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FEBRUARY 2002
ISSUE #126

Popular Woodworking

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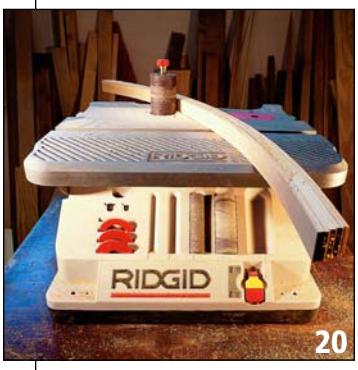

TOOLS AND TECHNIQUES

continued on page 4

ON THE COVER

To make nice projects, you don't have to have a production shop in your basement. Mag Ruffman shows you how to build this shelf unit using handheld power tools and common materials from your local home center.

Cover photo by Al Parrish

IN EVERY ISSUE

PROJECTS

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A Better Magazine

We've added more pages, writers and a beefier cover.

If you read this column with any regularity you know I don't waste this space by telling you what you're going to find in this issue. I'm confident you'll find it in the table of contents without any help from me. I prefer to write about something that I hope you will conclude has some value.

This time around, however, I do want to share with you some goings-on with your magazine that happen to begin in this issue. And besides, a little good news is a nice break from the stretch of bad news we've been getting lately.

Perhaps most important to you is the addition of Lonnie Bird as a regular contributor. Of Lonnie's many skills, I'm not sure which to rate as his strongest — woodworking or teaching. His mastery of the craft ranks him up there as one of the best in the United States, especially when it comes to traditional furniture styles. But Lonnie has been teaching woodworking for years to students who went on to become full-time career woodworkers. This combination — his deep knowledge of the craft and his keen ability to share that knowledge and make it understandable — even to beginners, is a true gift.

In Lonnie's first article, he explains why wood expands and contracts and how to deal with it. You might have read about this subject before, but I promise that reading Lonnie's take on it will surely teach you something you didn't know before. Next issue, he'll explain how to use a cutting list. Believe me, there's more to it than meets the eye.

We're also starting a new column in this issue called "Q&A." I think you'll find it helpful because it is somewhat like "Tricks of the Trade." Each month we answer hundreds of woodworking questions from readers that come in on the phone, in the mail and in our e-mail. We're publishing the best questions in this new column, and some really good answers, too.

More good news is the quality of the magazine you are holding in your hands. We've been working hard to bring you quality projects, technique stories and tool reviews. But now we are bringing you a higher quality manufactured product, too. For example, this issue is 100 pages long. Last year, this issue was about 90 pages. Your extra pages are being used for more articles, I should add, not more advertising.

You might notice the paper on the cover is heavier, too. We know many of you save your issues, sometimes for years, and this better paper will help preserve your magazines for years to come. And it also will take more abuse as your issue travels through the postal system.

This issue is also wider than what you are accustomed to receiving. The extra width will allow us to present photos and drawings more clearly. It's not a huge difference, but it helps. I think you'll notice that there's a different look and feel to this issue compared to those in the recent past.

All these changes add up to our determination to produce a better magazine in every way. Over the years we've been building a team of top-drawer contributors. I'm proud of the fine work they regularly produce for you. It pleases me greatly to now bring more of that work to you in a better quality magazine. **PW**

Steve Shanesy

SAWSTOP UPDATE

In last month's column I invited you to weigh in on a new product called SawStop. It's a passive safety device which, if it is found to be effective in the long term, could save many woodworkers' fingers. Many of you visited our website and cast your votes, for which I thank you. So far, more than 1,300 readers have voted with nearly 75 percent saying they'd pay $150 extra to have such a device on their table saw. In the next issue, I'll give you the final results and some reaction from machinery manufacturers.

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SAFETY NOTE

Safety is your responsibility. Manufacturers place safety devices on their equipment for a reason. In many photos you see in *Popular Woodworking*, these have been removed to provide clarity. In some cases we'll use an awkward body position so you can better see what's being demonstrated. Don't copy us. Think about each procedure you're going to perform beforehand. Safety First!

Lock Your Mortiser's Holddown Forever

Off-the-Rack Hardware Solves Machine's Most Nagging Problem

I solved my holddown problem on my Fisch mortiser by replacing the post that the forked holddown rides on with a 14mm bolt (approximately the same diameter as the holddown shaft) that I bought from the hardware store.

I cut off the bolt's head, ground a flat surface on one side of the bolt along the threaded end and then ground a notch at the other end as suggested in your article ("A New Manual for Mortisers" August 2001, issue #123).

I installed the bolt in the hole in the fence and rotated the bolt so that the flat aligned with the set screw on the forked hold-down. I put the holddown on the bolt, then put a washer on top of that and threaded a nut onto the top of the bolt.

One could also include a lock nut, but this has not proven to be necessary.

Floyd B. Carothers
Pittsburgh, Pennsylvania

Editor's note: Well Floyd, you seem to have simply solved the problem that has dogged a lot of us for years. If you didn't read the original article in the August issue, the "notch" Floyd refers to is simply ground into your holddown's post at the point where the setscrew contacts the post. Make the notch about 1/8" deep by using your grinder. The notch prevents the post from coming out of its socket in the fence, and Floyd's solution prevents the forked holddown from coming loose during use. Together, these two simple modifications make your holddown far superior to the factory equipment.

— Christopher Schwarz, senior editor

Best New Tool of 2001 Could Turn Out to Be a Finger-Slicing Machine

I've received my December 2001 issue of *Popular Woodworking*, and after looking at your list of the Best New Tools of 2001, I have to wonder how, by any standard, you could have come up with this list. Some do have merit, but when you listed the Craftsman Laser Miter Saw, all interest in your selections was lost.

The laser you speak of will, in my opinion, eventually be the cause of many woodworking accidents. The laser works using centrifugal force. So the saw must be running in order to align the cut mark with the laser. Moving your hands under a turning blade is a bit like the "Perils of Pauline."

With the many upgrades and improved technology in 2001, this in my opinion should be on a list of the 15 worst of 2001. Many woodworkers would love a quality laser miter saw, but I definitely wouldn't recommend this one.

Al Berube
Salisbury, Massachusetts

Editor's note: You bring up a good point about safety concerning the use of miter saws, but I'm afraid we have to disagree with you about the safety of this particular tool. In general, many miter saw users have developed the habit of lowering the blade to the workpiece (without the saw running) to allow the guard to retract and align the blade with the cut mark. If this is a habit they are unable to break, then this is not the saw for them. But as the saw is designed, the laser functions through the guard with the blade arm in the

WRITE TO US

Popular Woodworking welcomes letters from readers with questions or comments about the magazine or woodworking in general. We try to respond to all correspondence. Published letters may be edited for length or style. All letters become the property of *Popular Woodworking*. How to send your letter:

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fully up position. There is no need to lower the blade to the work. Because of this, even though the blade must be spinning to make the laser function, it is still covered by the guard. Again, if you still need to lower the blade to the work and aren't comfortable relying on the laser, then please choose another saw that won't provide an incentive to unsafe shop practices. Thanks for keeping safety in our minds.

— David Thiel, senior editor

Where Do I Find Glaze for the Morris Chair Project?

I recently read your article on building a Morris chair (June 2000, issue #115) and would like to find out more information on Lilly's warm brown glaze. If you could provide me with a website address, phone number or a company that sells it, it would be most appreciated.

David Smith
Ocean City, New Jersey

Editor's note: We've had more than 100 requests from people looking to find a good source for Lilly's glaze. The fastest way is to check with your local paint store, especially one that caters to professional painters. If that doesn't work, I recommend you go to woodfinishingsupplies.com. **PW**

— Christopher Schwarz, senior editor

CORRECTIONS & CLARIFICATIONS

In our article on cryogenics in the December 2001 issue, we inadvertently left out one of the labs that you can send your tooling to. Performance Cryogenics has offices in Cleveland, Ga., and Mooresville, N.C. You can reach the company by calling 877-219-3556 or at www.percryo.com.

In our special Outdoor Furniture issue, which was available only on the newsstands, there are two corrections to the Outdoor Morris chair article. The four rear leg pieces should be 20 1/8" long instead of 21". Also, in the drawing labeled "profile," the front leg dimension is called out at 2 1/4". It should be 2 3/4", as stated in the cutting list.

In the Tractor-Trailer Toy Box (December 2001, #125), there is a correction to the drawing labeled "Trailer box assembly plan." The hole for the hitch platform dowel should be 1 1/8" instead of 1/8".

In our 2002 Tool Buying Guide (#124), the key to the chart on page 80 was inadvertently omitted. DB=dust bag, DC=dust canister, VP=vacuum port, OPT=optional.

Cabinet Scrapers Save Your Thumbs

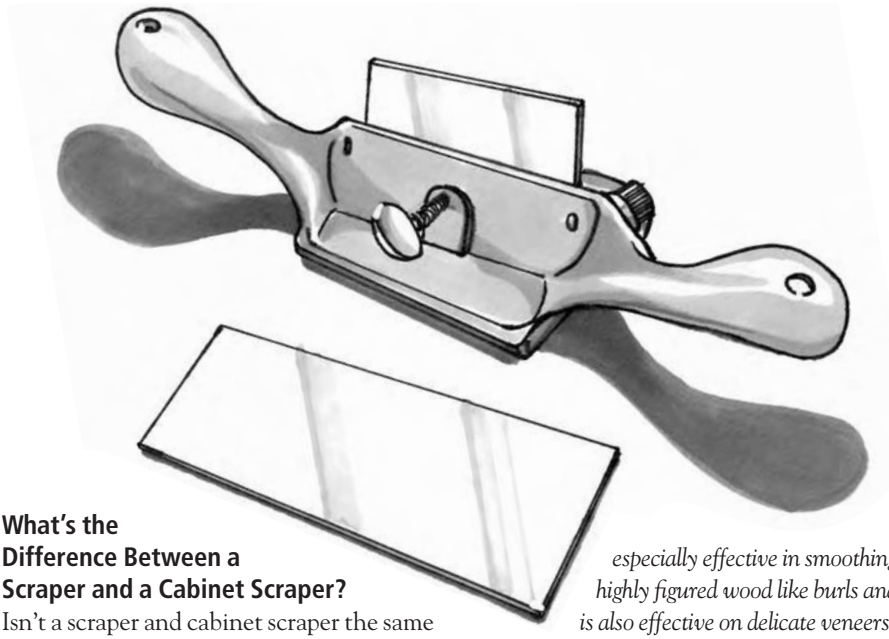


Illustration by Hayes Shanesy.

What's the Difference Between a Scraper and a Cabinet Scraper?

Isn't a scraper and cabinet scraper the same thing, just different names for the same tool? And if not, what is the difference?

There's often confusion when woodworking terms are used incorrectly or interchangeably. One case in point is the scraper vs. a cabinet scraper. Although each puts a fine finish on a board, they are different tools. The scraper, or more accurately scraper blade, is either a rectangular piece of steel or is rounded and called a gooseneck scraper. It is is used for smoothing the inside radii of mouldings and such. The cabinet scraper, on the other hand, uses a scraper blade that is held in a cast-iron body that has a milled bottom where the blade protrudes slightly, much like a plane iron in a hand plane.

Scraper blades are versatile and can be used for rough or fine work, from scraping glue to final smoothing for the truly practiced. What's an anomaly about this whole "name" question is that if properly sharpened with a correct hook, scrapers don't scrape at all. They actually cut the wood fibers cleanly without tearing or pulling.

The cabinet scraper also has many uses. It can remove an old finish or prepare a wood surface before sanding. A cabinet scraper can be especially effective in smoothing highly figured wood like burls and is also effective on delicate veneers.

One big advantage a cabinet scraper has over a scraper blade is ease of use. The user's hands don't fatigue nearly as fast as compared with the scraper blade.

— Steve Shanesy, editor and publisher

Dealing With Unusual Miter Slots

I'm a beginning woodworker looking at buying the Delta 34-183 tenoning jig, and it (along with several other manufacturer's jigs) requires a $\frac{3}{8}$" x $\frac{3}{4}$" miter slot. I own a bare-

WRITE TO US

Every day we get questions from readers on all subjects about their woodworking. Some are letters, many are e-mail messages. We are more than happy to share our woodworking experience with you by answering your questions or adding some clarity to whatever aspect of your craft you are unsure about. In addition to the hundreds we answer privately every month, we want to share the best questions here with readers.

Send your questions via e-mail to popwood@fwpubs.com. Or send us a note by mail to: *Popular Woodworking*, Q&A, 1507 Dana Ave., Cincinnati, OH 45207.

bones Skil table saw. I took a look at my miter slots, and they're each about 3/32" narrower than 3/4", and a tad shallower than 3/8". Is this a problem? Or is this simply another confusing woodworking term (e.g., when 2x4s really don't measure 2" x 4"), and can I be assured that the jig will fit my saw?

Brint Keyes
via the internet

Since you are a beginning woodworker, I'll give you both an answer and some other thoughts on table saws. The depth of the slot on your saw may not matter, but the width sure will. As shipped from the factory, the guide bar on the tenoning jig just won't fit in the slot. Your best bet is to remove the bar from your saw's miter gauge and see if you can mill a few holes in it to attach it to the tenoning jig. You also can make a wooden guide bar for the commercial jig.

But let me pose another question. Why invest in rather expensive jigs? There are lots of ways to cut tenons without them, and I don't mean by hand.

Also, lots of folks start woodworking with a benchtop table saw and quickly run afoul of their limitations. Unfortunately, you should get a different table saw. If you haven't already, you will outgrow the benchtop saw soon. Take the money you would have spent on the jigs, combine that with what you can get from selling your benchtop saw, and buy a 1 1/2-horsepower contractor style saw that's equipped with an induction (not universal) type motor. You'll use it for years and enjoy your woodworking more. It's unlikely you'll ever outgrow it. You can buy a contractor-style saw for little more than $300, better ones for about $700. Trust me, this isn't about tool snobbery, just the facts of woodworking.

— Steve Shanesy, editor and publisher

Can You Thin Water-based Polyurethane?

In reference to the technique of thinning polyurethane with mineral spirits and wiping it on with a rag, do you know if that will work with water-based poly as well?

Ralph L Hardison
via the internet

I'm sure your question arises from contributor Scott Phillips' comments about his favorite finish technique, applying oil-based polyurethane with a rag after thinning with mineral spirits at

a ratio of three parts mineral spirits to one part polyurethane. We asked our finishing expert and contributing editor Bob Flexner for his advice:

"You can thin it with water. The problem with doing this is that you reach a point where there aren't enough emulsifiers to combine the added water with the resin, and the finish separates or beads. Brands are different. You just have to try different mixture ratios. If it works, great. If the finish separates, thin with less water until it works. The first coat will probably be fine no matter how much you thin it because it soaks into the wood. It's the next coats that will separate if there's too much water."

Should I be Worried About My Tabletop Warping?

I want to build a kitchen table using ¾"-thick oak. The dimensions are not final (about 36" x 96"). Can I make this size tabletop by edge-gluing boards without a big concern of warpage? Should I put cross pieces on the bottom to keep it from warping?

Rob Doty
via the internet

There are concerns, but if you've done your prep work correctly you should be in good shape. First, use quartersawn lumber, which has less risk of cupping and warping. Make sure the wood is dried correctly by checking the moisture content (around 7 percent is preferred). If you have the opportunity, run the boards to thickness and allow them to sit for a day or so. If any of them warp, set them aside in your scrap pile. Lastly, remember to attach the top in a way to allow the wood to expand and contract during changes in humidity. (For more information on this subject, see Lonnie Bird's article in this issue regarding wood movement.)

— David Thiel, senior editor

Why Oval Holes to Attach a Top?

In the $175 Workbench (February 2001, issue #120) you attached the bench's top to the base through cleats. Why did you make the screw holes in the cleats oval shaped?

Ralph Knox
via the internet

The top expands and contracts more than ⅛" a year. The oval-shaped holes prevent the screws from snapping as the top moves. **PW**

— Christopher Schwarz, senior editor

Illustrations by John McCormick

Introducing the Plunge Trimmer for Inlay

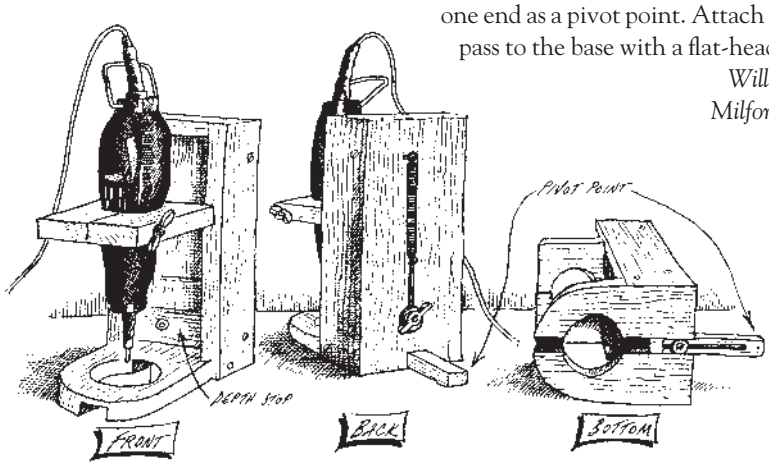
THE WINNER:

Turn your Dremel or other moto tool into a plunge trimmer using shop scraps and some off-the-rack hardware. I built mine with an adjustable compass point in the base so I can rout semi-circular recesses for inlay. (*Editor's note: see the stringing on the "Inlay Door With a Router" for an example of this*). The backbone of the tool is a piece of wood ¾" x 3½" x 9". To make the channel that the plunging mechanism rides in, glue and screw ⅛" x 2" x 9" strips to the edges of the backbone. Then glue ½" x ½" x 8¼" strips to the inside of the ⅛" strips. The plunging mechanism is an "L"-shape. One wing of the "L" (¾" x 3½" x 3½") holds the Dremel, the other rides in the channel. The Dremel is held in place in a 1⅞" hole lined with a piece of leather. The Dremel is held fast by cutting a kerf in the wing that intersects the hole for the Dremel. Then drill a hole through the wing and insert a 4" stove bolt and put a wing nut on the end. Tighten the wing nut, and the bolt closes the kerf. Like a plunge router, you need a return spring to lift the tool out of a cut. Rout a groove through the backbone. Screw one end of a spring to the backbone and the other to the plunging mechanism, which is attached through your groove.

The depth stop is a piece of wood that rides in the channel and is held in place by a wing nut and bolt that also ride in the groove in the backbone.

Finally, make the adjustable compass by first routing a ⅝" x ⅝" groove in the ¾" x 3½" x 5" base). Rout a groove through a piece of wood ½" x ⅝" x 3". Drive a brad through one end as a pivot point. Attach the compass to the base with a flat-head screw.

William Adsit
Milford, Illinois



CASH AND PRIZES FOR YOUR TRICKS AND TIPS!

Each issue we publish woodworking tips and tricks from our readers that we think are useful. We want to encourage you to share with your fellow woodworkers, as well as reward the most useful and original concepts. Delta has agreed to lend us a hand with that, and the author of this issue's winning trick receives the new 22-580 two-speed portable thickness finisher (shown at left). The other trick's authors receive $75.

To submit your tip or trick, e-mail it along with a daytime phone number to david.thiel@fwpubs.com or mail it to:

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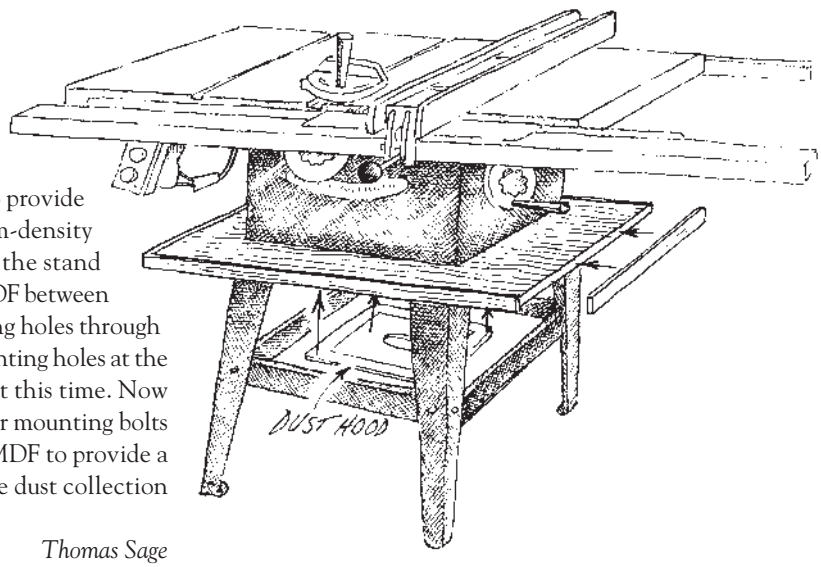
DELTA MACHINERY

Add Dust Collection and a Handy Shelf to Your Contractor Saw With Scraps



Here is a simple solution to two issues: the need for a convenient place to put the rip fence and miter gauge when not being used (as well as push sticks, featherboards, etc.), and a way to close off the underside of a contractor table saw to provide a surface to mount a dust port. I used a piece of ¾" medium-density fiberboard (MDF) cut to 32" x 24". Unbolt the saw from the stand and raise it about 1" using sawhorses and shims. Slide the MDF between the saw and the stand and mark the location of the mounting holes through the stand. Remove the MDF and drill slightly oversized mounting holes at the marked locations. Cut a hole for the dust collection port at this time. Now slide the MDF in place and bolt the saw to the stand. Longer mounting bolts may be necessary. Fasten ¼" x 1" strips to the edge of the MDF to provide a lip to help prevent items from sliding off. Finally, screw the dust collection port to the underside of the MDF.

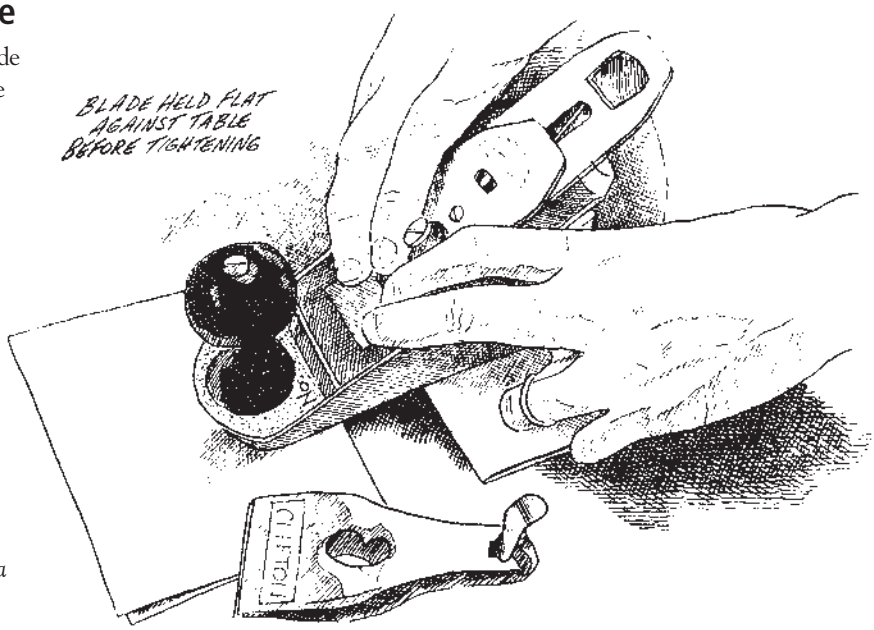
Thomas Sage
Waukegan, Illinois

Even Better Homemade Wood Putty

I make my own wood putty by emptying my sanding bag into a container. When I am ready to fill the holes, I mix sanding sealer with the sawdust. Here's how: Pour some sealer into a small container — just the amount you think you'll need to fill the holes — then add sawdust until you have a nice wood filler consistency. Stir the sawdust into the sealer until it is well mixed. Use some compressed air to blow out the spaces to be filled so they are clean of any dust and the filler will adhere well. I use a Teflon putty knife to compress the putty into the holes so the wood isn't marred. Let it dry, then sand it and apply the same sealer to your whole project. The nice thing about this filler is you don't have to worry about different shades, it's real wood and it doesn't make any difference if the sealer spreads over the hole because you're going to use the same sealer to complete the project anyway.

Terry Campbell
El Cajon, California

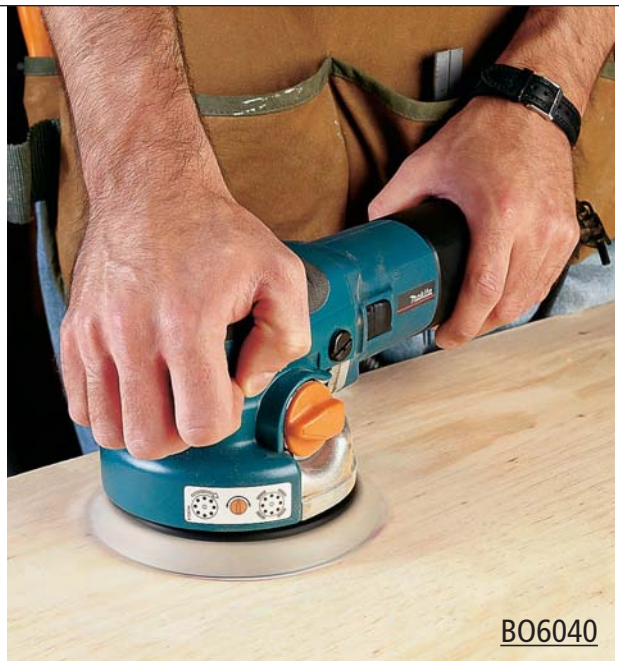
Paper is the Key to Paper-Thin Shavings With Your Bench Plane



I've always had a real tough time adjusting the blade on my small bench plane so it's square to the mouth. Setting the blade depth and keeping it parallel to the mouth was always a challenge. I came up with a simple way to fix the problem for free. First loosen the blade enough to easily adjust it. Place the sole of the plane on a flat surface. Slide two pieces of paper under the sole. One in front of the mouth; one behind it. Gently apply a small amount of downward pressure on the blade. Put the cap iron in place and tighten. The blade will be square to the mouth and the depth of cut will be close to where it should be. **PW**

Arnie Frand
Mesa, Arizona

The Newest and Best Sanders from Makita



BO6040

We've rated Makita's BO5010 palm grip random orbit sander our favorite model for a couple years now, so when company officials said they had a couple of new random-orbit models, we were all ears. We weren't disappointed. Both the new in-line BO6030 and the right-angle BO6040 are impressive sanding tools.

The in-line BO6030 is designed as a fine finishing sander and performs well in that role. The 6" pad provides superior performance on larger surfaces, while the variable-speed control offers easily adjusted sanding aggressiveness.

The sander has low vibration during use and is remarkably quiet. The two-handle design with rubberized rear handle dampens vibration even further and makes the sander comfortable to use for long stretches. Though quiet, the 2.7-amp motor provides ample power to remove material at a moderate pace.

Dust is collected through the pad and trapped in a standard cloth dust bag, or the sander can be hooked directly to a vacuum for improved collection.

The larger right-angle BO6040 is another animal altogether. Where the 6030 seems a very refined but capable sander, the 6040 is an aggressive and powerful industrial-feeling tool with the highest amperage rating in its class (though it is still a quiet tool). Also with a 6" pad, the sander operates at a lower orbits-per-minute than the 6030, but it offers two operating modes. In the random-orbit mode the sander operates as a fine finishing sander. When switched (either on the fly, or while stopped) to the "random orbit with rotation mode," the tool steps down the pad speed to between 180 and 670 rpm and the sander removes material very aggressively. It also can be used for polishing in this mode.

As with the 6030, the ergonomic design of the housing makes it pleasant to use and the tool has a rubberized palm grip for comfort. An optional side handle is available.

Dust collection on this unit is also through the pad. With both of these 6" units Makita has relocated the collection holes in the pad more toward the edges of the pad, where most of the dust is created. This proves to be a good strategy, though you need to buy new Makita sanding discs to take full advantage of the redesign. The pads do include a second set of six holes toward the center of the pad for other manufacturers' sandpaper.

On the 6040, the through-the-pad dust collection is designed to be used with a vacuum, and this system proved effective. Unfortunately, the sander is not sold with the dust collection connections and we had to use duct tape to hook up our vacuum for testing.

Both of these sanders are a pleasure to use and are strong performers. We would prefer that the right-angle model come complete with the dust collection attachments and the handle, though. In particular we found the BO6040 to be a powerful and impressive tool, and though priced higher than some right-angle models, it's not out of line for the sanding performance you get.

For more information, circle #152 on Reader Service Card.

SPECIFICATIONS

Makita BO6030/BO6040

Street price: $180/$370
Motor: 2.7amp/6.6amp
OPM: 4K-10K/1.6K-5.8K
Orbit diameter: 1/8"/7/32"
Weight: 5.1 lbs./5.9 lbs.
Pad size: 6"/6"
Decibels @3': 88-90/89-98
Performance: BO6030 ●●●●○
BO6040 ●●●●○
Value: BO6030 ●●●●○
BO6040 ●●●●○
Makita: 800-4-MAKITA, or www.makitatools.com

BO6030

HOW WE RATE TOOLS

At *Popular Woodworking* we test new tools and products with an honest, real-world workout. We check for ease of assembly and determine how clear and complete the manuals are. Then we use the tool in our shop to build projects that appear in the magazine. Each issue, the magazine's editorial staff shares its results and experiences with the tools, rating each for performance and value.

We use a one-to-five scale, with "five" in performance indicating that we consider it to be the leader in its category. For value, "five" means the tool is a great deal for the money, while "one" means we consider it pricey. However, a tool with a low value rating may be worth the high price.

If our tool reviews don't answer all your questions, e-mail me at david.thiel@fwpubs.com or call me at 513-531-2690, ext. 255. If we haven't reviewed the tool you're considering, there's a good chance I've used the tool, but simply haven't had a chance to write a review. Give me a call and see if I can help. You can also visit our website www.popwood.com to check out our past published tool reviews and sign up for our free e-mail newsletter (focusing on tools) that's sent out every other week. —David Thiel, senior editor

New DeWalt Brad Nailer Mixes Features with Style

DeWalt has branched into the world of air tools with a new line of compressors from Emglo and a full set of nail guns. We tested the D51238K 18-gauge brad nailer and were impressed with the tool's details. First off, it comes with cool safety glasses. OK, get over that and let's look at the tool. The skin is smartly designed with a moderate-weight, all-aluminum body and a glass-filled nylon magazine. There's an overmolded rubber grip for comfort. Out of the box, the nailer is set up for "bump-firing," which means that with the trigger depressed, the gun will fire every time the nose is pressed to your work. The tool comes with a sequential-fire trigger that is fairly easy to install.

We really like the depth-of-drive adjustment, which operates by pressing a release button and sliding a lever to another notch. It's the easiest depth adjustment we've seen, and there's even a scale so you'll always know where you are. Other features include an adjustable exhaust, visible reload indicator, tool-free nose door for clearing jams and a rear-mounted nose safety for better viewing and easier access to corners. DeWalt has entered the race with a good tool with smart options.

For more information, circle #153 on Reader Service Card.

SPECIFICATIONS

DeWalt D51238K

Street price: $145
Brad sizes: 18 gauge, 5/8" - 2"
Magazine capacity: 110 brads
Trigger style: Bump or sequential
Weight: 2.8 lbs.
Performance: ●●●●○
Value: ●●○○○
DeWalt: 800-4DeWalt, or www.dewalt.com

Delta Offers the First Two-Speed Benchtop Planer

After reviewing all the benchtop planers a few issues ago we thought we'd seen everything in this category. Then Delta surprised us by showing us the new 22-580 13", two-speed planer/finisher. Delta calls it a planer/finisher because officials say the slower feed speed offers a planed surface that is near finished quality. I still think I'll do a little sanding, but it is a nice surface. Along with the obvious advantage of an improved surface finish offered by the slower speed and increased number of cuts-per-inch, the 22-580 has all the finer features available on today's new planers: a head lock for reduced snipe, a full-range depth stop across the entire height range, a zero indicator for setting the planer up for the first pass and a well-located and easily read material removal scale.

The 22-580 also makes blade changes a snap, with removable upper covers for easy access, on-board tools and locating pins for adjustment-free installation. This is a well-equipped and versatile planer that is priced a little high, but offers a lot for the money. **PW**

For more information, circle #154 on Reader Service Card.

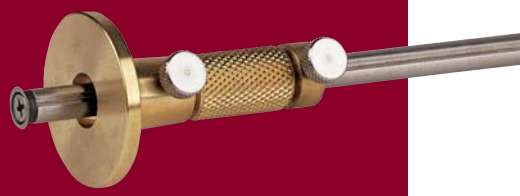
SPECIFICATIONS

Delta 22-580

Street price: $450
Max material width: 13"
Table size: 13" x 35"
Weight: 97 lbs.
Blades: two double-edged disposable, .062" x 1/2"
Feed rates: slow speed gives 90 cuts per inch at 14.8 feet per minute; fast speed gives 60 cuts per inch at 22.4 feet per minute
dB no load/load: 92/96
Amps, no load: 7.3
Amps, load: 8.3
RPM, no load: 9,766
RPM, load (fast/slow): 6,734/7,181
Lateral blade adjustment: 1/8"
Performance: ●●●●●
Value: ●●●○○
Delta: 800-438-2486, www.deltawoodworking.com

TOOL SCOOP

New Cutting Gauge is Extremely Precise



In the world of marking wood, a cutting gauge beats the pants off a marking gauge everyday. Instead of scratching the wood with a pin, the gauge's wheel slices your mark and is less likely to follow the grain. Glen-Drake Toolworks has now vastly improved on standard cutting gauge designs and made the tool easier to adjust and use.

The Tite-Mark gauge has two spring-loaded locking knobs instead of one. The rearmost knob locks the head where you want it. Then you fine tune your setting by turning the knurled barrel and lock that setting in with the front knob. All these operations can be done with one hand. This well-manufactured tool surpassed every expectation. Of course, quality has a price. The Tite-Mark costs $79 plus shipping.

For information on ordering, phone 707-961-1569 or visit www.glen-drake.com. The Tite-Mark is also available from Lie-Nielsen Toolworks 800-327-2520.

Arrow Brad Nailers

In our 2002 Tool Buying Guide we offered information and advice on buying 18-gauge brad nailers. But we were being a little myopic, thinking only in terms of pneumatic brad nailers. So to correct that oversight we're happy to include information here about two electric 18-gauge brad nailers from Arrow. The ET100 is a 10-amp tool firing three nail sizes (5/8", 3/4" and 1") priced at around $40. The ET125 (shown) is a 14-amp tool firing four nail sizes (5/8", 3/4", 1" and 1 1/4") priced at around $115. Features on both tools include non-slip cushioned grips, solid state circuitry and both a trigger and nose safety. For information visit www.arrowfastener.com.

Ridgid EB4424 Oscillating Belt/Spindle Sander

This unique tool sands both curves and flat areas.

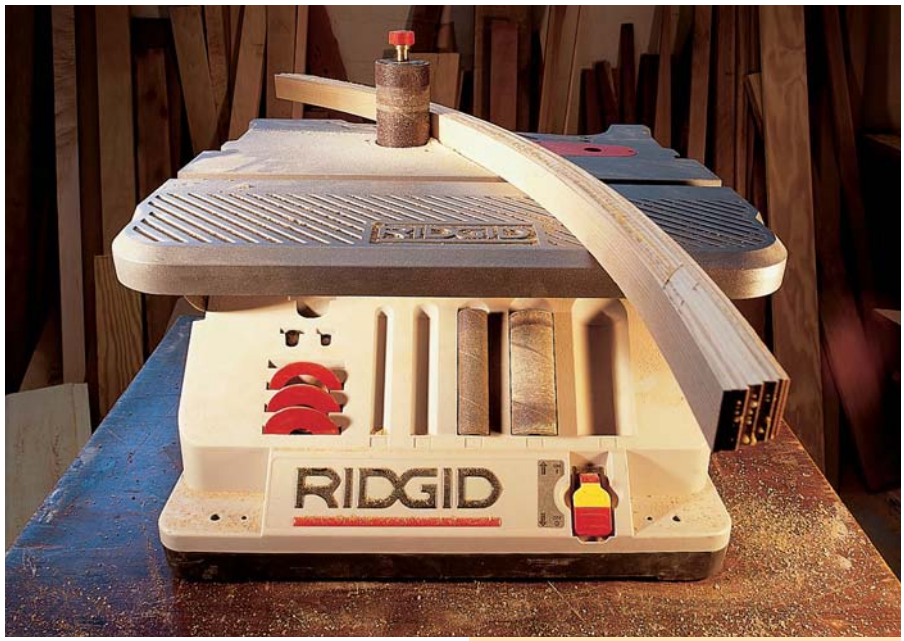


Photo by Al Parrish.

When the Ridgid line of woodworking tools was introduced three years ago, we were aware of how Ridgid's parent company (Emerson Electric) had made tools for Craftsman for years. So we were anxious to see the new line. Of the many innovations in the Ridgid tool line, the EB4424 caught our eye. It's a sanding machine with two heads. One head is a traditional round spindle that oscillates up and down (shown in the photo). The other head is more like a 4" belt sander turned on its side. It also oscillates. After testing the unit for more than two years, we've made a permanent place for it in our shop. Here's why.

To be honest, the specifications of this combination unit aren't as good as that on a large stand-alone oscillating spindle sander or an edge-sanding machine. The oscillation stroke (up and down) is slightly shorter than average, and the belt surface capacity is significantly less than on most edge sanders.

But having both functions in one unit for under $250 makes great sense for a home woodworker. Two independent units would cost more than $600. Add to that the fact that the edge sander also oscillates and you've improved not only the sanding ability, but by not running pieces over the same spot on the belt, the sandpaper lasts longer. Belt tracking adjustment on the sander is fairly easy and holds track well. Changing the belt itself is also user friendly.

The table tilts easily to four preset angles, or it can be locked down anywhere within a 45° arc. The preset detents can be adjusted to square them perfectly. The table itself is of good cast aluminum construction and offers a groove for use with a miter gauge.

Ease of changing from spindle to edge sander is a matter of unscrewing one knob and trading out the sanding heads. The drive spindle must be aligned properly in the edge sanding unit, but once in place it's no problem. The spindle sander also comes with four throat plates to accommodate the different spindle sizes and is also a quick change. New sandpaper sleeves can be slipped over the rubber drums with little fuss.

One of the primary concerns in either a spindle or edge sander is retaining a square relationship to the table. In testing, the drive shaft flexed at the top of the spindle in either mode. This flex may be about 1/16" and occurs under significant pressure. That said, we haven't noticed the flex adversely affecting the performance of the tool.

Though provided with a dust collection port, we found that dust removal was far from perfect and required cleaning during heavy use. But it is sanding and we should expect some dust.

We continue to enjoy using this tool in our shop. It isn't what we would recommend for a production cabinet shop, but the performance and versatility for the price makes it a strong option for the home workshop. **PW**

— David Thiel

SPECIFICATIONS

Ridgid EB4424 Oscillating Belt/Spindle Sander

Street price: $239
Motor: 4.6 amp induction (3/8 hp)
RPM: 1,725
Oscillations per minute: 60
Stroke length: 3/4"
Drum length: 4 1/2"
Table stops: 45°, 30°, 22 1/2°, 15°
Dust port: 2 1/2"
Spindles: 1/2", 3/4", 1", 1 1/2", 2"
Weight: 39 lbs.
Belt size: 4" x 24"
Nice features: Tilting table, easy changeover between sanding modes, great value for combined abilities.
Recommended modifications: Improve rigidity of drive spindle to reduce flex, increase available work surface in edge-sanding mode.
Available at: Home Depot. Ridgid: 800-4RIDGID or www.ridgidwoodworking.com

ABOUT OUR ENDURANCE TESTS Every tool featured in our Endurance Test column has survived at least two years of heavy use in our shop here at *Popular Woodworking*.

Clamp Assist

Simple solutions to three perplexing assembly problems.

Most woodworkers operate under the theory that you can't have too many clamps and stock them by the dozens, even the hundreds. I'm one of those, I admit. My clamp inventory takes up a whole corner of my shop — when my shop is straightened up, that is. On most days, my clamp collection is spread out over the entire shop so I can enjoy it properly.

For all my clamps, however, I frequently run across assembly tasks that I can't do properly with store-bought clamping equipment alone. For these tasks, I've developed several simple "clamp assists" that extend the capabilities of ordinary clamps to help accomplish extraordinary clamping jobs.

Holding Assembled Parts Square

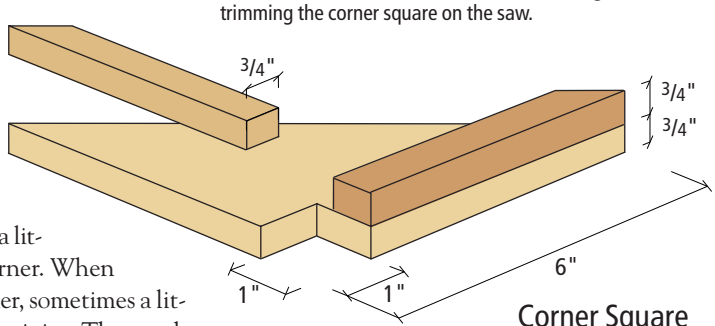
When assembling projects, you frequently need to hold the parts square to one another. Miter clamps have their place, but they aren't as versatile or as easy to use as corner squares. These simple jigs are triangular pieces of plywood with cleats along the edges at right angles to one another. You clamp the cleats to the parts you are assembling and the corner squares hold them at 90°.

To make the corner squares, first cut right triangles from ¾"-inch plywood. Note that I put a little notch in the right corner. When you glue the parts together, sometimes a little glue squeezes out of the joint. The notch prevents the glue from sticking the jig to the assembly. Attach cleats to the right sides, then trim the cleats on a table saw to make sure the outside edges are precisely 90° from one another.

Photo by Al Parrish.

When using the corner squares, clamp the cleats to the parts of the assembly. You can make fine adjustments by loosening a clamp until it's just snug and tapping the clamped part with a mallet until it shifts a fraction of an inch. At right, I'm trimming the corner square on the saw.

Illustrations by Mary Jane Favorite.



Corner Square

These jigs are useful for dozens of shop chores. They also will hold temporary assemblies together while you test the fit of the parts. They hold boards together while you drill holes for fasteners, or hold the parts of

For the crowned bars to work properly, the assembly must rest on a flat, rigid surface such as a workbench. Be careful not to over-tighten the clamps. If the middle of a bar lifts off the assembly, the clamps are too tight.

a frame or a box square to one another while the glue dries. I have even used them to hold large boards — too large to fit in a vise — while I worked the ends or edges.

Clamping Face-to-Face

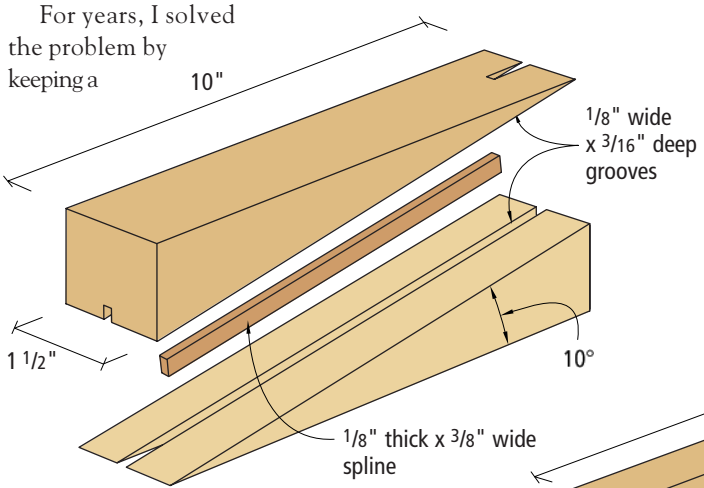
Occasionally, I need to clamp two boards face to face. This is a simple chore when the boards are narrow, but it becomes more difficult as the boards grow wider. Even deep-throated clamps have a limited capacity that may not reach to the center of wide boards. Consequently you won't get an even clamping pressure all across the width, and the assembly will be weak in the center. You run into a similar problem when trying to attach veneer or marquetry to a wide panel. How do you clamp the center area?

For years, I solved the problem by keeping a stack of concrete blocks outside the shop. When I needed pressure in the center of a wide assembly, I stacked blocks on it. It works, but it's inconvenient and somewhat limited.

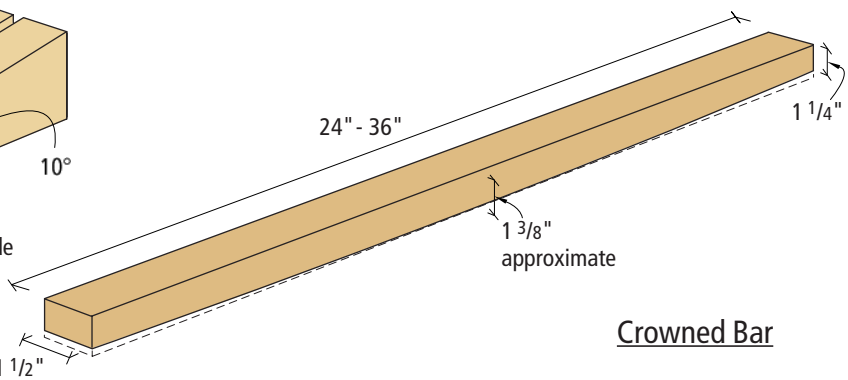
A better solution is to make a set of crowned bars. These are hardwood bars, 24" to 36" long, with one convex edge. This edge is crowned only slightly, about 1/16" to 1/8" wider in the center than it is at the ends. I cut a crown by raising the outfeed table of my jointer a few thousandths of an inch above the knives and jointing the edge. You can also create a crown with a band saw, hand plane or a disc sander.

To use the crowned bars, lay the assem-

Grooved wedges are useful not only for putting projects together but also for taking them apart. Here I'm using the wedges to pop the joints of a wobbly chair as I prepare to restore it.



Grooved Wedges



Crowned Bar

bly on a flat workbench and lay the bars across the assembly with the crowned edge down. (I label the opposite edge with the word "Up" to help me orient the bars properly.) Then clamp the ends of the bars to the workbench. The bars will flex slightly, evenly distributing the pressure from the middle out to the edges of the assembly.

Applying Tension

Clamps are designed, by and large, to generate compression to squeeze two boards together. But every now and then, you need some tension either to pull an assembled joint apart or to clamp a part inside a larger assembly. When I need a little tension, I rely on a set of grooved wedges.

I cut the wedges from a hardwood with a slope of about 10°. If the slope is any steeper than that, you run the risk of the wedges slipping when you use them. Make grooves in the sloping edges by cutting shallow saw kerfs down the center. Finally, make a spline to fit the kerfs. The spline should be as thick as the kerf is wide and twice as wide as the kerf is deep.

To use the wedges, position them slope-to-slope with the spline in the grooves. Use a bar clamp to slide the wedges together so each wedge climbs the other's slope. As this happens, the outside edges of the wedges will push against the parts of the assembly, applying tension. **PW**

Nick Engler is the author of over 50 books on woodworking, plus countless articles and project plans. Currently, he's helping kids across America to build ribs for a full-size replica of the first true airplane, the 1903 Wright Flyer.

CENTENNIAL FLYER UPDATE

The ribs of the 1903 Centennial Flyer continue to come in from all over the world — one from as far away as Singapore! Once again, many thanks to the volunteers who are running the rib-building workshops and helping hundreds of young people all over this continent — and beyond — to participate in this once-in-a-lifetime project.

The Wright Brothers Aeroplane Co. took a short hiatus from constructing the 1903 Flyer in September and October to travel to Kitty Hawk, North Carolina, and fly our replica of the 1901 Wright Glider that we just completed. We had some very good winds and made some surprisingly decent flights, although we found as the Wright brothers did that the 1901 glider design was lacking in lift and control.

While we were on the Carolina Outerbanks, we worked with two Wright "re-enactors," Tom Cherry (Wilbur) and David Thompson (Orville) to recreate scenes from the Wright brothers' work for a PBS documentary scheduled for release during the Centennial of Flight in 2003. Both Tom and Dave were delighted to hear news of our Centennial Flyer, and we invited them to attend our unveiling. You can see Tom and Dave flying the 1901 glider on our web site at www.wright-brothers.org.

Tom Cherry and David Thompson measure the lift of the 1901 Wright Glider, recreating one of the Wright brothers' experiments.

Kelly Mehler: Table Saw Whiz in the Bluegrass State

Scott Phillips, host of TV's 'American Woodshop,' visits Mehler's shop and finds — of all things — an automotive showroom filled with table saws.

Photo by Christopher Schwarz.

Kelly Mehler: Best known for his landmark "The Table Saw Book," first published in 1993, Mehler also is a frequent lecturer on The Woodworking Shows circuit and an instructor at the Marc Adams School of Woodworking. Mehler works only with solid wood and is known for his grain-matching talents.

The lifeline of Berea, Ky., is Chestnut Street. It takes every visitor to the heart of Berea College. This school has been teaching progressive concepts for over a century, programs to keep inspired individuals prospering. This atmosphere touches everyone in Berea, or maybe the people of Berea just are independently unique. Either way, Kelly Mehler's shop on Chestnut Street fits this place like a glove.

Mehler's first passion is custom woodworking. But on the side he finds time to author books, articles and videos, teach classes at Marc Adams School of Woodworking, give seminars at The Woodworking Shows, and to host many workshops across America every year.

The first thing that is striking about his place is that Mehler converted a vintage automotive dealership into his wood shop. Aged brick walls frame huge banks of windows that light up his shop. Years ago, cars probably occupied every inch of both the showroom and the "garage." Today air-drying wood fills that space, and its aroma makes all woodworkers feel right at home.

When I walked through the 24"-wide door into the garage-turned-woodshop I got a little envious. Natural light from the southern exposure streamed in on his vintage machines. Fifteen-foot-high, well-insulated ceilings lift the eyes to explore every nook and cranny.

His shop space totals about 3,000 square feet. This includes a small entrance showroom that features graceful furniture accented by beautifully figured wood that Mehler builds from select logs. When asked to describe his design style, he smiles because most folks see a unique furniture form.

It all is solid, beautifully selected and matched-grain native woods that blend the best of Shaker, traditional and contemporary forms. Mehler says he buys rare logs, then has them sawn so he can use matching boards for every piece he makes. He says he air-dries most of his own lumber because of the rich colors this technique produces. After more than 30 years in the business he has amassed a small fortune in special wood. But don't even think about offering to buy some of it. My guess is that in the back of his mind he has plans for every board.

Mehler's latest project is updating his well-known "The Table Saw Book" (Taunton Press), so his shop is temporarily loaded with about every table saw on earth. It was interesting to see "all" table saws at once. It reminded me that most saws are copies of a few basic designs.

So which saw does he like for the home woodworker? Mehler says he's kind of partial to the new DeWalt DW746. Mostly, though, Mehler warns woodworkers away from buying a saw based only on price.

"We spend $2,000 on a computer that lasts about five or six years," he says. "Yet

often we try to pinch pennies when we buy tools that last a lifetime."

I couldn't agree more. Spend the extra dollars for quality, and you'll always be happy. Just don't tell everyone at home about your purchase. And get rid of the box before you take it home. Wives are cagey about empty, expensive-looking packaging. Don't tell anyone I told you this.

When Mehler is done with all of these saws, you can bet he'll stick with his 5-horsepower Austrian-made Felder combination machine (they cost between $5,000 and $15,000 and can be set up to do just about every machining job in a wood shop). It occupies the center of the shop and maybe Mehler's heart.

Another interesting part of Mehler's shop is his vintage heavy-duty machinery that he has purchased wisely (and inexpensively) over many years and after a little horse trading. I covet his 36" 1910 Oliver band saw, which he uses primarily for resawing. His 24" Crescent planer looks as big as the rock of Gibraltar. It also was interesting to see that his dust collection system ducts directly outside to minimize shop cleanup time and maximize woodworking time. His industrial-grade spray booth is tucked in a far corner behind his clamp rack.

During my visit to Mehler's shop in Berea, Ky., nearly every square foot of floor space was occupied by a table saw. Every place there wasn't a table saw, there were huge racks of wood.

Mehler's band of heavy-metal machines includes this massive planer. My only question is: Where is its mobile base?

Photos by David Thiel.

Perhaps his favorite "tool" is his German-style European workbench that looks loaded with great stories. This well-worn bench is where Mehler uses hand tools to cut dovetails, fit joints, and make the wood just about sing.

Everywhere you look you'll see that this man has carefully grown his shop with just the right tools for his needs. So passionate is Mehler about tools that he's lately been getting involved in the debate about safety and guards in the U.S. market. Mehler consults for many different companies regarding shop safety and design. He is a member of an Underwriters Laboratories Inc. advisory council and focuses on improving power tool safety.

When asked what is the most important piece of safety equipment on a table saw, the splitter comes to the top of Mehler's list. Why? Because, he maintains, the splitter reduces the risk of a kickback dramatically. He also says that European manufacturers can teach American tool companies many great ideas on improving tool guards.

For example, he showed me how the Felder table saw's splitter actually was designed to move up and down with the saw blade. The splitter can be used for non-through groove and shoulder cuts because of this feature — again, minimizing the risk of kickback. Also, European guards on jointers make it hard to even get your hands near the cutterhead while jointing a board. The guard is positioned to make a woodworker raise his or her hand over the danger zone. Very smart design! And by the way, Mehler practices what he preaches. Even his old 12" Oliver jointer was set up with a great guard.

Mehler's portfolio of furniture is extensive, and it's obvious he specializes in matching and coordinating the grain in a piece of furniture. When I visited, Mehler was working on a tiger maple chest, a rift-sawn red oak hope or blanket chest (with hand-cut dovetails) and a large case-on-case piece.

He probably works 60 hours a week and clearly loves what he does. I bet if he had to just do one thing it would be to teach woodworking to as many folks as possible. If you have an opportunity to work with him, don't pass it up. You will find your time well spent with this American master. **PW**

—Scott Phillips, contributing editor

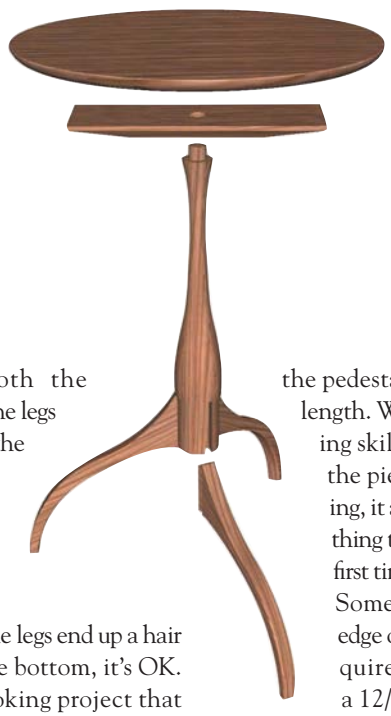
Mehler (center) demonstrates his Felder combination machine. It's amazing how the splitter moves up and down with the blade. Why can't we have this on all U.S.- and Taiwanese-made saws?

AMERICAN WOODSHOPS

Woodworkers love to see the shops of other woodworkers. And few people see as many amazing shops as Scott Phillips, host of PBS' "The American Woodshop." Every issue, Phillips takes us inside the shops of some of the finest craftsmen (and women) in America. You can see more about Kelly Mehler's shop by tuning in to "The American Woodshop" on your local PBS affiliate in spring 2002. Check your local listings for airtimes and dates.

classic shaker
CANDLESTAND

While this is one of the most traditional furniture forms, building one of these small tables is not all that complicated.



Built by members of the Mount Lebanon community in New York during the first half of the 19th century, this recognizable Shaker form is actually their stylish interpretation of earlier forms. The legs are a derivation of a Sheraton design. The Shakers referred to the leg design as "umbrella" or "spider feet." I first found this table in John Kassay's "The Book of Shaker Furniture." The original shown in the book is part of the J.J.G. McCue collection, and resides in the Museum of Fine Arts in Boston. A very similar cherry table is also in the collection of the Metropolitan Museum of Art in New York City.

Forgiving Form

While I've included detailed patterns for both the pedestal and the legs on this table, the form is actually forgiving. If your turning ends up a little thinner in one area, or the legs end up a hair thinner at the bottom, it's OK. It's a nice-looking project that will allow you to practice your skills and end up with a great-looking table.

Everything about the table connects to the pedestal, so let's begin there. I've included a pattern that gives the diameter of the pedestal all along its length. While the turning skills required for the piece aren't taxing, it also isn't something to attempt your first time at the lathe. Some basic knowledge of turning is required. Start with a 12/4 maple turning blank that is about 20" long. Turn the entire piece to round, finishing out at about 2⅞". That is the largest diameter dimension used on the pattern, but if you end up with less than that, adjust the rest of the dimensions to match that difference. Turn the rest of the pedestal according to the pattern, leaving a 1"-diameter x ¾"-long stub on both ends.

When you're done with the pedestal, the next step is to cut the three sliding dovetail grooves for the legs on the base of the pedestal. The legs are oriented at 120° around the base of the pedestal. You need to mark the locations accurately, but to cut the grooves themselves I've borrowed from a few different books to make a router jig that makes it nearly foolproof. The jig is made from shop scraps and holds the two stubs of the pedestal in place and uses a screw to hold the pedestal oriented correctly to cut each groove. Use two different bits to cut the grooves. Start with

by Malcolm Huey

Malcolm Huey has been building reproductions and adaptations of 18th and 19th century furniture for more than 30 years. His company, Malcolm L. Huey & Sons, is located in Middletown, Ohio.

Photo by Al Parrish.

Turning the pedestal is a great way to practice your lathe skills. While there is a pattern to follow, the lines are fluid enough to allow for personalization, slight miscalculations or both.

a ½" straight bit to remove most of the wood, then follow up with an 8° dovetail bit. Stop the groove at the shoulder, 3½" up from the base of the pedestal.

The next step is to rough out the legs by milling three pieces to ⅞" x 4" x 15". Then use the provided scaled pattern to lay out the shape of the legs in pencil on the pieces. Make sure the grain runs the length of the leg, or your legs could snap. Determine the location of the dovetail pin on each leg and cut the corner from the leg blank at that point. Before shaping the rest of the leg, it's easier to cut the dovetail pin first.

Set up your dovetail bit in a router table. Attach an auxiliary fence to allow you to hold the leg upright against the fence. Run a test piece on some scrap to see if your offset is correct. You want the fit to be tight at this point. You'll hand-fit each joint later. When the test piece fits to your satisfaction, run each side of the leg past the bit, shaping the pins.

With this important joint complete on all three leg pieces, head for the band saw and rough cut the legs to shape. Then use a spindle sander (or spokeshave) and finish shaping the legs to finished size. On the original Shaker piece, the legs are also tapered slightly in thickness down to the feet. You can achieve this authentic look with a bench plane and some care.

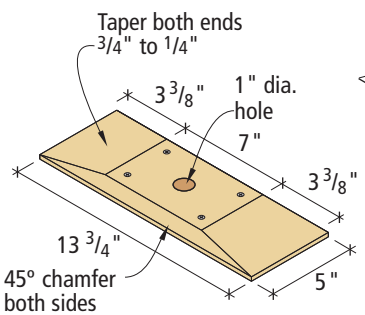
The dovetailing jig makes it fairly simple to place the leg, run the groove, then rotate the leg to the next position. Note the screw in the diagram and photo that's used to hold the pedestal in the appropriate position.

The next step is to fit each leg to the pedestal. I re-use part of my router jig as a stop on my bench to hold the pedestal in place while I carefully pare away material with a chisel until each leg slides in place with a snug fit.

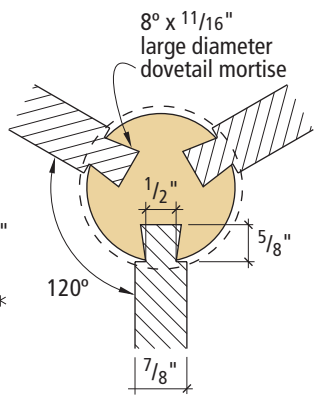
Once satisfied, trim the lower stub off the pedestal, finish sand the legs and post, and glue the legs in place. If your joint is well-made, you shouldn't need any

SHAKER CANDLESTAND

	NO.	ITEM	DIMENSIONS (INCHES) T	W	L	MATERIAL
❑	1	Top	¾	19⅞ dia.		Maple
❑	1	Mounting plate	¾	5	13¾	Maple
❑	3	Legs	⅞	3⁹⁄₁₆	14⅝	Maple
❑	1	Pedestal	3 dia.	20		Maple
❑	4	Wood screws	#9	1¼	FH	Steel



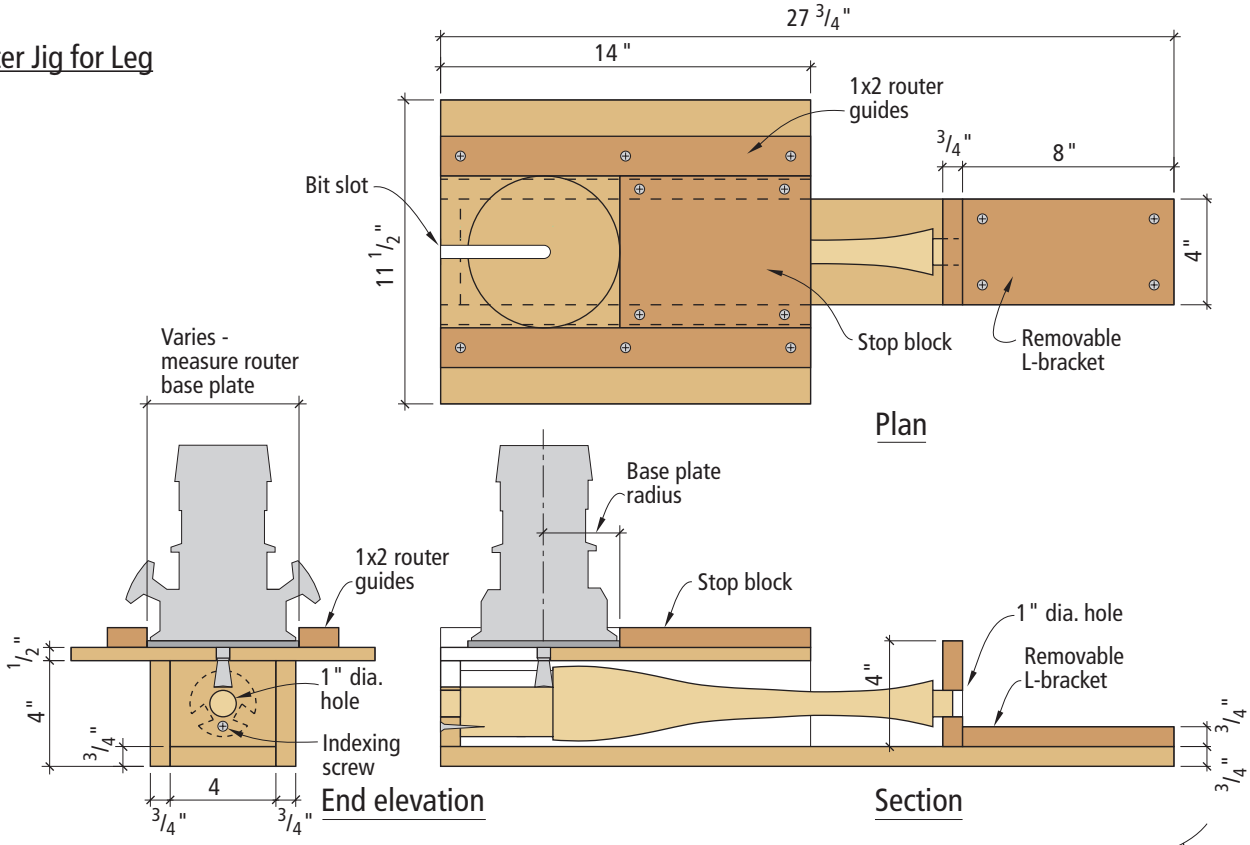
Mounting plate



Leg to pedestal dovetails

To cut the mating pins for the sliding dovetails, a router table works best. By using an auxiliary fence clamped above the table, first one side of the leg is run (left), then the leg is turned around and the opposite side is run (right).

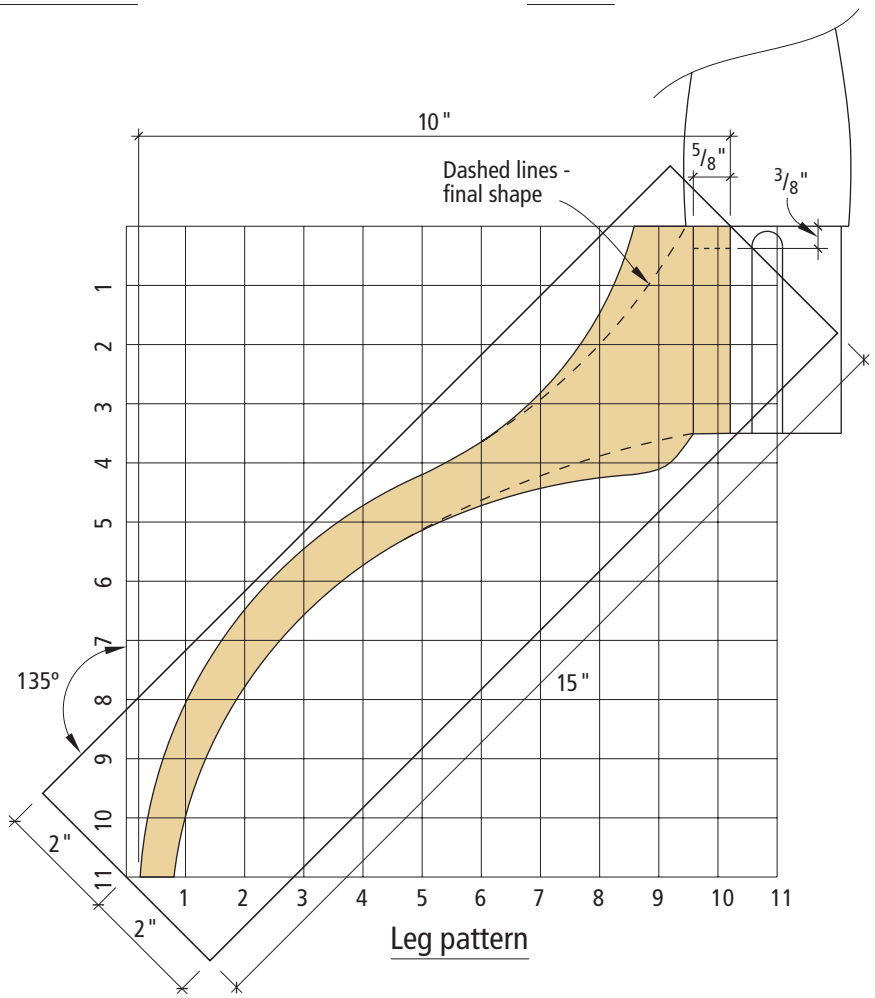
Router Jig for Leg

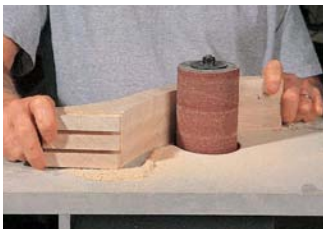


clamping pressure. The Shakers used metal plates across the base of the pedestal to hold the legs in place, but our glues are more reliable. Allow the glue to cure and move on to the top.

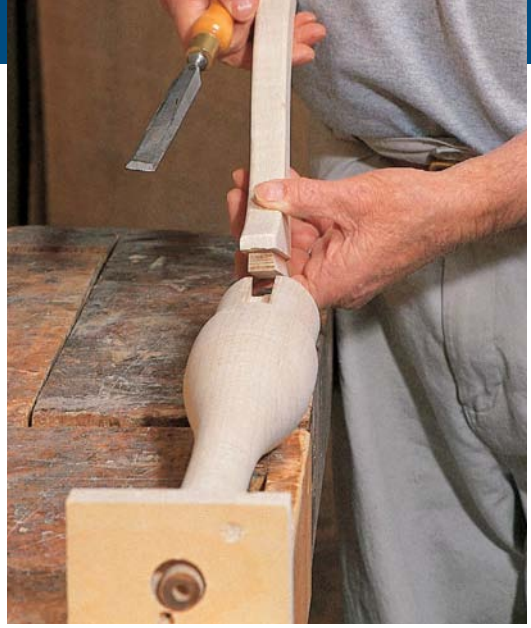
You now have a table base. The last two parts are actually the easiest. If you can find a piece of maple that is 20" wide, use it for the top. That's what the Shakers did, and it looks great. If you can't find a board that wide, look for a thicker piece, cut it

The leg shape is created by making a full-size template from the included scaled pattern, then transferring that to the leg blanks. A band saw makes quick work of the roughed-out shapes.





A spindle sander makes what could be a daunting task reasonably painless. By using double-sided tape to hold the legs together, all three can be sanded at the same time, reducing work and ensuring uniform shapes.



No matter how accurate your machining, there needs to be some hand-fitting to make the legs just right. A sharp chisel can make a big difference here. Don't make the joint too tight, but not too loose, either.

A circle-cutting jig attached to my router lets me make a true circle. Take increasingly deeper passes around the perimeter of the top to complete the cut.

It's a good idea to drill clearance holes in the mounting plate before gluing the mounting plate to the base. It screws on much easier the second time.

in half along the width on your band saw and make the top book-matched. While you're scrounging for wood, grab a piece that's 5" x 13¾" to use as the mounting plate.

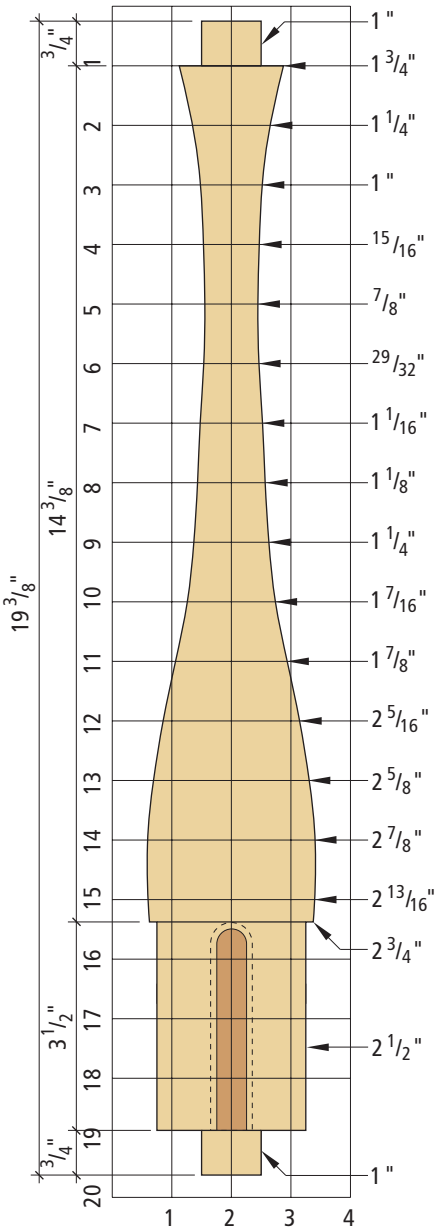
To shape the top, I use a simple circle-cutting jig that mounts to my router. With the center of the jig attached to the underside of the top, cut the 19⅞"-diameter shape using a spiral bit, taking the cut in three or four passes. When the top is round, chuck a ½" roundover bit in your router and round over the bottom edge of the top. Then do the same to the top edge with a 1/16" roundover bit (or break the edge with sandpaper).

The mounting plate is simple, except that to keep it like the original, both ends of the plate taper to ¼" thick within the first 3⅜" of each end. There are a couple of ways to do this, but I still think the safest way is to use a band saw to cut the taper, then use a sander to clean up the surface.

With the plate tapered, cut a 3/16" roundover on all four edges and drill a 1"-diameter hole in the center of the plate. Then drill a few more mounting holes for attaching the top. You're now ready to finish sand the piece.

To attach the base to the mounting plate, cut a saw kerf across the width of the top stub on the pedestal, running the kerf with the grain. Slip the mounting plate over the top of the stub, then add glue and drive a wedge into the saw kerf to lock the plate in place. When the glue is dry, cut the tenon and stub flush to the top of the mounting plate.

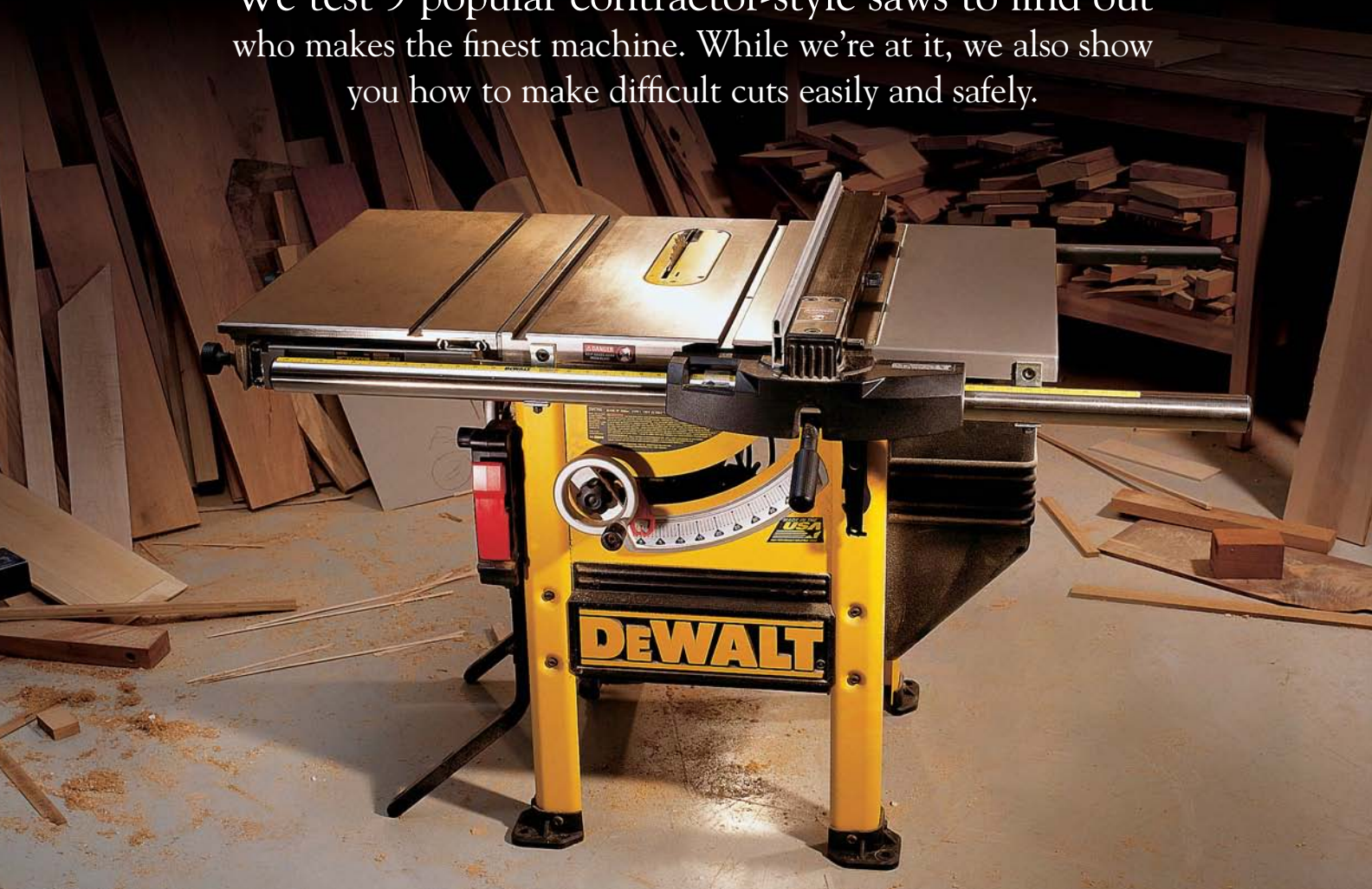
All that's left is to attach the top and add the finish. I use a water-based aniline dye made by Moser that's available from Woodworker's Supply (800-645-9292). Traditionally, in my shop we dilute the dye more than the manufacturer recommends. Be sure to make some sample boards to find a color that you like. Next, I follow that with a couple coats of orange shellac. I level that with 360-grit sandpaper and then apply a brown glazing stain over the shellac. After I allow that to dry overnight, a few coats of lacquer finish the job. **PW**



Pedestal turning & dovetail mortise

THE ESSENTIAL GUIDE TO table saws

We test 9 popular contractor-style saws to find out who makes the finest machine. While we're at it, we also show you how to make difficult cuts easily and safely.



During a tool demonstration a while back our staff was honestly a little scared and concerned to see an "experienced" woodworker rip a board by standing to the side of the saw and pushing the board through sideways. We realized that while the manuals included with table saws give you basic safety tips, the advice doesn't always sink in — sometimes with disastrous results.

For the new woodworker, it's imperative to learn the correct, safe way to use this dangerous machine — saws with a circular blade are the No. 1 cause of accidents in U.S. woodshops. For those who have been using table saws for years, it's best to stop and think about the way you're now using the saw, rather than risk an injury.

Entire books have been written on setting up and using the table saw, so we can't tell you everything about using a saw here. But we will give you the basics on safety, and ripping and crosscutting both plywood and solid wood. Once the basics are in place,

by David Thiel

Questions or comments? You can contact David at 513-531-2690 ext.255 or at david.thiel@fwpubs.com.

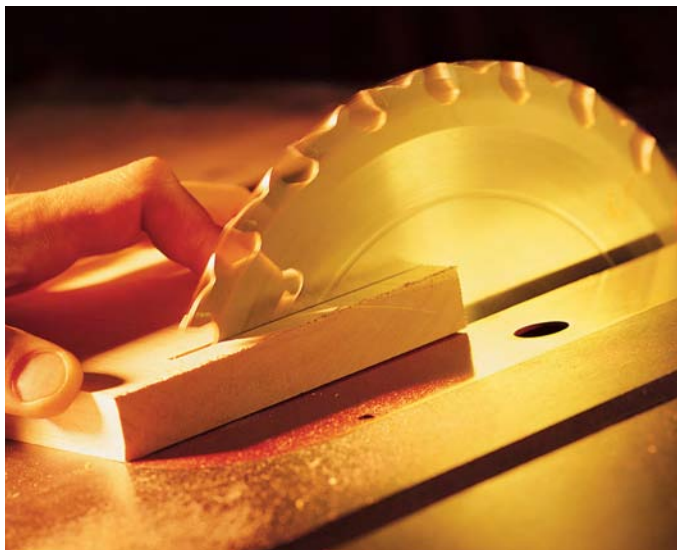
we encourage you to take a look at some of the books available to make sure you're getting the most out of your table saw.

Groan - Safety!

OK, no one wants to read a long discourse on table saw safety, but is your safety worth a couple of minutes? You bet it is. Let's start with a quick list of rules you should follow whenever you use your table saw.

1. Follow the setup instructions as described here, and from the manufacturer.
2. Set the blade to the proper height for each cut.
3. Stand in the proper place at the saw to provide support and to keep you safe.
4. Keep your fingers clear of the insert plate zone when the saw is operating. In fact we like to paint our inserts red (if they aren't already) to remind us where that zone is.
5. Keep scraps, tools and loose objects off the saw during operation.
6. Unplug the saw every time you change the blade.
7. Make sure that the insert plate and any table additions are level to the saw table surface. When your blade is spinning in the middle of a cut, it's a bad time to find your piece is hung up on something.
8. If you're ripping material less than 4" wide, use a push stick. Period.
9. No loose clothing or jewelry near the saw.
10. Work with help handy. If you get into trouble, can you call for assistance?

What about guards? OK, we'll admit that most guards provided with saws (a combination splitter/pawl/shield)meet the bare minimums to be called a guard.



If this photo doesn't make your stomach turn a bit, you probably need to examine the way you use a saw. The blade is too high, the hands are too close to the blade. The wrong type of blade is installed and you never make a cut freehand.

Most combination guards are difficult to adjust and keep adjusted, and perhaps half of the cuts that can be made on a table saw can't be made with the factory guard in place. We know. But if you can use a guard during an operation, please do so. If you can afford to upgrade your saw to a more user-friendly aftermarket guard (see the "Getting Started" article on the next page) it's a great idea. In addition to guards, we feel strongly about using safety glasses, hearing protection, push sticks and splitters.

Before making your first cut on a new saw (or if it's been a while since you tuned up your saw) do these simple checks on the saw to make sure everything is ready to run. Check the blade for square to the tabletop. We keep a fairly inexpensive metal machinist's square near the saw at all times. When you first square the blade, the set screws are adjusted to allow you to return to square easily. But with use, this adjustment can change, and it should be checked periodically. Your owner's manual will show you how to adjust this setting.

You also need to check the blade and rip fence to make sure they are parallel to the miter gauge slots. Again, your owner's manual provides most of the information necessary for this step.

My dad, God bless him, used to have a saying in the shop, "It's carbide, it doesn't need sharpening yet!" Well, I think we all know that a sharp blade cuts more eas-

A good example of the right and wrong way to use a saw is what is known as the "the invisible arrow." When cutting rabbets, the cut can be made two ways: the correct way is to make your first cut with the piece flat on the table, then make the second cut with the piece on edge. This allows the waste to fall to the outfeed side of the blade. If done in the opposite order, the waste piece becomes trapped between the blade and the fence and is launched at some 40 miles an hour. If you're standing in the wrong position behind the fence (like me in the photo at right) you can get a nasty surprise just a little south of the breadbasket. Knowing where to stand and the proper steps to cut a piece can make all the difference.

SOURCES

AFTERMARKET GUARDS

Excalibur/Sommerville,
800-357-4118
excalibur-tools.com

Biesemeyer, 800-782-1831
biesemeyer.com

ROLLER STANDS

Delta, 800-438-2486
deltawoodworking.com

Fisch, 724-663-9072
fisch-woodworking.com

HTC, 800-624-2027

Record, 937-382-3811
recordtool.com

Rousseau, 800-635-3416
rousseauco.com

Shop Fox, 360-734-3482
woodstockinternational.com

Triton, 888-874-8661
multi-stand.com

Photos by Al Parrish.

ily than a dull one. Make sure your blade is in good shape, and sharp, so you don't end up trying to force wood past it. That's a sure way to get hurt.

So you're ready to raise the blade and make a cut. But how high should you raise the blade? For the most efficient (and safest) cut, the blade should be about 1/8" to 1/4" higher than the thickness of the piece you're cutting. This allows the teeth to clear the cut (for more efficient performance) but keeps the blade low enough to be less of a hazard.

The proper place to stand while using your saw will depend on what cut you're making. We've outlined the basic "moves" later in the article. But in general, standing directly behind the blade is the more hazardous location.

Speaking of standing, there are a few operations on a table saw that benefit greatly from an extra pair of hands or roller stands. To be honest, while an extra pair of hands can be useful, it takes a skilled and knowledgeable pair of hands to assist, rather than hinder, during a cut. You're likely better off to look to any number of roller stands available on the market, or build an outfeed table that suits your type of woodworking.

Finally, before you do anything on the table saw, be rested, unhurried and think carefully about the cut before you make it. If something feels wrong or makes you nervous, there's probably a better (and safer) way to do it. Listen to the voices in your head and your gut, and you'll enjoy woodworking for many years to come.

GETTING STARTED—SAFETY AND ALIGNMENT

Beyond the stock guards provided with most table saws, more convenient and user-friendly aftermarket guards are available, but at some cost. The Excalibur overarm guard (left) allows the guard to be lifted away from the blade for "through" cuts impossible with a standard guard, though you're still limited in height. This guard should be used with a splitter/pawl attachment. The Biesemeyer version (right) simply snaps into place and requires no tools for removal. An absolutely necessary safety tool is a push stick. Two homemade versions are shown at right. We generally prefer the "shoe" style (the one on top) for added support. You'll also note the homemade throat insert, providing zero clearance spacing around the blade. It's a must to stop small scraps from slipping through the plate and getting tossed back.

The first step in making sure your table saw is safe is to make sure the blade and fence are parallel to one another. (We'll assume you've already aligned the blade to the miter slot as instructed by your owner's manual.) Simply set the fence to any reasonable distance (9" in our photo, left) and check the distance between the fence and blade both at the front and rear of the blade. If the measurements are not equal, adjust your fence until correct. If this setup isn't done correctly, your material can become pinched between the fence and blade (or splitter guard) and either violently be kicked back at you, or make it too hard to push the piece all the way through. If you have to force a piece through a cut, you're doing something wrong. If the fence is out of parallel in the other direction, you may not get hurt, but you'll have a hard time making square cuts.

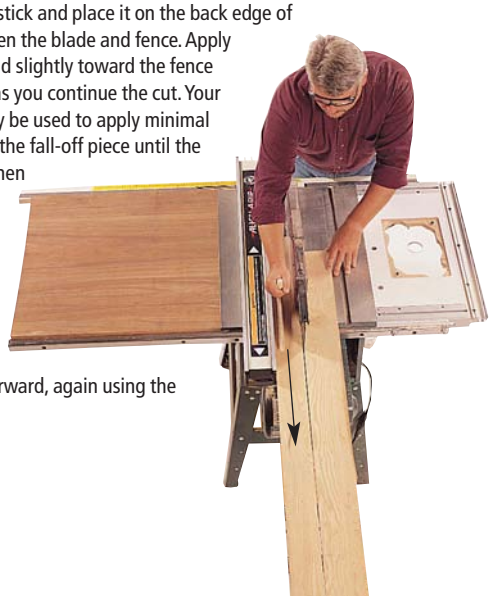
When crosscutting narrow pieces on the table saw, you will eventually encounter the situation where the falloff pieces are small enough to not move out of the way on each cut, and they will begin to accumulate to the outfeed side of the blade. This doesn't automatically create a dangerous situation, but one of the pieces could be pushed against the outfeed side of the blade and be thrown back at you. Even with the guard in place, a piece can be small enough to be kicked around between the guard and blade, or tossed back. Optimally, you should stop the saw and wait until the blade has stopped spinning, then remove the offending chunks. More likely than not, it will be inconvenient to keep turning off the saw. In that case, stand out of the kickback line of fire and use a scrap piece of wood or your push stick to nudge the pieces out of the way (right). Don't use your fingers! You can always make a new push stick.

RIPPING A BOARD

1 Ripping a piece of solid lumber is simpler than ripping plywood, but there is more potential for danger because the stress in a solid wood board can pinch the blade when it is ripped. Roller stands are recommended (you can't see mine in the photos) and should be positioned to support both pieces coming off the saw. To start the cut, you should be positioned at the rear corner of the board as in the photo, supporting the back end with your right hand. Your left hand (at the center of the board) provides pressure against the fence, keeping it flush to the fence. The arrows indicate the direction I'm applying pressure.

2 Walk the board slowly into the blade, keeping the edge flush along the length of the fence. When your left hand reaches the edge of the saw, allow it to slide backward along the length of the board, maintaining pressure against the fence. Maintain this support until the back end of the board reaches the edge of the saw table.

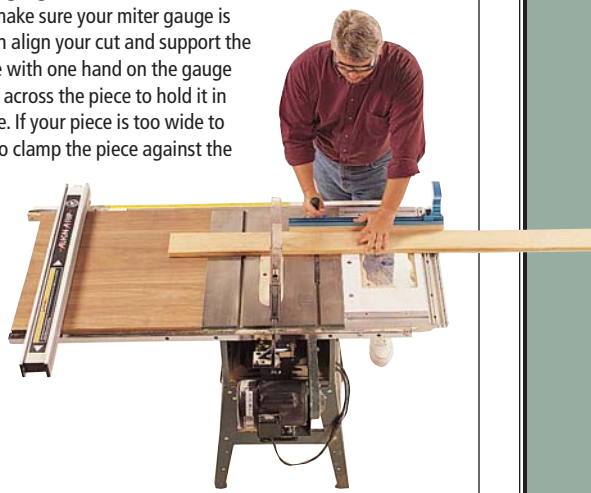
3 Grab your push stick and place it on the back edge of the piece between the blade and fence. Apply pressure forward, and slightly toward the fence with the push stick as you continue the cut. Your left hand should only be used to apply minimal guiding pressure on the fall-off piece until the piece is separated, then move your left hand out of the way. Once the keeper board is clear of the blade and guard, turn your attention to the fall-off piece and push it safely forward, again using the push stick.



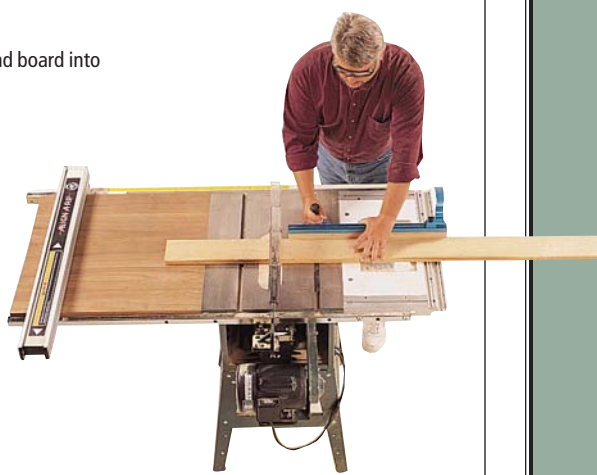
CROSSCUTTING A BOARD

1 When crosscutting a board, the substantially thinner width of the piece (and not enough width to ride adequately against the fence) causes us to use a miter gauge rather than the fence. You may note the gauge in our photos is not standard equipment. We recommend either adding a backing board at least 24" long to your miter gauge, or purchase an aftermarket gauge.

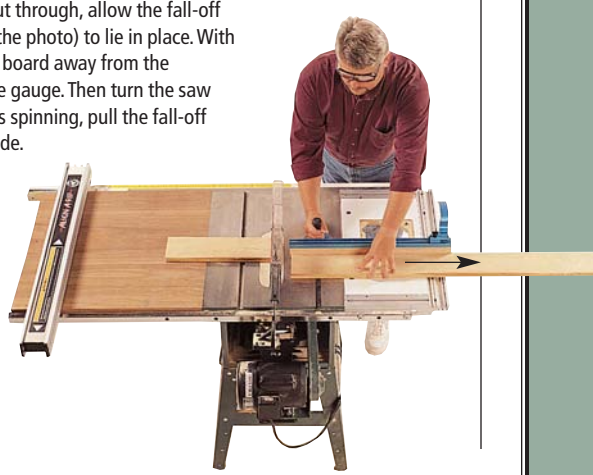
Start by checking to make sure your miter gauge is square to the blade. Then align your cut and support the board against the gauge with one hand on the gauge and the other stretching across the piece to hold it in tightly against the gauge. If your piece is too wide to reach across, it's smart to clamp the piece against the gauge during the cut.



2 Guide the gauge and board into and past the blade.



3 Once the board is cut through, allow the fall-off piece (to the left in the photo) to lie in place. With your left hand, push the board away from the blade, sliding it along the gauge. Then turn the saw off. Once the blade stops spinning, pull the fall-off piece away from the blade.



CROSSCUTTING PLYWOOD

Crosscutting a sheet of plywood on a contractor saw is a task safely accomplished with the use of roller stands. Though plywood is bulky, you don't have to worry as much about the board pinching the blade in the cut because plywood doesn't have a grain direction like solid wood.

1 Here you see one stand positioned to one side of the table saw, and another positioned at the outfeed side. When using the rip fence, do not crosscut a piece less than 18" wide and over 48" long. There is too much chance of the board shifting and becoming pinched. Start the crosscut by standing in the center of the board to support the length. Keep your eye on the fence and keep the board tight against it. Again, arrows indicate where my hands are applying pressure.

2 Maintain the center position as you push the board through the blade. Keep your eye on the fence!

3 Once the board has cleared the blade, let the fall-off piece lay where it is, and carefully push the piece between the fence and blade past the blade and onto the roller stand. Keep the piece flush against the fence until the piece is clear. Then lift the fall-off piece out of the way

RIPPING PLYWOOD

1 Ripping a 4' x 8' sheet of plywood on a contractor saw is possible, but delicate. Roller stands are a must, and they should be positioned to support the largest piece coming off the saw, or preferably both pieces. To start the cut, you should be positioned near the rear corner of the sheet as in the photo, supporting the back end of the sheet with your right hand, while your left hand provides pressure against the fence and aligns the sheet flush to the fence. With the piece pushed nearly up to the blade, check the fit against the fence again, then slowly walk the sheet into the blade.

2 As you move forward, keep your eye on the fence to keep the sheet flush along the fence. As the balance of the weight of the sheet is transferred to the saw table you can shift your position to the rear of the sheet, supporting from the back, but still maintaining pressure against the fence with your left hand. Continue to push the sheet forward, paying attention to the point when the sheet contacts your roller stand (to make sure it's riding on the stand, not pushing it over), then continue the cut. My roller stand is not shown in the photos.

3 As you reach the end of the cut, allow the outfeed piece (under my left hand) to come to a rest and transfer your attention to the piece between the fence and blade. Push this piece clear of the blade, careful not to extend your reach over the blade. Once clear of the blade and guard, lift the piece up and over the fence and bring it to rest to the side of the fence opposite the blade. Don't try to drag the piece back toward you over the guard. With that piece safe, continue to push the waste piece forward and away from the blade until it clears the blade and guard. **PW**

CHOOSING A CONTRACTOR

Table Saw

Today's contractor saws offer performance and quality at a price that makes woodworking possible for all.

Recently a subscriber asked us to simplify our tool reviews and recommend only one tool as the "Editor's Choice." While that might seem to make things easier for our tool-buying readers, it isn't the right thing to do. Our test of premium contractor saws is a prime example of why.

Of the nine saws we tested in our shop, all performed the routine woodworking tasks assigned to them. Certainly some machines were a little easier to use and some performed a bit better. But they are all pretty good saws and a few of them are simply excellent machines.

Another complication is determining the saw that's the "Best Value." With some tools, the low-price leader isn't worth buying no matter what the price. However, with better manufacturing overseas and increased competition there are now lower-priced tools available that can save you hundreds of dollars without sacrificing enough performance or convenience to outweigh the bargain.

Photos by Tim Grondin.

It's a pretty unusual sight to see a monster power feeder on a contractor saw. But that's the machine we chose to feed boards through each of the nine saws we tested. The power feeder ensured that all the boards were fed at the same speed and with the same pressure.

Motors and Fences

A table saw needs to do two things well. First, it needs the guts to perform what would be considered normal operations. That's not to say it won't bog down in 8/4 hard maple — most contractor saws will. The saw also must be equipped with a fence system that allows easily repeated, accurate set-ups without a lot of fuss. And it must be easily adjustable so you can set it at 90° to the table and parallel to the miter slot. Some saws make it difficult to calibrate the fence. All three "Editor's Choice" saws have very simple and intuitive fence adjustments. Beyond the fence and motor, everything else is gravy. I like gravy, but sometimes a pad of butter is enough.

For the test, we assembled each saw according to the manufacturers' instructions (whether good or bad). We set the blades and fences square and parallel. We then checked each machine for noise, vibration, ergonomics and fence accuracy.

Next we tested the motors. To level the playing field, all nine saws were equipped with a new Freud 40-tooth Teflon-coated finishing blade — an excellent carbide blade. All the saws were wired for 110-volt operation. Using a Grizzly power feeder (shown at left), we ran 7/8"-thick poplar boards through each saw at a speed slightly above standard hand feeding. We then observed how much more amperage the motor pulled from the wall and how much the motor's rpm decreased under that load. All of these statistics are listed on the accompanying chart.

Niceties and Oddities

Aside from the motor and fence, we also noted differences in the other features on these saws. First, the miter gauges are frequently not worth keeping. Of all the gauges, only those on the General and Grizzly were pretty good.

On the subject of blade guards, most of them are a hindrance to woodworking. But there have

by David Thiel

Questions or comments? You can contact David at 513-531-2690 ext.255 or at david.thiel@fwpubs.com.

been improvements. Ridgid's guard is easily slipped on and off its post without tools, making it more likely to be used. Other guards worth mentioning are DeWalt's, which has a smaller splitter (that actually reduces binding rather than promotes it) and the Powermatic guard has independent side shields that do a better job of keeping the blade covered during crosscutting.

And dust collection — usually a joke on contractor saws — really works well on the Ridgid, Craftsman and DeWalt units.

Winners

In the end, we decided on more than one winner. Three equally priced saws take top honors: the Delta, Jet and Powermatic.

The Jet and Powermatic are nearly identical (Jet owns Powermatic), with the major difference being the Jet is a right-tilt saw and the Powermatic is a left-tilt. While we think left-tilt machines are safer; this is a personal preference and either of these saws is a good choice.

The Delta saw is different in many ways and outperformed the other saws in the most categories. The Unifence system is equal in accuracy and reliability to the T-style fence offered on the Jet and Powermatic units, and does a lot of extra tricks, too.

When it comes to value, it was a tough call. The Grizzly and Bridgewood were tight competitors for this honor. Both required some extra set-up and patience during assembly. But once that's done, both are good performers for the price, but the Bridgewood pulls ahead with at least one solid-cast iron wing (and the extra legs thrown in), the left-tilt motor and a slightly better quality rip fence. **PW**

BRIDGEWOOD TSC-10CL

The Bridgewood TSC-10CL is the least expensive saw in the test, but it offers good power, a good T-style fence system and a left-tilt mechanism, which we prefer. The rip fence offers aluminum faces on both sides that have T-slots for attaching stops or fixtures. To square the fence to the table, you need to shim a pad underneath the fence. The solid cast wing is nice, though a second wing would have been better. The saw is currently sold with a free leg set (not shown) — and a laminate-covered table board is available for an extra $70. The blade height and tilt adjustments operated smoothly with positive stops. The saw is shipped without a blade, and if that keeps the price low, we're OK with that. In general most of the features were average. Again, if it keeps the price low, OK. Downside? Assembly took more work than with other saws. It was necessary to shim the fence's infeed bar with washers to raise the fence to a workable height. Also, some masking tape was needed on the fence to square it with the tabletop. But even with these complications and the less-than-pristine fit and finish of the machine, it's a sweet saw at a great price. And so we gave the Bridgewood Best Value honors on the strength of the better quality rip fence, left-tilt capability and the solid cast-iron wing.

www.wilkemach.com/800-235-2100

CRAFTSMAN 22859

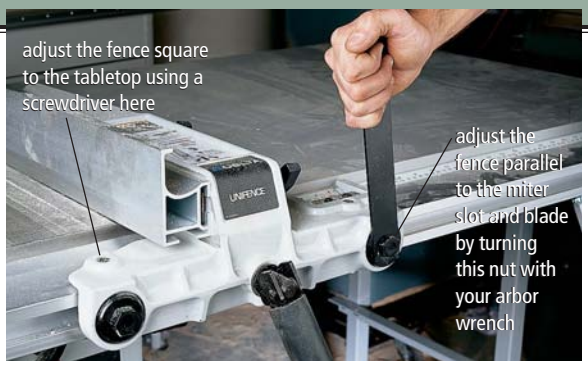
The 22859 was one of the nicest saws to assemble. The instructions are excellent and there were many small details that made assembly a joy. The 22859 was nicely packaged, with individually labeled hardware bags. The fence rails slide onto square-head bolts in place on the tables, and the switch location is adjustable. When assembled, the fit and finish of the tool scored very well. Operating vibration was better than average and the handles were comfortable to use and easy to reach. Unfortunately the rest of the testing didn't fare as well. Though the saw offers a micro-adjustable fence (which can be helpful), we needed to shim the mechanism with six washers to align it correctly with its toothed gear. There are no positive stops on the blade beveling mechanism, causing a mushy feeling and the need to rely on the bevel indicator, which no manufacturer does correctly. Though the fence moves smoothly, it cannot be adjusted square to the table without shimming. Adjusting the fence parallel to the blade is very difficult, and the fence's scale is only in 1/16" increments and not easy to read. The motor performed acceptably, but on the whole the saw was ultimately not worth the $800 price.

www.craftsman.com/800-377-7414

DELTA 36-426

The word "Delta" means "saws" to a good many woodworkers, and the 36-426 supports that image. The saw arrived nicely packaged with all the components well protected by lots of cardboard. The instructions were good, illustrated with photos, and actually tell you how to remove the goopy protective coating on the metal surfaces. The three-piece stamped steel base (as well as the "slide-on" rails) proved for quick, simple assembly ... until we got to the side table/leg assembly. This proved over-complicated, though ultimately the legs add stability. The Unifence is a versatile, precise and reliable system that is a strong competitor to the T-style clones. The fence moved smoothly, the scale is readable, and the ease of adjustability proved superior to all others tested. While not a determining factor in the results, we were pleased with the 50-tooth combination blade included. With the extended table board, the Delta offered a full 5" more working surface than any other saw tested. Also, the Delta is one of two saws tested that offered a two-wrench blade changing feature, improving ease of use even further. Not everything was perfect, though. The height and beveling handles are undersized and feel of lesser quality than those on other saws. The blade guard cannot be raised completely out of way when in use and uses a safety feature to keep it from locking open at all unless the throat plate is in place. In the end, the benefits offered by the Unifence system, overall quality of the assembly, fit and finish, and the quiet and capable motor made us choose the Delta as an Editor's Choice.

www.deltawoodworking.com/800-438-2486



A Class by Itself

The Delta Unifence (above) offers both parallel and square adjustment to the table without lifting the fence from the saw. Though you may only have to adjust the fence once a year, it's very convenient to have all the adjustments easily accessible. Also note the unique aluminum fence face that can be oriented in either a high or low height arrangement on either side of the fence rail, and can be slid forward or back for improved support. This fence offers great versatility for the user.

Locks the Bevel

Both the Craftsman and Ridgid (shown right) saws employ a blade bevel lock, but not a height adjustment lock. Our initial concerns were that while the bevel lock could prove useful, would the blade creep down during dado operations without a height lock? After testing we found that no creep occurred. Likely the fine thread adjustment requiring 35 revolutions to raise and lower the blade made these saws less susceptible to height creep. Though we appreciate that improvement, we didn't enjoy the extra revolutions necessary to adjust the blade height.

DeWALT DW746

The DeWalt DW746 was one of the easiest saws to assemble (arriving mostly assembled), with most of our assembly time spent being impressed by the design features on the model. This saw is unlike the other machines in this test because it has an internally mounted motor and a blade beveling wheel mounted on the left of the saw.We found the saw's instructions to be less than thorough, but adequate to the setup task. As mentioned before, the dust collection shroud around the blade works extremely well. The fence system is also different; it's a T-style fence that locks both at the front and rear. We found the fence to be smooth operating, accurate, easy to read and generally easy to set up and adjust. The aluminum fence face offers forward and back adjustment similar to the Delta Unifence, which is an asset in a number of situations. The DeWalt is one of two models tested that offer a two-wrench blade change system. The motor performed well, and the vibration is pleasantly low.We rated the DeWalt as having the best height and tilt adjustments with convenient handles that operated smoothly and positively. Even though the wings are of sheet metal construction, the heavy gauge of the metal makes these lighter-weight wings accurate and sturdy. The DeWalt finished very well in our testing, and was only edged out for Editor's Choice recognition due to the higher price. You may be able to argue that the price is justified if the option of adding the sliding table (another $400) is important to your style of work.

www.dewalt.com/800-433-9258

GENERAL 50-185

The General contractor saw is a fine and capable saw with a decent instruction manual and a fair assembly. Its strong points are its well-placed and manufactured handles, a good quality cast iron miter gauge, and an easy-to-use and read T-style fence system. The saw is also offered in either a right- or left-tilt version, (the only model tested that is), so if the tilt direction is important to you, General can help you either way. Overall the General motor performed capably and the use of the fence system and all adjustments worked smoothly and accurately. If you want to adjust the fence square to the table, you need to shim a pad beneath the fence. There's no real nice way to say this, but the General is a very capable, but average saw. It doesn't excel beyond the other tested models in any significant category, but has features that make it a very workable tool. The pricing is comfortably below the highest price, but is also not low enough to make this saw a true bargain.

www.general.ca/819-472-1161

GRIZZLY G1022Pro

The G1022Pro is new to the Grizzly family for 2002, but it looks familiar. The machine is essentially the G1022ZFX with the Shop Fox Classic fence added. That's a good thing. Assembly was of average complexity, and not always explained well in the instructions. Once assembled, the Grizzly performed well in a number of categories, not least of which was the performance of its 2hp-rated motor (make sure your shop circuit can handle this motor). Strong features include a Powertwist link belt to reduce vibration, good cast iron miter gauge and a fence system that operated well (though less smoothly than some other T-style clones tested in this review). The scale on the fence was a tie for best readability, and the vibration during operation was very low. The saw arrived in our shop with the blade mounted $^{1}/_{16}$" off parallel to the miter slots (a quick fix) and there were sharp or rough spots on the machine to be filed or sanded. The open cast wings are a bit of a compromise, and we'd prefer solid cast wings instead, but priced at $550 it's an extremely affordable package. When compared to the lower-priced Bridgewood, the Grizzly offers two cast iron wings and a beefier motor for an extra $50. This saw is a great deal, and was only beat out for Best Value honors by the Bridgewood by a whisker.

www.grizzly.com/800-523-4777

JET JWTS-10PF

Our test of the JWTS-10PF started off a little rocky. While the assembly was generally user-friendly, we ended up having to do some extra drilling to align the holes on the fence rails. The bevel pointer was bent out of orientation during shipping, and the instruction manual could have done with some better photography. But after the assembly was complete, the strong points of the saw became obvious. Motor performance proved to be excellent, while offering extremely low vibration. The fence system, the reliable T-square clone design, proved accurate, easy to read and easy to use. With the two solid cast iron wings and a table board the work surface is a very ample 56 1/4" wide. The fit and finish on the tool was very good, with little room for complaint. This saw is extremely close in design to the Powermatic 64A, with the major differences being the right-tilt design and a noisier (though better performing) motor on the Jet. In deciding which tools to award Editor's Choice to, we decided that ultimately it was more important how the tool continued to operate, rather than what it took to set it up the first time and felt it appropriate to recognize the Jet, as well as the Powermatic.

www.jettools.com/800-274-6848

POWERMATIC 64A

One of the first affordable contractor saws offered with a T-style fence and a left-tilt design, the 64A has seen some upgrades since Powermatic was purchased by the Jet Group. Though still very similar to the Jet saw in features and design, assembly proved easier on the Powermatic with improved imagery in the instructions as well. The Powermatic has a somewhat less efficient motor than the Jet, but still very respectable and a significant nine decibels quieter motor than the Jet. But for the paint color, the fence systems on the two saws are nearly identical, though the lever on the Powermatic's fence was beefier. We did encounter more vibration from the Powermatic unit, but to counter that the blade guard on the Powermatic is of a superior design for ease of use, and they've added some plastic caps on the fence rail (for appearance) and added leveling feet on the base. Both saws are priced the same, so picking between the two was tough. So we decided to let you decide. If you prefer a left-tilt machine with a quieter motor, the Powermatic is for you. (Mobile base in photo not included.)

www.powermatic.com/800-248-0144

RIDGID TS2424

We found the packaging on this saw to be quite impressive. Packaged to fit in two economically sized boxes, the parts were nested within each other throughout, but all parts were well protected and well labeled to make assembly smooth. Even the motor was boxed, and the box itself offered a handle to help lift the motor conveniently, which is usually like wrestling a greased hog. The TS2424 comes standard with a mobile base that is a little fussy to set up, but a welcome accessory. Interestingly the open cast wings (though not our personal favorite due to finger injuries) were the only wings attached using bolts and nuts, rather than machine bolts threaded into the main table. The fence rail attaches using slip-over T-bolts, making assembly efficient and quick. The fence system also employs a micro-adjust feature like the Craftsman, but the Ridgid's relies on friction against the rail, rather than a toothed gear. To adjust the fence square to the table you'll need to shim underneath pads below the fence. The saw is shipped with a decent dust collection box mounted under the saw and includes a hose hookup and hose. The motor mounting and pulley guard were simple to attach and user-friendly. For all the nice touches and user-friendly features on this saw, it still comes down to using it on a day-to-day basis. While the saw tied for least vibration and quietest of those tested, we found the motor capable, but not stellar and the fence lacking in ease of use and scale readability, leaving the Ridgid model in the middle of the pack.

www.ridgidwoodworking.com/800-474-3443

Small Refinements Are Nice

While it may not seem to be important, the redesign of the pulley guard (left) on the Craftsman and Ridgid saws made mounting the motor and adjusting or replacing the belt simpler. The more traditional metal guard requires two or three hands to mount the motor and more often than not a wing nut ended up in the sawdust during the struggle.

How About a Cabinet Saw?

If you're planning on spending $850 on a nice contractor saw, you might want to think about a cabinet saw instead. Amazingly, Grizzly Industrial offers the G1023S, a 3 hp, 220-volt cabinet saw for less than $800. This saw includes the T-style design Shop Fox Classic rip fence. Cabinet saws have more power, less vibration (the trunnions are mounted to the cabinet, not the top), and a more stable working platform. Grizzly also offers a left-tilt version (shown above) for $895 and a version with a smaller motor than runs on 110 power. We've had the G1023S in our shop for two years and find it an excellent option (if you can get 220 power in your shop) to a contractor saw — at the same price!

	BRIDGEWOOD TSC-10CL	CRAFTSMAN 22859	DELTA 36-426	DEWALT DW746	GENERAL 50-185	GRIZZLY G1022PRO	JET JWTS-10PF	POWERMATIC 64A	RIDGID TS2424
Street price	499	800	850	900	730	550	850	850	600
GENERAL									
Ease of height/tilt adjustments	4	3	3	4	5	3	3	3	3
Overall vibration	5	2	3	4	3	4	5	3	5
Initial trunnion alignment	5	5	5	5	4	3	5	5	5
Max. blade height	3 1/8"	3 3/8"	3 1/8"	3 1/8"	3"	3 1/8"	3 1/8"	3 1/4"	3 3/8"
Blade guard quality	3	3	3	3	3	3	3	4	4
Miter gauge quality	3	2	3	3	4	4	3	3	3
Total weight	242 lbs	265 lbs	295 lbs	254 lbs	300 lbs	290 lbs	300 lbs	310 lbs	244 lbs
Handle comfort	3	4	3	4	5	3	3	3	5
Turns to max. blade height	12	36	12	22	12	14	13	12	35
Turns to max. blade bevel	30	30	29	22	31	29	29	30	29
Adjustable feet?	No	Yes	No	No	Yes	No	No	Yes	Yes
Fit and finish	3	4	4	5	3	3	4	4	4
Ease of assembly	3	5	4	5	3	3	4	4	4
Type of blade supplied	None	40T-ATB	50T-ATB	30T-ATB	None	None	28T-ATB	40T-ATB	40T-ATB
MOTOR									
Listed amp. rating	16amp	13amp	12.8amp	15amp	15amp	26amp	18amp	18amp	13amp
Amp draw with no load	10.2	4.7	3.9	4.7	6.3	18	10.4	10.2	5.6
Amp draw under load	20	13.3	13.4	16.5	19	25.8	19	20	14.3
Percentage amp increase	96%	183%	244%	251%	202%	43%	83%	96%	155%
RPM with no load	3,586	3,585	3,588	3,583	3,583	3,580	3,575	3,585	3,589
RPM under load	3,442	3,484	3,507	3,496	3,434	3,478	3,471	3,433	3,447
Percentage RPM decrease	4%	2.8%	2.3%	2.4%	4.2%	2.8%	2.9%	4.2%	4%
Noise level (dB)*	84	81	78	79	86	88	85	76	76
TABLE									
Material	CI	CI	CI	CI	CI	CI	CI	CI	CI
#/Type of wings	2/SCI	1/SCI	1/SCI	2/SM	2/SCI	2/OCI	2/SCI	2/SCI	2/OCI
Table size (inches)	27x30 1/4	27x53 1/2	27x62	27x40 3/4	27x40 1/4	27 1/8x40 5/8	27x56 1/4	27x57	27x44
Table height	36 1/2"	36 1/2"	34 1/4"	34 1/4"	34 3/4"	37"	34 1/2"	35"	36"
Rip capacity/left of blade	12"	24"	12"	16"	12"	12"	12"	12"	24"
Rip capacity/right of blade	30"	30"	30"	30"	30"	25"	30"	30"	24"
Blade tilt left/right	Left	Left	Right	Left	Left/Right	Right	Right	Left	Right
Table flatness	5	5	5	5	4	5	4	5	5
Throat width	3 1/2"	3 3/4"	3 3/4"	3 3/4"	3 1/2"	3 3/4"	3 1/2"	3 1/2"	3 3/4 "
FENCE									
Design	T-Square	Rail F&B	T-Square	Rail F&B	T-Square	T-Square	T-Square	T-Square	Rail F&B
Scale accuracy	1/6ths	1/6ths	1/32nds	1/32nds	1/32nds	1/32nds	1/32nds	1/32nds	1/32nds
Scale readability	3	3	4	4	4	5	4	4	3
Ease of aligning fence to miter slot	3	3	5	4	3	3	4	4	3
Ease of use	3	4	5	4	4	4	4	4	3
Ease of adjusting square to table	3	1	5	3	3	3	3	3	3
	BRIDGEWOOD TSC-10CL	CRAFTSMAN 22859	DELTA 36-426	DEWALT DW746	GENERAL 50-185	GRIZZLY G1022PRO	JET JWTS-10PF	POWERMATIC 64A	RIDGID TS2424

KEY

Ratings are based on a 1-5 scale with "1" being "poor" and "5" being "excellent." Trunnion alignment is how the machine was shipped, either in alignment, or out of parallel to the miter slot. *Noise level was tested with the blade set a 1" height above the table and the level was taken with a decibel meter held at head height. Table flatness was measured using a straight-edge and feeler gauges - any gap less that .005" was considered acceptable. Fence alignment refers to the ease of fence adjustment parallel to the miter slot. Vibration was measured with the saw on a level surface using a dial indicator. CI=cast iron; SM=sheet metal; SCI=solid cast iron; OCI=open cast iron.

TABLE SAW
Outfeed Tables

Don't let the simplicity of these tables fool you. When used together they make many operations easier and serve many other tasks that aren't immediately obvious.

You can find all sorts of devices for sale to support your stock as you feed it over your table saw. Some sport rolling pin-style rollers, some have a series of roller balls. Some attach directly to your saw, others offer micro-adjustment to level it to the precise plane of your saw table.

My humble outfeed table offering has no such features. In fact, they are about as "plain Jane" as you can get. Remove them from the shop and no one would take them for anything other than what they are — a pair of trestle tables.

So what's the big deal? Well, if you operate in a small shop space, say a garage or basement, these tables will serve so many useful purposes you'll wonder how you ever did without them.

I've been using a pair of tables just like these in my basement shop for the past five years. They surround my table saw and can be easily repositioned for ripping long stock, crosscutting a full sheet of plywood and supporting long crosscuts using my table saw's sled (and they give me a place to hang the sled when it's not in use). But wait, there's more.

These tables also serve as stock support for both sides of my compound miter saw. I use them as smaller assembly tables, for stacking stock while I'm planing or jointing it. Sometimes I finish projects on them. And because they are also the same height as my regular assembly table, I can put larger objects on both.

I arrived at the trestle-style design because it's not only stout and material-efficient, but it keeps the base enough "inboard" so that you're not bumping table legs with your feet. It also keeps the weight down and makes them easy to slide on your shop floor.

Getting Set for Building

Before you start construction, measure the distance from the floor to the top of your table saw. There can be as much as an inch or two variance in heights. The plans given here are for a saw that is just over 34" high. You should make your tables' height ⅛" less than your saw's height and reduce the height by as much as another ⅛" if your shop floor isn't very level around the saw. What can make these tables useless is if they are even a bit higher than the saw table. In my book, being slightly under doesn't matter.

And if you wonder why I didn't use levelers, I'll tell you. It's just not worth the hassle of adjusting them every time you move a table, let alone two of them. And you'd have to do this every time, owing to variations in the floor or the fact that most screw-adjustable levelers will wind or unwind just by dragging the table across a floor. When maintaining a plane in critical work, perhaps with a miter saw, shims or wedges are quick and easy.

Construction Details

I built these tables using both mortise-and-tenon joints and dowel joints. You could use only dowels if your shop isn't set up with mortising equipment. And in fact, my original tables were constructed entirely using biscuit joints and screws and are no worse for the heavy service they have seen. If you don't use mortises, remember to deduct the length of the tenons from the parts list.

I used stout white oak for the bases because I had some 8/4 stock on hand. But since I finished it out to 1½" thickness, you might want to consider using ordinary 2 x 4s. Just don't use twisted ones.

Follow the diagrams and cutting list to prepare your stock in the correct sizes, making any allowance for a difference in table saw height in the leg parts.

Next take the feet, top rails and legs for Table 1 and lay out the mortise locations as shown in the diagram. All tenons are ½" thick by 1¼" wide by 1¼" long. Make the mortises the same dimensions except in depth. Make them 1/16" deeper so the tenons don't bottom out before they seat home.

Layout Trick: Work From the Center Out

When I do layout work I often find it handy to use a couple tricks. Take the top rails and feet of Table 2, for example. It's really important that the mortises and dowel joints line up perfectly for the legs. To pull this off, I group all the parts together so their ends align perfectly. You can

Photo by Tim Grondin.

by Steve Shanesy

Comments or questions? Contact Steve at 513-531-2690 ext. 238 or steve.shanesy@fwpubs.com

even throw a square on the group to make sure they aren't creeping out of alignment. Clamp them so they can't move.

Next, locate and mark from each end the center of the leg locations (7⅛") on one of the parts. Since the feet get mortises that are 1¼" wide, measure out ⅝" from each side of the center lines. Now take a square you know to be true and transfer these lines to the other parts. For the top rail, use the same lines to align your doweling jig. Later, you can transfer these lines onto the leg parts for identical jig alignment. Grouping parts and measuring from the center out cuts down on simple errors of missed or inconsistent measuring on common parts. The beauty of this method is that even if you are off slightly, everything remains off consistently. After laying out the mortises, cut them all.

Cut the Tenons

Next cut the tenons, fitting them to the mortises. I use the table saw for this job, setting up the saw using scraps of fall-off from the actual parts so their dimensions are consistent with the materials I'm working with.

I cut the cheeks using the table saw's fence, standing the parts on end to run them over the blade. Use a back-up block to support the tall stock when making these

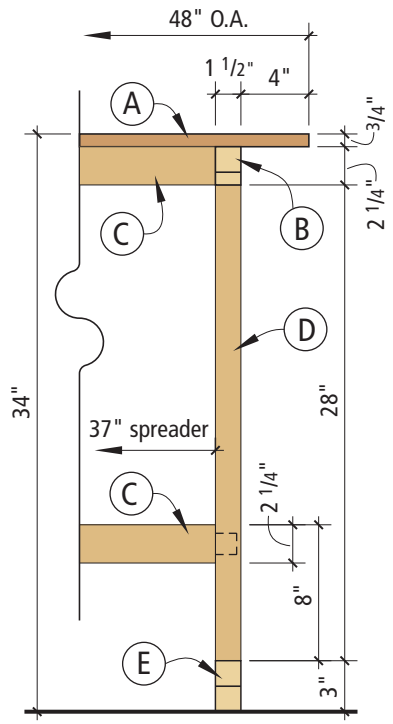
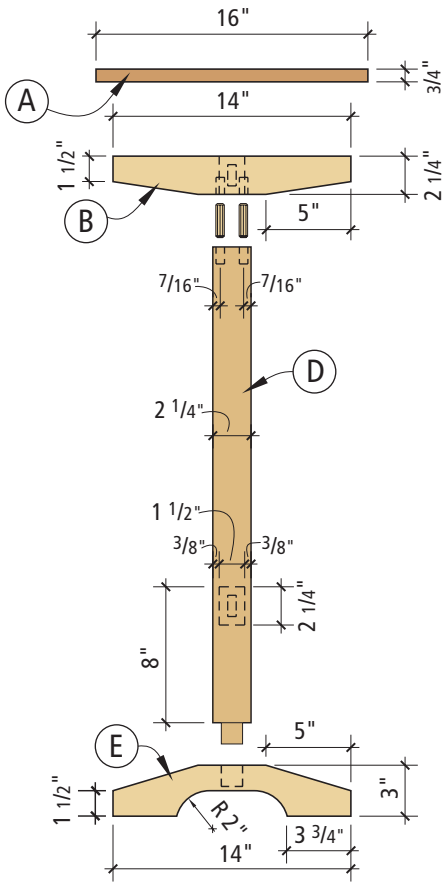


Table 1



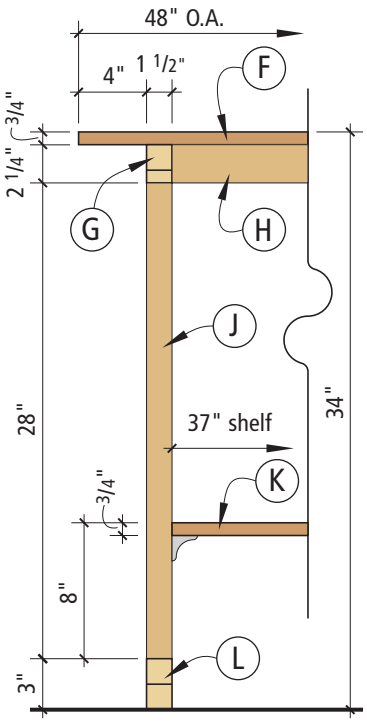
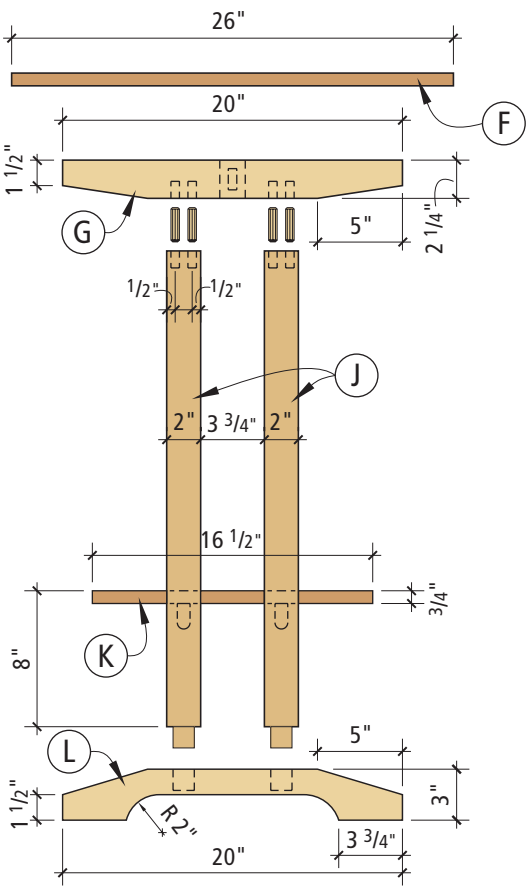


Table 2



It may take a little "persuading" to seat the tenons in their mortises, but if properly fit should only require tapping in place.

cuts. To finish the tenons I band saw off most of the waste from the cheek cut. I then set the table saw fence to establish the final length of the tenon. With the stock on its side and guided by a slot miter gauge, trim the remainder of the cheek waste. Then turn the part to the other side and make the shoulder cut.

In this project, since there weren't a lot of tenons, I just made a series of passes over the rest of the shoulder to cut away the waste. Otherwise, I would have set up a dado stack to do the work more quickly.

Before you make the final shapes on the top rails and feet, lay out and drill for the pair of

When gluing up, assemble the ends first and let them dry before completing the table base assembly by gluing the stretchers to the ends.

Joining the top stretcher to the top rail and the leg to the top rail on Table 1 requires the dowel placement to straddle the mortise.

The top rails are joined to the legs using two ½" dowels for each leg while the bottom uses a mortise and tenon. Other joinery options include dowels only, mortises only or biscuits.

dowels at the top of the leg-to-rail joint on Table 1. Position them so they straddle the mortise in the rail as shown in the diagram.

Next make the angle cuts on the rails and feet, and the cutout on the bottom of the feet. Follow the layout in the diagram, then band saw out the waste. Smooth the rough band-sawn edges.

Before gluing up, make a dry-run assembly to make sure everything is right before you get to that panic glue-up stage. After making any adjustments, start gluing up, but don't try to do everything at once. First glue up and clamp the leg/rail end sections. Once those are dry, glue the stretchers to the ends. Although this takes a bit longer, it allows you to make sure your glue ups are square and flat. A twist in a table base is a real pain.

Once the base is completely assembled, you can call it done or rout a ⅜" radius profile on all the edges except where the feet meet the floor and the top rail and stretcher attaches to the top. I did this on my tables and think it makes them appear more "finished."

The tops and shelf are straightforward. Cut plywood to the sizes given, then glue and tack on ¾"- x ½"-wide solid edging. Tack below the center point so you can rout a ¼" radius profile on the top edges. This detail isn't optional; the rounded edge helps prevent stock from catching on the edge when the tables are in use.

Before attaching the shelf on the larger table, sand the base and tops to your satisfaction. I didn't bother with a finish on my tables. These are for the shop, after all.

To attach the shelf, use corner braces at each of the four legs. If you change the height of the shelf for any reason, just make sure it won't interfere with your table saw's motor hanging out the back of your contractor saw.

And by the way, if you are already set up and happy with an outfeed system for your shop, remember that you can always change the height of these tables and use the design and joinery for any number of other trestle-style tables. **PW**

OUTFEED TABLES

	NO.	ITEM	DIMENSIONS (INCHES) T	W	L	MATERIAL
TABLE 1						
❑	1	Top (A)*	¾	15	47	birch plywood
❑	2	Top rails (B)	1½	2¼	14	white oak
❑	2	Top-Bot stret (C)	1½	2¼	39½	white oak
❑	2	Legs (D)	1½	2¼	29¼	white oak
❑	2	Feet (E)	1½	3	14	white oak
❑	2	Solid edging	¾	½	48	any hardwood
❑	2	Solid edging	¾	½	15	any hardwood
TABLE 2						
❑	1	Top (F)*	¾	25	47	birch plywood
❑	2	Top rails (G)	1½	2¼	20	white oak
❑	1	Top stret (H)	1½	2¼	39½	white oak
❑	4	Legs (J)	1½	2	29¼	white oak
❑	1	Shelf (K)*	¾	15½	36	birch plywood
❑	2	Solid edging top	¾	½	48	any hardwood
❑	2	Solid edging top	¾	½	25	any hardwood
❑	2	Solid edging shelf	¾	½	37	any hardwood
❑	2	Solid edging shelf	¾	½	15½	any hardwood

*Dimension given does not include ½"-thick solid edging to be added.

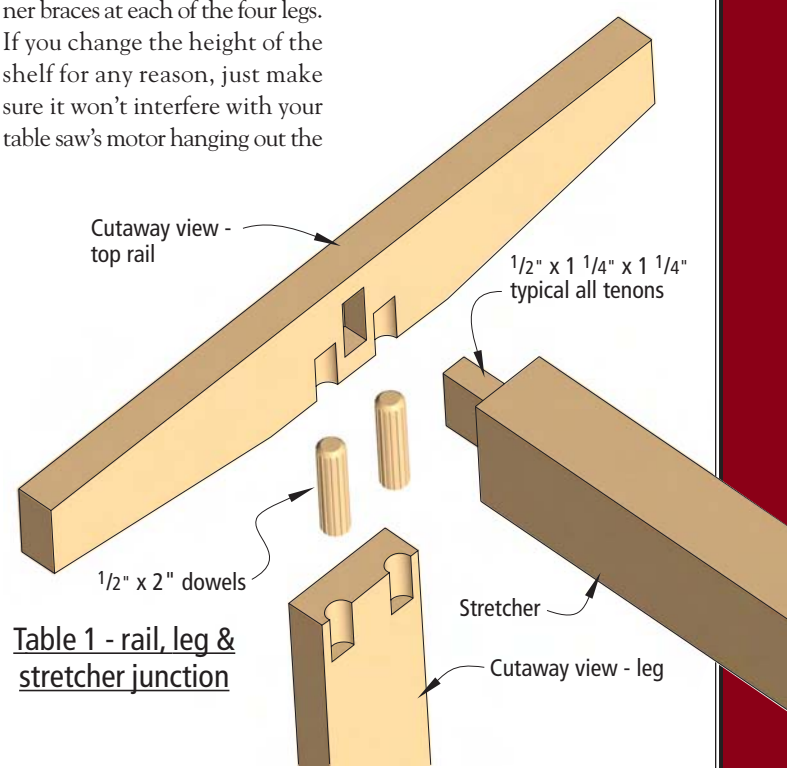


Table 1 - rail, leg & stretcher junction

ULTRAFAST Frame & Pane

Build traditional doors using modern tools.

When you've got it down, try your hand at this simple cherry stepback.

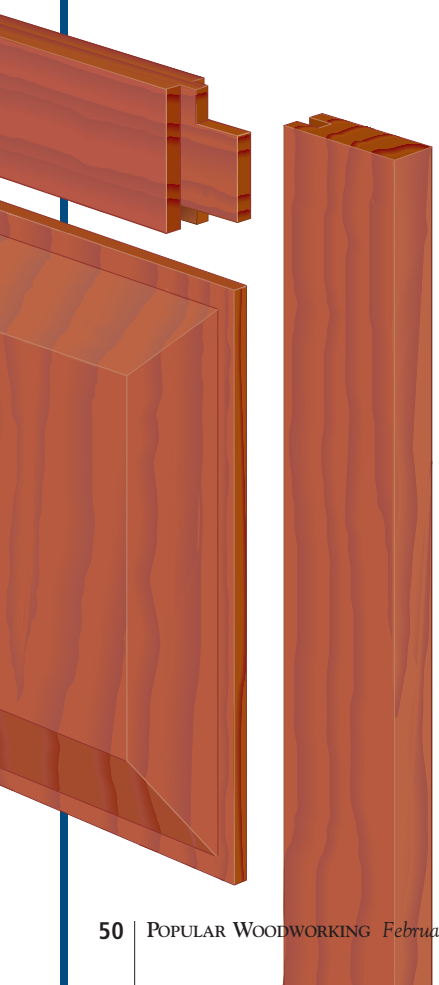


Illustration by Mary Jane Favorite.

Without a doubt, mortise-and-tenon joints make the strongest frame-and-panel doors. But this traditional joint strikes fear into the hearts of beginning woodworkers because it requires either precision with a hand saw and chisel or a deep wallet to buy some serious machinery. After 17 years of building doors, I've found a method that is fast enough for a professional cabinetshop but uses tools you'd find in a home workshop.

Essentially, you cut your tenons with a dado stack in your table saw. You cut your mortises with a hollow chisel mortiser, mortising attachment for your drill press or Forstner bit. And you make your raised panels using a router table, table saw or even a shaper.

Now before you start thinking that this sounds really expensive, let's take a minute to do the math. You probably already have an 8" dado stack. If not buy one for $85. There's lots of other ways it will be useful in your shop. If you don't have a hollow chisel mortiser, it would be nice to get one of these, too. A decent benchtop model will cost $250, or you can buy an attachment for your drill press for $75. Mortising equipment will change your woodworking. Suddenly it's child's play to make everything as stout as a mule. If you don't want a hollow chisel mortiser, you can cut these mortises by chain-drilling overlapping holes using a Forstner bit in your drill press. Finally, to make the raised panel you can use a raised-panel bit in your router table or shaper, or you can raise the panel on your table saw using a rip blade.

I design my inset doors (as I did for this project) so they're exactly the same dimension as the door opening. Then I trim them down on my jointer to get a perfect 1/16" gap all around. Begin building your doors by milling out your stock to the proper thickness. Doors are made up of stiles (the vertical pieces), rails (the horizontal pieces) and the panel. Make your rails and stiles 3/4" thick and your panel 5/8" thick. Cut your rails and stiles to size but leave the panel oversized until assembly.

Cutting Tenons

I like to cut the tenons first because it is faster.

by Troy Sexton

Troy Sexton designs and builds custom furniture in Sunbury, Ohio, for his company, Sexton Classic American Furniture. Troy is a contributing editor for Popular Woodworking.

1

Photo by Al Parrish.

SUPPLIES

Rockler • 800-279-4441

Non-mortising hinges
#31300 • $5.79 a pair.

2 wooden knobs

Here's why: Your mortising bit (or Forstner) makes a slot of a consistent width (unlike when you make a mortise using a chisel and mallet). That means you can depend on every mortise to be exactly as wide as your first one. So if you cut your tenons on the rails first (with the help of a piece of scrap with a mortise in it), you can simply lay the tenon on the stile where it needs to go and use the tenon like a ruler to mark the starting and ending point of the mortise.

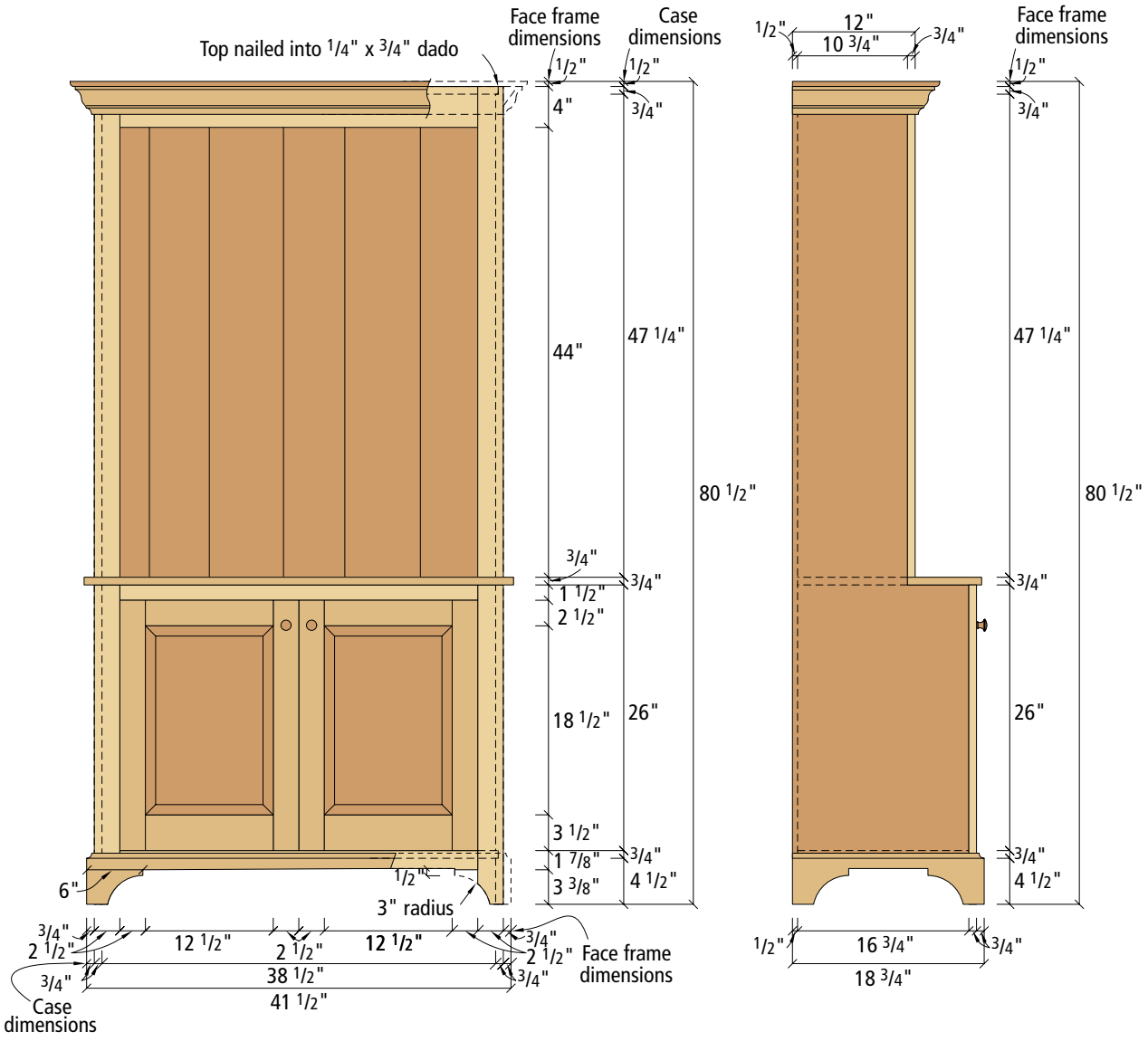
This procedure saves you a step because you don't have to get out your combination square to figure out where your shoulders will go on the stiles.

For most cabinet doors I like to cut tenons that are 1" long and have ½" shoulders. The rule of thumb is to make your tenons one-half the thickness of your stock. So for ¾" stock your tenons should be ⅜" thick.

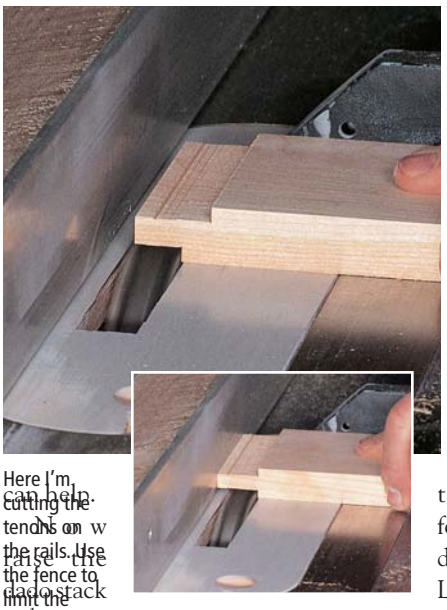
I cut my tenons on the table saw using a dado stack. Here's how. First get a piece of scrap. Go to your mortiser or drill press and make a long mortise in that scrap using a ⅜" bit. You use this piece of scrap to check the thickness of your tenons. Make the mortise in the scrap about 1 1/16" deep. Install your dado stack in your saw. The number of chippers isn't critical. Make the stack ⅝"- or ¾"-wide. Now raise the dado stack so it's 3/16" high.

Set your table saw's fence so that the distance from the leftmost tooth to the fence is 1". Get out your miter gauge and make sure it's set perfectly square. Put your rail flat down on the table of the saw. Define each side of the tenon in two or three passes as shown in the photos.

Hold the work firmly and keep your fingers away from the blade. Flip the rail over and repeat these cuts on the other side. If you have trouble with tearout, try making the first cut on the tenon with the tenon against the fence. It

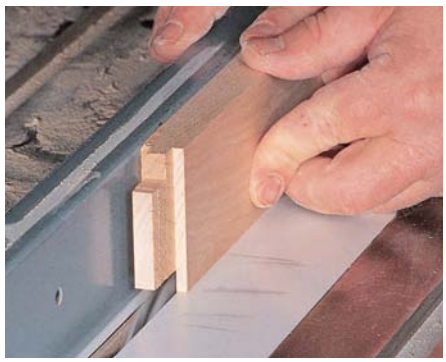


Illustrations by Jim Stuard.



Here I'm cutting the tenons on the rails. Use the fence to limit the length of the tenon.

To cut the haunch, keep the same setup on your table saw and merely add a 3/8"-thick spacer to your fence. Run the rail on edge and your haunch is cut.



I use a dado stack in my table saw to cut the 3/8" x 3/8" groove on the inside of the rails and stiles. Take care that you center the groove.

can help. Now it's time to cut the shoulders and the haunch. What's a haunch? It's an uncut part of the tenon that fills the 3/8" x 3/8" groove you'll soon make for the panel in both the rails and stiles.

To cut the haunch you could readjust the fence and perhaps take a couple chippers out of your stack. What a pain. Instead, I take piece of 3/8"-thick scrap and attach it to my fence. Then I run the rails on edge on one side (see photo). Instant and perfect haunch. Now remove the 3/8"-thick scrap from your fence and cut the shoulders on the other edge. Lay out the locations of all the mortises using the tenons you just cut.

Machining Mortises

Mortising is the most straightforward part. You want your mortises to be centered on your stock and about 1 1/16" deep. The little extra depth ensures your tenons won't bottom out in your mortises and makes a place for the excess glue to go.

When you use a mortising machine, here are a couple of good rules that aren't in most manuals. First, don't cut the holes so they overlap. You want to make a hole, skip a small space and then make your next hole. Then come back and clean out the waste between the holes.

This prevents your mortising chisel from deflecting or even breaking during a plunge cut.

Second rule: after you make the mortise, go back and clean out the bottom. I do this by repeatedly plunging the mortising bit to the bottom of the mortise in short strokes while moving the stile in small increments. This will get rid of most of the junk at the bottom of a mortise and prevent you from having to clean up your work with a chisel.

The Panel

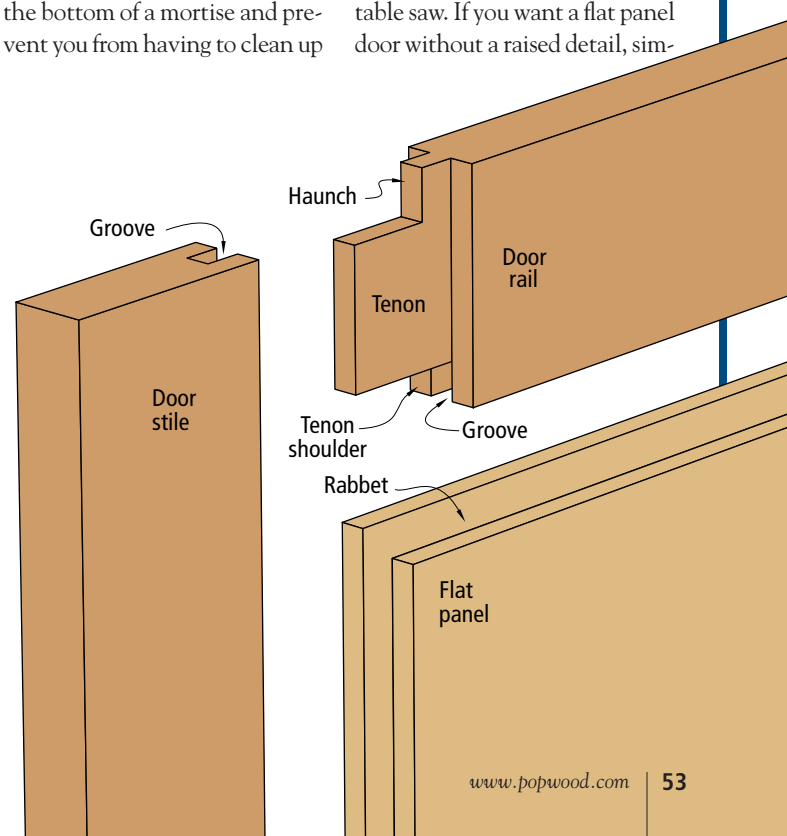
To fit the panels, the first step is to cut the 3/8" x 3/8" groove on the inside edges of the rails and stiles to hold the panel. I use a dado stack in my table saw to accomplish this quick chore. Adjust the height of the blade until your haunch fits into the groove snugly.

Now dry-assemble the stiles and rails and measure the opening for the panel. Add 1/2" to the height and width and that's the finished size of your panel. Cut your panel to finished size on your table saw. If you want a flat panel door without a raised detail, sim-

CHERRY STEPBACK

	NO.	ITEM	DIMENSIONS (INCHES) T	W	L	MATERIAL
❑	2	Sides	3/4	17 1/4	80	Cherry
❑	1	Top	3/4	11 1/4	39	Cherry
❑	1	Bottom	3/4	17 1/4	39	Cherry
❑	1	Countertop	3/4	18 1/4	41 1/2	Cherry
❑	3	Shelves*	3/4	10 3/4	38 1/2	Cherry
❑	1	Top FF rail	3/4	4	37	Cherry
❑	1	Mid FF rail	3/4	1 1/2	37	Cherry
❑	1	Lower FF rail	3/4	1 7/8	37	Cherry
❑	2	Top stiles	3/4	2 1/2	48	Cherry
❑	2	Lower stiles	3/4	2 1/2	31 1/4	Cherry
❑	2	Door top rails	3/4	2 1/2	14 1/2	Cherry
❑	2	Door bot rails	3/4	3 1/2	14 1/2	Cherry
❑	4	Door stiles	3/4	2 1/2	24 1/2	Cherry
❑	2	Door panels	5/8	13	19	Cherry
❑		Bot moulding	3/4	5 1/4	84	Cherry
❑		Top cap	1/2	3	90	Cherry
❑		Back boards	1/2	39 1/2	76	Cherry

* shelves have a dropped edge on the front.



I like to cut most of the bevel on the raised panel on my table saw (left). Then I use a vertical raised panel bit in my 1½ hp shaper to cut the profile in one pass (above).

ply cut a ¼" x ¼" rabbet on the backside of the panel (as shown in the drawing on the previous page) and move on to assembly.

If, however, you want that beveled edge on your panel to add a shadow line, you need to do a little more fiddling. The end result is to create a bevel on the panel that is about 1½" wide, at about a 12° angle and that fits snugly into the groove you cut in the rails and stiles.

If you've got a shaper or a router table with a big variable-speed router, you can buy a panel-raising bit for just this purpose. When you cut the bevel on the edge, don't do it all in one pass. Instead, take several passes to get you where you want to be. Or, better yet, cut most of the meat off using your table saw, then make the bevel cut in one pass on your shaper or router table. When making the cut on the router or shaper, cut the profile on the top and bottom of the panel first, which is where you're most likely to have the ends blow out. Then follow up by cutting the profile on the sides. This should clean up any tear-out from the first two cuts.

If you want to raise the panel using your rip blade in your table saw, set the blade's height for 1½" and tilt the blade about 12° away from the fence (you might have to move your table saw's fence to the other side of the blade to accomplish this). Now move the fence up to the blade and make several test cuts on a piece of scrap until you've nibbled away just enough so the bevel fits in the groove.

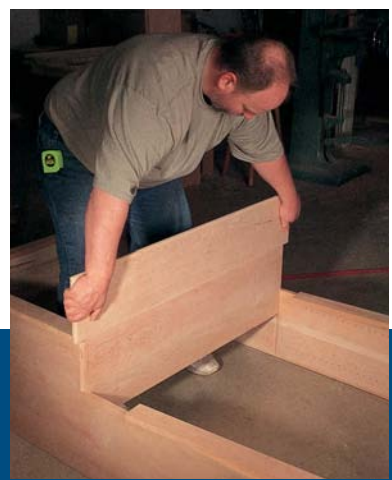
You want the bevel to snuggle into that groove so there's a ⅛" gap between the edge of the panel and the bottom of the groove. This will give your panel room to expand and contract.

Dry-fit your doors to make sure everything goes together. Before you glue up the door, sand the bevel. I use a random-orbit sander with great care. You can hand-sand the bevel, but it will take considerably more time. Finish-sand the backsides of the panels all the way to your final grit.

Assembly

The trick here is to glue only the mortise-and-tenon joints, not the panel. Put glue in the mortises and clamp the door. Don't overtighten the clamps; you can easily twist the door. When the glue is dry, sand the rest of the door.

Because the panel will expand and contract with the seasons, I like to add a bit of insurance to the door to make sure the panel won't slide around too much when it shrinks. The insurance is two brad nails. I nail the panel to the rails through the groove at two locations on the back of the door. One nail goes at the center of the top rail and one nail in the center of the bottom rail. This will still allow the panel to expand and contract, but it will keep it centered. **PW**



To save time and effort, I glue up the panel for the countertop from two boards so it will fit perfectly into the dadoes in the sides.

BUILDING THE STEPBACK: A PLAN OF PROCEDURE

1. Cut all your stock to size; glue up any panels you might need. When gluing up panels for the sides, use one board that is 11¼" wide and 80" long, and one board that is 6" wide and 31¼" long. Glued together on edge, these form the corner where the countertop goes. Use the same procedure for the countertop.
2. Build your face frames for the upper and lower cabinet using mortise-and-tenon joinery.
3. Build your doors using mortise-and-tenon joinery.
4. Cut ¼"-deep dadoes in the sides to hold the bottom, top and countertop. Cut a ½" x ½" rabbet on the back of the sides for the back pieces. Drill holes for the adjustable shelf pins.
5. Nail and glue the top and bottom pieces between the sides. Nail the face frames to the case. Slide the countertop in place and glue and nail.
6. Cut solid wood pieces for the shiplapped back. Finish sand all pieces.
7. Hang the doors. Nail commercially available crown moulding in place. Add a ½" cap on top. Stain or dye all the parts then add three coats of a clear finish.
8. Nail the shiplapped back in place.

Tank Heaven

End bathroom clutter
and elude the annoying plop of destiny.

At least once a year I knock something off the bathroom counter, right into the toilet. It's usually a highly non-disposable item, like my favorite hairbrush. There follows the humbling act of fishing the item out of the bowl. Then the challenge of cleaning it off. The dishwasher is tempting, unless you live with nosy people who'd want to know why your hairbrush is in the cutlery rack on Sani-cycle.

I don't blame myself for knocking stuff into the toilet, because it's society's fault. In the old days, a single bar of soap served as shampoo, shaving foam, skin care regimen and deodorant. Washing was a once-a-week proposition. People smelled a bit but they spent most of the day behind a horse who didn't seem to mind. Folks got cleaned up on Saturday night to prepare for the next morning, when being crammed into a church pew was the social event of the week.

In contrast, today's society is a teeming 24/7 press of bodies, with people crushed together in buses, offices, restaurants and movie theaters. We don't do much of anything alone and we can't afford to smell like it.

And here's my huge, salient point: there just isn't adequate surface area in modern bathrooms to contain all the tools families require for personal grooming. Many families have an arsenal of products perched around the sink, the edges of the tub, and atop the toilet tank.

Society gave us this clutter. But God gave us elbows. So on a bad day, one of those personal grooming products is going for a swim.

My answer to society and my elbows was to build a pine tanktop shelf-unit. It hangs in the unused space above my toilet tank, holding every pomade, soap and lotion I've accumulated in years of smelling nice.

This unit is a great beginner's project with some easy options for making it look professionally hand-crafted. To build it you'll need only a few basic tools, my favorite being the jigsaw.

Tool's Errand

If you're new to woodworking and you're only planning to get one saw, make it a jigsaw. They generate about as much noise as a sewing machine, so they're soothing to use, plus they perform almost every kind of cut, from straight to swoopy. I recently got the cordless purse model so I'm ready to jig anytime, anywhere.

And while we're talking about tools; for sheer tingle factor, whenever you have a birthday or anniversary coming up, ask for clamps. You just can't have too many clamps. You'll need at least one pair of clamps for this project with a minimum span of 20". If you don't have clamps, you're going to have to engage a helper. Clamps are more useful than most helpers, unless the helper brings beer.

And finally, to make your shelves look especially perky, consider buying a plug-cutter bit. This is a cool little device that fits in your drill just like a regular bit. It cuts tiny cylindrical wood plugs that camouflage the screw heads, so the finished project looks tidy and sleek.

Cut it Out

Lumber is personality-related, so know yourself. Clear pine is slick and cooperative, but the knotty stuff has more character. Also, if you have a low irritation threshold, avoid boards that are twist-

by Mag Ruffman

Mag Ruffman's how-to TV series "Anything I Can Do" airs in Canada, the U.K., Europe and Asia. For more project instructions, visit www.anythingicando.com.

Photo by Christine Polomsky.

Photos by Al Parrish.

When you're riding your jigsaw around the curves, guide the blade smoothly so you don't create bumps and dings that you'll have to sand out later. Many jigsaws have a dial that allows you to adjust the stroke of the blade to be either gentle or aggressive, depending on the wood you're manipulating and the mood you're in.

A Veritas cornering tool makes short work of softening the edges of pine. It acts as a miniature plane, leaving a smooth radius in its path. If the blade chips or binds, then you're working against the grain. Try pulling from the opposite end of the board. Grain lines always get wonky around knots, so you may have to change direction several times, but it's still faster than sanding.

ed, cupped (the ends of the board are crescent-shaped), split, or sporting "pitch pockets," dark spots that ooze sap and defile your work surface, tools and mood.

Take your time in the lumber aisle and use the "eyeballing" technique: Pull a board off the rack and put one end of it on the floor. Then, holding the other end at eye level, scrutinize your subject for twists, warps and wows. Flip it authoritatively, glaring down the length of each surface of the board in turn. If the board is clean and straight, put it on your cart. If it isn't, set it aside and move on to inspecting the next board.

Once you've got the boards cut to length, decide on a profile for the side pieces. If you're feeling jaunty and self-assured, mark the shape directly onto the board and cut it out with your jigsaw. If you've gotten into trouble this way in the past, draw the shape on cardboard first and cut it out to be sure it looks OK. Some people like to construct entire mockups in cardboard just to test the dimensions. I prefer to wing it and live with my mistakes, which explains my van, but that's another story.

Next, draw the wavy shapes for the 18"-long top and bottom rails. To achieve symmetry in your design, take a 9"-wide piece of paper or cardboard and draw a curvy line on it. Cut the design out and trace it onto one half of the 18"-long board. Then flip the cardboard over and trace the design onto the other half of the board. Repeat the process for the bottom border, varying the design a bit so it isn't exactly the same shape as the top.

If you have an earnest reverence for our outhouse heritage, you may have the urge to add a crescent-moon somewhere on your unit. Draw the shape where you want it and drill a generous hole in the middle of the moon. Insert your jigsaw blade into that hole, and proceed to cut out the moon. You should definitely use a scrolling blade for this purpose. A scrolling blade is more delicate than a regular jigsaw blade, and can handle tight corners that would make a standard blade buck.

Once you've cut out all your pieces, "round over" the sharp edges with sandpaper so they're soft and aged-looking. If you find sanding unfulfilling, either lower your expectations or use a cornering tool to ease all the straight edges. Cornering is a hugely satisfying activity, producing lovely curly shavings that can be used later for homemade potpourri.

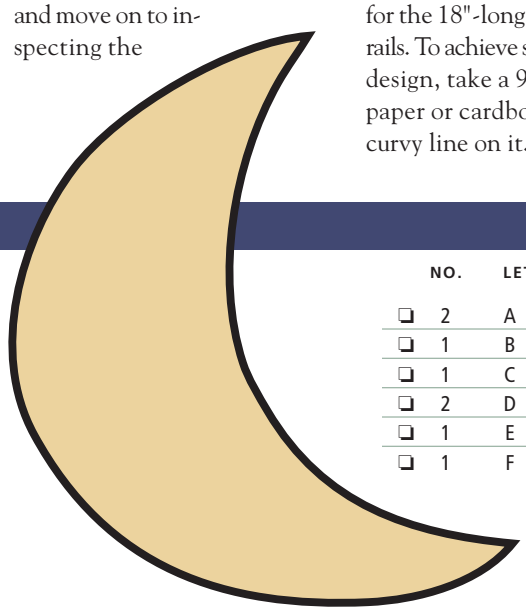
Shellac Luster

After all that sanding you're going to want some instant gratification. It's tempting to screw the whole unit together right here, right now. But do yourself a giant favor and put the stain, paint or clear-coat on the individual pieces before you go any further. It is SO MUCH EASIER than having to cover all the multiple surfaces of the shelf-unit after it's assembled. Besides that, glue squeeze-out will glom on to bare wood during the assembly process, but if your boards already sport a coat of finish, the glue can be easily wiped off.

My favorite finish is shellac. It's made from the excretions of "lac" bugs that live in trees in India and Indonesia, and if that's not a great conversation starter I don't know what is. This bug residue is scraped off the trees, and then cleaned, filtered and mixed with denatured alcohol to make one of most interesting and least noxious finishes I know of.

There are two ways to buy shellac: pre-mixed or dry form. The pre-mixed stuff has a limited shelf life, so you usually end up having to throw a lot of it out. I prefer to buy dry shellac flakes and mix them with high-quality shellac thinner. "Super Blonde" shellac from Lee Valley Tools is brilliantly clear, plus it's de-waxed, which means it doesn't water-stain.

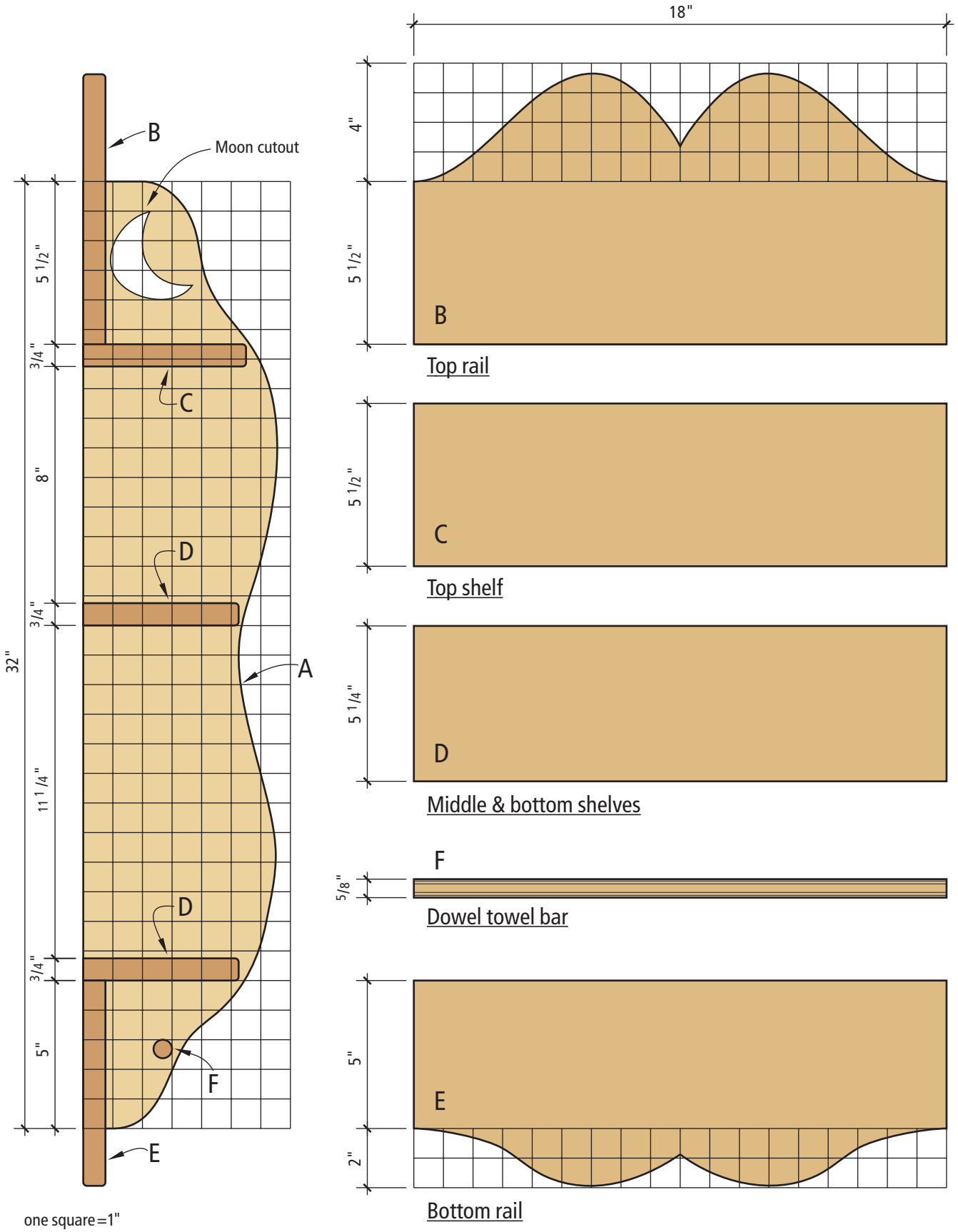
Even if you don't work with shellac as your final finish, at least



TANK TOP

	NO.	LET.	ITEM	DIMENSIONS (INCHES) T	W	L	MAT.
❑	2	A	Sides	¾	6½	32	Pine
❑	1	B	Top rail	¾	9½	18	Pine
❑	1	C	Top shelf	¾	5½	18	Pine
❑	2	D	Mid & bot shelves	¾	5¼	18	Pine
❑	1	E	Bottom rail	¾	7	18	Pine
❑	1	F	Towel bar	⅝ dia.		18	Dowel

Other materials: Carpenter's glue, 1½" #8 wood screws, shellac, paint, stain or urethane. Cornering tools and plug cutters are available from Lee Valley Tools, 800-871-8158 or www.leevalley.com.


B
Moon cutout
C
D
A
D
F
E
32"
5 1/2"
3/4"
8"
3/4"
11 1/4"
3/4"
5"
one square = 1"
18"
4"
5 1/2"
B
Top rail
5 1/2"
C
Top shelf
5 1/4"
D
Middle & bottom shelves
F
5/8"
Dowel towel bar
5"
E
2"
Bottom rail

Shellac has to be applied with a patient, steady hand in smooth, long strokes that don't overlap. Because it's alcohol-based, it dries extremely fast, so there's little downtime. If you're mixing your own shellac, use a good solvent procured from a reliable woodworking supply place.

brush a couple of quick dabs of shellac on any knots. This will seal the knots and prevent sap from oozing up under your chosen finish. In fact, shellac is a great primer coat for pretty much any finish except stain, so don't resist using this fine gift from the bug world.

Fit to be Tried

Now you're ready to dry fit the whole unit. Lay it all out with the sides, shelves and borders in place. This is your opportunity to identify the tallest spray cans in your battery of personal care products. Space the shelves accordingly, so everything fits nicely on the unit when you're done. Clamp everything together lightly, and then square the shelves using a speed-square. Now reef on those clamps so they're nice and tight. Use a pencil to mark a light line on the side pieces under each of the shelves for reference later when you're doing the final assembly under the duress of knowing that the glue is starting to set up.

While all the clamps are in place, pre-drill pilot holes for your screws so you don't split the shelves when you drive the screws. Then, right on top of the pre-drilled screw-holes, drill larger holes to a depth of 3/8" to make a cavity for the plugs that will hide the screw heads. To avoid drilling the plug holes too deep, it's a good idea to wrap a piece of masking tape around your drill bit 3/8" from the end so you know when to stop.

Now for the wet fit. Take all the pieces apart and apply a modest bead of glue along the edges of the shelves and borders, plus a dab on each end of the towel bar. Reassemble and clamp everything together, and drive those screws. Use a damp rag to wipe away any oozing glue around the joints.

Just Say 'Yes' to Plugs

Once your screws are in place, fire up the plug-cutter and cut the plugs in a scrap piece of pine.

Once you've cut about 30 plugs, use a knife or screwdriver to pop each plug out of its little hole. They'll pop easier if you lever the knife perpendicular to the grain.

TIP: As an alternative to cutting your own plugs, you can buy pre-cut hardwood plugs at the hardware store, but hardwood looks funny when used with a soft wood like pine; the color of the wood doesn't match, plus hardwood isn't as absorbent as pine so the plugs take finish differently and refuse to blend in.

Before inserting each plug into its pre-drilled hole, place a drop of glue on the bottom of each plug and smear it around a bit.

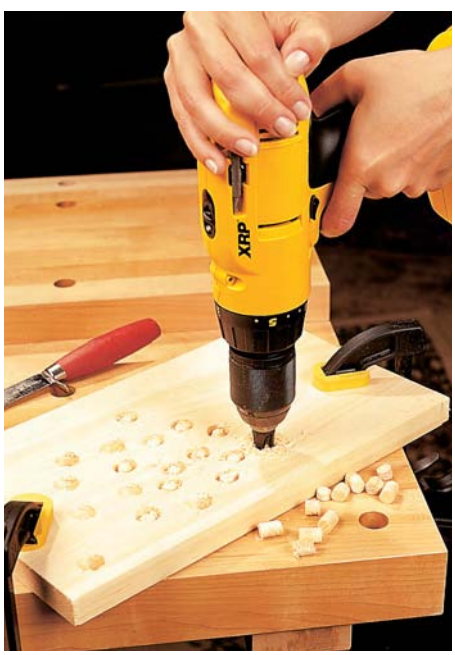
When you have your unit plugged, wait 20 minutes for the glue to set up. Then use a flush-cut saw to cut each plug flush with the surface of the cabinet. If you don't have a flush-cut saw, you can take the plugs down fairly quickly using a sander loaded with 80-grit sandpaper.

Once the plugs are cut and sanded, touch up the plugs and sides of your shelf-unit with shellac or whatever finish you're using.

Mount 'Em

Now it's time to mount your unit on the wall. My favorite mounting technique is to screw two 2"-long strips of metal plumber's tape (which has prepunched holes) on the back of the shelf-unit, and then lift the unit onto waiting nails anchored in studs above the toilet. Finding the studs is a matter of importance, because you don't want your unit crashing down on you while you're otherwise occupied with a good magazine.

Also, it's vital to leave enough room between the toilet tank lid and the shelf-unit. If the toilet floods, you need maneuvering room to whip the lid off, plunge your hand into the dank tank and slap the flapper back down. You'll remember this ritual from the first time you knocked something into the toilet, and tried to quietly flush it away. **PW**



Plug-cutters come in different sizes and varieties. I used a 1/2" tapered bit to cut my plugs. The resulting plugs are slightly narrower at one end, which makes them easier to push into the hole later. One safety tip: To prevent the plug-cutter bit from bucking and skating on the wood, set the teeth of the bit in the wood by leaning heavily on your drill before you begin. Then keep some weight on the drill as you start the motor.

When drilling the countersinks for the plugs, keep your drill as perpendicular to the surface as possible to prevent the plugs from going in at an angle. I went through a troubled phase of having a fish-eye level stuck on the heel of my drill, but it was just distracting.

Inlay Door
WITH A ROUTER

THE SECOND OF TWO PARTS

In our last issue we gave you plans for the case of this spice box, now we show you how to make the amazing inlay door using your router and band saw.

I'd never tried anything like inlay when I came across the image of a great-looking 18th century spice box. The image struck me and I stopped to consider the skill required to make the piece. When I started thinking harder I realized that the inlay was almost entirely designed with geometric shapes. While I'm no artist, I can handle math and geometry. The more I thought about it, the more I realized it was within my grasp.

In the December 2001 issue (#125) we published the first installment that shows how to build the basic cabinet and a frame-and-panel door for the piece. This time I'm going to show you how to tackle inlay with some jigs, some patience and tools you likely already have in your shop.

Which Comes First: The Inlay or the Recesses?

I debated whether it made more sense to cut the 1/8"-deep recesses in the door first and then fit the inlay in place, or to start by making the inlay. In practicing on a piece of inlay I realized that even though I was working toward achieving a specific width, it wasn't easy to end up at the size I'd planned. So I decided to make all the inlay parts first, then cut the recesses to match.

The pictures on this and the following pages provide most of the instruction for this project, but there are some general observations that will prove useful. One of the steps toward a good-looking piece of inlay is to have the different wood types butt against each other with a nearly invisible gap. Because of this, fitting individual pieces by careful hand sanding is critical. That's where the patience comes in.

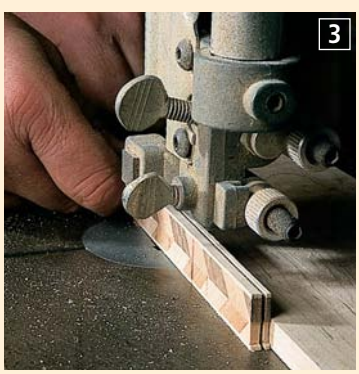
A light touch proves beneficial when gluing the banding together. If too much glue is applied and left in place, your inlay will show dark glue lines when finished. Take it easy with the glue. It's only holding an 1/8" piece of wood in place, and it doesn't take much.

by Glen Huey

Glen Huey builds custom furniture in his shop in Middletown, Ohio, for Malcolm Huey & Sons and is a contributing editor for Popular Woodworking.

The first inlay to make is the outer frame. Start by gluing up eight 35/64" wide x 3/4"-thick strips, angling the glue-up to anticipate the 45° cuts which will follow. When the glue dries, cut a 45° miter on one end, then set your table saw to cut 5/16"-wide strips. Be careful and use a push stick.

To form the chevron banding, glue the previously cut strips together, alternating the color pattern. At the same time, glue the 1/16" outer striping in place to the outer edges. This will bring the finished pattern to the final 3/4" width. I ripped the striping off a 3/4"-thick, 4"-wide block on the table saw, allowing the 1/16" piece to be the fall-off of the cut for safety. Some sanding on the mating faces (and using only the amount of glue necessary) will keep the glue line as small as possible.



After the glue-up is dry, head to the band saw and set up a fence to make a resaw cut, slightly thicker than 1/8". I started with both outside faces of the inlay sanded flat and cut the two outside surfaces from the block. I then resanded the faces of the piece that was left, then made two more cuts. Each piece should yield four lengths of banding. The smooth face on each length is the side that I glued down to the panel.

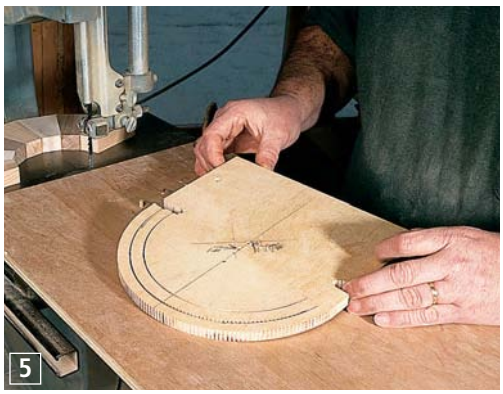
Photo by Al Parrish. Special thanks to Sharon Woods for use of location.

The inlay pieces are made using cherry, tiger maple and walnut. Straight-grain pieces are easier to work with, especially with the vining patterns, but the tiger maple pattern can also be very attractive in some areas. And in the chevron pattern, I used quarter-sawn grain (or side grain on a flat sawn board) to make the inlay more dramatic. Just choose your wood carefully. And make a few extra pieces, just in case.

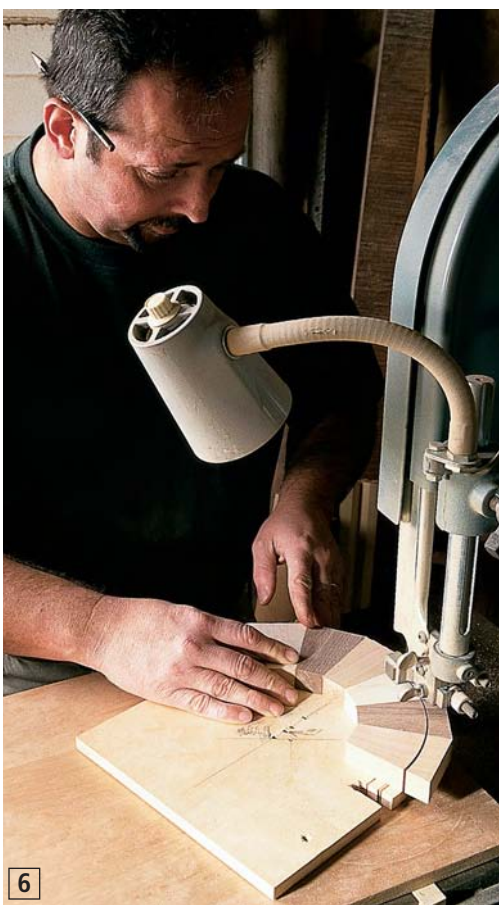
The door itself is a ¾" x 12½" x 13¾" walnut panel. Start with an oversized piece because you'll be nailing guides to the edges.

Wood moves with changes in humidity. After finishing this door, it would be a crime to have

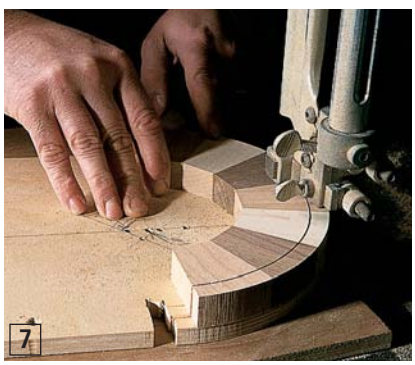
To form the inner circular inlay, I started with alternating walnut, maple and cherry ¾"-thick wedges cut at 22.5° angles on both sides. Glue up enough wedges to make a little over ⅓ of a circle. To make the glue-up easy, I first put wax paper on a piece of plywood, then arranged and glued the pattern. I then nailed the two outer wedges (at the inner point) to the plywood to keep the pattern from shifting. I then used a band clamp to pull the shape together. Only one section is necessary to complete the pattern.



After the wedge blank is dry, use the pattern at the end of this article to make a circle-cutting jig for your band saw. The jig is for a one-time use and will be cut with the blank. Pre-drill a center hole in the jig. In the plywood support board attached to the band saw, mark three points (4 9/16", 4 1/16" and 3 9/16") in a line from the edge of the blade. Start with a nail in the farthest hole as a pivot for the template. The wedge pattern blank can be attached to the jig using the same nail locations used during the glue-up. Make the first cut, then relocate the nail in the lower board and continue.



Using the circle jig, I first cut the outer arc on the blank, trimming the square ends of the wedge to a smooth arc. I then moved the jig to the second center hole in the platform and cut the first strip from the blank.

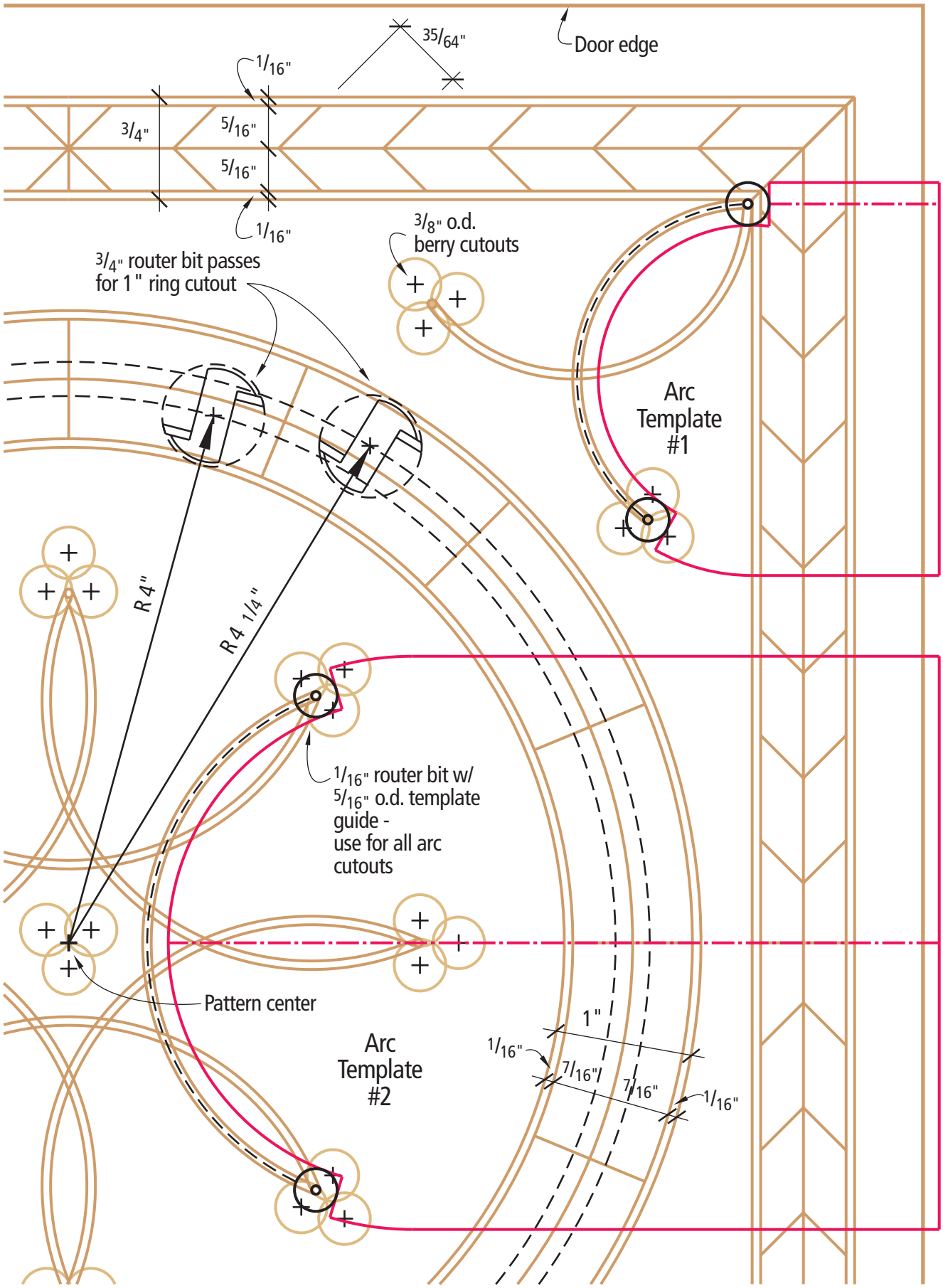


With the first band cut, the center nail is again moved to the closest nail hole in the platform and the inner band is separated from the blank.

Glue the two strips together, again alternating the color pattern. The seam should be fairly close, but a little sanding may improve the seam to make the joint as thin as possible. Squeeze clamps will provide adequate pressure for the glue-up.

Next, cut 1/16" striping for the chevron banding, and add it to the inner and outer surfaces of the arc, finishing out at 1" wide. I used the fall-off from the circle cuts on the band saw as clamping cauls for this step.

Then it's back to the band saw for resawing to complete the four sections. Just as with the chevron banding, sand flats on the outside surfaces, resaw from each side to ⅛", then sand new flats on the remaining piece and resaw again.



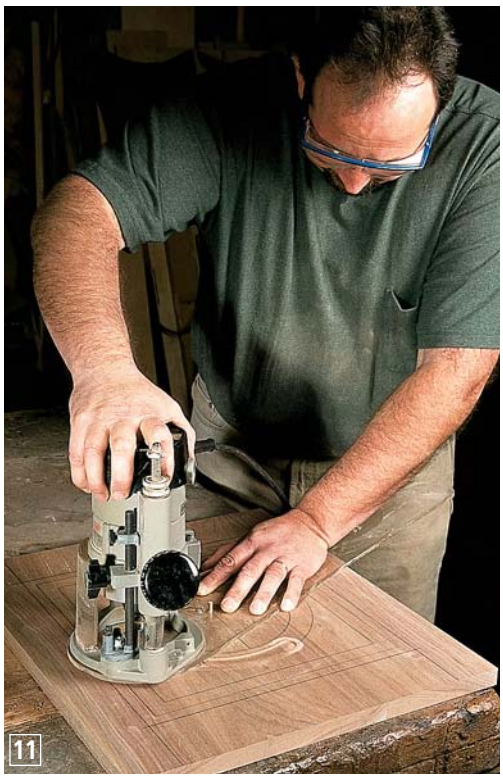
Full-scale plan of door and templates (shown in red).

it warp or twist and mess up the design. Because of this I decided to cut the panel into 2" widths and reglue it together. Of course, you could also make your own solid walnut plywood from three ¼"-thick panels, but because of all the inlay you don't really notice the grain pattern on the panel itself, so I was comfortable with just ripping and regluing.

I'm happy to say I was able to figure out how to use my beloved power tools for almost every step of this project. Sure, there's a certain amount of hand sanding, and I did have to use a corner chisel, but most of the work was done with the table saw, band saw and routers. I will recommend that you take a few minutes to tune up your band saw before the project. You'll be resawing ⅛"-thick small pieces on that machine and you want that puppy cutting straight, square and smooth.

Finally, I didn't take any pictures of the final sanding process. Once you get all the inlay pieces in place in the door it looks like a little topographical map with bumps and ridges all over the place. When you get ready to sand, take it easy. If you start in with too aggressive a grit you will leave sanding marks in some of the delicate, cross-grain inlay pieces and you could pull something loose. Start with a fine grit sandpaper. I used a random-orbit sander to level the door, but be patient.

If you didn't build the spice cabinet from the last issue (or perhaps didn't even purchase the last issue), you can buy issue #125 (December 2001) from our website at www.popularwoodworking.com. It's a great project with either door, but don't be afraid of the inlay. Heck, I did it! **PW**

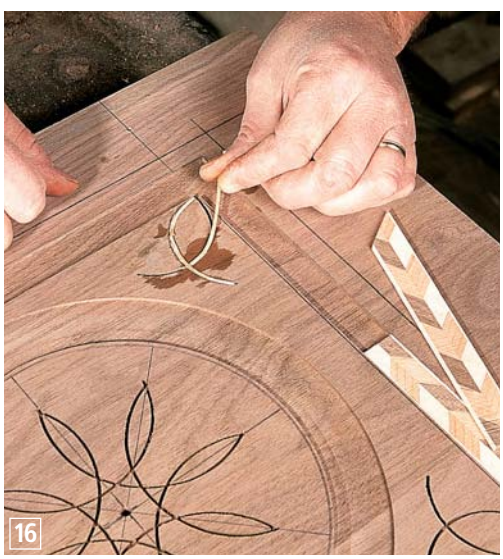

11

With the inlays made, lay out the pattern on the door front. The first step is to cut the circle pattern. I used a shop-made circle-cutting jig (though you can also purchase one), making the 1"-wide recess ⅛" deep in two overlapping passes using a ¾" straight bit. Start with the outside dimension, then adjust the jig inward to the inner diameter.


12

For the next step I chose to make a simple 2x4 frame and used a bit with a top-mounted bearing to create the outer border recess. This ensures that the corners will meet accurately. I used a ¾"-wide straight bit to make the cut with a single pass. After the cut, use a chisel to square out the corners.


13


16

To make the banding for the corner arcs, set your table saw to once again slice 1/16" strips from a larger piece. Then carefully slice the strip to a little over ⅛" thick. A straight edge and utility knife will serve well here. Then add a little glue and press them into the recess. Make some extra strips in case some snap. I used tiger maple, which is pretty brittle. Holly would have been easier to work with.

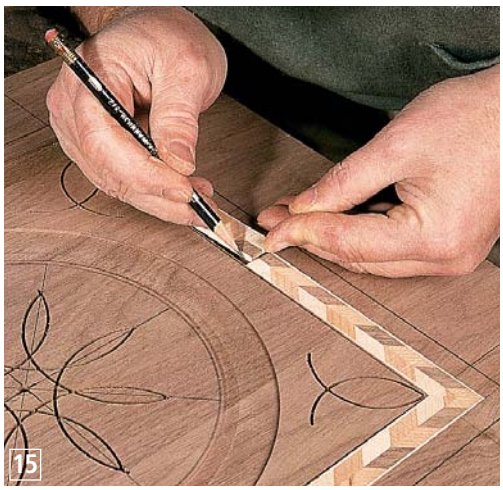

17

For the "berry" designs, I used a ⅜" plug cutter to make a number of ⅛"-thick dots. Carefully glue these in place. The berries in the center of the pattern are created in the same way.


18

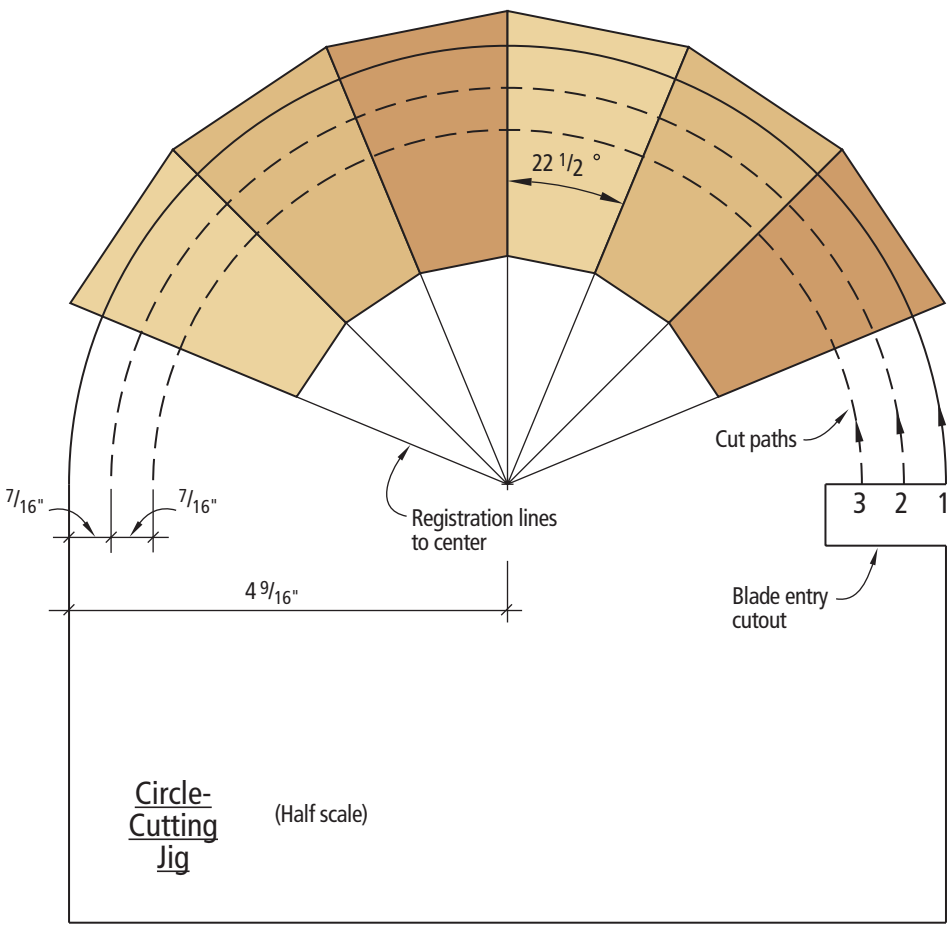
To make the mating arc inlays in the corners I used a template guide and trim router with a 1/16"-wide bit. I made the template from a 1/2" piece of scrap plywood. The inlay runs out from the outer banding. Use the diagram on a previous page to make your own template so that your cut will start right at the corner. The notches at the ends of the arc will help you start and stop your cuts.

The center mating arcs are made using the same bit and template guide, but a new plywood jig. Note that I used center lines struck on the door front to orient my template jig.



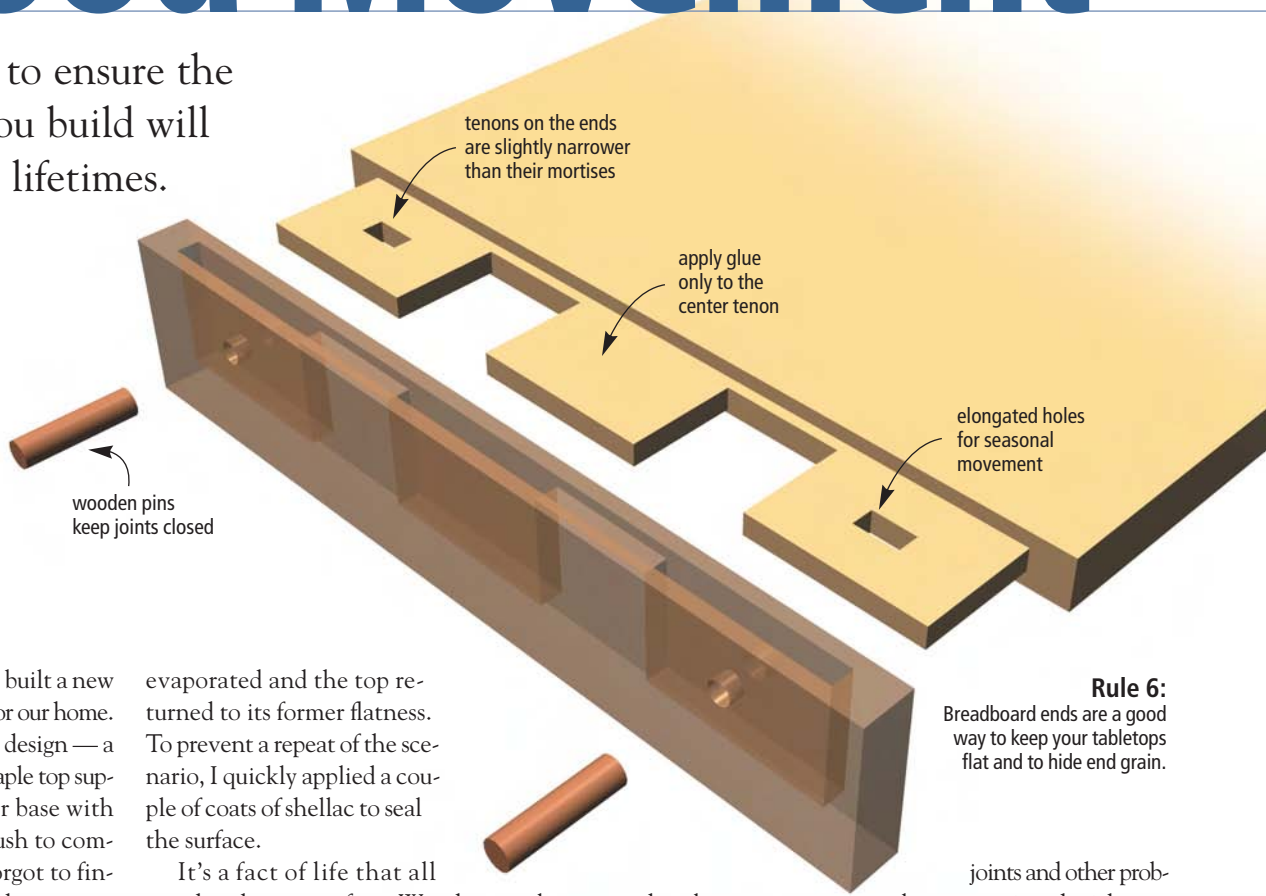
With all the recesses cut, it's time to start putting the inlay in place. I started with the outer chevron banding. Above, I'm marking the center of each run to reverse the direction of the chevrons. This actually makes the pattern easier to glue in.

Finally (though I'm working across the pattern in the photo above) glue the center ring inlay in place. The trick here is getting the four quarter-circle pieces to the correct lengths to mate exactly with almost no visible joint.



Dealing with Wood Movement

Eight ways to ensure the furniture you build will last several lifetimes.



Rule 6: Breadboard ends are a good way to keep your tabletops flat and to hide end grain.

A few years ago I built a new kitchen table for our home. It was a classic design — a richly figured curly maple top supported by a stretcher base with turned legs. In my rush to complete the project I forgot to finish the underside of the top.

The next day the relative humidity rose dramatically as a storm front approached; I entered the shop to find the top severely cupped, in spite of the stiff breadboard ends added to keep the top flat. In fact, the breadboard ends were warped, too.

Fortunately, I knew what to do. The moment the sun came out I placed the top outside with the unfinished convex side facing up. After an hour or so out in the warm sunshine, the moisture evaporated and the top returned to its former flatness. To prevent a repeat of the scenario, I quickly applied a couple of coats of shellac to seal the surface.

It's a fact of life that all woodworkers must face: Wood expands and contracts with changes in seasonal humidity. That's because wood is hygroscopic. What's hygroscopic? Simply a technical term for the concept that the wood's cell structure is similar to a bundle of straws, ready to draw moisture from the surrounding air. As the relative humidity goes up, wood absorbs the water vapor and expands. Days (or even weeks) later, it contracts as the relative humidity drops. To further complicate the problem, wood only moves across the grain. (Although technically speaking it does expand lengthwise with upswings in humidity, the amount is so minimal that you can safely ignore it.) So when you join two pieces of wood at a right angle, there's potential for problems because seasonal movement occurs in opposite directions. And because wood surfaces absorb and release moisture at different rates, a board will usually warp as it's exposed to changes in humidity. Fortunately, there are a number of steps you can take to minimize the cracking, warping, opened joints and other problems associated with seasonal wood movement. Let's take a quick run through each of them.

by Lonnie Bird

Lonnie Bird (lonniebird@earthlink.net) builds period furniture and conducts woodworking seminars in Dandridge, Tennessee.

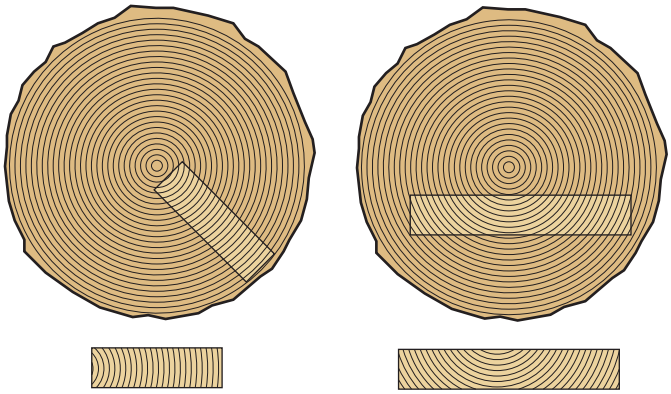
1 Begin With Dry Lumber

You'll avoid many of the potential problems associated with wood movement if you use properly dried lumber. That's because as lumber dries, it also contracts or shrinks. Obviously it's best if it does most of the shrinking before you construct that chest of drawers for your wife's anniversary present. Think Levis jeans: They're pre-shrunk to avoid more shrinking during laundry cycles.

In the same way, dried lumber is pre-shrunk so that it won't later contract and cause you grief.

So…how dry should the lumber be? The best moisture content (commonly referred to as MC) is one that places the lumber in equilibrium with your home's environment. Having the lumber in balance with the relative humidity of your home will dramatically reduce the amount the contraction (or expansion) that occurs. Want a hard number for moisture content? In most areas of the United States this equates to a 6 to 8 percent moisture content.

A common misconception floating around is that only kiln-dried lumber is suitable for fine woodworking. But the process used to dry the lumber is not as important as the final moisture content of the wood. In fact, I dry most of the lumber I use without using a kiln or other sophisticated machines. Here's how I do it: I usually buy my lumber as a great-looking log directly from a commercial logger. Buying the log allows me to get wide and thick boards that would cost a fortune and cost me hours of scrounging around a lumberyard. I have it custom-cut to my specifications, seal the ends of the boards, and stack them in a shed for drying. To promote drying, the boards are separated with sticks during the stacking. This allows air to circulate around the boards. After the lumber has dried in the shed to 15 percent MC (in equilibrium with outside relative humidity in my area), I store it on a rack in my shop to further dry it. Before using the lumber I always check the MC with a moisture meter. This small electronic device works by measuring the electrical resistance and converting it to MC. Lumber measuring higher than 8 percent MC remains in the rack for more drying time.



Quarter Sawn

Flat Sawn

2 Buying Dry Lumber

If you typically buy your lumber from a dealer, make certain that it is dry. Although most commercially available lumber is kiln dried, it may not be in the 6 to 8 percent MC range that is required to limit wood movement problems. Why? Most storage sheds at lumber yards are not heated. So if kiln-dried lumber has been stored in the shed for more than a few weeks, it's likely to absorb water vapor from the warm, moist, outside air. (Remember, wood is hygroscopic and it seeks equilibrium with its environment.)

So how can you avoid using lumber with a high MC? Always check it first with a moisture meter; for an accurate reading, also check the inside by sawing off a few inches from one end. Additionally, it's a good idea to always store lumber in your shop for a few weeks before working it. This allows it to acclimate to the environment in your shop and avoid potential movement problems.

3 Lumber Selection

Another way to minimize the natural contraction and expansion of wood is to select lumber that is naturally more stable. Because wood moves different amounts in relationship to the annual rings, its tendency to move depends on how it is sawn from the log. Sort through a stack of boards and note the orientation of the annual rings on the ends. On most boards the rings form arcs that are tangent to the board's face. This is called tangentially sawn lumber (also called flat sawn). Lumber with rings that are roughly 90° to the board's face is referred to as radially sawn (often called quartersawn).

Radial lumber is much more stable than tangential. Because of this it's sometimes the best choice for broad, flat surfaces. For example, acoustical guitar bodies are made from radial-sawn lumber. However, radial lumber is usually more expensive when and if you can find it. Also, most people find the flame figure in flat-sawn lumber to be more attractive than the straight grain found in quartersawn boards.

4 Wide Boards Look Best

My old high school woodworking textbook said to never use boards over 6" wide. Wide boards, the author stated, would have a greater tendency to warp. But wide boards have continuity of grain, figure and color that can't be matched by gluing several boards together. Drawer fronts, desk lids, door panels and small tabletops will all turn more heads when constructed from one wide board. In fact, I commonly use boards up to 24" wide. So, how do I keep them flat and prevent surface cracks during the dry winter months?

I begin by allowing them to dry (pre-shrink) and warp before I use them. Afterwards, I flatten them to remove the warp before planing them to thickness. Then I use construction techniques that allow for inevitable wood movement.

Another old saw from woodworking textbooks is to alternate the annual rings when gluing up a tabletop. That is, put one board with the rings facing up, the next with the rings facing down and so on. This does little good. You're better off finding the best face of each board and choosing that side for the top.

5 Constructing for Movement

One of the best ways for dealing with seasonal wood movement is to use construction methods that allow for seasonal di-

MOISTURE METER

Few woodworkers own moisture meters, a tool that can save you from an occasional disaster. With this particular model, you merely set the meter on your wood to get a reading. Less expensive models have pins that you insert into the wood you're checking.

mensional changes. Probably the best known example is frame-and-panel construction. A flat panel is trapped within a groove in a stile-and-rail framework. Because the groove is deeper than the panel's width, the panel is free to expand as the relative humidity climbs. As an added advantage, the thick frame prevents the wide, yet thinner, panel from warping.

Because of its ability to span broad areas while providing dimensional stability, frame-and-panel construction has been popular for centuries. It's been used for doors, wall paneling and even casework. In fact, roll-top desks are constructed entirely from frame-and-panel assemblies.

And the frame-and-panel assembly can be adapted to fit within the design parameters of most any furniture design. For example, the frame can be dressed up with a simple moulding profile along the inside edges. Where the moulding intersects in the corners it can be either mitered or coped. Coping works best to hide seasonal movement that occurs in wide rails. The panel can be flat, beveled (also called raised) or arched. I often use the panel as a place to show off wide, dramatically figured wood, such as crotch grain.

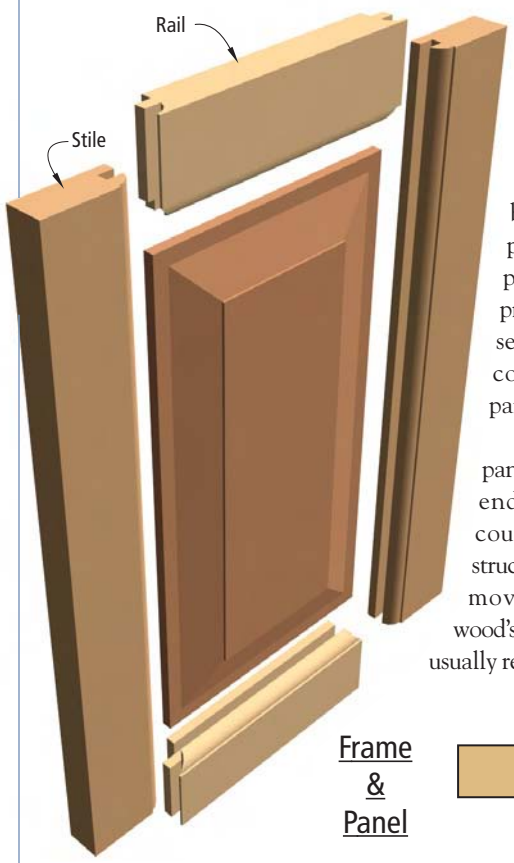
6 Breadboard Ends

Breadboard ends are another time-tested construction method for keeping a large panel flat, while still allowing for seasonal movement. (You'll still have to finish both faces of the panel — more on that in a minute.) Breadboard end construction is used on lids for desks and chests and wide tabletops.

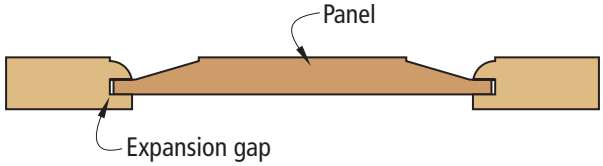
It works like this: Strips of wood are attached cross-grain to the ends of a wide panel. During normal seasonal humidity changes, the breadboard ends prevent the panel from cupping because wood has greater stiffness along the grain than across the grain.

Although the breadboard ends solve the cupping problem, they can potentially create a new problem — restriction of seasonal expansion and contraction — in the panel.

The key is to allow the panel to "float" within the ends. Anytime you encounter cross-grain construction you must allow for movement. Restricting wood's natural movement will usually result in split boards and open joints. So I attach the breadboard ends to the top with an odd number of mortise-and-tenon joints. By making the outer tenons slightly smaller in width than their corresponding mortises, the design allows the tenons to slide inside the mortises when the relative humidity changes. Also, I don't use glue in the joints because glue would restrict movement. So to keep the joints tightly closed I secure them with a wooden pin driven through the joint. I elongate the pin hole in the tenon, which allows the tenon to slide around the pin during humidity changes. During final assembly I apply glue only to the center joint; this forces the seasonal movement to occur equally on both edges.



Frame & Panel



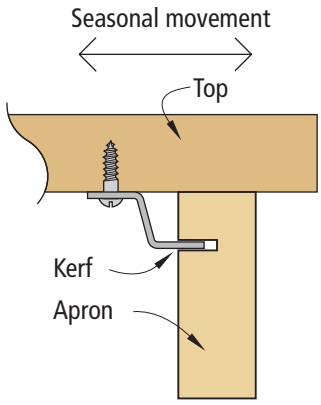
7 Attaching Tabletops

Like other instances of cross-grain construction, tabletops must be firmly attached to the framework of the base while allowing for seasonal movement. The most common method is to use pocket screws.

A series of screws are driven through the edges of the aprons into the underside of the top. To hide the screws, they are driven at a slight angle and the screw-head fits within a pocket on the inside of the rail. To allow for movement, the screw holes in the rails are elongated for a sloppy fit.

Other common methods to attach tabletops to bases include z-shaped clips that slide into a groove in the table's apron and screw to the underside of the top and shop-made wooden buttons that do the same thing.

Frame-and-panel, breadboard ends and pocket screws are just three construction methods you can use to deal with wood movement; each time you encounter cross-grain construction it presents a new challenge.



Z-clip

A final note on construction. Don't mill large, flat panels until you're ready to shape them. Otherwise they may warp slightly, making shaping and cutting joints difficult. For example, make the framework of a door first and dry assemble it to check for fit. Afterwards, cut the panel to size, shape it, and immediately fit it into the frame to keep it flat.

As an added precaution I'll wrap an assembly in plastic to prevent moisture exchange until time for finishing. I use the rolls of plastic available in hardware stores and home centers.

8 Seal the Wood

Sealing the surfaces of a board with a finish greatly limits the exchange of moisture. It's important, though, to seal all surfaces. Leaving a surface unfinished, like I did with my tabletop, can cause warping. This occurs because one face absorbs moisture at a much higher rate than the opposite face.

Finally, once the furniture is in the house, don't set it directly over a heating duct. Despite all your efforts, the continuous blast of hot, dry air can create serious wood movement problems. **PW**


The History of the
LEWIS AND CLARK EXPEDITION

ASIAN Bedside Table

Building cabinetry can give you a serious case of Zen Buddhism. In fact, the contradictions in woodworking are sometimes amusing — if not enlightening. Cabinets, for the most part, are more air than wood. To build a piece of furniture is mostly a process of removing wood. And to make a project look as simple and plain as this one does, it is quite a complicated process.

This frame-and-panel project is all about grooves, tongues and ancient proverbs.

Now before you start worrying that this simple bedside table is too much for your woodworking skills, remember my favorite Bulgarian proverb: "If you wish to drown, do not torture yourself with shallow water."

Frames and Panels

Except for two small pieces of plywood in the sliding doors, this project is made entirely out of solid wood. To account for the seasonal expansion and contraction of the material, the table is built using a series of frame-and-panel assemblies. In a nutshell, all of the frames are connected using mortise-and-tenon joinery. The panels all rest in ⅜"-wide x ⅜"-deep grooves in the frames. After you have milled all the parts using the cutting list and glued up any panels you might need, I recommend you begin by building the doors.

Lightweight but Solid Sliding Doors

The sliding doors on this table run in ¼"-wide x ¼"-deep grooves cut into the frame pieces. Once this table is glued up, the doors are in there for good. (You can easily make the doors removable by deepening the grooves in the top rail and increasing the width of the tongue on the top of the doors.) To ensure the doors slide smoothly for years to come, choose straight-grained stock for the parts.

The rails and stiles of the doors are joined using mortises and tenons. The plywood panel rests in a rabbet cut in the back of the door, and the slats are merely glued onto the panel.

Begin by cutting your ¼"-thick x 1"-long tenons on the rails. As you can see in the photo on the next page, the shoulders facing the outside edges of the door are ½" bigger than the ones facing inside. This makes a cleaner-looking joint when you cut the tongue on the top and bottom of the door. Now cut the matching mortises in the stiles. Glue and clamp the doors.

When the glue is dry, cut a ¼"-deep x ⅜"-wide rabbet on the backside of each door. Square the corners with a chisel. Finish sand the ¼" birch plywood panel and then glue it in the rabbet. When that glue is dry, glue the slats in place spaced 1" apart.

Finally, to complete the doors cut a ¼"-thick x ⅜"-long tongue on the top and bottom edge of the backside of the doors.

We shape clay into a pot, but it is the emptiness inside that holds whatever we want.

— Lao Tzu, Zen saying

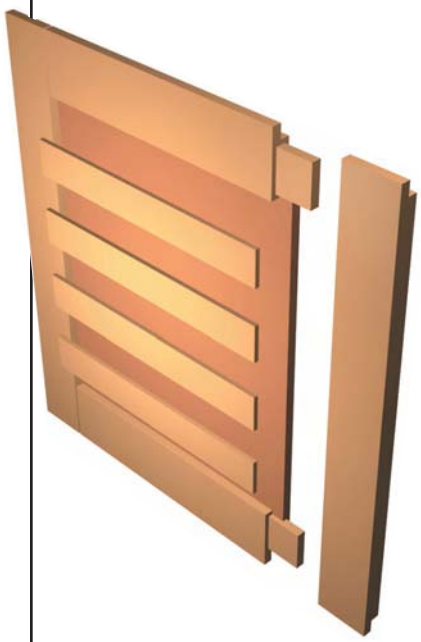
The Case

Begin work on the case by cutting ½"-thick x 1"-long tenons on all the rails with a ¼" shoulder all around. Now use your tenons to lay out the locations of the mortis-

by Christopher Schwarz

Comments or questions? Contact Chris at 513-531-2690 ext. 407 or chris.schwarz@FWPubs.com.

Photo by Al Parrish.

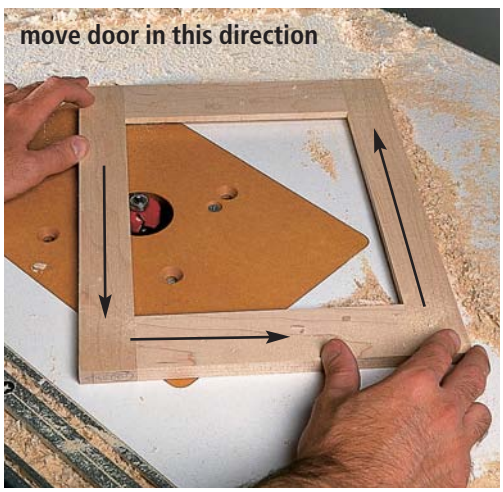


BEDSIDE TABLE

	NO.	ITEM	DIMENSIONS (INCHES) T	W	L	MATERIAL	
Top							
❑	2	Top stiles	1 3/4	1 3/4	30	Maple	3/8" x 3/8" groove on inside edge
❑	2	Top rails	1 3/4	1 3/4	18	Maple	1" TBE, 3/8" x 3/8" groove on inside edge
❑	1	Panel	3/4	16 1/2	20 1/2	Maple	in 3/8" x 3/8" groove; 1/2" x 3/8" rabbet, all sides
Base							
❑	4	Legs	1 3/4	1 3/4	23	Maple	3/8" x 3/8" groove for side & back panels
❑	4	Rails for sides	1	1 1/2	14	Maple	1" TBE, 3/8" x 3/8" groove for side panels
❑	3	Rails frt & bk	1	1 1/2	22	Maple	1" TBE, 3/8" x 3/8" groove for back panel
❑	1	Front bottom rail	2	1 1/2	22	Maple	1" TBE
❑	2	Top & bot panels	3/4	12 3/4	20 3/4	Maple	1/2" x 3/8" rabbet on edges; rests in 3/8" x 3/8" groove
❑	2	Side panels	3/4	12 5/8	12 5/8	Maple	1/2" x 3/8" rabbet on edges; rests in 3/8" x 3/8" groove
❑	1	Back panel	3/4	12 5/8	20 5/8	Maple	1/2" x 3/8" rabbet on edges; rests in 3/8" x 3/8" groove
Doors							
❑	4	Stiles	1/2	1 1/2	12 1/2	Maple	
❑	4	Rails	1/2	1 3/4	9 1/2	Maple	1" TBE
❑	2	Panels	1/4	8 1/4	9 3/4	Ply	in 1/4" x 3/8" rabbet on back of door
❑	8	Slats	1/8	1	7 1/2	Maple	applied to panel

KEY: TBE= tenon on both ends.

You can see the large shoulder on the door tenon here as I'm dry-fitting the door. The large shoulder makes for a cleaner-looking tongue.



You know, I really should install a starting pin in my router table for making cuts like these. If you take it slow and steady, you shouldn't have any problems. Just make sure you cut against the rotation of the cutter.

es on the legs. You want all of your rails to be set back 1/8" from the outside edge of the legs.

The only anomaly comes when laying out the mortises for the beefy front bottom rail. Its mortises run vertically instead of horizontally.

Cut the 1 1/16"-deep mortises. I used a hollow-chisel mortiser equipped with a 1/2" bit. As you'll see when you get into it, cutting these mortises is a bit different than in most case work. You'll clamp your work to your mortiser's fence and then move the fence in and out to cut the mortises (except when cutting the mortises for the front bottom rail, which

QUICK TIPS: STRATEGIES FOR RIDDING YOUR JOINTS OF GAPS

When you do a lot of mortise-and-tenon work, one of the most frustrating aspects of the joint is getting a seamless fit. Here are a few tricks to ensure fewer gaps.

1. Pay attention to the edge of the board that the mortise is in. If you sand or plane this surface before assembly, chances are you're going to change the angle of the edge, which will give you a gap when you assemble the joint. Before I cut a mortise in an edge, I run it over my jointer slowly to remove any saw marks. After the joint is glued and assembled, I go in and clean up the jointer marks with 120-grit sandpaper.
2. On highly visible joints, I'll put the tenoned piece in my vise and go to work on it with a chisel. Pare away at the shoulder area around and up to the tenon — but stay away from the edge. You only need to remove 1/32" of material or so.
3. Make your mortises 1/16" deeper than your tenons are long. This stops your tenons from bottoming out in the mortises and gives any excess glue a place to collect.

On the door slats, I cheated. I didn't feel like mortising the really thin stock into the stiles. To ensure your spacing is correct, use a couple of 1"-wide spacers to place your slats. A piece of tape on mine shimmed the spacers a bit to ensure the slats were equally spaced.

are cut conventionally). Finally, miter the tenons so they fit in the mortises without bumping into each other.

Two Grooves for Every Rail

There are lots of grooves on the rails and in the legs. One way to cut them all is using a 3/8" straight bit and a router table setup. However, I like to see what's going on when I cut grooves like these. So I used an aftermarket edge guide on my router. I prefer the Micro Fence for work such as this because it allows me to sneak right up on the perfect measurement with its microadjustable knob. Other edge guides are capable of the job, however.

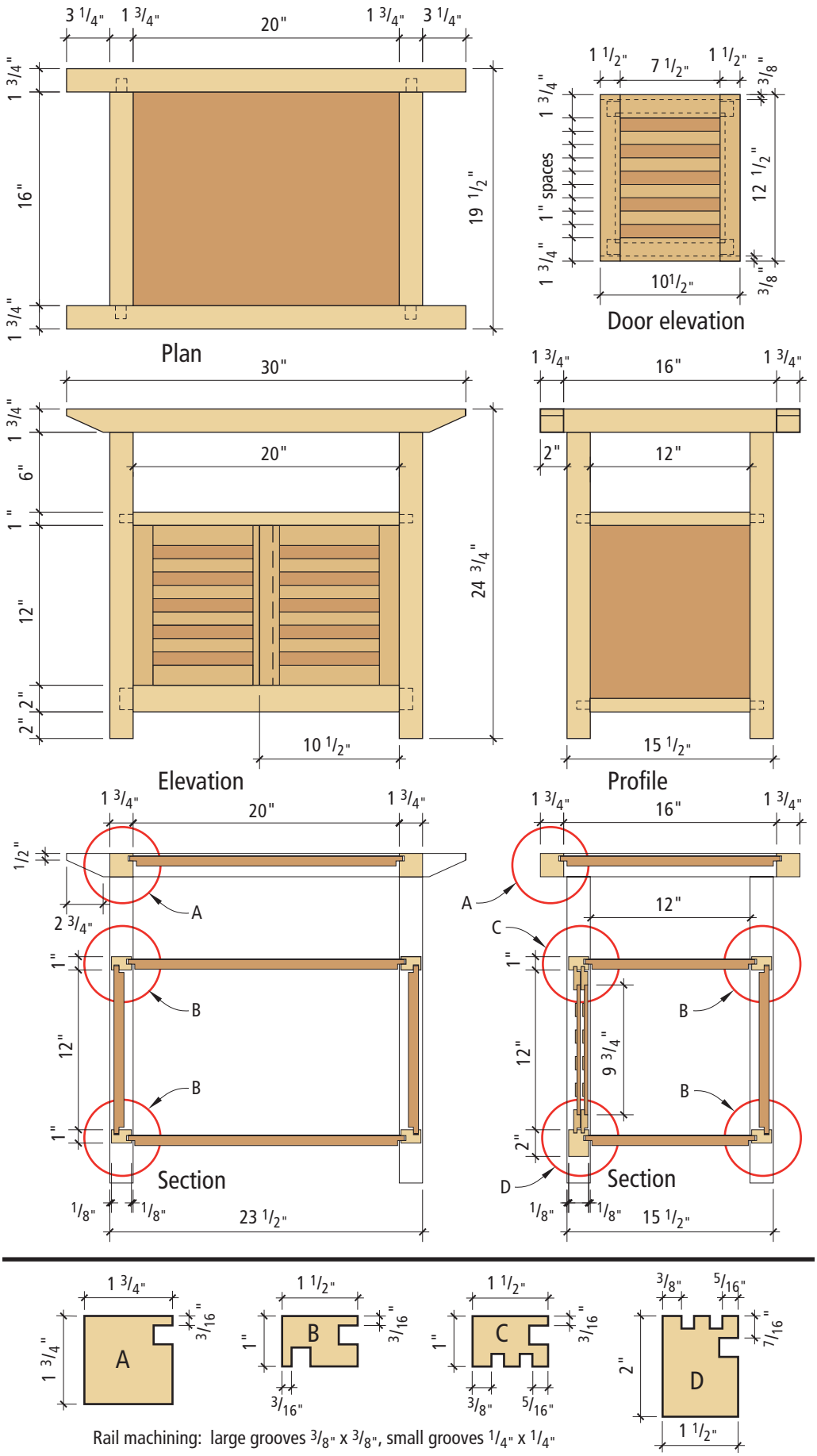
Set your 3/8" straight bit so it will make a 3/8"-deep cut and set your fence so the bit is 3/16" from the fence. Now, working from the outside edges of the rails, cut the 3/8" x 3/8" grooves on all the rails that hold the panels (except for the groove in the bottom front rail that holds the bottom panel). To cut that groove, set the distance between the fence and bit to 7/16" and fire away. See the drawings for more details.

Now cut the grooves in the legs for the panels. Set your bit so it's 5/16" from the fence and essentially connect the mortises.

Now it's time to cut the two grooves in the two front rails that the doors ride in. Chuck a 1/4" straight bit in your router and cut the grooves in the top and bottom rails as shown in the drawings at right.

To make the panels fit in their grooves, cut a 3/8"-deep x 1/2"-long rabbet on the underside of all the panels. You're going to have to notch the corners of each panel to fit around the legs. Cut the notches using a back saw.

Finish sand all the parts for the case and get ready for assembly. Check the fit of the doors in



Again, when cutting the grooves, you want to move the router in the direction opposite the rotation of the cutterhead. In this instance, this means moving the router from left to right.

Here's where it all comes together. You can see the grooves for the panels in the rails and legs and the mitered tenons.

SUPPLIES

Rockler
www.rockler.com
800-279-4441

Desktop fasteners, item # 21650, $3.99 for a package of eight.

Micro Fence
www.microfence.com
1-800-480-6427

the grooves. A couple passes with a shoulder plane on the tongues made my doors slide smoothly. Once everything fits, glue the side assemblies up. Put glue in the mortises, but not in the grooves. You'll want to finish everything before final assembly, so set the side assemblies and the rest of the parts aside for later.

The Top: Still More Grooves

The top is made much the same as the sides. First cut the ½"-thick x 1"-long tenons on the ends of the rails. Cut the mortises to match in the stiles. Get out your router and your fence again, chuck the ⅜" straight bit in there and set the distance between the bit and the fence to 3/16" (this will make the top recessed into the frame). Set the depth of cut to ⅜" and cut the grooves in the rails and the stiles.

Cut the detail on the ends of the stiles as shown in the drawings. I cut it using my band saw and cleaned up the bevel using a plane. Finally, cut a ⅜"-deep x ½"-long rabbet on the bottom side of your panel. Finish sand all the parts and glue up the top frame.

Finish and Fit

Before finishing, apply masking tape to all the tenons and plug the mortises with packing peanuts. Apply three coats of a clear finish, such as clear shellac or lacquer, and sand between each coat. When the finish has fully cured, assemble the case. Apply glue in the mortises, slide the doors in place and clamp it up. Check the case for square across the height and depth of the case. When the glue is dry, attach the top using desktop fasteners (sometimes commonly called "figure-8" fasteners). With a ¾" Forstner bit chucked into your hand drill, cut a recess for the fastener in the top of each leg. Screw the fasteners to the legs. Then screw the case to the underside of the top.

Whenever I finish a project such as this, I can't help but look askance at the tiny imperfections (unnoticeable to most people) that come from handwork. But then I try to remember another Zen saying from Ts'ai Ken T'An that should comfort all woodworkers: "Water which is too pure has no fish." **PW**

BOOKSHELF

If you're interested in Asian furniture, tools and construction methods, I recommend the following books available from The Japan Woodworker, 800-537-7820:

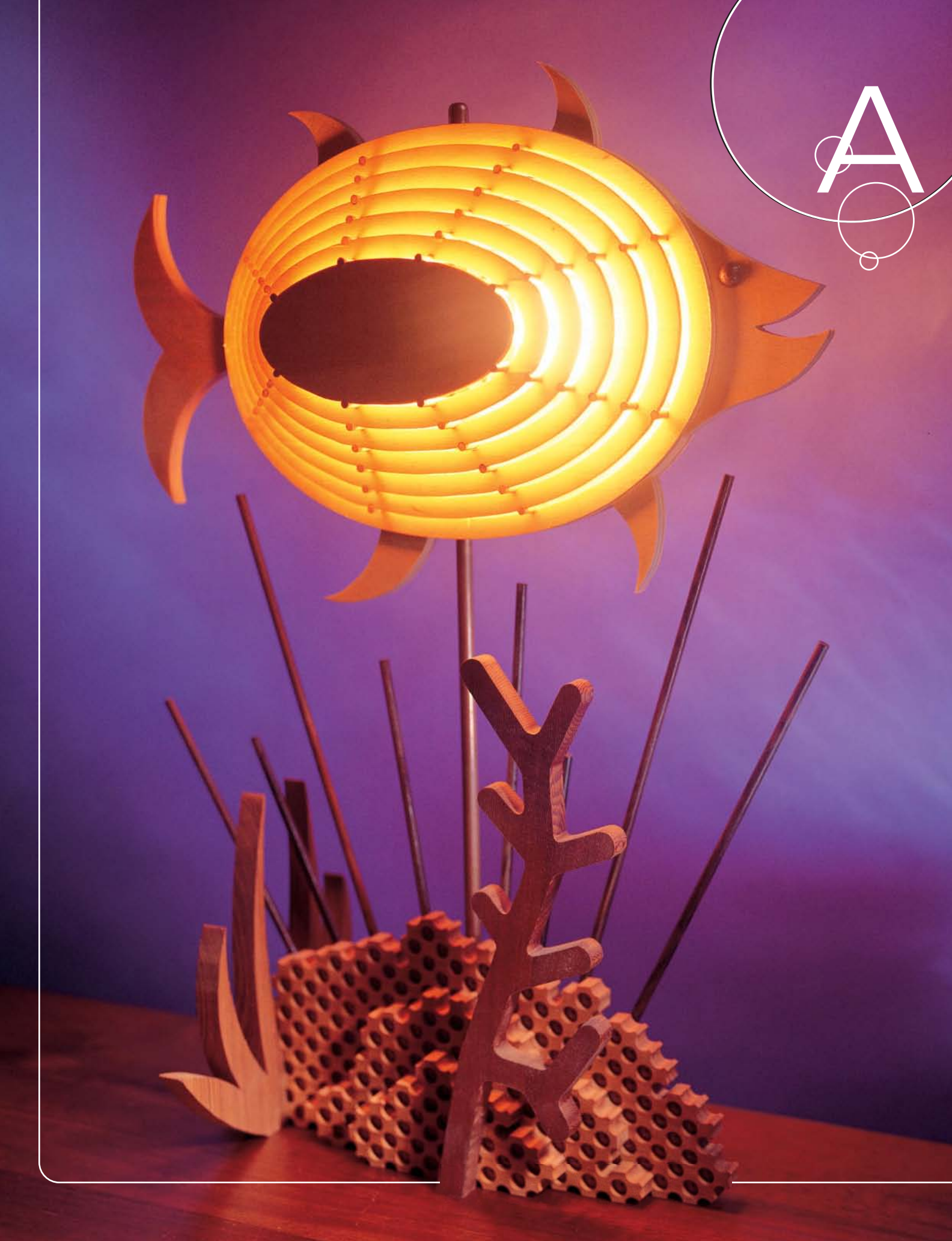
"The Complete Japanese Joinery" by Hideo Sato, item # 03.241, $29.95

"The Art of Japanese Joinery" by Kiyosi Seike, item # 03.009, $16.95

"Traditional Japanese Furniture" by Kazuko Koizumi, item # 03.195, $85

"Japanese Woodworking Tools: Their Spirit, Tradition and Use" by Toshio Odate, item # 03.250.25, $24.95

My large shoulder plane is probably one of the most useful tools in my shop. It trims tenons and deepens rabbets better than anything else out there. The original Record 073 (now out of production) sells used for several hundred dollars. I bought my Lie-Nielsen version for $225. Pricey? Yes, but well worth it. When you trim the tongues on the doors, make sure you have something backing up your cut or you will blow out the grain at the end.



LAMP CALLED WANDA

Add another useful pet to your household with this clever basket of a fish.

The tongue-twisting term *bioluminescence* translates to the production of light by living organisms. Bioluminescent fish light up to lure prey, defend themselves and attract other fish. The majority of such fish are found in the deepest regions of the ocean in a realm of perpetual darkness. Wanda (genus *Happy woodfishium*), the glowing subject of this article, was unexpectedly hatched in broad daylight at an altitude of 837 feet above sea level in the rolling hills of Delaware, Ohio. Talk about a fish out of water. Although relieved from the day-to-day lantern fish responsibilities of luring, defending and attracting, she stands ready to provide just the right touch of mood lighting for the author and his family.

Backbone

As with any good vertebrate, a backbone is the key to a successful Wanda. The pine backbone is the same shape as the first rib as shown in the drawing. All the drawings are half-scale. Enlarge them 200 percent to make them full size. Because I didn't have stock wide enough to create the required 9" x 12" oval, I cut two 4½" x 12" C-shapes from ½" clear pine and glued them together with joints at the head and tail. Don't sweat less-than-perfect joints. The fins, head and tail will cover them.

Ribs

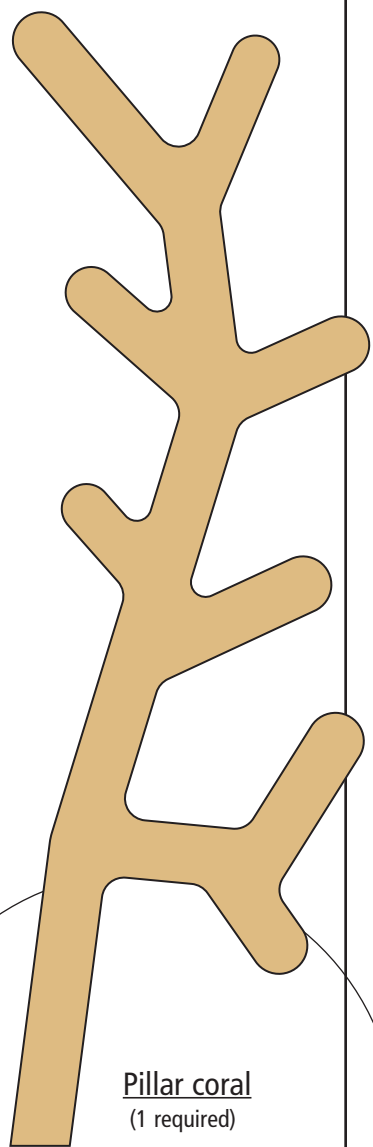
Apply two body patterns to ¼" Finnish birch (Baltic birch or Appleply will also work) plywood. A 12" x 36" sheet will fill the bill. Drill all the 3/16" dowel holes. With a scroll saw, play connect-the-dots and cut out the ribs and the outer oval. Nest the ribs and oval, keeping the original face-grain orientation. Apply small tabs of electrical tape to the front tops to keep it all sorted out. Glue the largest of the basket-like shapes to the backbone.

Dowels

Cut 96 (that's right, 96) ¾" lengths of 3/16" dowel. Since it is important that the ends of the dowels are square, I used a micro miter box with a stop clamped in place.

Body Half Assembly

On each rib, glue the dowels in the inner notches. Make sure they are plumb and flush with the bottom of the strip. Slide a small rib down over the dowels on a larger rib until the top ¼" of the dowels is exposed. With a small brush, apply glue to the inside of the exposed dowels. Now pull the small rib up until it is flush with the top of the



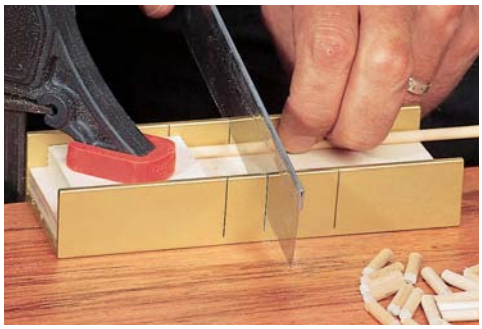
Pillar coral
(1 required)

by John W. Hutchinson

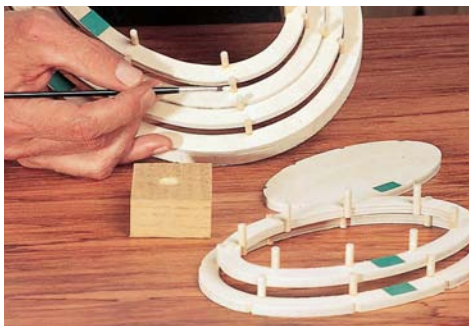
After nearly exhausting the realm of land animals to depict in his wooden creations, John has turned to the sea for inspiration. A Lamp Called Wanda will soon be followed by a wind-driven exercise in octopus behavior. We'll give you a little shore leave to rest up for that one.

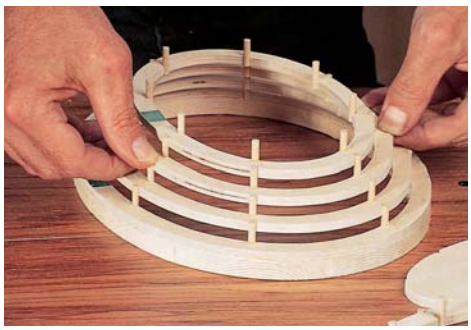
Photo by Al Parrish.

Enlarge the patterns to full size at your local copy store (yes, Copy Store person, you have our permission to reproduce this copyrighted material). Adhere the patterns to your plywood using a spray adhesive or rubber cement and then drill all the 3/16" holes using your drill press. Then it's just a matter of connecting the holes by cutting on the lines.



This small-size miter box and the gent's saw are available for sale at most woodworking stores. They are the key to cutting the 96 dowels with square ends. I clamped a stop block in the miter box to ensure all the dowels were the same length.





To assemble the basket sides, first glue one of the two largest ribs to your backbone. Glue the eight 3/4"-long dowels in notches in this rib with 1/2" protruding from the rib. Once the glue is dry, press-fit the next larger rib into the dowels and push it down so 1/4" of each dowel is exposed. Using a brush, paint the inside face of each dowel with yellow glue (right). Now raise the rib into position (far right). While waiting for this rib to dry, work on the rib on the other side of the basket.

dowels. When this first subassembly has dried, slide it down and over the dowels protruding from the next largest rib, apply glue to the dowels and pull up. Continue this process until you've created two "baskets." Work back and forth between the two body halves, allowing the glue to dry as you go.

Appendages

Laminate two layers of 1/4" plywood to create 1/2" stock for the head, fins and tail. Apply the patterns and cut them out on the scroll saw. Drill the eye sockets and insert 3/8" walnut screw hole buttons. Glue the appendages to the backbone.

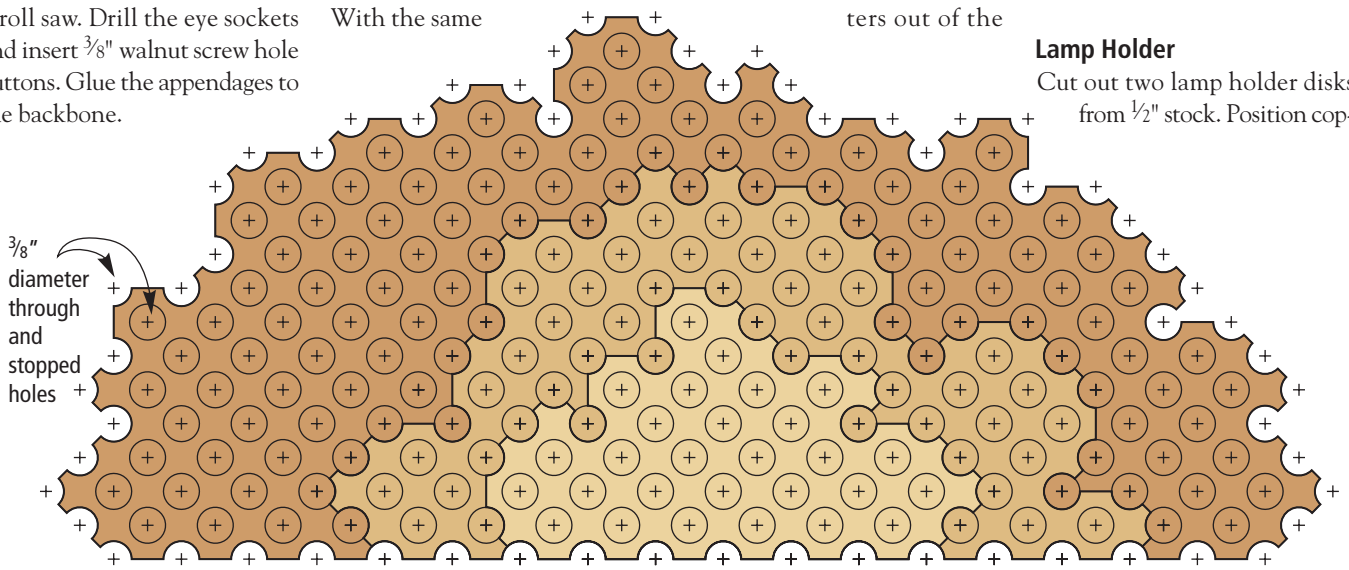
Base

While it would be easy to run out and purchase a gorgeous chunk of coral for the lamp base, doing so would only hasten the demise of one of Mother Nature's treasures. It's satisfying, and a lot of fun, to create your own underwater kingdom from scraps of wood and dowel lying around the shop. For the mound of brain coral that anchors the lamp, I used 1x cherry. Apply three patterns for the successive layers to the stock. Bore the grid of 1/4"-deep "cups" with a 3/8" Forstner bit. With the same bit, drill the perimeter through-holes. After the drilling is complete, it's again time to play connect-the-dots with the scroll saw. Glue up the three-layer coral with the help of 3/8" alignment dowels inserted into a few of the cups. The pillar coral and turtle grass are cut from a contrasting wood. I used clear cedar.

The brain coral is backed up by three joined semicircles. Some scrap 1x oak was the wood of choice here since it added heft to the base. As shown in the patterns, scroll saw the centers out of the two outer disks. The cavities provide a place for the wiring connections. The smallest semicircle becomes the removable cap. Drill a small hole in the cap for the lamp cord. Glue the larger pieces together and attach the cap with brass wood screws. Drill a 3/8" hole through the large disk and epoxy a length of copper pipe into the hole with 14" protruding. Drill a series of angled holes, again in the large disk, to house the 1/4" dowel reeds. Finally, center and glue the semicircle assembly on the back of the brain coral.

Lamp Holder

Cut out two lamp holder disks from 1/2" stock. Position cop-

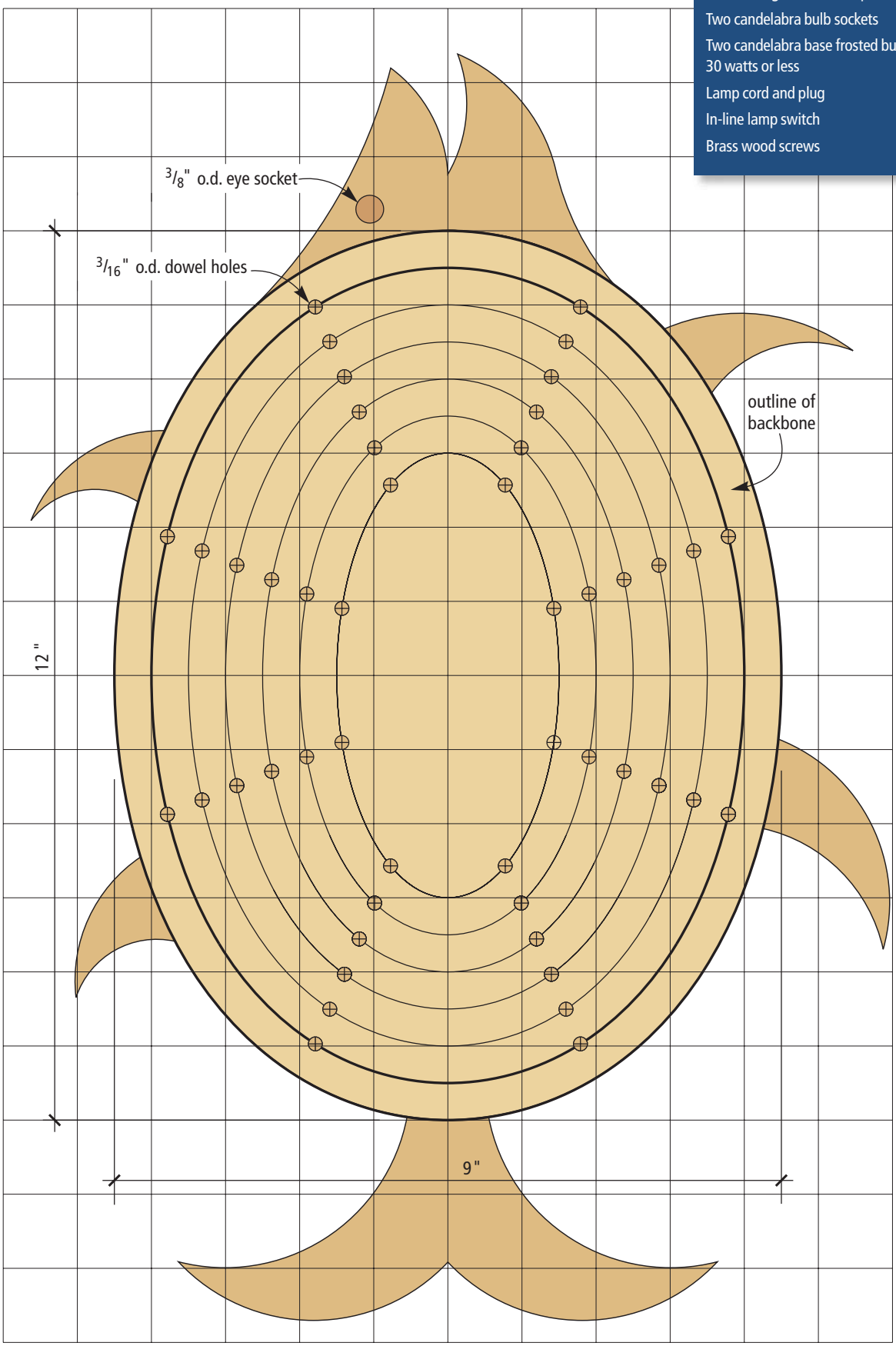


3-layer brain coral

half-scale drawing

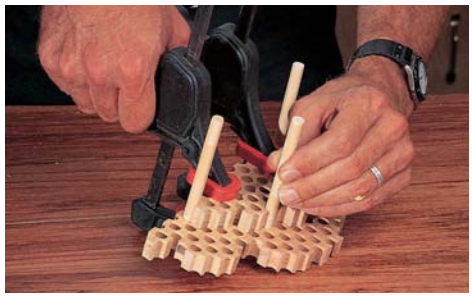
SUPPLIES

- 24" length of 3/8" o.d. copper tube, two T-fittings, one tube cap
- Two candelabra bulb sockets
- Two candelabra base frosted bulbs, 30 watts or less
- Lamp cord and plug
- In-line lamp switch
- Brass wood screws



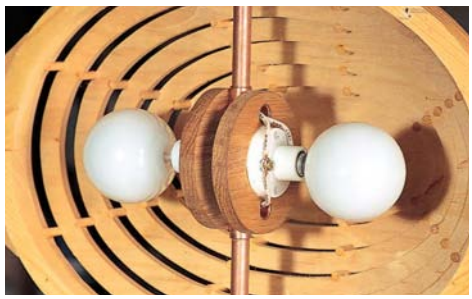
Half-scale drawing; enlarge 200 percent for full-size

Making the "coral" base is mostly a matter of drilling holes. Adhere the patterns to three pieces of wood and chuck a 3/8" Forstner bit in your drill press. The holes on the edges of the coral go all the way through the piece; the holes in the middle are 1/4" deep.



Use 3/8" dowels to line up the pieces of coral when you glue them up. Don't use too much glue because it's difficult to clean up squeeze-out in these holes.

The two wooden pieces of the lamp holder are joined by copper "tees" epoxied into holes drilled through the wooden circles.

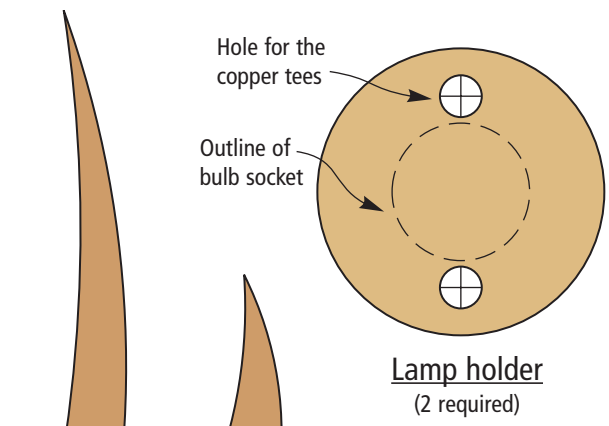


Here's what the lamp assembly looks like. Though the wiring is not difficult, I recommend you consult with an electrician friend to ensure your lamp won't accidentally transform into a "Wanda flambe."

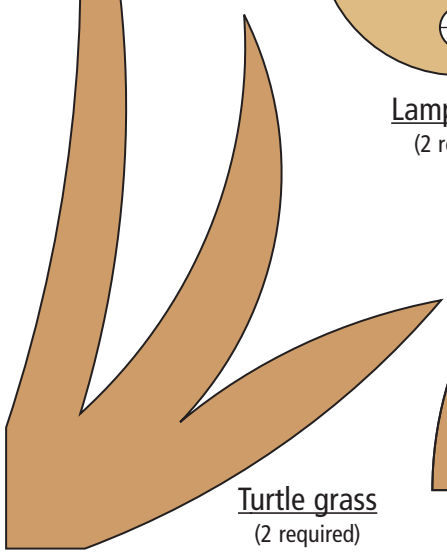
per "tees" in the holes and glue with epoxy. Next, screw (or glue) the lamp sockets in place on the center of the disks. Slide the upper and lower copper tubes through the holes in the backbone and epoxy them to the copper tees in the lamp holder. Also epoxy the backbone to the tubes to keep the body from rotating. In other words, glue everything to everything. With the guidance of someone versed in the ways of flowing electrons, fish (great term here) the electric cord up through the lower copper tube and make connections at the socket terminals. Screw in the light bulbs and attach the remaining body side to the backbone with brass wood screws.

Let Her Shine

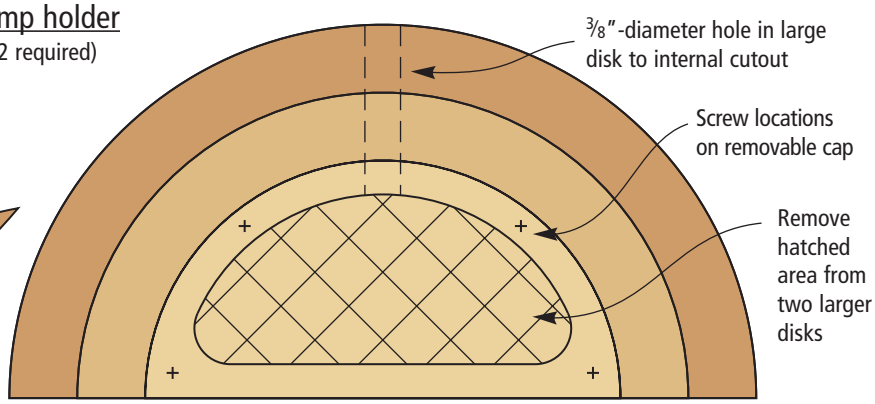
Aside from a mild case of Repetitive Motion Disorder brought on by all the cutting and drilling, the pleasure derived from adding Wanda to your household will far outweigh the pain. **PW**



Lamp holder
(2 required)

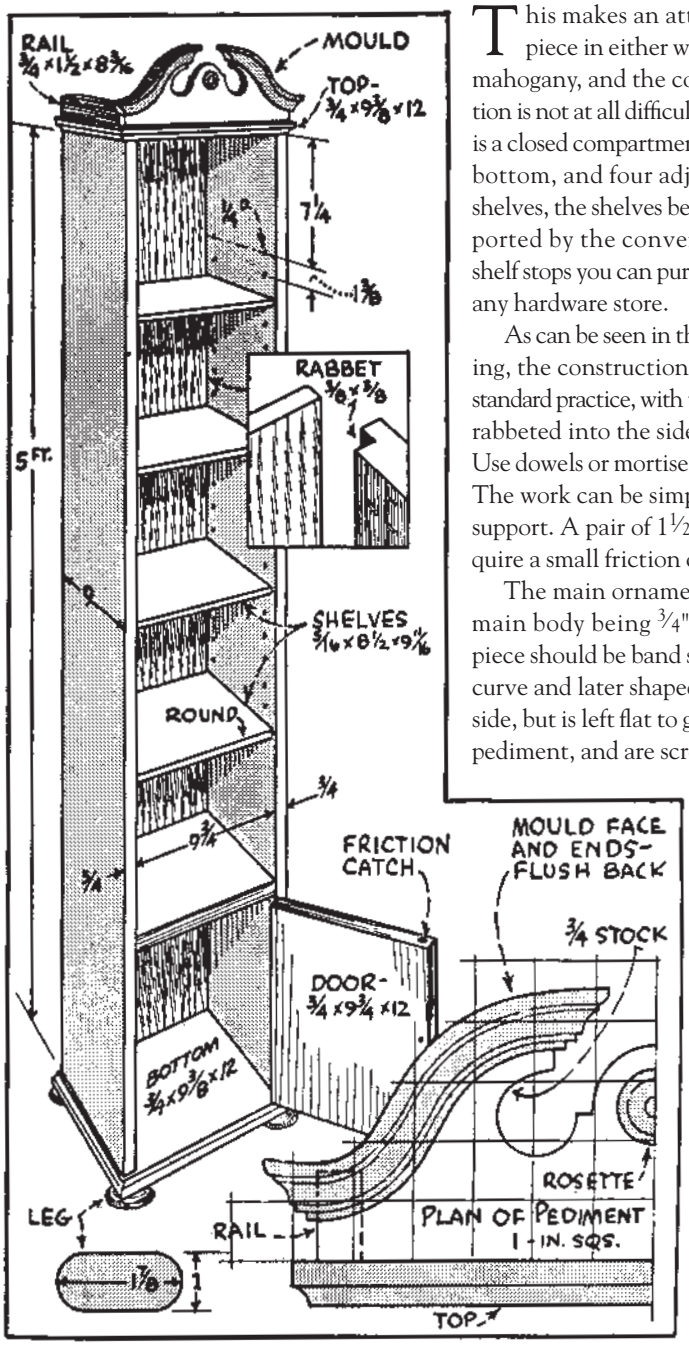


Turtle grass
(2 required)



3-layer brain coral backup

Pier Cabinet with Shelves and Storage



This makes an attractive piece in either walnut or mahogany, and the construction is not at all difficult. There is a closed compartment at the bottom, and four adjustable shelves, the shelves being supported by the conventional shelf stops you can purchase at any hardware store.

As can be seen in the drawing, the construction follows standard practice, with the back rabbeted into the side pieces and the top and bottom screw-fastened into place. Use dowels or mortise-and-tenon joinery when fitting the top of the compartment. The work can be simplified by using metal angles on the underside as a means of support. A pair of 1½" by ½" brass butt hinges carry the door, which will also require a small friction catch to hold it in a closed position.

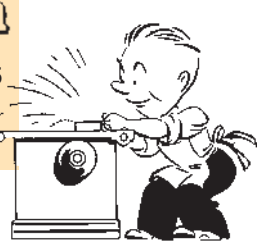
The main ornamentation is the pediment. This is made up in two parts, the main body being ¾" stock and the moulding somewhat heavier. The lighter piece should be band sawed to shape first; then the mould can be sawn to the right curve and later shaped on the drill press. The moulding is not shaped on the back side, but is left flat to glue flush to the lower portion. The two rails butt against the pediment, and are screwed in place about 7/16" from the edge of the top.

It is important that the holes for the shelf stops be in exact alignment, and to that end it is advisable to use some form of jig when boring these on the drill press. There are 22 stop positions, the centers being 1⅜" apart and the same distance in from the edge and back of the cabinet. The stops should be purchased before drilling the holes since the size varies from 3/16" up. There is a bit of turning to do — four legs, a rosette for the pediment and a handle for the door. All of these can be chucked quite nicely on a single screw center. **PW**

The Deltagram

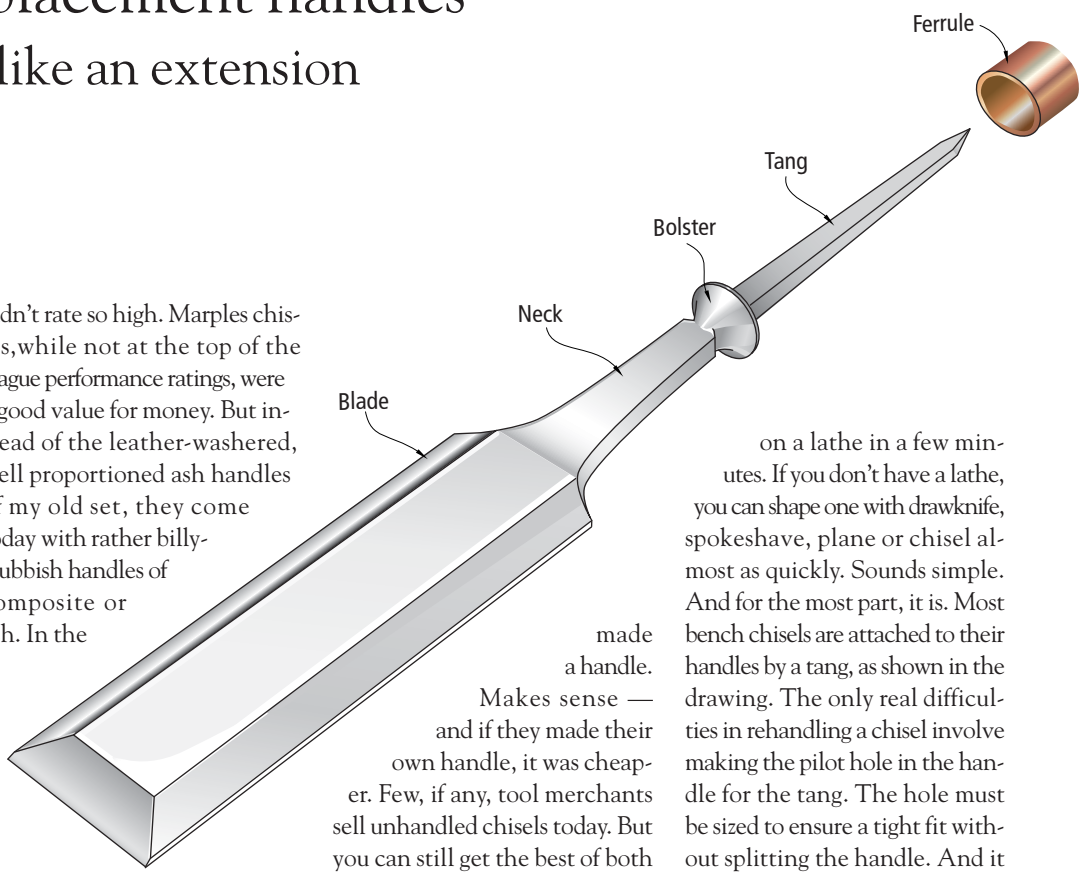
From Vol. 4 **January 1935**

A nostalgic look back at plans published by Delta Machinery during the mid-20th century.



making your own CHISEL HANDLES

You don't have to own a lathe to make replacement handles that will feel like an extension of your hand.



A few months ago I had to face the unpleasant truth about my chisels. Given to me years ago by my father, my trusty old set of Marples bevel-edge chisels had run out of steel. Ground and sharpened to stubs, they had to be replaced.

A little research into the chisel market revealed a surprisingly large selection. The important consideration, it seemed to me, was performance — which blades would take the keenest edge and hold it longest. But when I'd plowed through a stack of reviews (not being a tool steel expert, I relied on the tests and experience of others) and narrowed the field, I found I'd overlooked a second important consideration: handles.

No matter how marvelous the cutting edge, if the tool feels like a billy club in your hand it's of little use. Several of the top-performing chisels had clunky handles, while the handles I liked best were attached to chisels that didn't rate so high. Marples chisels, while not at the top of the league performance ratings, were a good value for money. But instead of the leather-washered, well proportioned ash handles of my old set, they come today with rather billy-clubbish handles of composite or ash. In the end, I found myself buying several chisels as much for their handles as for their steel.

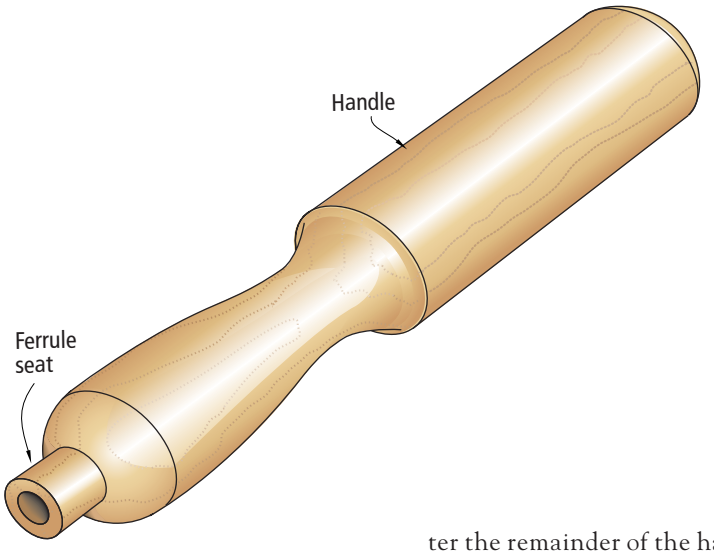
The more I thought about it, the more this seemed an unhappy compromise. It was once common practice to sell unhandled chisels. Craftsmen bought the chisel blade then bought or made a handle. Makes sense — and if they made their own handle, it was cheaper. Few, if any, tool merchants sell unhandled chisels today. But you can still get the best of both worlds. Ignore the handle and buy the tool for its steel or its value for money or whatever else appeals to you. Then cut off and replace the offending handle.

You can turn a chisel handle on a lathe in a few minutes. If you don't have a lathe, you can shape one with drawknife, spokeshave, plane or chisel almost as quickly. Sounds simple. And for the most part, it is. Most bench chisels are attached to their handles by a tang, as shown in the drawing. The only real difficulties in rehandling a chisel involve making the pilot hole in the handle for the tang. The hole must be sized to ensure a tight fit without splitting the handle. And it must align the handle and the blade on the same axis. So, before you slice off the handles of your favorite chisels for replacement, rehandle a similar, but less valued, chisel (or two) for practice.

by Roger Holmes

Roger Holmes trained as a furniture maker in England and has been working wood professionally and for fun for 30 years. He lives in Lincoln, Nebraska.

Illustrations by Mary Jane Favorite.



Off with the Old

Before you can put on a new handle, you have to get rid of the old one. First, mark the estimated length of the tang on the handle — 2" or so should do — then cut off the top of the handle above that point. I cut both composite and wood handles with a hacksaw. If I've miscalculated the tang length, I won't ruin the teeth of my nice backsaw.

If you're removing a wooden handle and you want to reuse the ferrule, next make a few saw cuts just above the ferrule down to the tang. Then split away the remainder of the handle, using another chisel as a wedge. You may now be able to drive the ferrule off the tang with a hammer and cold chisel. Or you may need to bore out some of the wood from inside the ferrule to loosen it. If you don't want to keep the ferrule, just cut through its length with the hacksaw and pry it off the tang.

The process is similar for a composite handle, which is cast in place around the tang. Using the hacksaw, I cut off the end of the handle. Then I make lengthwise cuts down to the tang to quarter the remainder of the handle, which makes it easier to split.

Tang Types

Tangs on my old chisels are four-sided and tapered to a point. Some are irregular and bear the marks of forging. They are seated in the handle in a stepped pilot hole, as shown in the drawings on the following pages.

Tangs on some of my newer chisels are cast, not forged. Those for wooden handles are faceted on four sides, but not tapered. They seat in a single pilot hole. The corners of tapered and faceted tangs dig into the wood to make a tight, torque-resistant fit.

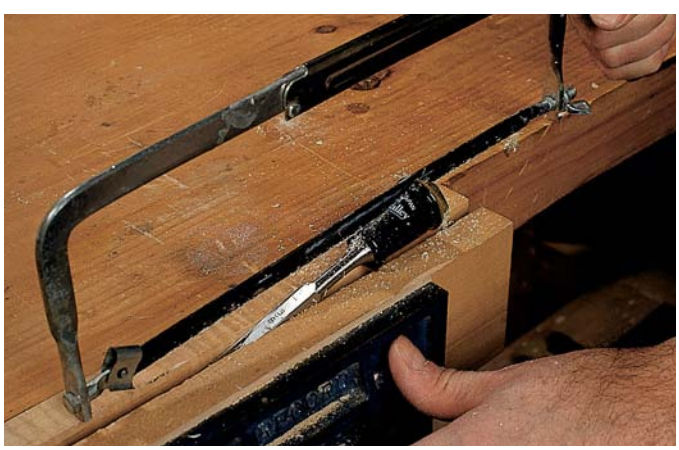
Tangs for my composite handled chisels are cylindrical, with small raised "fins" along their length to key them into the composite material formed around them. Driven into a wooden handle bored to the same diameter as the tang (or slightly smaller), the fins might be enough to ensure a tight fit, particularly for a light-duty chisel. I ground facets on the tang and sized the pilot hole accordingly to be on the safe side.

To ensure that the edges of the tang dig into the wood, the pilot hole should be smaller than the tang. For a square-section tapered

Saw off the top of the old handle with a hacksaw—you won't damage the saw teeth if you hit the tang by mistake.

After making saw cuts at the top of the ferrule in to the tang, split a wooden handle away from the tang.

To remove a composite handle, saw lengthwise down to the tang in three or four places, then split the remains of the handle from the tang.



Step photos by Mike Farrell; illustrations by Mary Jane Favorite.

The chisel blade in the center has a forged, four-sided tapered tang. The other blades have cast tangs. The left one, for a composite handle, is cylindrical, with small "fins" along its length. The right blade, for a wooden handle, has four faceted faces but no taper.

You can make handles in a wide variety of shapes quickly and easily on a lathe.

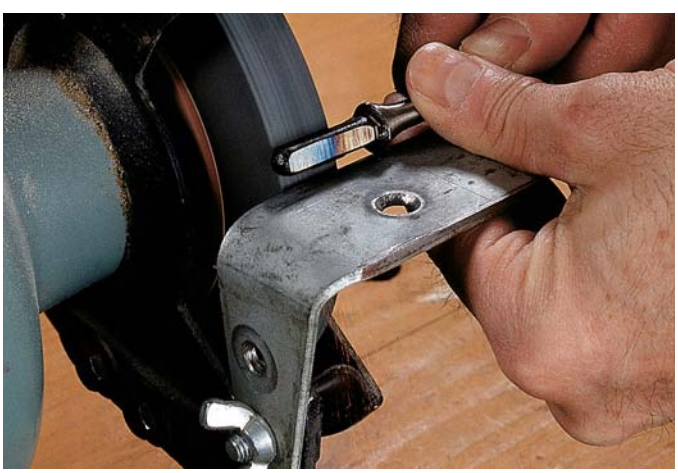
tang, the larger of the stepped pilot holes can be the same diameter as the diagonal across the tang as measured about one quarter the length of the tang from the bolster. (The bolster is the flared section between the chisel's narrow neck and the tang; it seats against the end of the handle.) Take the measure for the smaller hole about three-quarters of the length of the tang from the bolster. For an untapered faceted tang, make a single pilot hole of smaller diameter than the tang's diagonal measure. The difference in the size of the hole and the tang can be larger in softer woods than harder woods, which have less give and will split more easily.

Ferrules

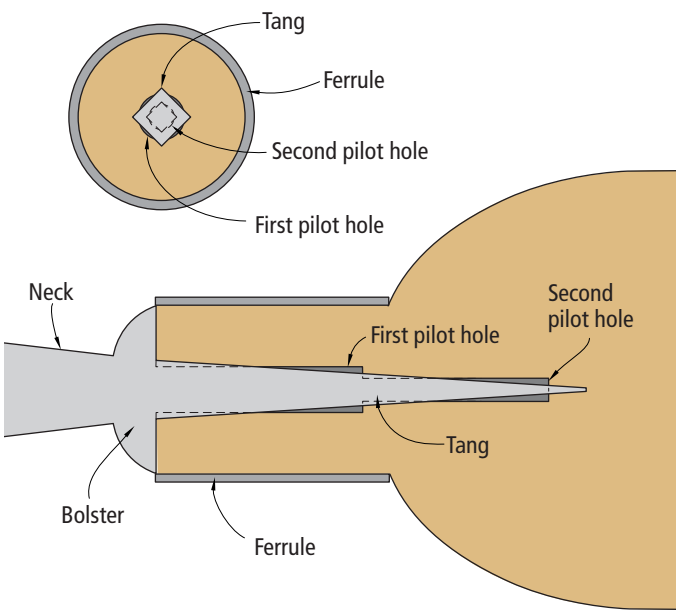
These short cylinders of brass or copper bind the handle just above the bolster of the chisel. The bolster and ferrule work together to prevent the handle from splitting when the chisel is driven by a mallet. Chisels and gouges used only with hand pressure need no ferrules. But most chisels have ferrules even if they're intended for fine paring work; some carving tools do not. For many chisels, the greatest risk of splitting the handle comes when fitting the handle, so a ferrule is a good precaution regardless of the tool's intended use. Chisels and gouges subjected to heavy banging are often fitted with a metal hoop at the top of the chisel to prevent splitting at that end.

The size of the tang and bolster largely determine the size of the ferrule. If you're replacing a wooden handle, you can reuse the ferrule or use one the same size. If you want to fit a smaller ferrule or you're replacing a composite handle, make sure there will be enough wood inside the ferrule to accommodate the tang. In general, the diameter of the ferrule must be at least that of the chisel's bolster.

If you don't reuse a ferrule, you can make your own from copper tubing sold at hardware stores. Or you can buy brass ferrules for a few cents apiece from Lee Valley Tools. These come in a wider range of diameters than are avail-



Grind flat facets on a round cast tang made for a composite handle to ensure a tight fit in the new wooden handle.

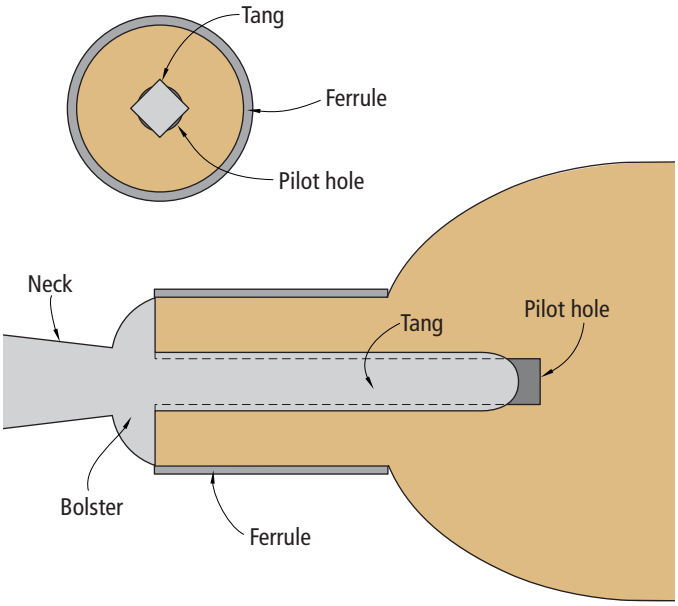


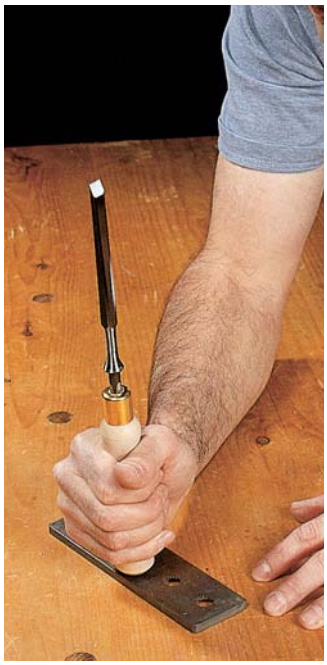
Bore the tang pilot hole on the lathe using a machinist's drill mounted in a chuck on the head stock. Feed the handle into the spinning bit with the feed wheel on the tail stock.

able in copper tube. You need to fit the handle to the ferrule, so always have the ferrule you intend to use before you make the handle. Some chisels are fitted with leather washers that slip over the tang and seat between the bolster and the end of the handle. I think they're intended somehow to cushion mallet blows, but I can't say I feel a difference in use. I like them anyway, so I cut them out of a piece of shoemaker's sole leather and put them on.

Making the Handle

This is the fun part. You can make any kind of handle you can imagine. Turning handles on a lathe is quick and easy—you can make and discard half a dozen before you find the one you want and still be done in an hour. Shaping handles with drawknife, spokeshave, plane or chisels takes longer, but can produce handle shapes — faceted or flattened for example — that are unobtainable on a lathe. And you can combine turning and hand-shaping. If you want to rehandle a chisel but don't want to make the handle, you can buy a classic boxwood pattern in several sizes from Lee Valley.





Seat the tang in the handle by repeatedly striking the end of the handle against an iron plate or machine table.

Commercial handles are commonly made of ash, beech or boxwood. But any reasonably hard wood will do. I'm looking forward to making some handles of osage orange, a native here in Nebraska that has tight grain, a lovely orange color, and is tough as nails. Firewood suppliers are excellent sources of ash, maple, birch and other local woods that make fine handles. If you can split handle blanks from the log, you'll ensure that the grain will run parallel to the handle's length, the strongest orientation.

On the Lathe

Turning is the easiest way to make a handle. Whatever shape you choose, it is important to fit the ferrule snugly to one end. It needn't be a forced fit, but it shouldn't rattle around on the wood, either.

The great advantage of a lathe is in boring the pilot hole for the tang. I mount a chuck and bit on the head stock and feed the handle onto the bit by turning the tailstock's dead-center wheel. This bores a hole right on the handle's axis, ensuring that the chisel blade and handle will be properly aligned.

Use machinist's bits — the tapered nose makes a neater, easier entry than a brad point or other spur bit. Complete the handle's shape (and rub finish on the spinning handle with a cloth if you wish) before you bore the hole.

Assembly

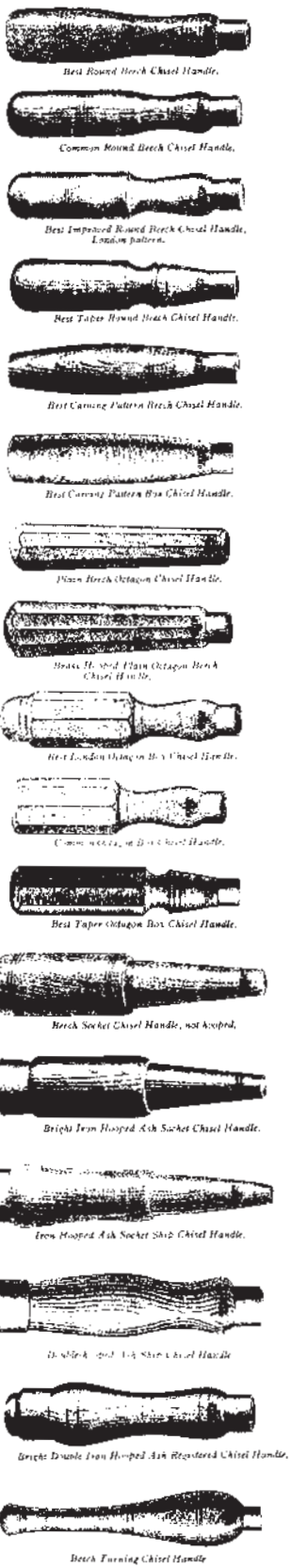
To join chisel and handle, slip the ferrule in place on the end of the chisel handle, add a leather washer if you want one and start the tang in the pilot hole. You can fix the chisel in a vise and drive the handle on. I prefer to upend the chisel and handle and bang the end of the handle on a machine table or other heavy piece of iron. Done this way, the blade's own weight drives the tang into the handle and I don't have to worry about the blade slipping

SUPPLIES

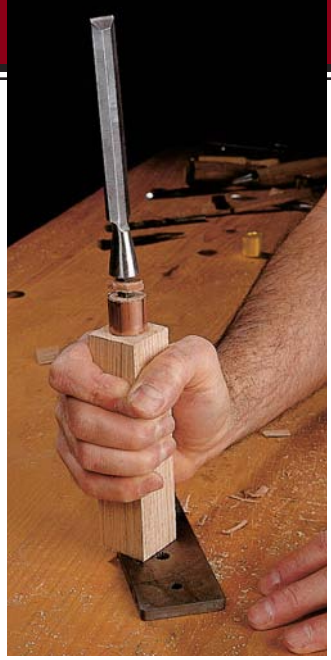
Lee Valley Tools
800-871-8158
www.leevalley.com

Octagonal Boxwood Chisel Handles available in 5¼" lengths to 6¼" lengths. Priced from $6.95 to $8.25 each.

Brass Ferrules available with interior dimensions from .312" to 1½". Prices range from 15 cents to 96 cents each.



Different chisel handles as shown in R.A. Salaman's "Dictionary of Woodworking Tools" (Astragal Press), an excellent resource on the identification and history of hand tools.



After making cuts at the corner to prevent splitting along the handle's entire length, form the ferrule seat with a chisel (left).

If you're uncertain about the alignment of the tang pilot hole and handle, you can assemble the blade to the handle blank. Draw lines on the handle along the axes of the blade. Shape the handle parallel to the axes to ensure good blade-handle alignment.

in the vise. It takes a while, but unless you've badly underestimated the size of the pilot hole, the bolster will eventually seat snugly against the end of the handle. Even if the hole is a bit too tight, splits are usually contained by the ferrule.

Hand-shaping a Handle

If you don't have a lathe, or you want a faceted handle, it is easy to shape one by hand. The tricky part is boring the pilot hole in the handle so that the blade and handle will be aligned. A blade that skews off the handle centerline can be very awkward to use. I think the easiest method is to bore the hole in a square handle blank before shaping the handle. With a drill press the hole can be bored very accurately. Or the blank can be held firmly in a vise for hand drilling. Set a square or two up to gauge the angles.

Next, form the seat for the ferrule. Make saw cuts in at each corner to prevent splitting beyond the ferrule seat. Then pare carefully with a chisel until the ferrule fits the seat snugly. If you're confident that the pilot hole is well centered along the length of the blank, you can shape the handle, then assemble it with ferrule and blade as described previously. If you're uncertain about the orientation of the pilot hole, you can assemble the handle and blade, then shape with drawknife and spokeshaves, as shown in the photos. This can be a bit awkward in spots, but it allows you to make adjustments in the handle to offset an off-center pilot hole.

Rehandling a chisel or gouge is very satisfying. A homemade handle may not be stronger or more durable than one from the factory. But it is certainly more personal and is worth doing for that reason alone. **PW**

Photo by Al Parrish.

Bench Deadman

For less than $10, you can rig your workbench to easily support and clamp large panels, doors and long boards.

by Christopher Schwarz

Comments or questions? Contact Chris at 513-531-2690 ext. 407 or chris.schwarz@FWPubs.com.

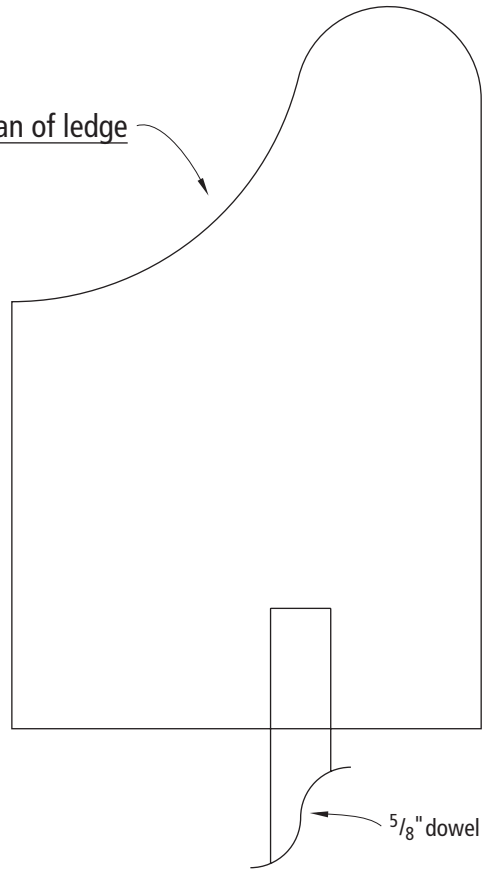
There are few clamping jobs that are more difficult than trying to secure something big so that you can work on its edge. Mortising a large door for a hinge is a common situation. Cleaning up the long edge of a board you just band sawed is another.

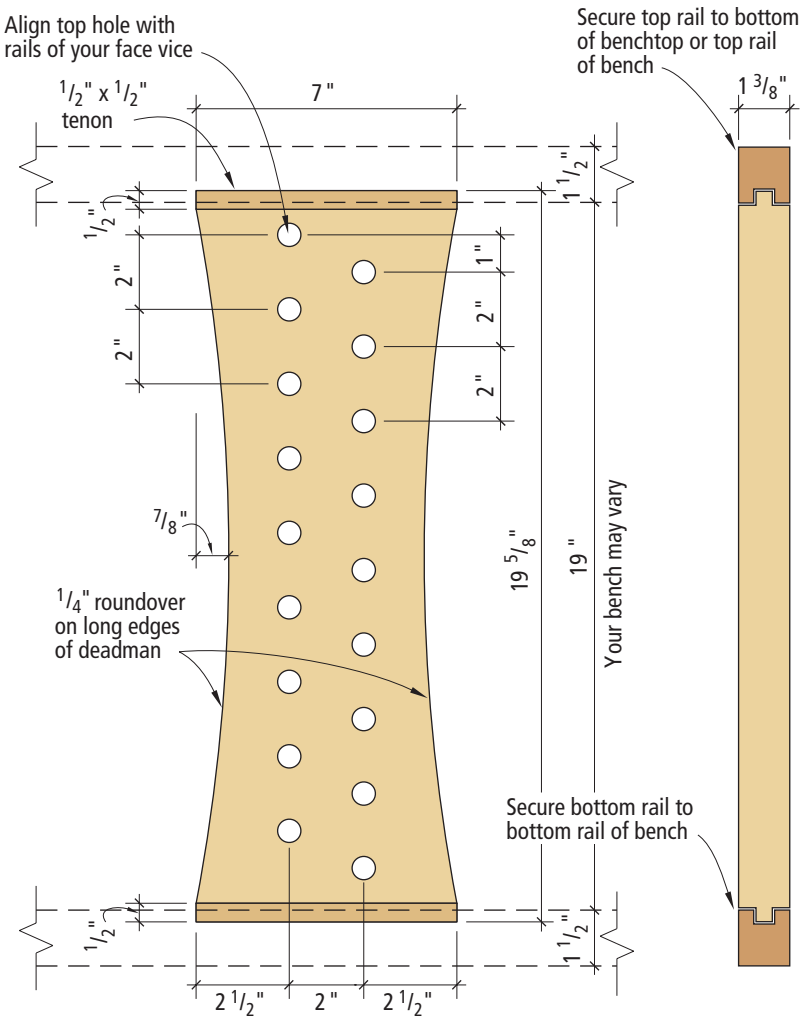
These problems are quickly and easily solved with $10 and by taking a lesson from 18th-century joiners. A common feature on older benches is what's called a sliding deadman. This contraption works with your face vise to support work that is long, wide or both long and wide. I adapted mine from a sketch of a deadman

BENCH DEADMAN

	NO.	ITEM	DIMENSIONS (INCHES) T	W	L	MATERIAL	NOTES
❑	2	Rails	1 3/8	1 1/2	47	SYP	
❑	1	Deadman	1 3/8	7	19 5/8	SYP	1/2" TBE
❑	1	Ledge	1 3/8	4 7/8	7 1/2	SYP	
❑	1	Dowel	5/8 dia.		5		

TBE = TENON ON BOTH ENDS; SYP= SOUTHERN YELLOW PINE OR EQUIVALENT



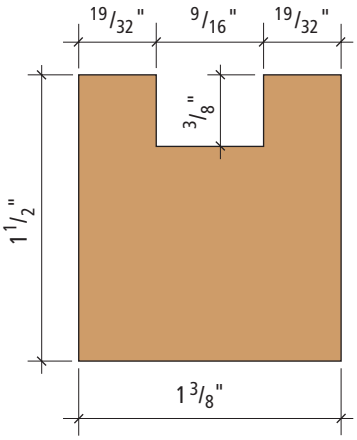


by Graham Blackburn that was featured in his excellent book "Traditional Woodworking Handtools" (The Lyons Press). This particular version is sized to fit our "$175 Workbench" from the February 2001 issue, though you can easily cut the rails and the sliding deadman to fit your bench.

After you determine the proper dimensions for all your parts, begin by cutting your pieces to rough size. Cut a 3/8"-deep x 9/16"-wide groove in the center of a long edge of each rail. Use a dado stack in your table saw, a straight bit in your router or a plough plane to cut the groove.

Before you cut the curves on the deadman itself, bore the 5/8"-diameter holes through the part for the ledge. I bored two staggered rows of holes; each hole is 2" down from the one above it. The topmost hole is located so that when the ledge is in place in the deadman, it lines up with the rails on my face vise.

Cut the 1/2"-long x 1/2"-thick tenons on both ends of the deadman. The tenons are slightly thinner than the width of the grooves they ride in. Now cut the deadman to shape. The long edges are curved in 7/8" so they are easy to grasp when the deadman is resting against your bench's legs. Round over the long edges of the deadman to make it friendly to grasp. I used a 1/4" roundover bit



Full-size section of rails

in a router.

Trim your rails to the proper length and install them. Screw one rail to the bottom rail of your bench using four #8 x 2" screws. Don't use glue; you want to be able to remove the rail for later adjustments or repairs. Now put the top rail and deadman in place and line them up with the bottom rail. Using screws, secure the top rail to the underside of your bench's top, or to the top rail of your bench — if you have one. Wax the grooves in the rails. The deadman should slide back and forth with minimal effort.

Now make the ledge. You could simply use a dowel. I chose to make one a little fancier. Bore a 1¼"-deep hole in one end for the ⅝" dowel and glue it in place, again making sure that when the ledge is inserted into the top hole, it lines up with the rails on your face vise. You might need to sand your dowel to fit the holes in the deadman. I used a ¼" beading bit in a router to shape three edges of each side of the ledge. Finish your deadman to match your bench. **PW**

Caption the Cartoon

Illustrated by Bob Rech
bobrech@juno.com

#52

Submit your caption(s) for this issue's cartoon on a postcard to *Popular Woodworking*, Cartoon Caption #52, 1507 Dana Ave., Cincinnati, OH 45207 by **February 14**. Winners will be chosen by the editorial staff.

The winner will receive the new Freud FJ85 Jigsaw with Electronic Cruise Control. This variable speed, 6-amp, orbital jigsaw offers toolless blade change and the cruise control keeps the blade speed constant under different loads to provide a finer, faster cut. The runners-up each win a one-year subscription to *Popular Woodworking*.

freud®

#50

"Now that's what I call 'pressure-treated wood!'"

Brett Britton, of Crossville, Alabama, is the winner of our Cartoon Contest from the August issue and recipient of a fine set of Freud router bits. The following runners-up each receive a one-year subscription to *Popular Woodworking*:

"I can actually see the syrup coming out of your maple bookcase."
Ryan Vogt, Urich, Missouri

"Any more clamping pressure and we'll be making diamonds!"
Larry Cramer, Brookings, South Dakota

"Hey Butch what's under those clamps? Is it alive?"
Michael Collingsworth, Centerville, Ohio

Caring for Furniture

Do furniture care products really 'moisturize' your project or its finish? Learn the truth about furniture cleaners and polishes.

Furniture care is a subject you're probably not very interested in, but it's a pretty sure bet that the people you give or sell your projects to find it very interesting. In fact, "How do I care for it?" is probably the first question they ask you.

If you give them an intelligent answer, their respect for you grows, but if you fumble around and show you don't really understand the subject, they may lose some confidence in you. There's no reason for this to happen because there are really only two things you need to know: the causes of damage and how to avoid them, and which furniture polish to recommend.

Causes of Damage

The two elements that cause the most damage to furniture, especially to the finish, are light and physical abuse. No one can keep furniture totally away from light, but furniture can be kept away from bright light near windows, which causes finishes to deteriorate faster than they would otherwise. To see what light does to finishes, compare the condition of an old finish protected from light under some hardware with the finish around it. (See the photo on the next page.)

So the first instruction you should give is, "If you want the finish to stay in good shape for as long as possible, keep the furniture away from bright light, especially direct sunlight."

The second is, "Discipline your children and pets so they don't abuse the furniture, and use table cloths, place mats and coasters to protect the finish from scratches and water rings."

Furniture-care Products

There's more hype, myth and misinformation about furniture polishes and waxes than about any other product related to furniture. Most of the problem is created by the suppliers themselves.

Here are the facts.

Photo by tim Grondin.

Don't go looking for these furniture-care products on your next trip overseas. For the most part, the United States is the only country that uses them. Why? Usually water cleans just as well.

Furniture-care products do five things more or less well:

- add shine to a dull surface.
- add scratch resistance.
- aid in dusting.
- aid in cleaning.
- add a pleasant scent to a room.

No furniture polish or wax replaces natural oil in the wood (only a few exotic woods ever had it in the first place), feeds or moisturizes the wood, feeds or moisturizes the finish or builds up (unless, of course, the excess isn't wiped off). No furniture polish or wax does any harm to the wood or finish, either. Furniture polishes and waxes are totally inert.

In fact, furniture-care products don't really do much at all, and the United States and, to a lesser extent, Canada, are the only countries where these products are used to any great extent. Most people in Europe and Japan just wipe their furniture with a damp cloth when it gets dusty or dirty.

So you could simply advise your family member, friend or customer, "You don't need

to do anything at all except keep the furniture clean by wiping it now and then with a damp cloth." But this probably won't work because people are conditioned to want to "use" something, to do something "good" for their furniture.

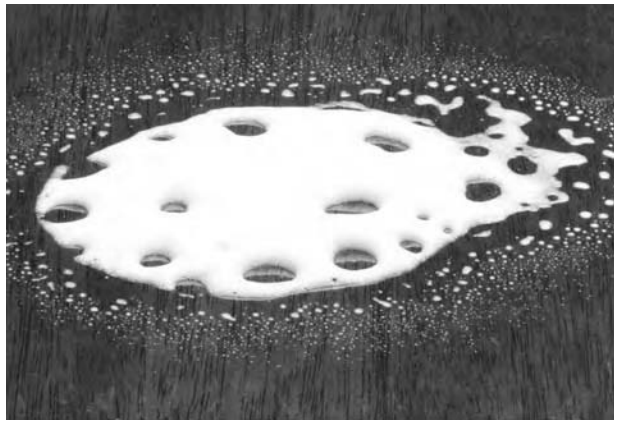
So, to understand the differences in the furniture-care products they could use, let's look at the ingredients in them and see what each does.

Besides the added scent, which does nothing for the furniture but rewards people for their dusting effort by making their house smell nice, furniture-care products are composed of one or more of four basic ingredients: slow evaporating petroleum-distillate solvent, water, wax and silicone oil.

• Petroleum-distillate solvents used in furniture polishes are essentially slow-evaporating paint thinner. This liquid adds shine and scratch resistance only until it evaporates (usually within a few hours), helps pick up dust and cleans grease and wax. It has no cleaning effect on water-soluble dirt like sticky fingerprints or soft drink spills.

Most clear polishes on the market, those commonly sold as lemon or some other nice-smelling oil and packaged in clear plastic containers, are composed of this single ingredient.

• Water evaporates too rapidly to be effective at adding shine or scratch resistance, but it helps pick up dust, and it's a great cleaner for most types of dirt. In many liquid and so-called "cream" furniture polishes, and in some liquid and paste waxes, water is added to improve cleaning ability. You can recognize these products by their milky-white color (they are emulsifications like milk is an emulsification of water and animal fat). Most are packaged in aerosol-spray containers.



The furniture polishes that clean best are emulsifications of water and petroleum-distillate solvent. These polishes are usually packaged in aerosol spray cans and are always milky-white in color.

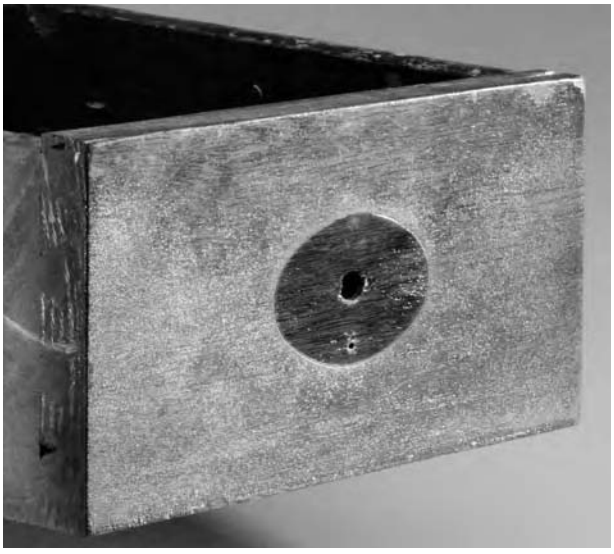
• Wax is a solid substance at room temperature and is by far the most effective of the four ingredients at adding shine and scratch protection over a long period of time because it doesn't evaporate. But wax is hard to apply (because of the effort necessary to wipe off the excess) and there's no reason to apply it very often, so it's not effective for dusting, cleaning or adding scent.

Sometimes wax is added to liquid polishes, and you can identify these by the settling that occurs over time – polishes containing wax have to be shaken before use. Clearly, these polishes will be more effective at adding long-lasting shine and scratch protection than polishes that don't contain wax, but more effort will be required to remove the excess from the surface.

• Silicone oil is a synthetic oil similar to mineral oil in the sense that it is totally inert and doesn't evaporate, but silicone oil is slipperier and bends light better than mineral oil. The first quality makes furniture polishes that contain this oil extremely effective at reducing scratches and the second makes finished wood appear richer and deeper.

Most aerosol-spray polishes contain silicone oil, though rarely is this admitted. Silicone oil has been given a bad reputation by furniture refinishers and museum conservators due to the added difficulty they have refinishing furniture treated with this oil. But consumers love silicone-oil polishes because they keep furniture looking good between polishings better than anything except wax, and they're easy to use.

Most polishes that contain silicone oil also contain petroleum distillates and water, so they're good cleaners.



Light is a prime cause of finish deterioration. Here you can see that the finish protected under the hardware is in near-perfect condition, while the finish exposed to light for many decades is badly crazed.

How to Choose

So how do you make sense of this for the recipients of your projects? Easy.

If they just want something for dusting, choose any liquid furniture polish.

If they want something that will clean in addition to picking up dust, choose any milky-white furniture polish – virtually all polishes in aerosol containers except Scott's Liquid Gold.

If they want maximum scratch resistance and richer depth without the work involved with using paste wax, choose a polish that contains silicone oil – virtually all polishes in aerosol-spray containers except Endust and Scott's Liquid Gold.

If they want to add shine and protect an old, deteriorated surface from abrasive damage, choose paste wax – because the other possibilities either evaporate too quickly (petroleum distillate) or highlight the cracks in the finish (silicone oil). Dusting and cleaning will have to be done separately with a damp cloth. **PW**

Bob Flexner is author of "Understanding Wood Finishing" and a contributing editor to Popular Woodworking.

Sacrificial Scraps

On a cold winter night I realize memories are made of many things, including cut-offs from my shop's scrap barrel.

I have a small, galvanized trash can in my workshop where I throw scraps of hardwood that are too small to put to use. It sits near the outfeed side of my table saw where it's out of the way but easily reached by a short toss from anywhere in the shop. Pieces of white oak, maple, cherry, mahogany, black walnut, rosewood and the occasional poplar fragment eventually overflow the 3'-wide can and have to be dealt with. Pine doesn't make the cut (if you'll pardon the pun) because the can is for wood that will end up in the family fireplace. Pine burns too hot and coats the flue with creosote, so it goes in the compost heap along with my sawdust. But the hardwood scraps pile up and once each year they warm the cold New England winter; usually in late January or early February, and for some reason that I can't explain, always at night.

The fire starts out with nondescript strips of plywood for kindling. They're light and burn quickly. On top of that go thin lengths of any wood that is unfit to use. Perhaps some strips of maple with ugly wane or lengths of glued-up end grain cut from squaring-up a tabletop. Thicker but shorter pieces follow. Lengths of picture frame that are just to small to eke out four more sides, or maybe some sections of trim from a large case piece. The fire slowly builds and, with the help of a few logs, warms the house for hours.

But it's the process of feeding the blaze that proves cathartic. Because the barrel fills over the course of a year or more, pieces from past projects emerge and remind me of the different phases of my long apprenticeship with woodworking. Short cut-offs of practiced hand-cut dovetails look rougher as they emerge from deeper within the barrel. Pieces that were used for testing machine setup tell of trial and error to get the perfect fit. Some lengths of wood have so many holes, mortises, rabbets, grooves and tenons that there is simply no surface left to cut. I can't help but feel a pang of regret when throwing these hardworking helpers onto the fire. It seems a shame to burn them, but they served their purpose and their time has come.

I give away most of what I build, so some scraps take me back to projects that I haven't seen in a while. I might pick out a piece and show it to my wife. We'll discuss whatever it was that I was building then, or something that happened in our lives at that time. It's like getting a roll of film developed that has been in the camera for a year.

There are pieces, though, that I have no compunction about burning. If a project was ill conceived or poorly executed, I get a sense of finally being done with it once the last scraps meet their fiery demise. It's not as if I burned the whole piece, but I might have wanted to during construction. Throwing the cutoffs into a roaring blaze is the next-best thing.

And finally, at the bottom of the barrel, I find pieces from what seems like long ago. Some of the scraps reveal the progress that I've made in the months since they were tossed out. Or a scrap might surprise me in that I don't remember being able to perform a particular operation so long ago.

When there's nothing left except sawdust and slivers, the barrel goes back to its humble position by the saw, ready to accept a new lot of castoffs and scraps. Sitting there empty, it seems to invite me to get busy and do some woodworking. Maybe this will be the year that I master hand-cut dovetails. Or perhaps I'll tackle a particular project that may have intimidated me in the past. It's funny, but that empty barrel seems to hold a lot of promise. **PW**

Joe Pescatello works wood in Rye, New Hampshire. His articles have appeared previously in Modern Drummer *and* Home Office Computing *magazines.*