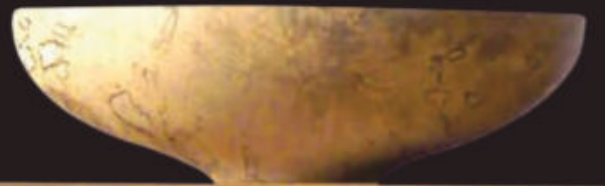


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This easy-to-build, multipurpose cabinet proves that an economical storage solution can still be attractive.



Ultimate Sanding Station

By Jeff Jacobson

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Our senior art director prioritized functionality and dust-collection efficiency when designing this flagship of a shop helper.



Skee Bag Game

By Rob Johnstone

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Here's a kid-friendly weekend project that can bring the thrill of bag toss games indoors for the winter.



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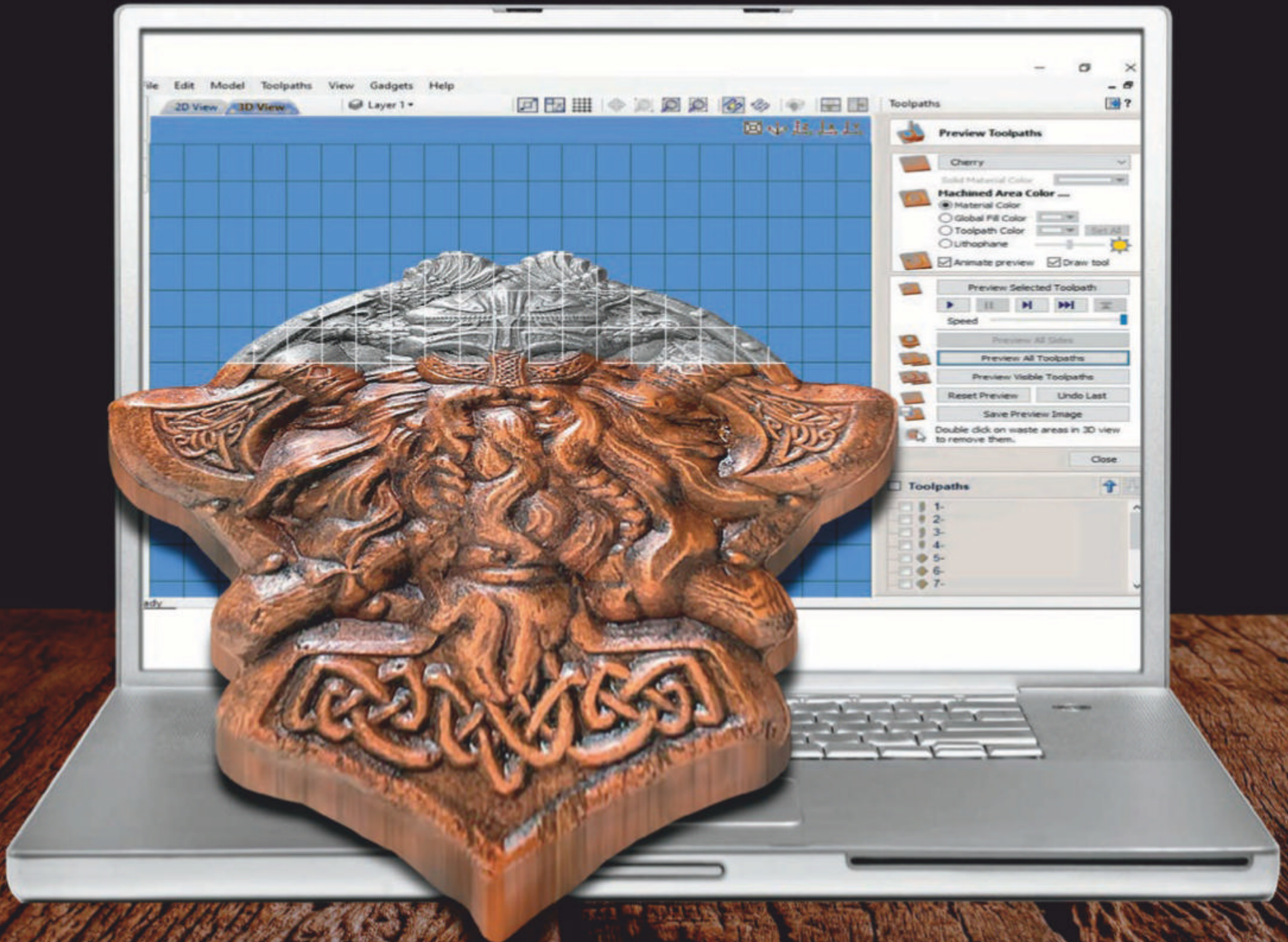
Chevron Table

By Nick Brady

Learn how to work with multiple species when you make this sturdy modern table project.

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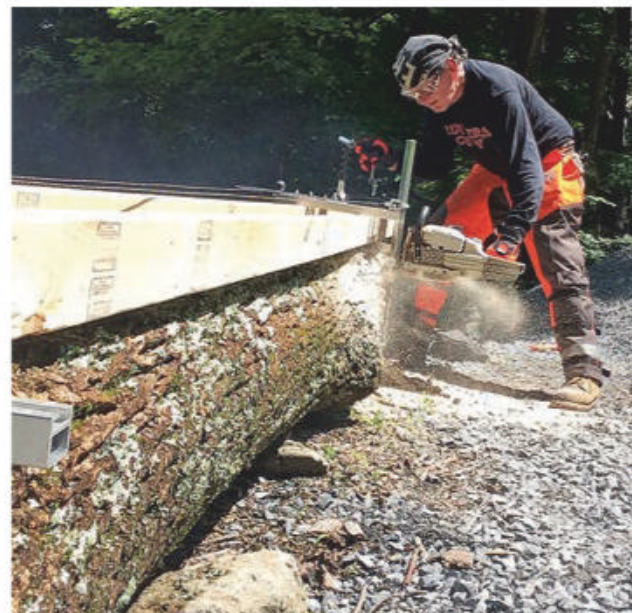
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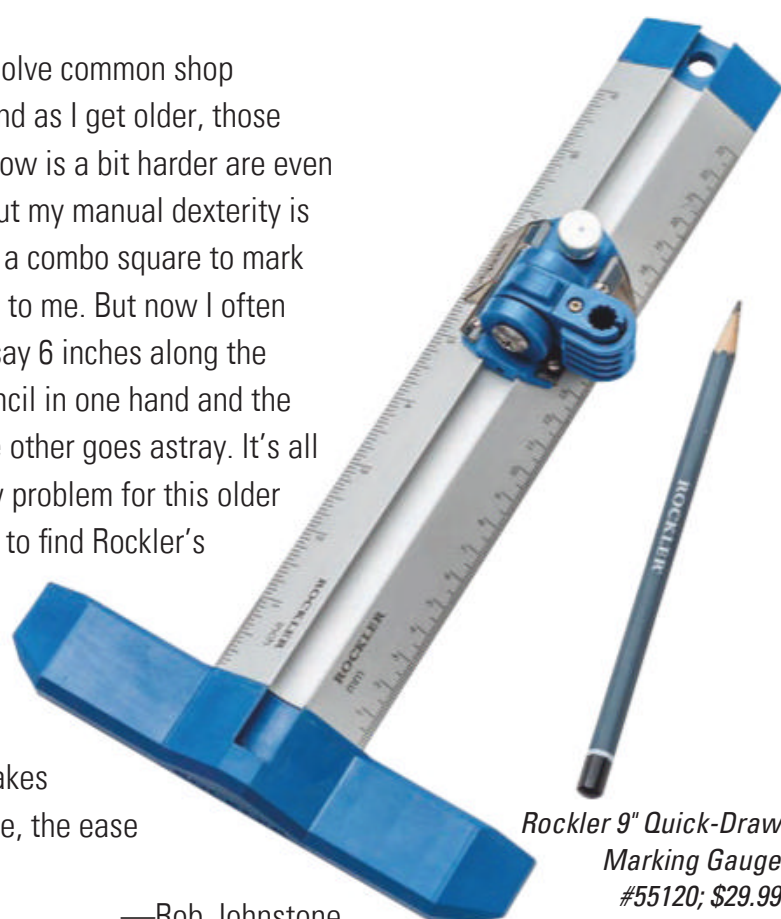
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Effective and Adaptive: Teaching Old Fingers New Tricks

Tools that simplify woodworking tasks and solve common shop problems are surefire winners in my book. And as I get older, those that make a task that once was easier and now is a bit harder are even more appreciated. I don't know about you, but my manual dexterity is not exactly what it once was. Using a combo square to mark lines on projects was second nature to me. But now I often fumble as I attempt to mark a line, say 6 inches along the length of a board. When I hold a pencil in one hand and the square in the other, often one or the other goes astray. It's all the more frustrating since it's a new problem for this older dude. That's why I was really happy to find Rockler's 9" Quick-Draw Marking Gauge. As you can see, it takes this two-handed layout work and turns it into a one-handed operation that is both accurate and easy. It makes other tasks easier as well, but for me, the ease of marking is where it really shines.

—Rob Johnstone



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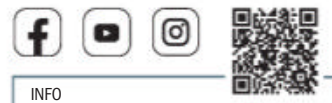
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FROM OUR READERS

Let's Get Started!



A NEW YEAR WITH NEW DEPARTMENTS!

Every year, as all of us here at *Woodworker's Journal* consider what woodworking topics to cover next, there's a good bit of discussion. As you likely know, we survey our readers regularly and ask (among other things) what you would like to learn more about. However, if we ask a hundred woodworkers what their opinions are, we'll probably get a hundred different answers. You are an independent

lot, but we still aim for broad appeal. With that in mind, I want to share three new departments we are launching about which I am pretty pumped!

The first is one we are calling *Advanced Power Tool Techniques*. In each issue this year, we will be selecting one of the primary woodworking tools and demonstrating two or three techniques that make that tool even more valuable. For this issue, it's the table saw (see page 52).

Have you ever purchased a specialized router bit set, such as for milling rail-and-stile joints, then found out that there were no included instructions? Setting them up became a real challenge, I'll bet. This year, we will address some of the more complicated router bits and demonstrate how to use them. The title of the department says it all: *Simplifying Bit Setups*.

And our old friend Ernie Conover will be sharing his wisdom outside of woodworking in 2023 by teaching *Modern Shop Hand Tools*. This new department is a direct result of the surveys we sent out late last year. Learning how to better integrate hand tools into your power tool shop is the goal of this new series.

Please let us know what you think of these content changes and what you'd like to see in them. We have plans, of course, but ideas are always welcome.

— Rob Johnstone

LETTERS

Need Thinner Biscuits? Grab a Hammer!

After reading Bruce Kieffer's method for sanding swollen wood biscuits so they fit again [*Tricks*, April 2022], I thought I'd share my

method. I place the biscuit on something solid like a concrete floor or a piece of steel and tap it a couple of times with a heavy hammer, turn the biscuit over and do the same on the other side. Presto — the biscuit fits again! And when glue is applied, it swells back to its normal working thickness.

Tom Lawton
Via the Internet



Continues on page 10 ...

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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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February 2023 *Woodworker's Journal*

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A spring-loaded cursor and scale make it easy to set track saws for depth-of-cut, particularly those on saws such as this DeWALT model that read in Imperial measurements.

Why We Really Skipped the Metric System

In “Track Saws and Circular Saw Guides” [October 2022, p. 53], the caption for the lower left photo of the DeWALT saw is a bit condescending toward the Imperial system. Let me relay a conversation I had with my wife in the mid-1970s. My wife was never taught the metric system, so I was trying to explain it. “A quart is just a little less than a liter. A cup is about 250 milliliters. You already have the tools. Look at

your four-cup measuring cup. It has a liter, 1000 milliliters.” At that point she interrupted with, “I will never cook in metric.” And so, this conversation was repeated millions of times across the U.S., and the metric system died in America. In those days, single guys would eat out or starve. I know because I ate one and a half meals per day on average in the cafe at the bowling alley. I don’t even bowl.

Rich Flynn
Huntington Beach, California

READER PROJECTS



Sapele Mantel Clock

When planning to make some gift clocks for my family, I built this mantel clock to gauge the degree of difficulty. However, my wife immediately claimed it for herself. It’s made of sapele and finished with Watco Danish Oil. It also forced me to finally make a zero-clearance insert for my table saw so I could cut the tiny pieces of quarter-round molding to hold the glass in place.

Mike Reslie
Via the Internet

Optical Illusion Art Box

I made this 4" x 12" x 14" art box for my grandson last year. I used red cedar and paulownia in an optical illusion-style cutting board pattern. The pattern flows around all six sides. This is side grain rather than end grain. I lined it with thin oak to add strength. It took two months to make, and there is never going to be another one.

Herb Brodie
Via the Internet



Tall Chairs Finally Done!

I had been holding on to my April 2018 magazine to eventually build the “Tall Outdoor Chairs” highlighted in that issue. In the past few months, I’ve finally been able to complete the project! Why did it take so long? Well, I decided to use ash stock that I milled from logs back in 2019. Here’s a photo of “Father Wood,” who donated the logs for the project. Because I was milling the lumber with my Alaskan Mill, I was able to cut the legs and cross braces for the chairs to full thickness,

rather than worrying about laminating 3/4" stock. Thanks for the inspiration!

Rob Orr
Metuchen, New Jersey



SURVEY

WHAT DO YOU MAKE AND FOR WHOM?

This time out we asked you about a number of personal wood-working experiences. Here is what you had to say.

1. Which room of the house have you made the most projects for?

- a. Basement 8%
- b. Bathroom 4%
- c. Bedroom 12%
- d. Dining room 3%
- e. Entryway 1%
- f. Family room 16%
- g. Kitchen 20%
- h. Living room 18%
- i. Other 18%

2. Who have you made the most projects for?

- a. Children 17%
- b. Customers 9%
- c. Friends 3%
- d. Grandchildren 4%
- e. Parents 1%
- f. Relatives 9%
- g. Siblings 3%
- h. Spouse 43%
- i. Other 11%



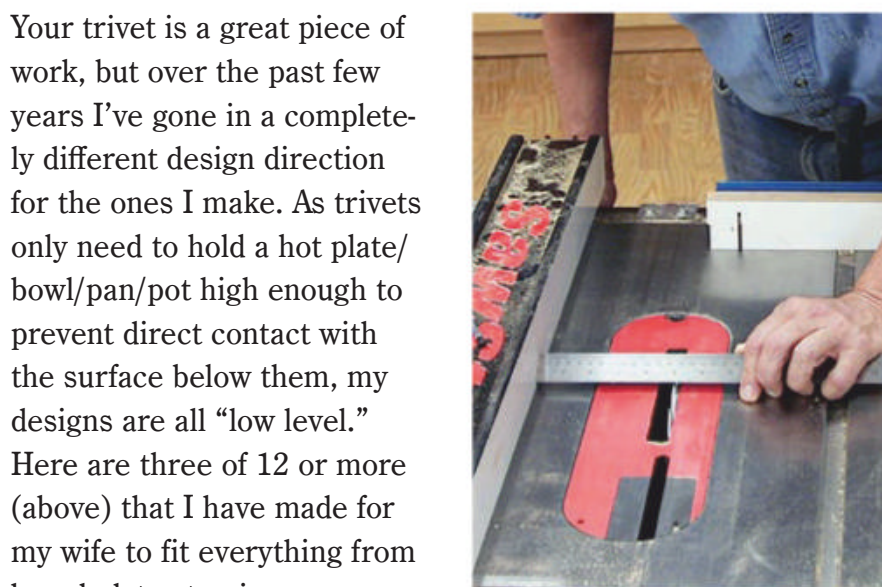
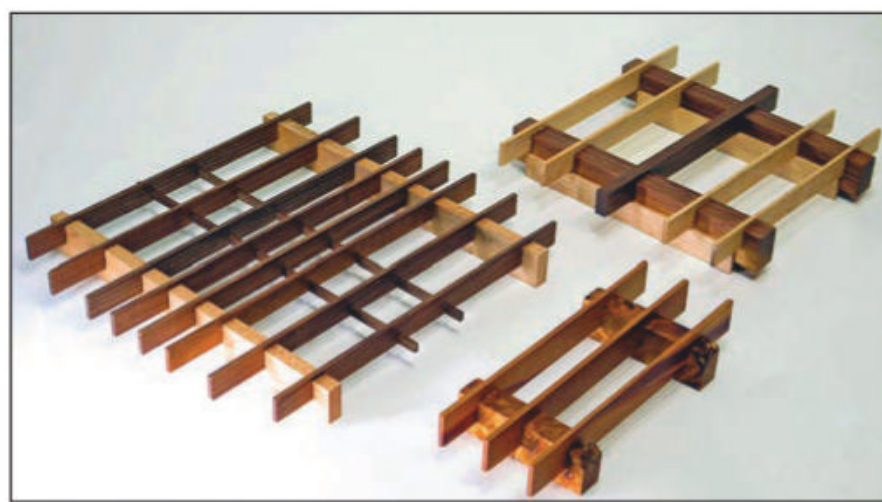
3. In the last 12 months, have you been doing:

- a. More woodworking than usual 15%
- b. Less woodworking than usual 47%
- c. Amount of woodworking hasn't changed 38%

4. Over the last 12 months, what have you spent most of your woodworking budget on?

- a. Hand tools 6%
- b. Power tools 21%
- c. Supplies (glue, sandpaper, etc.) 23%
- d. Wood (solid lumber, sheet stock) 46%
- e. Other 4%





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MORE ON THE WEB

Check online for more content
covering the articles below:

**Modern Shop Hand Tools
(page 20):**

Learn more about using and
sharpening backsaws (video)

**Shaker-inspired Cabinet
(page 32):**

Overview of economical lumber
and sheet goods choices for this
cabinet (video)

Skee Bag Game (page 40):

Follow along as our publisher
builds this game (video)

**Simplifying Bit Setups
(page 50):**

Routing parts for a rail-and-stile
joint (video)

**Advanced Power Tool
Techniques (page 52):**

Cutting coves on a table saw
(video)

What's in Store (page 58):

Featured tools in action (videos)

**Hardworking Hardware
(page 62):**

Here's how to install threaded
inserts and T-nuts (video)

Slatted Trivet Successes

Using the October 2022 issue's "Slatted Trivet" plans, I was able to make two trivets, one as per the plan and the other from the cutoff from the base (top left). I used hard maple and leopard wood that I had on hand. The large one is suitable for a lasagna pan and the smaller one is sized for an oven dish that my wife often uses. I finished them to 240-grit and used Watco Danish Oil (Natural) to finish them. I also added small clear pressure-sensitive feet to elevate and protect from counter moisture. This was a nice project!

Howard Renker
Glastonbury, Connecticut

Thanks for the plans for the trivet. I was in the process of thinking what I could build for a silent auction at our church bazaar. This seemed to be just what I was looking for. When you mentioned that you could build a smaller one with the cutoff, I thought why not make three stackable ones (top right)? I made my original block 2 1/4" x 2 1/2", kind of shooting from the hip. I made each leg and the slats shorter and the coves smaller.

Ron Welch
Via the Internet

Your trivet is a great piece of work, but over the past few years I've gone in a completely different design direction for the ones I make. As trivets only need to hold a hot plate/bowl/pan/pot high enough to prevent direct contact with the surface below them, my designs are all "low level." Here are three of 12 or more (above) that I have made for my wife to fit everything from bread plates to pizza pans.

Bob Peterson
Via the Internet

Router Table Work Too?

I read the article about the "Slatted Trivet" and I have a question. My table saw doesn't accept a dado blade setup, so I was wondering if I could use a 1/4" straight router bit in the router table to make the cuts for the slats.

Beverly New
Via the Internet

Rob Johnstone Responds:

That would work just fine! You will need to be accurate in your layout and cut the slats to fit the width of the slat openings. If you're using dense hardwood for the trivet ends, such as ash or maple, consider using a spiral bit. Often it will produce cleaner cuts than a straight bit, especially when making deep cuts, like these 3/8"-deep dados.

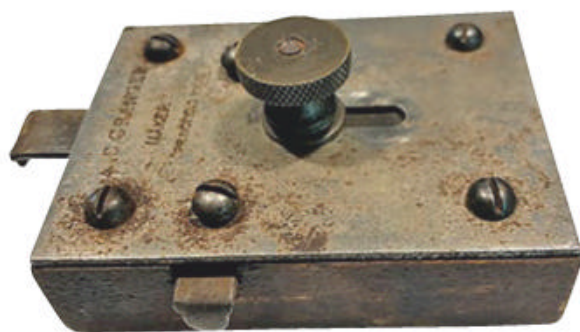
STUMPERS

Locked-in Consensus

Readers open this mystery's door.

Only six sleuths ventured guesses as to the purpose of Rae St. Amand's square October mystery device, but all of them zeroed in on a single object it was once used for.

"It's a butt gauge for laying out door hinges," says **Tom Altman**. Well, Tom, other



Rae St. Amand's October mystery tool draws speculations from just six readers this time. However, there is almost full consensus among them as to what this device was designed to do.

readers here will debate you about its usefulness as a hinge layout tool, but they'll agree that this Granger item is made for doors.

"It looks like an antique rim lock, the predecessor to today's deadbolt," speculates

David Underhill from Monument, Colorado. He adds, "I don't know the size, etc., so it could be a latch for a cool box or similar."

"It's a door lock," assures **Robert Schweizer** of Williamsburg, Virginia. "The round knob operates the bolt that is locked into position by the flat lever pictured on the left side of the device. I believe some versions may be operated by a key into a key hole on the side opposite the knob."

Gary Hamilton agrees with Robert's assessment. "This is very similar to the door latch mechanisms on the interior doors of both my maternal and paternal grandparents' homes in the Arkansas River Valley when I was a youngster. Their homes were probably built in

the late 1800s or early 1900s."

Jack Payton also believes the Granger device is a vintage lock, but his guess stems from locks he sees every day. "I own a 96-year-old two-flat that has the original doors and hardware. This stumper is a rim lock, probably from the first three decades of the 20th century. Often used on exterior doors until 1940, I believe. It attaches to the inside face of the door above the mortised latch and knob."

Steve Nicholson, hailing from Gig Harbor, Washington, suggests a more curious purpose to this device. "The item shown is a secret gate latch. The tab on the bottom is activated to release the locking mechanism. The knob on the face is a dummy."

What's This?



Ken Gatto of Ashland, Massachusetts, found this piece. When its handle is depressed, the tiny tongue behind the front screw presses down. He wonders if it's intended to hold or notch something. "Bullock" is stamped on the handle. Do you know what it's for? Email your answers to stumpers@woodworkersjournal.com or write to "Stumpers," Woodworker's Journal, 4365 Willow Drive, Medina, MN 55340.

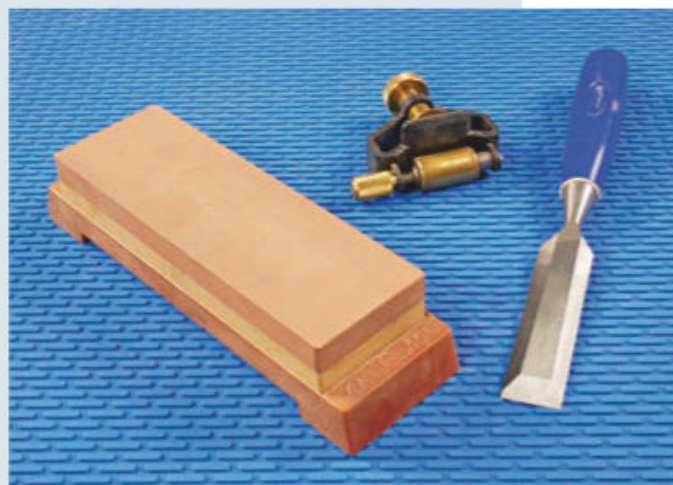
TRIVIA

Should I Sharpen it Now? Probably Yes.

One of the most frequent (and unanswerable) questions I get about sharpening is: How often should I sharpen? The correct but unsatisfactory answer is: Pretty much any time the question "Should I sharpen?" pops into your head. When I ask myself that question, I stop and look at my tool's edge. Can I see a glint of light at the tip of the bevel? If I can, it's time to sharpen. I look at my work to see if the surface is clean or if it's marred by fine lines or scratches in the wood. If I can see those lines, the edge is likely damaged and needs to be reground. And I think about the last few minutes of work I've done. If the work took more time than expected, it's time to sharpen.

Christopher Schwarz
Sharpen This

Lost Art Press; ISBN: 1954697119



TRICKS OF THE TRADE

Taping, Tallying and Trimming Tips



Labeling Setscrew, Allen Wrench Sizes

Many shop machines and accessories have one or more Allen-style setscrew for securing handwheels, adjusting blade guides and other functions. Problem is, most are different sizes, and some are metric, others Imperial. I have spent a lot of time finding and trying various Allen wrenches before getting one to fit. I put a stop to this hassle by locating every setscrew in my shop and marking its size beside the screw. I also tag my Allen wrenches with a tape label to avoid the problem of trying to read their tiny sizing stamped on the wrench. End of problem!

Bill Wells
Olympia, Washington



Supersized Miter Gauge

When I was building a bench recently, I needed to angle-cut the ends of one of the stretchers. It was too wide to cut in one pass with my miter saw and too long and heavy to crosscut with my table saw miter gauge. Instead, I used my tapering jig (with the workpiece stop removed) held against the fence of my crosscut sled to set the cutting angle I needed. That way, I could stabilize the board at the correct angle and slide it safely through the blade. Success!

Serge Duclos
Delson, Quebec



Refreshing a Cutting Edge

Being a frugal farm boy at heart, I cut cloth-backed abrasives for my sanders off of longer rolls to save money. That dulls my utility knife blade in just a few cuts. Rather than go get a new blade every time, I pull out my pliers and break off the dull portion of the tip. It gives me a fresh cutting edge. I can do this about four times before turning the blade around in the knife or getting a new blade.

Robert Owens
Via the Internet



Plug Fits Tape-side Up

Here's an annoyance about polarized tool plugs: it seems like about half the time I try to stick the wide prong into the narrower slot in the receptacle because the plug is upside down. If this bugs you, too, there's a simple solution. Plug in the cord and put a brightly colored piece of electrical tape on the top side of the plug. You'll always know the correct orientation for plugging it in: tape side goes up.

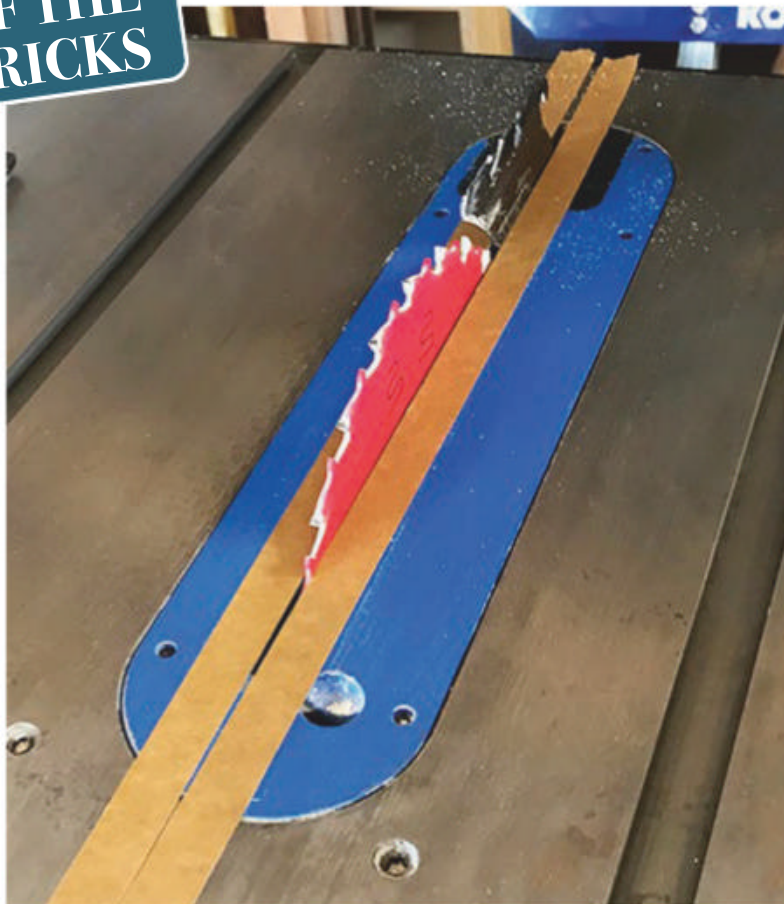
David Long
Lexington, Kentucky

Quick Zero-clearance Table Saw Mod

The blade openings on the standard throat plates of table saws are too large for making narrow rip cuts or crosscutting thin slivers off the ends of workpieces. Here's my simple fix: I apply a long strip of durable tape on one or both sides of the blade across the full width of my saw table. I position the tape so it nearly touches the blade. Now thin offcuts can't fall down inside the saw or get wedged and pose a kickback hazard. When I'm no longer in need of "zero-clearance" capability, I just peel off and toss the tape.

Seamus Harrington
Acushnet, Massachusetts

**PICK
OF THE
TRICKS**



In addition to our standard payment (below), Seamus Harrington of Acushnet, Massachusetts, will also receive a Milwaukee M12 FUEL™ Orbital Detail Sander for being selected as the "Pick of the Tricks" winner. We pay a one-time sum of \$150 for each trick 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.

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SHOP TALK

Five Stages of a Woodturner

By Rick Weil

Woodturning teacher and Fairfax, Virginia, Rockler store associate shares his turning journey.



My name is Rick and I am a woodturner. I frequently go into my shop in the morning and don't emerge until dinnertime, covered in wood shavings. Whenever I hear a chainsaw in the neighborhood, I get in my truck and drive towards the sound in the hopes of scoring some freshly-cut wood. I am a woodturner!

I didn't start out wanting this kind of life. Once, I was

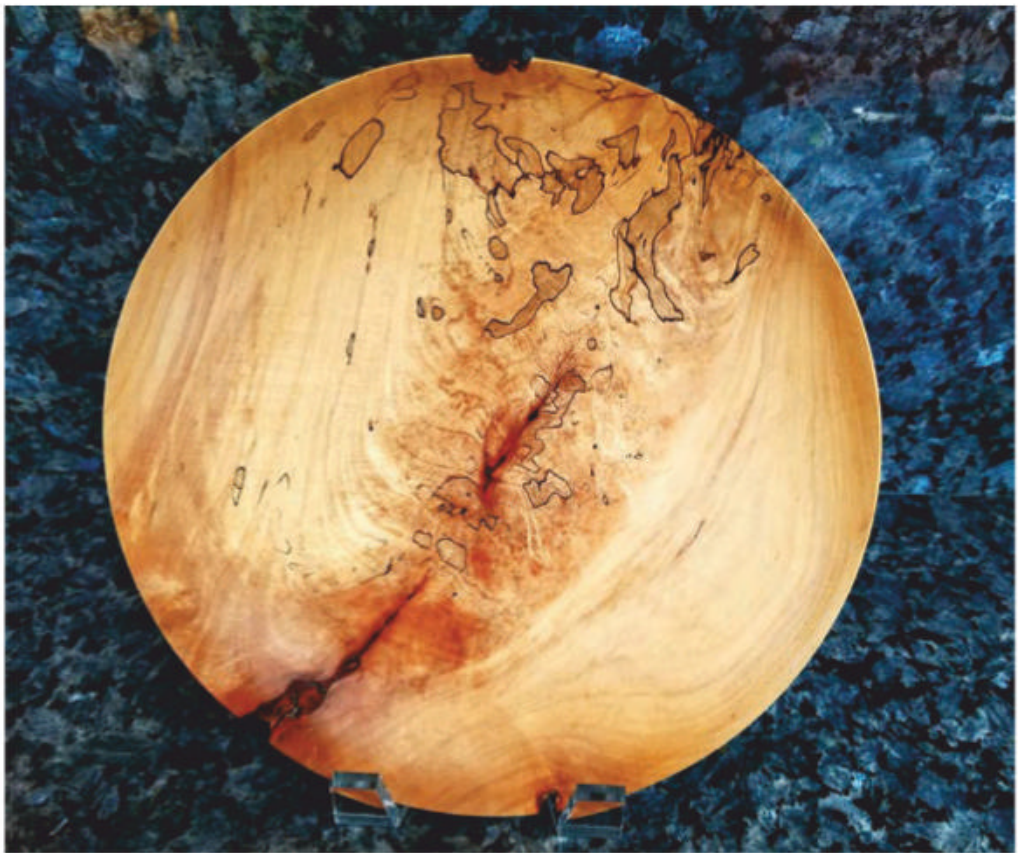
just like everyone else. I did repair jobs around the house, built sheds and decks and knocked together bookshelves using big box store lumber — just another weekend warrior. Then I

Accidental Success

In the early "Wheee, I just turned a round thing" stage, I was very pleased if I wound up with something marginally usable. I rarely could make two things that looked the same.

And I used a LOT of sandpaper — otherwise known as the "80-grit gouge" — to smooth over poor tool-handling technique. Success was purely accidental, and the results were at best "interesting."

The next step in my evolution from accidental to intentional woodturner was focused on acquiring good tool-handling techniques. I call it the "YouTube" stage. My goal was to produce a turned surface that could be finished with minimal sanding. I watched a lot of videos and went through a lot of firewood. After 50 or so bowls, I had the whole technique thing down pat. And I could repeatedly produce similarly-shaped objects. But the silly bowls were still ugly. Oh well, from firewood to firewood ...



Technique as Means to an End

The third step was perhaps the most important in my development as a turner. I call it the “intentional design” stage. I thought about what I liked and what I didn’t in examples of other turners’ work – the proportions, rim detail, foot dimensions and overall shape. I read about the golden ratio. I looked at examples of color and patterning in raku pottery. I sketched out scale drawings of work I intended to produce and evaluated them in terms of both form and functionality. Technique became just the means to an end, and success was not accidental but intentional.

At the end of this intentional design stage, I was able to produce objects that I liked. Other people liked them too, so I was able to start selling my work. This pleased my wife to no end, because the house was getting a bit cluttered with bowls.

The fourth progression is what I call the “druid” stage. I work exclusively with local-

ly-sourced green wood. Green wood gives you the opportunity to use the wood grain as an intentional design feature. Showcasing unusual feathered or fiddleback grain in a turned piece is done by choosing where to take wood from a tree. This requires looking past the surface of the tree to visualize what the grain looks like under the bark. I’ve also learned how to position the piece on the lathe to balance the grain of the finished piece.

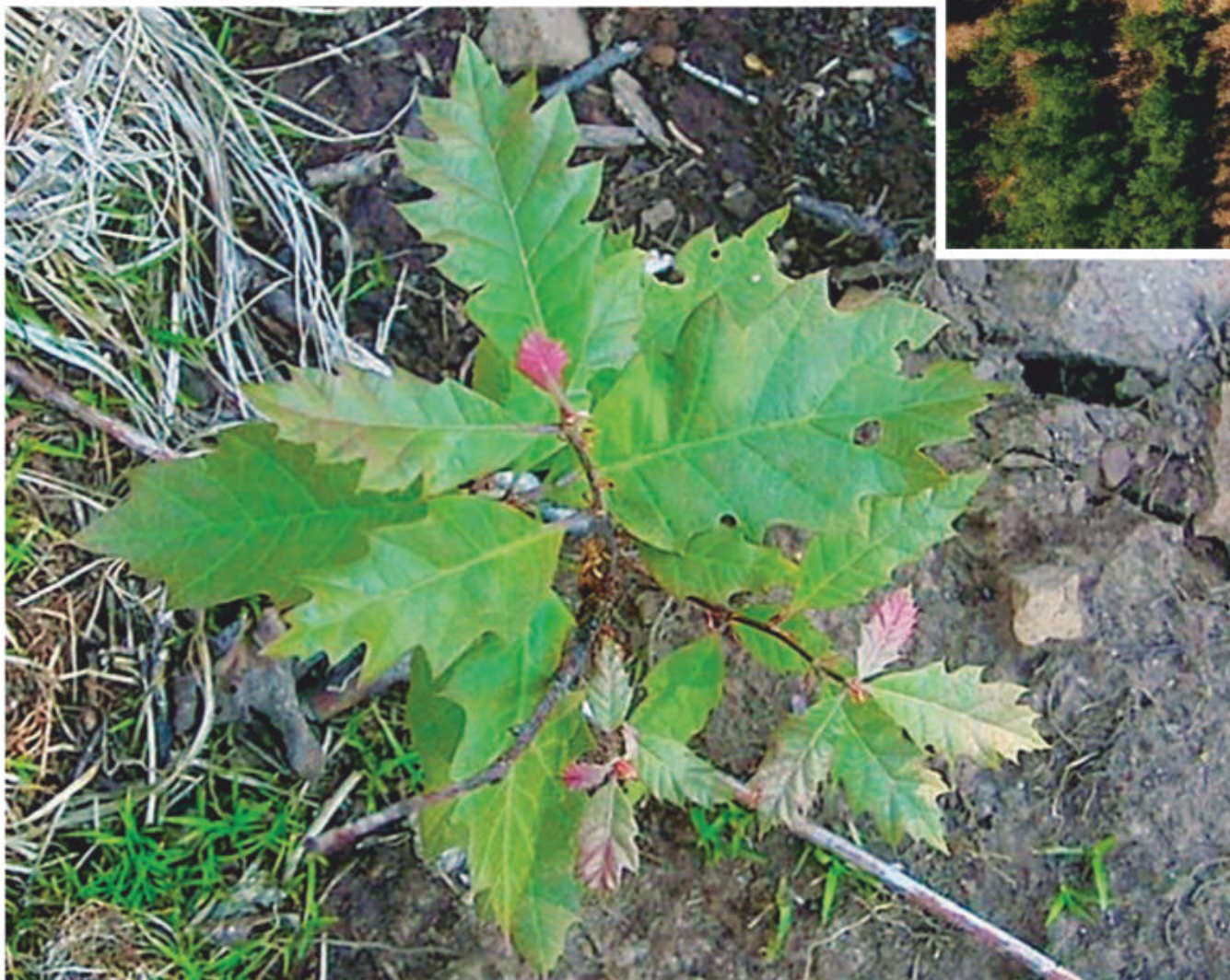
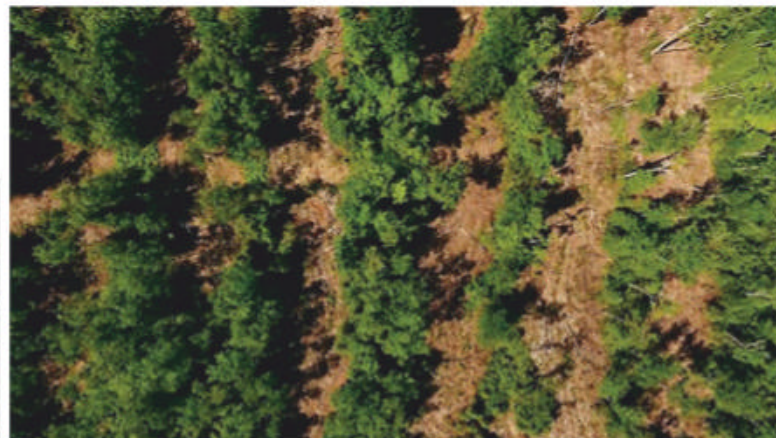
See It, Do It, Teach It

The fifth and final stage is the last stop on the “see it, do it, teach it” train ride. Learning how to convey muscle-memory skills and intuitive knowledge to new and emerging turners has been fun but also very challenging. It has forced me to examine what I’m doing, understand why I do it and find ways of sharing that knowledge with others who may have very different learning styles than me. And I practice what I preach with every woodturning class I now teach.

Restoring Forests for the Future

By Rob Johnstone

The United States to Plant 1 Billion Trees.



This effort, supported by bipartisan legislation, is in part to address forest loss to western wildfires. In the past five years, more than 5 million acres of land have been subjected to intense fires.

Obviously, growing more trees is good news for woodworkers. But forests also help filter water, support wildlife, provide recreational space, beautify the landscape and take carbon out of the air.

Planting on Many Levels

While these efforts are at the federal level, there are many other tree-planting efforts going on across the board. For example, in my home state of Minnesota, our Department of Natural Resources planted over 2 million trees in 2021. And there are non-governmental efforts as well. The *Journal's* parent company, Rockler Woodworking and Hardware, supports the Hardwood Forestry Fund (hardwoodforestryfund.org) that has planted millions of trees all across the country.

Our forests are important and under stress, but with continued efforts, they can remain healthy and provide lumber and other benefits for generations to come.

Math has never been one of my strong suits, but with that said, even I know that a billion is a really big number. To help wrap my head around just how huge that number is, I found this comparison.

If I told you that I was going to visit you in one million seconds, you'd have to get ready in about 11.6 days – less than two weeks. By contrast, if I informed you that I would be visiting you in one billion seconds, you would not see me for about 32 years. It's a big number.

Why this number might matter to you is that over the next decade, the U.S. Forestry Service is planning to plant over a billion trees. ("US to plant 1 billion trees as climate change kills forests": July 25, 2022, Matthew Brown (<https://apnews.com/article/wildfires-fires-forests-trees-plants-de0505c965c198a081a4b48084b0e903>)).



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MODERN SHOP HAND TOOLS

Backsaws and their Varied Uses

By Ernie Conover

This new department will encourage hand tool use in the modern shop. Each article will have an extensive “More on the Web” video that will provide a much deeper dive for those who are looking for more instruction.



Backsaws come in a range of styles and sizes. Starting at the top is a 24" Disston 12-point crosscut, originally for miter boxes but which the author now uses as a tenon saw. Second down, left, is a Zona 16-point rip flush cut saw, and next to it is an 8" Two Cherries gent's 14-point rip saw. Third down, left, is a Rockler dozuki with a replacement blade. To its right is an 8" Crown 22-point rip-filed gent's saw. Below it is a 12" E.C. Atkins 12-point rip.

Hand tools, in my opinion, have an important place in every woodworking shop. This is not to say that it makes sense to step back in time and ignore the truly remarkable power tools that are available to home shop woodworkers today (my shop is replete with top-notch examples of them). Instead, there are times when hand tools make more sense, in terms of appropriateness and efficiency. That is what this department is about.

What are Backsaws?

A backsaw is a handsaw with a metal (or today sometimes plastic) spine at the top edge of the blade, which stiffens the blade to facilitate precise cuts. All backsaws are either rip style for cutting with the grain or crosscut style for cutting across the grain. Backsaws for rough work have bigger teeth than those for fine work, the range being between 12 and 22 points. Point count is the teeth *lying within one inch*; you are counting the tips

of the teeth, not the spaces between them.

Backsaws commonly range between 10 and 22 points, depending on their intended use. I have four backsaws hanging from pegs at the right side of my workbench where they are always within easy grasp. The oldest is an E.C. Atkins 14-point rip, manufactured around 1890. The rest are late twentieth century. Two of these are filed rip and one is a 14-point crosscut that I mostly use in a shop-built miter box.

Name	Handle Type	Point and Filing	Length	Comments
Gent's	Straight	18 to 22, Rip	8" to 10"	Small, precise dovetails
Dovetail	Open or Closed Grip	12 to 22, Rip or CC	9" to 14"	Dovetail or tenons
Carcass	Open or Closed Grip	10 to 14, Rip or CC	11" to 16"	Shoulders of large tenons, general carcass work, dados, etc.
Tenon	Generally Closed	9 to 14, Rip or CC	14" to 20"	Large tenons



This 8" Crown 22-point rip-filed Gent's saw (Rockler item 98823) or the 8" Two Cherries gent's 14-point rip are both ideal for cutting the very small Empire dovetails in this case that the author built for his carving chisels.



This 10" Independence 14-point rip-filed backsaw is a good choice for the dovetails in this larger chest. Backsaws have a metal or sometimes plastic spine on their back edge to stiffen the saw blade.

Tooth Counts

What do the different tooth counts mean, and why should you pay attention to them? As you can see in the chart above, backsaws are very much sized to the type of work you are using them for. However, at somewhere around 12 points it does not

matter much whether a saw is filed rip or crosscut; either will do for general work. The great teacher and cabinetmaker, Tage Frid, filed (sharpened by hand) all of his saws of any size to rip. For coarser saws, I think it does make a difference. But for 12 points and finer, not by much.

As an aside, many avid hand tool users sharpen their saws themselves. It is a skill like any other that can be learned. Sharpening a saw is metalworking rather than woodworking, but the dexterity learned in woodworking is easily transferred to using a file to sharpen a saw.



The author uses this 10" Independence 15-point crosscut-filed backsaw for sawing precise miters in his shop-built miter box.



Here's the proper hand grip for a backsaw, with index finger extended. Note that the saw is also held level to the workpiece.



This Z-Saw dozuki saw (Rockler item 66376) only costs \$30, and replacement blades are \$20. It works very well. Replaceable blades mean that a woodworker does not need to have a dull saw sharpened.



A Japanese flush-cut saw is not really a backsaw but belongs in every toolbox. This one (Rockler item 65231) is U.S.-made and trims dowels and such flush without marring the surrounding wood surface.

Japanese Backsaws

Many fine craftspeople forsake Western-style backsaws for Japanese dozuki saws, which cut on the pull rather than the push stroke. (Some claim this adds more control as they start a cut, but that is completely subjective.) Japanese saws have teeth filed in a completely different way than Western saws. Ideal for cross-cutting, they also rip well.

While it is possible to sharpen a dozuki saw yourself, it is only worthwhile on the custom handmade variety. Most users and even some experts choose mass-produced dozuki saws that are outfitted with inexpensive replaceable saw blades that can quickly snap into the handle.

Premium Backsaws

Great Britain and Europe have always manufactured high-quality backsaws, and that is still true today. There are also now a number of U.S. and Canadian companies offering premium backsaws. Custom saws are, of course,



The author stows a variety of backsaws on pegs at the end of his workbench so they can be accessed quickly and conveniently. He finds them useful for a wide range of cutting tasks.

more expensive than most of the saws shown in this article. But they offer premium steel and much more ergonomic handles. This gives them a better “hang.” That is, they offer more heft in hand and make cutting straight and level more intuitive and less tiring. If you are looking to craft dovetails in gaggles of drawers, premium backsaws are worth looking into. As the

old saying goes, buy the best you can afford and you only cry once.

It does take some practice to learn to cut with confidence and effectively with classic backsaws, but once the skill is gained, it pays dividends in enjoyment and accuracy.

Learn more about Conover's hand tool skills classes at conoverworkshops.com.

www.woodworkersjournal.com MORE ON THE WEB



To see a video of the author using backsaws for a variety of tasks and demonstrating how to sharpen Western saws, visit woodworkersjournal.com and click on “More on the Web” under the Magazine tab.

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Ultimate Sanding Station

By Jeff Jacobson

Our art director builds an over-the-top sanding station. From casters to worktop to dust connectors, he really goes all in!





The framework of this sanding station is made up of Rockler's steel Rock-Steady legs and two sizes of stretchers. The author recommends using 4" casters (see inset) because their locking levers are easier to flip by foot than other smaller wheel options.



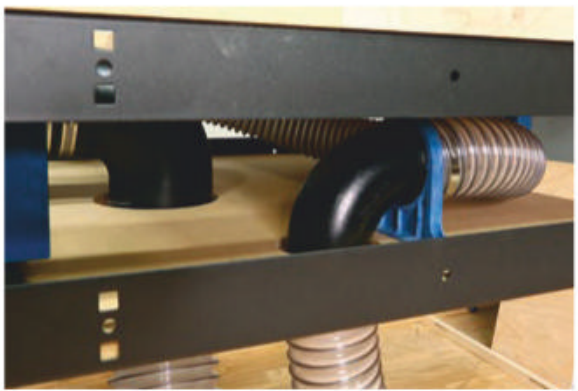
Our magazine's workshop has needed a multipurpose sanding station for quite awhile, so I set out recently to design one using Rockler's Rock-Steady legs and 28" and 44" stretchers for its framework. My goal for this project was pretty ambitious: I wanted it to house our Dust Right Downdraft Table, have room on top for a benchtop spindle sander when needed, plus have an ample amount of work area on top to sand longer or larger workpieces by hand or with other handheld sanders. I wanted all the sanding dust to be corralled by a single dust collector, which meant accommodating dust port connections for random-orbit and other sanders, the 2½" ports of

benchtop sanders and the 4" port of the downdraft table. And I intended the whole station to be mobile — casters never hurt!

Now, we all here recognize that this project is a bit aspirational for most woodworkers. Heck, you might only have one sander or very little money to spend. And judging by the very long list of components I've integrated into this unit (see "Hard to Find Hardware, page 29), you might shake your head in disbelief. But my hope is that once I walk you through this project's design, there might be a few features to tuck away in the back of your mind for when you DO need a sanding station of some sort. And I hope this project overview of mine encourages you to visit rockler.com for the almost astonishing variety of dust collection fittings and accessories you'll find there. If you need a dust collection solution, whatever it might be, Rockler probably has it.

A Walk Through the Station's Basic Construction

In the top right photo, you'll see my starting point: it's an amalgam of Rockler's Rock-Steady Shop Stand legs, four 28"



Ninety-degree elbows, attached to both hose sizes, help them change direction where they pass through the upper shelf in this narrow compartment.



A 3" hole saw made quick work of cutting the pass-through hole in the upper shelf for the station's 2½" dust hose. Notice the 1/2"-diameter hole next to the hole saw's kerf; it provides a channel for dust to escape.



The author used a handheld jigsaw to cut a 5"-diameter hole through the upper shelf for the 4" dust hose to pass through. Here, a 1/2"-diameter clearance hole for the saw blade starts and ends the cut.



Sawing a 28" x 40" piece of Rockler's butcher block worktop in half creates a section of tabletop for a benchtop spindle sander and the top for a tip-down extension table at the end of the sanding station. The author eased the sharp edges and ends of these workpieces with a 1/8" roundover bit in a compact router.



The author located and installed a 2 1/2" Dust Right adapter flush with the left inside edge of the spindle sander table before mounting this portion of the worktop to the station's upper stretchers.



This 2 1/2" adapter enables either dust hoses from portable power tools or benchtop sanders to be connected to dust collection using Rockler's Click-Connect fittings.

stretchers and six 44" rails. (I used four long rails for the basic stand and an extra two long rails serve as supports for the upper shelf that holds our downdraft table.) The shelf is also a raceway of sorts for the 4" and 2 1/2" dust hoses that pass through it on the way to the station's top. Both the upper and lower shelves are made of 3/4" MDF, and so is a side wall I built for mounting a central "trunk line" of dust collection fittings on the station's lower shelf. You can see that wall in the top and bottom right photos on page 31.

The top surface of my sanding station is a piece of Rockler's 1 1/2"-thick x 28" x 40" prefab hardwood butcher block, which I split in half, widthwise, on the table saw. Its 28" width fits the

top of the Rock-Steady stand perfectly, and the material is rigid enough not to need any intermediate cross supports underneath. One half of the butcher block serves as a "table" for our spindle sander.

If you look closely at the opening photo of this article and the bottom right photo on this page, I surrounded the downdraft table on three sides with two layers of 3/4" x 2" MDF strips to create a flush surface the rest of the way around the top of the Rock-Steady stand. After laminating these MDF strips together, I simply screwed them and the butcher block section to the top stretchers of the stand with #6 x 3/4" flathead wood screws, driven up from underneath.



A right-angle drilling attachment (see inset) sure came in handy for driving short screws up through holes in the station's steel stretchers for attaching the butcher block worktop and shelf panels.

The other half of the butcher block is on the opposite end of the station. It mounts to the project with brackets from Rockler's new Rock-Steady Knock-Down Table Saw Outfeed Kit, which you can read more about in *What's in Store* on page 59. The kit's folding, telescoping legs make it possible for us to extend the cart's worktop length when we need to by tipping this section of the worktop up. It folds down for storage when we're done sanding. I think it's a handy addition!

In terms of the basic order of operations for assembling the project, after I had wrenched together the steel stand and installed oversized casters on its legs, I cut the two shelf panels to shape. The upper shelf needed a couple of large holes cut

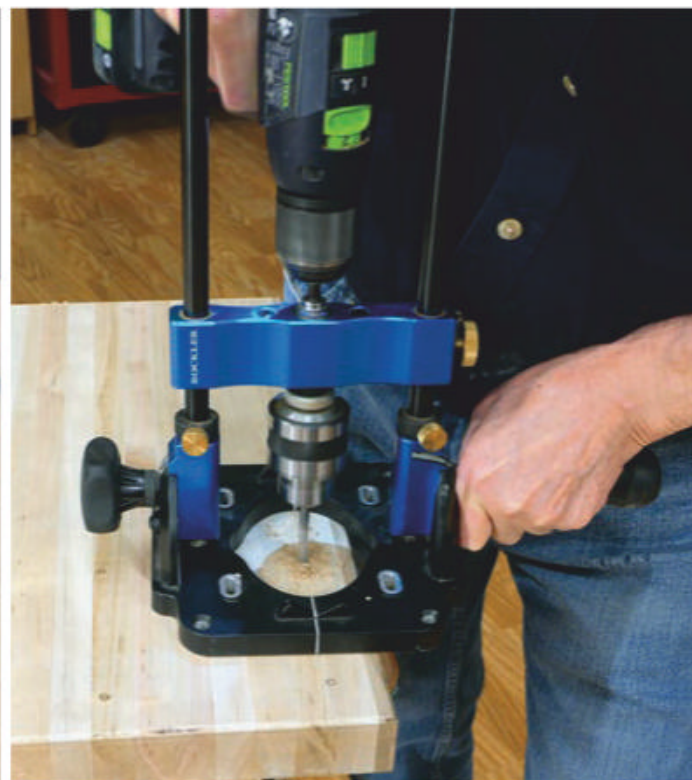
through it for the two dust hose sizes to pass through. I located these holes quite a ways away from the bottom trunk line of dust collection to ensure that the bends in the hoses would be as broad and gentle as possible; I didn't want to restrict airflow by bending the hoses any more severely than necessary. Also, I actually reversed the orientation of the two long upper shelf stretchers so that the shelf panel could nest down inside rather than sit on top of them. With this shelf in place, the downdraft table's height was just where I needed it to be: flush to the worktop's surface. For both the 4" and 2½" hoses, I used 90-degree elbows to help them change direction where they pass through the upper shelf.

The MDF wall on the bottom left end of the station went in next. It's doubled up with a narrower piece on the inside face to provide a thicker attachment surface for the dust collection fittings. This shorter inner layer also offsets the dust collection assembly from the station's steel legs enough so a 4" Dust Right Quick Change Handle can plug straight into it (see bottom photo on page 31).

Ultimate Sanding Station Hard-to-Find Hardware

Legs for Rockler Rock-Steady Shop Stands, 4-Pack, 28"H (1) #56980	\$59.99 pk.
Stretchers for Rockler Rock-Steady Shop Stands, 4-Pack, 28"L (1) #59686	\$34.99 pk.
Stretchers for Rockler Rock-Steady Shop Stands, 4-Pack, 44"L (2) #53469	\$44.99 pk.
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Rockler Rock-Steady Knock-Down Table Saw Outfeed Kit (1) # 65575	\$119.99 ea.
Dust Right® Downdraft Table (1) #57664	\$129.99 ea.
4" 300-lb. Heavy Duty Stem-Mount Polyurethane Caster, Swivel w/Total Lock Brake (4) #87643	\$13.99 ea.
Clear Flexible Dust Collection Hose - 2½" Diameter (1) #22784	\$39.99 ea.
Clear Flexible Hose - 10 Feet Long 4" Diameter (1) #22791	\$49.99 ea.
Dust Right 4" Quick Change Tool Set (1) #52594	\$39.99 ea.
Dust Right 4" Mountable Dust Coupler (1) #58448	\$15.99 ea.
Dust Right Ready-Mount 4"-to-2½" Y-Connector (1) #66519	\$12.99 ea.
Dust Right Ready-Mount 4" Mounting Brackets, 2-Pack (1) #65053	\$6.99 ea.
Dust Right Quick Connect 4" Elbow (2) #34432	\$19.99 ea.
Rockler 4" Dust Coupling (1) #27651	\$9.99 ea.
2½"-to-2½" Ready-Mount Blast Gate (1) #69089	\$11.99 ea.
4"-to-4" Ready-Mount Blast Gate (1) #65837	\$14.99 ea.
Dust Right Ready-Mount 2½" 90° Elbow (1) #62138	\$8.99 ea.
Dust Right Ready-Mount 2½" Mounting Brackets, Pair (1) #63960	\$5.99 pr.
Dust Right Click-Connect Upgrade Kit for FlexiPort Hose Kit (1) #61615	\$19.99 ea.

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The leg brackets of Rockler's Rock-Steady Knock-Down Table Outfeed Kit (above) mount to the extension table with machine screws. Their through holes must be drilled straight, which is exactly what a portable drill guide (upper right photo) is designed to do. Countersinking the screw heads (bottom right photo) keeps them from interfering with workpieces being sanded.

After I had the shelves and wall installed, I added the tip-up portion of butcher block using the Outfeed Kit. Rockler provides thorough instructions for how to mount the hardware components of the kit and its legs, so follow those carefully. The leg brackets attach to the worktop with machine screws that pass all the way through it. I was able to easily tackle drilling those holes with my drill/driver mounted on Rockler's Portable Drill Guide and using a long twist bit. The drill guide ensures that holes will run straight through whatever you're drilling. (Once you have one of these drill guides, you'll be surprised by how

often it can come to the rescue for drilling through workpieces that are too big or bulky to hulk over to the drill press.) I countersunk the worktop bolt holes for the tapered heads of the machine screws so there'd be no chance of them marring anything we happen to be sanding.

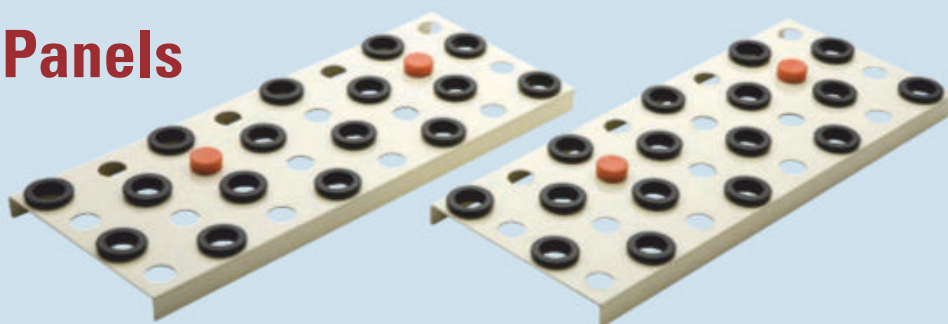
A Menagerie of Dust Collection Fittings

The last 13 items of the "Hard to Find Hardware" box are all dust collection hoses, fittings, adapters and brackets for creating

Rockler Downdraft Table Panels

Prefabricated downdraft tables, such as the blue steel version shown in the opening photo on page 26, are just one option. You can also purchase only the perforated top panels and build a downdraft table yourself from sheet goods and a dust collection port. These 6¾"x 16½" steel panels with rubber grommets offer a more economical, customizable solution to fit your sanding needs and budget.

Rockler Item #25077 \$41.99 kit

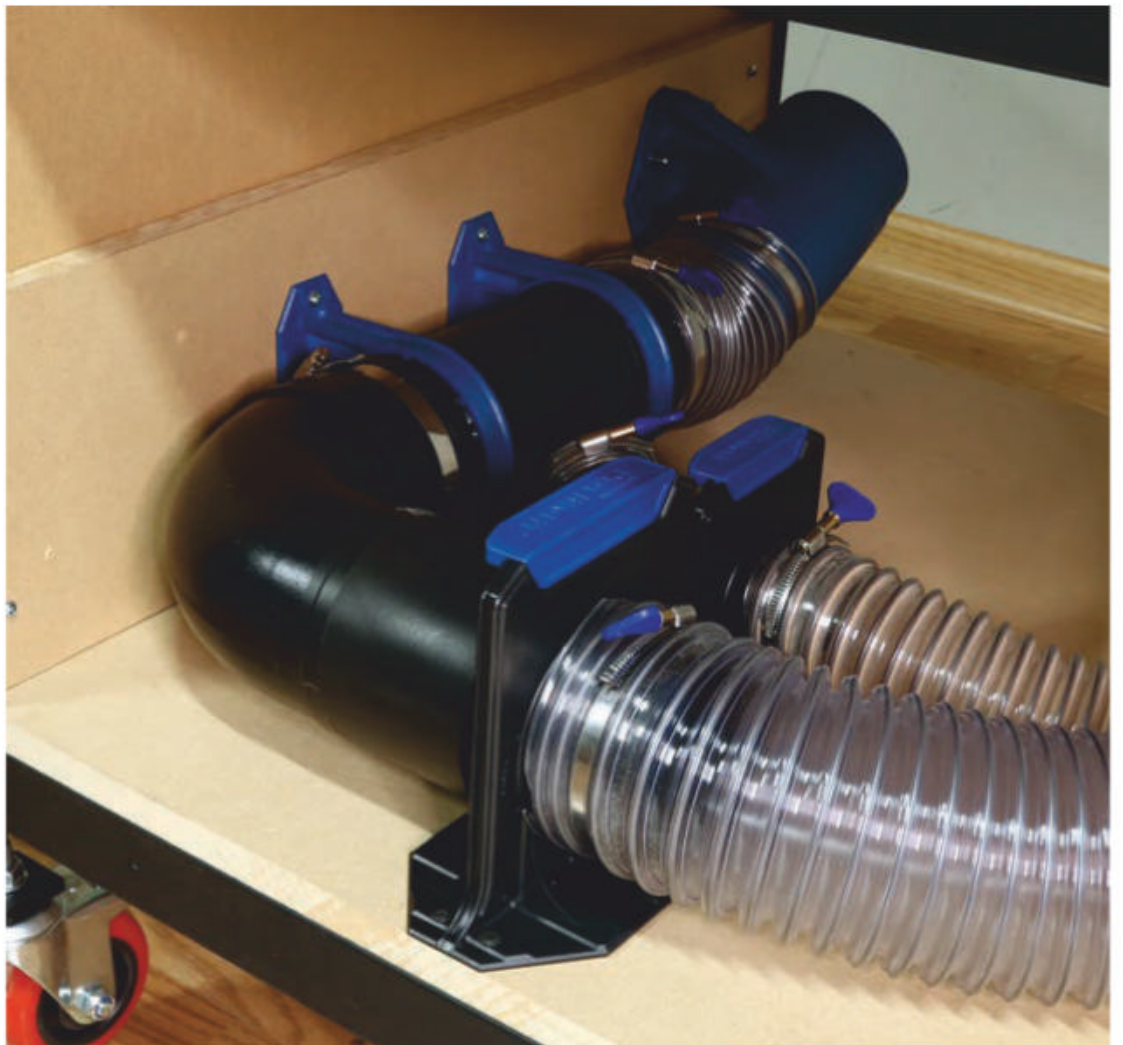




Rockler's new Click-Connect system and FlexiPort Hose Kit provide adapters to fit a variety of handheld and benchtop sander dust ports. An adapter on the hose makes for quick attachment to these tools.

this sanding station's dust collection trunk line. I've already covered how the 2½" and 4" hoses pass through the upper shelf. The smaller hose terminates on top in an adapter dust port that's mounted below the worktop on the left end of the spindle sander table. This port (you can see it in the bottom right photo on page 28) enables smaller power tool dust hoses to be connected to the 2½" main hose with Rockler's new Click-Connect tool adapters (see upper left photo). This makes it simple to use dust collection with any sander we're using and to have no excuses for not keeping the work area as clean as possible. I think that's one of the big reasons why we often don't use dust collection — it can be a hassle to hook up quickly and easily. That's not a problem with this setup.

What about the components that form the dust collection trunk line down below? Well, that collection of fittings, adapters and sections of hose took a lot of figuring on my part. Because as I mentioned at the beginning of this article, one goal was to have all of the dust collection accommodations of this station be serviced by one 4" dust collector. I also wanted the 2½" and 4" hoses to be able to be used at the same time (for instance, to run a random-orbit sander and the downdraft table simultaneously) or to have the option of closing one or the other off when needed (say, to run just dust collection for the spindle sander or only the downdraft table when hand-sanding on top of it). Here's how I did it. As you can see in the top right photo, the two sizes of hose attach to a pair of side-by-side blast gates attached to the bottom shelf. The 4" blast gate connects with a coupling to a 90-degree elbow,



Side-by-side blast gates for the station's two hose sizes connect to a variety of fittings that terminate at a single port for attaching to a 4" dust collector. Mounting brackets secure this assembly, in part, to a built-up side wall on one end of the sanding station.



One of the author's goals for the dust collection system of this project is that it would be able to be connected to a single dust collector. Rockler's Quick Change Tool Handle friction-fits into the outer adapter on the trunk line to make dust collection quick, easy and tool-free.

and a coupling in turn connects it to a 4"-to-2½" Y-connector. The smaller blast gate ports into this Y-connector with a short piece of 2½" hose. From there, the remaining 4" end of the Y-connector has a short length of 4" hose that feeds to an adapter piece from Rockler's Quick Change Tool Set. That's where we attach the sanding station to our dust collector. Several Rockler Ready-Mount 4" Brackets secure these various parts to the station's side wall with short screws. This integrated trunk line was worth the careful planning, because so far it's serving our sanding needs well by helping to keep the dust at bay!

Jeff Jacobson is senior art director of Woodworker's Journal.

Shaker-inspired Cabinet

By Chris Marshall

This practical and attractive two-tone storage unit will give your rail-and-stile router bit set a hearty workout.



I've always had a soft spot for the clean lines and simplicity of Shaker-style furniture. So when my recent college grad daughter asked me to build a storage cabinet for her small apartment, my design sensibilities naturally turned to Shaker inspirations. A cabinet like this will never go out of fashion, and I think its two-tone cherry and milk paint theme,

combined with some antique brass hardware from Rockler, give it contemporary flair. Building this cabinet will also put some good mileage on your rail-and-stile router bit set. If you need a refresher on how to set up and use those effectively — or if this is your first experience with these router bits — see our new *Simplifying Bit Setups* department on page 50.

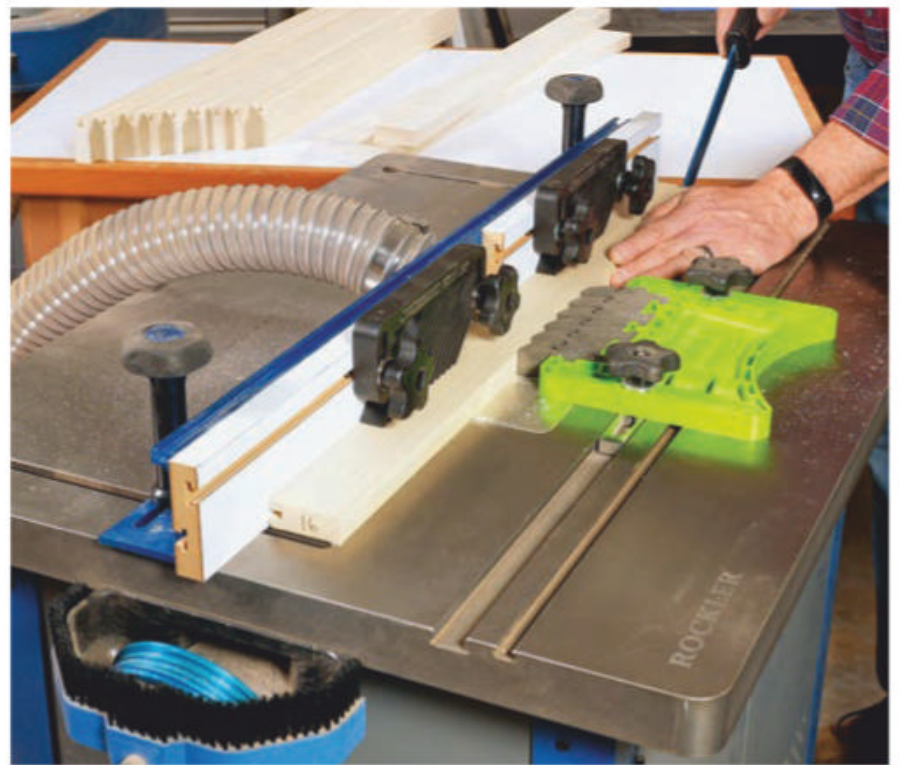
Building the Cabinet Sides

Let's get started by jointing and planing 8/4 stock down to 1¾" thick for the legs and ripping four leg blanks to size. I chose clear yellow poplar, which paints well. Crosscut the legs to 35¼" long.

Mark the leg bottoms for short tapers on both inside edges of each leg. These tapers begin 3" up from the bottom ends



Rockler's Small Parts Taper Jig with integral hold-down clamps worked well to position and secure these leg blanks at a severe angle for cutting pairs of short tapers on each leg at the table saw.



Mill the sticking profile along the inside edges of the side frame stiles and the door stiles at the router table. Then repeat this process on the side frame and door rails, too.

and reduce their thickness to 1" square at the "feet." Cut them to shape using a tapering jig, either at the table saw or band saw.

Set the legs aside for now so you can rip 2"-wide workpieces for the rails and stiles of the side frames from 3/4" stock. Here again, I used affordable poplar. While you're at it, prepare lengths of rail-and-stile stock for the doors, too. Make sure these door frame parts are harvested from straight-grained lumber and are jointed flat. They're large doors, and you don't want the frames distorting, or the doors won't close properly.

Install the stile bit in your router table, and mill the sticking profile along the inside edges of side frame and door frame stiles. Then repeat this process on the inside edges of all the side frame and door rail stock. Make sure to test the cut on a piece of scrap material first, to verify the router bit's setting for accuracy.

Crosscut the side frame workpieces to final length. Note that in the *Material List* on page 35, the part lengths for the stiles include an additional 3/4" to account for the coped joinery on their ends. Crosscut

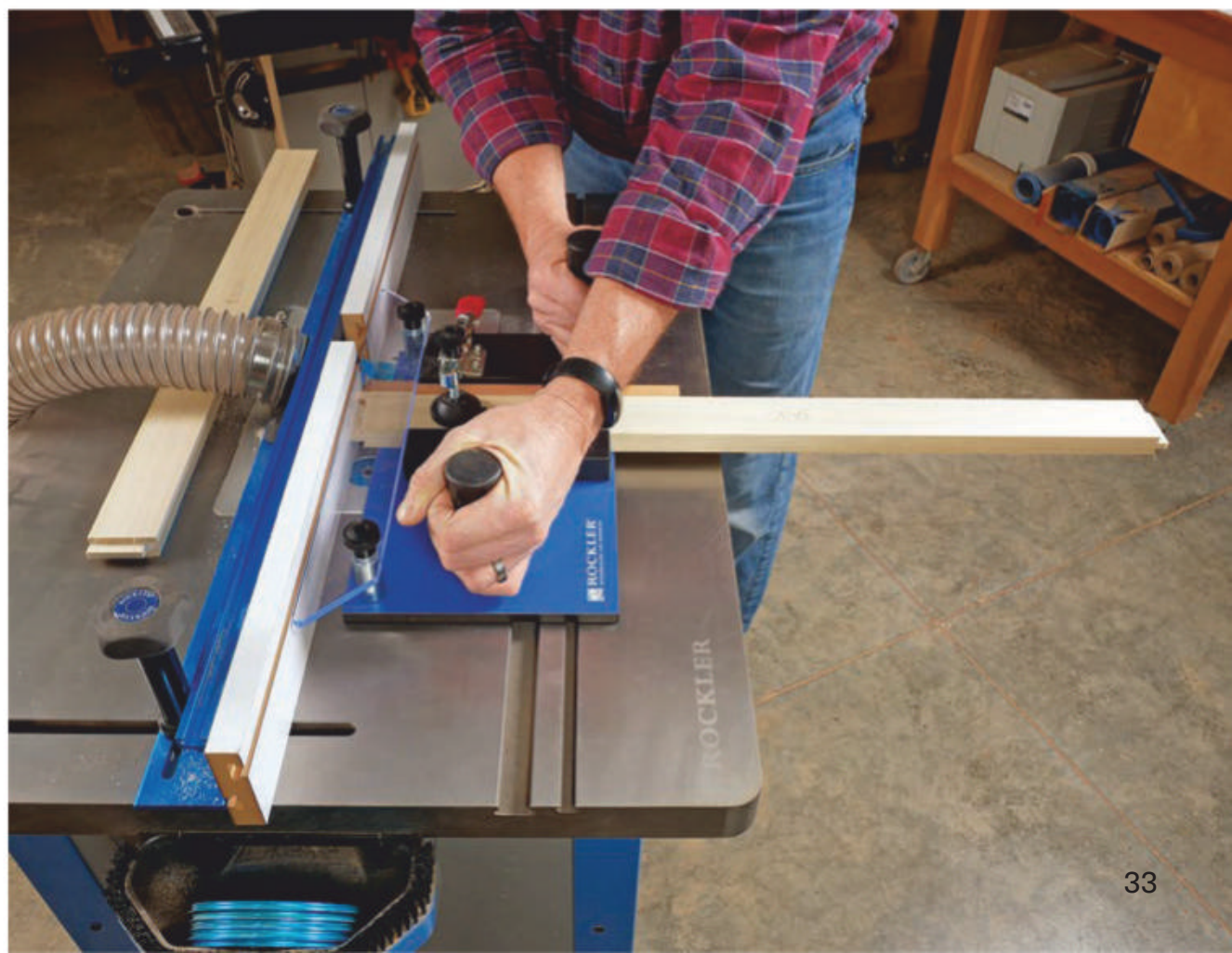
the door frame parts 1/8" longer than listed for now. This way, you can trim the parts to final lengths when the doors are fitted to the cabinet's exact opening.

Replace the stile bit with the rail bit in the router table, and adjust it accordingly so its height matches the sticking profile you routed on the stiles and rails. Mill the cope profile into the ends of the side frame stiles. Leave the rail bit in the router table and set up as is, but don't cope the ends of the door frame rails now. Set the door frame parts aside. You

won't need them again until much later in the building process.

Cut the side frame panels to size from 1/4" plywood or MDF. Make sure they fit the panel grooves of the stile cutter snugly. Sand the legs and side frame parts up through the grits to 120. Go ahead and glue the rails, stiles and panels together to form two side frames. Don't worry that the panels need to "float" in their frames. They can be glued in place, because they aren't made of solid wood, so they won't need to expand and contract seasonally.

Typically, the ends of stiles aren't coped for door construction — the ends of the rails are coped instead. But with these side frame stiles, go ahead and cope the ends so they'll engage with the inside profiles of the side frame rails.





After the side frames are glued together, join them to the legs with Dominoes, Beadlock loose tenons or dowel pins, as you prefer. Here, the author used five 6 x 40 Dominoes per joint.

you also could use Rockler's Beadlock loose tenons or even

dowel pins, if you prefer. Whichever method you choose, lay out the position of the frames on the legs so they're set 1/4" back from the outer leg faces to create pleasing shadow lines here. Mill mortises or dowel holes for the joints in the legs and along the long edges of the side frames, and assemble the sides of the cabinet with glue and whichever loose tenon or dowel solution you've chosen. Clamp the side subassemblies to close the glue joints.

cabinet. I used single 8 x 50 Dominoes for these joints and cut their mortises now. Position these parts so the top front rail will be flush with the tops of the legs and the bottom front rail aligns with the starting points of the taper cuts. These rails are also flush with the front faces of the legs.

The back panel of this cabinet is made of 3/4" plywood. You could also use MDF, but I opted for plywood because it's much lighter in weight. Cut a blank for the back panel to size. A nice way to decorate a flat panel that will be painted is to add some V-grooves to it, simulating a traditional slatted back. This back panel's 32" width makes those "slat" cuts easy to space apart at 4" intervals. I laid out the pattern with a pencil and straightedge, then plowed 1/4"-deep grooves with a V-groove bit in a handheld router. If you do the same, guide the edge of the router's subbase against a clamped straight-edge to ensure the slat lines are perfectly straight and parallel with one another.

After that, I milled Domino mortises into the side edges of the back panel and followed with corresponding mortise cuts in the back legs. Position these so the back panel will be flush with the back faces of the legs. I also bored several screw pockets into the back face of the back panel to reinforce the long edge joints.

Finish-sand the back panel and sand the front upper/lower rails to 120-grit. Then dry-assemble the side frames, back panel and front rails to check the fit of these cabinet carcass components. While it's clamped up, determine the range of settings for the cabinet's two adjustable shelves, and mark the stiles of the side frames with shelf pin holes. I decided on seven holes, spaced 2½" apart, beginning 8" down from the top of the side frames. Drill the shelf pin holes. Now, go ahead and glue and clamp the cabinet carcass together, making sure the overall as-



Determine the joinery you'll use for attaching the upper and lower front rails to the legs. Again the author chose Dominoes, this time using the larger 8 x 50 size. Lay out these joints so the rails will install flush with the front faces of the legs.

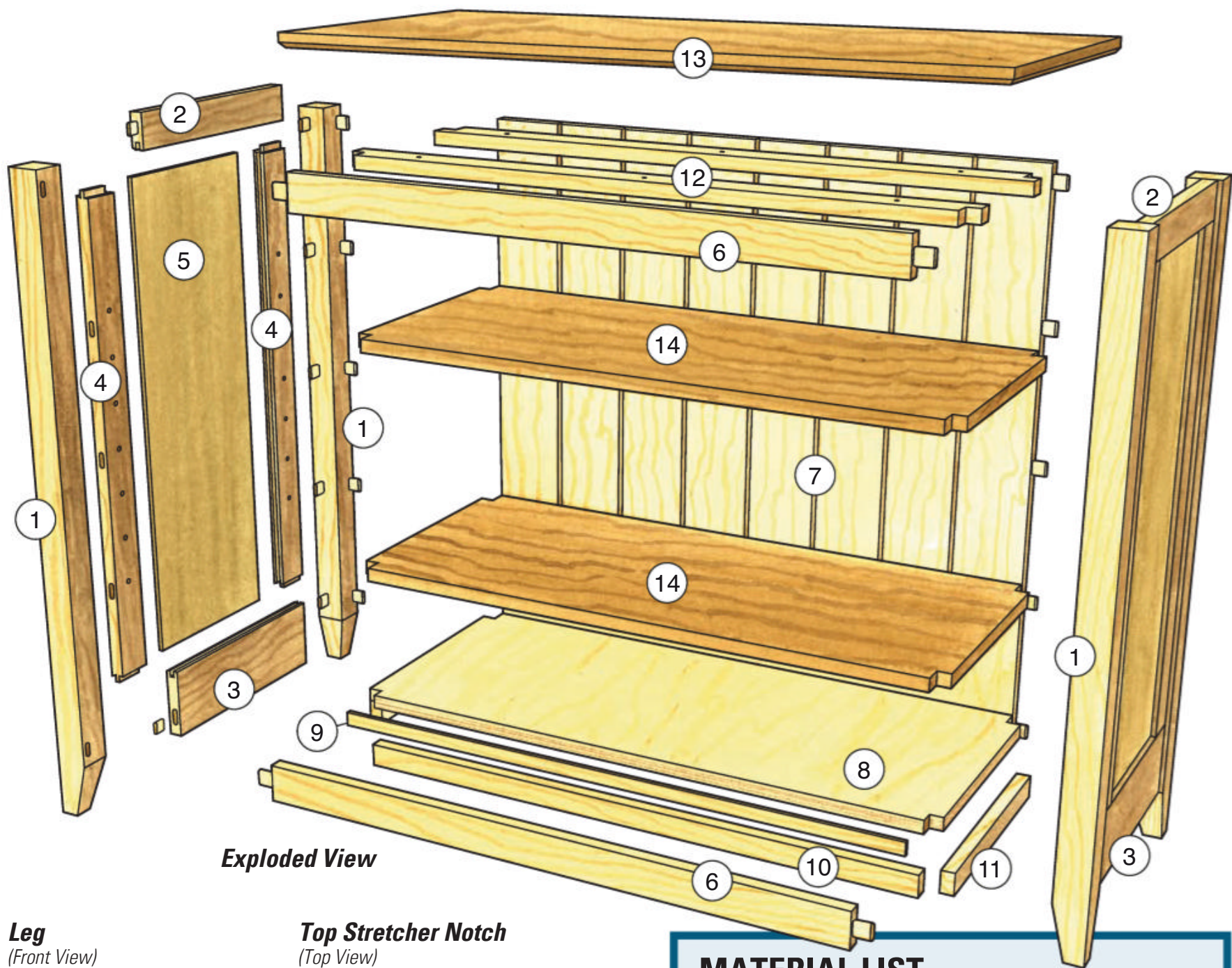
When the glue cures, it's time to install a side frame between each pair of legs. I used five 6 x 40 Festool Dominoes per side of each side frame for this task, but

Assembling the Carcass

Next, rip and crosscut a pair of upper and lower front rails to size, and determine how you plan to install them in the

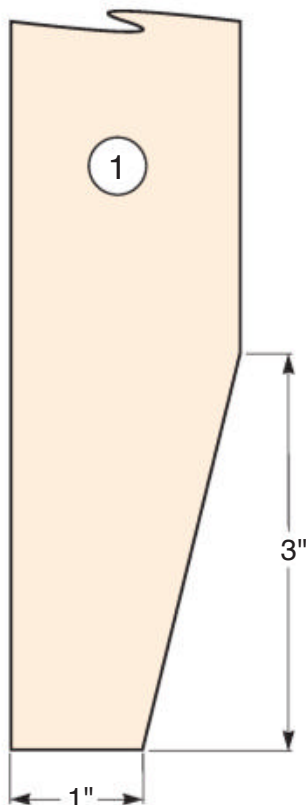


Create a faux slatted effect on the back panel by routing a series of V-grooves on its inside face with a V-groove router bit (see inset). Space these grooves 4" apart across the width of the panel. Use a clamped straightedge to guide the edge of the router's subbase.

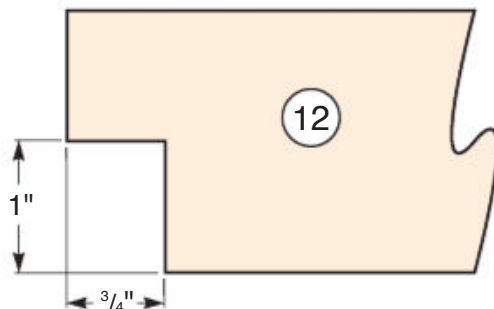


Exploded View

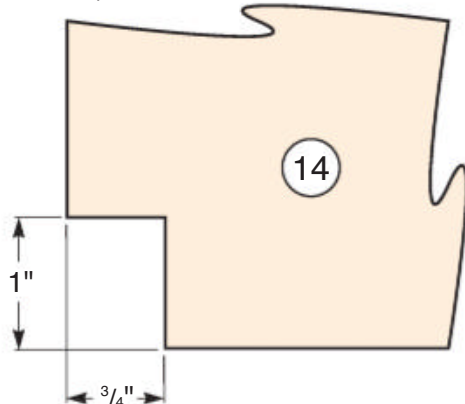
Leg
(Front View)



Top Stretcher Notch
(Top View)



Shelf Notch
(Top View)



MATERIAL LIST

Cabinet

	T x W x L
1 Legs (4)	1 3/4" x 1 3/4" x 35 1/4"
2 Side Frame Top Rails (2)	3/4" x 2" x 12 1/2"
3 Side Frame Bottom Rails (2)	3/4" x 4" x 12 1/2"
4 Side Frame Stiles (4)	3/4" x 2" x 27"
5 Side Frame Panels (2)	1/4" x 9 3/16" x 26 15/16"
6 Upper/Lower Front Rails (2)	3/4" x 2" x 32"
7 Back (1)	3/4" x 32" x 32"
8 Bottom (1)	3/4" x 14 1/4" x 33 1/2"
9 Edging (1)	1/4" x 3/4" x 33 1/2"
10 Cleats, Long (2)	3/4" x 1 1/4" x 32"
11 Cleats, Short (2)	3/4" x 1 1/4" x 12 1/2"
12 Top Stretchers (2)	3/4" x 2" x 33 1/2"
13 Top (1)	3/4" x 17" x 37 1/2"
14 Shelves (2)	3/4" x 14 7/16" x 33 7/16"

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MORE ON THE WEB



For a video discussing lumber and sheet goods choices for this cabinet project, please visit [woodworkersjournal.com](http://www.woodworkersjournal.com) and click on "More on the Web" under the Magazine tab.

Shaker Cabinet Hard-to-Find Hardware

Oil Rubbed Bronze, Ball Tip, Partial Wrap-Around Hinge (2) #24720 \$11.99 pr.
Magnetic Catch For Inset Doors (2) #30546 \$6.49 ea.
Oil Rubbed Bronze Zachary Knob, 1 1/16" (2) #52237 \$3.06 ea.

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



Assemble the side frames, front top and bottom rails and the back panel with glue to form the cabinet's carcass. Since plywood edges tend to soak up more glue than solid wood, the author reinforced the back panel joints with pocket screws to strengthen them.



After the solid-wood edging piece is glued to the bottom panel, mark the four corners for leg notches and trim them to shape at the band saw or with a handheld jigsaw. Mark and make these cuts carefully — your accuracy here will show when the cabinet doors are opened.



Attach the four cleats to the bottom interior of the cabinet with glue and screws or brads. Then set the bottom panel into place, and secure it with 18-gauge 1½" brad nails driven into the cleats.

sembly remains square when the clamps are tightened up. If you've added pocket screws to the back panel as I have, drive those 1½"-long screws into place, too.

Next, cut a bottom panel to size from MDF or plywood. There's a solid-wood edging strip that still needs to be glued to its front edge. This strip will hide the edge plies of the plywood or, if you use MDF instead, it will make the front edge of the MDF more abrasion-resistant. Make up this strip and glue it to the bottom panel's front edge. Then lay out and cut notches in the four corners of the bottom panel so it will wrap around the legs. On all four corners, these notches should be 1" deep where the bottom will fit against the back panel or bottom front rail but ¾" where it abuts the side frames. Sand the bottom panel smooth.

The bottom panel rests on two long and two short cleats, fastened to the bottom side frame rails, the bottom front rail and the back panel. Rip and crosscut these cleats to size from ¾" stock, and install them ¼" up from the bottom edges of the cabinet's side and front bottom rails. The rear cleat installs flush with the bottom of the back panel. Glue and brad-nail or screw them into place, as you prefer. Then fit the bottom panel inside the cabinet on top of its cleats. Drive 18-gauge 1½" brad nails down through the bottom panel and into the cleats to secure it. Cover the nailheads with dabs of wood putty.

Next comes the top stretchers, so cut them to length and width. Notice in the *Exploded View Drawing* on page 35 that the outside corners of the stretchers need to be notched to fit around the legs, so cut those ¾" x 1" notches at the band saw or with a jigsaw. The cabinet's top panel will need to expand and contract across its width with changes in seasonal humidity. To account for this, I routed three 3/16"-wide x 3/8"-long slotted holes through the front stretcher, orienting

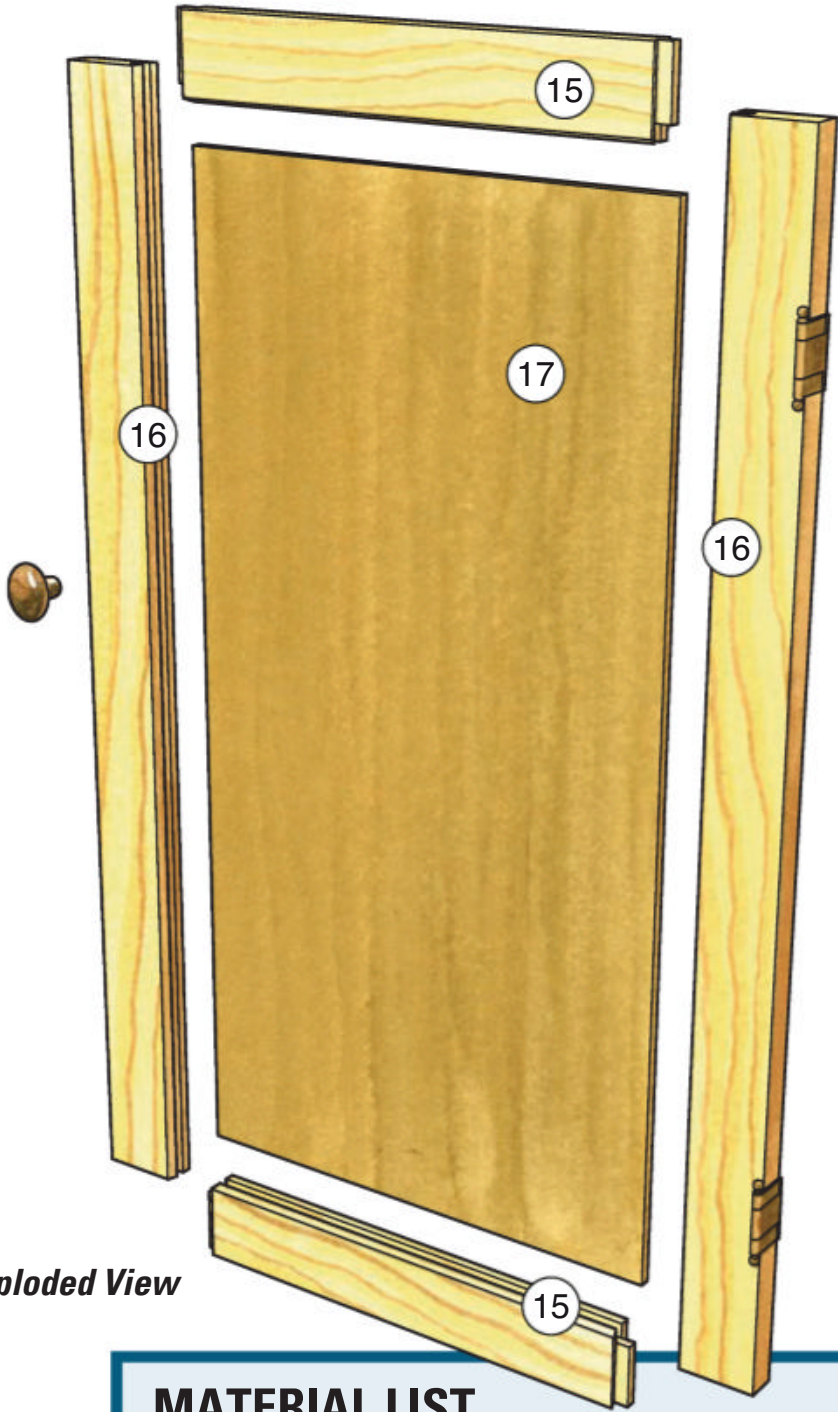
these holes perpendicular to the stretch-er's length. That way, the cabinet's top panel will still be able to expand or contract when screws are driven through these slotted holes. (The rear stretcher, however, can have typical round screw pilot holes instead, in order to hold the panel stationary along its back edge.)

Drill a series of screw pockets into the top faces of the top stretchers so you can attach them to the top front rail and the back panel with 1¼" pocket screws. Spread glue along the contact edges of the stretchers, position them slightly below the top edges of the cabinet and clamp them in place. Drive in the pocket screws to secure the stretchers. (The reason for positioning the stretchers slightly below the top edges of the cabinet is so the top panel installation screws will pull it down tightly against the cabinet when they are driven through the stretchers.)

Adding Shelves and Doors

Glue up a panel of solid wood for the cabinet's top panel. I used some clear cherry I had on hand, in order to contrast attractively with this cabinet's sage-green

Exploded View



MATERIAL LIST	
Door	T x W x L
15 Door Rails (4)	3/4" x 2" x 12 ⁵ / ₈ "
16 Door Stiles (4)	3/4" x 2" x 28 ¹ / ₈ "
17 Door Panels (2)	1/4" x 12 ⁹ / ₁₆ " x 24 ¹³ / ₁₆ "



The author routed three elongated screw holes through the front top stretcher using a 3/16" straight bit and guide collar, run inside a shop-made template. These holes will allow for top panel wood movement.



Install the top stretchers on the back panel and upper front rail with glue and pocket screws. Position them slightly below the top edges of the cabinet to ensure that the top panel will screw down tightly against it.



Glue up a panel of solid wood for the cabinet top and two more panels for the shelves. Rockler's Deluxe Panel Clamps (item #67164) make easy work of this job by applying pressure across the panel width as well as against the panel faces to hold the glue joints flush.



The "Mini" versions of these Deluxe Panel Clamps (item #66150) are a handy solution for gluing frame joints together, too. They'll handle assemblies up to 16" wide, such as the doors for this project.

painted finish and give the project some two-tone pizzazz. When the top panel's glue joints cure, rip and crosscut it to final size, and ease its bottom ends and front edge with a chamfering bit in a handheld router. I sized these chamfer cuts to match the chamfered sticking profile on my rail router bit.

building the doors, so round up the door frame parts you made earlier. Determine the final length of the door rails, and crosscut them to size. When you make this calculation, keep in mind that it's always better to start with doors that fit their openings tightly and trim or plane them to final size, rather than have the

Next, make up the cabinet's shelves from slightly oversized panels of solid wood. Again, I used cherry. When they come out of the clamps, rip and crosscut the shelves to final size. Notch all four corners so the shelves can fit around the inside corners of the legs, and test-fit them inside the cabinet with the shelf pins in place.

That leaves us with

doors be too short or narrow for the cabinet opening to begin with. Head back to the router table so you can mill the cope profile into the ends of the door rails.

Dry-assemble the two door frames, and measure their interior openings for door panels. Cut two panels to these dimensions from 1/4" plywood or MDF. Then finish-sand the rails, stiles and panels, and glue each door together.

When the doors come out of the clamps, carefully trim or plane them to final length and width. Allow for about 1/16" of clearance between the top and bottom ends of the doors and the cabinet's top and bottom front rails. Leave this same amount of spacing along the hinge edges of the doors and where the doors meet in the middle.

No-mortise hinges, which we've specified in the "Hard to Find Hardware" box on page 35, will make these doors easy to install. Start by attaching the bent "wrap-around" leaf of each hinge to the back of each door. I tend to align the top or bottom ends of hinge knuckles even



Carry out the door-hanging process by attaching the bent leafs of these no-mortise hinges to the back faces of the doors. Then, with the cabinet on its back, set the doors into place in the cabinet opening, and mark the locations of the flat "leg-side" hinge leaves onto the legs (inset).



The durability, flat sheen and attractive colors of milk paint make it an appropriate choice for Shaker-inspired furniture. Apply two coats to the cabinet and doors with a brush and foam roller.



When the finish on the top panel cures, install it on the cabinet by driving washerhead or pocket screws through the stretchers into it. Allow for a 1" overhang on the front edge and ends.

with the inside edges of the door rails, as I have done here. Now lay the cabinet on its back and clamp a temporary spacer behind the top rail to act as a ledge so you can set the doors in the cabinet opening. Adjust them for even gaps all around. Carefully mark the locations of the flat “leg-side” hinge leaves on the inside leg faces. Then remove the doors and unscrew the hinges. Set the hinges into place on the legs, and mark the flat-leaf screw hole locations onto them. Fasten the hinges to the legs, driving a single screw into one of the slotted hinge leaf holes in each hinge for now. Attach the hinges to the doors again, and shift the hinges up or down on the legs to achieve an even gap above and below the doors. Once the gaps are dialed in, drive the rest of the leg-side hinge leaf screws.

With the doors hung, add a door catch to each door. The magnetic catch hardware I used has a bent-steel receiver piece that mounts to the bottom edge of the upper front rail. The magnetic component fastens to the inside top back corner of each door with screws.

Finishing Up with Several Finishes

Remove the doors, hinges and catches to prepare for painting. I applied two coats of General Finishes Basil Milk Paint to the cabinet’s carcass and doors with a foam roller and brush. The top panel and shelf received three coats of General Finishes Enduro-Var II waterbased satin

urethane finish, also applied with a roller. Give the paint and clear finish at least eight hours between coats to fully dry.

To add even more protection to the painted areas, I rolled on a coat of General Finishes’ new Dead Flat topcoat. You can read more about it on page 66.

Once the finishing stage is behind you, set the top panel into place on the cabinet, adjusting it for an even 1" overhang on the ends and front edge; it should be flush with the back of the cabinet. Attach it with wood screws driven up through the pilot holes in the back stretcher and the slotted holes in the front stretcher. I

used 1 $\frac{3}{8}$ "-long pocket screws here. Center the screws in the slotted holes.

Your last task is to drill a through hole in each door for the knob hardware you’ve chosen. I centered mine on the lengths of the doors. Then rehang the doors in the cabinet on their hinges. Choose heights for the shelves inside, and install them with shelf pins. Mount the door knobs on the doors with machine screws to complete this helpful and handsome storage project.

Chris Marshall is senior content editor of Woodworker's Journal.



Skee Bag Game

By Rob Johnstone

Here's an indoor bag toss game for the winter months. It's tons of fun to play and teaches addition and subtraction too!



Bag toss games are crazy-popular these days. There are likely a lot of reasons for that. For one, they don't require advanced athletic skill to participate, and almost any kind of beverage can be consumed as the game is being played. Unlike the lawn darts of my youth, there is little inherent danger, and neither gender will have any specific advantage.

In the version that our art director, Jeff Jacobson, came up with here, there are three scoring options: a rhombus-shaped area that is worth negative-one point, a central hole that is worth one point and a smaller-diameter upper hole that is worth two points. Keeping score will require addition and subtraction, which will be great practice for kids. And the variety of scoring options will mean a more unpredictable and more competitive

game. Jeff came up with the concept by thinking about the skee-ball arcade games of his misspent youth.

The two game boards required are made from 1/2"-thick plywood and are 14" wide and 24" long. There is onboard storage for the legs, which are formed from a 1 1/4"-diameter dowel.

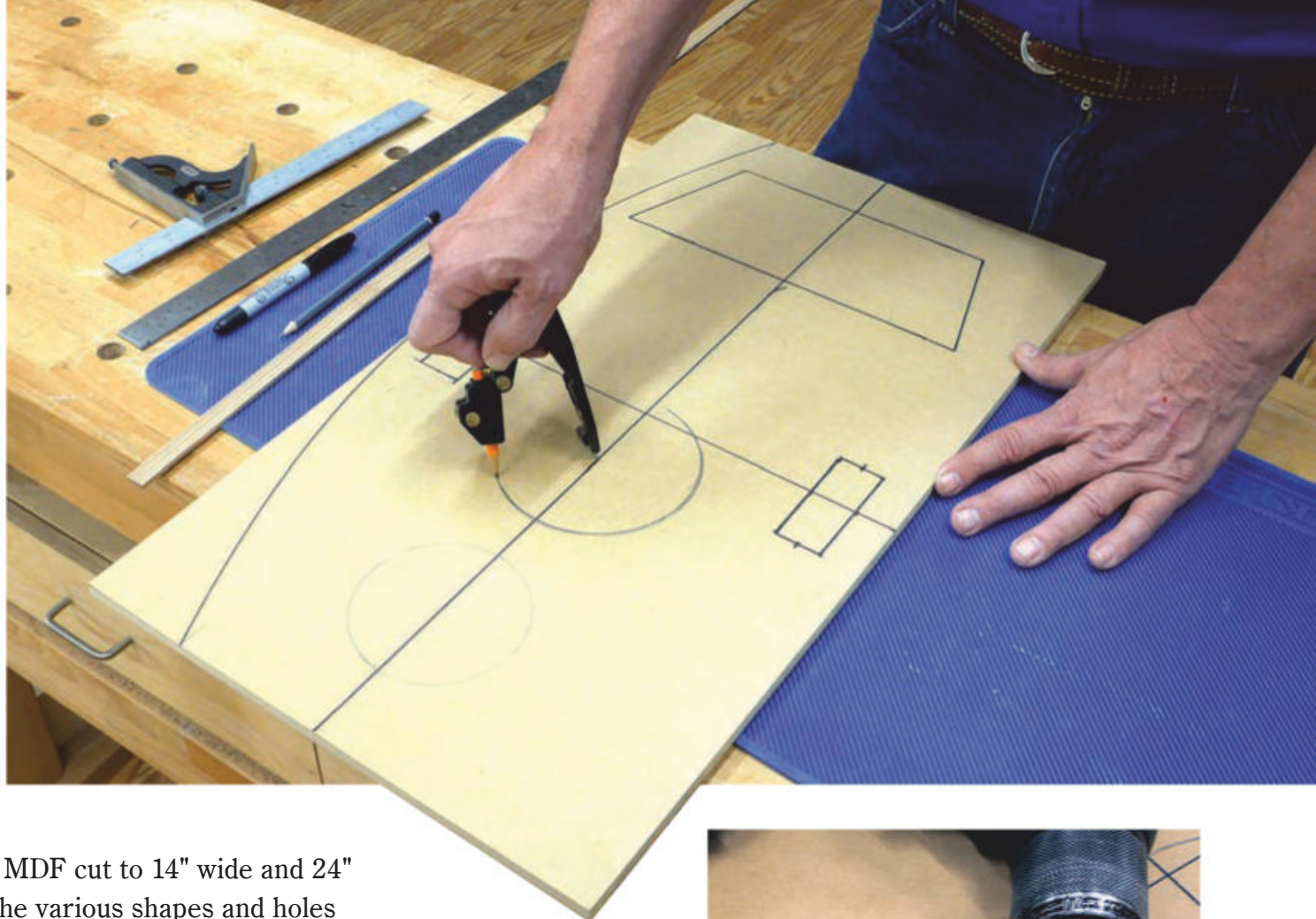
Starting with a Template for Accuracy

This is a perfect project for a template. You are making multiple holes through the plywood, and they all need to be placed accurately. In addition, these two game boards need to be identical. And as sometimes happens, when your friends or family members play the game, they might want one of their own. With a master template, you can get them done in short order.



For a video demonstrating how to make this project, visit woodworkersjournal.com and click on "More on the Web" under the Magazine tab.

This game needs two game boards. Make a template with all of the details for each board, including scoring holes, handles and the curved shape. An added advantage of the template is you can make more games for friends and family.

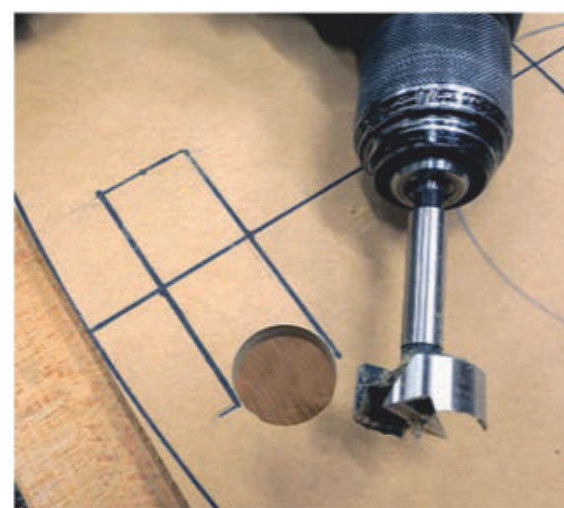


I made my template from 3/8" MDF cut to 14" wide and 24" long. Then I began to mark out the various shapes and holes that I would cut out to guide my router. Look at the *Drawings* on page 42 for all of these details. I began by scribing a line down the center of the blank along its length. Then I drew a line across the width of the MDF at the center point of the handles. These two axes then allowed me to accurately locate all of the remaining details (see the photo, above right).

An important consideration here is how you are going to cut out those holes on the actual game boards. If you are going to simply trace the shapes onto the plywood and then cut out the openings with a handheld jigsaw, then create the template so that the marks you transfer to the plywood are exactly the size shown on the *Drawings*. If you are going to, as I did, rout out the openings and the curved sides, then figure out the offset of the rub collar you will be using. I used a 1/4" bit in a 3/8" O.D. rub collar. That left 1/16" offset between the bit and the edge of the collar. (See the inset photo below.) For that reason, I marked the diameter of the holes 1/8" larger than the final openings. (Although I must confess that we are not talking rocket surgery here, the size of the holes can vary a bit and you'll still have a

usable game.)

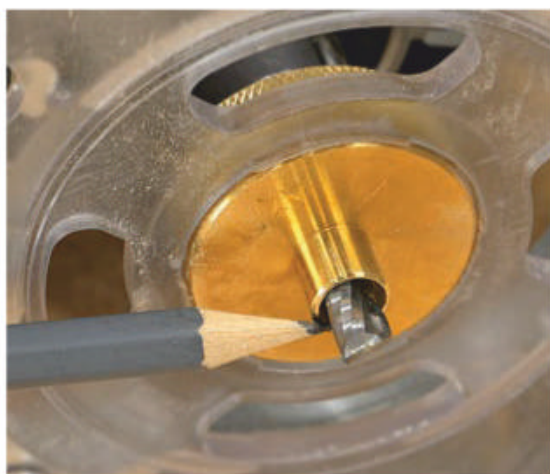
I only shaped one edge of the template and cut out one handle opening. I flipped the template over to form the second edge and the second handle hole on each board, which helped make the boards identical. I cut out the template openings and the curved shape of the edge with a handheld jigsaw.



Use a 1/4"-diameter Forstner bit to form the rounded ends of the handles. It makes the job faster and ensures uniformity.

Making the Game Boards

Start out by cutting three pieces of 1/2" plywood to 14" x 24". Place a sacrificial board (I used some scrap plywood) on your workbench. Then put the plywood blank down and clamp the



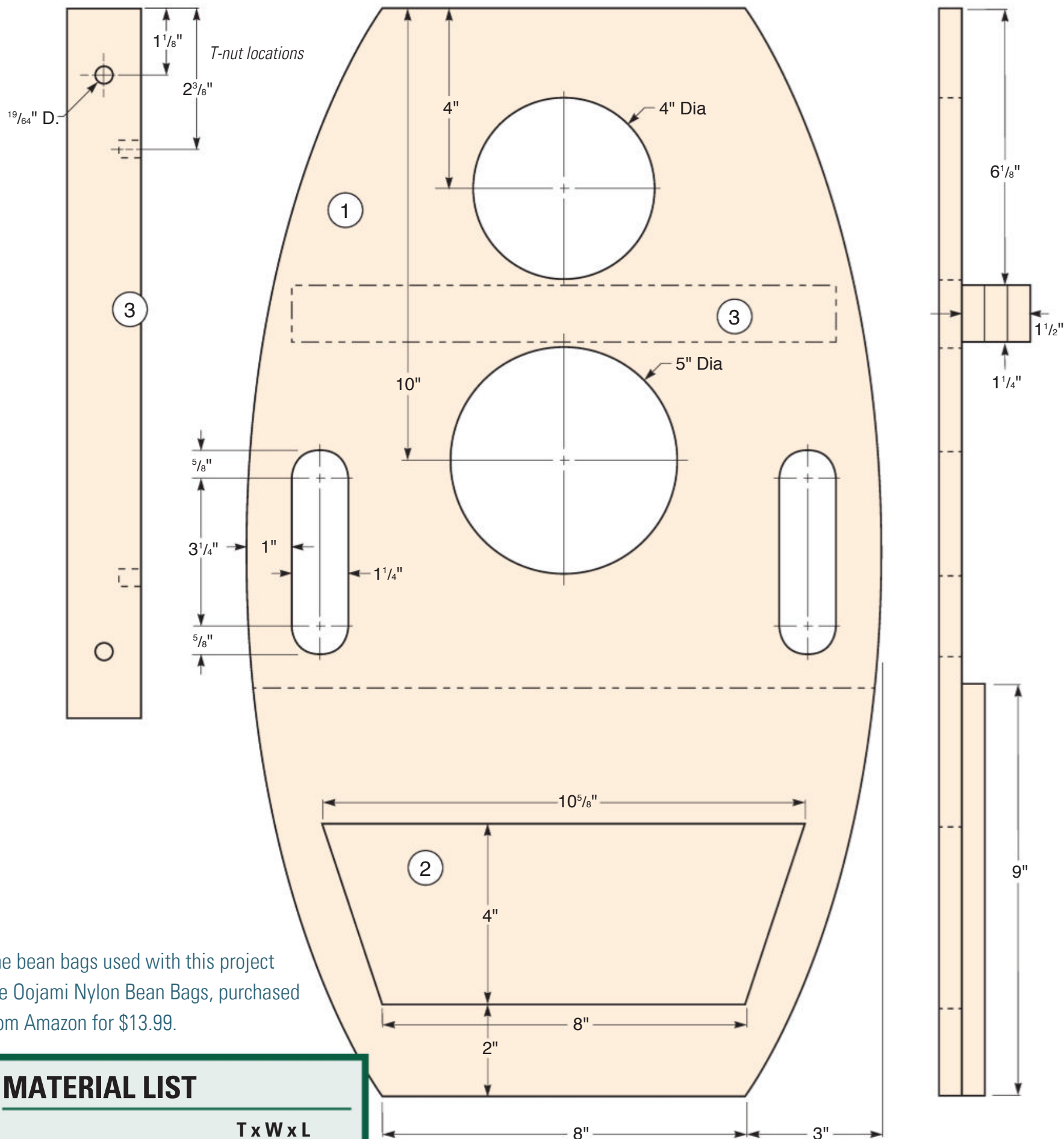
The author used a 3/8" outside diameter rub collar with a 1/4" upspiral bit chucked into the plunge router. With this setup, make the template holes 1/8" larger in diameter than the sizes required on the game board. To make the cuts more controllable, take two passes of increasing depth to rout all the way through the 1/2" plywood.



Leg Mounting Blocks

Top View

Side View



The bean bags used with this project are Oojami Nylon Bean Bags, purchased from Amazon for \$13.99.

MATERIAL LIST

	T x W x L
1 Game Boards (2)	1/2" x 14" x 24"
2 Backer Boards (2)	1/2" x 9" x 13 3/4"
3 Leg Mounting Blocks (6)	1 1/2" x 1 1/4" x 12"
4 Legs (4)	1 1/4" Dia. x 5 1/4"

template over the top of it. Their edges should match exactly. Go ahead and cut out the openings with your plunge router, making two roughly 1/4"-deep passes. When you have finished machining both game boards, grab the third piece of plywood and rout it into the shape of a game board, but without any of the openings. Then cut off 9" from each end to make the backer boards. They get mounted behind the rhombus-shaped openings to close those holes.

Skee Bag Hard-to-Find Hardware

1/2" American Birch Plywood, 24"W x 48"L (1) #62379 \$39.99 ea.
 1/4"-20 x 1 1/2" Hanger Bolts, 8 pack (1) #24406 \$2.99 pk.
 T Nuts 1/4" (#20), 8 Pack (1) #26054 \$3.49 pk.
 Dowel Rod - Birch - 36" x 1 1/4" (1) #20800 \$11.99 ea.

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

There are two leg mounting blocks yet to be made. They are 1 1/2" x 1 1/4" x 12" in size and can be made of solid wood, or as I did, laminated up from three pieces of the 1/2" plywood I had been using for this project. When you've made those pieces you



Secure the backer board to the game board. The author chose to paint the Skee Bag game white with bright colors as accents (see photo, below). A clear finish would work as well. It is entirely up to the builder.

need to drill 19/64"-diameter holes to mount the T-nuts in. See the *Drawings* for the hole locations. Pound the T-nuts home.

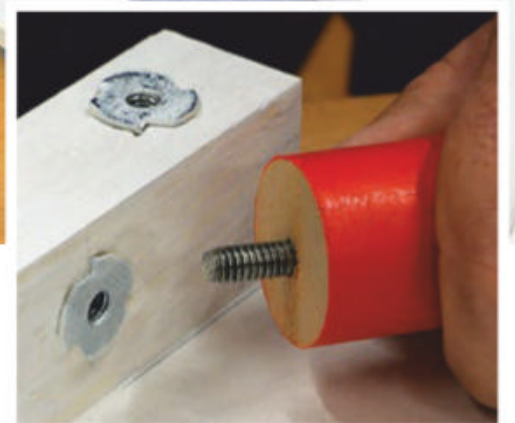
Adding Legs and Final Details

Just a few more things to consider and do before you are done. First, how are you going to finish the game? We chose to paint it white with bright accent colors. It just seemed right. But you could apply a clear finish and be happy with that. It's up to you.

With that determined, go ahead and cut the legs to length from 1 1/4"-diameter dowel stock. Drill a hole in one end and



Driving hanger bolts into the ends of the legs allows you to thread them into the T-nuts.



screw a hanger bolt into the hole. If you are painting the legs, now is the time.

Mount the backer board behind the rhombus opening with screws driven in from the back. Secure the leg-mounting block to the game board with screws driven in from the top of the board. And with that your project is completed. Set the game up, prepare for some basic addition and subtraction and get started with the fun!

Rob Johnstone is publisher of Woodworker's Journal.



Chevron Table

By Nick Brady

Multiple wood species aligned in a chevron pattern make up this little trendy table.



A few years ago, I had a rule about using multiple species of wood on a single project: Don't.

But recently I have had a change of heart when it comes to mixing species, especially when those various pieces create an interesting geometric design. I think this table is a good example of exactly that. The chevron (not her-

ringbone!) design is interesting to look at but not overpowering. I used six different wood species, but of course that is a completely subjective decision; you could go with more or less.

The table is easy to build and quite sturdy. As a dad with little kids, sturdy is very important to me. This table will need to withstand some rough-and-tumble times!

Starting Out

The core of the tabletop is two pieces of 3/4" plywood. Cut the pieces to size, as shown in the *Material List* on page 47. You'll notice that one of the pieces is 1/2" longer than the other — that's intentional. With the two pieces cut, form the radius on the corners of Top #1, the shorter piece. I've found that getting exactly



The author marks out the radius on the corners of Top #1. There are a host of ways to get this task done, but uniformity of the shape is very important. The corners are rough-cut with a band saw, staying close to the lines.



One of the benefits of using this template system from Rockler is that you can flush-trim the radius. For that reason, all four corners will be identical, which of course will give this project a refined appearance.

symmetrical radii on corners is very easy to do with a corner radius routing template, such as the one shown in the above left photo. I use the template to mark the shape, rough-cut it with a jigsaw or band saw and then step over to the router table. Using a flush-trim bit with the bearing at the top end of the flutes, I completed the shapes of all four corners (see top right photo). Keep the bit in the router table — you'll use it again shortly.

Go ahead and grab the second top and gather up a glue bottle, a couple of clamps and some #8 x 1/4" screws. Apply a generous coating of glue to the surface of the top you just shaped, then place it on top of the second top. Position it so there is a 1/4" of plywood extending on each end of the glue-up. You'll notice that the tops will easily move around as the upper panel is "floating" on the glue layer. Once the panels are correctly aligned, clamp them together to hold them in place. Now screw the panels together and allow the glue to tack-up solidly. Rough-cut the corners of the second top at the band saw. The final step on the tabletop for now is going back to the router table and flush-trimming Top #2 to match its mate. Sand the routed edges smooth, and set the top aside.

Prepping the Other Stock

While the tabletop has a plywood core, the cubby is solid lumber. That means you need to glue up its bottom panel before you make the cubby. Take the time to prep your stock and glue up a panel that's slightly larger than the finished dimensions found in the *Material List*.

The choice of the cubby material is up to you. I chose cherry to match the lighter woods on the finished tabletop.

Next up is to machine the 24 chevron pieces. I sourced my stock for the chevrons from Rockler. Not only do they have 1/8"-thick stock for sale, but they have it in a very wide selection of species. For this table, I used maple, cherry, mahogany, bubinga, ebiara and wenge. (Yeah, I had never heard of ebiara either ...)

There is absolutely no reason that you could not make your own 1/8"-thick pieces by resawing them from thicker stock. One advantage to doing so is that the matching pieces will be more uniform in color and figure. However, a challenge will be how you get identical thicknesses and



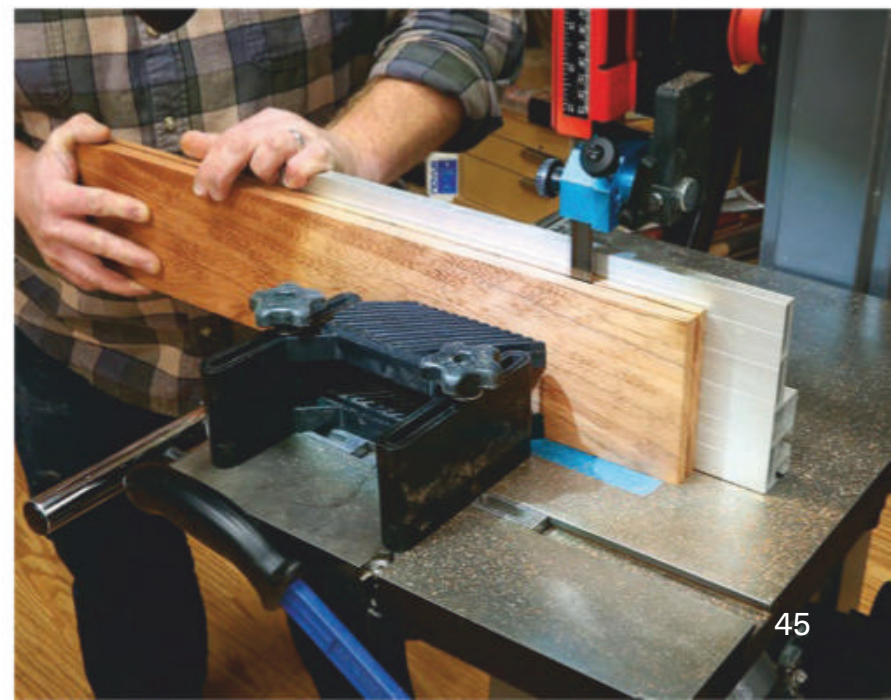
Gluing the two plywood pieces together can be a bit tricky as they tend to slide around. Use clamps across their width. There needs to be about a 1/4" overhang on both ends.



The key to successfully creating a chevron pattern is accurately cutting the widths of the pieces and the angle where they will be joined together.

Resawing

We purchased our chevron lumber already sized at 1/8" thick. Another option is to resaw your pieces. Planing those pieces smooth and to a uniform thickness can be done, but that requires a sacrificial surface in your planer and a bit of caution.





The very first chevron is secured to the plywood tabletop with a combination of CA and woodworking glue. Use an accelerator to speed the process up, but also use clamps to hold it down as it cures. This chevron will locate all the rest of them on one side of the table core.



With one side of the table's chevrons glued in place, the author put a panel clamp down the middle of them. Then he added another clamp at the center of the glue-up. Any pieces that were lifting on their ends got an additional clamp.



for this task and made sure I had a sharp blade in the machine.

My chevrons were exactly $3\frac{1}{8}$ " wide, and I determined their angle to be 30 degrees. I cut them all at the same time and set them aside for a moment. I left the length of the chevrons overly long, as I would trim them after they were all glued in place on the tabletop. I grabbed the table core and moved it to my workbench, then drew a line down the center of its length. To assist with aligning the chevrons, I clamped a straightedge on that line.

Installing the Chevrons

It's finally time to mount the first chevron. I used an unusual method to secure the first piece. First, I spread a coating of PVA wood glue in the center of the chevron, then squeezed a thick bead of CA glue around its perimeter. Next, I carefully placed the corner of the chevron at the end of the table core with its angled edge up against the straightedge. Pressing it down into place, I sprayed CA accelerator around the piece which locked it down. Then I added a clamp to further secure it to the core. I used this technique to speed up gluing and placing the remaining chevrons.

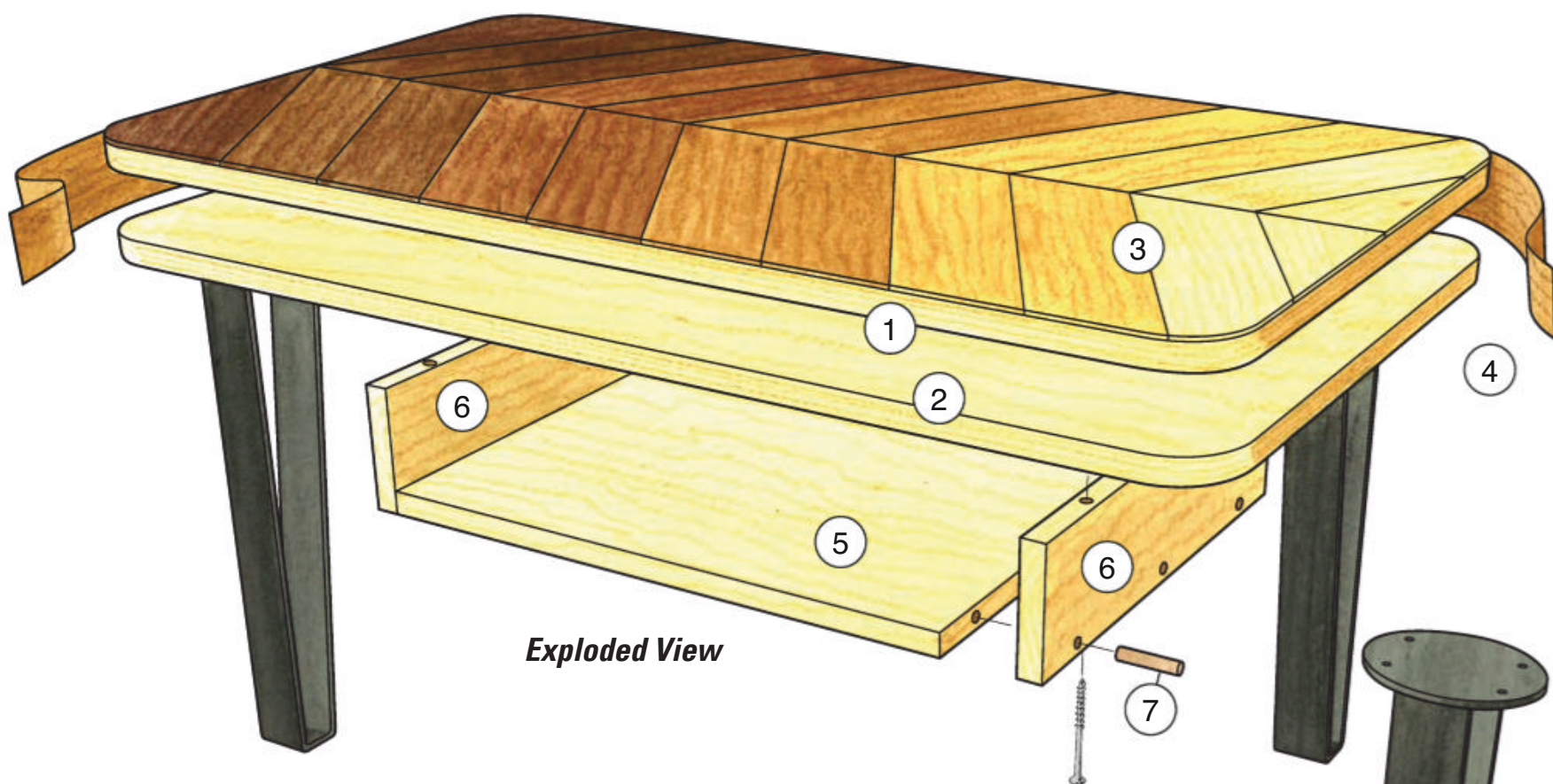
While I didn't mention it earlier, I had already determined the order of the various species of wood on the top. Now I took one of each species and placed



The last two small pieces of hardwood are fitted into the opening in the chevron pattern. Glue and clamp them in place and allow the glue time to cure.

two smooth faces. Planing thin stock is possible on home-shop planers, but you usually need to add a smooth sacrificial platten to the planer, and then take very shallow passes. Even so, the thin pieces may get pulled up into the cutterhead and shatter. You'll have to sort out your planing process if you do your own stock milling for these parts.

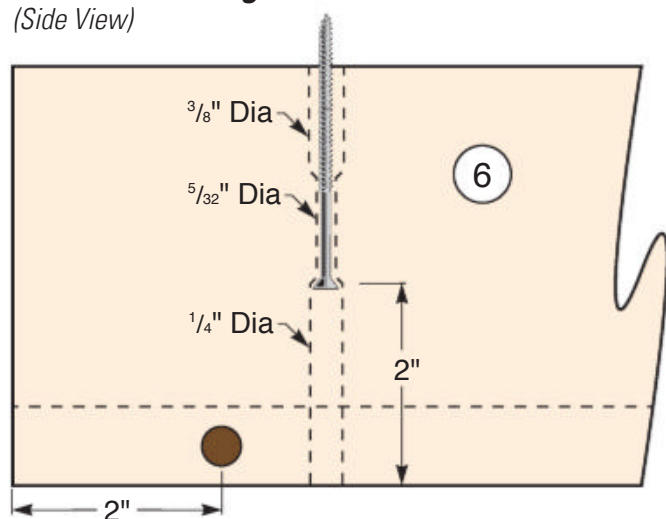
The most critical detail in this project is to make the chevrons exactly the same width and to form the angles precisely the same on each piece. I chose the table saw



Exploded View

Screw Mounting Detail

(Side View)



MATERIAL LIST

	T x W x L
1 Top #1 (1)	3/4" x 20" x 36"
2 Top #2 (1)	3/4" x 20" x 36 1/2"
3 Chevrons (24)	1/8" x 3 1/8" x 15"
4 Edge Banding (1)	1/32" x 2" x 10'
5 Cubby Bottom (1)	3/4" x 14 3/4" x 18 3/4"
6 Cubby Sides (2)	3/4" x 4" x 14 3/4"
7 Cubby Dowels (6)	3/8" Dia x 2"

Chevron Table Hard-to-Find Hardware

2" x 25' Pre-Glued Edge Banding, Cherry (1) #57121 \$22.99 pk.

16" I-Semble Bent Flat Steel Legs with Adjustable Feet (1) #85560 \$84.99 set

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visit www.woodworkersjournal.com/hardware

Or, call 800-610-0883 (code WJ1577).

them next to the table core in the order in which they were to be mounted. I put a thick coat of glue on the table core, using a glue roller to spread it evenly. Then I placed each chevron on the top, sliding it gently back and forth to help the glue get tacky. I worked my way down one side of the tabletop layout line, installing half the chevron pattern.

To further secure the chevrons, I put a panel clamp down their middle. If you don't have a panel clamp, you'll need to make clamping cauls (the stiffness of 2x material works well). The cauls should have a very slight crown along the length of them to apply pressure in the middle

of the glue-up. Add another panel clamp next to the straightedge in the center of the panel. Check the end of each chevron to be certain that they are making good contact with the table core. If not, add clamps to solve that problem. If I noticed that a chevron was lifting in the middle, I used a heavy weight to push it down. Allow a couple of hours for the glue to cure.

When you are confident that the glue has set, use the same basic techniques to glue the remaining chevrons in place on the other side of the core's layout line. Follow that up by adding four more pieces to the top. There will be two rather wide pieces that go on one end of the core

— the end you started the chevrons on — and two smaller piece at the other end of the table. You'll need to fit the small pieces in place. Glue and clamp them, and allow the glue to cure.

Tip-top Details

With all the chevron pieces now installed, scrape any glue squeeze-out off the surface, then turn the tabletop over and put it down on the workbench. At this point, I made a 1/4"-thick spacer to use as I trimmed the chevrons back a bit (see the photo at the top of the next page). I attached the spacer to the edge of the tabletop with self-adhesive sticky dots and



Using a 1/4"-wide spacer attached to the edge of the tabletop core with adhesive sticky dots, the author trimmed away most of the extra chevron length. All four sides were trimmed this way.



Attaching hot-melt edge banding to the tabletop core hides the plywood edges and creates a "hard-wood" looking edge underneath the chevrons.



used a hand saw to trim away the excess length of the chevrons. I did this on all four sides of the tabletop. The reason I left the small "ledge" is to make the next task much easier: wrapping the table core's edges with edge banding. Before I attached the edge banding, I removed any glue blobs or irregularities on the edge of the core.

If you've ever attached long pieces of thin edge banding, you'll know that one of the challenges it presents is that it can flop around and cause trouble. I solved that problem by putting a couple

A flush-trim bit chucked into a handheld router was used to trim the chevron top flush to the edge of the tabletop.

of clamps on the core that loosely kept the edge banding from moving around (see middle left photo). I looped an overly long piece around the top and then began ironing it in place on one of the narrow ends. The small "ledge" formed by the overhanging chevrons helped me to align the edge banding perfectly as I worked around the end and down both sides. When I got to the far end, I overlapped the edge banding and sliced both pieces at once, creating a perfect fit. After the final bits were ironed in place, I was pleased with how well the operation had gone. The edge banding was a bit wider than the table core, so I trimmed off the excess and then used a file to put a slight bevel on the edge to prevent it from being pulled out easily or splintering.

With that done, it was time to flip the tabletop over and do some sanding on the chevrons. (You didn't think you'd get away without sanding did you?) Despite my best effort, the chevrons were not perfectly level to one another. So I grabbed the biggest rotary sander that I own, put some 40-grit paper on it and leveled the top. Then I worked up through the grits to 320.

The smooth top was a benefit for the next step. Setting up a handheld router with a flush-trim bit, I removed the last bit of the chevron's overhang. I took my time, feeding the router around the tabletop smoothly and steadily. When I was done, I hand-sanded the freshly routed edges, gently breaking their top corner and smoothing away any bit marks.

A Chubby Cubby

You are really making progress now! The cubby is a very basic bit of woodworking, as it is constructed with butt joints and dowels. Grab the panel you glued up earlier and sand it smooth, top and bottom.



With the cubby sides clamped and glued to the cubby bottom, bore 3/8-diameter holes for the dowels. Put a small bit of glue in the holes and drive the dowels home. Allow the glue to cure.



These walnut dowels make nice accents on the side of the cubby, but any species of dowel will work. Cut the dowels flush to the cubby sides with a handsaw, using a piece of paper as a shield to prevent saw marks.

At the table saw, cut it to the dimensions found in the *Material List*. Then cut two sides for the cubby, and you're ready to put it together.

I had some 3/8" walnut dowel left over from another project and thought it would add an interesting detail. When I clamped the sides to the cubby bottom, I drilled holes through the sides and, with a small bit of glue, drove the dowels through the sides into the ends of the bottom panel. I left it alone for the glue to cure. Once the joints were dry, I trimmed the dowels flush and then gave the cubby a complete sanding up through the grits.

To attach the cubby to the underside of the tabletop, I used long screws driven up through the width of the sides. The *Screw Mounting Detail* drawing on page 47 shows a narrow hole bored into the edge of the side, and then two larger diameter holes on the top and bottom edges of the side. The screws (#6 x 3" trimheads) seat at the bottom of the 1/4" opening and are driven up into the bottom face of the tabletop. You can also glue the cubby's edges to the tabletop if you so desire, but I felt that the screws were more than strong enough.

I chose black steel legs from Rockler for this table. They screw onto the bottom of the tabletop and are very sturdy when installed. Drill pilot holes for the screws and install them with a drill/driver. Again, my choice of leg style is subjective. There are many different types of legs that would work with this tabletop. Should they be steel or wood, or even if you made the legs in your shop,



Boring holes for the trimhead screws is a three-step operation. The screws are seated inside the cubby sides where the 1/4" clearance hole stops. The screws hold the cubby tightly to the tabletop.



that's your choice and another way to customize this unique project.

I then applied a clear finish to this table. With all the different species of wood, it seemed a shame to change their natural color with stain. I applied a coat of sanding sealer, sanded it with fine-grit paper and then finished with two top coats of polyurethane.

This project was fun to build, and I've found that it fits right into our home — kids and all.

Nick Brady is a Rockler project builder.

Attaching the legs to the table is one of the last steps in the process. These steel I-semble legs are extra sturdy.

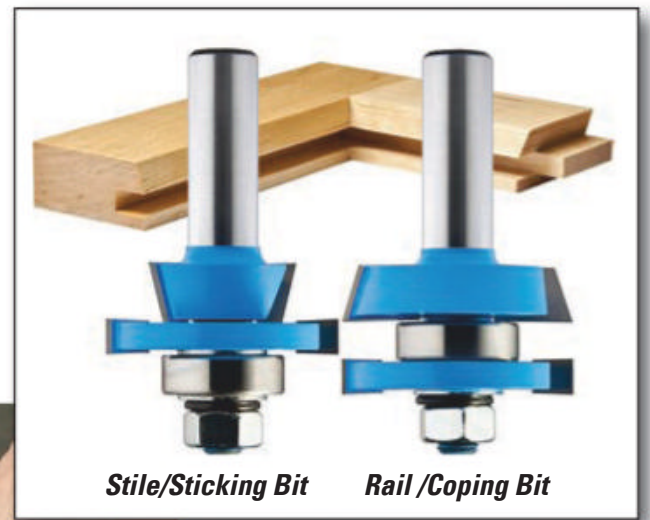
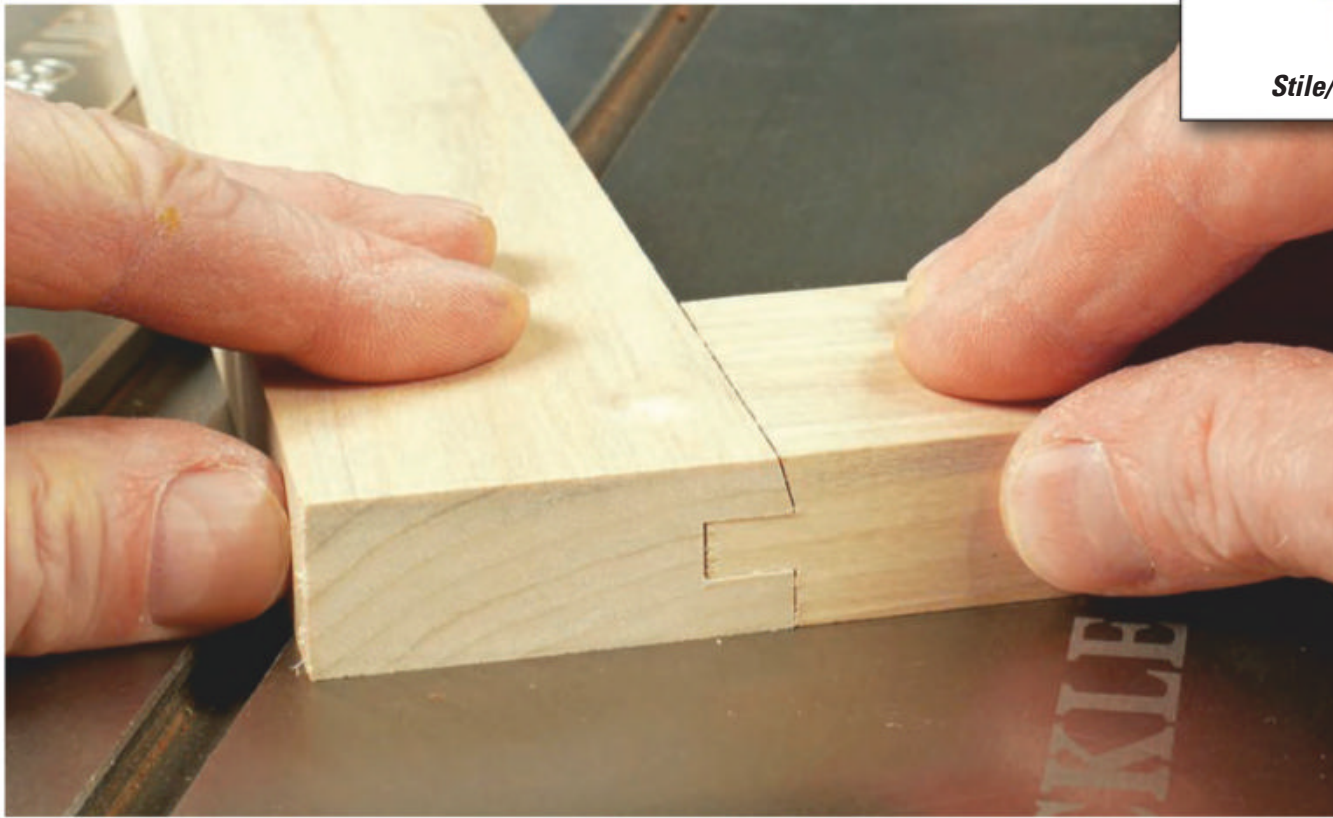


SIMPLIFYING BIT SETUPS

Rail-and-stile Router Bit Sets

By WJ Staff

Matched bits cut joints for cabinet doorframes, plus a panel groove and a decorative profile.



the same way a mitered piece of trim molding is contoured with a coping saw to fit its mate, this bit often is called the “coping” bit.

Label Them for Clarity

It's easy to confuse which bit is which, because the profile each creates is actually the negative space of its shape. Plus, the bits are oriented in a router table to cut stiles and rails back-face up. So do yourself a favor and label each bit with an “S” for stile/sticking cutter and an “R” or “C” for the rail/coping cutter. (You'll thank us the first time these labels prevent you from choosing the wrong bit for each cut ... it's an astonishingly easy mistake to make.)

Which Cut Comes First?

While the photo sequence on the next page shows the stile bit used first for making a joint, it's also perfectly acceptable to cope the ends of the rails first. That can be advantageous when you already know the final length of a cabinet door's rails. The rail can be coped on each end, followed by the stile/sticking cuts. Either way, since coping cuts are made across the narrow rail ends, they're best performed with the workpieces clamped in a sled that increases stability and keeps your fingers clear. A backup

The **stile cutter** (see inset photo, above) cuts a centered groove along both a door's stiles and rails for fitting wood panels or sometimes glass. The bit also mills a decorative profile, called sticking, along the inside front-facing edge of the door parts. This shape may be as simple as a chamfer or any number of different roundover, filet or ogee forms, depending on the bit set's design. Because the stile cutter is also used on the door rails, it sometimes is referred to as the “sticking” bit instead, which actually may be the more fitting term for it.

The **rail cutter** mills a mirror opposite profile of the stile cutter — a reversed sticking cut and a stub tenon to fill the panel groove and strengthen the joint. Because the rail cutter's profile mates with the stile cutter, much in

Take a close look at the corner joints of nearly any cabinet door made these days, and you'll likely find some variation of rail-and-stile joinery, such as the example shown above. These sturdy, attractive joints can be made easily in a home workshop with a matched set of rail-and-stile router bits, using a router table equipped with a mid- to full-size router.

MORE ON THE WEB

To watch a video on routing rail-and-stile joints, visit woodworkersjournal.com and click on “More on the Web” under the Magazine tab.



A setup block for some rail-and-stile bit sets, like Rockler's Shaker-style set (item #40431) shown here, can help dial in bit settings efficiently. Label the block and each bit with an “S” and “R” or “C” to denote the joint cuts.



2 *Install the stile bit in the router table and adjust its height until its center cutter aligns with the groove of the stile/sticking profile on the setup block. Typically, this groove is centered on the door stock thickness.*



3 *Open the router table's fence facings to just clear the bit's width and lock them in place. Then adjust the fence in or out until the rim of the stile bit's top bearing is flush with the front face of the fence. Lock down the fence.*



4 *Install featherboards around the bit opening on the table and fence to help control the cuts. Then feed the stile-and-rail workpieces, back face oriented up, past the bit to create the stile/sticking profiles on their inner edges.*



5 *Install the rail bit, and adjust its height until its top and bottom cutters align with the back lip and sticking profile of the stile/rail workpieces. If you plan to use a coping sled, be sure to account for it when setting bit height.*



6 *Orient a rail so its flat (outer) edge is against the coping sled's backup board on its fence. Clamp the rail down securely, and slide the coping sled along the fence to mill the first rail/coping profile on one end.*

block of scrap can be used in place of a coping sled, if you don't own a sled.

Note that when the stile/sticking cuts are made first, you'll need to make a filler strip with the coping cutter to

fit into the stile cut (see inset, photo 7) in order to prevent the second coping cut from tearing out the wood inside the stile profile when the bit passes through it.



7 *Before coping the other end, rout the edge of a strip of scrap stock with the coping profile to fill in the stile/sticking cut already made (see inset). That way, the second coping cut on the rail, in which the stile profile will face the coping sled fence, won't be subjected to tearout when the bit passes through it. Clamp the rail in the sled and cope the remaining flat end of the rail.*



ADVANCED POWER TOOL TECHNIQUES

Cutting Coves, Non-through Cuts and Tapers

By A.J. Hamler

When it comes to cutting simple straight lines, the table saw is the champ! Now build your skill set with these three next-level techniques.



You use your table saw routinely for ripping and crosscutting wood in perfectly straight lines, guided by the fence or miter gauge. Tilt the blade or adjust the gauge, and you get straight bevels or mitered cuts.

No argument, that's the table saw's bread and butter. But beyond those basic techniques are several others

you should consider adding to your arsenal of skills. Let's take a look at three of the most useful ways to go beyond the basics.

Cove Cutting

Coves are common in molding, trim, picture frames, box components and more. Small coves, like simple coved trim, are easy to make with a

router. But for wider, deeper coves for crown molding, box sides and other larger projects, you need either a shaper with large-scale cutters or a well-stocked trim supplier.

But you can also cut coves on your table saw. The process may seem tricky (and maybe a bit scary if you've never done it before), but it's really just a matter of



Pencil in the rough arc of your cove. A center mark and other registration markings will make it easier to sight-in the angle during setup.

simple preparatory steps and the right guidance for your workpiece. The type of blade you use doesn't matter, but a higher tooth count produces a smoother cut.

While coves are arcs, you still cut them in a straight line. The trick is orienting the workpiece at an angle so the saw cuts in a spiral to form the arc. You can do this with straight wooden guide pieces clamped to the saw at the appropriate angle, but clamping to a saw table isn't always easy; there are some places on saws that clamps just won't go.

Instead, consider a miter slot-based cove-cutting jig, such as the Rockler offering seen in the opening photo, that uses expandable miter bars to lock the jig into place. Its parallelogram design makes for easy alignment, while a vertical featherboard keeps workpieces pressed down securely during the cut.

To demonstrate, I'll cut a cove measuring 5/8" deep by 3 1/2" wide, into a 1"-thick workpiece. I want the final coved workpiece to be 4 3/4" wide, but I'll include a bit of extra at the edges to fine-tune the piece after coving.

First, I mark the end of the workpiece (see top left photo). Here, I've not only drawn

the cove but also a centerline, a horizontal line at the top of the arc and a pair of lines delineating the ends of the cove. These make it easier to set the correct angle on the saw.

Now I set the saw blade to the cove's depth, in this case 5/8" high. By the way, you can't leave a riving knife in place when cutting coves, so that's why I've removed it.

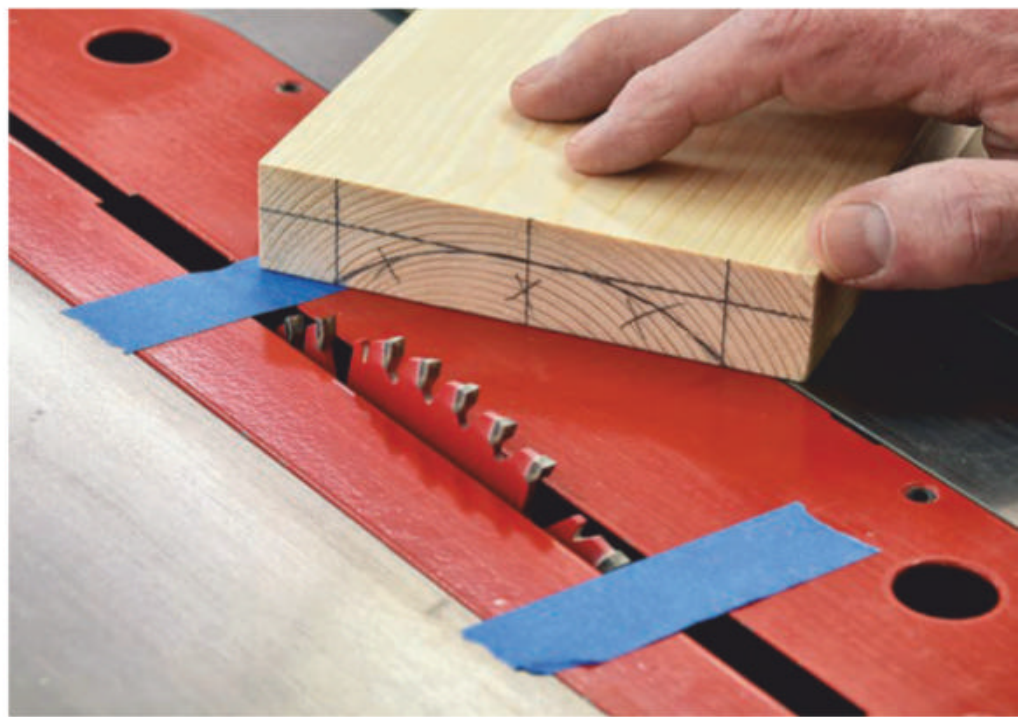
With the blade height set, I mark where the teeth exit and enter the throat plate, placing masking tape at the exact points where they come up and go down — tooth tips should just graze the tape. Note in the middle right photo that the exposed portion of the blade is actually longer than the marked cove on the workpiece.

Next, I place the workpiece in front of the blade, with the feed angle matching my saw's tilt; for my left-tilt saw, I'll angle the feed from the left. Feed direction doesn't matter for symmetrical cove cuts with the blade at 90 degrees, but it will matter for asymmetrical coves that require a tilted blade. More on that later.

I align the workpiece where the first tooth will contact the wood and then sight from the other side of the table. (Those vertical registration marks make this easier.) Now I can



Set the blade height to match that of the desired cove cut. This is also a good time to remove your saw's riving knife.

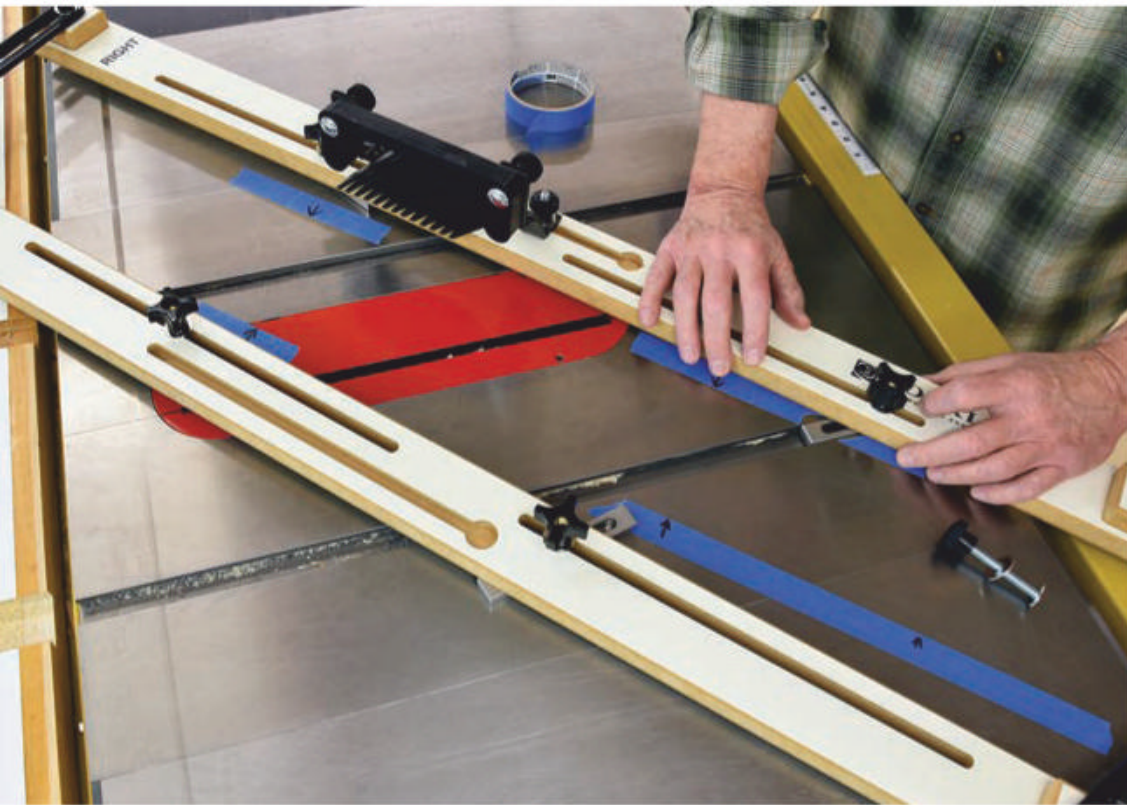


Use strips of tape to mark the full cut of the exposed saw blade, exactly at the first point a tooth comes above the plate and the last point before it goes back into the table.



Sight over the table's top and adjust the workpiece angle until the blade's arc lines up with and exactly matches the one you've made in pencil. An angle-setting app or chart is another option.

ADVANCED POWER TOOL TECHNIQUES CONTINUED



Here, the author has used masking tape to outline the edges of the workpiece at the correct angle, and he's positioning the cove-cutting jig's parallel fences flush with these tape indexes before locking it down into the miter slots.



With the jig secured and featherboard in place, slowly feed the workpiece through the spinning blade, set initially at about 1/16" above the table. Raise the blade in small increments and make repeated cuts.

angle the workpiece and sight over the blade until the cove exactly matches the blade's arc (see bottom right photo, preceding page).

By the way, there are easy-to-find angle setting charts and even phone apps on the Internet that calculate the correct feed angle for you.

Here, my exact calculated angle is 45.2 degrees, but I settled on an easily repeatable 45 degrees for my cove.

Without moving the workpiece (a weight, such as a pipe clamp, can keep it in place), I lay strips of tape along the workpiece edges to act as guides for jig placement. When that's done, I lower the blade.

Now I loosen all knobs and place the jig on the table saw, aligning its inner edges to the tape. The miter bars are inserted into their respective slots, and I lock them down with one side of the jig exactly on the tape edge. Then I repeat with the other side, locking the end bars to secure everything into a rigid parallelogram.

If you're following along on your saw, set the workpiece inside the jig and check that it moves freely, adjusting the jig as needed. Finally, set the featherboard to hold the work-

piece through the cut. Since you're cutting across the blade, you'll get resistance; the steeper the cut angle, the harder the push will be. Keep in mind, too, that hardwood will present more resistance than softwood. So cut in blade height increments of no more than 1/16" at a time.

Now raise the blade and make the first pass (see bottom left photo). Push blocks are essential for this operation, as your hands pass right over the blade. After each cut, raise the blade 1/16" and take another pass until you've cut to your layout line and the cove is complete. Feed a bit more slowly on the final pass to create a smoother surface.

If you plan to make more coves with the same setup,



Once the cove is complete, sand off any "spiral" marks left by the saw blade.

cut off a small piece at the end of the finished cove molding to use as a cut-depth guide for future workpieces.

With the cove done, examine its surface and sand as necessary to remove the angled blade marks.

Cove cutting is a dusty operation. There are no scraps or offcuts produced with coves.



Coves create boatloads of dust. To minimize dust (and shorten cutting time), remove excess material before cutting the actual cove. Here, the author has made a series of straight rips and snapped out the waste.



By tilting the saw blade, you can make coves in a variety of shapes. Here, the author is cutting walnut handles for a box project. After the cove is complete, individual handles are cut from the longer workpiece.

It's all dust. Even with a good dust collection system, you can cut down on the mess by removing the bulk of the waste before actually cutting the cove.

In the above left photo, you can see that I prepped this workpiece by making a series of straight rips in the cove's waste area. With each cut 1/8" or so apart, it was easy just to snap the waste out in strips. This not only eliminates a lot of dust, but it also speeds up the process and makes for easier feeding, especially in hardwoods.

In our example, we've cut a symmetrical cove, but as noted earlier, you can cut almost any cove shape by tilting the blade. A symmetrical cove's arc apex is in the center, but angling the blade shifts this apex to the side. The greater the angle, the farther to the side the apex will be. You can see what I mean here in the top right photo.

Getting a specific cove profile can take a lot of calculation or some trial and error. You'll find numerous charts and calculators for the process online, but I personally prefer just trying various setups and picking the one I like best.

Non-through Cuts

Cutting wide channels part-way through wood — often called non-through cuts — are useful for rock-solid joinery. Called a rabbet when the cut is on an edge, a dado when it crosses the grain or a groove when it follows the grain, you can make these non-through cuts in a variety of ways. Router tables and shapers excel at this, and you can even cut them — albeit more slowly — with a regular blade in multiple passes. But most woodworkers agree that a dado set, sometimes called a “dado stack” or “dado head,” is the best way to go.

The set consists of two outer blades that resemble regular blades, which cut and define the edges of a dado, groove or rabbet. A selection of narrow chipper blades with fewer teeth clean out the waste in the center of the cut, between the outer blades. Rounding out the set are shims and spacers in various thicknesses. How you “stack” these together determines the width of the cut. Manufacturers often include a simple chart listing the needed components for typical cuts.

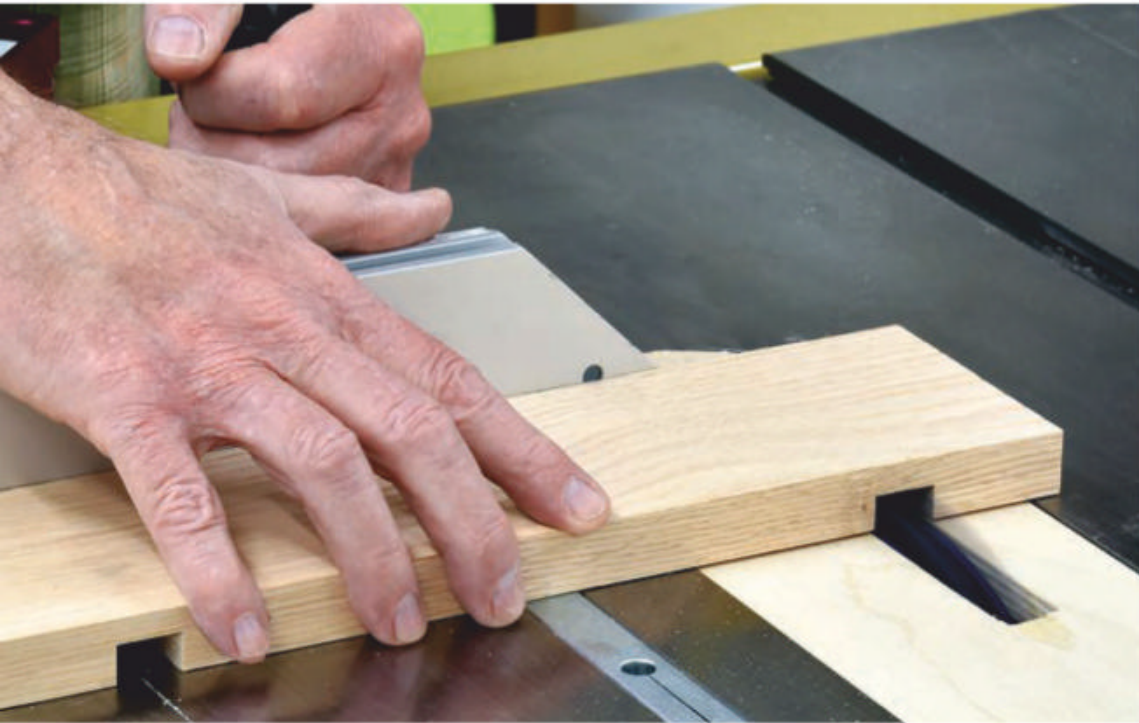


Standard dado sets include a pair of outer blades, a number of chipper blades and a series of shims and spacers to set and adjust dado widths. An included guide lists the parts needed for specific cuts.



With blades, chippers and spacers “stacked,” the set is secured in the table saw. Because dado sets are smaller than standard 10" blades, the riving knife must be removed. It serves no purpose for non-through cuts.

ADVANCED POWER TOOL TECHNIQUES CONTINUED



Non-through cuts like these dados are typically made using a miter gauge for narrow pieces and the saw fence for wider stock. Note that a custom throat plate sized for this specific dado setup creates a zero-clearance insert.



A rabbet cut made along the edge of a workpiece can be accomplished with the rip fence. Clamping on a sacrificial wooden fence protects the saw's standard factory fence facing.



Install the dado set one piece at a time, starting with an outer blade. Chippers and spacers follow as needed for specific cut sizes, with the other outer blade going on last, and the arbor washer and nut holding everything

together as a unit. By the way, dado sets are smaller in diameter than standard 10" blades. A 10" table saw, for instance, uses an 8" dado set. You'll also need to remove the riving knife, which not only impedes the cut of the smaller diameter dado blade but also serves no purpose for non-through cuts.

Some table saw throat plates have openings that accommodate narrow dado blade widths, but some don't. If yours doesn't, you can make your own throat plate out of MDF or plywood, using the same process for making any zero-clearance insert. As a bonus, a custom plate improves dust collection and helps eliminate tearout.

This Rockler tapering jig includes both a standard tape measure and one-degree registration marks on each end of the jig to assist in setting up angled tapered cuts.

You can cut dados, grooves or rabbets in large workpieces using your table saw's rip fence, just as you would for any rip or crosscut in large stock. For narrow workpieces, a miter gauge is your best bet.

For cutting rabbets along an edge, all you need is your rip fence. However, you'll first want to add a sacrificial fence. This can be any piece of straight stock, simply clamped to the face of your regular fence. This allows you to adjust it until the fence facing just kisses the blade, making for smooth, accurate rabbets.

As with other non-through cuts, your hands will often pass right over the blade. So be sure to use featherboards and push blocks for safety.

Cutting Tapers

Taper cuts are nothing more than angled rip cuts. You can cut simple tapers with a jigsaw or band saw, then refine them with sanding or planing. But for more accurate, repeatable results, a taper-cutting jig is faster and easier. These jigs, such as the Rockler Taper/Straight Line Jig shown here, are essentially variations of crosscut sleds that use your saw's miter slot to guide them.

In addition to the base, which has a miter bar on the underside, the jig consists of a moveable fence to set taper angles, hold-down clamps to secure the workpiece and a handle. Index marks, set at



For this table leg, which will be tapered on two sides, the author pencils in the cutlines on the “foot” end of the leg showing where the taper cuts end. There are also corresponding pencil marks at the beginning of the tapers, higher up the leg.

1-degree increments, and tape measures at each end, help align everything. An adjustable workpiece stop caps the end of the movable fence.

To set up the Rockler jig, first size it to your saw. This is simply a matter of assembling the jig and running it through the saw to cut a zero-clearance edge along the jig’s base. With the tape measures then applied right at the new edge, precise angles are easy to set.

Let’s cut a small table leg that’s tapered on two sides. First, mark the “foot” end of the leg where the taper cuts end (see top left photo). Then pencil lines around the upper part of the leg where the tapers begin.

To mount the workpiece in the jig, align the pencil lines designating the top and bottom of the taper with the jig’s zero-clearance edge, snugging the fence in place against the workpiece and twisting the knobs to lock it down. To secure the workpiece itself, swing the hold-downs into place and lock them down.

To make the cut, raise the blade so it clears the top of the workpiece, turn on the saw and feed the jig through the cut. Once the first taper is cut, disengage the hold-downs, rotate the workpiece 90 degrees, secure it once again with the hold-downs and make the second cut. You’re done.

Tapering jigs can also function as straight-line jigs, perfect for processing rough stock or workpieces with irregular edges. For this, remove the miter bar and use the saw’s rip fence for guidance instead. Set the jig’s movable fence as needed to support the workpiece, and use the hold-downs to secure it. As before, use the jig’s rear workpiece stop to support the end solidly.

Set the saw fence to the appropriate position to make the cut, then feed everything through just as before. Now your workpiece has a fresh, straight edge allowing you to further process it however you like.

A.J. Hamler writes frequently for Woodworker’s Journal.



The workpiece is clamped into place with the beginning and ending marks for the taper aligned with the jig’s zero-clearance edge. With everything locked down, one pass through the blade creates the taper.



With the miter bar removed, the Rockler tapering jig works with the saw’s rip fence as a straight-line jig to cut irregularly shaped workpieces. It’s a safer way to get a straight edge.



An adjustable stop at the rear of the jig works in tandem with the hold-down clamps to secure a workpiece during the cut.

WHAT'S IN STORE

Must-have Festool Merch, Glue Bottle Dock

Contact Information

Bench Dog
800-279-4441
rockler.com

Festool
888-337-8600
festoolusa.com

Milwaukee Tool
877-729-3878
milwaukeetool.com

Rockler
800-279-4441
rockler.com

This *Glue Bottle Dock* (item 61892; \$6.99) from **Rockler** eliminates the hassle of inverting a glue bottle and waiting for the glue to reach the nozzle during a glue-up, because the glass-reinforced nylon holder stores the bottle upside down so the tip remains primed with glue. No shaking or repeated squeezing is required. A built-in opener pops up the nozzle of Titebond® glue bottles, so you can grab and open the bottle with one hand. A flat, textured recess underneath enables the tip to be closed with a bump and scraped clean when needed. There's also a bottom plug with a rubber gasket, offering easy clean-out of wet glue that drips from the tip. The Dock fits 4, 8 and 16 oz Titebond bottles, Rockler glue bottles

Rockler Glue Bottle Dock



and bottles from other brands. Mounting holes allow for easy attachment to Rock-Steady Shop Stand legs, pegboard or other solid surfaces.

You'll sand tight corners and delicate contours with greater control and comfort using **Milwaukee's M12 FUEL™ Orbital Detail Sander**. While its orbital sanding motion

prevents scratches and gouges, four speed modes up to 14,000 max rpm allow you to choose the aggressiveness and material removal rate to suit the job at hand. This 1.35 lb tool also has a variable-speed trigger, lock-on button and an LED work light. It comes with a sponge pad, pad saver and a mesh abrasive kit with three pieces each of 80-, 120- and 180-grit POWERGRID™ sanding sheets. Four other grits are also available. The M12 FUEL Orbital Detail Sander (model 2531-20) is priced at \$149 and does not include a charger, 12-volt battery or carry case.

The **Bench Dog 12 oz Brass Mallet with Sapele Handle** (item 88868; \$29.99) is a perfect companion for tasks such



*Milwaukee M12 FUEL
Orbital Detail Sander*





For videos demonstrating featured tools,
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Festool Branded
 Merchandise Options

Bench Dog 12 oz Brass Mallet
 with Sapele Handle



you supply the tabletop
 of your choice, the kit in-
 cludes a pair of steel legs
 that adjust from 22⁵/₈" to
 37⁵/₈" in 1" increments,
 with 1/2" leg levelers to
 fine-tune their height.
 Large quick-release
 paddles enable the legs
 to fold flat for storage.
 The table attaches to the
 back rail of most cabinet
 and contractor saws with
 Biesemeyer-style
 T-square fences, using a
 pair of interlocking brack-
 ets with removable pins.
 The bracket system is
 also height-adjustable and



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 hoodies, work pants, drink
 tumblers, tool stickers, logo
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 ally be updated with new gear
 every few months.



as carving, because its heavy
 head focuses impact into a
 small area for optimal control,
 and the round shape doesn't
 require aligning to the contact
 surface first. Its turned sapele
 handle is comfortable to hold.
 The mallet is 5¹⁵/₁₆" long with a
 head diameter of 1⁵/₁₆".

There's no denying that an
 outfeed table behind a table
 saw adds safety and control
 when sawing long, large or
 heavy workpieces. But smaller
 shops might not have room to
 make a permanent outfeed ta-
 ble realistic. Fortunately, the
 quick-release hardware and
 folding legs on the *Rock-Steady
 Knock-Down Table Saw Outfeed
 Kit* from **Rockler** makes it
 possible to add an outfeed ta-
 ble to many full-size saws and
 remove it when needed. While

comes with interchangeable
 bushings for various mounting
 bolt diameters. Other installa-
 tion hardware is also included.
 The Rock-Steady Knock-Down
 Table Saw Outfeed Kit (item
 65575) sells for \$119.99



Rockler Rock-Steady
 Knock-Down Table Saw
 Outfeed Kit

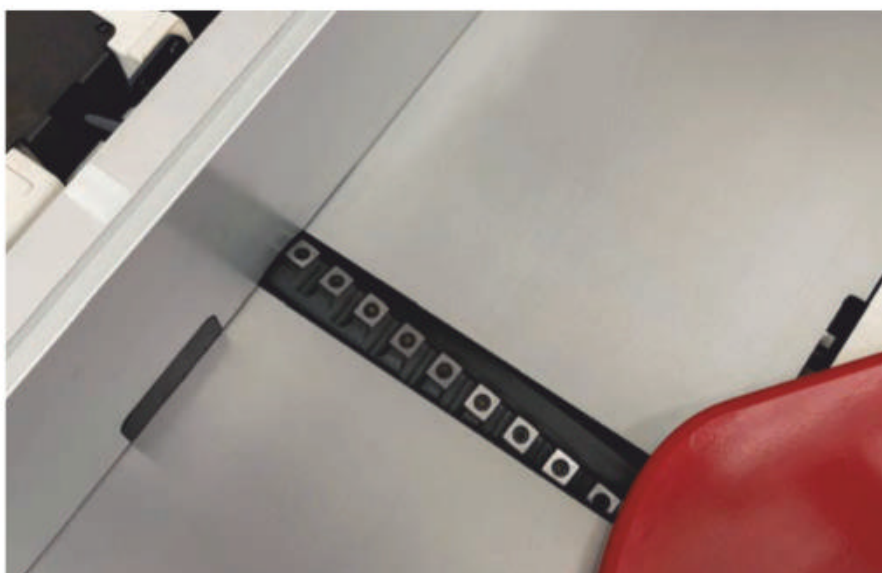


TOOL PREVIEW

JET JPJ-12BHH 12" Planer/Jointer

By Chris Marshall

Enjoy this combination machine's expansive jointing capabilities, then change it over quickly for planing without removing the fence.



A helical cutterhead, outfitted with 42 replaceable carbide inserts, ensures smooth surfaces with minimal tearout when jointing or planing. They are easy to maintain and stay sharp for an impressively long time.

you to face-joint stock as wide as you can plane.

JET equips the jointer with a pair of heavy-duty cast-iron tables that have a ground finish to deliver accuracy and flatness. They're parallelogram style, in order to maintain a close distance to the cutterhead and to allow precise depth-of-cut adjustments. The overall jointer table length is a respectable 55".

Unlocking a knob and hinging the jointer up on its side presents the machine's 12"-wide planer underneath. It can be made ready for planing by simply flipping a dust shroud over and into position. The planer's bed is cast-iron and measures 25" long.

The JPJ-12BHH powers both surfacing machines with a 3hp TEFC single-phase induction motor, wired for 230 volts. It spins the 2³/₄"-diameter cutterhead at 5,300 rpm for either jointing or planing, and it drives a two-speed gearbox that enables the planer to feed stock through at 16 or 26 feet per minute.

In terms of maximum capacities, the jointer can remove up to 1/8" of stock per pass,

If you have a modestly sized shop where every square foot of floor space counts, a combination jointer/planer machine like this JET JPJ-12BHH could make loads of sense for your lumber-surfacing needs. That's because it piggybacks a 12"-wide jointer on top of a 12" planer, yet its welded-steel cabinet occupies a footprint of under 4 square feet. The duo enables

JET JPJ-12BHH

Street Price: \$5,649.99

Motor: 3hp single-phase TEFC; 230 volts

Weight: 453 lbs

Jointer Table Size (Combined): 12 $\frac{1}{32}$ " W x 55" L

Jointer Fence Size: 5 $\frac{7}{8}$ " W x 43 $\frac{1}{4}$ " L

Planer Table Size: 12 $\frac{1}{32}$ " W x 25" L

Planer Feed Rate: 16 or 26 feet per minute

Cutterhead Speed: 5,300 rpm

Cutterhead Style: Helical, 42 four-sided inserts

Dust Collection: 4" port / 550 cfm recommended

Stand Footprint: 21 $\frac{1}{4}$ " W x 24" L

www.jettools.com



JET's JPJ-12BHH offers 12" of jointing capacity in a compact package. A dedicated 12" jointer from most competitors would cost about the same or even more than this dual-purpose machine.

and the planer can be set to a maximum cutting depth of 5/32". You can plane stock up to 8 $\frac{3}{4}$ " thick.

A 5 $\frac{7}{8}$ "-tall, 43 $\frac{1}{4}$ "-long aluminum fence on the jointer helps to ensure that wide workpieces can be edge-jointed accurately. It has preset stops for 90 and 45 degrees, or set and lock the fence to any angle in between. It pivots with the jointer and need not be removed for planing.

The machine's 4" dust port will help make either jointing or planing operations cleaner. JET recommends that at least 550 cubic feet per minute of dust collection draw be connected for optimal efficiency.

Two Cutterhead Options

This 453 lb combination machine actually comes in two model options, which differ only in terms of their cutterhead styles. The JPJ-12BHH has a helical cutterhead with 42 four-sided carbide inserts. When they dull or get nicked, each insert need only be loosened and pivoted to a fresh edge, then tightened down again. No additional indexing is required.

JET also offers a JPJ-12B model. It has a conventional cutterhead outfitted with three high-speed steel straight knives. They're held in place with gib screws and must be indexed when they're



Hinging the jointer up on its side presents the machine's second function as a 12" planer. The planer shares the same motor, cutterhead and dust shroud as the jointer and can plane stock up to 8 $\frac{3}{4}$ " thick.

removed for sharpening or replacement.

The JPJ-12BHH (Rockler item #68009) currently retails for \$5,649.99 at Rockler. JET's JPJ-12B (item #67096) sells for \$4,129.99.

HARDWORKING HARDWARE

T-Nuts and Threaded Inserts

By Rob Johnstone

Threaded inserts can come in handy for certain assembly tasks. T-nuts — a variation of threaded inserts — are another niche piece of hardware that add a helpful arrow to your woodworking quiver.



Threaded inserts and T-nuts provide a way to use bolts or other threaded hardware to attach things like legs, headboards or backsplashes to furniture quickly and easily, with the added benefit that the pieces can be taken apart — or knocked down — with very little fuss.

While it may seem as if the uses for this sort of joint would be limited, it is surprising how often they come in handy. And sometimes they are the only solution.

It may appear that inserts and T-nuts are essentially the same in function: they provide a threaded “nut” embedded

into wood or some other substrate. The main differences are in how easy they are to mount and how strongly they hold. Understanding those details will help you decide which insert is right for you.

Mounting the Hardware

This may seem backwards, but let’s talk first about how to install threaded inserts and T-nuts as our starting place.

First thing you need to do is drill a hole ... or maybe two. For the barrel-shaped inserts, one hole will do. They will thread into place flush to the surface of the workpiece. For T-nuts, screw-on T-nuts and tapered/flanged threaded inserts, you need to make a decision. They will sit proud



Kits containing a properly-sized drill bit, threaded inserts and a tool to drive them home are one-stop solutions for this helpful hardware.

of the surface without also pre-drilling a recess for their flanged portion. See the image above for clarification; the flanged insert and the



One way to install threaded inserts is to use a bolt with a few nuts on the shaft. Thread on the insert and wrench the insert into the wood.



Another option: a threaded rod chucked into a drill, with a nut up against the chuck. Thread the insert onto the rod and use the drill to drive it in.



This tapered/flanged insert has a hex nut section above the internal threads. This detail and its tapered shape make it easy to twist in.

standard T-nut both are sitting slightly proud of the edge of the board. If you want whatever you are screwing into or attaching to your hardware to be tight to the surface, you need to accommodate those details.

There are also considerations regarding the hole size that you bore as the primary mounting hole. Each piece of hardware will have a specified drill bit size, most often found on their packaging. I've sometimes gone with a slightly smaller-diameter hole, especially in softer woods (basswood vs. hickory as an example). It can make installa-

tion a bit harder but provides better holding performance.

For actual softwoods, the threaded insert of choice is the tapered/flanged insert.

An important point to keep in mind is that you select your insert or T-nut by the thread on the inside of the hardware – be it 1/4-20 for a 1/4" bolt or 5/16-18 (5/16" bolt) or 3/8-16 (3/8") and so on. Metric sizes are no different.

Installing standard T-nuts is easy: drill the pilot hole and hammer it home. Screwed-on T-nuts are also easy. Bore the correctly-sized hole (and flange recess if you choose), tap the T-nut in place and then

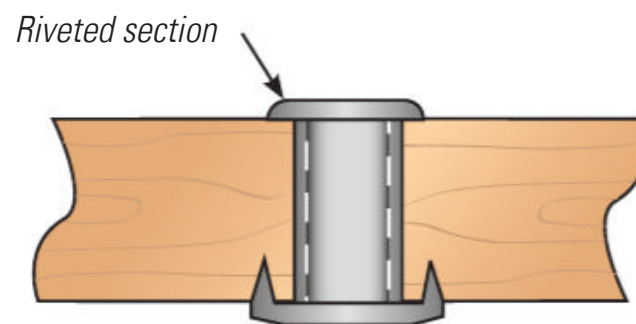
pre-drill and drive in the three screws. The other inserts are a bit trickier.

A common way to drive barrel-shaped inserts into a pre-bored hole is with a bolt properly threaded for the insert. Add a few nuts to the bolt so that just a small amount of thread is exposed. Screw the threaded insert onto the bolt and use a ratchet to turn the insert into the hole. You might notice a screwdriver



Hand-twisting the inserts in using a drill press and a threaded rod ensures that the insert will be driven in squarely to the surface of the wood.

Relative Strength				
				
Shear	Strong	Strong	Strong	Strong
Tension	Weak	Moderate	Strong	Moderate
Compression	Strong	Strong	Strong	Strong



Riveted T-nuts use a special tool to crown the end of the T-nut barrel for extra holding strength (see the illustration above). This added functionality requires that the hardware be sized to the thickness of the material, so they are sold in lengths of typical panel thicknesses.

www.woodworkersjournal.com MORE ON THE WEB



To watch videos documenting installing threaded inserts and T-nuts, visit woodworkersjournal.com and click on "More on the Web" under the Magazine tab.

slot on the top edge of the insert. But trying to drive in an insert with a screwdriver is asking for trouble. The slot is better suited for taking an insert out.

If you have a lot of inserts to drive in, consider chucking a threaded rod into your drill/driver and put a nut on it (see center top photo, previous page). Then put the insert on

the threaded rod and get busy.

If you are having trouble getting your inserts to start square to the surface of your wood, use a similar setup in your drill press ... but DON'T turn the drill press on. Use your hand to turn the chuck and thread the insert home.

The tapered/flanged threaded inserts are best used in softwood, and many have a hex-drive socket built into the insert. Use an Allen wrench to drive it in.

Which Insert to Use?

This is the most important question for choosing one of

these pieces of hardware. For me, it comes down to how strong the joint needs to be. Classic T-nuts, while quick and easy to install, do not perform well when tension is applied (when you pull on the joint). Strong in shear and under compression, as all of these inserts are, their ability to withstand tension varies considerably. A well-installed barrel-shaped insert will provide the most strength under tension. The screwed-in T-nut is second-most strong, the tapered/flanged is next and the classic T-nut is the weakest. The chart on the previous page spells this out. The riveted T-nut, shown above, is also quite tenacious under tension, but it is the fussiest to install. Choose your product with those constraints in mind.

Threaded inserts and T-nuts are versatile and can solve a bunch of woodworking problems. Attaching removable panels, mounting legs with hanger bolts (see "Skee Bag Game," page 40) hanging shelves, creating knock-down projects — the limit is your imagination. Simple in concept and effective in use, why not give these fasteners a try in your shop soon!



Threaded clamps? Mounting the legs on this Mid-Century project was a bit of a challenge. The author used threaded inserts on the legs and hanger bolts threaded into the carcass. The inserts helped mount the legs on the lathe. Then, using hide glue, the inserts and hanger bolts "clamped" the legs in place as the glue cured.



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FINISHING CORNER

General Finishes Dead Flat

By WJ Staff

New water-based polyurethane topcoat adds protection to bare or painted wood without imparting color or altering sheen.



General Finishes recently launched Dead Flat, a durable matte sheen now included in its High Performance Topcoat lineup. It's a single-component water-based cabinet and furniture-grade finish that can be brushed, sprayed or rolled.

Christine Adams, marketing director for General Finishes, reports that this cross-linked polyurethane is an ideal topcoat for protecting figured woods and can be used over paint that already has a flat sheen.

"With Dead Flat, the beauty of the wood grain displays with natural clarity, and the color of painted projects shows with more intense saturation," Adams says.

Due to recent advances in its patented polymer technology, General Finishes has formulated Dead Flat without the use of the durability-reducing matting agents required in the past. This gives it the durability of higher gloss finishes with a more natural appearance and low luster.

Adams reports that Dead Flat has a <5-degree sheen (compared with the company's Flat Out Flat product that has a <10-degree sheen), with improved chemical and water-resistance properties. It meets KCMA durability standards, contains no Prop

Dead Flat imparts no color and doesn't alter the sheen of painted or bare-wood surfaces once it dries.

65 chemicals, uses renewable resources and is VOC compliant nationwide.

When applying by hand, use a synthetic bristle or foam brush or a short nap roller or pad. Dead Flat is available in quarts (\$45) and gallons (\$116.67). To find a retailer near you, visit generalfinishes.com/where-to-buy.



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