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February 2000 #113

# Popular Woodworking

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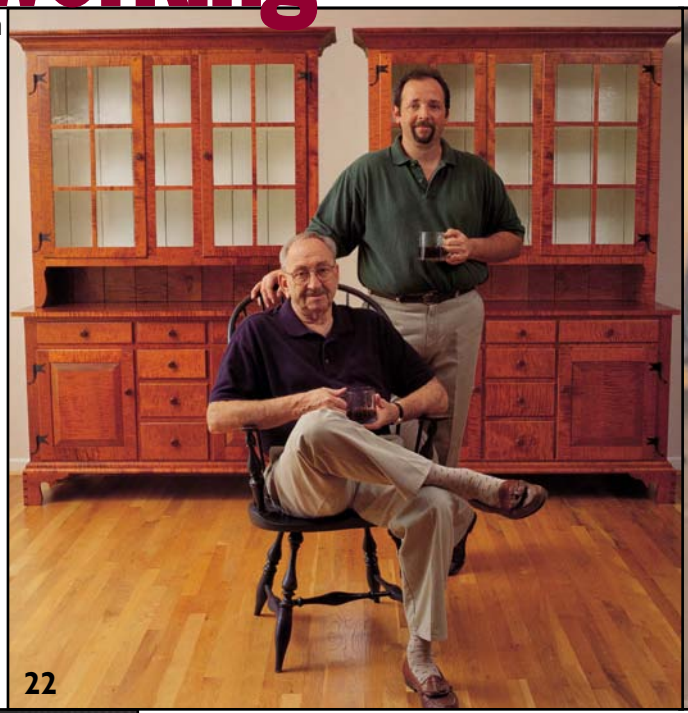



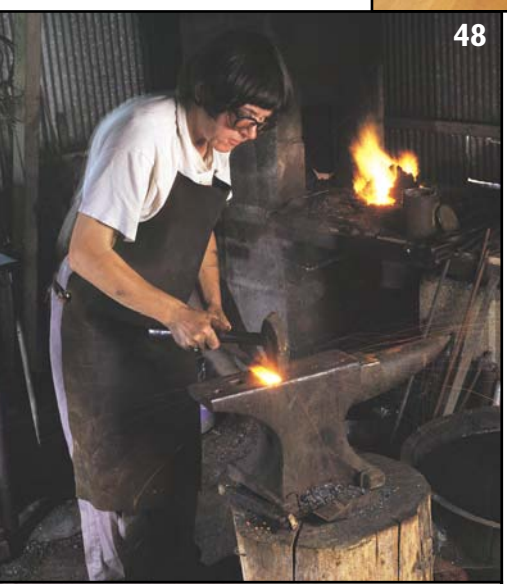


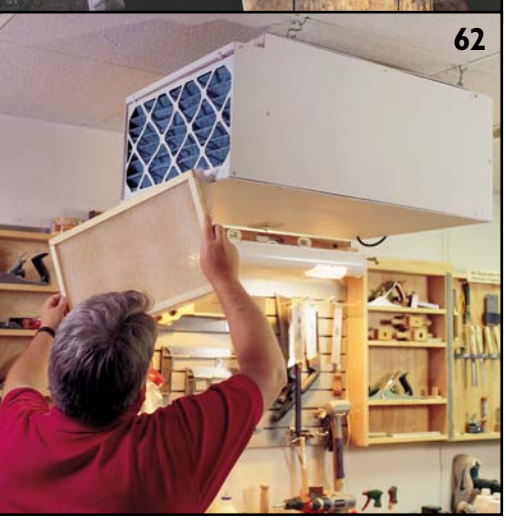



## In This Issue


## IN EVERY ISSUE



**ON THE COVER**
Check out this year's Tool Report for the gospel truth on the must-have features for woodworking tools.

Cover photo by Al Parrish

# Popular Woodworking®

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# Choose Wisely

## Job-site machines don't always measure up in the woodshop.

While I've never spent much time on a new home building site, I do recall the days when carpenters and finish carpenters would show up hauling a trailer that had some serious machinery strapped to its stake bed sides. Particularly, a big old radial arm saw and a "contractor-style" table saw. Where I grew up in the Midwest, they'd set up these machines in the garage as soon as it was under roof to keep them out of the elements.

These tools passed for "portable" machines then. Portable enough for a couple burly guys to hump off the back of the trailer and drag them in place. They ran on 110-volt power, standard fare for a construction site.

The contractor-style table saw was quickly adopted by the home woodworker as a less expensive alternative to the cabinet saw, but still featured a 10" blade, a horse-and-a-half motor, sturdy rip fence and reasonably sized cast iron top. It's the kind of saw I bought when I started 20 years ago (and just recently retired when I finally upgraded to a cabinet saw). I had noticed a contractor saw in one of the books written by veteran woodworker Tage Frid and figured it had to be good enough for me.

Today, you won't find a building site with a radial arm or contractor saw in sight. They've given way to a new breed of machine that's much more portable. The compound miter saw and benchtop table saw. In the case of the compound miter saw, its features are superior in nearly every way to the radial arm saw. The new breed of benchtop table saw has many advantages over the contractor saw — if you're working on a job site.

These past few years, many woodworkers have once again adopted these job-site machines in their home woodshops just as their brethren did a generation earlier. While I applaud the arrival of new miter saws, the table saws are another story. In most cases, I think it's a mistake. I have a theory when it comes to buying machines that's pretty straightforward. If you don't have to pick it up and move it during the course of a day's work, it ought to have two key ingredients: cast iron and an induction motor. Benchtop table saws with aluminum tops and universal motors should be the exclusive domain of job-site carpenters. That's what they're made for. But I've yet to encounter one of these saws that could be classified as a wise investment for home woodworking.

One of the problems is the universal motor. This motor is lightweight and powerful, but it is built to run for short periods of time because it generates a lot of heat —a motor's worst enemy. Universal motors are also much noisier and have a shorter lifespan than induction motors. Bottom line: these motors are good for tools you turn on for short periods of time (such as routers) but not those that you run all day. Also, saws with aluminum tops vibrate more than those with cast iron tops. The place where the motor and table are attached is more susceptible to stress and twisting in a benchtop saw than in a contractor saw. Finally, the fences on benchtop saws are rarely sufficient for quality woodworking.

I'm not a tool snob, believe me. I just want a machine that delivers the goods until I give out rather than vice versa. I want a machine that will stay in reasonable adjustment, that can be pushed when called on without begging or babying.

The table saw, band saw, jointer and planer are the cornerstones of a well-equipped woodshop. Among these machines, the prices difference between an average benchtop with a universal motor vs. a cast iron model sporting an induction motor is just a few hundred dollars. Invest the extra money because you'll almost certainly get it back the day you decide to sell it. Invest, even if it means delaying your next purchase for a year. You'll be glad you did, I promise. **PW**

Steve Shanesy

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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!**

# Don't mess with your plane's cast yoke

### Removing the Slack From a Cast-Iron Yoke is Risky

I picked up a copy of *Popular Woodworking* (September 1999 issue) a couple weeks ago, and one of the articles that I read was "Restoring a Hand Plane" by Rick Peters. This captured my attention because I enjoy restoring and using old hand planes. One of the planes that I use most frequently is a Bailey #4 (late 40's vintage), and it had some slack in the fit between the depth adjusting knob and the "Y" yoke. This article described a technique for tightening this gap by squeezing the yoke with a clamp.

Granted, the article warned that the "yoke is cast so it'll only bend so far without breaking." But I tried this procedure on my Bailey #4 and the yoke immediately snapped without first removing any noticeable slack. I was horrified to see this happen to such a treasured tool (it was my grandfather's, and then my father's). My only relief came in knowing that I had planned to do this to my Bedrock #2 if it worked on the #4, and I very well could have trashed a $1,000 tool.

In my search for a replacement part, I was unable to locate a new part. After some calling around, I found a shop that had a box full of used replacements. When I asked him if he had any of these because mine had snapped, he replied, "What magazine ran an article that advised people to put their yoke in a vice this time?" He went on to explain that any responsible tool collector would not dream of trying this procedure unless the piece is steel, rather than cast iron. He said he gets four to five new customers, however, each time a magazine or web site promotes this procedure. I drove to his shop and was fortunate to find a yoke that fit, after drilling the pin hole out.

I would ask that you publish a follow-up to this piece recommending that this procedure will not remove much slack out of most yokes, and no slack out of some yokes. A better strategy would be to take your plane to a local tool collector who may have a coffee can full of replacement parts, and may just have one to fit your plane. Unless the slack is so bad the tool is unusable, you may have a lot to lose by trying this.

On a more positive note, I enjoyed your magazine other than this particular tip. I found the projects to be refreshingly different from the other rags. Particularly the camera project, which was the reason I bought a copy in first place.

*Paul V. Mayer*
*Eden Prairie, Minnesota*

*Editor's note: Rick says that in his experience, he's been able to remove small amounts of slack by tightening a cast yoke with a c-clamp. But, as he warned, it is a risky adjustment. Steel yokes adjust well with little risk. So if you're restoring a plane that has sentimental or real value, you might want to think twice before trying this procedure.*

### How Tightly Should Tabletops be Screwed to Their Bases?

I read your reply to the gentleman requesting information on tabletop cupping. I thought your reply was quite interesting especially in light of a lot that I have seen in various magazines and heard on TV. I was

***Continued on page 10***

## WE WANT TO HEAR FROM YOU

***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*****.**

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# Letters

*Continued from page 8*

under the impression that wooden tabletops needed to be allowed to move and should never be screwed down tightly, although I could never quite figure out why.

But the voice of experience (your magazine) tells us that you have learned the opposite: secure tabletops tightly with pocket hole screws. It makes sense to me but would you care to comment further on it for the sake of other readers and for the edification of the TV commentators?

*James C. Johnson*
*West Chester, Pennsylvania*

*Editor's note: Hand tighten the screws to the top. As the top moves, the apron will either slide over the top edge of the apron or just push it out. Either way, it doesn't matter. The pocket holes mentioned were a little oversized and drilled in a table apron. This arrangement lends itself to accommodating wood movement (table aprons are quite floppy until you screw a top to them). The slightly oversized holes (a 1/4" hole for a #10 screw) yield a little, too. We use the same method for securing battens across the tops. The screwhead gives a little as the top expands. The only time I've seen significant movement (1/2" or more) was when the furniture was placed in a very humid environment or after being moved to a dry one.*

*—Jim Stuard, associate editor*

## Are There More Plans for the Blacker House Bench?

I just bought the November issue (#111) of *Popular Woodworking* and was very pleased to see an excellent article on building a replica of the hall bench from the Blacker House. I have long admired this excellent example of the Greene and Greene style, and had only recently begun to design one modeled on a photo from one of Randall Makinson's books on Greene and Greene furniture. (I was going to wing the dimensions!)

Your article will obviously save me the trouble of designing my own, except that I will have to cut down the dimensions slightly to fit the space that I have in mind for the piece. I was wondering if scaled drawings, plus cutting patterns at full scale are available for sale, or if you have a CAD file you could make available to scale the various members to full scale to make cutting pat-

terns? Congratulations on a fine article, and an even finer piece of work.

*Barry W. Larson*
*Calgary, Alberta*

*Editor's note: If you have a computer assisted design (CAD) program for your computer that can translate DWG files, check out our website at www.popwood.com/fixes/blacker.html to download this file.*

### Another Skeptic Converted to the $19.99 Dovetail Jig

I read your article in the September issue (#110) "19.99 Dovetail Jig" and was skeptical about it being this easy, so I tried it. I am an amateur tinkerer and aspiring woodworker. I built a drawer from wood lying around my garage and it turned out great.

I would have never attempted starting a project that included making drawers before, but now I can't wait to try one. Oh, and my template guide and router bit was $23.59, but only because I couldn't find a guide to fit my Ryobi router, except to order one from Ryobi.

*Jim Treece*
*Knoxville, Tennessee*

### Another Way to Remove Rust from Your Table Saw

To remove rust from a cast iron top, here's what I do: Use a random-orbit sander with emery cloth until the entire table is bright. Wipe the table with a clean cloth and then apply paste wax.

Now I can set soda cans, beer cans, lemonade glasses or whatever on it. I even had to let it sit out in a storm once (covered, of course) with no problems. This process keeps the finish nice and also makes the wood slide over the table like velvet. It's almost unbelievable how nice and smooth the "action" of your work is.

*Robert Mauk*
*Lusby, Maryland*

### Rust Cannot be Removed, Only Prevented

Years ago I was testing the rust resistance of a hydraulic oil using new steel panels. On one occasion when I was out of new panels for the test, I sandblasted some old rusted ones. Guess what? They rusted in the same pattern they had earlier. Rust gets into the pores of iron just like mildew gets into the pores of the wood and is difficult if not impossible to remove. The best defense is to not let it rust in the first place.

The oil on your drill press' table will keep moisture in the air from reaching clean metal. But some day the rust will be back in the same places it was earlier.

*R.E. Kreider*
*Oakland, California*

### Question About the Miter Sled

Your miter sled (November 1999 #111) is a very interesting design, and I plan on building one very shortly. But before I get started, I have a few questions.

1. From where the operator stands (at the front of table saw) your sled works on the right side of the saw blade. Did you choose the right side of the blade for a particular reason? Are you left-handed? The reason I ask is because I'm right-handed and normally I keep the saw fence to the right of the saw blade.

2. With reference to the sketch of your radius cutting jig, perhaps you can clarify a few things for me. Is that a studded knob with a 5/16" t-nut which you used to "lock down" the slide? What kind of fasteners did you use to join the 1/4" Plexiglas to the upper slide section? Does the 1/4"-thick plywood bottom have a 1/4" notch on each side to bring the bottom piece down to a width of 2 1/2"? One last question: What range of radii can be handled with this jig?

*Norman H. Camire*
*Haines City, Florida*

*Editor's note: I chose the right side of the blade for the sled so I could use the saw's rip fence for longer crosscuts. Simply clamp a gauge block to your fence in front of the blade so you don't trap your work between the blade and fence. Then set your fence for the desired long cut (over 25") and run it through. If you have reservations about using the right side of the blade, just reverse everything and go to the left side. As to question #2, all fasteners are 1/4"-20 threads. The t-nut is a 1/4"-20, but the outside diameter of the threaded part is 5/16". I simply used #6 x 3/8" wood screws*

**Continued on page 12**

*Continued from page 11*

*countersunk into the Plexi and screwed into the plywood above. Also, use a little epoxy to set the Plexi on the jig's base. The upper and lower parts of the jig are identical in width. The wooden sides are nailed to the top to guide the bottom sliding part. Right now the jig will rout from 6" to 22". If you need a larger radii, just make another slider and stick a t-nut on it to fasten it down.*

*Also, one small clarification on the project. The Schedule of Materials indicates that the fence is made from plywood. Actually, as shown in the photos, it's made from solid maple.*

*—Jim Stuard, associate editor*

### Good Deals on Old Tools

Good article on used tools in the November 1999 issue ("Hand Tools for $100," issue #111). I have found some real bargains that way. I am curious as to the location of the open air show you pictured in the article.

Another excellent flea market is in Greenville, Kentucky, a few miles from Central City. It is open on Tuesday. As you said, go early for best selection. Another good market is in Litchfield, Kentucky, and is on Wednesdays. Lots of Amish attend this one so there is a good selection of hand tools.

I am still looking for a good post drill and a leg vise. One of my friends found one of each a few years ago in Amish country at a farm sale and brought both home for less than $50 total. I am still jealous.

I am partial to hand tools because I grew up using them. I understand the fascination with power tools, but I try to avoid them whenever possible. I made an edge planer from a few pieces of wood and a Stanley low-angle block plane, and that lets me do really good glue joints. I use a lot of hand planes and buy most of my wood from an Amish mill at very good prices. I let it cure for a few years and then break out my Stanley #20 and bring it to size.

I got a lot of kidding some time back for my methods. I needed a piece of wood measuring ¼" x 3" x 24". The choice was to either plane a piece down or rip saw the board from a larger piece. Out came a very good Disston rip saw, and in a few minutes (15 or 20) I had the wood. Then I finished it up with my hand plane. A couple of friends just stared at me when I did it. They wanted to know why I didn't 1. use plywood, or 2. go to my neighbor's and use his thickness planer. I told them I was finished before I could have gone to his shop and learned how to use the planer.

I'm not Roy Underhill, but I have learned a lot from watching him and Norm on TV. My wife has watched so much of them that she sees Norm use some power tool and she says, "You didn't do it that way, you had a hand tool for the job." Or she makes some comment about, "Norm used $40,000 worth of tools to build that piece." I don't have any trouble when I ask to buy some antique tool.

*Doug Wilkey*
*Clay, Kentucky*

*Editor's note: The market pictured in the article is the Burlington antiques fair, which is held the third Sunday of the month between April and October. The show is held in Burlington, Ky., which is in Northern Kentucky, just outside Florence. If you're taking Interstate 75, you get off at the Florence/Burlington exit, also known as Highway 18. Head west. You'll drive about 10 miles until you reach the town of Burlington. Turn right on Idlewild. You'll see the fair about ½ mile on your left. It's at the 4H Utopia Fairgrounds. Good show; I recommend it.*

*In future issues you can look for more stories about hand tools. In April, we're building a nice Shaker stepstool entirely by hand. And we're running an article all about the care and use of one of the ultimate hand tools: scrapers.*

*—Christopher Schwarz, managing editor*

### Complete Index on Website

You can now download a complete index (through September 1999) from our website at www.popwood.com. Click on the button labeled "Article Index" and you'll be taken to a page where you can download the index in a pdf format.

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- A tutorial on how to cut half-blind dovetails by hand. If you've ever wanted to try cutting dovetails for a drawer, here's how to get started. **PW**

# Circles Without a Band Saw

## Three great jigs for your table saw that can cut circles and even bowls.


Photo by Al Parrish

You can cut perfect circles—even bowls—on your table saw using these three jigs and what I call the "pivot-guidance technique." This technique is the same for all three jigs. With each, the work piece rests on a pivot point, and you turn the work over the blade, making light passes until you reach the desired shape.

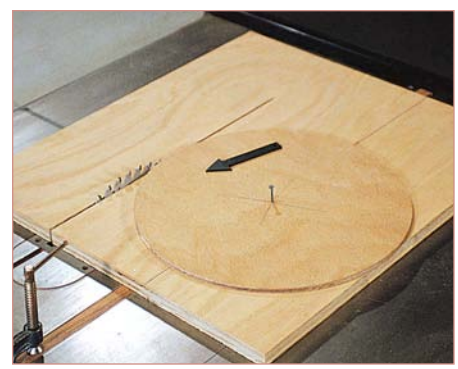
### Perfect Circles

This jig is great for transforming a square piece of wood into a round one. You start by removing the bulk of the waste stock by making tangent cuts, a chore with a miter gauge and not something to do freehand. But the operation proceeds quickly and safely with a simple jig—just a platform kerfed for the saw blade and guided by a strip that rides in the table slot.

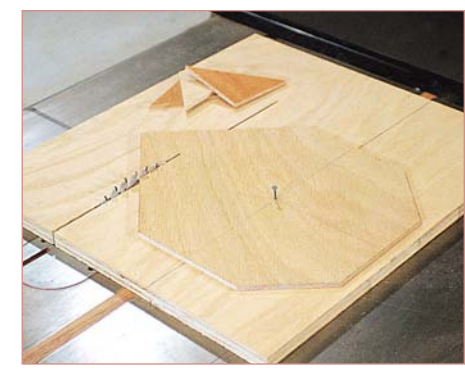
Prepare a piece of plywood for the platform and use a strip of hardwood for the guide (see the drawing titled "Platform for Tangent Cuts"). Set the rip fence 6" from the blade and run a kerf in the platform about 15" long. Leave the platform in place while you slip the guide strip into position. Hold the guide in place by tack-nailing through the platform. Then in-

## sawing circles

*To create a circular component, first make tangent cuts to remove the bulk of the waste stock. Both the work and the jig are moved past the saw blade in repeat passes with the work rotated after each pass. Although not shown in the photographs, use the guard.*



*After the waste is removed, clamp the jig so the centerline of the work is in line with the front edge of the saw blade. Then hold the work firmly and rotate it slowly against the blade's direction of rotation. Set the blade height so it's adequate for the thickness of the stock.*



*The jig can be used to produce multi-sided figures. Mark the work for the number of sides needed so it can be aligned with a line on the platform that is at a right angle to the blade. An octagon, for example, requires two perpendicular diameters.*

vert the assembly and attach the guide permanently with glue and short screws or ¾" nails.

The jig is used for the tangent cuts and for the final pivot pass that results in a true circular component. During the entire operation, mount the work on the platform with a nail driven through the center of the work and into the platform. If you don't want a hole through the work, drive the pivot nail up through the platform so it only partially penetrates the bottom of the work.

To make tangent cuts, hold the work securely and move both the jig and the work past the blade. Make repeat passes, rotating the work after each one. The more of this you do, the less work on the final pivot pass.

After the bulk of the waste is removed, clamp the jig to the table so the centerline of the work is in line with the front edge of the blade. Then rotate the work slowly counterclockwise. Smoothest cuts result when you work slowly and have done enough tangent cutting to leave a minimum for the final rotation pass.

Cutting a circle directly, skipping the tangent cuts, is also possible. On thin material you can get through in a single pass, but thick material will require repeat passes, raising the blade a 1/16" or so after each.

The jig can also be used to shape multi-sided figures. Draw a line on the platform at right angles to the saw blade, and mark the work so it can be positioned accurately for each of the passes required. An octagon, for example, requires two perpendicular diameters.

I like to get as much as I can out of whatever tool I buy or make, so I view the circular-sawing jig as a sliding table. Here's an example of an extra function I get from the jig: I use it to form short tapers. The work is positioned by a guide that is tacknailed to the platform. In this case, taper all four sides simply by flipping the stock after each pass.

## Rotary Coving

If you have ever done coving on a table saw you know it's done by making a series of oblique passes across the blade with blade projection increased a bit after each pass. Because of the oblique feed, the profile that results is more a section of an ellipse than a true arc.

To get a true arc (relative to the size of the saw blade), the work has to be moved on a line 90 degrees to the face of the blade. This is feasible, but more important is that it leads to rotary coving, a technique where the work is situated directly over the saw blade and pivot-guided through repeat passes to produce a bowl shape.

The repeated passes plus the slow rotation of the work may seem a tedious procedure, but it's not. With a 10" blade and a 3" maximum projection, it takes me 4 to 5 minutes to produce a bowl shape about 10" across and 3" deep. Not out-of-line when considering the same type of work done on a lathe. And the rotary technique produces a perfect shape.

There are factors that affect the time element. Pine cuts faster than maple, and a saw blade with set teeth cuts faster than, say, a crosscut blade. The blade I use is the one that's usually on my machine; a carbide-tipped combination blade. By making reasonable cuts—not more than 1/16" or so for each pass, and making the final pass with the blade barely touching the work, I get impressively smooth results.

Because the work covers the blade, you can't see what's happening so it's critical to know the blade projection that results with a turn of the elevating crank. On my machine, a quarter turn of the crank increases blade projection about 1/8" so I know how many full turns of the crank I need to get to a particular depth.

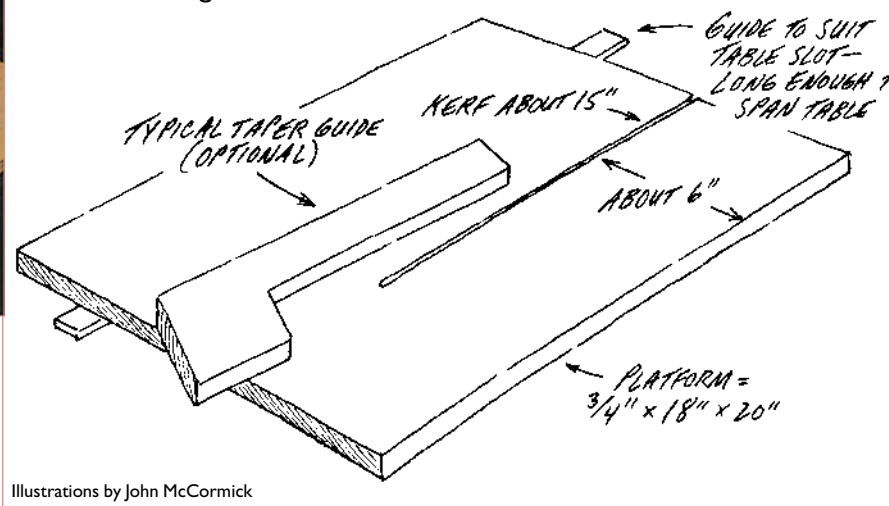
However, should you get lost, it's simple to remove the work from the jig being used and make a visual check.

Also be sure your starting block is of sufficient size to suit the blade used and the size of the depression you plan.

***Continued on page 16***

*Getting more from your jig. Here, I'm forming short tapers on legs I needed for a low stool. The guide, which positions the work for the cuts, is tacked-nailed to the platform.*

**Platform for Tangent Cuts**

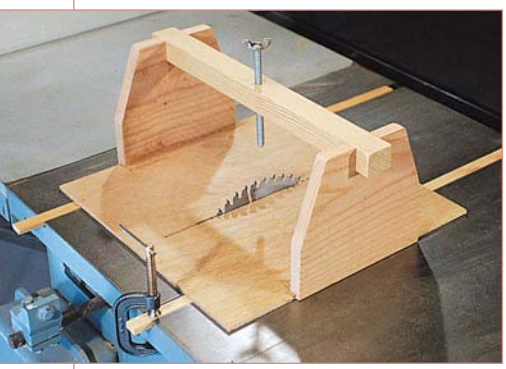



Illustrations by John McCormick

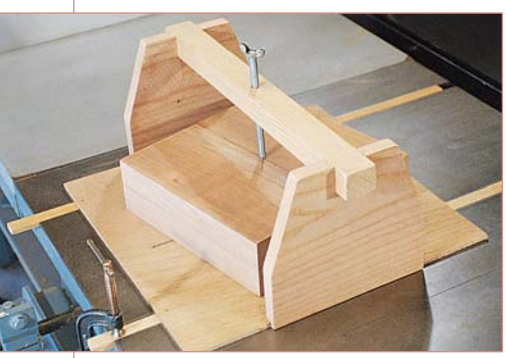
*Continued from page 15*

# rotary coving

*Output from a 10" blade includes a bowl shape almost 10" across and 3" deep. The starting block can be square, round or even rectangular, just as long as the size can be handled by the jig.*

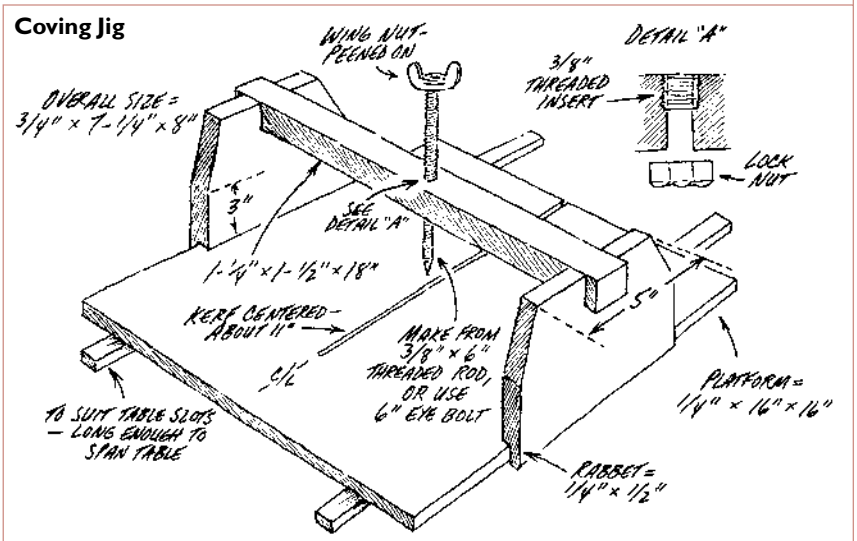


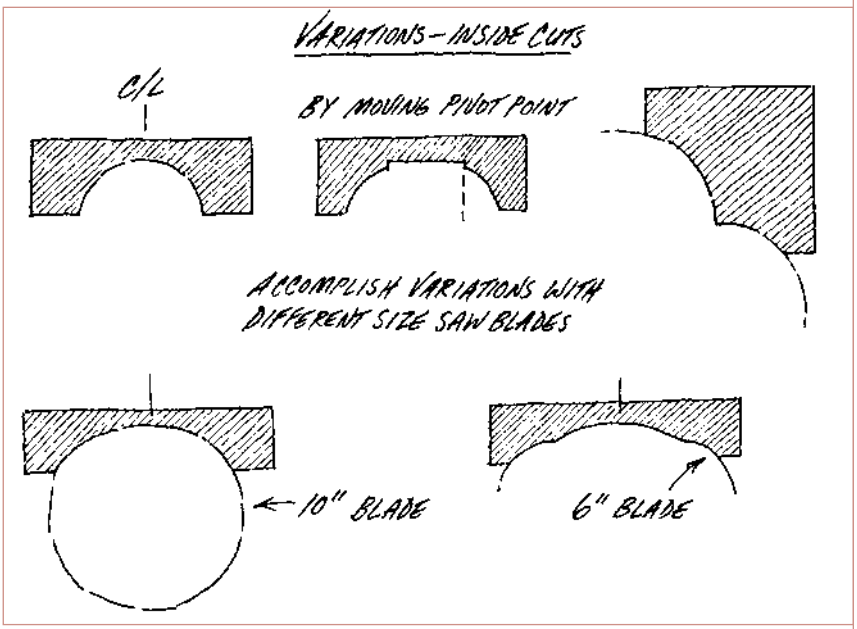
*The overhead jig. The jig, centered over the saw blade, is clamped in place. The jig, as dimensioned, can be used with work pieces up to 12" square and about 4" thick.*



*Secure workpieces with the pivot point (the piece shown is a bit too large for the jig). Adjust the pivot so the work is held firmly but will rotate. Secure the pivot setting with a lock nut.*

**Coving Jig**




## The Jig You Need

I use this idea for inside cuts (bowl shapes) and perimeter cuts. Two jigs perform the cuts. The overhead jig, shown in the drawing titled "Coving Jig," is for bowl shapes. It's sized so I can rotate a 3½"-thick x 12" square block under the pivot screw.

Start the project by sizing the platform and making two guide bars to suit the slots in the saw table. Set the rip fence so the platform will be centered over the blade, and slip the guide bars into place. Secure the guides by driving ⅝" brads through the platform. If you want, remove the guides and reinstall them after applying glue. Now raise the blade with the assembly in place and form a centered kerf about 11" long.

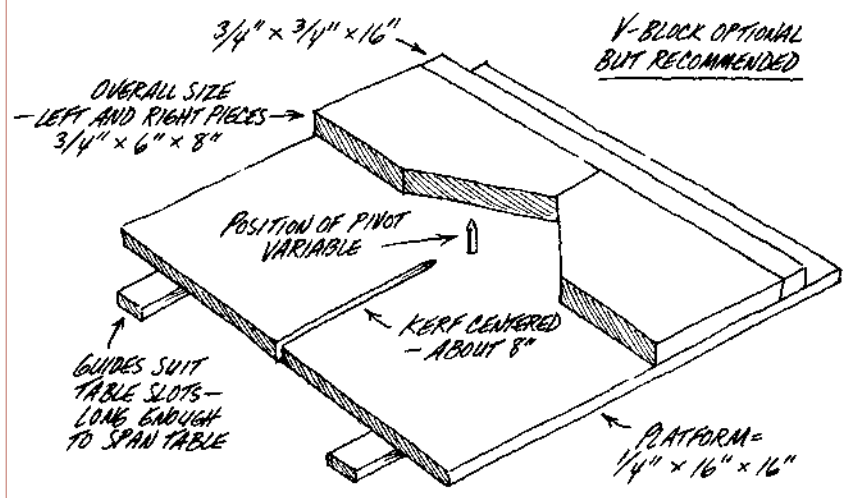
Make the verticals by first tack-nailing together the two pieces. Next cut the slants on the sides and form the U-shape required for the bar on both pieces. You can form the U-shape with a dado if you use a miter gauge with an extension that will provide

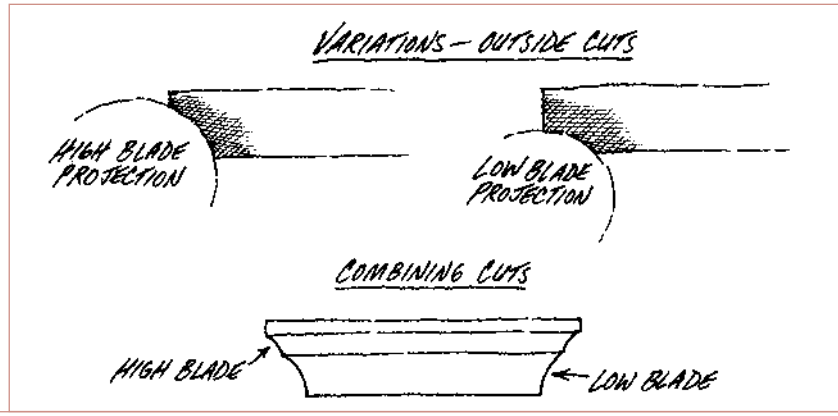
# perimeter cuts

*Perimeter shaping is done with the flat jig. The workpiece is secured on a pivot and supported by the V-block. The procedure is standard; repeat passes with the blade raised a bit after each one.*

*Here the jig is clamped in place, and the position of the pivot-point and V-block are established. Because the blade is exposed, be sure to use the saw's guard.*

**Jig for Perimeter Cuts**




adequate support for the work. Size the U to provide a tight fit for the bar.

Now separate the pieces and form the rabbet cut along the base of each of them. Attach the parts to the platform with glue and ¾" brads that are driven up through the platform. Be sure the vertical pieces are centered on the platform.

Cut the bar to size and drill a ½" hole in its center. Install the insert and place the bar with glue, being sure the insert is exactly over the kerf in the platform. Make the pivot as suggested in the drawing or use a readymade 6" eyebolt.

## In Use

Clamp the jig so the pivot is centered over the saw blade. Workpieces are prepared with a slight, exactly centered countersink for the pivot-point to rest in. Thread the pivot down until it sits in the countersink, tight enough to hold the work firmly but allowing it to be rotated. Then tighten up the lock nut to secure the setting. Work of any size—round or square—can be established with the jig.

Variations are possible so long as you remember there is a critical relationship between the size of the work and the diameter of the blade.

## Perimeter Cuts

Outside cuts, like the one shown in the photos above, are feasible on round projects, but the procedure calls for the jig shown in the drawing titled "Jig for Perimeter Cuts." Make the jig by following the steps suggested for the overhead jig. Start with the platform and center it over the saw blade by using the rip fence, then add the guide bars. The V-block is an optional but wise addition because it can supply security when doing the work. Also, the V-block can add to the jig's function. For example, use it to make miter cuts on frame components that have been pre-cut to length.

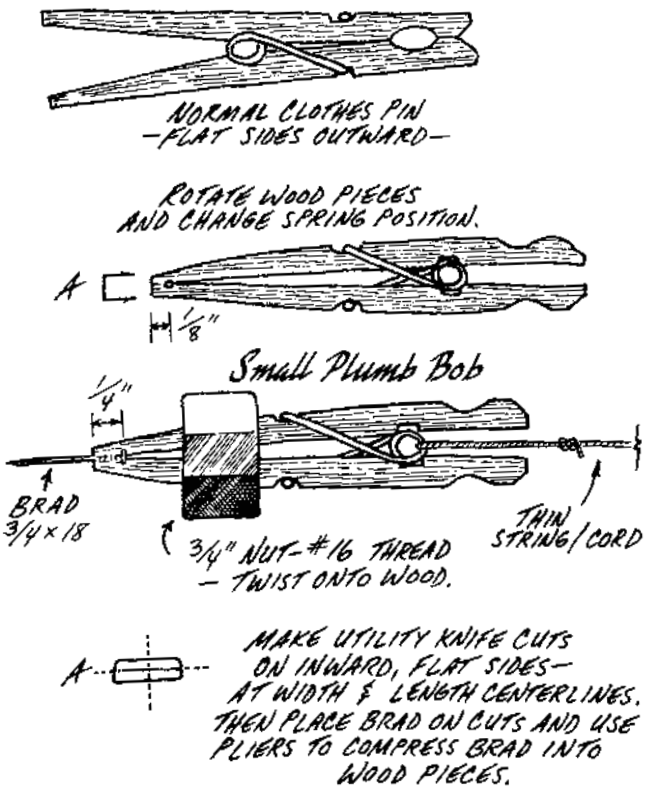
Like inside cuts, perimeter shapes are produced by making repeat passes with the saw blade raised a bit after each one. The shape you get is affected by the size of the saw blade, where the jig is clamped and the placement of the pivot point.

Approach this area of pivot work carefully because the saw blade is exposed, so be sure to use the saw guard! Even with the guard in place, don't use the technique on projects smaller than 6" in diameter. **PW**

*R.J. DeCristoforo is one of* Popular Woodworking*'s contributing editors and the author of dozens of books about woodworking. His most recent book "The Ultimate Woodshop Jig Book" is available from Popular Woodworking Books.*

## WINNER!

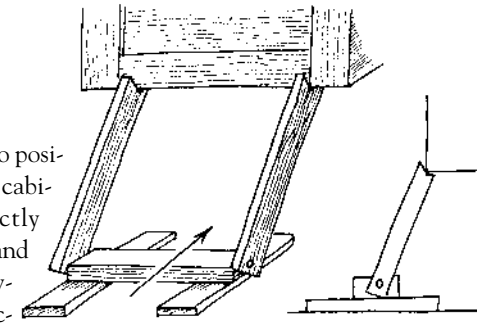
### The Poor Man's Multi-Tool




I have a tool for those little odd jobs that is inexpensive and easily replaceable. It's my multi-purpose clothespin. By taking a normal wooden clothespin and rotating the pieces 180 degrees and relocating the spring position I've made a new tool with lots of uses: For picking up small items; as a ¼" wood clamp; as a brad nail holder; for staining and painting small wood pieces; to hold *Popular Woodworking* open while I'm reading; to make a simple but effective plumb bob; or take the pieces apart and use them as putty knifes to avoid damaging the wood. The clothespin might be an ancestor of the Swiss Army/Leatherman/Gerber family!

*Milo Meyers*
*Seattle, Washington*

### 'Dead Man' Lends a Hand

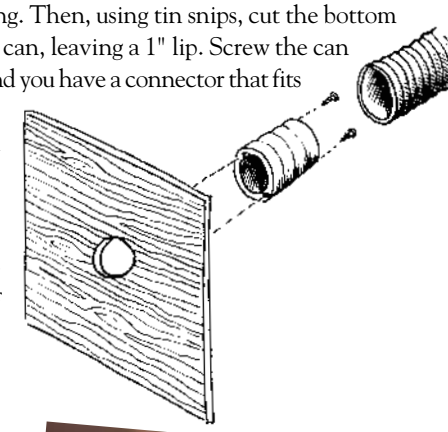


It's often difficult to position a cupboard or cabinet on a wall exactly where you want it and hold it while screwing it in place, particularly if it's heavy and you don't have much help. This temporary assembly will push the cabinet into place and hold it there while you drive screws. Suitable sizes of scrap wood are 2x4 for the crossbar and 1x2 for the other parts, but you could use whatever is available. Cut the crossbar to a length that will allow the struts to come near the ends of the base of the cabinet. Put feet under it, and cut the struts with notched tops so they will be at a fairly steep angle when the cabinet is in position. Pivot them on stout nails in the ends of the crossbar. You can make final adjustments to get the cabinet level by moving one end of the base and not the other.

*Percy W. Blandford*
*Stratford-on-Avon, England*

### Dust Collection Connection— Good To The Last Chip!

Running 4" flexible hose from a dust collector is not a huge problem, but every now and again hooking the other end of the hose to a tool can be. For example, a contractor saw. While many are fitted with a lower pan to direct the dust, getting the hose around the 1" flange extending from the pan, then securing it with a clamp can be difficult. Next time, take a simple flat piece of ½" plywood cut to fit the tool opening. Then, using tin snips, cut the bottom out of a 13 ounce coffee can, leaving a 1" lip. Screw the can to your plywood panel and you have a connector that fits perfectly into a 4" hose. You almost don't need a clamp for your hose, but if you do, you have 5½" to grab onto. **PW**



*The Popular Woodworking Staff*

## BE AN INNOVATIVE THINKER AND WIN!

**Turn your woodworking knowledge into a truly tricked-out tool from the Simpson Machine Tool Co. (www.smtco.com). Your best trick or shop tip can earn you a reproduction of the 19th Century Stanley Odd Job #1 — the original multi-tool — and a check for $50. The Odd Job is an inside miter and try square, mortise scribe, layout tool, depth gauge, beam compass and bubble level, with a 6" and 12" brass-lined maple rule. This re-creation of a classic tool is cast from solid manganese bronze and is machined to within .0015 tolerance. One winner will be chosen each issue; published runners-up receive $25.**

**To make things easier, you can e-mail your trick and daytime phone number to us at DavidT@FWPubs.com or mail it to: Tricks of the Trade • *Popular Woodworking* • 1507 Dana Ave. • Cincinnati, OH 45207. All entries become the property of *Popular Woodworking*.**

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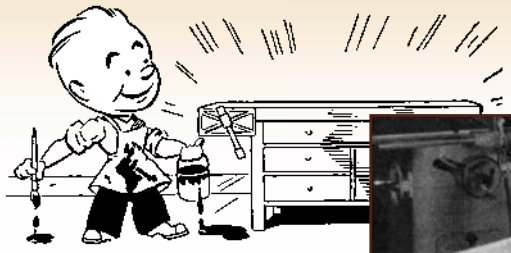
Illustrations: John McCormick

The Deltagram

A nostalgic look back at plans published by Delta Machinery shortly after World War II.

From Volume 17, Issue No. 4, 1947-48



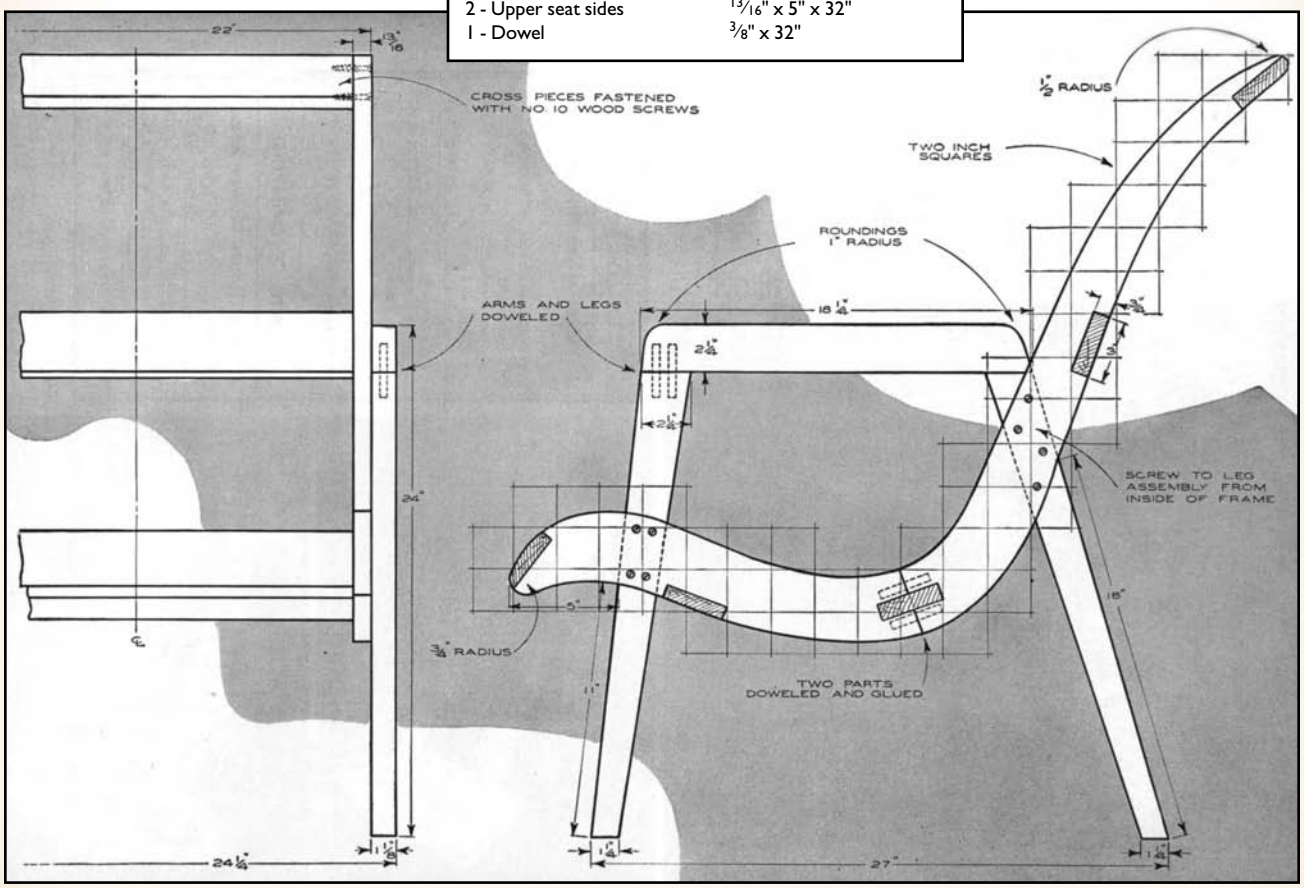
# Modern Chair

Actually you can build two chairs almost entirely different in appearance from this one plan. The chair on the bottom right is the completed frame with webbing attached. This makes a modern chair that is comfortable and practical. The webbing in this case should be the outside type, available in various colors in most localities.

The same chair is pictured at right with the addition of foam rubber padding and leopard spotted upholstering material to finish it off. The foam rubber material is easy to use. The small portion of wood left exposed should be finished natural. **PW**

**BILL OF MATERIALS**

| | |
|---|---|
| 2 - Front legs | 1 1/8" x 2 1/4" x 22 1/2" |
| 2 - Rear legs | 1 1/8" x 2 1/4" x 23" |
| 2 - Arm rests | 1 1/8" x 2 1/4" x 18 1/4" |
| 5 - Cross pieces | 3/4" x 3" x 20 5/8" |
| 2 - Lower seat sides | 13/16" x 5" x 20" |
| 2 - Upper seat sides | 13/16" x 5" x 32" |
| 1 - Dowel | 3/8" x 32" |



*Quite a pair — of stepbacks and woodworkers. The father and son team of Malcolm Huey (seated) and Glen Huey are partners in their antique reproduction cabinet shop. They've built dozens of these cabinets.*

# PENNSYLVANIA STEPBACK *Cupboard*

## Put your cabinetmaking skills to the test with this authentic Colonial classic.

My dad made one of these Pennsylvania stepback units for my mom a few years back, then promptly "borrowed" it to display it at furniture shows. After taking orders to build several like it, he returned the stepback to mom. This piece is now a staple of our business, and we've got construction down to a science.

Approach this project as three parts (base, lower cabinet and upper cabinet) and the task becomes more manageable. The construction is traditional, but not terribly involved. And if you don't think you can construct the muntins and mullions for the glass doors, think again. The way I build the lights in this piece — and all my other glass-doored furniture — is simple and straightforward.

by Glen Huey

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

Photo Al Parrish; step photos by Christopher Schwarz

*The construction techniques I use in this piece require a lot of mortise-and-tenon joints. I use a shop made tenoning-jig (see* Popular Woodworking *Issue #112 for construction details) to make the job less time consuming.*

*The loose base is of simple construction but adds a dramatic touch to this piece, being one of the only places where dovetails are visible at all times* ***(left)****.*

*With the face frame clamped against the case, I can carefully locate the partition position to ensure the drawer runners will fit in place with little or no problems* ***(below)****.*

## The Base

Starting from the bottom up, the first step is to build the stand-alone base. The top of it is a simple flat frame, biscuited at the mitered front corners and mortise and tenoned at the rear joint. Form the feet by cutting eight feet halves and milling dovetails to join the corners. The profile for the six visible feet is shown on a drawing later in the story. With the feet corners formed, glue them to the base frame and add corner blocks inside to support the corners. Complete the

### Schedule of Materials: Pennsylvania Stepback Cupboard

Base Cabinet

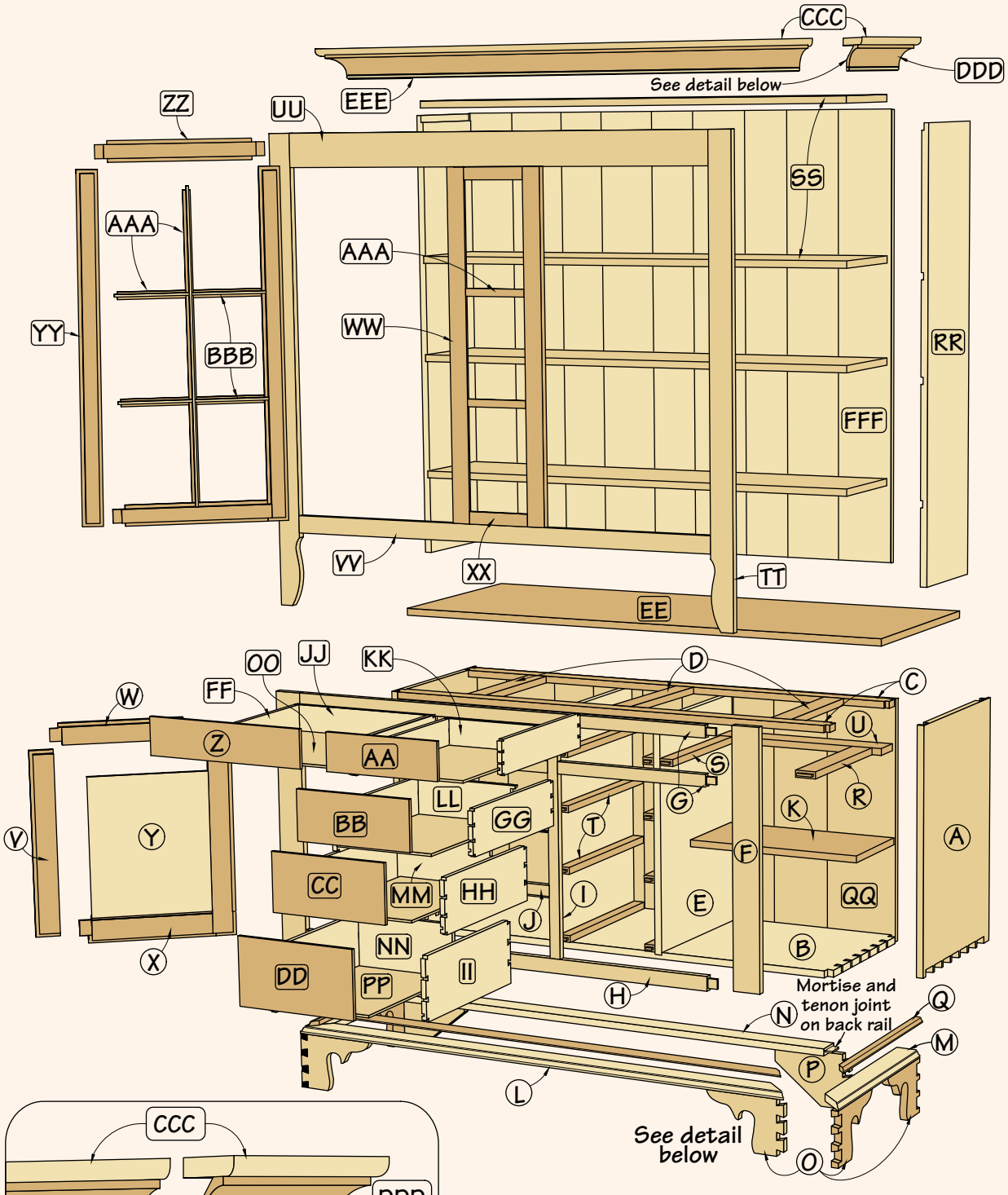
| No. | Ltr. | Item | Dimensions T W L | Material |
|---|---|---|---|---|
| 2 | A | Sides | ¾" x 18⅜" x 26⅝" | P |
| 1 | B | Bottom | ¾" x 17⅝" x 52¼" | S |
| 2 | C | Long stretchers | ¾" x 2" x 51¾" | S |
| 3 | D | Short top stretchers | ¾" x 1¼" x 15¾" | S |
| 2 | E | Interior partitions | ¾" x 17⅝" x 25⅜" | S |
| 2 | F | End stiles | ¾" x 2⅞" x 26⅝" | P |
| 2 | G | Top & mid. rails | ¾" x 1¼" x 48½" | P |
| 1 | H | Bott. rail | ¾" x 1½" x 48½" | P |
| 2 | I | Intermediate stiles | ¾" x 1⅛" x 25⅞" | P |
| 2 | J | Intermediate dividers | ¾" x 1⅛" x 13½" | P |
| 2 | K | Interior shelves | ¾" x 10" x 19⅝" | S |
| 1 | L | Base front rail | ¾" x 2½" x 55" | P |
| 2 | M | Base sides | ¾" x 2½" x 20½" | P |
| 1 | N | Base back rail | ¾" x 2½" x 52" | S |
| 6 | O | Front & side feet | ¾" x 5¾" x 8¼" | P |
| 2 | P | Rear feet | ¾" x 5¾" x 8¼" | S |
| 1 | Q | Base trim | ½" x ⅞" x 96" | P |
| 2 | R | Drwr runners | ¾" x 2¼" x 16" | S |
| 2 | S | Drwr runners | ¾" x 1½" x 16" | S |
| 8 | T | Drwr runners | ¾" x 1¼" x 18" | S |
| 2 | U | Rear drwr supports | ¾" x 3" x 19⅝" | S |
| 4 | V | Door stiles | ¾" x 2¼" x 19⅝" | P |
| 2 | W | Door top rails | ¾" x 2¼" x 15" | P |
| 2 | X | Door bott. rails | ¾" x 2½" x 15" | P |
| 2 | Y | Door panels | ⅝" x 13⅛" x 15½" | P |
| 2 | Z | Drawer fronts | ¾" x 3⅞" x 17⅛" | P |
| 1 | AA | Drawer front | ¾" x 3⅞" x 12¼" | P |
| 1 | BB | Drawer front | ¾" x 5" x 12¼" | P |
| 1 | CC | Drawer front | ¾" x 5⅞" x 12¼" | P |
| 1 | DD | Drawer front | ¾" x 6⅝" x 12¼" | P |

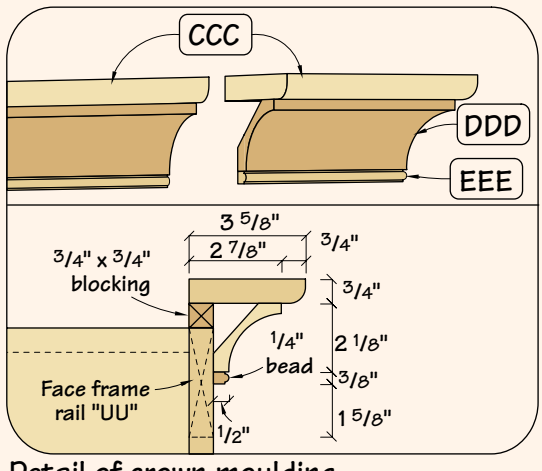
| No. | Ltr. | Item | Dimensions T W L | Material |
|---|---|---|---|---|
| 1 | EE | Top | ¾" x 20¾" x 54½" | P |
| 6 | FF | Drwr sides | ½" x 3½" x 16" | S |
| 2 | GG | Drwr sides | ½" x 4⅝" x 16" | S |
| 2 | HH | Drwr sides | ½" x 5½" x 16" | S |
| 2 | II | Drwr sides | ½" x 6¼" x 16" | S |
| 2 | JJ | Drwr backs | ½" x 2¾" x 16⅜" | S |
| 1 | KK | Drwr back | ½" x 2¾" x 11½" | S |
| 1 | LL | Drwr back | ½" x 3⅞" x 11½" | S |
| 1 | MM | Drwr back | ½" x 4¾" x 11½" | S |
| 1 | NN | Drwr back | ½" x 5½" x 11½" | S |
| 2 | OO | Drwr bottoms | ⅝" x 16¼" x 15¾" | S |
| 4 | PP | Drwr bottoms | ⅝" x 16¼" x 10⅞" | S |
| | QQ | Back boards* | ⅝" x 51" x 26½" | P |

Upper Cabinet

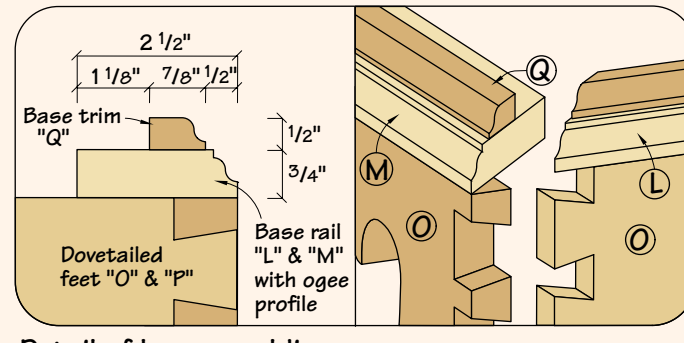
| | | | | |
|---|---|---|---|---|
| 2 | RR | Sides | ¾" x 11¼" x 47½" | P |
| 4 | SS | Shelves, top & bott. | ¾" x 10½" x 50" | S |
| 2 | TT | Face frame stiles | ¾" x 2⅜" x 47½" | P |
| 1 | UU | FF top rail | ¾" x 3⅜" x 48¼" | P |
| 1 | VV | FF bott. rail | ¾" x 1¾" x 48¼" | P |
| 2 | WW | Center frame stiles | ¾" x 1⅞" x 34⅞" | P |
| 2 | XX | Center frame rails | ¾" x 1⅝" x 8½" | P |
| 4 | YY | Door stiles | ¾" x 2⅛" x 35½" | P |
| 4 | ZZ | Door rails | ¾" x 2⅛" x 16⅞" | P |
| 6 | AAA | Glazing dividers* | ¼" x ½" x 33" | P |
| 6 | BBB | Glazing flats* | ¼" x ¾" x 33" | P |
| 1 | CCC | Top moulding* | ¾" x 3⅝" x 90" | P |
| 1 | DDD | Crown moulding* | ¾" x 3" x 90" | P |
| 1 | EEE | Bead moulding* | ⅜" x ½" x 84" | P |
| | FFF | Back boards* | ⅝" x 50½" x 47" | P |

Key: P=maple, S=secondary wood, such as poplar; * Cut to fit




Detail of crown moulding




Detail of base moulding

## Simple door mullions

**Nothing makes a glass door feel more "authentic" than separated glass lights, but the double-rabbeted, notched mullions are never any fun. Here's a simple way to get the same effect.**

**a) Working from the back of the door, take two glazing dividers (¼" x ½") and cut them to fit across the door width, seating inside the rabbets in the door stiles on edge. Glue them into the rabbets with a dab of glue so they'll align with the shelves in the top unit.**

**b) Turn the door over and cut a glazing flat (¼" x ¾") to length to fit inside the door opening from top to bottom. Glue the piece in place with a dab of glue at the two intersecting spots of the glazing dividers already in place.**

**c) Turn the door over again and, working from the back side, fit three dividers behind the glazing flat piece, and between the original two glazing dividers. This will complete the ½" deep spaces for the glass pieces.**


C

**d) Once again, flip the door over and cut the four pieces of glazing flat to fit between the long flat piece and door stile. Glue them to the glazing dividers.**


D

**e) Once the glue dries and the mullions carefully sanded, you're ready to finish the door and then glaze the pieces of glass in place. I use Durham's Water Putty to glaze because it's easy to work with, doesn't shrink out and hardens to a very tough finish.**


E

**The glass I use for most of my pieces is referred to as restoration glass, and is available from Bendheim (800-221-7379 in New Jersey, or 800-900-3499 in California). The mouthblown glass is available in "full" or "light" restoration appearance. Full restoration has more distortion, and more accurately replicates glass made in the 17th and 18th centuries. Light restoration more closely resembles glass made during the 19th and early 20th centuries. Call for pricing information.**

*The center section drawer runners have tenons on the front end that fit into mortises in the face frame. The back of the runners are simply nailed in place, at right angles to the face frame. The drawer runners in the outer sections are tenoned on both ends and fit into the face frame and rear drawer support.*

base by routing an ogee profile on the frame edges. You'll attach the base to the case with screws through the frame into the bottom.

### The Lower Case

Assemble the case from solid lumber using dovetails. Dovetail the bottom between the two side panels, and dovetail 2"-wide stretchers between the sides at the top. The partitions and shelves fit into dadoes in the bottom and sides. Then build and attach the mortise-and-tenoned face frame.

To build the case, start by gluing up the pieces for the sides, bottom and partitions. When your panels are dry, cut a ¾" x ½" rabbet for the back pieces on both sides and the bottom. Next mark the pieces for the dovetails to hold the sides and bottom together. The two long top stretchers are also dovetailed into the sides, but first they must be mortised to accept the three short top stretchers that are tenoned on both ends. The five pieces then become a top frame to hold the top.

The next step is to build the face frame. The joinery is primarily mortise and tenon, with the exception of two half-lapped joints where the drawer stiles intersect the middle rail. Cut the half-laps, then mortise and tenon the rest of the joints. Assembly should go as follows: the intermediate dividers fit between the two intermediate stiles; then put all three rails in place; and finally add the two end stiles. Before gluing up the face frame, mark and cut the ⅜"-deep mortises on the back side of the face frame that will hold the drawer runners. After gluing up the face frame, I used square pegs to reinforce the joints.

With the frame complete, dry assemble the case and put the face frame in place on the case. Mark the location for the two center partitions from the location of the drawer stiles on the face frame, holding the partitions flush to the inside edge of the frame opening on the drawer side.

Now disassemble the case and cut the ¼"-deep dadoes for the partitions in the case bottom. Also cut the ⅜"-deep stopped dadoes for the interior shelves and the rear drawer supports.

You're now ready to glue up the case. Start by gluing the bottom between the case sides and the loose top support frame to the sides. Then glue the face frame in place, aligning the drawer stiles with your bottom dadoes. Clamp the face frame in place, then glue the partitions in place.

Complete the case construction by squaring pencil lines from the drawer openings in the face onto the drawer partitions. Follow these when attaching the tenoned center drawer runners in place, gluing the tenoned joint and nailing the rear of the drawer runner in place.

The last step is to glue the notched shelves, side drawer runners and rear drawer supports in place. Set the base cabinet aside for now. We'll build the doors, drawers and back after the upper case is complete.

### The Upper Case

Start the upper case by again gluing up any panels necessary. The construction of the piece is pretty simple, and much like the lower case. The two shelves, top and bottom are fit into ¼"-deep dadoes cut in the sides. Also milled in the sides are stopped rabbets to receive the back.

With the four horizontal pieces glued

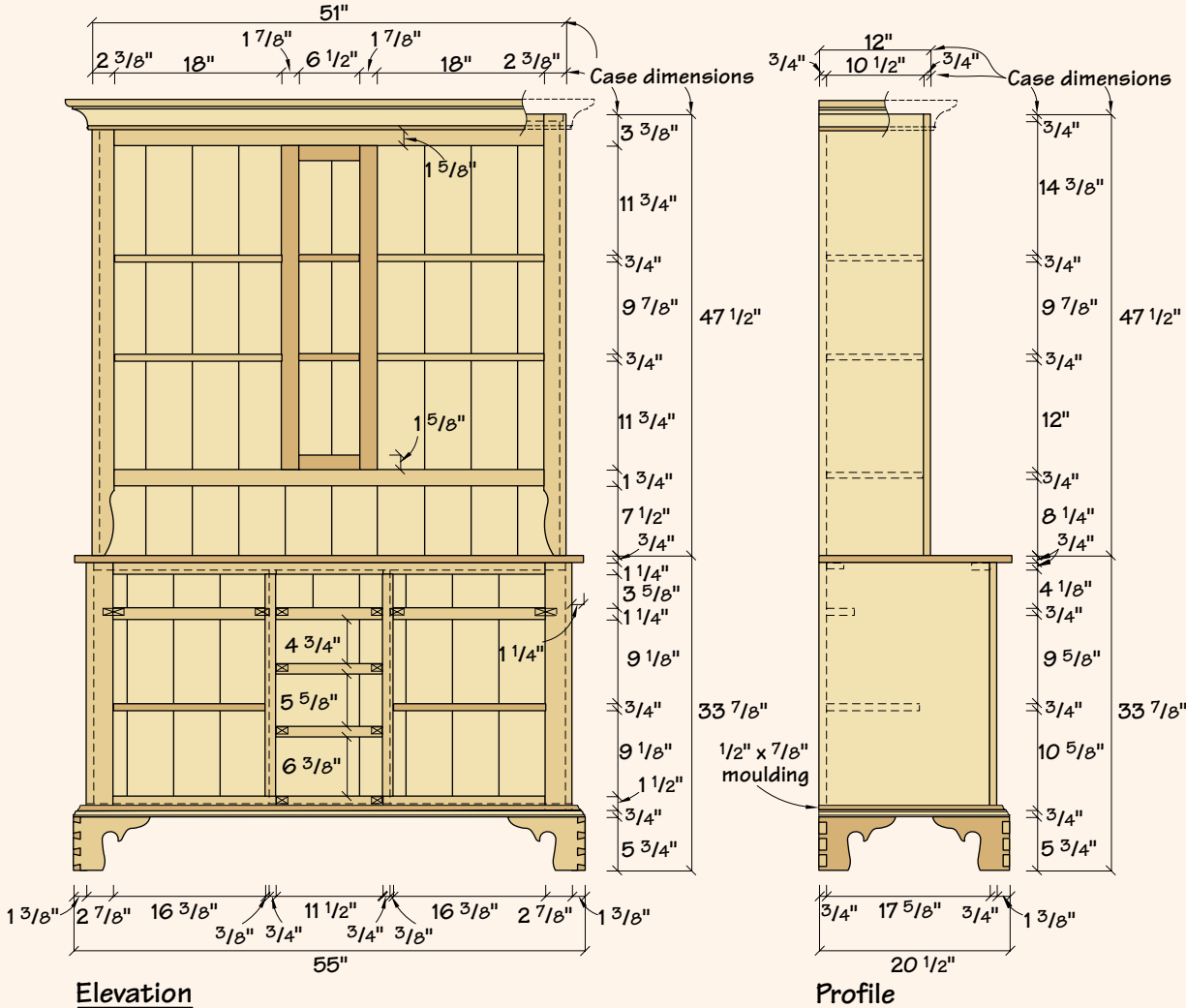
*To make installing the glass in the center frame easier, the frame is built separately and attached to the main face frame with pocket screws **(left)**.*

*Fitting and miter cutting the crown moulding is much easier with the upper case turned upside down. Fit the crown first, then add the bead moulding **(right)**.*

to the sides, I again pegged the joints to add strength and decoration, pegging each piece through the sides.

The face frame construction is similar to that of the lower case, using mortise-and-tenon joints to assemble the stiles and top and bottom rails. The one departure is that the center glass section is a separate face frame, also mortised and tenoned. I chose to build this section separate after dealing with the difficulty of installing the glass in the center section once the case was complete. Leave the section loose until the glass is installed, then use pocket screws through the stiles to attach the section.

Before assembling the face frame, cut the scroll pattern on the inside lower end of each stile. Then glue and clamp the face



*My homemade knob/catches take a little extra time, but they make the finished piece feel handmade—as they should* ***(top)****.*

*Attaching the rattail hinges is a little trickier than modern hinges, but there's nothing that gives this piece a more dramatic look* ***(left)****.*

frame until dry. Once ready, attach the face frame to the upper cabinet using glue and again pegging through the frame into the sides, upper and lower rails.

The next step is to miter and attach the top moulding. The moulding extends 2¾" from the face and sides of the cabinet, and will be supported by the crown moulding and bead moulding. I make my own cove moulding by running my stock at an angle over my table saw blade, but you could use stock moulding as well. Profiles for the cove and bead mouldings are shown in the diagrams.

The top of the lower cabinet is attached to the upper case with screws. After gluing up the boards for the top, simply screw up through the top into the sides of the upper case. When the back is attached it will rest on the top.

### Doors, Drawers and Backs

The doors use traditional pegged mortise-and-tenon joinery, with floating beveled panels in the lower section, and separated glass lights in the upper doors.

Cut all the stiles and rails to size as listed in the Schedule of Materials, then mill the mortises and tenons. The lower doors require a ⅜" x ¼"-deep groove run in the stiles and rails to capture the panels. The groove in the stiles should be stopped to avoid running through the mortise part of the piece. The panels are beveled at an 11-degree angle on all four edges and should be approximately ⅜" thick, ¼" in from the edge to fit snugly in the door frame grooves.

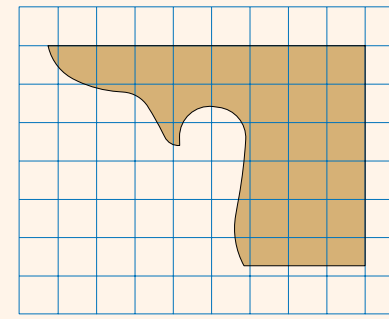
The upper doors are assembled the same way, but require a ½" x ⅜" rabbet on the inside edge of the doors to hold the glass. A clever method for making the separate light stiles is shown in the story earlier in the article.

All the doors are partial overlay, meaning they have a ⅜" x ⅜" rabbet run around the outside back edge. A 3/16" roundover profile finishes up the front edges.

The drawers also use traditional construction techniques. Cut a rabbet on the backside of the ends to form a ⅜" overlay. Cut a ¼" rabbet on the backside of the top edge of the drawer front. Then dovetail the sides into the drawer front and dovetail the back between the sides. Fit the bottoms into grooves run in three drawer parts. Bevel the bottom piece to fit in the grooves as you did with the lower door panels. Finally, cut the same profile on the drawer front that you did on the doors.

The back slats are "shiplapped" meaning a 5/16" deep x ½" wide rabbet is cut on two opposing long edges of each piece. The pieces are then interlocked with a gap between the pieces that allows for movement due to changes in humidity.

I used forged-iron rattail hinges (from Ball & Ball Hardware 800-257-3711, item #H41-CO5, $33.50 per pair) to hang the doors. This particular hinge is a little unusual as it's made to fit over a ⅜" lipped door. To attach the hinge, first locate the leaf on the door so the edge of the leaf is in line with the inside edge of the door rail. Then mark the location for the center hole on the leaf, drill that hole and attach the hinge. Move the hinge so that the rattail piece is parallel to the door. Mark the location to hold the rattail in place, drill and screw. Then insert the other screws.



**Foot "O" profile**

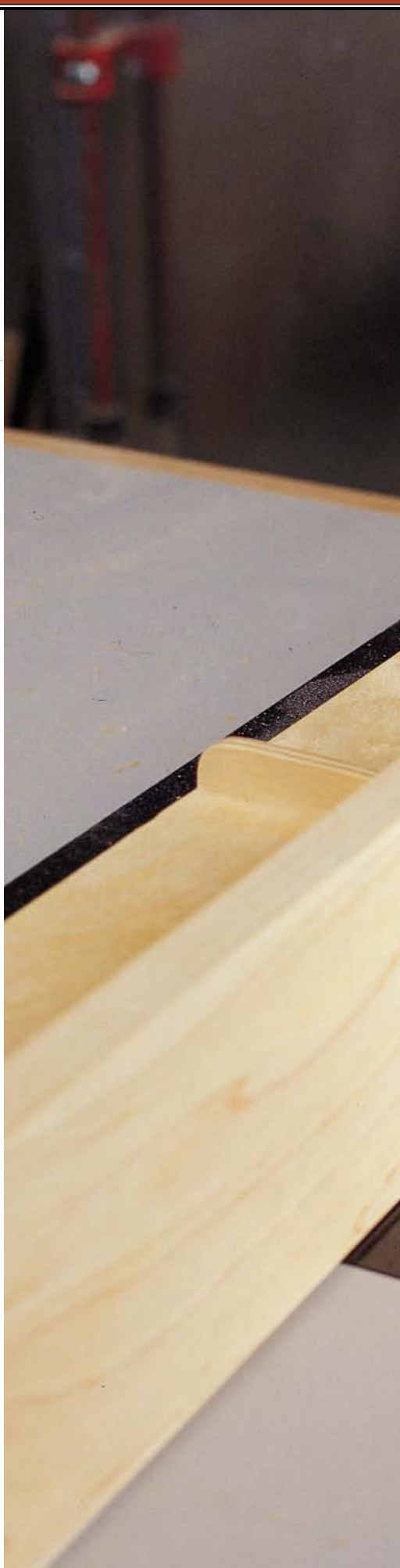
Each square = 1"

The door handles are made from store-bought pulls mounted on a ½" piece of dowel. Then add a piece of scrap as shown in the photo to function as a simple but effective door latch.

For the finish, I use a Moser golden-amber maple water-based aniline dye, a sanding sealer and five coats of lacquer.

Whatever you do when you complete your stepback, don't loan it out for display. I still hear mom tell the story of losing her new cupboard for a few weeks. Dad just grins and thinks of all the orders we received from that one piece. **PW**

# Router Fence for a Table Saw



If you've got a table saw, you've got the beginnings of a versatile router table system and edge jointer.

Your table saw is a router table and jointer just waiting to happen. Replace one of the saw's wings (or adapt your existing table board) to hold a router table insert, and you're in business. Add this router fence to your table saw's fence and you get a router fence with the capacity to handle boards few commercial router tables could even touch. Make a couple quick adjustments to the fence and you can edge-joint boards for gluing up panels — no jointer necessary.

This fence was designed for the Little Shop Mark II, a rolling workshop that was featured in the September 1999 issue (#110). However, this fence will work with just about any contractor- or cabinet-style table saw.

**It's in the Hole**

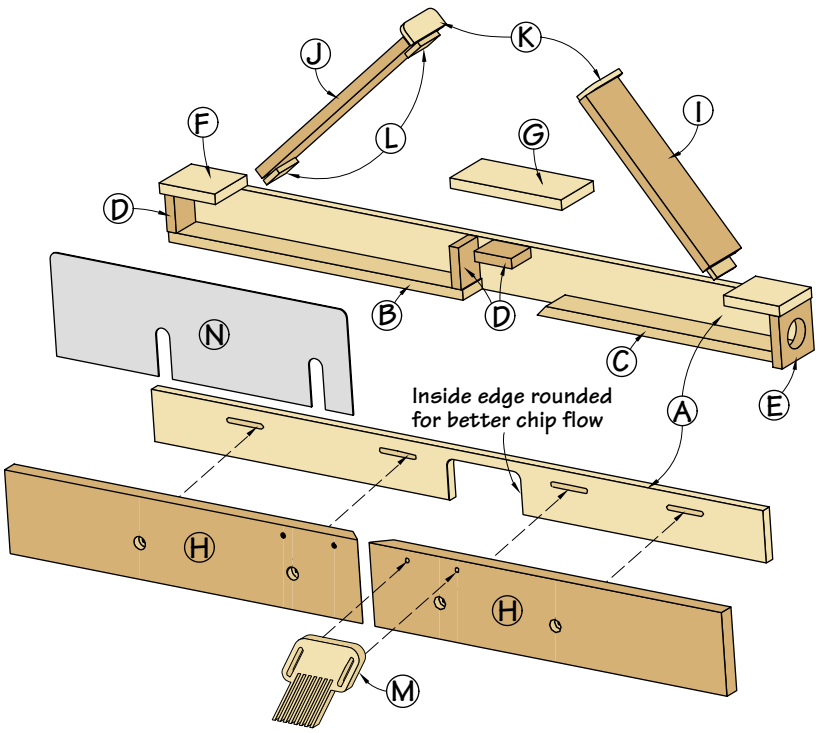
This fence is essentially two long plywood boxes with hardwood face fronts on them. The space between the boxes is where the router bit spins. One of the boxes stores router bits, the other acts as a dust collection chute. Though construction isn't complex, study the diagrams carefully before you begin.

First cut the hole for the insert in the top of your saw's table. If you've built the Little Shop Mark II, use the end of the long top for your table. For contractor's saws, you can use the table board on the right side of the saw. Or you can replace one of your saw's wings with a piece of laminate-covered plywood. Lay out the spot for the router table insert. I put the insert in the middle of the width of the table and between the back and front rail from the end. Cut the opening for the insert as shown in the photos. Mount the insert to the router. Drop it in the opening and adjust it so it's flush with the table.

By Jim Stuard


Photo by Al Parrish

**Routing the Plate Opening**
*A good way to get a parallel and square opening is to use the saw fence as a guide for two of the cuts. Measure the offset from the edge of the router base to the side of the spiral bit and use this in setting the fence for each cut, parallel to the fence. Clamp a square piece of wood in place as a guide for the sides of the opening, perpendicular to the saw fence. Next form the rabbet that holds the insert in place by using the same procedure and bit you used to cut the opening* ***(right)****.*




## Making the Fence

First you build the body of the fence, and then you attach the fence faces afterward. Begin by cutting the opening for the bit on the front piece. Use a rasp to round over the inside right edge of the opening to help deflect chips into the box that will later be connected to a shop vacuum. Next cut the bottom piece for the right box and cut a 45-degree chamfer on the end next to the opening for the bit, again to deflect chips.

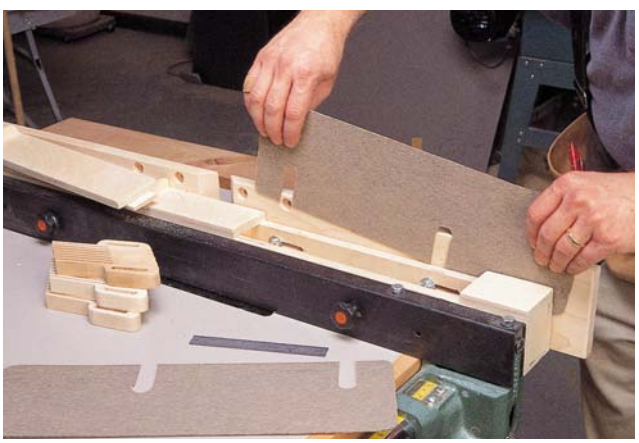
Assemble the boxes like this: First attach the two end pieces of the left box to the left bottom piece. Then attach the larger end piece for the right-side box (with the dust collection hole) to the bottom piece for the right box. Now nail the front and back pieces to the left and right assemblies. Be sure to hold the bottom edges flush. For the top part of the fence, keep in mind there are three fixed pieces — one on each end and one in the middle. And there are two removable pieces that give you access to the bit storage, the dust collection tube and the wing nuts that will hold the fence faces in place. Attach the three fixed top pieces and the support.

Now drill the holes in the back piece to accept the ¼" x 20 t-nuts that attach the router fence to the saw fence.

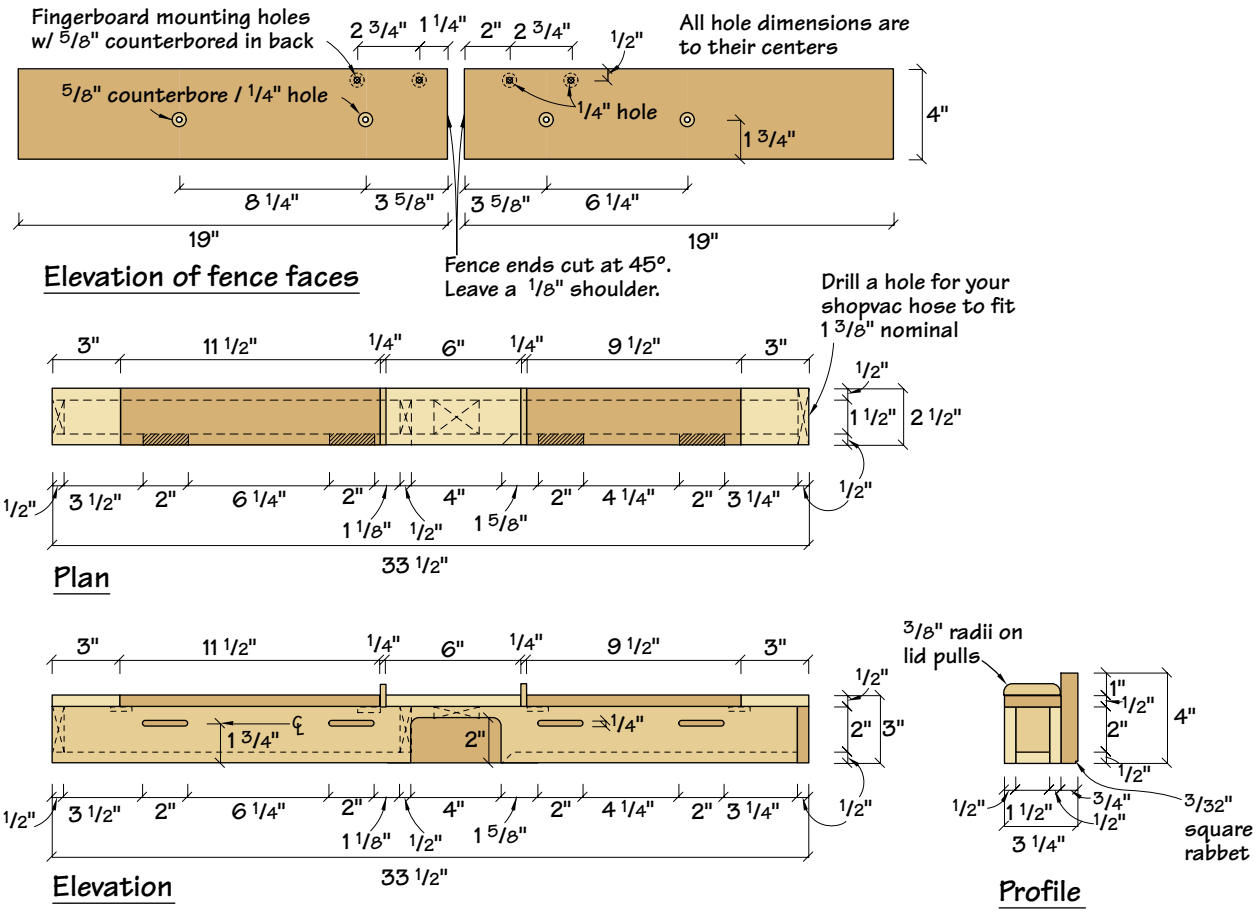
## Make it Adjustable

Now it's time to cut slots in the front piece that will be used for attaching the fence faces to your box and allow the fence faces to be adjustable. Rout the ¼" x 2" slots for adjusting the fence faces according to the diagram. Drop-cut plunge routing is something I'll only do with larger assemblies

**Routing Slots in the Fence**
*Clamp a stop to the saw fence to stop the assembly at the end of its cut. Drill a ¼" hole at the beginning of the cut and with the router running, lean the fence assembly against the stop, touching the table and lever it down over the hole that you just drilled. Gently push the assembly to the end of its cut and lever-lift the assembly off the table.*



**Jointer Insert**
*For edge jointing, cut a piece of laminate to the size of one fence face. Make it a little tall so you can pull it out from between the fence face and the fence. Cut two slots to clear the bolts on the fence. Chuck a straight bit in the router and set it flush with the offset fence face and you've made an edge jointer. Pull the spacer out to resume normal operation.*



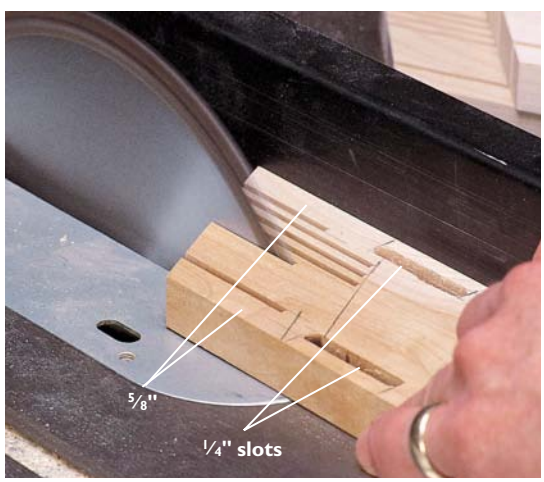

**Schedule of Materials: Little Shop Router Fence**

| No. | Ltr. | Item | Dimensions T W L | Material |
|---|---|---|---|---|
| 2 | A | Front & back | 1/2" x 2 1/2" x 33" | Plywood |
| 1 | B | Bottom | 1/2" x 1 1/2" x 15 3/4" | Plywood |
| 1 | C | Bottom | 1/2" x 1 1/2" x 13 1/8" | Plywood |
| 3 | D | Ends & support | 1/2" x 1 1/2" x 2" | Plywood |
| 1 | E | End | 1/2" x 2 1/2" x 2 1/2" | Plywood |
| 2 | F | Tops | 1/2" x 2 1/2" x 3" | Plywood |
| 1 | G | Top | 1/2" x 2 1/2" x 6" | Plywood |
| 2 | H | Fence faces | 3/4" x 4" x 19" | Maple |
| 1 | I | Lid | 1/2" x 2 1/2" x 9 1/2" | Plywood. |
| 1 | J | Lid | 1/2" x 2 1/2" x 11 1/2" | Plywood |
| 2 | K | Pull | 1/4" x 1" x 2 1/2" | Plywood |
| 4 | L | Index blocks | 1/4" x 1" x 1 1/2" | Plywood |
| 2 | M | Finger boards | 3/4" x 3 1/8" x 8" | Maple |
| 2 | N | Jointer spacers | 5" x 16" | Plas. Lam. |

such as this. Smaller pieces don't have enough mass to absorb a kickback. If you're unsure about this process, then use a less accurate, but safer, method of drilling two 1/4" holes and connecting them with a jigsaw. The object is to get a 1/4"-20 bolt to slide smoothly throughout the length of the 2" slot. Now cut a 45-degree angle on the ends of the fence faces, leaving a 1/8" flat end on the miter for durability. Lay out and drill the relief holes for the 1/4" x 20 bolt heads then follow these holes with 1/4" holes for the bolt shanks.

## Tiny but Tough Fingers

The last step is to make finger boards. The method I use is to rip a piece of 3/4" wood to 3 1/8" and about 8" long. When doing this, it's actually safer to have the blade height up a little higher than usual to prevent kickback. A good rule is to move your fence 1/4" after each cut until you've completed the finger board. The fingers on this board are thick enough to take a beating, but thin enough to flex with some strength. Make three finger boards. One for both sides of the fence and one for the router table insert, with its center right at the insert opening. **PW**




### Finger Boards

*Cut a 30-degree angle on the end of the board. Cut two parallel, 1/4" slots in the board as shown in the photo. Mark a line 2 1/2" from the end of the miter cut. Cut out the 5/8" notches in the sides and then cut out 1/8" fingers with a 1/8" spacing, ripping to the 2 1/2" pencil mark. Stop and back the board out of the cut.*

## Supplies

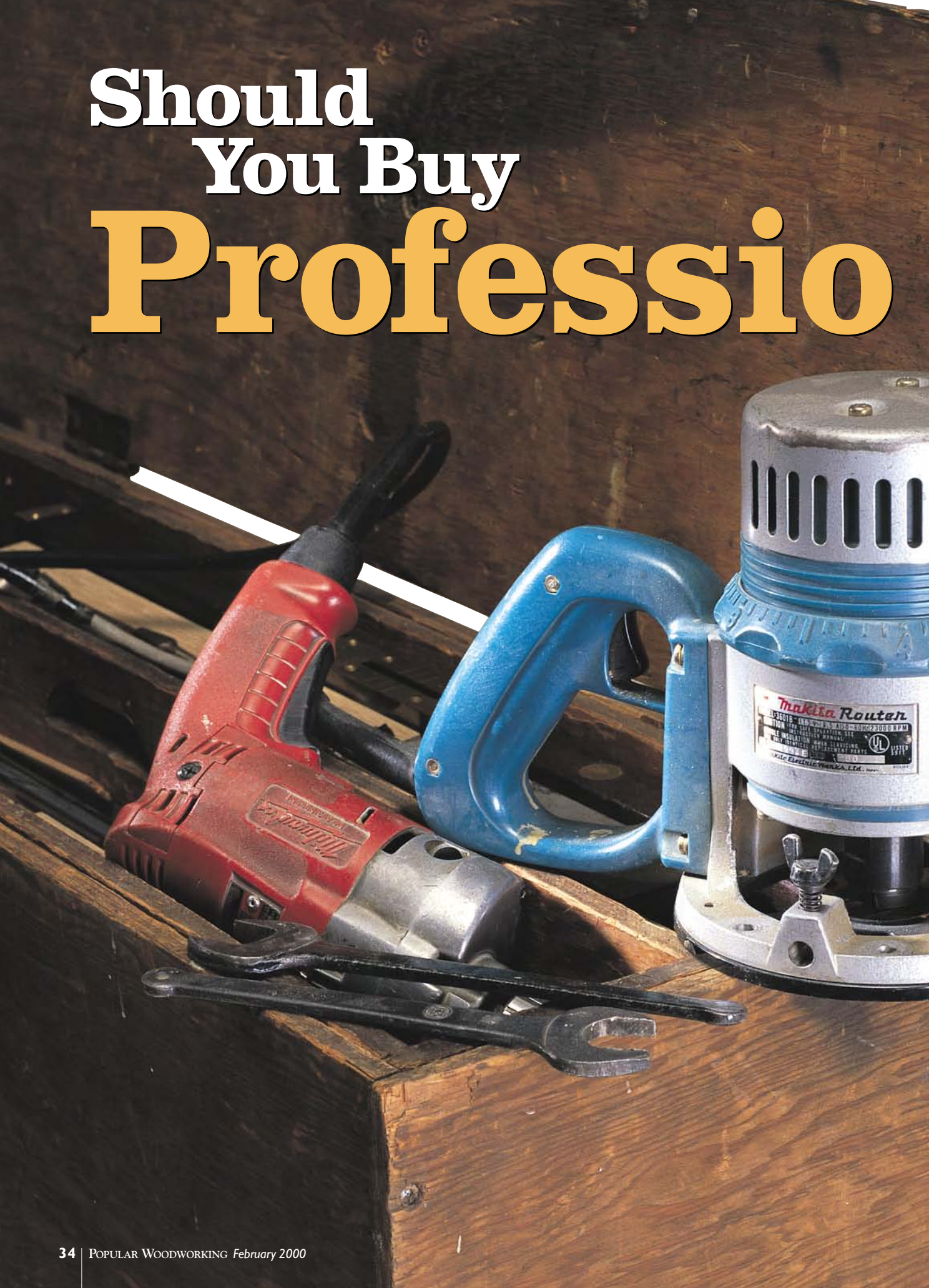
**Ried Tool Supply Co.**
**800-253-0421**

**2 fluted plastic knob, AP-30, $.70/apiece. Insert a 2" x 1/4"-20 hex bolt into this knob to create knobs for attaching the router fence to the saw fence.**

**Tools On Sale**
**800-328-0457**
**Router table insert, RM3509/$29.95.**

**Other hardware:**
**10-1 1/2" x 1/4"-20 hex bolts**
**10- Lock washers for 1/4" bolts**
**10- Flat washers for 1/4" bolts**
**10- 1/4"-20 wing nuts**
**2-1/4"-20 t-nuts**

# Should You Buy Professio



# nal Tools?

## Know the difference between a tool built for occasional use and a tool built for a daily workout.

Most woodworkers know you should have the right tool for the job. But choosing the right power hand tool can sometimes be confusing when the different tools you are considering are made by the same manufacturer but have wildly different price tags. For example, you can buy a $39 jigsaw or a $160 jigsaw from the same manufacturer. Both will cut wood, but will the $160 jigsaw cut wood four times better than the $39 tool? Probably not.

So to decide which power tool is right for you it's good to understand the difference between inexpensive tools and expensive ones. In a broad sense manufacturers make tools for two types of users. On one hand are the "occasional users." These are homeowners, do-it-yourselfers and part-time hobbyists who use power tools occasionally. On the other end of the scale are "professional users," carpenters or commercial woodworkers who use their tools every day and demand the most from them.

If it were that black and white, tool designing would be simple. However, many occasional users are demanding shoppers, and have the money to purchase better tools than they might need. The two-tier scenario also doesn't take into consideration the advanced home woodworker who wants pro tools or the professional who needs a chop saw once a month.

In some cases, manufacturers do not clearly identify the two different design groups. Some use the same tool color across their line, and they use the same selling or marketing terminology in ads and catalogs. Other companies produce tools under two different brand names: one for the home user and one for the professional. For example, Black & Decker and DeWalt are part of the same company, but DeWalt tools are built and marketed for the professional market. Bosch builds tools for the professional user, but its sister company markets a line of home tools under the Skil nameplate.

Recognizing the difference between the pro and home tools isn't easy in the store. One good indicator used to be the features on the tool, but even the less expensive tools now offer more features. So the place to start is with the price tag. A $39 drill is built dif-

by Randy Caillier

*Randy Caillier is a regional service manager for Makita and has been involved in the power tool and equipment industry since 1978. The opinions expressed in this article are his own and not those of Makita.*

ferently than a $139 drill. The line blurs again, however, when you start comparing high-end tools to other high-end tools, such as a $140 jigsaw and a $250 jigsaw. Sometimes you don't get what you pay for at that level.

### Fit and Finish

One in-store technique for separating pro tools from home tools is looking at the fit and finish of a tool. Are the seams tight or rough? Do the switches, knobs or levers operate smoothly and with precision? Does the outer surface of the tool have sharp edges? Is the finish or paint bubbled, chipped or uneven? Does the battery slide in and out of the tool easily? Does the router base adjust smoothly? These are things that can help you identify the engineering and care put into a professional quality tool.

Fact is most of the differences between tools is internal, and unless you're an engineer with the chance to tear apart a tool, you won't know the difference. Here's a look at some of the internal differences between pro tools and home tools.

### Bearings and Bushings

For the occasional user, manufacturers anticipate less wear and tear on the parts, so they use parts rated for a shorter lifespan to keep the price affordable. (Price is a strong selling point for occasional users.) Instead of ball or needle bearings, they'll use bushings or plain bearings to center a rotating shaft in a tool. Bushings provide some wear protection and centering for the tool's rotating shaft. They are usually made from a single piece of metal or nylon, and they have no moving parts.

Ball or needle bearings, on the other hand, are made from several pieces of steel, providing high levels of centering accuracy and finer tolerances. Also, ball and needle-type bearings protect the rotating shaft from wear better than a bushing. Ball bearings can handle rotating shafts that thrust as well as spin (called a radial load). Whereas roller or needle bearings are built for handling only radial loads — but they can handle huge loads. Both types of bearings usually cost much more than bushings or plain bearings.

Ball and needle bearings are considered almost standard in a professional tool. An instance where this would not hold true would be for the rollers on a belt sander, because the dusty environment would reduce the effectiveness of ball bearings.

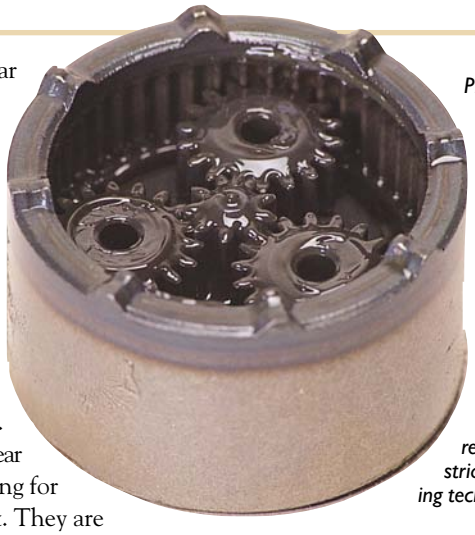
You're not going to be able to determine what type of bearing or bushing was used in a tool while you're shopping in the store, but the price is usually a good indicator of what's inside.

### Gears

The amount of machining performed on a gear affects the performance and quality of a tool. The tighter the gears, the less play in the mechanism and less wasted energy as the tool operates. Tighter tolerance also reduces wear on the gears, extending the life of the tool.

To create a quality gear, you generally have to go through multiple machining steps, with each step adding to the cost of the gear, but it does improve the quality of the gear match.

At one time tools for the occasional user could be identified by "straight-cut" or "powdered" gears. Straight-cut refers to a rough-cast gear that is machined in a single step to keep the overall cost of the gear low. A powdered gear is made by pressing powdered steel into a mold under high pressure. This also produced a gear that was less expensive and had a shorter lifespan. Today's technology now produces powdered gears that rival machined steel gears for precision. Many manufacturers are now using these improved powdered gears — but not all. In some cases, low-tolerance single-run and the poorer-grade powdered gears can actually be heard as a raspy metal-rubbing-on-metal sound when the tool winds down.



*Professional tools use gears that are machined several times to a fine tolerance. Home tools might use "straight cut" or "powdered" gears that are inexpensive to make. Though these inexpensive gears are less desirable, their quality has been increasing in recent years with strides in manufacturing technology.*

### Tool Housings

When plastic housings on hand tools started to become the norm, they were often considered to be less durable. However, with today's technology, plastic housings are all over the map. Some are still somewhat flimsy. But many quality professional tools now have glass-filled nylon housings that are extremely durable and also insulate against excess heat produced by the motor.

Two-piece, "clam-shell" motor or tool housings are found in both professional and occasional-use tools. As the term implies, the whole tool housing is split in half, with a left and a right side. For the manufacturer, the clam-shell tool is easier to assemble at the plant, and any step saved in the manufacturing process reduces the final cost of the tool. As the halves go down the line, the tool components can easily be placed into the open half, and at the end of the assembly process the two halves are screwed together.

If there is a weakness of this housing style, it is when your bearing seats also are two pieces. For a bearing or bushing to be

## Differences Between a Professional Tool and a Home Tool

**Bushings and Bearings**
**Pro tools use ball or needle bearings. Some home tools use bushings or plain bearings.**

**Gears**
**Pro tools use highly machined gears. Some home tools use straight-cut or powdered gears.**

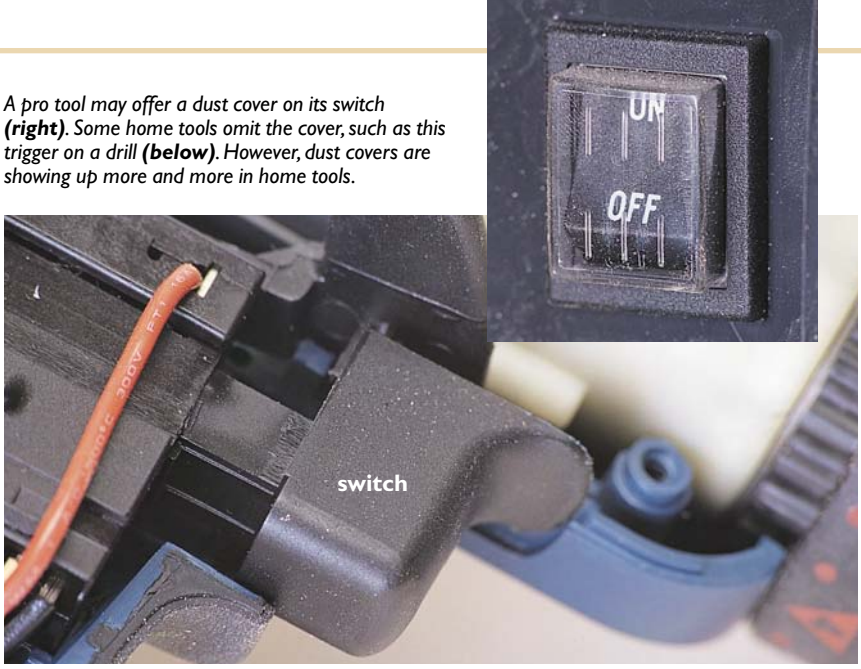
**Housing**
**Some pro tools use a molded one-piece case to support bearings. Some home tools (and pro tools) use a two-piece "clamshell" design.**

**Switch**
**Pro tools use a cover on the tool's switch to keep dust out. Some home tools don't have a dust cover.**

**Cords**
**Pro tools use a rubber cord that has a separate guard. Home tools tend to have a cord and cord guard molded into one piece.**

**Warranty**
**Home tools tend to have a longer warranty than pro tools.**

**Brush Hatches**
**Pro tools have coin-opened hatches that let you get to the brushes in a universal motor tool. Some home tools do not.**




*A pro tool may offer a dust cover on its switch **(right)**. Some home tools omit the cover, such as this trigger on a drill **(below)**. However, dust covers are showing up more and more in home tools.*

*Ball bearings or needle bearings are one indicator of a pro tool. How will you know if your tool has these bearings? You won't unless you take the thing apart.*

most effective, it needs to remain stationary in its housing location (or bearing seat). When you apply heavy loads to a split or two-piece bearing seat, they may flex apart — causing the exterior of the bushing or bearing to slip or spin with the rotating shaft. As this happens, the bearing or bushing is less effective. The worst case is when the slipping or spinning of the bushing or bearing race (the bearing exterior) is excessive. The plastic bearing seats begin to melt, causing the shaft tolerance to alter, leading to major tool failure.

### Switch Covers

Dust, liquids and other debris can enter the switch and cause its contacts to short out, which is one of the first things that usually goes wrong with a tool.

To protect against this, some manufacturers place a dust cover or "boot" on the switch. A quality rubber switch dust cover is often designed into the professional-user tool models (and more and more into home tools). You can't always see this difference in the store. More and more professional tools offer an internally sealed switch to keep dust out without impeding access to the switch.

Uncovered or unsealed switches are fine for lower-usage tools because of the cleaner work environment and lower frequency of use.

### Cords

Occasional-use tools often use a plastic one-piece molded cord guard, while professional tools use a two-piece rubber cord that has a separate guard. The one-piece plastic cord is acceptable for home use because of the tool's infrequent use (causing less stress on the power cord) and the less extreme temperature demands. A rubber cord on a professional tool allows increased flexibility during normal or cold weather use, while the plastic cord can become stiff and unmanageable, or even crack and break, in cold weather use.

The one-piece cord is less expensive because it allows the manufacturer to quickly install the cord during assembly, reducing the overall cost of the tool.

### Warranties

One thing you can check in the store is the warranty offered on a tool. But does a longer warranty mean a better tool? Not always. Professionals notice problems with their tools quickly after the purchase, so a 90-day or six-month warranty on a professional tool is pretty standard. A two-year warranty gives the occasional user the opportunity to use a tool a few times (or for the first time after a year or so) to discover defects. This gives the occasional user a fair shake at being covered by the warranty.

In most cases what is more important than the warranty is the manufacturer's reputation for standing behind its tools. Quality manufacturers take a look at warranty requests on an individual basis and usually support their tool unless an obvious abuse has occurred.

### Brushes

Another visible indicator of a high-quality, universal motor tool is the presence of an external hatch that allows you to easily replace the brushes. (Except for cordless tools where external brush access is rare). Professional tools see enough use to require new brushes, so manufacturers make this maintenance procedure easy to do in the field. Tools for the home user don't usually have these hatches because it's unlikely the tool will be used enough during its lifetime to warrant new brushes.

### Motors

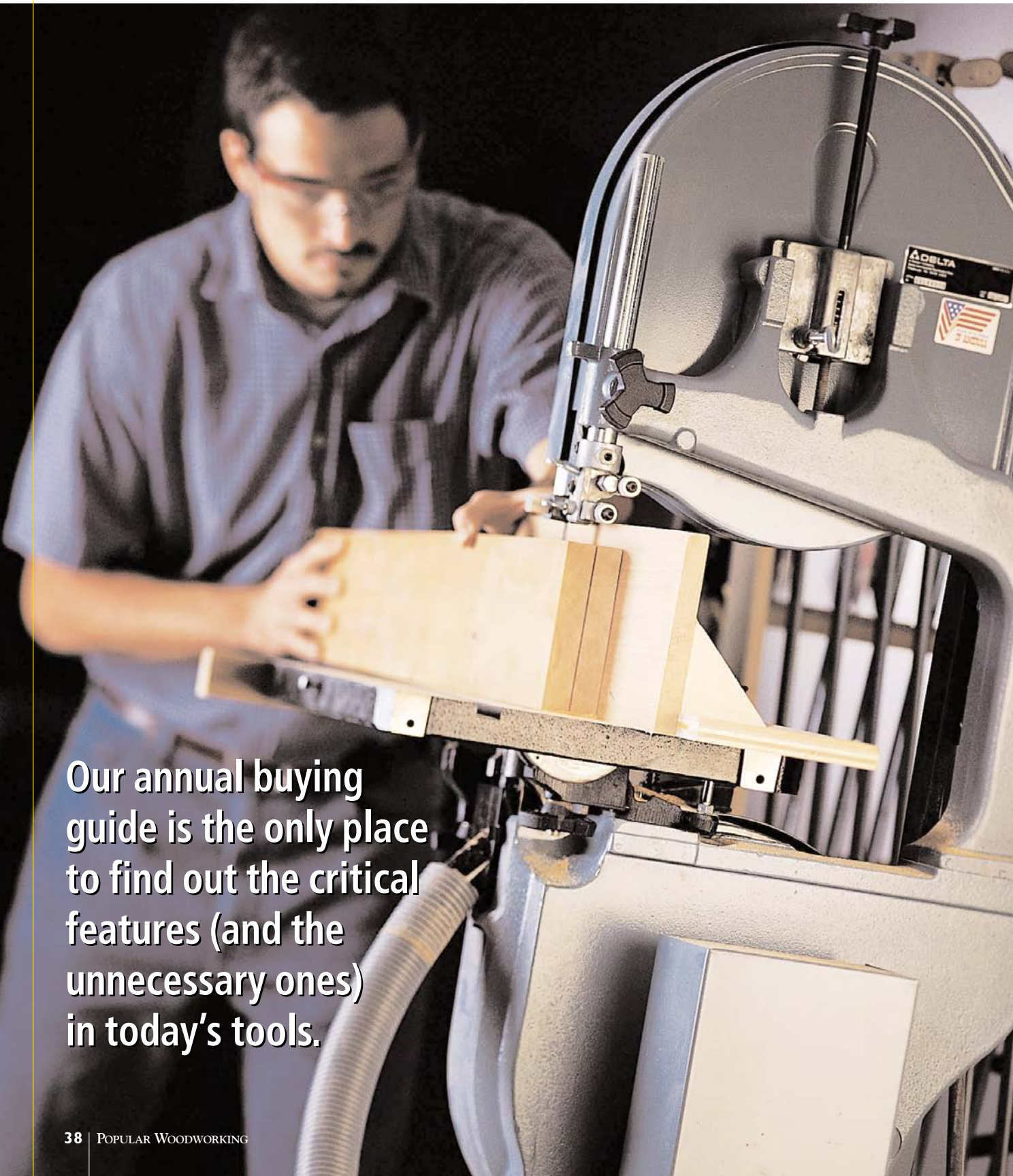
A tool's motor is difficult to evaluate in the store. Motors come from many sources and the country of origin isn't always the sign of a good or bad motor. Some motors for power hand tools are rated in horsepower or developed horsepower. Ignore this rating. Check out the amperage rating on the motor's information plate. This indicates how much current the motor pulls from the wall and is a better indication of the tool's power. However, amperage can also be fudged, so the truth is there's no perfect way to compare motors.

### So Should You Buy a Pro Tool?

It's not fair to say that tools for the occasional user are not worth buying. As a matter of fact, if you honestly place your power tool work requirements into the occasional-use category, some can be a good value.

On the other hand, if you plan to make a living with your power tools, or if you know you will be using them on a more than occasional basis at home under heavy work conditions, consider buying the professional-user tools. This will keep you out of the repair shops and on the job. **PW**

# Tool Report




**Our annual buying guide is the only place to find out the critical features (and the unnecessary ones) in today's tools.**

Every day we get phone calls from readers who are about to buy a tool. They already have a good idea about what they want. They've done some research, and they just want someone to tell them they're making the right choice.

These conversations are helpful for us as well. Over the years we've learned a great deal about what tools woodworkers are buying and what features are important to them. Plus we've found out what information (or misinformation) they already have.

This daily contact with our tool-buying readers is critical to the way we review tools in our annual Tool Report issue. It makes us constantly ask: What information can we provide to help woodworkers when they buy tools? It's not just telling them what brand to buy. A woodworker who needs a scrollsaw for some occasional details doesn't need the same tool as someone who spends eight hours a day doing fretwork.

Our approach is to explain which features in a tool are important (and which aren't) and give you enough information to decide if those features are important to you. We don't, however, give out "best buy," "best value" or "editor's choice" blue ribbons. We will show you which tools have received a "Best New Tool" award, have passed our rigorous Endurance Test or have received a four-star or five-star performance rating in our Tool Test column.

In this issue we've provided information on five tool categories: 10" cabinet saws, biscuit joiners, 14" band saws, single-stage dust collectors and cordless drills. We've included realistic price ranges (also called the "street price") for each of the tools, except when they are available from only one source, such as tools from Craftsman and Grizzly Industrial. If the tool you are interested in buying isn't included in this year's report, you can check out past tool reports on our website (www.popularwoodworking.com).

We hope that when you think about buying a tool, you'll turn to *Popular Woodworking* for advice. If our published information doesn't answer all your questions, give me a call (513-531-2690, ext. 255). You'll learn something, I'll learn something and we'll both be the better for it. **PW**

by David Thiel

# What's Inside



## Contact Information

**Belsaw**
800-468-4449 www.belsaw.com

**Black & Decker**
800-544-6986 www.blackanddecker.com

**Bosch • SB Power Tools**
877-267-2499 www.boschtools.com

**Bridgewood • Wilke Machinery**
800-235-2100 www.wilkemach.com

**Craftsman • Sears**
800-377-7414 www.sears.com/craftsman

**Delta International Machinery**
800-438-2486 www.deltawoodworking.com

**DeWalt**
800-433-9258 www.dewalt.com

**Fein Power Tools**
800-441-9878 www.fein.com

**Festo • Toolguide**
888-463-3786 www.toolguide.net

**Freud USA**
800-334-334-4107

**General International**
819-472-1161 www.general.ca/an/index2.htm

**Grizzly Industrial**
800-523-4777 www.grizzlyindustrial.com

**Hitachi Power Tools**
800-706-7337 www.hitachi.com

**Inca • Garrett Wade**
800-221-2942 www.garrettwade.com

**Jet Equipment & Tools**
800-274-6848 www.jettoools.com

**Lamello • Colonial Saw**
800-252-6355 www.csaw.com

**Lobo Machine Power Tools**
800-786-5626 www.lobomachine.com

**Makita**
800-462-5482 www.makita.com

**Metabo**
800-638-2264 www.metabousa.com

**Milwaukee Tool**
262-781-3600 www.mil-electric-tool.com

**Mini Max SCM Group USA**
800-292-1850 www.minimax-usa.com

**North State • Leneave Machinery**
800-442-2302

**Panasonic Power Tools**
800-338-0552 www.panasonic.com

**Penn State Industries**
800-377-7297 www.pennstateind.com

**Porter-Cable**
800-487-8665 www.porter-cable.com

**Powermatic**
800-248-0144 www.powermatic.com

**RBI Industries**
800-487-2623 www.rbiwoodtools.com

**Reliant • Trendlines**
800-877-7899 www.trend-lines.com

**Ridgid • Emerson Tool**
800-474-3443 www.ridgidwoodworking.com

**Robland • Laguna Tools**
800-332-4094 www.lagunatools.com

**Ryobi Power Tools**
800-323-4615 www.ryobi.com

**Seco Machinery Tool**
888-558-4628 www.seco-usa.com

**Skil • S-B Power Tools**
877-SKIL 999 www.skiltools.com

**Star Tools**
888-678-8777 www.411web.com/s/startools

**Sunhill Machinery**
800-929-4321 www.sunhillnic.com

**Tradesman • Power Tool Specialists**
800-243-5114 www.tradesman-rexon.com

**Transpower • C.P. Tools**
800-654-7702 www.cptools.com

**Wagner Electronic Products**
800-727-4023

**Woodtek • Woodworker's Supply**
800-645-9292

Your table saw is the most important tool in your shop. If you can afford it, buy a cabinet saw. They have more power for cutting thicker or denser woods, better fences, heavy-duty trunnions and are more stable than contractor-style saws. A cabinet saw will make your woodworking more pleasurable, and its usefulness will likely outlive you.

### Stability

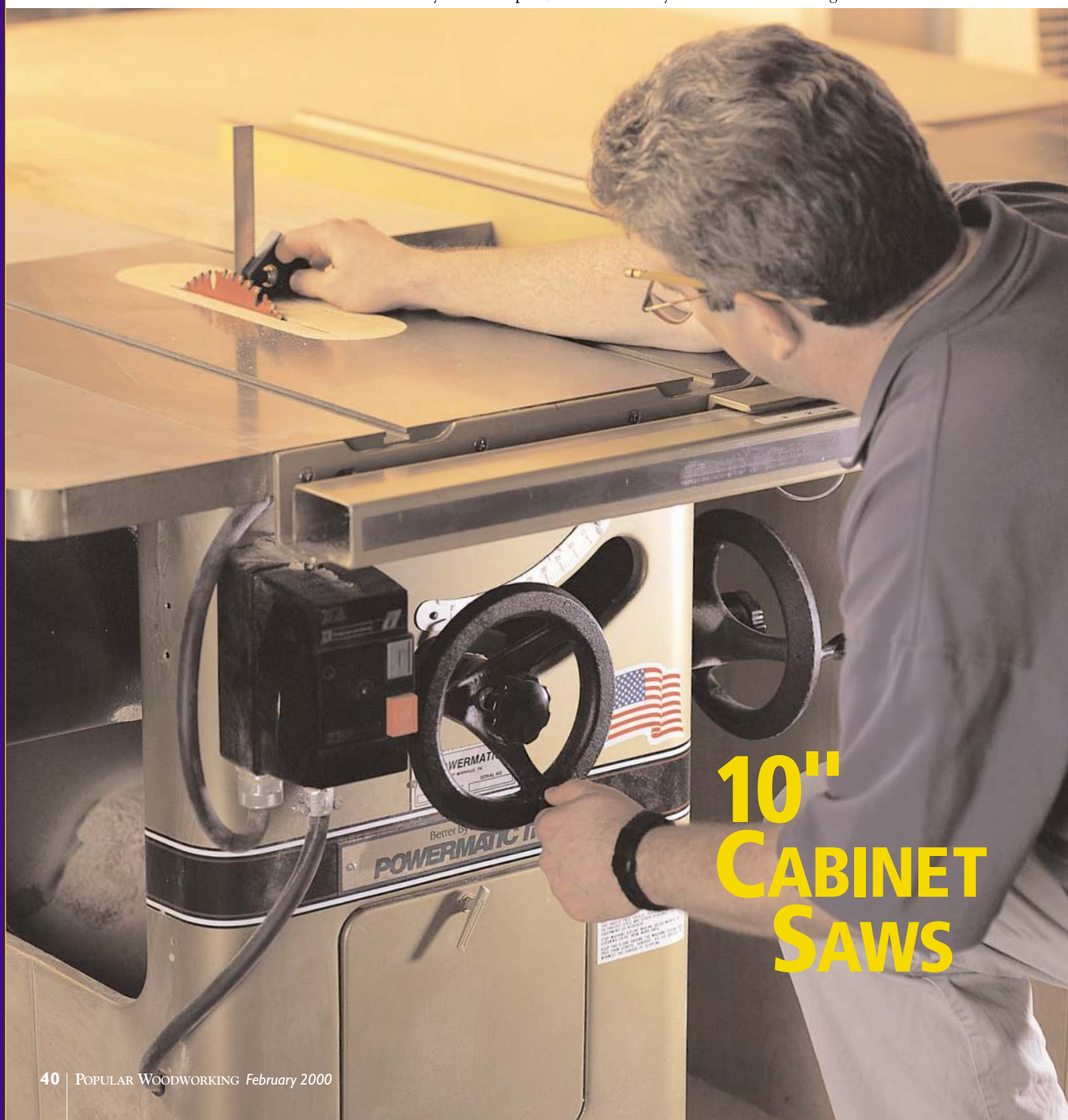
Cabinet saws are more stable because they have a heavy-duty motor and blade-mounting system attached to the solid cabinet base, which also reduces vibration. This mounting system improves the accuracy of the blade and results in a better cut.

### Power

More power will always perform better — if your house or shop is wired for it. Almost all cabinet saws require 220-volt power, and many can be purchased to use three-phase power (almost always a necessity with a 5 hp motor). Decide what type of power you can supply and narrow your search that way first. The difference between a 3 hp or 5 hp saw is the ability to cut thicker, harder woods with less resistance. If you don't rip $10/4$ white oak every day, a 3 hp machine should meet your needs. If money isn't a large concern, choose the most horsepower your wiring can support.

### Fence

The Biesemeyer-style fence is standard on most quality cabinet saws. The label might not say it's a Biesemeyer, but many manufacturers have cloned Delta's Biesemeyer system, and they work just as well. JET, Powermatic and General all have Biesemeyer-style fences that are rock solid, lock with a cam motion against the front rail and align themselves square to the blade. The locking mechanism attaches




# 10" Cabinet Saws

only at the infeed side of the saw, allowing outfeed attachments at the rear.

Delta also makes the Unifence, which uses many of the same principles as the Biesemeyer, and adds some nice features. Some people swear by this fence.

If cost is an issue, many of the non-clone front-and-rear locking fences will also provide excellent service. Unfortunately this is a decision best made with hands-on experience, or a good recommendation.

## Left Tilt vs. Right Tilt

One feature that comes down to personal preference is whether your saw should have a right-tilt or left-tilt blade. I've heard convincing arguments from both camps, nonetheless I learned on a left-tilt saw and prefer that design. Again, the choice is personal, and some manufacturers offer you the option of left or right tilt in the same basic saw.

## Accessories

The weight and size of a cabinet saw makes it a great platform for adding outfeed tables, larger (50" or more) fences and sliding crosscut tables. If you plan to add accessories to your saw, try to find out if they are compatible with the machine you want. For example, some sliding tables won't work with left-tilt saws. Also, some aftermarket miter gauges don't fit in some saw's miter slots.

## Delivery

Because of the size and weight of a cabinet saw, make sure you include shipping expenses in your price when shopping from catalogs. This can add 5 percent to 10 percent to the cost of the machine. Also take into consideration how you will get it off the truck and into your shop.

## Unimportant Features

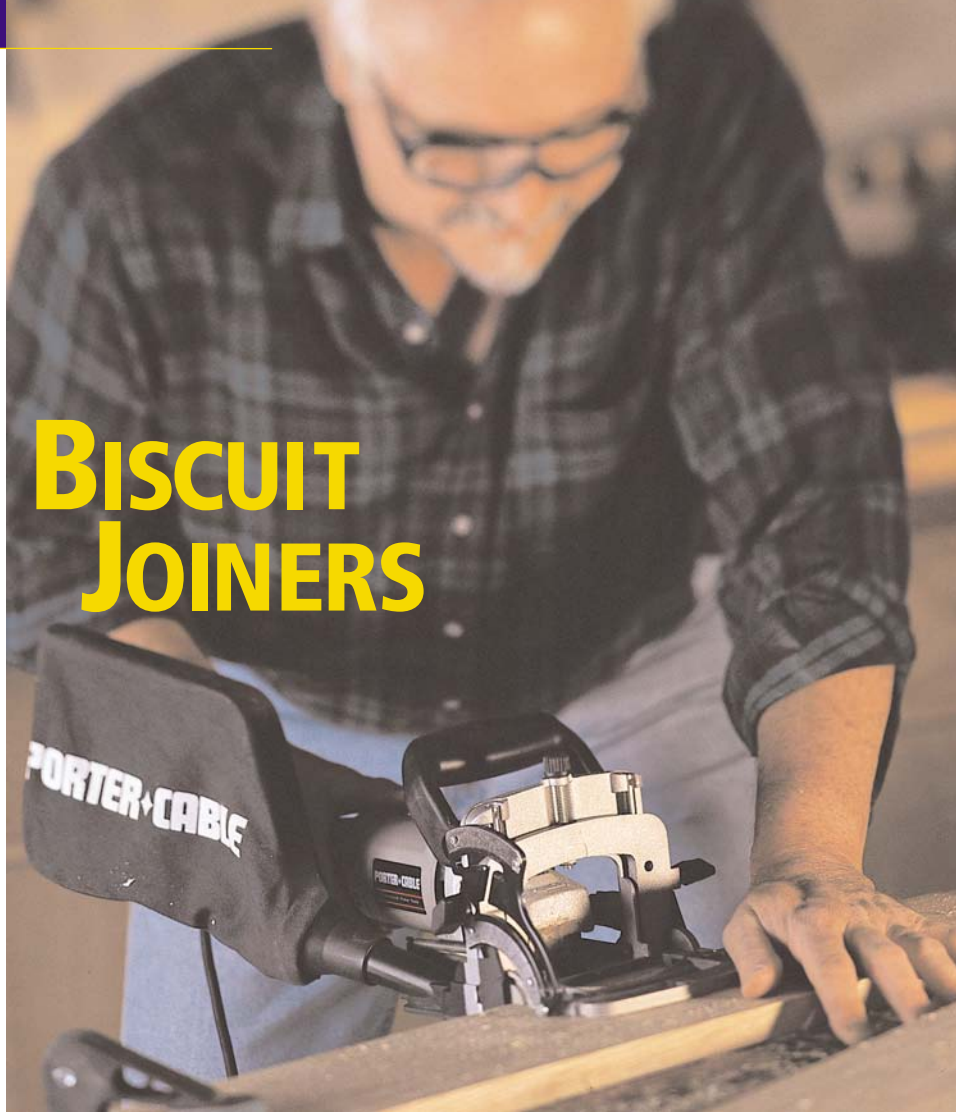
When you spend more than a grand, you'd expect the miter gauge to be nice. It's usually nothing special. Don't hold this against one of your choices, however, because they're almost all marginal.

Same goes for the guards that come with the saw. Most are inconvenient to use and remove. If you are safety-conscious, replace it with an aftermarket guard.

The rest is cost and reputation. While there are a number of newer manufacturers who offer quality cabinet saws, a few companies have been providing the same quality for decades, or longer. **PW**

| Brand & Model | Street Price, low/high | Horse Power | Volts | Amps | Table Size | Tilt Direction | Table Material | Max. Cut Rip | Max. Cut Depth | Fence Type | Comments |
|---|---|---|---|---|---|---|---|---|---|---|---|
| **Bridgewood BW-10CS** | $995 | 3 | 230 | 18 | 27" x 40" | R | CI | 50" | 3" | Biesemeyer clone | |
| **Craftsman 22694** | $1300 | 3 | 230 | 15 | 36" x 27" | R | CI | 50" | 3" | T-clamp clone | |
| **Delta 34-783** | $850 | 5 | 230 | 20 | 36" x 27" | R | CI | 52" | 3 1/8" | Unifence | 3 phase opt. |
| **Delta 36-810** | $1300/$1400 | 3 | 230 | 12.4 | 36" x 27" | R | CI | 50" | 3 1/8" | Unirip w/2 wings | |
| **Delta 36-830** | $1400-$1500 | 3 | 230 | 12.4 | 36" x 27" | L | CI | 30" | 3 1/8" | Unifence | |
| **Delta 36-820** | $1500/$1600 | 3 | 230 | 12.4 | 36" x 27" | R | CI | 52" | 3 1/8" | Unifence | |
| **Delta 36-820L** | $1500/$1600 | 3 | 230 | 12.4 | 36" x 27" | L | CI | 52" | 3 1/8" | Unifence | |
| **Delta 36-821** | $1500/$1600 | 3 | 230 | 12.4 | 36" x 27" | R | CI | 50" | 3 1/8" | Biesemeyer | |
| **Delta 36-821L** | $1500/$1600 | 3 | 230 | 12.4 | 36" x 27" | L | CI | 50" | 3 1/8" | Biesemeyer | |
| **Delta 36-945** | $1600 | 3 | 230 | 12.4 | 36" x 27" | R | CI | 50" | 3 1/8" | Biesemeyer | Platinum edition |
| **Delta 34-782** | $1700 | 3 | 230 | 12.4 | 36" x 27" | R | CI | 52" | 3 1/8" | Unifence | |
| **Delta 34-782L** | $1700 | 3 | 230 | 12.4 | 36" x 27" | L | CI | 52" | 3 1/8" | Unifence | |
| **Delta 36-882** | $1700-$1800 | 3 | 230 | 12.4 | 36" x 27" | R | CI | 50" | 3 1/8" | Biesemeyer | |
| **Delta 36-878** | $1900 | 5 | 230 | 20 | 36" x 27" | R | CI | 50" | 3 1/8" | Biesemeyer | |
| **General 50-200** | $1025 | 2 | 230 | 24 | 27" x 40" | R | CI | 28" | 3" | General clone | |
| **General 50-200L** | $1060 | 2 | 230 | 24 | 27" x 40" | L | CI | 52" | 3" | General clone | |
| **General 50-275** | $1399 | 3 | 230 | 12 | 36" x 27" | R | CI | 52" | 3" | General clone | |
| **General S350-T50** | $1550 | 3 | 230 | 12 | 28" x 72" | R | CI,AL | 50" | 3 1/8" | General clone | |
| **General 350-1-M1** | $1600 | 3 | 230 | 12 | 36" x 28" | R | CI | 25" | 3 1/8" | General clone | |
| **Grizzly G1023** | $695 | 3 | 230 | 18 | 36 5/8" x 27" | R | CI | 21 1/2" | 3 1/8" | F & R Locking | |
| **Grizzly G1023S** | $775 | 3 | 230 | 18 | 36 5/8" x 27" | R | CI | 25" | 3 1/8" | Clone/F & R | |
| **Grizzly G1023Z** | $1095 | 3 | 230 | 18 | 36 5/8" x 27" | R | CI | 25" | 3 1/8" | Shop Fox /F & R | |
| **Grizzly G1023ZX** | $1195 | 5 | 230 | 25 | 36 5/8" x 27" | R | CI | 25" | 3 1/8" | Shop Fox/F & R | |
| **Inca 290** | $2495 | 2 1/2 | 230 | 15 | 27" x 31" | R | AL | 60" | 3" | NA | |
| **JET JWCS-10JF** | $999 | 2 | 230 | 12 | 40" x 27" | R | CI | 30" | 3 1/8" | Jet Fence/F & R | |
| **JET JWCS-10JX** | $1079 | 2 | 230 | 12 | 40" x 27" | R | CI | 30" | 3 1/8" | XACTA clone | Home shop fence |
| **JET JWCS-10JFX** | $1099 | 2 | 230 | 12 | 40" x 27" | R | CI | 30" | 3 1/8" | XACTA clone | Commercial fence |
| **JET JWCS-10PF** | $1169 | 2 | 230 | 12 | 40" x 27" | R | CI | 50" | 3 1/8" | XACTA clone | Home shop fence |
| **JET JWCS--10PFX** | $1179 | 2 | 230 | 12 | 40" x 27" | R | CI | 50" | 3 1/8" | XACTA clone | Commercial fence |
| **JET JTAS 10X50-1** | $1399 | 3 | 230 | 15 | 40" x 27" | R | CI | 50" | 3 1/8" | XACTA clone | Commercial fence |
| **JET JTAS 10X50-3** | $1499 | 5 | 230 | 15 | 40" x 27" | R | CI | 50" | 3 1/8" | XACTA clone | Commercial fence |
| **JET JTAS 10XL50-1** | $1399 | 3 | 230 | 15 | 40" x 27" | L | CI | 50" | 3 1/8" | XACTA clone | Commercial fence |
| **JET JTAS 10XL50-3** | $1499 | 5 | 230 | 15 | 40" x 27" | L | CI | 50" | 3 1/8" | XACTA clone | Commercial fence |
| **JET JTAS 10XL50-5/1** | $1699 | 5 | 230 | 15 | 40" x 27" | L | CI | 50" | 3 1/8" | XACTA clone | Commercial fence |
| **Lobo BS-0143** | $1290 | 3 | 110/230 | 36/18 | 36" x 27" | R | CI | 49" | 3" | F & R Locking | |
| **Mini Max SC-2** | $2995 | 3 3/5 | 230 | 14 | 22" x 33" | R | CI | 51" | 3" | T-style | With sliding table |
| **North StateTSC-10HK** | $995 | 3 | 230 | 16 | 40 1/2" x 27" | R | CI | 50" | 3 1/4" | Biesemeyer | |
| **North State MBS 250** | $1150 | 3 | 230 | 16 | 36" x 27" | R | CI | 50" | 3 1/8" | Biesemeyer,Vega or Excalibur | |
| **Powermatic 66** | $1800 | 3 | 230 | 17 | 38" x 28" | L | CI | 30" | 3 1/8" | Accu-Fence clone | Special Edition |
| **Powermatic 66** | $2000 | 3 | 230 | 17 | 38" x 28" | L | CI | 50" | 3 1/8" | Accu-Fence clone | |
| **Powermatic 66** | $2100 | 5 | 230 | 17 | 38" x 28" | L | CI | 50" | 3 1/8" | Accu-Fence clone | |
| **Robland XZ** | $2695 | 3 | 230 | 25 | 36" x 48" | R | CI | 50" | 3 1/4" | NA | |
| **Seco SK-1010TS** | $1760 | 3 | 230 | NA | 36" x 27" | R | CI | 49" | 3" | NA | |
| **Star S3202** | $1100 | 3 | 230 | 15 | 36" x 27" | R | CI | 36" | 3 1/8" | Clone | |
| **Star S3204** | $1300 | 5 | 230 | 35 | 36" x 27" | R | CI | 36" | 3 1/8" | Clone | |
| **Transpower MBS-250** | $1150 | 3 | 230 | 18 | 36" x 27" | R | CI | 30" | 3" | F & R Locking | |

# Biscuit Joiners




One of the more vilified but useful tools is the biscuit joiner. Purists see it as a low-quality shortcut to joinery, and the strength of the joint formed by a biscuit is hotly debated. While biscuits might not be the best in all applications, there are so many places where a biscuit makes construction and assembly faster, more precise and in a number of cases stronger, that biscuit joiners are popular tools.

## Unimportant Features

Biscuit joiners are what we call a "franken-grinder" (an angle grinder with a carbide blade and fence). The motor is rarely an issue except in dense woods. Then there is dust collection. The ports clog too quickly to be useful, and if you hook the tool to a shop vac, the tool is awkward to use and harder to keep accurate.

## Fence

This is the most important feature. Some fences offer settings only at 45 degrees and at 90 degrees. Others offer a range of settings from 0 to 90 degrees and beyond. The accuracy of these fences and the ease of adjustment are critical to the value of the tool. Rack-and-pinion fences are more accurate and reliable, with double rack and pinion twice as nice. Locking levers provide adequate accuracy as well, but are harder to adjust.

If you're using your biscuit joiner for straight cuts, there's no need for a fancy fence. But if your woodworking takes you into the realm of odd angles or chair construction, you need an adjustable fence.

## Biscuit Sizes

The size of biscuits accepted is standard on all machines, with two notable exceptions. The Porter-Cable 557 accepts two different-sized cutters to allow the use of smaller face-frame biscuits, as well as standard sizes. So if you build a lot of face frames, this is the tool to buy. The Ryobi DBJ50 (and the Craftsman 17550) are designed to use only three sizes of mini biscuits for face frame and craft-oriented applications.

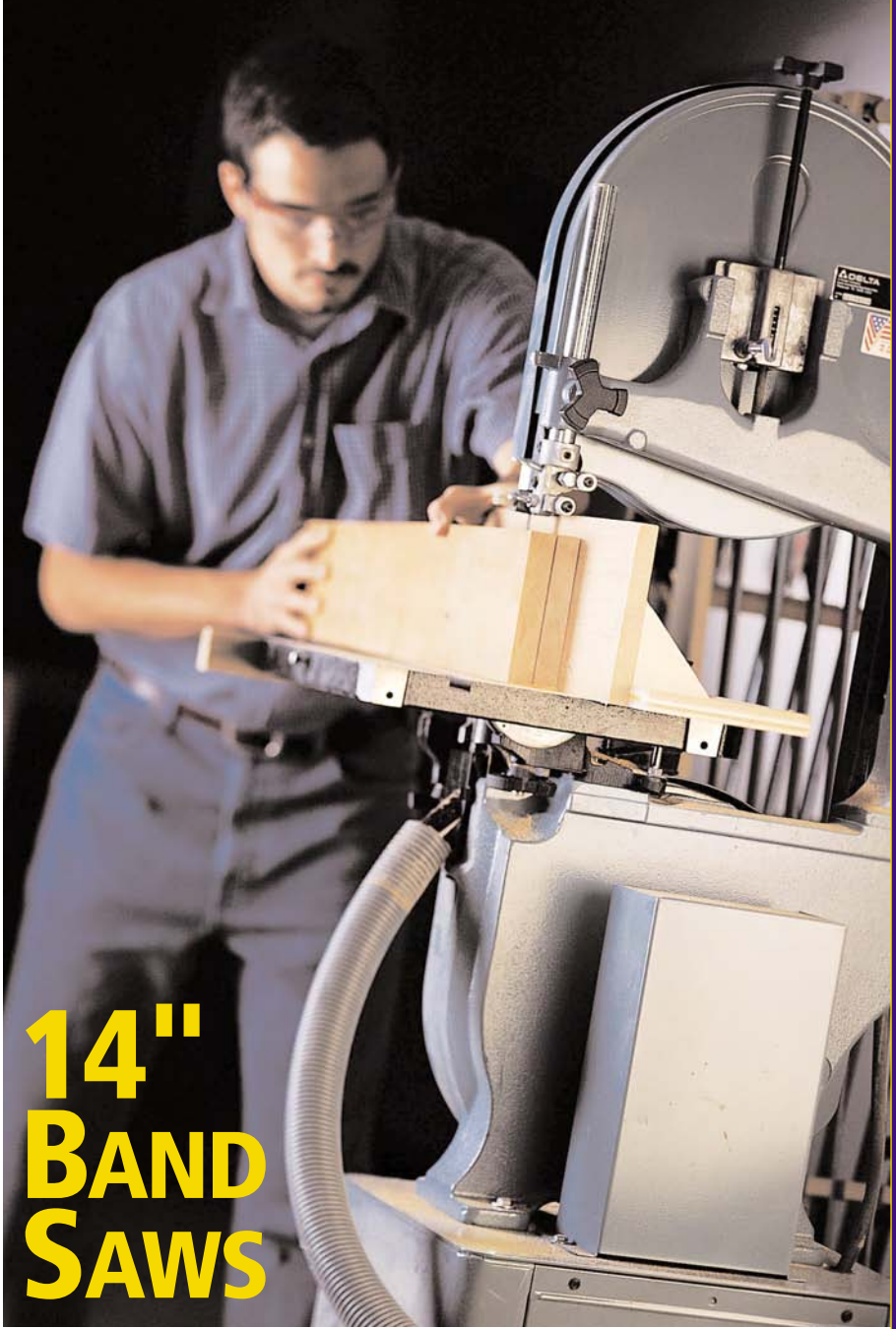
## Pins or Pads?

To keep the tool from wandering during the cut, biscuit joiners have pins, rubber pads or an abrasive attached to the area surrounding the blade. Pins can mar the wood, but that might not matter because the tiny holes will be concealed in the joint. Which system is best is entirely up to you. **PW**

| Brand & Model | Street Price, low/high | Fence Adjustments | Fence Angle Range | # of Depth Stops | Dust Collection | Amps | Anti-Slip Device | Comments |
|---|---|---|---|---|---|---|---|---|
| **Craftsman 17501** | $95 | LL | 0-90 | 3 | DB | 6 | RU | 2-knob fence lock |
| **Craftsman 17550** | $78 | LL | 45, 90 | 3 | N | 3.5 | RU | Mini-biscuits |
| **Craftsman 27730** | $170 | R&P | 0-90 & 135 | 4 | NB,VP | 6.5 | RP | |
| **DeWalt DW682K** | $155/$179 | DR&P | 0-90 & 135 | 3 | DB,VP | 6.5 | RP | |
| **Freud JS100** | $99 | LL | 45, 90 | 6 | DB,VP | 5 | RU | |
| **Freud JS102** | $130 | LL | 0-90 | 6 | DB,VP | 5 | RU | |
| **Lamello Classic C2** | $339/$370 | LL | 0-90 | 6 | VP | 6.5 | RU | |
| **Lamello Top 20** | $628/$679 | LL | 0-90 | 6 | VP | 6.5 | RU | |
| **Makita 3901** | $156/$209 | R&P | 0-90 | 3 | DB | 5.7 | RU | |
| **Porter-Cable 556** | $130/$145 | S | 0-90, 45 & 90 | 3 | N | 5 | RP | |
| **Porter-Cable 557** | $195/$200 | DR&P | 0-135 | 7 | DB,VP | 7.5 | F | 1998 Tool of the Year |
| **Ryobi DBJ50** | $69/$75 | LL | 45, 90 | 3 | N | 3.5 | RU | Mini-biscuits |
| **Ryobi JM-80K** | $109 | LL | 0-135 | 3 | DB | 6 | RU | |
| **Skil HD1605** | $112 | S | 45, 90 | 3 | DB,VP | 5.8 | RU | |
| **Virutex AB-11C** | $230 | LL | 0-90 | 3 | VP | 6 | RU | |

Fence Adj.: DR&P=double rack and pinion; LL=locking levers, R&P=rack and pinion; S=allen screw; T=thumb wheel.
Dust Collection: DB=dust bag; VP=Vacuum, N=none. Slip: RU=rubber; RP=retractable pins; F=facing;

# 14" Band Saws



For most woodworkers, we recommend they buy a 14" band saw with a riser block. While larger machines offer more capacity and power, the price of the 14" makes it the most practical machine.

For beginners, keep in mind that the 14" refers to the distance between the blade the post of the saw. You'll be able to saw into the center of a 28"-wide board with a 14" saw. Fourteen-inch band saws are offered in two basic configurations (open-stand or closed-stand) and are available with ¾ hp, 1 hp or 1½ hp motors.

## Resaw Capacity and Motor

Most 14" saws will resaw a piece of wood that's 6" wide (see photo at right). Some saws will accept an accessory riser block to double the resaw capacity to 12" for between $40 to $70. Kits typically include an extra-long guard and post for your blade's guides. The downside to riser blocks is that they increase the length of your saw's blade (and add to the cost of the blade).

You don't have a lot of options when it comes to the power of the saw. If you're going to do any resawing, buy a 1 hp model.

## Guides

Three basic types of blade guides are available. Metal guide blocks, fiber or plastic guide blocks (sometimes called cool blocks) and ball-bearing systems. Metal blocks have been standard for years, but non-metal guides give you tighter adjustment with less friction. Bearing guides provide even more superior control with low heat concerns. We recommend ball-bearing guides. There also are excellent aftermarket guides available. **PW**

| Brand & Model | Street Price, low/high | HP/ Amps | Volts | Resaw Capacity | Tilt Left/Right | Max. Blade Width | Weight in lbs. | Guide Type | Frame Type | Comments |
|---|---|---|---|---|---|---|---|---|---|---|
| **Bridgewood BW-15BS** | $295 | ¾/12 | 115 | 6" | 10°/45° | 1" | 172 | M | Open | 15"/2-speed , opt. 4" riser |
| **Craftsman 22414** | $550 | 1½/10 | 115 | 6" | 15°/45° | ¾" | 202 | M | Open | |
| **Delta 28-275** | $500/$609 | ¾/10.7 | 115 | 6¼" | 10°/45° | ¾" | 201 | M | Open | Riser block option |
| **Delta 28-280** | $700/$839 | 1/9 | 115/230 | 6¼" | 10°/45° | ¾" | 224 | M | Closed | Riser block option |
| **Delta 28-255** | $800/$850 | 1/9.0 | 115 | 6¼" | 10°/45° | ¾" | 224 | M | Closed | Riser block option |
| **Grizzly G1019** | $300 | ¾/12 | 110/220 | 6" | 10°/45° | ¾" | 210 | M | Closed | Riser block option |
| **Grizzly G1019Z** | $325 | 1/14 | 110/220 | 6⅛" | 10°/45° | ¾" | 160 | M | Open | Riser block option/2 speed |
| **Grizzly G1148** | $445 | 1/14 | 110/220 | 7½" | 10°/45° | ¾" | 175 | M | Open | Two-speed |
| **JET JWBS-140S** | $500 | ¾/10 | 115/230 | 6" | 10°/45° | ¾" | 183 | NM | Open | Riser block option |
| **JET JWBS-14CS** | $550/$580 | 1/10 | 115/230 | 6" | 10°/45° | ¾" | 197 | NM | Closed | Riser block option |
| **JET JWBS-C140S** | $629/$699 | ¾/10 | 115/230 | 6" | 10°/45° | ¾" | 186 | BB | Open | Riser opt., Carter guides |
| **JET JWBS-14MW** | $640 | 1/10 | 115/230 | 6" | 10°/45° | ¾" | 206 | NM | Open | Riser block option |
| **JET JWBS-C14CS** | $679/$699 | 1/10 | 115/230 | 6" | 10°/45° | ¾" | 200 | BB | Closed | Riser opt., Carter guides |
| **JET JWBS-C14MW** | $ 749/$799 | 1/10 | 115/230 | 6" | 10°/45° | ¾" | 209 | BB | Open | Riser opt., Carter guides |
| **Lobo BS-0143** | $329 | ¾/NA | 115 | 6" | 10°/45° | ½" | 176 | NM | Open | 3-speed |
| **North State WA14M** | $425 | 1/NA | 115/230 | 6¼" | 10°/45° | ¾" | 250 | M/BB | Open | |
| **Powermatic 044** | $600 | 1/7 | 115/230 | 9" | 15°/45° | ¾" | 214 | BB | Open | One-piece frame |
| **Powermatic 141** | $1700 | ¾/10.6 | 115/230 | 6" | 15°/45° | ¾" | 375 | BB | Open | One-piece frame |
| **Reliant DD90** | $297 | 1/NA | 115/230 | 5¾" | 10°/45° | ¾" | 168 | M | Open | 4-speed |
| **Ridgid BS1400** | $499 | ¾/ | 115 | 6" | 10°/45° | ¾" | 195 | M | Open | |
| **Tradesman 8157** | $399 | 1/NA | 115/230 | 6¼" | 10°/45° | ½" | 162 | BB | Open | |
| **Transpower SB500** | $265 | 1/NA | 115 | 6" | 10°/45° | ½" | 195 | NM | Open | |


# Single-Stage Dust Collectors

Thanks largely to Asian imports, dust collectors are now affordable. If you own a planer or a jointer then you should have a dust collector.

But what kind? A two-stage system separates larger debris from finer dust into two compartments. A single-stage collector sucks it all into one bag. If you're a home woodworker, a single stage collector is likely all you need.

To choose the right single-stage collector, consider your needs. If the dust collector is for one machine, any of these will do. If you're hooking the collector up to multiple machines (even when using blast gates) then you need at least 600 cfm (cubic feet per minute).

## Power

The method for determining a machine's cfm is not a science, so some variance is possible depending on the manufacturer's testing methods. Also, as you add more ducting, inlets and more efficient bags, you reduce the effective cfm of the machine.

Another unscientific measurement of dust collectors is horsepower. Manufacturers test their motors differently. So it's more accurate to check the motor's amperage (if it's available).

With all these uncertainties, we recommend you buy a brand name you're comfortable with. Other things to look for include:

## Impeller

The impeller is the big fan blade in the collector that causes the air to move. In most cases it's made of metal, however some impellers are made of plastic and are more easily damaged by larger hunks of debris. Ask your salesperson about the impeller or check it yourself.

## Bag Clamp

Be sure to check out the band clamp that attaches the bags to the collector. Some require you to use a screwdriver to tighten it, others need only a quick flick of the wrist. Go for the quick-release type.

## Bags

Another consideration is the type of collection bag offered by each manufacturer. The standard appears to be a bag that captures particles 30 microns and larger. Some manufacturers offer 5-micron bags as standard equipment. And while this upgrade isn't necessary, the extra expense is worth it if you're particular about dust particles in your shop.

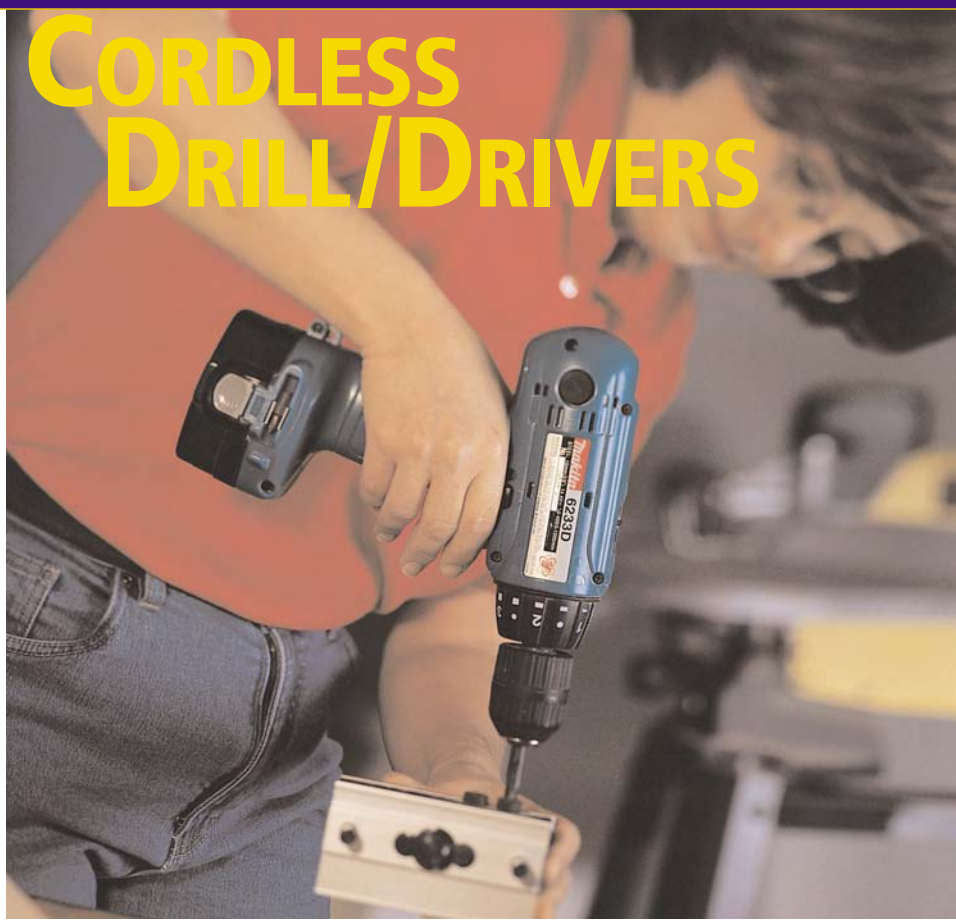
## Noise

Something we consider important in choosing a collector is its noise level. Some manufacturers don't offer this information. If that's the case, try to hear the machine while it's running.

In general dust collectors can be one of the noisier machines in most shops. A quiet dust collector makes a happier woodworker. **PW**

| Brand & Model | Street Price, low/high | Horse Power | Max. CFM | Capacity in cu.ft. | # of ports @ size | Weight in lbs. | Decibel Level | Bag Efficiency | Comments |
|---|---|---|---|---|---|---|---|---|---|
| **JET DC-610** | $179/$190 | ¾ | 610 | 1.8 | 1@4" | 64 | 55 - 60db | 30 micron | |
| **Tradesman 9992** | $199 | ¾ | 453 | 1.5 | 1@4" | 64 | NA | NA | |
| **Woodtek 911-047** | $160 | ¾ | 250 | 20 gal | 1@4" | 18 | 70 - 80db | 10 micron | |
| **Belsaw MC-CT-90C** | $179 | 1 | 700 | 2.2 | 1@4" | 73 | 62 - 80db | 30 micron | |
| **Belsaw MC-CT-50S** | $189 | 1 | 700 | 2 | 1@4" | 46 | 62 - 82db | 30 micron | |
| **Belsaw MC-CT-80A** | $189 | 1 | 600 | 2.2 | 1@4" | 70 | 52 - 74db | 30 micron | |
| **Bridgewood BW-015A** | $169 | 1 | 700 | 17.8 gal. | 1@4" | 78 | NA | 1 micron | |
| **Craftsman 29978** | $300 | 1 | 650 | 1.5 | 1@4" | 95 | 55 - 65 db | 30 micron | |
| **Delta 50-840** | $214/$243 | 1 | 650 | 2.1 | 1@4" | 57 | 63 - 73db | 30 micron | |
| **Grizzly G8027** | $130 | 1 | 500 | 2.2 | 1@4" | 79 | NA | 30 micron | Best New Tool 1999 |
| **Grizzly G1163** | $150 | 1 | 450 | 22 | 1@4" | 70 | NA | 30 micron | |
| **Grizzly G1028** | $240 | 1 | 1150 | 6 | 1@4" | 116 | 60 - 80db | 30 micron | |
| **JET DC-650** | $199/$229 | 1 | 650 | 2.1 | 1@4" | 84 | 60 - 70db | 30 micron | |
| **Lobo DC-1190** | $219 | 1 | 730 | 2.5 | 1@4" | 78 | 60 - 70db | NA | |
| **North State CT50S** | $200 | 1 | 700 | 3.5 | 1@6"/2@4" | 80 | 62 - 82db | 20 micron | |
| **Penn State DC1-5** | $210 | 1 | 700 | 3.5 | 1@6"/2@4" | 66 | 62 - 82db | 5 micron | |
| **Powermatic 471** | $200 | 1 | 650 | 2.4 | 1@4" | 57 | 50 - 60db | 5 micron | |
| **Reliant NN720** | $207 | 1 | 655 | 2.5 | 1@4" | 67 | 55db | 20 micron | |
| **Robland D1500** | $545 | 1 | 1000 | 30 | 1@4" | 100 | NA | NA | |
| **Seco UFO-40** | $199 | 1 | 500 | 2.5 | 1@4" | 44 | 55 - 65db | 20 micron | |
| **Seco UFO-90** | $219 | 1 | 655 | 2.5 | 1@4" | 75 | 60 - 70db | 20 micron | |
| **Seco UFO-70** | $265 | 1 | 655 | 2.5 | 1@4" | 80 | 60 - 70db | 20 micron | |
| **Seco UFO-70F** | $278 | 1 | 655 | 2.5 | 1@4" | 80 | 60 - 70db | 20 micron | With floor sweeper |
| **Seco UFO-80** | $285 | 1 | 655 | 2.5 | 1@4" | 75 | 60 - 70db | 20 micron | Outlet for floor sweep |
| **Star S3810** | $185 | 1 | 700 | 2.2 | 1@4" | 70 | 70 - 80db | 35 micron | |
| **Star S3811** | $185 | 1 | 700 | 1.5 | 1@4" | 70 | 70 - 80db | 35 micron | |
| **Sunhill UFO-90** | $195 | 1 | 610 | 2.5 | 1@4" | 70 | 55db | 20 micron | |
| **Woodtek 864-367** | $209 | 1 | 380 | 3.5 | 2@4" | 47 | 74db | 10 micron | |
| **Woodtek 802-124** | $229 | 1 | 400 | 2.5 | 2@4" | 85 | 74db | 10 micron | |
| **Delta 50-850** | $285/$342 | 1½ | 1200 | 6 | 2@4" | 100 | 69 - 79db | 30 micron | |
| **JET DC-1100** | $280/$400 | 1½ | 1100 | 5.1 | 2@4"/1@6" | 103 | 70 - 80db | 30 micron | Special Edition includes accessories |
| **Penn State DC3-5** | $205 | 1½ | 750 | 1.5 | 1@4" | 46 | NA | 5 micron | |
| **Penn State DC2-5** | $290 | 1½ | 900 | 40 gal. | 1@6"/2@4" | 130 | 67 - 87db | 5 micron | |
| **Powermatic 73** | $350 | 1½ | 1200 | 3.5 | 2@4" | 125 | 70 - 80db | 5 micron | Built-in floor sweep |
| **Belsaw MC-1DC** | $279 | 2 | 1182 | 5.2 | 2@4" | 123 | 67 - 87db | 30 micron | |
| **Bridgewood BW-002A** | $279 | 2 | 1059 | 5.8 | 1@6"/2@4" | 128 | NA | 1 micron | |
| **Delta 50-851** | $450/$500 | 2 | 1500 | 6.5 | 3@4" | 175 | 68 - 82db | 30 micron | |
| **Grizzly G1029** | $250 | 2 | 1550 | 6 | 2@4" | 130 | 65 - 85db | 30 micron | |
| **JET DC-1200-1** | $377/$400 | 2 | 1200 | 5.3 | 1@6"/2@4" | 143 | 65 - 80db | 30 micron | |
| **JET DC-1200-3** | $380 | 2 | 1200 | 5.3 | 1@6"/2@4" | 143 | 65 - 80db | 30 micron | |
| **Lobo DC-101** | $379 | 2 | 1290 | 9.5 | 2@4" | 155 | 65 - 80db | NA | |
| **Makita 410** | $399 | 2 | 307 | 7 | 1@2⅞" | 20.4 | NA | NA | |
| **North State UFO-101** | $295 | 2 | 1182 | 5.4 | 3@4&5" | 140 | 65 - 80db | 20 micron | |
| **Reliant NN820** | $315 | 2 | 1185 | 5.2 | 2@4" | 140 | 69db | 20 micron | |
| **Seco UFO-101** | $369 | 2 | 1182 | 5.2 | 1@5"/2@4" | 140 | 65 - 80db | 20 micron | |
| **Star S3820** | $275 | 2 | 1182 | 5.2 | 1@5"/2@4" | 145 | 67 - 87db | 35 micron | |
| **Sunhill UFO-101** | $325 | 2 | 1182 | 5.2 | 2@4" | 143 | 69db | 20 micron | |
| **Transpower DC2000** | $285 | 2 | 1200 | 4 | 2@4" | 143 | 60 - 70db | NA | |
| **Woodtek 805-930** | $399 | 2 | 790 | 5.2 | 2@5" | 123 | 76db | 10 micron | |
| **Penn State DC250** | $335 | 2½ | 1350 | 5.8 | 1@6"/2@4" | 145 | 65 - 90db | 5 micron | |
| **Belsaw MC-2DC** | $449 | 3 | 1883 | 10 | 3@4" | 150 | 75 - 95db | 30 micron | |
| **Belsaw MC-CT-201H** | $449 | 3 | 1836 | 10 | 3@4" | 156 | 75 - 95db | 30 micron | |
| **Bridgewood BW-003A** | $495 | 3 | 1836 | 13.5 | 4@4" | 235 | NA | 1 micron | |
| **Delta 50-852** | $630/$680 | 3 | 2100 | 12.5 | 4@4" | 200 | 77 - 91db | 30 micron | |
| **Grizzly G1030** | $450 | 3 | 2300 | 12 | 3@4" | 170 | 75 - 90db | 30 micron | |
| **JET DC-1900** | $650 | 3 | 1900 | 10.6 | 1@8"/3@4" | 198 | 75 - 90db | 30 micron | |
| **JET DC-1900-3** | $619/$650 | 3 | 1900 | 10.6 | 1@8"/3@4" | 198 | 75 - 90db | 30 micron | |
| **Lobo DC-102** | $519 | 3 | 2800 | 10.5 | 3@4" | 198 | 75 - 90db | NA | |
| **Lobo DC-103** | $339 | 3 | 1700 | 10.5 | 2@4" | 160 | 75 - 85db | NA | |
| **North State UFO-102B** | $489 | 3 | 1883 | 5.4 | 4@5&6" | 180 | 75 - 90db | 20 micron | |
| **Powermatic 75** | $650 | 3 | 1900 | 10 | 3@4"/1@6" | 245 | 80 - 90db | 5 micron | |
| **RBI** | $499 | 3 | 1900 | 7.4 | 1@6" | 110 | 83db | 20 micron | |
| **Reliant NN830** | $450 | 3 | 1883 | 10.5 | 3@4" | 170 | 78db | 20 micron | |
| **Seco UFO-102B** | $598 | 3 | 1883 | 10.5 | 3@4" | 181 | 75 - 90db | 20 micron | |
| **Star S3830** | $475 | 3 | 1850 | 10.4 | 1@4"/3@6" | 165 | 75 - 95db | 35 micron | |
| **Sunhill UFO-102B** | $459 | 3 | 1883 | 10.5 | 3@4" | 181 | 79db | 20 micron | |
| **Sunhill UFO-103** | $759 | 3 | 2683 | 17.6 | 4@4" | 363 | NA | 20 micron | |
| **Transpower DC3000** | $335 | 3 | 1850 | 5.3 | 3@4" | 178 | 60 - 70db | NA | |
| **Woodtek 864-381** | $489 | 3 | 1180 | 10.5 | 2@6" | 194 | 78db | 10 micron | |

# Cordless Drill/Drivers



If you're a woodworker, buy a cordless drill that has between 9.6 volts and 14.4 volts. In our opinion, 7.2 volts isn't enough power, and if you need more than 14.4, use a corded drill.

All but the most basic drill/drivers offer the following standard features: forward and reverse speeds in a variety of speed ranges, keyless chuck, two batteries, one hour charger and from four to 24 clutch settings for improved torque control.

## Speed and Torque

Two-speed drills are better because the slower speeds (with adequate torque) are good for larger bits (Forstners) and for use as a screwdriver. Higher speeds perform well for drilling with smaller bits ($\frac{3}{16}$" bits perform best at 1,800 rpm, which is outside the limit of all our listed drills).

Torque is a measure of force the drill can put on the screw or bit. Purchase as much torque as you can afford. You change the torque with the clutch. Drills have between 6 and 24 different clutch settings. And while the 24 positions offers more finesse, in our opinion six is adequate.

## Batteries

Battery performance is determined by volts and amp hours. Volts are the horsepower in a battery — the higher the rating, the more torque produced. Volts also affect runtime. Amp hours is, essentially, how much "fuel" the battery can hold — the higher the rating, the longer the runtime per charge.

Most cordless drills are fueled by Nickel Cadmium batteries. Last year, Nickel Metal Hydride hit the scene as an improvement in battery technology for the power tool industry. And while it hasn't been embraced by all manufacturers, the promise for continued performance and runtime is impressive. As far as the charger goes, a one-hour charge time is standard. Faster chargers are more expensive, but the 10- to 15-minute charge time is worth it for some.

## Chucks and Handles

Our staff is divided on the issue of the chuck capacity. For most woodworking jobs, a $\frac{3}{8}$" chuck is adequate. If you also plan to build a deck using your drill, go for the $\frac{1}{2}$" chuck.

Drills come in pistol-style or a mid-handle (also called T-style) design. The pistol design lets you to put more weight behind the bit, but that's rarely important in woodworking. The T-handle drill is more balanced.

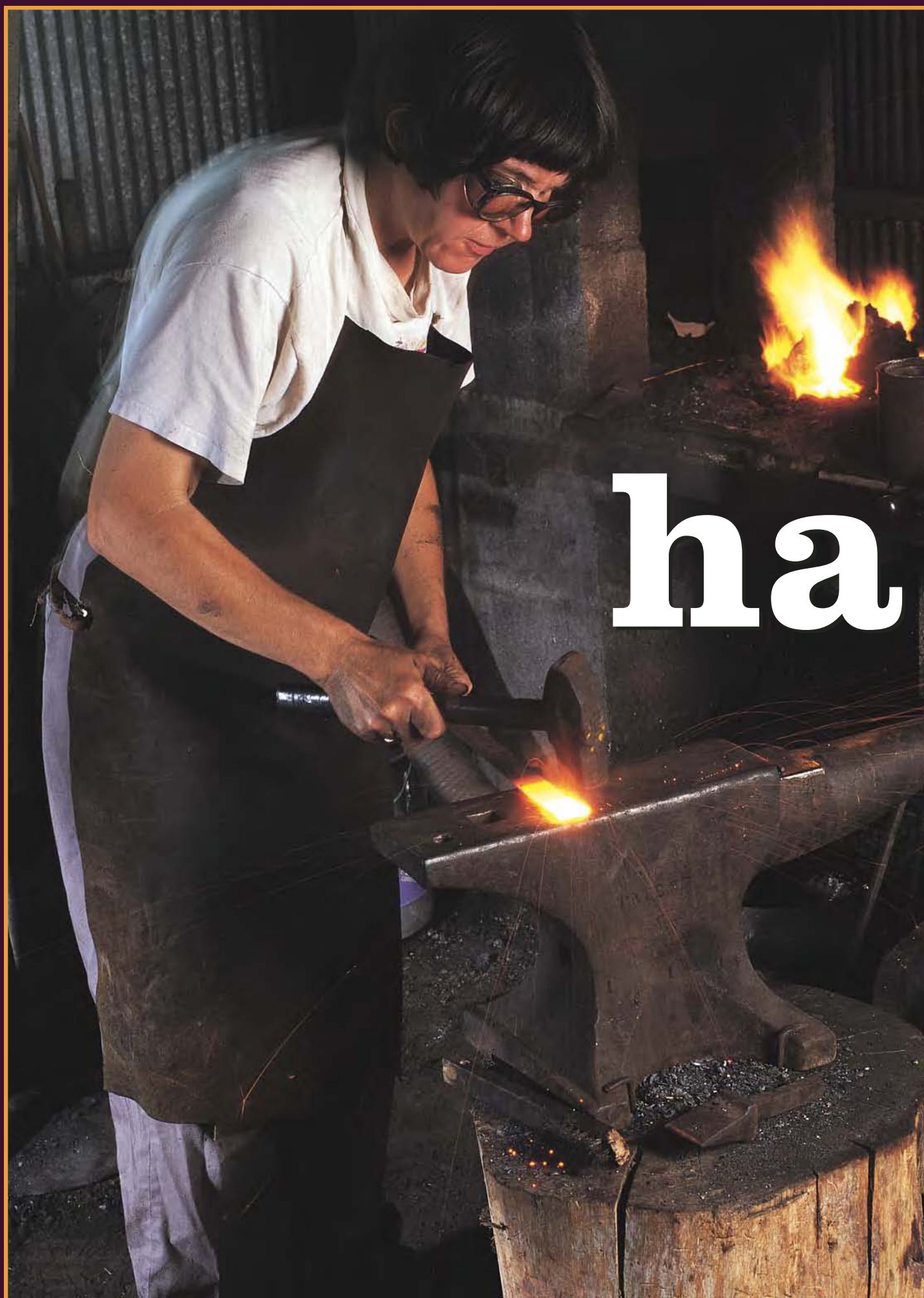
## Useless Features

Drills are loaded with stuff you don't need. Here are a few. First off, a bubble level. Second, a wrist strap. Third—unless you work on your roof a lot—bit storage. And finally, the case. Most cases get put away, so don't let the case affect which drill you purchase. **PW**

### 9.6 Volt

| Brand & Model | Street Price, low/high | Torque in inch/lbs | RPM Low/Hi | Charger Speed | Amp Hours | # of Clutch Settings | Weight in lbs. | #/type of Batt. | Handle Design | Comments/ Options |
|---|---|---|---|---|---|---|---|---|---|---|
| Black & Decker FS96 | $79 | 110 | 0-700 | 3hr | 1.3 | 24 | 3 | 2/NiCad | T | Best New Tool 1998 |
| Bosch 3105K | $124 | 175 | 0-350/0-980 | 1hr | 1.4 | 6 | 3.1 | 2 /NiCad | T | Performance 4.5 stars |
| Craftsman 27490 | $98 | 110 | 0-600 | 1hr | 1.4 | 4 | 3.3 | 2/NiCad | P | |
| Craftsman 27190 | $115 | 213 | 0-350/0-1000 | 1hr | 1.5 | 24 | 4 | 2/NiCad | T | |
| DeWalt DW926K-2 | $109 | 200 | 0-300/0-1100 | hr | 1.25 | 15 | 3.4 | 2/NiCad | T | |
| Festo CDD 9.6 ES-Plus | $295 | 221 | 0-380/0-1100 | 1hr | 1.7 | 18 | 3.6 | 2/NiCad | P | Compact design |
| Hitachi FDS10DVAL | $69/$84 | 130 | 0-280/0-850 | 1hr | 1.2 | 6 | 3.3 | 2/NiCad | T | W/flashlight |
| Hitachi DS10DV2 | $192 | 174 | 0-350/0-1200 | 15min | 2.0 | 22 | 3.5 | 2/NiCad | T | |
| Makita 6222DWE | $100/$115 | 108 | 0-700 | 1hr | 1.3 | 6 | 3.1 | 2/NiCad | T | |
| Makita 6096DWE | $113/$129 | 133 | 0-350/0-1100 | 1hr | 1.3 | 18 | 2.9 | 2/NiCad | T | |
| Makita 6095DWE | $123/$129 | 122 | 0-400/0-1100 | 1hr | 1.3 | 6 | 3.7 | 2/NiCad | P | |
| Makita 6095DWBE | $169 | 91 | 0-400/0-1100 | 1hr | 2.2 | 6 | 3.8 | 2/NiMH | P | |
| Panasonic EY6181CRKW | $292 | 156 | 50-350/150-1000 | 1hr | 1.2/1.7 | 24 | 3.2 | 1/NiCad | T | Opt. 15 min charger |
| Ryobi HP961K | $69 | 90 | 0-550 | 5hr | 1.3 | 24 | 3.3 | 2/NiCad | T | |
| Ryobi RY961K | $89 | 90 | 0-550 | 5hr | 1.3 | 24 | 3.2 | 2/NiCad | T | Nylon bag; Value 4.5 |
| Skil 2380-02 | $47 | 70 | 0-700 | 3hr | 1.3 | 6 | 3.5 | 1/NiCad | T | |
| Skil 2375 | $50 | 70 | 0-700 | 3hr | 1.3 | 6 | 2 | 1/NiCad | P | |
| Skil 2380-04 | $67/$70 | 70 | 0-700 | 3hr | 1.3 | 6 | 3.5 | 2/NiCad | T | |
| Skil HD2645-04 | $109 | 160 | 0-350/0-1000 | 1hr | 1.3 | 16 | 4 | 2/NiCad | T | |

| | Brand & Model | Street Price low/high | Torque in in/lbs | RPM low/hi | Charger Speed | Amp Hours | # of Clutch Settings | Weight in lbs. | #/type of Batt. | Handle Design | Comments |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 12 Volt | Black & Decker FS12 | $99 | 115 | 0-800 | 3hr | 1.3 | 24 | 3.5 | 2/NiCad | T | Best New Tool 1998 |
| | Bosch 3305K | $139 | 200 | 0-400/0-1200 | 1hr | 1.4 | 6 | 3.4 | 2 /NiCad | T | Performance 4.5 stars |
| | Bosch 3315K | $159$169 | 225 | 0-400/0-1200 | 1hr | 1.7 | 16 | 4.3 | 2/NiCad | T | 15 min. charger |
| | Craftsman 27139 | $135 | 150 | 0-350/0-1000 | 1hr | 1.5 | 6 | 4.2 | 2/NiCad | P | |
| | Craftsman 27196 | $155 | 230 | 0-350/0-1000 | 1hr | 1.7 | 24 | 4.3 | 2/NiCad | T | |
| | Craftsman 27491 | $155 | 110 | 0-600 | 1hr | 1.7 | Inf.Variable | 5 | 2/NiCad | T | Performance 4 stars |
| | DeWalt DW953K-2 | $168/$170 | 190 | 0-400/0-1200 | 1hr | 1.25 | 17 | 3.8 | 2/NiCad | T | |
| | DeWalt DW970 | $179 | NA | 0-450/0-1400 | 1hr | 1.7 | 17 | 3.2 | 2/NiCad | T | |
| | DeWalt DW971K-2 | $209 | 310 | 0-450/0-1400 | 1hr | 1.7 | 17 | 4.2 | 2/NiCad | P | |
| | DeWalt DW972K-2 | $180/$195 | 310 | 0-450/0-1400 | 1hr | 1.7 | 17 | 4.2 | 2/NiCad | T | |
| | DeWalt DW972KQ-2 | $235 | 310 | 0-450/0-1400 | 15min | 1.7 | 17 | 4.2 | 2/NiCad | T | |
| | Fein ABS12-2 EU | $250 | 230 | 0-340/0-1200 | 1hr | 2.0 | 13 | 4.5 | 2/NiCad | T | Best New Tool 1998 |
| | Festo CDD 12 ES-Plus | $340 | 221 | 0-380/0-1100 | 15min | 1.7 | 18 | 4 | 2/NiCad | P | Also uses 9.6 batt. |
| | Hitachi DS13DV2 | $130/$200 | 200 | 0-350/0-1200 | 1hr | 2.0 | 22 | 4.2 | 2/NiCad | T | ½" chuck |
| | Makita 6223DWE | $136/$149 | 115 | 0-700 | 1hr | 1.3 | 6 | 3.3 | 2/NiCad | T | |
| | Makita 6213DWAE | $149/$179 | 287 | 0-450/0-1400 | 1hr | 2.0 | 18 | 4.2 | 2/NiCad | T | |
| | Makita 6313DWAE | $152/$229 | 225 | 0-450/0-1400 | 1hr | 2.0 | 18 | 4.4 | 2/NiCad | T | ½" chuck |
| | Makita 6213DWBE | $154/$239 | 287 | 0-450/0-1400 | 1hr | 2.2 | 18 | 4.2 | 2/NiMH | P | |
| | Makita 6213DWBLE | $160 | 287 | 0-450/0-1400 | 1hr | 2.2 | 18 | 4.2 | 2/NiMH | T | w/flashlight |
| | Makita 6011DWE-2 | $175 | 239 | 0-450/0-1350 | 1hr | 1.3 | 12 | 4.2 | 2/NiCad | P | Also uses 9.6 batt. |
| | Makita 6216DWBE | $219 | 320 | 0-400/0-1300 | 1hr | 2.2 | 17 | 4.6 | 2/NiMH | T | Met. gear housing |
| | Metabo BEAT12/2 R+L | $180 | 177 | 0-300/0-900 | 1hr | 1.7 | 6 | 4.0 | 2/NiCad | P | Opt. 15 min. charger |
| | Metabo BEAT212/2 R+L | $230 | 230 | 0-400/0-1400 | 1hr | 2.0 | 10 | 5.4 | 2/NiCad | T | ½" chuck, Opt.15min. |
| | Milwaukee 0502-20 | $148 | 220 | 0-360/0-1100 | 1hr | 2.0 | 20 | 3.8 | 1/NiCad | T | |
| | Milwaukee 0502-23 | $149/$213 | 220 | 0-360/0-1100 | 1hr | 1.4 | 20 | 3.8 | 2/NiCad | T | |
| | Milwaukee 0501-20 | $161/$255 | 220 | 0-360/0-1100 | 1hr | 2.0 | 20 | 4.2 | 1/NiCad | P | ½" chuck |
| | Milwaukee 0501-23 | $194/$219 | 220 | 0-360/0-1100 | 1hr | 1.4 | 20 | 4.2 | 2/NiCad | P | ½" chuck |
| | Milwaukee 0407-6 | $182 | 195 | 0-350/0-1000 | 1hr | 1.4 | 6 | 3.7 | 2/NiCad | P | |
| | Milwaukee 0407-22 | $222 | 195 | 0-350/0-1000 | 1hr | 1.4 | 6 | 3.7 | 2/NiCad | P | work light |
| | Milwaukee 0415-21 | $203 | 195 | 0-350/0-1000 | 1hr | 1.7 | 6 | 3.7 | 2/NiCad | P | |
| | Panasonic EY6406FQKW | $165/$169 | 293 | 50-350/150-1000 | 30min | 2.0 | 18 | 3.8 | 2/NiCad | T | Elec. feedback |
| | Panasonic EY6407NQKW | $180 | 293 | 50-350/150-1000 | 45min | 3.0 | 18 | 4.0 | 2/NiMH | T | ½" chuck |
| | Porter Cable 9866 | $137 | 330 | 0-400/0-1200 | 1hr | 2.0 | 20 | 5 | 2/NiCad | T | |
| | Porter Cable 9866F | $175 | 330 | 0-400/0-1200 | 1hr | 2.0 | 20 | 5 | 2/NiCad | T | w/flashlight |
| | Ryobi HP1201K | $79 | 105 | 0-550 | 5hr | 1.3 | 24 | 3.5 | 2/NiCad | T | |
| | Ryobi RY1201K | $99 | 105 | 0-550 | 5hr | 1.3 | 24 | 3.5 | 2/NiCad | T | Performance 3.5 stars |
| | Ryobi R10510K | $129 | 200 | 0-375/0-1350 | 1hr | 1.7 | 24 | 4 | 2/NiCad | T | Cushioned grips |
| | Ryobi JS10511K | $129 | 220 | 0-400/0-1400 | 1hr | 1.7 | 24 | 4.2 | 2/NiCad | T | One-handed chuck |
| | Skil 2475-02 | $55 | 75 | 0 - 700 | 3hr | 1.3 | 6 | 3.5 | 1/NiCad | P | |
| | Skil 2480-02 | $53 | 90 | 0 - 700 | 3hr | 1.3 | 6 | 3.5 | 1/NiCad | T | |
| | Skil 2480-04 | $76 | 90 | 0 - 700 | 3hr | 1.3 | 6 | 3.5 | 2/NiCad | T | |
| | Skil 2492 | $119 | 175 | 0-400/0-1200 | 1hr | 1.3 | 16 | 3.5 | 2/NiCad | T | Performance 3 stars |
| | Skil HD2745-04 | $159 | 190 | 0-400/0-1400 | 1hr | 1.3 | 16 | 4.5 | 2/NiCad | T | |
| | Wagner WB120K-2 | $90 | NA | 550 | 3hr | NA | 6 | 3.3 | 2/NiCad | T | |
| 14.4 Volt | Black & Decker FS144 | $129 | 220 | 0-300/0-1100 | 1hr | 1.5 | 24 | 4 | 2/NiCad | T | Best New Tool 1998 |
| | Bosch 3615K | $175/$199 | 250 | 0-400/0-1200 | 1hr | 1.7 | 16 | 4.3 | 2/NiCad | T | Opt. 15 min. charger |
| | Bosch 3650K | $195/$215 | 400 | 0-500/0-1500 | 1hr | 2.0 | 16 | 4.9 | 2/NiCad | T | ½" chuck, Opt.15min. |
| | Bosch 3655K | $195/$215 | 370 | 0-400/0-1400 | 1hr | 2.0 | 16 | 4.8 | 2/NiCad | T | ½"c huck, Opt.15min. |
| | Craftsman 27194 | $185 | 275 | 0-400/0-1400 | 1hr | 1.7 | 24 | 4.6 | 2/NiCad | T | |
| | DeWalt DW954K-2 | $192 | 280 | 0-400/0-1250 | 1hr | 1.25 | 17 | 4 | 2/NiCad | T | |
| | DeWalt DW990K-2 | $245 | 334 | 0-450/0-1400 | 1hr | 1.25 | 17 | 4.9 | NA/NiCad | T | |
| | DeWalt DW991K-2 | $195/$225 | 334 | 0-450/0-1400 | 1hr | 1.7 | 17 | 4.9 | 2/NiCad | T | |
| | DeWalt DW991KQ-2 | $259 | 334 | 0-450/0-1400 | 15min | 1.7 | 17 | 4.9 | 2/NiCad | T | |
| | HitachiDS14DV | $195/$200 | 304 | 0-350/0-1200 | 1hr | 2.0 | 22 | 4.6 | 2/NiCad | T | ½" chuck |
| | Makita 6233DWBLE | $175 | 330 | 0-400/0-1300 | 1hr | 2.2 | 18 | 4.4 | 2/NiMH | T | w/flashlight |
| | Makita 6333DWAE | $175/$245 | 330 | 0-400/0-1300 | 1hr | 2.0 | 18 | 4.6 | 2/NiCad | T | ½" chuck |
| | Makita 6333DWBLE | $180 | 330 | 0-400/0-1300 | 1hr | 2.2 | 18 | 4.6 | 2/NiMH | T | ½" chuck, light |
| | Makita 6233DWAE | $181/$209 | 330 | 0-400/0-1300 | 1hr | 2.2 | 18 | 4.4 | 2/NiCad | T | |
| | Makita 6233DWBE | $190/$229 | 330 | 0-400/0-1300 | 1hr | 2.2 | 18 | 4.4 | 2/NiMH | T | |
| | Makita 6236DWBE | $229 | 358 | 0-400/0-1300 | 1hr | 2.2 | 17 | 4.9 | 2/NiMH | T | |
| | Makita 6336DWBE | $239 | 358 | 0-400/0-1300 | 1hr | 2.2 | 17 | 4.9 | 2/NiMH | T | ½" chuck |
| | Metabo BEAT214/2 R+L | $279 | 257 | 0-400/0-1400 | 1hr | 2.0 | 24 | 5.9 | 2/NiCad | T | ½" chuck |
| | Milwaukee 0511-21 | $175/$239 | 350 | 0-450/0-1250 | 1hr | 1.7 | 20 | 4.7 | 2/NiCad | P | ½" chuck |
| | Milwaukee 0512-21 | $235 | 280 | 0-450/0-1250 | 1hr | 1.7 | 20 | 3.8 | 2/NiCad | T | ½" chuck |
| | Porter Cable 9876 | $155 | 360 | 0-475/0-1450 | 1hr | 2.0 | 20 | 5.3 | 2/NiCad | T | |
| | Porter Cable 9878 | $165 | 360 | 0-475/0-1450 | 1hr | 2.0 | 20 | 5.3 | 2/NiCad | T | ½" chuck |
| | Ryobi HP1441K | $100 | 150 | 0-650 | 1hr | 1.3 | 24 | 3.9 | 2/NiCad | T | Rubberized housing |
| | Ryobi R10520K | $149 | 275 | 0-375/0-1350 | 1hr | 1.7 | 24 | 5 | 2/NiCad | T | ½" chuck |
| | Ryobi JS10521K | $149 | 280 | 0-400/0-1400 | 1hr | 1.7 | 24 | 4.6 | 2/NiCad | T | One-handed chuck |
| | Skil 2580-04 | $85 | 120 | 700 | 3hr | 1.3 | 6 | 4 | 2/NiCad | T | |
| | Skil 2592 | $129 | 200 | 0-400/0-1200 | 1hr | 1.3 | 16 | 3.7 | 2/NiCad | T | Performance 3 stars |
| | Wagner WB144K-2 | $146 | NA | 650 | 3hr | NA | 6 | 3.6 | 2/NiCad | T | |



# ha

Visit an active forge operation where cabinet hardware is made just as it was 200 years ago, by hand and one piece at a time.

# HANDMADE rdware


*Raw mild steel on the left is bent, welded and hammered into the shape at right: a traditional rat-tail hinge. In the pre-industrial period, hardware such as this would have been made from iron, and it wouldn't have been made from the standard sizes at left.*

Photography by Christopher Schwarz

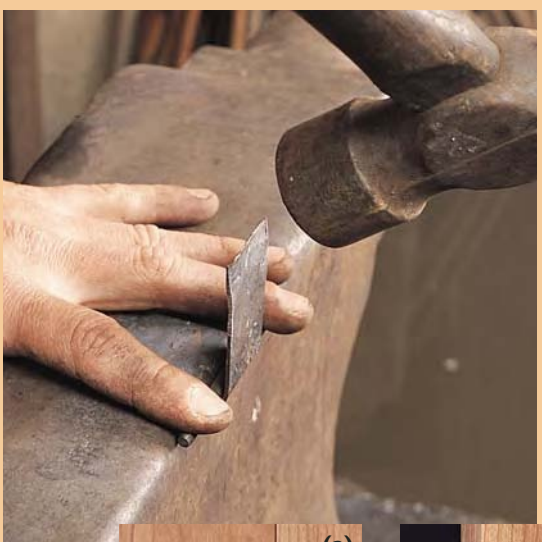
By Steve Shanesy

For woodworkers today, using traditional joinery is an expression of skill and nostalgia, a demonstration of the mastery of techniques practiced every day two centuries earlier. A time when furniture making in America reached a pinnacle that has yet to be eclipsed. For colonial cabinetmakers, dovetails, box joints and pinned mortise-and-tenon joints represented state-of-the-art technology when it came to keeping two pieces of wood together. More than anything, it was the well-made joint that kept furniture from falling apart. In fact, use of the dovetail allowed cabinet design to shift from clunky low chests to vaulting highboys, tall chests supported by delicate cabriole legs.

There were no high-strength glues. No screws. Nails could be had, but at a price that made hand-cut joints economical. There was no Home Depot, no corner hardware store, no catalog from which to order. Hardware, as we know it, didn't exist at all, not even in a corner of the general store.

Instead, there were blacksmiths. Thousands of them in cities, towns and villages throughout the colonies. A survey of Philadelphia in 1788 listed 214 blacksmiths. A census of Lancaster County, Penn., listed 25 blacksmiths and whitesmiths, seven gunsmiths and seven nail makers.

Before the Industrial Age, if you wanted something from iron (steel was used



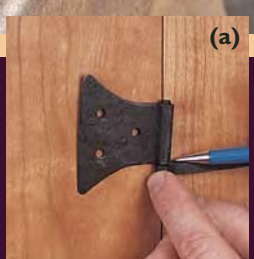
*Accomplished blacksmith Marsha Nelson starts the process of hand making a hinge by cold bending flat stock on a jig secured in a vise. The jig provides the correct opening size for the the pintle, or hinge pin* ***(above)****.*

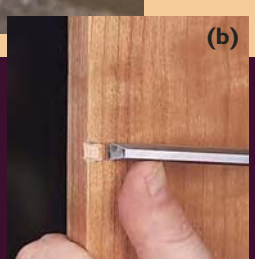
*Still cold, the bending process is completed at the anvil with a hammer. The hinge and a piece of pintle stock is held in place between Marsha's fingers and tapped around until it's completely folded over* ***(left)****.*

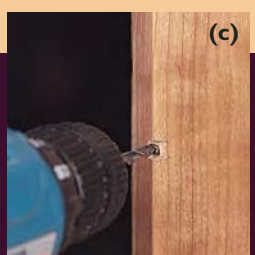
## Installing a Rat-Tail

**Back when I was making period furniture for a living, I got a lesson in installing rat-tail hinges. It started out like this: "You get one shot to install this hinge right." With that introduction, I got a lot of practice installing these hinges on expensive furniture.**

**Let's start with a little basic knowledge. These hinges work best on cabinets with face frames. There are three basic parts. The leaf, pintel (or pin) and the snipe, the piece that penetrates the stile and is splayed like a cotter pin inside. Practice the mounting operation on scrap before mounting for real. Begin by placing the door in its opening and holding the hinge in the location where it will be mounted. Mark both sides of the snipe location on the stile (a). Next, take a small saw and cut in about ¼" across the grain at the marked lines. Take a ¼" chisel and clean out a small chamfer on the edge (b). This will give a flat surface for drilling a ¼" hole. Drill a hole at about a 45-degree angle through the stile (c). With the entire hinge assembled, place the snipe in the hole. You might have to swage the snipe to get the hinge to seat properly. Do this in a vise with a hammer, while the pintel is still in place. When the hinge looks right, attach the pintel spade and the leaf**



*Bent completely over to form the barrel, the steel is super heated in the forge then welded together with a couple hammer blows.*

sparingly) you went to the blacksmith and placed an order. It would be made by hand in a forge and shaped on an anvil. And yes, some smiths fitted horseshoes, but these were a minority and were considered near the bottom rung.

Hardware was expensive. To begin with, raw iron stock from which the work was wrought, was pricey. Add to that the labor of making one piece at a time, which usually required heating and re-heating it several times and working it on the anvil in between. Blacksmiths took pride in their work. For example, prior to the Industrial Age they never left hammer marks on their work. It was considered a sign of poor workmanship. After the Industrial Age, they left hammer marks to show the work was handmade. A whitesmith, so called because his work was finished as bright metal, not black, filed and finished all his work to a flawless surface.

Some blacksmiths made nails. A good one could produce 1,000 nails a day. That's about a half minute to make each one, which required cutting ¼"-square barstock to length, heating, pointing one end by hammering, then nicking the other end where the appropriate-sized head was formed there.

Blacksmiths also made hinges, latches and locks. They made many of the edge tools for cabinetmakers. They made shears, fireplace tools, iron rims for wagon wheels, chain, ship fittings, weapons, and even spoons, knives and forks.

But the ring of the anvil faded as the Industrial Age revolutionized how work was done. Today, blacksmiths, except for the horseshoeing variety, are scarce as hens' teeth. However, the number of blacksmiths producing more artistic work is growing thanks to the work of the Artist-Blacksmiths Association of North America.

Marsha Nelson is a blacksmith from Cold Spring, Ky., who is schooled in the traditional ways of smithing. She produces traditional designs of furniture hardware and household furnishings of the late 17th and early 18th centuries. She has a ready outlet for her work at an antique furniture reproduction shop and showroom across the river in Ohio.

Intrigued about what it must have been like to work with a blacksmith, I visited Marsha's shop one day when she was making a traditional hinge called a rat-tail, a popular hinge in the 1700s.

She explains that her technique is strictly 18th century, learned during her apprenticeship at the Farmers' Museum in Cooperstown, N.Y., some 15 years ago.

To start the process, Marsha first makes the barrel part of the hinge using inch-wide flat stock. She places the mild steel in a jig that's secured in a vise. The flat stock is then cold bent in the vise to a 90-degree angle. Then the barrel is formed by



**(d). When you've got a good fit, hold the hinge in place and peen the snipe ends over after splaying them with a screwdriver (e).**

***—Jim Stuard***

*Before the metal cools, additional hammering spreads the steel on one end to give it its final shape. Lastly, the excess length of flat stock is scored with cold chisel and hammer then bent back and forth until the pieces part.*

wrapping the stock around a jig.

The bending process can now be completed. Marsha moves the stock to the anvil where, held between spread fingers, the bend is completed by a series of taps with a hammer. She holds a piece of round stock with the same diameter as the pintle, or "tail" portion, in place to maintain the correct barrel opening.

In further preparation for welding, Marsha fires the forge to heat the metal to a temperature of near 3,000 degrees. To do this, she moves pieces of coke, the residue of burned bituminous coal, into a beehive shape with a small opening in the hot forge. Using a steady steam of air from a hand-cranked blower, the coke is super heated.

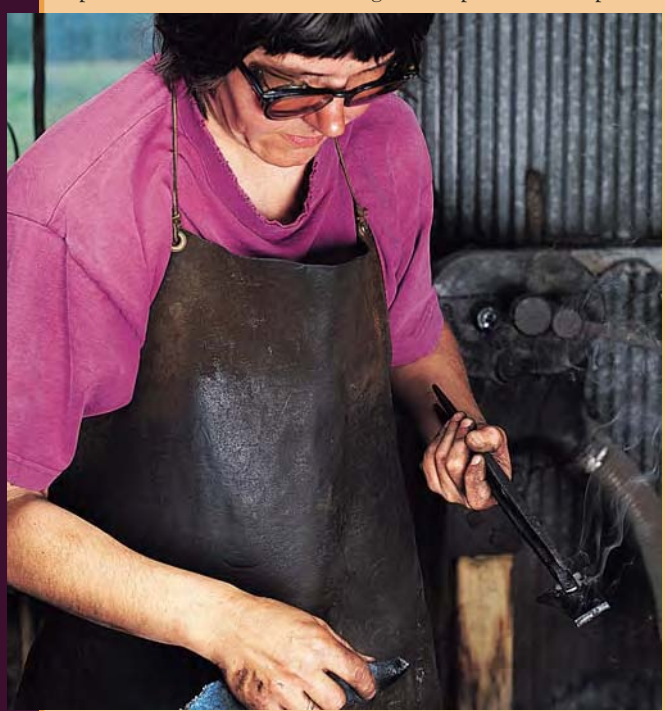
While the temperature builds, she sprinkles the work with Borax (as in 20 Mule Team soap), which acts as a flux that prevents new scale from forming during the heating process. Next the iron is placed in the mounded, now glowing, coke. Marsha's trained eye observes the color of the metal and the color of the glowing coke. Because the welding process, which includes hammering, can only occur within a range of about 100 degrees, a keen eye is essential to tell the blacksmith when the moment arrives by reading the colors in the forge.

Marsha also explains that overheating "burns" the stock, causing it to throw off sparks and can lead to it melting and dropping to the bottom of the forge as clinker.

*Marsha shows the hinge barrel part that has been separated from the flat stock from which it was formed and welded.*

Watching her tend the fire, I couldn't help but ask if she's fond of cooking on a charcoal grill. "Not much," she shoots back, "but when I'm with a group they always ask me to get the fire going!"

The welding is done by hammering the white-hot steel with a cross-peen hammer. Striking the metal with a cross peen, as opposed to a flat-faced hammer, spreads the work across its width and will not lengthen it. So with hammer in hand, Marsha positions the white metal on the anvil where she strikes it rapidly with the hammer, molecularly bonding the bent ends together to form a seamless single piece. At the same time, the hammering gives the broader hinge end its shape. This all occurs in just a couple seconds.



*The iron takes on its traditional black color as a by-product of treating the hot steel with linseed oil, which, after burning, helps prevent rust for awhile.*

After the metal cools, she parts off the excess length of flat stock by scoring the work using a cold chisel, and bends it back and forth till it snaps free. She quickly removes sharp edges with a file. Then, with residual heat still on the hinge, Marsha coats it with linseed oil, which blackens the iron as the oil burns, oxidizing the surface and preventing rust for a time.

With the difficult part over, she makes the pintle. Marsha heats one end, then hammers it into the traditional ball and spear shape. Then she bends the pintle to the desired shape and cuts it to about a 4" length. The sharp edges are cleaned up and deburred with a file, and then the piece is blackened. Then finally, she bends the snipe around the pintle. And, in a seeming concession to modern times, Marsha switches on her drill press to bore the holes for the fasteners that hold the leaf and pintle in place on a cabinet door and stile.

Examining the completed hinge, I was struck by the near sculptural quality of the work. How with a few blows of a hammer in the trained hand and skilled eye of an accomplished blacksmith, an unyielding material like iron was reshaped like so much clay into a strikingly handsome form.

As a woodworker, I've often been frustrated by the everyday design and quality of commonly available cabinet hardware. And, by contrast, I've been delighted by the the quality that well-designed and finely finished hardware can add to casework. Custom made hardware from a seasoned blacksmith adds a new dimension to your work. Handmade furniture and handmade hardware are a perfect combination for totally handcrafted work. **PW**

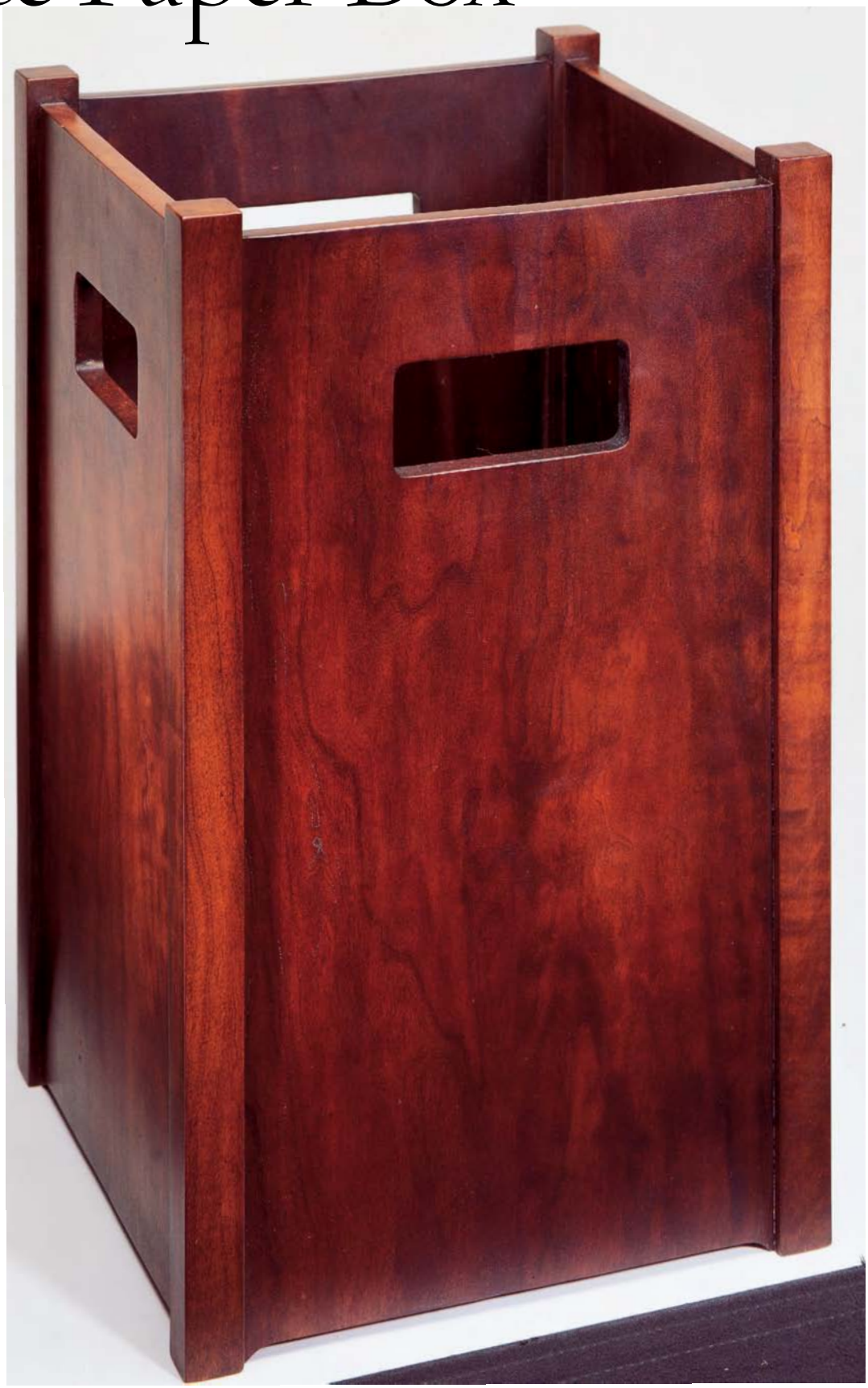
**If you're interested in more information about Marsha's work, you can write to her at 330 Tippenhauer, Cold Spring, KY 41076**

LIMBERT

# Waste Paper Box

Complement your Arts & Crafts decor with this reproduction of the #255.

By Christopher Schwarz



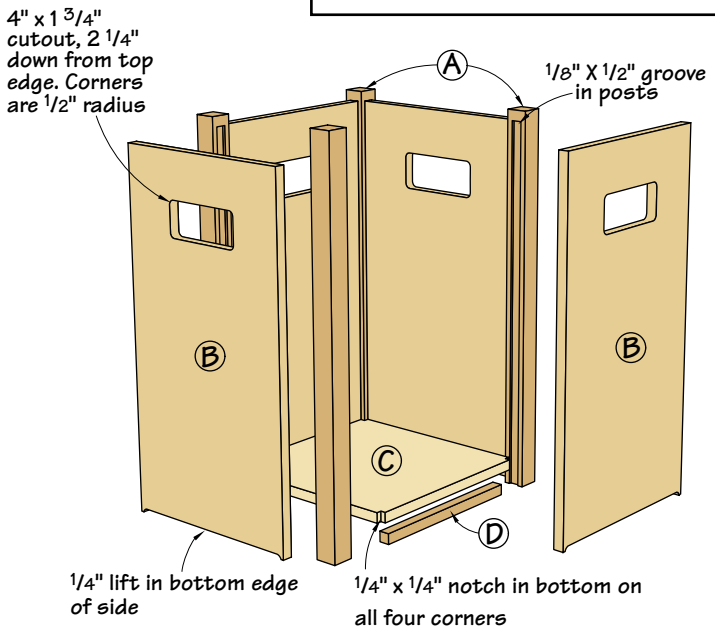
> "Unlike much modern furniture, Limbert's Holland Dutch Arts & Crafts furniture does not depend for its beauty upon carving or applied ornament, which often merely disguises or hides poor workmanship."
>
> *—Charles P. Limbert's Booklet No. 112*

## Patching Trick

**Checks in your boards can be tricky. They might get larger, they might not. To fill mine, I made a quick and effective putty. The putty is made from equal parts of fine cherry sawdust and cyanoacrylate glue (super glue to most people). The putty sets up in about five minutes as hard as a rock. It's sandable and — when finished — looks like one of those dark streaks of cherry that's common to the species. Then cross your fingers and hope the check stays small. Be sure to have some solvent on hand if you mess up the patch.**


**Schedule of Materials: Waste Paper Box**

| No. | Let. | Item | Dimensions T W L | Material |
|---|---|---|---|---|
| 4 | A | Posts | 1" x 1" x 18" | Cherry |
| 4 | B | Sides | ½" x 9¼" x 17½" | Cherry |
| 1 | C | Bottom | ½" x 9½" x 9½" | Cherry |
| 2 | D | Cleats | ½" x ½" x 8" | Cherry |




Charles P. Limbert's furniture designs are best thought of as American Arts & Crafts pieces that went to finishing school in Europe. Like no other furniture maker of his time, Limbert was able to combine the massive straight forms of American pieces from the Stickleys and progressive design from Europe. The result is straightforward furniture that has a certain flair to it, a subtle curve or a cutout.

This waste basket is a replica of the #255 Waste Paper Box found in Booklet No. 112, one of the many catalogs his company produced after the turn of the century. The proportions of this can are identical to the original. The joinery is simple and sturdy, much like that I've seen on other Limbert pieces. The only change I've made in the appearance is that I used cherry instead of quartersawn white oak.

This project can be built with a table saw, a router and a few hand tools. Construction is straightforward. The panels are glued into ⅛"-deep grooves in the corner posts. The bottom is screwed to the sides through cleats. Begin by gluing up any panels you'll need for the sides and trimming all the other parts to size. When your panels are ready, cut out the handle and the small lift on the bottom of each. I did this by first making a plywood template of the cutout and arch. I shaped the template using a jigsaw and cleaned up the cuts with a rasp and sandpaper. Then I used a pattern-cutting bit in my router to cut the two shapes. When your panels are done, turn your attention to the posts.

The most important aspect of the posts is to make sure you center the ⅛"-deep x ½"-wide groove that receives the panel. I made the cuts using a dado stack in my table saw and squared up the end at the top with a chisel. When your posts are milled, sand everything and begin assembly. The best way to go about this is to first glue up two side assemblies that have two posts and a side piece. When those are dry, glue the two remaining sides into the assemblies and clamp.

Now attach the bottom. When you screw the cleats to the sides and to the bottom piece, be sure to make the screw holes in the cleats in the shape of an elongated oval. This will allow for wood movement. Disassemble everything and then finish. I used Moser's Light Sheraton Mahogany dye (available from Woodworker's Supply 800-645-9292, item #W13304, $11.90 for four ounces of powder). Then I added a coat of clear finish, sanded it and applied a coat of warm brown glaze, which is available at professional paint stores. After allowing that to dry overnight, I added two more coats of a clear finish. **PW**

Photo Al Parrish

# 4 Ways to Build a Tavern Table

## Build almost any table you please with these tried-and-true construction methods.

We used to have a table just like this one that was great for playing cards or board games with our two kids. Unfortunately, I sold that table and have always regretted it. So when we finished out a couple new basement rooms for the kids, building a new game table was first on my list.

The top of this table is made from three boards of wormy chestnut, a species of wood that you're going to have to hunt for. I bought mine from a wholesaler who bought it out of a barn in the Smokies. And it was expensive: about $10 a board foot. The painted base is made from poplar.

Begin the project by milling the legs and cutting the taper. You can use a tapering jig for your table saw, but I don't recommend it. A few years ago I came up with a quick way to use a jointer to cut tapers faster and safer. See the story on this technique on the following pages.

by Troy Sexton

*Troy Sexton designs and builds custom 18th century furniture and is a private woodworking instructor in Sunbury, Ohio, for his company, Sexton Classic American Furniture. Troy is a contributing editor to* Popular Woodworking.

## Some Thoughts on Table Design

**No matter which construction method you use to build your table, there are a few rules you must follow when designing your table. Otherwise your family and guests will be uncomfortable, they'll ram into each other or they'll constantly bang their knees on your aprons.**

**We've combed several books on the topic of tables and most sources agree on these guidelines.**

### Table Height

**You don't have a lot of room to wiggle here. Make sure your table height falls between 28½" and 30". A few sources state that 32" is OK, but 30" or less is more common.**

### Apron Height

**Make sure each of your sitters has at least 24" to 25" of room between the bottom of the apron and the floor. This means that a 30"-high table with a ⅞" -thick top should have aprons no wider than 5⅛".**

### Overhang

**The distance from the edge of the top to the apron can vary. Between 10" and 18" is great — if possible.**

### Elbow Room

**The amount of tabletop allowed for each place setting should be no less than 23". A roomier table will have 28" to 30".**

### Tabletop Width

**The standard width is between 30" and 34". A square table for four should be about 40" x 40". Six can be accommodated by a 60" x 30" top.**

### Circular Tops

**To seat four, make your top 44" in diameter (34½" per person). To seat six people, make it 54" in diameter (28¼" per person).**

### Leg Taper

**Tapered legs are a common feature of dining tables. Legs should taper down to half their width at the floor. The taper should begin about 1" below the apron.**

## Sources

**For more about standard furniture sizes and basic furniture construction, check out the following books:**

***"Illustrated Cabinetmaking"* by Bill Hylton, Reader's Digest, Pleasantville, N.Y.**

***"Measure Twice, Cut Once"* by Jim Tolpin, Popular Woodworking Books, Cincinnati, Ohio.**

***"Encyclopedia of Furniture Making"* by Ernest Joyce, Sterling Publishing Co. Inc., New York.**

***"Cabinetmaking and Millwork"* by John L. Feirer, Bennett Publishing Co., Peoria, Ill.**

***— Christopher Schwarz, managing editor***

*The plugs for the breadboard ends are made from the same material as the table top. Sand the plug to fit, put some glue on the sides and tap it in place* ***(above)****.*

*I usually build my tables using straight mortise-and-tenon joinery* ***(top right)****. However, there are special cases when other methods are just as good or even better.*

*These table top fasteners are cheap ($1.99 for a pack of eight) and sturdy. Simply place the clip end into the kerf in your apron and screw the other end to your table top* ***(right)****.*

There are a lot of ways you can join the aprons to the legs, from totally traditional to quick-and-dirty. I prefer using a straight mortise-and-tenon joint, though if I were building a little side table or something else that wouldn't see daily abuse, the two less traditional methods I'm going to cover would work just fine. But before we talk about the bases, build the top.

### Making the Top

After I pulled the right boards from my woodpile, I got them ready for glue-up. I wanted this top to look rustic, so I didn't plane the lumber. Instead, I jointed the edges of the planks and glued up the top. Then I rough sanded it with a belt sander to get it reasonably flat and to remove some of the milling marks. Then I cut the top to size and worked on the breadboard ends.

For a long time I used traditional through-mortises to attach breadboards to cover the end grain of my tabletops. Other people showed my how to do it with slotted screw holes. I was always against using that method until I actually tried it. Now it's the only way I'll attach breadboards. You actually get less up-and-down movement using screws, and the top stays flatter-looking for a longer time. Here's how I make my breadboard ends.

After cutting the breadboards to size, cut ⅜"-wide by 2½"-long by 1½"-deep mortises in the breadboards. I cut five of these for my 36"-wide top. How ever many you use, it's always good practice to use an odd number of mortises so it's easier to lay them out. I put the two outside mortises ½" in from the end of the breadboard.

Now cut two slots for two screws in each

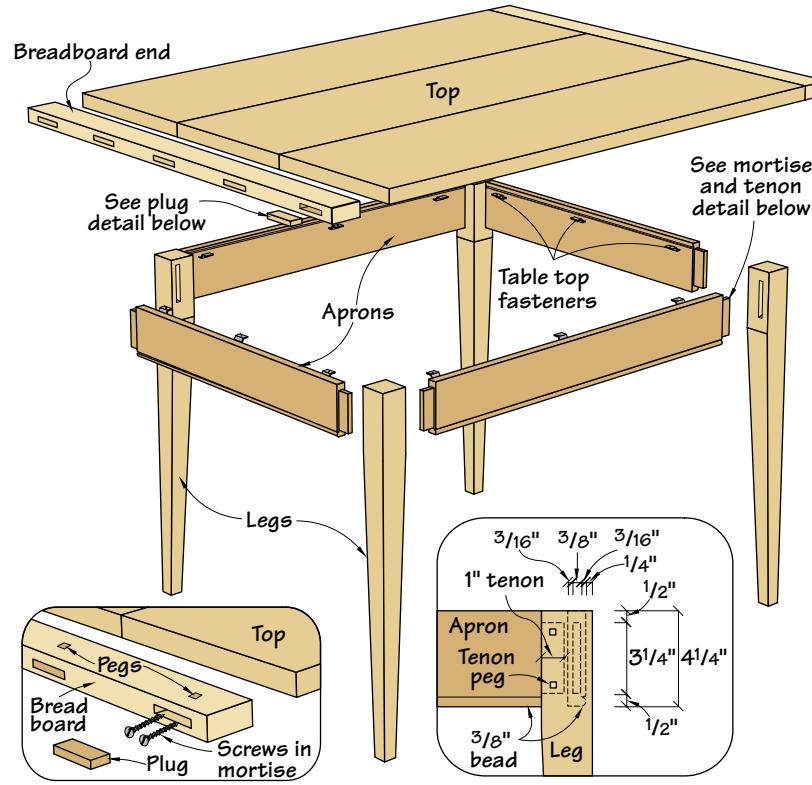
mortise. I make the slots about 3/8" long to give the top some real room to move if it has to. You can make a router jig to cut the slots, or you can use your drill press and work the bit back and forth. Clamp the breadboard to the table top and put two screws in each mortise. I put the screws at the sides of the mortise, not at the center. I do this because I peg the fake plug later in the process, and this keeps me from boring a hole into one of my screws accidentally. Don't drive the screws in too tightly because you want the table top to be able to move.

Now plug the mortises. I cut plugs to fit the opening and taper them a bit so they fit snugly when tapped in place. Glue the plugs in place, then peg the plugs through the top with 1/4" x 1/4" square pegs.

Now age the top. I strike the top with a key ring full of keys; I even write people's names in the top with a knife. It's pretty amusing to watch people as they see me do this. They freak out.

Stain the top with a golden oak color and then add a natural oil finish, such as Watco, which is an oil/varnish blend. You don't want the top to look too shiny.

Now turn your attention to the base.




Detail of breadboard ends

Detail of mortise and tenon

## Mortise and Tenon

Cut your aprons to size. Cut 1"-long tenons that are 3/8" thick. The apron lengths in the Schedule of Materials include the tenons. I cut my tenons first and use them to lay out my mortises, which results in less layout, in my opinion. These aprons

**SCHEDULE OF MATERIALS: TAVERN TABLE**

| No. | Item | Dimensions T W L | Material |
|---|---|---|---|
| 4 | Legs | 2 1/8" x 2 1/8" x 28 1/4" | S |
| 2 | Aprons* | 3/4" x 4 1/4" x 31 3/4" | S |
| 2 | Aprons* | 3/4" x 4 1/4" x 25 3/4" | S |
| 1 | Top | 1 1/8" x 36" x 43" | P |
| 2 | Breadboards | 1 1/8" x 2 1/2" x 36" | P |

P = chestnut; S=poplar • * including 1" tenon

*Mitered mortise-and-tenon joinery is common on tables with thin legs or when your set back is deeper than normal* ***(top)****.*

*When you have to use mitered mortise-and-tenon joinery, don't get too worked up about the fit of the miter. You don't want the miter too tight* ***(left)****.*

are set back 1/4" from the front of the legs, this is called a "set back."

Now cut a bead on the bottom edge of the aprons using a beading bit in your router. Finally, cut a slot on the inside of the aprons for fastening the base to the top. I use metal tabletop fasteners from Rockler (see the supplies list at the end of the article). Rockler sells very sturdy ones, and I recommend them.

For these fasteners, the slot needs to be the width of your table saw's blade (between 1/8" or 1/16" wide) and 7/16" down from the top of the apron and 3/8" deep.

Glue up your base, peg the mortises through the legs and finish the base. I use square pegs in my legs. Drill a round hole through the leg and into the mortise. Then take a piece of square stock, whittle one end of it roundish, then pound it into the hole. It should convert your round hole into a square.

### Mitered Mortise and Tenon

This method is similar to the straight mortise and tenon above, but you must miter the ends of the tenons because your mortises meet in the middle of the leg. Why would they meet? Well you might have a thinner leg, or your mortises might be back farther if you chose to use a larger set back.

When this is the case, I make a standard tenon and chop the end off at a 45-degree angle on my miter saw. You're not trying to match the two miters exactly (it

*Be sure to glue the joint and hold the leg and apron together tightly while screwing it together.*

*Pocket screws aren't my first choice for building dining tables, but for a small occasional table, it'll work.*

*Use the bracket as a template for locating the holes for the corner bracket. Then use a drill press to make your pilot holes.*

will never show) so leave a little gap between the two tenons. If it's too tight, it could get you in trouble because the ends of the tenons will touch before the shoulders seat into the legs.

### Pocket Screws

I wouldn't recommend this for a large table. If you're going to spend the money on the wood, you might as well do it right. But if you want to build a quick-and-dirty side table, this will work fine. Be sure to glue and screw this joint for added strength. It's important to keep the pieces tightly together as you screw the apron to the leg.

### Corner Brackets

Corner brackets are a faster alternative to traditional joinery, but they aren't as sturdy. However, you can't beat them when you want to make a table that can be knocked down and stored away.

These measurements apply to the brackets from Rockler (see the supplies box at the end of the article). The first step to installing these brackets is to cut a bevel on the inside corner of the legs. This is where you'll later install the hanger bolts. The best way to cut the bevel is on your jointer. Set the machine's fence to a 45-degree angle and the depth of cut to ¼". Cut 3½" in on the top corner as shown in the photo.

Now install the hanger bolts, which are odd-looking fasteners that have wood screw threads on one end and machine screw threads on the other. The wood screw end goes into the leg, and the machine screw end is bolted to the corner bracket. To install the hanger bolts, first lay out and drill pilot holes on the leg. Then install the bolts using the method shown in the photo.

Now you need to cut a kerf in each apron for the bracket to grab. The kerf should be 1¾" in from the end and ⅜" deep for these brackets. Different brands can use different measurements.

### Attaching the Top and Finishing

I attach the top with tabletop fasteners that I screw in place about every foot. On the long aprons, don't push the fasteners all the way into the kerf when screwing them down. This will give your top some room to move.

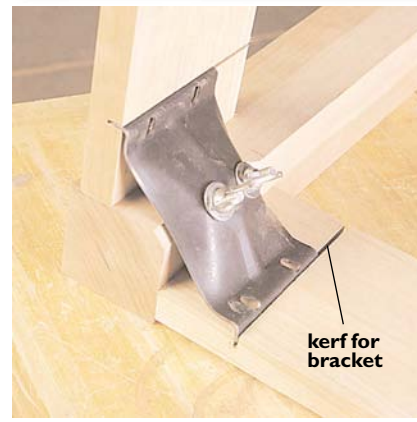
I finished the base with a couple coats of latex paint followed by a glazing stain. Finally, I added a couple coats of lacquer for protection. **PW**


*To install the hanger bolts, thread two machine nuts onto the end of the hanger bolt and tighten them against one another. Then grip the two nuts with a wrench and screw the hanger bolts into the leg.*

#### SUPPLIES

**Rockler 800-279-4441**
**www.rockler.com**

- **3" x 4¾" Corner Brackets, set of four, item #34303, $2.99**
- **Table Top Fasteners, eight per pack, item #34215, $1.99**




*Corner brackets are great for building furniture that needs to be knocked down or moved frequently.*

## If You Have a Jointer, Throw Your Tapering Jig Away




***A.** Here I am making the first pass on the leg. My jointer is set to make a ½"-deep cut. As soon as the cutterhead reaches the mark at 11", pull the leg up off the jointer.*

***B.** Here I'm beginning the second pass on the jointer. I've turned the leg around and "popped a wheelie" using my pusher-holddown block. Advance slowly and steadily into the cutterhead.*

***C.** Here I am near the end of the second pass. The outfeed table supports the tapered side after it comes off the cutterhead so the leg moves steadily over the jointer beds as long as I keep firm pressure down on the pusher-holddown block.*

**For years I used a tapering jig on my table saw to cut tapers on legs. Even after cutting hundreds of the things, I never liked using the jig. It felt unsafe and always brought my fingers too close to the blade for comfort. One day this method came to me out of the blue. It works so well and so fast that I'm still kicking myself for not thinking of it sooner. It uses your jointer and can cut just about any taper in only two quick passes.**

**Let me show you how to do this on a 2⅛" x 2⅛" x 28¼" leg. First mark on the leg where the apron will be. Let's say the apron is 4" wide. Add 1" to that and make a mark 5" down from the top of the leg. Then take the remainder of the leg, 23¼", divide that number in half and forget about the fraction — so you get 11". Make a mark on the leg that's 11" up from the bottom of the leg. To reduce the width of the leg at the floor by half (which is standard with leg tapering), set your jointer to make a ½"-deep cut. Now make your first pass on the jointer by slowly pushing the leg into the cutterhead — foot first — until you reach the mark at 11". Lift the leg off the jointer.**

**Now turn the leg around so the top part is headed towards the cutterhead. Place your pusher-holddown block on the bottom of the leg and push down so you "pop a wheelie" with your leg. Slowly push the leg into the cutterhead while pushing down and forward on your pusher-holddown block. When you finish this pass you will have a perfectly tapered leg on one side.**

# shop-built Air Cleaner

## Tired of *sucking dust?* Building an efficient air cleaner is ***simple*** and ***inexpensive.***

Working in a cloud of sawdust in the workshop can take the fun out of woodworking. Your dust mask has to stay on longer and cleanup becomes more of a challenge.

You can reduce if not eliminate this problem with an air cleaner. Air cleaners are different than dust collectors, which pick up large dust particles and wood chips when attached to a machine, trapping the stuff in large bags. Dust collectors, however, don't trap the finer particles.

For that you need an air cleaner. It is designed to remove the smaller dust particles suspended in the air. Because the dust collector and air cleaner don't do the same thing, it's wise to have both.

The human body can filter small concentrations of dust found in the air, however the high concentration of dust generated in a wood workshop can damage your health. Lung-damaging dust is between 0.5 microns and 5 microns in size. To put things in perspective, a period on a typewriter is about 500 microns across.

An air cleaner quickly removes most of the dust from your shop, but you still need to wear a proper dust mask. Don't use your air cleaner as a reason to abandon good safety practices.

Commercial air cleaners for the shop are readily available, but building your own can be just as easy. It's hard to improve on the design of store-bought air cleaners, but a homemade unit is cheaper and can be built to your needs, either for space or capacity.

There are three important elements to an air cleaner: a fan, a filter and the housing to put them in. Make sure you have the right combination of filter and fan to do the job.

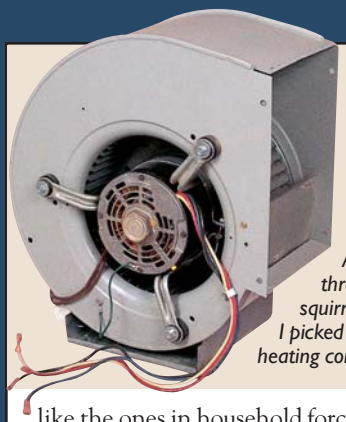
### Fans

The best fan for an air cleaner is a squirrel cage fan (also called a centrifugal fan

by Michel Theriault

*Michel Theriault works wood part time from his home in Ottawa, Canada. He has written more than 100 magazine and newspaper articles based on his woodworking, which includes carving, turning and general cabinetry.He has also written a project book titled "Woodworking with a Few Basic Tools."*

Photo by Al Parrish



A modern three-speed squirrel cage fan I picked up from a heating contractor.

A 1950s-era single-speed squirrel cage fan

Here are the three filters in the order in which they're placed in the air cleaner. Media pad (left), pleated filter (center) and bag filter (right).

like the ones in household forced-air furnaces and commercial ventilation systems). Squirrel cage fans are superior to less expensive box fans because they're available at much higher airflow capacities. This allows the fan to maintain performance when subjected to air resistance (static pressure). The air resistance is caused by the filters and increases quickly as the filters get dirty.

With squirrel cage fans, speed control isn't essential as long as your air cleaner is properly sized for your workshop, but it is handy to reduce the speed (and therefore the noise) for continuous operation or increase it after a dusty operation (see the accompanying story on speed). Buying a new fan can negate the savings of building the air cleaner yourself, so it pays to search for used fans. If size isn't a constraint, old furnace fans are cheap, even free. Call your local heating, ventilation and air-conditioning shops. Many older furnaces are replaced with more energy-efficient units, and they may be happy to give you an old fan. The fan used in my air cleaner came from a damaged furnace that was almost new. It was rated for 1,100 cfm according to the HVAC person who sold it to me. You'll find that these squirrel cage motors from heating contractors are commonly rated in cfm. As a rule of thumb, commercial air cleaners have a ¼ hp or ⅓ hp motor and a cfm draw between 550 cfm and 1,600 cfm.

## Speed

**The speed of your fan directly affects performance. The following performance relationships should be considered with a variable or multiple-speed fan:**

- **Air flow (cfm) varies directly with fan speed (rpm). If the speed is halved, the cfm will halve, and cfm doubles if the speed is doubled.**
- **Static pressure capability varies as a square of the fan speed ($rpm^2$). If the speed is halved, static pressure capability is reduced by ¼. Likewise, if the speed is doubled, the static pressure capability is four times as great.**
- **Power required varies as the cube of fan speed ($rpm^3$). If speed is halved, power reduces by ⅛. A doubling of speed requires eight times the power.**

### Filters

Filters work best in stages. While it may sound technical, the different stages are really just different types of filters. A single-stage has one filter, a two-stage has two filters and a three-stage air cleaner has three. The first filter catches large particles. The second filter keeps medium particles from getting to the third filter, which is designed to trap the smallest particles. This configuration improves the performance of an air cleaner and reduces costs by extending the life of the other filters.

The "media filter" (see story

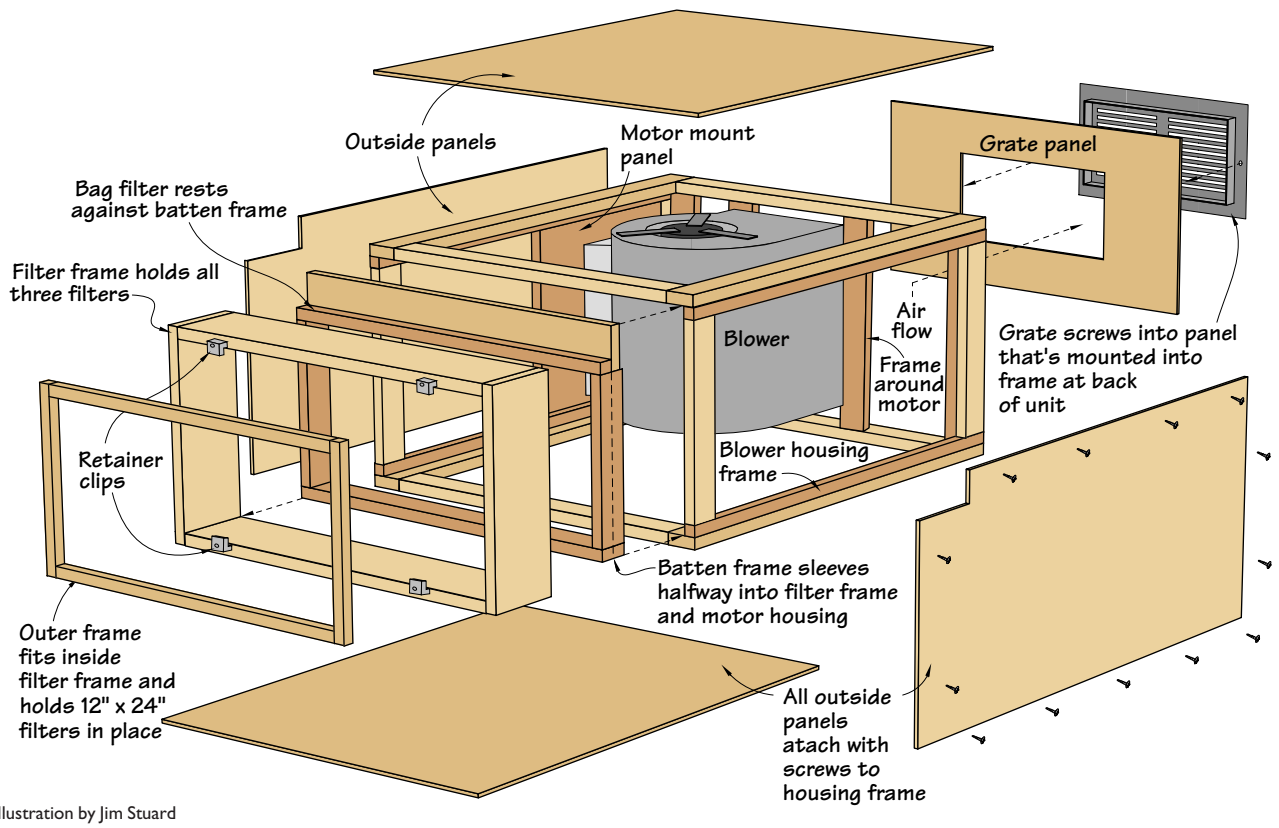



Illustration by Jim Stuard

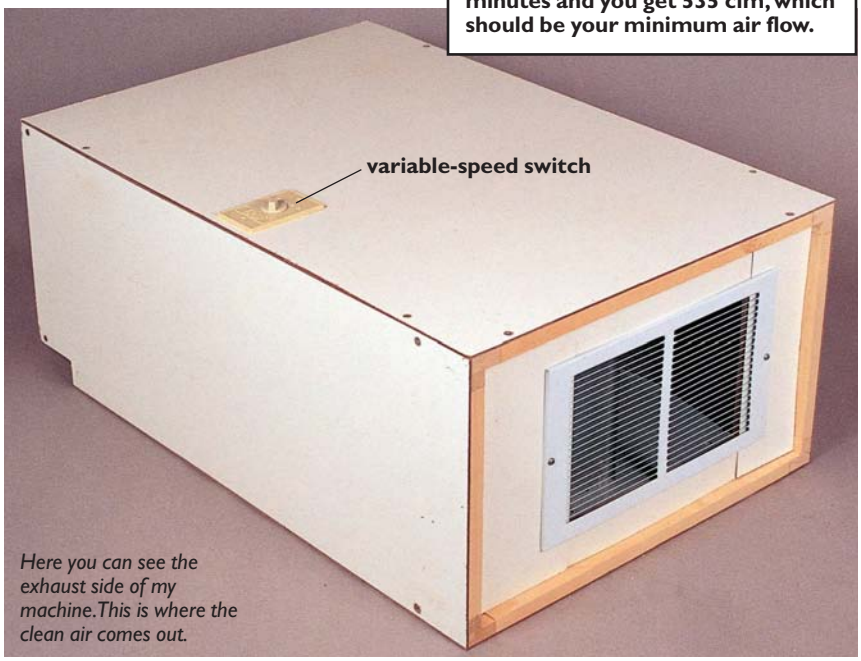
*Here's what the guts of my air cleaner look like. The wiring is simple, but if you're not a confident home electrician, I strongly urge you to chat with a pro before you wire your cleaner.*

## How Much CFM Do You Need?

**A good rule of thumb is one air exchange every six minutes.**

**To calculate your required air exchange, determine the volume of your room. In a typical double garage, the floor area is 20' x 20' = 400 sq. ft. Multiply this by the ceiling height to get the volume of the room, which is typically 8', giving a volume of 3,200 cubic feet.**

**Divide 3,200 cubic feet by six minutes and you get 535 cfm, which should be your minimum air flow.**




*Here you can see the exhaust side of my machine. This is where the clean air comes out.*

## A Filter Primer

**Media or pad filters are a layer of fiber, (they often look like glass fiber) either in a cardboard frame or in large sheets that are cut to size. They are commonly found in home furnaces and are the least expensive and least efficient types of filters.**

**Pleated filters are made from thin pleated material. They come in various sizes and thicknesses, from ½" to 6" or more in thickness. The pleats provide more surface area. They are moderately expensive and more efficient than media filters. Typical efficiencies range from 25 percent to 55 percent.**

**Bag filters have several long pockets made out of thin material. They come in lengths from 12" to 36" and have between three and eight pockets. The bags increase the surface area for air flow. This increases the "effective" size and enables a more efficient dust collection with a longer life, especially when combined with a media or pleated filter. The latter are the most expensive types of filters with operating efficiencies typically at 65 percent, 85 percent or 95 percent.**

## Typical Filter Sizes

**The bag filter comes in a smaller range of sizes. The following sizes are typical:**

**Face sizes**
**24" x 24", 20" x 24", 12" x 24", 20" x 20", 16" x 20". Pleated filter thickness: 1" to 5" thick. Bag filter: 12" to 36" long**

above) acts as a first stage, the "pleated filter" is the second stage and the "bag filter" is the third stage. In a two-stage cleaner, only a pleated filter and bag filter are used.

The best sources for filters are wholesalers/retailers or your local heating, ventilation or air-conditioning shops. Before you look around, have an idea of the size and type of filter you need (see the box that explains the common sizes). Your two main considerations should be the efficiency rating and the maximum air flow rating (in cubic feet per minute or cfm). The maximum air-flow rating must be the same or higher than your fan's maximum air-flow rating. The efficiency rating is independent of the fan and is a rough indicator of how well it traps small dust particles. When buying a filter, be sure to tell the salesman the air-flow rating of your unit.

A good combination for a three-stage filter is a standard 1" media pad, a 2"-thick pleated filter in the range of 25 percent to 30 percent efficiency and a 12" or deeper bag filter with an efficiency of 55 percent to 65 percent. This combination will trap about 99 percent of the lung-damaging dust created in your shop.

### General Construction Notes

An air cleaner is basically a housing with a set of filters at one end and a fan at the other. When you build your own, you have the luxury of making it suit your needs.

First, determine how much air flow (cfm) you need and buy a fan and filter to meet those specifications. Check the typical filter sizes, and call around for availability, maximum cfm and efficiencies.

Build your housing around your filter and fan. The size of my air cleaner is similar to a commercial air cleaner. It was built with a pine frame with ⅛" hardboard panels screwed to it. You can use a plywood box as long as you add a ledge for the filters to fit on, totally enclose the fan and leave an opening for the exhaust. And be sure to leave adequate space around the fan intake.

### Building the Air Cleaner

My air cleaner uses a compact in-line furnace fan and 12" x 24" filters. To allow enough air for the intake of the fan, I made the box thicker than required.

Start by building the frame shown in the drawing. The corners are formed with a piece of ¾" x 2" and a piece of ¾" x ¾" glued up to give an L-shaped cross section. Next, add cross members, gluing them together. Glue and screw the butt joints together.

Add the cross members for the fan, used in mounting, on the bottom and at the back for fan exhaust. With my project, I screwed the cross members to the frame for added strength. Next, add the pieces at the intake to frame the filter and provide a ledge for them to rest against. I made a frame out of ¾" x ¾" pine to hold the filters in place using plastic toggles. Mount the fan, and remember to accommodate a switch as well.

Now, cut out the hardboard panels to size, drill pilot holes in them and screw the panels to the frame, ensuring that the power cord and switch/speed control are properly installed. If you are suspending your fan, attach mounting hardware to the frame and suspend it with chain. **PW**

## How We Rate Tools

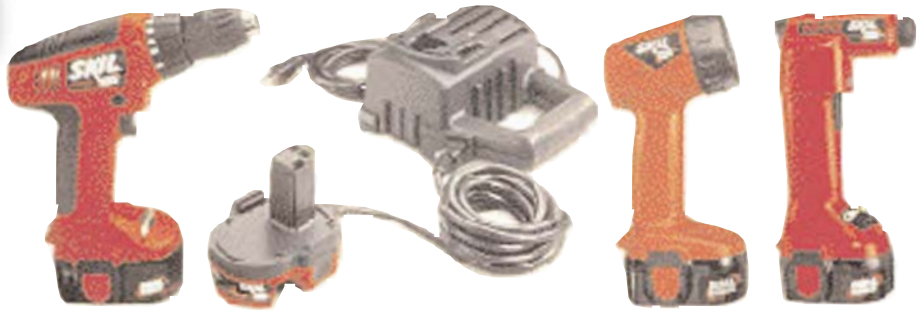
**We test a lot of tools at *Popular Woodworking*, and while we don't often test tools until they fall apart, we do give them an honest, real-world workout. Each issue we share the results of our hands-on experience with you and offer insights to help guide your shopping decisions. The ratings reflect the opinion of the magazine's editorial staff.**

**Here's how our rating system works. Performance: A rating of "five" indicates we think this tool is a leader in its category — for now. (You won't likely see performance ratings of "one" or "two" in these reviews because we wouldn't publicize an inferior tool.) Value: "Five" is a great tool for the money; "one" isn't the mark of a value. However, a low "value" rating shouldn't prevent you from buying that tool. Some tools might be worth a little more because they're one-of-a-kind or just a really great tool.**

**If you have a question about a tool — whether it's been reviewed or not — you can contact me at (513) 531-2690, ext. 255, or by e-mail at DavidT@FWPubs.com.**

**And by the way, many of our past tool reviews appear on our website at www.popwood.com, including data on entire categories of tools (such as table saws). Check it out.**

***—David Thiel, senior editor***



## Skil Puts the Plug Back on Cordless Tools

**Performance:** ●●○○○
**Value:** ●●◐○○

Skil: 877-SKIL 999, or www.skiltools.com

Targeting those of us who forget to plug in our battery chargers, Skil now offers a cordless drill set that lets you plug the drill in an outlet and go to work if your battery is dead. The new Dual-Source system allows you to remove the drained battery, plug it into the power station/charger and plug the corded back-up pack into the drill. You now have power to keep working while recharging the drained battery. The cord is 16' long, so you're not held on a short leash. The system is available in a 9.6-, 12- or 14.4-volt drill driver (ranging from $90 to $130), and the 9.6- and 12-volt drill/drivers will be offered as part of a two-piece kit with a nice high-pressure air gun inflator, or a three-piece kit with the inflator and a flashlight. The kits will sell between $130 and $150 depending on voltage and tool selection.

This is a clever idea, and will doubtless ease many an occasional drill-user's mind. While we think the air pump (capable of inflating a beach float or car tire) and flashlight (with Krypton bulb and swivelling head) are great, we were disappointed in the quality of the drill/driver itself. It offers only a single speed setting, has no electronic brake and though it has a Jacob's chuck, it's not the top-of-the-line model. All of which would be OK if it weren't a $120 drill. For our money we'd buy a better drill with two batteries and buy the air pump separately (which isn't available at this time).

For more information, circle #180 on the Resource Directory Coupon.

## BeadLOCK Offers Mortise and Tenon Strength With Doweling Simplicity

If you can't afford a hollow chisel mortising machine, this might be the next best thing. I recently built an Arts & Crafts-style bed that needed the strength of a mortise-and-tenon joint, but the pieces would be unweildy on a mortiser. So I decided to give the BeadLOCK system a try. The concept is a loose tenon that is shaped something like three or five dowels glued side-by-side. To drill the mortises, you use the BeadLOCK jig like a doweling jig, with a simple two-step process using a standard hand drill. The result is a surprisingly accurate and sturdy joint made with common tools. The tenon stock is supplied in one-foot lengths that can be cut to any length, and is available in 3/8" or 1/2" thickness. The jigs can be purchased separately (3/8" for $30, 1/2" for $33) or in a kit with both sizes for $47. Shipped with 2' of stock for each jig, extra tenon stock is available in 3' lengths for $5.50 or $6.

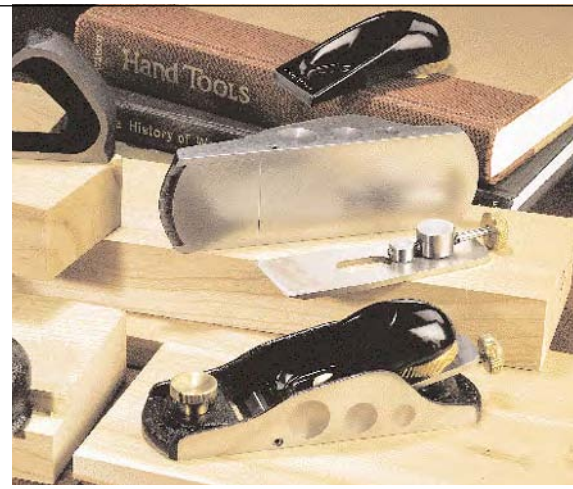
**Performance:** ●●●●◐
**Value:** ●●●○○

Woodcraft: 800-225-1153
Trendlines: 800-877-7899, or www.trend-lines.com

I was pleased with the strength and accuracy of the finished joint formed by the BeadLOCK system, but I did have to be careful when setting up the joints. There isn't a lot of room for error because of the close tolerances of the tenons, which fit nice and tight. While the tenons aren't as inexpensive as a biscuit, you don't have to buy a biscuit joiner and the resulting joint is sturdier. This is a good option for many woodworkers.

For more information, circle #181 on the Resource Directory Coupon.

## Veritas Low-Angle Plane Pleases Both Hand and Work




The first plane in Veritas' new line of woodworking tools is a great one. Measuring 2" x 6" it offers a number of features that make it an excellent woodworking tool. The blade itself is 1/8" thick and made from A2 tool steel, which Veritas says will take a keener edge, dull less easily and resist chipping. We'll let you know about that claim in a few months. A combined feed screw and lateral adjustment mechanism makes fine adjustment easy, higher side wings make the plane easier to hang onto (and easier to shoot a board with). Another interesting feature is a pair of jack screws set into the side of the plane body that lock the blade in place, increasing the stability of the cut and keeping the blade from being knocked back or canted during use.

**Performance:** ●●●●◐
**Value:** ●●●●●

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

This plane is extremely well machined and produced an excellent curl in end-grain walnut right out of the box. After honing and stropping it was ready to compete with anyone. The tolerances in all the machining are outstanding with barely a 1/16-turn play in the feed screw. It's a little heavy in the hand at 1 lb. 12.4 oz., but in use the weight feels good. The plane is priced at $69.50, which is $20 more than a Record, but $70 less than a Lie-Nielsen. We recommend this plane to anyone who is serious about hand tools, but chagrined at some of the prices. We look forward to the entire Veritas plane line.

For more info., circle #182 on the Resource Directory Coupon.

## Bosch's New Detail Sander Gets In Tight Places With Ease


Bosch's new 1294VSK Corner/Detail Sander is an aggressive tool that outperforms less expensive detail sanders, giving it a professional edge. But it is priced below the "professional" detail sanders, making it a good home shop tool.

Weighing 2.4 pounds, the sander sports a 2.3-amp motor providing variable speeds from 9,000 to 19,000 orbits per minute at a 3/32" orbit diameter. When hooked to a vacuum, the built-in dust extraction port pulls dust through the pad, providing a more efficient and cleaner sanding action. The triangular sanding pad can be rotated to three positions to extend the life of the hook-and-loop paper and the pad itself. The change requires no tools. Sold as a kit for $135, the sander comes with 20 sanding sheets, a case and three extension plates, including two "finger" extensions (one thin enough to fit into a 1/4" space). Our only negative comment is that the size of the barrel is somewhat large and may feel uncomfortable in smaller hands. **PW**

**Performance:** ●●●●○
**Value:** ●●●○○

Bosch Power Tools: 877-267-2499, or www.boschtools.com

For more information, circle #183 on the Resource Directory Coupon.

# Tool Scoop

### Quick Grip Upgrades Its One-Handed Clamps

**In our September 1999 Tool Test section we told you about the redesigned line of Quick Grip one-handed clamps. Just before the clamps hit the stores, American Tool tweaked them to improve their performance. In addition to the tool-less spreader feature and the "stay-on" jaw pads, Quick Grip has improved the closing speed of the jaws to make operation faster and less fatiguing. Good job!**

### Blade-Loc—Beats a Stick In Peformance, But Not Price

**The high-impact plastic Blade-Loc fits over and completely covers the raised saw blade protecting your hands from raking teeth, and protects the brittle carbide from steel wrenches. Having the blade raised makes access to the nut easier. Blade-Loc holds the blade in place braced against the saw table while you break the nut free with a wrench. This is a clever and safety-conscious product that we like, but the $22.95 price seems a bit high when you compare it to a scrap piece of poplar on the floor. Check it out at www.benchdog.com, or 800-786-8902.**

### Keep All Your Designing Tools In a Mug Boss

**If you can't walk through a hardware store without looking at the tool belts, Duluth Trading has a clever little product for your desk at work. The Mug Boss is a stitched canvas cover for your coffee mug that offers pockets for your desk "tools," such as pens, pencils, scissors and more. It looks a lot like Duluth's "Bucket Boss" line of tool carriers that slip over five-gallon buckets. The price is $2.99, or in a gift pack with a 16 oz. steel coffee mug and a packet of "Daily Grind" coffee for $19.99. Check it out at www.duluthtrading.com, or 800-505-8888.**

# Finishing for First-Timers

If you've never put brush to bare wood (or you'd like a refresher), learn how to greatly improve your chances of success.

It's one thing to describe finishing steps to an experienced finisher. It's quite another to teach someone who has never applied stain or finish to anything. Describing finishing so a novice feels comfortable and experiences success the first time is not easy, but here's an attempt. The steps are sanding the wood smooth, deciding on the color and applying it, and deciding on the finish and applying it.

## Sanding

Flaws in the wood, such as machine milling marks, scratches, gouges, etc., have to be sanded out before applying a stain or finish, or these flaws will be highlighted. To sand them out, always sand in the direction of the wood grain beginning with a sandpaper grit coarse enough to remove the problems efficiently without creating greater problems. In most cases this means using 80-grit or 100-grit sandpaper. Then sand out coarse-grit scratches with increasingly finer-grit sandpaper up to 150 grit or 180 grit.

Unfortunately, knowing which grit sandpaper to begin with, when it's time to move to the next finer grit, and when the wood is ready to be stained or finished, can be learned only from experience. You can look at the wood in a low-angle, raking light, and even wet the wood with mineral spirits (paint thinner) as an aid to spotting remaining flaws. But even these tricks don't always work.

Keep in mind that if you don't sand the wood well enough and the flaws still show after you've applied the stain or finish, you can always remove the stain or finish at any time using a paint-and-varnish remover (or simply paint thinner for stain alone) and start over. You don't need to remove or sand out all the color from a stain, just the binder — the stuff that makes the stain stick to the wood.

Photos by Al Parrish

*If you're a first-time finisher, try coloring your wood with a gel stain. For the protective top coat, use oil-based polyurethane in a satin finish or use a wiping varnish.*

## Staining

You can see what the wood will look like with only a finish applied by wetting the wood with a liquid, such as paint thinner. If the wetted wood isn't dark enough or the right color, you'll have to use a stain. Unless you are finishing a quality hardwood, such as oak, mahogany or walnut (not cherry, it blotches), you will be safest using a gel stain. Gel stains are thick and very effective at reducing blotching (uneven coloring due to inconsistent densities in the wood).

No matter which stain you use, the method of application is the same. Using any application tool (such as a brush or rag), apply a wet coat and wipe off the excess before it dries. Begin working on smaller surfaces such as legs and drawer fronts to get a feel for the drying time. If the stain dries too hard to wipe off, reliquefy it by applying more stain right away, then remove the excess immediately.

Apply the stain and remove the excess from one or more complete surfaces at a

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*Continued from page 70*

"You can see what the wood will look like with only a finish applied by wetting the wood with a liquid, such as paint thinner."

time. Don't overlap the stain onto a surface that has already been completed or the double application may cause a difference in color.

### Finishing

A finish is necessary to protect the wood from water damage, dirt, stains, etc. You can apply a finish either directly to the wood or over a stain after it has dried. It's always better, that is, more attractive and protective, to use a stain and finish packaged separately than a stain-and-finish combination, which is just a stain with a little more binder in it.

In my opinion, the two best finish choices for a first-timer are oil-based polyurethane in a satin sheen and wiping varnish. Wiping varnish is oil-based varnish or polyurethane thinned about half with paint thinner and usually sold as tung oil. You'll know the product is wiping varnish and not real tung oil if it's labeled "tung oil" and

contains "petroleum distillate." Real tung oil doesn't contain petroleum distillate. Wiping varnish is also sold as Waterlox, Seal-a-Cell, Val-Oil and Profin.

Oil-based polyurethane and wiping varnish are easier to use than water-based finishes, which dry very fast, raise the grain and are difficult to use in combination with stains.

Oil-based polyurethane provides excellent durability with only two or three applications. Wiping varnish goes on with reduced brush marking and fewer dust nibs but requires many more applications to achieve the same durability. Polyurethane is best for surfaces that get a lot of wear. Wiping vanish is best when you want a thinner, more flawless finish.

### Applying Polyurethane

Apply polyurethane using a bristle or foam brush about 2" wide. Foam works well and eliminates the chore of cleaning, because the brushes are cheap and thus disposable.

You can apply the first coat full strength or thinned up to half with paint thinner, making, in effect, a wiping varnish. (Use a separate can or jar.) Thinning leaves less actual finish on the wood so the finish dries hard faster and is thus easier to sand sooner.

Always sand the first coat of finish smooth to the touch after it has cured (usually overnight in a warm room) using 280-grit or finer sandpaper. Remove the dust with a tack rag (a sticky cloth you can buy at paint stores) or a vacuum and apply a second coat full strength. Brush the polyurethane just like brushing paint. If there are bubbles, brush back over the finish lightly to make them pop out. Brush with the grain of the wood when possible.

On flat horizontal surfaces such as tabletops, spread the finish onto the wood working from side to side (with the grain) and front to back. Stretch out the finish as thin as possible. After every 6" to 12" of surface covered from edge to edge, line up the brush strokes. Do this by lightly bringing the brush down onto the surface near one edge in an airplane-like landing and moving the brush across and off the other side. Then do the same back the other way — back and forth until all the brush strokes are lined up and the bubbles almost gone. The remaining bubbles should pop out on their own.

"The trick to reducing problems, such as bubbles, runs and sags, is to work in a reflected natural or artificial light."

Then apply the next 6" to 12" in the same manner, working the finish back into the last inch or so of the previous application. Continue until the surface is covered.

The trick to reducing problems, such as bubbles, runs and sags, is to work in a reflected natural or artificial light. This is the critical instruction that is rarely given. If you move your head so you can see your work in a reflected light while you're brushing, any problem that occurs will become quickly apparent, and the solution will be obvious. In most cases, it is to brush back over the area and stretch the finish out thin.

You should use as clean a brush as possible and work in as clean a room as you can, but there will still be dust nibs when the finish cures. Sand these out between each coat. When the finish looks good — after two or three (maybe four) coats — it's done. Leave the last coat unsanded.

### Applying Wiping Varnish

You can apply wiping varnish exactly like polyurethane by brushing coat after coat onto the wood. Or you can wipe on, and then wipe off, most of the excess. The more excess you leave, the greater the build.

This second method is the easy one, and the way wiping varnish is usually applied. It's an almost foolproof finish when applied in this manner. Again, the trick to achieving good results is to check the finish for flaws in a reflected light as you're applying it. **PW**

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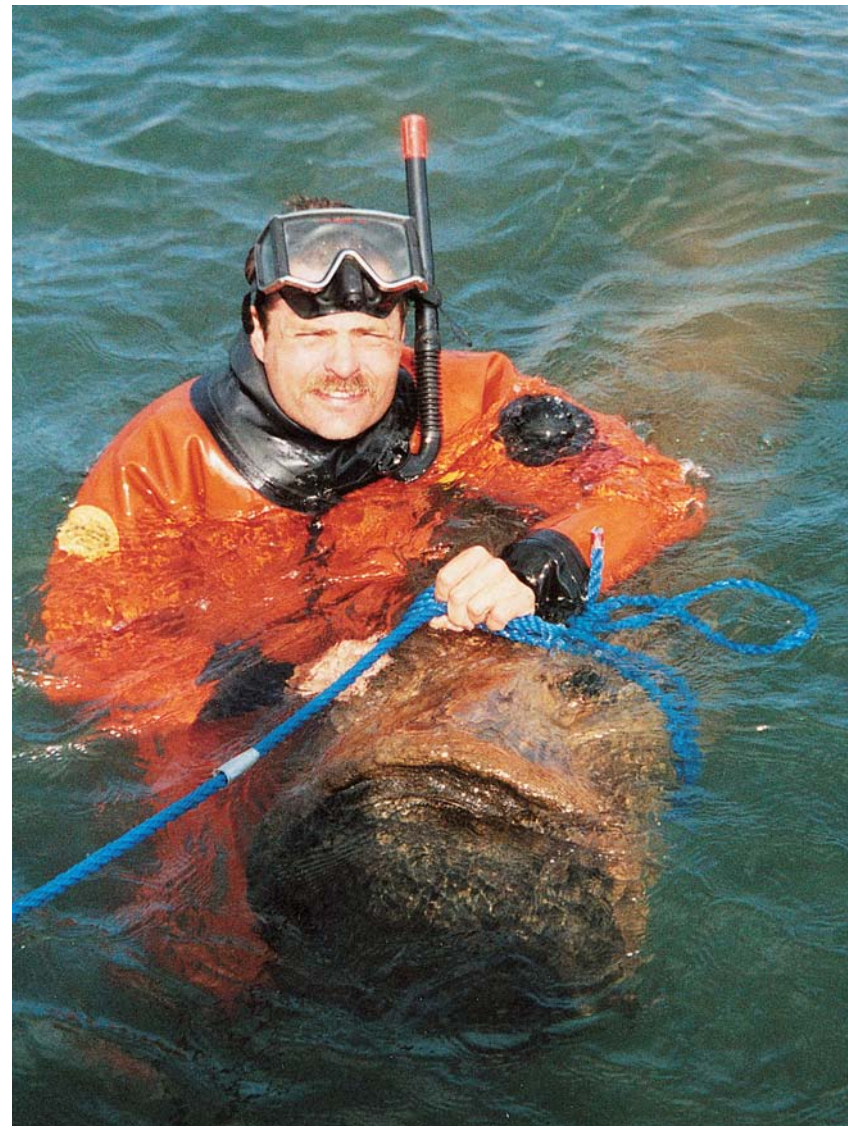
*Bob Flexner is a nationally known finishing expert in Norman, Oklahoma, and the author of "Understanding Wood Finishing."*

# Buying Submerged Lumber

Home woodworkers can now purchase old-growth lumber cut from logs discovered in the watery depths of the Great Lakes.

By Gregory Crofton



*Greg Sveinsson with a log recovered from the Great Lakes. Submerged timber is prized for its tight grain and annular rings.*

In the cold waters of the Great Lakes, treasure hunters and commercial divers considered them a nuisance. Huge logs stuck in the mud, suspended underwater or resting on the bottom were everywhere. But before long, the divers realized what they had once cursed was indeed a sunken treasure of a different kind.

They had discovered logs of red oak, yellow birch, white pine and maple that were lost between the mid-1800s and the early 1900s while the wood was en route to lumber mills. It turns out, the quality of this waterlogged wood was actually enhanced during its long stay underwater because much of the resin had leached out.

Today, sonar equipment, mechanical log loaders and polypropylene rope help to salvage the logs from the water. As this virgin timber is reclaimed from the water, many woodworkers are now able to buy this wood with its tight annular rings (sometimes as many as 77 per inch) and grain structure directly from salvage companies.

"When we bring a log up, it's kind of completing what these guys had started to do over 150 years ago," says Greg Sveinsson, co-owner of Timber Reclamation International, a business in Ashland, Wis. The company, founded in 1998, locates submerged wood, saws it and sells it. "One area in the Great Lakes where a team of horses ... went through the ice with a load of logs ... the skeletal remains of the horse are still there, harness, logs and all."

Hardwoods sink much faster than softwoods, so loggers made rafts out of pine to transport them. But often these rafts would break up going over a waterfall or get caught in a lake storm and the logs would be lost. Even back in the 1800s, hardwood was very valuable. Most of the wood that sank as deep as 20 feet was recovered by loggers with piking poles. They would stab into the water, screw the end of the pole into a log and pull it to the surface.

"(Logs) all weigh more than water," says Chris Pilot, co-owner of TRI. "The only reason they are floating is because they have some air trapped in their cellular structure." Hardwoods such as red oak have a more open cellular structure than softwoods, so they absorb more water and sink much faster.

Log salvagers consider themselves lucky if they find any hardwood underwater, but a good place to start looking is near old mill sites. TRI uses sonar equipment costing $34,000 to pinpoint the location of the logs. The sonar buoy is towed behind a boat and a cable attached to it sends information back to a computer kept on board. "You can actually measure the logs with the computer, so I can tell how long ... and how thick they are," Sveinsson says. Once he locates the wood, he'll swim to it and identify the species.

But TRI doesn't pull the logs out of the water. It only helps other salvagers find the wood. "We prefer not to recover them ourselves," Pilot says. "We prefer to teach peo-

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ple how to do it. The only thing we ask in return is the first opportunity to buy the logs they do bring up."

One of the salvagers TRI works with is Clay Bingley, a 43-year-old resident of Pembroke, Ontario. He runs C.J. Marine Services, a company that has recovered logs for 15 years.

Sveinsson helps locate the logs with sonar, and Bingley sells the hardwood he finds to TRI. "It's no worse than green-wood (to use)," Bingley says. "In some instances it's quite a bit better."

TRI's not the only game in town. Superior Water-Logged Lumber, a competing company founded in 1992, recovers the logs it locates, cuts, dries and sells the wood. Caz Neitzke, the president of company, declined to be interviewed for this story other than to say, "We are the clear-cut leaders in the industry."

*Logs lurking in the lake. Salvagers now see sunken timber as sunken treasure.*

*Salvaged lumber is loaded on a truck where it will be sawn, dried and then sold to woodworkers.*

## Why Waterlogged-Logs?

For woodworkers, the fact that the log was underwater is good. The wood doesn't have the gum content, so it's easier to work with.

Joseph Nagyvary, a professor of biochemistry at Texas A & M in College Station, builds violins, violas and cellos using reclaimed timber. He says that legendary instrument maker Stradivarius often soaked the wood he used for making violins — sometimes for as long as 20 years.

Nagyvary says that when wood is sub-

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## Wood Types

*Continued from page 76*

merged, bacteria eat away at "hemicellulose" and starchy matter in the wood, creating wood ideal for instrument makers.

"It's pretty obvious that you can put a log deep in the water, or in sea water, and it stays healthy for many, many years — easily 100 years," Nagyvary says. "Apparently you extract a number of gooey substances. If you remove them, the wood becomes lighter and drier so it resonates better."

But submerged lumber isn't only for instrument makers. Woodworkers such as Bob Bickel use salvaged timber to make furniture. He owns The Suites, an antique reproduction shop in Houston, Texas.

"The virgin growth gives us a better grain consistency," Bickel says. "In some instances, we get some of the most beautiful grain quality and grain pattern because of the tightness of the grain and growth rings."

In fact, furniture catalogs such as Sundance, which is owned by Robert Redford, are beginning to feature furniture made with submerged lumber. Redford's catalog, and many like it, are promoting the wood as a way to get beautiful furniture using rare wood that is ecologically responsible.

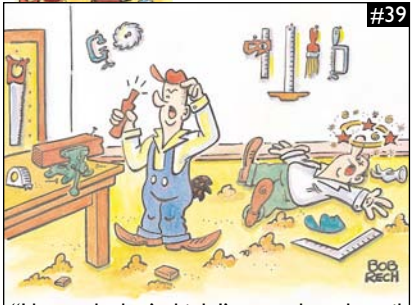
*Here a portable band saw mill cuts into a log of red oak that was on the bottom of a lake for 100 years or more.*

### How to Get Some

The price of TRI's reclaimed virgin timber is about two to three times the cost of regular hardwood. Pilot says prices range as high as $25 for a board foot of highly figured maple to as low as $2.50 for eastern white pine. Superior's sales department can be reached at 715-685-9663, and TRI's can be reached at 715-746-2067. Both companies ship orders as small as a few board feet. **PW**

# Cartoon

Illustrated by Bob Rech
**www.bobrech.com**



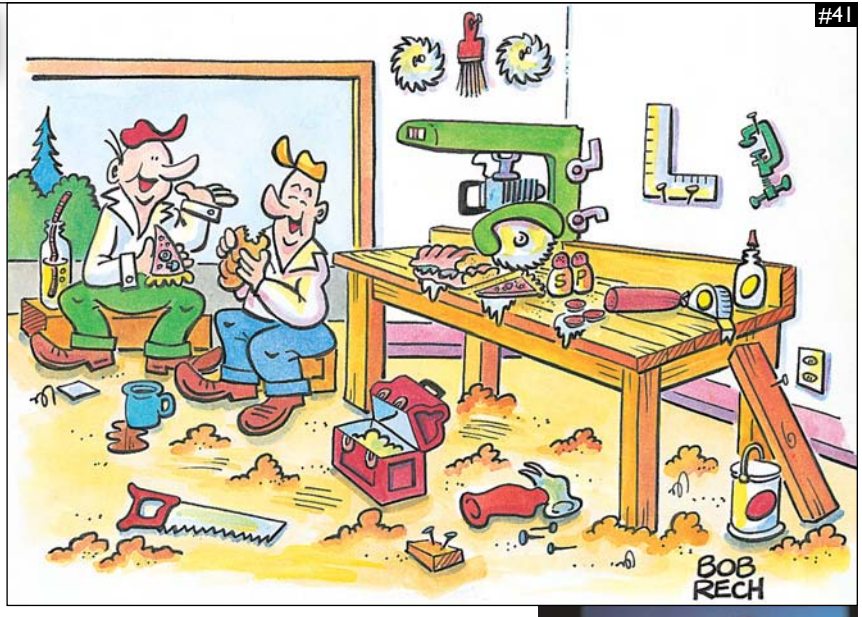

"I honestly don't think I've ever heard a nail scream before."

***Ron Weisenstein,*** from Lucinda, Pennsylvania, is the winner of our Cartoon Contest from the November issue and recipient of the fine set of Quick Grip clamps. The following runners-up each receive a one-year subscription to *Popular Woodworking*:

"That's the last tool I'll buy from the Snap-Off Tool Co."
**F.R. Gibson, Roanoke, Virginia**

"Oops! It looks like the 'loose-handle problem' has finally come to a head."
**Arthur H. Thomson, Perryvale, Alberta**

"Well golly! I don't remember owning an air hammer!"
**Kathy McHaney, McKinney, Texas**




Submit your caption(s) for this issue's cartoon on a postcard to *Popular Woodworking*, Cartoon Caption #41, 1507 Dana Ave., Cincinnati, OH 45207 by Jan. 21. Winners will be chosen by the editorial staff.

The winner will receive a selection of Quick Grip clamps from American Tool Co. Inc. Newly redesigned, these one-handed clamps are a must-have tool. Winners will receive five 12" clamps and five 24" clamps. A $170 value!

The runners-up each win a one-year subscription to *Popular Woodworking*.

Sponsored by AMERICAN TOOL COMPANIES INC.

POPULAR WOODWORKING
FEBRUARY 2000

# Fein Random Orbit Sander

This random orbit sander was the first Fein power tool we ever used. And because we really dislike sanding, we were pleased to make its acquaintance about three years ago. At first glance (at the tool and the price tag) we knew this was a well-made professional tool. What we weren't prepared for was the tool's remarkable performance.

We first saw the MSf 636-1 sander at work on a piece of oak that was still in the rough. We were amazed at how quickly the large board was made ready to finish. We then thought, "OK, it can hog off material. But is it a finesse machine?"

We then handed the operator a piece of walnut with a lacquer finish. He slapped on some micro-mesh sandpaper and polished the lacquer. We were converted.

The Fein sander performs so well because it is part of a sanding system. Designed to be used with one of Fein's shop vacuums, the tool removes 98 percent of the dust created by the aggressive sanding motion, allowing the sandpaper to work only on the wood, not the dust.

In addition, the dust extraction system keeps the sanding discs from clogging, again improving sanding speed and finish. The suction created by the dust extraction actually holds the tool to the work surface, requiring less hand pressure on the tool, reducing operator fatigue.

The MSf 636-1 is a 380-watt right-angle tool, with a 5/16" stroke, providing 7,500 orbits per minute under load. This is the largest stroke and the highest orbits per minute on the market. The 6" sanding discs use hook-and-loop paper. Coupled with the Turbo II dust wet/dry vacuum (model 9-55-13) the tool removes dust as small as 5 microns. The vacuum and sander work together. When you switch on the tool, the vacuum comes on automatically. When you switch off, the vacuum runs for a few seconds then switches off.

The sander itself is not the quietest tool on the market, and the vibration will wear you out if you use it for several hours straight. It also takes some practice to keep the hose out of the way, even though it is one of the most flexible hoses we've ever used.

This is an amazing tool, built to stand up to the rigors of any professional shop. If you hate sanding as much as we do, you'll appreciate this tool. The sander sells for $500, or you can purchase the system with vacuum for $670. This sander isn't for everybody, but if you work with glued-up solid panels, veneered panels or highly figured woods, this tool will pay for itself in time and effort. **PW**

## Results

### Fein Random Orbit Sander

**NICE FEATURES**
- Aggressive
- Virtually dust-free
- Unparalleled finish quality
- Commercial-quality durability
- Well integrated dust "system"
- 16' cord

**RECOMMENDED MODIFICATIONS**
- Improved noise reduction
- Improved tool vibration
- A really great sale

**Fein tools are available from Tool Crib at 800-358-3096. Or call Fein for a dealer near you 800-441-9878.**

## About Our Endurance Tests

**When a new tool hits the market we do our best to tell you what the benefits and pitfalls are with that tool. While this is good information, we know that the question you really want answered is, "How long will the tool last?" That's what this column is for. We regularly pick a tool we've used in our shop for at least a year that has stood up to our regular use. We make sure the tools we've tested here are virtually unchanged from the versions in the store today. So when you see a tool written up in here, it has passed the *Popular Woodworking* Endurance Test. —*David Thiel, senior editor***

# Coffin Confession

You'd think that building coffins would be a profession with steady business. My descent into the industry almost put me six feet under.


In a woodworking magazine last year I saw an ad which I'll paraphrase, "Looking for plans for a coffin. Have you any?" The actual phrasing was not so prim and Cotswoldean. It was more Pennsylvanian. Specifically, "Bensalem-esque." I've got a grand ear for the printed word.

I wrote to the guy and asked, "Why the heck do you want to build a coffin?" He wrote back, and sure enough his response had been shuttled through the Bensalem, Penn., post office. The respondent's name was Irvin. (I knew at once that the writer was an old fellow, otherwise his name would have been "Hunter" or "Branch.") He told me that he made wooden *objets d'art* (this is the only French expression I know, and it means, curiously enough, "objects of art") that he sold in the crafts shop owned by his lady friend, Babs. Irv told me that he and she were kind of up in years (I'm a hard one to surprise), and that Babs had such an affinity for his woodworking that she had asked him to construct a coffin for her, the one she would actually be buried in.

By the time I'd written Irv, some helpful soul had mailed him plans for a simple pine coffin.

When Irv forwarded me a copy of these plans, why, my eyes were filled with dollar signs. I immediately decided to found the McCormick Coffin Co. and to get rich quick by selling modest, inexpensive pine coffins to extremely mortal, chintzy people like me. People who might employ their coffins as blanket chests or bookcases until the Angel of Death reveals his or her or its stale breath and bony finger to them.

I describe myself as "extremely mortal" because I'm sick much too often and am only about four years from being 50, the age when my father died. His mother told me that our line of McCormick men almost always croak in their 50s, and boy oh boy that really sucks a thumb or two.

I also worry a lot about everything, which isn't good. And I smoke like a chimney. And in my middle age, given to various work and life mistrials to date, I am an apprentice bricklayer as well. Most bricklayer apprentices are about 20 and built like tanks. I am a gray-templed old endomorph. The work is so rough sometimes that even my hallowed teacher in Local 1's brickie school steered his sons away from the trade. And the day before last Thanksgiving, what did I do but fall off a 13' scaffold and land flat on my back. I spent a miserable day in a stupid hospital. Extremely mortal, I'm telling you.

Back to coffins.

I built me a prototype, and I made the mistake of telling the kid at the lumberyard what I was making out of the pine I so carefully selected. He asked if I were a mortician, and I noticed he kind of kept his distance.

Ready for my orders to pour in, I placed ads in three newspapers and rented a post office box. For this effort I received but one inquiry, and nary an order. So I gave up. I'm not much of a businessman.

Yet in the basement sits the box I'll probably be buried in, and I like the looks of the thing — even if its detractors call it an "extended cedar chest." It's well made (although with an interior dimension of 6' it's a little tight for me with shoes on) and therefore, by law, no funeral home in the state can refuse to admit it. Ha-ha.

The manila rope handles look especially humble, but unfortunately they're quite adequate. I've been thinking about razoring through them halfway for some prospective funereal fun. Frankly, I'm too staid for such nonsense.

So here's to good long lives for decent people, and to their modest coffins which shall not be underground anytime soon. **PW**

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*John McCormick of Detroit, Mich., recently gave up bricklaying to begin his own concrete business, which we understand is far more successful than his woodworking business. John is a regular contributor of illustrations to this magazine.*