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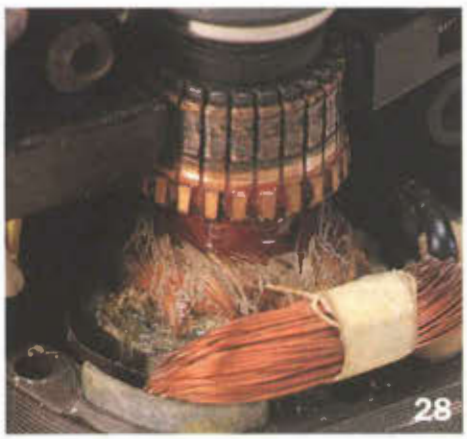

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On the Cover

Cover photo: Al Parrish, Parrish Photography

Senior Editor David Thiel checks out one of the table saws for our 1999 Tool Report. Rather than recommend the one or two models we think are great, our annual Tool Report gives you something more valuable: the knowledge you need to pick out the perfect tool for *your* needs. This year we examine the essential (and not-so-essential) features found on mid-sized table saws, jigsaws, compound miter saws and brad nailers.

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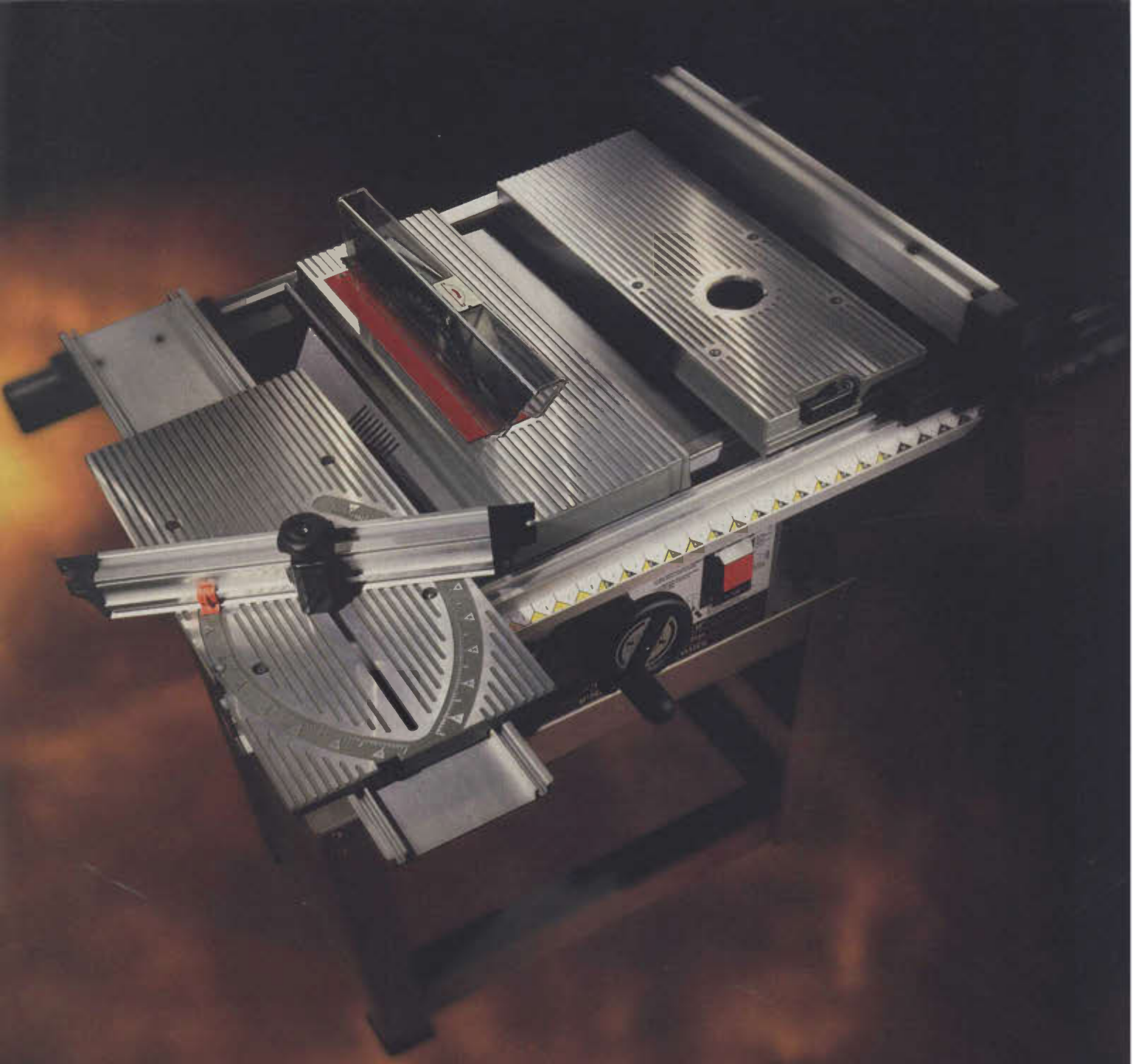

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RYOBI

DESIGN: The *Forgotten* Woodworking Skill

AS WOODWORKERS, we ask a lot of ourselves. And you know, if we had known what we were getting into before we began, we might never have started at all.

Think about it. Armed with only a thin shield of questionable advice, we embark on the craft by spending serious money (enough to buy a used car) on machinery. Then, not really knowing how dangerous an activity woodworking is, we start cutting wood with little, if any, reliable instruction or supervision.

Eventually, we get comfortable using a couple machines, learn some joints and get a project built. Say it's a simple little table. We put a finish on and oops, our nice little table looks awful. All we thought we had to do was rag on a little stain, then slap on some poly finish, just like we see on TV! So now we realize we have to learn to finish wood. So we learn finishing by a lot of trial and painful error.

But now we're cruisin'. We've been down the woodworking road several times and we know the turns, potholes and danger zones. We're feelin' pretty good about our woodworking. Now we're ready to design our own project.

After some futile attempts at drawing, we quickly reconfirm that we never could sketch anything but crude stick figures. Mastering woodworking, even finishing, hasn't helped our drawing ability. So out comes the graph paper and ruler. Soon we're headed back to the shop with a finished drawing and double-checked parts list in hand.

Our hard-won experience pays off. Accurately cut parts lead to an easy assembly. The finish looks great. We step back to admire our work. We yell to our spouse to share our triumph.

It looks pretty good. But somehow, it doesn't look as good in the round as it did in our mind. It looks pretty good. It just doesn't look great. It doesn't even look real good. It's not bad, it's just, well, a bit off. The legs might be a bit too chunky, or not tapered enough. The top is too thick, too thin or hangs over too much, or not enough. The single drawer front looks good, fits good, but the pull is too big, too small or not quite positioned right. Hey, we're not designers, we're woodworkers. So now what do we do?

We can always rely on books, magazines and purchased plans and never build from original designs again. But that is unrealistic.

How do we improve our designs without going back to school? A few are just lucky this way and have a good sense of proportion and scale. For the rest of us not so blessed there is help. Mostly, we need to follow the simple practice of 18th century woodworkers: Copy the great work of others.

The reason the names Chippendale, Hepplewhite and Sheraton became so famous has more to do with their publication of pattern books than their exquisite design and workmanship. Every serious cabinetmaker copied from the books, borrowed stylistic forms, followed proscribed proportions.

We can also study all kinds of woodwork in museums, antique shops, books on old and new furniture. The trick is to carefully study the details. Examine the arrangement of parts, note the placement of hardware. While browsing through books, use an architect's scale to find approximate dimensions from photographs. Because many books on antiques give overall dimensions, you can use these to determine dimensions of parts.

Other ways to help your project's design is to use that architect's scale to draw the project. This shows the balance of the piece, the relationships parts have to one another. Smaller projects can be drawn full scale. If it's an important project, make a full-size model from cardboard and tape.

Consult books on design, become familiar with the application of the Golden Section, a simple system of establishing ratios and proportions that has been used since the ancient Greeks (read Jim Tolpin's book "Measure Twice Cut Once" for an introduction to this stuff).

Achieving great designs is not an easy task. Consider that virtually all manufactured objects go through numerous design prototypes before a final design is put into production. It's rare, if not impossible, to expect perfection on the first effort. So the objective should be to get as close as possible.

Satisfying designs might be harder to achieve than learning woodworking or finishing. Like finishing, it takes real initiative to learn to do it well. But just like finishing, design is one of the three equal components of a successful woodworking project: good design, good workmanship, good finish.

Woodworkers ask a lot of themselves. Design, build, finish, and yes, some engineering. I bet Michelangelo would have made one fine woodworker! **PW**

Steve Shanesy

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LETTERS

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Letters may be edited for publication.
— Steve Shanesy, editor, PW

I Don't Buy Your 'Rules'

Ever since I read your editorial "The Only Rule to Observe" in the November 1998 issue (#105) I just get more ticked off at your kind.

You automatically assume that because a person uses a folding rule, he can't possibly be accurate. However, you "self-appointed" experts would probably never believe that a machinist can use a pair of spring calipers and make a part to within one-thousandth of an inch (1/1000" to you people who lack mechanical skills). The tool you use on the job depends on what needs to be done. While a tape has its virtues, it is also the first tool to be stolen. I like to use both a folding rule and sometimes others, such as a 35-foot tape. I find the larger tape is sometimes easier to handle, it is easier to find when set down and it extends to a longer length without bending (try getting a 12' x 1/2" tape to extend 6 feet without bending). I also carry in my pocket the famous 12' x 1/2" rule. But because you are harping on unnecessary accuracy, there is nothing more accurate than a machinist's steel rule, some of which can measure to .010" with nothing more than your eye.

Robert Reemsnyder
Fayetteville, Tennessee

Small Tape Measures Rule!

Just a quick note to let you know that I couldn't agree with you more about tape measures. I have a couple of 25- and 30-footers that stay in my carpentry belt. But in my shop apron I have two of the Stanley Leverlock 12' tapes. (I need two because I lose them even in my own shop.) As far as I am concerned, this is the greatest rule!

Alex Savakinas
Attleboro, Massachusetts

Don't Be So Precise

When I read the "Out on a Limb" column in the November 1998 issue, I laughed out loud. I could not believe that Steve Shanesy would write such a commentary chastising his co-workers. The reason that his tape measure was damaged was because he failed to take proper care of it. Had he returned it to his tool box, it probably would still be as good as new.

As for the young apprentices who had to endure his "two-point test," both people would have been better served if they had been asked to make a small project instead of his senseless tape measure check. This is the exact attitude that deters young people from this hobby. I would bet that not many of your readers have a 12-foot tape with 1/32" divisions on the first 12". Woodworking does not have to be this precise if you know how to use basic hand tools. Some advice to those beginners: take the money saved by purchasing a regular tape and put it towards a good quality plane or chisel set.

By looking at Mr. Shanesy's tape, I would guess that he does little woodworking because tools don't wear if they are not used. One question for Mr. Shanesy. Are you a woodworker or machinist? Me? I do have a folding rule as well as a 25-foot tape and an assortment of precise steel rulers for those times when precision measurements are necessary.

Joe Gatesman
Columbus, Ohio

Editor's note: Whoa! Talk about touching a nerve. It was like a steel tape measure landing on a bare 220-volt live wire. I guess this is one reason to favor the folding wood rule — reduced chance of electrocution.

Most of the flak I received about my column took me to task for something I wasn't trying to say, which is that a steel tape is sufficient for all woodworking measuring jobs. Of course it isn't. I use steel machinist rules, especially for layout jobs, and I rely on a dial caliper for precision measurements on critical, smaller objects. The point I wanted to make, and must not have made clearly enough, is the superiority of the steel tape over the folding wood rule as the measuring device for general use. It is the one to keep on your bench or in your shop apron. And for those who don't think woodworking requires precision to within 1/32", I suggest you try slipping a tenon into a mortise that's 1/32" too small, just to name one of dozens of other examples I could cite. But hey, if you want to cut parts or joints a couple times in order to get them to fit, go ahead. Personally, I'd rather get it right the first time and move on to the next project. — *Steve Shanesy*

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. Think ahead. Safety First!

Continued on page 11

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Scrollsaw Advice From a Master

I received the November 1998 issue today and there are some projects I like really well. One of them is the Angel-Face Ornament. When I saw this I thought about our four grandchildren. After reading the instructions I felt I should write to you about scrollsawing. You should never use spray adhesive when stacking pieces. Also, never cut the outside first, always do the inside cuts first. If you use adhesive, you sometimes might use a little too much and then break them when taking the pieces apart. This goes also for Baltic Birch.

This Angel ornament is a fretwork project. You take the three to five pieces and glue the pattern on the top one. Never use glue on the wood — only on the back of the pattern. Then you can use an air-powered brad nailer, carpet tape or you can put tape around the pieces. (The best way is to use the brad nailer.)

Mike Moorlach
Brandon, South Dakota

Editor's note: Moorlach produces some of the most amazing scrollsaw work we've seen. Mike, we stand corrected. Thanks.

More Christmas Plans, Please

I have to say I am very disappointed in the November 1998 issue. I thought it would be full of plans for toys and gifts for Christmas. I also was expecting a number of projects that could have been made to sell at Christmas bazaars.

Only two projects appeal to me: the antiqued table hutch and the Arts and Crafts magazine stand. I know it must be hard to come up with good projects, but after all, the projects are the reason we woodworkers purchase and read your magazine.

Don Ransom
Portland, Oregon

Editor's note: We always try to keep our readers happy, but we don't always succeed. The November issue wasn't all Christmas projects, but we did feature plans for five ornaments, two stocking hangers and a Santa pachinko chimney. We'll try harder next year.

Continued on page 14

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Woodworker's Journal, January/February 1998

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LETTERS

Continued from page 11

A Garden Arbor Fit for a Supermodel

Well my "Garden Arbor Bench" (July 1998 #103) is finished! I chose to work with SBS cedar, so the cost to complete, including the finish, came close to $260. This was my first "for real" carpentry project. I have done plenty of rough carpentry, such as framing, but this is the first time I have tackled a project that can't be covered up with drywall or siding. Being a real amateur, I have a limited supply of tools. They include a hammer, hand saw, Skil saw, electric drill, level, framing square, pipe clamp and a borrowed belt sander. With these tools I successfully built the Arbor Bench and, according to the neighbors, it's beautiful.

Some additional tips for other first-time builders: although the article and dimensional drawings call for 1½" x 1½" grid pieces, the nominal 2 x 2s at the lumber store are really 1⅜" at best and cutting the notch on the 1½" line results in a ⅛" or better gap. So next time I'll remember that 1½" really means 1⅜" and to cut inside the line to keep a tight fit. Also, to improve the design, I would have given the roof trusses an overhang and a 45-degree angle on both the front and back. The flush end at the rear of the truss really needs an overhang to give it a finished look.

With the diagram and the pictures that accompany the article this project can be done over a couple of weekends. I am delighted with the result and look forward to the next project I take on with the help of your publication.

Richard Groonwald
Apple Valley, Minnesota

Editor's note: The arbor bench looks great, Richard. We also wanted to point out a couple corrections to the Schedule of Materials for those of you who are tackling this project. Parts "F" and "H" should be 1½" thick. And part "I" should be 16½" long, not 6½".

Keep the Poly Glue Next to the Ice Cream

Thank you for the article concerning various glues and glue manufacturers. I recently had some problem with the "Excel" brand polyurethane wood glue. The problem was that the glue in the container soon "cured," and I could not get more glue out of the container.

I called the AmBel Corporation (the distributors of Excel). AmBel was most cooperative and suggested that I keep the glue in the freezer. I did this and since then have had no problem. I take it out of the freezer when needed. It flows immediately. I apply what is needed and then replace it in the freezer. This process has certainly improved my enjoyment of using this amazing glue product. Thank you for your continued fine publishing and editing. **PW**

Ordean Grant
Alma, Wisconsin

Editor's note: In our shop we store it upside down so any glue that cures will be at the bottom of the bottle. Franklin International has just begun packaging its poly glue in a bottle that stores upside down. See our "Tool Test" column for more details. —Christopher Schwarz,

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It's simple, inexpensive, and easy with professional production quality MLCS carbide tipped door sets! Our reversible combination bit makes a matching rail and stile frame. The panel raising bit with ball bearing guide makes a perfect raised panel every time!

Includes Instructions and Professional Tips!

*Raised Panel Router Bit

*Reversible Combination Rail & Stile Bit
Works with stock from 11/16" to 7/8".

Raised Panel Door Sets *Ball bearing included

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#1302	1/2" Shank Router	* 3-1/2"	$79.95
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Raised Panel Door Instructional Video
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1/4" Shank Carbide Tipped Router Bits

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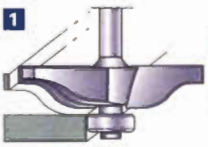

1 OGEE RAISED PANEL
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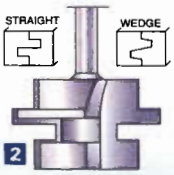
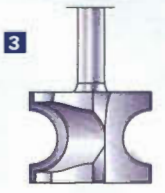


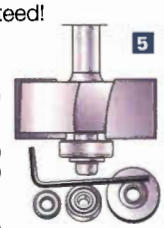
2 TONGUE AND GROOVE
#1333 Straight.....$29.00
#1335 Wedge $29.00

3 BULL NOSE
#1330 1/2" Dia. of Circle.....$16.00
#1331 3/4" Dia. of Circle.....$21.00



4 LOCK MITRE BIT
#1433
2" Dia.,Stock thickness: 1/2"-3/4"..$37.50

5 RABBETING KIT
4 depth of cuts: 3/8", 7/16", 5/16", 1/4". Set: 1/4" shank rabbeting bit, 4 bearings (3/8", 1/2", 5/8", 3/4") & hex key.
#1425 1-1/4" Large Diameter..$25.00



6 BRASS PILOTED
Rout into tight spaces and sharp corners. These bits have Brass Pilots, measuring only 5/32" in dia., instead of usual 1/2" bearing.
#1428 1/8" R Round Over.....$16.00
#1429 1/4" R Round Over.....$17.00
#1430 3/8" R Round Over.....$19.00

7 SOLID CARBIDE UPCUT AND DOWNCUT SET
2 flute flat bottom cutters. Upcut spiral ideal for mortise and tenon joints. Downcut will plunge cut and plane edges.
#1437 1/4" dia., 3/4" cutting length
Special Set Price $19.95

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MERLE ADJUSTABLE CORNER CLAMP*

- Adjustable, uniform clamping pressure on all corners • Great for wide cabinet frames (for center or edges)
- Forces a frame into perfect square
- Almost NO capacity limitation, ships with **23 ft. reel of steel banding !**
- Aluminum & Steel construction

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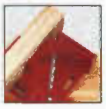
REG. $39.95 .....Sale $24.95

The Can-Do Clamp



- **Join picture and cabinet frames**
- **Clamps to 2-34" wide**
- **Easy Mounting • Use as bench vise**

Sturdy aluminum clamp is great for framing, drilling, doweling, and more.
- High clamping pressure
- Movable jaws • Two swivel points

ITEM #1367 REG. $29.95 .....Sale $24.95

16 Piece Forstner Bit Set

High Quality Steel - ground for heavy use

This set comes with the following sizes: 1/4", 3/8", 1/2", 5/8", 3/4", 7/8", 1", 1-1/8", 1-1/4", 1-3/8", 1-1/2", 1-5/8", 1-3/4", 1-7/8", 2", 2-1/8".

ITEM #1418 REG. $141.20 .....Sale $43.95

Round Over/Beading Bit Set

1/4" shank, Carbide Tipped, 4 Round Over Bits with 1/2" OD bearing: (1/8", 1/4", 3/8", 1/2"), plus 3/8"OD bearing & allen wrench.

ITEM #1434
$72 Individually.....Sale $39.95

Biscuit Joining Set

5/32" Slot Cutter-1/4" Shank and 250 #20 Biscuits

Instruction sheet included.

ITEM #1385
REG. $35.00.....Sale $29.95

Solid Brass Router Inlay Kit

Makes perfect fitting recesses and inlays!

Easy to use inlay kit follows a 1/4" thick pattern template of almost any shape to produce the recess. Fits Porter Cable, Black & Decker or any router with an adaptor for Porter Cable bushings. Kit includes 1/8" solid carbide downcut spiral bit, brass bushing, brass template guide, brass retainer nut & instructions.

ITEM #1426 REG. $35.95 .....Sale $21.95

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TOOL TEST

We get to 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 tool tests with you and offer insights to help with your shopping decisions. The ratings shown reflect the opinion of the *Popular Woodworking* editorial staff.

Here's a quick reference on our rating system. **PERFORMANCE:** A rating of "five" indicates we think this tool is a leader in its category — for now. (You won't likely see 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 specific tool — whether it has been reviewed or not — 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. Check it out.

— David Thiel, senior editor

Performance: ●●●●○
Value: ●●◐○○

Craftsman Redi-Drill: Five Tools In One

When Craftsman showed this unorthodox cordless drill to woodworking magazine editors in 1998, there were actually a couple of chuckles in the room. But if you've ever been on a ladder and need both a 3/16" drill bit and a Phillips bit, you know that carrying two drills isn't convenient. And Murphy's Law says you will certainly drop a bit if you try to change them out in one drill. So Craftsman put the option of five bits on one drill. Open the 3/8" keyless chuck, rotate the bit you need into place on the barrel, slide the actuator home and tighten the chuck. You're ready to go.

Features include the magnetic-tipped actuator to hold the bit in place, a magnified sight window to see which bit is selected, a 12v motor with variable speeds of 0-600 rpms with a torque-adjusting clutch, and a two-position drilling setting to keep the clutch from slipping. Also, a soft-start feature protects screw heads from stripping. The drill comes with two batteries, a one-hour charger, three screwdriver bits, two drill bits and a plastic case.

At $160 it's competitively priced with other 12v cordless drills that don't offer the clever versatility. It's a little heavy, and feels pretty massive in your hand, but then so does a Swiss army knife, and I still own one.

For more information, circle #193 on the Resource Directory Coupon.

Performance: ●●●●◐
Value: ●●●●○

Bosch Compact Drill/Drivers Right Size ... Right Price

Bosch has offered reliable cordless drill/drivers for years now, but they've recently added two excellent drills to their line that deserve a place on your bench. Both are more compact and lightweight than previous models but keep the performance and endurance of Bosch's larger models.

The 9.6v 3105K ($115) offers a variable-speed ratio of 0-300/0-980 rpms, weighs only 3.1 pounds and delivers 175 inch-pounds of torque. The 12v 3305K ($135) offers a variable-speed ratio of 0-400/0-1200 rpms, weighs only 3.4 pounds and delivers 200 inch-pounds of torque. Both models have a 3/8" single-sleeve keyless chuck, two 1.4 amp-hour batteries, a one-hour charger and plastic case.

The weight, balance and performance of these tools make them perfect for use on all woodshop construction and assembly projects. If it's sitting on your workbench you'll use it all the time, and you'll wish there were two of them so you wouldn't have to change bits. Hmmm. Perhaps the 12v and 9.6v make a great benchtop pair.

For more information, circle #194 on the Resource Directory Coupon.

Finishing Dyes For Use in Water, Alcohol or as a Top-Coat Tint

Performance: ●●●●○
Value: ●●●○○

From the Homestead workshop of finishing expert Jeff Jewitt comes a dye-stain that has a wide range of uses and is simple to use.

TransTint™ concentrated dyes are lightfast metalized dyes in a solvent that allows them to be mixed in water (for non-flammable and environment-friendly use) or in alcohol and other organic solvents for a fast-drying, non-grain-raising stain. TransTint dyes also can be added directly to water- or solvent-based finishes for use as a tinting agent. We found the dyes easy to use and very forgiving for streaking and blotching. Intermixing colors offers an even wider choice of finishes.

Available in 14 intermixable colors (seven wood tones and seven primary color accent tones) each 2 oz. bottle ($15) yields 2 quarts of dye solution. TransTints are available from Woodcraft Supply 800-225-1153.

For more information, circle #195 on the Resource Directory Coupon.

Buck's Mini-Multi Tool

Performance: ●●●●○
Value: ●●○○○

It's a well-known fact that woodworkers and toys — er tools — share a somewhat emotional bond that sometimes defies logic. Well, this tool was made for us. Multi-tools have been around for a few years, and Buck's version has been one of the better and more popular designs. The MiniBuck™ takes the performance and fun and shrinks it down to keychain size.

Packed into the 2½"-long 1.5-ounce tool are needlenose pliers, scissors (that work), a knife, a bottle opener/slotted screwdriver, a Phillips screwdriver, nail file and nice tweezers. The tools stay in the open position while in use, and Buck's smooth handle design keeps the tools on the inside of the handle (so you can easily grip the handle). At $39 it might be a little pricey — and not as useful as a full-size multi-tool — but it's really cool.

For more information, circle #196 on the Resource Directory Coupon.

Accuset Micro Pinner: Size Does Matter

There are times when the convenience of air fasteners just doesn't make up for the fact that you've got a lot of large nail holes to putty on your project. With Accuset's new Micro Pinner (A100MP), that hole is smaller than a freckle. Great for many smaller and delicate projects, the A100MP fires 23-gauge headless pins in ½", ⅝", ¾" and 1" lengths. Weighing in at 2.4 lbs., this lightweight and small pinner will also get into hard-to-reach spots for precision fastening.

Performance: ●●●●●
Value: ●●●○○

At $135, the A100MP includes a plastic case, quick-disconnect fitting, lubricant, safety glasses and a fastener rebate coupon so that you can select the size fasteners you prefer. It also includes a two-year warranty for non-commercial use and one year for commercial applications. **PW**

For more information, circle #197 on the Resource Directory Coupon.

TOOL SCOOP

DeWalt/Pro-Tech Spar in Court

The Black & Decker Corp. (the parent company of DeWalt Tools) recently announced it had won a $1.7 million trademark infringement suit against Pro-Tech Power Inc. The court statement reads, "the overwhelming evidence leads the court to conclude that Pro-Tech intentionally and deliberately copied the yellow and black color scheme of the DeWalt line." The court halted all further sales of Pro-Tech yellow and black power tools, effective November 1998. Jim Lancaster, general manager for Pro-Tech Power Inc. said, "We are disappointed in the court's response. We have a temporary stay on the injunction, and we will be appealing the decision."

A New Life for Unloved Tools

Looking for a used tool deal? ReTool™, the first retail chain to specialize in buying, selling and trading pre-owned tools, is headed for your neighborhood. Quality used woodworking tools are sold at half their original price; reconditioned tools are sold at very competitive rates. With stores in Detroit and Minneapolis already open, ReTool, (a national franchise of Grow Biz International Inc.), has plans for 45 stores by the end of 1999 and ultimately has plans for 500 stores nationwide. Other franchises owned by Grow Biz include Play It Again Sports® and Once Upon A Child®. If you would like information about franchise opportunities with ReTool, call 800-269-4075.

Packaged To Move

Repackaging an existing product isn't always exciting news, but this redesign deserves some attention. Franklin International, makers of Titebond glues, has reworked the cap on all of their 4 oz., 8 oz., 16 oz. and quart bottles of glues. The new applicator tip is a pull-open, push-close design that reduces dripping, keeps the tip clear between uses and provides better shelf-life for the product. Also, Franklin has addressed a problem with all polyurethane glues — reduced shelf life due to air contamination. Their new polyurethane bottle stores upside down on a flat cap to keep any "thickening" glue away from the applicator. Thanks Franklin! PW

GET MORE

Detail sander, power scraper and oscillating saw all in one tool.

GET MORE

The new MultiMaster is three tools in one: detail sander, scraper and flush-cut saw.

Detail Sander

The MultiMaster's patented oscillating motion and special triangle sanding pad permit aggressive sanding along delicate edges and in tight corners.

Flush Cut Saw Blade

Smoothly undercuts door jambs for floor coverings. Plunge cuts into wall board. Cuts wood, plaster and PVC. But because it oscillates, it won't cut you.

Rigid Scraper

Easily removes old putty, caulking and flooring adhesives. Great for scraping paint and varnish or lifting linoleum.

Oscillation

Only the MultiMaster oscillates at a rate of 21,000 strokes per minute in a 3.2 degree arc.

OPTIONAL ACCESSORIES

Get even more. The optional Professional Kit includes a carbide rasp, a grout-cutting saw blade, and a segment knife.

Carbide Rasp

Quickly grinds paint, mastic, stone and concrete. Won't load up.

Grout-Cutting Saw

Blade cuts grout to remove damaged tile without breaking surrounding tiles or creating excessive dust.

Segment Knife

Easily slices rigid materials like floor tiles, linoleum, carpet, plastic and leather.

DO MORE

Scrape. Sand. Saw.

SPEND LESS

The new MultiMaster. Best pricing ever.

Until now, a Fein detail sander plus scraper and flush-cut saw would have cost you over $300. Now, while supplies last, the MultiMaster package includes all of these accessories, and the price is under $200*. It's the best Fein value ever. Want a MultiMaster now? Simply call for immediate delivery from a participating Fein dealer near you. To learn more about the MultiMaster, ask for our free brochure and poster.

The Fein MultiMaster is a true multi-purpose tool that saves hours of time. With the MultiMaster, finishing is just the beginning.

Finishing is just the beginning.

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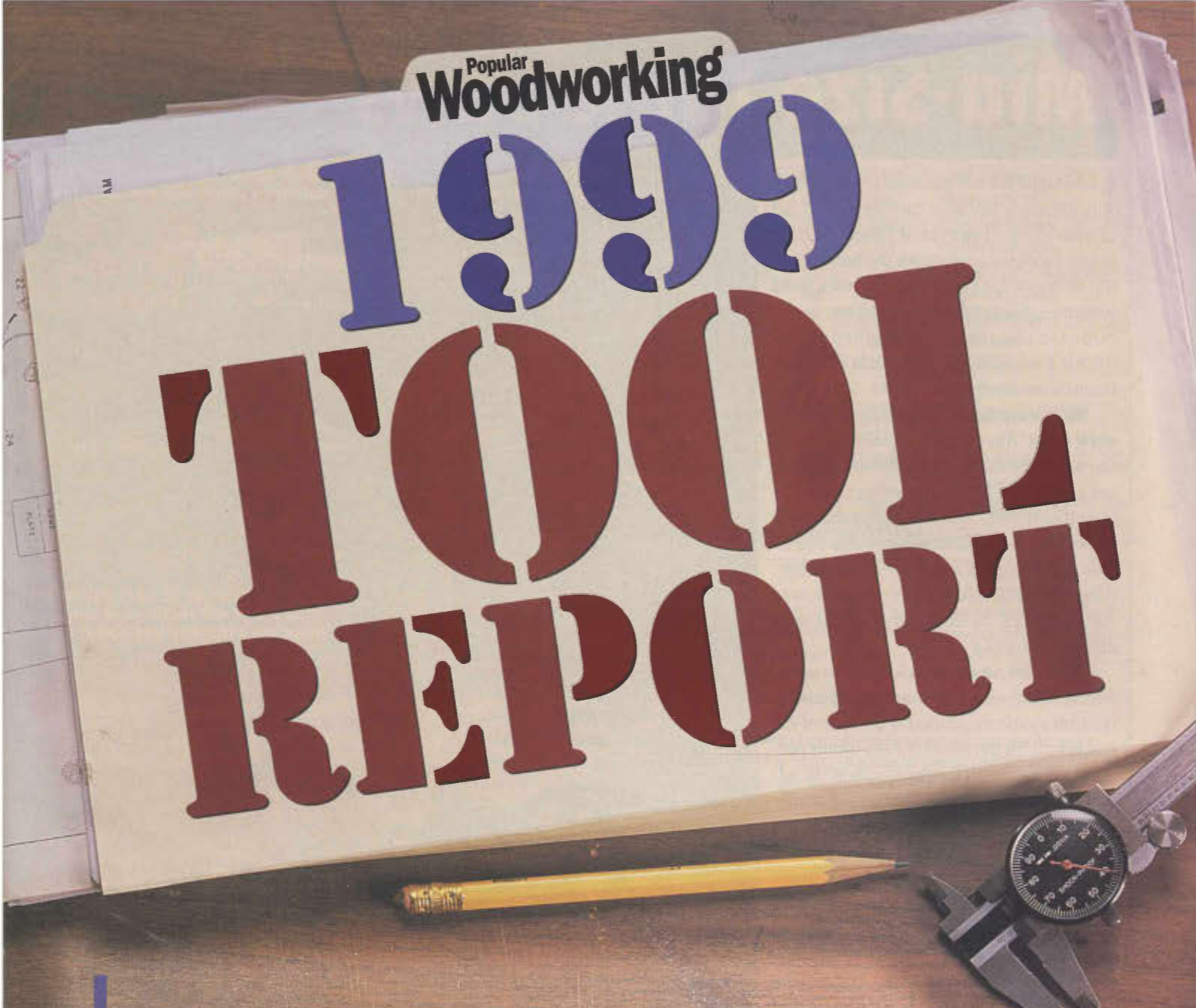
Popular Woodworking

1999 TOOL REPORT



I RECENTLY OVERHEARD a conversation in the tool section of a home supply store. A customer wanted to buy a jigsaw and asked the salesman what he would recommend. The salesman turned the question back on the customer and asked him what he was looking for in a jigsaw. The customer replied, "I don't know, maybe one of those yellow ones."

I bit my tongue and walked away.

It wasn't that the tool he bought was a bad one, it was that his choice was being made without any attention to what he needed. Tools are expensive, and their purchase is something that should be done with thought and research. That's why we devote space each March to educate our readers about a few tool categories and provide an overview of what features are important (or superfluous) and give you a checklist for shopping.

This issue we've focused on what we call mid-size table saws (contractor saws in the retail terminology), jigsaws, compound miter saws and pneumatic brad nailers. The charts give a quick reference to important information about the tools and the prices listed are retail or "street" values. Where appropriate we've included a high and low price according to the range of prices we've found by combing the Internet, stores and catalogs. If only one price is given it indicates the tool is available only through one source (such as a Craftsman tools from Sears) or is brand new.

We haven't ranked the tools by performance or preference because what we think is the best tool for us, may not be the best tool for you. Each woodworker has different needs and uses for tools. While we might prefer a tool because of its outstanding performance, the price for that performance might be more than you can afford — or need. We've also indicated if a tool is new to the market, or if it offers an unusual feature. Most importantly, we've told you what are the critical features of a tool so you'll know what to pay attention to and what to ignore.

If you have a question about a particular tool beyond what we've discussed here, or if it's a tool we didn't cover, feel free to contact me and I'll be happy to answer your questions. I'm at 513-531-2690 ext. 255, or you can e-mail me at DavidT@FWPubs.com. **PW**

—David Thiel, PW staff

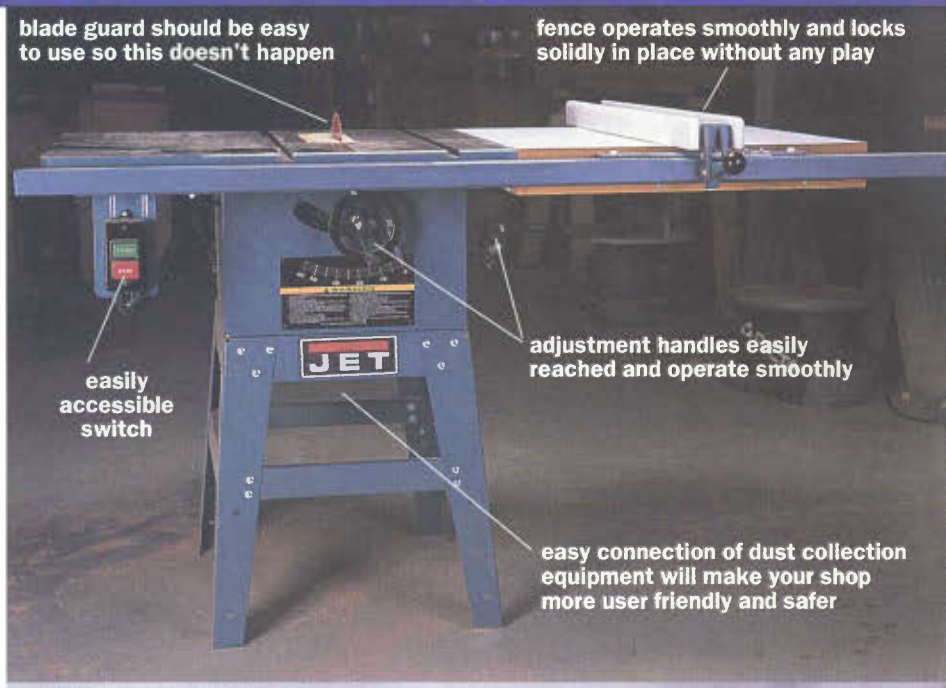
Mid-Size Table Saws

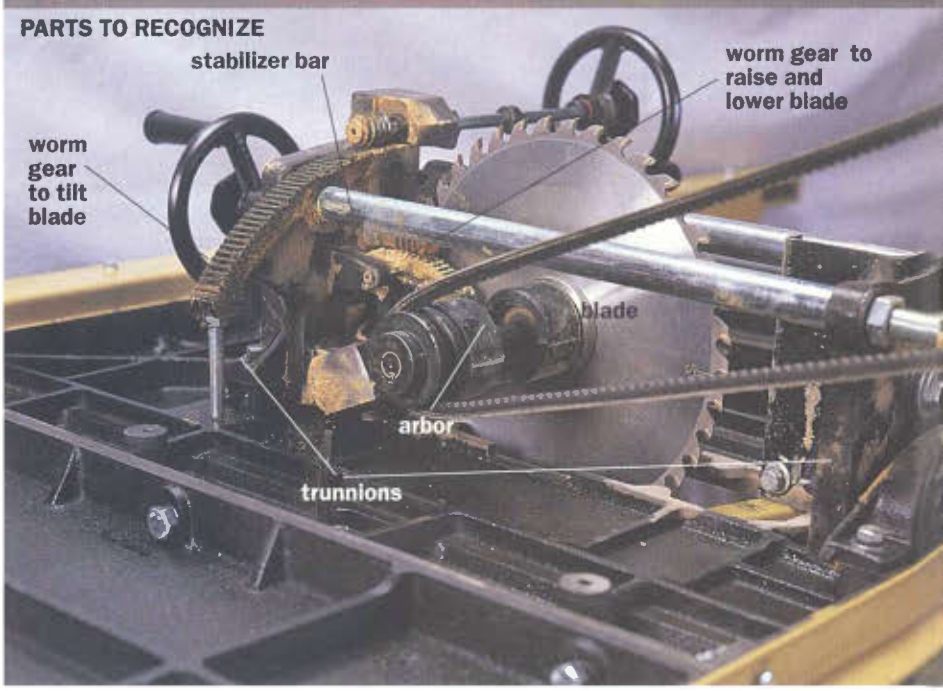
IF MONEY were no object, you'd likely choose a full-size cabinet saw to put in your shop. However, if money is tight you're probably looking for the best benchtop table saw for the money. Between these extremes there is a happy medium — the mid-size saw (commonly called a contractor's saw). First let's look at what differentiates the three saws.

Benchtop saws are usually sold without a stand, run off a universal motor, and the beveling mechanism for the blade is not geared and frequently swings free during adjustment. These features make for a very portable, affordable saw able to provide good torque for short periods of time. (See "What You Absolutely Must Know About Motors" for an in-depth look at what drives our tools.)

Mid-size saws are sold with an open-frame stand and are powered by an induction motor suspended at the rear of the machine with the weight of the motor providing the tension for the saw belt. In addition, in mid-size saws the interior mechanism is suspended from the top on cast trunnions, with the beveling mechanism operated by a worm gear and rack that's often mounted on the front trunnion. These features make for a more stable machine that can run for longer periods of time and offers more precise beveling. These saws are often sold with better rip fences that are more precise and longer.

Cabinet saws offer an enclosed stand design for improved dust collection and increased stability. They operate off larger induction motors and the internal workings are mounted to the cabinet rather than suspended from the top. This reduces vibration and allows the motor to be fixed in place with a set amount of belt tension to the blade.





Getting back to the happy medium, many mid-size table saws available today offer cabinet saw features and benefits for about half the price. While not as inexpensive as a benchtop saw, they're worth serious consideration.

Features

Some features to look for when shopping for a mid-size table saw include horsepower (more specifically, amps and motor quality), type of extension wings, (stamped steel, open-design cast-iron wings or solid cast-iron wings), type of fence, the direction of blade tilt, and the ease of dust collection.

Other features include how convenient the controls and safety features are to operate and the general fit and finish of a machine. But let's start with a more concrete shopping point — price.

Price

Mid-size saws range in price between $450 and $799. We didn't include every table saw (or variation of table saw depending on accessories) in our chart. We have tried to include a mid-size model (or two) from each manufacturer. The major price

MID-SIZE TABLE SAWS

Manufacturer/ Model	Street Price	Max. Cut Height/Rip width	Table Size	Wing Design	HP/Amps	Dust Port	Weight	Comments
Grizzly G1022Z	$449	3⅛"/24"	40⅝" x 27⅛"	Cast/open	1½/16	Opt	270	Micro-adjustable fence
Tradesman 8000T	$530/449	3¼"/24"	40½" x 27"	Cast/open	1½/14	N	262	Comes with four casters
Ridgid TS2412 (N)	$469	3⅜"/24"	44" x 27"	Stamped	1½/13	Opt	217	T-square fence
Craftsman 22831 (N)	$499	3⅜"/24"	44" x 27"	Stamped	1½/13	Opt	205	Align-A-Rip 2412
Jet WTS-10JF	$590/499	3⅛"/30"	40" x 27"	Stamped	1½/15	Y	260	T-Square fence
Star S3205	$575	3"/36"	40" x 27"	Cast/solid	2/24	Y	350	Freud LU82 blade
Delta 36-444	$599/579	3⅛"/30"	40" x 27"	Stamped	1½/12.8	Y	223	UniRip T-Square fence
Craftsman 22841 (N)	$599	3⅜"/24"	44" x 27"	Cast/open	1½/13	Opt	242	Align-A-Rip 2424
Grizzly G1022ZF	$599	3"/25"	40⅝" x 27⅛"	Cast/open	1½/18	Y	285	Shop Fox fence
Ridgid TS2424 (N)	$649	3⅜"/24"	44" x 27"	Cast/open	1½/13	Opt	217	Mobile base
Bridgewood TSC-10C	$685	3¼"/26"	40" x 27"	Cast/open	1½/16	Y	242	Vega fence
Grizzly G1022ZFX	$699	3"/25"	40½" x 27⅛"	Cast/open	2/20	Y	290	Shop Fox fence
Jet JWTS-10CW-PF	$769/729	3⅛"/30"	30" x 27"	Cast/solid	1½/18	Y	324	X-Acta fence w/table
Powermatic 64A (N)*	$799/749	3⅛"/30"	40" x 27"	Cast/solid	1½/18	Y	320	Left Tilt / T-Square fence
Craftsman 22851 (N)	$799	3⅜"/30"	44" x 27"	Cast/solid	1½/13	Y	332	Align-A-Rip XRC
Delta 36-460	$780	3⅛"/29"	40" x 27"	Stamped	1½/12.8	Opt	267	Biesemeyer fence
Delta 36-465 (N)	$780	3⅛"/29"	40" x 27"	Stamped	2/12.8	N	202	30" Unifence

*This tool was chosen by the *Popular Woodworking* staff as one of the Best New Tools of 1998 in the January 1999 issue. (N)=new tool

jump from one end of the spectrum to the other is frequently a result of adding cast iron extension wings and/or the addition of a precision T-square style rip fence. You know how much you're willing to spend. If what you want seems out of your price reach, I'd consider losing the benefit of cast extension wings before I'd lose the benefit of an upgraded rip fence.

Horsepower

The average mid-size table saw will most likely have a 1½ hp motor; some offer a 2 hp. A typical cabinet saw will have a 3 hp or 5 hp motor. Don't sell the smaller motor short. You can do a lot of cutting with a quality 1½ hp motor, but if you still think it's not enough, consider a thin-kerf blade before trading up to a cabinet saw.

Also, you should be aware that all motors aren't created equally. Check out "What You Absolutely Must Know About Motors" for a closer look at how to evaluate a motor.

Fences

The rip fence on your saw can make or break the precision of your work. If the fence can't be set parallel and perpendicular to the table, it will hurt your work. If the fence moves or flexes when locked in place, your cut will be inaccurate and it can even prove dangerous. Precision fence designs vary in that some lock only on a front rail, while others lock to both front and back rails. If you will be adding an outfeed table to the back of the saw, a rear-mounting fence will prove inconvenient. The fence itself will vary greatly from manufacturer to manufacturer, and you'll have to determine what you prefer. Read the "Store Testing" section for some tips on recognizing a good fence while you're in the store.

Controls and Safety Features

While most people think of the blade guard and a push stick as the safety features on a saw, the ease of using the controls can be very important to safety as well. If the controls are awkwardly located so your attention is drawn away from the blade it can be dangerous. Also, while the blade guard is an obvious and important safety feature, many woodworkers complain that the guard is in the way and remove it. By choosing a saw with a better guard design you are much more likely to use it.

Fit and Finish

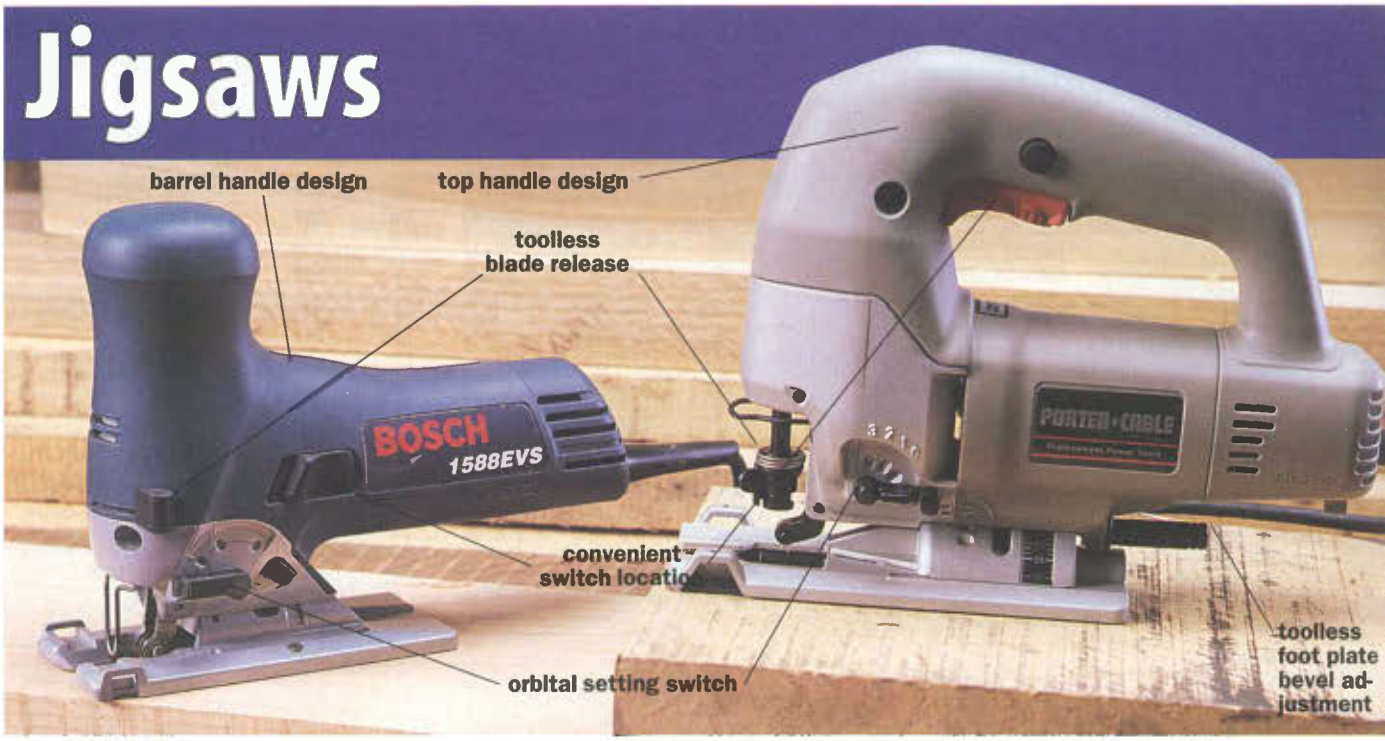
Much more than just a pretty face, fit and finish on a machine are indicators of the care and attention to detail used to manufacture the tool. That said, some of our favorite table saws don't always live up to our expectations in fit and finish. Look at the fit of the miter gauge, check for sharp edges that can mar wood. Less than perfect paint may be a cost saving measure, but it shouldn't scratch easily and it should preferably look like an even smooth coat. Bottom line, fit and finish may be more important to your emotions than to the function of the machine. Weigh it in perspective.

Store Testing

After you've narrowed your selection to one or two models, take a look at them in the flesh (or steel). Unfortunately about 90 percent of the time you won't have a chance to turn the machine on in the store. This doesn't mean you can't get a feel for the value. Answer these questions and you'll be well on your way:

- Does the blade adjust flush to the table or below?
- Are the controls easy to reach?
- Do the blade elevation and beveling controls move easily, or do you bang your wrist every time you adjust the blade height? Are they of a size so motion isn't wasted?
- How does the blade guard operate? Can you see the blade with the guard in place? Does it remove and replace easily so that you will use it?
- How does the fence operate? Does it lock in place smoothly and positively? Once locked can you push on the far end of the fence and cause it to flex? Can you read the measurement gauge? Does the fence move smoothly, or hang up at any spot?
- How convenient is the connection for dust collection, or do you need to buy an accessory part to hook up to a vacuum?
- Is there a place to store tools such as the blade wrench and push stick?
- Finally, does the saw feel good to you? You are the one who must feel comfortable and confident in your ability to use this tool safely.

Jigsaws



WHILE JIGSAWS have improved over the years, the last two years have seen significant changes, including more cordless models and a number of improved toolless blade-changing designs. Always a useful tool, the jigsaw is becoming more affordable, more reliable and easier to use. But with so many models available, it becomes even harder to make a buying decision.

Price

You can spend between $39 and $500 for a jigsaw. How you're going to use your jigsaw will determine which one is right for you. A $39 saw will last for a few hard weekends adding a deck to your house, but for a tool that will survive daily use in a production woodshop for a couple of years, expect to spend around $150. A tool from either price category is likely to perform well for the recreational user. But if you're using the jigsaw often, a little extra money will buy you features and endurance that will make the job more pleasant and the finished result better.

Performance-enhancing features

Performance in a jigsaw is measured by the ease of making a cut, and on the finished appearance of the cut. Variable speeds will offer a better finished cut in different materials, while saws offering up to four different orbital cut settings will improve the ease of the cut. Some of the newest technology available from Bosch offers electronic feedback control to keep the rpms at a constant rate in extra hard or thick material.

Another performance feature is the guide that's positioned behind the blade. Not every jigsaw offers this feature, and on those that do, the design can vary widely. On Porter-Cable's newest jigsaw the guide not only supports the rear edge of the blade, but it also wraps around the sides of the blade and is positioned just above the foot plate. The design and location of this guide reduces blade deflection, which means a straighter cut.

Convenience

Toolless and cordless mean convenience in today's jigsaw market.

Changing the blade in a jigsaw is a toolless experience with half-a-dozen manufacturer's upper-end models. Porter-Cable's new design utilizes a pinch-activated clamp. You open the clamp by squeezing two tabs. Then you insert the blade. Release the clamp and the blade is locked in place. Even simpler, Bosch has a system in which the blade is just pushed into


The new Porter-Cable 9543 jigsaw has a beefed up blade guide.

Bosch's new 1589EVS and 1588EVS jigsaws have the easiest blade removal system we've ever seen. Pull a lever and the blade hops out onto your bench.

JIGSAWS

Manufacturer/ Model	Street Price High/Low	Toolless Blade Change	Dust Collection	Cuts Per Minute	Amps	Chip Blower	Weight (lb.)	Comments
Skil 4235	$35/30	N	N	0-3,200	3.2	Y	3.1	5/8" stroke
Ryobi JS45	$39	N	N	0-3,000	2.5	Y	3.1	Scrolling feature
Skil 4340	$39	N	Y	800-3,200	4	Y	4	Variable speed
Black & Decker JS250	$50/40	N	Y	800-3,200	3.5	Y	4	Variable speed
Skil 4445	$47/45	N	Y	800-3,200	4	Y	4	Orbital, variable speed
Skil 4470	$60/55	N	N	800-3,200	4	Y	4.1	Scrolling, orbital features
Black & Decker JS320	$58	Y	Y	2,450 & 3,200	3.7	Y	4	Scrolling feature
Black & Decker JS350	$64/60	Y	Y	800-3,200	3.7	Y	4	Scrolling feature
Ryobi JS045	$69	N	N	0-3,000	3	Y	3.5	Orbital, variable speed
Makita 4323	$75	N	Y	500-3,100	3.7	Y	4.0	Low noise/vibration
Craftsman 17228	$78	N	Y	0-3,000	4	Y	5.2	Orbital, variable speed
Makita 4324	$85	N	Y	500-3,100	3.7	Y	4.2	Orbital, variable speed
Freud FJ65	$95	N	Y	0-3,000	3.2	N	3.4	Orbital, variable speed
Ryobi JS048	$95	N	N	0-3,000	4	Y	3.4	Orbital, variable speed
DeWalt DW318	$124/99	N	N	0-3,100	4.5	N	6.2	Orbital, variable speed
Freud FJ85	$135/99	N	Y	0-3,000	4.8	N	5.4	Orbital, variable speed
Makita 4304*	$179/130	Y	Opt	500-3,000	5.5	Y	5.3	Orbital, variable speed
Porter-Cable 97549	$149/133	N	Y	500-3,200	4.8	Y	6.5	Orbital, variable speed
Craftsman 27251	$138	N	N	0-3,100	4.5	N	6.2	Orbital, variable speed
Bosch 1587AVS*	$160/139	Y	N	500-3,100	5	Y	5.5	Orbital, variable speed
Milwaukee 6266-6*	$169/143	Y	Y	450-3,100	5.7	Y	5.3	Orbital, variable speed
Makita 4304T* (N)	$179/145	Y	Opt	500-3,000	5.5	Y	5.3	Orbital, variable speed
Milwaukee 6256-6	$159/145	N	Y	3,100	3.8	N	5.8	Variable speed
Hitachi CJ65V2K*	$185/150	N	N	700-3,200	5.2	Y	5.3	Orbital, variable speed
Porter-Cable 9543 (N)	$179/158	Y	Y	500-3,100	6	Y	5.8	Orbital, variable speed
DeWalt DW321*	$169/159	Y	Y	500-3,100	5.8	Y	6.4	Orbital, variable speed
Metabo STEP550	$169	N	Y	1,000-3,000	4.8	Y	5.9	Orbital, variable speed
Bosch 1589EVS* (N)	$179	Y	Y	500-3,000	6.3	Y	5.1	Orbital, March 1999
Metabo STEP600	$199	N	Y	1,000-3,000	5.2	Y	5.9	Orbital, variable speed
Metabo STEP700	$259/200	N	Y	1,000-3,000	6.0	Y	6.4	Orbital, barrel grip only
Makita 4330DWA	$235	N	Opt	2,800	12 volt	N	6	Cordless/orbital/April '99)
Porter-Cable 548	$245	N	N	0-4,500	3.5	N	6.5	Worm gear drive
Makita 4332DWA	$250	N	Opt	2,400	14.4 volt	N	6	Cordless/orbital (April '99)
Metabo EP140	$299	N	N	700-2,500	1.4	N	3.9	Orbital ,9.6 Volt cordless
Milwaukee 6267-21	$319/285	Y	Y	1,700	12 volt	N	6.75	Cordless, 12 volt orbital
Festo PS2E+	$292	N	Y	1,200-3,100	4	Y	4.9	Orbital, barrel grip only
Fein ASTE638	$500	N	Y	1,050-2,600	3.9	Y	4.8	Orbital, barrel grip only

* Also available in a barrel grip model, which sometimes has a different model number

place and locks tight. To release the blade, flip a lever on the front of the unit and the blade is ejected from the clamp!

For the ultimate convenience of no cord you'll need to again take a look at what you're using the tool for. Price wise, cordless jigsaws are not a DIY tool. If you have to work without power, or do a job without having to run extension cords, cordless is very convenient. It's also fun, but run time is pretty limited and the power developed is below that of a corded tool.

Power

Ranging from 1.4 to 6.3 amps, power is all over the scale in jigsaws. Unless you are spending a lot of time cutting 2" maple and solid-surface material, maximum power is usually not a great concern. Except for a couple of "bargain" tools, the tool's power will be adequate for most tasks. One thing to look for, if you get the chance to turn the machine on, is the vibration during use. The sign of a fine machine is smooth performance.

Other Features

With the increasing importance of health concerns in the shop, dust collection has become a major feature. Not all tools offer dust collection hook-up. It may be offered as an after-market accessory, or as an alternative to a beveling foot plate.

Not all saws have adjustable foot plates, and of those that do, some require a tool to adjust, while others are toolless.

Store Testing

In-store testing on jigsaws isn't very complicated. The features are obvious from the chart and literature about the tools. You're in the store more to find out how it feels in you hand.

- Do you prefer a barrel grip or top-handle design? For some woodworkers a top-handle design seems to provide awkward balance to the tool. While a personal choice, it's one you shouldn't make lightly.
- How easily does the blade insert and remove? If it's a toolless model, does the mechanism work well for you? If it requires a tool, where is it stored? On the tool?
- Is the switch located well for your needs?
- Does it have a dust collection attachment?
- Is a case important to you?
- Is the cord long enough?
- When you place the saw on a work surface, can you adequately see the blade to follow the cut?

Brad Nailers

GIVE ME A BRAD NAILER and I'll make you any piece of furniture you want. At least that's what I told my wife. I got the nailer, the rest is yet to come. Why do woodworkers need air tools? Well, "need" may be a strong word, but they can be very useful and it opens up a new world of tool options including air sanders (both detail and random orbit), air finishing such as spraying lacquer, not to mention blowing up tires, air mattresses and basketballs.

Even better, it's getting a lot less expensive to scratch your air-power itch. Over the Christmas holiday two air fastener companies offered bundled starter kits with a brad nailer, compressor and all the hoses and couplings to get started for $250. It used to cost $200 to buy the nail gun and another $350 for the compressor. The starter kit compressors won't get you into finishing or air sanding tools, but it is a nice introduction.

So now that it's affordable, how does it fit your woodworking? Granted you're not going to start making Chippendale highboys with nail holes all over them, but there are a lot of joints that benefit from a small fastener. Drawer boxes are a good place for brads, and if you've ever held moulding in place while trying to clamp it, you'll appreciate the benefit of a single brad nail to hold everything in place while the glue dries.

LEFT • With some brad nailers you can clear a jam by popping the front open with a lever.

RIGHT • With others you need a hex wrench to open it. Some contend these types jam less and that jams can be cleared from the interior of the nailer.

There are many types of air fasteners. Nailers accept 1/2" headless brads or roofing nails up to 2 1/2". Air staplers are great for tacking things that will be hidden (like the edges of upholstery), and provide more hold than a brad. But if you must chose one tool, choose a brad nailer. Brad nailers offer a range of 18 gauge headed and headless brads and nails ranging from 1/2" to 2" long.

Features

You can find brad nailers priced from $60 to $300. Surprisingly, the lower end of that scale could be just what you need. There are dozens of inexpensive nailers that are great for the home woodworker. You *can* spend too much on a brad nailer, especially if you don't use it every day.

When using the chart to help in your decision, ask yourself what length fastener you need (all brads are 18 gauge unless otherwise noted). If you are doing

BRAD NAILERS

Manufacturer/ Model	Street Price High/Low	Fastener Range	Bump Firing*	Requires Oil	Depth Control	Weight	Comments
Grizzly G1852	$60	3/8" - 1 3/16"	Y	Y	N	2.6	
Airy 0232SRE	$65	3/8" - 1 1/4"	N	Y	Y	2.6	
Craftsman 18452 (N)	$70	5/8" - 1 1/4"	N	Y	N	1.5	Light weight composite
Grizzly G1861	$70	5/8" - 1 9/16"	Y	Y	N	3.3	
Grizzly G6045	$70	3/8" - 1 3/16"	Y	N	N	2.6	
Woodtek 882-371	$80	5/8"	N	Y	N	2.3	Nailer/stapler
Craftsman 18409	$85	3/8" - 1 1/4"	N	N	N	2.2	
Hitachi NT32AE	$90/85	5/8" - 1 1/4"	Y	Y	N	2.6	
Porter-Cable BN125	$99/85	5/8" - 1 1/4"	Y	Y	N	2.3	
Penn State ANK-SUP	$89	13/32" - 1 9/16"	N	Y	Y	2	
Accuset A125BN (N)	$100/90	5/8" - 1 1/4"	N	Y	N	2.3	
Campbell Hausfeld NB0030	$100/90	3/8" - 1 1/4"	N	Y	N	2.6	
Airy EZ-1	$139/95	5/8" - 1 1/4"	N	Y	N	2.6	Stapler/nailer
Airy 0241NK	$107/98	13/32" - 1 9/16"	N	Y	Y	3	
Grizzly G6047	$100	5/8" - 2"	Y	N	N	3	
Airy 0249SP	$105	3/8" - 2"	N	Y	Y	3	
DeVilbiss SHBN4	$119	1/4" - 1 1/4"	Y	N	N	2.7	
Accuset A200BN (N)	$140/120	5/8" - 2"	N	Y	Y	3.4	
Woodtek 832-371	$120	5/8" - 1 1/2"	N	Y	N	2.3	
Craftsman 18424	$125	5/8" - 2"	N	Y	N	2.6	
Porter-Cable BN200	$155/125	3/4" - 2"	Y	N	N	2.5	16 gauge fasteners
Campbell Hausfeld NB0040	$129	5/8" - 2"	N	Y	N	2.8	
Hitachi NT50AE	$129	5/8" - 2"	Y	Y	Y	2.5	
Stanley-Bostitch BT-35B	$160/129	5/8" - 1 3/8"	N	Y	N	2.4	
Grizzly G7578 (N)	$130	3/4" - 2"	Y/N	N	N	3.2	Switchable bump fire, 16 gauge
Penn State ANK-2	$130	5/8" - 2"	N	Y	N	3.7	
Woodtek 914-547	$138	1/2" - 1 1/8"	N	Y	N	3	Nailer/stapler
Woodtek 832-378	$147	3/4" - 2"	N	Y	N	3.5	
Makita AF503	$149	5/8" - 2"	Y	Y	N	3.7	
Stanley-Bostitch BT-50B	$209/175	1 3/16" - 2"	N	Y	N	2.6	
Senco SLP20	$287/180	5/8" - 1 5/8"	N	N	N	2.3	
Duo-Fast DBN-4052	$209	5/8" - 1 9/16"	N	N	N	2	
Hitachi NT50AD	$285/225	1" - 2"	Y	Y	Y	2.5	
Senco LS1	$279	1/2" - 1"	N	N	N	2.7	Headless nails
Makita AF502	$299	5/8" - 2"	Y	Y	Y	2.5	

*"Bump firing" is a feature that allows a nailer to be fired rapidly without releasing the trigger. The trigger is depressed, and as the tool is pushed against the work piece and the nose safety is depressed, the tool fires. Each time the nose safety is depressed the tool will fire again.

more decorative or small box construction, a smaller fastener length (5/8" or 7/8") is required. However, if you will be doing larger furniture construction, the longer fasteners (1 1/4" or 2") are better. Some of the models offer a happy medium in fastener length.

The feature known as "bumping" is important to some people. It's sort of a rapid-fire option. You hold down the trigger and every time you press the gun to the wood it fires a brad.

What's the Difference?

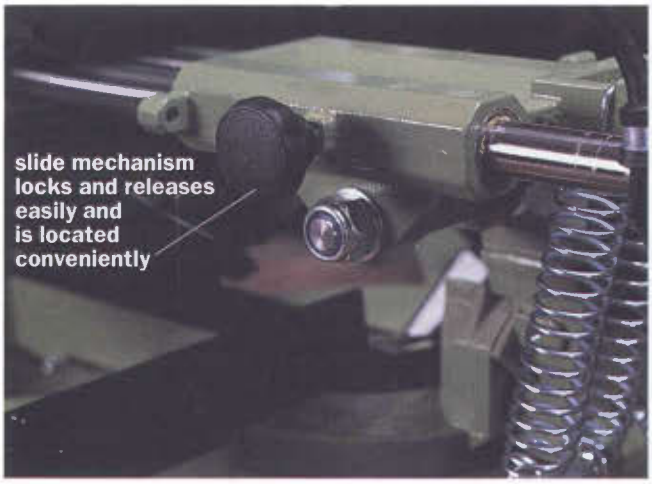
The type of trigger safety, either a double trigger or a nose safety, is a personal choice. The double trigger is just what it sounds like. Two triggers must be pulled to fire the tool. The nose safety requires the nose of the tool be pushed against the work surface before the tool will fire. Both work well, though some woodworkers think the nose safety can mar the surface of the work, hence plastic or rubber guard protectors are often added to the nose of the nailer.

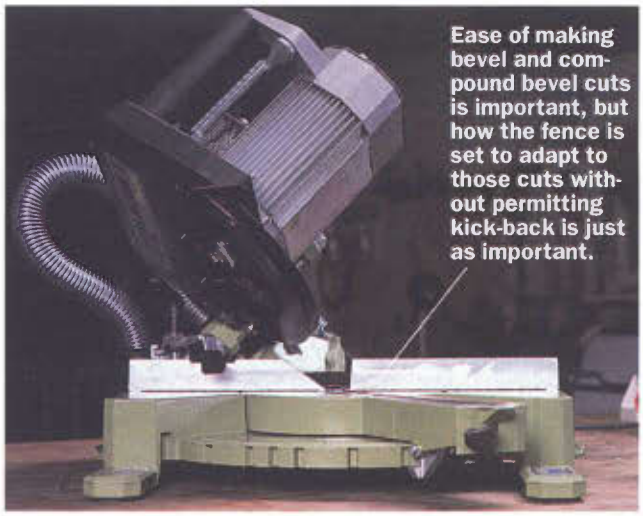
Store Testing

Picking up one fastener model or another may not give you much to base a decision on right away. Obviously how the tool feels in your hand will be important, but there are a few features that may not be obvious right away.

- Do you prefer the type of safety trigger offered on the tool? If it's a nose safety, does it have a plastic nose guard?
- How do the fasteners load into the tool? Does the mechanism move easily and is the motion convenient?
- Is there a convenient way to tell if the fastener magazine is almost empty?
- Is the tool an oilless design, or does it require oiling? If it requires oil, does the exhaust port direct the air away from the work surface to avoid oil staining?
- Is the fastener depth adjustable? How easily?
- Does the tool come with the necessary accessories? Oil, fasteners, hose, quick disconnect hook-ups, safety glasses, a case?
- Will the tool accept only one brand of fastener?
- How easy is it to clear a jammed fastener? Does it require a tool?
- How does the weight of the tool feel? If you're likely to be using the tool over your head, or using it for extended lengths of time, the lighter the better.

Compound Miter Saws





MITER SAWS are a hot item in today's woodworking market. In fact the high-end sliding compound miter saws are now the "thing" to own. That's surprising because they cost about $500, which is near the cost of some of the table saws discussed in this section. But when you consider that many of these saws are taking the place of the traditional radial arm saw (which is a pretty good thing in our opinion), it's worth a little extra. In fact sliding compound miter saws are a lot more accurate and convenient than a radial arm saw. However they won't accept a stack dado (which is too bad) and they won't allow a rip cut (which is a good thing in our opinion, because of the safety concern).

While the power miter saw category extends from 8" to 12" blades, we think 12" is overkill for woodworking shops. Because of this, we've restricted our look at miter saws to 10" and smaller models. We've also restricted our report to exclude standard miter saws because for another $50 you can make the step up to the compound tool.

Features

An important place to start when considering a miter saw is how much saw you really need. You may want a sliding model, but more likely than not you only need a compound miter saw. Check the maximum cut statistics in the chart and compare them to what work you need done, or any work you plan on doing.

An overlooked feature is the blade. A good blade can cost up to $100. If you'll be using the saw for finished woodworking, make sure it comes with at least a 40-

COMPOUND/SLIDING COMPOUND MITERSAWS

Manufacturer/ Model	Street Price	Blade Diameter	Maximum Crosscut T x W	Miter Range (L/R)	Bevel Range (L/R)	Amps	Weight	Comments
Compound Miter Saws								
Pro-Tech 7207	$159	10"	2 5/8" x 5 3/4"	50/50	47/-2	13	32	
Delta 36-075	$205/169	10"	2 3/8" x 5 3/4"	47/47	48/-3	13	28	
Hitachi C10FC	$209/188	10"	2 5/8" x 5 3/4"	45/60	45/0	15	32	
Pro-Tech 7208	$189	10"	2 3/4" x 5"	45/45	45/0	15	45	
Tradesman 8328	$190	10"	2 5/8" x 5 3/4"	45/45	45/0	13	34	
Delta 36-220	$239/195	10"	2 3/4" x 5 1/8"	47/47	45/0	15	60	With stand
Powermatic 409 (N)	$210/199	10"	2 9/32" x 5 9/16"	47/47	45/0	15	34	
Ridgid MS1050 (N)	$230/199	10"	2 5/8" x 5 3/4"	45/45	45/0	15	35	
Ryobi TS230	$209	10"	3 9/16" x 5 9/16"	45/45	45/0	13	31.5	
Makita LS1040	$269/225	10"	2 3/4" x 5 1/8"	45/52	45/0	15	24.2	
Craftsman 23536	$260	10"	2 5/8" x 5 3/4"	45/45	45/0	15	41.5	
Hitachi C10FCD (N)	$299	10"	2 13/16" x 5 5/8"	45/45	45/-45	13	33	
Makita LS1045 (N)	$299	10"	2 3/4" x 5 1/8"	45/52	45/0	15	24.5	
Milwaukee 6494	$329/309	10"	2 1/2" x 5 9/16"	51/59	50/-3	15	37.5	
Sliding Compound Miter Saws								
Freud TR215	$369/245	8 1/2"	2 3/8" x 12"	45/45	45/0	9.7	37	
Ryobi TSS200	$409/369	8 1/2"	2 5/8" x 12"	45/60	45/0	10	43	
Tradesman 8336	$370	8 1/2"	2 9/16" x 12"	45/45	45/0	10	39	
Hitachi C8FB2	$479/429	8 1/2"	2 9/16" x 12"	45/45	33.9/0	9.5	38.6	
Craftsman 21294 (N)	$449	8 1/2"	2 5/8" x 12"	45/60	45/0	10	55	
Delta Sawbuck 33-055	$659/629	8"	2 3/4" x 16"	47/47	47/-2	15	96	With stand
Makita LS1011	$449/400	10"	2 15/16" x 12"	45/57	45/0	12	34.8	
Delta Sidekick 36-240	$449/413	10"	3 5/8" x 11 1/2"	45/57	45/0	13	51	
Bosch 3915	$579/499	10"	3 1/2" x 12"	52/62	47/-2	13	47	
Elektra Beckum KGS 300 (N)	$499	10"	2 5/8" x 12"	45/57	45/0	15	50	induction motor (1999)
Makita LS1013*	$619/500	10"	3 5/8" x 12"	47/52	45/-45	13	46.5	PW Tool of the Year
Milwaukee 6496-6	$600/569	10"	3 7/16" x 12 3/8"	51/59	48/-3	15	52	
Elektra Beckum KGS 330 (N)	$579	10"	2 5/8" x 12"	45/57	45/0	15	50	Available early 1999
Hitachi C10FS	$739/579	10"	3 1/2" x 12 1/4"	45/57	45/-45	10	44	

Store Testing

When you're checking out a chop saw in the store, running it is unlikely to be an option. So determining what makes one saw better than another will be a touchy thing. Literally.

- First, check the location and convenience of the switch. Does it have a switch safety? It should!
- How easily does the blade lower and return to its top position? It shouldn't be too hard to push down, but it should return smartly out of the way.
- Does the guard allow you to see the cut while still providing adequate protection?
- Grasp the blade (of an unplugged saw) and feel the amount of side-to-side play. If it moves a lot, you may be in for a lot more kerf than you want. This is called runout.
- How smoothly does the miter table move? Does it stop smoothly at the preset stops? Does it lock in place at the stops easily? Does it lock in place between the stops easily?
- Does the back fence provide adequate support? Does it provide tight enough clearance to help avoid tearout at the back of the cut? Are the fences adjustable?
- If it is a sliding saw, how smoothly does that mechanism perform? How easy is it to lock in place? Dual-rail designs are generally more stable.
- Is the saw set up for convenient dust collection?
- How stable is the saw (particularly sliding saws) when making a cut? Does it need to be clamped to a table, and if so, is this easily accomplished?

tooth or better combination blade. If it comes with a rough cut blade, it can be expensive to replace it with a finer finish blade.

Weight is a factor as well. If you will leave the saw in one place, a heavier saw may be more stable. If you'll be moving it around, watch your back. **PW**

Contacting Manufacturers

Accuset/Senco 800-543-4596
or circle 160 on the Resource Card

Airy- 800-999-9195
or circle 161 on the Resource Card

Black & Decker - 800-762-6672
or circle 162 on the Resource Card

Bosch - 800-301-8255
or circle 163 on the Resource Card

Bridgewood - 800-235-2100
or circle 164 on the Resource Card

Campbell-Hausfeld - 513-367-4811
or circle 165 on the Resource Card

Craftsman -
Contact your Sears store or circle 166 on the Resource Card

Delta - 800-438-2486
or circle 167 on the Resource Card

DeVilbiss - 800-888-2468
or circle 168 on the Resource Card

DeWalt - 800-433-9258
or circle 169 on the Resource Card

Duo-Fast - 888-386-3278
or circle 170 on the Resource Card

Elektra-Beckum
or circle 171 on the Resource Card

Fein - 800-441-9878
or circle 172 on the Resource Card

Festo - 805-565-4675
or circle 173 on the Resource Card

Freud - 800-334-4107
or circle 174 on the Resource Card

Grizzly Industrial - 800-541-5537
or circle 175 on the Resource Card

Hitachi - 800-829-4752
or circle 176 on the Resource Card

JET - 800-274-6848
or circle 177 on the Resource Card

Makita - 800-462-5482
or circle 178 on the Resource Card

Metabo - 800-638-2261
or circle 179 on the Resource Card

Milwaukee - 800-414-6527
or circle 180 on the Resource Card

Paslode - 800-323-1303
or circle 181 on the Resource Card

Penn State - 800-377-7297
or circle 182 on the Resource Card

Porter-Cable - 800-487-8665
or circle 183 on the Resource Card

Powermatic - 800-248-0144
or circle 184 on the Resource Card

Pro-Tech Power - 800-888-6603
or circle 185 on the Resource Card

Ridgid Power Tools - 800-325-1184
or circle 186 on the Resource Card

Ryobi - 800-525-2579
or circle 187 on the Resource Card

Skil - 800-301-8255
or circle 188 on the Resource Card

Stanley-Bostitch - 800-556-6696
or circle 189 on the Resource Card

Star Tool Corp. - 888-678-8777
or circle 190 on the Resource Card

Tradesman - 800-243-5114
or circle 191 on the Resource Card

Woodtek - 800-645-9292
or circle 192 on the Resource Card

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WHAT YOU Absolutely Must KNOW ABOUT MOTORS

Learn to shop smart so you get the right motor for the way you work.

IF YOU'RE AN ELECTRICAL ENGINEER, you can stop reading this article right now. This story isn't for the gear heads — it's for the rest of you woodworkers who use power tools every day but are occasionally stupefied by amps, volts, watts and horsepower. I'll warn you, there's just the tiniest bit of math to learn here. But if you can multiply and divide two numbers, you will open up a whole new world of understanding when it comes to the subject of motors.

The first thing to understand is that there are two kinds of motors that power almost all of the machinery in a home workshop: induction motors and universal motors. Each type has its strengths and weaknesses. The reason that you need to know the difference between the two is that some tools (table saws, planers and jointers, for example) can be powered by either type of motor. So you need to educate yourself so you'll choose the right motor for the kind of work you do.

In general, induction motors power stationary machinery that must run for hours on end, such as big table saws, planers, band saws and jointers. Universal motors power mostly hand-held stuff: routers, jigsaws and sanders. However this is changing. These days you'll find more and more universal motors in benchtop table saws and portable planers.

I like to think of the two motors as the tortoise and the hare. Induction motors are the tortoise of the pair. They're rugged, quiet, large, heavy, turn more slowly and can be stalled under heavy use. They are great for the long haul. Universal motors, on the other hand, have a shorter life span, they're smaller, they make more noise, they operate at very high speeds, they offer the most horsepower per pound of any alternating current motor, and they are very difficult to stall. Universal motors provide large amounts of power in quick bursts with

*By **Christopher Schwarz**, managing editor,* Popular Woodworking.

constant torque and at variable speeds.

It might help to think about how you use tools with universal motors. If you've got a chop saw, you need a burst of power for three or four seconds to make your cut. You need torque and you need it fast. Same goes for biscuit joiners and routers. Unless you are running parts for 100 doors on your router table, chances are that these tools are on for five minutes and then off for a while. Now think about how you use a jointer or a planer with a hefty induction motor. You might have 100 board feet of lumber to surface. Each board might have to go through that machine five times. Your machine might be running for hours on end.

So each type of motor has a type of job that it's really good at. And it all has to do with the way that the motor is built. Here's the inside story:

Induction Motors

The reason they are called "induction" motors is the way they convert electricity into a spinning rotor. To understand how induction motors work, let's say you've got one of these puppies in your table saw and you're about to turn it on. As you flip the switch, power flows into what's called the "stator" and magnetizes it. The stator is a mass of copper windings that surround the rotor in the center, which is what spins the saw's blade through a series of belts and pulleys. Inside the stator are two or four "poles" that become magnetically charged because of the electricity running through the wires. When the electricity changes direction or cycles, as it does 60 times a second in the United States (hence the term 60 cycles), each pole changes its magnetic strength, from a positive to a negative value or from a negative to a positive value.

The induced poles in the rotor are then attracted and repulsed by these ever-changing electromagnets in the surrounding stator. The motor isn't running, but the rotor is excited. What this hulk of iron and copper now needs is a shot of power from another copper winding (called a "starting winding") that is out of phase physically and electrically with the main winding. And that's where the capacitor comes in. In most modern tools a capacitor (which is in series with the "starting winding") helps with the starting torque. Then, when the motor reaches 85 percent of its speed, the capacitor and the starting winding drop out of the circuit and the motor runs on its main winding.

Whew. So, this is the long way to explain why these are called induction motors. As you can see, the rotor spins because it is "induced" by the electromagnets in the stator. Induction motors are large and heavy because the induction process takes a lot of iron and copper (a ½ hp induction motor weighs about 25 pounds; a ½ hp universal motor weighs 2½ pounds). Induction motors are reliable because they're simple, their parts are built for long life and they run at slow speeds (so they don't generate as much motor-damaging heat). In fact, a well-built induction motor won't heat up more than 40 degrees centigrade over room temperature. Induction motors are slow because the rotations per minute (rpms) are governed by how many poles are

THE INDUCTION MOTOR

Different Kinds of Power for Your Home Shop

You probably know that most of your house is wired for 110-120 volts. And you might know that certain appliances, such as your electric range, dryer and big air conditioners, are wired for 220-240 volts. And perhaps you've heard about three-phase power. What's the difference between these and which should you be using in your shop?

110-120 VOLTS This is the standard current that most of your hand power tools run off of. And except for special circuits that power 240 appliances, this is the voltage to all the outlets in your house. Remember that voltage entering a house can vary. So some people get 110 volts, some people get 120. Tools and appliances can handle a 12-volt variation, so don't worry.

220-240 VOLTS To get this heavy-duty circuit, the electrician takes two lines from the main panel and one neutral line. These heavy-duty circuits are good for a variety of reasons. First off, they need only half the amperage of 120-volt circuits, so you are less likely to trip a breaker or blow a fuse on a well-wired 240 circuit. Plus, 240 circuits are much less prone to voltage drops than 120 circuits.

Here's the box on the motor for our Jet table saw. You simply move a couple leads and your saw is then ready to take 240 — as soon as you change the plug, that is.

This means you can have a table saw that's more than 20 feet from your service box. Operating a motor at low voltage causes the torque to drop and the motor to heat up (shortening the life of the motor). Many induction motors can easily be switched over for 240 power. In the box on the motor where the electric cord goes in there will be a diagram to show you how to reconnect the different leads. If you can afford the wiring change, do it. However, one myth about 240 power is that it is cheaper. Don't believe the myth. You buy power by the watt.

THREE-PHASE POWER Look out your window at the power lines outside your house. The three power lines strung on the poles are carrying three-phase power. What's three-phase power? Well, the power coming into your house is single-phase power. This means that there's one electric pulse changing direction 60 times a second. Three-phase power has three of those pulses changing direction at slightly different times. The fluctuations are timed so that when one phase is at its lowest power, another phase is at its highest. The result is a very steady stream of energy. Three-phase power is typically used in factories, not homes. You need a special motor to run three-phase power, but three-phase motors are less expensive, extremely reliable and more efficient than single-phase motors. Three-phase power is not available to most residences. But you can purchase a "phase converter." Some manufacturers don't recommend static phase converters but say that rotary phase converters are OK. Bottom line, for the home shop, it's cheaper to buy a single-phase motor for a saw than it is to convert your juice to three-phase power.

inside the stator and the number of times per second that your electricity cycles — which is standard at 60 cycles. So now you can understand why you wouldn't want your router powered by an induction motor — you could barely lift it, and it probably would be too slow and not have enough torque.

Universal Motors

Universal motors get their name from the fact that many of them can operate on both alternating current (from an outlet) or direct current. The way that universal motors work is a little more complicated than their induction cousins, but there are similarities.

Instead of a rotor, universal motors have what's called an armature that spins in the center. Instead of a stator, universal motors have what's called a field, usually consisting of two coils surrounding the armature. Universal motors also have some parts that induction motors don't. On one end of the armature is a part called the commutator. This part is round like the armature, but it is usually smaller in diameter and is made of small bars of copper. It's through these bars that the armature winding is energized. Universal motors also have what are called "brushes." Brushes are made from a carbon-graphite material and are usually held in place against the commutator by small springs. When you turn on a universal motor, current travels in what's called a "series circuit." One side of the electrical line goes through the field, then through the brushes, into the commutator, then the armature, and back to the other side of the line. Each of the bars in the commutator changes polarity as it contacts a brush, and this changes the polarity in the magnets in the armature. The magnetic forces in the armature react with the electromagnets in the field coils and the motor develops torque.

Universal motors make a lot of noise because they spin at a dizzying speed — sometimes seven times faster than an induction motor — and their fans suck a lot of air through the motor, which makes noise. Universal motors are less reliable for three reasons. The motor generates more heat, which can cause the components to break down. Second, the carbon brushes wear out. If they can be replaced then it's a quick fix. If they can't, you've got trouble. And third, the big fan that cools the motor brings in a lot of junk such as sawdust and foreign objects. This junk can damage the windings and their insulation.

Learn to Shop

Now that you know the differences between induction and universal motors, you need to know how to compare motors when tool shopping. First consider how you will use the tool and whether it should be powered by an induction or universal motor. If you need your table saw to be portable or you're only turning it on for short times, a universal motor will do. But if your table saw is going to be on all the time, get an induction motor.

Things become more complicated when you start comparing one motor to another. Motors are measured differently by different manufacturers. Should you use horsepower? Amperage? Wattage? Motor efficiency? All of the above? The answer is that all these factors are related and all play a part in judging whether a motor has got a lot of guts or is just a loafer on the job.

First off, let's clear the air about horsepower, which is the way you measure induction motors and some universal motors. It's almost a meaningless number, unfortunately. That's because there are several ways to measure horsepower, and this makes comparing two 1-hp motors almost impossible.

Some manufacturers measure horsepower with the motor under no load. Some measure horsepower as the saw almost reaches the point where it is about to stall — called the point of "breakdown torque." Some lock the motor in a dead stall, turn on the power and see how many amps the motor pulls from the outlet and calculate the horsepower from that. This is one way to measure "developed horsepower."

Developed horsepower is probably the least accurate measure of the motor's day-to-day abilities. When you lock the motor in a dead stall and turn it on, the motor will pull a lot more amps than normal because it's trying desperately to pull itself out of this stall.

Instead, try to find a "continuous-duty" horsepower rating, which is found on most high-quality induction motors. If the motor's nameplate doesn't state its horsepower rating is for continuous duty, ask the sales person. If they don't know, have them find out, or call the manufacturer yourself.

Why is this so complicated? Keep in mind that there are a couple different formulas to calculate horsepower. One way is to multiply the rpms of the motor by the amount of torque (which is in foot-pounds). Divide that number by 5,250 and you have a horsepower rating. Keep in mind that a universal motor's really high rpms skew this equation. The other horsepower formula involves the electricity going into the motor.

For this calculation you need to know how amperage, voltage and wattage are related (this is that math that I promised you). Almost every basic electricity textbook explains these different terms by comparing the electric lines in your house to a water hose. Voltage is like water pressure. The more voltage you have, the more force with which the electricity moves through your wires. Amperage is like the amount of water in a hose. You can have the faucet on low or high. Wattage is harder to explain. It is, in electric terms, the amount of energy that a device consumes. You can calculate wattage by multiplying the amperage of a tool (usually found on the information plate on the motor) by the voltage (which for home shop people in the United States

Assembled armatures and commutators at Makita's plant in Georgia. We were impressed with the rigorous tests Makita performed on their universal motors.

QUICK TIP: MOTOR CARE

The universal motors in most of your hand power tools will live longer if you follow this simple tip: blow clean air through the motor regularly.

Universal motors suck a lot of air through them because the motors turn at a high speed and they have large fans to keep the motor from overheating. Think about your shop. Pretty dusty isn't it? That dust is being sucked through your router and is slamming into your armature like a meteor shower. This dust can also build up, cause the motor to run hotter and shorten the life span of the tool. If you regularly blow compressed air through the vents of the tool, you'll dislodge the dust and keep your motor healthy.

In addition to sawdust, the carbon-graphite material from the motor's brushes also builds up on the commutator. Blowing air through the tool also helps dislodge that stuff, too, and this also prolongs the life of your tool.

Induction vs. Universal? You Make the Call

In the old days, table saws, planers and jointers had induction motors. Small tools had universal motors. Alas, that line has blurred in the last decade. Some manufacturers, such as Ryobi, DeWalt and others, put universal motors in their table saws. The universal motors are much smaller and are much less likely to stall in a cut, but they are much noisier and their life expectancy is shorter.

Universal motors have also become the mainstay in portable planers — a tool that would have been a lot harder to design with a huge induction motor driving it.

If you think you can run a table saw or planer for an extended period of time and it's powered by a universal motor, you'll be replacing the motor a lot sooner than you think. How can you determine if your tool has an induction or universal motor? Turn on the tool. A really noisy motor indicates it's probably a universal motor. If you're still not sure, look at the motor. Many universal motors have coin-opened hatches so you can easily change the brushes.

is 120 volts or 240 volts). Why would you want to calculate wattage? Because 746 watts equals one horsepower.

So with that formula you can attempt to calculate the actual horsepower (as opposed to the advertised horsepower). This is one of the most important aspects of this whole article. Remember it. Here's an example of how you can estimate how much horsepower a tool has compared to how much horsepower a tool says it has on the box: Does a 9-amp router live up to the 2 horsepower rating on its box? Let's see: 9 amps multiplied by 120 volts equals 1,080 watts of power. To get horsepower, we divide 1,080 watts by 746. The answer is 1.44 horsepower. Hmmm. You can probably guess that either this router will develop 2 hp right as it's ready to crash and burn, or that the manufacturer used that other horsepower equation, which uses rpms and torque, to calculate horsepower. And as pointed out earlier, universal motors in routers have very high rpms, which can skew that equation. (My apologies to the gear heads here because I left out some of the other complicated factors in calculating power, such as the power factor and line losses).

So if horsepower is a bogus measure, what does that leave us with? Amps. Amps tell you how much power a tool consumes, and that's the simplest way to compare similar motors, especially universal motors. Unfortunately, a lot of manufacturers tell us that the amperage on the nameplate is not always the amperage you get. Three different 7-amp motors can all draw a different amount of current.

Even worse, amperage doesn't tell you how much of that energy is wasted. Here we're talking about the elusive "motor efficiency." Motor efficiency is not something advertised on many universal motors, but you can sometimes find it on the nameplate of induction motors. It is a percentage, usually between 50 percent and 80 percent, that explains how much of the amperage going into the motor is converted into work coming out. When you shop for an induction motor, look for a motor with the highest efficiency, highest amps and best horsepower for the job.

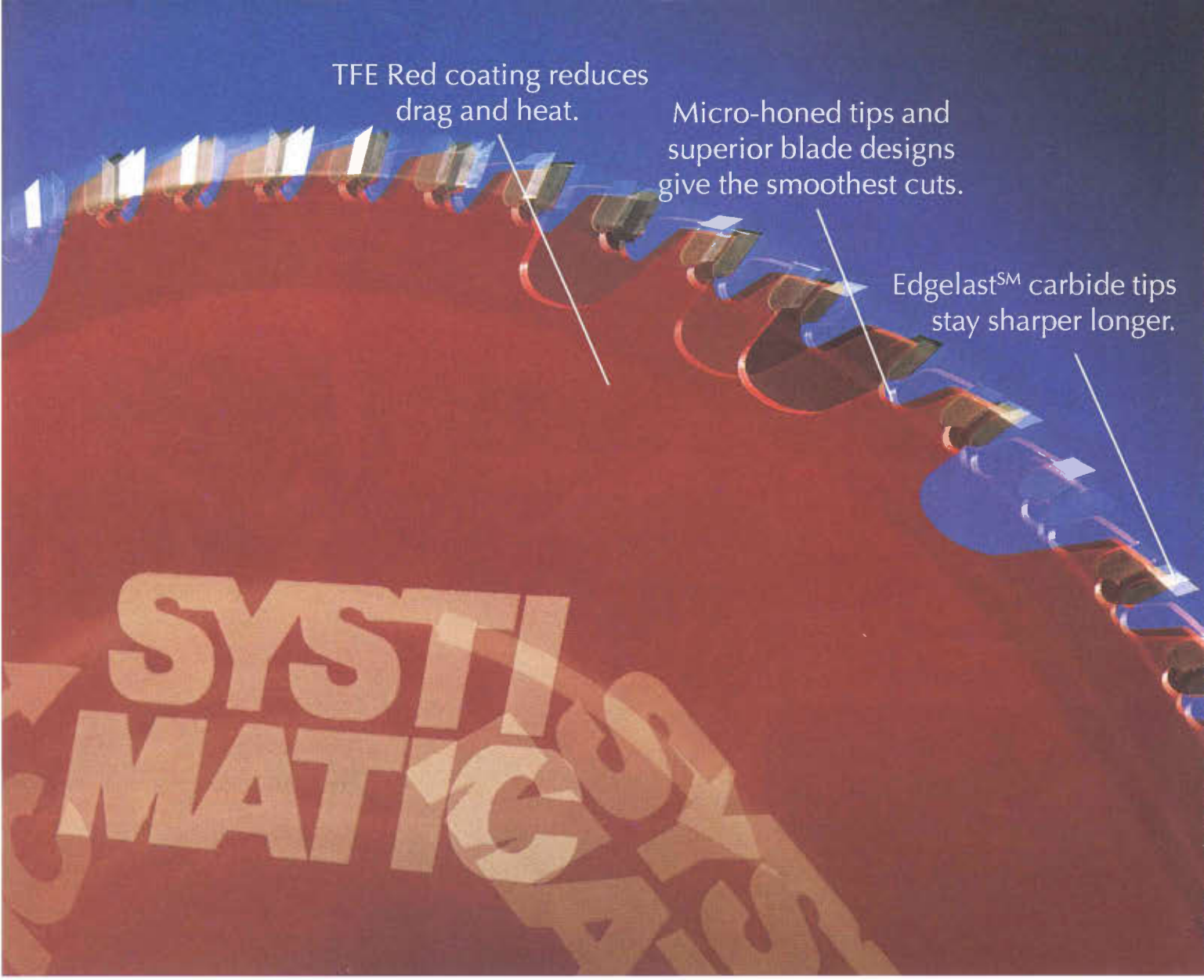
An employee at the Kosta Plant in Taiwan balances the armature on a universal motor. The plant assembles tools and tests motors for Delta Manufacturing.

If you can't tell a motor's efficiency, there are other ways to judge it in the store. One expert told us to peer through the vent fans in a tool with a universal motor to see if you can see the bars on the commutator. The smaller the bars, the better the motor. Smaller bars mean there are more coils in the armature winding, and that makes a smoother-running motor. If you can't see the commutator bars, there's still one final way to choose a motor: buy a trusted brand name.

Last year our editor toured several manufacturing plants in Taiwan. At one facility, his tour guide pointed to a pile of rusting commutators sitting outside. Those, the guide explained, would be cleaned up, repaired and put into motors for off-brand tools. Installing used parts isn't something that happens just in Taiwanese off-brands. And don't assume this is a typical practice of Taiwanese manufacturers because it isn't. Manufacturers of cheap motors anywhere can lower the cost of a tool by reducing the amount of iron and copper in a motor. This will lower the life span of the motor because all that metal acts as a heat sink to dissipate heat generated by the motor. They also can skimp on the brushes.

So do the math when you shop for motors. But even that can be misleading. One 14-amp chop saw can be $100 more than a similar-looking 14-amp chop saw. What's the difference? Probably the motor. Should that deter you from buying the cheap saw? No. If the tool won't get heavy use, a less expensive tool will allow you to spend that money somewhere else. But it should make you think twice about what you're buying and what you can expect in the long run. **PW**

Thanks to Robert Geary for his assistance with this article. Geary retired in 1992 as shop supervisor for Cinergy (Cincinnati's electric utility) after 40 years. He's considered by many local motor repairmen to be the expert on electric motors.



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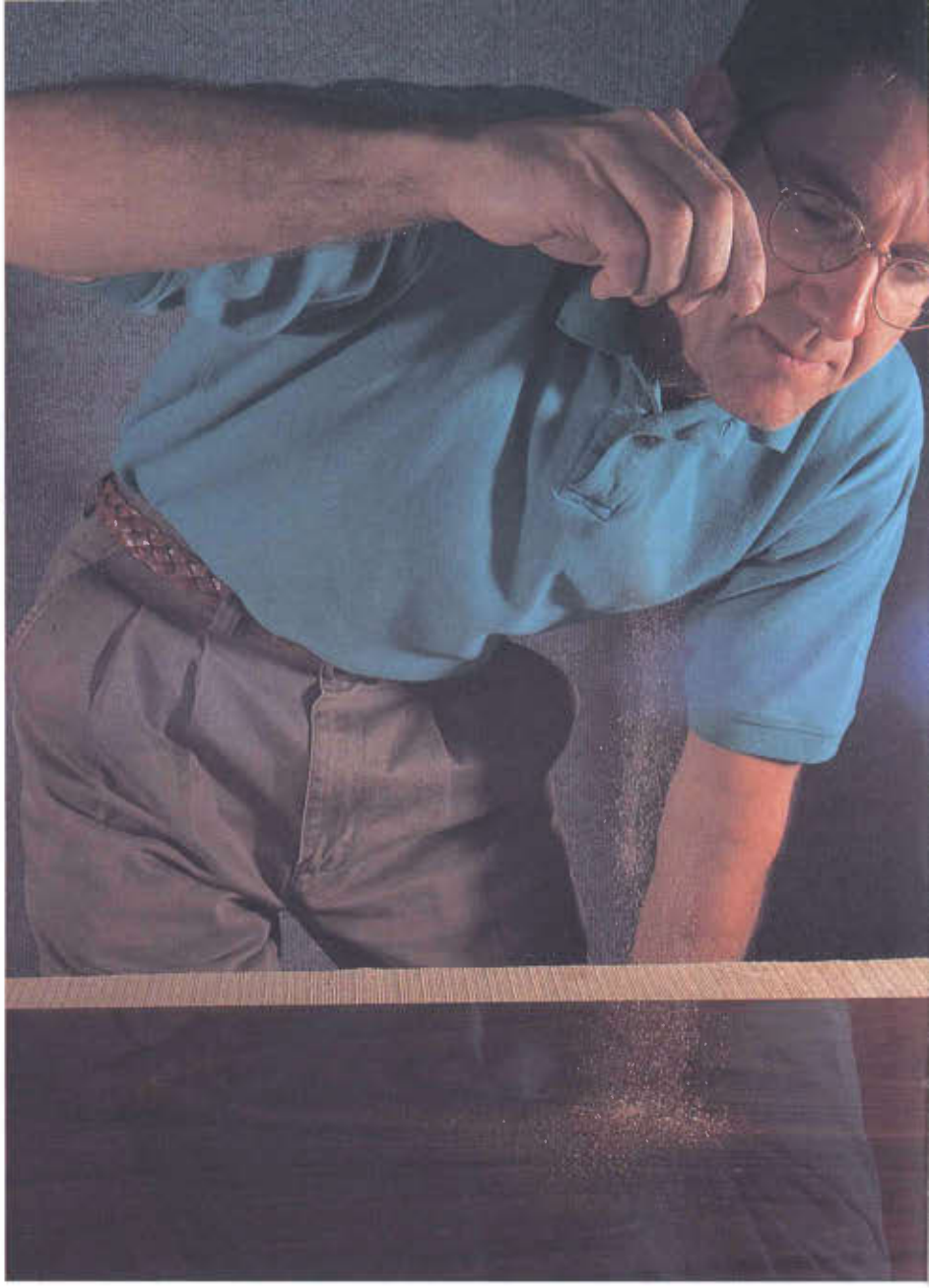
Secrets to a SILKY SMOOTH FINISH

Ignore the oddballs who spend hours massaging a finish. Here's how to do the job quickly and easily.



DON'T TRY THIS AT HOME • To prove just how effective wetsanding is at giving your project a glass-like sheen, we sprinkled a handful of sawdust on some wet shellac. After rubbing it out, no one in the office could tell that the finish had ever been boogered up. See the story "Goobers Begone!" to see how we did this.

LEARNING to finish your finish, more often called "rubbing out," will do more to improve the quality of your woodworking than anything else, period. (OK, that assumes you already know how to glue parts together so they don't come apart.) It's the secret to a silky, satiny, even mirror-like finish, and it will take away all your stress about dust, lint, hair, even assorted bugs settling into that wet coat you just carefully applied. In fact, you won't even have to worry so much about applying your finish quite so carefully.

Best of all, it's sooo easy.

Basically, in this final installment in our series on finishing, I'm talking about rubbing out your finish. But first I want to assure you that I won't ask you to spend hours massaging your project with 0000 steel wool. And I'm not going to ask you to buy pumice, or rottenstone, or rubbing and polishing compounds. You'll only need those products if you're going for the ultimate high-polish mirror finish, which I do with about the same regularity as a visit from Halley's Comet!

No, all I want you to do is hand sand your finish (not the bare wood, but the varnish, shellac, lacquer or polyurethane), with two or three different grit sandpapers. It's so simple, you won't want to tell anyone how you did it because the fantastic results look like it ought to require a lot more work.

What finishes rub best

The method I'll describe here will work on any common film-forming finish. It is easiest and will produce the best results on lacquer and shellac, but you'll still get incredible results with varnish (including polyurethane varnish) and water-based finishes.

Shellac and lacquer work best because the dried film, although hard, is still softer than water-based finishes and varnish (which is almost always sold as polyurethane). This property makes it sand faster, so it's easier. Also, the scratches from the sanding are smoother, producing a clearer sheen. But in no way let this discourage you from applying these techniques to your varnish and water-based finishes.

Sanding the first, or sealer coat

You start finishing your finish after your first coat or sealer coat has been applied and has had time to dry. Drying time will vary greatly depending on the finish you're using. Basically, it's dry enough when it doesn't "ball up" on the sandpaper. For this first sanding, use what's called a "self-lubricating" aluminum oxide sandpaper. It is self lubricating because it has a special powder applied to it that helps prevent sanding dust from sticking in the abrasive grit and clogging it up. One common brand of such sandpaper is 3M Tri-M-ite.

To sand, use moderate pressure to sand off the fuzzy-feeling "nibs," or all the little imperfections that make the first coat rough to the touch. In smoothing this first coat, you are preparing a surface for the application of the next coat. The objective is to begin producing an ideal surface. Think of glass as a perfect surface. If you brushed or sprayed a finish on it, it would lay out and form a perfectly smooth film.

In addition to sanding off the nibs, you also want to begin "leveling" your first coat of finish. This will include high spots from lapping brush strokes, or runs or sags on vertical surfaces. If you finish open-grained woods such as oak, ash, walnut or mahogany, leveling will also begin knocking down the "peaks" of finish created by the "valleys" of the open grain.

A word of caution is in order, particularly if you are working with a project that has any type of color applied, such as a stain or dye. If you sand too much, you will sand, or "cut," through the film and likely sand away the applied color. Edges are especially vulnerable and require a delicate touch.

Now that you have completed your first level of surface preparation, dust off the work and apply more finish material. If you are brushing varnish, polyurethane varnish or water base, one coat is probably enough. If you are brushing or spraying shellac or lacquer, apply at least three coats. Again, allow sufficient drying time between coats and before the next sanding step.

Wetsanding: A brave new world

If wetsanding is new to you, you'll be amazed at how efficient it is when applied to your finish. For sandpaper, switch to 400-grit wet/dry sandpaper. This is a paper with a special adhesive that won't dissolve in the liquid, and the paper itself will hold up as well.

Wetsanding works because the liquid you use both lubricates between the surface and the sandpaper and, importantly, flushes away the material that is being removed by the sanding process.

When wetsanding, I like to use a half sheet of sandpaper that has been folded twice. Some finishers prefer to wetsand with a block that has a piece of ¼" cork glued on the sole. Using a block can help make sure you sand flat continually and, some might argue it helps prevent "cutting through," but it can give the user a false sense of security.

The liquid I prefer for wetsanding is paint thinner. You can also use water that's had a few drops of liquid dish

Goobers Begone!

HOW TO FIX THE GOOBER • First, let the finish dry completely and don't be tempted to try to fish out that errant hair, fly or dust speck. You'll only create a bigger problem. Next, lightly sand the finish in the dust-strewn area with 220-grit paper, dry. Try to get the surface as level as possible to the surrounding finish. Next, apply another coat of finish and let it dry completely. Proceed with wetsanding and *presto*, you'll wonder where the sawdust went.

DRIED GOOBERS • A close-up of the accumulated dust to show just how bad a problem it is.

VOILA! • Much much better than new. The massive sawdust defect is virtually eliminated. Need you ever worry about finishing in a "dust free" area again?

Four Steps to a Super-Fine Finish

Here's a close-up of what the finish looks like after a first coat of lacquer on walnut, which is an open-grained wood. The finish will feel fuzzy and the grain will look hilly. The object is to remove these fuzzy nibs and level the finish so that the next coat of finish will lay flatter.

Sanding the first, or sealer coat with 360-grit dry-lube sandpaper is the first step in rubbing out, or finishing your finish. This sanding is the first step in preparing the surface for the next coat of finish and begins leveling the surface. Use a full sheet of sandpaper folded twice under the flat of your hand (inset). Then add another coat of finish. At this stage, your finish will begin leveling, seriously reducing the open-grain look of a non-sanded finish.

detergent added. Paint thinner works best because it's more efficient at flushing away the sanded finish residue. We all know that water on wood and wood finishes has some inherent problems, especially if the end grain isn't completely sealed.

So is wetsanding a tedious, time-consuming chore? Clearly, it adds a couple more steps to the finish process, but if your goal is simply a nice, slicked-up finish, it really doesn't take all that much extra work. For example, the walnut sample board in the photos is about 18" x 36" and it took me no more than 10 to 12 minutes to wetsand it each time. In some respects, it may *save* you some time. If you've been led to believe the nutballs who insist you finish in a "dust free" environment, forget it. Let me save you some time because it may take you less time to wetsand than create a "clean" room. You'll also benefit from not being concerned about goobers falling in your not-quite-dry finish.

Now, depending on the type of finish and sheen you want, you can proceed with another round of applying clear finish and wetsanding a last time, or you can basically call your finish done, except for a final coat of wax. Of course, before you complete the job with a coat of wax, clean all the messy sanding slurry off the work. For this chore, use either paint thinner or VMP naphtha on a clean rag.

On tight-grained woods such as cherry, maple, birch or a softwood like pine, you will have a smooth, flat, closed-pore finish with a medium sheen. With open-grained woods such as walnut or mahogany, the finish will be either an open or semi-open pore finish. The distinction is simply a matter of the degree of wood grain that's not filled up and leveled off.

To achieve a fully filled finish on open-grained wood that's not been grain-filled, you'll need to proceed with another coat of finish and another wetsanding. Follow the procedure as before. By the end of this stage your finish should be finished except for a coat of wax.

Should you want a higher level of sheen, wetsand one last time using 600-grit wet/dry sandpaper.

It would be at this stage that you would continue working with various levels of rubbing and polishing compounds if you wanted to create a high-polish finish. Frankly, it would take a pretty special project for me to go to that level of a finish.

In fact, I'd even make a strong recommendation that

STEP 3
First Wetsanding

Wetsanding will open new worlds of better finishes for you. Use 400-grit wet/dry sandpaper and a lubricating liquid such as paint thinner or soapy water to allow the fine abrasive to work without becoming clogged (see inset).

STEP 4
Second Wetsanding

A final wetsanding with 600-grit wet/dry sandpaper will produce a higher sheen if so desired. This sanding should go quickly because the objective is only to eliminate the coarser sanding scratches from the previous sanding, not leveling the surface further.

If you choose, you can take your finish to an even higher level of sheen by rubbing it out with polishing compounds and very fine steel wool. However, I recommend this only for your most important projects.

when you decide to wetsand a project, you might even skip certain parts of the project altogether. For example, it would be good to wetsand a table top but not the legs. Or the top of a desk but not the sides. In other words, only the most prominent and visible features. Generally speaking, it would be very difficult to wetsand the details on turned or carved work.

If you forego wetsanding part of a project, it may, however, be necessary to rub out the entire piece with 0000 steel wool or a synthetic steel wool product like 3M's Scotch Brite pads. This will impart a consistent level of sheen to the entire project.

You should also consider using only gloss finish on projects you intend to wetsand. Not only will the gloss finish material make the finish look clearer, but the final sheen will be derived from the wetsanding or rubbing. **PW**

Editor's note: This is the final installment in our series on finishing. I appreciate you hanging in through all the stories. If you have specific questions about finishing, I encourage you to contact me here at the magazine by e-mail: SteveS@FWPubs.com, or by regular mail: Popular Woodworking, *1507 Dana Ave., Cincinnati, OH 45207.*

SECRETS TO STEEL WOOL • If you do decide to use steel wool in the final polishing of your project, here's the right way to use it. Unfold the pad completely and then fold it over on itself once. Then use the flat of your hand to press the steel wool against the wood.

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If you're like most woodworkers, you earned your skills the hard way: by working alone in your basement night after night. Sure, your father or shop teacher might have shown you some basics, but the reason you can cut a mortise-and-tenon joint is because you taught yourself how to cut that mortise-and-tenon joint.

There are wood schools you can attend, of course. But few woodworkers have the hundreds or thousands of dollars to invest in the training. Most of us would rather buy a new tool with that money.

That's why *Popular Woodworking* is rolling out its "*Popular Woodworking* Boot Camp" contest. One lucky woodworker and a friend will win an all-expenses-paid trip to our magazine's headquarters in Cincinnati, Ohio. Here you'll work with our editors in our huge cabinet shop and get the training that will take your woodworking to the next level — whether you're a rank amateur or a seasoned home-shop veteran. You'll build a project that will be published in a future edition of *Popular Woodworking*, and you'll take home a Jet contractor saw and dust collector for your home shop.

All you have to do is send us your most inspiring home woodworking story. It can be entertaining or serious. Just as long as it's about woodworking in the home shop, and as long as your tale is true, we'll read it. Entries should be no longer than 650 words and should be received in our editorial offices no later than Aug. 16, 1999. The winner will be chosen by the editorial staff based on the content of the story. All entries become the property of *Popular Woodworking*.

Send your entry to:

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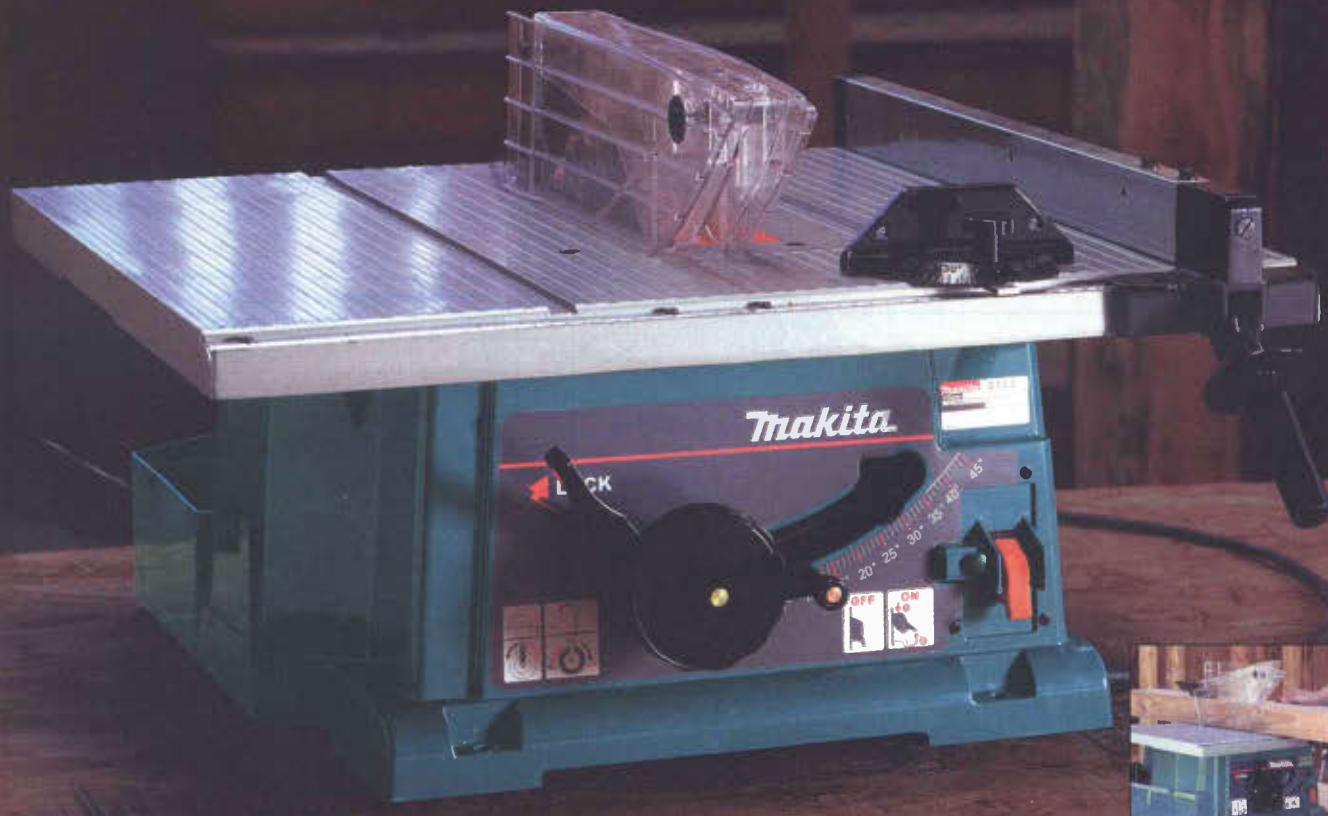

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Roadhouse Pipe Box

Back in the days of horse and buggy, travelers would stop at a roadhouse where they'd likely see a box like this on the wall. It held a selection of clay pipes for the use of patrons. A traveler who wanted a smoke would take a pipe from the box and break off a short piece of the stem as a sanitary measure. After use, the pipe was put back in the box for the next smoker. This accounts for the unusually long stems on clay pipes.

If you don't smoke, you could always use this box to hold dried flowers or other decorative items.

STEP ONE: Construction is simple. The front, divider and bottom are captured between the sides and attached with glue and nails. That assembly is then glued and nailed to the back. Begin by cutting out all the pieces according to the sizes in the Schedule of Materials. Glue and nail the divider perpendicular and flush to the bottom of the front.

STEP TWO: Now glue and nail the sides to the front, flush to the top of the front. Glue and nail the bottom in place.

STEP THREE: Cut a radius on the back according to the diagram, then drill a 1/2" hole for hanging on the wall. Before attaching the back, paint the inside of the box. Mask the edges of the back where the sides meet and paint it also. After the paint dries, remove the tape from the back and glue and nail the back to the box assembly.

STEP FOUR: The drawer is tricky only in that it is so small. Before assembly, cut a 1/4" x 1/8" rabbet on one edge of all four drawer sides. This will capture the bottom.

Cut a 1/4" x 1/4" rabbet into three edges of the front. Nail the sides into this rabbet. Nail the back between the sides and nail the bottom into the rabbet on the bottom edges.

STEP FIVE: After fitting the drawer to the opening, sand and paint all the parts. Lay out the decorative design using the PullOut™ Plans and a compass. Use a contrasting paint to highlight the design. Attach a screw-in pull on the drawer front and you are ready for the next wayfarer that stops by. **PW**

—Jim Stuard, PW staff

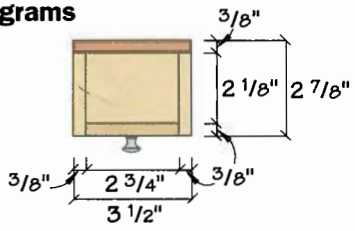
Schedule of Materials: Pipe Box

No.	Item	Dimensions T W L	Material
1	Back	3/8" x 3 1/2" x 12"	Pine
2	Sides	3/8" x 2 1/2" x 10 3/8"	Pine
1	Front	3/8" x 2 3/4" x 8 1/4"	Pine
1	Divider	3/8" x 2 1/8" x 2 3/4"	Pine
1	Bottom	3/8" x 2 1/2" x 2 3/4"	Pine
1	Drawer front	3/8" x 1 3/4" x 2 3/4"	Pine
2	Drawer sides	1/4" x 1 3/4" x 2 3/8"	Pine
1	Drawer back	1/4" x 1 3/4" x 2 1/4"	Pine
1	Drawer bottom	1/4" x 2 1/4" x 2 1/2"	Plywood

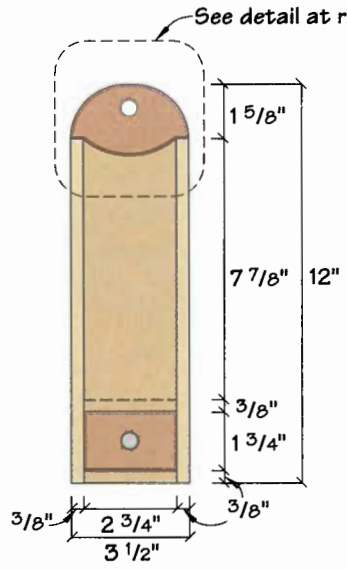
Are we on target?

To see more projects like this in future issues, circle "P6" on the postage-paid card in the Resource Directory.

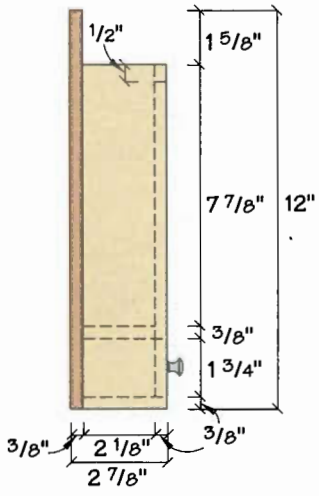
Diagrams



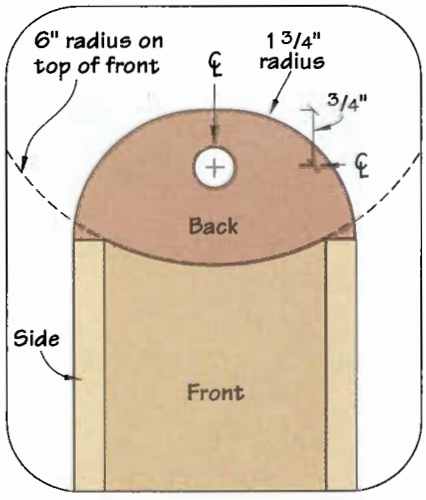
Plan



Elevation



Profile



Detail of Front cutout

PullOut™ Plans • March 1999 issue #107

Popular Woodworking

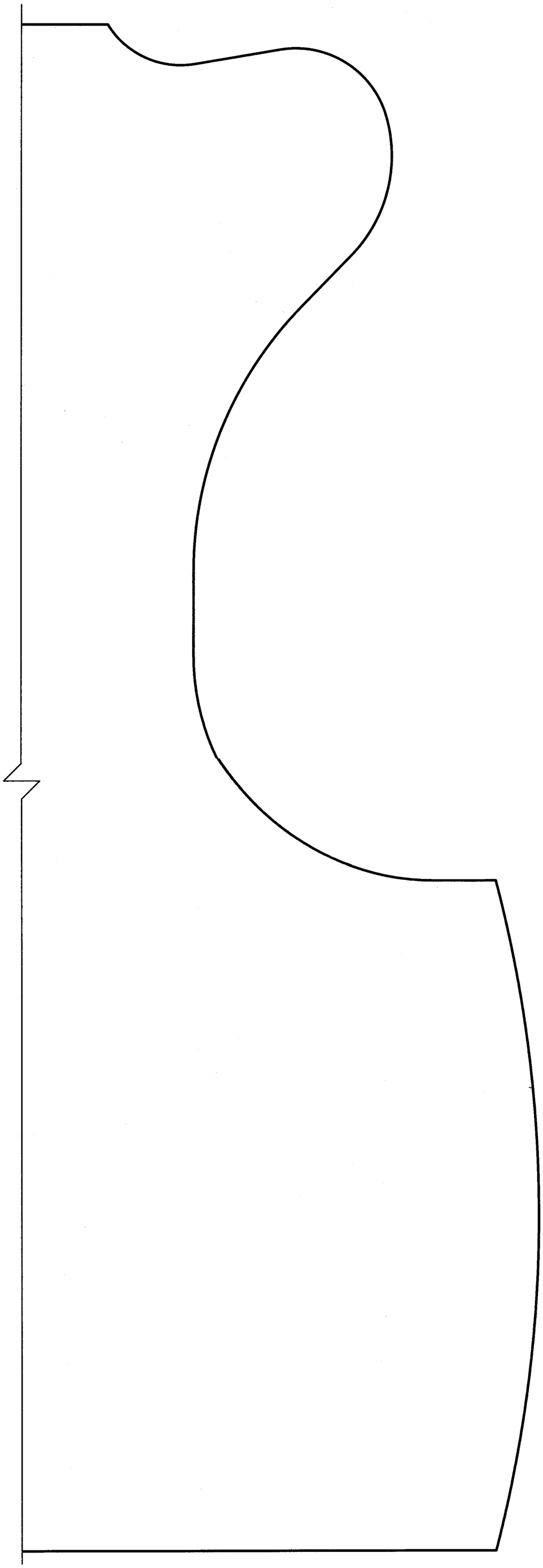
Carefully open staples to remove plans, then bend staples closed again.

Supplemental drawings for projects in this issue

These plans incorporate pages 41 to 48 of this magazine

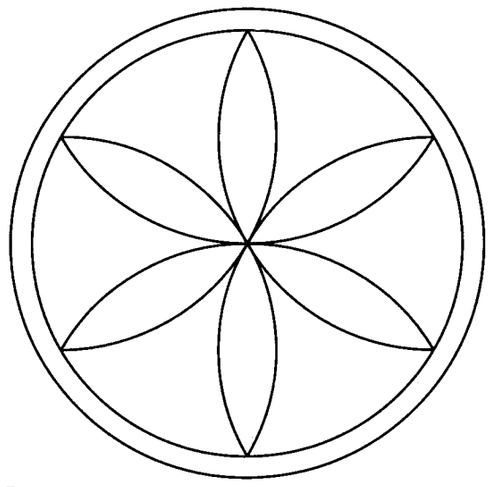
Mission Style Server

Full-size diagram of pattern on top of end.



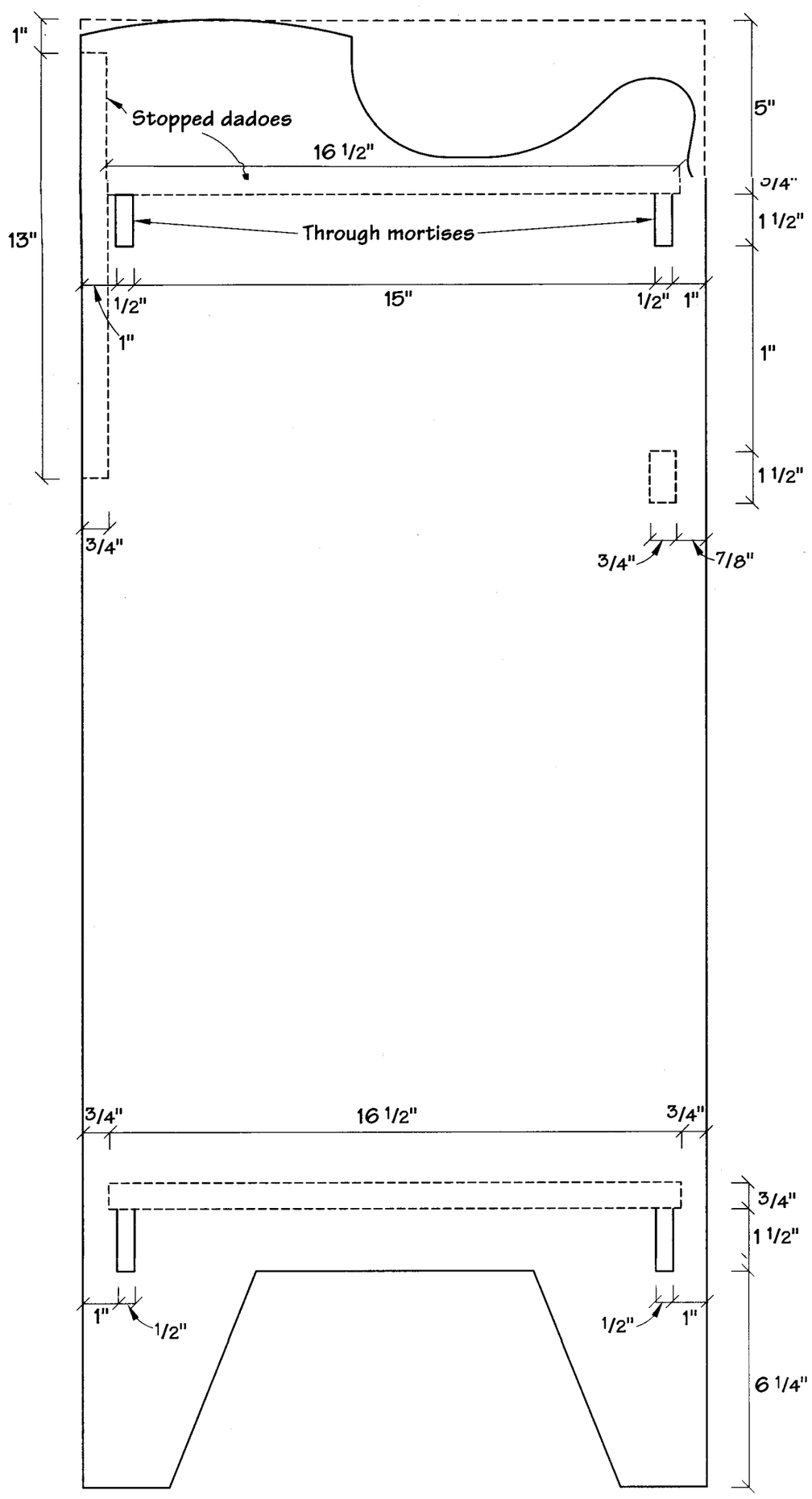
Roadhouse Pipe Box

Full-size diagram of design on front of box.



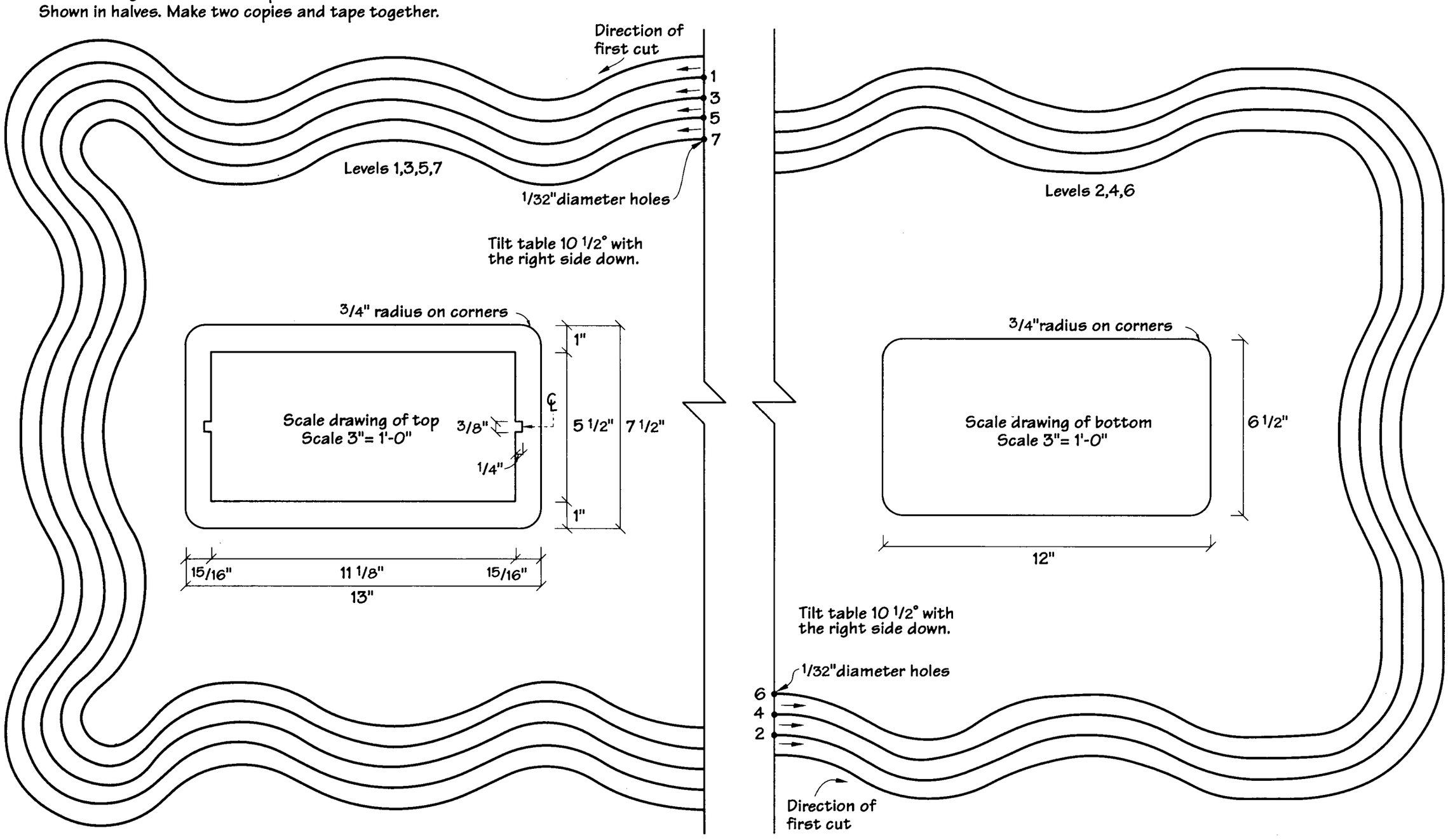
Mission Style Server

Scale diagram of mortise and dado location on the ends.
Scale: 3" = 1'-0"



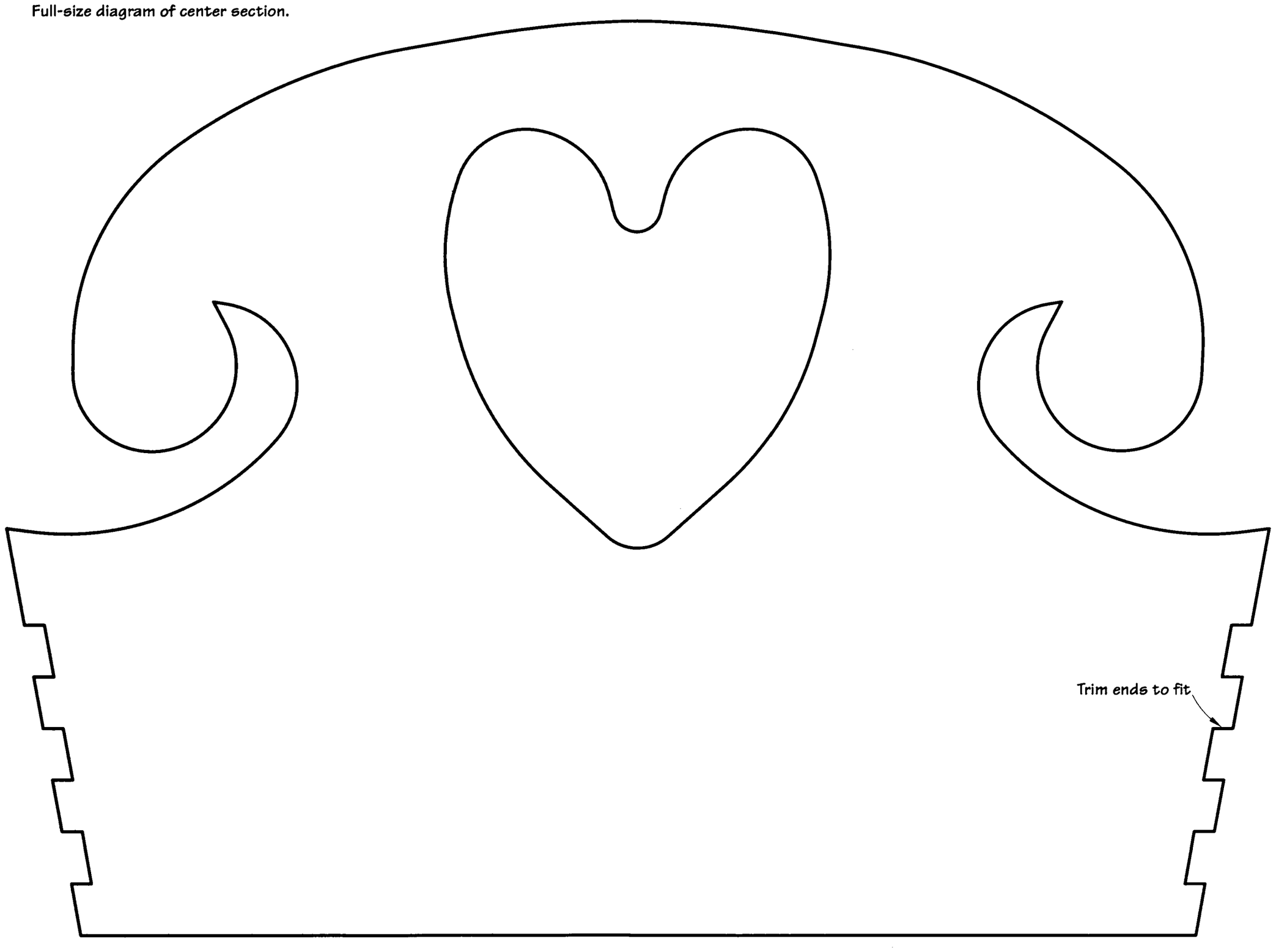
Silverware Basket

Full-size diagram of scrollsaw pattern.
Shown in halves. Make two copies and tape together.



Scrollsaw Silverware Basket

Full-size diagram of center section.



Shoji-Paper Lamp

Believe it or not, the idea for this lamp came to me while scrutinizing some flea-market lampshades made from used popsicle sticks. The concept, I decided, was sound. But I wanted to make some changes.

So instead of gorging myself on 100 Dreamsicles, I decided to use 1/4" maple strips. And instead of creating a true oddity of Americana, I chose to look to the Far East to create a lamp that would be at home in a Japanese household.

STEP ONE: First you need to cut the 88 sticks that make up the sides. Rip some 1/4"-thick maple into 1/4"-wide strips. I found that a board that's 1/4" thick, 6" wide and 4' long makes one lamp. Now crosscut the strips to 6 1/8" long.

STEP TWO: Now drill the 176 holes in the side pieces for the four dowels that hold the lamp together. I made a jig to hold a side piece in place on my drill press while I drilled the holes. The center of each 1/8" hole is located 3/16" in from each end. Now sand all the pieces.

STEP THREE: Build the base. First cut the base to size and cut two 1/4"-deep by 3/4"-wide grooves in the bottom of the base. These should be located 7/8" from the edges. Glue the feet in place. Now mark on the base where the four dowels will be located. Here's how: Draw two lines between the opposite corners of the base. This creates an "X" at the center of the board. Measure out 4 1/16" from the center on each of these four lines. Drill a 1/8" hole at each location.

STEP FOUR: Sand your four 1/8" dowels a bit and put some wax on them. Slide the side pieces onto the dowels. When you've reached your final height, glue the four dowels into the base. Glue the top two side pieces to the dowels and cut them flush to the top.

STEP FIVE: Glue the shoji paper to the inside of the lamp. I cut out four pieces of paper and glued them to the inside using yellow glue sparingly. Add your light fixture and you're done. No finish is required. **PW**

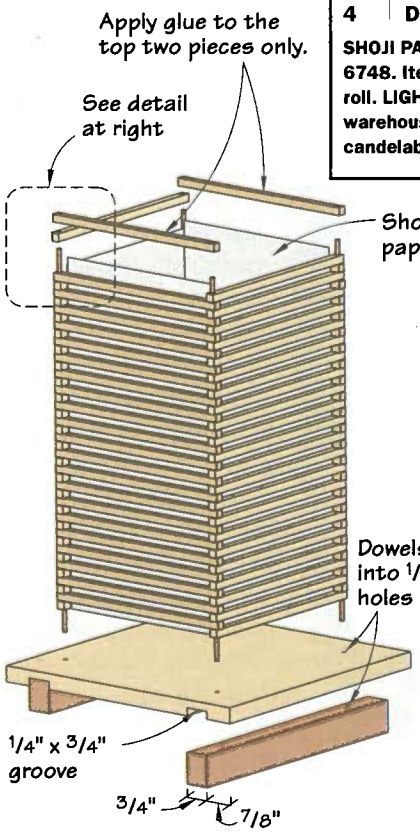
— Christopher Schwarz, PW staff

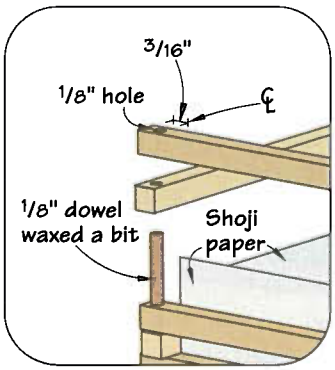
Diagrams

Schedule of Materials: Shoji-Paper Lamp

No.	Item	Dimensions T W L	Material
88	Sides	1/4" x 1/4" x 6 1/8"	Maple
2	Feet	3/4" x 1" x 8 1/2"	Maple
1	Base	1/2" x 8 1/2" x 8 1/2"	Maple
4	Dowels	1/8" x 13"	

SHOJI PAPER available from Highland Hardware 800-241-6748. Item # 21.64.01 • $11.95 for a 11 1/8" x 60-foot roll. LIGHT FIXTURE available from Lowe's or other home warehouses. I used an Angelo brand 6' cord set with candelabra base. Item # 70108 • $3.98.





Detail of dowel assembly

Are we on target?

To see more projects like this in future issues, circle "P7" on the postage-paid card in the Resource Directory.

Mission-Style Server

When I first began building mission furniture for a customer's dining room, I aspired to build a great big sideboard like a turn-of-the-century Stickley piece. As I looked at my customer's dining room again and again, that sideboard became smaller and smaller until finally it ended up a server. The project is built of white oak, using through-tenons with beveled edges to soften the look. There's a little more scrollwork than most Stickley projects, and there's a large radius curve cut on the back piece of the serving table.

STEP ONE: Select the wood and match the grain patterns for the best look. Glue up any panels to needed width. Then mill the wood to the final dimensions.

STEP TWO: Before cutting the top pattern on the side pieces, mark then rout the 3/4" x 1 1/4" through-mortises in the sides as located in the PullOut™ Plans.

The top and lower shelf are held in place between the sides in 3/8" deep x 3/8" wide x 14 1/2" long dadoes. The lower drawer rail slides into 3/4" x 3/4" x 3/8"-deep mortises in the sides. Mark and rout the dadoes at the locations shown in the PullOut™ Plans.

STEP THREE: The back fits into the sides in 3/8" x 3/4" stopped rabbets cut on the back edge of the sides. Start the rabbet 14" down from the top of each side, and stop the rabbet 1" down from the top.

STEP FOUR: To form the tenons on the shelf and top, cut a 3/8" x 3/8" rabbet on the ends of the lower shelf and top, making the cut from the bottom. Trim the ends of the tenons off 1" from each end to fit into the 14"-long mortises.

STEP FIVE: On each of the four rails, cut the through-tenons by removing 1/8" of material, 1 1/4" in on two sides of each end. This will leave a 1/2" x 1 1/2" x 1 1/4" tenon on the end of each rail. Cut the ends on the lower drawer rail to form 3/4" x 3/4" x 3/8"-long tenons centered on the rail.

STEP SIX: The last bit of mortising is for the drawer divider stile. Cut 3/8" x 3/4" mortises in the center of the two drawer section rails. Then form a 3/8" x 3/8" x 3/4" tenon on both ends of the divider stile.

STEP SEVEN: Now transfer the full-size pattern for the side detail from the PullOut Plans to a piece of 1/4" or 1/2" material to be used as a router pattern. Transfer the pattern to the sides, then cut the shapes using a band saw or jigsaw, staying 1/16" from the traced line. The pattern can then be clamped in place and the shape routed smooth on each side using a pattern bit in the router.

STEP EIGHT: To cut the curve on the back, mark 1" down from the top on each side and make a mark. Then use a thin strip of wood (1/4" x 1" x 48" will do well) and hold the two ends on the end marks. Next bend the center of the stick out to the top edge of the back and mark the curve. Cut the curve with a jigsaw or band saw and sand.

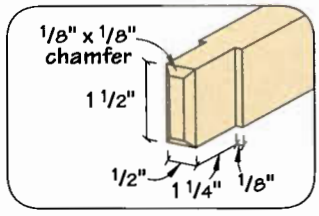
STEP NINE: Lightly bevel all the edges using a small chamfer bit or by vigorously sanding. Then sand all the pieces through 220 grit.

STEP TEN: Before assembly, rout a shallow groove in the top about two inches from the back so that you can display your china. Also, on the end of each through-rail, chamfer the ends on all four faces to soften the ends of the through-tenons. Only 1/2" protrudes, so chamfer about 1/4".

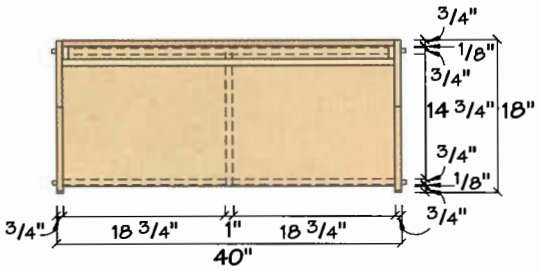
About the Author

Andrew Schultz, a frequent contributor to this magazine, is the author of "Classic Arts & Crafts Projects You Can Build," which will be published by Popular Woodworking Books in April 1999. The book will be available through the WoodWorker's Book Club. Call 800-937-0963 to join.

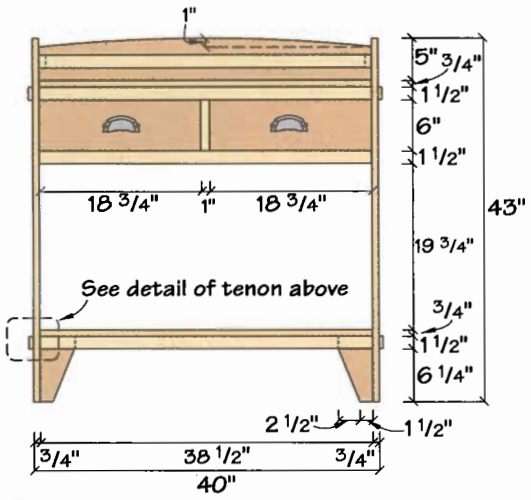
Diagrams



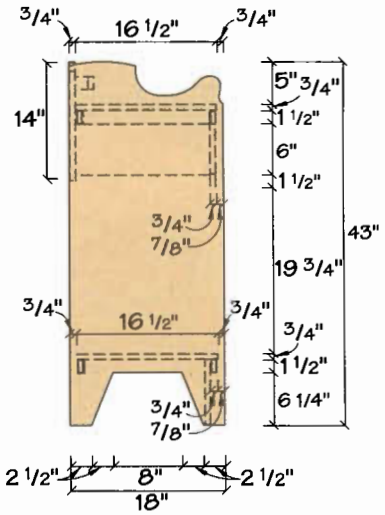
Detail of tenon end



Plan



Elevation



Profile

Schedule of Materials: Mission-Style Server

No.	Item	Dimensions T W L	Material
2	Sides	3/4" x 18" x 43"	White oak
1	Top	3/4" x 16 1/2" x 39 1/4"	White oak
1	Lower shelf	3/4" x 16 1/2" x 39 1/4"	White oak
4	Rails	3/4" x 1 1/2" x 41"	White oak
1	Lower drawer rail	3/4" x 1 1/2" x 39 1/4"	White oak
1	Back	3/4" x 14" x 39 1/4"	White oak
2	Feet	3/4" x 4" x 7 3/4"	White oak
1	Plate rail	3/4" x 1 1/4" x 38 1/2"	White oak
2	Plate rail brackets	3/4" x 1 1/4" x 1 1/2"	White oak
1	Drawer divider stile	3/4" x 1" x 6 3/4"	White oak
2	Drawer fronts	3/4" x 6" x 18 3/4"	White oak
1	Drawer divider	1" x 6" x 15 5/8"	Poplar
4	Drawer sides	1/2" x 5" x 15"	Poplar
2	Drawer front	1/2" x 5" x 17 1/4"	Poplar
2	Drawer back	1/2" x 4 1/2" x 17 1/4"	Poplar
2	Drawer bottoms	1/4" x 14 1/2" x 17 1/4"	Plywood

Are we on target?

To see more projects like this in future issues, circle "P10" on the postage-paid card in the Resource Directory.

STEP ELEVEN: Start assembly by gluing the drawer divider stile into the two front rails. Then glue and clamp the rails, top and shelf between the sides, checking for squareness. Apply a bead of glue to the top of the lower and upper rails and clamp the shelf and top to the rail tops. Biscuit the poplar drawer divider between the drawer divider stile and the unattached back piece.

STEP TWELVE: Before gluing and clamping the back panel in place, glue the drawer divider in place in the center of the drawer space, attaching the piece to the underside of the top and the drawer rails and divider. Then glue the back in place, using glue only in the center of the panel to allow for movement due to humidity changes.

STEP THIRTEEN: Make the drawers in the manner you prefer. The dimensions provided in the Schedule of Materials allow for a box drawer that will then be glued or screwed to the drawer front. The drawer is assembled by cutting 1/4" rabbets on the ends of the front and back, and 1/4" x 1/4" rabbets on the ends of the sides. To support the bottom, cut a 1/4" x 1/4" groove 1/2" up from the bottom edge on the sides and on the front of the drawer box. The drawers are mounted in the drawer space on drawer slides. I allowed 1/2" on each side of the drawers to accommodate a drawer slide.

STEP FOURTEEN: With the drawer boxes assembled, mount the drawer slides on the server and the drawers and check the fit. Fit the drawer fronts and mount the fronts to the drawers.

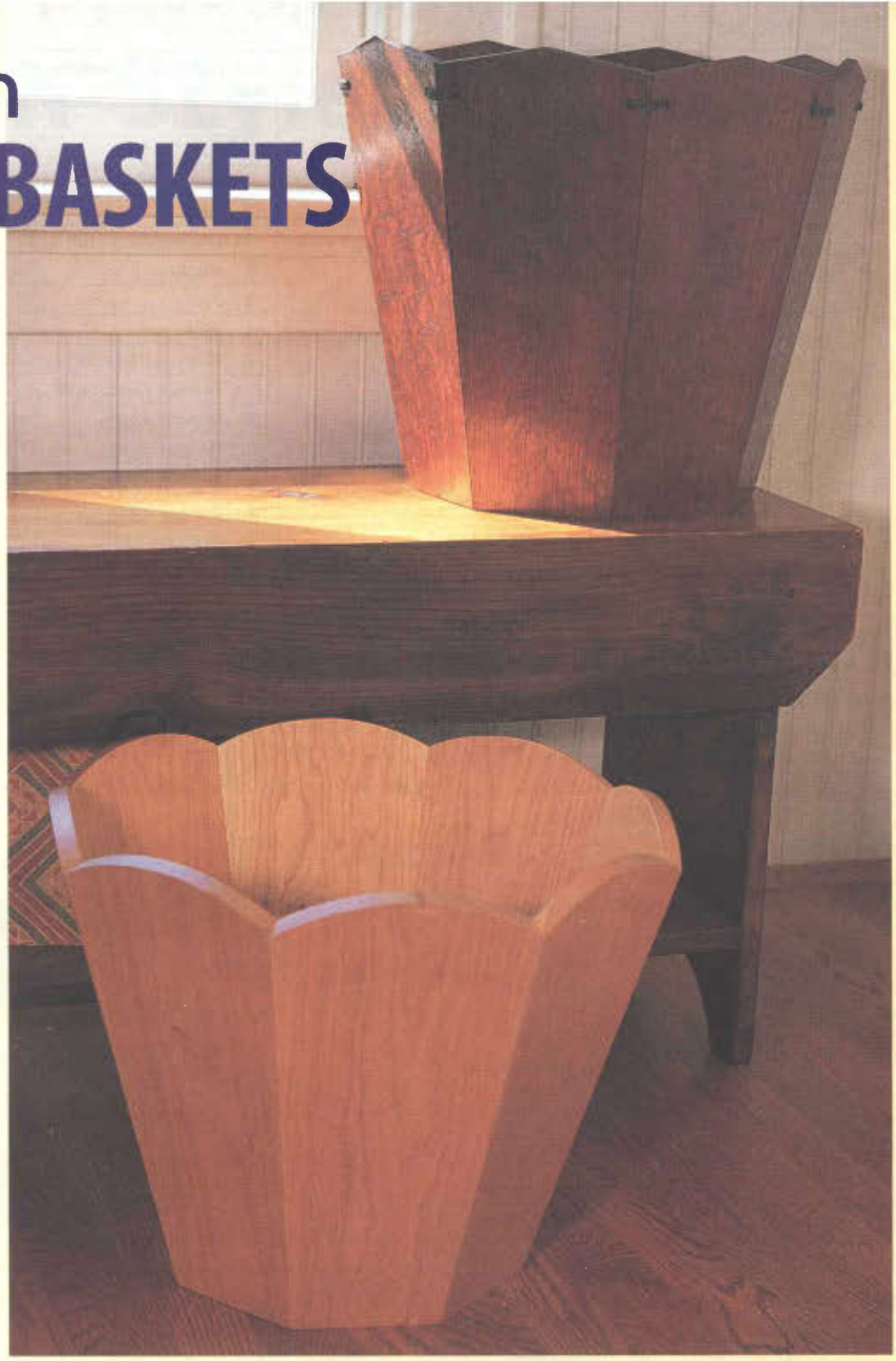
STEP FIFTEEN: The last two construction details are the plate rail and the feet brackets. First biscuit or dowel the two support brackets to the back of the plate rail, then drill clearance holes through the server's back to screw the brackets and rail to the server. The feet are cut to shape and then glued to the inside of the sides and flush to the inside of the front and back rails.

STEP SIXTEEN: To finish the server, I used Moser's aniline dye (oil soluble) in a medium fumed oak color followed by two coats of boiled linseed oil rubbed in. Moser's stains are available from Woodworker's Supply 800- 645-9292.

Apply the finish with a good brush. Between coats, sand lightly with the orbital sander and with 220 paper (or by hand). **PW**

—Andrew Schultz

Wooden WASTE BASKETS



As projects go, this one's pretty simple — once you get the hang of the compound miters. The mechanics are the same for both waste baskets pictured, but I built two to give you an idea of how you can personalize your own wooden waste basket project.

STEP ONE: It's very easy to modify the basket by changing any of the dimensions. Adjusting the taper angle on the sides will make the basket wider or smaller at the opening. The construction steps will remain the same, so feel free to experiment. In fact the two baskets shown are of different thickness (the oak is 3/8" and the cherry is 5/8"). Also, the cherry basket is shorter than the oak. Start by cutting and planing the pieces to the sizes in the Schedule of Materials (those listed are for the oak basket). If you change the size of the sides, you'll need to change the size of the bottom, so cut that piece to size last.

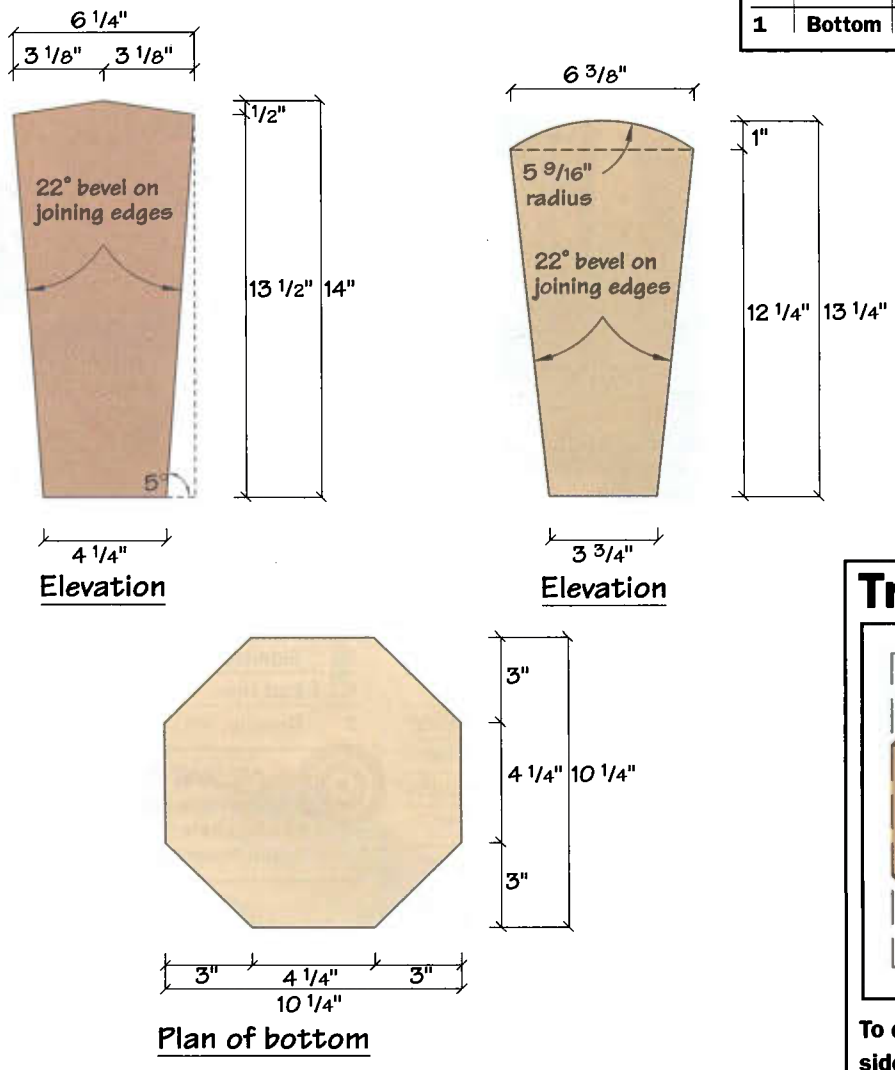
STEP TWO: With the sides cut to size, it's time to start mitering. I recommend using a tapering jig to form the compound angles. If you don't have one, it can be made simply with a couple pieces of poplar, a hinge and a drop-front door stay. Lay out the shape of the sides by marking the vertical center on one of the sides. Then mark the 4 1/4"-wide bottom (assuming a 5-degree taper on the sides). Draw a line to connect the top corner to the bottom mark on both sides. Now set the blade's bevel angle to 22 degrees, and set the tapering jig and rip fence to make the cut along the left side of the piece. Cut all the left sides, then flip the tapering jig end for end and reset the tapering jig angle to match the taper angle on the right edge of the side. Then make those cuts.

STEP THREE: To check the fit of your miters, lay all of the sides flat and face-up on a table and use masking tape to temporarily attach the sides together. The miters should all fit fairly tightly. While the basket is taped as a cylinder, it's time to fit the bottom. Follow the instructions in the article "Trash Can Math" to lay out and cut the octagon shape. The 10 1/4" size should work for the sizes given in the schedule. If you change sizes, recheck the bottom size. Cut the octagon bottom to size, then set the sawblade angle to 80 degrees and run all eight edges to allow the bottom to fit tightly against the sides.

STEP FOUR: At this point the hard part is over and you can have some fun. I opted for two different edge treatments on the tops of the sides: the oak with a shallow picket top; and the cherry with a simple radius. You can get as crazy or as simple as you please.

STEP FIVE: I also played a little bit with the way the baskets are held together. Truth be told, the compound

Diagrams



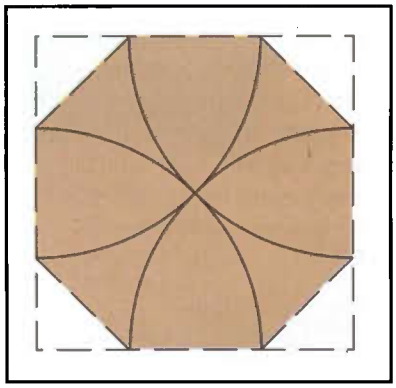
Schedule of Materials: Wooden Waste Basket

No.	Item	Dimensions T W L	Material
8	Sides	3/8" x 6 1/2" x 14"	Oak
1	Bottom	3/4" x 10 1/4" x 10 1/4"	Oak

Are we on target?

To see more projects like this in future issues, circle "P8" on the postage-paid card in the Resource Directory.

Trash Can Math



To determine the length of the sides on an octagon (such as a waste basket bottom), all you need is a trammel and a straight edge. After cutting the bottom square, mark the center of the piece by using a straight edge to draw intersecting lines from opposite corners. Next set your trammel points to make a mark the length of the distance from the center to an outside corner. To mark the octagon, put the pin in one corner, and pivot the pencil from side to side, marking where the radius intersects with the sides. Repeat for all corners, then connect the marks.

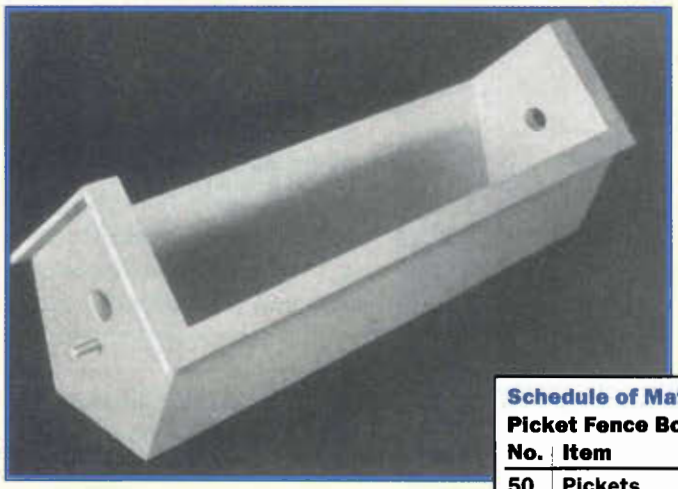
Shown at use on another project, our shop-made taper jig solves lots of geometric problems. If you don't own one (they're about $15 to $20), you can make one.

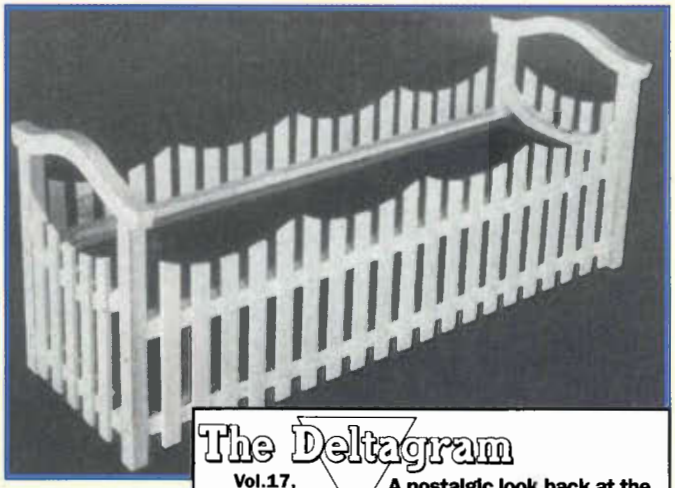
miters on the oak basket weren't quite perfect, and rather than recut the angles I decided to fall back on a historical "tied" joint that didn't require a perfect miter. If you opt to tie the basket, drill two 3/8" holes on each side, then sand and finish the individual pieces before assembling. I used a Cordovan TransTint™ Dye from Homestead Finishing Products (440-582-8929) followed by a coat of orange shellac to give the piece an antiqued finish. Next use a piece of leather (shoelace or a craft supply store purchase) to cinch the tops of the sides together. Tape the lower part of the sides together as before, drop the bottom in place and use plain or decorative nails to hold it in place.

The cherry miters worked fine, and I used the taping-the-sides trick to clamp the sides while the glue dried. Once dry, I applied a little glue to the edges of the bottom and lowered it into place. The pressure of the fit was fine for drying purposes. I then sanded the piece and applied a clear finish. **PW**

— David Thiel, PW staff

PROJECTS FROM THE PAST
FLOWER BOXES





The Deltagram

Vol.17, Issue 5 1947-1948

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

There is always room for one more flower box to brighten up the windows or porch rail. Here are two designs to pick from. Both are built from pine or fir.

For the picket fence box, you should also build a separate box that sits inside to hold the flowers. You also could build metal pans or liners to keep the wood from rotting. **PW**

Schedule of Materials: Flower Boxes

Picket Fence Box

No.	Item	Dimensions T W L
50	Pickets	3/16" x 3/4" x 9"
4	Uprights	3/4" x 3/4" x 11"
2	Lower ends	3/4" x 3/4" x 7 1/2"
2	Middle ends	3/4" x 2 1/4" x 7 1/2"
2	Upper ends	3/4" x 2" x 10 1/2"
4	Sides	3/4" x 3/4" x 28 1/2"
2	Interior sides	3/4" x 6" x 26 3/4"
1	Bottom	3/4" x 5 3/4" x 26 3/4"
2	Ends	3/4" x 6" x 7 1/4"

Bird House Box

No.	Item	Dimensions T W L
2	Sides	3/4" x 6 3/4" x 28 1/2"
1	Bottom	3/4" x 5" x 28 1/2"
2	Ends	3/4" x 9 3/4" x 10 3/4"
2	Side trim	3/8" x 1 1/4" x 28 1/2"
4	End trim	3/8" x 1 1/2" x 7 5/8"
2	Dowels	1/4" x 5"

Are we on target?

To see more projects like this in future issues, circle "P1" on the postage-paid card in the Resource Directory.

Diagrams

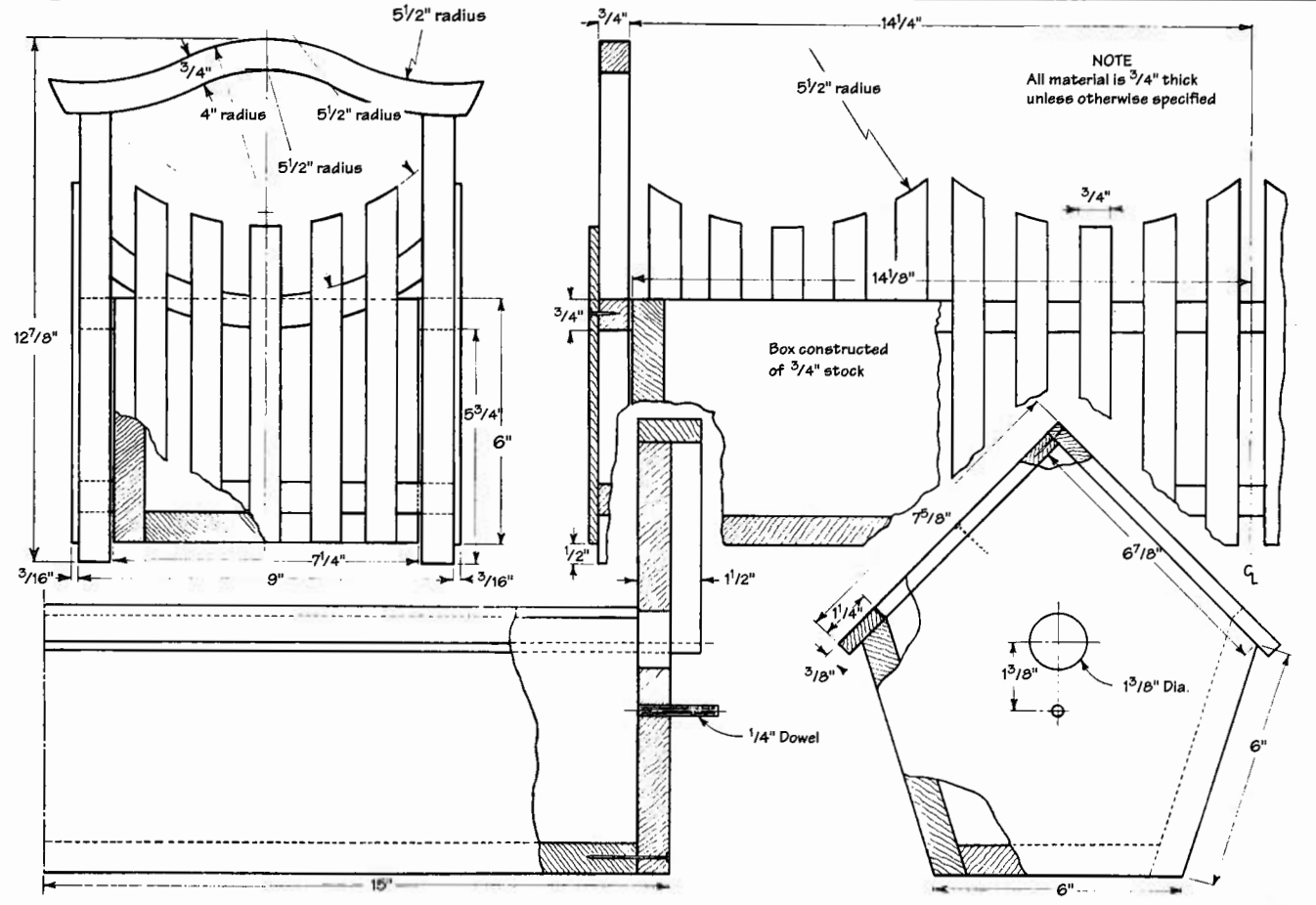


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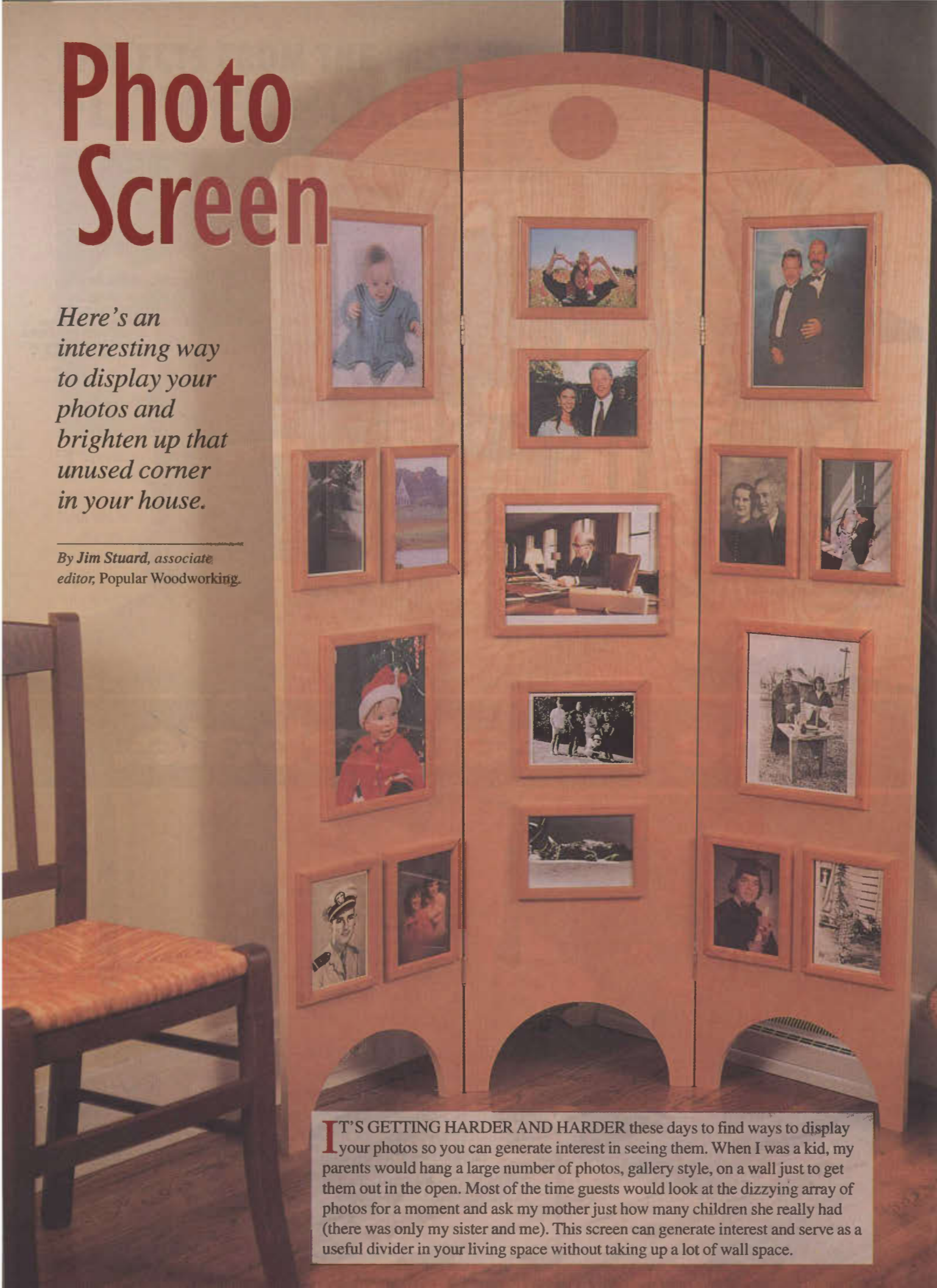
Photo Screen

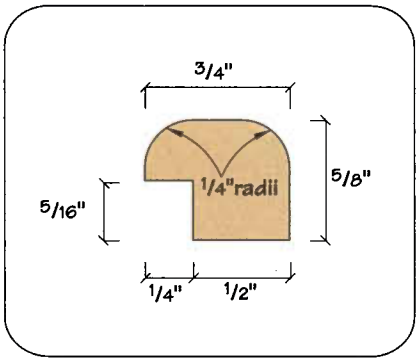
Here's an interesting way to display your photos and brighten up that unused corner in your house.

By **Jim Stuard**, *associate editor,* Popular Woodworking.



IT'S GETTING HARDER AND HARDER these days to find ways to display your photos so you can generate interest in seeing them. When I was a kid, my parents would hang a large number of photos, gallery style, on a wall just to get them out in the open. Most of the time guests would look at the dizzying array of photos for a moment and ask my mother just how many children she really had (there was only my sister and me). This screen can generate interest and serve as a useful divider in your living space without taking up a lot of wall space.

Diagrams



Profile of frame moulding

Schedule of Materials: Photo Screen

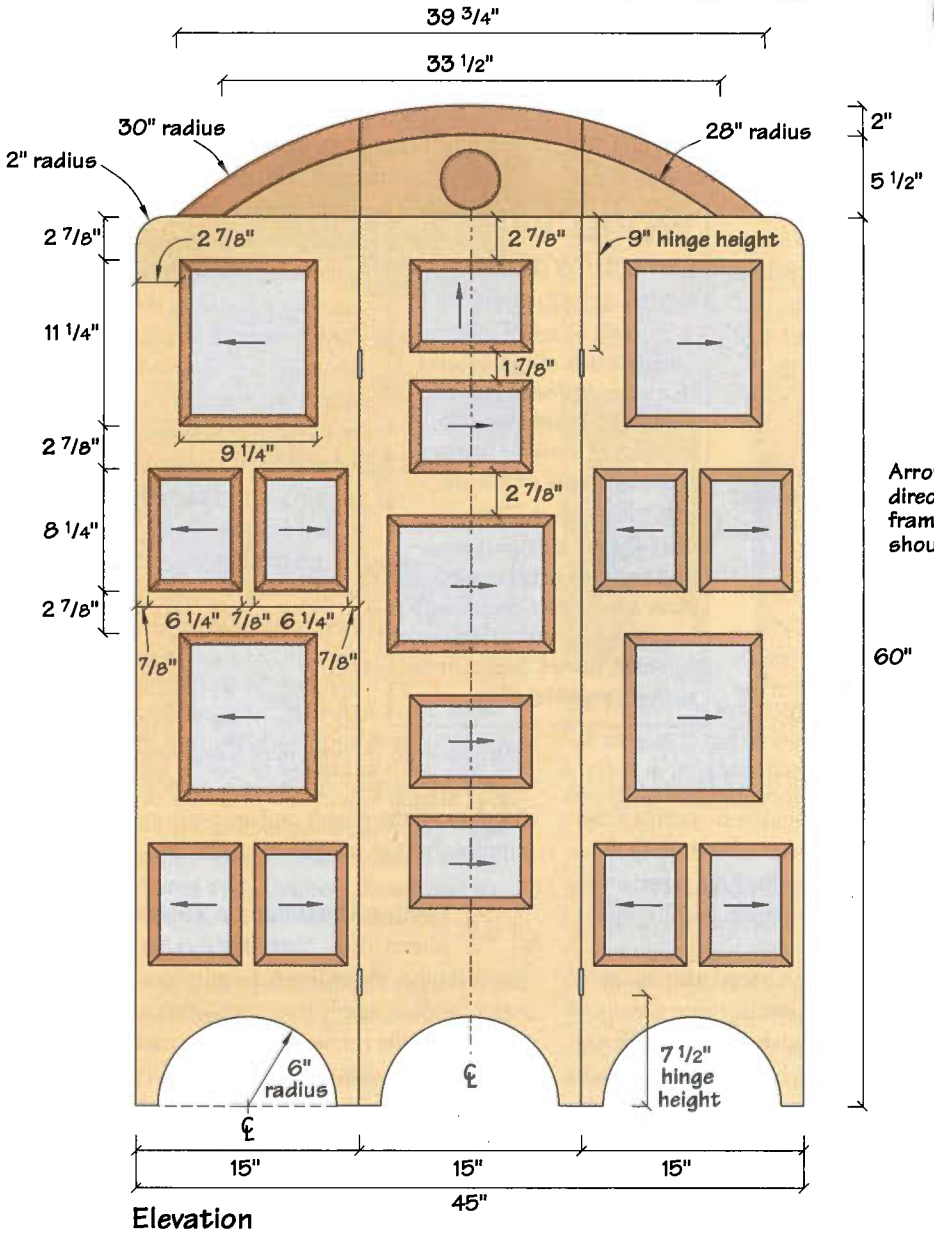
No.	Item	Dimensions T W L	Material
3	Panels	3/4" x 15" x 60"	Birch plywood
1	Arc cap	3/8" x 7 1/2" x 40"	Cherry
2	Arc cap	1/8" x 5 1/2" x 34"	Maple
1	Medallion	1/4" x 4" diameter	Cherry
10	Lrg. frame pieces	5/8" x 3/4" x 11 1/4"	Cherry
10	Lrg frame pieces	5/8" x 3/4" x 9 1/4"	Cherry
24	Sm. frame pieces	5/8" x 3/4" x 8 1/4"	Cherry
24	Sm. frame pieces	5/8" x 3/4" x 6 1/4"	Cherry
12	Face Plexi	1/8" x 5 1/4" x 7 1/4"	Plexiglas™
5	Face Plexi	1/8" x 8 1/4" x 10 1/4"	Plexiglas
2	Spacers	1/2" x 2 7/8" x 8"	Plywood
2	Spacers	1/2" x 1 7/8" x 8"	Plywood
2	Spacers	1/2" x 7/8" x 8"	Plywood

Hardware: Four double-swing hinges, Woodcraft 800-225-1153 part #27G33 ($3.75/pair). Edge tape, #123273 ($14.99).

Plexiglas: Available at most large hardware stores (Home Quarters, Home Depot, Lowes, etc.).

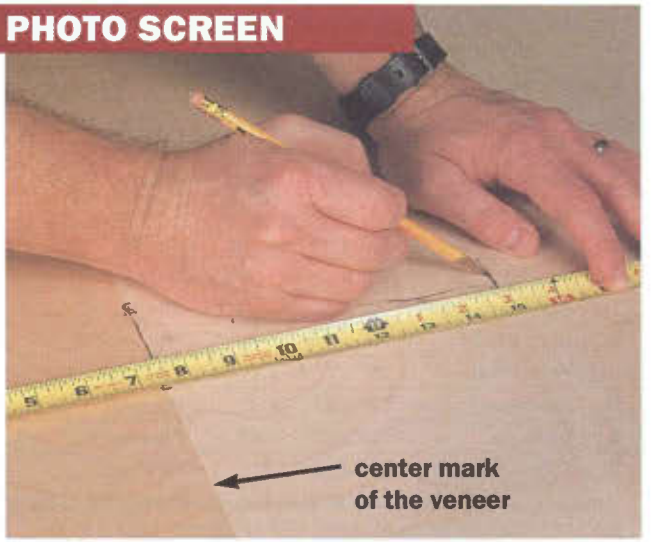
Are we on target?

To see more projects like this in future issues, circle "P3" on the postage-paid card in the Resource Directory.



Arrows indicate the direction that the loose frame end/plexi front should slide.

Elevation



1 LAY OUT THE PANELS • After crosscutting the panel to length, begin laying out the rip cuts by finding the center mark of the bookmatched veneer pattern. Lay out the center panel first and then the outer panels.

2 EDGE TAPING • The proper way to iron on edge taping is to heat the tape with a household iron (don't tell your spouse you're doing this) and apply pressure with a roller while the hot melt glue is still soft.

That said, there are many combinations for photo arrangement available for this screen. I simply made the one that worked best for me. Just add 1¼" to the picture size and you have your frame size using the moulding profile supplied in the diagrams.

This project will test your ability to make many small parts, but the payoff is worth it. I've found the best way around the tedium involved in repetitive operations is to challenge yourself to find the fastest way to do an individual operation and stick to it.

STEP 1 Make the Screen • Before cutting the panels out, let's talk about plywood selection. When you purchase the ply for this project, you want to make sure you get a nice sheet of material. Look for book-matched veneer panels with a pattern centered on the 4' x 8' sheet. Start by cutting out the parts according to the Schedule of Materials. Crosscut the sheet first then lay out the cuts for the panel rips.

WOOD´WORDS
(wood´wurds) n.

BOOK-MATCHED: A method of arranging two consecutive slices of veneer, turning one over and laying them side by side, producing a mirror image, like the pages of a book.

FAST-TACK: Referring to glue that is a little thicker and has a shorter open time than other woodworking glues. In short, it gets stickier, faster. Sometimes called moulding glue.

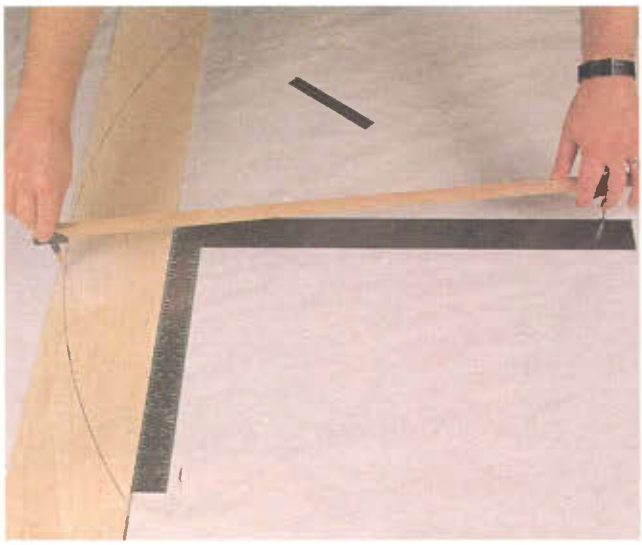
STEP 2 Edge Taping • Lay out and cut the radiused corners on the outside panels and cut out the 6" radius semicircles on the bottom of the panels. After cleaning up these cuts, apply heat-sensitive edge tape to all of the panels. File the edge tape flush and finish sand the panels to 220 grit.

STEP 3 An Arc on Top • The distinctive arced trim on top of the screen is simply a lamination of three pieces of thinner wood, cut at the panel joints and doweled in place on top of the screen. Begin making the arc by milling out blanks of maple and cherry a little larger than the size given in the Schedule of Materials. Lay out the arc using the method suggested in the caption. Cut the arcs out on the band saw and sand the edges. Finish sand to 220 grit and find a spot to do the laminating.

Start by making sure that your work surface is clean and flat. Mark the centers of each arc on its bottom edge. I used a fast-tack glue to laminate the arcs. This worked well because it has a short open time and you don't have to put a lot on the surface to get a good joint. Apply glue and line up the three pieces with the center line flush on the bottom edge. Place the first clamp on the center with a backing strip of wood. Add more clamps as needed. Make sure to check the bottom edge for slippage and adjust accordingly. When the glue is dry, clean off the bottom edge and joint if necessary. Apply the 4" medallion to the front of the arc with glue and small nails.

On your work surface, place the panels together as they would be attached. Place the arc on the top edge and center it on the assembly. Mark where the joints are and follow them to the top edge of the arc. Using a handsaw, cut the arc into three pieces. Clean up the sawn edges with a block plane and dowel the pieces into their respective panels. You can glue these arc sections in or leave them loose. I left mine loose to make it easy to move the screen. Apply two coats of clear finish to all the panels and arc sections. Go ahead and rout the notches for the double-swinging hinges and attach them.

STEP 4 Cutting Moulding • After attaching the hinges, set the screen aside. Make the moulding according to the diagram. It takes about five 8' lengths to make all of the moulding. After sanding, apply two coats of clear finish to the moulding stock. Take the moulding that you made and begin cutting the frame parts as shown in the photo. After setting your chop saw to 45 degrees, make the first miter cut by trimming the end of a long piece of moulding with the top down and the rabbet against the fence. Then turn the moulding around with the rabbet facing you. Put the piece against your stop and make the second cut. Be careful and accurate. Your results will speak for themselves. Never



3 MAKE A RADIUS • The easiest way to make this radius is to get a piece of butcher paper for layout. Lay down a center line and mark a square line at one end. Mark off the two radii from this mark as well as the two trim heights. Determine the bottom edge of the wood trim and set it on the appropriate trim height mark. Using trammel points, lay out the radius according to the diagram.

4 MITER THE MOULDING • Setting your miter saw to the left will decrease kickbacks when making repetitive cuts. Screw a piece of plywood across the blade as a fence and cut through it with your saw set to 45 degrees. Measure from the inside of the miter cut to the left for the four different lengths. Cut the longest lengths first.

5 NAILING A FRAME • The object is to nail down three pieces with some of that fast-tack glue and leave the fourth side loose so it can slide out when the Plexiglas is attached. All of the loose sides on the panels should slide to the left or right. It doesn't matter which way, just that you can get past the double-swinging hinge barrel when you slide out the Plexi-frame end. The only exception was the top frame on the middle panel, which slides up.

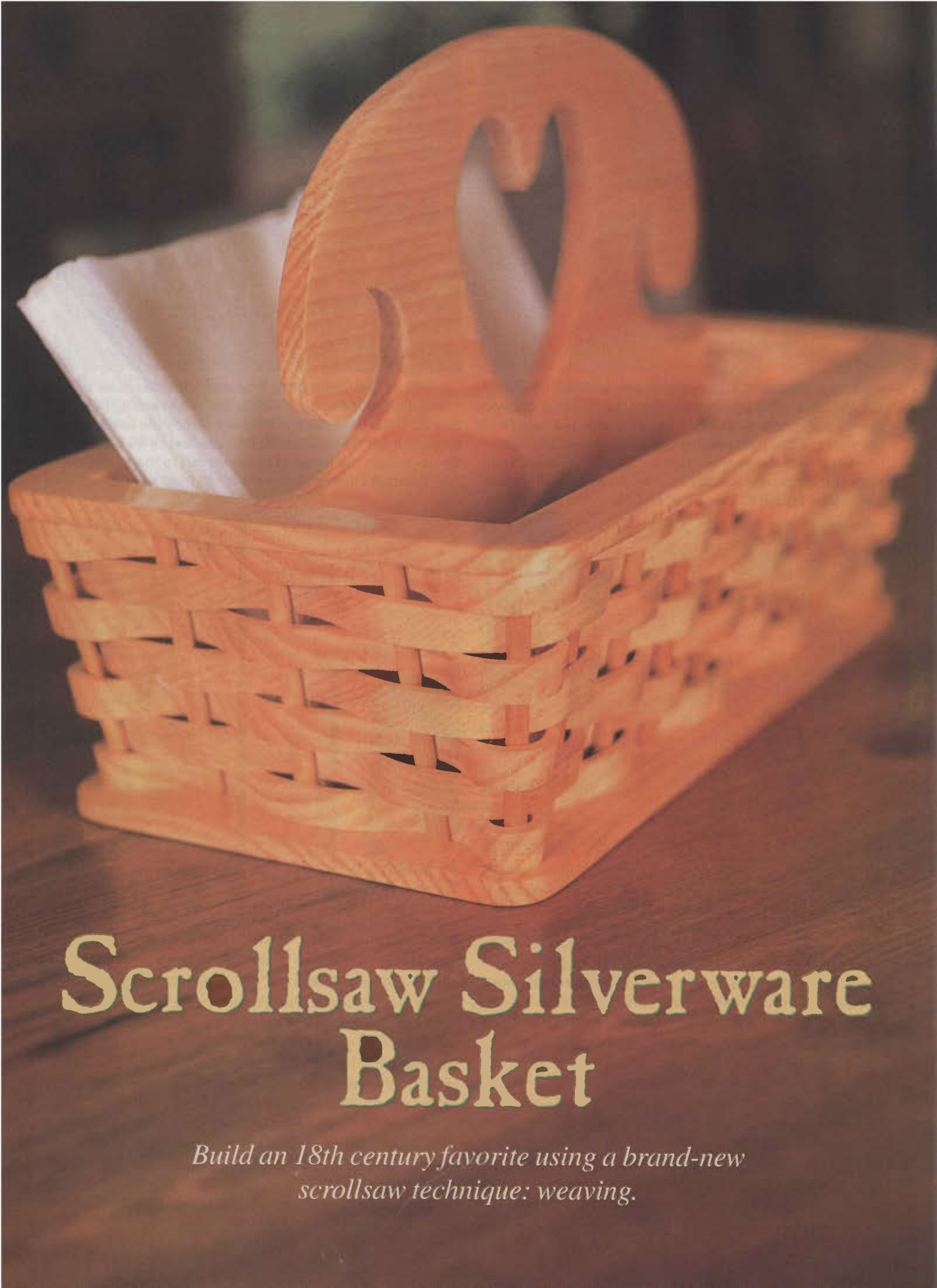
6 MOUNT A PICTURE • Take the fourth frame piece and attach it to the Plexiglas with cyanoacrylate glue while it is in place. Gently pull the frame piece and Plexiglas assembly out of the frame.

get complacent in these repetitive operations and pay attention to where the sawblade is at all times. Safety first.

STEP 5 **Nailing the Frames** • After the frame pieces are cut, lay the screen on a flat, soft surface such as a piece of cardboard or a blanket. Begin laying out the frame locations according to the diagram. To make this easier, cut the spacers in the Schedule of Materials to locate the first two frame pieces in each frame. Attach the frames as shown in the photo.

STEP 6 **Mount a Picture** • After mounting all the frames, it's time to attach the Plexiglas to the loose frame parts. Stand the screen upright for installing the Plexi. This lets the Plexi settle out in the frame. Check to make sure that the Plexiglas fits into the opening in the frame piece. Next, slide a piece of cardboard into the opening. Peel back the protective plastic that covers the front of the Plexiglas and insert it into the frame. Shim it out until it is pushed all the way forward in the frame. Mount as shown in the photo.

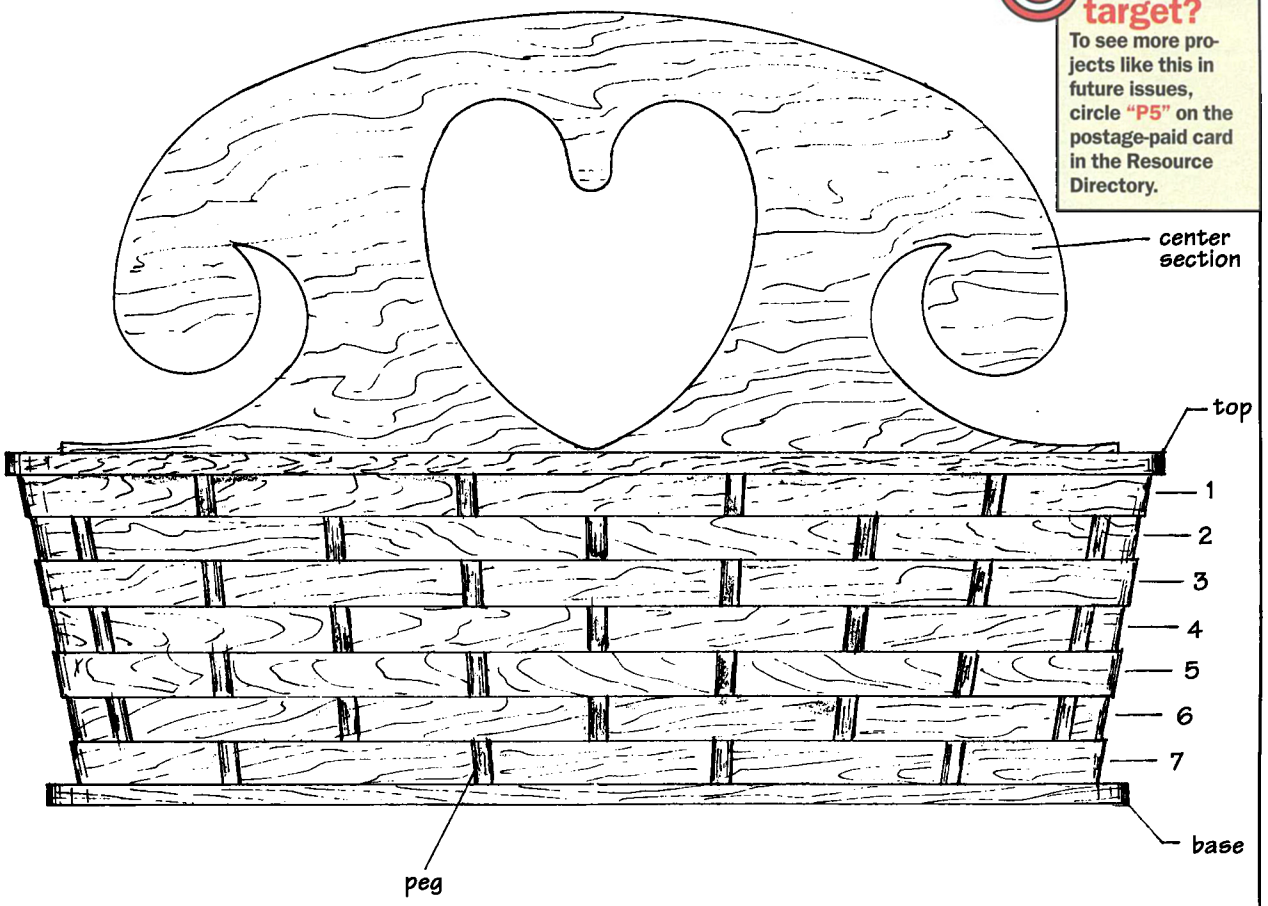
Finally, if you need to place a photo only, cut out a cardboard backer to fill the opening. If you have a matted photo, simply make sure that the matte fits the opening. **PW**



Scrollsaw Silverware Basket

Build an 18th century favorite using a brand-new scrollsaw technique: weaving.

Diagram



Are we on target?

To see more projects like this in future issues, circle "P5" on the postage-paid card in the Resource Directory.

BACK IN THE 1700s, silverware trays were very popular, and many of the originals can be found today in antique shops. For some reason they fell out of favor, and I can't understand why. I made one for my wife years ago and she uses it every day when setting the table. It's also handy to carry plasticware for a picnic. In fact, I've had to make quite a few silverware trays for friends and relatives who've seen ours and want one. This silverware tray incorporates my new scrollsaw method that creates the illusion of a woven basket. This project will amaze your family and friends because they'll never believe you made it with a scrollsaw.

STEP ONE: Make full-size copies of the patterns located in the PullOut™ Plans. Choose a knot-free wood and sand the top and bottom with 120-grit sandpaper. This will save you some frustration at the end of the project. Attach the patterns to the wood using rubber cement or spray adhesive, both of which you can find at an office supply store. Apply the adhesive to the paper, not the wood.

STEP TWO: Carefully locate and drill the 1/32" starter holes for odd levels one through seven and even levels two through six as shown on the plans. Now tilt your scrollsaw's table to 10 1/2 degrees with the right side sloping down. This is important, so double-check it. Make the first outside cut, cutting in a counter-clockwise direction using a #2 skip-tooth blade. Carefully make the remaining interior cuts for levels two through seven.

STEP THREE: Set your table back to zero and cut out the center section, including the heart-shaped handle. Note that the ends might need a little trimming. Cut the top piece and the base as shown (you might want to use a contrasting wood). Now cut 24 3/16-diameter pegs to 3 5/8" lengths. Sand all the pieces with a fine-grit sandpaper to remove any burrs.

STEP FOUR: Stack levels one through seven on top of each other as shown in the diagram. Starting from the ends, slip the pegs into the open spaces. On the sides, start from the center and slip the remaining pegs in place. Do not force any pegs into place. If the pegs are tight, simply sand them until they fit snugly. Do not glue anything at this time.

STEP FIVE: If all is correct, the center section should slip into place and hold everything together. Put the center section in diagonally, turn it and then center it. Trim the ends if necessary. Apply a little glue to hold it in place. Slide the top in place and apply a little glue to hold it in place. Center the bottom on the basket and glue it in place.

STEP SIX: After the glue is dry, sand any remaining rough edges and apply two or three coats of a clear finish. Your silverware basket is ready for use. But watch out. Everyone will want one, once they see how handy it is. **PW**

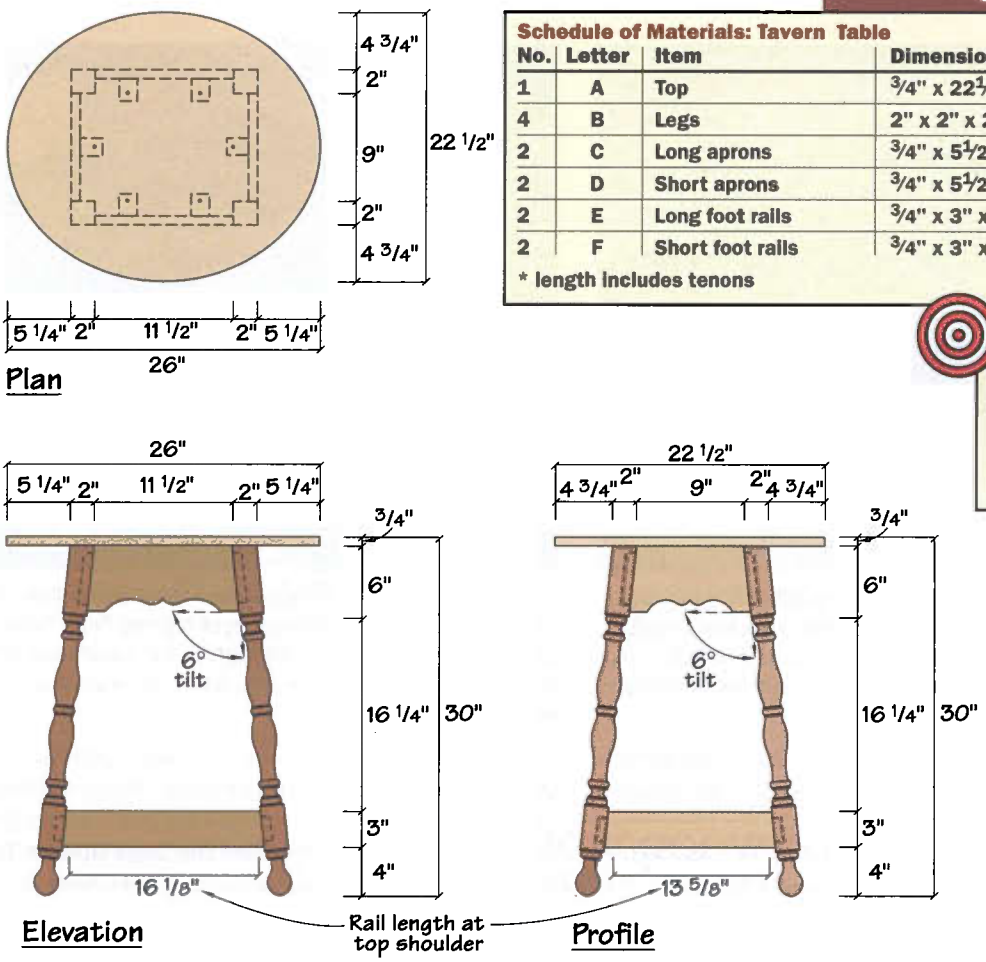
*By **John Nelson**. If you like this scrollsaw basket-weave project, you might want to write to Nelson Designs, P.O. Box 422, Dublin, NH 03444-0422 for information on purchasing other basket-weave plans or books.*

18th-Century
TAVERN TABLE

Built to take the abuse of bar patrons, this table is a sturdy addition to any home.

TAVERN TABLE

Diagrams



Schedule of Materials: Tavern Table

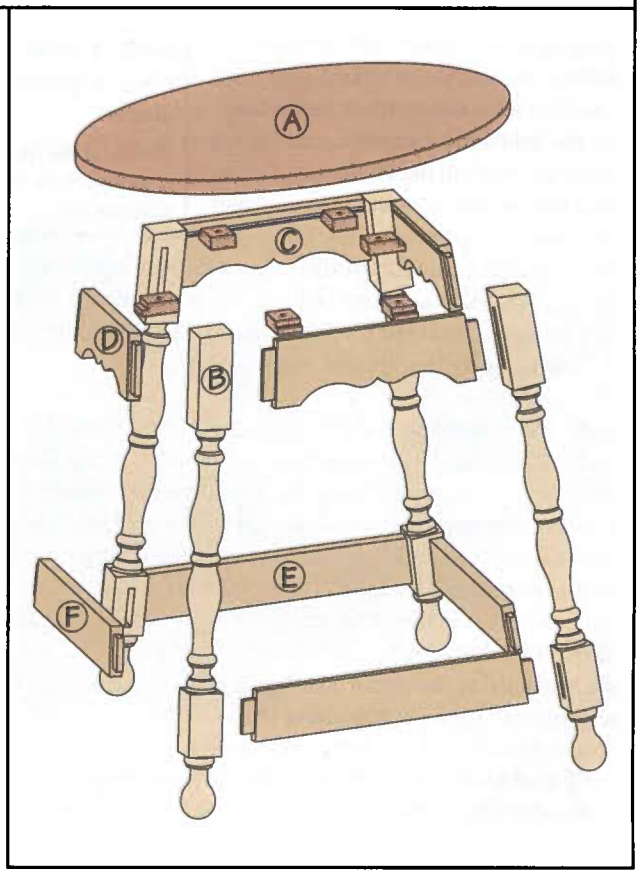
No.	Letter	Item	Dimensions T W L	Material
1	A	Top	3/4" x 22 1/2" x 26"	Pine
4	B	Legs	2" x 2" x 29 1/2"	Pine
2	C	Long aprons	3/4" x 5 1/2" x 14 1/4"*	Pine
2	D	Short aprons	3/4" x 5 1/2" x 11 5/8"*	Pine
2	E	Long foot rails	3/4" x 3" x 18 1/4"*	Pine
2	F	Short foot rails	3/4" x 3" x 15 3/4"*	Pine

* length includes tenons

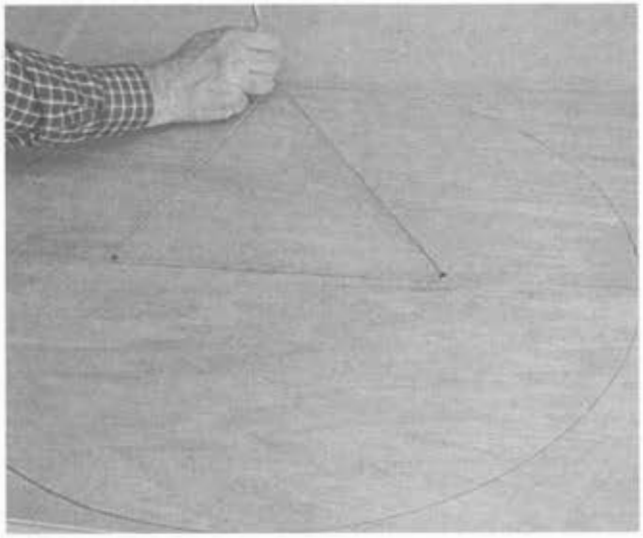
ONE OF THE MOST IMPORTANT INSTITUTIONS, both in Europe and colonial America, was the inn, or tavern. It was, and in Europe still is, the social center of the community. But it was more than just a gathering place. It was the place to get news, discuss politics, and hold town meetings. It was, of course, also the scene of hard drinking and rowdiness, and the furniture was built to withstand inevitable abuse. So tavern tables, in one form or another, have been around for centuries, but were at their height of popularity during the 18th and 19th centuries. Typically they had square, rectangular, round, octagonal or, in rare cases, oval tops, and three or four tapered, square or turned, splayed legs. Square legs didn't appear until after 1790; before that legs on these tables were all turned.

Antique oval tables were, and are, quite rare. This one is typical of those made in New England from 1700 until 1820. The turned legs are typical of the late Jacobean or early Queen Anne period. It's an elegant piece, unusual, and will definitely be a nice addition to your home. I sold mine for $195 and received orders for more — not bad for a weekend's fun in the shop and less than $20 in materials.

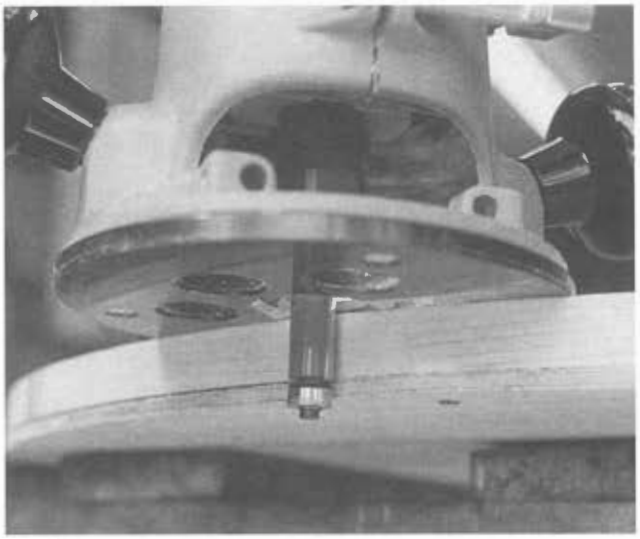
At first look, this seems a fairly simple piece, but there are one or two tricky areas that present something of a challenge.



Blair Howard *is a professional writer and woodworker. He is the author of* Making Money Making Furniture, *due out in 1999, and* Building Classic Antique Furniture with Pine, *available now; both are Popular Woodworking Books.*



1 MAKE A PATTERN • To make the pattern for the top, place the pencil inside the loop and draw the string tight. Now, keeping the string tight, push the pencil around the oval, which should finish roughly 26" x 22½".



2 FINISH THE TOP • Take your router and a flush trimming bit and trim the edge of the top true. Next replace the flush trimming bit with a ¾" roundover bit and round the top edge of the top. Sand the top smooth and set it aside.

But it's fun to build, incorporates the two basic elements of furniture construction — turning and joinery — and lets you use almost every tool in the shop.

The legs, apron and rails are joined together with mortise and tenon joints, and the top is attached to the base with cleats. The board for the top is constructed using three pieces of stock 8" wide with the annual rings alternated for stability. The legs are turned from blanks cut from 2" x 12" stock — if you don't have a lathe, you can substitute tapered square legs. I cut the mortises in the legs using a dedicated hollow chisel mortising machine; you can also use hand tools. The compound angles at the top of the legs and apron take a little figuring out, but you'll find instructions in the project steps. Start by milling all the pieces as laid out in the materials list. Then glue up the stock to make the top.

WOOD´WORDS (wood´wurds) n.

Cyma: A moulding that has a partly concave and partly convex shape, such as an ogee profile.

Bead: A small, rounded moulding.

Cove: A curved, hollow moulding profile.

Proud: If an item such as a screw is *proud*, it is raised above a flat surface.

STEP 1 Mark the Top • From a piece of ¼" plywood 27" x 25," make a pattern for the top. First mark a line down the center of the length. Mark the middle of the center line, then measure out 6¼" to either side and mark both spots. Drive a small screw part way into each of the two spots, leaving the head proud by about ⅛". Now take a piece of thin string, double it in two, and make a loop 19¼" in diameter; it doesn't need to be exact, ⅛" either way won't matter. Next, take a pencil, lay the string around the two screws and make the pattern as shown in the above photo.

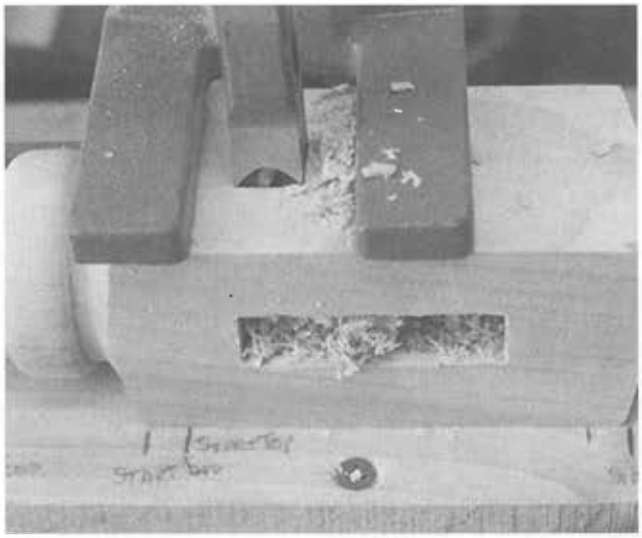
STEP 2 Build the Top • Use the pattern to mark an oval on the underside of the top and cut the oval ⅛" larger than the mark. With small screws, attach the plywood pattern to the underside of the top, making sure there is excess material showing all around the oval. Finish the edge of the top with a router.

STEP 3 Turn the Legs Down • Take one of the leg blanks, mark the top and lower square sections, and chuck it into your lathe. Use a large gouge and round the section between the squares and the section beyond the lower square. Mark for the beads, coves, and ball foot as laid out in the drawing and the PullOut™ Plans. Then turn to size and sand smooth. Repeat the process for the other three legs using the first leg as a reference and marking aid. Cut the mortises, ¾" deep and ⅜" wide, in the legs (two left and two right) for the aprons and the rails. Mortise straight into the legs; you'll angle the tenons to fit.

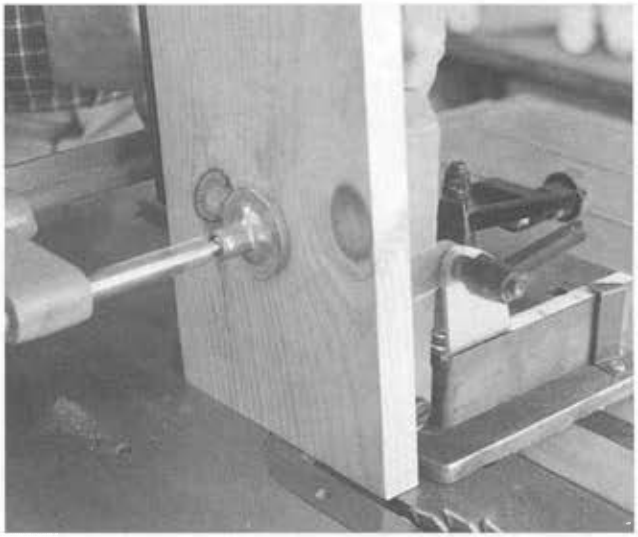
STEP 4 Angle the Aprons and Tenons • Here's how to cut the angles on the ends of the aprons and rails: Set your table saw's miter gauge to 6 degrees off 90 and trim the ends.

Now cut the tenons. The tenons on the aprons measure ⅜" x ¾" x 4"; The tenons on the rails measure ⅜" x ¾" x 2". First mark the small shoulders at an angle of 6 degrees to accommodate the angle inside the mortise. Use your band saw to cut the small shoulders. Now finish cutting the tenons to size using your table saw and a tenoning jig.

STEP 5 Angle the Aprons • Now you need to cut an angle on the top edge of the aprons so they will fit flush to the table's top. First tilt the blade on your table saw to 6 degrees. Set your rip fence to 5½", lay the aprons flat on the table, outer side up, top edge toward the blade, and rip the edge to 6 degrees.



3 LEFT OR RIGHT? • If you use a mortise machine, you may find that cutting mortises for left and right-hand legs can be a little confusing. I use a piece of scrap stock screwed to the bed on my machine and mark the stop and start positions on it.



4 USE A JIG • If you have a tenoning jig, set the back-stop to 6 degrees off the vertical and cut the tenon's long shoulders. Do this first on a piece of scrap stock and test the tenon for fit in one of the mortises.

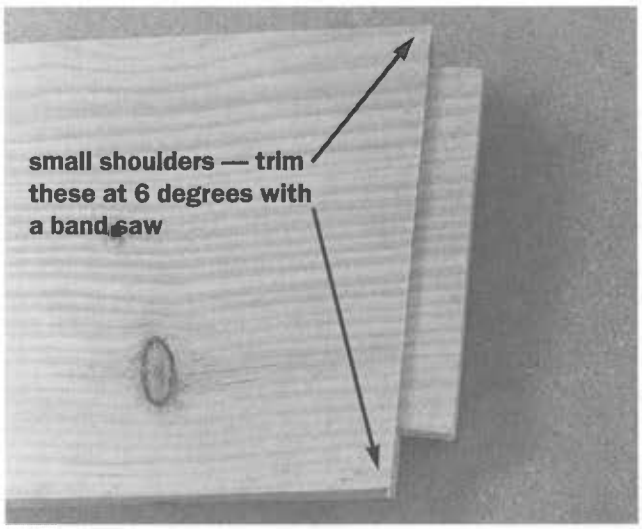
Now put a dado stack in your table saw and cut a 3/8" x 3/8" groove about 3/8" down from the top of all four aprons to receive the cleats that hold the top on. The cleats are blocks made from 3/4" scrap. Cut a 3/8" x 3/8" rabbet on one end. The rabbet will fit into the groove in the aprons and screw to the underside of the top. See the 3-D diagram to see how this works. Finally, cut the cyma curves on the aprons using your band saw.

STEP 6 **Trim the Legs** • Trim the top of each leg so the top of the under-structure will fit flush to the underside of the top. Dry-fit all the rails to the legs and lay the top on the structure; all should sit true. Disassemble all the pieces, sand everything smooth, glue, reassemble the under-structure, clamp and leave overnight to cure. Don't attach the top yet.

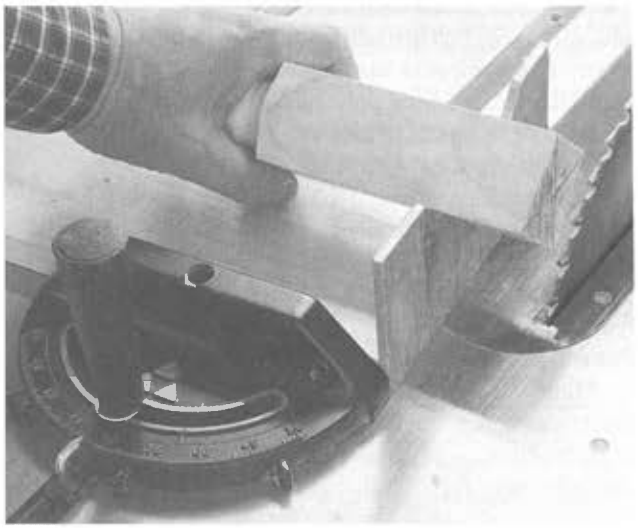
Finishing

I did a little light distressing — just a small ding or two — before staining. Then I applied a sealer coat of diluted shellac and left it overnight to cure.

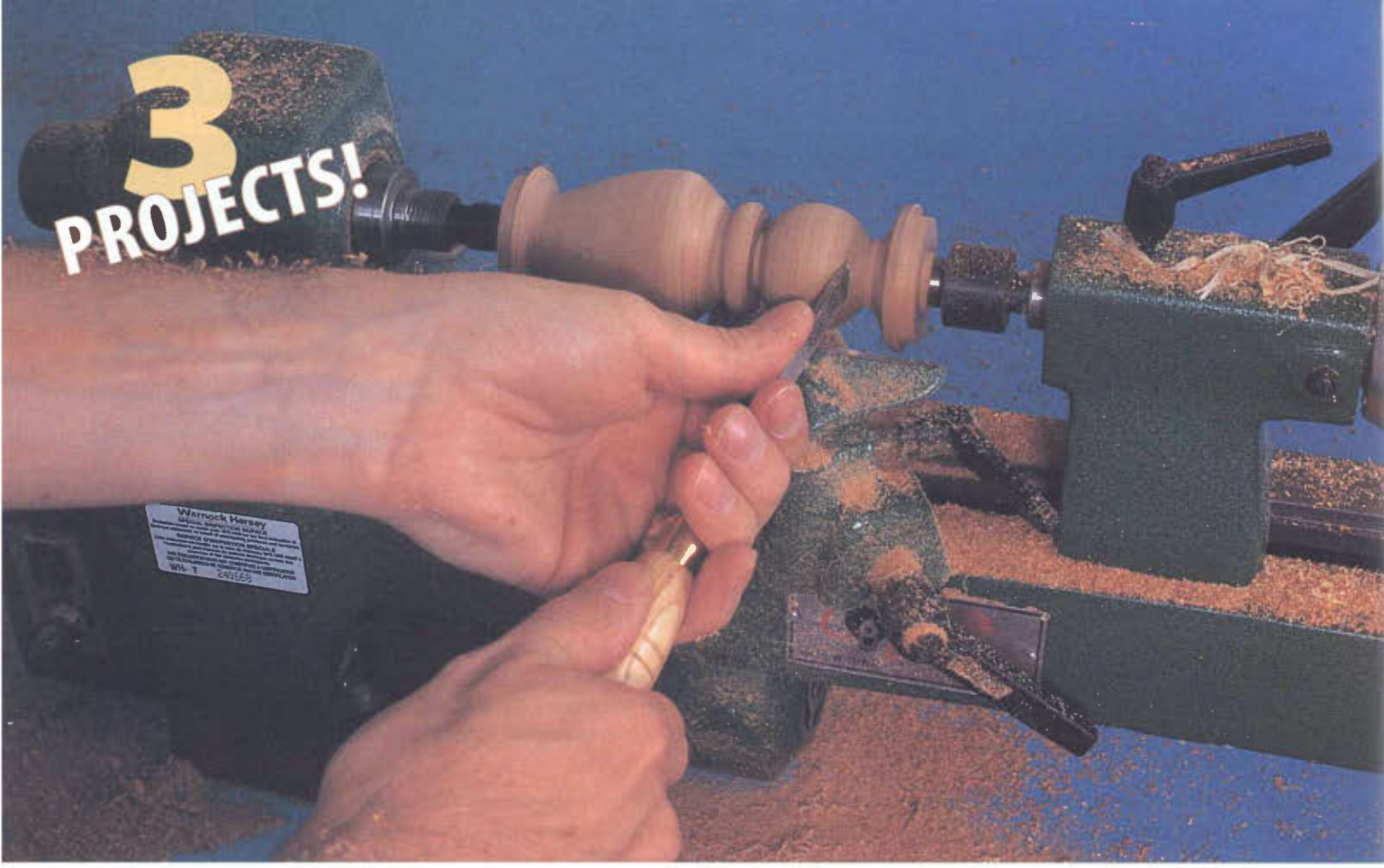
Next, I lightly sanded the grain and applied four more coats of shellac at a three-pound cut and rubbed the surface smooth with 0000 steel wool. This gave the piece a rich, dark luster. Finally I attached the top and finished the whole thing with a couple of coats of beeswax buffed to a shine. **PW**



5 ANGLES • The ends of the rails that make up the apron are angled at 6 degrees to provide the correct splay of the legs, and the tenons themselves have to be angled upward at an angle of 6 degrees to fit the mortises.



6 TRIM TO FIT • Make this small jig to hold your legs at a 45-degree angle. Set the table saw's blade to 90 degrees, set your miter gauge to 6 degrees off 90, and, using the jig, trim the top of each leg. Pay attention to which way the leg splays outward when making this cut.



TURNING on a DIME

Making small objects on a lathe is inexpensive and fun.


Miniature maple bowl, goblet and candlestick you can turn.

THE ADVANTAGE of turning wood on a miniature lathe is that it can be done in much less space than a full-size turning. While the maximum size you can turn is more limited, there are still lots of projects you can make even with this limitation. A typical full-size lathe allows you to turn objects 12" to 16" in diameter and 36" to 44" long. Miniature lathes usually have a maximum of 3" - 6" in diameter and 12" to 18" long.

Miniature lathes can vary considerably from small, portable models, to larger models that are too heavy to be considered portable. Portability gives you the opportunity to carry your hobby with you when you go to the cottage for a vacation. If you have limited space and can't keep a lathe set up all the time, it can be stored away, then taken out and set up almost anywhere you want.

Miniature turning means different things to different people. To most, miniature turning is simply turning small projects. To the purist, miniature means turning to a scale of 1 inch = 1 foot, which is a common scale used for doll houses and doll furniture.

The size of turning you plan to tackle will influence the tools you choose, because your tools need to be of a similar scale to the dimensions of your turnings. Turning gouges are available in different sizes, including full-size, miniature and micro-miniature. As well, some miniature turners make their own specialty turning tools themselves.

If you already have a full-size lathe and want to try miniature turning, don't despair. In fact, anything you do on a miniature lathe you can do on a full-size lathe, it's just a little more cumbersome. The only modification you might need is a shorter tool rest when you work between centers on a small piece. Your lathe's manufacturer might sell a short tool rest, or you can cut the ends off a regular one, or you can bring your existing tool rest to a machine shop and they can make one to your specifications. Beyond that, smaller accessories, such as drive centers, a small faceplate and smaller live tailstock centers will come in handy. For many projects, you might be able to get along with your existing turning tools. However for really small-scale turnings, such as the candlestick in this article, you will need to buy or make miniature turning tools.

Michel Theriault *lives in Ottawa, Ontario, and is the author of* Woodworking Projects With a Few Basic Tools *(Sterling).*

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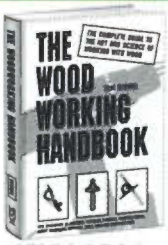

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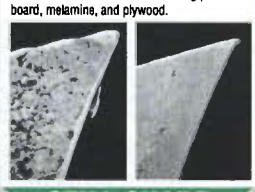

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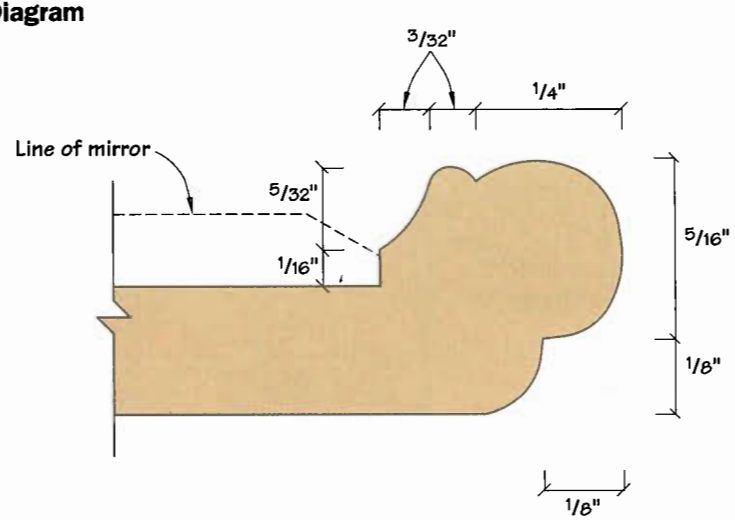
1 Pocket Mirror

Diagram



Enlarged profile of mirror holder

For actual size, set copier to 50 percent, then reduce again at 66 percent.

This simple project uses a special round mirror with a bevel. However many glass shops can cut a mirror to your specifications and polish or bevel the edge —for an extra charge.

Based on the diameter of your mirror insert, decide on the outside diameter of your pocket mirror. In our case, the insert was 2" so we made the pocket mirror 2 5/8" in diameter. Cut out a 1/2"- to 3/4"-thick blank to the diameter you need plus 1/2" on your band saw.

Attach the blank to the faceplate with double-sided tape. If you don't have a faceplate that is at least 1" smaller in diameter than the finished pocket mirror, use a block of wood between the larger faceplate and the blank you turn your mirror from. This will let you turn the edge easily.

Establish the diameter of the mirror insert. Position the tool rest close to the face of the blank, slightly under center. To make the pocket in which the insert will go, use a parting tool and cut in close to the diameter of the insert, turn off the lathe and check the size. Restart the lathe and expand the diameter if it is too small, stopping to check periodically. The idea is to sneak up on the exact size you need.

Once this is done, you can take out the waste on the inside of the pocket to the correct depth, either with your parting tool, gouge or scraper.

Make Your Own Miniature Turning Tools

While it is hard to beat quality manufactured miniature turning tools, if you want to make very small turnings, such as the candlestick, you might need to make your own tools. One simple way is with a concrete nail (head removed) inserted in a small handle, such as the screwdriver handle shown. Then grind the end of the nail to the desired shape.

COMPARISON OF TURNING TOOLS
TOP: Standard 1/4" spindle gouge, 16" long.
MIDDLE: Miniature Robert Sorby 1/8" spindle gouge, 10 1/2" long.
BOTTOM: Homemade miniature gouge, 5" long.

With the pocket established, turn the edge of the mirror by repositioning the tool rest and using a spindle gouge. Keep in mind that the mirror will be hand-held, so make the edges smoothly curved. Add any decorative elements such as grooves or beads, as desired.

Remove the tool rest and carefully sand the mirror blank with sandpaper folded in your hand. Gently pry the blank off the faceplate, remove the doublesided tape and sand the back by hand.

Apply a finish to the hand mirror and when dry, glue the mirror insert in place.

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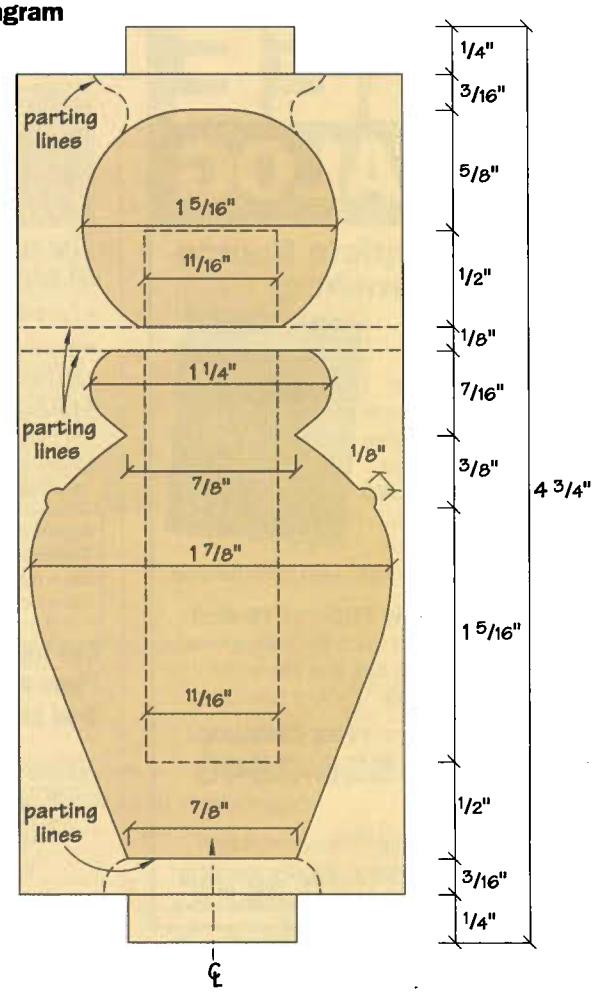
2 Perfume Vial

Diagram



Full-size diagram of Perfume vial

To begin this project, mount the blank between centers and rough out the blank to the required diameter. When satisfied with the diameter, make a parting cut 1/4" deep where the top and bottom will eventually be separated.

Carefully turn the shape of the bottom, leaving a 1/4"-long tenon at the headstock end. Once the shape is completed, turn the top, also leaving a 1/4" tenon, this time at the tailstock end. These tenons will be used to re-mount the parts and allow you to drill out the insides to hold the perfume bottle.

Using the parting tool, part the top and bottom in two. Screw a piece of 3/4" scrap wood to a small faceplate and turn a pocket 3/8" deep and slightly less than the diameter of the tenon on the bottom part. Carefully make the pocket larger in diameter until the tenon fits snugly in the pocket.

Apply cyanoacrylate to the tenon and press it into the pocket, making sure it is fully seated and centered. Once the glue is dry, start up the lathe and lightly turn the blank so that it is perfectly true. Sand the blank with progressively finer grits, ending with 320.

Using a Forstner bit to suit the diameter of your vial, mount it in a chuck in the tailstock. Run the lathe at its lowest possible speed (under 500 rpm) and carefully bore into the bottom piece deep enough to accommodate the vial. Stop frequently and withdraw the drill bit to avoid overheating.

When the required depth is reached, part the piece off the auxiliary faceplate and repeat the entire process with the top.

You can apply the finish while the turning is still on the lathe, or after it has been removed, depending on your own preference. In this case, several coats of an oil finish were applied after the turning was removed from the lathe.

Glue the top of the vial into the top piece you just turned. You can glue the glass vial into the bottom piece, or leave it removable, depending on your preference.

After the top is complete, the blank will be parted in two and each half will be remounted to bore the hole for the glass vial.

Turning a pocket in the wooden auxiliary faceplate to accept the tenon on the end of the perfume vial blank.

Boring the hole for the glass vial using a Forstner bit chucked in the tail stock.

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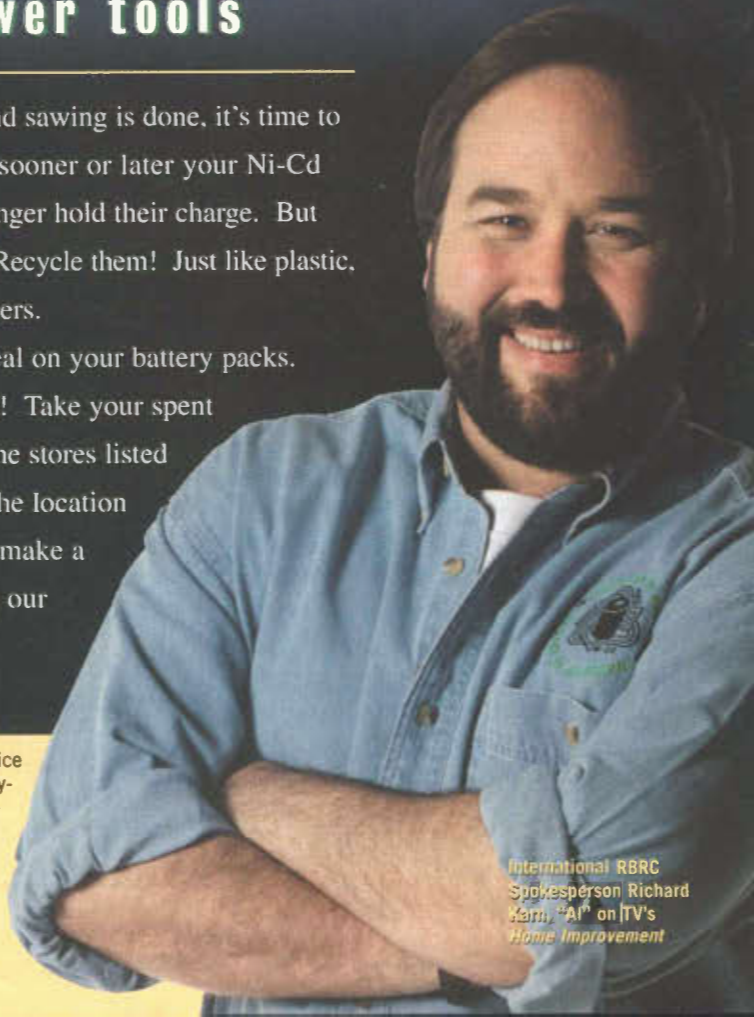

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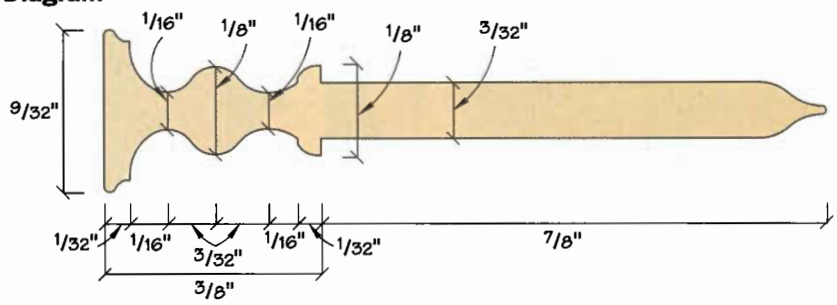
3 Candlestick

Diagram



Enlargement of candlestick

For actual size, set copier to 50 percent, then reduce again at 66 percent.

A true miniature, this project represents a 15"-tall candlestick in real life, and is an excellent accessory for a doll house.

To begin, screw an auxiliary wooden faceplate to a 2" faceplate. Bore a 1/4"-deep x 3/8"-diameter hole in the center of the auxiliary faceplate while it is turning, and glue a 1 3/4"-long 3/8" hardwood dowel in place. When dry, move the tailstock with a live center against the end for extra support.

Use the illustration and mark the major transitions, such as between the candle and the candlestick holder, as well as the curves on the candlestick holder. These marks will guide you as you turn the candlestick. The turning speed should be high, near 2000rpm, or whatever you are comfortable with.

Using miniature tools, either store-bought, or homemade (see "Make Your Own Miniature Turning Tools"), begin to shape the candlestick holder first, taking light cuts. Compare your profile regularly with the drawing and carefully measure the diameters. While you don't need to get the profile or the diameters exact, it needs to be well-proportioned.

After finishing the candlestick holder, begin working on the candlestick itself, taking light cuts and supporting the back side of the candlestick with your fingers to prevent the thin piece from deflecting under the pressure from your turning tools. Don't finish the wick yet, because you still need the support of the tailstock.

With a small piece of folded #320 sandpaper, carefully sand the turning, supporting it with your finger while sanding. Be careful not to sand off any detail.

When you are satisfied with the sanding, finish off the wick. Be prepared for the small waste piece at the tailstock to come off. When it does, back off the tailstock, carefully sand the tip of the candle, and part the candlestick off at the base. Because this turning was quite delicate, an oil finish was carefully applied after it was removed from the lathe. **PW**

SOURCES

MINIATURE LATHES

- **Carba-tec mini wood lathe at Craft Supplies USA and Woodcraft**
- **Taig Micro Lathe II Model 4500 for woodworking at Lee Valley Tools**
- **Klein Lathe at Woodcraft and Garrett Wade**
- **Jet Mini-Lathe (JML-1014) at woodworking and home stores**
- **Vicmarc VL 100 at Craft Supplies USA**
- **Ryobi ML618**
- **Comet Mini Lathe at Craft Supplies USA**
- **Grizzly Model G5967 mini lathe from Grizzly Industrial**

MAIL ORDER SOURCES FOR MINIATURE TURNING SUPPLIES AND EQUIPMENT

- **Woodcraft**
  210 Wood County Industrial Park
  P.O. Box 1686
  Parkersburg, WV 26102-1686
  800-225-1153
- **Garrett Wade**
  161 Avenue of the Americas
  New York, NY 10013
  800-221-2942
- **Penn State**
  Penn State Industries
  Department 962
  2850 Comly Road
  Philadelphia, PA 19154
  800-377-7297
- **Craft Supplies USA**
  1287 E. 1120 S.
  Provo, UT 84606
  800-551-8876
- **Lee Valley Tools**
  P.O. Box 6295, Station J
  Ottawa, Ontario K2A 1T4
  800-871-8158
- **Grizzly Industrial**
  East of the Mississippi
  800-523-4777
  West of the Mississippi
  800-541-5537

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2-1/2 HP, 15 amp motor. D-handle with trigger switch for positive control. Electric brake automatically stops blade in seconds. Includes 10" blade with 5/8" arbor, and retractable blade guard. Dust collection ready.

- Blade speed: 4900 RPM @ no-load
- Capacities: 2-3/4" x 5-3/4" crosscut; 2-3/4" x 4-1/8" 45° right & left miter; 1-3/4" x 5-3/4" 45° left bevel; 1-3/4" x 4-1/8" 45° x 45° compound
- Table diameter: 10-1/2"
- Tool weight: 60 lbs.
- Factory reconditioned, factory perfect

ITEM 06125-4EKA **$149.99**

CHICAGO Electric Power Tools

TRIM ROUTER

Now you can tackle those jobs that were too fine or exacting for a standard router. This compact router weighs only 4 lbs. for easy operation. Includes a straight and adjusting conductor to assist in trimming and engraving in both straight and circular patterns.

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- 110V, 3-1/4 maximum amp draw
- 30,000 RPM no load speed
- 4 lbs. tool weight

~~$45.99~~ **$36.99**
ITEM 33833-6EKA

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1 quart cup; 1/4" NPT; PSI: 50 to 70; CFM: 9.5 @ 50 PSI

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ITEM 07901-8EKA

1/4" x 25 FT. COIL SELF STORING AIR HOSE

- Abrasion and corrosion resistant
- 1/4" NPT

ITEM 00829-1EKA **$4.99**

RASK

RADIAL ARM SAW KIT

The performance of a radial saw at a fraction of the cost. Award-winning patented design features easy setup with most 7-1/4" and 7-1/2" circular saws. Makes fast accurate bevels, rips, miters, and crosscuts. Ruggedly built and completely portable.

- Saw and table wood not included

Maximum miter & bevel: 45°; Crosscut: 12-3/4"; Length: 24"; Rip capacity: 15-3/4"; Height: 22"; Weight: 23 lbs.

~~$59.99~~ **$49.99**
ITEM 33576-1EKA

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Multiple clutch plates permit instant adjustment. Simply depress plates to slide handle against workpiece. Includes heat-treated steel bars with cast iron jaws, plated steel screws, and hardwood handles.

- All clamps have 3/4" pods and throat depth of 2-3/4"

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18"	31264-2EKA	$2.99
24"	05976-3EKA	$3.49
30"	34389-5EKA	$3.99
36"	34388-5EKA	$4.49

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- Includes SKIL EDGE 18 tooth carbide blade

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ITEM 01487-0EKA

7-1/4" CIRCULAR SAW

Maximum cut @ 90° 2-7/16", @ 45° 1-15/16"; 10 amps, 2-1/3 HP, 4600 RPM; Factory reconditioned, factory perfect
Skil 5150
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ITEM 06188-4EKA

CENTRAL MACHINERY®

EVEN TURNS BOWLS

14" x 40" WOOD LATHE

Create beautifully turned pieces of furniture with this four speed lathe. Comes with chuck plate. Mount on your workbench.

Motor: 1/2 HP, 110V, 60 Hz, 5 amps; Swing over bed: 14"; Speed: 3010 RPM; Distance between center: 40"; Drive: V-belt; Overall size: 56-1/2" x 8-1/4" x 12-3/4"; Tool weight: 88 lbs.

~~$129.99~~ **$99.99**
ITEM 38515-1EKA

DELTA®
Delta 22-540

12" PORTABLE PLANER

- Long lasting high speed steel, reversible, double edged knives
- Precise thickness scale conveniently located for easy reference
- Four precision ground columns to effortlessly raise and lower cutter head
- Includes removable table extensions, and fold away depth adjustment for easy transport
- Convenient carrying handles
- Factory reconditioned, factory perfect

26.2 FPM feed rate; Motor: 15 amp, 120V; Table size with extensions: 12-1/8" x 26"; Capacities: 12" width, 6" thick, 3/16" depth of cut; 8000 RPM, 16,000 CPM; 27-1/4" x 20-1/2" x 15" overall dimensions; 68 lbs. net weight

ITEM 06177-6EKA **$269.99**

NEW PLANER

ITEM 00258-6EKA **$299.99**

PLANER BLADES

ITEM 33075-3EKA **$29.99**

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MORTISING MACHINE

Make a square hole in the fraction of the time it takes by hand! Easier layout for professional mortise and tenon joints in furniture, cabinets, and restoration projects. Fence with hold down clamp keep workpieces from lifting off the table. Large capacity – up to 5" maximum height. Includes fence, workpiece clamp, and 1/4", 3/8", and 1/2" mortising chisels and bits.

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ITEM 35570-5EKA **$149.99**

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6" INDUSTRIAL RABBETING JOINTER

- Infeed table size: 22-1/2"
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- Motor: 1 HP, 110V, 4 amp, 4900 to 5900 RPM cutter head speed
- Maximum depth of cut: 3/8"

ITEM 30289-4EKA **$199.99**

REPLACEMENT BLADE SET

ITEM 38268-0EKA **$9.99**

CENTRAL MACHINERY®

25" RIP CAPACITY

10" INDUSTRIAL TABLE SAW

Die cast aluminum table 26" x 16" has adjustable 17-7/8" x 2" rip fence. Anit-kickback fingers and see-through blade guard for safety.

- Maximum depth of cut @ 90°: 3-1/8"; @ 45°: 2-1/2"
- Shipping wt.: 36 lbs.
- Miter gauge adjusts 0° – 60° left & right
- Motor: 2HP, 115V, 60 Hz, 10 amp, 4500 RPM
- Blade sold separately

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Resharpenable precision ground tips; 5/8" arbor

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- 25,000 RPM • 8 amps @ 120V
- All ball bearing motor • 1/4" collet
- Includes spindle lock and wrench storage
- Factory reconditioned, factory perfect

ITEM 51782-2EKA **$45.99**

5 PC. STRAIGHT ROUTER BIT SET

- Carbide tips • 1/4" shanks
- Includes: 1/4", 3/8", 1/2", 5/8" and 3/4" straight bits (2 flutes)

$9.99

ITEM 38357-1EKA

CENTRAL MACHINERY

DOVETAIL MACHINE

Just place stock and pull the cam handles to positively lock material in place. Allows cutting tails, pins, half blind, and standard dovetails. Accepts stock up to 12" wide and 1-1/4" thick. Includes 1/2" template.

ITEM 34102-8EKA **$39.99**

CENTRAL MACHINERY

16" SCROLL SAW

- Precision milled 14-1/2" x 8" cast aluminum table tilts 0° to 45° left
- Uses pin end blades, 5-1/2" long
- Heavy duty cast iron frame and base reduce vibration
- 1/8 HP, 110V, .83 amps
- 1750 SPM blade speed
- 7/8" blade stroke
- Single speed

ITEM 37908-2EKA **$49.99**

FOOT SWITCH WITH GUARD

Ready to use. Steel housing and 8 ft. cord.

ITEM 37784-1EKA **$9.99**

CENTRAL MACHINERY

12" DIRECT DRIVE BENCH TOP DISC SANDER

Get sharp, accurate finishes without burning or marring. Direct drive disc won't slip. Table tilts to 45°; 2" dust collection outlet; fan-cooled brushless motor; miter gauge, base pads prevent creeping; safety switch. Includes 60 grit, 12" sanding pad.

- 1 HP, 120V, 10 amps
- No load speed: 1793 RPM
- Wheel diameter: 12" • Base: 13" x 10"
- Shipping wt.: 92 lbs.

ITEM 37297-3EKA **$89.99**

Pittsburgh

2 PC. 3/4" HEAVY DUTY PIPE CLAMP

Constructed from heat-treated cast iron, these durable clamps keep your work rock steady. Just screw the handle side onto a 3/4" threaded pipe and slide the spring loaded end on. You're ready to go! Pipe not included.

- Handle screw operating range: 2-1/8"
- 1-1/2" throat depth
- Weight: 2-7/16 lbs.

ITEM 31255-1EKA **$3.99**

1/2" PIPE CLAMP

- 1-1/2" throat depth
- Weight: 1-4/5 lbs.

ITEM 37056-2EKA **$2.99**

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SOLID HARDWOOD WORKBENCH

Includes large flush mounted vises. Twin rows of 10 bench dog holes hold just about any project. Tools shown sold separately.

- 2 vises: 13"W x 1-1/4"D x 7-1/2"L max.
- Trough: 47-3/8"L x 5-1/2"W x 2-3/4"D
- Overall: 55"L x 25"W x 32-3/4"H
- Work area: 49-1/4" x 13-1/2"
- 20 bench dog holes
- Weight: 64 lbs.

~~$129.99~~ **$99.99**

ITEM 01635-0EKA

CHICAGO Electric Power Tools

3/8", 18 VOLT CORDLESS DRILL/DRIVER WITH KEYLESS CHUCK

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~~$72.99~~ **$59.99**

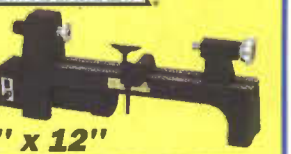
ITEM 37144-4EKA

18V REPLACEMENT BATTERY

~~$37.99~~ **$29.99**

ITEM 37145-1EKA

CENTRAL MACHINERY



6" x 12" MINI WOOD LATHE

Create projects from miniature to full-size. Heavy duty, cast iron construction for minimum vibration and high strength. Light weight and compact size allow bench top mounting or taking it on the job. Dual speed range for obsolute cutting control.
Distance between centers: 12-1/2"; 3-1/8" wide tool rest with adjustable height; 120V, 60 Hz, 3.2 amp motor; MT1 spindle; Swing over bed: 6"; 25"L x 4-3/4"W x 9-1/2"D; Speed range – Low: 275 to 3050; High: 400 to 4450

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ITEM 34837-7EKA

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VARIABLE SPEED RECIPROCATING SAW

- Gear driven, variable speed
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- 600 Watts • All ball bearing
- 300 SPM to 2400 SPM
- 110V, 60 Hz, single phase ~~$59.99~~ **$39.99**
- Overall length: 17"
- Tool weight: 7-1/4 lbs.

ITEM 36595-6EKA

RECIPROCATING SAW BLADES

LIMITED QUANTITIES

Grab bag selection of saw blades for your reciprocating saw. Contents vary for each package. 5 PACK **$1.99**

ITEM 36340-4EKA

TUNGSTEN CARBIDE TIPPED ROUTER BIT SETS

- 1/4" shanks
- Individually organized storage cases

15 PC. ASSORTED BITS

1-1/4" rabbeting♦, 1-3/8" cove♦, 1-1/16" roman ogee♦, 1-1/4" raunding over♦, 1/2" flush trimming♦ 1-3/16" 45° chamfer♦, 1/2" davetail, 3/4" straight, 1/2" straight, 3/8" V-groove, 1/4" cambination panel, 1/4" straight, 1/2" martising, 1/4" cove, 1/8" straight. ♦Includes pilot bearing

ITEM 31164-5EKA **$29.99**

4 PC. ROUNDING OVER BITS

- 1-5/32" long shanks • 2 flutes each

Sizes: 1/8", 1/4", 3/8" and 1/2" with pilot bearing tips

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CENTRAL MACHINERY

BENCH TOP SHAPER/ ROUTER

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- Uses 2" diameter shoper cutters and router bits with 1/4" shank
- Individually adjustable fence halves
- 115V, 4.3 amps, 7/8 HP
- 10,200 RPM motor speed
- Cast iron work table and base
- Rear chip discharge

ITEM 32650-0EKA **$89.99**

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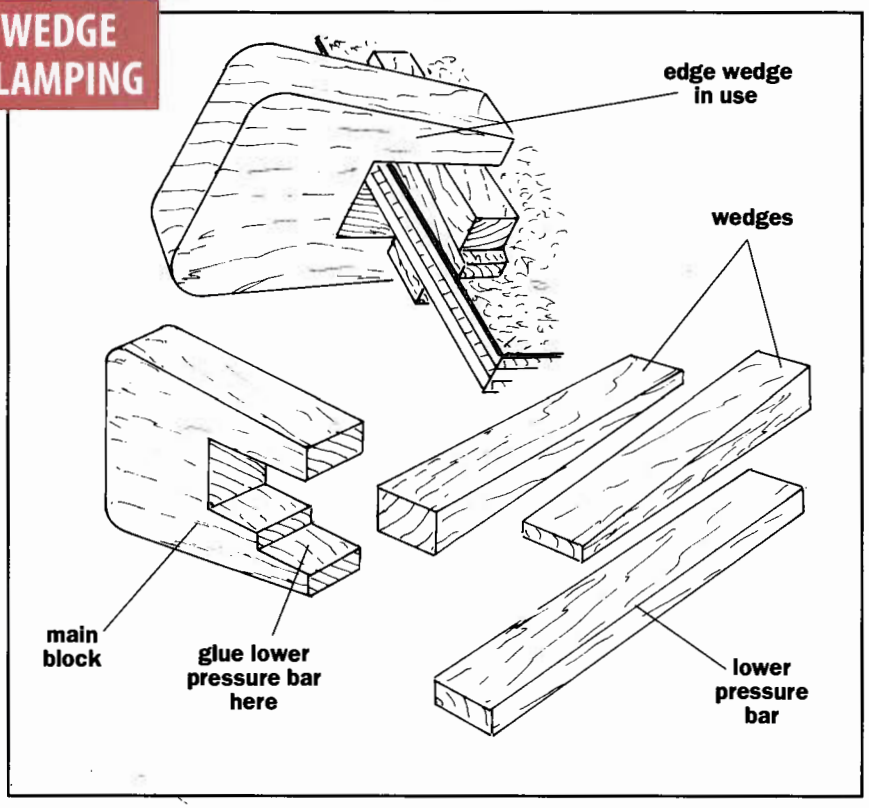
TRICKS of the TRADE

Each issue of *Popular Woodworking* offers tips and tricks for the woodworker that we've accumulated from readers, contributors and from our own workshop and woodworking experiences. We want to encourage the free exchange of these time-saving and safety ideas for all woodworkers. If you have a good trick, we'd love to hear about it. Send your trick, whether it's one your father taught you or one you came up with on your own, to *Popular Woodworking*, Tricks of the Trade, 1507 Dana Ave., Cincinnati, OH 45207.

WEDGE CLAMPING



Wedge That Edge!

When gluing laminate or veneer in place, the sheet often tends to pull away around the edges and needs clamping. Most ordinary clamps are bigger than necessary. Notched pieces of wood can be used, but the pressure of these and ordinary clamps is localized and you either need many of them or have to adjust pressure pieces as well as the clamps.

I have made several wedge clamps to help in these types of glue-ups. The wedges are identical, with slopes of 1 in 7 and about 1" x 6". The lower pressure piece is 1/2" thick and about the same size. The main block is 1 1/4" thick and large enough for the opening to be cut and leave a strong length of solid wood. My blocks are 4" x 6". The pressure piece is glued into the notch on the lower jaw of the block. In use, the wedges are driven over each other to put on considerable pressure along a 6" edge.

Percy Blandford
Warwickshire, England

PATTERN ENLARGING

% of increase	1st copy setting	2nd copy setting	3rd copy setting	4th copy setting
160	150	107	--	--
170	150	113	--	--
180	150	120	--	--
190	150	127	--	--
200	150	133	--	--
210	150	140	--	--
220	150	147	--	--
230	150	150	102	--
240	150	150	107	--
250	150	150	111	--
260	150	150	116	--
270	150	150	120	--
280	150	150	124	--
290	150	150	129	--
300	150	150	133	--
310	150	150	138	--
320	150	150	142	--
330	150	150	147	--
340	150	150	150	101
350	150	150	150	104
360	150	150	150	107
370	150	150	150	111
380	150	150	150	114
390	150	150	150	117
400	150	150	150	120

Enlarging a Pattern

A photocopier can be a real time-saver when enlarging a grid pattern. Not only does a photocopier save time, you'll find that a pattern doesn't even require a grid in order to be enlarged — you simply work from the curved pattern as shown in the book or magazine.

The technique requires the use of a photocopier that can enlarge at least 150 percent. Check your local copy center if you don't have a machine handy. The enlargements are accurate to within 1 percent. You'll first need to determine the percentage of enlargement before you can use the table at left. To do this, 1. Determine the desired full-size length of the pattern. 2. Measure the length of the pattern on the grid. 3. Divide the desired full-size length by the measured length of the pattern on the grid. Multiply the result by 100.

$$\%\ \text{of enlargement} = \frac{\text{desired full-size length}}{\text{measured length of pattern on grid}} \times 100$$

Or for a full-size 6" pattern whose printed pattern size is $1\frac{7}{8}$"

$$\% = \frac{6}{1\frac{7}{8}} \times 100 \quad \textit{or} \quad \% = 3.2 \times 100, \quad \text{so} \quad 320\%$$

Once you know the percentage of enlargement, use the table to figure out how to set the copier. **PW**

Excerpted from **The Woodworker's Guide to Shop Math**, *By Tom Begnal*
Published by Popular Woodworking *Books*

Purpleheart

(Peltogyne venosa)

Other Common Names: Amaranth, Guarabu, Nazareno, Palo morado, Pau roxo, Purperhart, Saka, Tananeo, Violetwood

Growing Regions: Purpleheart grows in Central and South America between Mexico and southern Brazil. The trees are most commonly found in the Amazon Basin.

Characteristics of Tree: The trees attain heights of 100 to 150 feet and diameters of 18 to 36 inches.

Characteristics of Wood: Purpleheart starts out with a heartwood that is brown, but it changes to a vivid purple color. Color variation between pieces of the wood can be high. The grain is usually straight but can also be wavy or irregular. The texture is fine and the luster is medium to high. There is no odor or taste, and the wood is very stable. Purpleheart is resistant to attack by fungi, termites, marine borers and many chemicals.

Finishing Characteristics: Purpleheart polishes well but some finishes may bleed. Water-based finishes hold color best; spirit finishes can remove the wood's purple color.

Workability: The wood glues well but sanding is difficult. Nails require pre-boring and do not hold well. The wood may gum up cutting tools that aren't sharp. It is also difficult in machining operations. Use slow feed rates and sharp, high-speed steel knives when machining this tough wood.

Common Uses: Bedroom suites, bridge beams, cabin construction, chairs, dockwork, drawer sides, figured veneer, sculpture, umbrella handles, parquet flooring.

Availability: Common.

Special Features: It is suggested that purpleheart be treated against fading. It often turns gray-brown when placed in the sun. Coating the wood with Armorall, a product usually used to protect cars, under the lacquer will help maintain the wood's original color.

Midwest Price: With two sides surfaced ¼ is $4.50 per board foot. **PW**

CAPTION the CARTOON SPONSORED BY Makita

JOHN BYRNE

from Garfield Heights, Ohio, is the winner of our "Caption the Cartoon Contest #33" from the November issue and recipient of the Makita belt sander. Congratulations John!

The runners-up each receive a one-year subscription:

"Boy, that's really power to the 'steeple.'"

"OK Coo-coo, come on out with both your wings up, or I'll shoot."

Woodrow Havens, from Newcastle, Oklahoma

"I'm sure this project will be a sweeping success."

Andrew Muller, from Canby, California

"Yup, it's a wind-up clock. It's going to wind up in the garbage."

Adam Rum, from Huntington, New York

illustrated by Bob Rech

Submit your caption(s) for this issue's cartoon on a postcard to *Popular Woodworking*, Cartoon Caption #35, 1507 Dana Ave., Cincinnati, OH 45207 by Feb. 22, 1999. Winners will be chosen by the editorial staff.

The winner will receive Makita's 6233DWBE 14.4v cordless driver-drill, the world's first Nickel-Metal Hydride-powered drill, offering 30-percent longer run time. NiMH-powered products were chosen as a "Tool of the Year" by *Popular Woodworking*. This 3/8" variable-speed drill features a two-speed gear selection, 18 torque settings and a keyless chuck.

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

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Band Resaws

BAKER PRODUCTS feature a wide variety of woodworking machinery from our world famous band resaws to scragg mills, conveying systems plus a variety of wooden pallet component machinery. Call or write today for your free literature and video package. Baker Products, P.O. Box 128, Ellington, MO 63638; (573) 663-7711. **Circle #102.**

Battery Recycling

RBRC, a non-profit public service organization, promotes and administers Ni-Cd rechargeable battery recycling programs in communities, businesses and government agencies. Consumers can recycle spent Ni-Cd rechargeable batteries by calling 1-800-8-BATTERY or visiting www.rbrc.com to locate a participating retailer store nearest you or **Circle #136.**

Catalogs

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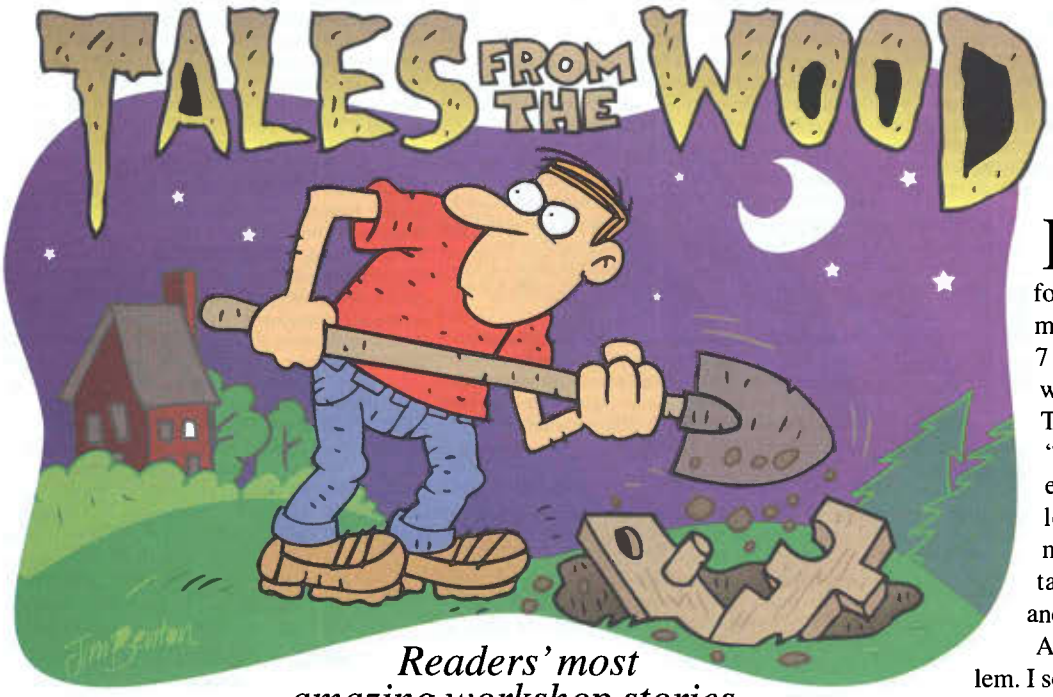

Readers' most amazing workshop stories.

WINNER!

This Is What We Call 'Operator Failure'

In the early 1980s I retired with no hobby. So I bought some woodworking tools from a friend and rented a garage for a workshop. Being a novice, when it came to band saws I knew zilch.

My old band saw had 72" blades. I was constantly breaking them and having them rewelded — if the break was at the weld. After quite a few breakages, I installed a newly welded blade one day and made the necessary adjustments to my saw. I tried to cut a piece of wood but the saw wouldn't cut. I took a close look at the blade and noticed the teeth were facing up instead of down.

So I took the blade back to the welder and told him the teeth were running the wrong way and that he would have to reweld the blade.

He looked at me kinda dumbfounded and told me all I had to do was to turn the blade inside-out. He even showed me how. Talk about embarrassed. I could have crawled in a hole — if there had been one around.

Rohn L. Morgan
Laurel, Montana

Apply Finish in an Avian-Free Area

Last spring I was asked to make a bookshelf for one of my friends. The measurements were to be 7 feet high by 4 feet wide with adjustable shelves. This was my first really "big" project so I was very excited about it. The problem was my workshop measures 9' by 20' and contains our freezer, washer and dryer and my tools, etc. Assembly was a real problem. I solved this by assembling the bookcase outside on my deck. As the work progressed, I would bring the shelf in and put it in my living room overnight. When it came time to finish the bookshelf, I decided on a red mahogany stain covered by a durable polyurethane finish. One beautiful spring morning my son helped me carry this huge shelf out on the deck. After sanding, I applied the red mahogany stain and went inside for lunch to let it dry. When I returned, I was surprised at the white and brown colors and hues that had been brought out in the stain!

Why? Because every bird within a hundred-mile radius had landed in the tree above the shelf and left messy deposits that were dripping down the exposed parts of the bookcase! I had to sand and stain all over again — this time under a tarp.

Michael A. Priest Sr.
Tampa, Florida

Continued on page 84

Share Your Story & Win!

Turn your favorite tale from the woodshop into a $150 gift certificate from Lee Valley Tools in *Popular Woodworking's* "Tales from the Wood" contest. We're looking for your funniest, most embarrassing or incredible story. And if we can learn something from your yarn — even better.

Each issue, our editors choose the best tale and print it here. Runners-up receive a Veritas Marking Gauge (shown at left) from Lee Valley Tools, the catalog company that features an impressive array of quality woodworking tools, supplies and accessories. One final rule: Please, no stories about people getting hurt. That's not funny. To make things easier, you can e-mail your tale and daytime phone number to us at PopWood@FWPubs.com or mail it to: Tales from the Wood • *Popular Woodworking* • 1507 Dana Ave. • Cincinnati, OH 45207. All entries become the property of *Popular Woodworking*.

WOOD TALES

Continued from page 82

Woodworking Teaches More Than Just Shop Skills

As a single mother of four, I had long been interested in woodworking. Even though I subscribed to several woodworking magazines while my children were growing up, I never had the time, energy or money to actually do any woodworking.

That all changed a few years ago when my youngest son was 16. I saw signs of low self-esteem and a lack of confidence. To correct this, and in spite of his objections, I convinced him to help me build a garden shed in the back yard.

When we began the project, all we had was a circular saw, a claw hammer, a couple of hand saws and a pair of pliers. Instead of purchasing a set of plans for the shed, we drew our own plans on graph paper. We had no idea how to measure angles, so we guessed at the angles for the joists of the barn roof.

It was a real stop-and-go project, and more than once we had to dismantle a part of the shed and try again. We spent a lot of time making trips to the local home improvement center to examine the garden sheds they had for sale. Then we'd rush home to put into practice the things our visual inspection had taught us.

By the end of the summer I had accomplished both goals. I had the garden shed I had envisioned, and my son and I had worked side by side to build it. It's not perfect, but it's sturdy, attractive and serves its purpose.

More importantly, I had given my son confidence that will last a lifetime. Two years later, my son enlisted in the Army. His goal was to be a crew chief on a Blackhawk helicopter. Less than a year after enlisting, he completed the Army's paratrooper training and reached his goal. He is now stationed with the 82nd Airborne in Ft. Bragg. As for me, that summer of shed building gave me confidence, too. I now have a fully equipped wood shop. When my son visits we work together in the shop that was inspired by his pride in that shed. **PW**

Joan Furst
Eugene, Oregon

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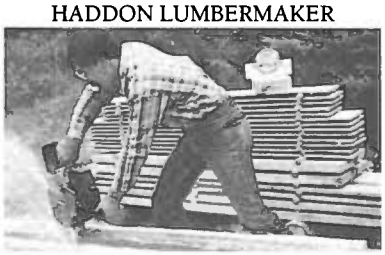

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The Dovetail Dilemma

How one man rationalizes his affection for this hand-cut joint.

The workbench I designed and built.

"Why do you cut dovetails by hand? Don't you have a router?"

That's what a friend wanted to know a while back, when we got to talking about our shared passion for woodworking. At the time, I didn't have an answer for him; I wasn't sure myself. I think I mumbled something about the "workmanship of risk" and changed the topic to biscuit joiners.

But, he had a good question. Why do I cut dovetails by hand? Sure, I have a router (two, actually). I even bought a jig for router-made tails and pins after my first miserable attempt to cut them by hand. The jig works flawlessly, so why don't I use it?

An engineer by training, this embarrassing Luddism doesn't show up in other aspects of my work. I can't imagine trying to make due without a table saw and thickness planer. OK, I do use a hand plane to edge joint boards, but that's a matter of budget, not principle. I openly covet that massive Delta jointer Norm fires up so nonchalantly every Saturday morning. That sure looks faster than my method.

So, why do I reach for my Japanese handsaw instead of the router when it's time to cut dovetails? Maybe I don't want the process to go faster. Sometimes we forget the obvious: This isn't a race. Like many part-time woodworkers, I am attracted by the activity and craftsmanship of woodworking, not because it pays well (it doesn't) or because my family needs more furniture (we do). Would I enjoy woodworking twice as much if I could build a drawer in half the time? I doubt it. That would just hasten the inevitable dilemma, "What should I build next?"

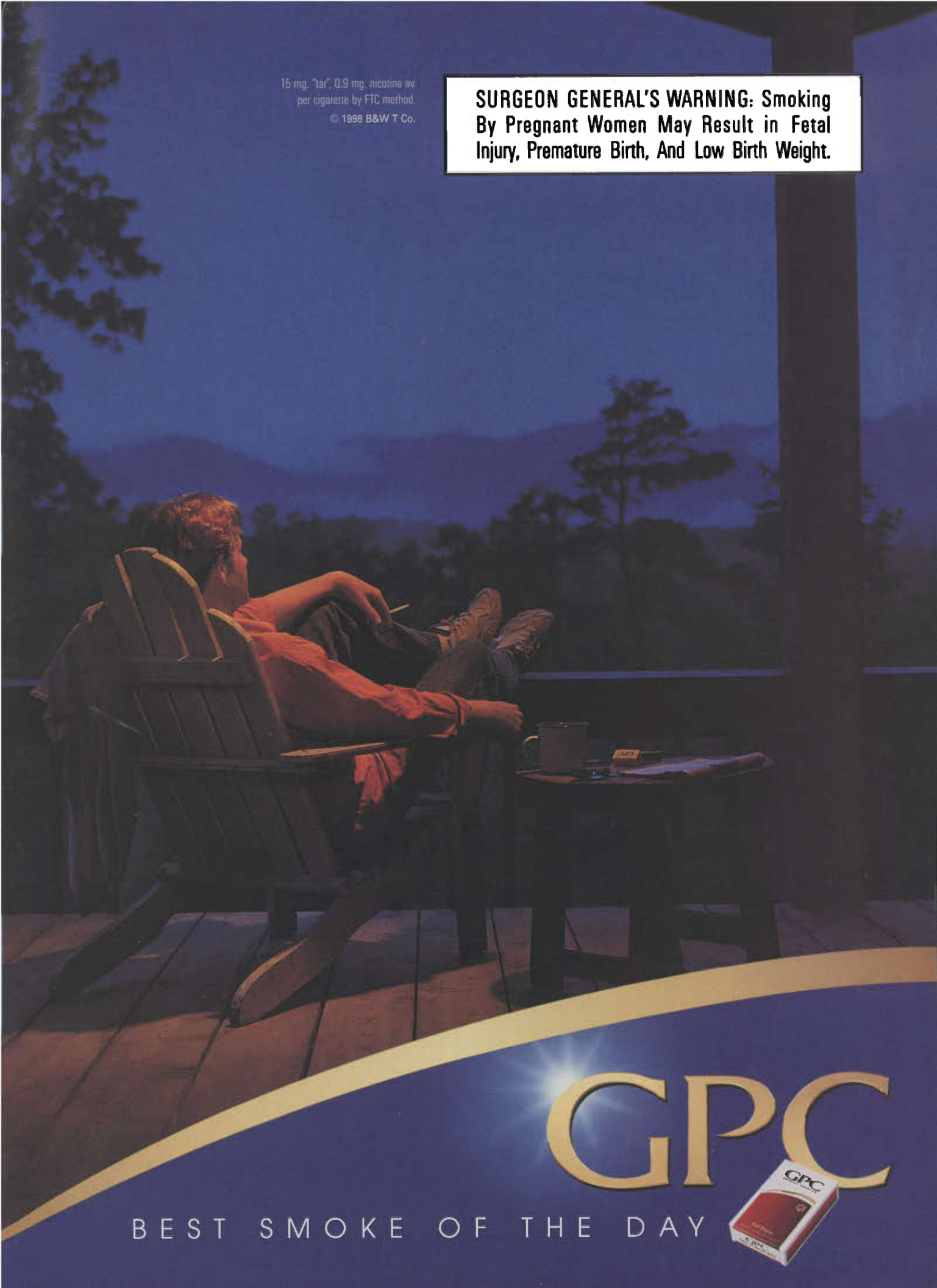
Then there's the question of aesthetics. To my eye, a flock of machined dovetails has an unnatural precision, evoking the crisp certainty of computer code or a circuit diagram. That kind of manufacturing exactitude is fitting for a metal piston or a plastic ballpoint pen, but somehow doesn't seem true to the nature of wood. The essential beauty of wood owes to its variability, the delightfully unexpected changes in grain pattern, color and texture evident even within a single board. In these days of CAD software and digital calipers, it's easy to forget that wood is a "living" material, not something to be engineered to precise tolerances. Consider the different perception in Sweden, where the similarity in the words for wood and tree – trä and träd – is a constant reminder of wood's natural roots. (Try telling someone that you are building a desk made out of tree!) The "flaws" introduced by human hand echo wood's natural inconsistencies. Minor variations and imperfections inevitably found in hand-cut joints harmonize with the natural qualities of wood, enhancing the overall appearance of the finished piece.

But my penchant for hand-cut dovetails goes beyond this sensitivity to natural materials and the simple desire to slow down and enjoy the work. This quintessential joint is my touchstone, a way to gauge progress as I improve my technical skills. For many of us, a well-executed dovetail joint is the "Holy Grail" of quality woodworking. As I reflect on the pieces I have built over the years, I know where the flaws are, even when they aren't readily visible. And, I'm (secretly) proud of the steady improvement in my work over time. Nowhere is this personal growth more evident than in the quality of hand-fitted dovetail joints. I keep my first dovetailed cabinet from years ago in my office as a reminder; there's more paste filler in those joints than wood!

So, to answer my friend's pragmatic question, I could have tried to explain all this: I cut dovetails by hand because I enjoy the process, to be true to the nature of wood, for pride in the finished piece and because this special joint symbolizes for me the craftsmanship of woodworking. And, of course, so I can brag to friends that I cut the joints by hand! Instead, I showed him a picture of the workbench I built, with its prominent dovetail joints.

"Now I understand," he said. **PW**

***Todd Peterson** recently started a custom furniture business near Cincinnati, Ohio, named Bridgewood Design.*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