WOODWORKER'S JOURNAL
BUILD-IT-YOURSELF AND SAVE!
FALL 2009

WOODWORKING for Your Home

10 MUST-HAVE Tools for Your Home Projects

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BATHROOM UPGRADE

Cherry/Bamboo Vanity

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PLUS:

Kitchen Island
Outdoor Swing
Fireplace Mantel
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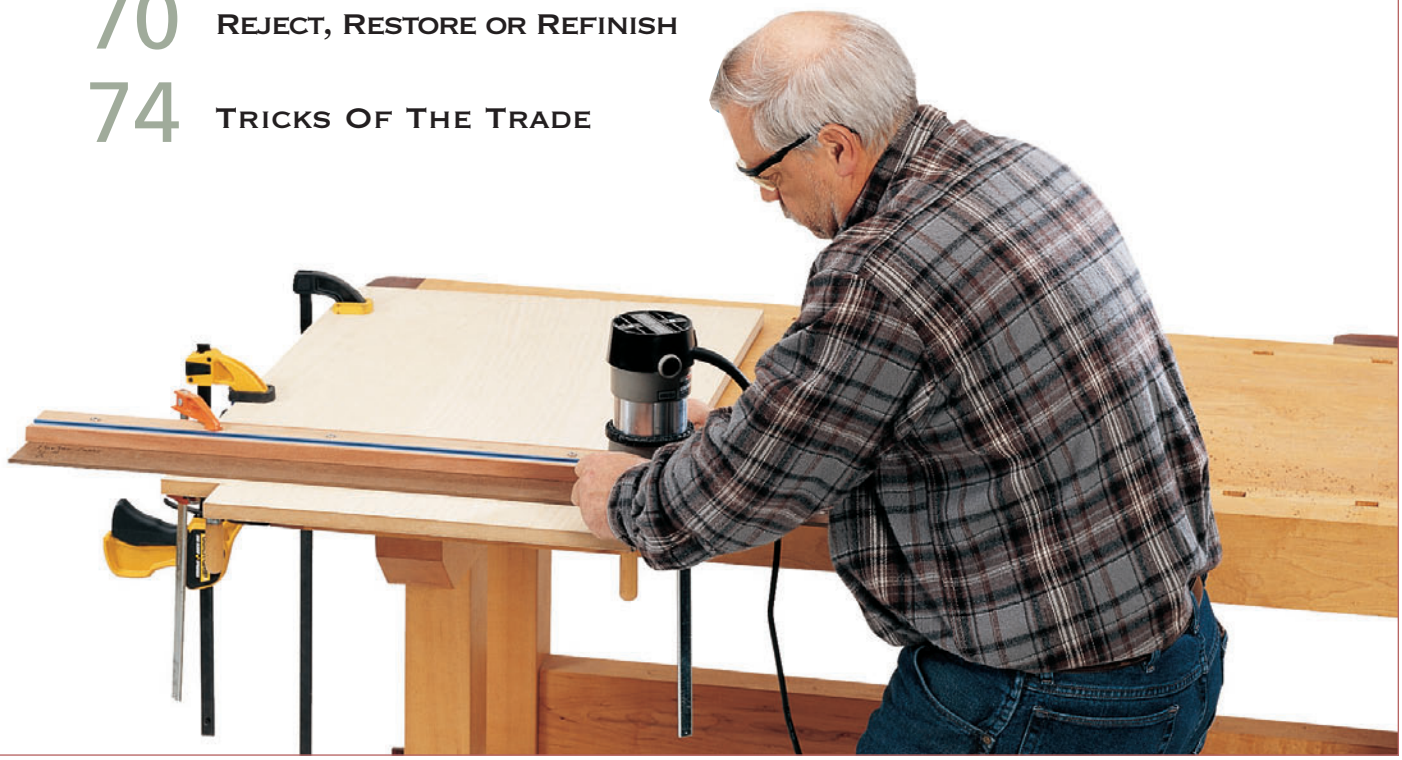

Introduction

Make the leap from DIYer to woodworker!

Most woodworkers I know are active do-it-yourselfers — but the opposite isn't always true. Even so, the skills you've learned from projects like hanging doors, installing trim or framing a new deck aren't all that different from so called "pure" woodworking skills. That's why we put this special issue together... to help you complete the transition from DIYer to woodworker.

With just a few new tools and some skills you probably didn't know you already have, you'll be ready to build wonderful projects that might actually stay with you next time you move! To get you started, Special Projects Editor Chris Marshall rounded up seven of our best home-themed projects from the archives, including a stunning Bathroom Vanity (page 18), bullet-proof Torsion Box Shelves (page 48) and a clever way to wrap a cabinet around utility shelves (page 56). Bill Hylton will even teach you how to make six-panel doors on page 32.

And if you're feeling ready to take the plunge, check out our feature story on page 12. We've covered the top ten essential tools for every home woodworking shop. Long-time contributor Michael Dresdner concludes things with a guide for evaluating finishes that need a little first aid (page 70).

So, read up, and let's get a great home woodworking project started!

Larry N. Stoiaken

Ian Kirby, an expert in torsion box construction, makes super-strong shelves on page 48.

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woodworkersjournal.com

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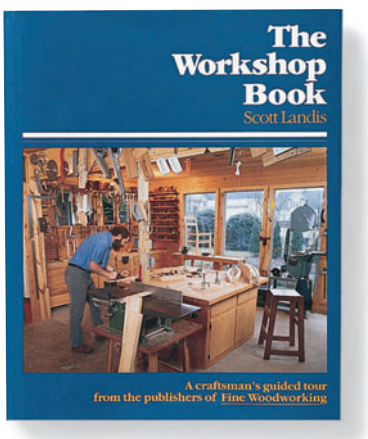
DOVETAIL DRAWERS

Reader Questions, Answered

READERS REGULARLY SUBMIT QUESTIONS ABOUT WOODWORKING TO THE MAGAZINE. WE DO OUR BEST TO ANSWER THEM— OR FIND OTHER EXPERTS WHO CAN. HERE ARE THOSE RESPONSES.



The Workshop Book, by Scott Landis, has our editor's endorsement as a great guide to planning your shop layout.

Q We recently retired to central Texas where it's either hot and humid or cold and humid. A 12' x 16' shed could make a small workshop. I make small items but need space for tool storage. I also need to store a walk-behind lawn mower, wheelbarrow and garden tools.

Aside from the space problem, I'm concerned about dust clogging an air-conditioner filter or exploding from a gas or electric heater. Flammable fumes, too, are a concern. Maybe I want more than I can have, but if you can suggest ways to solve these problems, you'll have my vote for president.

R. R. Ihrig
Whitney, Texas

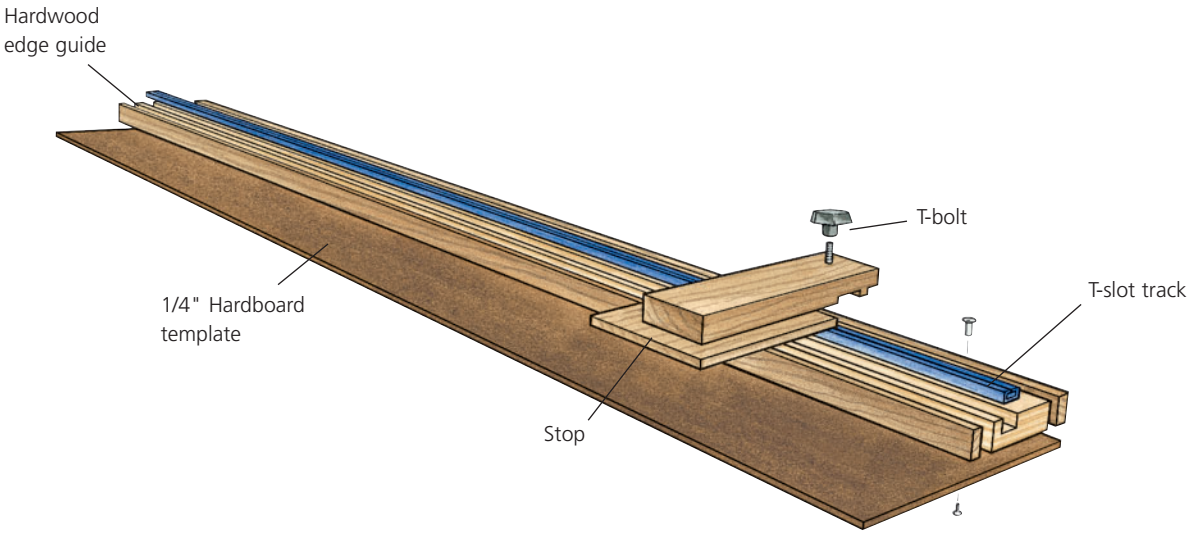
A If nominated, I will not run; if elected, I will not serve ... but thanks for your vote of support! It sounds like you are willing to put some time and money into creating an efficient and functional shop space. And you are doing it in the right way by planning to avoid problems before you begin. My favorite book on this subject remains Scott Landis's *The Workshop Book*, published by Taunton Press.

To your questions about dust and flammable fumes, common sense is the key in dealing with both. Sufficient dust collection (both point-source dust extraction and ambient air filtration) is a great investment. New options for both enter the market continually. In a small space, finishing with hazardous fumes can best be dealt with by avoiding them altogether. With the large selection of shellac and waterbased finishes on the market, not to mention products like wipe-on polyurethane, I would be surprised if you would need to resort to spraying lacquer or the like. I would avoid a heating system that uses an open flame, but I am aware of hundreds of shops that use woodburning stoves to heat them. I wouldn't ... and, in fact, when I run for office, that will be part of my policy statement: I'm strongly against open flames in the workshop.

— Rob Johnstone

Q I am making a garden gate out of red cedar. The gate is 3' x 4' high, but I think the surface is too flat and needs a textural element. I thought that a V-groove in the center and one every 3" expanding outward would break up the surface to give it more visual interest. Do you know of a jig design or another way to keep my router's V-grooves straight and the lines parallel to each other?

Donald Kennedy
East Hampton, New York



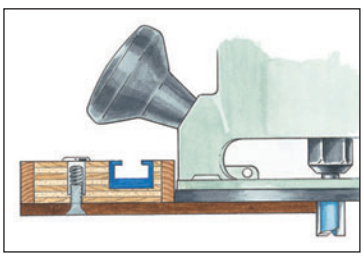
If you have a router table big enough for this project, that would be the ideal solution. Barring that, the next best answer is a straight-edge jig like the one I built for the June 2000 issue of the *Journal* (see *illustration* above).

The heart of the jig is a very straight, jointed plywood fence, which is sealed along its two ripped edges with strips of solid hardwood banding. A groove is then plowed in the top, to house an aluminum T-slot track.

Your router runs along the fence of the jig, and that guides a straight bit along a hardboard template attached to the bottom of the fence.

If you want to customize your jig, you can index the end off your first groove to your 3" spacing. Sandwich the gate on the board, and put a marker to use for indexing off a slot. Then continue down the gate, routing in all your V-grooves.

— Rick White



A router's baseplate rides against the edge of this jig to ensure a perfectly straight cut. A hardwood template marks the bit's path.

A chuck's three jaws seat on the flat part of DeWalt's Pilot Point bits, so the bit can't slip.

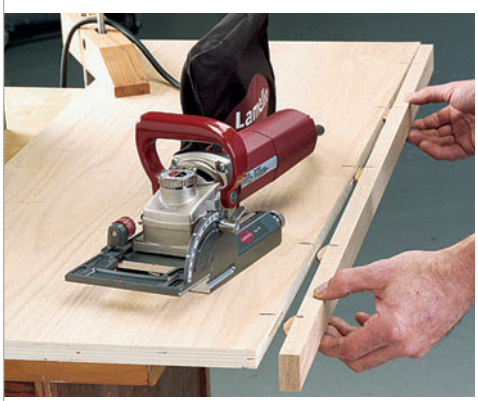
Q No matter what kind of portable drill I use or solutions I try, I can't seem to get keyless chucks tight. The drill bit slips inside the chuck whenever it meets a certain amount of resistance. Is there some secret to securing the drill bit inside the keyless chuck? Some sort of temporary adhesive or slip-resistant coating that I should use? Looking forward to any solutions you might have.

Alexander Bove
Chestnut Hill, Massachusetts

A Although I know of no "miracle coatings" that prevent bit slippage, I can think of several things to minimize the problem. Since keyless chucks with smooth plastic outer shells are difficult to grasp and tighten, you can improve your grip and increase bit-tightening torque by wearing gloves with anti-slip coated palms. To improve your chuck's hold on larger-diameter twist bits, try using flat-ground-shank bits (see photo, above).

It's also important to consider your technique: Are you applying too much pressure as you drill, causing the bit to slip? Try a little less downward force, especially when the bit is just about to break through the underside of the material. This is most important when boring through thin sheet metal. When drilling thick materials, such as wood or plastic, make sure to pull the bit out occasionally, to clear chips that can create enough resistance to hang the bit up.

— Sandor Nagyszalanczy



Aligning wood banding to plywood is one good use for biscuits, but they're not ideal for high shear-strength applications.

Q I recently had to repair an exterior wood storm door and thought it was a perfect excuse to try a biscuit joiner. I disassembled the door and found that it was held together with hardwood dowels. After replacing the dowels, I was wondering if there is any rule of thumb as to when to use dowels or biscuits.

Tom Chadwick
Glen Rock, New Jersey

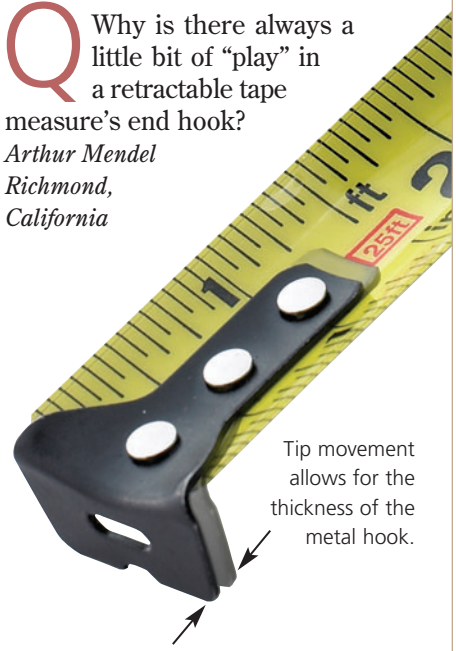
A Are you trying to reinforce the joint or simply align the parts? Because of the deep penetration you can get with long dowels, they'll provide more joint shear strength than biscuits. My primary application for biscuits is as alignment aids. However, dowels can be much fussier to work with. You can't beat the side-to-side adjustability and ease of installation with biscuits.

A second consideration is the size of the parts you're assembling. Even the #0 biscuit — the smallest conventional size — needs a slot about 2" long. This won't work on a face frame with 1½"-wide rails. The more recent face frame biscuits, and other specialty sizes, can help solve this problem, provided you've got a machine that can cut the smaller slots they require.

— George Vondriska

Q Why is there always a little bit of "play" in a retractable tape measure's end hook?

Arthur Mendel
Richmond, California



Tip movement allows for the thickness of the metal hook.

A Those moveable hooks seem a little odd until you consider that the hook has a thickness. If you're pulling the tape to measure off a board's end, the hook's thickness doesn't matter — it's situated on the other side of "zero" and opposite of what you're measuring. But, if you push the tape into a corner, the thickness of the hook would add to the sum of your measurement if it didn't move. Every "inside" measurement would be off by the hook's thickness. So, a hook is designed to move the same distance as its thickness to account for both inside and outside measurements. To keep it accurate, remember your shop teacher's advice ... don't let it slam home.

— Chris Marshall

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New Woodworkers' Top 10 Tools

THESE CORE TOOLS WILL GET YOUR WOODWORKING OFF TO A STRONG START.

BY CHRIS MARSHALL

Today's crop of rolling table saws offer excellent portability and some of the best new safety features.

Let's say you're a long-time DIYer who wants to get into woodworking, but your collection of "woodworking" tools amounts to the jig saw, drill and circular saw you've had since college. What do you buy next? That's a sensible question, and I can help answer it. Here are my top 10 picks for tools every new woodworker should own. Eventually you may decide to trade up as your skills improve, but these tools will serve you well without costing a bundle.

1. Rolling Table Saw

A table saw will take you farther than your circular saw ever will, and it's a better initial investment than a miter saw. You can rip, crosscut or cut angles on everything from plywood to purpleheart — safely and accurately. Plus, you can add dadoes, rabbets and box joints to your projects.

A 10" saw mounted on a collapsible wheel stand is a good way to go. That way, you can use your saw in the garage, basement or even outside and take it with you wherever you need to go. It's the most practical style for the DIYer/woodworker and quite affordable. Concerning features, look for a rip fence that locks down solidly, a riving knife that moves with the blade and an arbor shaft long enough to accept a dado blade. The blade guard should install easily and offer a clear view of the cutting action. Make sure the stand has durable wheels or pneumatic tires and sets up without hassle.

A benchtop drill press will bore straight, smooth holes, plus make a good mortiser and drum sander.

2. Benchtop Drill Press

A 1/3 or 1/2hp benchtop drill press is all the machine most woodworkers really need — and you can buy a good one for less than $200. Obviously, you'll be able to drill perfectly straight, smooth holes with a drill press, but it also works well for hogging out mortises or smoothing curves with sanding drums. Pick one with a 1/2"-capacity chuck and a pulley system that makes it simple to change speeds. Or invest in electronic variable speed control. A large, cast-iron table is an essential feature, especially if the edges are flat, so you can clamp jigs or workpieces to it.

You can cut curves, rip, crosscut and even do some light-duty resawing with an inexpensive 9" band saw.

3. Benchtop Band Saw

A 9" band saw (around $150) will do a much cleaner job of curve cutting than a jig saw can, plus it can navigate intricate scrolling work. You can also use a band saw for ripping, crosscutting and moderate resawing. Buy a machine with a large, cast-iron work table and built-in worklight. Ball-bearing blade guides are a plus, but solid guides work just fine, too.

4. Plunge Router or Multi-base Router Kit

No woodshop is complete without a router, especially a mid-size machine (1½ to 2¼hp). Here's the tool you need for template work or creating eye-catching profiles on the edges of your parts. It's also your ticket to machine-cut dovetails and other joinery. Plunge routers are more versatile than fixed-based styles if you can only afford one tool, but consider spending a little more for a combo kit. It's a great value. You'll get an interchangeable motor that fits into a fixed base (ideal for a router table) and a plunge base. Choose a unit with variable speed, electronic feedback and collets for 1/4"- and 1/2"-shank bits.

Whether you choose a full-size, mid-size, trim router or combo kit, you'll find it to be indispensable for shaping and joinery.

A quick way to bring the convenience pneumatic nailing to your woodworking projects is to buy an 18-gauge brad nailer and small compressor as an all-in-one kit.

The woodworking industry is filled with all sorts of clamps, and you'll need a small army of them for your project pursuits.

5. Brad Nailer/Compressor Kit
There's nothing wrong with hammering nails, but an 18-gauge brad nailer (the preferred gauge for woodworking) will help get the job done more efficiently and easily. Just load a strip of nails (5/8" to 2", depending on the gun), aim and squeeze the trigger. You'll drive and set the nail instantly. Buying the gun as an all-in-one kit with a small compressor gets you up and running for about $250, and you can use the same compressor with larger finish or framing nailers for other DIY projects. Perfect!

6. Hand Plane Duo
Ian Kirby, our hand-tool expert, recommends two hand planes for woodworking: a #4½ smoothing plane and a #07 jointer plane. The first will do a nice job of flattening and polishing board faces and general cleanup tasks. The second is useful for truing up stock and flattening edges when gluing up panels. It's a thrifty option to buying a stationary jointer.

7. Clamps, Clamps, Clamps
There's just no way around amassing an army of clamps. From locking down jigs to general project glue-ups and parts assembly, you'll reach for clamps all the time. A helpful set includes C-clamps, quick-action clamps, short and long bar clamps, pipe clamps and web clamps. Build your collection as you need them, and buy quality brands right from the start. Good clamps sure aren't cheap, but they'll hold up their end of the bargain like an old friend… and you can never have too many of those.

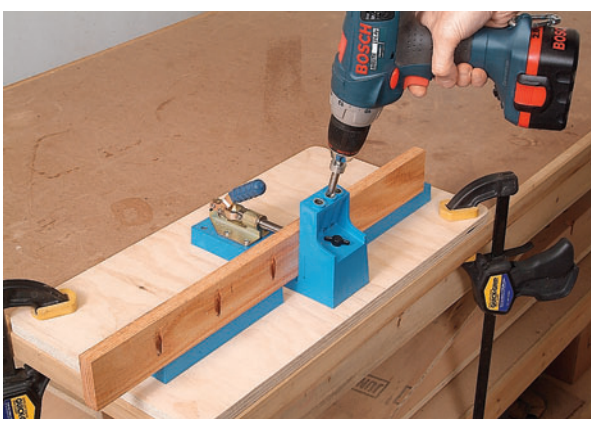
Hand-tool expert Ian Kirby recommends a smoothing plane for general cleanup and polishing work, plus a longer jointer plane for flattening and truing edges.

8. Pocket Hole Jig
One of the fastest and easiest ways to join wood is with pocket screws. If you can drill holes and drive screws, you can make panels, face frames, miter joints and cabinet boxes with these unique jigs and a stepped drill bit. Pocket screw joints are an effective alternative to more time-consuming or complex joinery such as mortise and tenons, and their strength has earned the respect of the pros. Very handy indeed.

Dust and chip control takes many forms. Here, an inexpensive two-port cover from Rockler turns a five-gallon bucket into a receptacle for heavier chips and debris. A shop vacuum powers the setup while capturing the finer dust.

9. Dust and Debris Collector
Wood chips, shavings and sawdust make a big mess and contaminate your airspace. The debris piles up really fast with some machines, so you've got to keep it under control. Whether the solution for your shop is a vacuum, a dedicated dust collector or one of several inexpensive accessories that convert your vac into a higher-volume two-stage collector (see photo, above), make sure it can handle the amount of dirt your machines make. You may need more than one machine to tackle it all. A dust mask should also be part of this overall plan to protect your long-term health.

10. Sharpening System
Dull chisels, plane irons and turning tools just don't cut it. Whether you decide to use oil- or water stones, a piece of plate glass and sandpaper or an all-in-one power sharpening system, you'll need to adopt a strategy for maintaining sharp edges. Good news is, there are several power sharpeners, such as the Work Sharp (see photo, bottom right), that simplify the process without a big learning curve. Sharpening stones work well, too—and they're cheap—but mastering them takes lots of practice.



Pocket-hole jigs enable you to drill steeply pitched holes into one workpiece, then easily join it to another with screws.

Power sharpeners make it easy for you to keep chisels, plane irons, drill bits and turning tools in tiptop cutting condition.

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BY ANGIE KOPACEK

Most of the vanities I've built have been pretty traditional in concept and execution. Nice enough to look at, but all about function. So when the *Journal* contacted me about building a vanity with a decidedly modern slant, I jumped at the chance. But don't worry; this cabinet will hold all of your morning's must-have accessories and more.

Building the Case

Get started by cutting out pieces 1 through 4 from hardwood plywood. Although this project can be built with solid wood, I opted for plywood to minimize the number of expansion and humidity issues this piece will face in a bathroom setting. To give the case a clean look, I used lock miter joints (see the *sidebar* on page 23) on the case and drawers. I suggest that you cut the dadoes for the dividers into the top and bottom of the case before the lock miter joints are cut, as it's easier to use the table saw fence on a square end. (See the *Drawings* on page 21 for construction details.) After you've set up for the lock miters, cut one side, then spin the piece 180° and cut the other side. The lock miter profile is next. Install a tall, sacrificial fence (with a small notch for the router bit) on your router table for extra support on these pieces. Use double- sided, pressure-sensitive tape to attach it to your fence. I cut the long top and bottom pieces vertically. It may seem counterintuitive, but the length is easier to handle vertically as it's not trying to tilt off the table.

The next step is assembly. To make things easier during finishing, sand the inside of the case and the dividers before you assemble. And to make cleanup easier, do a test assembly. Use blue tape to mask off the joints. It will make your post-assembly cleanup easy — just peel off the tape!

After the glue has dried, it's time to edge-band the front of the case and form rabbets on the back of the case for the backs, using a handheld router outfitted with a rabbet bit.

Shaping the Legs

Start with 8/4 stock for the legs (pieces 5). Mill the boards to 1¾" thick. Lumber selection is important here. When looking for this stock, try to find grain that curves a bit at the end and cut your legs follow-

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MORE ON THE WEB

For a downloadable and printable cutting diagram that describes the best way to cut up your plywood pieces for this project, go to our website (listed above) and click on the "More On The Web" button. Search for "Bathroom vanity" and you'll also find the author's recommended router bits and Forstner bit to help you machine the parts.

ing the curve of the grain. To ensure that your legs are all the same, create a leg template and flush-trim the legs to the template, as shown in the bottom right photo.

Round tenons need to be formed at the end of each leg to support the vanity top. The easiest way to cut a round tenon on a square leg is to use a jig attached to your table saw's miter gauge, as shown on page 22. To test the setup, find some scrap and use a 1" Forstner bit to make a test hole. As you cut the tenons, test them for fit in your scrap piece and adjust the blade height as necessary.

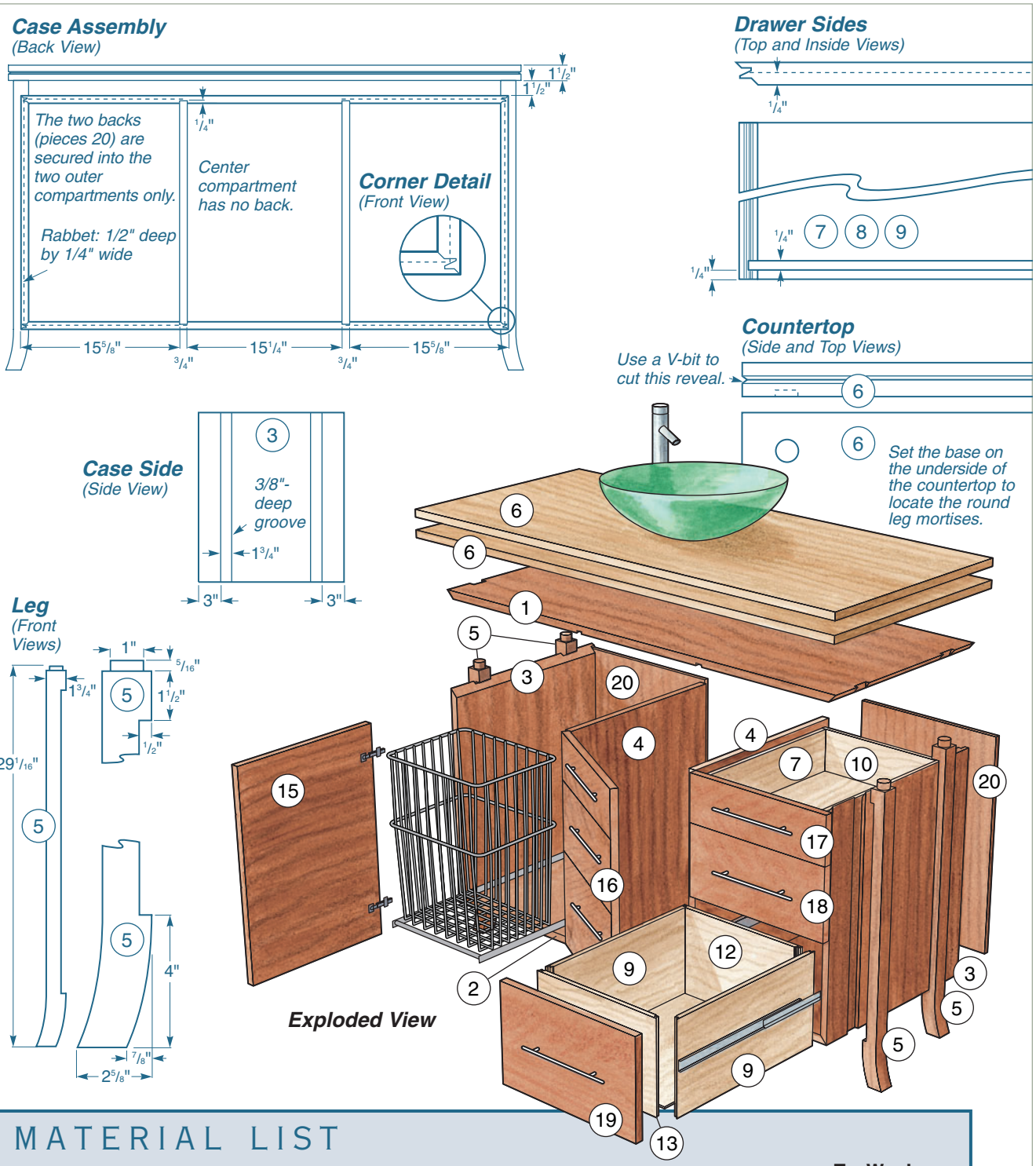
Next, the case needs to be grooved to accept the legs. Make a plywood jig to evenly space the legs 3" from the front and back of the case. Clamp the jig down, then set a leg into place. Use a scrap piece of plywood to sandwich that leg, clamp it in place, then lift the leg out. You now have a spot sized exactly for the leg. (See the bottom photo on page 22.) Use a pattern bit set to cut 3/8" deep to rout the groove for the leg. You'll also need to notch the legs, as shown in the *Drawings*. Use a dado blade and miter gauge to cut these notches. Once the machining is done, you can glue the legs to the case.

Constructing the Top

The top (piece 6) is built up from two pieces of bamboo plywood laminated together. Rough-cut the bamboo plywood slightly oversize so you have some room to trim the top to a final size after gluing. Titebond® III works well with bamboo and stands up to wet conditions. Since the top is fairly wide, use clamping cauls in the middle of the lamination to ensure good pressure.

When the glue has cured, trim the top to size and form a small reveal around the edge (right at the glue line) to add a little visual interest.

By creating a template from 1/4" MDF, our author was able to use it both to mark the legs' shape on the stock and as a guide while template routing (above). Cut out the legs on the band saw (left). Then attach the template to the leg blank with double-sided tape.



MATERIAL LIST

		T x W x L
1	Case Top (1)	3/4" x 19¾" x 48"
2	Bottom (1)	3/4" x 19¾" x 48"
3	Sides (2)	3/4" x 19¾" x 23"
4	Dividers (2)	3/4" x 19¼" x 22"
5	Legs (4)	1¾" x 2⅝" x 29 1/16"
6	Countertop (2)	3/4" x 20½" x 52½"
7	Top Drawer Sides (2)	1/2" x 18" x 4¼"
8	Middle Drawer Sides (2)	1/2" x 18" x 6⅝"
9	Bottom Drawer Sides (2)	1/2" x 18" x 9¼"
10	Top Drawer Front/Back (2)	1/2" x 13⅞" x 4¼"
11	Middle Drawer Front/Back (2)	1/2" x 13⅞" x 6⅝"
12	Bottom Drawer Front/Back (2)	1/2" x 13⅞" x 9¼"
13	Drawer Bottoms (3)	1/4" x 13⅜" x 17½"
14	Door/Drawer Blank (1)	3/4" x 23" x 47⅞"
15	Left Door* (1)	3/4" x 23" x 15⅞"
16	Middle Door* (1)	3/4" x 23" x 15⅞"
17	Top Drawer Face* (1)	3/4" x 5⅜" x 15⅞"
18	Middle Drawer Face* (1)	3/4" x 7" x 15⅞"
19	Bottom Drawer Face* (1)	3/4" x 10⅜" x 15⅞"
20	Cabinet Backs (2)	1/2" x 16" x 22"

** Pieces 15 -19 are cut from the drawer/door blank, piece 14.*

The author used the jig featured in "Jigs & Fixtures" in our February 2007 issue. You can use a standard saw blade to nibble the stock away or put a dado blade in your table saw. Either way, adjust the cut until you create a tenon that matches the *Elevation Drawings* on page 21. The mortises on the underside of the countertop can be easily formed using a Forstner bit.

Now, it's time to mark out the mortises for the leg tenons. To do so, I set the case upside down on the top, centered it and marked the tenons directly on the underside of the top. For now, there will be a 3/4" overhang on the front; the doors and drawer faces will bring it flush later.

Use the same 1" Forstner bit to drill the mortises for the legs into the top. Don't drill too deeply!

Making the Drawers

It's back to the lock miter bit for the drawer boxes. When using lock miter bits, wide pieces are much easier to control. Cutting 18" and 13⅞" lengths and large widths on your plywood drawer pieces not only allows for greater stability when cutting the lock miter profile, but it also enables you to cut off any areas that have a miscut snipe profile. Rout the 18" side pieces vertically (against the tall fence) and the 13⅞" pieces horizontally. Once the lock-miter profile is milled, rip the drawer parts (pieces 7 to 12) to width on the table saw.

Cut the drawer bottoms (pieces 13) from 1/4" plywood.

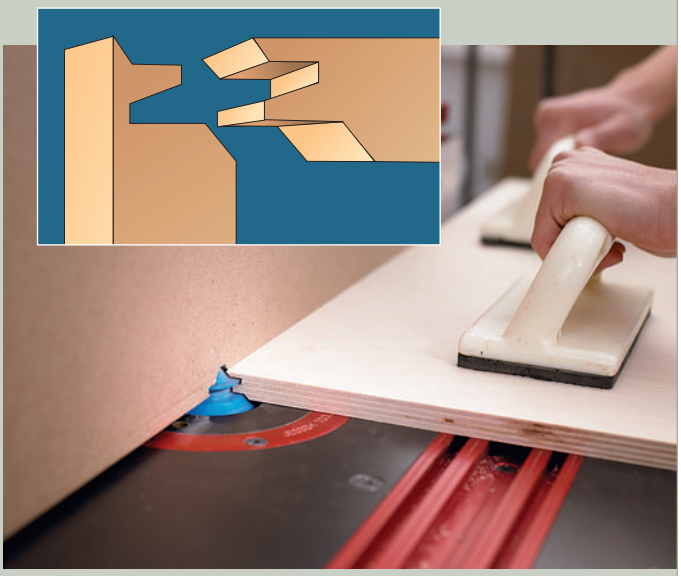
The author uses clamped-on guides to help control the router as she cuts grooves on the side of the carcass. These grooves will capture the legs.

Two Steps to Setting Up a Lock Miter Bit

These bits make great joints in plywood, but they can be challenging to set up for a perfect fit. That's because there are two factors involved in proper setup: the bit height and the fence position. The best method is to first set the bit height correctly, then adjust the fence position.

To begin the process, install the bit so the height and fence setting create approximately the same size diagonal on the outer edge of the cut. It likely won't be perfect, but it will be a good starting point. Using stock of the same thickness as you will in your project, run two pieces through horizontally. Flip one piece 180° and test-fit them. If they're flush, your bit height is set correctly. If not, adjust the bit height and do another test. You'll only need to adjust the height by half of the distance that the fit was off. When you've got it right, move on to adjusting the fence.

Start by running the test stock vertically against the face of the fence. Once your vertical pieces fit together flush, your router table should be correctly set. Do one last test joint to be sure, then rout your project pieces with confidence!



Lock miter bits create strong, accurate and attractive miter joints. As with any miter joint cut, setting it up accurately is the key to success. Our author offers a simple two-step process for getting it right.

Plow the grooves for the drawer bottoms in the fronts, backs and sides with a dado blade. Test the fit. Don't worry about stopping the grooves, as the lock miter will hide the corner. Before assembly, sand the insides of the drawers and both faces of the drawer bottoms. If you plan on finishing the inside of the drawers, tape the grooves and corners and finish. Then assemble the drawers and check them for square by measuring the diagonals—they should match.

Cutting the Door and Drawer Faces

The door and drawer faces (pieces 14 through 19) are made from one piece of plywood. This way, the grain flows smoothly across the entire face of the vanity.

Start by marking the left-hand door, middle door and the drawer faces on the plywood. Once all the pieces are cut, this will help keep them from becoming a jigsaw puzzle! Set the table saw fence to 15⅞" and cut off the left-hand door, then spin the piece 180° and cut off the drawer face blank. The remaining piece is the middle door.

Edge-banding will be much easier if you band the long sides of each of these pieces now. Then, score the doors and the drawer face blank with the same setup to create perfectly matched faux "drawer fronts" on your doors. Next, raise the blade and cut the drawer faces apart. Then, you can finish banding the doors and drawers. Finally, cut out the backs (pieces 20) and get ready to move on to the hardware installation.

Doors, Drawers, and Other Hardware

Hardware installation means you're almost done! First on the list is the laundry hamper inside the left-hand space. It's a snug fit. Mount the hamper to the floor of the case, as close to the non-hinge side as possible to allow space for the hinge. Next, mount the doors. Use full-overlay hinges for the left-hand door and half-overlay hinges for the center door. Use a scrap piece for the door and attach the hinges to the case with double-sided tape to test the clearance for the laundry basket. Install the hinges as shown in the *Drawings* and align the doors with the edges of the case and each other after the hinges are mounted.

Now it's time to mark the location of the drawer slides (see the

Drawings). I usually center the drawer slide on the drawer body. Rockler's Jig It® (*rockler.com*) works well for drilling inside the case; use a Vix bit for drilling the pilot holes.

Once the drawers are hung, you'll attach the drawer faces. Use double-sided tape to attach them temporarily. I've found that creating 1/8" spacers helps with positioning. After the drawer faces are mounted, you'll create a grid to assist with positioning the drawer pulls. Mark the center of the right-hand edge of each drawer face, then mark the center of the left-hand side of each section of the left-hand door. Draw a line between the two points. This represents the line on which the drawer handles will be mounted. Check the distance between the lines at various points to ensure they are parallel. Do the same for the vertical center of the doors and drawer faces. Now, create a jig for drilling the pull holes. Take a scrap of plywood or MDF at least 10" long and 3" wide. Mark the center of each side and draw a line, forming a cross on the piece. Mark a point 3⅞" from the center on each side of the long line. These points are your pull holes. Drill through these and install a pull on the jig to check your spacing. Once your spacing is set, line the cross lines on the jig up with the cross lines on the face of the door section or drawer face. You're now centered for drilling. When you've got the handles attached, all that's left is the cosmetics organizer in the top drawer and a rack for the inside of the center door. The rack can be centered on the door and the cosmetics organizer needs to be trimmed to fit. Although the cosmetics organizer instructions recommend sawing the organizer to size, I had great success simply scoring the plastic several times and carefully snapping off the waste. A light sanding will remove the rough edge, and you are ready to finish!

Finishing Up

I wanted to use polyurethane for protection and moisture resistance and an oil-based finish to bring out the luster in the cherry. General Finishes' Gel Topcoat fit the bill nicely. The wipe-on formula made it easy to apply on the vertical surfaces without drips or runs, and it creates a lovely sheen.

This vanity makes use of exciting hardware to organize its storage (rockler.com). The author found the washbowl and faucet at Rensup.com.

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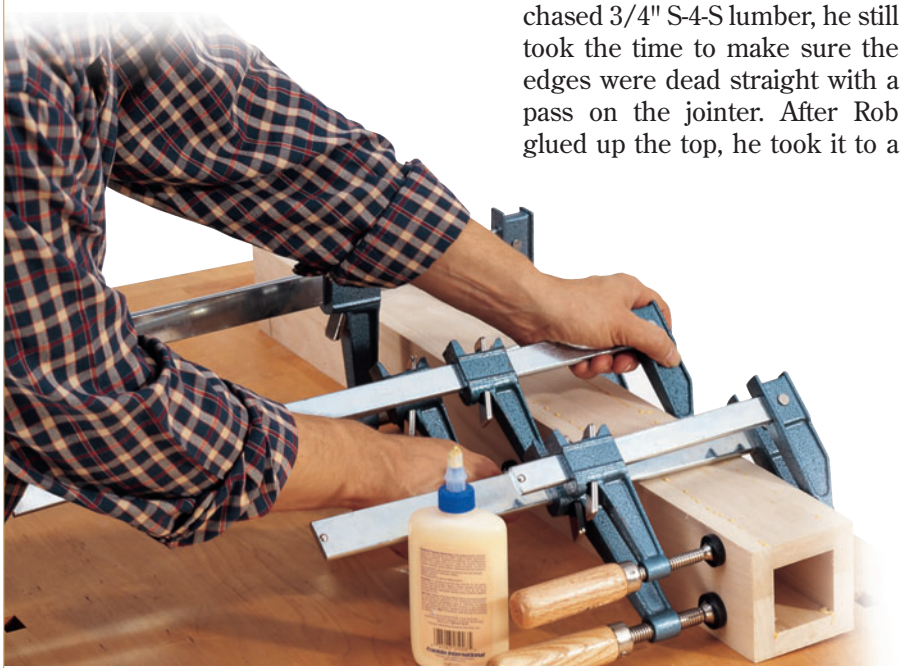
Classic Kitchen Island

THIS PROJECT IS REMINISCENT OF AN OLD-FASHIONED BUTCHER'S TABLE, BUT IT'S MUCH EASIER TO CONSTRUCT, THANKS TO A CLEVER, BUILT-UP MAPLE TOP.

By Rob Johnstone

In editor in chief Rob Johnstone's kitchen, this island serves three helpful purposes: it's a worksurface, a storage center for utensils and even a supplemental breakfast bar when the need arises. Here's how to build this handy project for your home's resident chef.



The legs are a glued-up hollow construction. Because the plan was to paint the base, our author used yellow poplar, a stable wood that accepts paint well.

Making the Wrap-around Top

To achieve the butcher block look and strength, Rob began by cutting two pieces of birch plywood (pieces 1) and glued and screwed them together to form the core. Next, he selected attractively figured hard maple lumber to glue up for the top (piece 2). Even though Rob purchased 3/4" S-4-S lumber, he still took the time to make sure the edges were dead straight with a pass on the jointer. After Rob glued up the top, he took it to a cabinet shop to have it sanded smooth and flat on a wide belt sander. You can flatten it yourself with a plane or handheld belt sander ... but he was in a hurry.

Once the top is flat, smooth and trimmed to size, glue the top edges (pieces 3) in place, which provides an illusion of thickness. Add to the illusion by making the end caps (pieces 4). Cut them to size and then plow a stopped groove on their inside faces (as shown in the *Drawings* on page 29). Now slice biscuit slots into the top to match the grooves you just plowed. The biscuits must not stick out farther than the depth of the endcap grooves, or you'll have a big problem. Glue the biscuits in place, and make sure there are no excess glue drops to harden and get in the way.

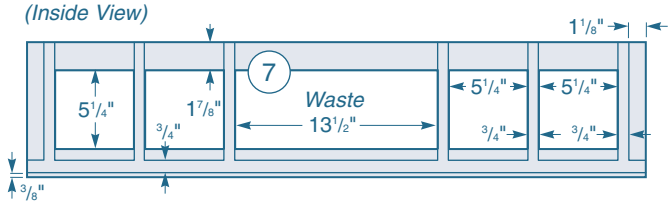
Put the top onto the plywood core: there needs to be a gap of at least 3/16" between the core and the sides of the top, but the biscuited ends of the top must match the core exactly. Put the endcaps onto the top with the biscuits nestled in their grooves. DO NOT GLUE THIS PIECE

MATERIAL LIST

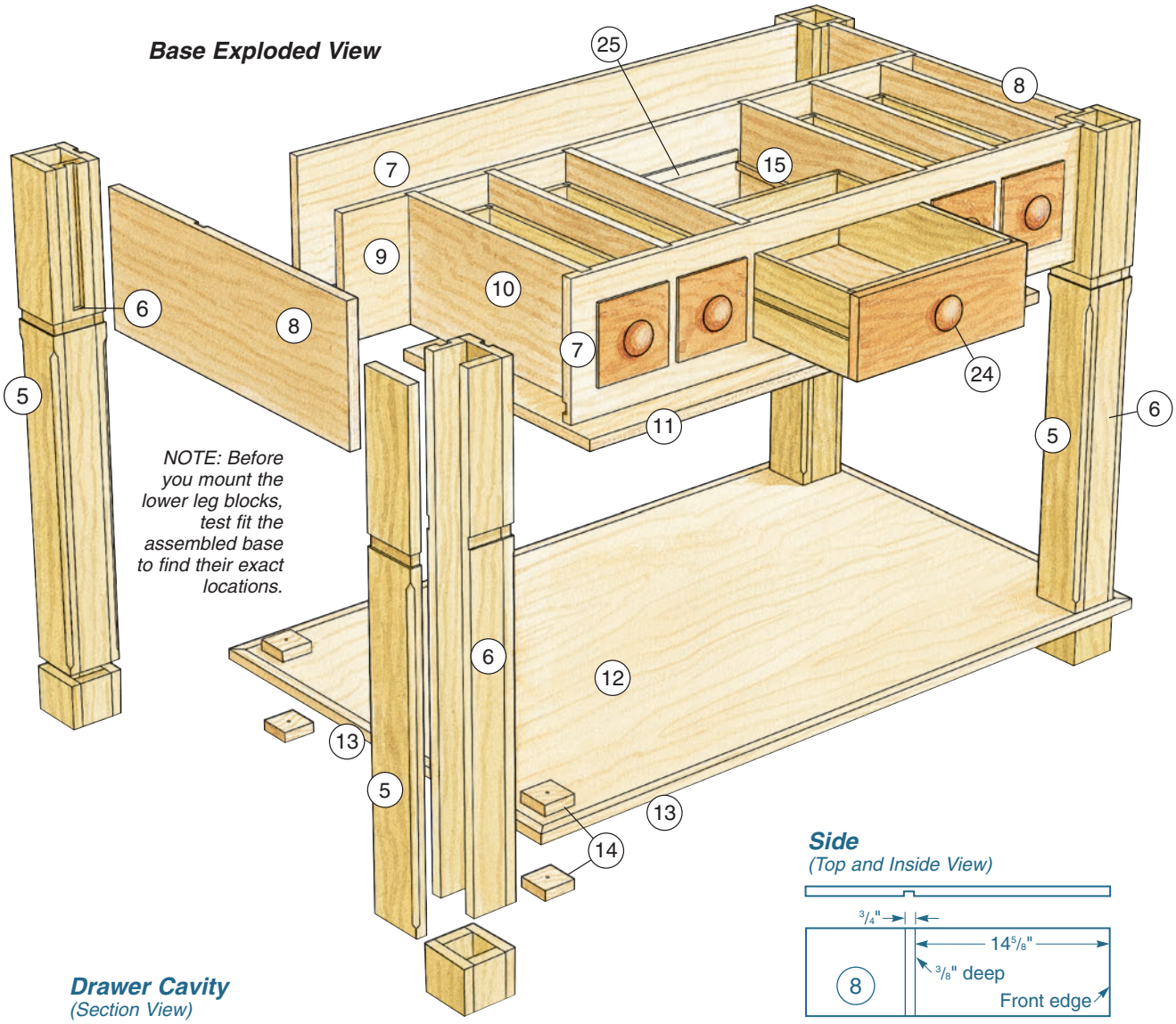
Top Assembly

		T x W x L
1	Core (2)	3/4" x 40 1/8" x 52 1/2"
2	Top (1)	3/4" x 40 1/2" x 52 1/2"
3	Top Edges (2)	3/4" x 2 1/4" x 52 1/2"
4	End Caps (2)	3/4" x 2 1/4" x 42"

Front
(Inside View)



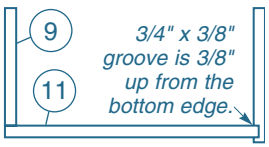
Base Exploded View



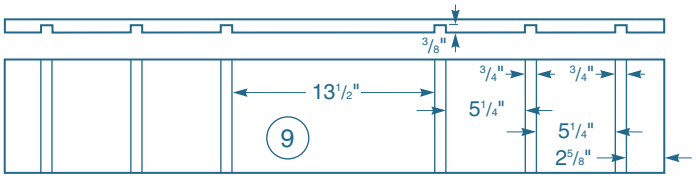
NOTE: Before you mount the lower leg blocks, test fit the assembled base to find their exact locations.

Side
(Top and Inside View)

Drawer Cavity
(Section View)



Long Divider
(Top and Inside View)



ON! Drill counterbored screw holes through the endcaps and screw them to the core. This allows the laminated top to expand and contract with seasonal humidity without fracturing. Plug the screw holes, sand the top smooth, and set it aside for a bit.

Building the Basic Base

There is nothing tricky about constructing the base unit. Begin by creating the legs from the staves and fillers (pieces 5 and 6). Cut them to size, then glue and clamp together. Their hollow construction will come in handy later. Once the glue has cured, sand them smooth and trim them exactly to length on the table saw. Go ahead and cut off the feet, and set them aside. Now use the table saw to reveal the little decorative dado around the barrel of the leg. (See the *Elevation Drawing* on the next page for these details.) Use a router in a router table to plow the grooves into the upper faces of the legs. Square up the ends of the grooves so they are ready for the front, back and sides (pieces 7 and 8). Finally, use your router and a large chamfering bit to form the decorative leg bevels.

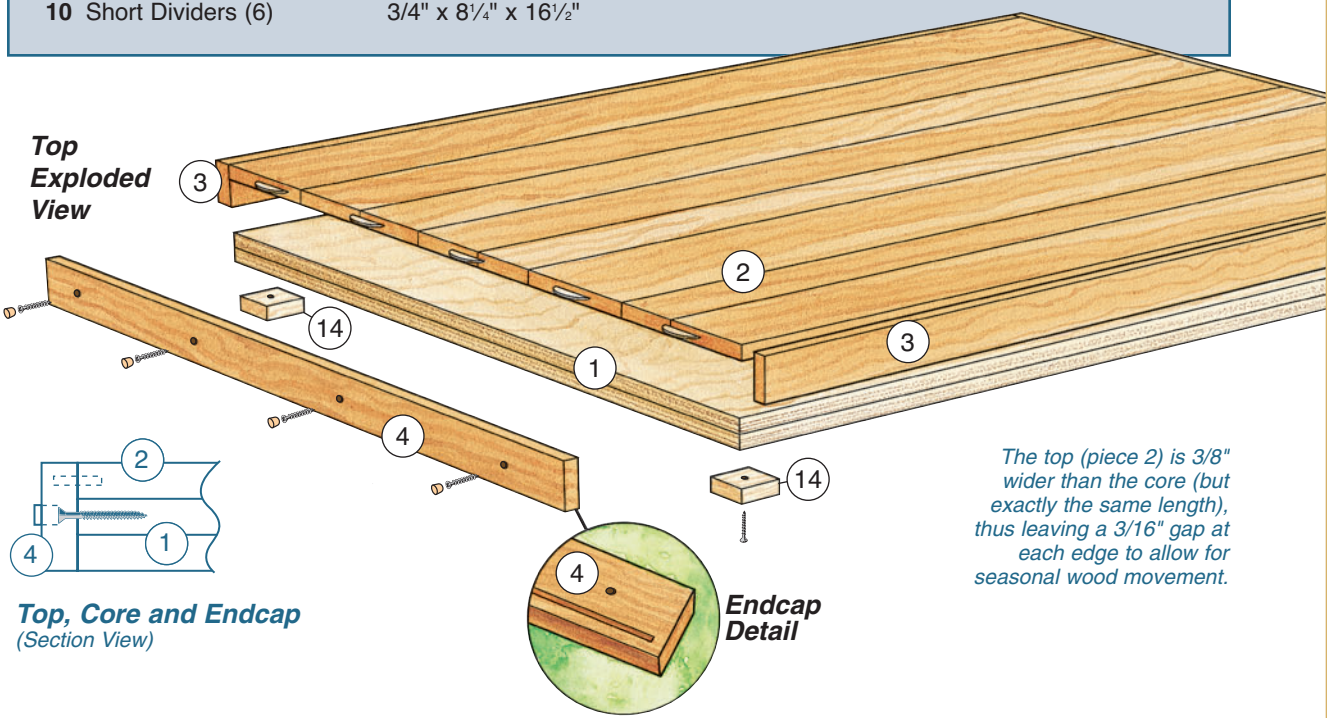
Cut the remaining sheet stock parts (pieces 9, 10, 11 and 12) to size. There are a number of dadoes and grooves to be cut into these pieces. Form them all on the table saw with a dado head installed. Again, the *Elevation Drawings* will specify the details.

Cut openings for the drawers in the face of the front after you form the dadoes and groove in its back face. Miter the shelf trim (piece 13) around the shelf (glue and finish nail it securely), and cut the leg blocks (pieces 14) and drawer slides (pieces 15) to size, but set them aside for the time being.

Now it's time to assemble the base. Rob glued and clamped it together on his work table with the legs pointed up in the air. That helped him align the upper edges of all the dividers, front, back and sides evenly. If you plan to paint this unit as Rob did, a finish nail here and there is no cause for worry. You might want to hold off on attaching the feet until you get it into your kitchen: that way it will clear a 30" door. (Rob found this out the hard

MATERIAL LIST – *Base Assembly*

		T x W x L
5	Leg Staves (8)	3/4" x 3¾" x 33"
6	Leg Fillers (8)	3/4" x 2¼" x 33"
7	Front and Back (2)	3/4" x 9" x 41¼"
8	Sides (2)	3/4" x 9" x 23¼"
9	Long Divider (1)	3/4" x 7⅞" x 44¼"
10	Short Dividers (6)	3/4" x 8¼" x 16½"
11	Bottom (1)	3/4" x 16⅞" x 39"
12	Shelf (1)	3/4" x 30" x 48"
13	Shelf Trim (1)	3/4" x 3/4" x 170"
14	Leg Blocks (12)	3/4" x 2¼" x 2¼"
15	Drawer Slides (10)	3/8" x 3/4" x 16½"



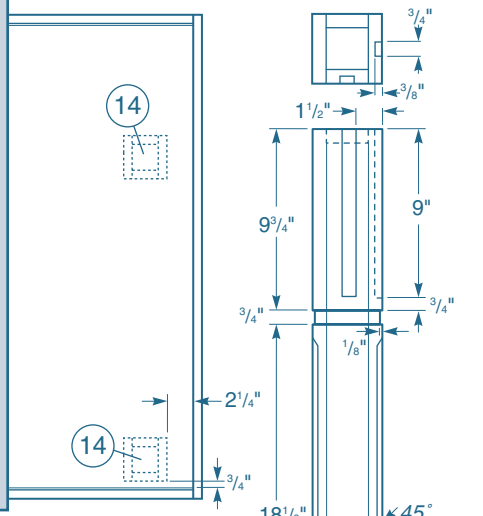
Top, Core and Endcap
(Section View)

The top (piece 2) is 3/8" wider than the core (but exactly the same length), thus leaving a 3/16" gap at each edge to allow for seasonal wood movement.

MATERIAL LIST – *Drawers*

		T x W x L
16	Drawer Sides (8)	1/2" x 5¼" x 15¾"
17	Drawer Fronts and Backs (8)	1/2" x 5¼" x 4¾"
18	Drawer Bottoms (4)	1/4" x 4¾" x 15¼"
19	Drawer Faces (4)	3/4" x 5¼" x 5¼"
20	Large Drawer Sides (2)	1/2" x 5¼" x 15¾"
21	Large Drawer Front and Back (2)	1/2" x 5¼" x 13¼"
22	Large Drawer Bottom (1)	1/4" x 13½" x 15¼"
23	Large Drawer Face (1)	3/4" x 5¼" x 13½"
24	Drawer Pulls (5)	2" Dia.
25	Spacers (5)	Trim to fit
26	Baskets (2)	Wicker, optional

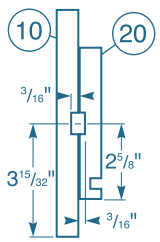
Leg Block Locations
(Bottom View, Core)



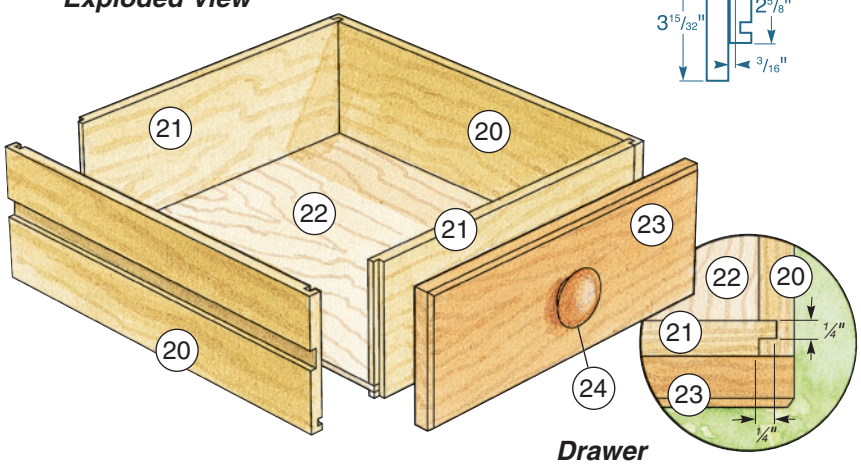
TIP: To locate the top leg blocks, flip the top over and position the base on it, using the measurements at lower right as a guide. Mark the position, account for the thickness of the leg stock, and temporarily screw the blocks in place. Verify the fit before securing the blocks with glue and screws.

Drawer Slide Locations

The 3/4" grooves for the slides are 3/16" deep, centered on the drawers and dividers.



Drawer Exploded View



Drawer Corner Detail

If you choose to use hanging wicker baskets, you may need to re-machine their hangers to match the inset *Drawing* at right.

way!) Once the glue has cured, go ahead and glue the drawer slides in place to complete the base assembly.

Assembling the Drawers

The simple corner joints on these drawers call for a bit of production woodworking. Rob machined all the drawer parts (pieces 16 through 23) at once and took advantage of each setup on the table saw to do all similar pieces at the same time. Dry-fit the drawers to test their joinery and to see how they fit into the base. When you're satisfied, glue and clamp them up, then mount the drawer pulls (pieces 24) to the drawer faces before you mount the faces to the drawers with screws.

With drawer construction behind you, sand them smooth and put two coats of clear finish on the drawers, inside and out.

Finishing Up

Use the drawer spacers (pieces 25) to adjust the drawer registration. Rob painted the base unit with white oil-based enamel so it would be easy to clean. As for the top, sand it to 600 grit, raise the grain with water and sand again with 600. Follow that up with several coats of butcher block oil.

Move the island to where you want to use it before you attach the top and feet (see notes on *Elevation Drawing*). Apply construction adhesive around the top of the legs to secure the top.

Add some sliding baskets to store spuds and onions down below, if you like. With that done, the only thing left is to screw the legs to the floor and get ready to start cooking. This project will delight your guests, no matter how good a chef you are.

Form the island's feet by cutting them off the glued-up legs. Most of the machining on this project can be completed on a good table saw.

Before laminating the top, establish straight, square edges by jointing the hard maple stock.

Shop-built Passage Door

A BIG ROUTER AND THE RIGHT SET OF BITS ARE ALL THE "SHAPER" YOU NEED TO MAKE THESE HANDSOME SIX-PANEL DOORS.

By Bill Hylton

Until my wife saw the results of these doors, they were just another project for the shop. But now, well, she has added new custom doors for our bathroom, bedrooms and closets to her ever-expanding "honey-do" list.

It doesn't take a shaper and cutters to make these six-panel doors; just some router bits designed specifically for forming cope-and-stick joinery on very thick stock. One set is from Infinity, the other from Freud. Either set will enable you to mill basic cope-and-stick joinery for traditional frame-and-panel doors on the router table. The Freud set can take you beyond just the cope-and-stick, as I'll explain in the *sidebar* on page 36.

Building with Loose Tenons

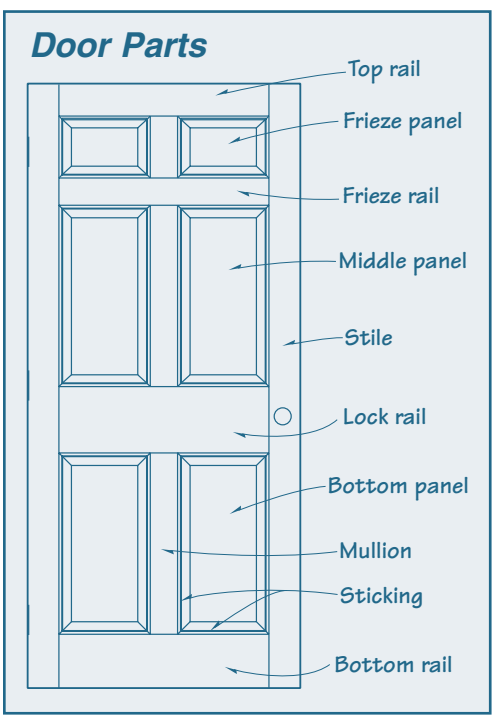
Cope-and-stick joinery is fine for cabinet doors, but it's quite a leap from an 18" x 30" door made from 3/4" stock to one that's 30" x 80" and 1¾" thick. Although the Freud bits are designed specifically to cut rails with integral tenons, I decided to go with loose-tenon construction instead.

A mortise-and-loose-tenon joint is made by cutting mortises into both mating parts and using a separate strip as a tenon to link them. I've used this form of mortise-and-tenon many times, and in my opinion, it has a lot of advantages.

First, you can cut the mortises with a commonplace plunge router. Fitted with an edge guide and a long up-spiral bit, I use the router with a shop-made mortising fixture. It's efficient because there's only one major setup for mortising. The loose tenons are a snap to mass-produce and easy to fit to their mortises.

Here's an additional benefit: The joinery allows trial assemblies at several stages, helping you to sidestep mistakes. In this project, you can dry-assemble the door parts and clamp them after the cope-and-stick joints have been routed and the panels raised. Then you can lay out and cut the mortises. It virtually guarantees the joints will align and the assembly will be square.

Panel dimensions gave me pause briefly. The Infinity bits produce a 1/2"-wide panel groove and matching stub tenon when set up for 1¾" stock, while the Freud bits produce a 5/8" groove/stub tenon. Making sample panels proved that I could achieve the appearance I wanted with either tongue thickness. A 1/2" tongue requires a 1¼"-thick panel; the 5/8" tongue, a slightly heftier 1⅜"-thick panel.



"I built the first door, and procedural surprises and histrionics aside, the result was good. But experience is a good teacher. Slight changes in layout, joint dimensions and parts labeling improved the whole construction process, and the second door is decidedly stronger."

Choosing Materials

Shop doors are utilitarian, so I chose poplar. For each door, I bought three 10"-wide 8/4 boards, which yielded all the frame parts and the panels. Then I built one door. While the process went more or less as expected, it exposed a couple of shortcomings. When I built the second door, the process was smoother, and I think the second door is definitely stronger than the first.

Starting with Cope and Stick Cuts

Three operations are primary to building these doors: Routing copes on the ends of rails and mullions, routing the sticking and raising the panels. Prepare your stock first, following the dimensions shown in the *Material List* on the next page. You can cut all the parts to final size, but I suggest leaving the stiles overly long for now. Because you don't have to account for the tenons, part lengths are easy to figure out.

The cope cut forms the negative of the sticking profile (the cope) on either side of a stub tenon. It is the first cut you make. Because it's a cross-grain cut, it's likely to cause splintering as the bit emerges from the wood. The sticking cut that follows the cope cut will remove any splinters produced by the cope cut.

Install the cope bit in your router table and set the height. Make a test cut and measure the shoulders of the cut; they should be equal in width. Then cope the ends of the rails and mullions in a single pass.

Now switch over to the sticking bit. Use a coped piece to gauge the bit's height, aligning the bit's slot-cutter with the stub tenon. The sticking cut forms the panel groove and the decorative profile on both edges simultaneously. Make this cut along both edges of the mullions and the frieze and lock rails, but only rout the inside edge of the top and bottom rails and the stiles.

Raising Panels

The next step is to raise the panels. Use whatever panel-raising bit you have — either horizontal or vertical styles will work. Make a shallow first pass, a deeper second pass and clean up with a final pass. At each cutting-depth setting, rout all four edges of both sides of each panel. Then adjust the setup for a deeper cut and repeat.

As you work your way around each panel, always begin with a cross-grain cut. You'll get some splintering as the bit emerges from the ends, but the following long-grain cut will eliminate it.

You're now at a point where you can dry-assemble the door to see how it looks. And it looks good, right?

Making the Loose-Tenon Joints

With the door assembled, clamp it exactly as you expect to in the final glue-up. If you've opted to leave the stiles long, align them so they extend beyond the rails at each end by a couple of inches. Check the assembly for squareness.

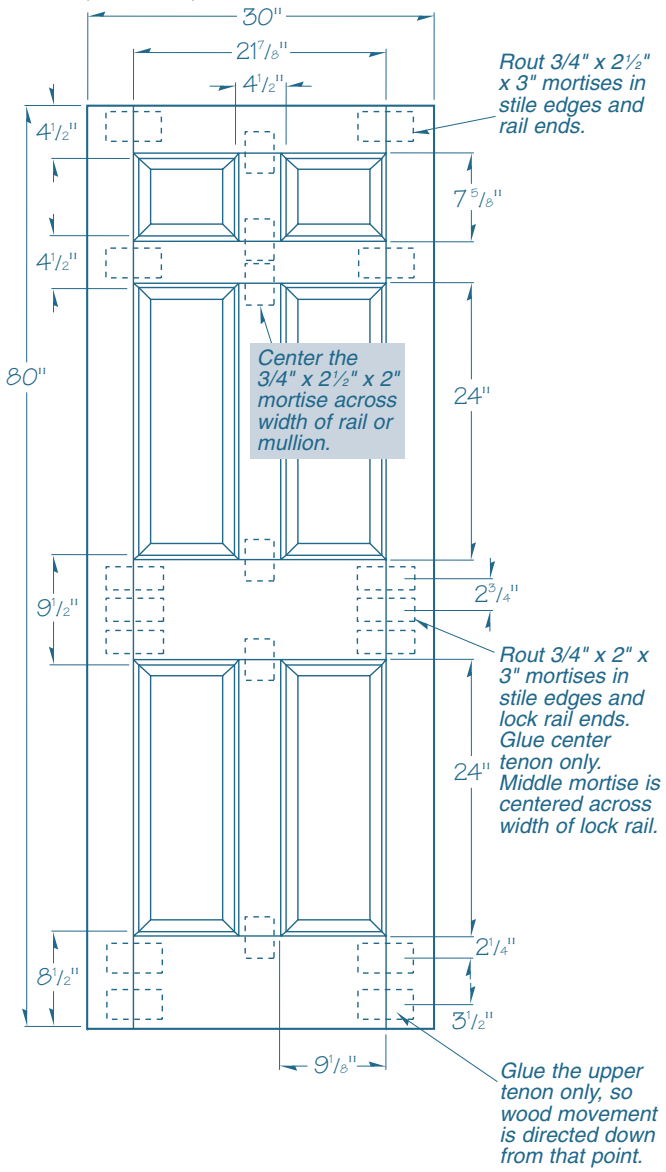
Now lay out the mortise loca-

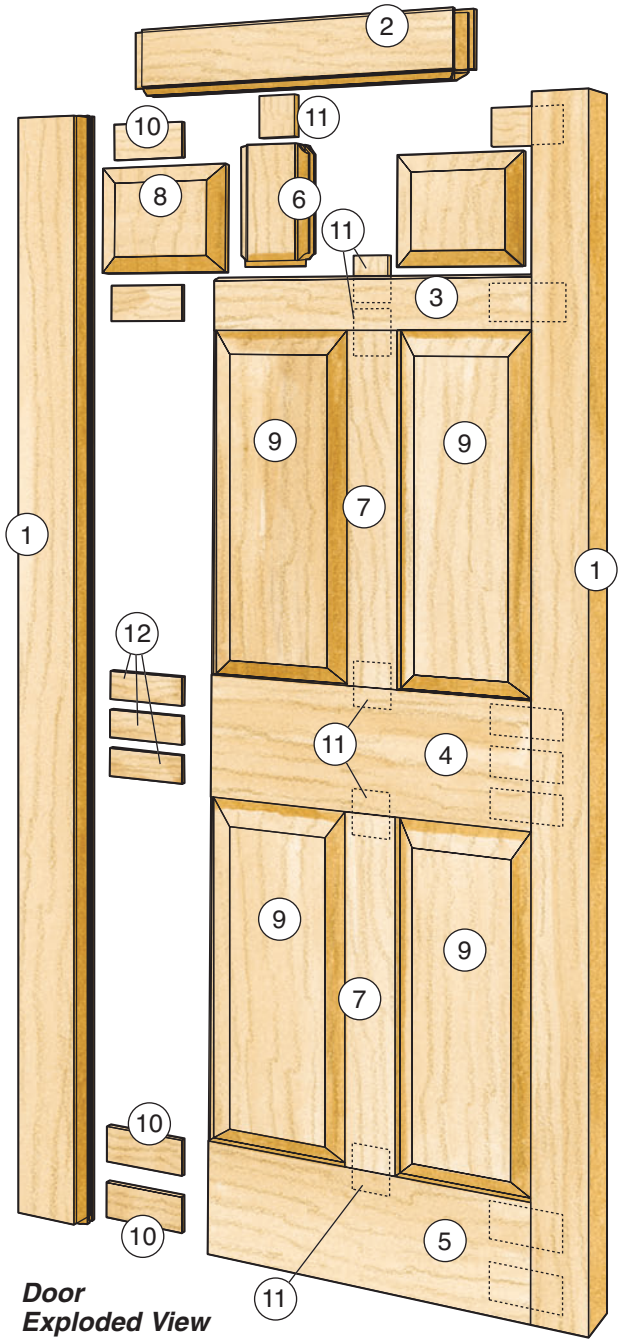
The cope cut forms the reverse of the sticking profile — the cope — on either side of a stub tenon. Cross-grain cutting causes splinters, but the following sticking cut removes them.

Minimize chipping by staging the sticking cuts. Follow a shallow first pass with a not-quite-full-depth cut. A final cleanup pass leaves you with a virtually chip-free finish.

A 1⅜"-thick panel with a 5/8"-thick tongue compared to a 1¼"-thick panel with a 1/2"-thick tongue. The former, prepared with the Freud bits, must be milled from 8/4 lumber. The latter, scaled for Infinity bits, is milled from 6/4 stock.

Shop Door Elevation
(Front View)





Door Exploded View

MATERIAL LIST

		T x W x L				T x W x L	
1	Stiles* (2)	1¾" x 4½" x 80"	8/4 poplar	**7**	Mullions (2)	1¾" x 4½" x 24"	8/4 poplar
2	Top Rail (1)	1¾" x 4½" x 21⅞"	8/4 poplar	**8**	Frieze Panels (2)	1¼" x 9⅛" x 7⅝"	
3	Frieze Rail (1)	1¾" x 4½" x 21⅞"	8/4 poplar	**9**	Middle/bottom Panels (4)	1¼" x 9⅛" x 24"	
4	Lock Rail (1)	1¾" x 9⅛" x 21⅞"	8/4 poplar	**10**	Loose Tenons (8)	3/4" x 2½" x 5⅞"	Scraps
5	Bottom Rail (1)	1¾" x 8½" x 21⅞"	8/4 poplar	**11**	Loose Tenons (6)	3/4" x 2½" x 4"	Scraps
6	Frieze Mullion (1)	1¾" x 4½" x 7⅝"	8/4 poplar	**12**	Loose Tenons (6)	3/4" x 2" x 5⅞"	Scraps

NOTE: These dimensions are based on the use of Infinity bits. If you use Freud bits, rails and mullions must be slightly longer.

*Work with pieces 4" to 6" longer than final length; trim excess after assembly.

If you use Freud bits, the panels must be 1⅜" thick; start with 8/4 stock.

By clamping the rails and mullions vertically in the mortising block, you can mill mortises in the ends accurately with a handheld plunge router (note the attached edge guide).

The same mortising block also sets up the edge mortises in the stiles. You'll need to support the long free end with a workstand.

tions. Twenty loose tenons hold the door together (see the *Elevation Drawing* on the previous page). Some will argue that all you need are tenons at the rails and stiles and that those between the rails and mullions are superfluous. I won't dispute that contention, but the short tenons joining the rails and mullions provide positive alignment during assembly, and to me, that is a BIG benefit. Taken together, all the joints provide strength.

For each pair of mortises, lay out the centerline, scribing a single pencil line along the rail and across the stile or along the mullion and across the rail. The lines will help you return the parts to this exact alignment during the tenon fitting and during final assembly. This centerline is all you need to register the part on the router mortising block fixture that I'll describe next. The mortising setup will control the position and size of the cut.

Label each joint with a letter or a number. The big value here comes later, when you fit the individual tenons (I suggest that you label those, too).

Now set up your mortising fixture. Years ago I designed and built a mortising block (see *tint box* on page 38) for routing mortises with a plunge router and edge guide. Plans for this shop-built fixture are in two of my books, *Bill Hylton's Power Tool Joinery* (F&W

Two Pioneers of Passage- and Entry-Door Router Bits

Infinity was first to market an architectural door set. Basically, they're pumped-up cope-and-stick bits designed to machine stock up to a full 1¾" thick in one pass. Until they appeared, routing architectural door parts required multiple passes with "doctored" cabinetry bits. What these specialty router bits do is no less than what shaper cutters have done for decades. With Infinity's bit set, as with all shaper cutters intended for the same job, making strong joints is an entirely separate undertaking from milling the basic cope-and-stick connection.

When you break down Freud's coping bit, the bottom profile cutter can mill an integral tenon of any length by shifting the fence.

Freud's router-bit set, on the other hand, takes joint strength one step further. Its innovative cope cutter enables you to form an integral tenon as long as you want. After an initial cut that forms both copes and a stub tenon, you break down the bit by unscrewing an arbor holding a profile cutter and the pilot bearing. What you're left with is an inverted-head, pilot-free bit, still set for the cut. Additional passes, controlled by the fence position, extend the cope cut farther and farther into the rail without touching the tenon, which gets longer and longer.

After forming all the tenons, you rout the sticking cuts. On

Infinity's two bits are a bare pair. A 1/4" slotter to use when working 1⅜"-thick stock is included, but there are no instructions for setting up or using the bits.

Publications) and the newly revised edition of *Woodworking with the Router* (Reader's Digest Books). Simple yet versatile and sturdy, it's basically a big block I clamp at the edge of the workbench. Here's how it works:

- The workpiece is clamped to the face of the block, so the edge or end to be mortised is flush with the block's top surface. It has interchangeable, adjustable workrests — one horizontal, one vertical — with toggle clamps to support and secure the workpiece.
- The plunge router rests on the top surface with the bit positioned over the workpiece. The top surface must be perpendicular to the face, of course. A registration line across the top is critical: It represents the center of the mortise, and you'll align the workpiece to it.
- The router's edge guide rides along the block's back edge (it's actually captured in a track). The guide's setting controls the position of the mortise. It also ensures the mortise is parallel to the workfaces.
- Adjustable blocks screwed to the block's top crowd the router, which limits the length of cut and establishes the mortise length.
- The router governs the depth of the mortise through its plunge setting, but you'll need a long bit. To achieve the deep door mortises, I used a DeWalt DW625 plunge router and a Leigh 1/2" up-spiral bit (180CL), which has 3"-long cutting edges and an overall length of more than 4". If you don't have this router, you'll need one with a plunge range that exceeds 3". Even on my DeWalt, I had to remove the "height-stop thumbwheel" from the threaded rod on the right front of the router to allow the motor to rise 5/8" higher on the posts.

Here's an inventory of the 40 mortises you need to cut for each door: 16 are 3/4" wide, 2½" long and 3" deep; 12 are 3/4" wide, 2½" long and 2" deep; 12 are 3/4" wide, 2" long and 3" deep. I did them all with one basic setup.

Cutting the Mortises

Begin setting up by laying out a mortise on a sticked scrap of the working stock. Mark the center, and measure and mark 1¼" to either side of the center line. Clamp the scrap to the block, aligning the center line with the registration line. Install the 1/2" bit in the router and adjust the plunge depth to 3". Fit the edge guide loosely in place. Set the router onto the block. Adjust the edge guide to center the bit in the scrap's panel groove. Move the router to one mortise end mark and set the first stop, then shift it to the other end and set the second stop. You're now all set up to rout the mortises.

A couple of tweaks, described

Twenty loose tenons — shown here on the surface of an assembled door — hold the door together. Positive alignment during assembly is a primary benefit of the short tenons joining the rails and mullions. The long tenons joining the rails and stiles provide strength.

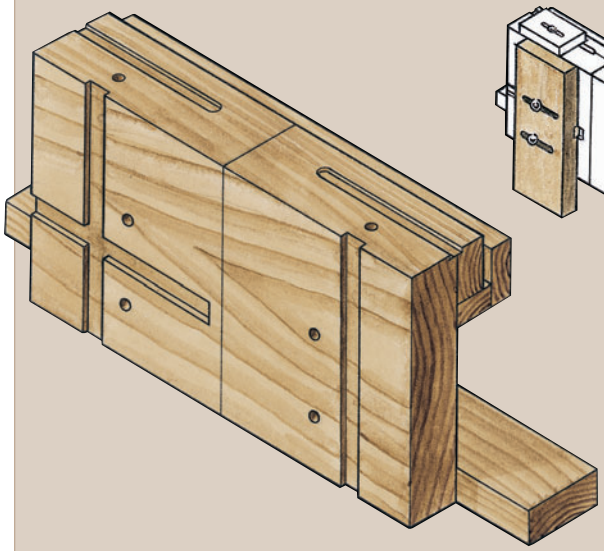
Rout the radiused edges of the tenons first; then refine their fit if needed by taking off a few shavings with a block plane.

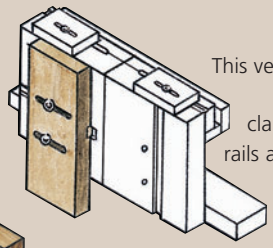
wide rails, like the lock and bottom rails, you divide the tenon on the band saw, leaving a stub tenon between tenon segments. The panel groove cut by the Freud bits is 1/16" deeper than the sticking profile, so you don't have to cut too close to the shoulders of the copes.

How you cut the mortises is up to you, though Freud's extensive instructions include suggestions for that procedure and every other step of a door project.

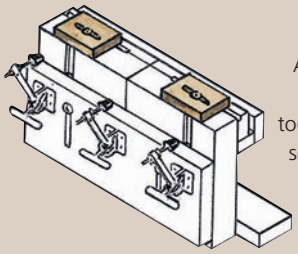
Expect more door-making bit options to come from these two companies in the future. Considering the cost savings of buying a set of router bits instead of a stationary shaper and cutters, these bits are a bargain at any price! And, they work great.

Mortising Block





This vertical holder with toggle clamps secures rails and mullions for end mortising.



A horizontal holder with toggle clamps secures stiles for edge mortising.

For routing all manner of mortises, just a block of wood with square and true edges can hold the work and guide the tool.

The router rides back and forth on top, limited by the adjustable stops. Its edge guide tracks along the back edge (see photo, top left on page 36).

The bit diameter establishes the mortise width, while the router's plunge function controls the depth.

below, allow you to rout those shallower mortises and shorter mortises without touching this basic setup. You switch from edge mortises to end mortises simply by changing workrests.

Always put the workpiece face with the layout lines against the mortise block face. That way, all the mortises will be a consistent distance from that face and they'll all align. Likewise, always line up the mortise center line on the workpiece with the registration line on the block.

The biggest difference between routing these mortises and those for cabinet doors or table legs is the size and weight of the workpieces. I used a telescoping stand to support the outboard ends of the stiles. I had to forgo the vertical workrest and use regular clamps to secure the lock and bottom rails for mortising.

Here are some tricks I used in routing the mortises, which took about an hour altogether to mill:

• Routing 3/4"-wide mortises with a 1/2" diameter bit: Use stop collars on the edge-guide shafts/rods to enable you to move the router 1/4" fore and aft along the rods. Collars (one on each rod) between the router and the guide set the fore position; collars on the outboard side of the guide set the aft position.

I set the guide against the router-side collars first and routed a 1/2"-wide mortise to the full depth. Then I shifted the router forward and re-routed the mortise, widening it 1/4". Remember, the guide is trapped in the mortising block's guide track, so it can't move fore or aft, only side to side.

The first step in setting up is to fit the stop collars on the edge guide rods. Slide one on each rod, mount the guide, then add the second pair of collars. Leave them loose.

Clamp a workpiece to the block and position the router to center the bit in the panel groove. Lock the edge guide. Measure 1/8" along the rods from the guide and position and tighten the collars. (I used a 1/8"-thick gauge bar held against the edge guide, then slid the collar against it and tightened the collar.) Set each of the four collars this way.

Seat the lock-rail to the middle mullion joint by applying a clamp momentarily. A coped scrap is valuable as a clamp block to protect the sticked edge of the lock rail.

• Use the router's plunge-stop turret to govern the two different mortise depths. Use the lowest step on the turret for the deepest mortises. When routing the shallower mortises, rotate the turret to a higher step to reduce the plunge depth by 3/4" to 1".

• Use spacers between the router and the mortising-block stops when routing the short mortises for the lock rail. The baseline setup allows the router to move 1" to the left and 1" to the right of the registration line. With a 1/2"-diameter bit in the router, the result of that travel is a 2½"-long cut.

Notice that the lock-rail mortises are only 2" long. So stick a 1/4"-thick shim (I used 1/4"-thick MDF) to each stop with carpet tape. This reduces the router's travel by 1/2", thus shortening the mortise an equal amount on either side of the registration line.

Making the Tenons

Complete this joinery work by making the loose tenons. I made mine from scrap poplar stock. Plane stock to fit a typical mortise. Rip strips to match the two different mortise widths. On the router table, round the tenon edges to match the mortises, then crosscut the tenons to length. As you dry-assemble the door, pare individual tenons with a block plane as necessary to refine their fit in the mortises.

Assembling the Door

Assembling the entire door without glue is an essential prelude to the final glue-up. Take time now to resolve fit, alignment and clamping issues. You should have labeled the joints as you laid them out. Now label the individual loose tenons so you don't mix them up or misorient any during final assembly.

Midway through the assembly, I applied two long clamps — one along the underside, the other along the topside — to pull all the rail-and-mullion joints tight. Position the "underside" clamp first and flank it with long boards to support the door parts (see photos, this page).

As you assemble a joint, use your penciled mortise layout marks to align the parts. Make sure they really do line up. If the marks don't align, disassemble the joint and whittle the edges of the loose tenon with a block plane to create a little extra play.

The lock and bottom rails have multiple tenons joining them to each stile. Only one tenon is actually glued to both the rail and stile. The theory is that gluing all the tenons hampers expansion and contraction of the wide rails, and this could cause them to split when humidity is low for a protracted period. Gluing one tenon holds the joint closed, while the unglued tenon(s) maintain alignment, preventing the rail from cupping or twisting.

During final assembly, I glued all the loose tenons to the rails, but I glued only the center lock-rail tenon and the upper bottom-rail tenon to the stiles. In preparing for final assembly, I pared the edges of the tenons that wouldn't be glued to the stiles to provide a modicum of clearance for wood movement. I applied a clamp temporarily to individual joints to seat them. I worked out which clamp I'd use at each juncture during the dry assembly.

Other Final Assembly Notes

Assemble the mullions and rails in top-down (or bottom-up) sequence. Insert the panels — don't glue them, of course — as you progress: It helps keep the parts in alignment.

Install the first stile. As before, apply clamps briefly to pull the joints tight and seat the stile against the ends of the rails. Install the second stile. At this point, remove the two top-to-bottom clamps so you can apply clamps across the door. Install one so it's lined up with the lower portion of the bottom rail, a second with the lower portion of the lock rail and a third with the frieze rail. Turn the door over and apply clamps aligned with the top rail and the upper portions of the lock and bottom rails.

After the glue has set, use a straightedge and a circular saw to trim the top and bottom ends of the door to remove the stile extensions, establish the final height and square up the door overall.

Voila! Great doors without a shaper!

Start your dry or final assembly of the mullions and rails by working from the top of the door down or the bottom up. Insert the loose tenons and install clamps above and below the assembly to close the joints.

Continue the assembly process, slipping panels into their grooves to help hold the rails and mullions in position. Make sure the mortise layout marks are aligned. Then finish up by installing the stiles.

Fireplace Mantel

A CLEAN AND SIMPLE DESIGN BUILT FROM RIFTSAWN WHITE OAK MAKES THIS MISSION-STYLE MANTEL THE HIGHLIGHT OF THE ROOM.

By Bruce Kieffer

This fine piece was built as a commission for a friend of my wife's. The only parameter given to me at the onset was: "We like Mission furniture." Wow, that leaves the field virtually wide open! Some woodworkers might cringe when offered so little guidance, but I don't feel that way. Even now, after nearly 30 years of building custom furniture, I'm very much humbled when a client puts that much faith in my abilities.

As for the design, well, I could have taken a simpler road and not tapered the columns, but I didn't like that look, and the challenges of making them tapered and then fitting them to the wall and brick were too tempting to pass up. I could have saved some time, too, by not making the mantel entirely of solid wood, but I worried that plywood might cheapen its appearance. So, there's where I started, mostly with some (self-imposed) lofty goals. Here's how I achieved them.

Design Challenges

Three design aspects needed addressing: First, the mantel needed to be be a simple design but not too understated. Second, being made completely of solid wood, the design needed to allow for wood movement. And third, since the mantel was not going to be stained, I had to figure out how to match the wood color and grain so it all blended well together.

In terms of design, I felt a well-crafted, simple style would stand up to the test of time, so I resisted adding superfluous moldings typical on commercially made mantels. I went to my client's home, cleared the area around the fireplace, sat down and stared at the raw wall. Quickly, I realized that there isn't really a whole lot of stuff that makes up a mantel. There's a shelf and something that supports the shelf. That's it! Add Mission styling to that, and I think you can see where I started my design process.

The author's design depended on an elegance of shape and proportion rather than superfluous applied moldings.

I made rough sketches exploring different shapes and elements. I noted every measurement, including window sizes and locations, as well as the size of the room. These days, before I saw any wood, I first build my projects on a computer using a CAD program. Since I work in 3D, I can see how a finished piece looks before it's built. All the problems are worked out in advance. It's an invaluable tool in any woodworker's arsenal, and there are many CAD programs to choose from these days.

Wood Movement: Managing wood movement requires a certain amount of compromise, but not allowing for it will surely lead to disaster. My main problem was the center arch rail (piece 15). It's 9" wide! I don't care that riftsawn white oak is stable: I live in Minnesota; it's going to expand and contract. To manage the arch rail's movement, I screwed it to the columns so the

This mantel was designed to fit a specific fireplace. Should you choose to build a version for your home, you will need to adjust dimensions to fit your circumstances and fireplace.

MDF mockups of the bases and columns are scribed and then used as templates for the oak pieces. The author used a scribe tool to mark the scribe line, then screwed his level to the centerline of the column to easily adjust it plumb (straight up and down).

bottom screws held it tight and the rest of the screws, which were set in elongated holes, let it move. All the movement is hidden by the mantel shelf.

Other screwed-together connections are handled in a similar fashion. For attaching the column moldings (pieces 12, 13 and 14), I decided that since they were small and not load-bearing, gluing them in place would be sufficient. My experience has shown me that yellow glue will be flexible enough to handle the movement without releasing those moldings.

Wood Matching: I knew that achieving the perfectly matched look I wanted would be a challenge. To ensure my results, I bought lots of extra wood, and I very carefully picked the pieces I used.

The column faces (pieces 9) are symmetrically shaped, so I decided I could get away with a joint on the centerline. I used very straight-grained rift oak and made sure the color was an exact match. The arch rail, on the other hand, is not symmetrical along its width. I figured that any edge-glued joint on it would scream out like a sore thumb. Finding a good piece of riftsawn oak that's 9" wide is nearly impossible. In all of the wood I bought, I only had two candidates. Both told me what I already knew: Wide riftsawn boards change to quartersawn on one edge. I had to live with this, so I chose my best one.

When it came to the 2½"-thick mantel shelf, I was faced with an even greater problem. The thickest white oak I could find locally was 8/4 (2"-thick roughsawn). I knew I would have to face-glue pieces together to achieve my desired thickness. To hide the joint, I bought a wide 6/4 board (1½" thick) and devised a resaw and book-match scheme. I selected a plainsawn board because the edges are typically riftsawn. In that way, the front edge of my mantel shelf would match the rest of the wood. I'll explain this detail later.

Construction Overview

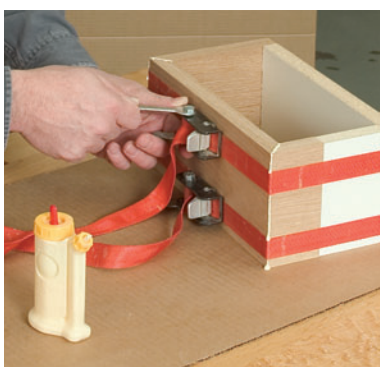
The bases and arch rail are screwed to the columns, the columns are screwed to the mantel shelf and then the arch rail is screwed to the back of the subtop (piece 24). Then the entire assembly is set over the bricks. I placed blue masking tape on the wall around the bases and above the rear edge of the mantel shelf. These "marks" became the relative reference lines I used to determine where to set the base and shelf mounting cleats (pieces 7 and 25). I used 2" screws to anchor the base mounting cleats to the wood floor and concrete anchors to mount the mantel shelf-mounting cleat to the brick.

To determine the dimensions of my mantel pieces, the calculations I made went like this: the fireplace brick was set on average 3⅜" proud of the wall; therefore, my column outsides were that much wider than the column insides. I added another 2" to the overall column depth to accommodate the 3/4"-thick column faces, plus a 1/4" space between the backs of those faces and the arch rail, plus the 3/4" thickness of the arch rail, plus one more 1/4" for clearance between the back of the arch rail and the fireplace brick.

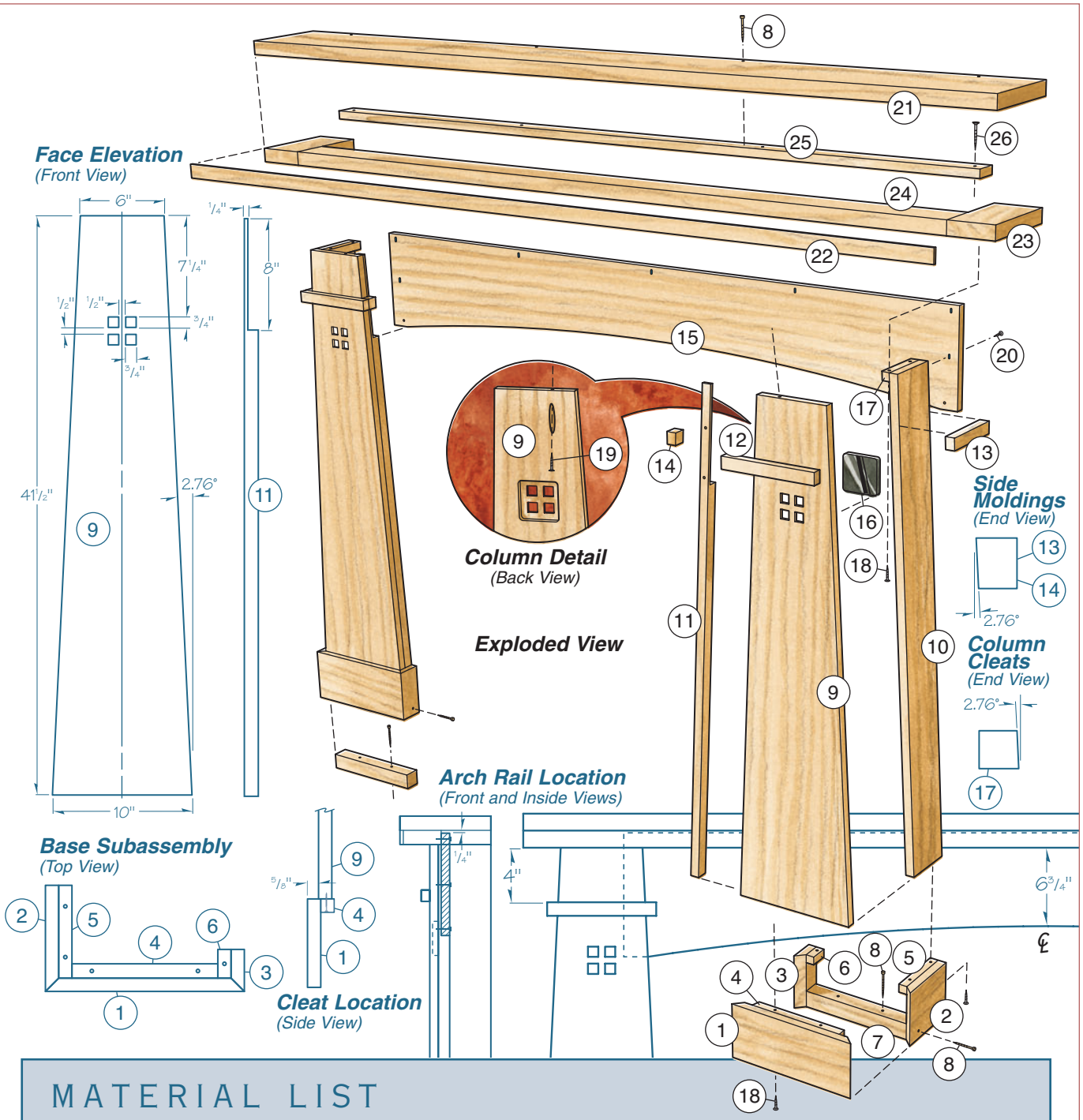
The overall height I used was the height to the top of the bricks, which was 46¾", plus 1/4" for a gap for shims under the mounting cleat, plus 3/4" for the mounting cleat, plus 1¼" for the thickness of the top (piece 21). I set the depth of the top at 8" and its length at 77".

Don't Let the Fitting Process Give You a Fit!

Installing a mantel like this to an existing wall requires a lot of fitting. There are many ways to approach the task, but the method I prefer is to make full-size mockups of the affected pieces, scribe and fit them, disassemble them and use the scribed shapes as templates for my actual pieces. I made full-sized



The author added a fill section made from scrap wood to the clamped assembly to turn it into a rectangle shape. Band clamps can then apply the proper pressure.



MATERIAL LIST

		T x W x L
1	Base Faces (2)	3/4" x 5" x 11¼"
2	Base Outsides (2)	3/4" x 5" x 6"
3	Base Insides (2)	3/4" x 5" x 2⅜"
4	Cleats/Face (2)	3/4" x 3/4" x 8¼"
5	Cleats/Outsides (2)	3/4" x 3/4" x 5¼"
6	Cleats/Insides (2)	3/4" x 3/4" x 1⅝"
7	Base Mounting Cleats (2)	1½" x 1½" x 9¾"
8	Mounting Screws (12)	#8 x 2"
9	Column Faces (2)	3/4" x 10" x 41½"
10	Column Outsides (2)	3/4" x 4⅝" x 41⅝"
11	Column Insides (2)	3/4" x 1" x 41⅝"
12	Moldings/Face (2)	3/4" x 1" x 8"
13	Moldings/Outsides (2)	13/16" x 1" x 5⅜"

		T x W x L
14	Moldings/Insides (2)	13/16" x 1" x 1"
15	Arch Rail (1)	3/4" x 9" x 62"
16	Inserts (2)	1/2" x 3" x 3"
17	Top Cleats (2)	3/4" x 13/16" x 4⅜"
18	Flathead Screws (14)	#6 x 1¼"
19	Pocket Screws (2)	#6 x 1¼"
20	Washerhead Screws (9)	#6 x 1¼"
21	Top (1)	1¼" x 8" x 77"
22	Subtop Edging (1)	1¼" x 1/4" x 77"
23	End Blocks (2)	1¼" x 7¾" x 4¼"
24	Subtop (1)	1¼" x 3⅜" x 68½"
25	Shelf-mounting Cleat (1)	3/4" x 2" x 68"
26	Concrete Fasteners (4)	#6 x 2"

Rout the 1/2"-deep "insert" recesses in the backs of column faces. A band-sawn 1/2" MDF template and a top-bearing pattern bit are the tools to use.

column and base mockups by screwing 1/4" MDF sides to 3/4" MDF faces and base tops. I screwed the columns to the bases so I could scribe them to the wall, brick and floor as units (see photo, page 42).

With the help of a long straightedge, I checked the flatness of the brick facade and that of the surrounding walls. It all seemed to be flat within a half inch, so that's how much extra I added to the side depths of my mockups. I roughly scribed the bases to the floor, and then I scribed the column outsides so they were tight to the walls and the insides so they flowed smoothly along the fronts of the bricks. I didn't try to follow the bricks precisely. When I was done with the sides, I finished scribing the bases to the floor and made any necessary touchups to the column sides.

Using my long straightedge again, I checked to see that the faces and tops of my columns were in the same planes. I also checked the level across the column tops to make sure the mantel shelf would rest level. I made a few more adjustments, and then I scribed a template for the shape of the rear edge of the mantel shelf. I noted the spread between the columns at the top. I needed that information later in my shop when I attached the arch rail.

Still, after all that prep work, I was not convinced it would fit perfectly. So, later, I took the completed but unfinished mantel and assembled it on site to test the fit. I did need to make a few more adjustments, but they were minor.

Remove most of the waste from the square holes by drilling 3/4"-dia. x 3/8"-deep holes. Use a Forstner bit and drill press.

Building Up from the Floor

If you were to build this exact mantel, here's what you'd do: Cut pieces 1 through 7 to size and miter the front ends of pieces 1, 2 and 3. Glue and clamp together the mitered front corners of each base. I used band clamps and added a fill section to make the shape a rectangle, and therefore easy to clamp (see the photo on page 42). Drill the screw holes in the cleats (pieces 4 through 7). Glue and clamp the oak cleats to the bases.

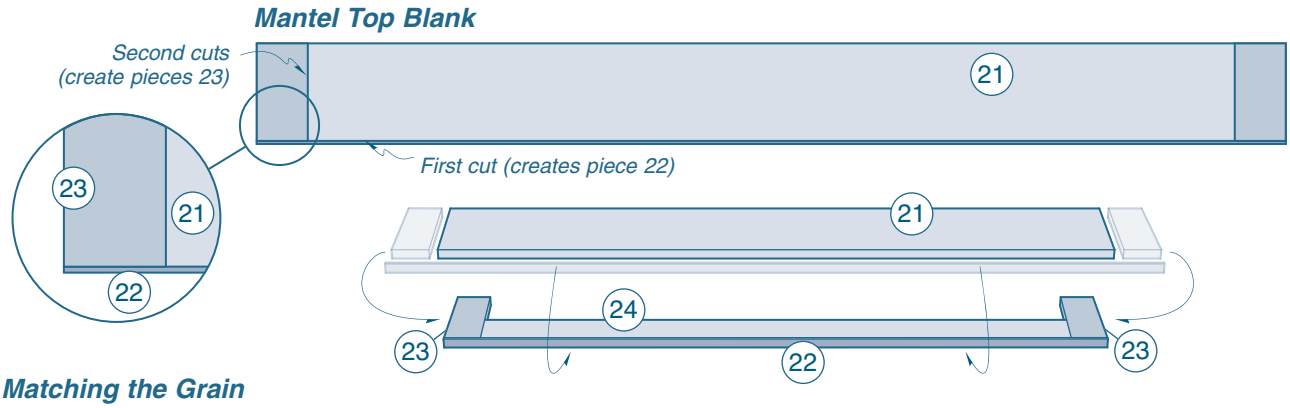
Building the Columns

Edge-glue pieces together to make the faces (pieces 9). Cut these pieces to 10" x 41½". Draw centerlines down the width, and then draw the tapered shapes, the square holes and face molding locations (see the *Drawings* on page 43). Drill out most of the square hole waste (see photo, bottom left), then chop the holes square (see photo bottom right). Cut the inserts (pieces 16) to size and rout their 1/2"-deep recesses (see photo, top left). Cut the column-faces' tapered shapes. Drill the pocket screw holes in the backs of the column faces for the screws that join the columns to the underside of the mantel shelf.

Cut the narrow and wide column sides (pieces 10 and 11) to width and 1" oversized in length. Bevel the ends of the sides and trim their lengths until they fit on the column faces. The bevel angle is 2.76°. I told you I did this stuff with a CAD program! Get as close to that as you can; it doesn't have to be perfect.

Lay out and cut the notches in the column insides for the arch rail. It's okay to cut the notch bottoms square, since when the column insides are tilted as they

Chop the holes square using a 3/4" chisel. Do the ends first, then the sides. This order makes cleaner holes.



Matching the Grain

This technique matches the top's edge and end grain. The front edge and ends are sawn off the oversized piece 21. Then they're flipped over and glued to the edge and ends of the subtop (piece 24), and to the underside of the top (piece 21).

are, the bottom of the arch rail will rest tight to the outside high side of the notch. Assemble the column faces and sides. Make and attach the moldings and cleats (pieces 12 through 14 and 17 — see *Drawings* on page 43).

Making the Arch Rail and Mantel Shelf

Choose the wood for your arch rail carefully. It's the most prominent piece of the mantel and the most difficult to find as one solid piece. Cut it to size. Knowing the spread between the columns at their tops will allow you to do a setup in your shop. Then the arch rail can be set in its notches and the curve ends marked. You can also locate the arch rail-to-column screw hole locations, then lay out and cut the rail's curve (see photo, bottom left, and the *Drawings* on page 43). Drill the screw holes. All except the two bottoms are elongated or oversized.

Draw the arch rail's long, sweeping curve. A 3/8" x 3/4" birch batten has the right tension to create a smooth curve. Clamp blocks hold the batten end points and center height.

Thin-to-thick Trick

Here's how to make the mantel shelf look like it's made from well-matched wood (see the *Drawings* above). *NOTE: the following dimensions assume 1/8" saw kerfs and no other waste.* Start with a 1¼" x 8⅜" x 85¾" piece of plainsawn white oak. Rip a 1/4" strip off the edge with the straightest grain. Trim 4¼" off each end of that strip to make the subtop edging (piece 22). Crosscut one 4¼"-long piece off each end of the main piece and, using a band saw, rip those short pieces so they're 7¾" wide to make the end blocks (pieces 23). What remains is the mantel top (piece 1). Make the subtop (piece 24). You may need to adjust its width. When all is assembled, its back edge must align with the back edge of the arch rail notches cut on the column insides. Glue the pieces together as shown in the *Drawings*, above.

Finishing and Installation

As I said earlier, it's best to make a final test fit now that you have all the parts made but not finished. Once you're happy with that, final-sand all the parts and apply your finish. I stained my inserts with ebony stain so they were a warm black color. I finished everything with a 25 percent sheen "water white" catalyzed varnish. You could get essentially the same look using a waterbased varnish.

The author used tiny-headed Torx drive screws, driven in so their heads were flush, to attach the mantel to the mounting cleats.

For many reasons, I never make my installations permanent. Here, I decided to use "yellow" trimhead Torx drive screws made by GRK Fasteners. An alternative would be readily available black trimhead drywall screws countersunk and filled.

Although I was not surprised, when I stepped back and looked at the new mantel, I was pleased that it looked "natural" and added a nice bit of warmth to the room.

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Build a Bedroom Shelf

BUILD A SHELF THAT IS SO STRONG IT SEEMS TO BE AN OPTICAL ILLUSION! YOU CAN PUT TORSION BOX TECHNOLOGY TO WORK IN A PRACTICAL SETTING.

BY IAN KIRBY

Like a large plank of solid wood, a single torsion box is of limited use. In the case of the large plank, we usually cut it into smaller pieces, which are then joined together in some way to make the desired object.

Not so with a T-box (torsion box). It differs from the large plank in two important ways. First, we can make it to any length, width and — most significant of all — thickness we want. Second, because it is a structural component, we can use it in ways that are impossible with a plank. There are virtually no boundaries to how we can design and engineer ways to exploit its strengths: we are not bound by wood movement, grain direction or surface finish.

A Practice Shelf

As an example of what the T-box has to offer, here's how to use a T-box to make one or more shelves on a wall with no apparent means of support. This is a quick and easy project for your first keeper T-box. It should find a useful place in your shop

Critical Path for Wall Shelf

1. Cut the skins to dimension and square.
2. Cut the core parts and spacer blocks.
3. Assemble the core.
4. Position the core on one skin.
5. Position the core on the second skin.
6. Glue the box.
7. Clamp the box.
8. Refine the edges.
9. Lip the edges.
10. Attach the ledger to the wall.
11. Glue the shelf to the ledger.

or garage. However, this is not just an ordinary shelf, but one sturdy enough to sit on! And after you've made your starter shelf, you can step up to build a lovely bedroom shelf.

Ledgers: The T-box Connector

The key to its design is the open pocket at the back of the shelf and the separate core piece, called a ledger, which is screwed to the wall. Indeed, this pocket-and-ledger system is almost a universal method of joining T-boxes into larger structures. Once familiar with how it works, you're well on your way to creating complex furniture from multiple single boxes.

The width of the ledger is the same as the core, but it's three or four times thicker to increase the glue surface and provide sufficient material to bolt firmly to the wall. Use hardwood for strength. My preference is maple.

In Praise of Lag Screws

I've learned that only lag screws attach the ledger to studs in the wall with the necessary rigidity. Earlier experience with regular wood screws up to #14 gauge revealed that the screws would flex and bend when force was applied to the front edge of the T-box. I use 3/8" x 4" lag screws. An added bonus is that driving a lag screw into a wall with a wrench is much simpler than putting in a heavy-gauge screw with a driver.

How Strong Can These Little Boxes Be?

Q: Just how strong is a wall-hung T-box shelf?

A: Very strong, as evidenced by the test rig shown here (below right) under load (weight unspecified!). When the glue has cured, you have a very robust, non-adjustable shelf. I suggest that when you decide to sell your house, promote it as "SHELF — with house attached!"

Over the years, I've demonstrated making T-boxes many times, as you can see by the various examples shown here. In the photo at left you can see a shelf that is ready to glue up. In the stack of shelves, the bottom one has MDF skin and core — no need to lip it: radius the edges and it's ready to paint. Next up is the same design, painted. Third up has an oak-faced plywood skin with oak lipping. The top one is leather-covered, which is finished with an oak lipping glued on at each end. The T-box is an important option for anyone who is serious about designing and building furniture.

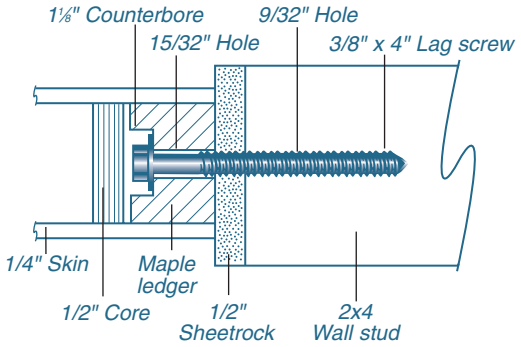
The author has, through the benefit of time and experience, perfected the torsion box as a component of fine furniture making. Its unique qualities are such that every woodworker should be willing and able to put them to use.

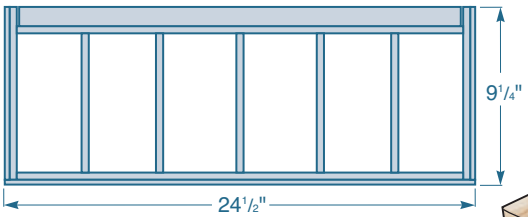
MATERIAL LIST — *Practice Shelf*

		T x W x L
1	Plywood Skins (2)	1/4" x 9" x 24"
2	Softwood End Frames (2)	3/8" x 1⅜" x 9"
3	Softwood Front & Inside Frames (2)	3/8" x 1⅜" x 23¼"
4	Softwood Cores (5)	3/8" x 1⅜" x 7⅛"
5	Maple Ledger (1)	1⅜" x 1" x 23"
6	Ash Lipping* (1)	1/4" x 1⅞" x 24½"
7	Ash Lipping* (2)	1/4" x 1⅞" x 9"
8	Locator Blocks** (8)	1/2" x 1¼" x 1¼"
9	Lag screws (2) plus washers	3/8" x 4"

**Cut the lipping long and trim to fit.* ***8 minimum, more if needed.*

Ledger Attachment
(Section View)





Practice Shelf Core Layout
(Top View)

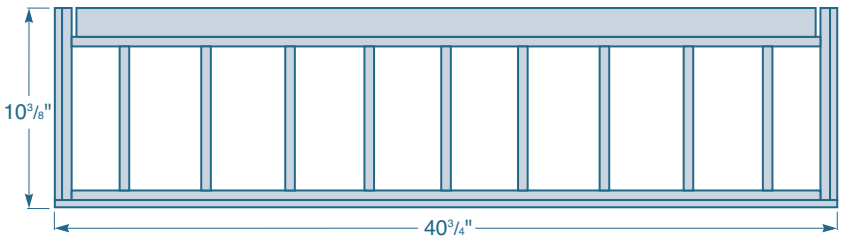
Shelf Exploded View

The locator blocks, (pieces 8), are used not only to locate the skin onto the assembled core during glue-up, but also to force the core into "square." If the front and back members of the core have a bend, you can adjust that during steps 4 and 5 of the Critical Path (see tint box, *facing page) by using locator blocks — they are simply hot-glued in place. They are not traditional glue blocks, as they do not join components of the shelf together.*

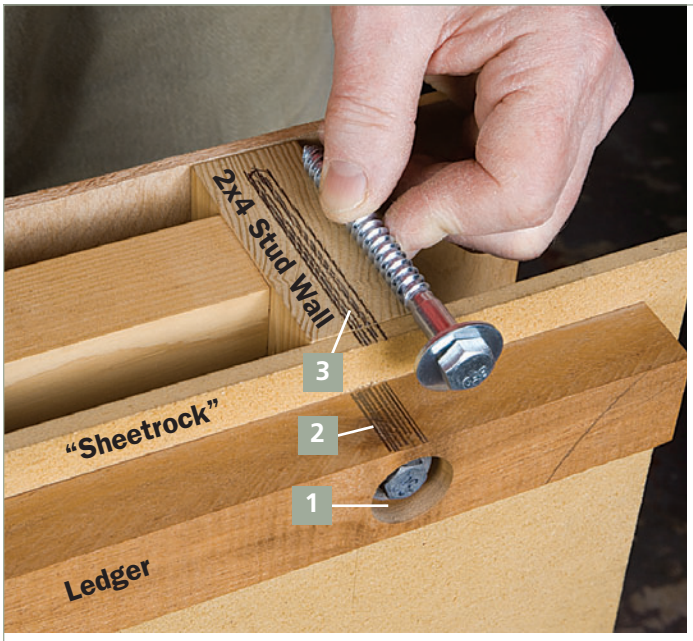
MATERIAL LIST — *Serious Shelf*

		T x W x L
1	Ash-faced Plywood Skins (2)	1/4" x 10" x 40"
2	Plywood End Frames (2)	1/2" x 2" x 10"
3	Plywood Front and Inside Frames (2)	1/2" x 2" x 39"
4	Plywood Core (9)	1/2" x 2" x 7½"
5	Maple Ledger (1)	1⅜" x 2" x 38½"
6	Ash Lipping* (1)	3/8" x 2½" x 40¾"
7	Ash Lipping* (2)	3/8" x 2½" x 10"
8	Locator Blocks** (8)	1/2" x 1¼" x 1¼"
9	Lag screws (3) plus Washers	3/8" x 4"

**Cut the lipping long and trim to fit.*
***8 minimum, more if needed.*



Serious Shelf Core Layout
(Top View)



Three holes are required to attach the ledger: 1) a counterbore for the washer and head; 2) a shank hole through the ledger; 3) a core clearance hole in the wall. The photo shows a mocked-up wall with 1/2" MDF playing the role of sheetrock.

A critical measurement: make sure the core clearance hole is the same size or slightly larger than the core of the lag screw.

Attach the ledger and confirm that it's level. If you make the shank clearance hole 13/32", it provides enough room to move the ledger just a fraction to get it level.

A Serious Shelf

The length of this shelf captures three studs. It's made using 1/4" ash-faced plywood skins with 1/2" plywood core stock. The ledger is maple held in place with 3/8" x 4" lag screws. The shelf is lipped with 3/8" solid ash. The edges are crisp but with the sharp edge removed. The stark white of the ash veneer was turned only slightly to a softer hue by three coats of salad bowl finish.

Drilling the Holes

You'll need three installation holes: a core clearance hole in the wall and a counterbore and shank hole in the ledger. In the case of a 3/8" x 4" lag screw, the core clearance hole is 9/32" diameter by 4" deep. Don't try to put a 3/8" x 4" lag screw into a stud without the correct clearance hole for the core. If you use a smaller diameter, the strength it takes to turn the wrench is being absorbed by the friction between core and clearance hole. You want the friction to be between the helical thread and the wood tissue.

In the absence of an electronic stud finder, you can locate stud centers by probing with fine drill holes within the area that will be covered by the ledger. Since light switches are usually nailed onto studs, that's a good place to start if one is near to hand. Plot the studs, drill the core clearance holes, then transfer their location to the ledger.

Drill the counterbore 1⅛" diameter by 3/8" deep. A spade bit in a drill press with the workpiece clamped in place works well. In theory, the shank hole is 3/8", but in practice it should be a bit larger to accommodate any leveling adjustment (see *Ledger Attachment Drawing*, page 51) that may be required when attaching the ledger to the wall. Now glue the shelf to the ledger using the instructions on the next page, and you've got an amazing, beautiful and immensely strong shelf. You're ready to pile on your favorite books, sculpture or whatever your heart desires.

After the ledger is properly attached, roll glue on the top and bottom of the ledger. A thin, but full-coverage, coating is required.

Roll glue on the skin of the pocket and wet all the contact areas. No glue is applied to the front of the ledger or to the core.

Carefully position the shelf on the ledger. Time is a factor here. Be sure to have gathered all your clamps, levels, etc., before you begin.

Clamp two battens on opposite sides of the pocket area. To extend pressure from the ends of the shelf to the middle, center a piece of folded cardstock top and bottom under the battens (the cardstock is too small to be seen in these photos). Check that the shelf is level front to back.

Gluing, Clamping and Leveling The Shelf

After you have attached the ledger to the wall, securing the shelf to the ledger is relatively easy, but not without peril. Because you are gluing the shelf to the wall (the ledger is now a part of the wall), it is something that you have to do correctly the first time... or live with imperfect results. (Once attached, you can remove the shelf, but you will destroy it in the process.) Get all the required tools and supplies gathered close at hand before you begin. It is a process that, with a small shelf, you can complete alone — but an extra set of hands makes it much easier.

If it's sloping up, bring the top clamping batten forward about 1/4" until it's level. If it's sloping down, clamp a block to the front of the box, loosen the batten clamps, level the box, and clamp it to a vertical bar. Retighten the batten clamps.

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- Heather Clancy, ZDNet.com

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Cabinet Shell Game

How do you turn a "gotta-do-it" home improvement project from a task into a treat? Make it into a "wanna-do-it" woodworking project!

By Rob Johnstone

There are many ways to skin a cat, or so I am told, having never actually tried to de-fur a feline. But when it comes to doing chores around the house, I discovered long ago that there is one way to change many of those traditionally tedious tasks from menial to magical — I simply employ my woodworking skills to fix the problem at hand. A great example of this is the simple cabinet shell that I built for my 1906-vintage house. With the children leaving home, it was starting to feel like the right time to "downsize." One of the trickier roadblocks to getting our home ready for market was a large and unsightly set of shelves in a back room. Our realtor quickly identified it as something that needed to be either upgraded or removed. The spot was really quite handy for storage, so sheetrocking over the area seemed a shame, but the mess on the shelves was indeed distracting and seemed to be a magnet that attracted other strange odds and ends without a better home. When I hit on the idea of building a cabinet "shell" over the existing shelves, it struck me as just the right ticket.

The "before" shelves, overflowing with family games, were useful but unsightly. I decided that a woodworking project was the only way to cure this homespun eyesore.

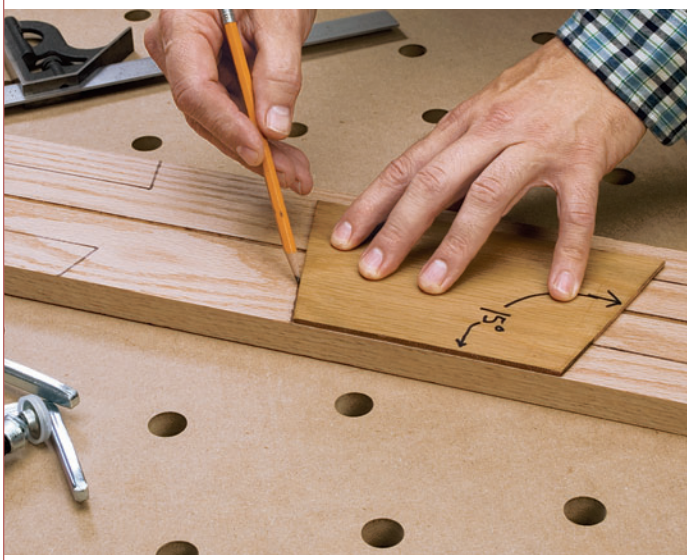
Making it Really Worthwhile

When I do this sort of project, one goal I have is to design and build it in a way that takes advantage of my skills. The basic DIY style of woodworking can certainly improve a home, but take it up a notch and you can both increase market value and leave behind something of lasting value. For this simple cabinet, I chose quartersawn red oak to match some nearby cabinets and added a couple of ornamental details that matched existing features in my home: keystone-shaped plinths or chevrons. Some details are subtle, such as those in the center door stiles. I chose to make the cumulative width of the two center door stiles the same measurement as the width of each outer door stile. In this nearly square cabinet, this feature helps the project look more rectangular, as do the chevrons (forming a bowtie area for mounting the pulls), placed low on each stile. I made the two center rails from a single piece of stock (see photo sequence on page 58) so the grain pattern in the wood flows from one to the other. The chevron motif is also

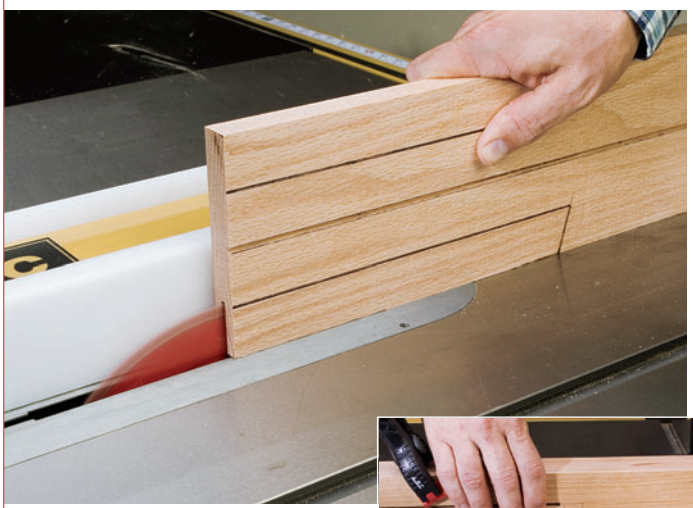
After

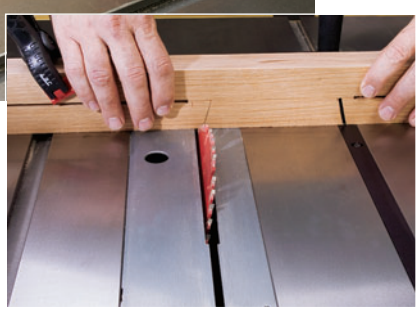
Stock selection is the easiest single step you can take to move any project you build from boring to beautiful.

The center stiles of this cabinet's full-overlay doors add shape and style to an otherwise uninteresting and utilitarian project.



With the aid of a template, I marked out the chevron detail for the center stiles. Note that both stiles are made from one piece of stock. The kerf in the center of this piece is essential for accurate layout.





Form the groove for the 1/4" plywood door panels in the stiles before cutting them apart. Then you can rip the resulting pieces apart. All this machining can take place on your table saw.

repeated in the built-up crown. And the crown was formed by slicing a single piece of superbly figured quartersawn red oak into strips. I marked them so as to keep their orientation consistent with the order in which I ripped them from the board. When I assembled the crown I kept that orientation — and, if you look closely — once again the figure flows smoothly from one strip to the next. By building it in segments, I was able to "remove" horizontal sections of the crown and, in turn, build in the center chevron. None of these details are visually overwhelming or even difficult to make, but they add up to help an ultra-simple cabinet look very stylish (if I do say so myself).

Starting with a Simple Case

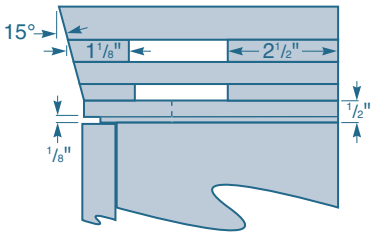
The case of this cabinet could hardly be more straightforward: two sides, a top and bottom, and a shelf (pieces 1 to 3). I formed 1/8"-deep dadoes (see *Elevation Drawings*, facing page) to locate and hold the cross members while I glued and brad-nailed them together. The shelf, piece 3, was made from red-oak veneered plywood with a strip of solid oak glued to the front edge; its 12¾" depth made this the practical way to move forward.

One comment here about stock selection: Before I made a single piece of this cabinet, I spent a good long while sorting through piles of lumber in order to select great-looking quartersawn red oak with pronounced rays or flecks. Stock selection is the easiest single step you can take to move a project from boring to beautiful. In this case, the time invested paid big dividends.

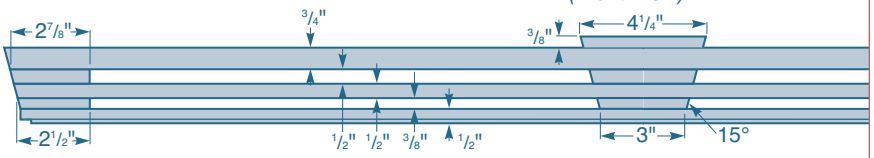
Creating Detail-rich Doors

The entire cabinet front is covered by matching full-overlay doors. Because I was attaching the case of the cabinet to an existing shelf assembly, a face frame was not only not required, but would in fact add unneeded complications. For this reason, I used European style hinges to mount the doors (see the *sidebar* on pages 60 and 61). The prospect of mounting these hinges either brings tears of joy or fear to the eyes of woodworkers, depending on whether they have installed them before.

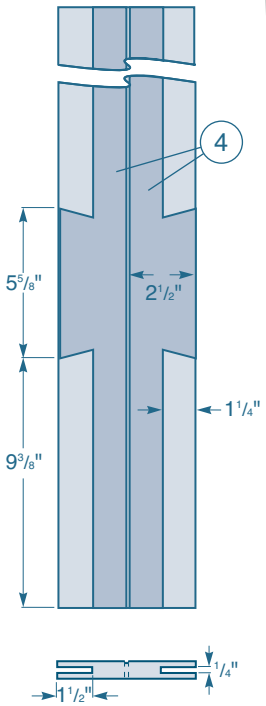
Crown Molding Assembly
(End View)



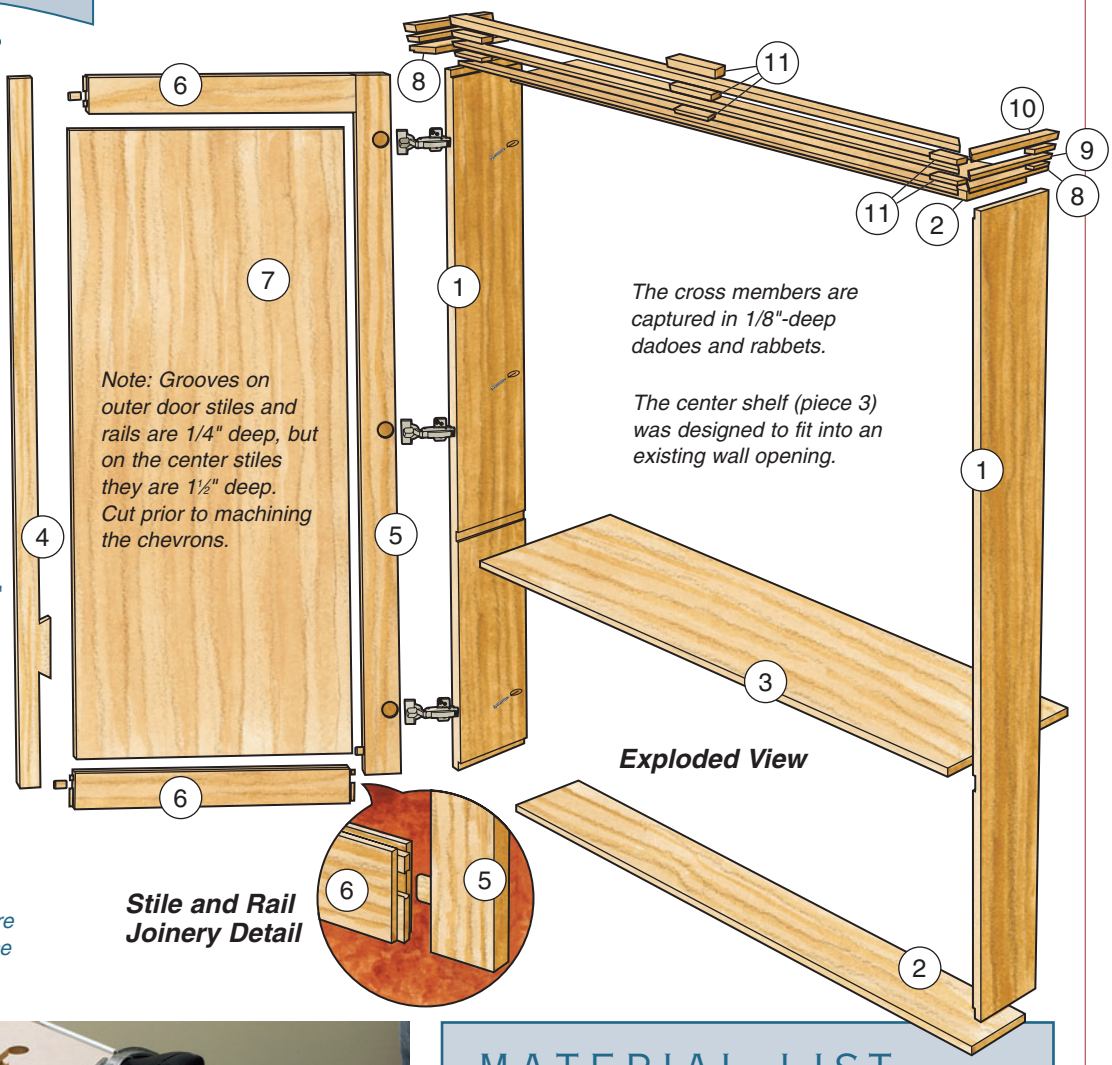
Crown Molding Assembly
(Front View)



Center Door Stiles
(Front and end Views)



The center door stiles are machined from one piece of stock.



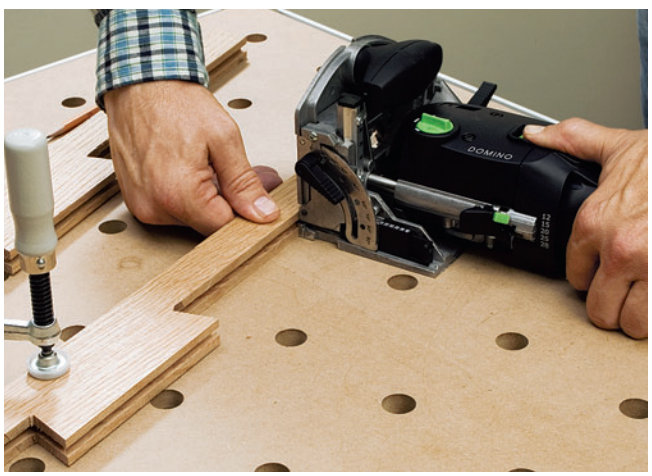
Note: Grooves on outer door stiles and rails are 1/4" deep, but on the center stiles they are 1½" deep. Cut prior to machining the chevrons.

The cross members are captured in 1/8"-deep dadoes and rabbets.

The center shelf (piece 3) was designed to fit into an existing wall opening.

Exploded View

Stile and Rail Joinery Detail



The mortises for the floating tenons were formed using Festool's Domino machine. A few of their dominoes, along with the rail's stub tenons, created easy-to-assemble and sturdy corner joints for the door's stiles and rails.

MATERIAL LIST

		T x W x L
1	Sides (2)	3/4" x 5" x 46⅞"
2	Top/Bottom (2)	3/4" x 5" x 41¾"
3	Center Shelf (1)	3/4" x 12¾" x 41¾"
4	Center Door Stiles* (2)	3/4" x 3½" x 47
5	Outer Door Stiles (2)	3/4" x 2½" x 47
6	Door Rails (4)	3/4" x 2½" x 18 3/16"
7	Door Panels (2)	1/4" x 18 3/16" x 42½"
8	Crown Base Strip (1)	1/2" x 2" x 55"
9	Lower Crown Strip (1)	1/2" x 1⅛" x 58"
10	Upper Crown Strip (1)	3/4" x 1⅛" x 58"
11	Crown Blocks **(11)	*See Elevation Drawing*

* *Cut from one piece of stock 3/4" x 6⅛" x 47".*
** *Form these blocks from the appropriate layers of crown strip stock. See* Elevation Drawings *to determine sizes.*

This crown is built up from stock cut from one piece of exceptionally beautiful lumber. Although a bit complicated in concept, it is very easy to build.

I turned to pocket-hole joinery to secure this cabinet shell to an existing set of storage shelves: a simple and effective solution.

The lion's share of the work building these doors involves making the center stiles (pieces 4) described earlier. I started with a select piece of stock that was the width of both the door stile and chevron detail, plus a saw kerf. I cut the piece to length and then plowed a shallow kerf exactly down the center of the piece to aid in marking out the various stile details. I made a hardboard template with 15° angles to mark the chevrons. With the layout complete, I plowed grooves into each edge of the board (see photo, page 58) to accept the door panels. Then I ripped the stiles apart. I used the hardboard template to set my saw blade at a 15° angle and cut out the chevrons using a miter gauge outfitted with a backer board. Staying on the table saw, I ripped close to the chevron layout lines and then finished up the tight corner cut on the band saw.

I followed that step up by making the rails and the two remaining outer stiles (pieces 5 and 6). I'm talking basic bread-and-butter woodworking here: The parts were cut to size, I plowed the grooves to accept the door panels and then raised the stub tenons on the rails (using a miter gauge on the table saw) to fit the panel grooves on the stiles. While these stub tenons held the door frame in perfect alignment, they were too small to hold the doors together. That's why I decided to add floating tenons (see photo, previous page). With them, the door frame machining was complete and the joinery sufficiently strong.

All that remained in constructing the door was to cut the plywood panels (pieces 7) to size, do one final dry fit of all the parts and then glue and clamp it all together. I set the doors aside while the glue cured and moved on to the crown subassembly.

Confused By European Hinges?

A drill press is great for drilling the cup holes for the hinges. When you drill the pilot holes for the cup hinge screws, be sure to use a square to keep everything properly aligned.

Many woodworkers find European-style hinges to be confusing and even a little frightening. One reason may be that they don't look anything like "real" hinges — at all! And while that is true, I have found them to be not only easy to use, but also forgiv-

A Crown with Flare

This built-up crown sub-assembly flares out from the cabinet at the same 15˚ that I used when creating the chevron motif. It looks a bit complicated, but is actually really a snap to build. First, I ripped the slices of stock as I described earlier. Each layer of the crown is built from progressively thicker pieces for a more dramatic visual effect. After all of the strips were cut, I reset the table saw blade at 15˚ and cut the "show" face of each strip. I selected the "show" face of the board that had the most dramatic figure to the wood.

With the former mess of board games now hidden behind the large doors, this shell of a cabinet turned one of our home's major eyesores into an attractive feature.

Before I put the crown together, I made the crown base strip (piece 8). This piece has an 1/8"-deep by 3/8" wide rabbet on its edge that creates a reveal (shadow line) under the crown. This line is further emphasized by the line at the top edge of the doors —another subtle but important detail. Once the pieces were cut, I simply mitered the long crown strips (pieces 9 and 10) — starting with the crown base strip — around the perimeter of the cabinet top. I kept the beveled face of each strip flush to the outside of the crown to create its 15˚ flare. The chevron details (with their own 15˚ ends) and the corner blocks (pieces 11) were glued and pin-nailed in place in a sequential process that went quickly. After the glue cured, it was time to do a bit of sanding and hang the doors. One of the great advantages of European hinges is the fact that they are adjustable. This was especially important with this project because you want the center stiles to fit together evenly.

Finishing and Mounting

I stained the cabinet to match my trim and molding and applied three coats of wipe-on polyurethane before mounting it. I decided early on that pocket-hole joints would be the best way to attach this shell to the existing shelf unit. The screws pulled the cabinet carcass tight to the shelves, and I was able to keep the whole assembly square. I then mounted the door pulls.

Now, when I stroll through that back room, I feel a sense of satisfaction rather than distress and distraction. Not bad for a couple of days in the shop.

I recommend a story stick to mark out the locations for the mounting plates. Then I use one of Rockler's Jig-It systems to drill the holes for the mounting plate.

ing in their nature. Simply stated, their designers have built a superior amount of adjustability into their function. The first thing you need to know about these hinges is that the cup part goes in the door and the mounting plate goes on the cabinet wall. (When I first saw this hinge system, my brain told me it should be the other way around.) With full-overlay doors like these, the easiest way to locate the hinges is to use a story stick to transfer exact location to both door and carcass. Check the directions for your hinges; for the ones I selected, the cup holes were located 7/8" in from the edge of the door. It's very important to be sure that the cup hinge section is mounted squarely in the door, so I use a square while drilling the screw holes to keep everything properly aligned. I always reach for Rockler's Jig-It® system to drill the holes for the mounting plate — it makes the task easy as pie. Once the plate and hinge are mounted, you just clip the two together, and the door is hung. Not quite right? Not to worry: you can adjust the position of the door on the cabinet by screwing the adjustment screws (see hinge directions). Using those screws, the door can be moved right and left or up and down (and in and out to boot!). Not confusing at all.

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Outdoor Swing & Arbor

MADE OF LUMBERYARD CEDAR, THIS PIECE IS AS STURDY AS IT IS COMFORTABLE. MORTISE-AND-TENON JOINERY ADDS STABILITY AND STYLE TO THIS FUN-TO-MAKE BACKYARD PROJECT.

By Jim Piaszynski

What could be more relaxing than to while away the summer hours on a cozy porch swing? If you don't have a porch, don't despair; you can build a swing that hangs from its own freestanding arbor and make it the centerpiece of your patio or yard. I built my first patio swing for my mother-in-law, and my wife's sister liked it so much, I ended up building another one. Now, you guessed it ... my wife wants one!

I made this swing of Western red cedar, an attractive and widely available wood that holds up well in the elements. I avoided the cheaper alternative — pressure-treated lumber — because of aesthetics and concerns about the toxic chemicals they use to preserve it.

The swing is very sturdy and gives you a sense of timber framing when you build it. Making mortise-and-tenon joints in 4 x 4 stock is really fun and great practice. The finished product is a showpiece that is comfortable to sit in. The overhanging roof beams lend visual balance to the design and offer a perfect place to hang flower baskets and such.

This project is large but easy to build, consisting almost entirely of simple mortise-and-tenon joints (see the *Drawings*, pages 66 through 68) held together with boatbuilder's epoxy and polyurethane adhesives. The only metal fasteners are the deck screws that secure the canopy boards and the side cross braces to the arbor. My total investment for materials was close to $500, including finishing supplies and hanging hardware.

Figure 1: Drill out your mortises with a 1⅛" Forstner bit, using a fence to keep the holes aligned in the center of the piece.

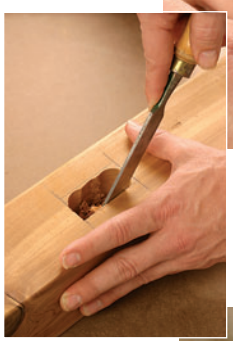
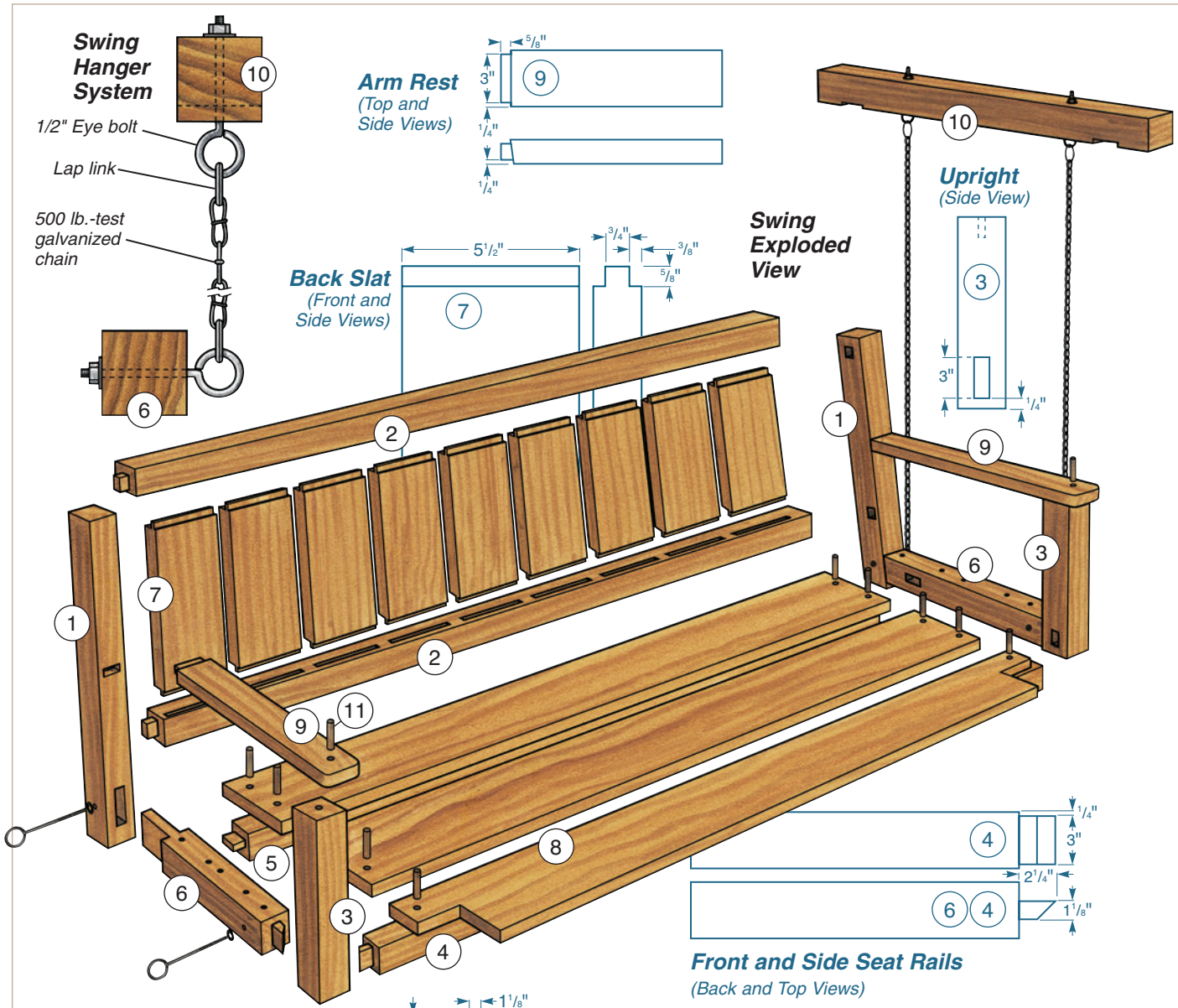


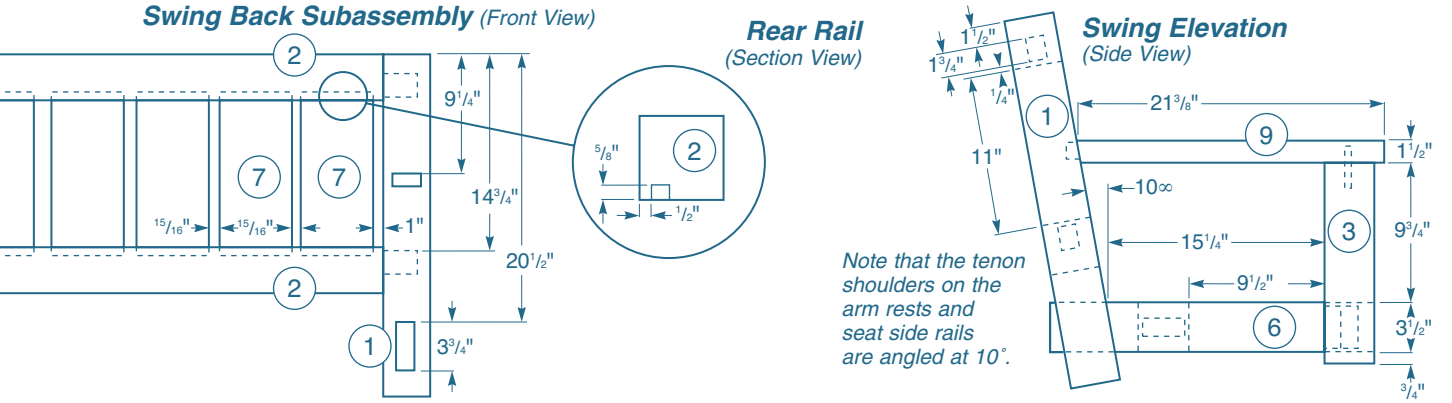
Figure 2: Square up the mortises with a sharp chisel. The sides of the drilled holes serve as a visual guide.

Figure 3: Cut the tenons to thickness with a stacked dado blade, working from both sides of the workpiece to keep the tenon centered.



MATERIAL LIST – *Swing*

		T x W x L
1	Rear Stiles (2)	3½" x 3½" x 26"
2	Rear Rails (2)	3½" x 3½" x 64"
3	Front Uprights (2)	3½" x 3½" x 14"
4	Front Seat Rail (1)	3½" x 3½" x 63½"
5	Rear Seat Rail (1)	3½" x 3½" x 64"
6	Seat Side Rails (2)	3½" x 3½" x 22"
7	Back Slats (9)	1½" x 5½" x 12¼"
8	Seat Slats (3)	1½" x 5½" x 66"
9	Arm Rests (2)	1½" x 3½" x 22"
10	Swing Support Beams (2)	3½" x 3½" x 50"
11	Dowels (12)	1/2" Dia. x 3"



Machining the Swing Components

You can build this swing with just a few common power tools — a miter saw to cut pieces to length, a table saw with a dado blade to cut the tenons and a Forstner bit in a drill press to rough out the mortises. You'll also need a sharp chisel to square up the mortises, and a router will help you form the mortises in the seat rails for the back slats.

It's important to remember that this is a rustic outdoor project, not a fancy piece of furniture. I designed it to use standard construction lumber sizes without significant modification. When you lay out your parts, select pieces with as few knots and other defects as possible for the back and bottom rails of the swing itself. These are the most critical weight-bearing parts.

I used a miter saw to cut my stock to length. The *Material List* includes an allowance for the tenons in the total length of the pieces.

After you've cut the lumber to length (pieces 1 through 10), you're almost ready to cut the tenons. But first, to make sure you end up with just the right tenon thicknesses, you'll need to make up a test mortise, so you can check and adjust the fit of the first tenon. In fact, it's best to make a test mortise for each size mortise and tenon in the project. (There will be five, counting those that accept the back slats.)

Most of the mortises in this project are large and deep (see *Figure 1*, page 64), so routers and hollow-chisel mortisers aren't effective options. I use a time-honored, two-step method: First, I drill out most of the waste with a 1⅛" Forstner bit in my drill press, using a fence to center the mortise on the stock and keep the holes in perfect alignment; then I square up the corners with a sharp chisel. The sides of the holes act as a visual gauge for chiseling (see *Figure 2*, page 64). The mortises that enter the front face of the rear stiles (pieces 1) are angled at 10˚. For that reason the shoulders of the complimentary tenons need to be angled to match. Refer to the *Elevation Drawings* for construction details. To drill the angled through mortises in the backrest uprights, I tilted my drill press table to 10˚. If your table doesn't tilt, you can build a wedge-shaped auxiliary table that will do the trick.

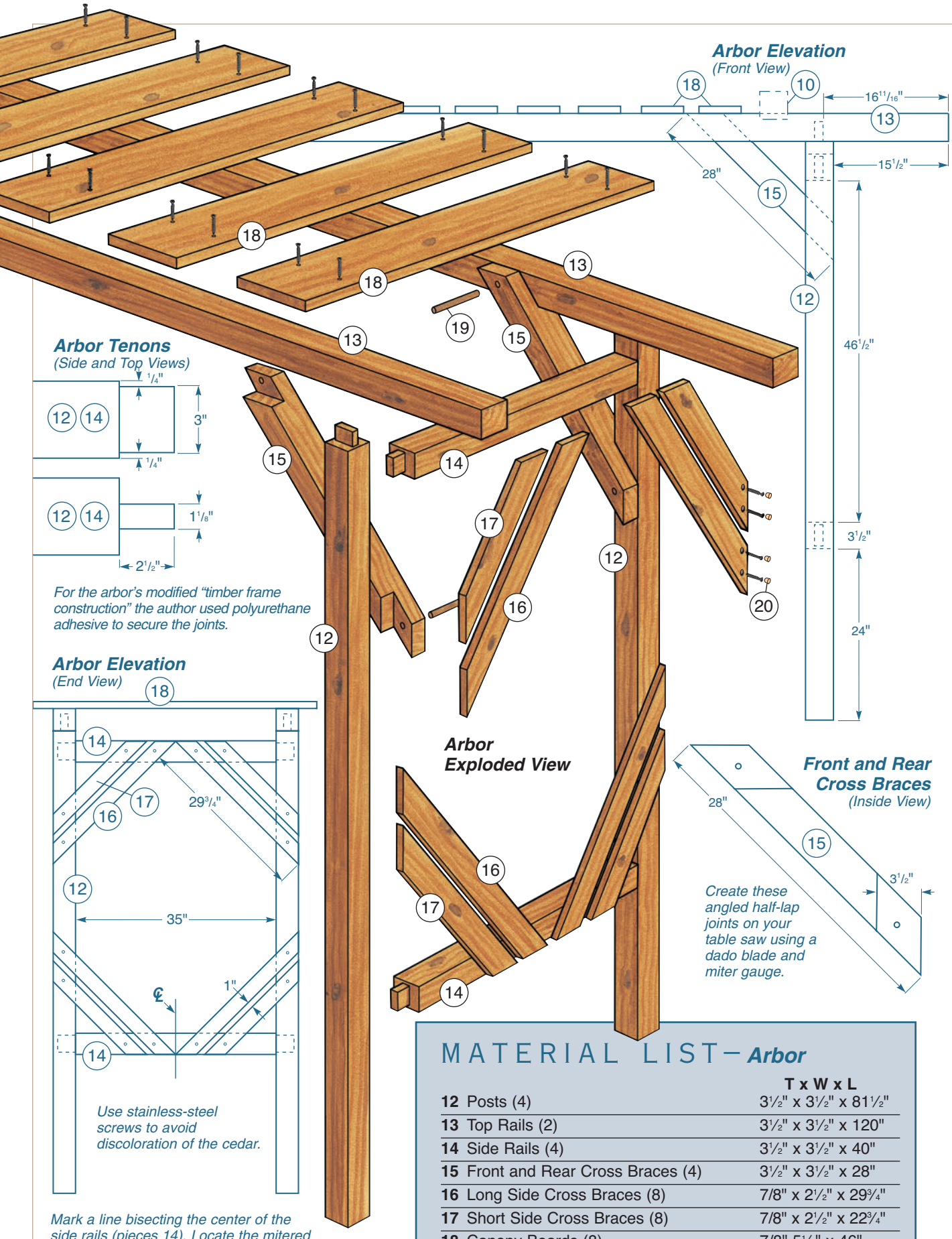
With your test mortises in hand, step to the table saw and set up your dado blade for sawing the tenons. Cutting from both sides of the stock assures that your tenons will be centered and exactly the right thickness. One caution: If there's any variation in the thickness of your 4 x 4s, it's a good idea to plane them to uniform thickness before tenoning, or your tenon thicknesses will also vary.

When you've got the first tenon right, cut all of them using your miter gauge (see *Figure 3*, page 64) to keep the shoulders square. For the angled shoulders (where the swing seat meets the back) set your miter gauge to 10˚.

The author made good use of water-resistant (epoxy and polyurethane) adhesives while building this project. To secure the seat slats, the author used 1/2"-diameter hardwood dowels and adhesive to peg the boards in place.

After you've cut the tenons to thickness, use the same dado method to cut them to height (see *Drawings*). Also, note that the tenons that meet in the uprights at the front corners of the swing seat must be mitered.

The final step before assembly is to mortise the back rails and cut the full-width tenons on the back slats to match. I used a 3/4" router bit to rout the 5/8"-deep mortises, then I chiseled the ends square. I positioned the mortises, so the faces of the slats would be set back about 1/8" from the faces of the rails, just behind their edge roundovers.



MATERIAL LIST – *Arbor*

		T x W x L
12	Posts (4)	3½" x 3½" x 81½"
13	Top Rails (2)	3½" x 3½" x 120"
14	Side Rails (4)	3½" x 3½" x 40"
15	Front and Rear Cross Braces (4)	3½" x 3½" x 28"
16	Long Side Cross Braces (8)	7/8" x 2½" x 29¾"
17	Short Side Cross Braces (8)	7/8" x 2½" x 22¾"
18	Canopy Boards (8)	7/8" 5½" x 46"
19	Dowels (8)	3/8" Dia. x 3"
20	Mahogany Plugs (32)	3/8" Dia.

Assembling the Swing

At this point, you're ready to glue everything up. I used polyurethane adhesive for the arbor and dowels and epoxy for the swing joints.

Start by assembling the swing back. Insert the slats (don't use glue here) between the two back rails and then glue on the uprights at either end, checking for square. Glue up the seat assembly separately (pieces 3 through 6) and follow up by gluing this subassembly to the back. Add the arm rests and peg them to the tops of the uprights. I used 1/2"-diameter mahogany dowels (pieces 11) for a nice color contrast, strength and weather resistance.

The seat slats aren't glued down. Just position them and dowel them into place. (Notch the front slat to fit.) One nice thing about this design is that the swing can be mounted to the ceiling of a porch (with caution to be sure it is strong enough; be sure to hit a joist), so no arbor is needed. But most of us will want to put the swing out in our yard. If that's what you plan to do, the arbor is your next task at hand.

Building the Arbor

Cut your lumber (pieces 12 through 18) to length using a miter saw as before. Use the same drilling and chopping technique to create mortises in the major structural members (pieces 12 and 13). Form the corresponding tenons to fit, and you're ready to start assembly. Glue and clamp each end of the arbor using polyurethane glue. Cedar is soft, so use clamping cauls to avoid marring your wood. Make sure the ends are square. After the glue has cured, lay the long top rails (pieces 13) on a level surface and glue and insert the side subassemblies into their mortises. Use temporary supports clamped to the rails and subassemblies to ensure that they are square as the glue dries. Now use your dado blade and miter gauge to notch out the angled lap joints on the front and rear cross braces (pieces 15). With the whole unit still upside down, attach the braces with dowels and polyurethane glue. Allow the glue to cure. Now get a buddy to help you turn the whole shebang right-side-up.

The side cross braces (pieces 16 and 17) are attached next. Mark a center line on the outside face of the side rails (see *Elevation Drawings*). This will help you fit the long cross braces accurately. Drill pilot holes in the ends of the braces for the deck screws (stainless steel are best), and counterbore to accept the mahogany plugs (piece 20). Secure them as shown in the *Drawings*. The last construction step is to attach the canopy boards (pieces 18). Again I used stainless-steel deck screws to secure these ... the stainless-steel screws will not discolor the cedar as it weathers.

Hanging the Swing

Technically, this swing is more of a glider, because it is suspended on four separate chains. (My idea of a "swing" has just two main vertical chains.)

I used inexpensive, 500 lb.-test galvanized chain, but you could easily get away with 350 lb.-test depending on your uses. The chain is attached to the swing and the support beams (pieces 10) above with 1/2" eye bolts and lap links.

The support beams are notched to fit over the top rails, but they aren't permanently attached. I left them movable, so I could easily remove the swing from the arbor without undoing the chains.

The final step is to sand and stain everything, then sit back and relax in your comfortable new swing and arbor. I used deck sealer to bring out the wet look of the wood with minimal tinting. Like any piece of outdoor wooden furniture, this project will have to be cleaned each year and have its sealer "freshened up" every few years. But for now, that's all in the future and summer is nigh.

It's important to remember that this is a rustic outdoor project, not a fancy piece of furniture. It was designed to accommodate standard construction lumber sizes without significant modification.

Reject, Restore or Refinish

You have many options for rescuing furniture with poor finishes. Start with our expert's sage advice.

By Michael Dresdner

Chances are, there are some pieces around your house whose finish could benefit from some attention. You'll need to decide first whether or not they are worth salvaging at all, and then choose between two options: saving and restoring the finish, or stripping it off and refinishing.

Rejecting Some Altogether

In most cases, it is not an abysmal finish that will deter you, but rather advanced structural problems. Peeled veneer, missing parts or poorly repaired joinery make some pieces not worth the effort to save, even if they were refinished.

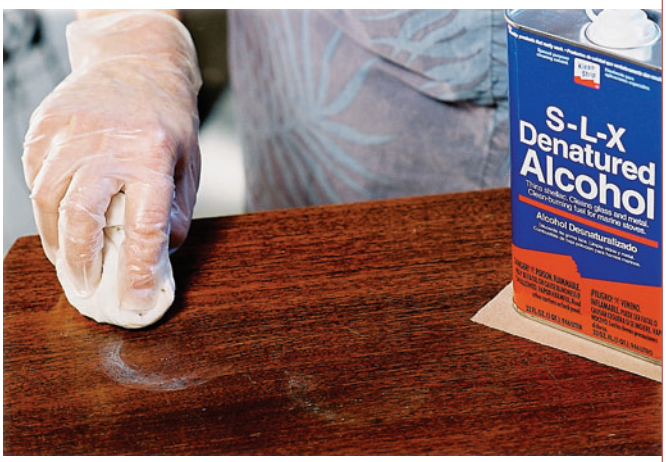
Almost all finishes will come off, though not necessarily easily. Watch out for thick, plastic-looking clear coats, like those used for decoupage and some bar tops. They will resist most chemical strippers, and sanding them off may result in more damage than the job is worth. Milk paint, a durable, traditional coating, is also impervious to most strippers, but it can be removed with either lye or special milk paint strippers.

Restoring a Finish

Many pieces, including most kitchen cabinets, are clear finishes over stain. If the finish is intact and not peeling, and there are no huge bare areas, you can usually restore what is there. That can include cleaning, removing white rings, rubbing out minor scratches, touching up serious ones, filling dings or even adding extra finish. You may have to do some or all of these steps, pretty much in that order.

- **Cleaning Up:** Clean the finish first. Use mild soap and water for gentle cleaning, or graduate to trisodium phosphate (TSP) to remove old wax and greasy or heavy dirt. In tough cases, use fine (#0000) steel wool to help dislodge the dirt. You'd be surprised how often a good cleaning is all that is needed, in which case you can go directly to "Rub" (next page) to restore the sheen.
- **White Rings:** White rings caused by water marks often come out when you clean the surface and remove old wax. If they don't, simply wipe them with a cotton cloth dampened with denatured alcohol. The cloth should be damp, not soaked. Damp means "about as wet as a healthy dog's nose." Alcohol may

There's not much value in a perfect finish if your piece is suffering advanced structural problems. The bottom line: Is it worth the effort to save a pig in a poke?



White rings from water marks often will disappear when you clean the surface and remove the old wax. If they don't, dampen a cotton cloth with denatured alcohol and gently wipe the area. If it works, you're repairing a shellac finish.

degloss the finish, in which case, move on to the next step.

- **Rub:** If the finish is in good shape but has merely lost some of its sheen to minor surface scratches, rub it. For a satin luster, use #0000 steel wool dipped into paste wax and rub back and forth in the direction of the grain to impart a series of fine, uniform scratches. Wipe off the excess wax immediately, or let it dry and buff it off for a slightly shinier surface. For gloss finishes, use rubbing and polishing compounds from the automotive store.
- **Touchup:** Now that it's clean, you'll see all the little nicks and scratches where color is missing. Your local woodworking specialty or hardware store will stock several different brands of touchup markers in a range of wood colors. They look like normal felt-tip markers, and they work the same way. Simply color in the light sections of scratches or edges where the finish has rubbed through. It's a good idea to buy several colors close to what you think you will need, and use whatever matches best, including combinations.

In the same section of the store, you'll also find wax fill sticks that look like crayons in woodtone colors. Use them to fill in small dings and nicks. Rub the crayon over the defect until it fills up, then scrape off the excess with the edge of a credit card to leave a smooth, flat surface.

French Polishing

The classic way to rejuvenate a clear finish on a fine antique is with French polish. Describing both the finish and the method of applying it, French polish involves applying thin coats of shellac with a cloth pad. Behlen (sold in many wood specialty stores) and Mohawk (sold online and through distributors) offer several versions of pre-mixed, ready-to-use French polish under names like Qualasole™, Rapid Pad, Lacover®, and Lac French. This beautiful shellac finish is great for fairly gentle wear, but on the down side, it is neither heat- nor alcohol-resistant. Additionally, it does take some skill and practice to get a nice surface.

If your finish is in decent shape, try using #0000 steel wool dipped into paste wax, and rub back and forth in the direction of the grain.

If you don't yet have the skill, you might try Bulls Eye™ French Polish from Zinsser. It is a traditional, clear wiping finish that goes on in one step. I've had good success with it.

Overcoating

Finishes that are wearing thin can be recoated to add another layer (or two) of protection and many more years of wear. Almost any finish can be recoated with more of the same, but if you don't know what is on already, there are still several safe options.

After cleaning, lightly sand the surface with 320-grit sandpaper. Avoid sanding through the color, or you'll have extra touchup to do. Zinsser SealCoat™ is a good first step, as it will bond to any finish. Any coating, including waterbased ones, can go over it. Apply one coat as a clear primer, or add several to give you a classic shellac finish. Oil-based polyurethane can also go over any finish, including SealCoat, and is more durable. Painting is another option.

Refinishing

When all else fails, refinish, but first make sure it's appropriate. If you suspect you have a valuable antique, have a conservator or appraiser look at it. Stripping very old pieces can detract substantially from their value. But painted yard-sale windfalls and battered, but sturdy, household pieces have a new life awaiting them once the stripper does its job.

I find it easiest to remove many layers of old paint by using a combination of methods. Start with a heat gun to get the bulk of the gunk off quickly and easily, then graduate to a semi-paste paint remover to get the remainders out of the corners and moldings. For thin, single coats of paint or clear finishes, go straight to the chemical stripper. Either method is easier and safer than trying to sand off a finish, which will destroy patina, leave previously stained wood mottled and may cause you to abrade through thin veneers.

One word of warning is in order, and that word is "lead." Until 1978, lead was commonly used in house paint. If you suspect the piece is old enough to have lead-based paint on it, DO NOT sand the finish, and DO NOT use a heat gun on it. Chemical stripping is safer, but make sure the stripping gunk is allowed to harden and dry before disposing of it. For guidelines on removing lead paint safely, see HUD's Office of Lead Hazard Control (www.hud.gov/offices/lead).

If French polishing is new to you, help is on the way. Bulls Eye™ French Polish, a one-step clear wiping finish, will make the job much easier for a newbie.

Sometimes, removing layers of old paint reveals beautiful wood underneath. Then again, you might find that your article of furniture is made from mismatched lumber never meant to sport a clear finish, and even staining won't hide its piebald appearance. Don't worry; you can always resort to repainting it, and this time around you can choose a color you really like.

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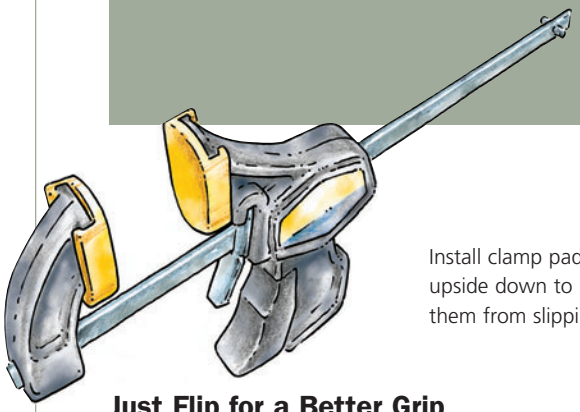
Tricks Of The Trade



Install clamp pads upside down to keep them from slipping off.

Just Flip for a Better Grip

Quick-Grip clamps are handy in the shop, except for one pesky problem: the rubber pads tend to creep off the jaws when tightened down. There's an easy fix: slide the pads off, flip them around and slip them onto the jaws from below. Now, the closed end of the pad will prevent it from sliding up and off. You can run a bead of hot-melt glue along the open end, just for good measure. Those pads will stay put.

Sawing Thin Metal

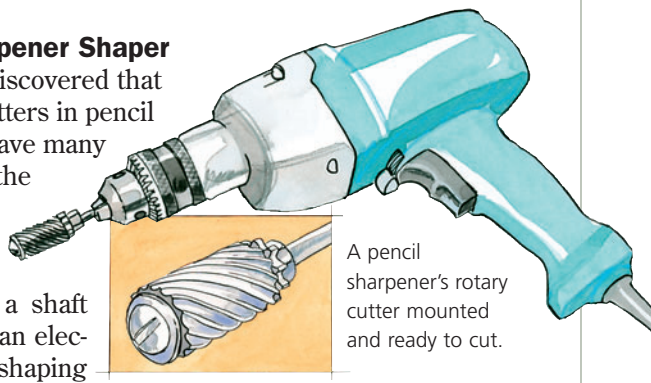
Here's a way to saw thin sheet metal more easily: clamp it in a vise between two pieces of plywood or Masonite™. You can then saw through the wood-and-metal sandwich with a hacksaw. Stiff backing keeps the metal from distorting.

Shop-made Logs from Shavings

A benchtop planer produces more shavings than you might know what to do with. If you have a fireplace, here's a way to turn them into "logs." Lay a sheet of newspaper on your bench, pile on the shavings and roll it into a tight sausage. Tape the newspaper shut, and your "log" is ready for burning.

Pencil Sharpener Shaper

One reader discovered that the rotary cutters in pencil sharpeners have many uses around the shop. Take out the cutter, mount it on a shaft and use it in an electric drill for shaping wood and other odd jobs. If the cutter needs sharpening, lay it flat on an oilstone or a piece of emery cloth and let it run at slow speed for a minute or two.



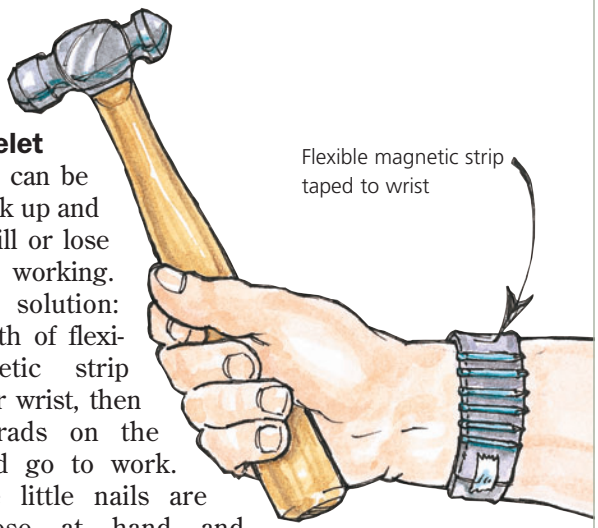
A pencil sharpener's rotary cutter mounted and ready to cut.

Epoxy Mixing Cups are just a Soda Can Away

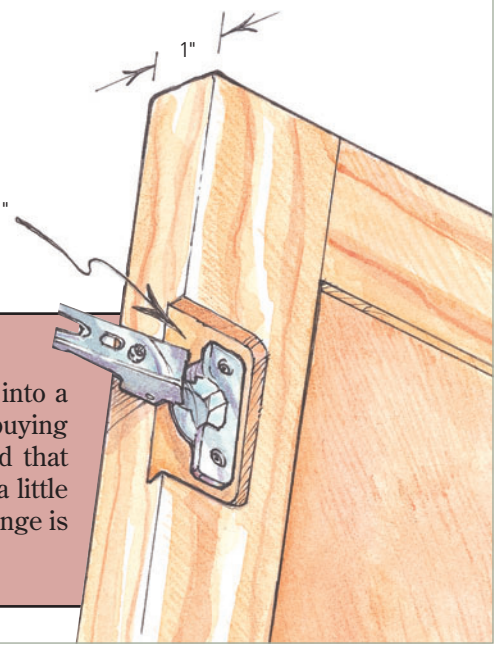
To mix up small quantities of a two-part epoxy, try using the dish-shaped hollow at the bottom of an aluminum beverage can. The cans are easy to hold when applying the glue, and they're plentiful.

Brad Bracelet

Small brads can be tricky to pick up and easily to spill or lose as you are working. Here's one solution: tape a length of flexible magnetic strip around your wrist, then sprinkle brads on the magnet and go to work. Now those little nails are always close at hand and spill-proof.



Flexible magnetic strip taped to wrist



Retrofitting Thick Cabinet Doors for Euro-style Hinges

While retrofitting an old cabinet with new cup hinges, one reader ran into a problem. The original doors were 1" thick rather than 3/4". Instead of buying other hinges to accommodate the thicker doors, he devised a method that allowed him to use standard 32mm cup hinges. He routed out an area a little larger than the cup and screw flange, thus making the area where the hinge is mounted 3/4" thick. Then the hinge cups could be installed as usual.

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