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AMERICAN WOODWORKER

#88 August 2001

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- Wooden Storm/Screen Door
- Craftsman-Style Mantelpiece

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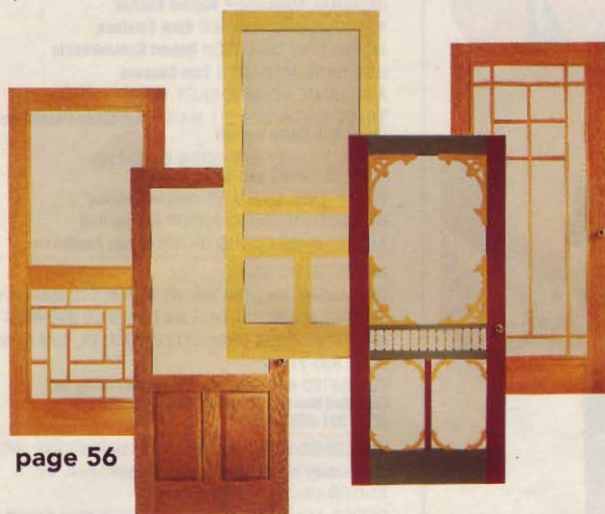
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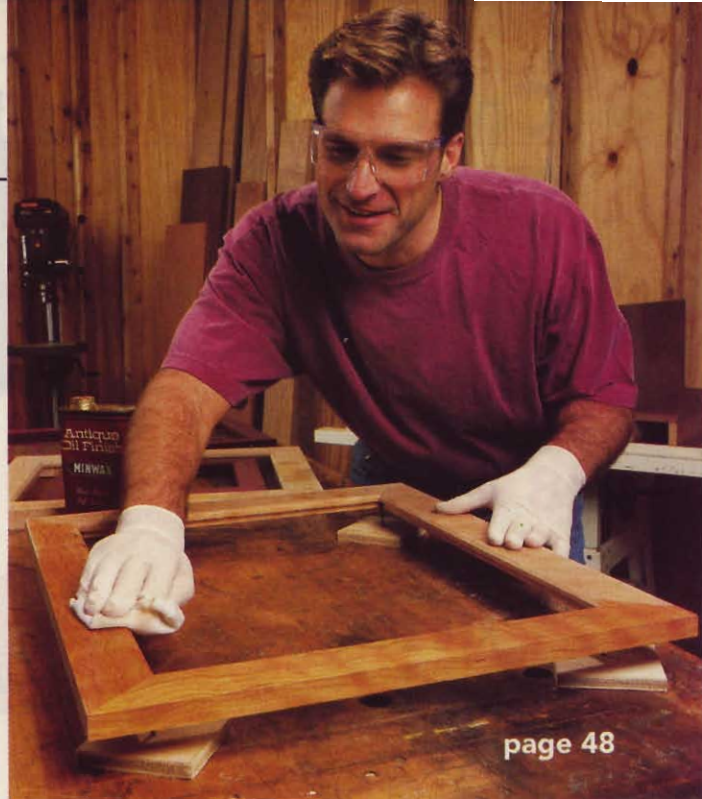
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Question & Answer

Warped Wood Woes

Q. I ordered a milled piece of ebony through the mail last winter. It looked great upon arrival, but after a few days it was so warped and twisted that I couldn't use it. What gives?

*Tim Avery
Bay City, MI*

A. Watching your prized ebony turn into a potato chip must've hurt! Chances are this board had a fairly high moisture content (10 to 12 percent) when it was shipped. It arrived in a dry winter environment, where wood can have a moisture content as low as 5 or 6 percent. Your board started to dry out as soon as you unwrapped it. Attempting to keep a board from changing shape while drying is a bit like trying to stop a glacier, but here are some things to try next time:

- **Buy rough lumber.** You'll need a jointer and planer to mill it, but if you start out with thicker wood you'll have more leeway if it warps.



Stack and sticker mail-order wood as soon as it arrives.

- **Use a moisture meter.** Compare the moisture content of your new wood with old wood stored in your shop. Don't mill your new wood until it's about the same moisture content as the old stuff.

- **Paint the ends.** Wood dries out faster through its ends and can crack if it dries too fast. Paint slows down the rate at which end grain loses moisture.

- **Stack your wood off the floor.** Concrete floors can be very damp.

- **Place stickers between the boards.** All sides of your wood should be equally exposed to air so they dry at equal rates.

- **Weight your boards.** This helps keep them flat and straight, but it's no guarantee. You've done about all you can do.

Period Furniture Makers Unite

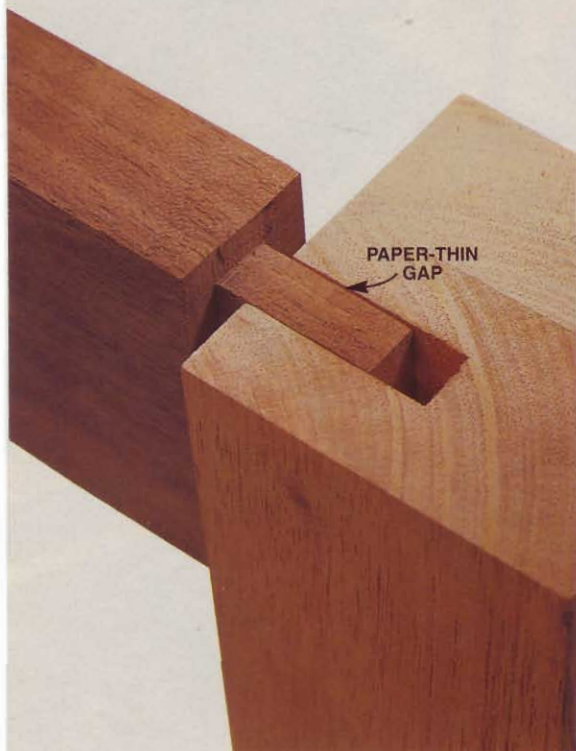
Q. I love building reproduction furniture, but I'm having trouble getting the details right. Where can I go for help?

*Charles Scott
Shelbyville, KY*

A. Bona fide measured drawings are hard to find, so your best bet is to contact professional woodworkers in the reproduction business. There's a group called the Society of Period Furniture Makers (www.sapfm.org) that may be just

what you're looking for. Don't be put off by the title; this is a bunch of folks that welcome woodworkers of all abilities. Membership is \$35 a year. Once a member, you can post questions through their Web site with some confidence that you'll get a reliable answer.

In addition to the Web site, this organization sponsors an annual conference in Williamsburg, Virginia, publishes a newsletter and holds summer workshop programs.



The Right Mortise/Tenon Fit

Q. What's the right fit between a mortise and a tenon? I'm going crazy trying to measure them with a dial caliper!

Marty Valle
Florence, SC

A. You're not alone. This question has bugged just about every woodworker, but the answer doesn't lie with precision instruments.

A crusty woodworker of the old school once said, "If you need your shoe to pound a tenon into a mortise, it's too tight. If it just drops in by itself, it's too loose. If you can tap it in with your hat, it's just right." Well, nobody wears a hat in the shop any more, but you get the idea.

If the fit is too tight, your glue-up

will be a nightmare and the joint may actually fail. Water-based glues slightly swell wood, so a joint that's tight when dry becomes even tighter when wet. Way too much pressure is necessary to force out the air trapped in a tight mortise. To make matters worse, you may "starve" the joint of adequate glue if it's scraped off the mating surfaces as the tenon enters the mortise.

If the fit is too loose, the glue won't bond the tenon and the wall of the mortise. White and yellow glues shrink as they dry and at most they can tolerate a gap about the thickness of a sheet of paper. That's more or less the amount of clearance in a joint that slips together easily by hand (or hat!).

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Question & Answer

Salvaging a Rusty Plane Iron

Q. I've got an old plane that my grandfather left me. I'd like to use it, but its cutting iron is really rusty. Do I need to buy a new one?

Will Novack
Modesto, CA

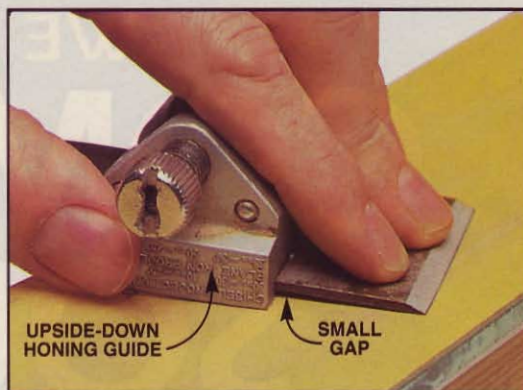
A. Don't throw away that iron yet. Flattening the back of a plane iron is usually the first step in sharpening, but you might spend hours to get down below the rust pits to clean steel. What a chore!

Here's a non-standard method that could rescue your antique plane iron. Rather than flatten the entire back, work only on the leading edge to create a very small, low-angle bevel. This will slightly increase the cutting angle of the plane, but you probably won't notice the difference.

The catch is that you must hone this back bevel at a consistent angle every time you sharpen. Use a standard honing guide to sharpen the main bevel of the iron and simply turn it upside down to create the back bevel. If you prefer to sharpen without a guide, you can create the back bevel by laying a shim on top of your stone. The shim slightly raises the blade the same way the guide does.

Source

Highland Hardware, (800) 241-6748, Standard Honing Guide; \$22.



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Question & Answer

Sanding Scratches Revealed

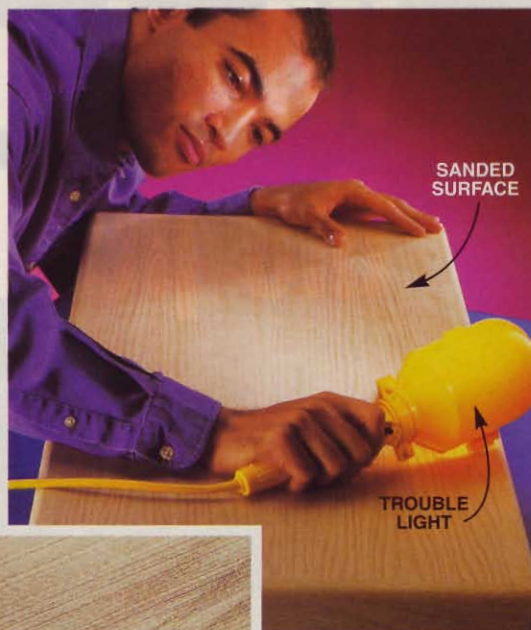
Q. What can I do to see sanding scratches before I apply stain? I always miss some of them until it's too late.

E. M. Hartz
St. George, UT

A. Doesn't that drive you crazy? Just when you should be home free, wham! Now you're stuck with a lousy finish and there's no way out. One simple measure can prevent this from happening again. Use a bright light to make the scratches visible *before* you stain.

A portable trouble light held at a very low angle to the wood makes sanding scratches stand out like long shadows at sunset. This raking light is the ultimate test for a well-sanded surface. You may see random orbit sander swirls that you never knew existed.

Check your progress with the light between each grit of sandpaper. As you move from coarse to fine paper, the trick is to remove all the scratches made by the previous grit. The only way to ensure that you've succeeded is to actually *see* the scratches, and that's where the light comes in. **AW**



Unwanted scratches pop out under a low-angle light.

Ask Us

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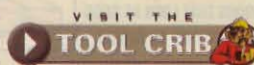


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WorkShop Tips

Silky-Smooth Polyurethane

Every woodworker I know uses water-borne polyurethane. Of all the ways I've seen to get a silky-smooth finish, abrasive, steel-wool substitute pads are by far the best. The coarseness of the pad determines the final sheen. A green pad (0) leaves a dull luster, gray (00) leaves satin and white (0000), gloss. I start with a pad that's coarse enough to remove imperfections. Then I work through the different pads until I get the luster I want. I made a cork-faced block (1/4-in. cork glued onto a wooden block) for flat surfaces. For edge profiles and other contoured surfaces, I just fold the pad over and go. After a final buffing with a soft, clean cloth I have a flawless finish you just have to run your hand over.

*Beverly Stedman
Hammond, IN*



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Better Bandsaw Dust Collection

The dust port on my bandsaw is small and never worked very well. To solve this problem all I did was add a 2-1/2-in. dust port to the lower door. First I drilled a bunch of 1/4-in. holes. This is safer than one big hole which would expose the moving blade wheel. I screwed on the new dust port and hooked up my shop vacuum. Now I can really bust the dust!

*Sam Baker
Jackson, MS*

Source

2-1/2-in. dust port, # 03J61.10; \$2
Lee Valley, (800) 871-8158 or www.leevalley.com

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Workshop Tips

No Trace Screw Removal

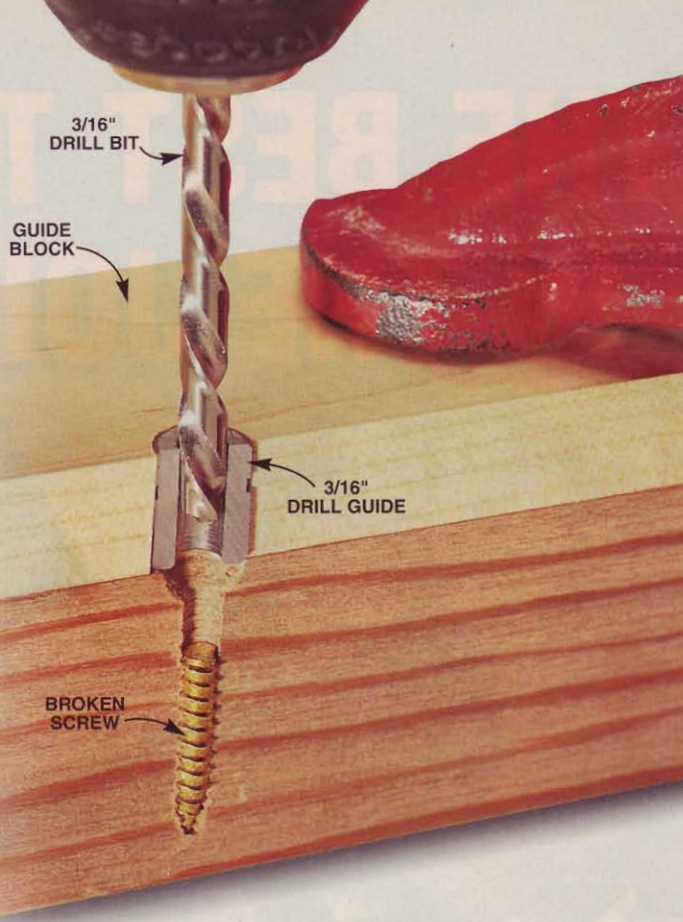
Last summer I built some outdoor furniture and used brass screws. Geez it's a pain when those screws break off. After I snapped a couple I couldn't find my screw extractor so I had to get creative!

I've got a set of steel drill guides that I use to make custom drilling jigs for shelf pegs and dowel holes. I discovered that if I put the 3/16-in. drill guide into a block of wood and clamped this assembly over the broken screw, I was able to drill it out. Then I plugged the hole with a piece of wood and some glue. Once I inserted a new screw, the fix was invisible. I've tried this with brass and mild-steel type screws but it doesn't work with hard drywall-type screws.

Ronald G. Early
Tacoma, WA

Source

3/16-in. drill guide, #821-869; \$3.
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Workshop Tips

Remove Spilled Candle Wax

After our last family birthday party I spent an hour scraping big globs of candle wax from several tables and our wood mantel. The next day, in response to my complaining, a coworker told me to try mineral spirits next time I'm faced with wax on wood. He said it won't hurt varnish, lacquer or shellac finishes, but it does dissolve wax. I had missed one waxy mess so I poured some mineral spirits on a clean shop cloth and kept wiping until the hardened wax dissolved into the cloth. Mineral spirits removes *all* the wax, including any paste wax or polish that's been applied purposefully and it can also cut into an oil finish. It's not a big deal to re-polish or re-oil. Just don't use mineral spirits on painted surfaces. Incidentally, I discovered that mineral spirits works on ill-placed crayon masterpieces as well!

Mac Simmons
Massapequa, NY



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I'm a die-hard tightwad, so I came up with this trick to extend the life of my steel wool. I unroll each pad and shape it into a fluffy ball before I use it. As the ball gets flattened, I stop and gently pull it back apart. Re-fluffing exposes new sharp edges and releases wood dust and broken-off bits of worn-out steel wool.

Denny Suttan
Wilmington, NC



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Workshop Tips

No Math Octagons

I'm not a numbers guy, so I hate complicated formulas for figuring out dimensions. I'd given up making octagonal wood blanks for my lathe until I discovered this technique. No

measuring required! You can also do this on your bandsaw.

*Steve Haffner
Northrun, UT*



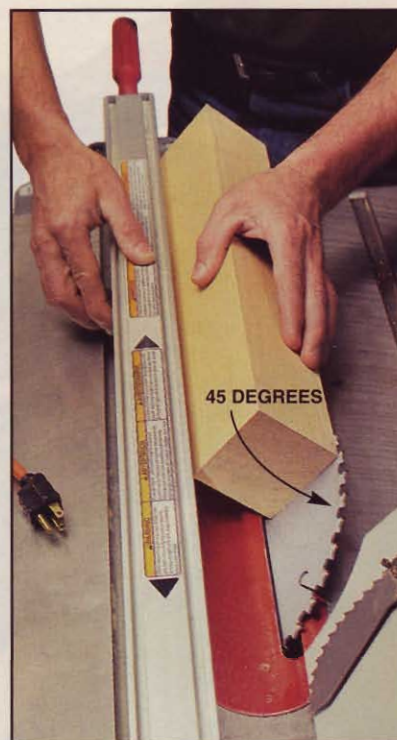
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Step 1: Tilt your tablesaw blade to 45 degrees. Rest the stock flat against the blade and slide the fence over until it touches the corner of the stock. Then lock the fence into position.



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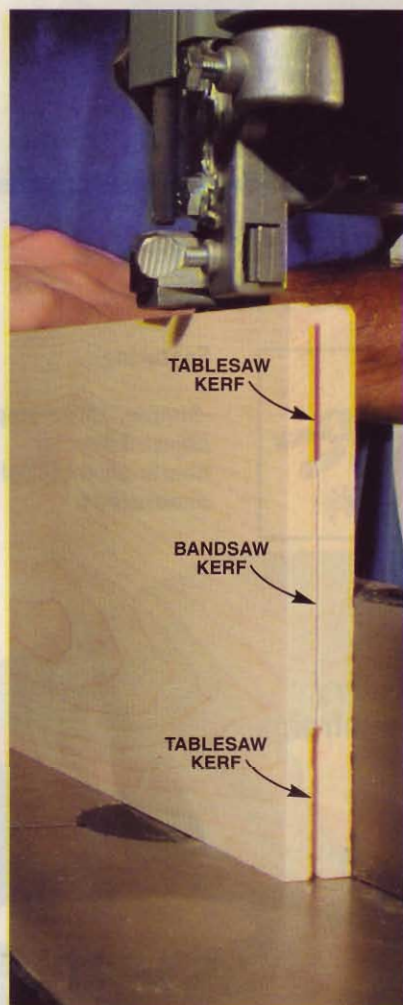
Step 2: Lower the blade half way. Then lay the stock flat and saw off the corners.

Workshop Tips

Easier Resawing

I'm stuck with a wimpy 1/2-hp bandsaw that stalled whenever I tried to resaw anything tall. Then my neighbor turned me on to a technique that solved my problem. I precut a 1-1/2-in.-deep kerf in each edge of the board with my tablesaw and do the final cutting on my bandsaw. Now I can take advantage of the full 6-in. capacity of my bandsaw and it only has to do half the work. My neighbor has a 3/4-hp bandsaw with a riser block and he says it helps him resaw boards a full 12 in. wide.

Rob Charles
Lindville, LA



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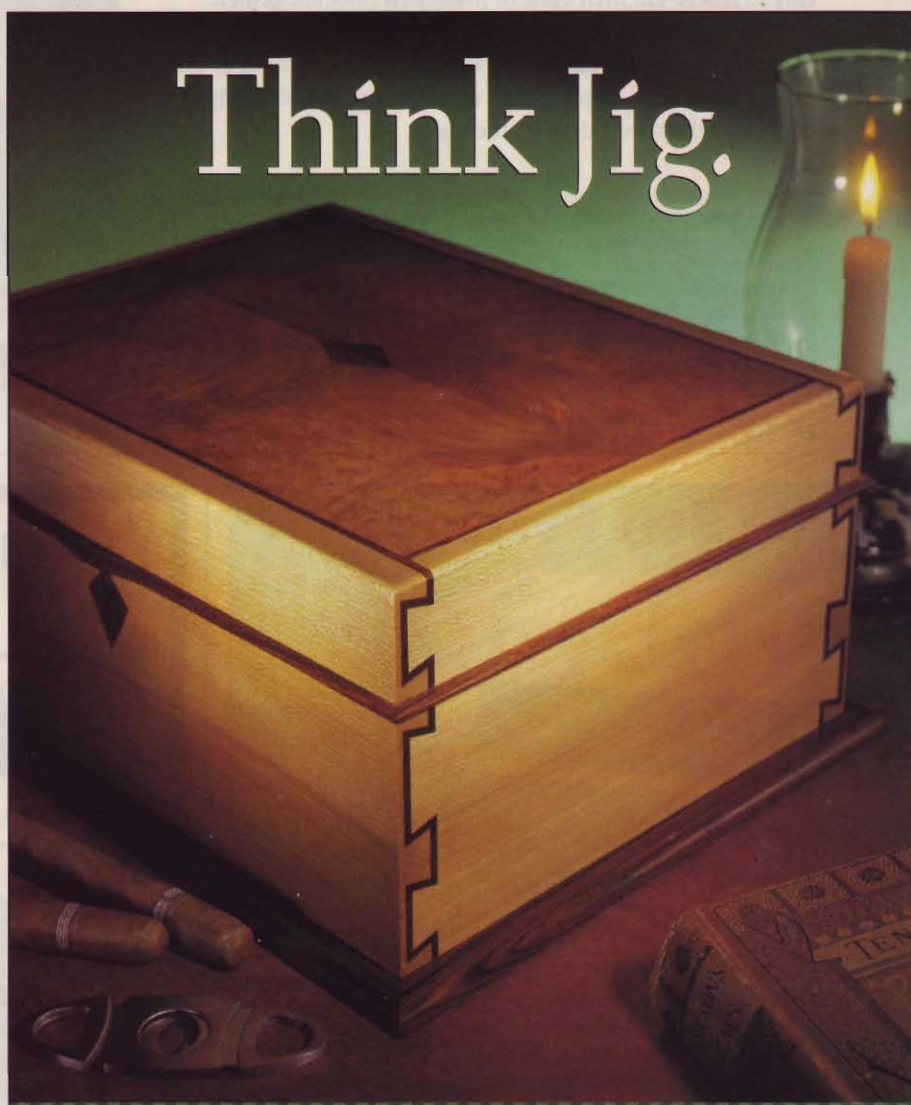


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Workshop Tips

Disposable Guide Blocks

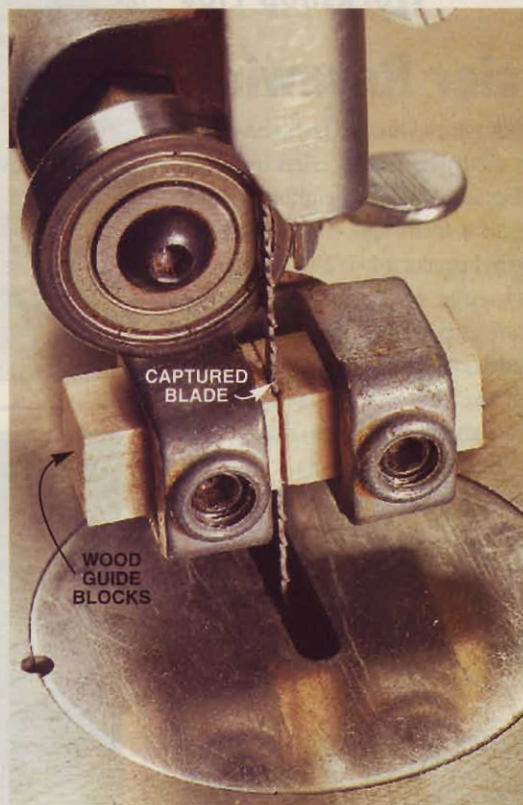
I've bandsawed hundreds of puzzle pieces using very small blades. I gave up on the steel guide blocks that came with my saw because when those little blades came in contact with the blocks, they'd dull right away. And, when I wanted to back out of a cut, the blade would pop out of the blocks.

Now I make my own guide blocks from scraps of hardwood. My blades last longer and don't pop out or wander because they're trapped between the wooden blocks. The blocks wear, but it's so easy to just re-cut their ends or make new ones altogether.

With the bandsaw unplugged, I install the new blocks by pushing them toward the blade until they're lightly touching it. Then I lock the blocks in place and spin the upper blade wheel to make sure they don't drag on the blade. **AW**

If you have an original Workshop Tip, send it to us with a sketch or photo. We pay \$200 for each one we print. Send to: **Workshop Tips, American Woodworker, 2915 Commers Drive, Suite 700, Eagan, MN 55121.** Submissions can't be returned and become our property upon acceptance and payment.

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Product Reviews

Cabinet Saw for Less than \$1,000!

Okay, so it's only less by a penny. At \$999.99, the Jet JWCS-10A bridges the gap between contractor's saws and industrial cabinet saws.

Compared to the open-leg design of a contractor's saw, the JWCS-10A's base improves stability and dust control. Its motor is mounted inside the base, directly under the arbor, instead of extending behind the table. This vertical arrangement lowers the saw's center of gravity and allows a smaller footprint. An angled sheet-metal trough, located inside the enclosed base under the motor, improves dust collection even further. It directs sawdust right to the 4-in. dust port, which is located on the side, under the motor cover.

The JWCS-10A's trunions, like those on a contractor's saw, are mounted to the underside of the cast-iron table. They support a right-tilting arbor with adjustable positive stops. The 1-3/4-hp., totally enclosed, fan-cooled (TEFC) motor has plenty of power. We had no trouble ripping 1-3/4-in.-thick kiln-dried ash using a 50-tooth carbide combination blade. Unlike an industrial cabinet saw, the JWS-10A runs on 120-volt household current, although it requires a 20-amp circuit.

The saw table is flanked by a cast-iron extension on the left and a wider wooden one on the right. This wooden table extends to the end of the 30-in. fence rails. The Xacta Fence, a compact three-locking-point, parallel-side design with plastic faces, is standard. 52-in. long rails are available for an extra \$100.

The Jet JWCS-10A joins the DeWalt Woodworker's Tablesaw (DW746; \$900) in a cool new category of tablesaws designed for the serious woodworker's shop. These saws are similar to industrial cabinet saws, but not as heavily built. The best news is that this category now offers two distinct choices. Jet has taken a conservative approach. The JWCS-10A uses time-tested component designs to produce a scaled-down version of a classic industrial machine. The DeWalt DW746 is innovative, from its blade-shroud dust collection system to its optional sliding table (\$450).

10-in. Tilting-Arbor Cabinet Tablesaw with Xacta Fence and 30-in. rails, JWCS-10A-PF; \$1,000

With 52-in. rails, table board and legs, JWCS-10-PFX; \$1,100

Jet Equipment and Tools, Inc., (800) 274-6848

www.jettools.com

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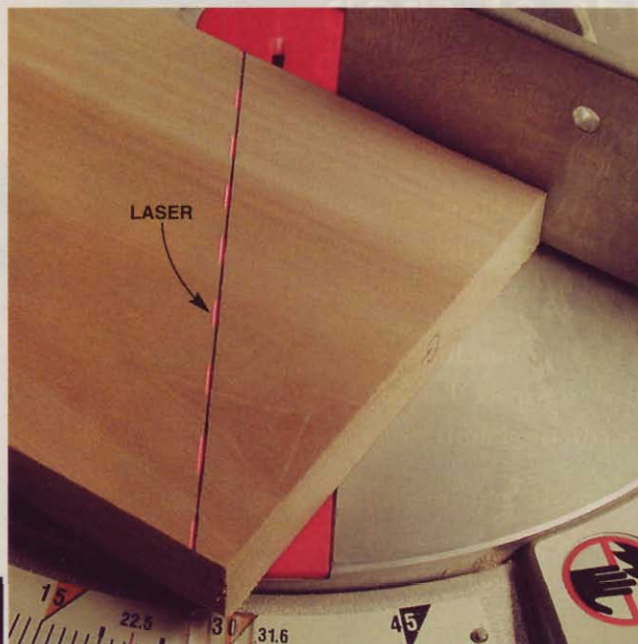
ART DIRECTION: PATRICK HUNTER • PHOTOGRAPHY: STAFF, UNLESS SPECIFIED

Product Reviews

Affordable Laser-Guided Saw

Remember the steel-cutting laser that almost bisected James Bond in *Goldfinger*? Now, for \$200, you can have a laser/cutting machine of your very own. True, the Laser Trac system on Craftsman's new 10-in. compound miter saw doesn't actually cut, but it sure *helps* you make accurate cuts. The battery-powered laser is contained in a disc that mounts on the saw spindle and functions as the blade's thrust washer. The laser makes alignment fast and easy.

The laser beam stays put at the left edge of the blade, no matter what kind of straight, angled or compound cut you make. The only drawback is that you



THE LASER APPEARS AS A DOTTED LINE through the blade guard, indicating it's safe to adjust the workpiece. As the blade is lowered, the guard retracts and the beam becomes solid.

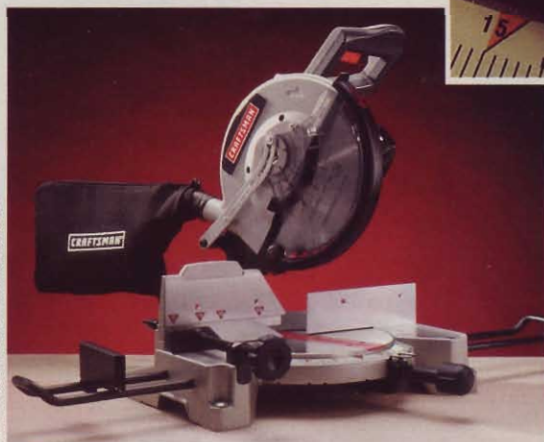


PHOTO COURTESY OF MANUFACTURER

can't activate the laser beam without starting the saw. Instead, the blade guard is slotted so you can position the workpiece safely while the saw is running.

This saw has a comfortable D-grip handle, table extensions, an adjustable 4-in.-high fence and comes equipped with a 40-tooth carbide-tip blade. Its 15-amp motor has external brushes and an electric brake. The owner's manual is very detailed and even contains a chart to assist set-up for cutting compound angles.

Craftsman 10-in. Compound Miter Saw with Laser Trac, #24315; \$200
Sears
(800) 377-7414
www.sears.com/craftsman

Metal Detector That's Good and Cheap



If you're planning to use recycled lumber, or harvest your own, you've *gotta* check it for hidden metal. A submerged nail or screw will ruin a \$100 saw blade quicker than you can say "IknewIshouldaspent\$20ona LittleWizardmetaldetector!"

This battery-powered unit scans for metal up to 2-1/2 in. below the surface and signals with LED lights and an audible tone when it finds some. The business end is only 2-in. wide, so it takes time to check a board completely. The best way to cover the surface is to establish a grid, working from end to end, first with the grain, then across.

The Little Wizard may not be the fastest metal detector to use, but for the money, it can't be beat.

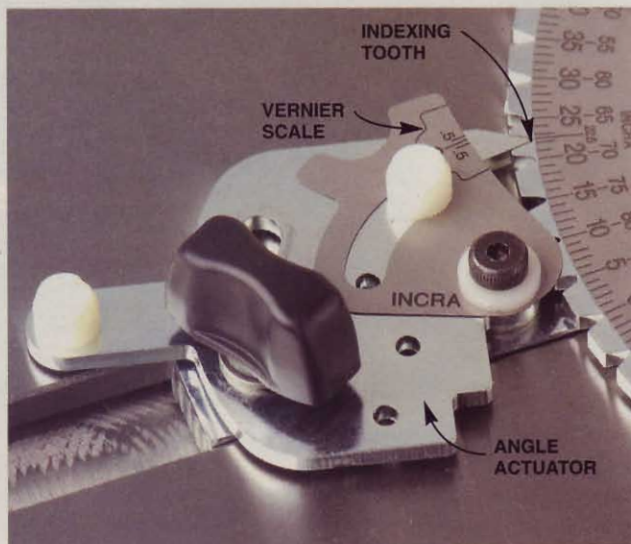
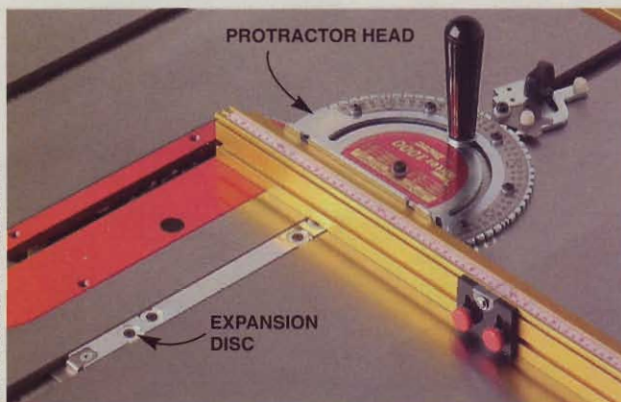
Little Wizard Metal Detector, #37539; \$20
Hartville Tool, (800) 345-2396. www.hartvilletool.com

Product Reviews

Excellent Miter Gauge

Buying a top-quality miter gauge for your table saw is a sure-fire way to improve your woodworking. At a street price of around \$100, the new Miter 1000 from Incra is a great buy. It retains the important features from an earlier Editors' Choice winner (AW #81, August 2000) for \$70 less.

The protractor head is precisely indexed every 5 degrees over a 180-degree range (± 90 degrees) with additional stops



at $\pm 22\frac{1}{2}$ and $\pm 67\frac{1}{2}$ degrees. Any angle that isn't indexed is easily dialed in using the vernier scale. The bar includes expansion discs so you can fit it precisely to your saw's miter slot. The 18-in.-long extruded aluminum fence is fully adjustable left or right and includes a scale and a sliding stop.

Incra Miter 1000; \$100
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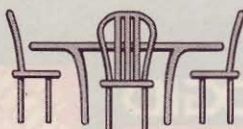
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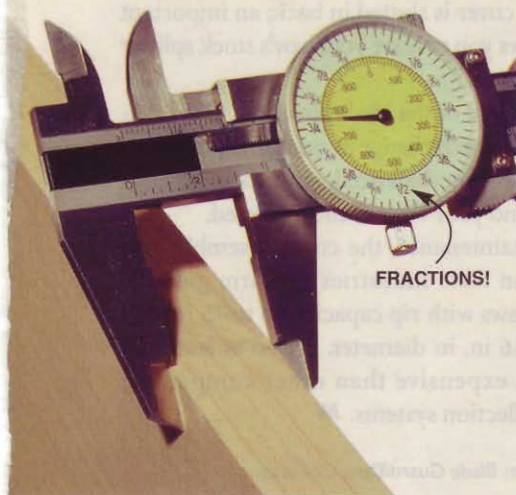
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Product Reviews

Dial Caliper Speaks Our Language



I confess. I've always had trouble deciphering dial calipers that are calibrated in decimals. This stainless steel gem indicates in *fractions*—measurements I'm more at-home with. Thicknesses down to 1/128 in. are clearly indicated because the fraction scale is the biggest one on the dial. A smaller decimal scale occupies the dial's center. Both English and metric measurements can be read from rules on the beam.

Dial calipers are most often used to measure thickness, and are indispensable aids for milling lumber, sizing tenons or measuring the diameters of dowels or screws. By using a second set of jaws, they measure inside widths (of mortises or dados) just as precisely. Depth measurements are also possible. Every woodworker should have a dial caliper. At less than \$40, this is the one to get.

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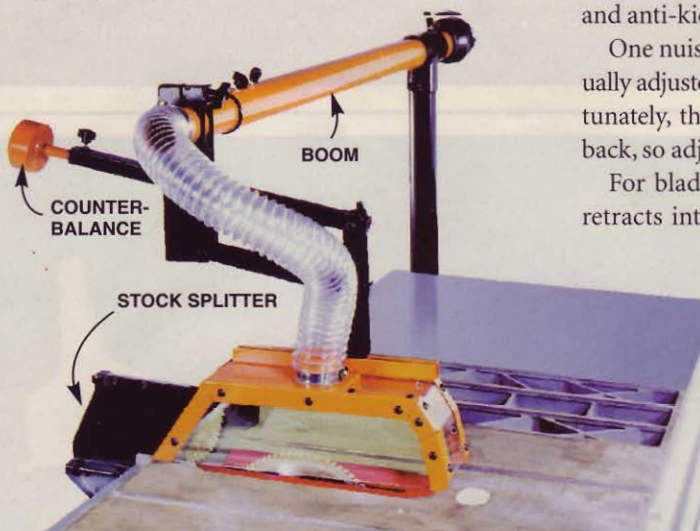
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Product Reviews

Dust-Sucking Blade Guard

Surveys reveal that 99.99 percent of all woodworkers *hate* the blade guard that came with their tablesaw. All 99.99 percent of us should consider Penn State Industries' new overarm blade guard/dust collector. It's a huge improvement.



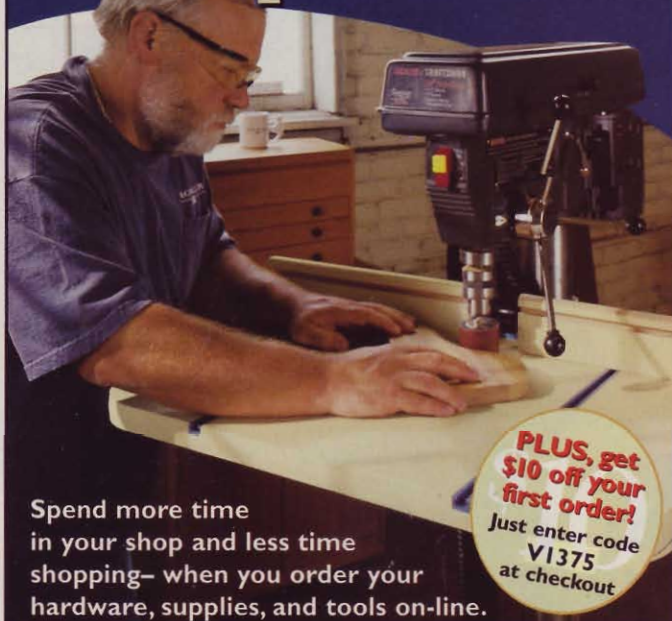
The blade cover is made with clear, shatter-resistant acrylic. It's big, wide and fully adjustable front-to-back and side-to-side. Dust is evacuated through a clear 2-1/2-in.-dia. hose and a standard 4-in. fitting at the end of the boom. The cover is slotted in back; an important safety feature because it allows you to leave your saw's stock splitter and anti-kickback pawls in place.

One nuisance is that the height of the blade cover must be manually adjusted before cutting, for each change in stock thickness. Fortunately, the cover is nicely counterbalanced, with the weight in back, so adjustment is easy and your view is unobstructed.

For blade changing or maintenance, the cover assembly arm retracts into the boom. Penn State Industries' overarm guard is designed for saws with rip capacity up to 75 in. and blades up to 16 in. in diameter. Priced at less than \$300, it's less expensive than other comparable guard/dust collection systems. **AW**

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Red Oak Plywood

Here's how to get the most from this popular and economical material.

Oak plywood has been used to make all kinds of good-looking furniture, including classic Arts and Crafts-style pieces, for almost a century. There's no reason why you can't get great results when you use this economical substitute for solid oak. All you have to do is pay attention when you choose and use it. I'll show you how to pick good-looking sheets of oak plywood. Then I'll give you some tips for cutting and finishing that'll help make your project look great.

Rotary-Cut Oak Plywood is Economical

You can find red oak plywood with plain-sliced and rift-sawn faces, but rotary-cut accounts for 70 percent of what's on the market. The oak ply you'll see at home centers is usually a mid-grade rotary-cut. Hardwood lumberyards carry higher grades than home centers and stock more expensive plain-sliced and rift-sawn oak ply in addition to rotary-cut. While going straight to the hardwood lumberyard is necessary for some projects, it's almost always worth it to check out the rotary-cut oak ply at the home center first.

Higher grades come with significantly higher prices. Top-grade sheets of 3/4-in. rotary-cut ply cost around \$60; up to 50 percent more than mid-grade. Fortunately, the differences between these grades are based on defects that often have little effect on overall appearance.

(continued on page 38)

The difference between rotary-cut and plain-sliced oak plywood isn't as distinctive as it used to be.



This great-looking oak Hoosier cabinet features extensive use of inexpensive, garden-variety rotary oak plywood (see AW #77, Dec. 1999 for complete how-to).

The Way Wood Works

Fig. A Harvesting Oak Veneers

Veneer for oak plywood is either peeled from the log, like paper towels from a roll (rotary-cut) or sliced, like cheese from a block (plain-sliced).



GROWTH RINGS

Rotary-Cut

Rotary cutting produces a continuous ribbon of veneer that has a different-looking figure, because the cut is virtually parallel to the growth rings.



Plain-Sliced

Plain-sliced veneers are cut the same way as solid-oak boards, across the log's growth rings.

(continued from page 36)

Another reason to focus on rotary-cut oak ply is that the difference between it and plain-sliced isn't as distinctive as it used to be. Today's smaller veneer logs yield less good-looking plain-sliced veneer. It's common for sheets of plain-sliced oak ply to contain narrow veneers with numerous splices and unbalanced figure patterns that don't bookmatch well.

Conversely, rotary-cut ply often looks better when it's made up of narrow pieces. Today's rotary-cut oak ply sometimes looks *better* than its more expensive plain-sliced cousin! One variation of rotary cutting being used more frequently results in figure that more closely resembles plain-sliced. For "half-round slicing," the log is mounted off-center so only a portion engages the knife on each rotation.

It's hard to find "perfect-looking" plain-sliced oak plywood, due to today's smaller veneer logs.

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The Way Wood Works

Tips for Choosing Oak Plywood

- Ask for permission to look through the stack before you start. Some hardwood lumberyards won't allow it.
- Take a friend along to help you look through the sheets. Practice a scout's etiquette and leave the stack neater than you found it.
- Look for sheets that most resemble solid boards. Choose vertical grain patterns and stay away from wide, flat ones.
- Expect to see unappealing sheets mixed in with the good-looking ones. These sheets are perfectly good for parts that won't show.
- Be aware that sheets are usually stacked with the face veneers in sequence. Appearance may improve (or deteriorate) slightly with each sheet. If your project requires multiple sheets, sequential faces ensure color and grain matches.
- Be sure to look at the back of each sheet. Even though it's graded lower, it may *look* better than the front.
- If you don't see the good-looking material your project deserves, come back in a week and look again. There's likely to be a fresh supply of plywood to look through.

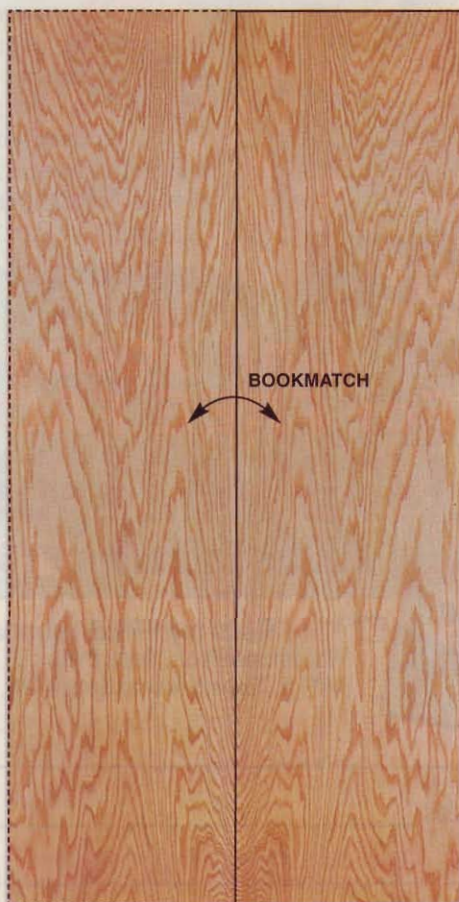
*When you shop for oak plywood,
don't settle for what's on top of the stack.*

THE CLASSIC APPEARANCES OF ROTARY-CUT AND PLAIN-SLICED OAK PLYWOOD

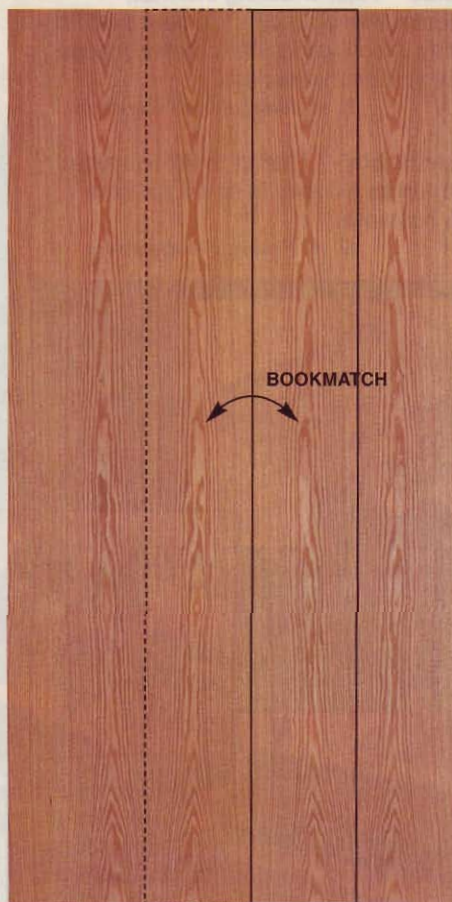
Rotary-cut figure is jagged and often wild looking. Plain-sliced veneer is more orderly, with the familiar cathedral and oval patterns that resemble edge-glued boards. Repeating patterns are visible in both sheets because the veneers are

bookmatched and spliced together. It's not unusual for plain-sliced sheets to be made up of eight or more pieces. Rotary-cut veneer pieces may be wider, but sheets almost always contain splices.

ROTARY-CUT



PLAIN-SLICED



The Way Wood Works

LOTS OF VERTICAL GRAIN can make rotary-cut oak plywood look just as good as plain-sliced oak ply. Look for tight grain, consistent figure and tall graceful cathedral patterns.

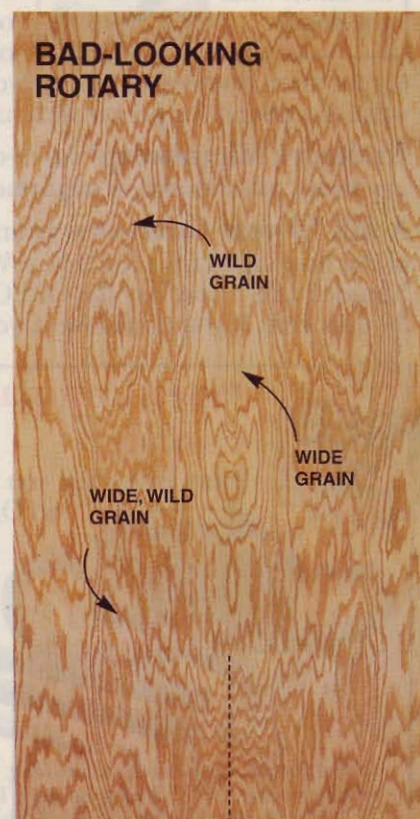
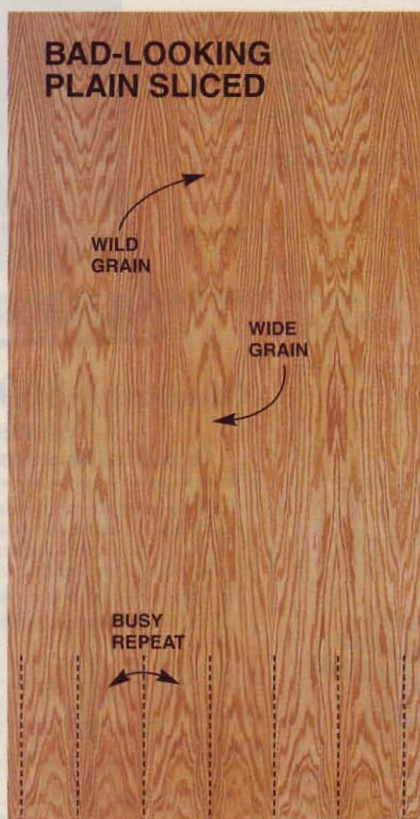
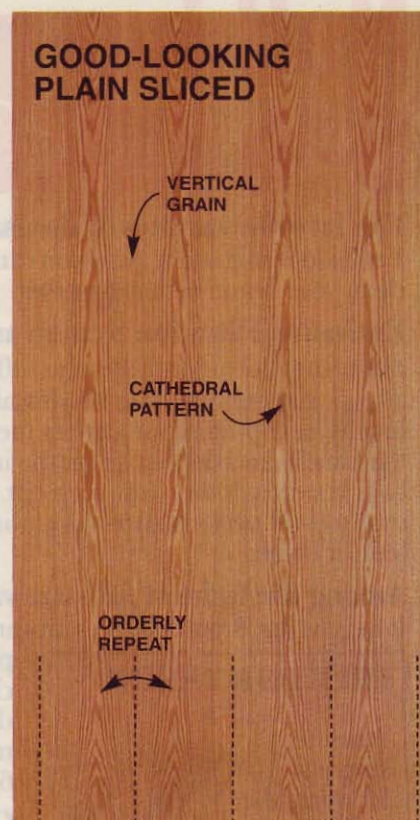
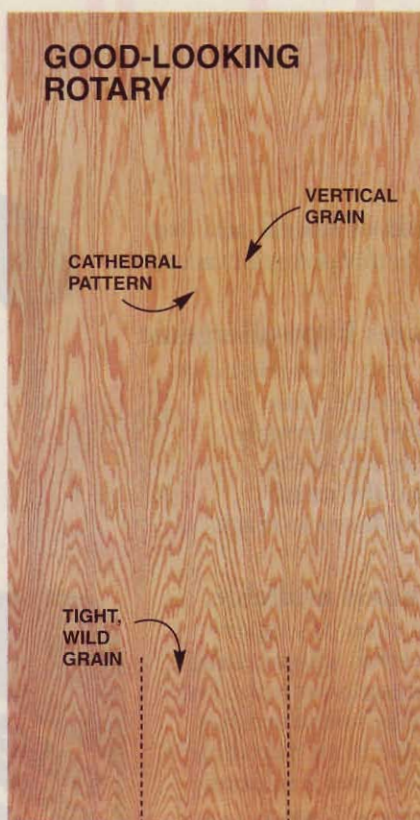
Vertical Grain Looks Best

Figure patterns for both rotary-cut and plain-sliced veneers vary widely, depending on the orientation of the knife to the log. If the knife cuts parallel to the growth rings, unattractive wide, flat patterns are the result. These patterns are more common and more pronounced in rotary-cut veneers than plain-sliced. In the worst case, rotary-cut oak plywood resembles fir ply (lower right), and plain-sliced oak ply looks like it was rotary cut (lower left).

Often enough, the rotary knife cuts across the log's growth rings at almost the same angle as a plain-slicing knife. This rotary-cut veneer is likely to contain vertical grain and a more natural (plain-sliced) appearance (upper left). Over an 8-ft. length, plain-sliced cathedral patterns frequently become wide and unattractive (lower left).

Rotary-cut oak plywood can look just as good as plain-sliced!

WIDE, FLAT GRAIN and jagged, wild grain spoil the appearance of both rotary-cut and plain-sliced oak plywood. Grain that's wide and wild looks worst of all.



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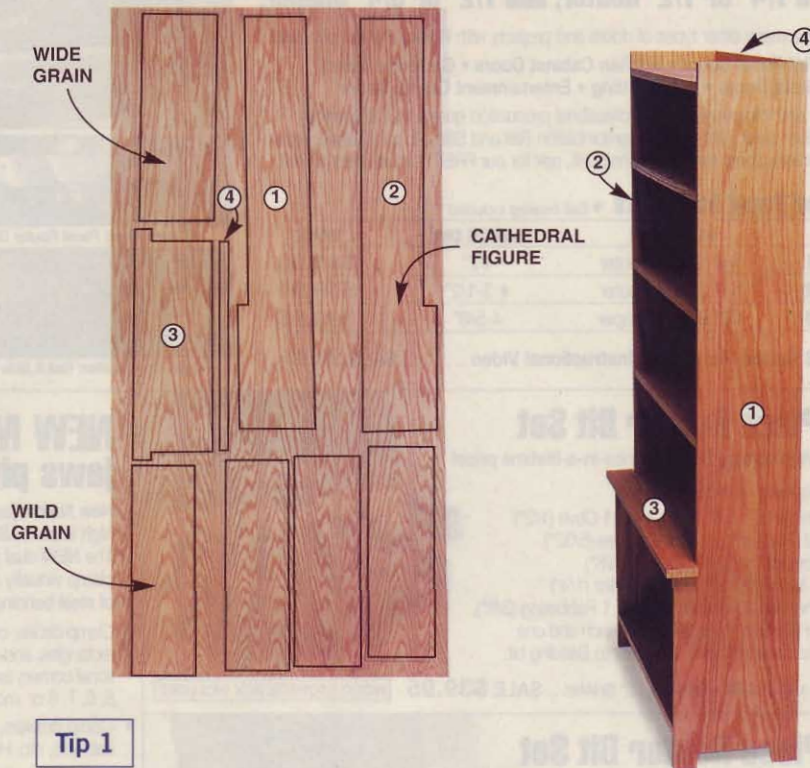
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FOUR TIPS THAT MAKE OAK PLYWOOD LOOK GREAT



Tip 1

CONSIDER FIGURE PATTERNS DURING LAYOUT.

On some projects, like the small bookcase pictured here, it's possible to cut your plywood for appearance rather than economy. In general, cathedral figure looks the most like solid lumber and edges look best with the grain running parallel. Choose the best-looking figure for visually prominent pieces and locate them first (numbers 1 through 4, above). Hide less attractive figure by using it on pieces where it won't show. Cut the pieces oversize with a circular saw or jigsaw before trimming them to final dimensions.

Tip 2



IMITATE A SOLID-WOOD BACK.

Cut kerfs in oak plywood so it looks like individual boards. A thin kerf blade works best. Position the kerfs at veneer splices, so the breaks look natural.

Here's how to make the kerfs stand out: Seal the plywood with a coat of clear finish before you make the cuts. Stain will darken the raw-wood kerfs, but not the neighboring sealed surfaces.

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The Way Wood Works



Tip 3

SAND BEFORE YOU STAIN.

Oak plywood is machine-sanded at the factory, but it'll look muddy if you stain it without further sanding. When you sand, you'll get the best results by using a block to distribute pressure evenly. Oak veneer isn't consistently hard (the latewood is harder than the earlywood), so fingertip sanding can result in an uneven, wavy appearance. Before using a water-based stain, sand once, then raise the grain by moistening the surface with a damp sponge, and sand lightly again.

STAINED WITHOUT CONDITIONER

BARBER POLE



STAINED OVER CONDITIONER

Tip 4

AVOID "BARBER POLE" stripes

by using a wood conditioner or sealer before staining. Barber pole is most noticeable on plain-sliced figure, but it occurs whenever veneers are bookmatched. Veneers have one "tight" face and one "loose" face as a result of the slicing process. Tiny fractures occur on the loose face as it curls away from the knife. These fractures cause the loose face to absorb more stain. Bookmatching puts tight and loose faces side by side, and staining results in noticeable stripes. Conditioners and sealers saturate the surface of the wood so the stain is absorbed evenly. But because these products don't allow as much stain to be absorbed, a second coat of stain may be necessary to reach the desired color. **AW**



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FOR REAL

By Dave Munkittrick

Tips
for
Better

Picture Frames

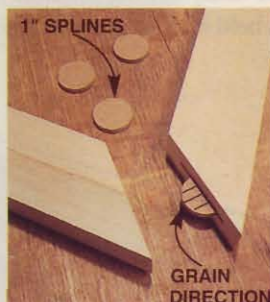
Frame like a pro
with simple tools.

ART DIRECTION: PATRICK HUNTER • PHOTOGRAPHY: MIKE HABERMANN • ILLUSTRATION: DON RAYMOND

Blind Splines

Until somebody discovers a miracle glue for end grain, miter joints will need reinforcement. Nails work, but pounding them in delicate frame material can be risky. Blind splines offer invisible reinforcement without nails.

Cut the slots on a router table using a guide board and a 1/8-in. slot cutter. Each piece is cut face up (mark the faces as a reminder). Feed the stock from the right for one cut and from the left for the second cut.

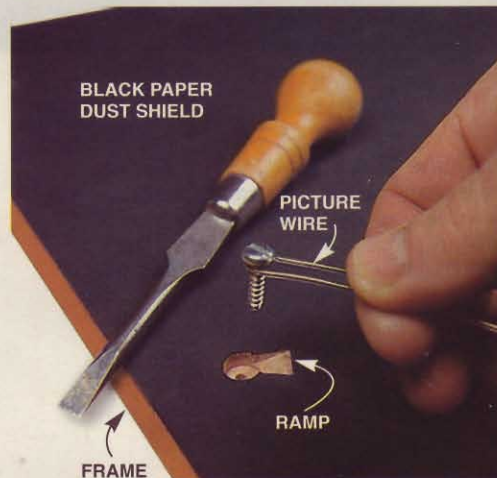


Cut the splines from a strip of hardwood with a 1-in. plug cutter and orient the grain perpendicular to the joint for strength.



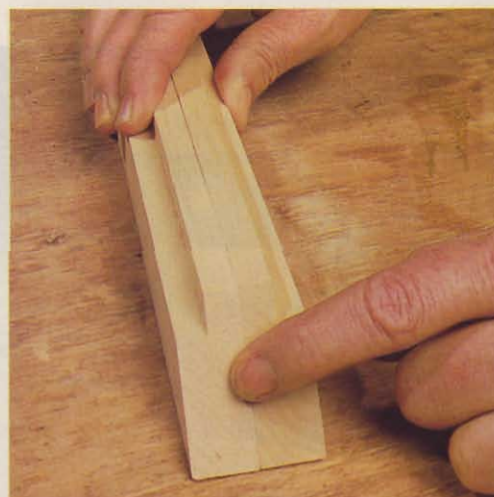
No-Mar Wire Hangers

Did you ever take down a picture only to find that the hangers have left some nasty scratches on the wall? For a frame that hugs the wall without marring it, try this flush-mount system. Countersink screws into the frame and chisel a ramp out of the hole to avoid kinking the wire. Add bumpers to the lower back of the frame for additional wall protection.



Fingertip Test

To get a mitered frame to come together perfectly two things must happen: 1. the top and bottom must be exactly equal in length; and 2. the two sides must be exactly equal in length. It's natural to want to grab a tape measure to verify these lengths, but forget it. When it comes to checking frame parts for equal length, no tool can come close to your fingertips. Pair up the frame pieces back to back and feel for any ridge where the miters line up. Your fingertip will detect differences smaller than the eye can see or your tape measure can measure.



Picture Frames

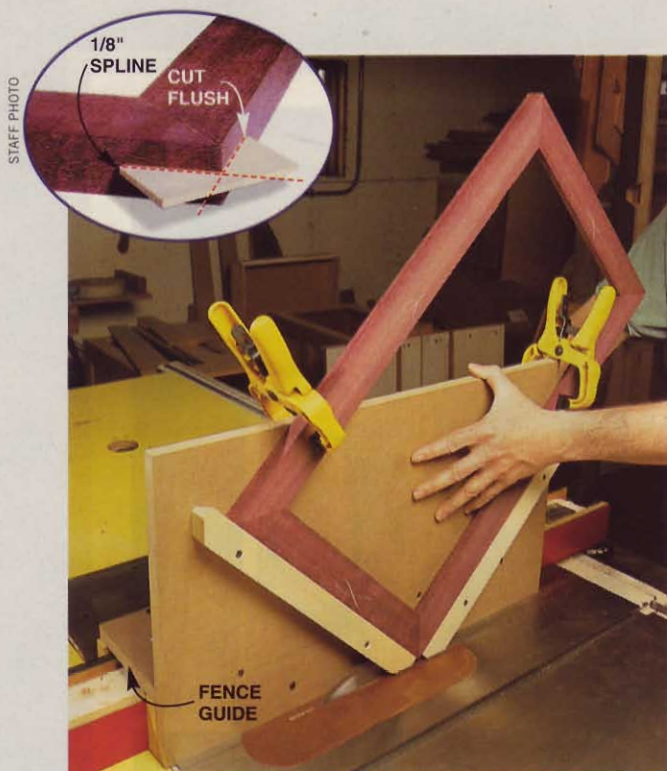
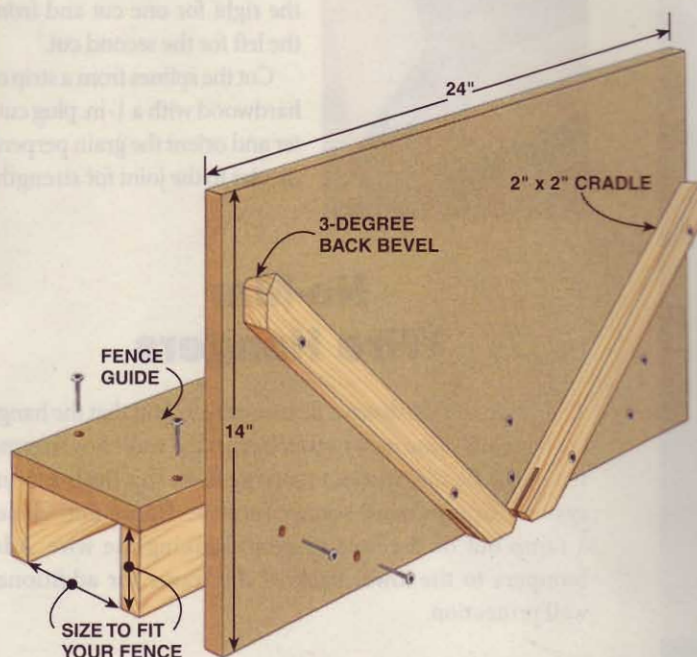


FIG. A Spline Slot Sled

Build the U-shaped guide to fit snugly over your table saw fence. Two 2x2 strips are screwed to a 14 in. x 24-in. piece of MDF to form the cradle. A 3-degree bevel on the inside edge of the cradle helps to hold the frame stock securely.



Spline Sled

Through-splines are a great way to reinforce miters. They also add a snappy decorative element to any picture frame.

A through-spline is a thin piece of wood that's glued into a slot cut across a miter joint. The spline can be made from contrasting wood for an accent or from the same species for a more subdued effect. Cut and sand the spline flush with the frame edges after the glue has set.

We built this nifty sled for safely cutting the slots for the splines. The picture frame is held in a cradle as the sled rides on your table saw fence.

Easy Brad Pusher

One-half-inch brads are ideal for securing mounted artwork and glass in a frame. But, the awkward angle and potential for damage rule out using a hammer. You could go out and buy a brad pusher (a specialized tool used by the pros), but why spend the money? For a handy, shop-made brad pusher just modify a pair of adjustable pliers. Stick a scrap of mat board on the bottom jaw with some double-faced tape to protect the frame. Simple and cheap.

Picture-Perfect Frame Miters

Few things are more frustrating than trying to get good-looking miter joints on all four corners of a picture frame. Three requirements guarantee success: the miters must be right on 45-degrees, the two sides must be exactly equal in length and the top and bottom must be exactly equal in length.

Our miter sled ensures you'll meet all these requirements. It also offers repeatability which allows you to quickly cut consistent parts for multiple frames. If you've struggled with making a crosscut sled for your saw, relax. This sled is a cinch to build. Before you start, check your tablesaw to make sure the fence and blade are parallel to the miter slot and the blade is 90 degrees to the table. Then follow these steps:

1. Cut a 1/2-in.-thick hardwood runner so it slides in your miter slot without slop.
2. Run a 1/4-in.-deep dado in the bottom of the base. Position the dado so the edge of the base overhangs the saw's line of cut.
3. Glue or screw the runner in place.
4. Once the glue is dry, set the base in the miter slot and trim the overhanging edge. Use the same blade you intend to use for cutting miters. We recommend a high tooth count cross-cut blade.
5. Cut a triangular fence support. It's essential that the apex of the triangle be a perfect 90-degrees.
6. Notch the sides of the support for spring clamps.
7. Fasten the fence support to the base using a combination square to establish the 45-degree angle.
8. Add the fence and handles.
9. Finally, make a hardwood stop-block with a 45-degree angle cut on one end.



Cut the first miter by clamping the stock on the fence that faces the operator.



Cut the second miter on the opposite fence with the newly mitered end locked into the mitered stop block.

FIG. B Perfect Miter Sled

This easy-to-build sled helps cut perfect miters every time.

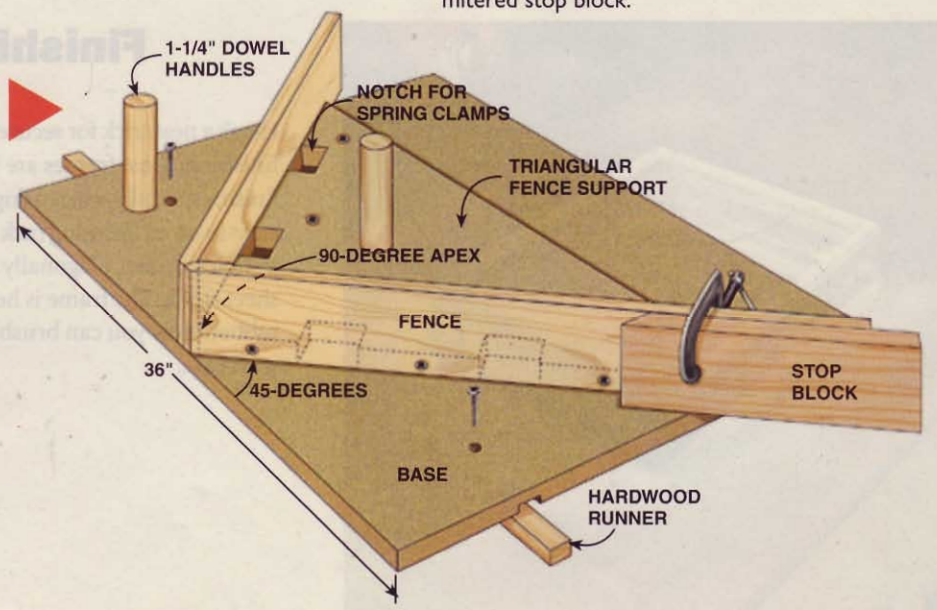
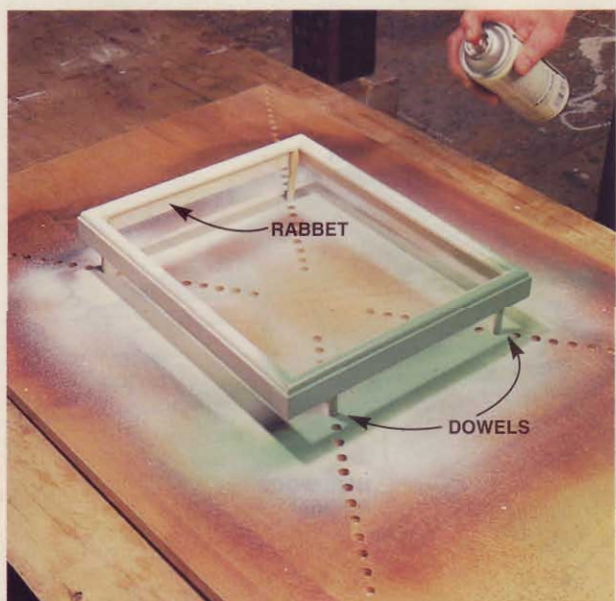
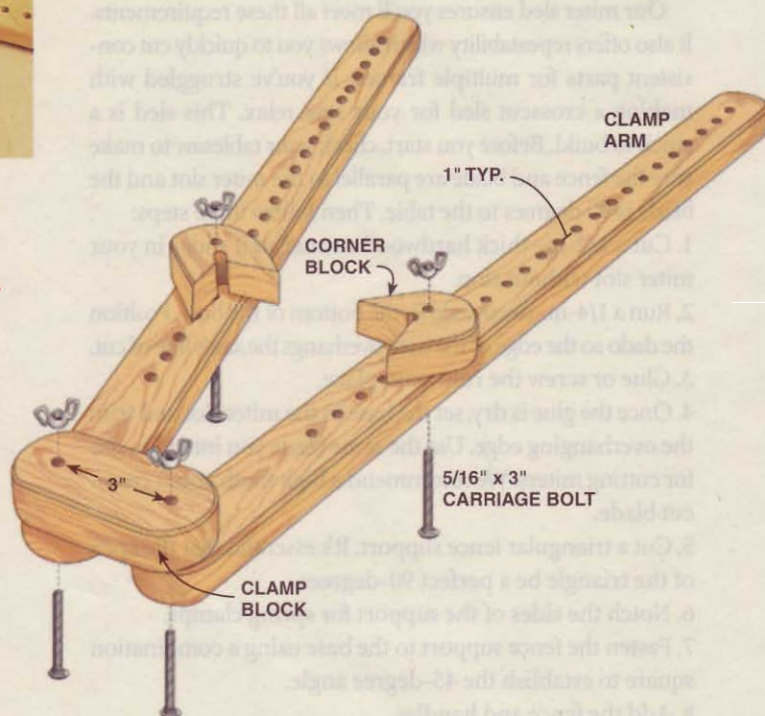




FIG. C Four-Point Frame Clamp

We used hard maple for our clamp, but any hardwood will do. The clamp arms are 1 in. x 2 in. x 30-in. long. The clamp block is 1 in. x 2 in. x 5 in. and the corner blocks are 1 in. x 2 in. x 3-1/2 in. Drill a 5/16-in. hole in the center of the corner blocks and cut a 90-degree notch into the hole with a bandsaw. Add a second hole, 3/4-in. behind the first, for the carriage bolts. Use eight 5/16 in. x 3-in. carriage bolts and wing nuts.



Four-Point Frame Clamp

This shop-made frame clamp puts equal pressure on all four corners of your frame at once, for quick, hassle-free assembly. Use scraps of paper towel under each joint to absorb glue squeeze out. Set the pivoting corner blocks to fit your frame. Apply enough clamp pressure to hold the frame together but still allow you to align the pieces for a perfect fit. Finally, clamp tight.

Finishing Rack

Here's a neat trick for securely supporting picture frames for finishing. Most frames are too light to hold still while you finish, especially when using a brush-on finish. This simple, easy-to-store finishing rack ends the hassles. Dowels are set in holes drilled diagonally from the corners of a piece of sheet stock. The frame is held firmly in the rack by its own rabbet. Now you can brush or spray almost any size frame with ease.

SHOP TIP SPECIAL

Keep It Clean!

It's essential to work in a clean environment during final assembly. Wear a pair of lint-free darkroom gloves (see Sources, page 56) during final assembly to keep fingerprints off the mat and glass. Protect the finished frame with a pad and keep a sharp eye out for dust and debris.

There's nothing more fist-banging maddening than spotting your own eyelash stuck inside the glass after the picture is hung on the wall.

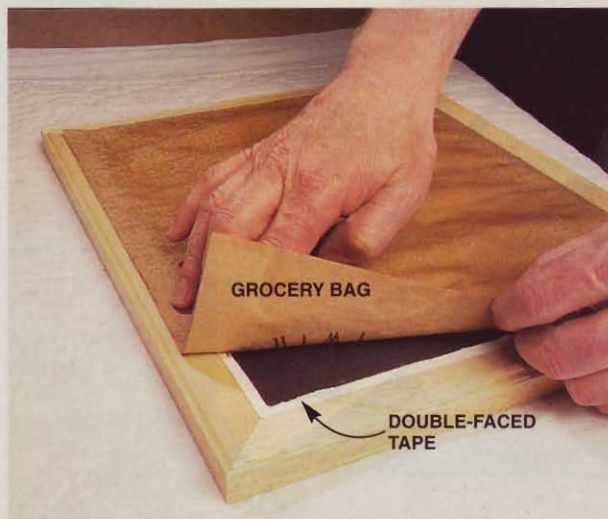


Grocery Bag Dust Shield

Dust and insects have an uncanny knack for finding their way into framed artwork. Professional framers always seal the back of the frame with a paper dust shield. You don't need special paper for this, a plain grocery bag works just fine (for larger frames, use brown kraft-paper available at art supply stores). Run double-faced tape along the inside edge of the frame and press the paper in place to seal the frame.

Tip

For a neater look, dampen the paper with a sponge after taping. The moistened paper will shrink as it dries, leaving a tight, wrinkle-free dust shield to protect your artwork.



Quick-Change Fasteners

For some frames, like those with the kid's school photos, removable backs are the best choice. Here's how to make your own quick-change fasteners: Cut 3/4-in. fender washers almost in half with a hacksaw. Use a Forstner bit to drill shallow holes in the inside edge of the frame. The bottom of the holes should be slightly below the back of the mounting board. A small hole drilled in the washer makes it easy to open and close the fasteners.



Matting and Mounting

Matting

Most artwork looks better when a border of mat board (see Sources, page 56) separates the frame from the picture. Beyond its aesthetic value, the mat also separates the artwork from the glass where condensation can cause damage. Here's a simple step-by-step procedure for cutting the mat opening and mounting the artwork using simple shop-made jigs and tools.

The first step, and probably the one that's most intimidating, is choosing the color and size of the border. Here are a few rules of thumb that should clear things up:

- Choose a mat color that reflects a dominant color in the art.
- Stay away from bold colors that might distract the eye from the art. Off-white is usually a safe choice.
- The border created by the mat opening should be wider than the frame. 2 to 3-in. borders are good for most common sizes.
- Make the bottom border 10 percent wider to visually anchor the artwork in the frame.
- When in doubt, visit a framing store and look at some examples of similar-size artwork for inspiration.

Cutting the Mat

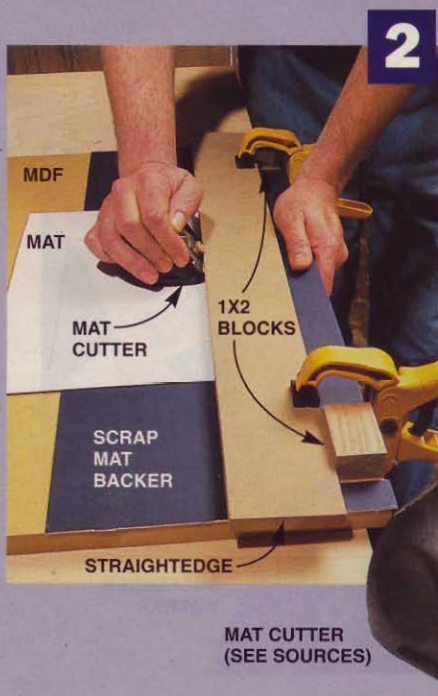
The artwork is typically sandwiched between the mat and a mounting board. A mounting board is nothing more than a solid piece of acid-free mat board or foam-core. Cut the mat and the mounting board to easily fit in the rabbet of the frame. A utility knife and a straightedge will do the trick. Because the cuts are hidden in the rabbet they aren't as critical as the visible cuts made for the mat opening.

Mark the desired opening in the mat (Photo 1). Always lay out the mat border on the backside of the mat and run the lines long on the corners. This makes it easier to see where to stop and start the cut. A marking gauge works great for this: no measuring, no straightedge to follow—just set the gauge to the border width you want and go.

Cutting the mat opening requires a straightedge guide and a cutter that holds the knife at a 45-degree angle (Photo 2). Each cut must be done in one continuous motion. Index marks on the cutter tell you where to start and stop your cut.

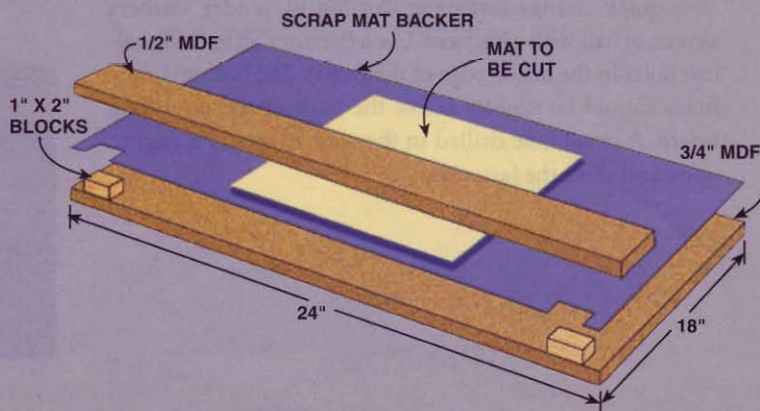


1
Lay out the mat opening with a marking gauge. You can easily make your own from a block of wood and some 5/8-in. dowel.



2
Use a mat-cutting jig to cut the opening. This straightforward jig prevents the straightedge from being pushed aside by the cutter while holding the mat secure. The jig is nothing more than a piece of MDF with a couple of 1x2 blocks glued to one edge. A piece of scrap mat board is used as a backer for the knife to cut into.

FIG. D Mat-Cutting Jig



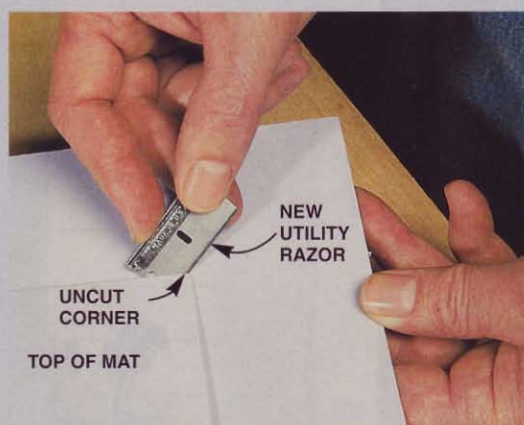
SHOP TIP SPECIAL

Mounting

Hinge the mat to the mounting board to keep the opening in the mat aligned properly with the artwork (Photo 3). Once the artwork is positioned in the mat opening (Photo 4) it is secured to the mounting board with two T-hinges (Photo 5). The hinges allow the artwork to hang freely on the mounting board, which prevents the artwork from buckling with changes in humidity.

Tip: Use acid-free tape for the hinges. It's reversible and won't contribute to the deterioration of the artwork (see Sources, below). **AW**

Oops!



Oh, no. Can you believe it? I didn't cut out all the way into the corners of the mat opening. Next time I'll get that cutter recommended in Photo 2, page 55 (see Sources, below). It has index marks to show you exactly where to stop the cut for perfect corners. In the mean time I carefully slipped a fresh utility razor into the 45-degree slit from the top side of the mat. Then I rocked the blade gently into the corner to finish the cut. Whew! That mat board is too pricey to waste.

Sources

Highland Hardware, (800) 241-6748
Mat Cutter, #17.77.06; \$16
Double-Faced Tape, 3/4 in. #10.01.51; \$10
1-in. Plug Cutter, #07.68.07; \$25
3/4-in. Forstner Bit, #FB-005; \$11
1/8-in. Slot Cutter, #10.14.48; \$13
1/2-in. Slot Cutter Arbor, #10.12.41; \$4
Bearing, #47708F; \$4.

PENCO, (800) 967-7367
Acid-Free Mat Board, 32 in. x 40-in. sheets;
\$12 to \$16
Acid-Free Linen Tape, #L1533-0751; \$9
White cotton gloves, #NP10138; \$1 per pair.

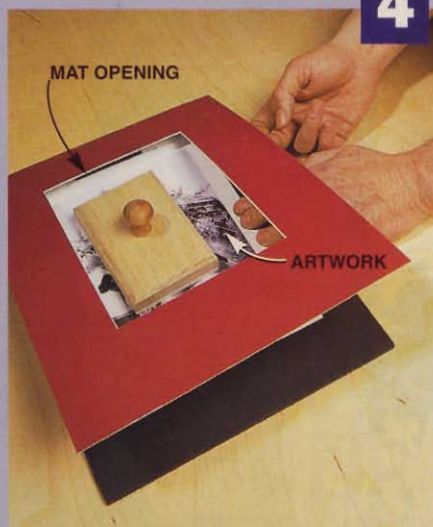
Hinge the mat to the mounting board.

Simply butt the top edges together with the mat board face down and the mounting board face-up, and secure with acid-free mounting tape.



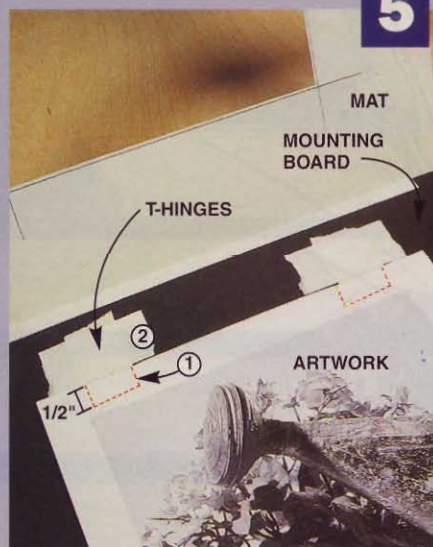
Position the artwork in the mat opening.

A simple block of wood with some acid-free mat board glued on the bottom keeps the artwork from shifting as the mat is raised and lowered for positioning. Don't be tempted to use your finger as a hold-down, acids and oils from your skin will cause the artwork to deteriorate over time.



Mount the art to the mounting board with T-hinges.

1. Fasten tape sticky-side-up on the backside of the artwork, at the top corners only.
2. A second piece of tape is placed sticky-side-down across the first, as close to the artwork as possible. With this technique, the artwork is free to expand and contract.





ART DIRECTION: VERN STREET PHOTOGRAPHY: BRIE ZIEGLER ILLUSTRATION: FRANK ROEBBACH

WOODEN STORM DOOR



Versatile design keeps winter winds out and lets summer breezes in.

By Tim Johnson

A storm door doesn't just keep out the wind and rain. It's the focal point of your home's entryway; the first thing guests see when they come to visit. An attractive and durable storm door is a woodworking project each member of your family will use every day. To guarantee a long service life, our storm door is made from weather-hardy wood, with mortise-and-tenon joinery and weatherproof, water-resistant glue. It's easy to remove the tempered-glass storm panel and replace it with a screen panel, for year-round comfort.

This door isn't hard to make, it's just big; 36 by 80 inches, a standard size for an entry door. Although you'll need a large, level surface for gluing it together, this project is manageable, even in a small shop. You'll need a tablesaw, a benchtop mortiser or a drill press with a mortising attachment, a router and three 4-ft. pipe clamps. A bandsaw is convenient, but not essential. If you don't have a jointer and planer, have your lumber surfaced at the lumberyard.

CHOOSING MATERIALS

This exterior door will be subjected to the toughest conditions: hot days, cold nights, sunlight, wind, rain and substantial swings in humidity. Two critical factors, durability and stability, should determine the lumber

you select. First, use a wood that won't rot, such as Honduras mahogany, teak or white oak. Of these, white oak is the most affordable. If you plan to paint your door, you can substitute furniture grades of ponderosa pine or fir. Second, look for rift- or quarter-sawn boards, indicated by straight grain running end-to-end. They're the most stable. Reject any board that's cupped or twisted. Insist on flat, straight stock. The basic "full view" door requires 15 bd. ft. of 6/4 rough stock.

Mahogany for the door shown in the photo at left, including the full-length internal grid, which requires an additional 7 bd. ft. of 6/4 stock, will cost about \$160.

Waterproof glue isn't essential, unless you have a submerged entryway! Besides, it's expensive and nasty to work with. Type II water-resistant polyurethane or PVA (polyvinyl acetate) glues are a more sensible choice. They're *weatherproof* (made for exterior use), easy to work with, widely available and reasonably priced (see Sources, page 64).

Interchangeable storm and screen panels have identical outside dimensions and frame thicknesses. The screen panel requires a wide frame to hold its shape. Tempered or safety glass is required for the storm panel.



Chop the Mortises



1 MARK THE THROAT PLATE of your saw to indicate where the dado blade begins cutting. This will allow you to stop the dados accurately. Then, carefully set the fence, using offcuts from the stiles or rails to center the dado.

Don't scrimp on your finishing products. Exterior-grade enamel paint will last the longest. If you want to show off the wood, make sure to choose a finish that contains both UV absorbers *and* pigments. These finishes are translucent, rather than clear, and add a honey-amber color to the wood (see Sources, page 64). Before applying any finish, clean the door by wiping it with a cloth dampened with acetone. Then brush a couple coats of thinned-down weatherproof glue on the exposed end grain, especially at the bottom of the door.

STORM AND SCREEN PANELS

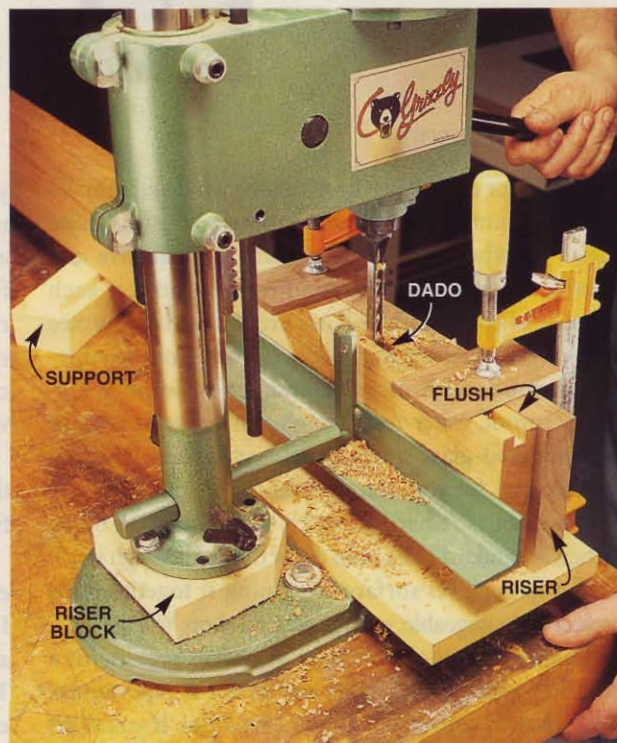
Storm and screen panels can be purchased cheaply enough that it's not worth your time to make them yourself. You'll find local manufacturers in the Yellow Pages, under "Screens" or "Storm Windows and Doors." Plan to pay about \$50 for the screen panel. The storm panel costs more, about \$120, because building codes require that it be made from tempered or safety glass. Have the panels in hand before you build the door, so you can make sure they'll fit.

Fiberglass and aluminum are the most common screening materials. Fiberglass is more flexible, but aluminum is stronger. For increased durability, "pet-" or "paw-proof" fiberglass screen has a heavy vinyl coating. Fine mesh or sun-blocking fiberglass weaves are also available. Copper and stainless steel screen are the toughest, but they're also the most expensive. We chose charcoal-colored aluminum.

SAFETY WARNING: The blade guard must be removed to make this cut. *Be careful.*



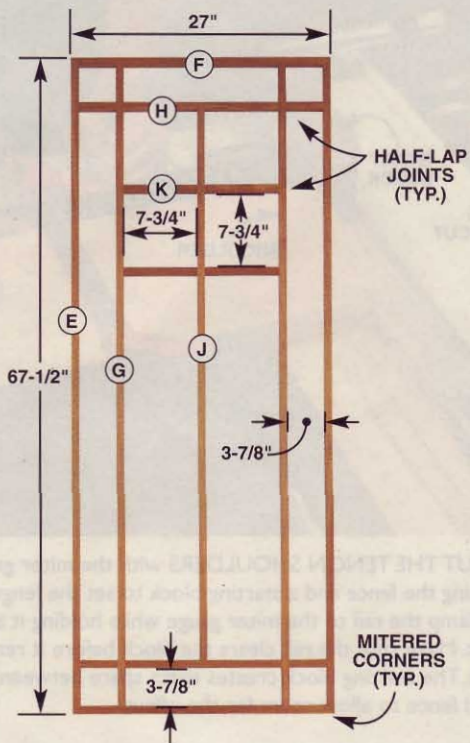
2 CUT STOPPED DADOES in the stiles. First, mark the end of the mortise on the stile. Then make the cut, advancing until the lines on the stile and throat insert meet. Stop the saw, remove the stile, turn it around and dado the other end.



3 MORTISE THE STILES, using the dado to center and guide the chisel. It's easy to modify your benchtop mortiser to accommodate the long, wide stiles. Increase capacity with a riser block. Add outboard support to keep the stile level. Fabricate a special hold-down, using scraps for arms and a riser that's the same width as the stile. Center the chisel and set the fence. Then snug the riser up against the stile, add the arms and clamp them to the base.

Detail 1

Dimensions for door grid in lead photo, page 56.



Haunched tenons, doubled at the bottom, make the door strong enough to withstand decades of slamming.

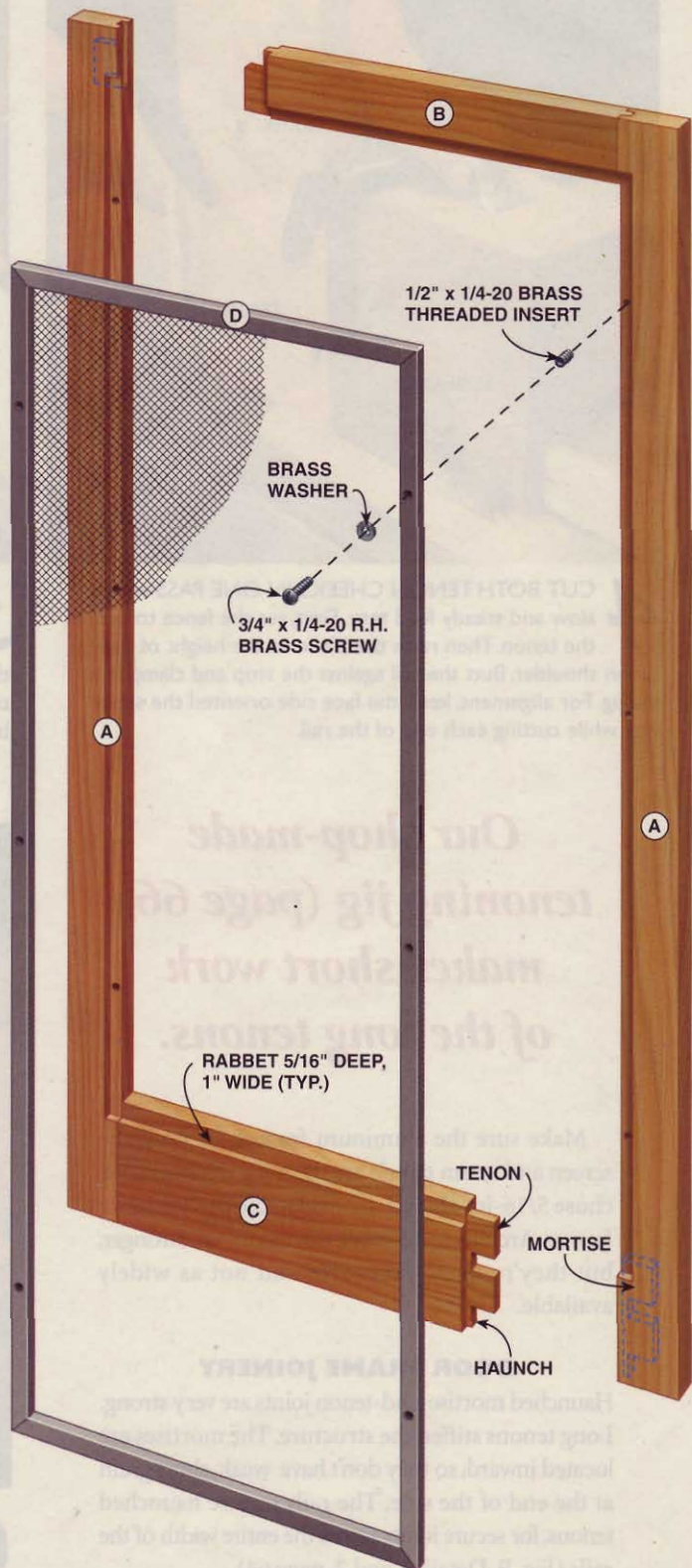
CUTTING LIST

Overall Dimensions:
1-1/8" x 36" x 80"

Part	Name	Qty.	Dimensions
A	Stiles	2	1-1/8 x 4-1/2 x 80
B	Upper Rail	1	1-1/8 x 4-1/2 x 31-1/4 *
C	Lower Rail	1	1-1/8 x 8 x 31-1/4 *
D	Screen/ Storm Panel	1 of each	5/16 x 29 x 69-1/2
E	Grid Outer Stiles	2	3/4 x 1-1/16 x 67-1/2
F	Grid Outer Rails	2	3/4 x 1-1/16 x 27
G	Grid Inner Stiles	2	3/4 x 1-1/16 x 67-1/2
H	Grid Inner Rails	2	3/4 x 1-1/16 x 27
J	Grid Center Stile	1	3/4 x 1-1/16 x 58-1/4
K	Grid Center Rails	2	3/4 x 1-1/16 x 17-3/4

*Includes 2-1/8"-long tenons on both ends

FIG. A SCREEN DOOR EXPLODED VIEW

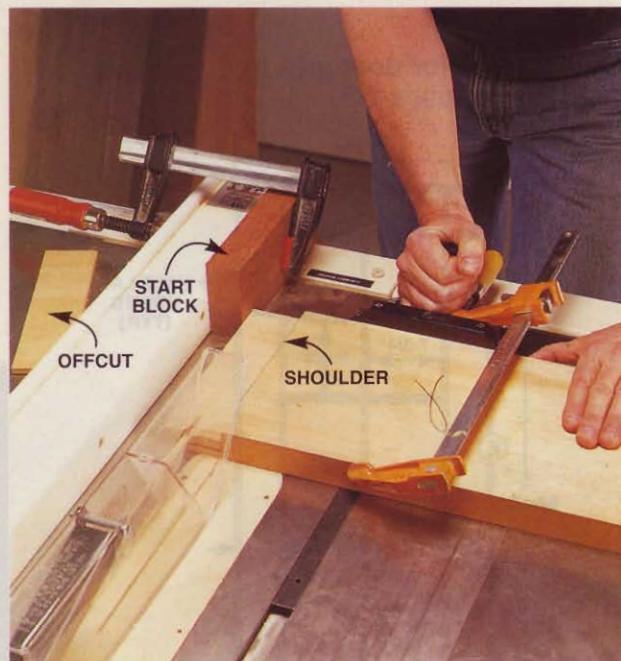


Cut the Tenons

SAFETY WARNING: The blade guard must be removed to make this cut. *Be Careful!*



4 CUT BOTH TENON CHEEKS IN ONE PASS with a slow and steady feed rate. First, set the fence to center the tenon. Then raise the blade to the height of the tenon shoulder. Butt the rail against the stop and clamp it to the jig. For alignment, keep the face side oriented the same way while cutting each end of the rail.



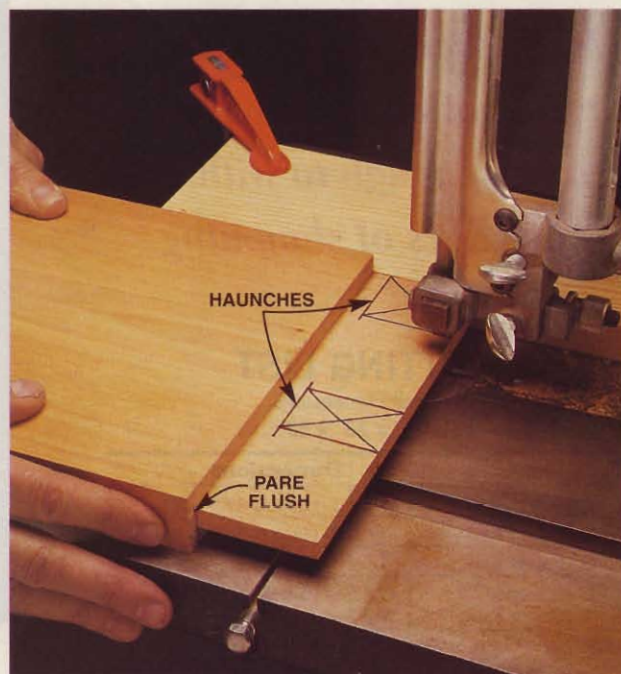
5 CUT THE TENON SHOULDERS with the miter gauge, using the fence and a starting block to set the length. Clamp the rail to the miter gauge while holding it against the block. Make sure the rail clears the block before it reaches the blade. The starting block creates extra space between the blade and fence to allow room for the offcut.

***Our shop-made
tenoning jig (page 66)
makes short work
of the long tenons.***

Make sure the aluminum frames for both the screen and storm panels are the same thickness. We chose 5/16-in.-thick, 1-in.-wide, rolled-aluminum frames. Architectural-grade extrusions are stronger, but they're more expensive and not as widely available.

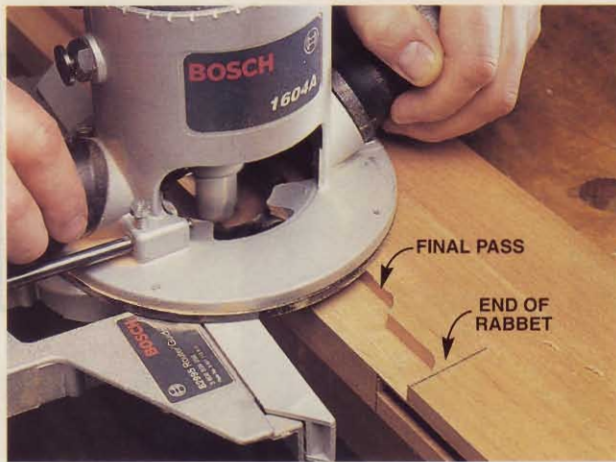
DOOR FRAME JOINERY

Haunched mortise-and-tenon joints are very strong. Long tenons stiffen the structure. The mortises are located inward, so they don't have weak, short grain at the end of the stile. The rails feature haunched tenons, for secure joints across the entire width of the rails (Fig. B, Details 1 and 2, page 64).



6 BANDSAW THE TENONS to width and remove the waste with freehand cuts, leaving the haunches. Pare the short shoulder flush with a chisel.

Install the Screen and Storm Panels



7 ROUT RABBETS FOR THE SCREEN PANEL (before the door is glued together), in several passes, with a straight-cutting bit and an edge guide. Rout the rails first, full length. Then dry-fit the door and mark the stop points on the stiles so you can rout them.

Good-fitting mortises and tenons require precision from both your machines and your stock. Make mortising easier by using centered dados to set up and guide the mortise chisel (Photos 1 through 3). Our shop-made tenoning jig (see "Foolproof Tenons," page 66), outfitted with the outside blades from an 8-in. dado set, accurately cuts both tenon cheeks in one pass (Photo 4). The only trick is to get the blades spaced correctly so the tenon fits the mortise. Finish the joints by trimming the tenon shoulders (Photo 5) and cutting the haunches (Photo 6).

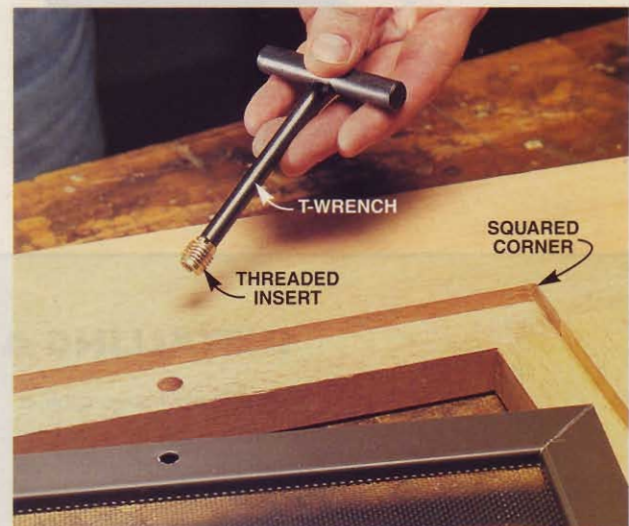
The rabbets for the screen and storm panels are too wide for a rabbeting bit, so they have to be routed before the door is glued together. Most of the waste on the rails can be cut away on the tablesaw, because the rabbets in the rails run full length (see Fig. B, Detail 2, page 64). The stiles require stopped rabbets (Photo 7).

You'll need three 4-ft. clamps for gluing; one for the top joints and two for the longer joints at the bottom. Cover the pipes with tape or plastic to keep the bottom side of the door from getting stained black wherever squeezed-out glue contacts the steel. Minimize squeeze-out by coating only the mortise walls and tenon cheeks with glue. Enough will spread during assembly to cover the face of the stile and the tenon shoulders (Photo 8). Clamp the door together and check to see that the glue-up is flat and square. Remove the squeezed-out glue before it hardens.



8 STRONG JOINERY makes this door sturdy. Weatherproof glue makes it last. Haunched mortises and tenons, doubled on the wide bottom rail, secure all four corners. New, extended-open-time, water-resistant glues allow enough time to glue and clamp this large assembly without rushing.

Threaded inserts make it easy to switch the storm and screen panels.

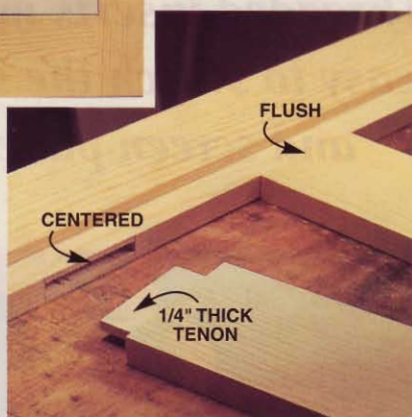


9 INSTALL THREADED INSERTS in the door rabbet with a T-wrench (see Sources, page 64). First, glue the door together and square the corners of the rabbet. Install the screen panel and drill pilot holes for the inserts. Remove the screen panel and use it as a template for drilling the storm panel. Fasten the panels with brass machine screws and washers.

Customize Your Door by Adding . . .

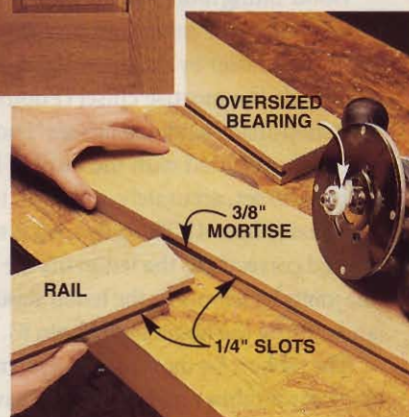
Additional Stiles and Rails

Plane internal frame pieces thinner, flush with the rabbet, so you can still use single screen and storm panels. Center the mortises and use thinner tenons. If you'd rather have separate upper and lower storm and screen panels, leave the top middle rail full thickness, and rabbet both edges.



Solid Panels

CUT SLOTS FOR THE PANELS with a 1/4-in. slot-cutting bit. Limit the depth of the slot to 3/8-in. by using an oversized bearing (see Sources, page 64).



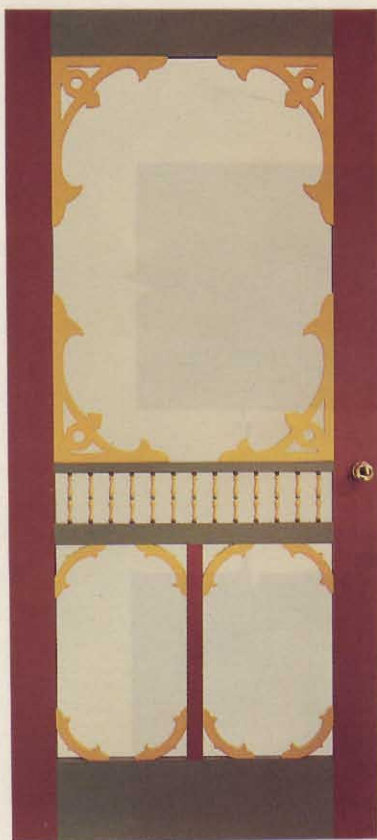
INSTALLING A SCREEN DOOR

Think of a screen door as a very large cabinet door that's going to be inset-mounted. Build the door to the dimensions of the opening. You may have to adjust the overall dimensions given in the Cutting List (page 59). For example, an 8-ft. tall door requires wider stiles and rails, for appearance and stability.

When fitting the door, allow 3/16 in. clearance in width and 1/4 in. in height. Cut the bottom at a 12-degree angle, to match the

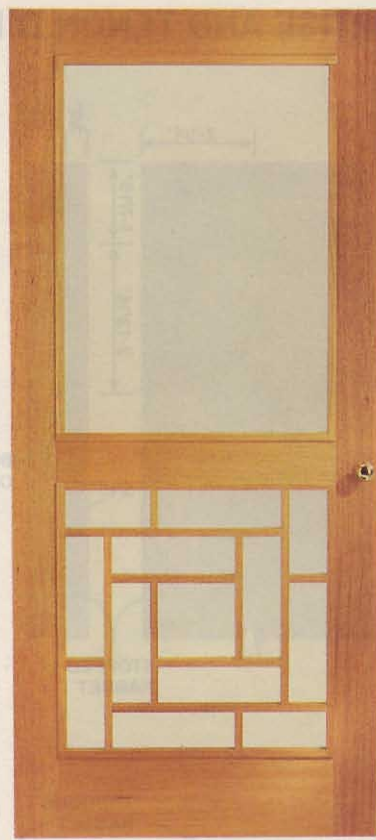
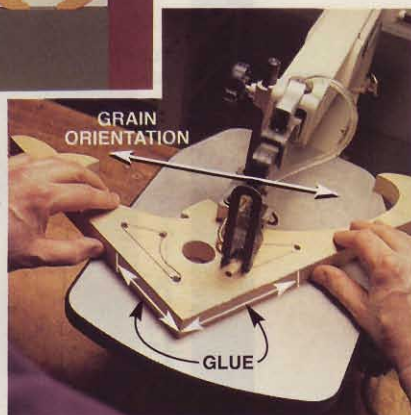
threshold. Then shim the door from underneath until it barely touches the top of the opening. Snug the hinge-side stile against the jamb and mark the three hinge locations on both pieces. Use four hinges for taller or heavier doors. Cut the hinge mortises, install loose-pin hinges and remount the door. Even out the gaps at the top and on the latch side with a block plane. Finally, install the latch, striker plate and door closer.

Extra Stiles and Rails, Panels, Brackets or Grids



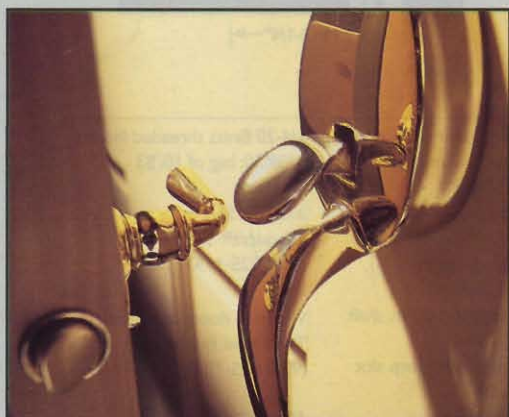
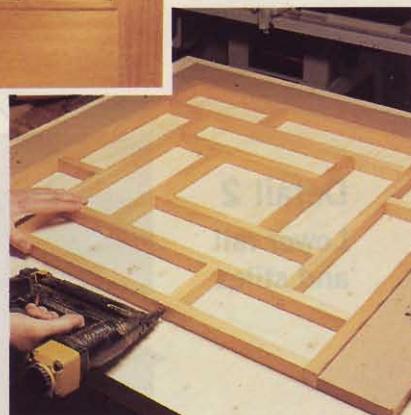
Brackets and Spindles

SAW DECORATIVE BRACKETS. Victorian brackets and spindles are available ready-made through the mail (see Sources, page 64). Accommodate wood movement by orienting the grain diagonally. When you fasten the brackets, glue only the inside corners and use brass screws in slotted holes at the ends.



An Ornamental Grid

ASSEMBLE GRIDS inside a shop-made frame that's exactly the same size as the opening in the door. When you glue the grid together, remove one side of the frame at a time to attach the outer pieces. Fasten the completed grid to the door, flush with the rabbet.



Oops!

After I got the door hung, I thought I was home free. Argh! The screen door smacks right into the main door latch! Now I'm faced with big holes to patch and I'll be reminded of

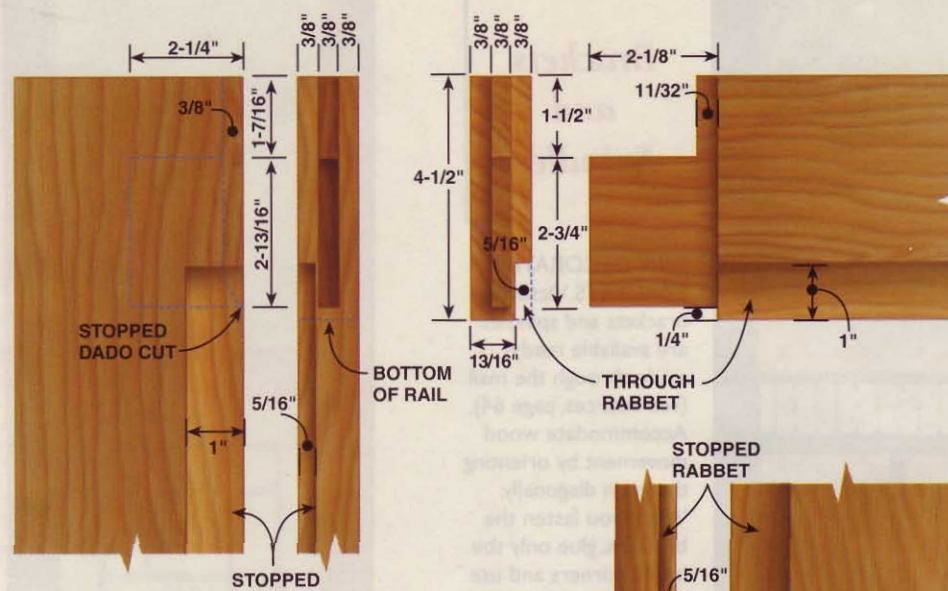
my mistake every time I open the door!

So before you drill the holes for the screen door knob, make sure it won't interfere with the latch set on your entry door.

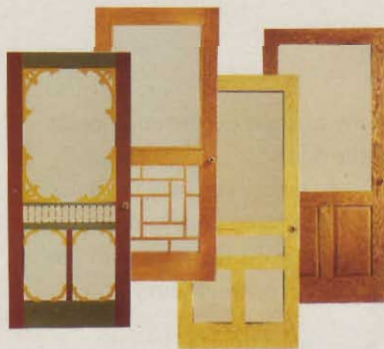
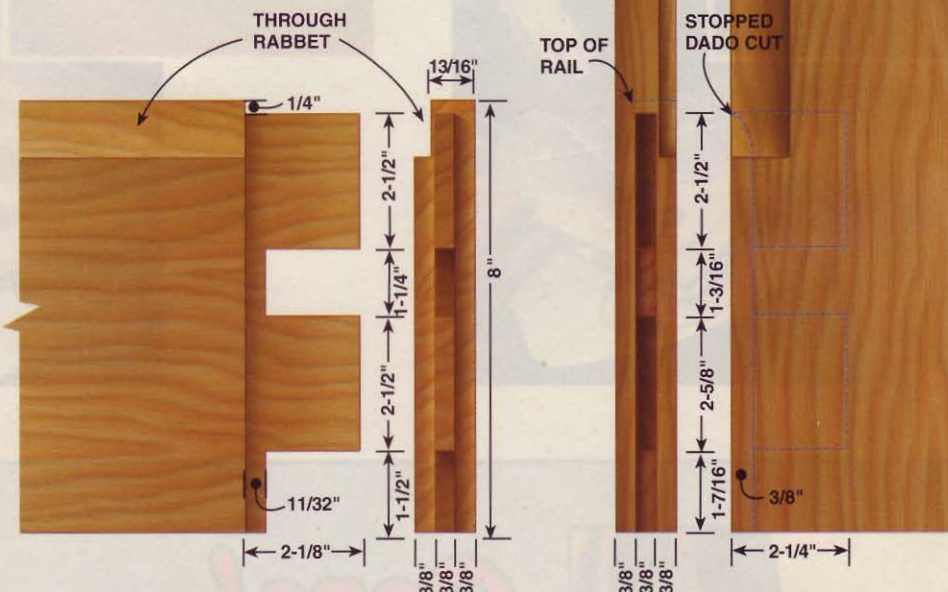


Detail 1

Upper rail and stiles



Detail 2
Lower rail
and stiles



Weatherproof, water-resistant Glues
Titebond II Extend
#16.50.21, 1 pint; \$5
Gorilla Glue
#16.50.14, 18 oz.; \$20.

Lumber
A&M Wood Specialty, Inc.
(519) 653-9322
www.farloversonwood.com

Translucent exterior finishes
Sikkens North America
(800) 833-7288
www.sikkens.com

1/4-in. Slot cutter
#10.14.50; \$13
Slot cutter arbor, 1/2-in. shaft
#10.12.41; \$4
Bearing for 3/8-in.-deep slot
#47728F; \$9
Highland Hardware
(800) 241-6748
www.highlandhardware.com

1/4-20 Brass threaded inserts
#12K50; bag of 10; \$3
T-wrench
#12K55; \$5
Woodcraft Supply
(800) 225-1153.

Victorian doors and parts
The Wood Factory
(936) 825-7233.

AN

Foolproof TENONS



Two blades and a rock-solid jig guarantee success.

Mortise and tenon joinery is the heart of many classic furniture projects. It's an incredibly strong, time-tested method of connecting boards. Making these precisely fit joints can be fussy and demanding work. But it doesn't have to be.

There are at least a dozen ways to cut tenons. We've chosen a technique that delivers the goods

every time, whether you're a beginner or seasoned pro. It's simple, safe and economical. Best of all, this technique will save you a lot of set-up time. Rather than fit tenons by trial and error for each project, you can easily reproduce the same size tenons, time after time.



ART DIRECTION: JERN STREETS • PHOTOGRAPHY: BILL ZUEHLKE • ILLUSTRATION: FRANK ROHRBACH

WHAT YOU'LL NEED

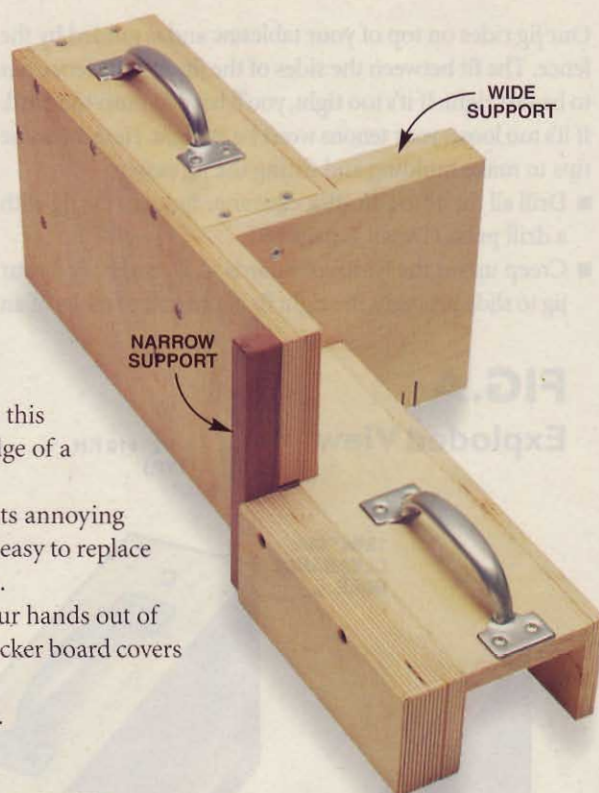
A Tenoning Jig

You can buy a commercial jig or make a better one yourself. Looking for a better mousetrap, we designed a heavy-duty jig that slides on top of a tablesaw fence. (Your fence must have parallel sides for this jig to work, however. If you have an L-shaped fence, see the jig in AW #81, page 55.)

Features:

- **Large capacity.** The 8-in.-tall sides are high enough to support a rail up to 36-in. long.
- **Dedicated sides.** No commercial jig offers this handy feature. The left side supports the edge of a rail; the right side supports the face.
- **No tear-out.** None. A backer board prevents annoying tear-out when you rip the tenon cheeks. It's easy to replace the backer board when you change settings.
- **Safe operation.** Generous handles keep your hands out of harm's way. An oversize block behind the backer board covers the saw blade after it makes the cut.

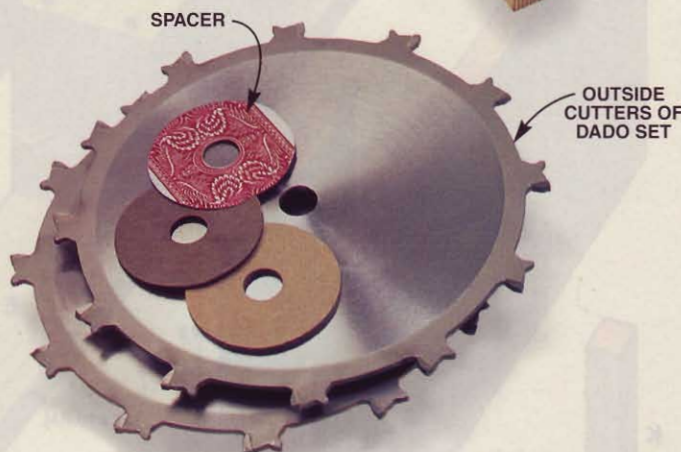
See page 68 for details on how to build the jig.



Two Saw Blades and Spacers

Make smooth-sided tenons with a pair of matched sawblades separated by spacers. You can use the outside cutters of a dado set or two carbide-tipped 7-1/4-in. circular saw blades (about \$8 each).

See page 70 for more information on how to make spacers.



Two blades and spacers guarantee a perfectly sized tenon time after time.

A Zero-Clearance Insert with Splitters

Make a dedicated insert for your tablesaw so your tenon cutting is as safe as possible. Although the parts you cut will be clamped to the jig, this insert provides additional support from underneath.



Caution: You must remove the blade guard and splitter from your tablesaw to cut tenons with this method. Add small splitters to a wooden insert to minimize the possibility of kickback.

BUILD THE JIG

Our jig rides on top of your tablesaw and is guided by the fence. The fit between the sides of the jig and the fence has to be just right. If it's too tight, you'll have to push too hard. If it's too loose, your tenons won't be straight. Here are some tips to make building and fitting the jig easier:

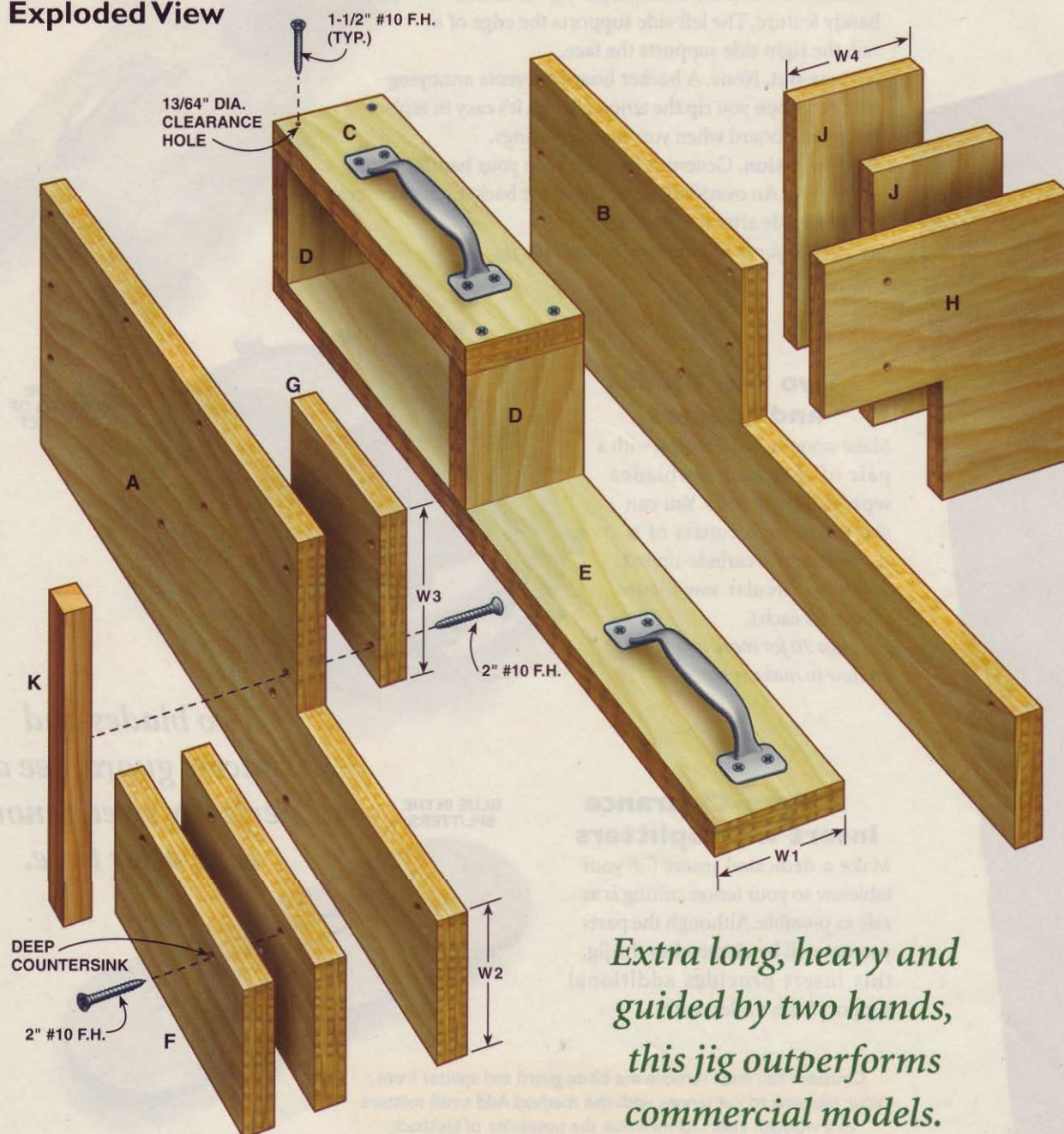
- Drill all the 13/64-in.-dia. clearance holes in the jig with a drill press (Detail 1, page 69).
- Creep up on the width of boards C, D, and E. For your jig to slide properly, the right fit is a matter of 64ths of an

inch. Rip the boards slightly oversize, then clamp them between the faces of the jig and try sliding the jig along your saw's fence.

- If your jig is too tight, shim the edges of boards C, D and E with masking tape. Don't laugh! It's an effective way to fine-tune the fit.
- Clamp the jig together and make sure it's square to the top of the tablesaw before drilling any pilot holes and driving in the screws. Don't glue the jig together. You may need to disassemble it later to adjust the fit.

FIG.A

Exploded View



Extra long, heavy and guided by two hands, this jig outperforms commercial models.

CUTTING LIST

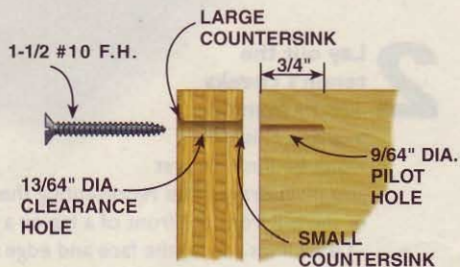
Heavy-Duty Tenoning Jig
3/4-in. Baltic Birch Plywood or MDF

Part	Name	Qty.	W x L	Comments
A	Left side	1	8 x 24	
B	Right side	1	8 x 24	
C	Top	1	W1 x 10-3/4	W1 = thickness of your fence.
D	Middle	2	W1 x L	L = 5-3/4" minus height of your fence.
E	Bottom	1	W1 x 24	
F	Blade cover	2	W2 x 8	W2 = height of your fence plus 1-1/2". Glue together.
G	Stiffener	1	W3 x 5-1/4	W3 = 6-1/2" minus height of your fence.
H	Wing	1	8 x 8	
J	Stiffener	2	W4 x 8	W4 = to fit. Glue J to H.
K	Backer	1	3/4 x 8	

Hardware: 50 1-1/2" #10 FH screws, 4 2" #10 FH screws, 2 extra-large pulls.



Cut the corners of the jig on the tablesaw (Detail 2). Stop the cut at the pencil line and withdraw the board. The bottom side of the board may be overcut, but that's OK. It's only a jig!



DETAIL 1

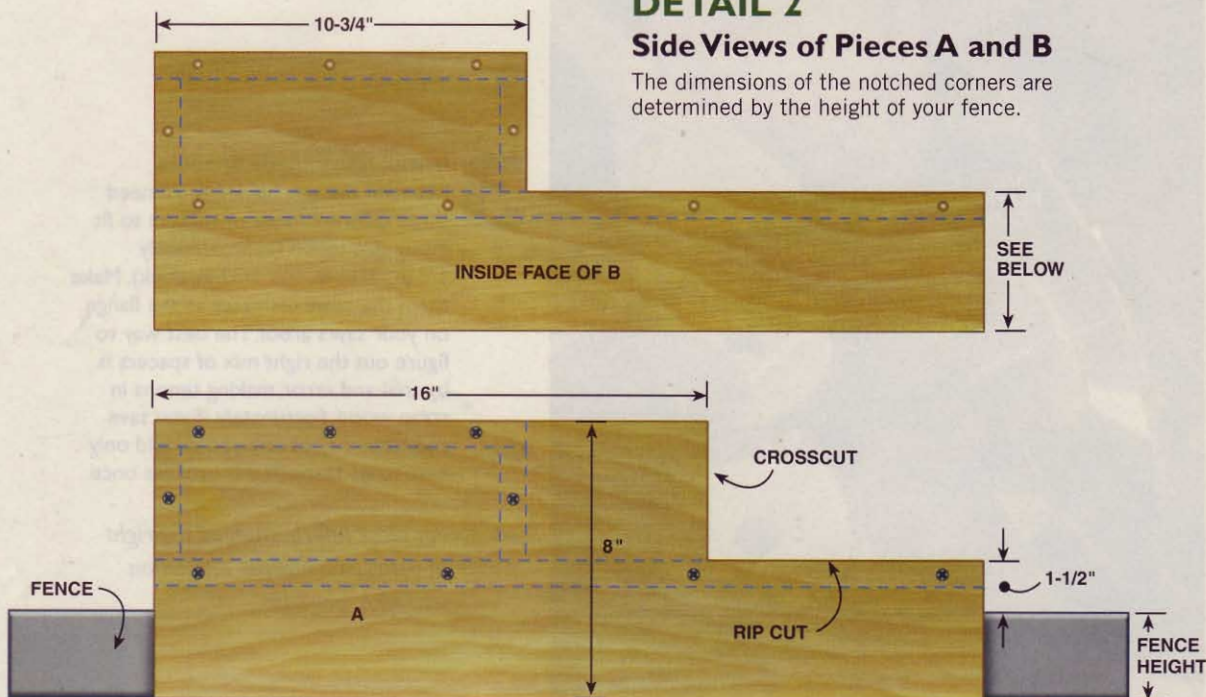
Cross Section of Typical Screw Holes

Countersink the *back* sides of all the clearance holes so the parts of the jig butt tightly together.

DETAIL 2

Side Views of Pieces A and B

The dimensions of the notched corners are determined by the height of your fence.

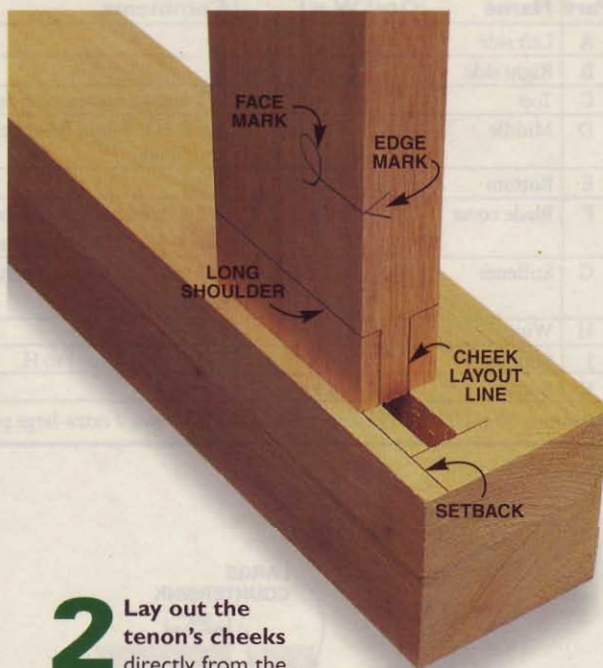


GETTING STARTED

Mill all your stock straight and square, and boldly mark the face and edge of each piece. Usually the face side is the **outside** of a rail and the reference edge is the **top** of a rail.



- 1 Make the mortises first.** It doesn't matter whether you use a mortising machine, a router or a drill press. It's far easier to fit a tenon into a mortise than it is to customize a mortise to fit a tenon.



- 2 Lay out the tenon's cheeks** directly from the mortise. This joint won't be flush, so first you must draw a line representing the setback of the rail from the front of a leg or a stile. Draw lines across the face and edge of the rail representing the shoulders of the tenon so you can set the height of the cut on the tablesaw.



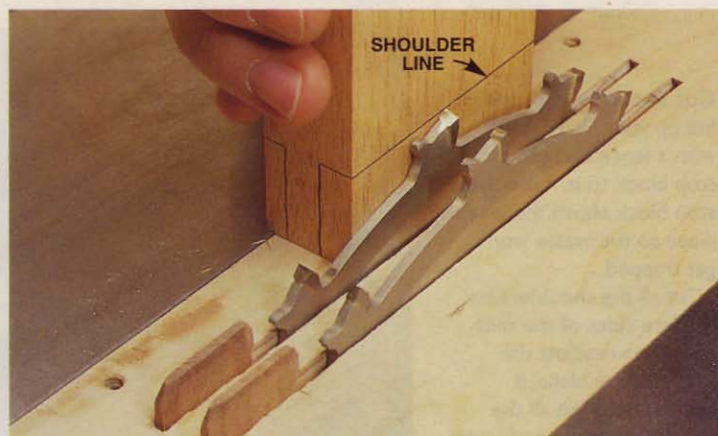
- 3 Install homemade spacers** between the saw blades. You'll need three different kinds of spacers to fit every size tenon (approximately 1/8 in., 1/16 in. and 1/32 in. thick). Make them the same diameter as the flange on your saw's arbor. The best way to figure out the right mix of spacers is by trial and error, making tenons in scrap wood. Fortunately, if you save and label the spacers you should only have to go through this process once.

For more information on the right fit between a mortise and tenon see Q&A, page 10.

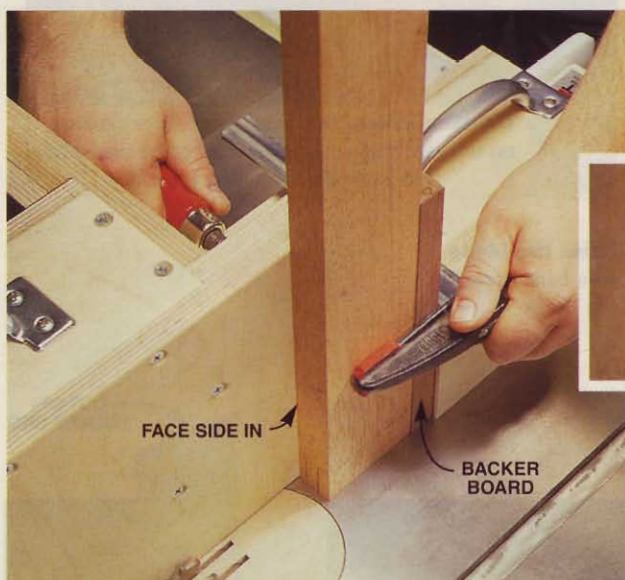
CUT THE CHEEKS

One pass through your ganged-up saw blades and you've cut *both* sides of the tenon.

- 4** Raise the blades to match the shoulder line on your rail.

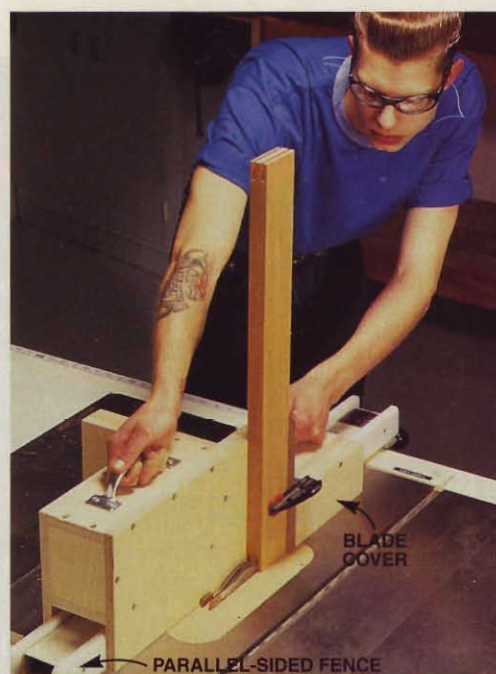


- 5** Clamp the rail to the tenoning jig, face side in, and adjust the tablesaw's fence so the layout marks line up with the two saw blades (inset, below).



Try a pair of inexpensive 7-1/4-in. circular saw blades. They work surprisingly well.

- 6** **Rip the cheeks.** Slide the jig through the cut, then pull the jig back and unclamp the rail. Rip all your tenons. Make sure the *marked* face of each of your rails is the face you clamp against the jig. When you're done, remove the double blades from the tablesaw and install a crosscut saw blade.



Caution: To avoid kickback, your fence must be adjusted so it's parallel to the saw blades.

CUT THE LONG SHOULDERS

Make perfect, tight-fitting shoulders with a crosscut saw blade.

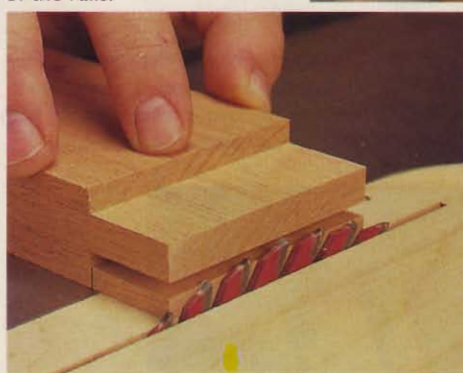
7 Cut the long shoulders.

Set up your miter gauge with a fence, and clamp a stop block to it. Raise the stop block above the waste piece so the waste won't get trapped.

Cut all the shoulders on the face sides of the rails first. Then readjust the height of the blade, if necessary, to cut all the shoulders on the back sides of the rails.



Caution: To keep the waste piece from catching on the saw blade, push the miter gauge well past the blade before pulling it back.



Raise the blade
so it barely touches
the cheek.

OUT-OF-SQUARE END

Oops!

My shoulders are drooping!

I thought they were going to line up just right but somehow they became offset. I checked the ends of the rail with an accurate square, and wouldn't you know it, they were off. The culprit is my miter gauge. It wobbles in the slot, so I don't get an accurate 90-degree cut every time. And if the shoulder cuts (Photo 7) aren't exactly

square, the shoulders won't line up at the edges.

The fix? I bought a premium miter gauge (\$100 to \$170, see AWW #81, page 81) that fits tighter in the slot. Rather than toss out the rails, I re-cut both ends as little as possible and re-cut the shoulders. Now my project is a bit smaller than originally planned, but the joints are perfect.

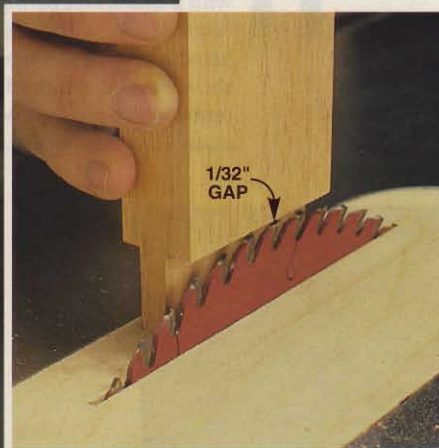
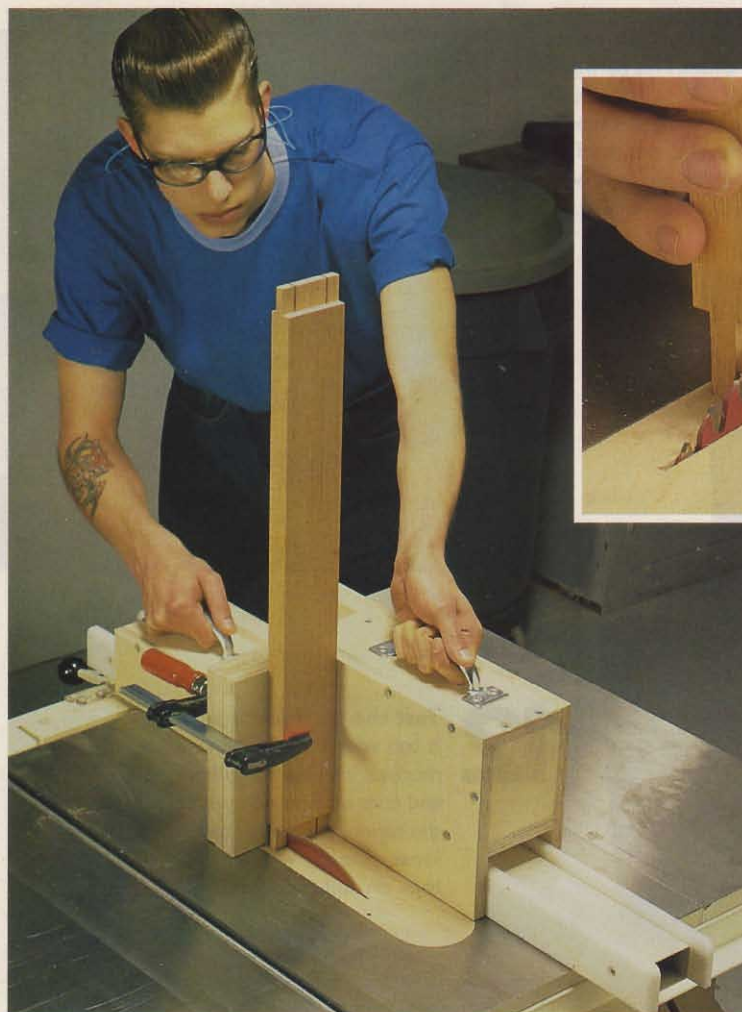
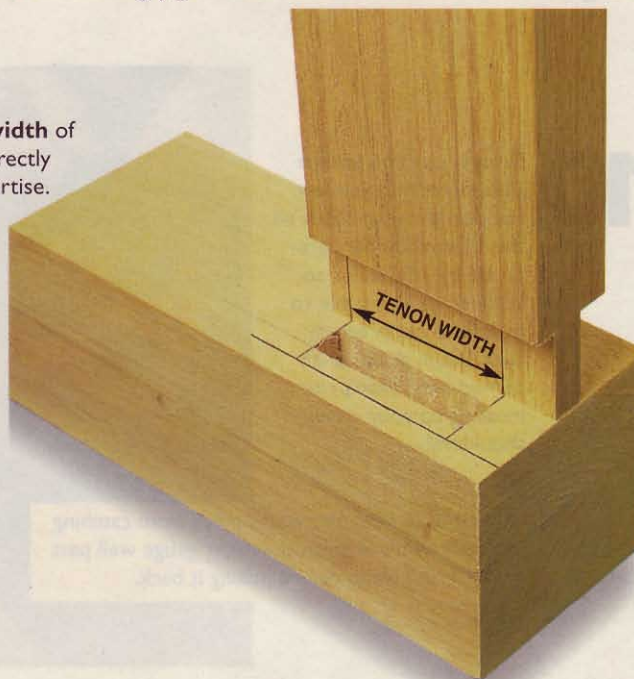
MISALIGNED SHOULDERS

CUT THE TENON'S WIDTH

Make two rip cuts on the right side of the tenoning jig. They establish the tenon width.

8 Mark the width of the tenon directly from the mortise.

There isn't any fussy micro-adjust on this jig. Simply nudge the fence with your fist.



Raise the blade about 1/32-in. lower than the shoulder to avoid cutting into it.

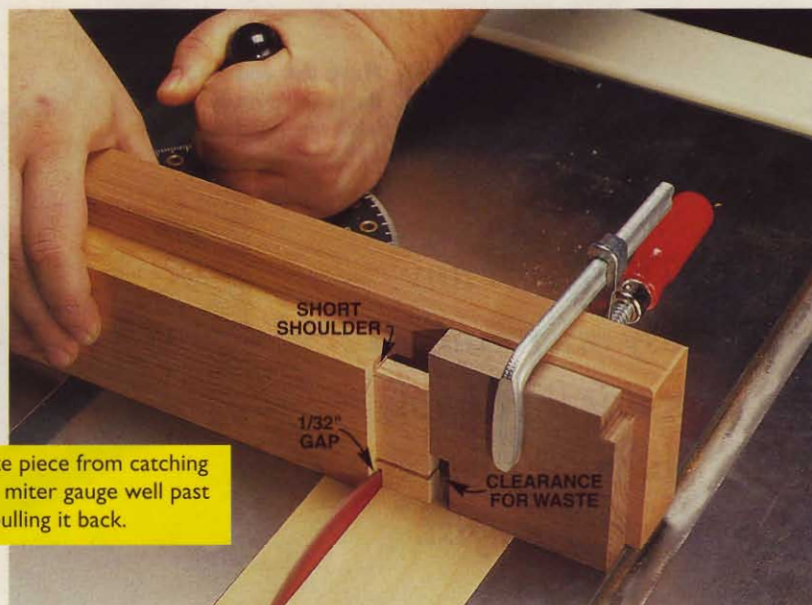
9 **Rip the tenon to width.** First, move the fence to the left side of the saw blade. Clamp the rail to the right side of the tenoning jig and adjust the fence until the blade lines up with the marks.

CUT THE SHORT SHOULDERS

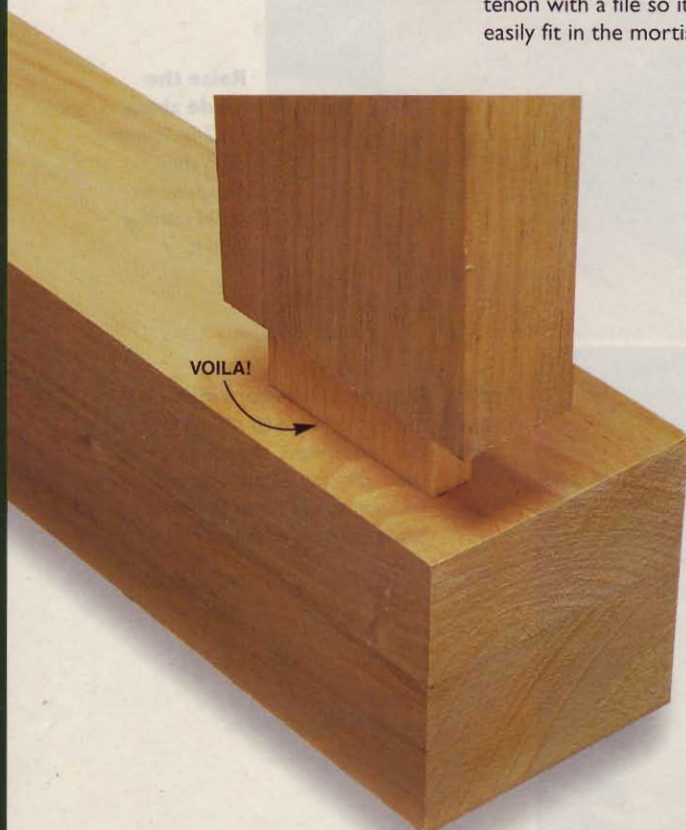
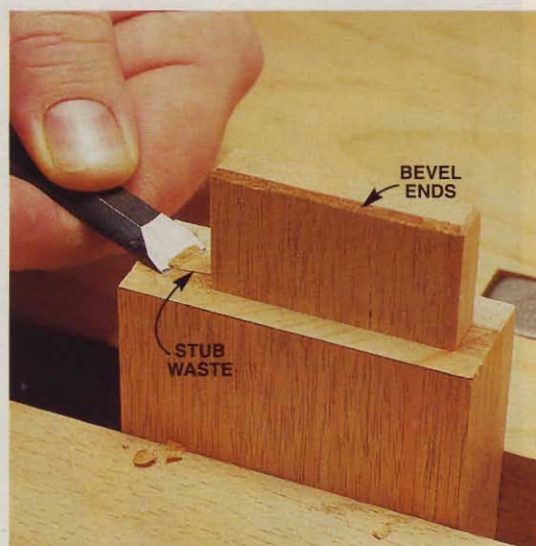
Sawing all four shoulders flush isn't realistic. Don't push your luck! Finish them with a sharp chisel.

- 10** Rough cut the waste pieces on the tablesaw. Position the stop block so the short shoulders are proud by 1/32-in. or so. In theory, it's possible to make this cut precisely flush, but in practice it's darned hard. Don't risk messing up your crisp shoulders!

Caution: To keep the waste piece from catching on the saw blade, push the miter gauge well past the blade before pulling it back.



- 11** Remove the stub waste with a chisel. This paring requires a keen edge, but if you cut too deep, it won't show. Bevel the ends of the tenon with a file so it will easily fit in the mortise.



- 12** Test the fit. If your tenon is too wide to fit into the mortise, it's easy to go back and trim off one side with the tenoning jig. If it's too loose, glue the waste pieces back on and cut again.

AW

Craftsman-Style

Bookcases

by David Radtke

Enhance your home with this built-in classic.

The Craftsman architectural movement of the early 20th century is enjoying a resurgence in popularity both in furniture design and home accessories. These bookcases and fireplace surround reflect that tradition.

If you can build a basic box with a face frame, then you can build this project. The tapered columns that showcase the hearth and buttress the bookcases present the greatest challenge. We'll show you a couple nifty jigs that make even that process seem easy.

When it comes to installing the bookcases, we solved the age-old problem of fitting a cabinet into an alcove by adding a 3-in. filler strip to the outside stile of each bookcase. Filler strips are a great way to bridge the gap between the cabinet and the wall. They're easy to install and they look great. You put the strips on at the very end; sawing, planing and sanding to a perfect fit. The result? The bookcase and mantel look as if the house were built around them!

We used quarter and rift-sawn oak—both solid and veneer plywood—for this project. This wood is a hallmark of the Craftsman style.

This project was designed for fireplaces that have a drywall or plaster enclosure, similar to the one shown here. The mantel portion of the design doesn't lend itself well to a brick fireplace.

The wood dividers (or muntins) at the top of the bookcase door frames are not "true" muntins. They don't frame individual panes of glass, but rather slip over a single pane. It's less authentic, but a lot easier.

This is a big project and is best approached in phases. The mantel and fireplace surround comprise the first phase. The two bookcases can be handled later.

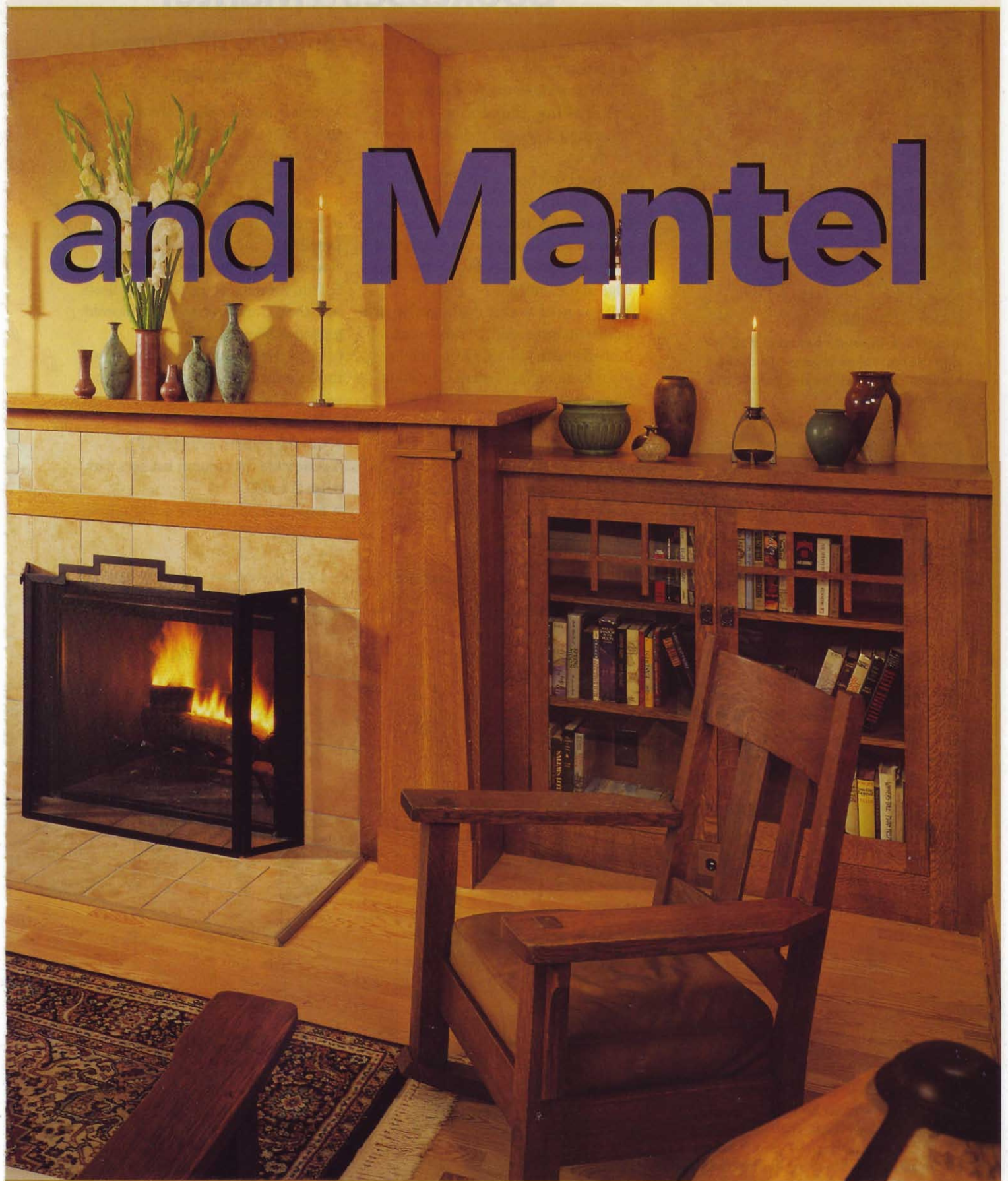
You'll need a tablesaw, bandsaw, planer, biscuit joiner (a pocket-screw or doweling jig will also work) and a router with a flush-trim bit. A compressor and a finish nailer make installation a whole lot easier. In the end, expect to spend around \$2,000 for the entire project.

Getting Started

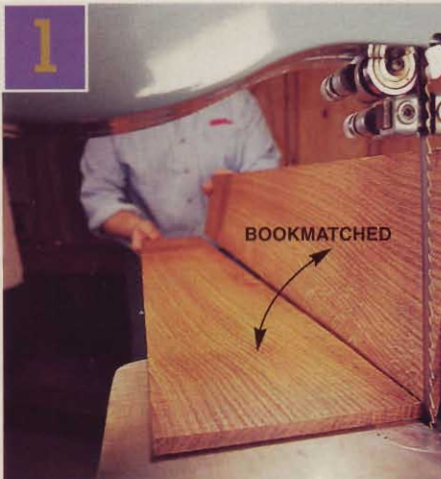
Start by measuring the fireplace projection and the area on each side of the fireplace. Our design is configured for the specific space shown in Fig. C. To allow room for the columns, we widened the mantel to extend beyond the original fireplace projection. You'll no doubt have to alter our plan to suit your



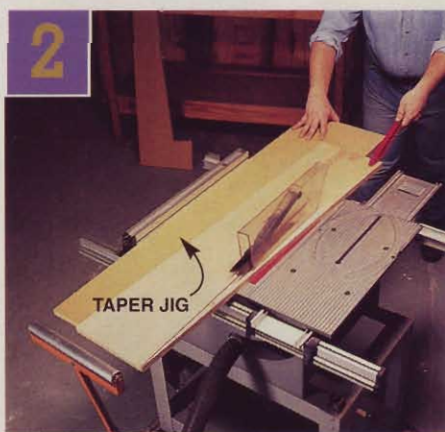
and Mantel



Building the Tapered Columns



1 Resaw a 6-in.-wide board in half, then glue the two halves together to create a bookmatched panel for the front of the columns.



2 Cut the tapered plywood on a tablesaw using two simple tapering jigs (Fig. A). Glue solid oak sides to the column.



3 Glue the bookmatched oak panel to the tapered plywood. Then cut the excess on the bandsaw leaving a 1/16-in. overhang on the sides. Trim the facing flush to the sides with a router and a flush-trim bit.

own room. Here are a couple of things to keep in mind:

■ You can widen the bookcases without making the doors too big by adding a center divider between the doors.

■ If you don't have walls at the cabinet ends, attach oak plywood end panels similar to the wall returns (parts L). Extend the cabinet tops (parts U1) and apply additional banding to cover the edge of the return.

■ If you need to alter the mantel to fit a different projection, be sure to maintain adequate setbacks from the fireplace opening (see Safety Considerations, page 79).

■ Have the tiles you're going to use on hand before you build. 8 in. x 8-in. tiles can vary by 1/4-in. and you'll need accurate measurements for making the mantel face frame.

1. Resaw oak for the bookmatched panel (N2) (Photo 1).

2. Cut the tapered plywood (M) using the jigs in Fig. A and Photo 2.

3. Glue the oak sides (N1) to the edges of the tapered plywood (Fig. D, Detail 1).

4. Assemble the columns (Photo 3).

5. Trim the ends of the oak sides flush with the top and bottom of the tapered plywood (Photo 4 and 5).

6. Cut a 3-in. section from the top of the column. Then, remove a 5/8-in.-wide strip to make room for the 3/4-in. astragal (P) (Photo 5).

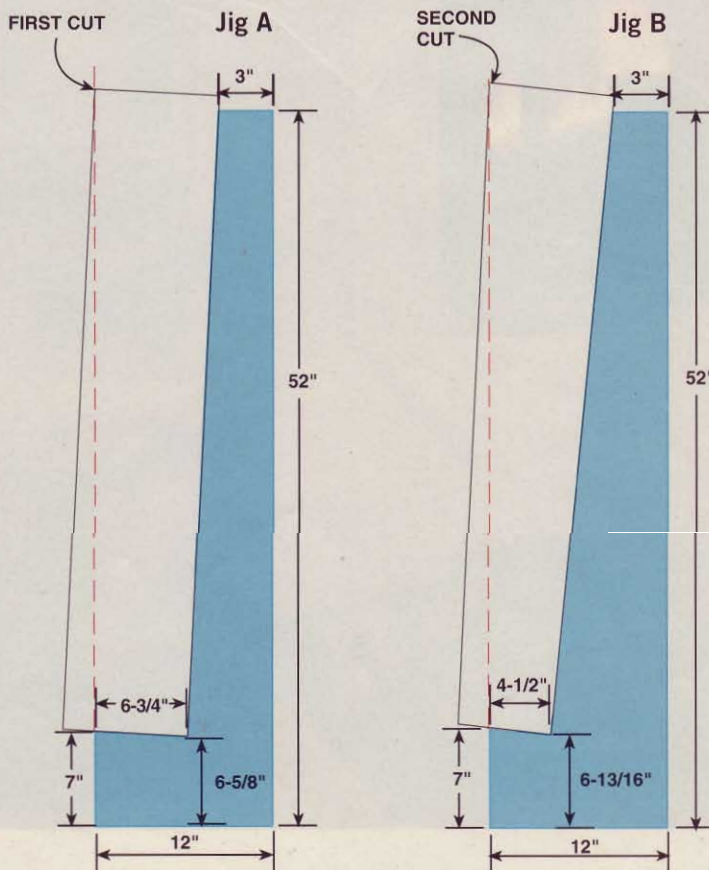
7. Cut the column astragals (P).

8. Assemble the column backers with parts C and D.

9. Assemble the mitered column base

Fig. A Tapering Jigs

Build two jigs to cut the tapered plywood. Cut the notches in each jig with a bandsaw or jigsaw. Use Jig A to make the first cut. Then flip the plywood over and cut the second taper using Jig B.

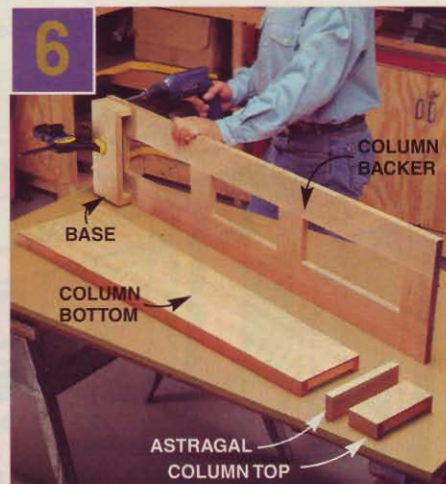




Trim the oak sides flush with the bottom of the tapered plywood. Make a 3/4 in. x 12 in. x 48 in. plywood sled with wood stops to center the column. Add a long fence to your miter gauge and use it to guide the sled through the saw.



Cut the column top, then remove an additional 5/8-in. section to make room for the astragal (see Photo 6). The 5/8-in. strip, plus the 1/8-in. saw kerf create a 3/4-in. gap that gets filled by the astragal.



Screw the column parts on the column backer starting with the base and working up. Drill pilot holes and screw them in place from behind.

fronts and sides (parts Q and R) with glue and nails.

10. Attach the column base, bottom, astragal and top to the column backer (Photo 6).

11. Join parts A and B to create the mantel face frame. Position the lower rail to accommodate the tile you've chosen. (We used 8 in. x 8-in. tiles. The actual size will vary.)

12. Assemble the mantel wall returns by screwing the cleats

(K1 and K2) to the wall returns (L).

13. Make the built-up mantel top by gluing the bottoms and underlayment (T2 and T3) to the top (T1).

14. Glue 1/4-in.-thick edge banding (S) to the outside edges. Be sure to miter the outside corners of the edge banding.

For safety and convenience, don't overlook these items when planning and installing your project:

- ✓ Fire codes generally require that 3/4-in.-thick wood be kept 6 in. away from the edge of a fireplace opening to prevent radiant heat from scorching it. For wood that protrudes 1-1/2 in. or more, such as the front columns of this project, the wood must be at least 12 in. away from the fireplace opening.

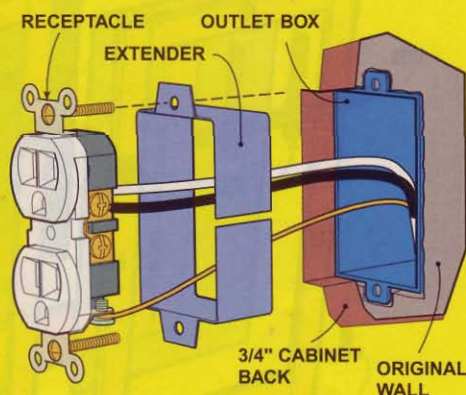
- ✓ Use thin-set mortar to apply the new tile or stone around the fireplace front and hearth.

- ✓ You must put electrical receptacle box extenders on any electrical boxes that end up behind the cabinet. Don't be tempted to remove the covers and bury the receptacles in the wall. This would violate electrical codes. The extender slips over the receptacle,

Safety Considerations

Fig. B. Outlet Extender

Outlet extenders allow you to safely extend wall outlets through the cabinet back.



extends inside the box and covers the cut-out in the plywood backs of the cabinets, as shown here. You can find box extenders at electrical supply retailers and home centers. Be sure to shut off the power to the box you're working on.

- ✓ You'll probably want to install new electrical receptacles in the cabinet bases or in the floor to make up for the receptacles left inside the cabinets. Hire a licensed electrician to do the job.

- ✓ The glass in the bookcase doors must be either safety glass (plastic film between two thin layers of glass) or tempered glass. This reduces the danger of injury from broken glass. Both types are more expensive than regular glass, and require professional cutting.

Fig. C Bookcase and Mantel Assembly

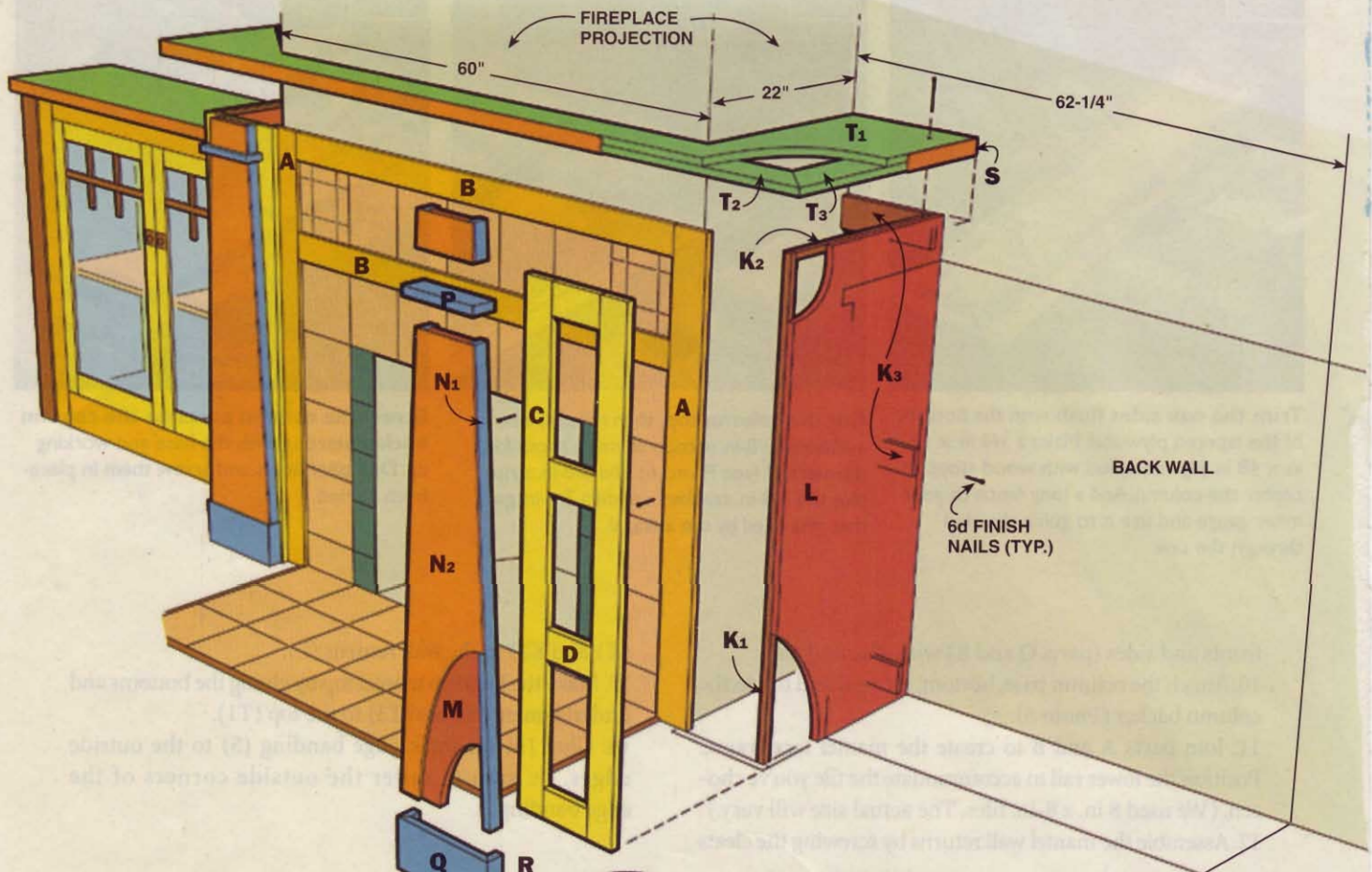
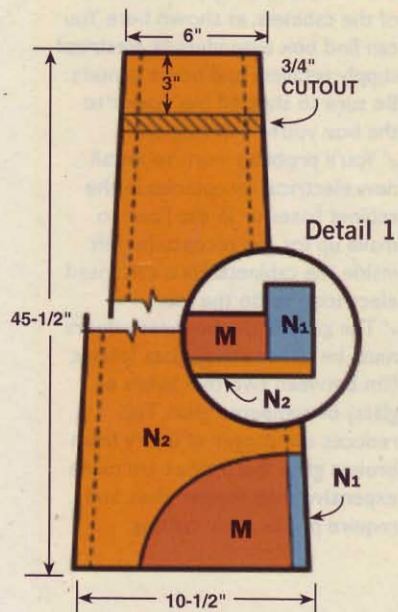
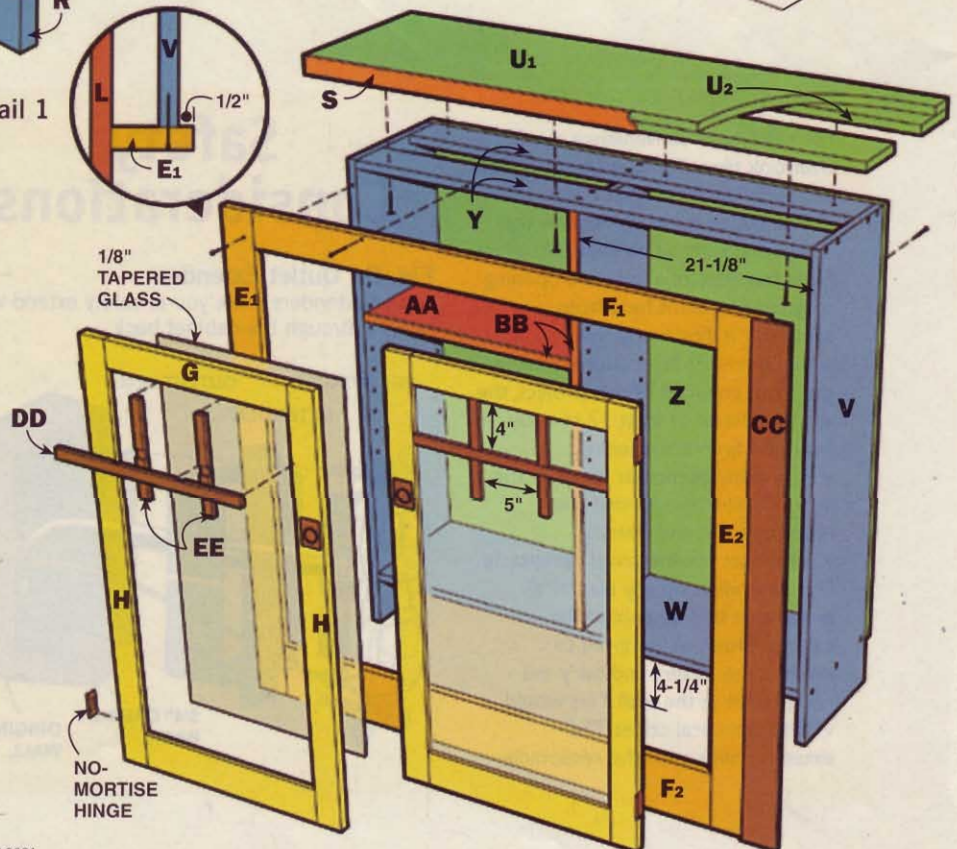
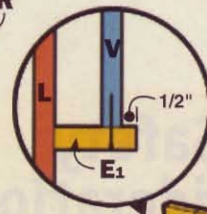


Fig. D Column



Detail 1



Building the Bookcases

1. Assemble the bookcases (parts V through Z) using 2-in. wood screws (Photo 7). Then, drill holes for the adjustable shelves.
2. Glue and clamp the face frames to each cabinet.
3. Biscuit or dowel the door frames together.
4. Rabbet the doors for the glass panels (Photo 8) and add the glass retainers.
5. Mount the doors to the bookcases using no-mortise hinges (see Sources, page 83).
6. Make half-lap joints for the muntins on your tablesaw and assemble with a drop of glue.
7. Build-up and edge-band the bookcase tops in the same manner as the mantel top.
8. Cut and edge-band the shelves.

Fig. E. Mantel Installation

Screw the columns to the face frame and the wall returns to the columns. Slide the whole assembly against the wall and nail the wall returns to the wall cleats and the face frame to the fireplace projection.

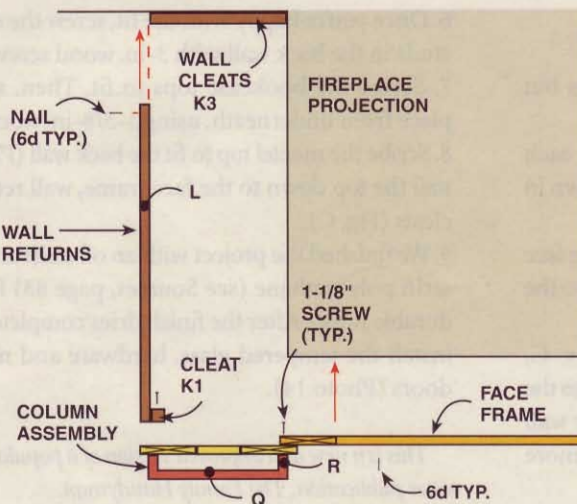
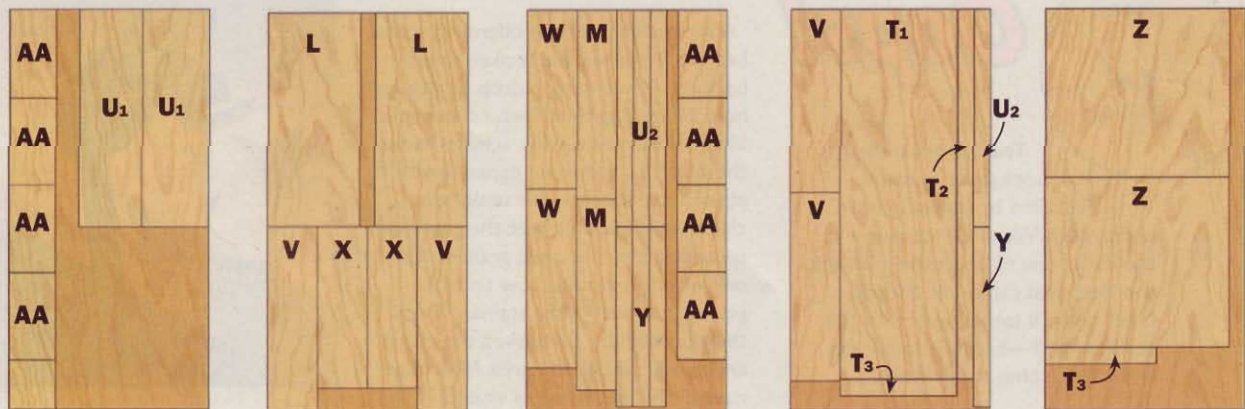
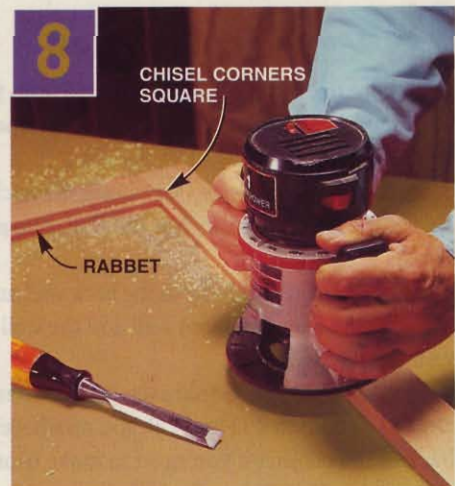


Fig. F. Cutting Diagrams



Screw the cabinet boxes together.

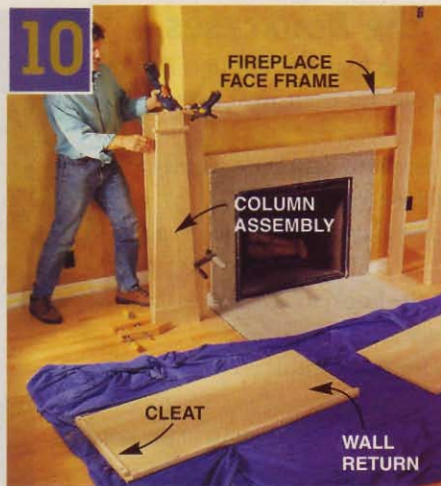
Attach the backs using screws every 6 in. The cabinet backs will "square up" the boxes and strengthen them.



Rout the rabbets for the glass panels and square the corners with a chisel.
Note: Have the glass cut 1/8 in. less than the rabbet width and height to insure a good fit.



Remove old tile, mantel and baseboard from the fireplace opening. The new tile is installed after the woodworking, staining and varnish are completed.



Screw the column assemblies to the fireplace face frame. Prop the face-frame against the fireplace projection to make the job easier. Screw the plywood wall returns through the cleats to the column assembly from the inside (see Fig. E).



Level each cabinet with shims. Then, scribe and plane the cabinet stile for a good fit against the wall return (Fig. C, Detail I). Cover any gaps along the floor with trim molding (FF).

Installation

1. Prepare the room for installation (Photo 9).
2. Assemble the mantel with 1-1/4-in. wood screws but leave the top off for now (Photo 10).
3. Screw three wall cleats (K3) along the back wall on each side of the fireplace to anchor the wall returns, as shown in Fig. E.
4. Push the entire assembly to the back wall and nail the face frame to the fireplace front wall and the wall returns to the wall cleats (Fig. E).
5. Level and fit the bookcases in the openings (Fig. C, Detail 1 and Photos 11 and 12). You may have to cut into the back of the cabinet if you need to make room for any wall receptacles. (See Safety Considerations, page 79 for more information.)

6. Once you're happy with the fit, screw the cabinets to the studs in the back wall with 3-in. wood screws.
7. Scribe the bookcase tops to fit. Then, screw them in place from underneath, using 1-5/8-in. wood screws.
8. Scribe the mantel top to fit the back wall (Photo 13). Then nail the top down to the face frame, wall returns and wall cleats (Fig. C).
9. We finished the project with an oil stain and two coats of satin polyurethane (see Sources, page 83) for a deep and durable finish. After the finish dries completely (48 hours), install the tempered glass, hardware and muntins in the doors (Photo 14).

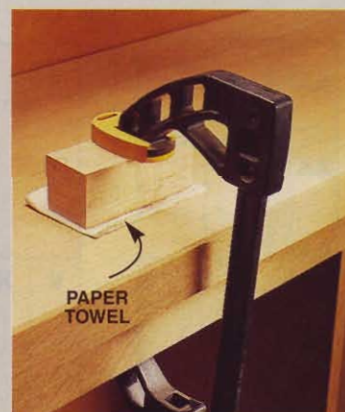
This is a new and improved version of a popular story from our sister publication, The Family Handyman.



Oops!

The tops of these bookcases must be installed by screwing from underneath. Wouldn't you know it, the last screw to finish the job went too deep and came out the top. Next time I'll take it easy with the cordless drill—but this time I was faced with some repair work.

After backing out the offending screw, I carefully pushed the broken fibers back into place using a drop of glue to hold things together. Then I clamped a block of wood over the area to flatten the repair. I used some paper towels to absorb the squeeze-out under the clamping block. This kept the glue from spreading into the open grain of the oak where it would show up as a permanent mark after staining. Once the glue was dry I removed the clamp and lightly sanded the area. Now that nasty little hole is barely visible.





Hold the filler strip in place and scribe to fit the adjacent wall. Then, nail the strip onto the cabinet stile.



Scribe the top for a tight fit against the back wall. Then cover any gaps along the fireplace projection with trim molding (FF).



Secure the muntins to the glass with silicone caulk after the finish is dry. **AW**

CUTTING LIST

Part	Name	Qty.	Dimensions	Material
A	fireplace stiles	2	3/4" x 4" x 50-1/2"	oak
B	fireplace rails	2	3/4" x 3" x 54"	oak
C	column backer stiles	4	3/4" x 4" x 50-1/2"	oak
D	column backer rails	8	3/4" x 4" x 3-1/2"	oak
E1	cabinet stiles	2	3/4" x 3" x 44-1/2"	oak
E2	cabinet stiles	2	3/4" x 4" x 44-1/2"	oak
F1	cabinet upper rails	2	3/4" x 3" x 42"	oak
F2	cabinet lower rails	2	3/4" x 5" x 42"	oak
G	upper door rails	4	3/4" x 2-1/4" x 16-7/16"	oak
H	door stiles	8	3/4" x 2-1/4" x 36-7/16"	oak
J	lower door rails	4	3/4" x 3" x 16-7/16"	oak
K1	cleats	2	3/4" x 3/4" x 50-1/2"	pine
K2	cleats	2	3/4" x 3/4" x 21-1/4"	pine
K3	wall cleats	6	3/4" x 3-1/2" x 10"	pine
L	wall returns	2	3/4" x 22-3/4" x 50-1/2"	oak plywood
M	taper-cut plywood	2	3/4" x 9-1/2" x 45-1/2"	plywood
N1	column sides	4	3/4" x 1-1/4" x 48"	oak
N2	column faces	2	1/4" x 11" x 46-1/2"	oak; trim to fit
P	column astragals	2	3/4" x 2-1/4" x 7-7/8"	oak
Q	column base fronts	2	3/4" x 5" x 11"	oak
R	column base sides	4	3/4" x 5" x 1-3/4"	oak
S	top edge banding	22 ft.	1/4" x 1-1/2"	oak
T1	mantel top	1	3/4" x 26-3/4" x 88-1/2"	oak plywood
T2	mantel underlayment front	1	3/4" x 4" x 88-1/2"	oak plywood
T3	mantel underlayment sides	2	3/4" x 4" x 26-3/4"	oak plywood
U1	cabinet tops	2	3/4" x 15-1/4" x 52"	oak plywood
U2	cabinet top underlayment	4	3/4" x 4" x 52"	oak plywood
V	cabinet sides	4	3/4" x 12" x 44-1/2"	oak plywood
W	cabinet bottoms	2	3/4" x 12" x 43"	oak plywood
X	partitions	2	3/4" x 11-3/4" x 38-3/4"	oak plywood
Y	cabinet top strips	4	3/4" x 4" x 43"	oak plywood
Z	cabinet backs	2	3/4" x 44-1/2" x 40-1/2"	oak plywood
AA	unfaced shelves	8	3/4" x 11-5/8" x 21"	oak plywood
BB	shelf and partition facing	30 ft.	1/4" x 3/4"	oak
CC	filler strips	2	3/8" x 3" x 44-1/2"	oak
DD	horizontal muntins	4	3/8" x 3/4" x 16-7/16"	oak
EE	vertical muntins	8	3/8" x 3/4" x 8"	oak
FF	trim	20 ft.	1/2" x 3/4"	oak

Sources

Steve Wall Lumber Co., (800) 633-4062, www.walllumber.com
60 bd. ft. FAS quarter-sawn white oak, (\$4.50 per bd. ft., plus s&h) and five 3/4" x 4x8 B-2 grade rift-sawn white oak plywood (\$70 per sheet, plus s&h).

The Home Depot
One 1x6 x 8' No. 2 pine,
Two qts. Minwax Early American No. 230 oil stain,
One gal. Minwax satin polyurethane.

Woodworkers' Hardware, (800) 383-0130
16 glass retainers, #EZ004; 35 cents each,
4 door magnets, part #A09798VW;
\$2.50 each,
48 1/4-in. shelf pins, #HB86C25;
10 cents each,
8 no-mortise hinges, #A03175TB DAE;
\$3 each.

Van Dyke's Restorers, (800) 558-1234
4 door pulls, #CG-02004761; \$39 each.

Tool Test

Bandsa

For Resawing



Resawing can push a bandsaw to its limits, so it's important to get one that can handle the job.

Bandsaws are well known for their ability to cut curves, but they can also perform the unique function of wide resawing. The ability to resaw can add a whole new dimension to your woodworking. You can save money by making your own thin lumber, or produce bookmatched panels (Photo 3). With the right machine you can even make your own lumber (Photo 2)!

One of the questions we hear most often from woodworkers shopping for a bandsaw is, "How will it perform for resawing?" We focused this test in response to that question.

Our test concentrated on bandsaws that have a resaw capacity of 9 in. to 12 in. and are priced between \$350 and \$1,350. Within this field we found 17 machines; ten 14 in., one 16 in., and six 18-in. Among the 14-in. bandsaws, we included only those that could saw 9 in. or greater or had a riser block kit available. A riser block (Photo 1) typically adds 6 in. to the resaw capacity, giving most 14-in. bandsaws 12-in. resaw capacity. At \$50 to \$100, a riser block kit is an inexpensive way to gain that extra resaw height.

To test the saws, we resawed 8-in.-wide hard maple and 8-in.-wide pine boards. We used new 3/4-in.-wide blades. We pushed the machines pretty hard to get some separation between those that could cut it and those that couldn't. For those that did well, we pushed even harder using hard maple boards as wide as 12 in.

Resawing Needs Power

Power is the biggest factor affecting a bandsaw's ability to resaw. Machines in our test group had ratings from 3/4 to 2 hp (Fig. A). We found that 1 hp is the minimum needed for resawing. You can resaw on the 3/4-hp machines, but they are slow and likely to test your patience. (See Workshop Tips, Easier Resawing, page 23, for a way to deal with an under-powered bandsaw.)

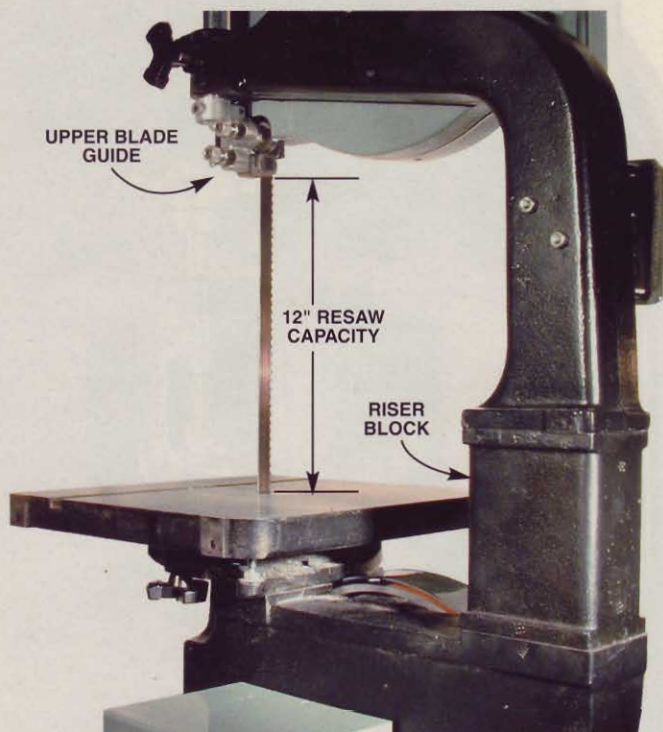
Power is important, but you also need adequate blade speed. Machines with blade speeds of 3,000 sfpm (surface feet per minute) or higher performed best. Some machines have multiple speeds, but this is not an advantage because these speeds are well below 3,000 sfpm and easily bogged down.

ART DIRECTION: VERN STREETS • PHOTOGRAPHY: STAFF AND MIKE HABERMANN • LEAD PHOTO: JOHN HAMEL

By Randy Johnson

WS

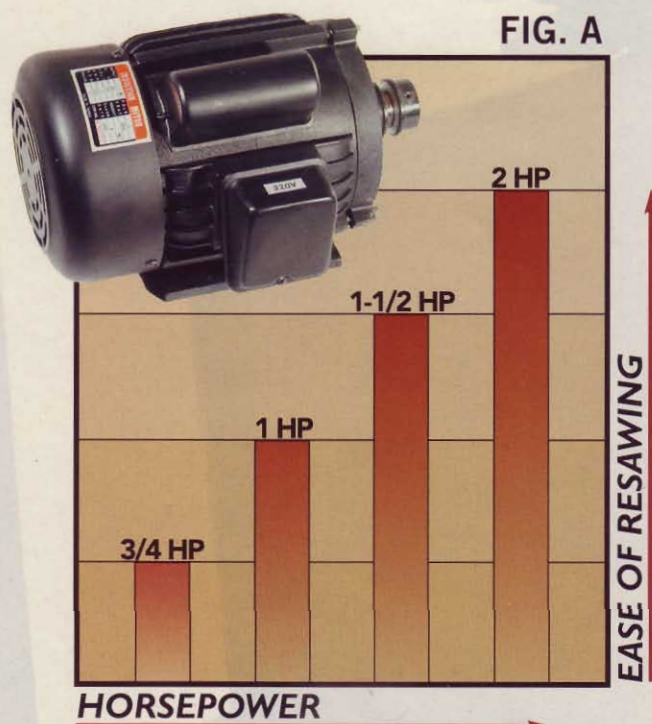




A riser block can be installed on some 14-in. bandsaws. It's an inexpensive way to increase their resaw capacity from 6 to 12 in.



2 Twelve-inch capacity is particularly useful if you plan to make lumber from logs with your bandsaw.



Power is important when it comes to resawing. We tested bandsaws with 3/4- to 2-hp. motors. We found that 1 hp. is a minimum requirement for wide resawing in hard wood. A 3/4-hp saw will cut but may test your patience.

Resaw Capacity - You May Not Need the Maximum

Resaw capacity is measured by the amount of space under a fully raised upper blade guide (Photo 1). How much capacity you need depends on the kind of work you plan to do. If you're making lumber from logs, a machine with 12-in. capacity is best. If you want to make bookmatched panels for cabinet doors, a machine with 9-in. capacity is probably enough. That's because two 9-in. panels glued together, plus 4 in. for two side stiles, equals a 22-in.-wide door.

A Rigid Frame and Sturdy Base are Best

The heavy demand resawing puts on a bandsaw can create machine vibration, blade chatter and even frame flexing. These problems can, in turn, result in rough and uneven cutting.

We found two features that helped minimize these problems; frame style and base style. There are two distinct frame styles;



A FRESH SHARP BLADE IS CRITICALLY IMPORTANT WHEN RESAWING.

3 Bookmatching lumber with unusual grain patterns is one of the many wonderful applications of resawing. Once resawn, the two parts can be glued together and used as a decorative door or cabinet panel.

welded-steel and cast-iron (Photo 4). All of the welded-steel frame machines had a very solid feel during resawing and did a good job of dampening vibration under a heavy resaw load. Among the cast-iron frame machines, the Delta and Enco resisted vibration best.

A sturdy base also helps dampen vibrations. For this reason we favor the closed- and the floor-base styles over the panel- and open-base models (Photo 5).

Resawing Requires the Right Blade

It's very important to use a blade that's fresh and sharp when resawing. If you don't, you're likely to get excessive blade wander, chatter and a slow feed rate. The width of the blade is also important. A 3/4 in. to 1-in.-wide blade with 3 to 4 tpi (teeth per inch) is a good choice. (For more information on bandsaw blades, look for our Bandsaw Blade Tool Test in the next issue of American Woodworker.)



4 Two frame styles. During heavy resawing the welded-steel frame (right) resists vibration better than most of the bandsaws with cast-iron frames (left).



5 A sturdy base helps to dampen vibration during heavy resawing. Closed and floor-style bases do the best job.

Bandsaws with riser blocks

Bandsaws without riser blocks

Manufacturer	Price w/out shipping	HP	Volts	Amps	Blade Speed(s) SFPM	Resaw Capacity	Frame Style	Base Design	Dust Collection
Delta 28-275	\$710	3/4	115	9	3,000	12"	Cast-Iron	Open	Fair, 1-1/2" port under table
Delta 28-280	\$790	1	115/230	9.6/4.8	3,000	12"	Cast-Iron	Closed	Fair, 1-1/2" port under table
Grizzly G1019	\$355	3/4	115/230	12/6	3,300	10"	Cast-Iron	Paneled	Fair*, 2-1/4" port under table
Grizzly G1019Z	\$375	1	110/220	12/6	3,350	10"	Cast-Iron	Open	Good, 1-1/2" port behind lower wheel
Jet JW14CS	\$650	1	115/230	10/5	3,000	12"	Cast-Iron	Closed	Fair*, 2" port under table
Jet JW14OS	\$570	3/4	115/230	10/5	3,000	12"	Cast-Iron	Open	Fair*, 2" port under table
North State WA-14M	\$495	1	110/220	15/7.5	3,000	11"	Cast-Iron	Closed	Good, 4" port in front of lower wheel
Reliant DD90	\$377	1	115/230	9/4.5	625; 1,061; 1,683; 2,578	12"	Cast-Iron	Paneled	None
Ridgid BS1400	\$559	3/4	120	10	2,800	12"	Cast-Iron	Open	Fair*, 2-1/4" port under table
Enco 199-9090	\$700	2	220	12	3,000	8-1/2"	Cast-Iron	Open	Poor, 3/4" port under table
Grizzly G4186Z	\$895	2	110/220	14/7	3,166	10"	Welded-Steel	Floor	Good, 4" port under table
Jet JWBS-18	\$1,099	1-1/2	115/230	16/8	3,000	10"	Welded-Steel	Floor	Good, 4" port under table on back side
Laguna LT16	\$1,345	1-1/2	220	7.9	3,600	12"	Welded-Steel	Floor	V. Good, one 4" under table, one 4" behind lower wheel
Lobo BSO183	\$799	2	110/220	24/12	2,000; 3,000	10-3/4"	Welded-Steel	Floor	Good, 4" port under table, but down near the floor
North State WA-18	\$795	2	110/220	24/12	850; 1,000; 1,280	10"	Cast-Iron	paneled	Poor, 1-1/4" port behind lower wheel
Powermatic 44	\$600	1	115/230	7/3.5	3,000	9"	Welded-Steel	open	Good, 3" port behind lower wheel
Transpower SB800	\$602	2	110/220	25/12.5	850; 1,000; 1,280	10"	Cast-Iron	open	Poor, 1-1/4" port behind lower wheel

*Dust port steps down in size, reducing air flow.

Dust Collection is a Must

Resawing produces a lot of sawdust so good dust collection is essential. All but one of the machines have some sort of dust port. Some are located under the table, others are found in front or behind the lower wheel (Photo 6). Port sizes vary from 3/4 in. to 4 in. in diameter.

We hooked up a shop vacuum to the machines and found dust collection to be only fair on machines with dust ports less than 2-1/2-in. in diameter. That's because the actual opening on the machine was smaller than the dust port and this restricted air flow. Larger ports on the larger machines worked best when hooked up to a central dust collection system. If your bandsaw lacks adequate dust collection, check out Workshop Tips, "Better Bandsaw Dust Collection," page 16.



6 Good dust collection is important when resawing. The 3-in. diameter rear dust port on this Powermatic provides good air flow and also helps keep the hose out of the operator's way. Several machines had dust ports that could accept a shop vacuum hose but the actual opening behind the dust port on the machine was small and restricted air flow.

	Guide Style	Front Guard Style	Column-mounted Switch	Hinged Wheel Covers	Easily Accessible Tensioning Knob	Rip Fence	Comments and Source
	Blocks	two-piece	No	Yes	Yes	Optional	Very robust micro adjustment system; front guard awkward to adjust; (800) 438-2486.
	Blocks	two-piece	Yes	Yes	Yes	Optional	Very robust micro-adjustment system; front guard awkward to adjust; (800) 438-2486.
	Blocks	one-piece	No	Yes	No	Stock	Optional ball-bearing guide available; riser block difficult to install; (800) 523-4777.
	Blocks	one-piece	Yes	No	No	Stock	Optional ball-bearing guide available; riser block difficult to install; (800) 523-4777.
	Blocks	telescoping	Yes	Yes	Yes	Optional	Lower micro adjustment difficult to access; (800) 274-6848.
	Blocks	telescoping	Yes	Yes	Yes	Optional	Lower micro adjustment difficult to access; (800) 274-6848.
	Blocks	telescoping	Yes	Yes	Yes	Optional	Lower guides difficult to adjust; LeNeave Machinery; (800) 442-2302.
	Blocks	telescoping	No	No	No	Optional	Blade speed insufficient for resawing; Trendlines; (800) 767-9999.
	Blocks	telescoping	Yes	Yes	Yes	Optional	Very nice 3/4-hp saw for general bandsawing; (800) 474-3443.
	Blocks	one-piece	Yes	No	No	Stock	Double-drive pulleys and belts; (800) 873-3626.
	Blocks	one-piece with rack-and-pinion	Yes	Yes	Yes	Stock	Optional ball-bearing guide available; lacks tension gauge; (800) 523-4777.
	Euro Guides	one-piece with rack-and-pinion	Yes	Yes	Yes	Stock	Very nice stock rip fence; (800) 274-6848.
	Euro Guides	one piece	Yes	Yes	Yes	Stock	Optional nonmetallic guides available; (800) 332-4094.
	Blocks	one-piece with rack-and-pinion	Yes	Yes	Yes	Stock	Lacks tension gauge and tension spring, which could lead to blade over-tensioning; (800) 786-3747.
	Blocks	one-piece	Yes	No	No	Stock	Blade speed too slow for resawing; LeNeave Machinery; (800) 442-2302.
	Ball Bearing	one-piece	Yes	Yes	Yes	Optional	Guides were difficult to adjust; (800) 248-0144.
	Blocks	one-piece	Yes	No	No	Stock	Blade speed too slow for resawing; C.P. Tools; (800) 654-7702.

Other Features

There are four styles of bandsaw blade guides; cylindrical blocks, square blocks, ball bearings and Euro style. For purposes of resawing, we like the Euro-style guides because they do an exceptional job of supporting wide blades (Photo 7). But if you plan to use blades under 1/4-in. wide, we'd recommend the block-style guides (Photo 8) fitted with nonmetallic blocks, such as Cool Blocks (about \$12 from Woodworking Fast-TraK, 888-327-7725). This style allows you to capture a narrow blade between the guides with no chance of damaging the teeth.

Our favorite blade guard assembly is the one-piece guard with a rack-and-pinion adjustment for raising and lowering (Photo 9). Several saws have a telescoping blade guard that is also simple to adjust. A column-mounted switch, hinged wheel covers, an easily accessible tensioning knob and a rip fence are also features worth looking for.

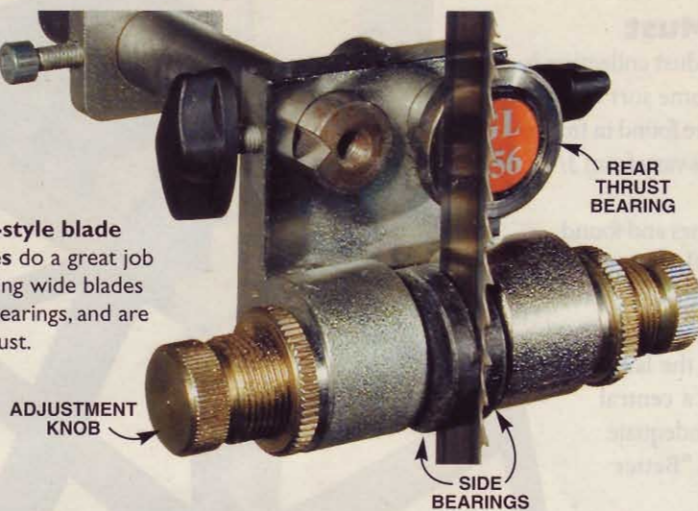
Recommendations

In choosing our favorites, we considered a saw's ability to do wide resawing in hard and soft wood. We balanced that with an eye towards user-friendly features and general bandsawing.

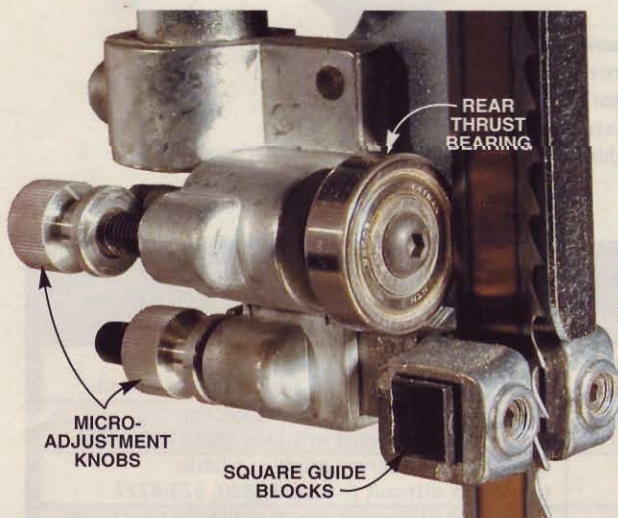
The Laguna 16 in. and the Jet 18 in. won Editors' Choice awards. Both have Euro-style guides and welded-steel frames. The Delta and Jet 14-in, 1-hp saws are our Best Buys. These saws both accept riser blocks and have 12-in. resaw capacity. Other machines we considered for Best Buy were the Lobo 18 in. and the Grizzly 18 in. They both have welded-steel frames with 2-hp motors, good dust collection and easy-to-adjust rack-and-pinion front blade guards. But they both lack a blade-tension gauge which could lead to over tensioning. Lobo's lower blade guides were difficult to adjust and the Grizzly 18 in. had more vibration than the other welded-steel frame machines.

In selecting a saw, don't overlook its electrical requirements. Some require 220 volts and some 110-volt saws have pretty high amperage requirements. Make sure your work area has the necessary wiring and circuitry. Check with a licensed electrician if you're in doubt.

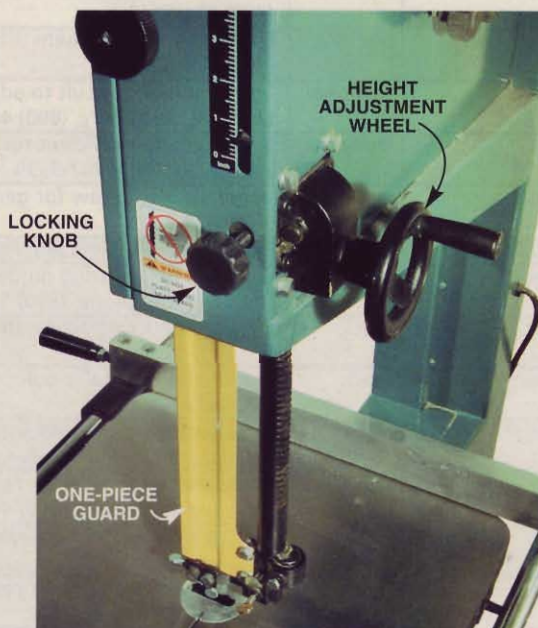
7 Euro-style blade guides do a great job of supporting wide blades with side bearings, and are easy to adjust.



8 Square, block-style guides work well for supporting wide blades but are also capable of supporting blades as narrow as 1/16-in. wide. Micro-adjustment knobs are a big help when fine-tuning the position of your guides.



9 A one-piece guard system with rack-and-pinion height adjustment makes raising and lowering a simple matter. This set-up also keeps the guard from crashing to the table when the locking knob is loosened.





EDITORS' CHOICE

Laguna LT 16 in.; \$1,345

PROS

- 1-1/2-hp motor
- 3,600 sfpm blade speed
- 12-in. resaw capacity
- Welded-steel frame
- Optional nonmetallic block guides available
- Two 4-in. dust ports
- Prewired and fully assembled
- One-piece front guard.

CONS

- Requires 220 service
- Lacks rack-and-pinion guard adjustment.



EDITORS' CHOICE

Jet JWBS 18 in.; \$1,099

PROS

- 1-1/2-hp motor
- 3,000 sfpm blade speed
- 115 or 230 volts
- Welded-steel frame
- One-piece front guard with rack-and-pinion guard adjustment
- Well-designed rip fence included with saw.

CONS

- Only available with Euro-style guides
- Only 10-in. resaw capacity.



BEST BUY

Jet JW14CS 14 in. with riser block; \$650

PROS

- 1-hp motor
- 3,000 sfpm blade speed
- 115 or 230 volts
- 12-in. resaw capacity
- Closed base
- Telescoping front blade guard
- Accepts nonmetallic guide blocks.

CONS

- Small dust port
- Micro-adjustment knobs on bottom blade guide are hard to access.



BEST BUY

Delta 28-280 14 in. with riser block; \$790

PROS

- 1-hp motor
- 3,000 sfpm blade speed
- 115 or 230 volts
- 12-in. resaw capacity
- Closed base
- Accepts nonmetallic guide blocks
- Heaviest cast-iron frame among the 14-in. saws.

CONS

- Front blade guard difficult to keep aligned
- Small dust port.



AW

Small Shop Tips

Low-Rider Mobile Tool Base

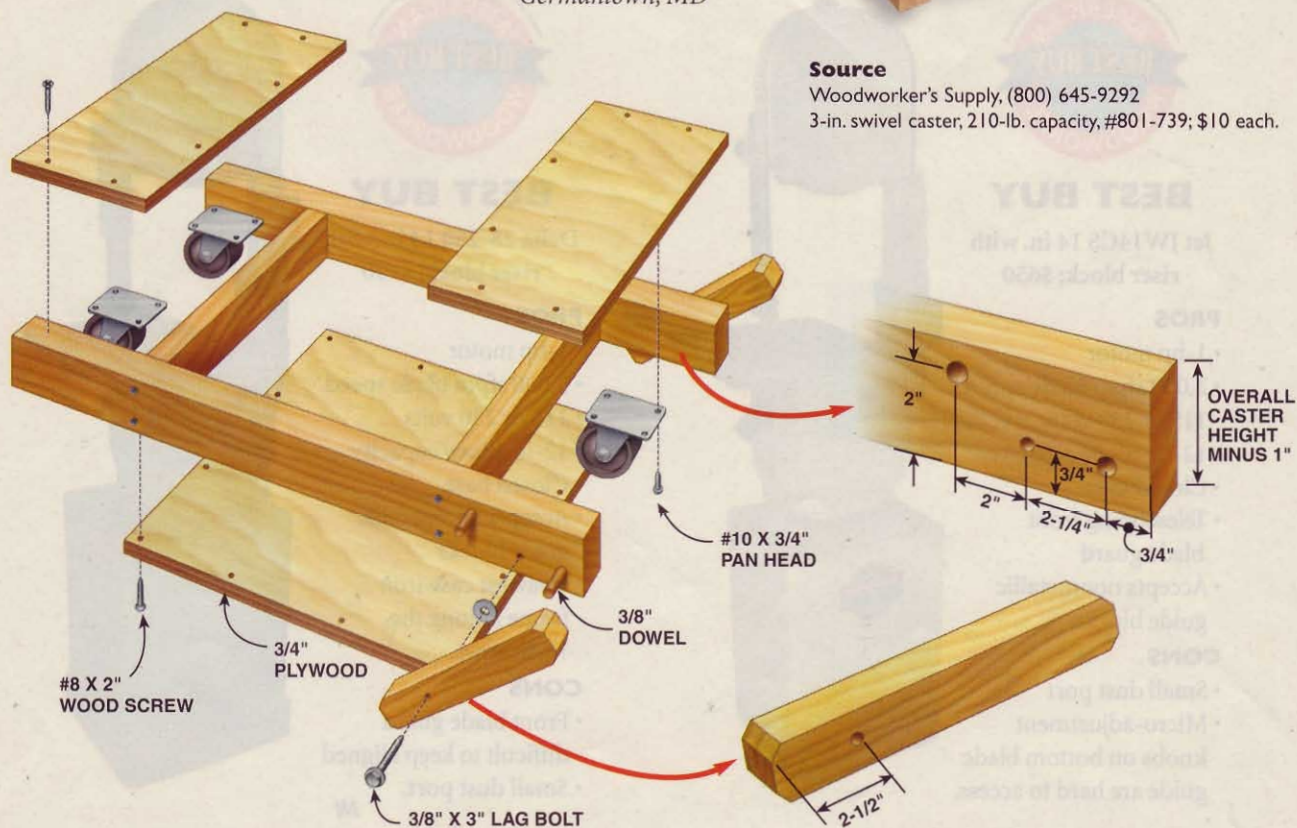
I got fed up with dragging my stationary tools around my garage to make room for my car, so I built mobile bases. Unlike some shop-made bases, this design adds only about 1 in. to the height of my tools. I made them out of 2x4s and plywood, fastened with glue and screws. The foot levers keep the base from rolling while I'm operating the machine. Cost? It was about \$40 for my jointer base, and worth every penny.

Brian K. Ott
Germantown, MD



Source

Woodworker's Supply, (800) 645-9292
3-in. swivel caster, 210-lb. capacity, #801-739; \$10 each.

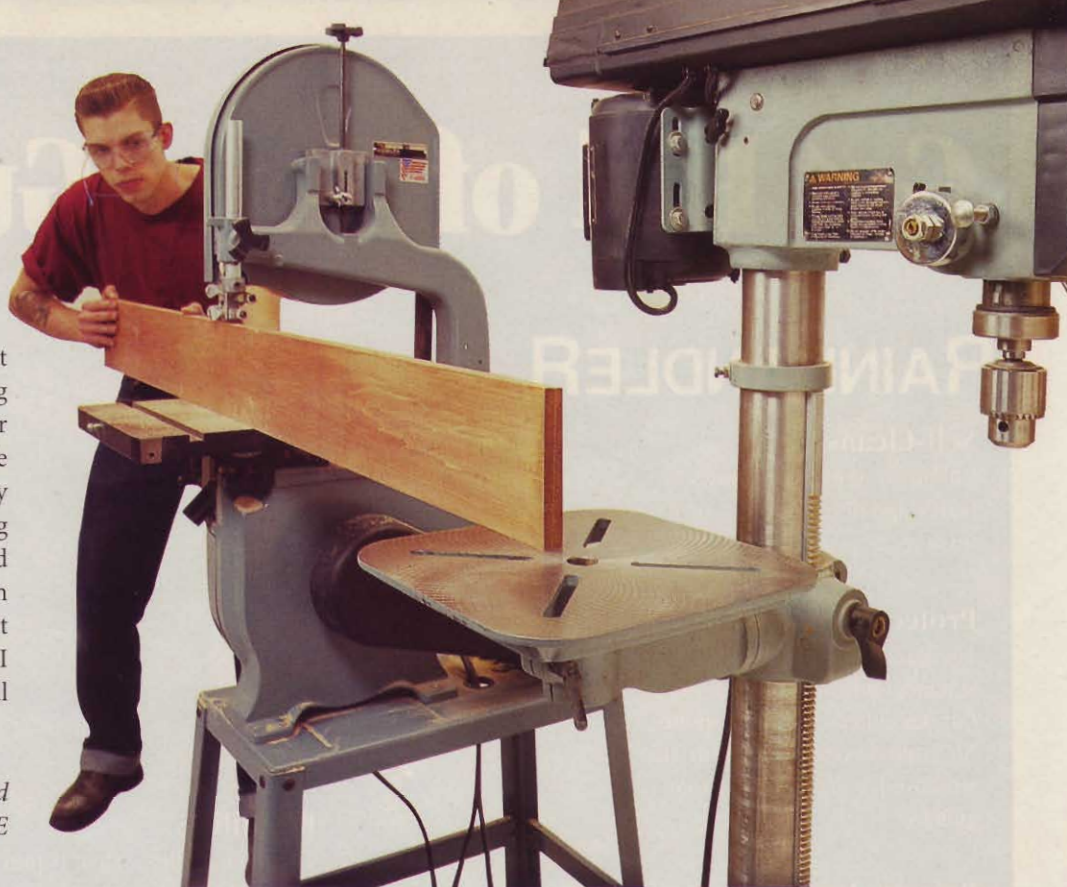


ART DIRECTION: VERN STREETS AND BARBARA PEDERSON
PHOTOGRAPHY: BILL ZUEHLKE AND RAMON MORENO • ILLUSTRATION: FRANK ROHRBACH

Bandsaw Outfeed Table

I recently tackled a project that had me resawing extra-long boards. I found that my regular outfeed roller stand wasn't stable or tall enough, so I pulled my drill press into position, swung the table to the side and adjusted the height to match that of my bandsaw table. It worked so well that next time I have to bandsaw long stock, I'll go right for that drill press!

Joshua Ballard
Wilmington, DE



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10"x80 T (1/8" or 3/32" K)	\$159	\$143	\$135
12"x80 T (1/8" K)	\$184	\$163	\$154

14"x100Tx1", 14"x80Tx1", 16"x100Tx1", 8", 7 1/4", others available. Call for prices.

Woodworker II

ALL PURPOSE - table saws and portable circular saws.

	Sale Price	10% Off 1st Blade	15% Off 2nd Blade
12" x 40 T x 1"	\$129	\$116	\$110
10" x 40 T (1/8" or 3/32" K)	\$119	\$107	\$101
10" x 30 T (1/8" or 3/32" K)	\$99	\$89	\$84
8 1/4" x 40 T (3/32" Kerf)*	\$99	\$89	\$84
8" x 40 T (3/32" Kerf)	\$99	\$89	\$84
7 1/4" x 30 T (3/32" Kerf)	\$89	\$62	\$59
5 3/8" x 40T x 10mm (5/64" K)**	\$99	\$80	\$76

14"x40Tx1", 14"x30Tx1", 12"x30Tx1", 9"x40T, 9"x30T, 8"x30T(3/32"K), 6"x40T(3/32"K) Call for prices.

*For Sears & Makita **For DeWalt Cordless Portables

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	Sale Price	10% Off 1st Set	15% Off 2nd Set
6" set	\$269	\$242	\$229
8" set	\$289	\$260	\$245
10" set	\$349	\$314	\$297
12" set	\$449	\$404	\$382

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Chop Master

Specially designed for sliding compound miter, miter-chop, and radial saws.

	Sale Price	10% Off 1st Blade	15% Off 2nd Blade
8 1/4" x 60T x 5/8"	\$100	\$98	\$93
8 1/2" x 60T x 5/8"	\$140	\$107	\$101
10" x 80T x 5/8"	\$130	\$125	\$118
12" x 80T x 1"	\$140	\$134	\$127
15" x 100T x 1"	\$190	\$179	\$169

6 1/2" x 40T x 5/8", 9" x 80T x 5/8", 14" x 100T x 1" also available. Call for prices.

Woodworker I

Designed for radial arm or tablesaws - fine crosscut.

	Sale Price	10% Off 1st Blade	15% Off 2nd Blade
7 1/4", 8", 8 1/4" x 60T	\$100	\$98	\$93
10" x 60 T	\$129	\$116	\$110
12" x 60 T	\$139	\$125	\$118

9" x 60T, 14" x 60T also available. Call for prices.

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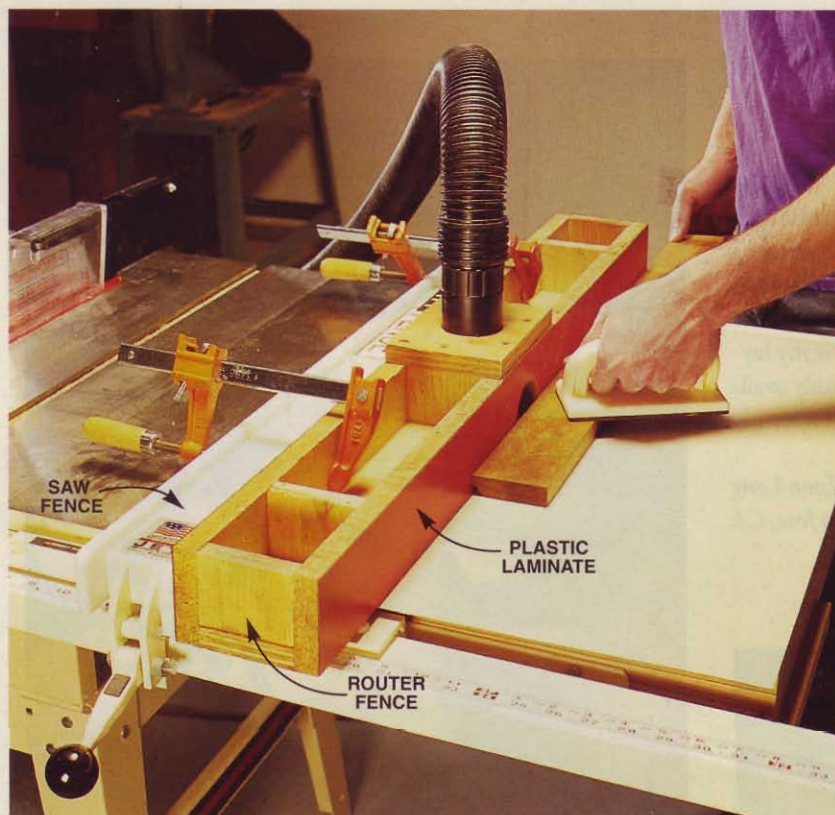
Other Canadian sales: Call CMR - Ron Collier 800-229-4814

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Tablesaw Router Fence

I live in big sky country, but my shop is as cramped as an efficiency apartment in downtown Manhattan! Consequently, I use my table-saw extension wing as a router table to save floor space. To make use of the table-saw's fence, I clamp on a shop-made router fence. The combination of these two fences is great. I get the easy adjustment of the saw fence and the router fence is wide enough to accommodate big bits. I also built in a dust port that does a super job of clearing the chips.

Bernie Singers
Smithton, MT



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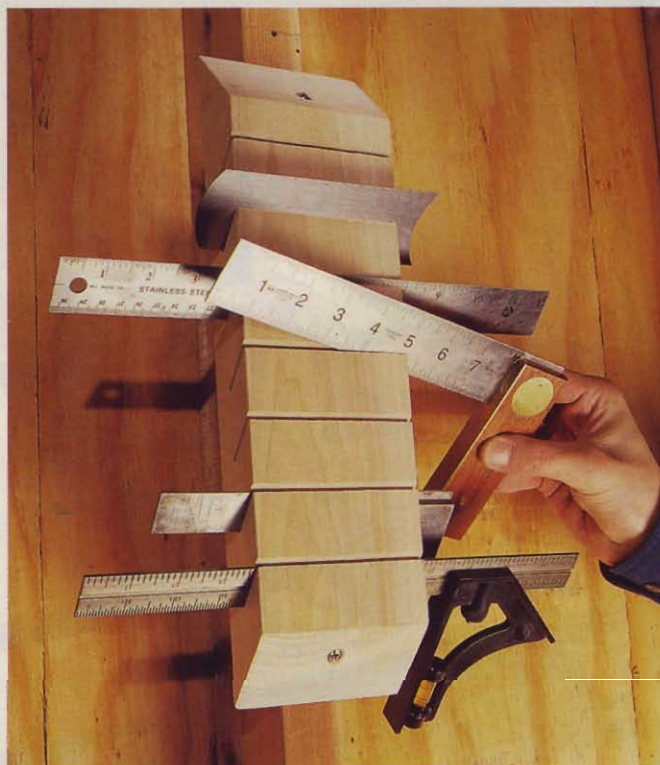
Small Shop Tips

Simple Storage for Layout Tools

I used to keep my layout tools in a toolbox, but they always banged around against each other. I needed a better way to store them, so I came up with this simple rack. All it took was a chunk of 2x6 and some angle cuts spaced about 1-1/2 in. apart. Now my layout tools are protected from damage and readily available. Plus, it turned out to be a good way to store my scrapers too. **AW**

Leon Long
San Jose, CA

If you have an original Small Shop Tip, send it to us with a sketch or photo. We pay \$200 for each one we print. Send to: **Small Shop Tips, American Woodworker, 2915 Commers Drive, Suite 700, Eagan, MN 55121.** Submissions can't be returned and become our property upon acceptance and payment.



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Biscuit Joiners Comparison Test, December 2000

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Figured Cherry

Nature truly is the greatest artist and figured cherry is living proof. If you've ever admired the fluid motion of a flag in a breeze or ripples of sand along a quiet beach, you'll love the look of figured cherry. It's amazing where a piece of wood like this can take the imagination.

The shimmering effect found in figured cherry is a result of irregularities in the growth rings. These quirks of nature result in grain that runs up toward the surface of a board, and then dives back down into it. No one knows what causes the irregularities in the tree, but the three-dimensional rippled effect in the wood is dazzling.

We found our figured cherry at Good Hope Hardwoods in Landenberg, PA—right in the heart of cherry country. All harvested trees are replaced with seedlings, allowing nature to rework its magic.

The roughsawn lumber is allowed to air-dry before final drying takes place in a low-temperature dehumidification kiln. The slow drying process helps preserve subtleties of color and reduces internal stresses in the board. Boards sawn from the same tree are kept together. This practice provides the customer with boards of uniform color, texture and appearance.

Good Hope carries plain and figured cherry in 4/4 all the way up to 24/4; prices vary from \$6 a bd. ft. to \$16 a bd. ft. depending on the grade, width and amount of figure. They will work with you to find the best lumber for your project and can custom cut orders to your specifications. **AW**

Note: Color and figure varies from tree to tree and board to board. Expect variations in the wood you order.

Source

Good Hope Hardwoods
(610) 274-8842
www.goodhope.com

Know of some Great Wood?
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Write Dave Munkittrick at
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