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#115 July 2005
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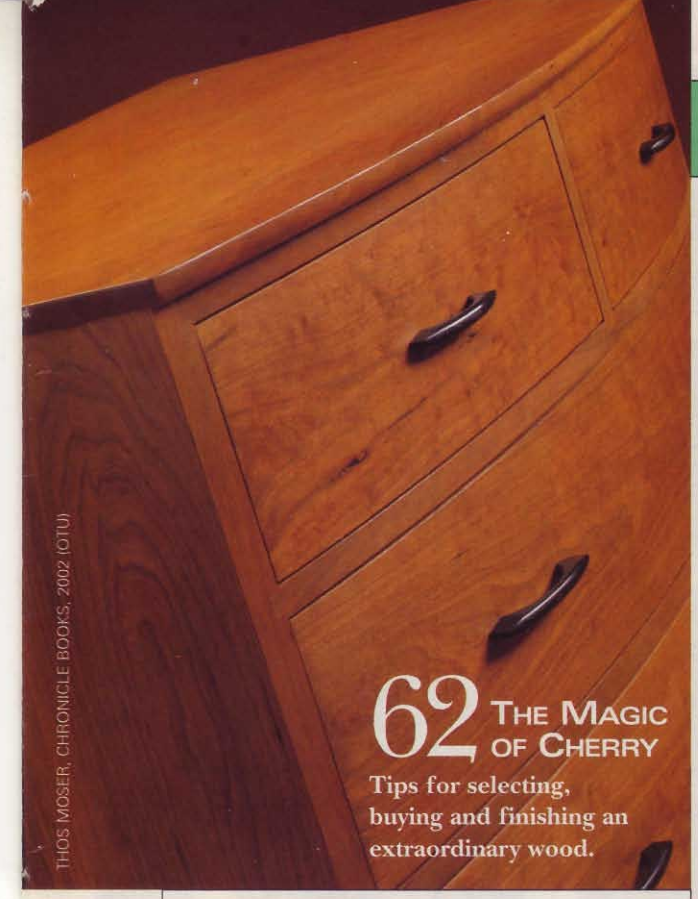

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AMERICAN WOODWORKER

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AMERICAN WOODWORKER
presents

On the House

With the Carey Brothers

We are proud to be associated with the premier woodworking magazine, and we are pleased to offer the following tips:

Tips of the Month

Auto Tools Can Help You Out Of Sticky Situations

The one thing you don't want when gluing a project is excess glue lying around the surrounding area. It's easy to remove glue from a connection where the joined material is completely flat—simply wipe the area with a dampened cloth. But when it comes to an irregular surface, the proposition can get a little tricky. We found the answer to this problem at the local automobile supply store. We purchased a set of deluxe "detailing brushes." They look like oversized tooth brushes and have handles that are ever so ergonomic. The set we bought contained 3 brushes: one with nylon bristles, one with brass bristles and one with stainless steel bristles. We use the nylon brush for removing glue in hard to reach locations, the brass one for getting into sculpted areas when using paint remover and the stainless one for tool cleaning and minor rust removal.

A Workbench That Measures Up

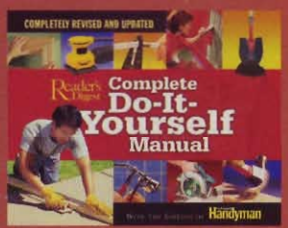
As far as we're concerned the best workbench top on earth is made with a piece of 1 1/8-inch plywood covered with a ¼ inch layer of tempered Masonite® and edged in the front with a piece of 1" x 2". However, it gets even better when we inlay a yardstick or three (we prefer those made of hardwood) into the Masonite layer. A little roofing paper is all that's needed as a spacer to lift the yardstick up flush to the surface. Our bench has rulers running in both directions—some left to right and others right to left.

Ask the Carey Brothers a woodworking, home improvement or remodeling question on their live radio broadcast every Saturday from 9:00 a.m. to 1:00 p.m. Eastern Time. Call toll-free at 1-800-737-2474 to ask your question. Visit their website at **www.onthehouse.com** for recaps of the show and other helpful info.

The Woodworker's Corner

A note from the Publisher of American Woodworker, Jim Schiekofer

We know many of our dedicated woodworker readers are also home improvement and do-it-yourself enthusiasts. We're thrilled to announce the launch of the first live online chat forum of our sister publication, *The Family Handyman*. On Thursday, June 16, if you visit **http://chat.familyhandyman.com** between 7:00 – 8:00 pm (EST), you'll be able to chat live about your DIY questions with *The Family Handyman's* own Spike Carlsen. Spike will have his favorite reference book on hand—*The Complete Do-It-Yourself Manual* from *Reader's Digest* and *The Family Handyman* ($35 and available at **www.thefamilyhandyman.com**). Completely revised and updated, it has sold more than 10 million copies and remains the leading and most authoritative home improvement guide on the market.



Spike Carlsen, Executive Editor of The Family Handyman

QUESTION & ANSWER

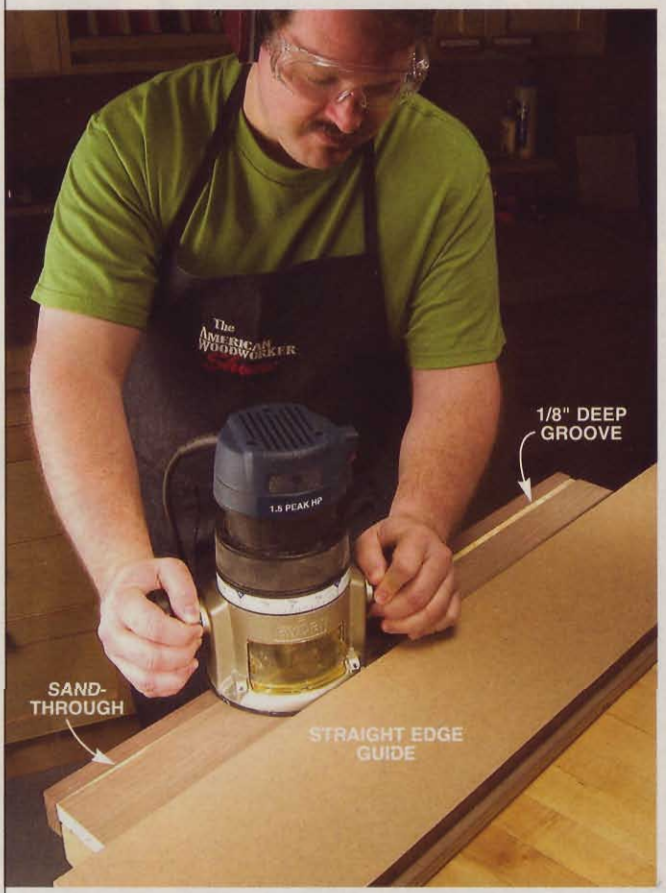
by Dave Munkittrick
and Bruce Kieffer

Repair a Sand-Through

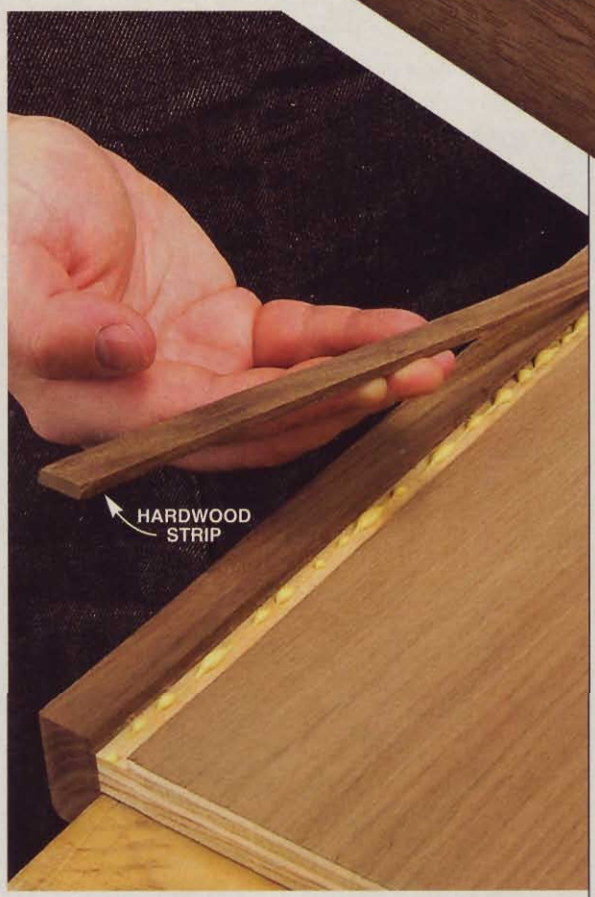
Q I went right through the veneer when I was sanding solid-wood edging flush on some plywood shelves. How can I fix it?

A Sanding through a veneer happens to everyone sooner or later. Here's an old cabinetmaker's trick that will salvage what looks to be a hopeless situation. First, remove the damaged veneer using a router and a straight cutting bit (see photo, below left). Then, select a piece of hardwood whose color and grain resemble those of your veneer stock and cut a strip to fit the groove (see photo, below right).

Veneer seems to be getting thinner every day. To avoid future sand-throughs, make a squiggly line with a pencil along the hardwood-veneer joint. It will help you keep track of how much material you're removing. For more sanding tips, see AW #110, October 2004, page 53.



Cut a 1/8-in.-deep groove wide enough to remove the sand-through area. Use a straight edge to guide the router. Cut the groove along the full length of the cabinet side or shelf.



Glue a strip of hardwood into the groove. The strip should be just a hair thicker than the groove is deep, so it can be carefully sanded down flush.

EDITOR: DAVE MUNKITTRICK • ART DIRECTION: VERN JOHNSON • PHOTOGRAPHY: PATRICK HUNTER, UNLESS NOTED

QUESTION & ANSWER

New Bandsaw Tires

Q My bandsaw has developed tracking problems to the point that the blade won't stay on the wheel. I checked everything and can't seem to clear up the problem. What's going on here?

A Since these problems developed over time, I suggest you check your tires. The tires on your bandsaw provide traction for the blade and, like the tires on your car, they wear out and the rubber degrades with time. A new set of tires will likely put your saw back on track.

"Obvious signs of worn tires are cracks and tears," explains Peter Perez, president of Carter Products Inc., a bandsaw accessory manufacturer. "A good wear test is to sink a fingernail into the tire. A good tire will rebound with no visible mark on it. If your fingernail leaves an impression, it's time to replace the tire."

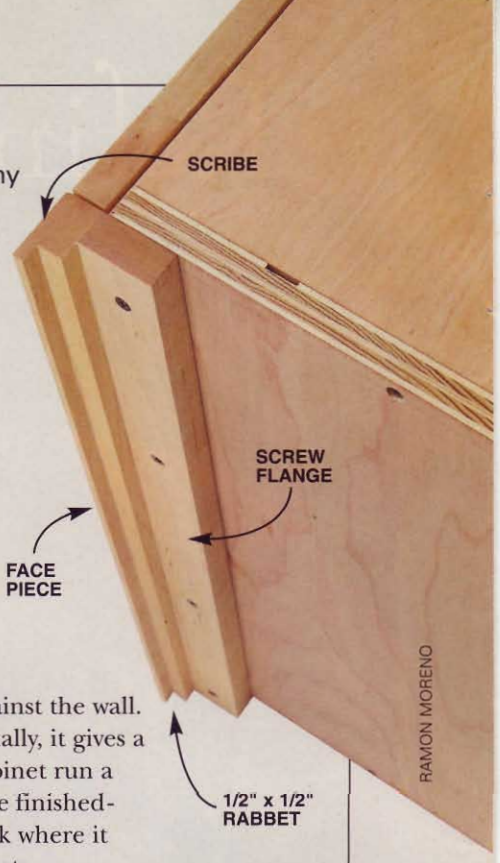
It's easier to replace the tires with the wheel removed from the saw. Taper the end of a dowel, clamp it in a vise and set the wheel on it. We recommend replacing both rubber tires with urethane tires. Urethane offers two big advantages: It lasts longer and it doesn't require adhesive to install. Clamp the new tire on the wheel and stretch the tire over the rim. Urethane tires can be made more flexible by soaking them in hot water before you put them on the wheels.

Source Carter Products Co. Inc., (888) 622-7837, www.carterproducts.com Carter Ultra Blue 14-in. urethane tires, $23.50 ea.; 16-in. urethane tires, $33 ea.

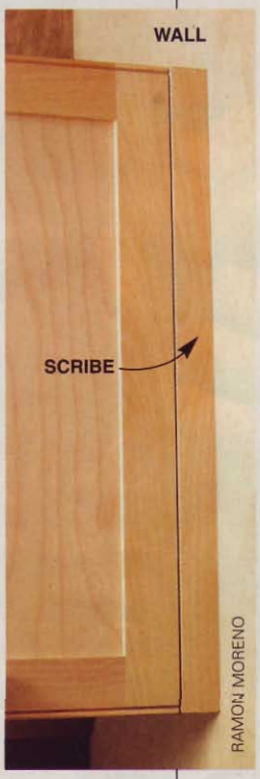
Fitting a Frameless Cabinet into a Corner

Q I plan to build and install frameless European-style cabinets in my kitchen. I know how to scribe face-frame cabinets to fit into corners but, from what I've seen, there's nothing to scribe on a frameless cabinet. How's it done?

A It's actually pretty easy. What you do is attach a scribe to the end of the cabinet that goes into the corner. The scribe does several things: It moves the end of the cabinet away from the wall so the door can open past 90 degrees. It also provides a thin edge that's easy to trim for a tight fit against the wall. Finally, it gives a cabinet run a nice finished-look where it meets a wall.



Typically, the scribe face is made 1- to 1-1/2 in. wide, but you're free to do what you think looks best. Cut a rabbet on the edge of the face piece that fits against the wall. Trim the rabbeted edge until it fits snugly and plumb on the wall where the cabinet will hang. Glue a screw flange onto the back of the face piece, screw the scribe to the cabinet and hang.



If you have a question you'd like answered, send it to us at **Question & Answer, American Woodworker, 2915 Commers Drive, Suite 700, Eagan, MN 55121 or e-mail to qanda@readersdigest.com.** Sorry, but the volume of mail prevents us from answering each question individually.

VERTICAL PANEL-RAISING JIG

I always get great results when I use this tall fence for making raised-panel doors. It has a built-in dust collection port and a pressure bar that holds the panel firmly against the fence.

I keep the bar's front edge waxed, so panels slide smoothly. Slotted holes in the cleats make it easy to adjust the bar for panels of different thicknesses. With the bar removed, the fence works fine for regular edge-routing tasks.

The fence-support brackets double as a dust collection chamber. I cut a hole in a piece of plywood to hold the hose and glued the plywood to the brackets.

Made from small MDF pieces, this jig cost next to nothing and took only an hour to make.

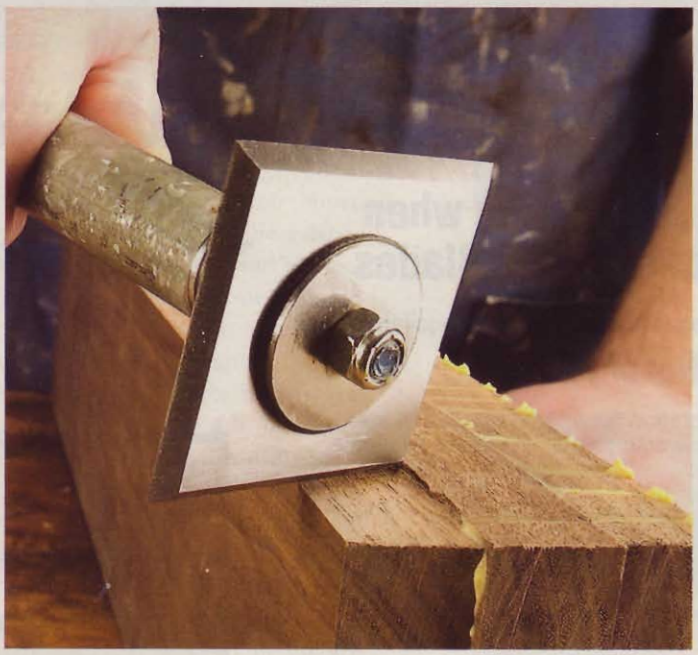
Jim Knox

ART DIRECTION: VERN JOHNSON • PHOTOGRAPHY: PATRICK HUNTER

Permanent Clamp Pads

I lost the rubber pads that came with my clamps. I liked the way the pads protected the wood, so I decided to make my own. After a couple dips in liquid plastic ($9 at a hardware store), my clamps have cushy pads that don't slip off. They work great!

Randy Barker



Heavy-Duty Glue Scraper

It's best to remove glue before it hardens, but sometimes that's not possible. When I face cement-hard glue, I pull out this robust scraper to bull my way through it. The blade is 1/8-in.-thick tempered steel, as tough as a chisel. There's no chatter, because the tool's long body is made from heavy iron pipe. Extra weight and leverage really count!

I ordered the blade through a catalog for about $8 and bought the rest of the parts from the hardware store for about $10. The pipe is a prethreaded nipple. The blade comes with a predrilled 1/4-in. hole, but I had to drill holes through a dowel and the end cap for the threaded rod. The rubber washers dampen vibration. To remove old, dried glue from the blade, I scrape it with a chisel or soak it in hot water.

Tom Caspar

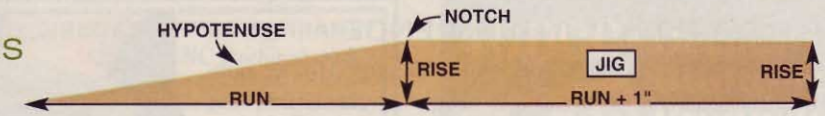
Source Woodworker's Supply, (800) 645-9292, www.woodworker.com
Blade for glue scraper, #511-004, $8.

Draw Huge Arches

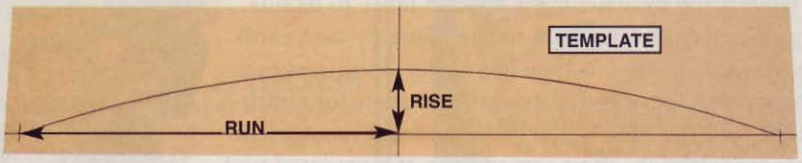
This old boatbuilder's trick allows you to draw large arches without using a giant compass or trammel. All you have to know is the arch's height (also called its rise) and length (its run). You don't need a center point. I like the long, shallow arches on Mission furniture, so I use this method for making router templates. I prefer 1/4-in. MDF for the jig and template, but any material will do.

Drive nails into the template at the center and the end of the arch. Position the jig with the hypotenuse against the end nail and the flat against the center nail. Hold a pencil in the notch and advance the jig while bearing against both nails. To complete the arch, flip the jig, move the end nail to the opposite end and repeat the process.

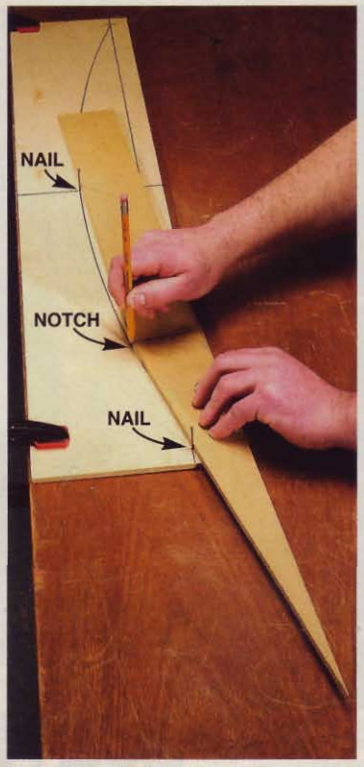
Tim Johnson



Make a jig based on the rise and run of your arch.



Use the jig to draw the arch on a router template.



Draw one side of the arch by sliding the jig against two nails. Flip the jig over to draw the other side.

A Better Jointer Fence

In our last issue (AW #114, May 2005, page 16), we published a workshop tip titled "Right-Angle Guide for Jointing." In this tip, a reader suggested a way to steady a hand plane by attaching a wooden fence to its side, with the fence being held to the plane by rare earth magnets. It turns out that Lee Valley Tools makes a hand plane fence with rare earth magnets for attachment, and the idea is patented. We can't recommend that readers make their own version of a patented tool, as it may be a violation of the patent.

Out of curiosity, we gave Lee Valley's Veritas Jointer Fence a test in our shop. The idea is simple enough: The fence makes it easier to plane a board's edge square to its face, which is particularly important when you're trying to joint edges for gluing. The magnets hold the fence firmly against the plane's body, and—a nice little feature that was absent on the shop-made version—an alignment pin hooks over the side of the plane and keeps the fence from sliding out of position during use. The Veritas fence works great and, unlike traditional fences that had to be clamped or screwed on, it snaps on and off in a flash.

Source Lee Valley Tools, (800) 267 8767, www.leevalley.com
Veritas Jointer Fence, $39.50.

by Brad Holden

Tips for Using epoxy

Epoxy is a specialty glue that does more than simply stick wood together. It also fills gaps. That makes it ideal for tackling loose joints, hard-to-clamp parts, repair work and colored inlays. Besides that impressive flexibility, it's also useful for joining wood to metal and for waterproofing outdoor wood projects.

Follow Some Basic Rules

Epoxy is a two-part glue: a hardener and a resin that combine to form a hard, durable plastic. It's important to follow the manufacturer's recommendations and use correct ratios of resin and hardener to ensure the glue cures fully and reaches its maximum strength. Epoxy generates heat as it cures; in fact, the heat helps it cure. The larger the batch, the more heat it generates. It's best to mix small batches to maximize your working time. If you need a large batch, pour the mixed epoxy into a large flat container, such as a pie pan. This has a cooling effect and increases your working time.

Working with epoxy does require that you take some precautions. Always wear protective clothing and safety glasses when you work with epoxy. Nitrile or Latex gloves are a must. Be sure to work in a well-ventilated space or wear a respirator. Be careful to dispose of used rags in a covered metal container.

EDITOR: RANDY JOHNSON • ART DIRECTION: VERN JOHNSON • PHOTOGRAPHY: PATRICK HUNTER

Rescue a Loose Joint

We all have moments when we wish we had left that tenon just a whisker thicker. The gap-filling properties of epoxy make it the perfect solution. Epoxy can fill small and big gaps and still maintain full bonding strength. This is something no other glue or wood filler can match.

TIP Plastic containers are ideal for mixing, because the epoxy simply peels out after it sets and the container can be reused.

Glue Metal to Wood

Epoxy bonds many kinds of materials to one another, including wood, metal, fiberglass, masonry, tile, concrete and plaster. It will not, however, bond to most plastics.

TIP On anodized metal surfaces, such as aluminum T-track, you must sand off the coating before gluing. Epoxy doesn't stick well to anodized surfaces.

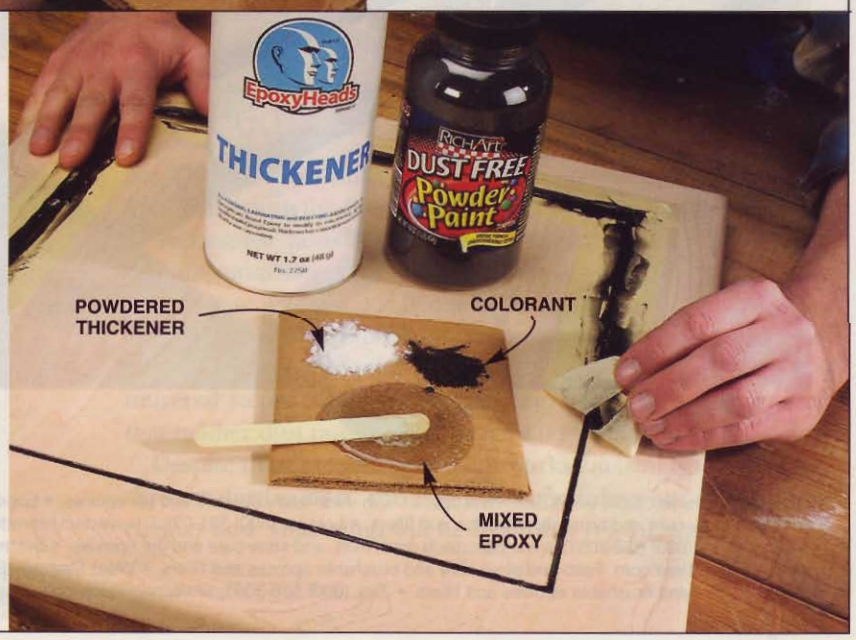
Renew a Stripped Screw Hole

Simply fill the hole with epoxy. When it has cured, predrill for the screws and reinstall the hinge. You can also let the epoxy cure with screws in place for a permanent attachment. If you want to make the screw removable, apply a coating of oil to the threads before pushing the screw into the wet epoxy.

TIP On a vertical surface, it's nice to have an epoxy that won't run. Gel epoxy is the perfect choice. It has a consistency similar to that of petroleum jelly. You can even make your own gel epoxy by adding a thickener.

Make an Epoxy Inlay

Rout a 1/8-in. x 1/8-in. groove and mask around it with tape. Mix a batch of slow-setting epoxy and add a colorant. Powder tempera paint works well. Add thickener (see Sources, page 26) until the epoxy is the consistency of petroleum jelly. Apply enough epoxy to the groove so it sits slightly above the surface of the wood. After the epoxy sets but is still slightly soft, remove the tape. When the epoxy has fully cured, sand it level.



Use When Clamping Is Awkward

Epoxy forms a mechanical bond and needs only contact pressure to adhere. Use quick-setting epoxy, press the parts into place with your fingers and the job will be done in only a couple of minutes.

TIP Wood is a porous material that absorbs epoxy. Applying it to both surfaces will ensure that enough is left unabsorbed to bond the two parts together. If you do use clamps, don't turn them too tight or you will squeeze out too much glue and starve the joint.

Waterproof Outdoor Projects

When used as an undercoat or sealer, brushable epoxy greatly reduces expansion and contraction in wood. Coat all parts prior to assembly and make sure epoxy gets down into the fastener holes. If the wood absorbs a lot of the epoxy, sand the first coat after it cures and apply a second coat. Epoxy is not UV-resistant, though, so you must topcoat your project with exterior varnish or paint. The extremely stable epoxy base coat also means that your topcoat will last much longer before refinishing is necessary.

Sources Devcon, (800) 933-8266, www.devcon.com Fast- and slow-cure and gel epoxies. • EpoxyHeads, (866) 376-9948, www.epoxyheads.com Fast- and slow-cure and brushable epoxies and fillers. • Loctite, (800) 321-0253, www.loctiteproducts.com Fast- and slow-cure and gel epoxies. • Super Glue, (800) 538-3091, www.pacertech.com Fast- and slow-cure and gel epoxies. • System Three Resins Inc., (800) 333-5514, www.systemthree.com Fast- and slow-cure and brushable epoxies and fillers. • West System, (866) 937-8797, www.westsystem.com Fast- and slow-cure and brushable epoxies and fillers. • Zap, (800) 538-3091, www.pacertech.com Fast- and slow-cure and brushable and gel epoxies.

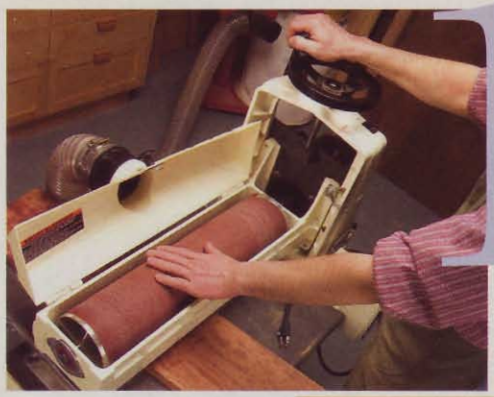
by Randy Johnson

Tips for Better Drum Sanding

If you hate sanding (and who doesn't?), a drum sander can be a god-send. Just feed in your boards, or even completed doors and other projects, and out they come, perfectly sanded, flat and smooth. And for a modern cabinetmaker looking for speed, precision and efficiency, a drum sander is hard to beat, unless you step up to a wide belt sander, but they can cost the price of a small car. Drum sanders start under $1,000. A 22-in. open-sided drum sander, like the one show here, costs about $1,500. It can sand a panel as wide as 44 in. when done in two passes.

Operating a drum sander is not as easy as it looks, though, and you can ruin many rolls of expensive abrasive paper before figuring out the right techniques. Here are some tips for improving your results and making your sandpaper last longer.

ART DIRECTION: RICK DUPRE • PHOTOGRAPHY: PATRICK HUNTER



1 Start at the Right Height

Before making your first pass, slide your workpiece under the sanding drum and adjust its height so the drum touches the workpiece but can still rotate with light hand pressure. Make your first pass or two at this setting. This approach takes off the highest spots on the board but reduces the chance of taking too big a bite, which could gouge your workpiece and burn or tear the sandpaper's abrasive material. A good rule of thumb is to take two passes at each height setting. You will get better results and your paper will last longer.

2 Use the Correct Grit

Match your abrasive grit to the job. The most common mistake people make is to start too fine. It will not only take longer but the tendency to try to take too much off will lead to poor results and damaged paper.

Grits can be divided into three groups: coarse, medium and fine. Coarse 24- to 60-grit papers are used for abrasive planing, which involves smoothing rough-sawn lumber, for dimensioning lumber thickness or for removing squeeze-out on glued-up panels. Medium 80- to 120-grit papers are for leveling previously planed material or glued-up doors and face frames. Fine grits, 150 and higher, are for your final sanding. Always progress through the grits in order; it's best not to skip a number. You should turn the drum sander's thickness adjustment wheel no more than one-quarter of a turn for coarse grits and one-eighth of a turn for fine grits each time you reduce the height.

3 Find the Right Feed Rate

The type of material you sand and how much you want to remove with each pass determines the best speed. If your machine has speed control on the conveyor belt, start at 50 percent and then adjust it according to the results you get. If your machine doesn't have speed control, take lighter passes until you develop a feel for your machine's capabilities.

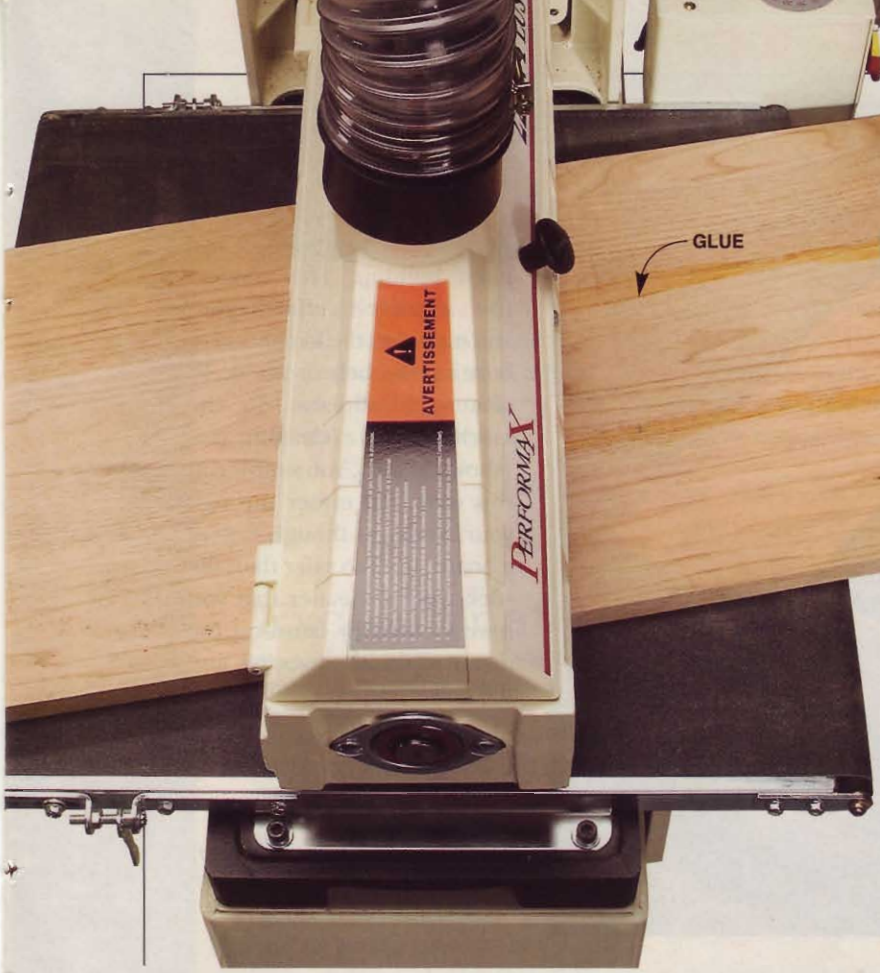
Some species, such as hard maple and cherry, are prone to burning, as is end grain (see photo at left). Light passes at a higher speed are the best way to avoid burning these types of woods. Oak and similar woods are less likely to burn, so a slower feed rate and more aggressive stock removal works fine. Remember, though, a drum sander is not a planer and is not made to hog off lots of wood in one pass. Also, if your speed or depth setting is too aggressive, you may get sanding chatter, which produces a tiny washboard texture on the wood. It can be hard to see, but hand sanding with a paper one grit finer than the level you used in the drum sander or holding the board up to the light usually reveals the little ripple pattern that sanding chatter produces. Staining and finishing will certainly reveal the ripples, but that creates a big "Oops." One way to avoid such an unpleasant surprise is do a final sanding of your project with a random-orbital sander, whether you suspect chatter marks or not.

4 Clamp Parts Together

Edge-sanding face-frame parts prior to assembly saves a lot of time. Clamping the parts together helps keep them vertical during sanding and guarantees they'll all end up the same width. As a rule of thumb, you should clamp parts together if they are 3/4 in. or less thick and 2 in. or more wide. This technique may seem to raise a red flag for you regarding safety, but as long as the clamps are cranked on tightly and set below the top of the boards, this setup works just fine. (Of course, this is not something you should ever attempt on a wood planer, because an accidental contact with the planer knives could cause disastrous results for you and your planer.)

5 Take Light Passes on Doors and Frames

Sanding doors and face frames is a common use of a drum sander, not only because it saves time but because the result is a flat frame with smooth joints. Getting these good results requires taking light passes. When the drum leaves the rail, it's touching only the two side stiles. If your depth setting is too aggressive, the drum tends to gouge the stiles right after it leaves the rail. It's much like a snipe from a planer and just as undesirable.

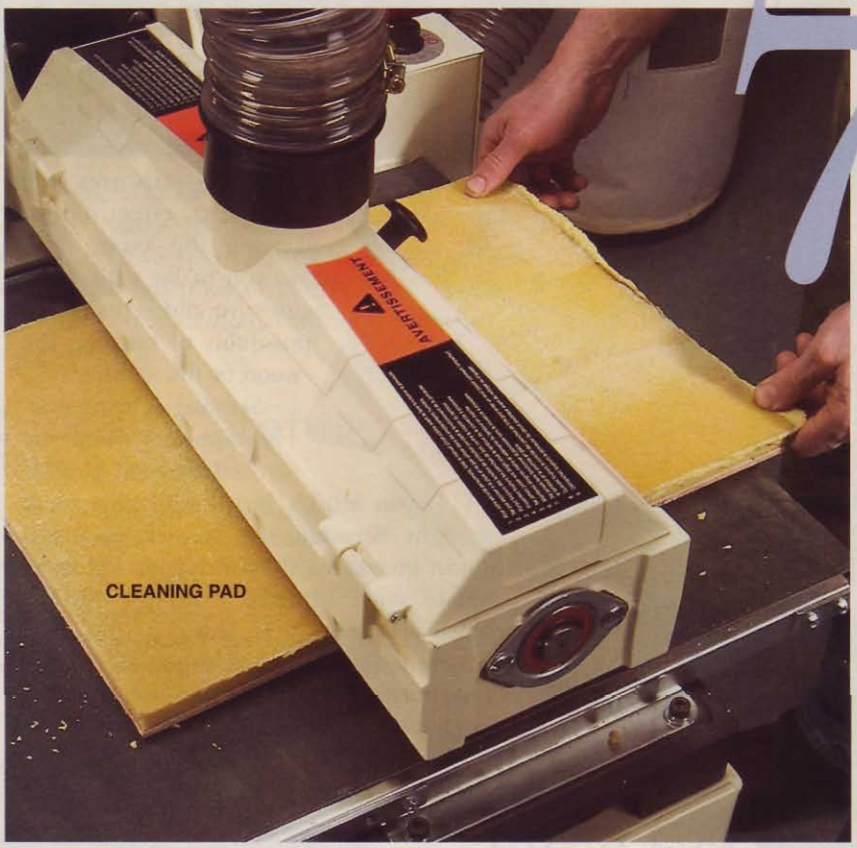


6 Skew the Work

Sending your workpiece though the drum sander at an angle improves the abrasive's effectiveness. Skewing the board also allows you to be a bit more aggressive and reduces the possibility of burning the wood or the abrasive.

Skewing is particularly important when you are sanding off glue. If you send a board with glue on it straight through the sander, you can almost guarantee the sandpaper will accumulate some adhesive buildup, which is nearly impossible to remove.

On the final two or three passes, run the board straight through to remove the angled sanding marks.



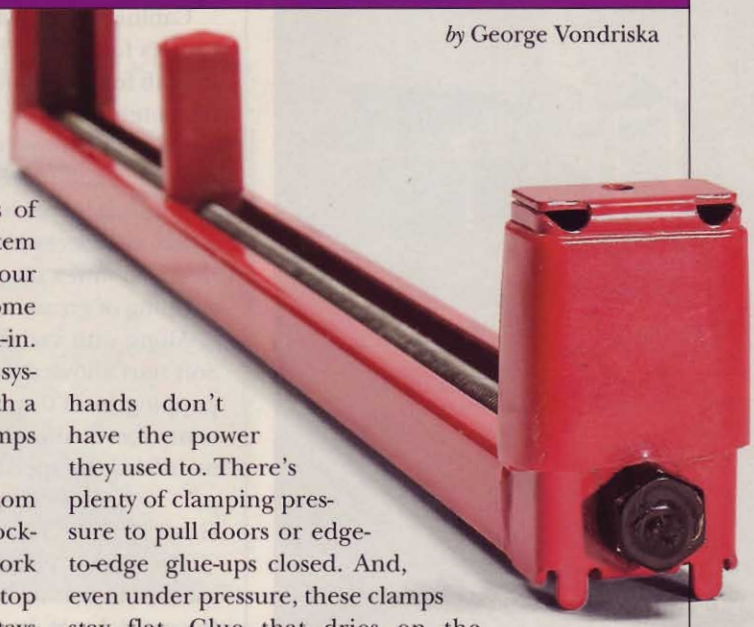
7 KEEP THE ABRASIVE CLEAN

With use, the abrasive is likely to clog with sawdust and pitch buildup. This reduces the abrasive's effectiveness and increases the likelihood of burning the belt or wood. To clean the abrasive on the machine, use a cleaning pad (shown at left). You simply run this wide, flat eraser through your sander as though it were a board. It's also safer than the stick type of cleaner that you have to hold by hand on the drum while it's spinning and the cover is open.

Source Grizzly Tools, (800) 523-4777, www.grizzzly.com 15-in. x 20-in. cleaning pad, #H2845, $60 ea.

by George Vondriska

Stackable Bar Clamps



Gluing up panels and doors can eat up lots of shop space. R & R Clamp's Panel Clamping System provides a solution: clamps that let you stack your work. A single 24-in. clamp sells for $26, or save some dough and get a starter kit that includes six 24-in. clamps with additional accessories for $195. The system really simplifies panel and door glue-ups with a price tag that's a little higher than for pipe clamps but a little lower than for parallel jaw clamps.

In addition to clamps, the kit includes two bottom and top alignment bars, rubber jaw pads and a socket driver. The bottom alignment bar fastens to a work surface, keeping the clamps square, and the top alignment bar caps the stack to make sure it all stays stable. Glue-ups can be done without these, but the system works best with them.

The clamp jaw travels on a threaded rod and is opened and closed using the socket driver, either by hand or with a cordless drill. A cordless drill makes assembly fast and really benefits woodworkers whose hands don't have the power they used to. There's plenty of clamping pressure to pull doors or edge-to-edge glue-ups closed. And, even under pressure, these clamps stay flat. Glue that dries on the threaded rod pops right off as the jaw travels over it.

These clamps work best on stacks of parts that are the same length. Available in 1-, 2-, 3- and 4-foot lengths, they also work as general-purpose clamps but are slightly more cumbersome than conventional bar clamps for case assembly.

Source R & R Clamp, (920) 863-2987, www.rrclamp.com Starter kit with 24-in. clamps, $195. Panel Clamping System starter kit with 36-in. clamps, $250. 12-in. clamp, $20. 24-in. clamp, $26. 36-in. clamp, $35. 48-in. clamp, $39. Rubber guards, $5.50 for four. 24-in. bottom alignment bar, $3 ea. 48-in. bottom alignment bar, $5.50 ea. 24-in. top alignment bar, $3 ea. 48-in. top alignment bar, $5.50 ea.

EDITOR: RANDY JOHNSON • ART DIRECTION: RICK DUPRE • PHOTOGRAPHY: PATRICK HUNTER, UNLESS NOTED

Two New Trim Routers

Cabinetmakers who work with plastic laminate have been using trim routers for years. These lightweight, small-diameter machines are easy to grab for one-handed control. They're great for 1/4-in. shank, small-diameter round-over, ogee and, of course, flush-trim bits. There are a handful of players in this field, but Bosch and Ridgid have introduced two new small routers with big features.

Both machines have variable speed. You generally think of variable speed as a necessity for running large-diameter bits, something you'll never do with a trim router. But running any bit at a lower speed offers a feeling of greater control over the cut and often leads to less burning.

Along with variable speed come soft start and electronic feedback. Soft start allows the machines to ramp up to speed instead of instantly popping from 0 rpm to full speed, again offering a greater feeling of control over the router. Electronic feedback ensures that the router maintains the speed you choose, even under load.

Bosch PR20EVS

The Bosch PR20EVS, $120, has a 5.7-amp variable-speed motor (16,000 to 30,000 rpm), a very comfortable soft grip for your hand and a top-notch user-friendly depth-of-cut adjustment.

The base has two adjustment modes. In one mode, the base freely slides up and down the router motor for big adjustments. In the second mode, a micro-adjust is used to fine-tune bit height. The base is locked with a quick clamp; there's no wing nut to tighten and loosen. The router includes a spindle-lock for one-wrench bit changes.

In addition to the PR20EVS, Bosch makes the PR10E, $100, that offers soft start but no variable speed.

Ridgid R2400

The Ridgid R2400 costs $100, has a 6-amp variable-speed motor (20,000 to 30,000 rpm) and comes in a kit that includes a fence. Compared with other trim routers, its 2-1/8-in. motor housing has an extremely small diameter, so it's very easy to grip, even for small hands.

Depth-of-cut adjustments are made by loosening the wing nut that locks the base and sliding the base up and down the router motor. A rack-and-pinion depth-adjustment knob helps control the position of the base, but the control isn't as precise as on the Bosch machine.

Sources Bosch Tools, (877) 267-2499, www.boschtools.com PR10E trim router, $100. PR20EVS trim router, $120. • Ridgid, (800) 474-3443, www.ridgid.com R2400 trim router, $100.

Massive Shoulder Plane

by Tom Caspar

Source
Lee Valley Tools
(800) 871-8158
www.leevalley.com
Large shoulder plane, #05P43.01, $170.

Ever make a tenon that's just a hair too thick? The fastest, most accurate way to shave it down is with a rabbet or shoulder plane. Both types of planes have blades that run the full width of the sole. Shoulder planes are heavier and larger, because they're also designed to cut end grain. This new large shoulder plane from Veritas is a joy to use and is large enough to pare the full width of most tenons in one shot. Its blade is made from 1/8-in.-thick super-durable A2 tool steel. The extra thickness makes it less prone to chatter. The additional durability is a real bonus, because you won't have to sharpen it as often.

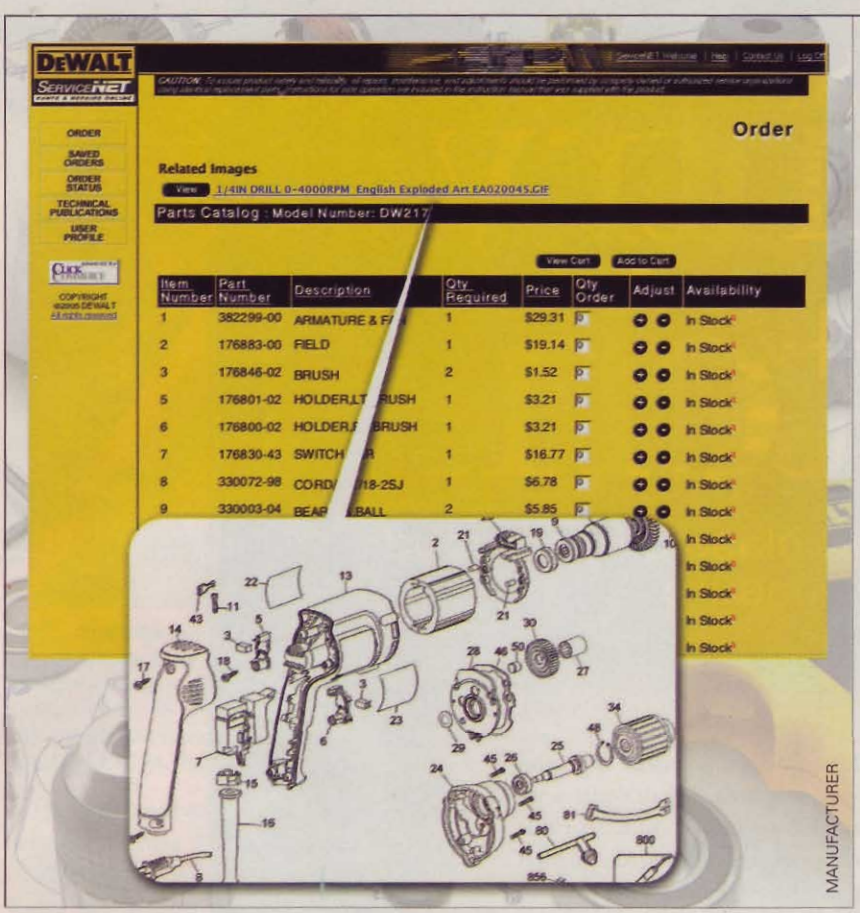
A couple of new features make this plane easy to use. Unlike most rabbet or shoulder planes, this one has a lateral lever for slightly skewing the blade. Skewing compensates for a blade that's not sharpened absolutely square. In addition, a clever rear knob can tilt to either side, providing a comfortable grip for either right- or left-handers.

Adjustable-Jaw Spring Clamp

Spring clamps are handy for a million different light-duty clamping jobs. Until now, though, you needed different sizes of clamps for different thicknesses of material. And large-capacity spring clamps are so hard to squeeze—you almost need another clamp to open them.

The new Bessey VarioClippix clamps have an adjustable jaw that ratchets open to 2-5/8 in. on the small model and to 4-1/4 in. on the large model. Jaw depth is 1-1/2 in. on the small clamp and 2 in. on the large one. Spring pressure remains constant even as the jaw opening increases, so you don't need a gorilla grip to use the clamp on thick material. At $5.50 for the small and $6.20 for the large model, the VarioClippix clamps are slightly more expensive than conventional spring clamps.

Source Bessey Tools, (800) 828-1004, www.americanclamping.com Small VarioClippix clamp, #XV3-50, $5.50. Large VarioClippix clamp, #KLI3.008, $6.20.



MANUFACTURER

DeWalt Online Parts and Service

If you have Internet access, you also have fingertip access to a huge array of DeWalt parts and service tips. DeWalt has introduced www.dewaltservicenet.com, a service-oriented Web site that is packed with information and easy to use.

Simply type in a DeWalt model number and away you go. The site provides exploded views, wiring diagrams, service notes and even a handful of how-to-repair videos. Lose your owner's manual? You can download one for most DeWalt tools. If you need replacement parts, they can be ordered directly through the Web site.

Source DeWalt Parts and Service, www.dewaltservicenet.com

CLASSIC Country Hutch

by Tim Johnson

American style and classic hardwood create a timeless treasure

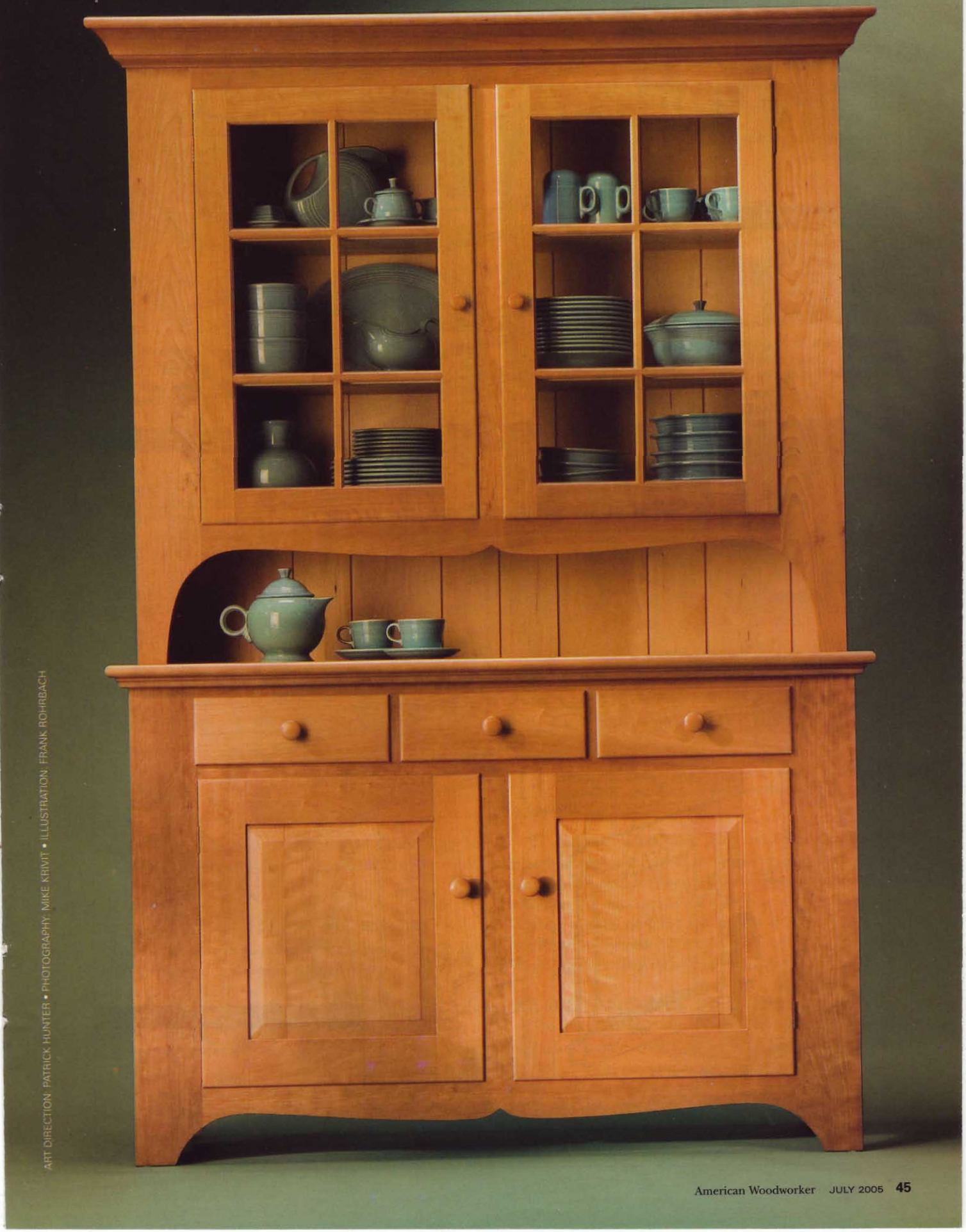
Tall and stately, this cupboard promises to be the focal point of any dining area. A functional wonder, it combines elegant display with spacious storage. For you as a builder, though, this cupboard is loaded with something quite different: advanced techniques that will challenge your woodworking skill. It has all the stuff to be your next dream project.

You'll be working wood on a grand scale. This cupboard is more than 7 ft. tall and nearly 5 ft. wide. You'll glue up boards to make all the wide cabinet pieces. You'll build the dovetailed drawers, raised-panel doors and divided-light doors. To top it off, you'll make your own crown molding.

Building this cupboard includes so many woodworking techniques that I'm going to refer you to other *American Woodworker* articles for complete how-to information on a couple of them. How to build divided-light doors is covered in this issue (see "Divided-Light Doors," page 57). And instructions for making the lipped drawers with a dovetail jig is covered fully in AW #84, December 2000, page 91.

You'll need a fully equipped shop to complete this project, along with dedication and determination. But if you accept the challenge, I guarantee you'll have the woodworking time of your life!

Carefully select 48 bd. ft. of 4/4 cherry for the two cabinets and 38 bd. ft. of 5/4 stock for the doors, base cabinet top and the crown molding. In addition, you'll need 16 bd. ft. of 4/4 hard maple for the drawer sides and support system and 75 bd. ft. of 4/4 pine for the shelves and back boards. I spent about $1,000 on lumber.



ART DIRECTION: PATRICK HUNTER • PHOTOGRAPHY: MIKE KRIVIT • ILLUSTRATION: FRANK ROHRBACH

Project Requirements at a Glance

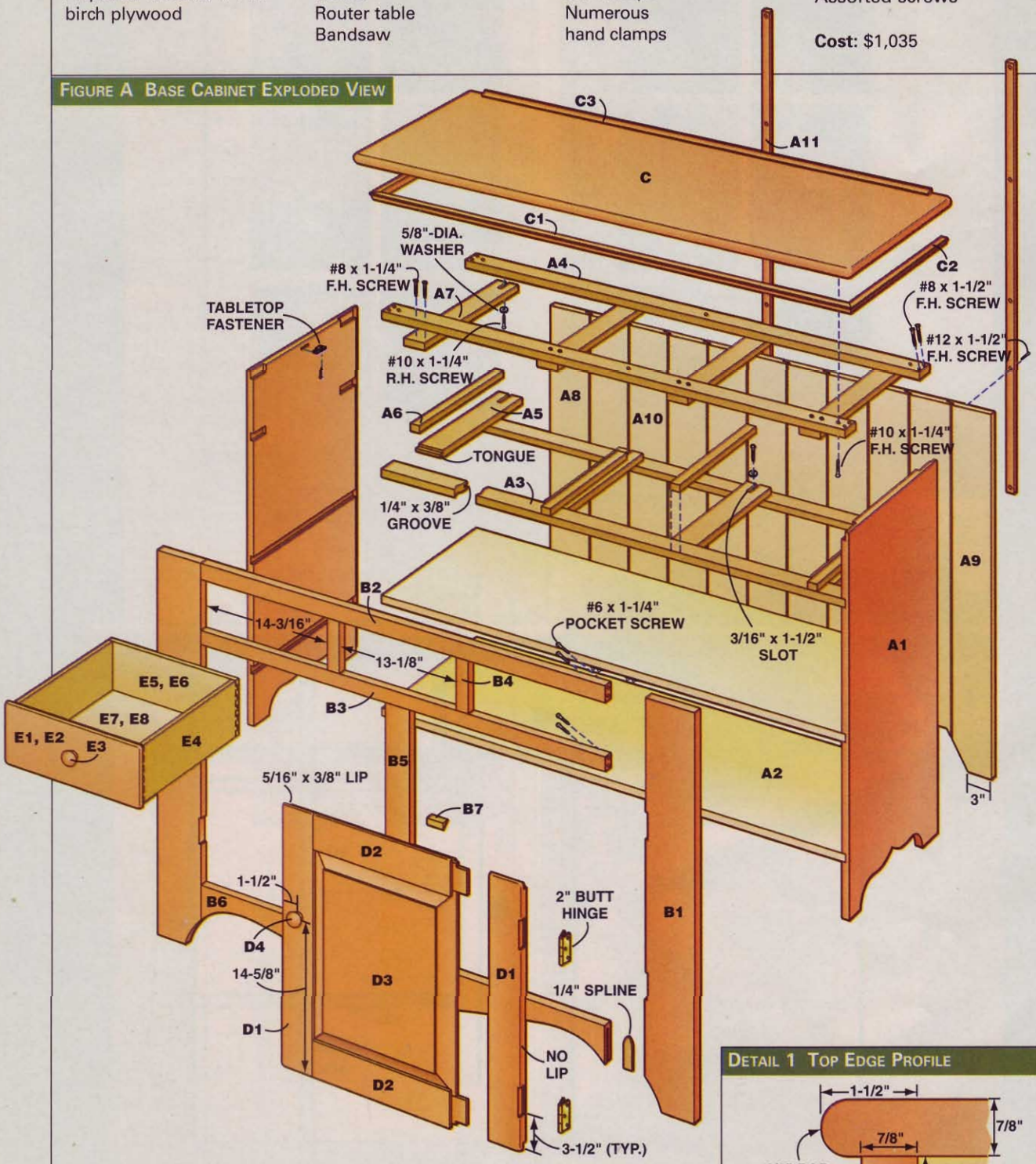
Materials:
48 bd. ft. of 4/4 cherry
38 bd. ft. of 5/4 cherry
16 bd. ft. of 4/4 hard maple
75 bd. ft. of 4/4 pine
A quarter-sheet of 1/4-in. birch plywood

Tools:
Jointer
Planer
Tablesaw
Miter saw
Router
Router table
Bandsaw
Drill press with mortising attachment
Dado set
Various router bits
Eight 60-in.-capacity bar clamps
Numerous hand clamps

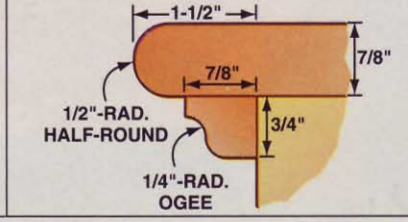
Hardware:
Eight 1-9/16-in. x 2-in. brass butt hinges
Four double-roller catches
Seven wooden knobs
Assorted screws

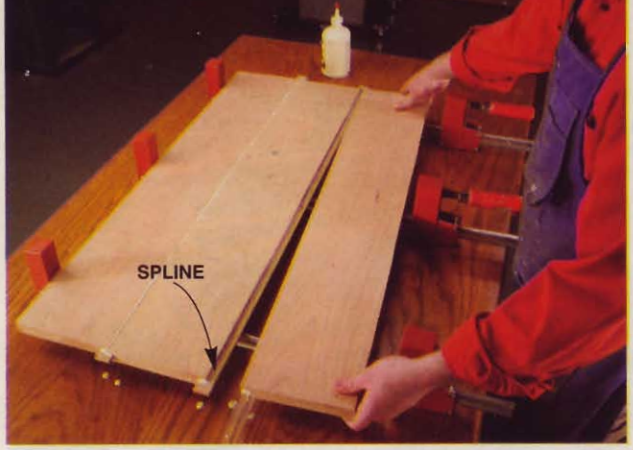
Cost: $1,035

Figure A Base Cabinet Exploded View

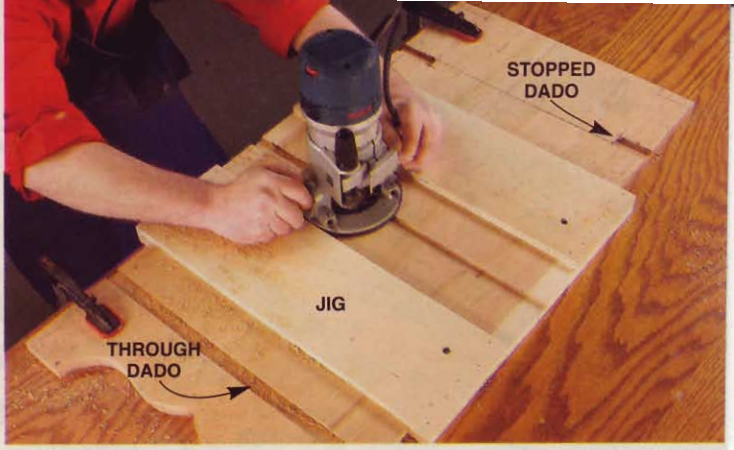


Detail 1 Top Edge Profile





1 Start by gluing up the cabinet sides. Splines keep the boards aligned, so the joints will be flush on the glued-up surface.



2 Rout dadoes in the sides to support the shelves and rails. You can't go wrong when you use this shop-made jig (see Fig. B., below).

Build the Base Cabinet

1. Glue up blanks for the cherry cabinet sides (A1, Fig. A, page 46) and the pine shelves (A2). Splined joints keep the faces aligned (Photo 1). Cut the sides to final dimensions (see Cutting List, page 54).

2. Rough-cut the decorative profiles on the bottoms of the sides and then rout the final profiles with a template (Fig. J, Detail 1, page 55).

3. Rout 1/4-in.-deep dadoes for the shelves (Fig C, below) with a straight bit and a jig (Photo 2). To prevent blowout at the end of the dadoes, the jig's rails should fit snugly over the base cabinet sides. Before routing each dado, fasten the jig in position by screwing it to the cabinet sides. Rout 1/4-in.-deep stopped dadoes for the drawer rails (A3). Make sure the front dado's bottom edge aligns with the back dado's top edge. Use the jig to rout the 1/4-in.-deep stopped rabbets for the top rails (A4), too. Rout the full-length 3/8-in.-deep rabbet on the back edge on the router table, using a fence and the straight bit.

4. Cut the pine shelves and maple rails to final dimensions. They're all the same length.

5. Rout a centered 1/4-in.-wide groove in the back edge of the front drawer rail.

6. Glue together the base cabinet, making sure the shelves, rails and sides are flush at the front. Use cauls on the shelves to apply pressure evenly all along the joints. Clamp 90-degree brackets in the corners to help keep this large cabinet square (Photo 3). After clamping the cabinet together, make sure it's still square by measuring diagonally; both diagonal measurements should be the same. Install both top rails (A4) when you clamp, but leave them unglued until the cabinet has been squared. Then glue and screw the front top rail. Screw the back rail in position, but leave it unglued so it can be removed.

Figure B Dadoing Jig

When used with a 1/2-in. straight bit, this jig allows you to adjust the width of your dadoes to match the shelves' thickness.

The distance between the fences determines the dado's width. For 3/4-in.-wide dadoes, this distance is the diameter of your router's base plus 1/4 in. If your shelves are a slightly different thickness, simply adjust the distance between the fences. When you build your jig, make sure the fences are perpendicular to the rails and parallel to one another.

Position the jig by aligning its dadoes with your layout marks on the cabinet side. Fasten it with screws and you're ready to rout.

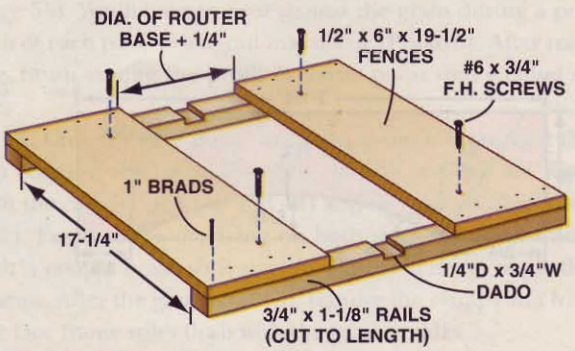


Figure C Cabinet Side Dimensions

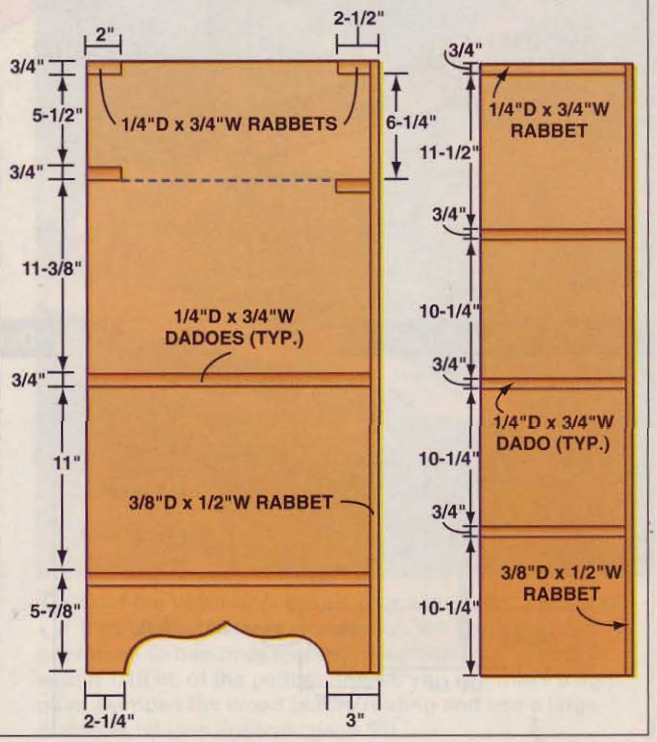
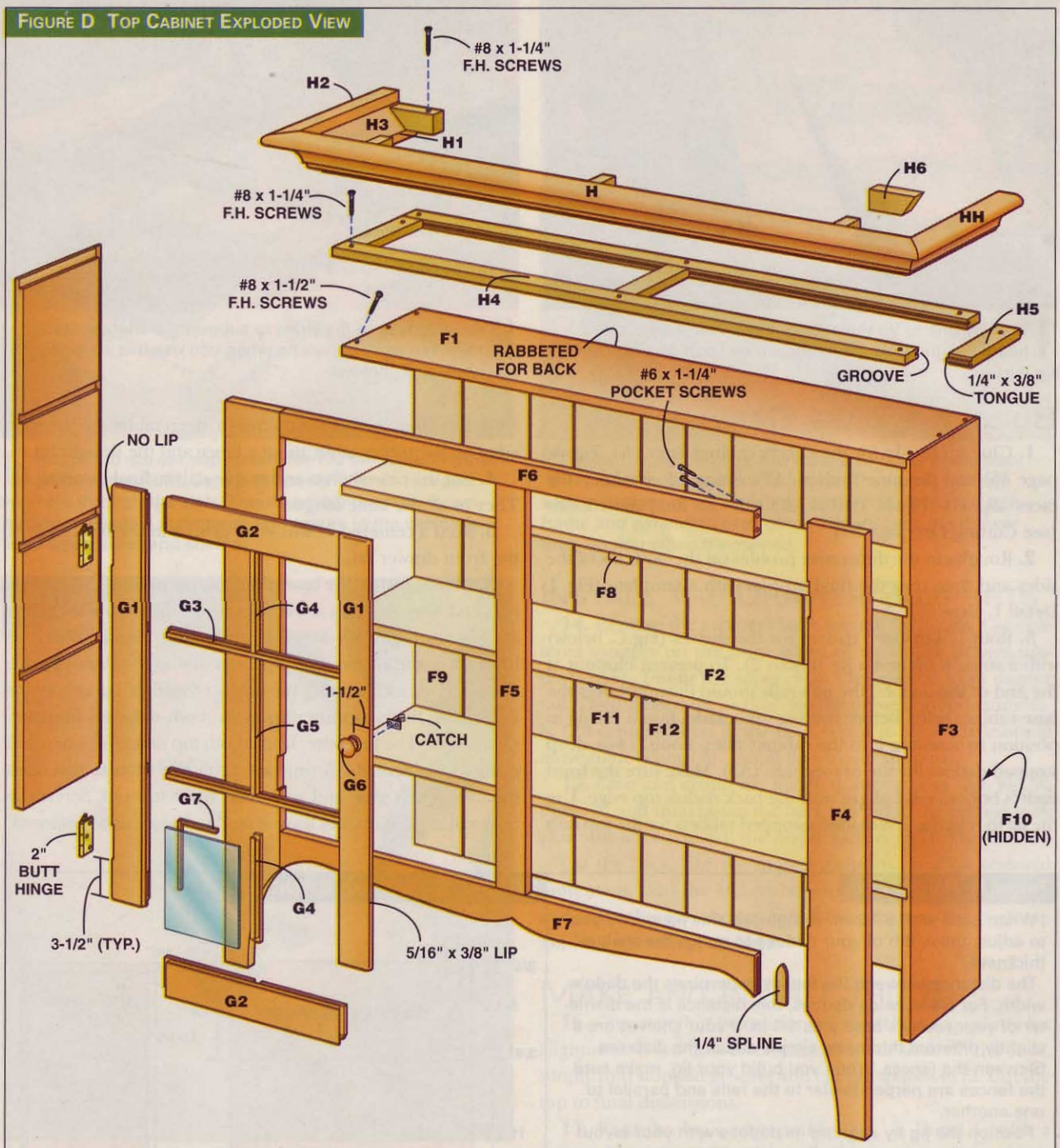
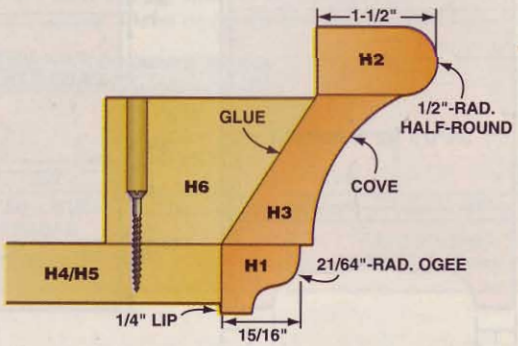


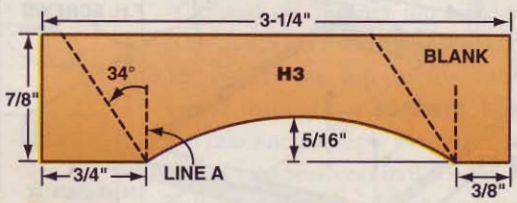
Figure D Top Cabinet Exploded View



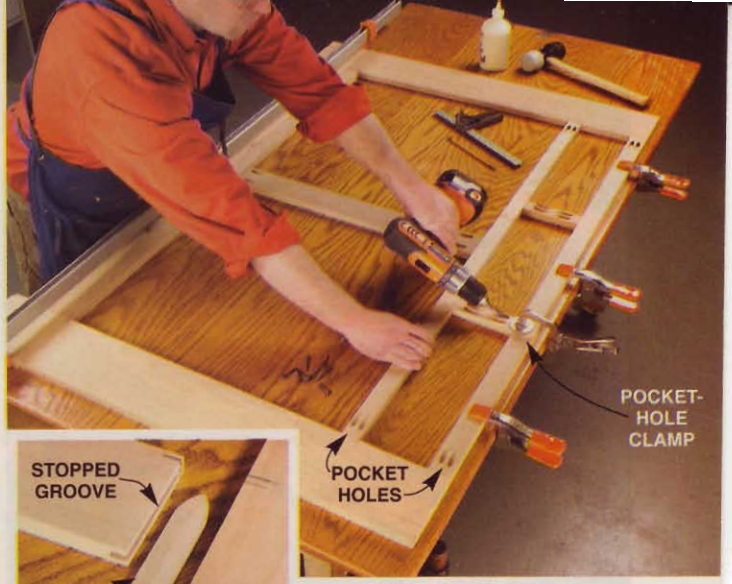
Detail 1 Crown Molding



Detail 2 Cove Blank Layout



3 Glue the base cabinet together on a flat surface. To square the cabinet, clamp shop-made 90-degree brackets in the corners before you tighten the bar clamps.



Assemble the face frame's bottom corners with splines so you won't have to worry about hitting a screw when you rout the decorative cutout.

4 Assemble the face frame with pocket-hole joinery. This method is fast and easy. You drill holes with a dedicated jig, clamp the pieces together and fasten them with special screws. The joinery is hidden, because it's on the back of the frame.

Assemble and Install the Face Frame

Pocket-hole joinery is a great choice for this job (Photo 4). Biscuits are too large for all the narrow pieces, dowels aren't as accurate and mortise-and-tenon joinery takes too long. Pocket-holes are drilled on the back side of the face frame, so make sure to orient all of your pieces back side up.

7. Cut the face-frame stiles and rails to final dimensions. The outside stiles (B1) are 1/16-in. oversize in width, so the face frame is slightly wider than the cabinet. After the face frame is glued on, its overhanging edges are routed flush.

8. Drill pocket holes in the top rail (B2), drawer rail (B3), drawer stiles (B4) and door stile (B5).

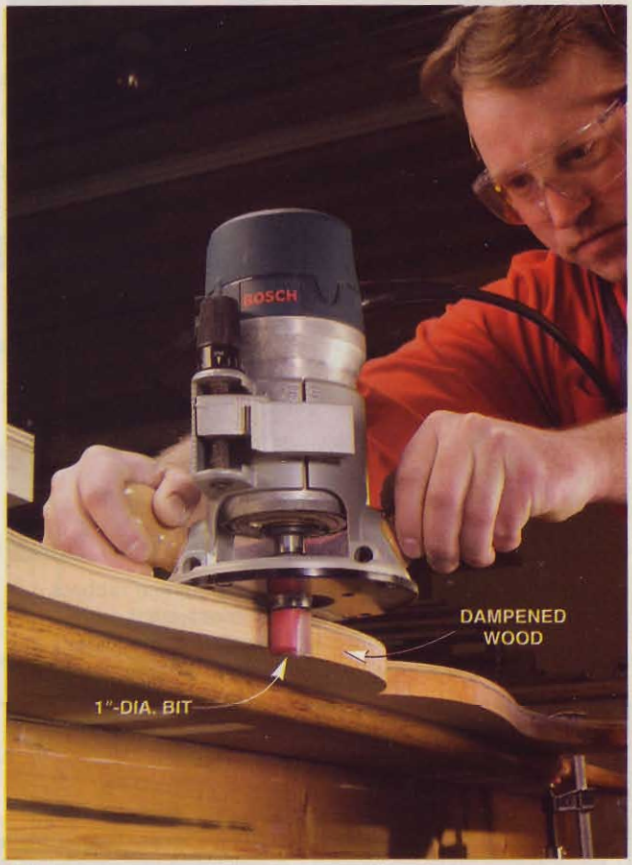
9. Rout stopped, centered slots for splines in the bottom rail (B6) and in the outside stiles (Photo 4, inset). Splines are a better choice here than pocket screws, because you'll rout through these joints when you shape the face frame's curved profile.

10. Glue and clamp the splined joints. Then fasten the rest of the face-frame pieces with pocket screws. Measure the diagonals to make sure the face frame is square.

11. Rout the decorative bottom profile (Fig. J, Detail 2, page 55). You'll have to rout against the grain during a portion of each pass, so tear-out may occur (Photo 5). After routing, finish cutting the profile's center point with a chisel or file.

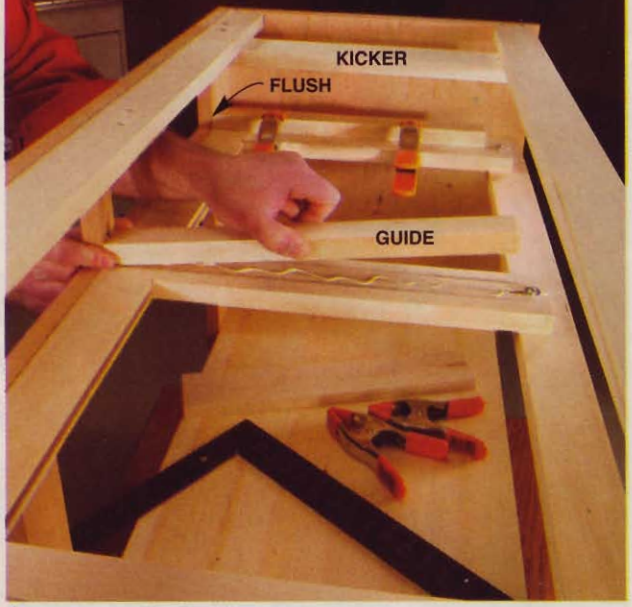
12. Glue the face frame onto the cabinet. Make sure the top edges of the face-frame rails (B2, B3 and B6) are flush with the cabinet rails (A3 and A4) and the bottom fixed shelf (A2). Equalize the overhang on both sides. Tack the frame with a couple brads so it stays in place when you apply the clamps. After the glue has dried, remove the clamps and trim the face frame stiles flush with the cabinet sides.

13. Glue on the shelf support (B7).

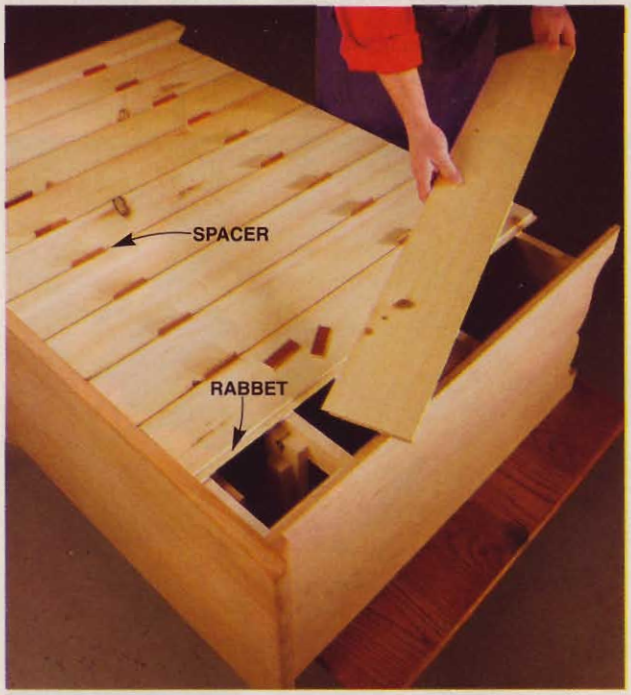


5 Rout the decorative cutout with a template and a flush-trim bit. You have to rout against the grain during this operation. To minimize tear-out, rough-saw the profile to within 1/16 in. of the pattern line, so you can make a light pass. Dampen the wood before routing and use a large-diameter bit (see Sources, page 56).

6 Attach the drawer supports. Glue the tongue-and-groove joints at the front. Secure the backs with screws and washers through the slots. This assembly method accommodates seasonal movement that occurs in the cabinet's solid wood sides and shelves.



7 Install drawer guides and kickers so the drawers track smoothly. Guides limit side play. They must be flush with the edges of the openings, perpendicular to the face frame and parallel to each other. Kickers keep the drawer from tipping when it's opened.



8 Build the back from boards with overlapping rabbets. These overlay joints are called shiplaps. Work from one end to the other, using spacers to maintain even gaps between boards. Plane or rip the last board to fit.

Install the Drawer Supports

14. Remove the cabinet's back top rail for access. Cut centered tongues on the front edges of the maple drawer supports (A5). Test-fit the supports in the grooved front drawer rail: Their faces must be flush for the drawers to slide smoothly. Cut centered slots in the back edges, to allow for seasonal movement (Photo 6). Install the drawer supports.

15. Glue and clamp the maple drawer guides (A6, Fig. A; Photo 7) and then fasten the back top rail to the cabinet with glue and screws. Install the maple kickers (A7). They're slotted at the back, like the drawer supports, to allow seasonal movement. Butt the kickers behind the face frame and glue and screw them to the top rail. Fasten them to the back top rail with screws and washers.

Make and Install the Top

16. Glue together boards for the top (C), using splines for alignment. If you don't want the splines to show on the ends, simply rout stopped grooves and cut the splines to fit. Cut the top to final dimensions.

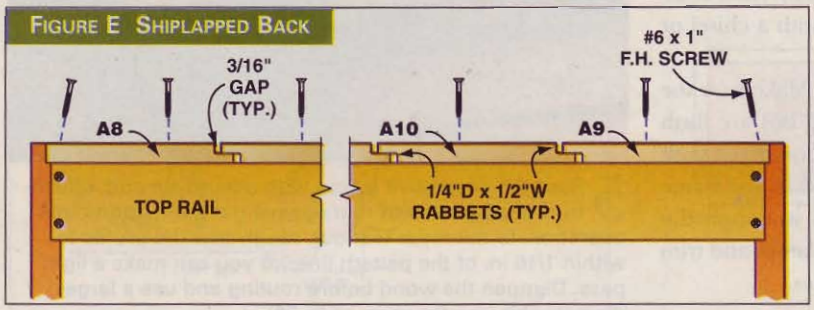
17. Rout the top's edge profile (Fig. A, Detail 1) with a 1/2-in.-radius half-round bit (see Sources, page 56) and an edge guide installed on your router.

18. Rout the 1/4-in.-radius ogee trim molding profile (see Sources) on wide 3/4-in.-thick blanks. Cut the front trim (C1) and side trim pieces (C2) and the thinner top back trim piece (C3) as offcuts from these blanks.

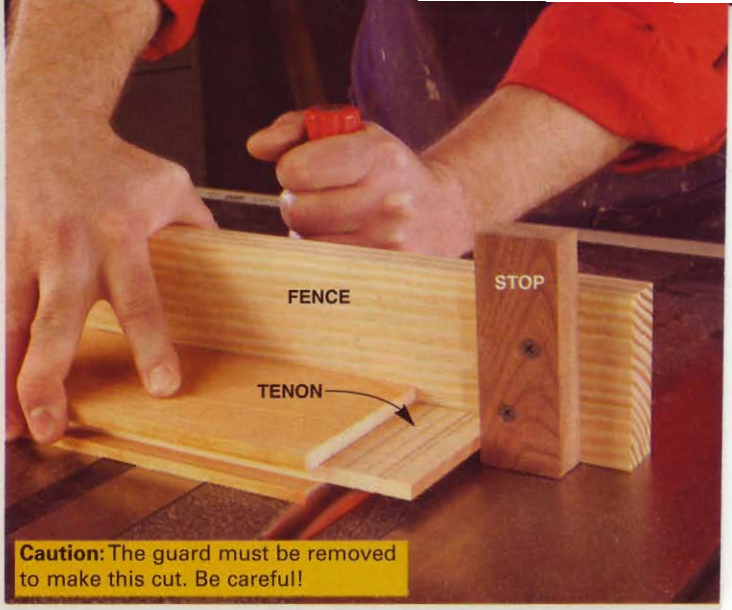
19. Fasten the top to the cabinet with screws through countersunk holes in the top rails and a couple of metal tabletop fasteners (see Sources) in the sides. Rout slots in the cabinet sides for these fasteners.

20. Miter the front trim to fit and glue it on. Then miter and attach the side trim.

FIGURE E SHIPLAPPED BACK

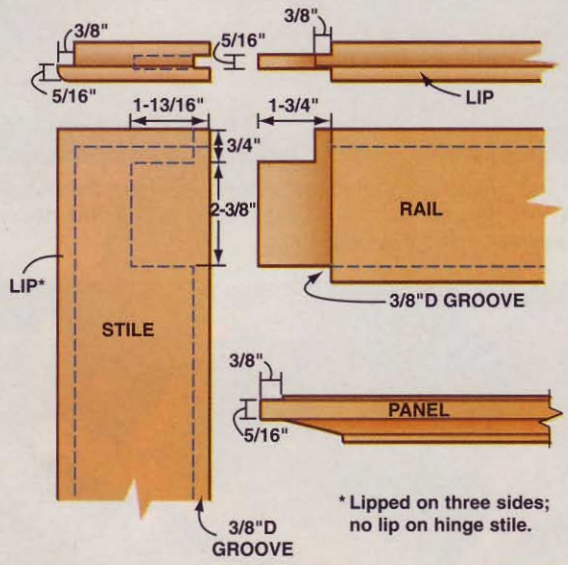


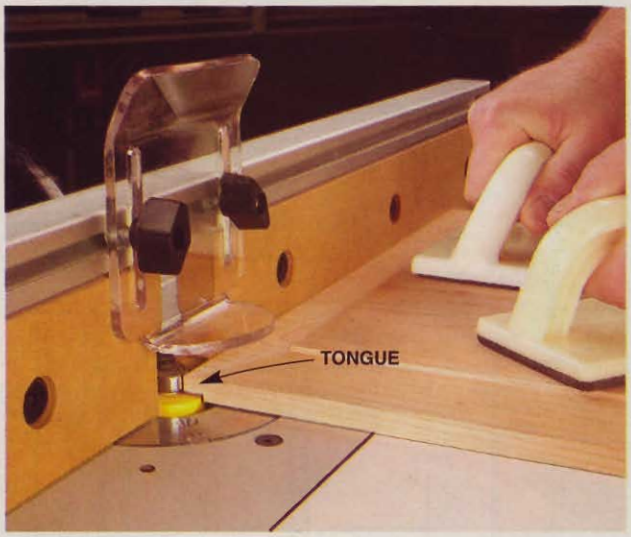
9 Build the raised-panel doors. Cut mortises in the stiles, using the groove to guide the mortising chisel. Keep the stile firmly in position by clamping a fence in front.



10 Cut tenons on the door rails using a dado set and the miter gauge. Install a fence and stop block. The fence controls tear-out and the stop block determines the tenon's length.

FIGURE F DOOR CONSTRUCTION





11 Rabbet the back of the door panel. By adjusting the bit's height, you'll make tongues that exactly fit the grooves in the stiles and rails.

Glue the miter and about the first 4 in. of the molding. Nail it at the back to allow the seasonal movement of the cabinet top and sides.

Install the Back Boards

Shiplapped boards disguise seasonal movement by overlapping, so gaps don't appear between boards during dry seasons (Fig. E, page 50).

21. Cut the pine back boards to final dimensions. The outside back boards (A8 and A9) are different widths to center the back's pattern when it's viewed from the front of the cabinet.

22. Rabbet the *back* face of the left side back board (A8). Rabbet the *front* face of the right side back board (A9). Rabbet *both* faces of the inside boards (A10). Drill countersunk holes for screws. Cut the angled feet on the outside boards.

23. Lay the cabinet on its face and fit the boards. Work from one edge to the other, using spacers to create even overlaps between boards (Photo 8). Make adjustments, either by changing the thickness of the spacers or the width of the two outside boards, until all the boards fit. Then fasten the boards with countersunk screws. Add rigidity to the cabinet by gluing the outside boards in the rabbets.

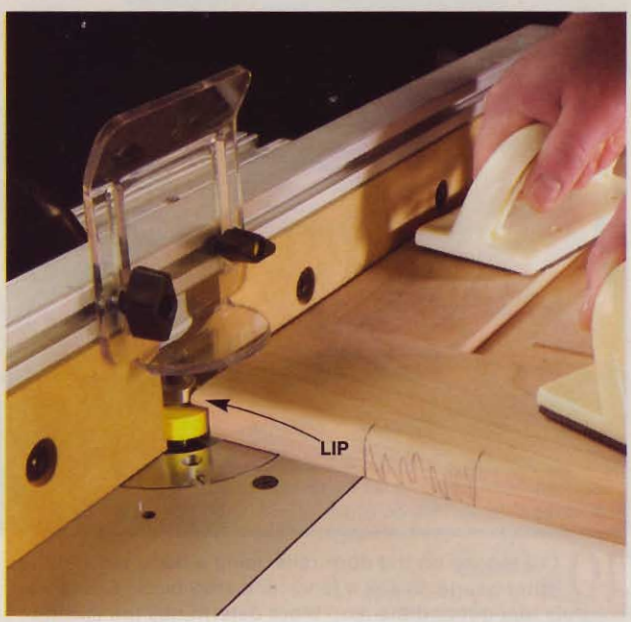
Build and Install the Doors

The doors feature raised panels and haunched mortise-and-tenon joinery (Fig. F, above left). Their outer edges are lipped, so the doors overlay the openings in the cabinet.

24. Saw centered grooves in the inside edges of the stiles (D1) and rails (D2).

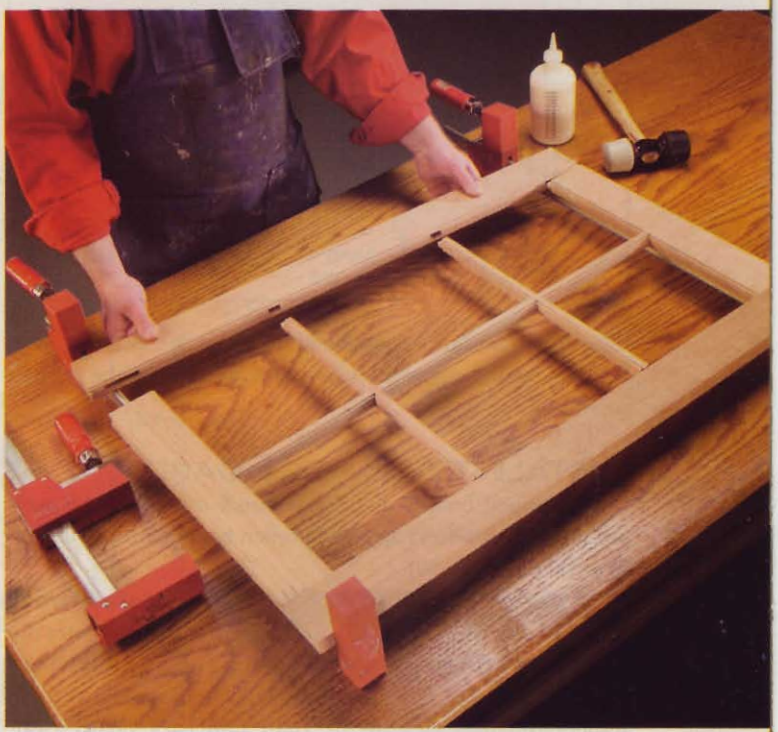
25. Cut mortises in the stiles (Photo 9).

26. Saw tenons on the rails (Photo 10). Adjust the height



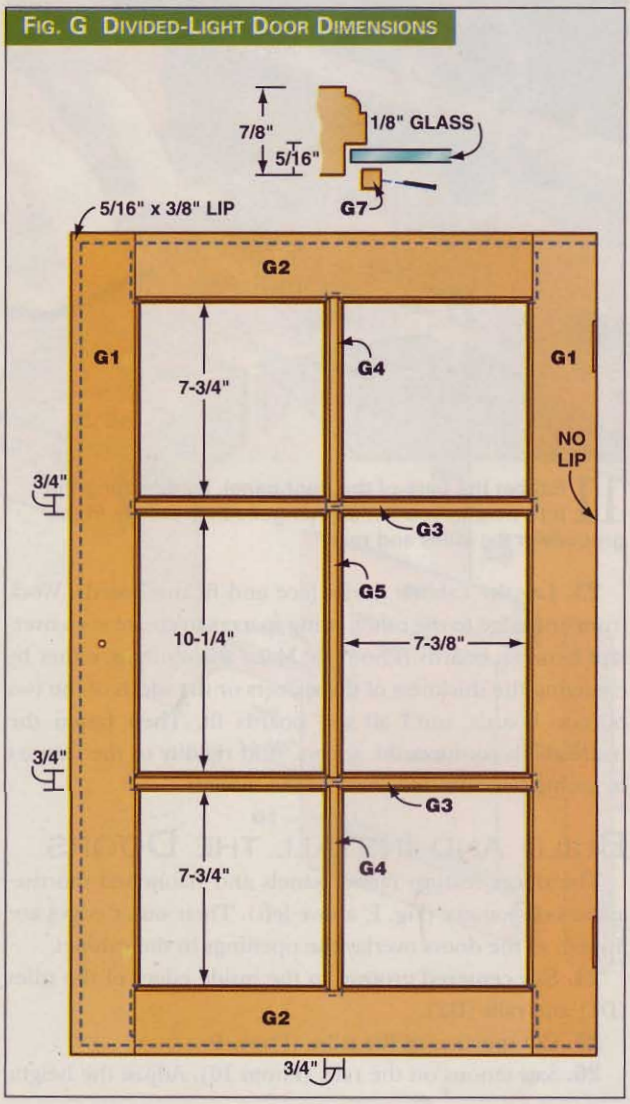
12 Rabbet the doors to create lipped edges. Lipped doors are easier to install than inset doors because they hide all the gaps. In the 19th century, lipped doors were used on cupboards like this one to keep out mice.

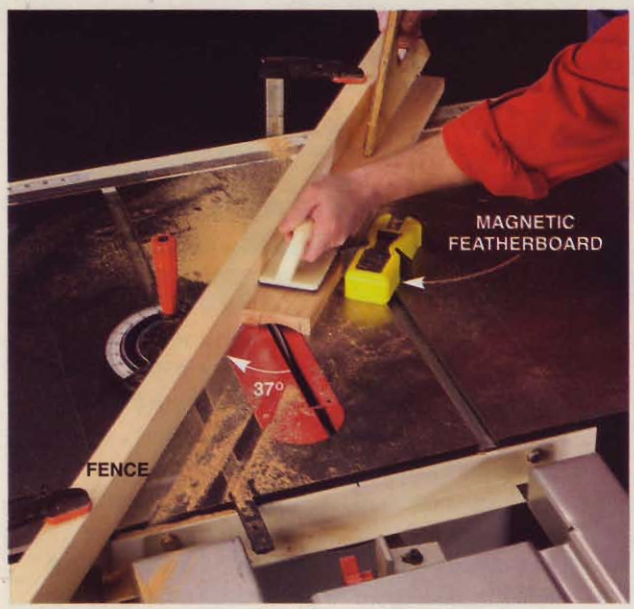
13 Transfer the hinge mortise locations from the doors to the cabinet. Use a straightedge to align the doors and center them in the openings.



14 Build frames for the glazed doors. You'll need a specialized router bit set (see Sources, page 56) and a router table. For complete how-to instructions, see "Divided-Light Doors," page 57).

FIG. G DIVIDED-LIGHT DOOR DIMENSIONS





15 Build the crown molding in three sections. Create the middle cove section by passing the cove blank over the tablesaw blade at an angle, using a fence set at 37 degrees. Fastening the fence to the miter gauge makes it easy to set this angle. Cut the cove by making light passes, raising the blade in 1/16-in. increments.

16 Saw the edges of the cove section at 34-degree angles. After making the first cut, reposition the fence on the other side of the blade to make the second cut.

of the dado until one pass on each face creates a tenon of the proper thickness. Saw out the haunches on the bandsaw.

27. Raise the panel (D3) on your router table with a panel-raising bit (see Sources, page 56). Then rabbet the back (Photo 11).

28. Glue the doors together after assembling them without glue to test the fit. Brush glue into the mortises and onto the tenons. Don't glue the panel. It must be free to expand and contract inside the frame. To make sure my panels don't get stuck, I always finish them prior to assembly. I also wax the edges, so any glue that happens to squeeze into the panel grooves during glue-up won't stick.

29. Round-over the doors' front edges with a 1/4-in.-radius bit. Then rabbet the back edges on three sides (Photo 12). Don't rabbet the hinge stile.

30. Cut hinge mortises in the doors. Then position the doors on the cabinet so you can transfer the mortise locations to the face frame (Photo 13). Cut these mortises, install the hinges and mount the doors. **Note:** Because of their overlay style and the use of traditional butt hinges, the doors swing open slightly less than 180 degrees.

31. Mark locations for the knobs (D4; see Sources, page 56) and drill holes for the screws.

Build the Drawers

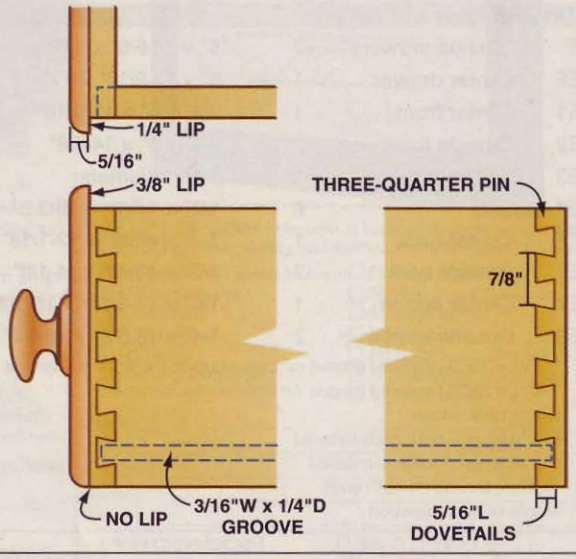
The drawer fronts (E1 and E2) are rounded-over at a 1/4-in. radius and lipped 3/8 in. on top and 1/4 in. on the ends, so they cover the openings. The bottoms aren't lipped. The drawers fit inside the openings with 1/16-in. width and 1/8-in. height tolerances. The knobs (E3; see Sources) are centered in the drawer fronts.

The maple drawer sides (E4) and backs (E5 and E6) are sized for machine-cut dovetails, with three-quarter pins at the top and bottom (Fig. H, at right). The plywood drawer bottoms (E7 and E8) fit in grooves centered in one of the dovetails, so they're hidden. If you're unfamiliar with routing dovetails with a dovetail jig, see "Making Lipped Drawers," (AW #84, December 2000, page 91) for complete how-to instructions.

The fact is, you don't have to use a jig to make the drawers. In the 19th century, drawers in cabinets like this one were often hand-dovetailed, but just as often, they were simply butted and nailed. That means you can choose the drawer joinery method that suits your taste and skill level. To make drawers, all you real-

Figure H Drawer Dimensions

The drawers are sized for dovetail jigs that produce pins and tails spaced 7/8 in. Set up your jig to leave three-quarter pins at the top and bottom. Center grooves for the drawer bottoms inside the lowest socket and pin.



Cutting List

Overall Dimensions: 19-1/2"D x 59-1/2"W x 85-3/8"H

Base Cabinet

Dimensions: 19-1/2"D x 57"W x 36-7/8"H

Part	Name	Qty.	Dimensions
Bottom cabinet			
A	Cabinet	1	18" x 36" x 54"
A1	Side	2	3/4" x 17-1/4" x 36"
A2	Fixed shelf	2	3/4" x 16-3/4" x 53"
A3	Drawer rail	2	3/4" x 2" x 53" *
A4	Top rail	2	3/4" x 2" x 53"
A5	Drawer support	4	3/4" x 2-3/4" x 14-5/8" **
A6	Drawer guide	4	3/4" x 1-1/4" x 14-3/4"
A7	Kicker	4	3/4" x 2-3/4" x 16-1/4"
A8	Left side back board	1	1/2" x 4-7/8" x 36"
A9	Right side back board	1	1/2" x 5-3/8" x 36"
A10	Inside back board	9	1/2" x 5-1/8" x 33"
A11	Top cabinet stay	2	1/2" x 1-1/2" x 43"
Face frame			
B	Face frame	1	3/4" x 36" x 54"
B1	Outside stile	2	3/4" x 5-1/16" x 36"
B2	Top rail	1	3/4" x 1-1/2" x 44"
B3	Drawer rail	1	3/4" x 1-1/4" x 44"
B4	Drawer stile	2	3/4" x 1-1/4" x 4-3/4"
B5	Door stile	1	3/4" x 2-1/2" x 22-5/8"
B6	Bottom rail	1	3/4" x 4" x 44"
B7	Shelf support	1	1-1/2" x 1-1/2" x 2"
Top			
C	Top	1	7/8" x 19-1/2" x 57"
C1	Front trim	1	3/4" x 7/8" x 58" ***
C2	Side trim	2	3/4" x 7/8" x 20" ‡
C3	Back trim	1	1/2" x 7/8" x 52-1/2"
Frame and panel doors			
D	Door	2	7/8" x 21" x 23-1/8"
D1	Stile	4	7/8" x 3-1/2" x 23-1/8"
D2	Rail	4	7/8" x 3-1/2" x 17-1/2" ‡‡
D3	Panel	2	3/4" x 14-1/2" x 16-5/8"
D4	Knob	2	1-1/2" diameter
Drawers			
E	Outside drawers	2	5" x 14-5/8" x 17"
EE	Center drawer	1	5" x 13-9/16" x 17"
E1	Center front	1	3/4" x 5" x 13-9/16"
E2	Outside front	2	3/4" x 5" x 14-5/8"
E3	Knob	3	1-1/2" diameter
E4	Side	6	1/2" x 4-5/8" x 16-3/8"
E5	Center back	1	1/2" x 4-5/8" x 13-1/16"
E6	Outside back	2	1/2" x 4-5/8" x 14-1/8"
E7	Center bottom ‡‡‡	1	1/4" x 12-9/16" x 16-1/4"
E8	Outside bottom ‡‡‡	2	1/4" x 13-5/8" x 16-1/4"

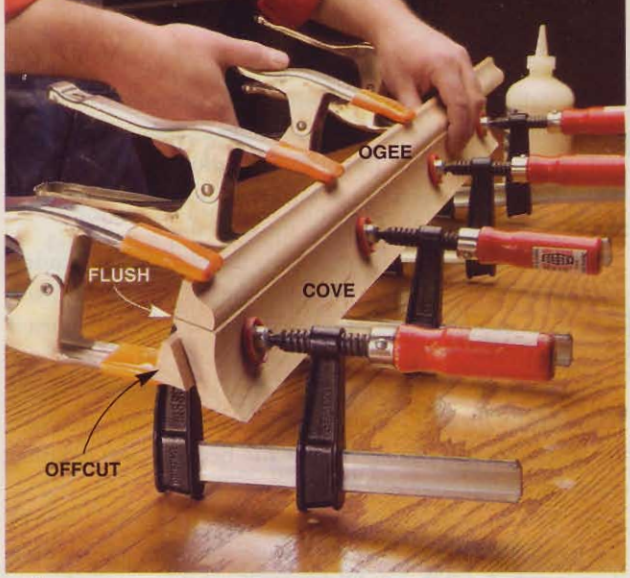
* 1/4"W x 3/8"D centered groove on back edge of the front drawer rail
** 1/4"W x 3/8"D centered tongue on front edges, centered slot in back edges
*** Cut to length, both ends mitered
‡ Cut to length, one end mitered
‡‡ 1-3/4-in. tenons on both ends
‡‡‡ Maple or birch plywood

Top Cabinet

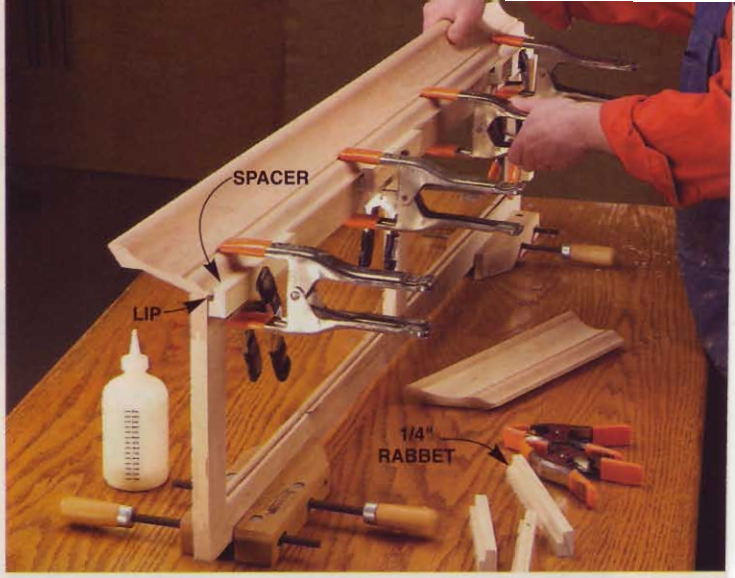
Dimensions: 14-3/4"D x 59-1/2"W x 48-1/2"H

Part	Name	Qty.	Dimensions
Top cabinet			
F	Cabinet		12" x 45-1/4" x 54"
F1	Top shelf	1	3/4" x 11-1/4" x 53" *
F2	Fixed shelf	3	3/4" x 10-3/4" x 53"
F3	Side	2	3/4" x 11-1/4" x 45-1/4"
F4	Face-frame outside stile	2	3/4" x 5-1/16" x 45-1/4"
F5	Face-frame center stile	1	3/4" x 2-1/2" x 32-1/4"
F6	Face-frame top rail	1	3/4" x 2" x 44"
F7	Face-frame bottom rail	1	3/4" x 4" x 44"
F8	Shelf support	2	1-1/2" x 1-1/2" x 2"
F9	Left side back board		1/2" x 4-3/4" x 44-7/8"
F10	Right side back board		1/2" x 5-1/4" x 44-7/8"
F11	Wide back board	4	1/2" x 7" x 44-7/8"
F12	Narrow back board	4	1/2" x 4-3/4" x 44-7/8"
Divided-light doors			
G	Glass-panel door	2	7/8" x 21" x 32-3/4"
G1	Stile	4	7/8" x 2-3/4" x 32-3/4"
G2	Rail	4	7/8" x 2-3/4" x 15-1/2" plus 20 mm **
G3	Horizontal muntin	4	7/8" x 3/4" x 15-1/2" plus 20 mm **
G4	Top/bot. vert. muntin	4	7/8" x 3/4" x 7-3/4" plus 20 mm **
G5	Center vertical muntin	2	7/8" x 3/4" x 10-1/4" plus 20 mm **
G6	Knob	2	1-1/4" diameter
G7	Glass retainers	48	3/16" x 3/16" x cut to length
Crown molding and web frame			
H	Assembled front crown	1	2-3/4" x 3-1/2" x 66" ***
HH	Assembled side crown	2	2-3/4" x 3-1/2" x 18" ‡
H1	Crown base	1	7/8" x 15/16" x 108"
H2	Crown cap	1	7/8" x 1-1/2" x 108"
H3	Crown cove blank	1	7/8" x 3-1/4" x 108"
H4	Web-frame stile	2	3/4" x 2" x 54-1/16" ‡‡
H5	Web-frame rail	3	3/4" x 2" x 8-3/4" ‡‡‡
H6	Brackets	5	3/4" x 1-5/8" x 2-3/4"

* 1/2"W x 3/8"D rabbet on back edge
** Dimensions for use with Freud router bit set #99-270
*** Cut to length, both ends mitered
‡ Cut to length, one end mitered
‡‡ 1/4"W x 3/8"D centered groove on one edge
‡‡‡ 1/4"W x 3/8"L centered tongue on both ends



17 Glue the crown molding together in stages. Clamping a beveled offcut to the back of the cove makes it easy to glue and clamp the ogee. Orient the two sections by keeping them flush at the back.



18 Glue the crown molding onto its own web frame. Rabbeted spacers align the molding and assure a uniform lip. When the crown is installed, the lipped molding covers the joint between the frame and the cabinet.

ly need to know are the size of the drawer fronts and the size and depth of the drawer openings.

Build the Top Cabinet

The top cabinet is constructed the same way as the base, with shelves (F1 and F2, Fig. D, page 48) glued into dadoes and rabbets in the sides (F3). A face frame (F4 through F7) is glued to the front, supports (F8) are glued under the shelves and shiplapped boards (F9 through F12) are screwed to the back. The back shows on this cabinet, so I used wide and narrow boards for visual interest. The top shelf is rabbeted, like the sides, to house the back boards.

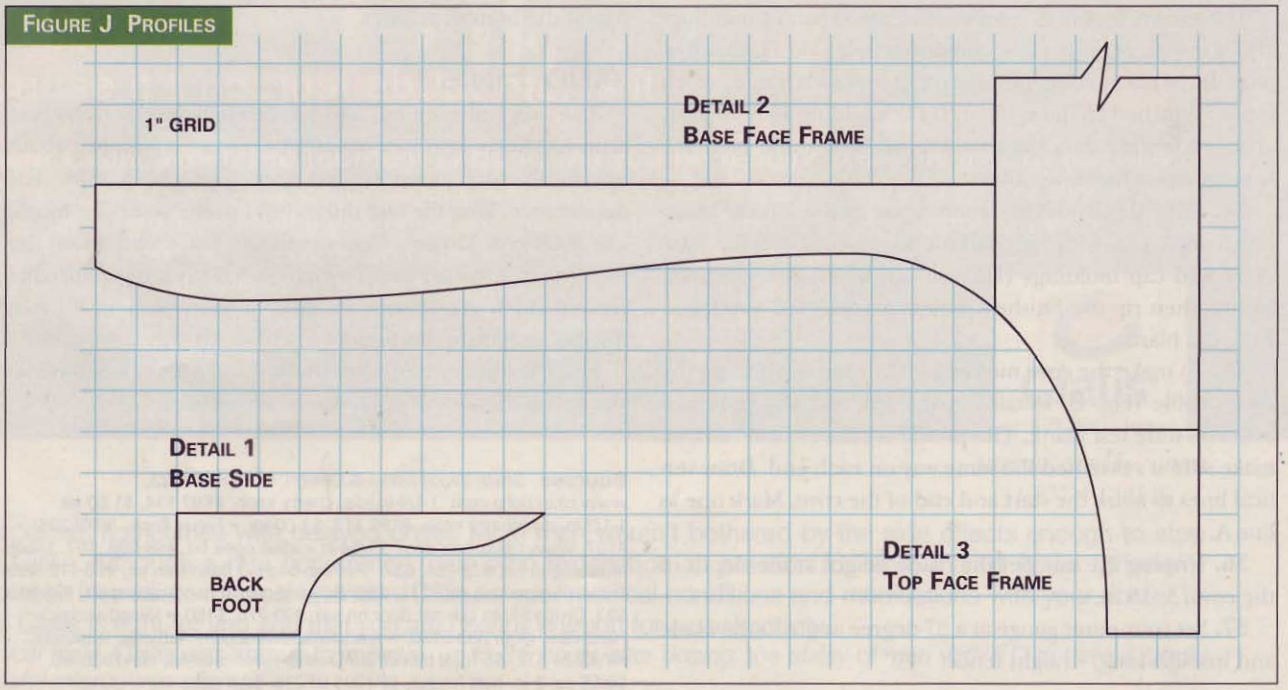
Build Divided-Light Doors

These handsome doors feature mortise-and-tenon construction that's modified to incorporate multiple individual panes of glass (Photo 14). In the old days, this complicated joinery was done by hand. Today, special router bit sets make the job easier.

Building these doors is in itself an advanced project, so we've devoted an entire story to show you exactly how to make them. Most of the work is done on the router table, but you also have to chop mortises. For complete how-to instructions, see "Divided-Light Doors" page 57. The dimensions for the glass openings (Fig. G, page 52) and for the door parts (G1 through G5) are dedicated to the same Freud router bit set (see Sources, page 56).

32. After gluing the door frames together, round-over the edges and rout lips on three sides, as you did on the solid panel doors on the base cabinet. Similarly, chop the hinge mortises, install the hinges and mount the doors. Then mark and drill screw holes for the knobs (G6).

FIGURE J PROFILES



Graceful curves, a wide stance and prominent crown molding reflect this cupboard's Pennsylvania heritage, where similar pieces have been built for more than 200 years. Other Pennsylvania design cues include the step-back style with glazed doors over an open sill and the three drawers banked over a pair of raised-panel doors in the base.

33. Remove the doors. Install the glass panes and retainers (G7) after you've applied the finish.

Build and Install the Crown Molding

The crown molding consists of three separate moldings (H1 through H3) that are glued together (Fig D, Detail 1, page 48). This molding mounts on its own web frame, which is then attached to the cabinet. If the molding were directly attached to the cabinet, seasonal movement would eventually break open the miter joints.

34. Rout the 21/64-in.-radius ogee (see Sources, below right) and 1/2-in.-radius half-round profiles for the base (H1) and cap moldings (H2) on opposite sides of a wide blank. Then rip the finished moldings (oriented as offcuts) from the blank.

35. To make the cove molding (H3), start by drawing the cove profile (Fig. D, Detail 2, page 48) on both ends of a 3-1/4-in.-wide test blank. The profile is offset to one side, so make sure it's oriented the same way on each end. Draw vertical lines to mark the start and end of the cove. Mark one as line A.

36. Unplug the saw. Set the blade height at the depth of the cove, 5/16 in.

37. Set your miter gauge at a 37-degree angle to the blade and install a long, straight fence.

38. Adjust the fence's position by moving the miter gauge forward or back. Hold the blank against the fence and use line A (Fig. D, Detail 2) as a guide for positioning. When line A intersects the point where the blade enters the throat plate, clamp the fence to the saw table.

39. Install a featherboard to keep the blank from wandering away from the fence as you make the cut. Lower the blade to 1/16-in. exposure and cut a test cove to familiarize yourself with the process. Then cut the coves (Photo 15).

40. Saw the cove's beveled edges at 34-degree angles (Photo 16). Orient the blank cove face up for both cuts. Save the larger beveled offcut. Handle the beveled cove molding carefully; its top edge is fragile.

41. Use the beveled offcut to glue the ogee-profile base to the cove (Photo 17). The cap glues on easily with spring clamps only. Sand the molding to remove the saw marks.

42. Build the maple web frame (H4 and H5). This frame isn't glued to the cabinet, so tongue-and-groove joinery is better than pocket holes. The frame is slightly longer than the cabinet, so the lipped molding will drop easily over the sides.

43. Fit the front crown molding (H) to the frame by mitering the corners. Then glue it on, using rabbeted spacers to create a uniform 1/4-in. overhang (Photo 18).

44. Miter and fit the side moldings (HH). Then glue them on. Fit and install the brackets (H6).

45. Screw the crown assembly onto the top cabinet.

Finally, Assemble the Cupboard

46. Make two stays (A11) to fasten the cabinets together. Position the top cabinet on the bottom cabinet so you can mark and drill countersunk screw holes on the stays. The screws go into two shelves in the top cabinet and both rails and one shelf in the bottom cabinet.

47. If necessary, install the top trim molding (C3) to cover the joint between the back boards of the top cabinet and the top of the bottom cabinet.

And Finish

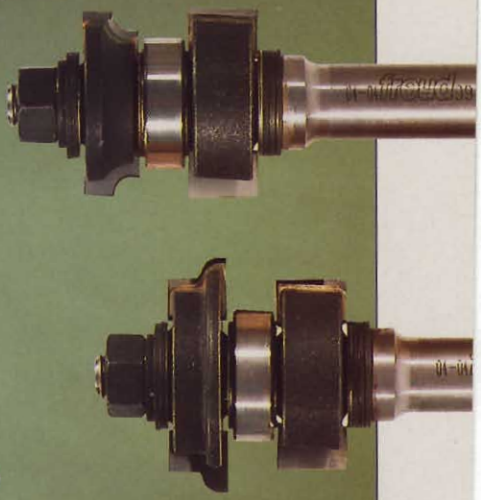
The only finishing mistake you can make with cherry is to stain it. Cherry ages to a beautiful deep color with just about any finish, so it doesn't need stain. Just give it time. For appearance, long life and durability, I prefer a surface finish, like shellac or lacquer. Cherry will age faster with an oil finish; however, an oil finish enhances cherry's unpredictable figure, which can appear mottled or even blotchy. Surface finishes minimize this figure.

Leave the pine interior unfinished and a fresh scent will fill the air whenever you open the cabinet doors.

Sources Smith Woodworks & Design, (908) 832-2723, www.niceknobs.com 1-1/4-in.-dia. cherry knob, #K92 114, $1.50 ea. 1-1/2-in.-dia. cherry knob, #K92 112, $1.60 ea. • Freud Tools, (800) 334-4107, www.freudtools.com 21/64-in.-radius ogee bit, #99-006, $57. 1/4-in.-radius ogee bit, #38-154, $37. 1-in. top-bearing flush-trim bit, #50-112, $28. 1-in. half-round bit, #82-118, $56. Beveled-profile panel-raising bit, #99-516, $93. Divided-light cabinet door bit set, #99-270, $150. • Woodworker's Hardware, (800) 383-0130, www.wwhardware.com Tabletop fasteners, #KV0324 STL, $5 for a box of 20. Double-roller catches, #LA1910 AC, $0.55 ea. 2-in. butt hinges, SP1295 BP219, $2 a pair.

divided-light doors

by Tom Caspar

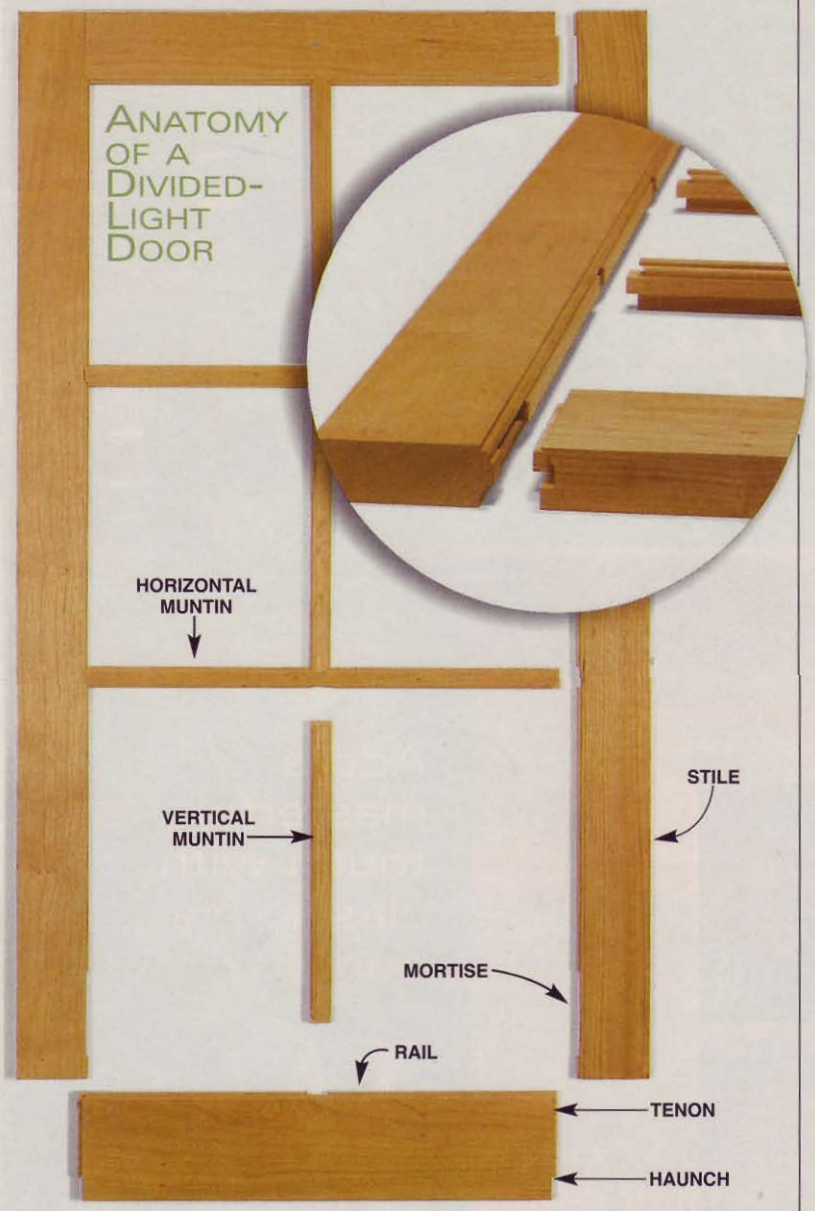


Add a masterful touch with classic glass doors.

With the right set of router bits, a divided-light door is a lot easier to make than it looks. The key to success is simple: Measure and cut every single part first. To get you going on the right path, I'll show you a foolproof way to calculate the precise length of every piece. Then you rout, mortise and assemble. Piece of cake.

MIKE KRIVIT

ART DIRECTION: RICK DUPRE • PHOTOGRAPHY: PATRICK HUNTER, UNLESS NOTED



Three major parts make a divided light door: stiles, rails and muntins. Every part is locked in place by a mortise-and-tenon joint. In this six-light door, the two horizontal muntins are the same length as the rails. Three short vertical muntins fit between the rails and horizontal muntins.

Although proportions vary among furniture styles, in this door the lower rail is 1-1/2 times as wide as the top rail. All the lights are the same size and evenly divided.

Tools You'll Use

To build these doors, you'll need a router table and a set of special bits (see Sources, page 61). You'll also need a metric ruler, tablesaw, planer, jointer and some means of making mortises.

Design Your Door

Let's start with some old-fashioned terms. The openings for the glass are traditionally called *lights*. They're "divided" by bars called *muntins*.

Start by drawing your door. Determine the door's overall size, the widths of the stiles, rails and muntins, and the size of the lights.

Next, select a set of divided-light door router bits. Each set is designed for a specific range of door thicknesses and requires a different setup, but the general steps are the same. Visit the manufacturers' Web sites for details. We used bits from Freud ($150, see photos below). They're suitable for doors from 13/16 to 1-1/8 in. thick with 5/8-in. or wider muntins. These bits make tenons; some other sets do not.

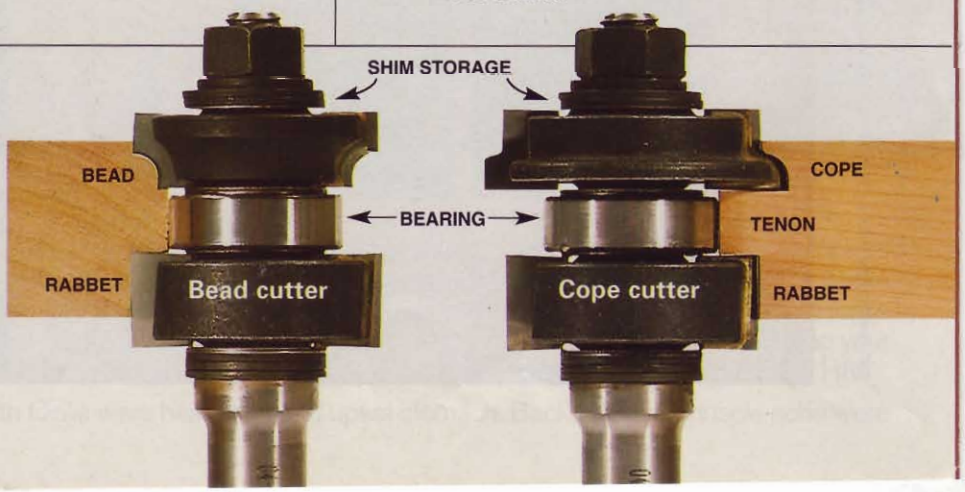
Start Cutting Parts

Mill all the door parts to final thickness (7/8 in. for this door). Make a few extra boards the same size as the rails. Use these for making the muntins and for testing the router bit and mortising machine setups. Crosscut all the pieces a few inches long.

Rip and joint the stiles and rails to final width. Cut the stiles to final length. Leave the rails and muntin boards long. The muntins will be 3/4 in. wide, but don't rip them yet. Leave them as part of a wider board.

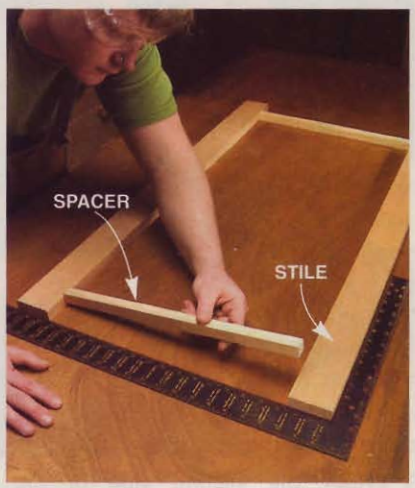
Two matched router bits cut all the profiles. The cope cutter shapes the ends of all the rails and muntins. It also forms a short tenon and a rabbet to receive the glass. The bead cutter shapes the long edges of the stiles, rails and muntins. It also forms a rabbet.

Both bits may be adjusted to fine-tune the tenon's thickness. You simply take apart the bit and add shims above the bearing. These shims come with the bit and are stored under the nut and washers.

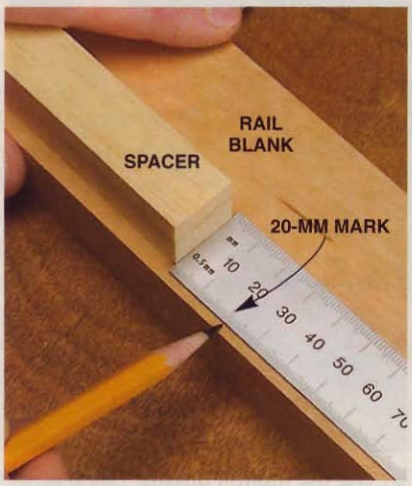


Determine the Length of the Rails and Muntins

Cut every part of the door to exact length in these steps. Use the actual stiles to calculate the precise length of the rails and muntins.



1 Cut two spacers to spread the stiles to the door's final width. This method prevents you from making a math error with awkward fractions in the next step.



2 Add the length of two tenons to the spacer and mark this total distance on a rail blank. With the Freud bits, two tenons are equal to 20 mm (about 25/32 in.) Crosscut the rails and horizontal muntin boards to this length.

3 Use the same process to calculate the vertical muntin boards' length. Position two 3/4-in.-thick blocks to stand in for the 3/4-in.-wide horizontal muntins. Cut two top and bottom spacers the same length. Then cut a middle spacer to fit. Add 20 mm to these spacers to mark and cut the vertical muntin boards.

Cope the Ends

Next, cut tenons on the end grain of every part. Coping the ends before cutting the beads minimizes problems with grain tear-out.

4 Set up the cope cutter. For a 7/8-in.-thick door like this one, raise the bit so the top cutter is 5/8 in. above the table. Position the router table fence so the cutter bearing is perfectly even with the fence or 1/64 in. proud. This assures a full-depth cut, which is necessary for a good fit.

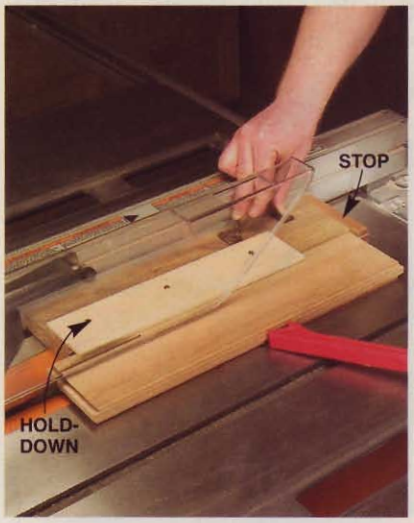
5 Test cut an extra piece of rail stock. Clamp a backing board to the workpiece to prevent tear-out. Use a push pad to keep the workpiece flat on the table and your fingers out of harm's way.

6 Measure the tenon's thickness. It should be 5/16 in. so it fits the mortise made by a 5/16-in. chisel. If the tenon is too thin, add shims above the bearing (see inset). Add the same shims to the bead cutter. When the tenon is correctly sized, cope the ends of all the rails and muntin boards.

Rout the Bead

The bead goes on the long grain of the stiles, rails and muntins.

7 **Rout beads** on the inside edges of the stiles and rails. Position the bit so the lower knife is level with the rabbet made by the coping cut (see inset). Cut beads on both sides of the muntin boards.



8 **Rip the muntin boards.** Use a push block with a stop and hold-down board so you can keep the guard and splitter on your saw. The exact width of this cut—3/4 in.—must be the same as the width of the stand-in muntin blocks you used to calculate the vertical muntin's length in Photo 3.

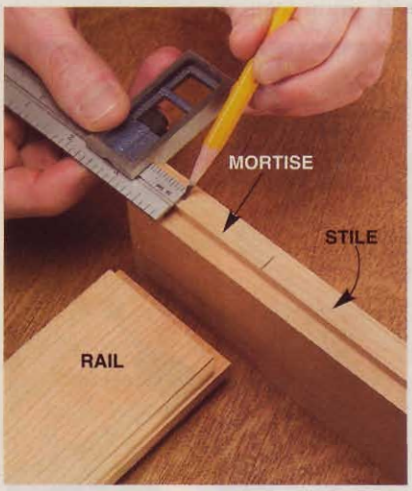
9 **Rout the second side** of the muntins. Use the same push block as you did on the tablesaw. This time the push block is flipped over and the hold-down removed.

Caution: You must use two featherboards to hold the workpiece square to the table.

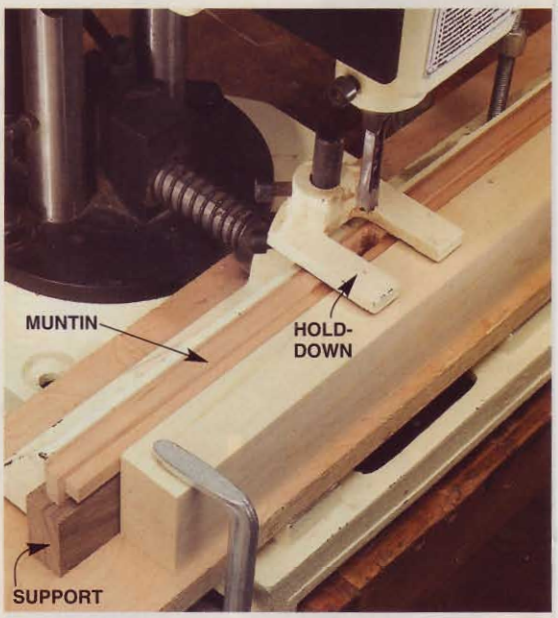
Cut the Mortises

Most routed doors merely have cope and stick joints. Mortise-and-tenon joints strengthen a divided light door to carry the extra weight of the glass.

10 **Mark mortises on the stiles** directly from the rails and horizontal muntins. Position the muntins with the spacers you made earlier (see Photo 3). Draw pencil lines along both sides of the tenons (see inset). Mark mortises for the vertical muntins in the center of the rails and horizontal muntins.



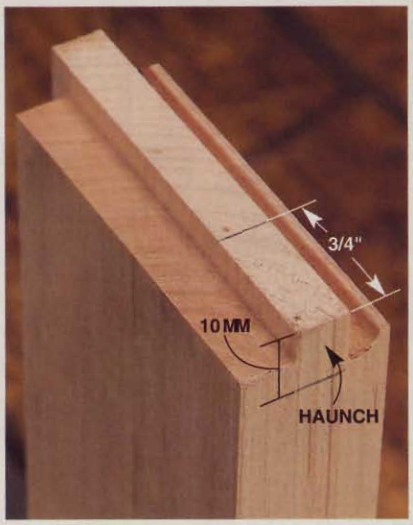
11 **Mark the outer end** of each rail mortise that will receive a rail. Typically, this mark is about 3/4 in. from the stile's end.



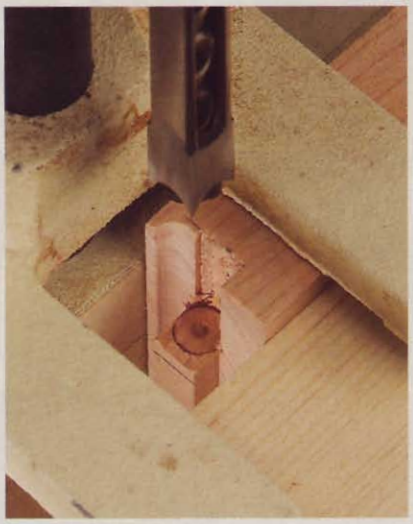
12 **Cut mortises** in the muntins halfway through from both sides. Place a support block under the muntin so its top edge is within range of the machine's hold-down. Cut 1/2-in.-deep mortises in the rails and stiles.

Haunch the Rails

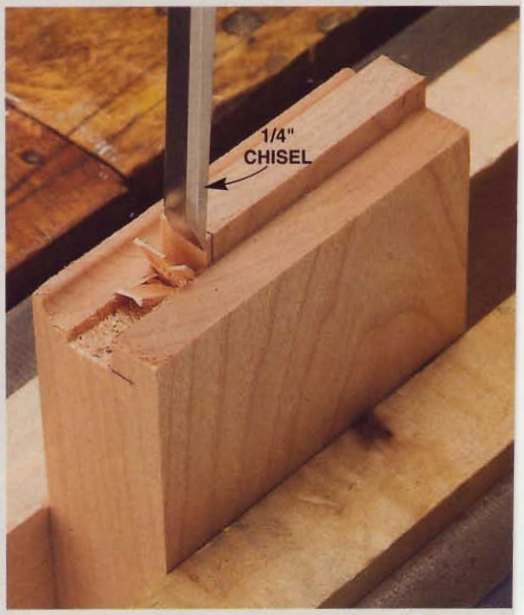
Remove the outer part of the rail tenons to fit the mortises.



13 **Mark the waste** on the tenon's *end with a combination square.*



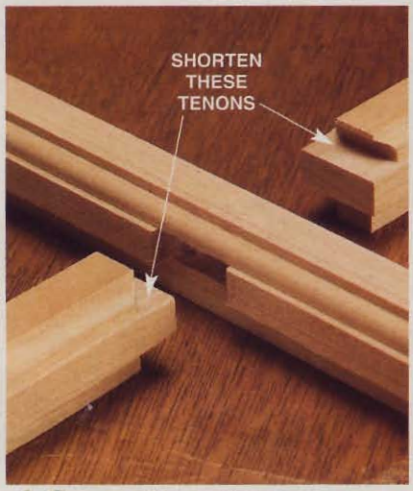
14 **Remove most of the waste** with a mortising bit. You don't have to move the machine's fence. This is the same setup you used for cutting mortises in the rails and stiles.



15 **Pare the tenons to width.** Check the fit of all the tenons in the mortises. File small bevels on the ends of all the tenons so they're easier to insert into the mortises.

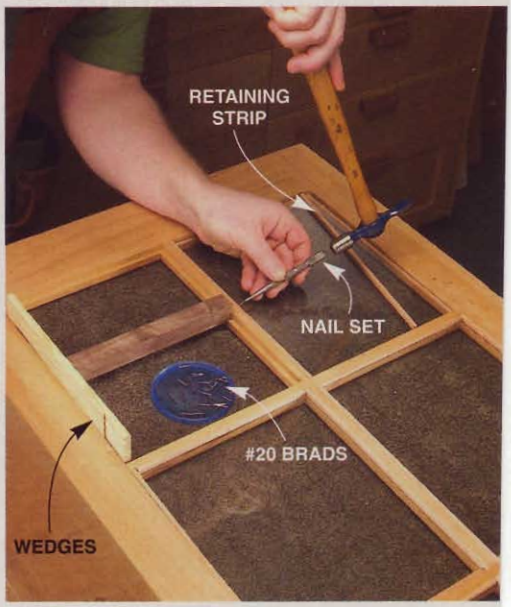
Assemble the Door

The entire door must be glued at one time. It's best to work directly on a large, flat assembly table so you can slide each piece home before clamping it.



16 ***Cut 1/16 in. off the ends*** *of the* vertical muntin tenons. As originally routed, each tenon is slightly over 3/8 in. long. That's too long for the through mortises in the horizontal muntins, which are 3/4 in. wide.

17 **Glue the door.** Squeeze-out around the beads can be difficult to clean up, so use a minimum of glue. Sand and finish the door before you install the glass.



18 **Nail small retaining strips** to hold the glass. Predrill angled holes in the 3/16-in. square strips using a nipped-off brad as a drill bit. Support the muntin with a spacer block wedged in the opposite opening. Use a nail set to keep the hammer's head away from the glass.

Sources CMT, (888) 268-2487, www.cmtusa.com Divided-light door set, #800.525.11, $228. • Freud Tools, (800) 334-4107, www.FreudTools.com Divided-light cabinet door bit set for 13/16- to 1-in.-thick stock, #99-270, $150. • MLCS, (800) 533-9298, www.mlcswoodworking.com Window-sash bits for 7/8 in. to 1-1/2 in. thick stock: a single reversible bit, #8893, $55; a two-piece matched set, #8894, $85. Miniature stile-and-rail bits for 1/2- to 3/4-in.-thick stock, #8848 $70.

The Magic of Cherry

"No wood can rival the depth and complexity of cherry's color and figure."
–Thos. Moser

I'm sitting at a figured-cherry writing desk I built more than 20 years ago. I intimately know every square inch, but when my eyes wander from my laptop computer to the wood, it always captures my imagination. What is it about old cherry that's so endlessly fascinating? Cherry is surprisingly bland when freshly planed, but after a few years, it glows like the embers of a warm, comforting campfire. To make that magic happen doesn't require smoke and mirrors, though, just smart purchasing and shrewd woodworking skills.

by Tom Caspar

Cherry's Allure

For my home, dark walnut is too formal, light maple too stark. I prefer working with American hardwoods rather than imported species, so when I want a medium-toned wood to relax with in my home, I build with cherry. It's fairly easy to work, like walnut or red oak, but the real appeal for me is its rich appearance.

Exceptional Curly Figure

Curly figure is quite common in cherry. As you walk around a figured board, the dark areas turn light and the light areas go dark, just like the luster of fine silk. Even a small amount of subtle curly figure under a clear finish can make magic. This stunning 3-D effect is called *chatoyancy*. Large-scale lumber dealers generally don't separate curly from straight-grained boards. When lumberyard boards are planed hit-or-miss, you can easily spot the curly wood. With some practice you can even spot chatoyancy in rough, unplaned lumber. Just look for dark ripples that go across the width of the board.

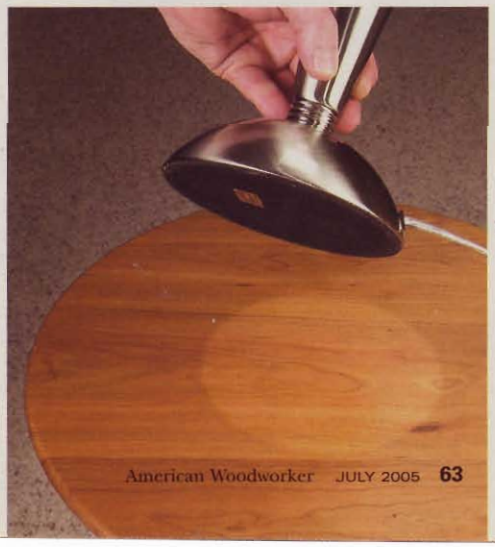
Age Improves Color

The real beauty of cherry takes time to mature. Cherry is a uniform pale salmon color when first cut, but over the course of a year or so, its surface slowly turns to a dark auburn set against a golden background. It is possible to stain or chemically treat a brand-new project so it looks somewhat like this deep color, but your best bet is simply to use a clear finish and be patient. As with aging a fine wine, let nature do its work.

Beware the Phantom

Cherry needs unobstructed exposure to light and air to turn color evenly. Don't leave a lamp, book or other solid object on top of your cherry furniture for an extended length of time during its first year. The wood underneath the object won't darken as fast, which results in a light-colored phantom "shadow" that may never completely disappear.

This problem starts when you first plane rough cherry boards. After planing, if you leave them piled willy-nilly overnight, you'll get shadow lines where they overlapped. At the end of a day's work, I stand all my boards on edge, separated from one another, so all faces get equal exposure to light and air.



ART DIRECTION: VERN JOHNSON • PHOTOGRAPHY: PAGE 62, THOS. MOSER; CHRONICLE BOOKS, 2002 (OTU); OTHER PAGES, PATRICK HUNTER UNLESS NOTED

Matching Color and Figure

The biggest challenge in working with cherry is to select boards that harmoniously blend with each other. I've spent hours at a lumberyard picking through piles of cherry, looking for the right family of boards, and the extra time is worth it.

Choose Carefully, Don't Stain

Cherry boards come in many shades. I look for boards that are similar in color and figure so I can use a clear finish and let the wood change color naturally. Many nonwood-workers assume cherry is very dark and has little or no figure. That's because most commercial cherry furniture is stained or toned to even out color differences and blend in light-colored sapwood. I understand the economics of this practice, but in my small shop, I consider stain a last resort. It simply obscures the magic.

Buy a Log

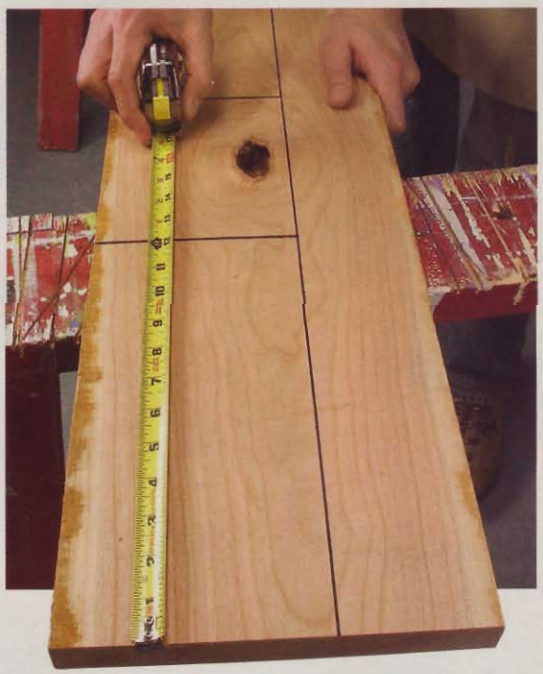
Some custom sawmills go to a lot of trouble to restack whole logs after they've been cut and dried (see Sources, page 65). This is a gold mine for cherry prospectors. Naturally, this wood will cost a bit more. Most custom mills have a $300 or so minimum order. You can buy an entire log (often called a flitch) or neighboring boards, depending on the mill's sales policy. Keep in mind that all the wood in a log won't necessarily be the highest grade. Some boards may have knots and checks. To avoid any misunderstandings, it's best to phone in rather than e-mail an order.

Saw a Giant Board

When it comes to matching color and figure, the next best thing to buying a cut-up log is to saw one yourself. You don't need a sawmill in your backyard, just a good bandsaw. Look for the longest, widest, thickest cherry board you can find. For a project requiring a modest amount of solid wood, you might get all the parts from one humongous board. Maybe it'll take two monsters. For maximum yield, rip and resaw the board before planing.

Smart Buying

Whether you're visiting a local lumberyard or ordering cherry by phone, you've got to know the wood and keep up with the lingo. I was recently surprised to learn that you can buy a super-premium grade of cherry if you know what to ask for.



The "All-Red" Grade

Be on the alert for light-colored sapwood when you select cherry boards. It's a dramatically different color than the heartwood. It's perfectly OK to have sapwood on the hidden, inside face of your boards, but sapwood on the outside face can be very hard to disguise.

Sapwood isn't considered a defect when most cherry is graded. That means Select and Better cherry boards, the highest standard grade, may well contain lots of sapwood, or none at all.

Some lumber dealers select cherry boards that have little or no sapwood and sell them at a premium price. They might be labeled as "all-red" or some variation of that phrase. This is a grade that has not been standardized nationally, so the percentage of sapwood allowed varies from dealer to dealer.

Lower Grade = Savings

Prime cherry costs from $5 to $9 per bd. ft. Only a small percentage is designated as the highest Select and Better grade. Grading is based on minimum widths and lengths and a low incidence of knots. No. 1 Common is a lower, less-expensive grade, and there's plenty available. You just have to plan around the knots or glue narrow boards to make wide ones.

Pennsylvania Grows the Best

Although good-looking cherry grows throughout the Eastern United States, wood from the Allegheny Plateau in northwestern Pennsylvania has a national reputation for being a more uniform, richer red color than cherry from other regions. Thos. Moser, the founder of a high-end furniture company specializing in cherry for more than 25 years, exclusively uses Pennsylvania cherry.

Watch Out for Gum Pockets

Gum pockets are small black streaks that occasionally form under the bark. Gum pockets aren't rated as defects when cherry boards are graded, but they can mar the appearance of an otherwise gorgeous board. On the other hand, placed judiciously, gum pockets can add character to an otherwise plain surface. Whatever your philosophy, it's a good idea to look for gum pockets before you cut full-size boards.

Sources Hearne Hardwoods, (888) 814-0007, www.hearnehardwoods.com • Page 62 photo and quote from the book: *Thos. Moser, Artistry in Wood,* by Thomas Moser with Brad Lemley, ©2002. (Used with permission of Chronicle Books LLC, San Francisco, CA; visit us at www.chroniclebooks.com.)

Random-Orbit SANDERS

by Richard Tendick

How they work, how to choose the right one and tips for better results.

Random-orbital sanders are terrific time-saving machines. They can remove milling marks left by a tablesaw, jointer or planer in no time flat. As simple as they are to operate, though, we found in our test that they're widely misunderstood tools.

Knowing how to use a sander correctly is as important as picking the right model. Through a series of questions and answers, we'll explain how learning the correct technique can improve the results you get, no matter which sander you choose.

We'll also show you how to pick the model that best fits your needs. Some sanders cut very quickly but leave behind relatively large swirl marks. Others cut slowly but leave a smoother finish. How do you tell them apart? We'll give you the inside story.

MIKE KRIVIT

Types We Tested

Palm-grip 5-in. random-orbital sander

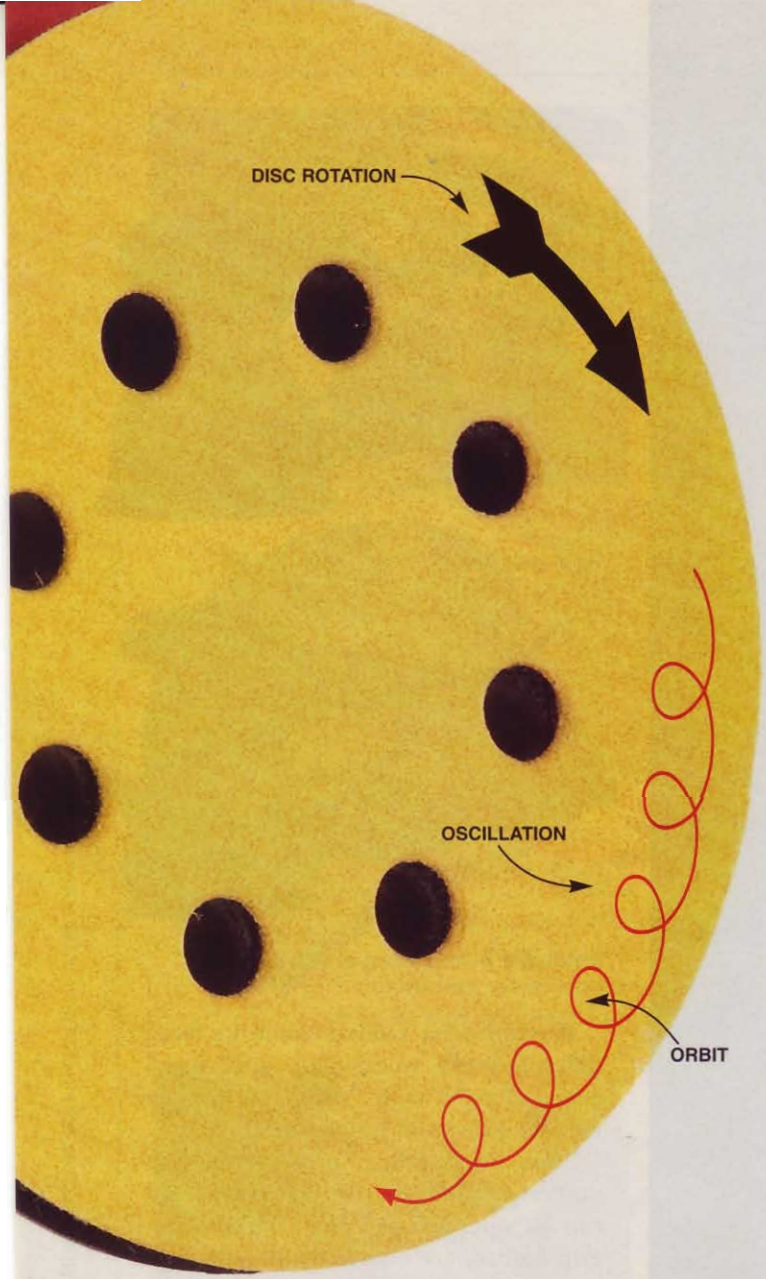
Pistol-grip 6-in. random-orbital sander

Random-orbit sanders come in three different body types: palm grip, pistol grip and right angle. We tested the first two: the palm- and pistol-grip styles.

Most woodworkers prefer palm-grip sanders because they're lightweight and can be operated with one hand. Palm-grip sanders are only available with 5-in. discs. All sanders with 6-in. discs are equipped with pistol-style grips. Their increased weight and torque generally require two hands to control, but most pistol-grip sanders may also be used one-handed. They have an additional palm grip above the motor. A few 5-in. sanders also have pistol grips because this design is standard in Europe.

Some random-orbit sanders run on compressed air rather than electricity. These pneumatic models are lightweight and very powerful, but they require a large air compressor to operate. We didn't include pneumatic models in this test.

EDITOR: TOM CASPAR • ART DIRECTION: RICK DUPRE • PHOTOGRAPHY: PATRICK HUNTER, UNLESS NOTED • ILLUSTRATION: FRANK ROHRBACH



What does the disc actually do?

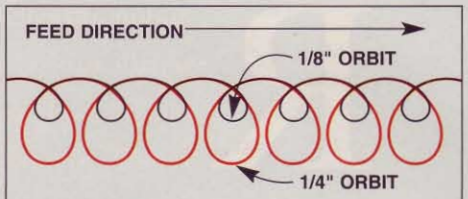
The disc on a random-orbit sander moves in two independent ways: It oscillates and rotates. This should produce a smooth finish without visible scratches, but success also depends on proper technique (see "Correct Speed and Pressure," page 69).

Oscillation produces tiny circles, or "orbits." Each orbit is always the same diameter on any individual sander, but that diameter varies from machine to machine.

The disc's rotation speed varies with the amount of pressure you put on the sander. As you push harder, the rotation slows; however, the disc continues to oscillate and make the same size orbits. Slowing the disc's rotation makes the pattern of swirl marks you leave behind much more visible (see "Correct Speed and Pressure").

What makes one 5-in. sander cut faster than another?

With most tools, more horsepower means faster stock removal. Random-orbit sanders are somewhat different. The orbit's size primarily determines how quickly a machine sands, given the same disc diameter. Orbits vary from a miniscule 3/32 in. to a huge 1/4 in., which is almost three times as large (see Chart, page 74).



Sanders with large orbits cut faster than sanders with small orbits simply because large orbits cover much more ground in the same amount of time. Larger orbits leave more visible swirl marks, however, because the loops are bigger.

Why does one 5-in. sander make a finer finish than another?

The orbit's size also determines how easy it is to see swirl marks. A small orbit makes small swirl marks, which are hard to see. Large orbits make large swirl marks that are more visible. No matter which sander you use, however, it's good practice to remove the swirls altogether by hand sanding prior to finishing. The smaller the orbits, the easier this will be.

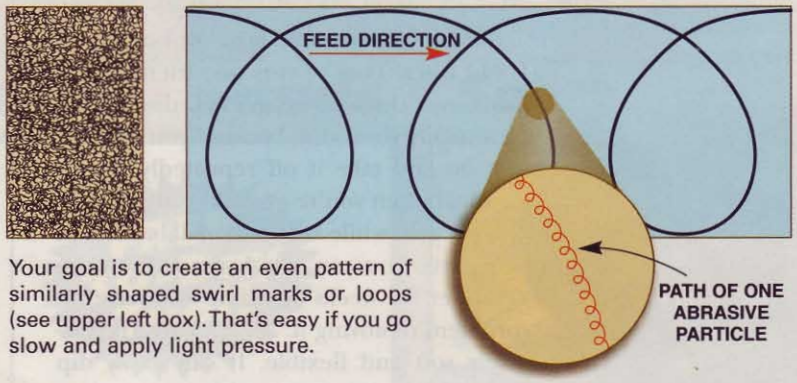
What orbit size should I look for?

Sanders with large orbits (more than 3/16 in.) are designed for quick stock removal. Sanders with small orbits (less than 1/8 in.) are designed for finishing work. Orbit size on most sanders falls somewhere in between. Two 6-in. models—Metabo SXE450 and Ridgid R2610—can switch from large to small orbits.

How can I improve my sanding technique?

The two keys to good results are to slow your arm action and lighten your pressure. Lots of woodworkers routinely commit two errors: They move the sander too fast and push down too hard. That reaction is only natural, though. When you sand by hand, both techniques get the job done more quickly with no apparent ill effect. With a random-orbit sander, however, both techniques are counterproductive, because they produce more noticeable scratch patterns.

Correct Speed and Pressure

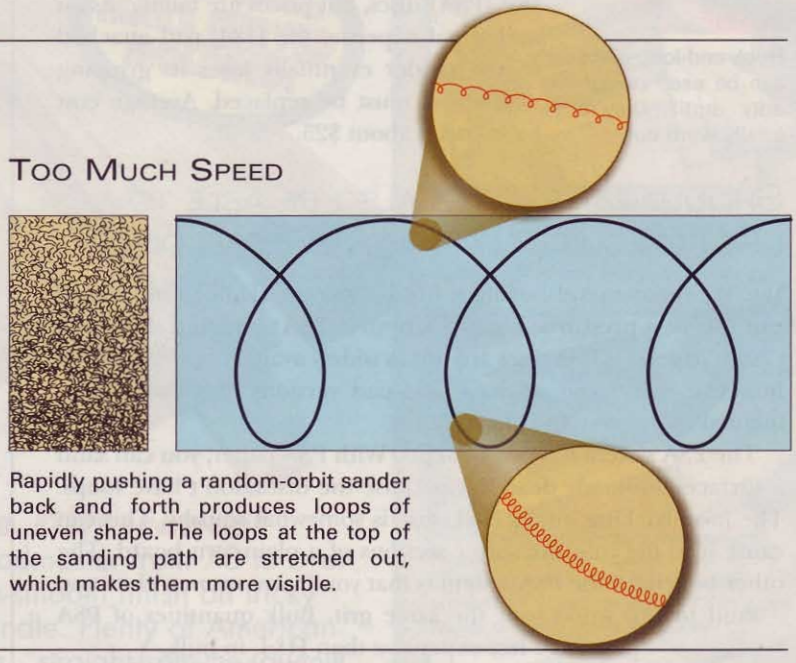


Your goal is to create an even pattern of similarly shaped swirl marks or loops (see upper left box). That's easy if you go slow and apply light pressure.

How fast should I move the sander?

To make an even scratch pattern, slow to a crawl. You should take 5 to 10 seconds to go 6 in. Going too fast creates an uneven pattern, with long, drawn-out swirl marks at the top of the sanding path and a denser pattern of bunched up marks at the bottom. This also leaves an uneven surface, with more wood taken off at the path's bottom than at its top.

Too Much Speed

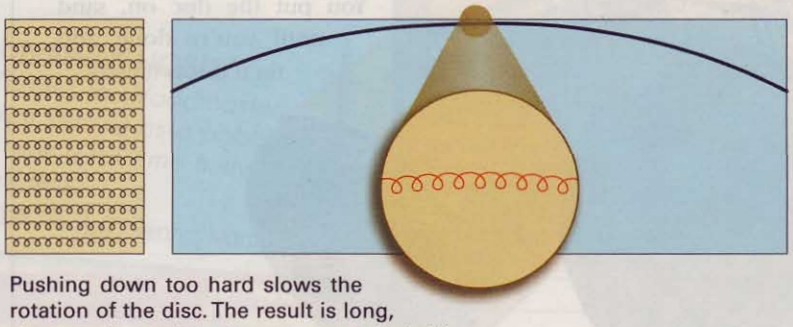


Rapidly pushing a random-orbit sander back and forth produces loops of uneven shape. The loops at the top of the sanding path are stretched out, which makes them more visible.

How hard should I press down?

Light pressure is best, about 2 to 4 lbs. (That's about the weight of your arm.) Light pressure allows the disc to rotate at top speed and make the most evenly distributed swirl pattern. It's true that pushing down harder actually removes wood faster, but most of the time it's counterproductive. That's because pushing too hard leaves behind a stretched-out pattern of swirl marks that will take even more work to remove with the next grit. It can also create dished-out areas that won't be visible until you apply a finish.

Too Much Pressure



Pushing down too hard slows the rotation of the disc. The result is long, deep tracks, rather than a more desirable random pattern of loops.

What are the pros and cons of hook-and-loop discs?

Hook-and-loop discs can be used repeatedly until they're totally worn out.

All the sanders we tested take hook-and-loop (H&L) discs. They're very user-friendly. You won't ever throw away an H&L disc before it's totally worn out, because you can put it on and take it off repeatedly. That's ideal when you're going through multiple grits while sanding small batches of parts. You can also leave a disc on a sander for weeks at a time and have no problem removing it. An H&L disc is relatively soft and flexible. It can easily dip into slightly low spots, which saves time sanding.

On the negative side, H&L discs are about twice as expensive as pressure-sensitive adhesive (PSA) discs, but prices are falling. As an additional expense, the H&L pad attached to the sander eventually loses its gripping ability and must be replaced. Average cost for a pad is about $25.

Should my sander also be able to use pressure-sensitive-adhesive discs?

Yes. We recommend buying a hook-and-loop (H&L) sander that can accept a pressure-sensitive-adhesive (PSA) pad and discs (see Chart, page 74). PSA discs are not as widely available as H&L discs, however. Some sanders have PSA-pad versions, but they're not inclued in our test and chart.

The PSA system has two benefits. With PSA paper, you can sand a surface absolutely dead flat because the discs don't have loops. The loop backing on an H&L disc is somewhat squishy. This can cause it to dig into the softer sections of a plainsawn board. The other benefit of the PSA system is that you'll save money when you sand lots of wood with the same grit. Bulk quantities of PSA paper are less expensive than H&L in bulk.

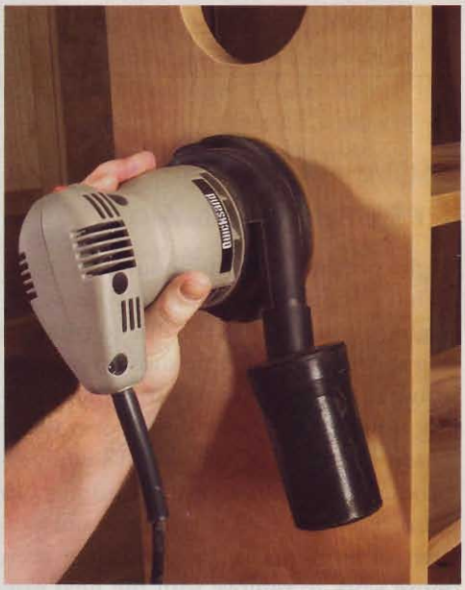
On the down side, a PSA disc usually can't be reused because the adhesive back is easily fouled with sawdust. You put the disc on, sand until you're done and then throw it away.

Pressure-sensitive-adhesive discs cost much less than hook-and-loop discs but usually will stick to the pad only one time.

Should I buy a 5-in. or a 6-in. sander?

Our preference for all-around work is a 5-in. sander. It's easy to maneuver and comfortable to hold in various positions. A 6-in. sander cuts faster, however, because its disc is larger and its motor more powerful. A 6-in. sander is about twice as heavy as a 5-in. sander, so it's awkward to use in a vertical position. If you've got lots of large, flat surfaces to sand, though, a 6-in. sander can be a real time-saver.

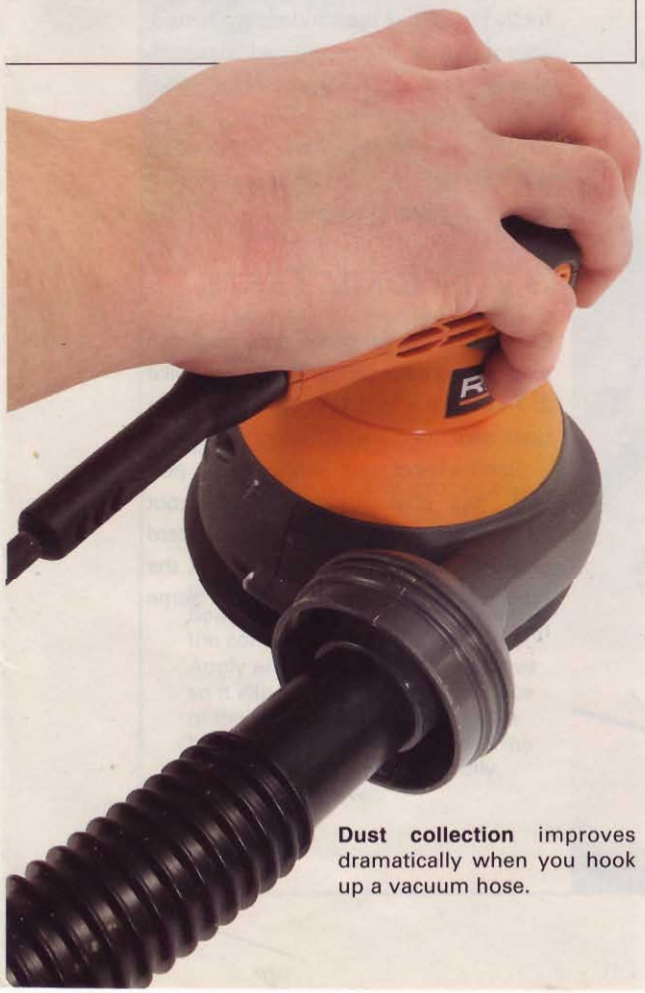
A 6-in. sander works quickly on large areas because its disc has almost 50 percent more sanding surface than a 5-in. sander. All 6-in. sanders have two-handed pistol grips.



A palm-grip 5-in. sander is easy to hold on both vertical and horizontal surfaces.

TIP:
Empty your bag often!

It can fill up before you know it. When that happens, dust backs up into the motor. All those gritty particles will slowly destroy it. No kidding!



Dust collection improves dramatically when you hook up a vacuum hose.

Should I buy a sander with a dust collection bag or a canister?

Both work, up to a point. Cloth and paper bags are about 60 to 70 percent effective; canisters with pleated microfilters are about 80 to 90 percent effective. Pleated filters are much more effective in capturing the smallest dust particles, which are the greatest threat to your health. But no type of onboard collection is as effective as hooking up to a shop vacuum.

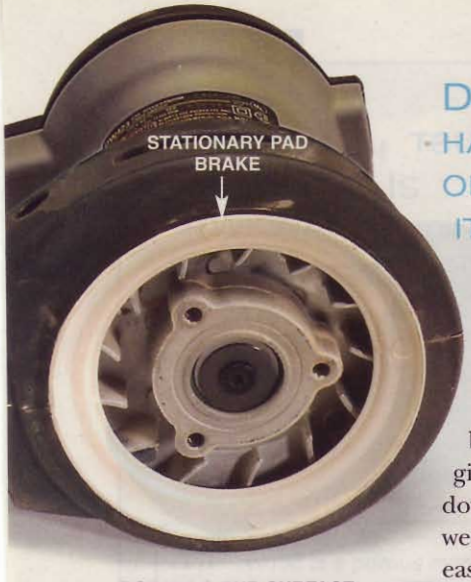
Paper bags are disposable. When they fill up, you just toss them out. This avoids creating the cloud of dust that a cloth bag makes when you shake it out.

Both canisters and the supports under paper bags stick out quite a bit. They can get in the way when you're working in tight quarters. Some models have optional cloth bags for these situations.

Do all sanders easily accept a vacuum hose?

No. This is a major difference among machines. Most sanders have round dust ports for directly hooking up a hose, but others have oval or rectangular ports that require an additional adapter from the manufacturer. Dust-port diameters are all over the map. Some sanders have ports sized to fit one of three common hoses (1-1/4 in., 1-3/8 in. or 2-1/4 in. outside diameter). Other sanders with odd-sized round ports require a manufacturer's hose or adapter or a universal stepped adapter (see Source, page 74). It's frustrating that neither dust ports nor hoses have been standardized.

Despite that, vacuum collection works amazingly well and has three major benefits. You'll get better results, your shop will be cleaner and your lungs will be healthier. It's the way to go!

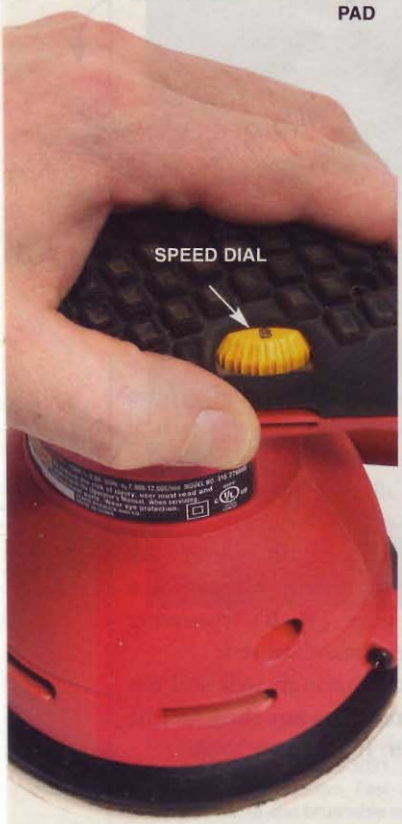


Do most sanders have some sort of brake? Does it wear out?

Most sanders have a simple device called a pad brake that is always on. It keeps the motor from spinning too fast when you lift the sander off your work. The brake prevents the disc from digging into the wood when you set it down on a new area. A brake can wear out, but it's inexpensive and easy to fix.

The simplest and most common pad brake is a stationary plastic ring that constantly rubs against the pad. Eventually, the ring wears down. Replace it when your motor revs way too high as you remove it from a workpiece.

Permanently removing the pad brake increases the speed of the disc so it cuts slightly faster. This shouldn't harm the motor, but it could void your warranty. And you will lose the no-digging-in benefit.



What are the benefits of variable speed?

Ever sand through veneer? Variable speed lets you slow the disc so you can more closely monitor your progress. That's helpful when you're leveling a face frame with a plywood cabinet, for example. Slightly slowing the maximum speed also allows you to find a machine's sweet spot, where noise and vibration are minimized. Many models come in both single-speed and variable-speed versions. It's not a big deal, but we think the few extra bucks for variable speed is worth it.

Is your san

During this test, we noticed that some sanders run much more smoothly than others. The smooth runners are easier to control and more comfortable to hold for long periods. Sanders that didn't run smoothly either vibrated too much, wobbled excessively or shook so much that they would unexpectedly run off in random directions. Who wants one of those?

Identical Models, Different Behavior

No individual make or model stood out as the best or the worst, for one simple reason: Identical sanders from the same manufacturer may actually behave quite differently.

Let's take three hypothetical sanders with the same model number. Sander A shakes but doesn't vibrate or wobble. Sander B doesn't shake, but it does vibrate and wobble. Sander C runs perfectly fine. Of all the sanders we tested, approximately 10 percent had unacceptable levels of shake, wobble or vibration.

We concluded that buying by brand name alone won't guarantee that you'll get a sander that runs as smoothly as a top. You've got to try it out.

3 At-Home Tests

Our advice is to make sure you can exchange a new sander if you don't like it. Then take it for a test drive, using the tests described at right.

Don't expect your sander to be perfect. Your goal is simply to find out whether you've received a substandard unit. The odds are slim. Fortunately, the next unit on the shelf from the same manufacturer is probably OK.

der a smooth runner?

The Control Test

Turn on your sander and hold it by the cord's strain reliever. You should be able to easily control which direction it goes.

The Wobble Test

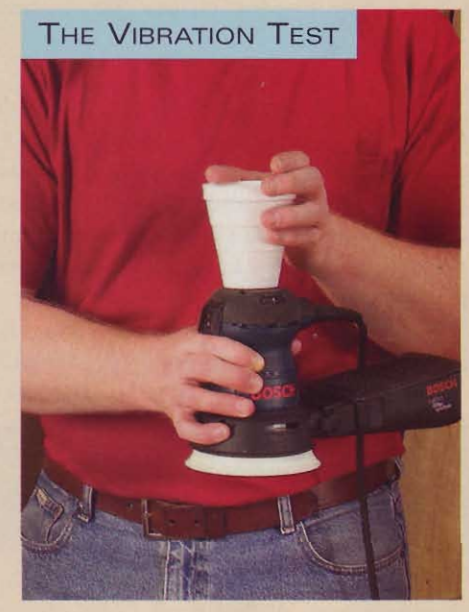
A sander wobbles in use when its top slowly rotates off center, like a child's toy top about to fall over. This is the least annoying of the three problems a sander may have—and it's the only one you can fix.

To measure wobble, unplug your sander, remove the sanding disc and butt the machine up to a pile of blocks and a ruler. Slowly rotate the sanding pad by hand. If the sander's top wobbles away from the ruler by more than 1/16 in., it's too much. Mark the pad at the point where the top is farthest from the ruler.

Remove the pad from the sander. Mark the same spot on the sander's driving plate.

Shim the "low" spot with small pieces of thin tape. Reassemble the sander and repeat the test with the ruler. Add or subtract shims until the wobble is minimized.

The Vibration Test



Slightly press a partially filled Styrofoam cup on top of your sander. The ripples on the coffee's surface show you how much the sander vibrates.

Waves around the perimeter and a calm interior indicate an acceptable level of vibration.

Waves covering the whole surface indicate a high level of vibration.

RECOMMENDATIONS

All random-orbit sanders we tested perform well when you've figured out the right technique: light pressure and slow feed (see "Correct Speed and Pressure," page 69).

The rate at which a sander cuts depends on two things: the disc's diameter and the orbit's diameter. A 6-in. sander does more work in less time than a 5-in. sander, but it's also much bulkier. A sander with a 1/4-in. orbit removes wood faster than a sander with a 1/8-in. orbit. Larger orbits also produce larger swirl marks, however.

If your primary goal is to remove wood fast, choose a large-orbit sander, such as the 5-in. Bosch 3725DEVS ($135). A 6-in. large-orbit sander, such as the Ridgid R2610 ($149), works the fastest. If a smooth finish is your most important goal, choose a slower-cutting, small-orbit sander, such as the Porter-Cable 333VSK ($80). Many other sanders have a compromise mid-size orbit.

In any case, look for a sander that's easy to hook up to a vacuum hose. The benefits of sanding without dust are so great that we feel this is a must. We also prefer a sander with variable speed, an optional PSA pad and a low noise level. Some manufacturers offer less-expensive models similar to those listed below that don't have variable speed.

Manufacturer	Hook-and-loop model	Street price	Grip Type	Weight (lbs.)	PSA pad option	Variable speed	Orbit diameter	
5" sanders								
Bosch	1295DVSK	$80	Palm	3.5	Y	Y	3 mm	.118"
Bosch	3107DVS	$90	Pistol	5.0	Y	Y	5 mm	.197"
Bosch	3725DEVS	$135	Pistol	5.1	Y	Y	5 mm	.197"
Craftsman	11695	$45	Palm	3.8	N	Y	4 mm	.157"
Craftsman	27989	$79	Palm	3.8	N	Y	1/10"	.100"
DeWalt	D26453	$84	Palm	4.0	Y	Y	3/32"	.094"
Festool	ES125EQ	$155	Palm	2.4	N	Y	2 mm	.079"
Makita	BO5010	$66	Palm	2.6	Y	N	1/8"	.125"
Makita	BO5012K	$74	Palm	2.9	Y	Y	1/8"	.125"
Makita	BO5021K	$106	Pistol	3.1	Y	Y	1/8"	.125"
Metabo	SXE425	$145	Pistol	5.2	N	Y	3/16"	.187"
Milwaukee	6019-6	$84	Palm	2.9	Y	N	3/32"	.094"
Porter-Cable	333VSK	$80	Palm	3.5	Y	Y	3/32"	.094"
Ridgid	R2600	$70	Palm	3.0	Y	Y	3/32"	.094"
Ryobi	RS241	$39	Palm	2.8	Y[1]	N	3/32"	.094"
Ryobi	RS280VS	$50	Palm	3.5	Y[1]	Y	5/32"	.156"
Skil	7490-01	$40	Palm	2.9	N	N	2.5 mm	.098"
6" sanders								
Bosch	3727DEVS	$150	Pistol	5.2	Y	Y	4 mm	.157"
Festool	ETS150/5EQ	$235	Pistol	4.0	N	Y	5 mm[9]	.197"
Makita	BO6030	$169	Pistol	5.1	Y	Y	1/8"	.125"
Metabo	SXE450	$175	Pistol	6.5	Y	Y	1/8" & 1/4"	.125" & .250"
Ridgid	R2610	$139	Pistol	6.0	N	Y	1/8" & 1/4"	.125" & .250"

Source Highland Hardware, (800) 241-6748, www.highlandhardware.com
7/8-in. to 1-1/4-in. Flexible Step Adapter, $3.30, #921072. 1-in. to 2-1/2-in. Flexible Step Adapter, $5.

2005 AMERICAN WOODWORKER BEST BUY

RIDGID R2600, $70

Many 5-in. professional-quality sanders perform very well, but this one stands out as a good value. It comes with a lifetime service agreement that offers free replacements for two normal-wear items: the hook-and-loop pad and pad brake. And it readily accepts a 1-1/4-in. vacuum hose.

Onboard dust collection	Round dust port	Dust port diameter [5]	Number of holes in disc	Noise level (decibels)	Contact
Canister [2]	N [3]	NA	8	89	(800) 267-2499, www.boschtools.com
Canister [2]	N [3]	NA	8	90	(800) 267-2499, www.boschtools.com
Canister [2]	N [3]	NA	8	87	(800) 267-2499, www.boschtools.com
Cloth bag	Y	1-3/16"	8	89	(800) 377-7414, www.sears.com
Cloth bag	Y	1-1/4", 2-1/4"	8	90	(800) 377-7414, www.sears.com
Cloth bag	Y	1-1/4"	8	90	(800) 433-9258, www.dewalt.com
Paper bag	Y	1-1/8" [6]	8 [7]	84	(888) 337-8600, www.festool-usa.com
Cloth bag	Y	7/8" [6]	8	85	(800) 462-5482, www.makitatools.com
Cloth bag	Y	7/8" [6]	8	88	(800) 462-5482, www.makitatools.com
Cloth bag	Y	7/8" [6]	8	88	(800) 462-5482, www.makitatools.com
Paper bag	Y	1-3/8"	8	87	(800) 638-2264, www.metabousa.com
Cloth bag	N [4]	NA	8	82	(800) 729-3878, www.milwaukeetool.com
Canister	Y	1" [6]	5 [8]	84	(800) 487-8665, www.portercable.com
Cloth bag	Y	1-1/4", 2-1/4"	8	87	(800) 474-3443, www.ridgid.com
Cloth bag	Y	1-1/4"	8	88	(800) 525-2579, www.ryobitools.com
Cloth bag	Y	1-1/4"	8	89	(800) 525-2579, www.ryobitools.com
Canister [2]	Y	1" [6]	8	83	(877) 754-5999, www.skiltools.com
Canister [2]	N [3]	NA	8	87	(800) 267-2499, www.boschtools.com
Paper bag	Y	1-1/8" [6]	8 [7]	88	(888) 337-8600, www.festool-usa.com
Cloth bag	Y	7/8" [6]	8 [7]	83	(800) 462-5482, www.makitatools.com
Paper bag	Y	1-3/8"	6	88	(800) 638-2264, www.metabousa.com
Cloth bag	Y	1-3/8"	6	87	(800) 474-3443, www.ridgid.com

1. PSA-backed hook-and-loop pad provided.
2. Canister contains microfilter.
3. Adapters for 1-1/4", 1-3/8" and 1-1/2" hose available from manufacturer.
4. Adapter for 1-1/2" hose available from manufacturer.
5. Inside diameter unless noted.
6. Outside diameter.
7. 8 holes with a center hole.
8. 8-hole pad available from manufacturer.
9. Also available with a 3-mm orbit diameter (ETS150/3EQ).

RAMON MORENO

Lighted Quilt Hanger

Decorative quilts make great wall displays, and this quilt valance gives you an easy way to show off a quilt—with light, no less. The top of the valance doubles as a small shelf for displaying plates or other collectibles. The design can easily adapt to any quilt size.

by Randy Johnson

Cut and Assemble the Parts

Start by calculating the size of the parts you need for your quilt according to the Cutting List (see page 86). You can machine your material to final width and thickness at this time, but don't cut the pieces to final length yet.

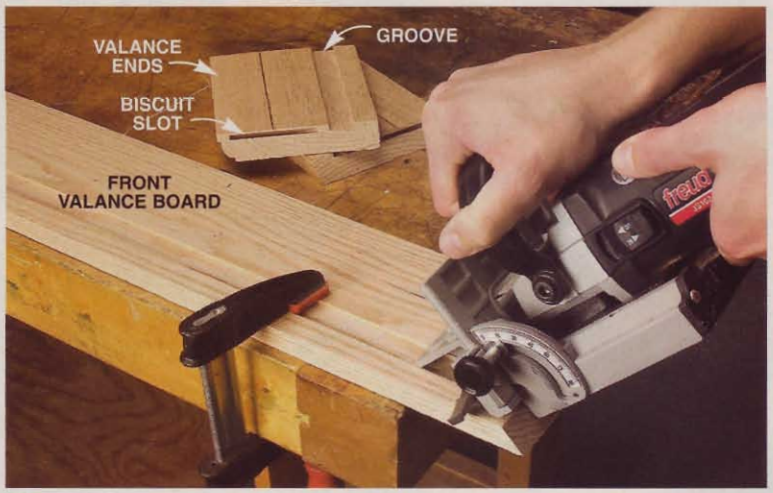
Next rout the profile on the edge and cut the groove on the back of the board you plan to use for the valance pieces (A and B, Fig. A, page 85; Photo 1). Then miter them to final length and cut biscuit slots in the ends (Photo 2). Do a test assembly of the three valance parts and double-check the length for the light board (C).

It's important that the light board not be too long or too short, because it would cause the valance ends to flare in or out and prevent the miter joints from closing properly. When you have the light board cut to the correct length, glue and clamp it to the valance boards. You can skip running clamps the length of the quilt rack if you drive some brad nails through the end valance boards into the ends of the light board (Photo 3).

Next cut and fit the trim boards and screw cleat (D, E and F) to final length and glue them to the valance and light-board assembly (Photo 4). Then make the clamp boards (G and H).

Make the final parts: the cover board (J), spacer blocks (K and L) and the plate stop (M). Assemble these parts with glue and check that they fit into the top of the assembled quilt hanger.

1 Rout the profiles on the valance and trim boards before you cut them to final length. Two common router bits are all you need to make this project: a 3/8-in. cove bit and a 3/8-in beading bit.



2 Cut biscuits in the mitered ends of the valance boards. Position the slots near the miter's inside edge. This prevents the slot from coming through the board's face. The board that the lights mount on will fit into the groove in the back of the valance boards.

3 Glue the valance boards around the light board. You can remove the clamps very quickly if you pin the joint with brad nails.

ART DIRECTION: VERN JOHNSON • PHOTOGRAPHY: PATRICK HUNTER, UNLESS NOTED • ILLUSTRATION: FRANK ROHRBACH

Project Requirements At-A-Glance

Materials:
Four 1x6 boards that are 18 in. longer than your quilt

Tools:
Planer, router table, tablesaw, biscuit joiner, drill driver, level, stud finder

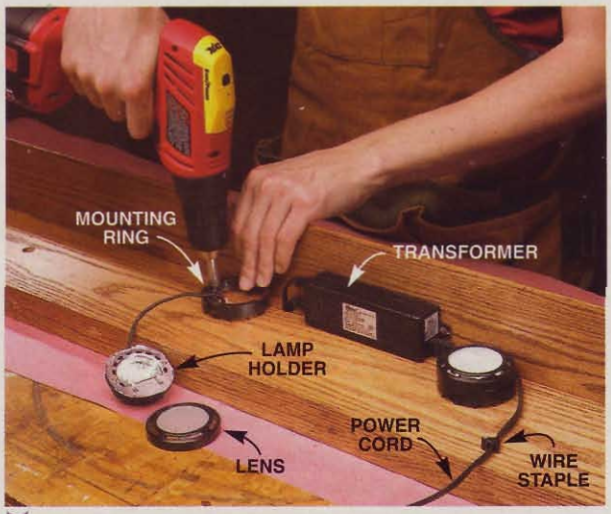
Hardware:
Low-voltage halogen lights, transformer, screw eyes, screw hooks

Cost:
About $100 for this 65-in.-long version, without the quilt

Fig. A Exploded View

The flexible design easily adapts to any quilt size. Simple joinery makes it easy to build.

4 Use spring clamps to glue on the trim board and screw cleat. The trim board covers most of the brad nail holes. Hide any remaining holes with wood filler.



5 Install the lights and the transformer on the bottom side of the light board. Snap the light and lens onto the mounting ring and run all the wires, except the power cord, through the holes to the top side of the light board.

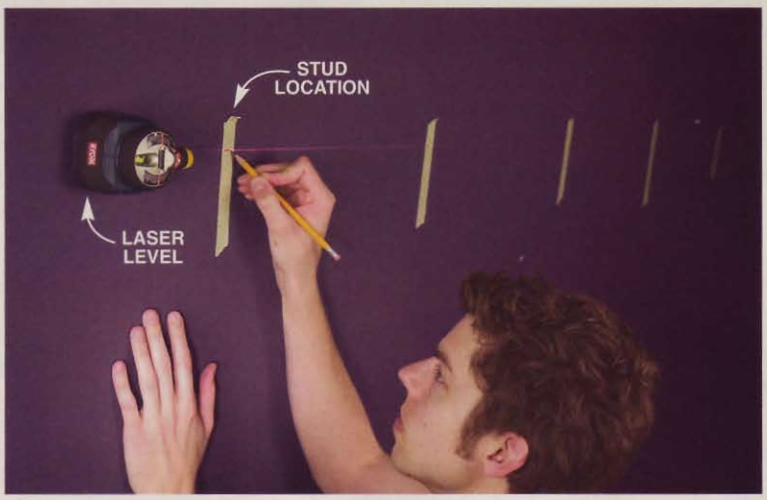
Mount the Lights

Now turn your attention to drilling the holes for the wiring (Fig. A). The lights' spacing will depend on the overall length of your quilt hanger. It is not critical, but I found spacing them between 11 and 14 in. apart to be about right. After the holes for the wiring have been drilled, you can sand and finish the quilt hanger.

When the finish is dry, install the lights (Photo 5). Screw the mounting ring on; then snap the lamp holder and lens into place. The wires run through the holes and are hidden on the top side of the light board.

Hang It on Your Wall

Locate the studs in the wall and mark them with masking tape. Strike a level line at the height you want your quilt hanger installed (Photo 6). Drill holes in the screw cleat to match the stud spacing and attach the quilt hanger to the wall with some long screws. This is really a two-person job, so ask someone to help you hold the quilt hanger in place while you drive in the screws (Photo 7). After the hanger is attached to the wall, screw on the cover board (Photo 8) and fasten the quilt between the clamp boards (Photo 9). Now simply engage the screw eyes on the hooks (Photo 10) and enjoy.



6 Mark a level line on your wall with a laser or bubble level. Use masking tape to mark the location of the wall studs, so you have a secure place to screw in the quilt hanger.

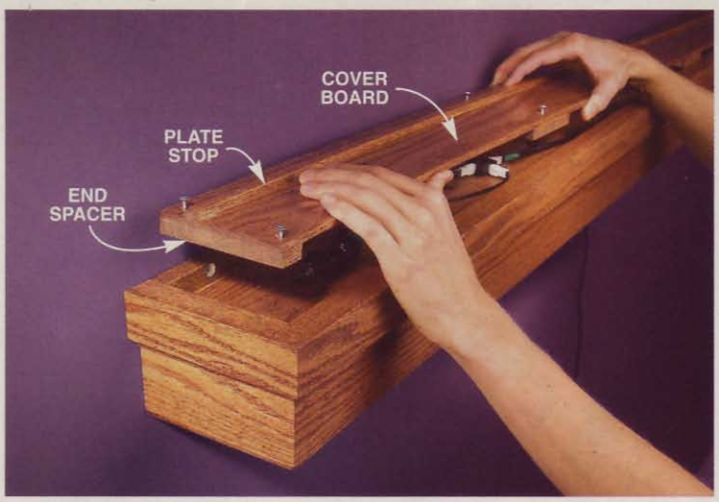
7 Attach the quilt hanger to the wall. Drill holes in line with the wall studs in the screw cleat on the back of the quilt hanger. After the quilt hanger is mounted, you can remove the exposed masking tape.

Cutting List

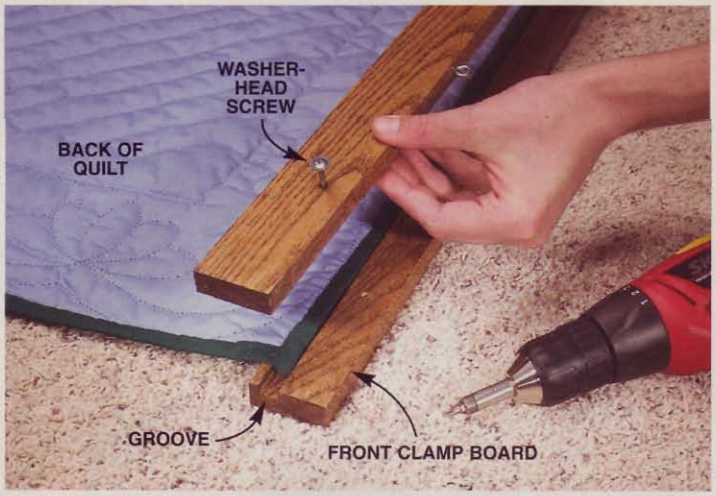
Overall Dimensions: 5"H x 6-1/2"D x L (quilt size + 3-3/8")

Part	Name	Qty.	Dimensions (Th x W x L)
A	Front valance board	1	5/8" x 5" x quilt size + 2-1/2"
B	End valance boards	2	5/8" x 5" x 6"
C	Light board	1	3/4" x 5-1/2" x quilt size + 1-3/8"
D	Front trim board	1	1/2" x 2" x quilt size + 3-1/2"
E	End trim boards	2	1/2" x 2" x 6-1/2"
F	Screw cleat	1	3/4" x 3/4" x quilt size + 1-1/4"
G	Front clamp board	1	3/4" x 2" x quilt size + 1"
H	Back clamp board	1	5/8" x 2" x quilt size + 1"
J	Cover board	1	1/4" x 4-9/16" x quilt size + 1-3/16"
K	End spacer blocks	2	1/2" x 4-9/16" x 1"
L	Side spacer blocks	4	1/2" x 1" x 4"
M	Plate stop	1	1/4" x 1/2" x quilt size + 1-3/16"

Source Woodworkers Hardware Supply, (800) 383-0130, www.woodworkershardware.com Low-voltage four-light kit with transformer, (transformer can handle up to six lights), #WKSR120LCS, $42 per kit. Individual low-voltage halogen lights, #WKAL20 LB, $6.50 ea. #8 x 1-1/4-in. washer-head screws, #SCLP8X114, $4 per 100.



8 Install the cover board with screws. The cover board hides the wires and serves as a shelf to display plates or other collectibles.



9 Secure the your quilt in the clamp boards. Most quilts have a thick edge binding; this fits into a groove in the front board. The simplicity of this clamping and hanging system makes it extremely easy to switch quilts when you want to change your decor.

10 Hang the quilt by engaging the screw eyes in the clamping boards to hooks below the light board. It's an easy, one-person job. Run the power cord behind the quilt, turn on the lights and enjoy!

RAMON MORENO

edited by David Olson

MOBILE BANDSAW

Horsing my bandsaw out of the way was a real pain until I installed a pair of large casters (see Source, below). Now my saw has a built-in two-wheel cart. During use, the saw sits firmly on the floor, because the wheels don't touch the ground. They're also out of the way.

Tipping the saw and balancing it while moving is tricky until you get the hang of it, because the saw is top-heavy and awkward to hold. Although casters make this cumbersome piece of machinery much easier to move, you should only install them if you're comfortable handling heavy loads.

Jock Holmen

Source

Atlanta Caster
(770) 492-0682
www.atlantacaster.com
5-in. rigid casters,
#16TMO5201R,
$12 ea.

Stabilize the saw with your foot when you tilt it back and set it down. Be careful! The wheels make the saw hard to control until you find its balance point.

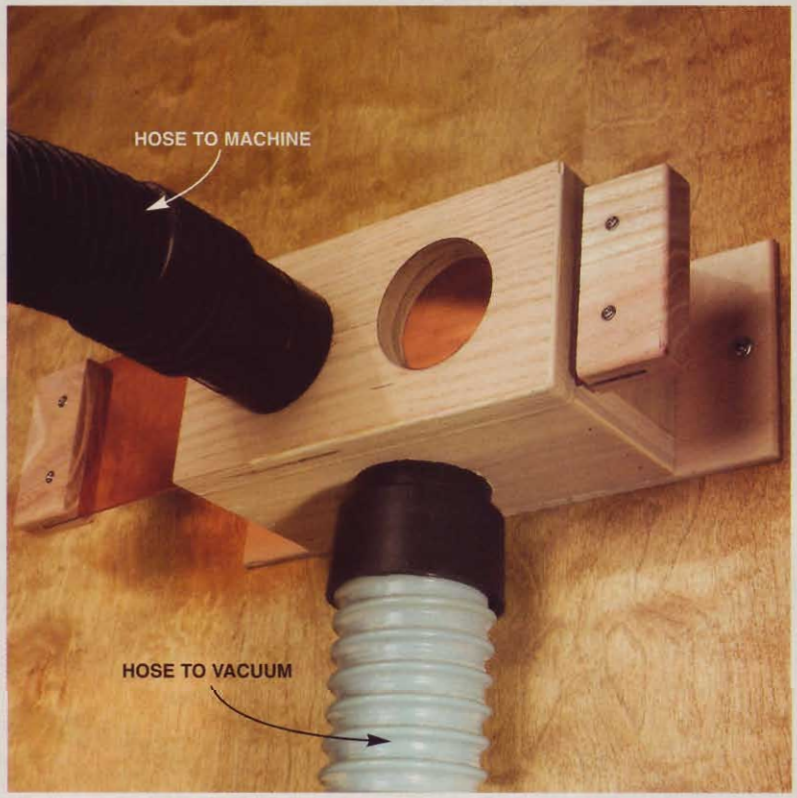
EDITOR: TIM JOHNSON • ART DIRECTION: VERN JOHNSON • PHOTOGRAPHY: PATRICK HUNTER

LIGHTWEIGHT EXTENSION WINGS

Extension wings on the miter saw make cutting long stock a breeze. My shop-made wings install and knock down in seconds and they're as light as feathers. My secret? The wings are made from a hollow-core door. After ripping the door to width, I pushed the internal honeycomb pieces back and glued new pine side rails between the faces. Then I installed swing-down legs for stability. Steel bed-rail fasteners hold the wings level with the saw table. After engaging the fastener, I drop a nail behind the hook to lock the wing in place.

Chas. Bridge

Source Woodcraft, (800) 225-1153, www.woodcraft.com 5-in. bed-rail fasteners, #127456, $11 for a set of four.

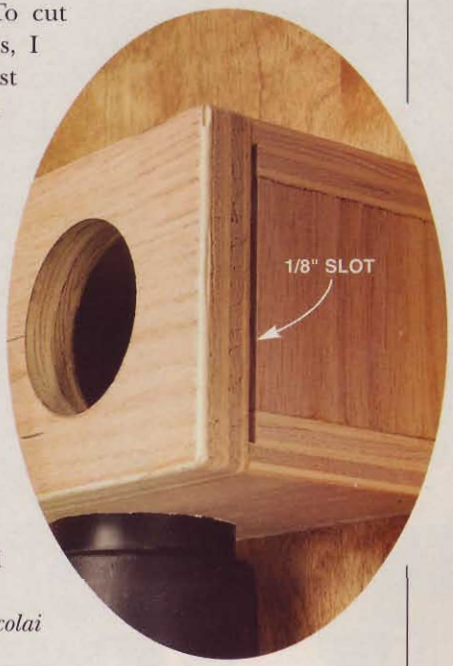


Blast Gate Manifold for Vac Hoses

In my small shop, I use a shop vacuum to collect dust from several tools. To cut down on the need to swap hoses, I built this manifold with two blast gates. Now I transfer suction with a flip of my wrist.

To make the box, I drilled holes for the hoses and rabbeted the box sides for the 1/8-in. blast gates. After cutting the end pieces to match the rabbets, I glued the box together on a long backplate for wall-mounting. I made blast gates from scraps of plastic, but hardboard would work just as well. To make the wooden handles, I sawed a kerf in an oversize blank, cut the handles from the blank and drilled holes for the screws.

Armand Niccolai



If you have an original Small Shop Tip, send it to us with a sketch or photo. If we print it, you'll get $100! Send it to **Small Shop Tips, American Woodworker, 2915 Commers Drive, Suite 700, Eagan, MN 55121 or e-mail to smallshoptips@readersdigest.com.** Submissions can't be returned and become our property upon acceptance and payment. We may edit submissions and use them in all print and electronic media.

Oops! Crazy Mistakes Woodworkers Make

edited by Tim Johnson

Rust Palace

Before leaving town for the weekend, I made room in my garage shop to stack the 500 bd. ft. of freshly cut red oak that I'd just acquired. I aimed a fan at the stack to help circulate the air, so the boards would dry evenly while I was away.

When I returned, I got a big surprise. I don't know how much water 500 bd. ft. of green oak contain, but I can tell you that enough was released in a single weekend to saturate the air in my shop and rust every tool.

Jim Knox

If you have a woodworking blunder that you're willing to share, send it to us. You'll receive $100 for each one we print. Send it to **AW Oops!, American Woodworker, 2915 Commers Drive, Suite 700, Eagan, MN 55121, or e-mail to oops@readersdigest.com.** Submissions can't be returned and become our property upon acceptance and payment. We may edit submissions and use them in all print and electronic media.

Woodworker's Dozen

After examining magazine storage boxes—those fold-together cardboard file boxes with open fronts and slanted sides—I decided my precious magazines deserved something better. So I set about making storage file boxes of solid wood.

I cut pieces to make 12 4-in.-wide file boxes, one for each of my subscriptions. Then I asked my wife to help me with assembly. Instead of gluing and clamping each file box individually, I demonstrated my woodworking prowess by clamping them all at once, using long pipe clamps. My wife was impressed by my ingenuity, and so was I. Unfortunately, I'd forgotten to insert wax paper between each box, to contain glue squeeze-out.

The next day, I made sure my wife was present as I triumphantly removed the clamps. You can imagine her response when we discovered that instead of 12 individual storage file boxes, I'd glued up a single 4-ft.-wide box with 12 compartments.

Dan Cobian

ART DIRECTION: VERN JOHNSON • ILLUSTRATION: STEVE BJÖRKMAN