom, then connecting the marks. With that done, step to the table saw and set up a tapering jig to accurately slice the angle that forms the taper.

You might notice also that these legs are subtly tapered. I laid out my desired taper on the leg boards, marking lines that tapered from 2" at the top of the legs to 3/4" at the bottom. I lined up these marks on my tapering jig and then ripped all four legs using the jig.

I also needed to rip the upper cross braces to width; they connect the tops of the legs. I'm reaching the point in my woodworking where I want to experiment more aesthetically. In the past, I probably would have cut these pieces out of stock the same thickness as the legs. This time around, though, I made them from thinner stock.

My next markups were to lay out the joinery: I used one of the cross braces I had cut to mark out the notches in the legs where the cross braces are joined to the legs, and I also marked out the location of a dado on the legs that will hold the low shelf. See *Drawings* on page 62 for the location of the dados.

I machined the dados and notches on my table saw using a dado blade and miter gauge. Cut them at 5° to the edge (again, see the *Drawings*). Now it's time to cut the cross braces (mostly) to length; I left them just a tad over-long so that I'd be able to use a hand saw to cut the angle to match the legs and sand them flush during assembly.

Body Building

I then turned my attention to the case-work portion of this table. My material for the table sides, bottom and back — because I had it on hand from other projects — consisted of walnut plywood,

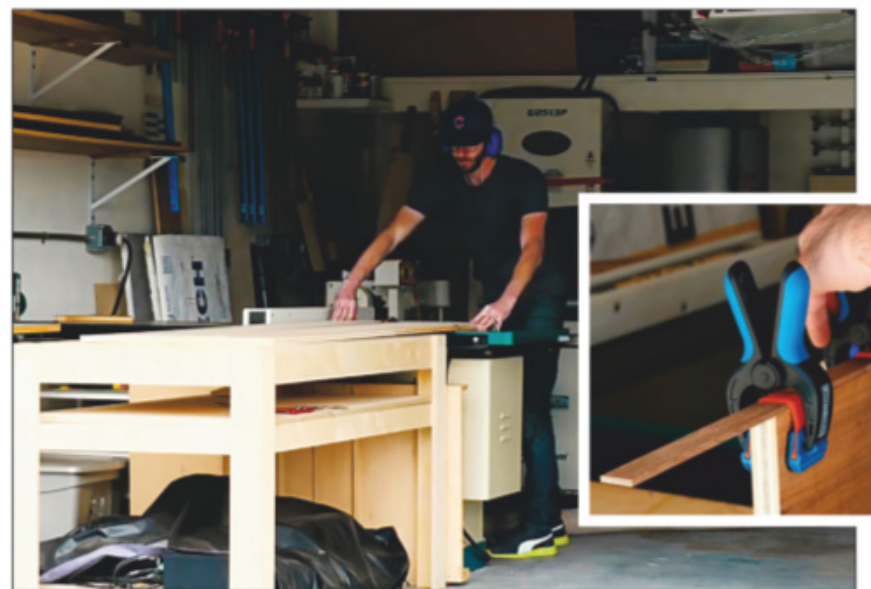
with hardwood strips to cover up the plywood edges. Obviously, if you have hardwood on hand or prefer to use it for the entire project, go ahead. I, on the other hand, roughed out the pieces for the back, bottom and sides, then I ripped and glued on the hardwood strips. Once they were dry, I sanded them flush.

I cut a 45° bevel on both ends of the long bottom piece and on the bottom end of each of the short side pieces. I also cut a 1/4"-deep by 3/8"-wide rabbet along the back edges of the plywood pieces, which will eventually capture the back panel.

My next step was to glue up the casework. I laid my boards out flat and end to end: the ends of the sides and bottom that are joined together with bevels were taped together with blue masking tape to serve as temporary "hinges." I applied a



The author used a hand saw to trim the cross braces to match the angle of the legs, then he sanded the joint flush and smooth.



The carcass of this hall table is constructed of walnut veneer plywood. The edges of the plywood are hidden by thin solid walnut strips.



Here the author uses a table saw to machine the 45° angle along the bottom edge of the carcass sides. It also sets the length of the sides.

MAKER PROJECT CONTINUED

Decorative Stretchers

(Front View)

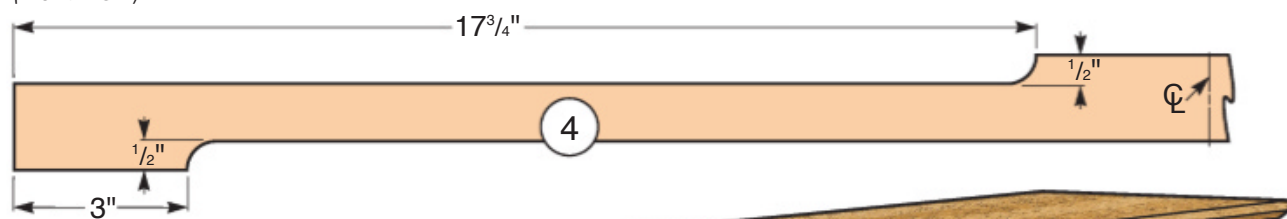
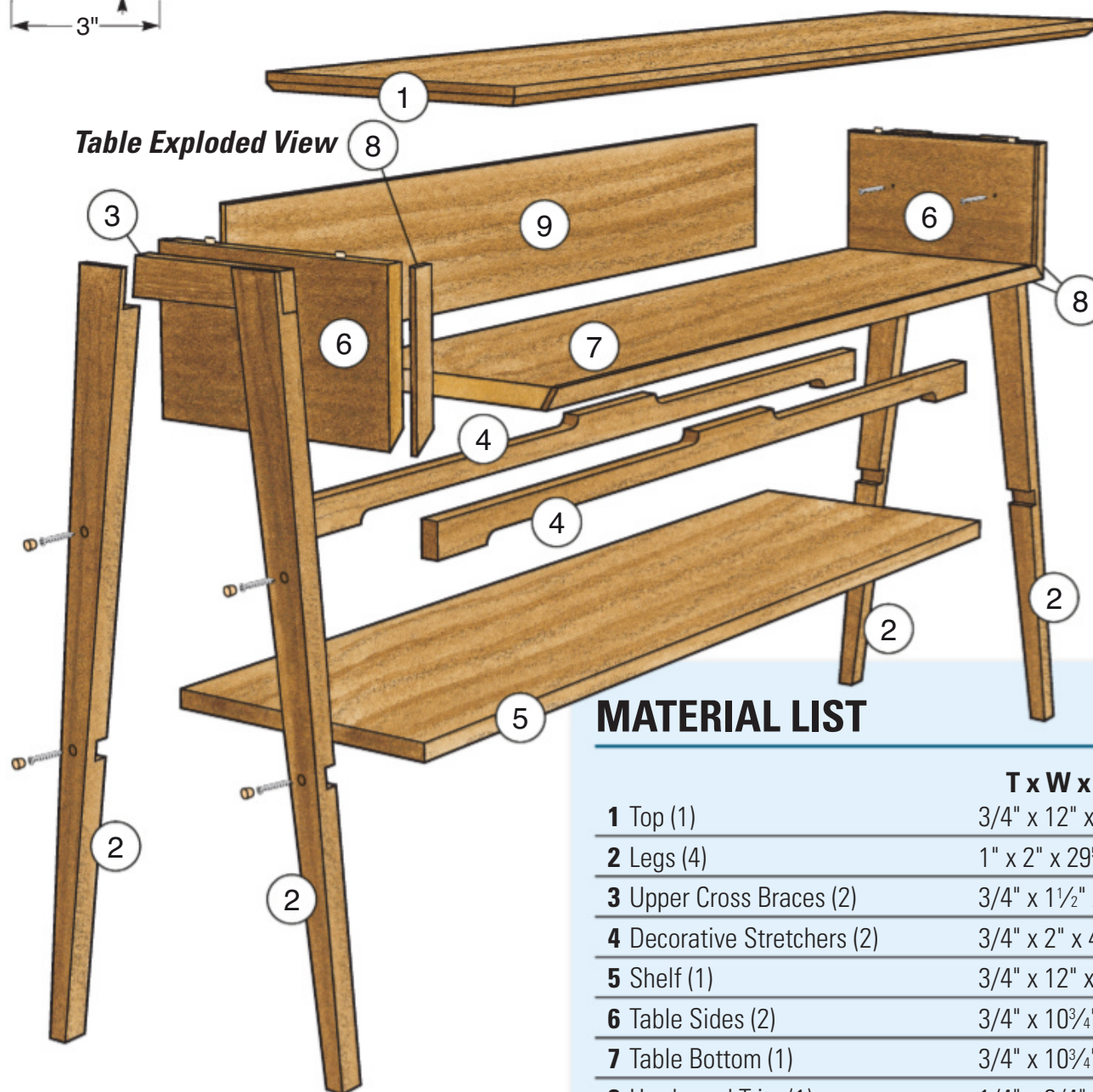
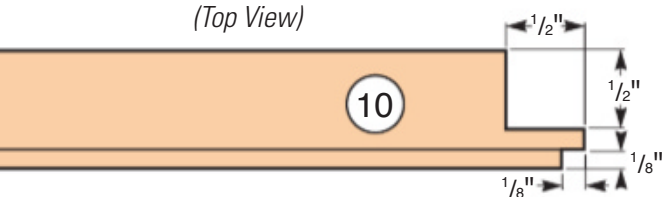


Table Exploded View

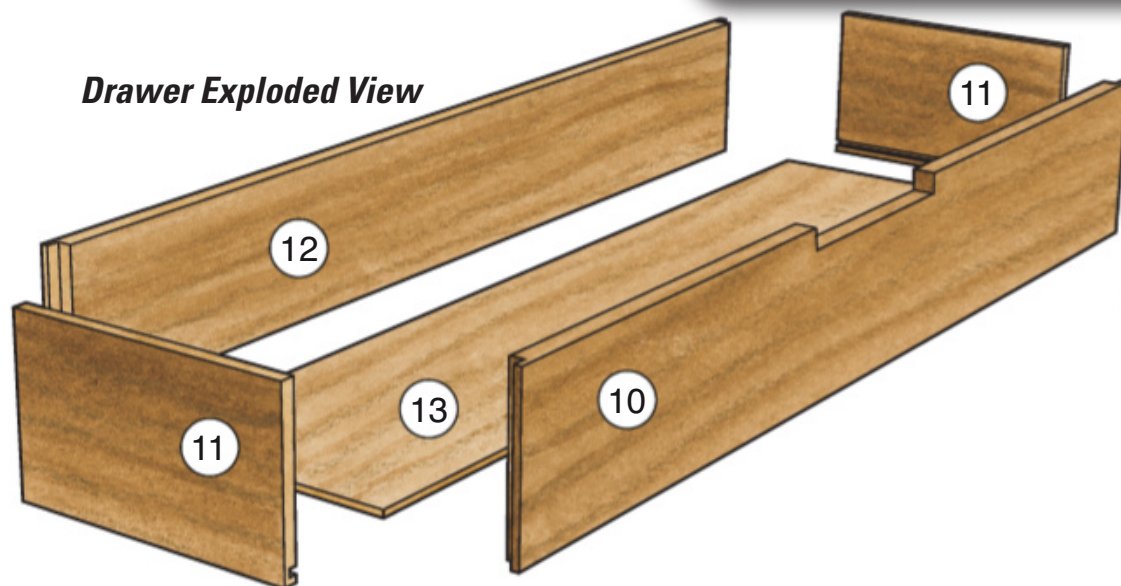


Drawer Front

(Top View)

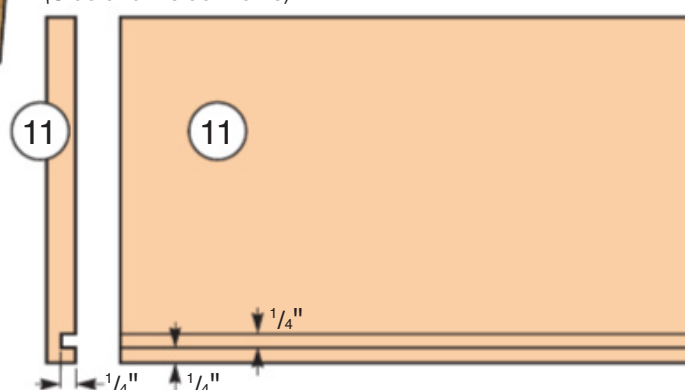


Drawer Exploded View



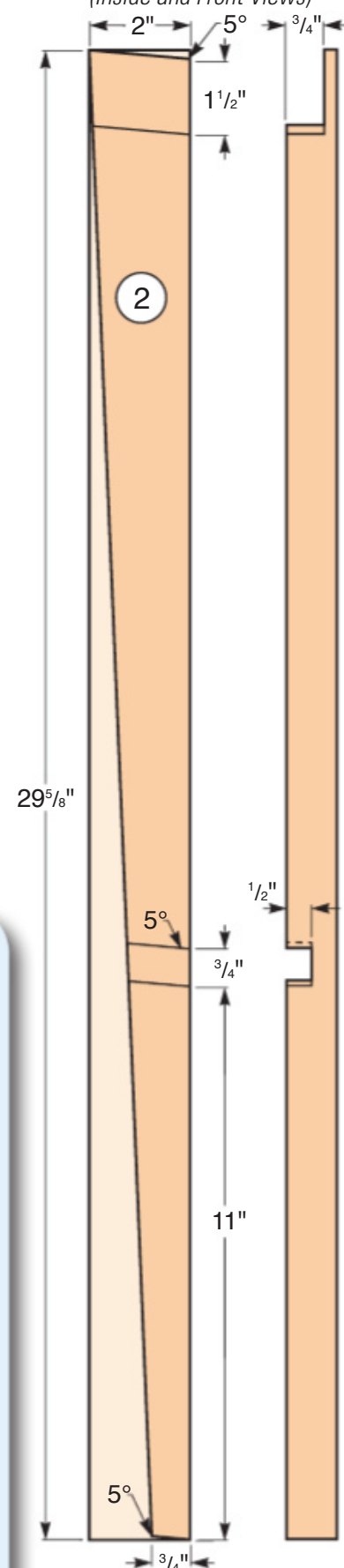
Drawer Ends

(Side and Inside Views)



Leg

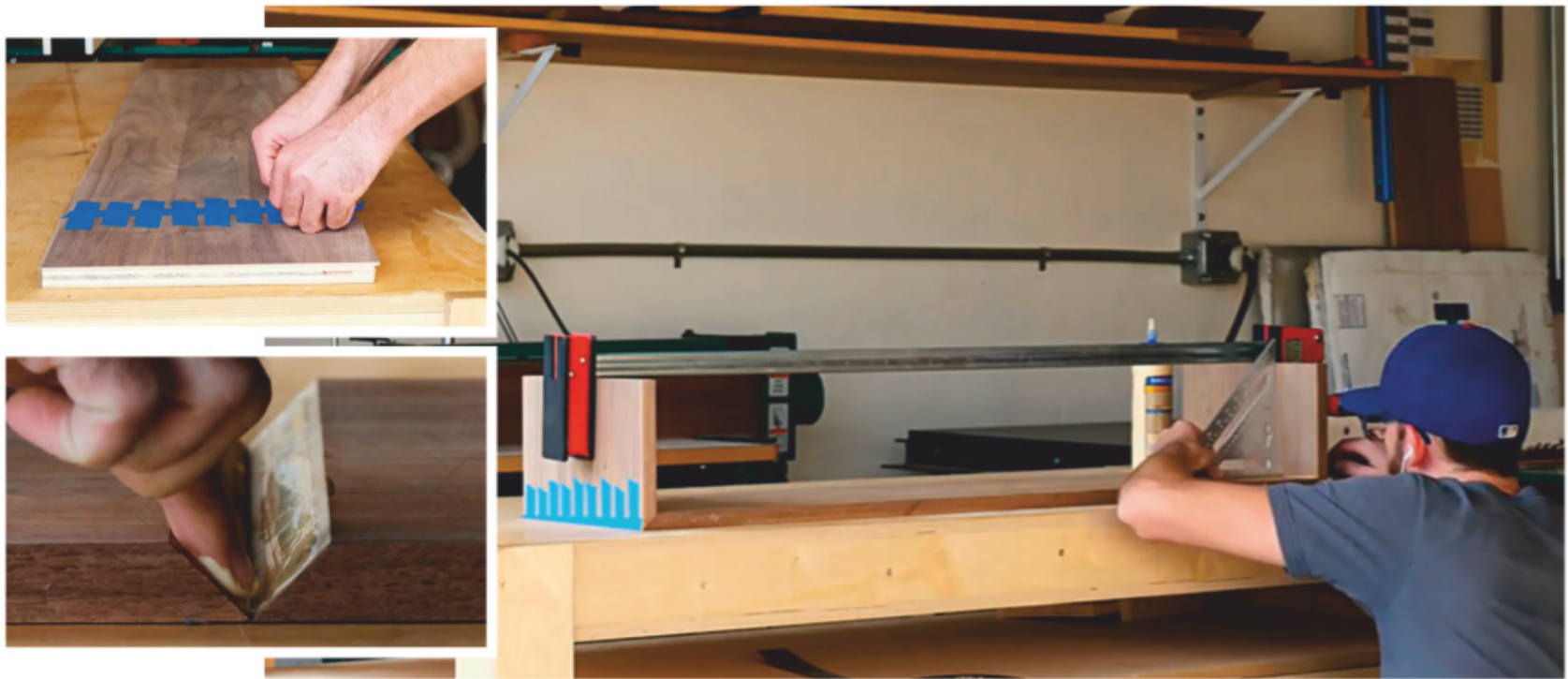
(Inside and Front Views)



MATERIAL LIST

	T x W x L
1 Top (1)	3/4" x 12" x 48"
2 Legs (4)	1" x 2" x 29 5/8"
3 Upper Cross Braces (2)	3/4" x 1 1/2" x 7 1/8"
4 Decorative Stretchers (2)	3/4" x 2" x 41 1/2"
5 Shelf (1)	3/4" x 12" x 42 1/2"
6 Table Sides (2)	3/4" x 10 3/4" x 6 3/4"
7 Table Bottom (1)	3/4" x 10 3/4" x 41 1/2"
8 Hardwood Trim (1)	1/4" x 3/4" x 60"
9 Table Back (1)	1/4" x 6 3/8" x 40 3/4"
10 Drawer Front (1)	3/4" x 6" x 40"
11 Drawer Sides (2)	1/2" x 6" x 10"
12 Drawer Back (1)	3/4" x 5 1/2" x 40"
13 Drawer Bottom (1)	1/4" x 9 1/2" x 39 1/2"

Note: The dimensions in the list above are exact. The dimensions stated in Chris's video are approximate.



After covering the exposed edges of the plywood sides and bottom with hardwood, the author then bevel-cut them to size. Using blue tape as a kind of "hinge," he applied a coat of glue to both faces of each joint and then "folded" the joints closed. A clamp held the glue-up square.

thin coat of glue onto both faces of these joints, then folded the assembly up into its correct shape. I used a long bar clamp to hold the ends and bottom square to one another while the glue dried.

As that cured, I sanded and finished those pieces that would be hard to access once assembly was complete.

Hardwood Components

My next cuts, made the following night after work, were for the table's top and the shelf. I left the shelf oversized at this point, in order to do more assembly later on in the building process.

The top, however, was cut to final dimensions (see *Material List*). I then

used a chamfer bit in my router to cut a 45° chamfer on the underside of the table's top. It's a bit more subtle than my usual sharp bevels, but again, it was part of my aesthetic experimentation with this piece.

Continues on page 64 ...

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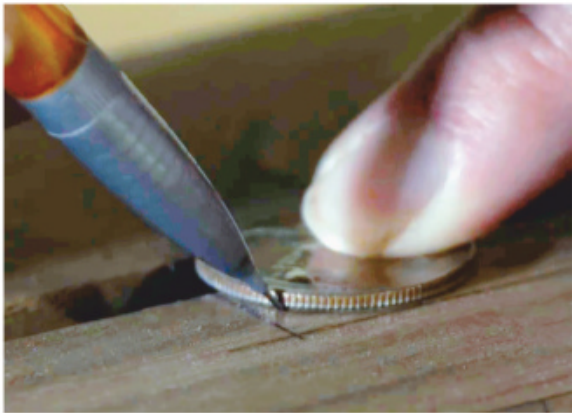


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MAKER PROJECT CONTINUED



Use a handheld router and a piloted chamfer bit to shape the bottom edge of the carcass top. It adds a nice shadow line.

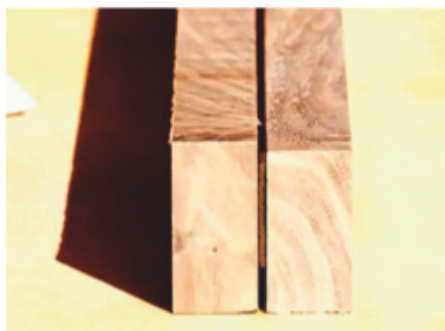


Using what he had on hand, the author formed radiused details on the decorative stretchers by tracing around a quarter.

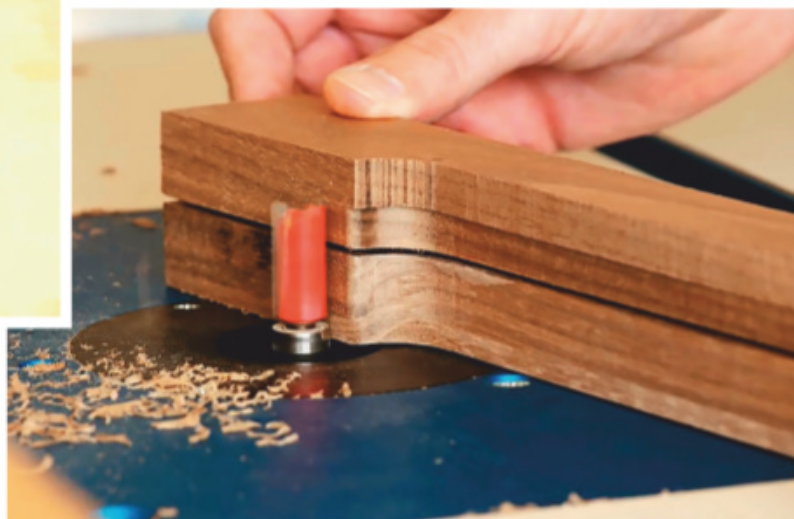


Even a band saw blade that's too wide to cut such tight radii can still do the job if you nibble away the waste and sand the curve smooth.

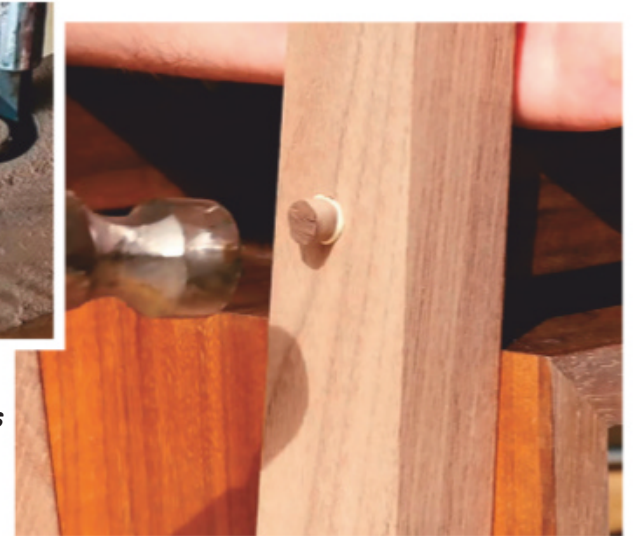
The decorative stretchers, made next, are both structural and add an attractive detail: they support the long plywood pieces to help prevent sagging. I marked out one of these pieces, then



A pattern-routing bit in a router table shapes the second decorative stretcher; the first stretcher acts as a template.



A tapered plug cutter was the tool of choice for making plugs from the offcuts of the project.



made the cuts on the band saw — sort of. My band saw blade was too wide to get close to the radius I had drawn, so I just nibbled close to the line, then sanded the rough area to the line to complete the shaping.

Since I wanted the decorative stretchers to match, after I had finished with the first one, I used it as a guide for tracing onto the second blank. I was then able to rough the second one out on the band saw. From here, I taped the two together and template-routed the second stretcher to match the first.

Assembling the Table

With all pieces cut, except for the drawer, I was ready to start assembling my table. The legs are attached directly to the casework sides using screws — they'll be hidden by the drawer.

To install the stretchers, I secured them with a screw driven down through the drawer carcass at the center point of each stretcher. I also drove screws through the legs and into the ends of the stretchers, but this created visible screw holes. To camouflage their screw heads, I first drilled a recess (some-

times called a counterbore) at each screw hole with a 3/8" bit, creating a place for the screw heads to "hide," then I cut tapered screw plugs out of my scrap wood from the project to cover up the holes. Once I made sure the grain orientation matched the rest of the surface and sanded down the plugs, they became pretty much invisible — unless you look really, really closely.

My method of choice for attaching the walnut table top to the rest of the plywood casework was four Domino joints. (If you don't have a Festool Domino machine, you can use dowels and get good results, too.) The Dominoes go from the top of the plywood into the underside of the top. After making the cuts in the plywood, I rested the top in position in order to mark where the cuts on the underside would need to be.



You can attach the top to the carcass with Domino joints. Dowels are another perfectly suitable way to join the top to the project.

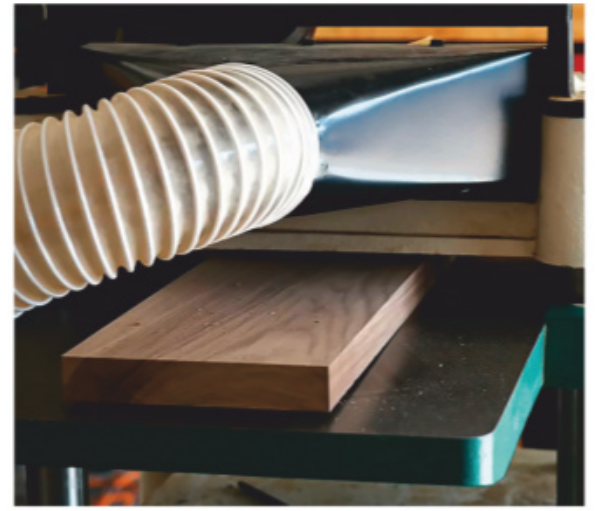
With that done, I was still not quite ready to glue the top down. Instead, I first installed the shelf between the legs, fitted into the dados I made earlier. I cut the shelf to size by referencing the space between the dados in the legs. The shelf, like the stretchers, is



Before gluing the top in place, fit the shelf into the dados that were formed earlier. It is secured with screws hidden by shop-made plugs.



When he started on the drawer, the author cut the pieces oversized, as he eventually wanted to fit them snugly into the drawer opening.



The walnut for the drawer was cut from some very thick stock, which needed to be planed down to a more appropriate thickness.

attached with screws, which are then hidden with plugs. (I figured I was already making the other plugs, why not just make more?) With the shelf in place, I attached the top.

Building the Drawer

As you may have noticed, I've been mentioning that this table has a drawer — and its construction is next up. The drawer is just a simple box that slides tightly into the cubbyhole created by the casework. No rails, no hardware.

The front and back pieces get a rabbet to accept the drawer sides, and the drawer side pieces get a groove for a bottom panel.

I used hardwood for the front panel and 3/4" plywood for the sides and back. It probably would have been more appropriate to use 1/2" plywood or solid stock but, again, I was just making use of whatever I had on hand.

I rough-cut all the drawer pieces slightly oversized. Then I planed the solid walnut front panel down to about

a 1" thickness. I carefully fit the drawer front piece (cutting, then test fitting) to get it to the exact width it needed to be. I used that setting on my table saw to cut the drawer sides to their exact widths as well.

I used the same fit-and-cut process with the drawer back piece to find the exact length I needed and transferred that over to the drawer front. This drawer needs to fit the opening snugly.

Continues on page 66 ...

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The author used a two-step cut to form rabbets on the ends of the drawer front. The drawer sides are glued and nailed into these rabbets.



The drawer bottom slides into the grooves prepared for it. Then nail the drawer bottom to the bottom edge of the drawer back with pin nails to secure it.



The "drawer pull" is created by removing a hand-sized notch in the top edge of the drawer front. It's an elegant and simple "non-hardware" solution.

I marked out the rabbet on the drawer front to fit the plywood sides. Stepping to the table saw, I cut these rabbets by first crosscutting on the table saw, then employing a jig to run the piece vertically for the second cut to complete the joint. I then plowed the grooves

drawer and the forward edges of the carcass a little more uniform and to provide a nice shadow line. With this work behind me, it was finally time to glue up and assemble the drawer, putting the drawer bottom in last. Be sure your drawer box is square when clamped up.



While the glue was curing on the drawer assembly, the author moved on to attaching the back panel with pin nails.

that hold the bottom in the side pieces and used that mark to determine how wide to cut the back piece to finalize it. That's because the drawer back is narrower than the sides and front so that the bottom panel can slide in under the drawer back and be pin-nailed securely to it after the drawer is assembled. (You can find these measurements in the *Drawings* on page 62.)

Before assembling the drawer, I shaped a cutout on the drawer front to act as a drawer pull. I made this negative space cutout on the table saw so that it fit my hand. I also shaped a small rabbet around the perimeter of the drawer front to make the reveal between the

Final Assembly Details

As the drawer box glue-up was drying, I attached a 1/4" plywood back panel into the carcass opening formed by the rabbets I had cut earlier.

Now it was time to do the final sanding and apply a finish. For this project, I opted for several coats of drying oil



Any clear top coat would work for the project, but drying oil followed by a high quality paste wax rub-down really brings the beauty of the walnut to the fore.

followed by a coat of paste wax. Oil and wax is a great solution to warm up the walnut's color, and the finish is easily touched up, if needed. This was a fun project to build and, call it what you will, it now looks great in our hallway.

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- Drill chuck: 5/8"
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- Table swing: 360°
- Table tilt: 45° left & 45° right
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W1844 Wall-Mount Dust Collector with Canister Filter

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Rockler Lock-Align Drawer Organizer System



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The **WORX® Storage Step Stool** is a portable toolbox that doubles as a step stool. The storage cavity underneath the top measures 14½" wide x 10½" long x 5½" deep. In combination with an 8½"-long x 9"-wide x 2¾"-deep pullout drawer under the cavity, the Storage Step Stool can hold up to 28 pounds of tools and accessories. The 13" step stool has a weight-bearing capacity of 324 pounds. Made of nylon resin, the Storage Step Stool has an integrated handle that lies flush in the lid for transport, a locking metal clasp for the storage compartment and a brushed surface for sure footing. The WORX Storage Step Stool is priced at \$39.99.



WORX Storage Step Stool

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Easy Wood Tools Negative Rake Cutters

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sive and therefore safer, as well as virtually eliminating chatter and chipping. The Negative Rake Cutters are carbide tips that fit all sizes of Easy Wood Tools roughing and finishing tool handles. Each Negative Rake Cutter is priced at under \$20.

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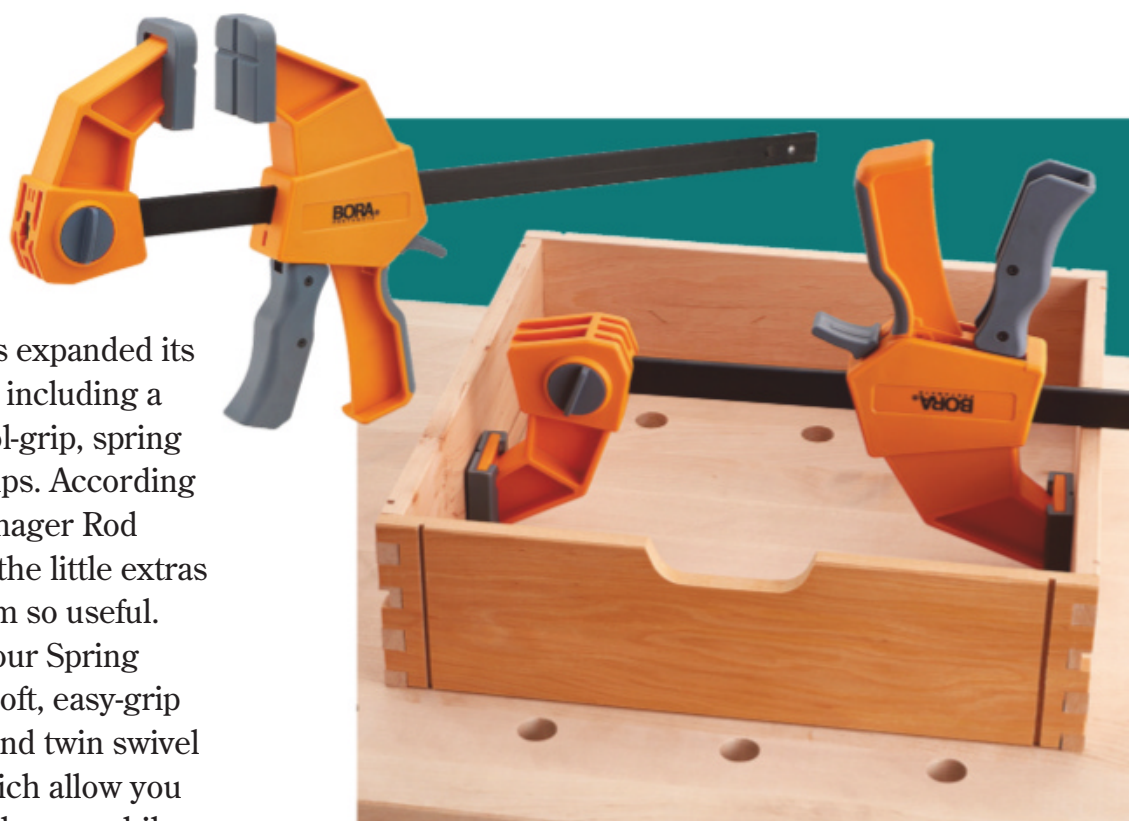


Big Foot Tools Flush Drive

Bora Tool has expanded its line of clamps, including a variety of pistol-grip, spring and lever clamps. According to product manager Rod Bonham, "It's the little extras that make them so useful. For example, our Spring Clamps have soft, easy-grip TPR handles and twin swivel head pads, which allow you to clamp odd shapes, while the Lever Clamps have a quick-release bottom jaw that swivels just enough to conform to the job at hand." The *Bora Tool clamps* are offered in a variety of sizes and functions, with prices ranging from \$10.50 to \$64.00.



BORA Tool clamps



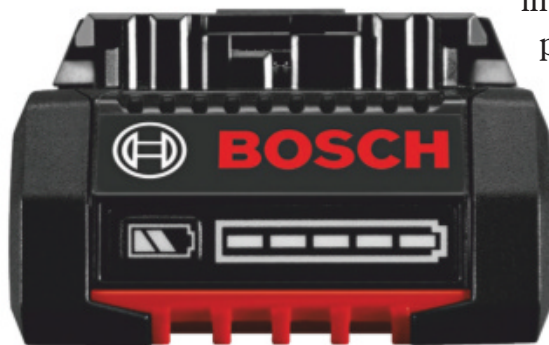
The new **Bosch BGBA18V40 Core18V 4.0 Ah Battery** utilizes 21700 lithium-ion cell technology to arrange all the power cells in a single layer, creating a smaller and lighter battery. The battery weighs in at 1.15 pounds, with dimensions of 4.6" long, 3" wide and 1.85" tall. It also incorporates Bosch CoolPack 2.0 technology, which combines a proprietary design and a high-density polyethylene housing that completely encases each cell to pull heat away from the cells. Plus, the battery is designed without space gaps, so heat from the cells doesn't get stored

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WHAT'S IN STORE CONTINUED



Bosch BGA18V40 Core 18V 4.0 Ah Battery

in the interior. All of this protection against heat is designed to extend the lifetime of the battery; Bosch says the CORE18V 4.0 has a 135% longer life than conventional batteries without CoolPack.

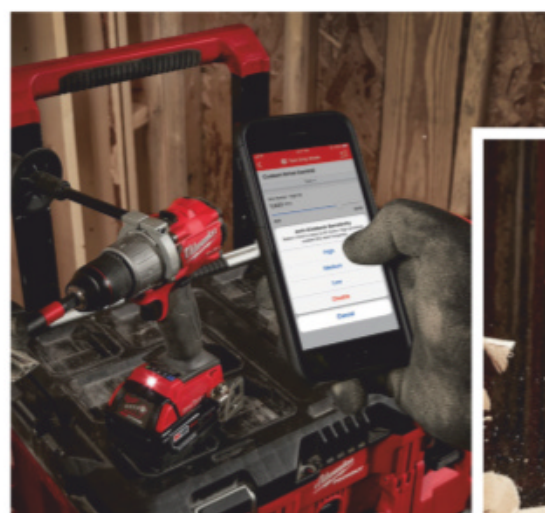
The Bosch CORE18V batteries are compatible with all 18-volt Bosch lithium-ion tools and chargers. The CORE18V40 is priced at \$99.

Rockler has added seven new *Bench Dog*® hand planes so that the line now covers the full process of milling wood by hand. All the Bench Dog plane bodies are made from ductile iron, stronger and more impact-resistant than cast iron, with soles machined flat to within a tolerance of .0015" to .002". The blades are tempered, high-carbon spring steel, the fittings are solid brass and the handles are durable sapele wood. Each plane comes in a storage box, with a storage sock included

Bench Dog hand planes



Milwaukee Tool M18 FUEL Drill/Driver with ONE-KEY



for most. The new models include a No. 7 Jointer Plane for milling boards flat and straight; three models of general purpose planes (No. 5, No. 5½ and No. 62 low-angle); a No. 4½ Smoothing Plane; and two types of shoulder planes for refining rabbets and tenons: a No. 92 and a three-in-one model that can be converted to a bull-nose and chisel plane. Prices of the new Bench Dog hand planes range from \$99.99 for the No. 92 Shoulder Plane (item 51527) to \$299.99 for the No. 7 Jointer Plane (item 58682).

The **Milwaukee Tool M18 FUEL™ Drill/Driver with ONE-KEY™** includes anti-kickback technology: by using this mode within the ONE-KEY app on their mobile device, tool users can set their preferred con-

trols, adjusting the sensitivity based on the application to increase control in bind-up situations and avoid nuisance shutdowns. Once the tool is set, the mobile device is no longer needed. ONE-KEY also offers tool tracking and management functions. The M18 FUEL Drill/Driver is compact, measuring 6.9" long, and offers 1,200 inch/pounds of torque and two speeds (0-550 rpm and 0-2,000 rpm). It weighs 4.8 pounds and includes a 1/2" all-metal ratcheting chuck. The M18 FUEL 1/2" Drill/Driver with ONE-KEY Kit (item 2805-22) includes the drill/driver, two M18 REDLITHIUM™ XC5.0 Battery Packs, charger, belt clip, side handle and bit holder and has a suggested price of \$329. It's also available as a bare tool (2705-20) for \$179.

Woodworking Tools & Supplies Index



February 2019

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FINISHING THOUGHTS

Shellac: Inside and Out?

By Michael Dresdner

Shellac has a place on a dresser. Our expert examines whether that place is in the drawer interiors, or on the dresser top.

Contact us

with your finishing questions by writing to Woodworker's Journal, 4365 Willow Drive, Medina, MN 55340, or by emailing us at:

finishing@woodworkersjournal.com.

Please include your address, phone number and email address (if you have one) with your thoughts or questions.



Michael Dresdner

is a nationally known finishing expert. He shares his expertise on the DVD *The Way to Woodwork: Step-by-Step to a Perfect Finish*, available through the store at woodworkersjournal.com.

Q I am planning on using shellac on cherry wood (not curly) in the near future. I will use a “clear/bleached” shellac, and I want to preserve as much of the natural look of the new cherry as possible. I will let it age on its own. Should I worry about blotching, or are there any other things that I should be concerned with for this combination of wood and finish?

The cherry piece is a dresser with drawers. The Internet tells me that using oil-based finishes will give off fumes for a long time. This is why I was going to use shellac, but if there is another product that could be used on the inside of drawers without fumes and would not discolor the cherry, I would be open to trying something else.

R. Clark
via Internet

A No, you don't need to worry about blotching with shellac on cherry. And yes, oil-based finishes can leave a lingering odor, especially on interior surfaces. For that reason, among others, it is traditional to leave the insides of chests of drawers, and the insides of the drawers themselves, unfinished. However, if you choose to seal them, shellac is an excellent choice and will not impart any lingering odor

once it is dry. In fact, shellac is often used to seal in odors that one can't remove.

I'll just add one unsolicited comment. While shellac is wonderful for many things, I'm not sure I would choose it for the top of a dresser. Spilled cologne, perfume, nail polish, nail polish remover or anything strongly alcoholic (rubbing alcohol) or alkaline (many mirror and

“all surface” cleaners) can all damage and even remove shellac. Shellac is also prey to moderately high heat, from a hot coffee cup to a curling iron. Thus, for a top, you might want to seal it with one thin, flood-on/wipe-off coat of shellac, but for more durability, I'd top the top with polyurethane or conversion varnish.



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HEY DID YOU KNOW?

Woodworking trivia: Timber!

Vikings used a process called “riving” to make tree trunks into strong, usable planks. The wood is split lengthwise, instead of sawn, and the plank follows the natural grain of the wood, making it exceptionally strong – for such purposes as the hulls of Viking ships.



What Does It All Mean?

A quick guide to terms from the world of woodworking.

Butterfly hinge: Type of butt hinge with its plates cut in a decorative, wing-like pattern

Miter gauge: An accessory with an adjustable fence enabling angled cuts; has a rectangular runner on the underside that allows it to be used on any wood-working machine equipped with a miter slot

Resin: Thick sap or pitch deposits sometimes found in lumber

Digital image courtesy of Nick Kurzenko/Bigstock.com



The tulip poplar was the state tree of Kentucky until 1976, when it was changed to the Kentucky coffee tree. That didn't last. In 1994, it was changed back to the tulip poplar, with the Kentucky coffee tree being given the title “State Heritage Tree.”



Digital image courtesy of DenysHutter/Bigstock.com

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“Lumberjills” were members of England and Scotland’s Women’s Timber Corps, established during World War II to maintain timber supplies for aircraft and railway construction, as well as everyday uses.



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John McKenna/Alamy Stock Photo

Submit your own trivia ...

Send in a curious fact about your favorite topic and ours: woodworking. If it is selected for use, you will win an awesome prize!

Submit your Trivia to Woodworker’s Journal, Dept. Trivia, 4365 Willow Drive, Medina, MN 55340. Or send us an email: trivia@woodworkersjournal.com

Your Trivia Test:

Q Where is the lifesize bronze statue of a Women’s Timber Corps member located?

Answer The lifesize “Lumberjill” statue is in Queen Elizabeth Forest Park near Aberfoyle, Scotland. It was dedicated in 2007.



Kimberly Sutherland of Smoot, Wyoming, will receive a **Armor Tool Auto-Jig Pocket Hole System** for having a contribution selected for the Trivia page.

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