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2005 Tool Buyer's Guide (pg.16)

25 HOT ACCESSORIES–*to rev up your router table!*

WORKBENCH®

WOODWORKING TO IMPROVE YOUR HOME®

October 2004

simple & elegant

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WORKBENCH® October 2004

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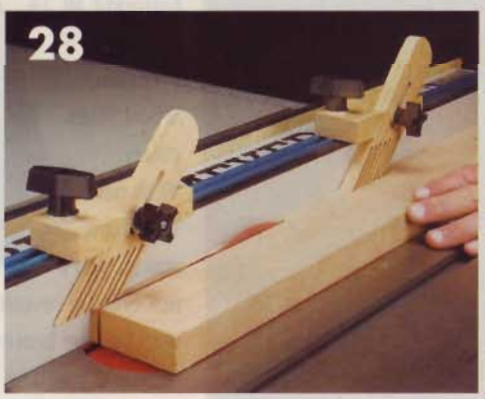
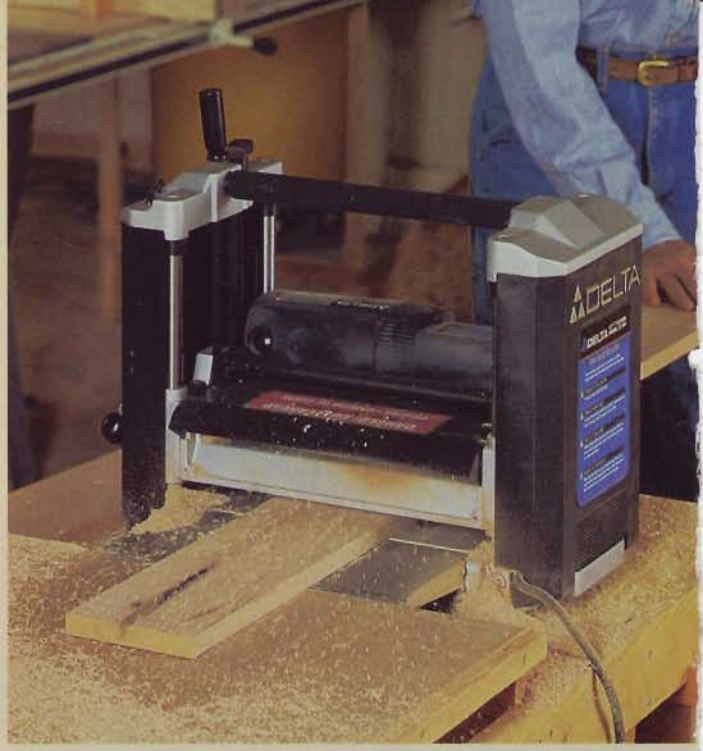


Questions & ANSWERS

thicknessing wood — PLANER OR SANDER?

Q *From what I have read and viewed, there are at least two methods to reduce the thickness of a board — planers and drum sanders. What are the advantages and disadvantages of each, and which one would you recommend?*

Michael Caputo
Robbinsville, NJ



A Actually, I would recommend using *both* of the tools — but for vastly different operations. While a thickness planer and drum sander might seem similar in the way they work, they are two distinct tools that both have a place in your woodshop.

Reducing Wood Thickness — If your main goal is to reduce the thickness of wood quickly, then the thickness planer is the tool of choice. It cuts wood using a round cutterhead that's equipped with sharp knives. As you feed wood into the the planer, these knives spin at 4,500 RPM, taking up to $^1/_8$" at a time off the thickness of a workpiece *(see How Planers Work, below)*. While the knives can reduce thickness quickly, there's tendency for tear-out, and sometimes a lot of sanding is necessary to achieve a smooth surface.

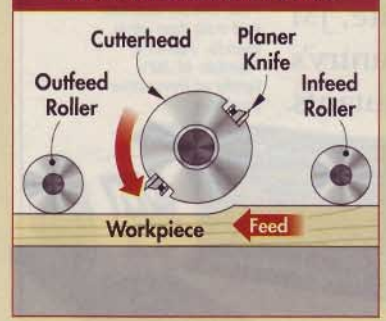
Flattening & Sanding — The drum sander does not have nearly the capacity for reducing thickness that a planer has. It can only take $^1/_{64}$" to $^1/_{32}$" off a workpiece at a time. Where a drum sander really shines, though, is in flattening panels and taking care of the initial sanding on most workpieces. It's also great when working with highly figured woods like curly or bird's-eye maple — woods that can chip out under a planer's knives.

Drum sanders work by means of a conveyor belt, which feeds workpieces under a steel drum that's wrapped with a sanding strip. The perfectly true surface of the drum will sand panels flat and smooth and cut hand-sanding time by as much as 75 percent. (**Note:** For an in-depth look at the new Performax drum sander, see page 36.)

▲ A thickness planer works best for reducing the thickness of a workpiece quickly.

A drum ► sander is preferred for flattening panels and preliminary sanding.

How Planers Works



How Drum Sanders Work

Got Questions? We Have Answers!

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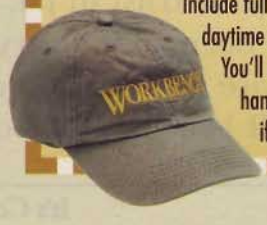
Forums: forum.woodnet.net
Mail: Workbench Q&A, 2200 Grand Ave., Des Moines, IA 50312

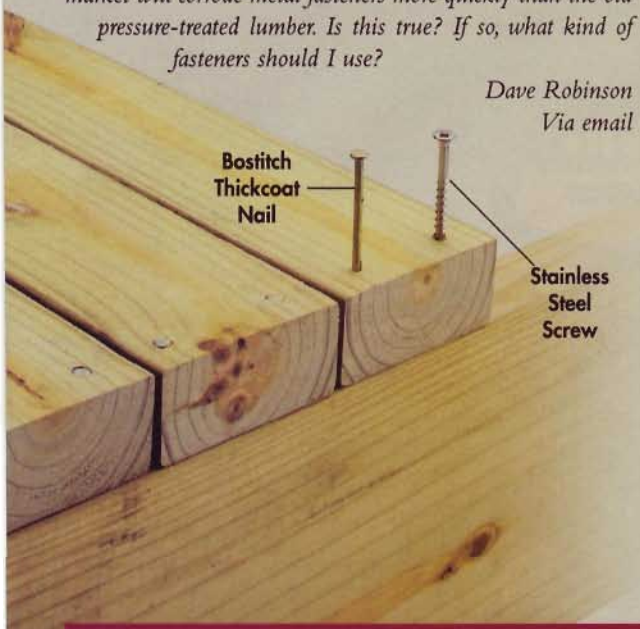
Include full name, address, and daytime phone number. You'll receive one of our handsome *Workbench* caps if we publish your letter.



best fasteners for TREATED LUMBER

Q I build a lot of outdoor projects and use a great deal of pressure-treated lumber in my work. A friend recently told me that the new treated lumber on the market will corrode metal fasteners more quickly than the old pressure-treated lumber. Is this true? If so, what kind of fasteners should I use?

Dave Robinson
Via email

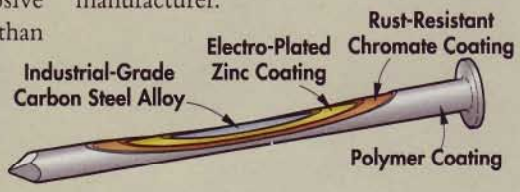


A Early in 2004, the wood treatment industry agreed to halt the production of lumber that has been pressure-treated with Chromated Copper Arsenate (CCA) for residential applications. Long the standard for projects such as decks, playhouses, and sheds, CCA production was ceased due to concerns over arsenic content.

New Outdoor Lumber — As a result, there is a new type of pressure-treated lumber at most home centers and lumberyards — Alkaline Copper Quaternary, or ACQ. And while ACQ is safer because of its non-arsenic content, studies have shown it to be three times as corrosive to metal fasteners as CCA. (It should be noted that ACQ is just one of several new pressure treatments, but the others show the same corrosive traits.) So it's more important than ever to use the right fasteners.

Stainless Steel — Hands down, the best material to use with any type of pressure-treated lumber is stainless steel. These fasteners are impervious to rust and corrosion. Their one downside is that the price is three times that of galvanized fasteners.

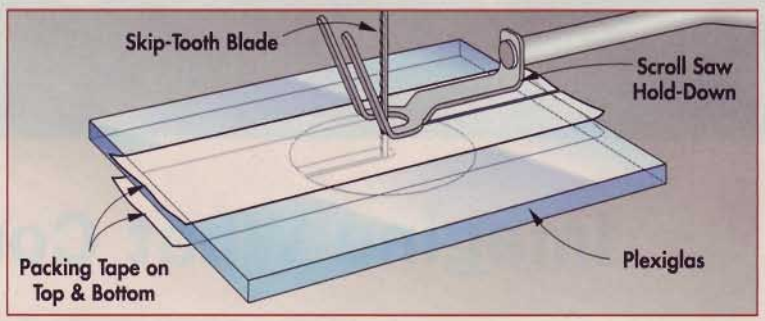
Galvanized Fasteners — If stainless steel is too pricey, "hot-dip" galvanized nails are generally regarded as the next best choice. But a variety of electro-plated fasteners also have tested as well or better than the "hot-dip" nails. Bostitch Thickcoat nails are one good example because they feature three layers of electro-plating to increase corrosion resistance *(see Illustration below)*. Of course, several other galvanized fasteners also are suitable for use with pressure-treated lumber. For questions about using other types of fasteners, your best bet is to check with the lumber manufacturer.



Cutting Plexiglas with a Scroll Saw

Q When I try to cut Plexiglas with my scroll saw, it always melts and "fuses" the kerf closed. Is there a special blade or speed I'm supposed to use? Or some other trick to cutting Plexiglas that I'm not aware of?

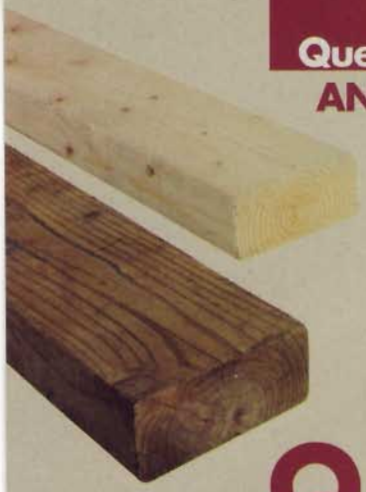
Steve Holz
Kewaunee, WI



A The main cause of this problem is the friction generated by the short cutting strokes of the scroll saw. This friction causes the blade to heat up, which in turn makes the Plexiglas fuse together.

Blade & Speed — A couple different strategies can make it easier to cut Plexiglas and other acrylics on the scroll saw. The first step is to choose a skip-tooth blade with 9 to 12 teeth per inch. The skip-tooth blades work well because the space between the teeth ejects chips quickly, preventing heat from building up *(see Photo, left)*. Also, be sure to set your scroll saw at a slower cutting speed to reduce the heat generated. About 1,000 strokes per minute or less should be sufficient.

Wrap It Up — The second strategy is to apply a few layers of packing tape to the cut line on both the top and bottom of the workpiece *(Illustration)*. In the case of an intricate curved cut, simply wrap the entire piece of Plexiglas in tape, and apply the pattern over the tape. The tape provides enough of a cooling effect to produce a smooth, clean cut.



demystifying LUMBER SIZES

Q *Why do they call it a 2x4 when it's really $1^1/_2$" x $3^1/_2$"? And why is $^3/_4$"-thick plywood more like $^{23}/_{32}$", or even $^{11}/_{16}$"?*

Anthony Dorn
Ballwin, MO

▲ New industry standards in the production of lumber changed the traditional 2x4 *(bottom)* into a $1^1/_2$" x $3^1/_2$" board *(top)*.

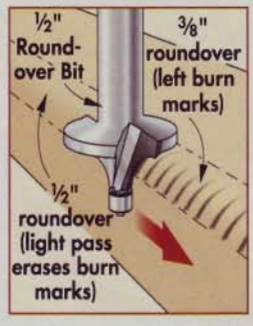
A 2x4 lumber is actually 2" × 4" when it's first rough-sawn from a log. But the drying and planing process that the board undergoes at a modern mill reduces it to a finished size of $1^1/_2$" × $3^1/_2$". Turn-of-the-century lumber did not go through such a standardized production process, which is why you're likely to find "true" 2x4s in older homes *(Photo, left)*.

As for plywood, its dimensions changed in the early '80s, when scientists determined that performance standards could be met with thinner plywood. So a tolerance of $^1/_{32}$" was allowed in each veneer layer. This is why plywood can vary by up to $^1/_{16}$" in thickness.

Router Burn

Q *I've been doing a lot of roundovers with my router lately, and I notice that I'm getting burn marks. Any suggestions on how I can get a cleaner cut?*

Norman H. Camire
Haines City, FL



A A number of factors can contribute to router burn. Here are a few suggestions that might lead to an overall cleaner cut.

Clean the Bit — First, try to clean the bit with one of the many bit cleaners available. It's amazing how much a dirty bit can impact the quality of cut.

Make Two Passes — Another approach is to make one pass near the final depth of cut, and then make a second lighter pass to achieve final depth. The second pass should clean up any burn marks made on the first pass *(see Illustration)*.

Sharpen It — If these two methods don't work, then your bit is probably dull. I would recommend using a resharpening service, as it's tricky to sharpen a carbide bit by hand.

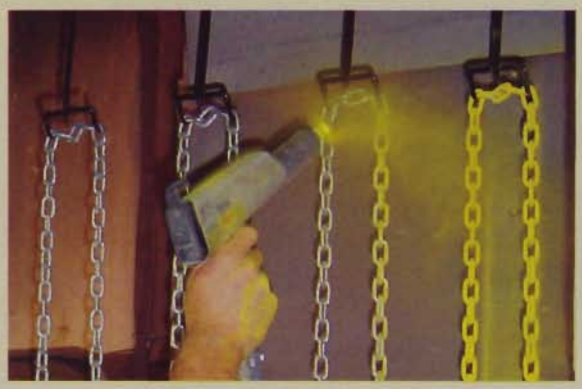
rust-proof metal with POWDER COATING

Q *In the June 2004 issue, your article on redwood decks (page 65) refers to aluminum balusters that are powder-coated. What is this powder coating, and is it any better than a good coat of paint?*

Jon Nordstrom
Via email

A There's no denying the protection and durability of a good coat of rust-resistant paint for outdoor metals, and for most projects, it should suit your needs fine. Plus, for the DIYer, it's tough to beat the low price of painting metal yourself.

Powder Coating — On the other hand, when a scratch- and chip-resistant finish is absolutely crucial, then powder coating is the way to go. Powder coating looks like paint *(Photo, left)*, but the process by which it's applied to metal makes it an excellent choice for outdoor protection.



The Powder-Coating Process — While paint only covers the surface of metal, a powder coating bonds electrostatically with the metal. This is accomplished by hanging the metal pieces on positively charged hooks, so that the negatively charged powder will bond with it *(Photo, above)*. Then, the powder coating is baked on for a finish that won't come off easily.

The one downside to powder coating is that it's not something you can apply yourself. So you'll either need to choose from the powder-coated items at your home center or find a powder-coating facility in your area for a custom job. This can make powder coating pricier than paint, but the extra protection might be worth it.

Finishing Fundamentals

using & staining
WOOD FILLER

Q *When refinishing a cabinet, I noticed the stain I was using would not cover areas where I had applied wood filler in the nail holes. Now I'm hesitant to use the wood filler for my new project. Any suggestions on how I can fill the holes and stain over them?*

Michael Pauchet
Snyder, TX

A The first popular synthetic wood fillers were commonly referred to as "plastic wood." These early fillers could be sanded smooth, but when a stain was applied, the "plastic" patch never accepted as much stain as the wood around it.

***Stainable* Filler** — Some of the newer wood fillers, like Minwax's Stainable Wood Filler, improve on this situation. These fillers readily accept both oil- and water-based stain. In particular, the Minwax filler is guaranteed to accept wood stain, can be used on both interior and exterior wood, dries quickly, sands easily, and resists cracking.

Clean & Pack — To apply the filler, start by making sure the hole is clean, dry, and free of loose particles. A good way to clean the hole is to use a small drill bit *(Fig. 1)*. Then, using a narrow putty knife or the tip of a screwdriver, pack the filler firmly into the hole *(Fig. 2)*. Take care not to smear the filler over the surrounding wood.

Sand & Match — After it dries (usually two hours), sand any excess filler using 180-grit sandpaper, and finish with a few strokes of 220-grit paper. To make the patch look more like real wood, use a utility knife to score shallow grain lines in the dried filler *(Fig. 3)*. Study the wood, and add enough grain lines to match it.

Apply Stain — Finally, when you apply your stain to the wood and the filler, the patch will have both the look and feel of real wood *(Fig. 4)*.

▲ Old nail and screw holes usually bring their old dirt and debris with them. A nice method for cleaning them out is with a few twists of a small drill bit.

▲ A putty knife or flathead screwdriver are great tools for applying wood filler to the hole. Pack the filler in tightly, and try not to smear it on the surrounding wood.

▲ After sanding the dried filler flush with the wood, a good way to match the grain is to score shallow grain lines in the filler with the tip of a utility knife.

▲ Once the filler is dried, sanded, and scored, you can stain right over it. A stainable wood filler is formulated to accept both oil- and water-based stains.

Workbench and **Bruce Johnson**, Minwax finishing expert, are teaming up to answer your questions about finishing.

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Email: editor@workbenchmag.com

Winners receive a **FREE** Minwax Finishing Kit!

Finishing Fundamentals

how to light your FINISHING ROOM

▲ When finishing a project, an inexpensive floodlight can provide direct lighting for detecting runs, drips, and missed areas.

Q *What would you recommend for lighting in the finishing area of my workshop?*

Tracy Bryant
Tucker, GA

A When finishing a project, it's always best to position your piece so the strongest source of light is shining directly on it. This may not always be an overhead light, which can wash out details and make it difficult to detect runs, drips, and missed areas.

Adding Extra Light — To solve this problem, I keep some inexpensive floodlights in my workshop to shine light wherever I need it *(Photo, left)*. Either the benchtop or the clamp-on variety of floodlights will work fine.

Rotating Table — You might consider using a plywood turntable, so you can rotate your piece without having to move the lights *(see the February 2004 Workbench, page 82)*.

Incandescent & Fluorescent — An argument can be made for either fluorescent or incandescent lights. So I suggest matching the lighting in your finishing room to the lighting in the room where the piece will eventually be displayed. If you stain a piece under fluorescent lighting and then display it under incandescent bulbs, it might reveal two slightly different color tones. This issue becomes especially critical when you're staining one piece to match an existing piece of furniture or woodwork in your home.

If you can, you may want to install both fluorescent and incandescent lights in your workshop, with a separate switch for each.

The Right Way to Finish Frame & Panel Doors

Q *I noticed in the August 2004 issue of Workbench (page 59) that the raised panel in the frame and panel door was finished prior to final glue-up. Is it really necessary to finish the panel before assembling the door?*

Sally Vargo
Via email

A Finishing a solid-wood panel before assembling a frame and panel door is strongly advisable for a few simple reasons.

Let's just say that you decide to assemble the unfinished door *before* applying a finish. Chances are, it will look great right after you finish it.

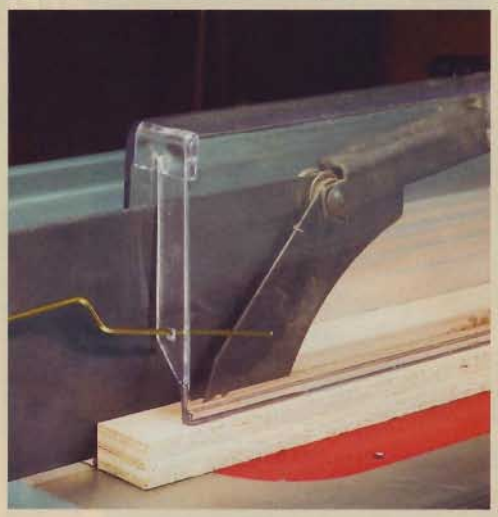
However, there's a problem with this approach — the portion of the panel that's enclosed in the rails and stiles of the frame remains unfinished. And a solid-wood panel has a tendency to expand and contract with changes in humidity levels. When the panel shrinks in the winter, the unfinished edge of the panel will be revealed *(Photo, below)*. It might only be $^1/_{32}$" to $^1/_{16}$" of exposed unfinished edge, but it's enough to be visible, especially to you, the builder.

As far as the rails and stiles go, I finish them *after* glue-up to avoid marring the finish with the clamps used during assembly. There's no such consideration needed for the panel, which is held in place by the frame during glue-up.

► Finish a solid-wood panel *before* door assembly to avoid this problem.

Tips & techniques

handy helper for BLADE GUARD



▲ This wire latch holds up the plastic guard while you set the fence or blade height.

◄ Disengage the latch to lower the guard. To do that, tilt the guard so the bend in the wire slips out the back.

I make it a point to use the blade guard and splitter on my table saw whenever possible. But there *is* one annoying thing about the guard — it won't stay up. It's especially irritating when I need to measure the distance from the rip fence to the blade or check the blade height.

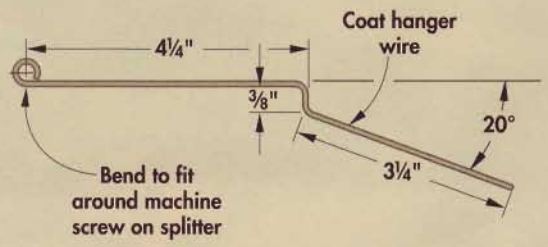
To hold the guard up and out of the way while setting up a cut, I made a wire latch from an old coat hanger *(Latch Assembly)*. The latch has a sharp bend in the middle that holds the guard upright *(Photo, left)*. To lower the guard, disengage the latch, as shown in the *Inset Photo*.

It only takes a few minutes to form the latch. The wire is fairly stiff, so I'd suggest wrapping it around a couple of bolts tightened in a vise to create the bend.

To install the latch, slip one end through a hole drilled in the back of the guard. Then make a loop on the other end, and fit it over the machine screw at the back of the splitter. The latch is "snugged" between a hex nut and a locknut. Don't overtighten the locknut — the latch needs to be free to pivot.

Albert Dowd
Concord, NC

LATCH ASSEMBLY



BEST TIP!

For sending us this feature tip, Albert Dowd wins a new Dremel variable-speed Scroll Station 1800!

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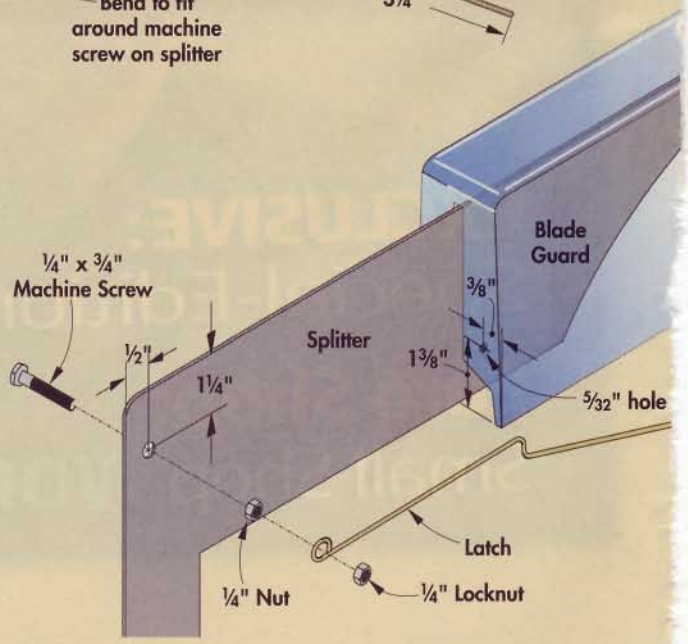
Des Moines, IA
50312

Email: editor@workbenchmag.com



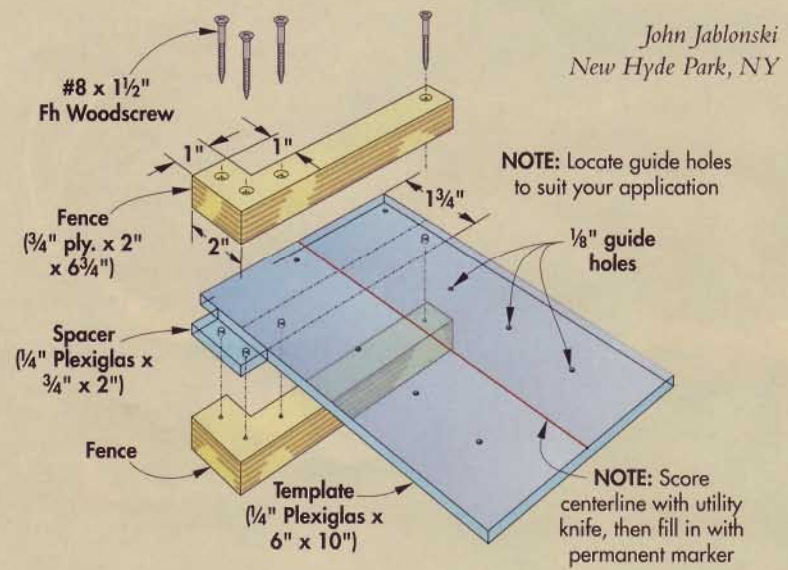
locate cabinet pulls WITH PRECISION

Close doesn't count when installing pulls on cabinet doors and drawers. A crooked pull will stand out like a sore thumb if the mounting holes aren't precisely aligned.

To accurately locate mounting holes, I use an awl and a simple template *(Photo, right)*. The template is a piece of 1/4" Plexiglas sandwiched between two L-shaped plywood fences *(Illustration, below)*. The shape of the fences lets you use the template on drawers or cabinet doors *(Dual-Purpose Jig)*.

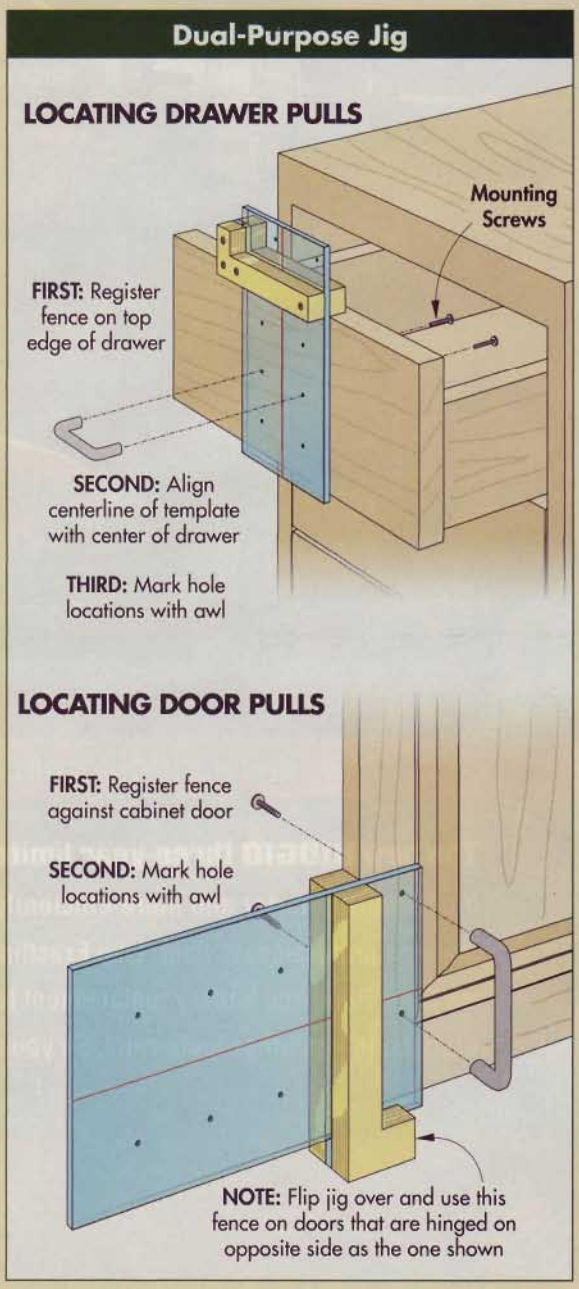
For drawers, align the centerline of the template with the center of the drawer, then mark the hole locations with an awl. For cabinet doors, fit the guide against the corner of the door. By using both sides of the template, you can locate holes on both right- and left-hand doors.

John Jablonski
New Hyde Park, NY



▲ When laying out mounting holes for pulls on cabinet doors and drawers, using an awl and this shop-made template guarantees pinpoint precision.

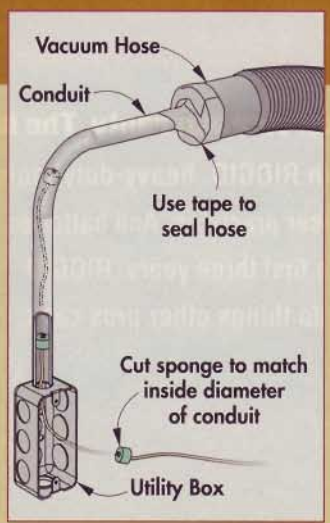
Dual-Purpose Jig



shop vacuum Wire Pull

Here's an easy way to fish wire through electrical conduit. Connect a shop vacuum to one end of the conduit, and insert a sponge tied to a string in the other. Then turn on the vacuum to suck the sponge through the conduit. Now tie the wire to the string, and pull it back through.

Donald Brougher
Connellsville, PA



swing-down OUTFEED SUPPORT

When ripping long boards on a table saw, an outfeed support is essential. Where to put it once you're done is another story.

That's not a worry with this outfeed support. It swings up and out of the way when it's not in use, so it doesn't chew up valuable floor space in your shop.

Designed for a basement shop with exposed joists overhead, the unit is suspended from the ceiling. It consists of two sections: an outfeed roller connected to a couple of 2x4 swing arms and two T-shaped mounting brackets *(Illustration, right)*.

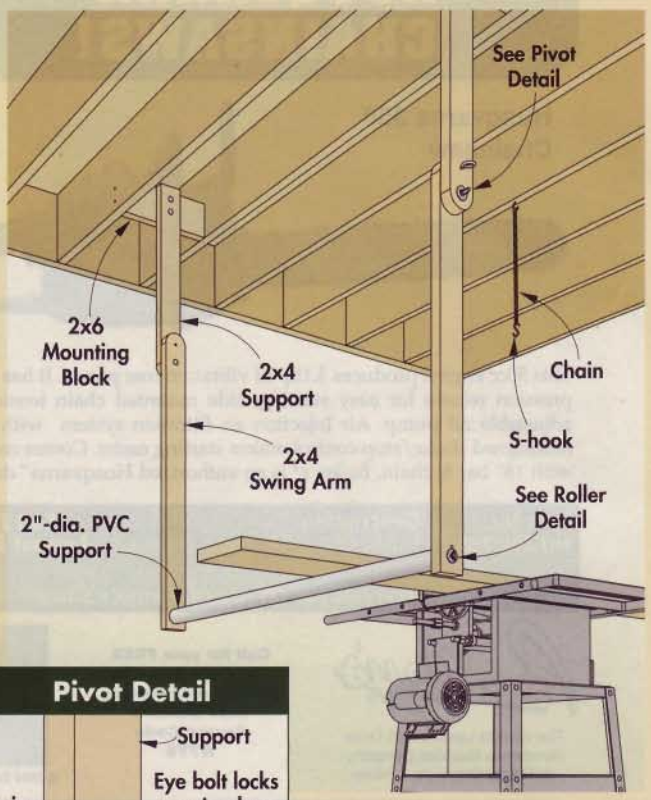
Note: Standard 2x4s and 2x6s work well for all the support pieces, but you'll have to tailor the length of these pieces for your situation.

The outfeed roller is just a length of 2" PVC pipe. It's attached to the swing arms with carriage bolts that pass through round wood plugs cut to fit in the ends of the pipe *(Roller Detail, right)*.

The swing arms connect to the mounting brackets, also with carriage bolts. The arms pivot on these bolts, so to prevent sway, they're locked in the "down" position with an eye bolt *(Pivot Detail, below)*.

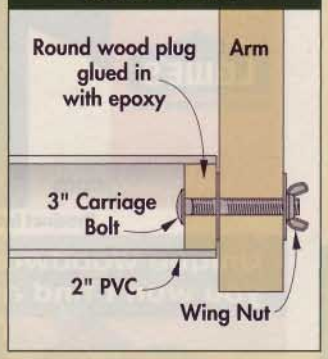
To store the outfeed support, remove the eye-bolt and swing the roller up toward the ceiling. Then secure it with an "S" hook and a short chain.

John Savarese
Waltham, MA

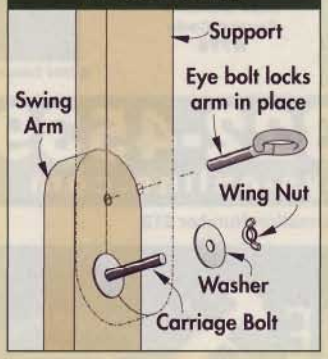


▲ This outfeed roller support swings down and locks in place with an eye-bolt. An S-hook and chain secure the unit in its "up" position.

Roller Detail



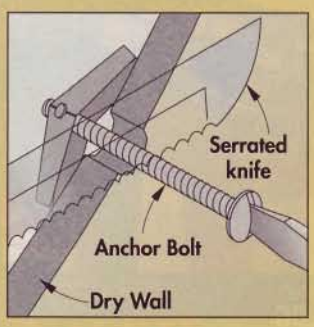
Pivot Detail



quick & easy Toggle Tip

Installing a toggle-style wall anchor can be a pain. Sometimes it seems like the spring-loaded "wing" just spins endlessly instead of tightening against the back of the wall.

To speed things up, I use an old serrated bread knife. With the knife blade engaged in the screw threads and the handle wedged against the wall, it holds the wing snug against the drywall as you install the anchor.



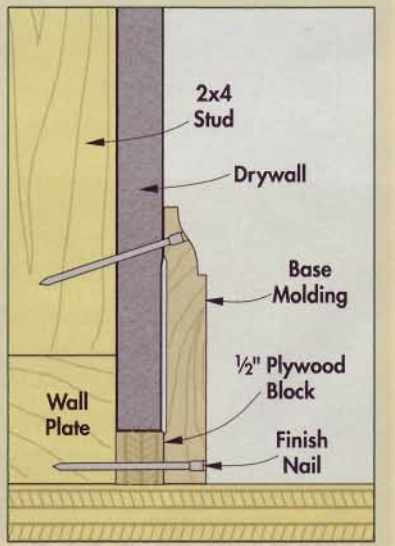
Gary Nordquist
Des Moines, IA

tight-fitting BASE MOLDING

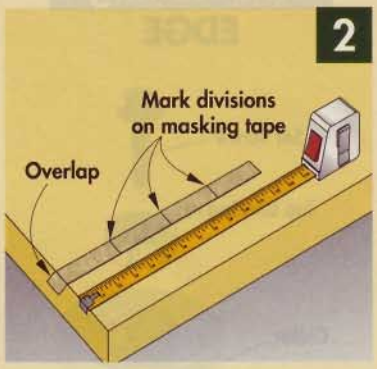
When installing base molding, the drywall is usually about 1" above the floor. The molding covers the gap, but when you nail it in place, it tips in at the bottom, creating a gap at the top. This also prevents the coped end of the molding from fitting tight.

My solution is to fit short blocks of $^1/_2$" plywood into the gap wherever the molding will be nailed to the wall plate *(Illustration, right)*. The blocks support the bottom of the molding, ensuring a tight fit at the top.

Joseph DePaulo
Midlothian, IL



"tape" measure for ROUND SURFACES



Recently, a project required laying out four equidistant holes around a pipe. To get perfectly even spacing between the holes, I used a "tape" measure made of masking tape.

Start by wrapping a strip of masking tape around the pipe (or whatever round piece you're working with). Make a mark where the tape overlaps *(Fig. 1)*. Then peel off the tape, stick it on a flat surface, and measure the distance from the end of the tape to the mark. That's the circumference of the pipe.

Now divide that measurement by the number of holes. The result is the distance between the holes. Mark lines on the tape that same distance apart *(Fig. 2)*. Then put the tape back on the workpiece and drill a hole at each mark.

Richard Hoff
Ladysmith, WI

foam wrap

Pencil Holder

Pencils seemed to always disappear mysteriously from my shop, until I started using this "pencil cushion." It's just a piece of pipe insulation that I glued onto a wall stud. Sticking the pencils into the cushion keeps them right at hand, and the pencil tips don't break off.

Peter Priestner
Chelmsford, MA

▲ Switching collars on the Superabbet is easy. All you do is loosen and remove the set screw, put the new collar in place between the two bearings, and then replace and tighen the set screw.

Amana Tool's SUPERABBET BIT

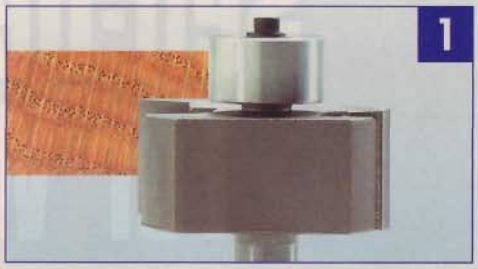
As its heroic name implies, this bit from Amana is not a cutting tool with self-esteem issues. But in my book, any bit that can cut a smooth $^3/_4$" x $^3/_4$" rabbet in a couple passes is worthy of the name "Superabbet."

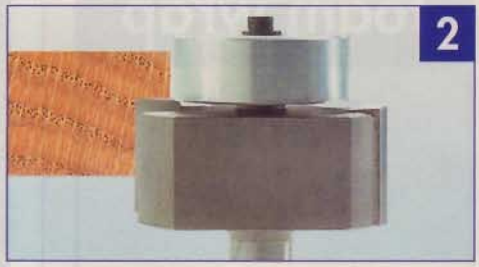
Superabbet to the Rescue — Usually, rabbets this wide and deep are the domain of dado blades. But when working on the storm door *(page 64)*, I needed a large rabbet along the *inside* edge of the main door frame. In just a few smooth passes, the Superabbet cut a crisp, clean channel out of a piece of white oak.

An *Adjustable* Bit — But the Superabbet is more than just a one-trick pony. By switching the collars that fit around the bearing of the bit, the Superabbet can cut many different widths of rabbets *(Figs. 1 & 2)*. With the bearing alone (no collar), the bit cuts a $^3/_4$" rabbet. It comes with one collar to cut a $^5/_8$" rabbet. Three separate collar kits let you adjust the bit to achieve 18 different rabbet widths (from $^{23}/_{32}$" to flush).

Some router bits with interchangeable parts can be a pain to work with, but this is definitely not the case with the Superabbet *(see Photo, left)*.

In addition to the standard Superabbet *(left and below)*, Amana offers a larger Superabbet and a Superabbet Jr. *(Top Photo, right)*. Prices range from $70 to $120. Five- and six-piece collar kits sell for $30. Visit www.AmanaTool.com or call 800-445-0077 for more info.





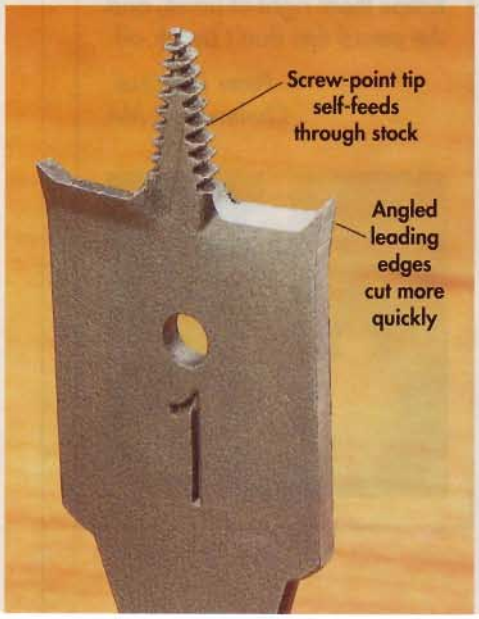
◄ These RapidFeed spade bits are available for around $4, or a set of five plus a bit extension is around $16. See www.BoschTools.com for more information.

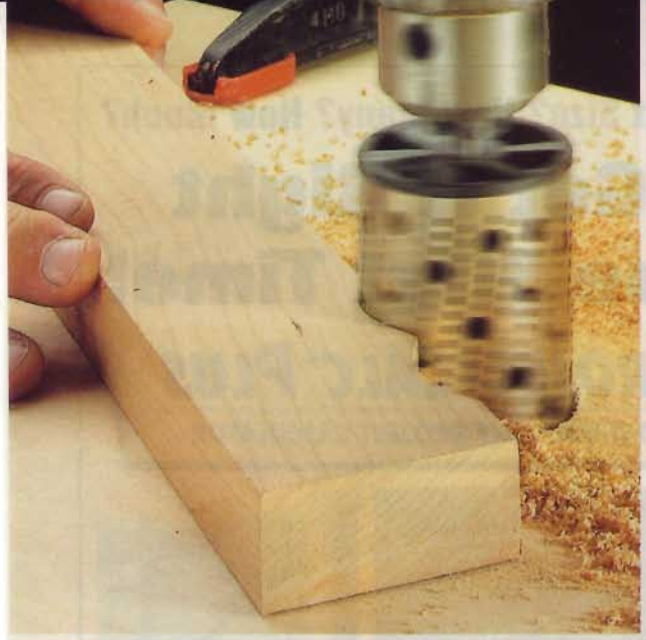
Bosch RapidFeed SPADE DRILL BITS

A spade bit isn't the fanciest drill bit, but Bosch's new version is a vastly improved way to drill holes.

Threaded Feed Tip — Two design changes make the Bosch stand out from a standard spade bit. First off, Bosch added screw-like threads to the feed tip of the bit. So rather than spinning around on the wood before starting the hole like a regular spade bit, this screw-point tip digs right in.

Angled Cutting Edge — Second, the sharp cutting edges on either side of the Bosch bit angle in toward the wood they're cutting through *(Photo, right)*. While a regular spade bit just scrapes its way through a hole, the Bosch has an aggressive cutting edge that works quickly.





▲ Microplane's rotary shaper spins on a drill press at 1,200 RPM. It uses stainless steel cutting teeth to shape wood quickly.

unique cutting tools — MICROPLANE SYSTEM

Microplane tools look like they'd be better at grating cheese than shaping wood. But these tools can chew through even the hardest wood with relative ease.

Each Microplane tool is made of stainless steel and has dozens of razor-sharp cutting teeth. These teeth are coupled with small holes that provide excellent chip relief.

Microplane Rasp — The new "Snap-In" planing rasp from Microplane has a plastic handle with interchangeable blades that easily snap in and out. Both 3" and 8" Snap-In handles are available, and the blades have flat, round, and angled profiles *(Photo, left)*.

The best way to use the Microplane rasp is with a "draw filing" technique — holding the blade at an angle and pulling it along the surface of the wood. Some of the jobs it can handle best are chamfering and rounding edges, carving details, and even coarse sanding work instead of sandpaper.

Rotary Shaper — Microplane's newest offering is the rotary shaper, a cylindrical drill press attachment. The shaper uses the same great cutting technology as the rasps, only it takes advantage of the power and speed of a drill press to quickly shape the edge of a workpiece.

The shapers are available with 1", 1½", and 2" diameters. The 2" model has a rubber ring around the bottom that's used as a bearing for template shaping. If you want to cut freely without the bearing, you can make an auxiliary table for your drill press with an opening in it that allows clearance for the ring *(Top Photo)*.

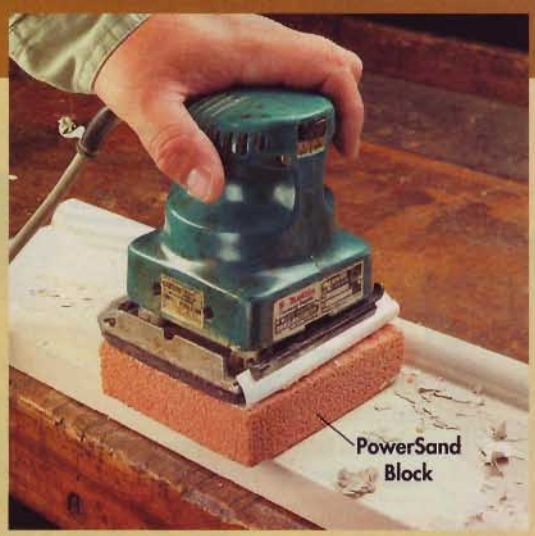
Most Microplane tools are around $10 to $20 apiece. Call 800-555-2767 or visit www.Microplane.com

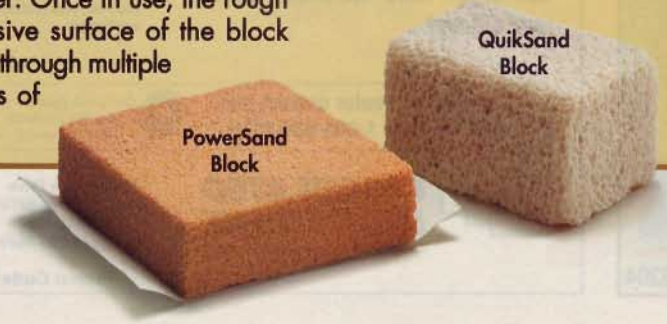
PowerSand & QuikSand

They may look like Rice Krispie treats, but these new sanding blocks from Zinsser are a great way to strip paint and finish off wood and metal surfaces.

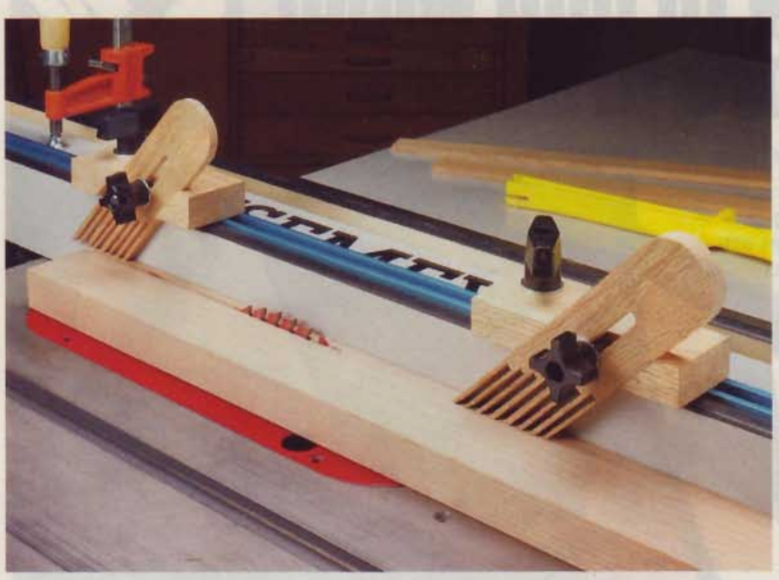
The PowerSand block *(below)* has an adhesive backing that attaches easily to any palm sander. Once in use, the rough abrasive surface of the block strips through multiple layers of paint much more quickly than a sheet of sandpaper *(right)*.

Zinsser also offers QuikSand hand-sanding blocks *(below)* that are made of the same material. Both blocks are available for $4 to $7 apiece. For more information, visit www.Zinsser.com





adjustable FEATHERBOARDS



▲ These featherboards can be quickly and easily adjusted to apply pressure exactly where you want. A 1/2"-thick featherboard helps hold the workpiece down as you feed it into the blade *(above)*. On the outfeed side *(right)*, a 1/4"-thick featherboard exerts pressure directly on the thin wood strip, ensuring a safe, controlled cut.

When ripping narrow strips of wood, holding them flat against the table saw is a must for safe, accurate cuts. Typically, clamping one (or more) featherboards to the rip fence is the best way to do that. The only problem is that clamping (and often reclamping) the featherboards is a nuisance.

That's what prompted Richard Poor of San Diego, California, to come up with a clampless solution — a pair of adjustable featherboards that slide in a metal T-track attached to the top of the rip fence *(Photo, left)*. Using this setup, he can position the featherboards and lock them securely in place in a matter of seconds.

Each featherboard is attached to an adjustment block that can be moved back and forth in the T-track. (A short dowel keeps the block aligned.) Tightening a knob on a T-bolt that fits into the track "locks" the adjustment block.

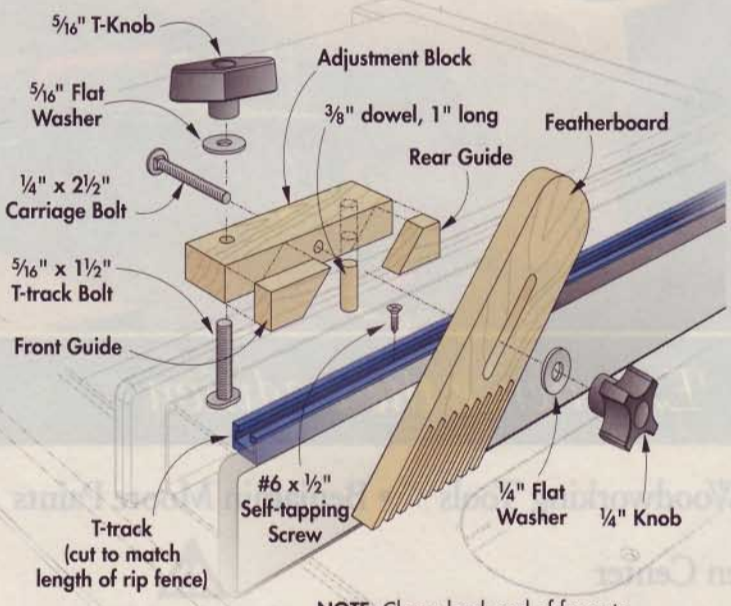
As for the featherboard, it fits between two angled guides attached to the adjustment block. It's secured by tightening a star knob on a bolt, which connects the featherboard to the adjustment block.

For optimal strength, make the featherboards from a piece of straight-grained wood. (Oak is a good choice.) It's also a good idea to make two different thicknesses of featherboards — 1/4" and 1/2" — for table saw operations like those shown in the *Photos* at left.

After planing stock to thickness, rip the featherboard blanks 1/4" wider than needed. (They will be trimmed to final width after the fingers are made.) Then miter the end of each blank and cut the fingers, as explained on page 28.

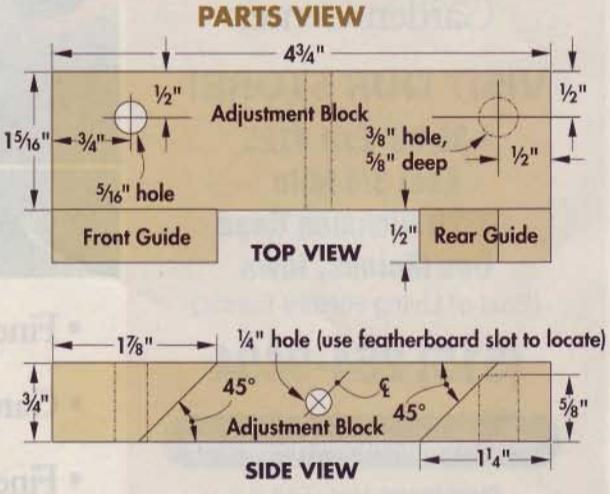
Now it's just a matter of making the adjustment blocks and the angled guides *(see Parts View)*. Position the guides so the featherboard adjusts freely, then glue them in place.

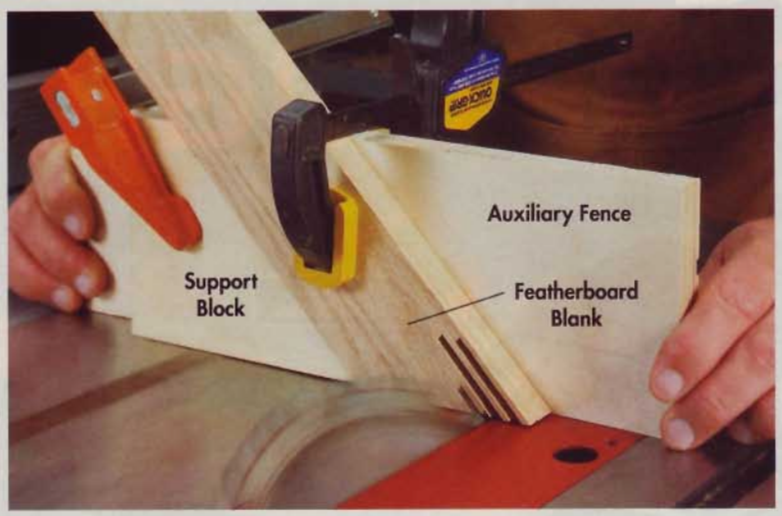
CONSTRUCTION VIEW



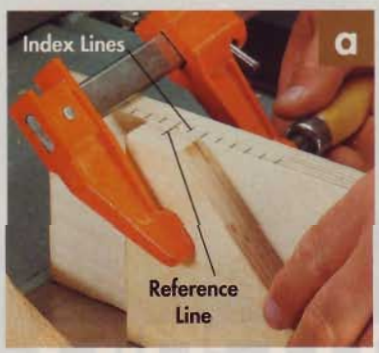
NOTE: Clamp back end of fence to table saw when using featherboards

PARTS VIEW

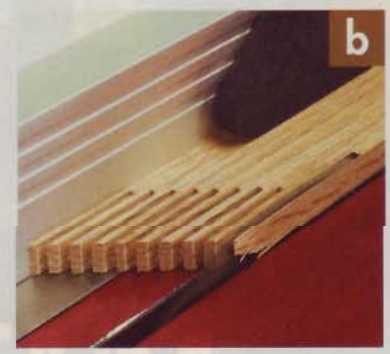




▲ With the blade tilted 45° and raised to 1 1/4", make a series of saw kerfs to form the "fingers" of the featherboard. A mitered support block holds the workpiece at a consistent angle during each cut.



▲ To position the support block for each subsequent cut, align a reference mark on the top edge with an index line on the fence.



▲ Rip the waste material from the edge of the featherboard to make the last finger identical in width to all the others.

flexible "fingers"

What makes this featherboard work are its flexible "fingers." To form these fingers, you'll need to stand the wood blank for the featherboard on its mitered end and make a series of angled saw kerfs. That requires two things: holding the blank at a consistent angle for each cut *and* spacing the kerfs evenly.

Both operations can be easily accomplished using a simple miter gauge setup on the table saw: a tall auxiliary fence and an angled support block *(Photo, left)*. The support block acts as a "bed" that holds the blank at the proper angle (45°) during the cut.

An equally simple solution ensures accurate spacing of the kerfs. Here, alignment marks on the top edge of the fence are used as a convenient index that makes it easy to move the support block — and the blank — in evenly spaced increments *(Photo A)*.

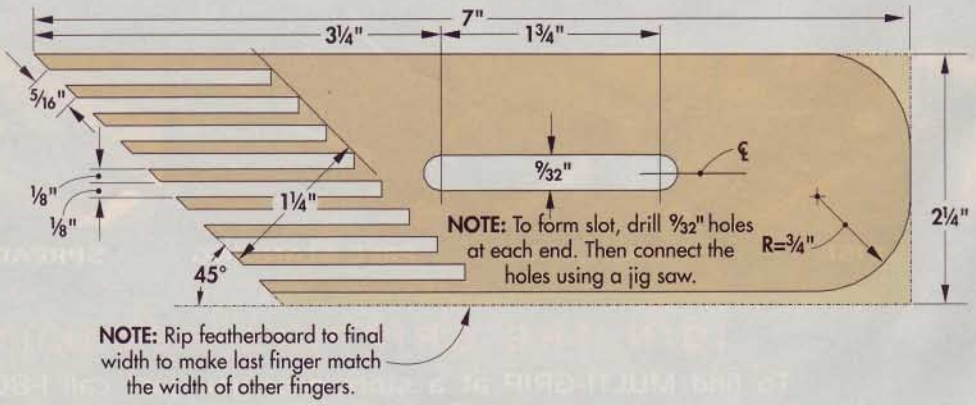
Lay Out & Cut First Kerf — To make this work, start by laying out the location of the first kerf near the "long" tip of the blank. Then position the blank so that mark aligns with the blade. Now clamp the blank and the support block to the fence and make a cut.

Mark Index Lines — At this point, you're ready to lay out the index lines on the auxiliary fence. Mark the lines 5/16" apart (the distance from the inside edge of one finger to the corresponding edge of the adjacent finger). Reposition the blank so it aligns with the next index line, reclamp both it and the support block, and cut the second kerf. Then repeat the process until you've made saw kerfs across the entire width of the blank.

Rip Featherboard to Width — Since you started with an extra-wide blank, the last finger will be wider than the others. To make it match, just rip a narrow sliver off the edge of the featherboard *(Photo B)*.

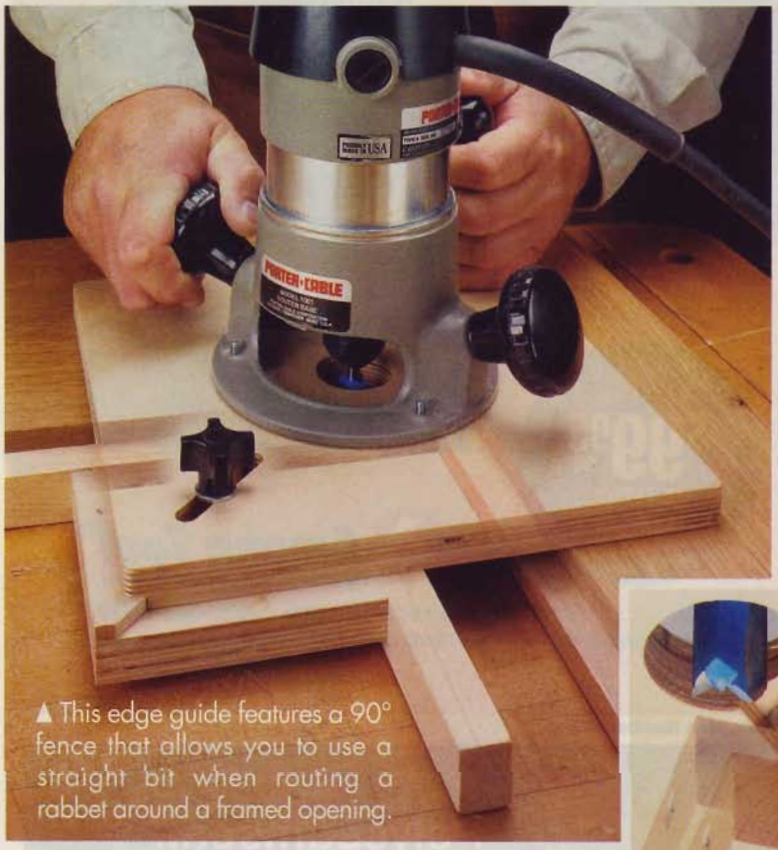
Adjustment Slot — To complete the featherboard, all that's needed is to cut the adjustment slot and sand a slight radius on the corners.

FEATHERBOARD PARTS VIEW



TIPS FROM THE WORKBENCH SHOP

"cutting corners" with SHOP-MADE GUIDE

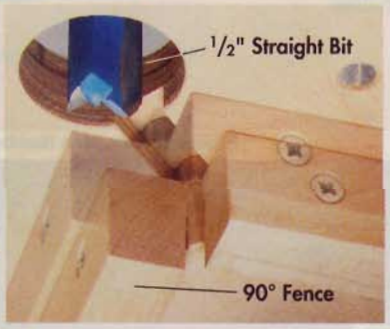


▲ This edge guide features a 90° fence that allows you to use a straight bit when routing a rabbet around a framed opening.

One way to cut the 3/4"-wide rabbet that holds the glass- and screen-panel inserts in the storm door *(page 64)* is to use a large rabbeting bit like the Superabbet bit, which is highlighted on page 24. As with most woodworking operations, however, there's more than one way to "skin a rabbet." You can accomplish the same thing with a shop-made edge guide and a 1/2" straight bit *(Photo, left)*.

What makes this edge guide unique is you can "turn the corner" when routing a rabbet around the inside edge of a framed opening *(Photo, left)*. To make that possible, it has a 90° fence that attaches to the base of the jig. Using one leg of this fence as a guide, you simply rout down one side of the frame until the second leg contacts the adjacent frame piece. Then, using that leg as a guide, continue routing at a right angle to the initial cut.

Although this edge guide has a two-part fence, it can be adjusted as a single unit *(see Inset Photo at left and Using the Edge Guide below)*. This guarantees that the rabbets on adjacent frame pieces are identical in width. **Note:** For details on building the edge guide, turn to page 34.



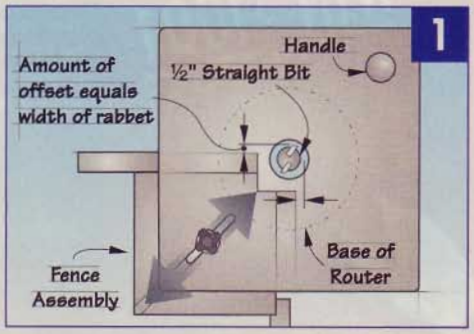
◄ To adjust the width of cut, the entire fence assembly slides diagonally in a groove in the base of the edge guide.

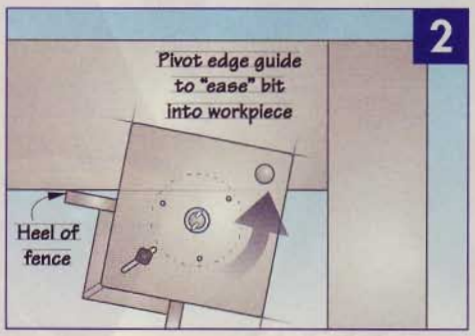
Using the Edge Guide

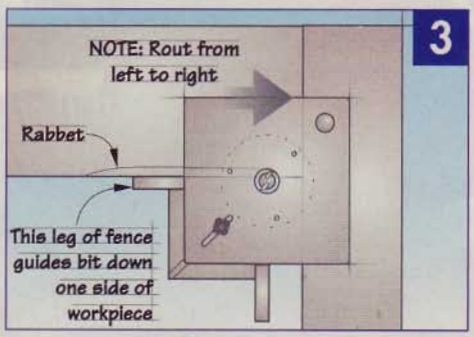
To set up the edge guide, start by mounting the router to the base of the jig. Then install a 1/2" straight bit, and adjust the router for a full-depth cut.

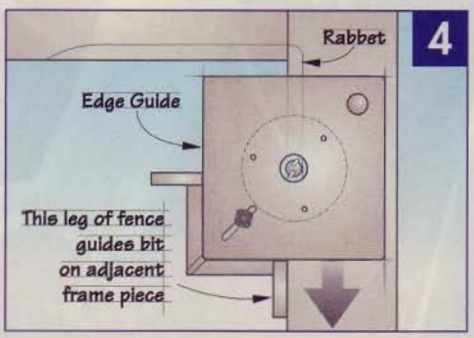
As for width of cut, that's determined by the offset between the fence and the bit *(Fig. 1)*. To adjust the fence, slide it diagonally to produce the required offset. Note: For wide rabbets, make several passes, increasing the offset 1/4" with each pass until you reach the full-width rabbet.

At the start of each cut, use the heel of the fence as a pivot point as you ease the bit into the workpiece *(Fig. 2)*. Then, using the fence as a guide, rout down one side of the workpiece *(Fig. 3)*. When the fence contacts the adjacent side, continue routing at a right angle to your initial cut *(Fig. 4)*.









TIPS FROM THE WORKBENCH SHOP

10 Steps to Built-In Accuracy

This edge guide has an adjustable 90° fence that slides in a diagonal groove in the base of the jig. As it slides back and forth, the offset between *each* leg of the fence and the router bit must remain identical. Otherwise, you'll end up with two different-width rabbets.

For accurate results, it's critical that the router bit is centered on this adjustable fence assembly. That's easy enough to accomplish if you follow these 10 simple steps.

Step 1 — Drill a ¼" "indexing hole" centered on a squared-up plywood blank that will become the base of the jig *(Base Blank)*.

Step 2 — Use a ¼" straight bit mounted in the router table as a "centering pin" to set up router table fence *(Router Table Fence Setup)*.

Step 3 — Without changing the fence setup, chuck a ½" straight bit in the table-mounted router. Then cut a stopped groove in the base blank to accept a runner on the fence adjustment block.

Step 4 — Now install a 5/16" straight bit (again, without moving the fence) and cut an adjustment slot in the base blank.

Step 5 — Locate and drill the holes used to mount the router to the base *(Locating Mounting Holes)*.

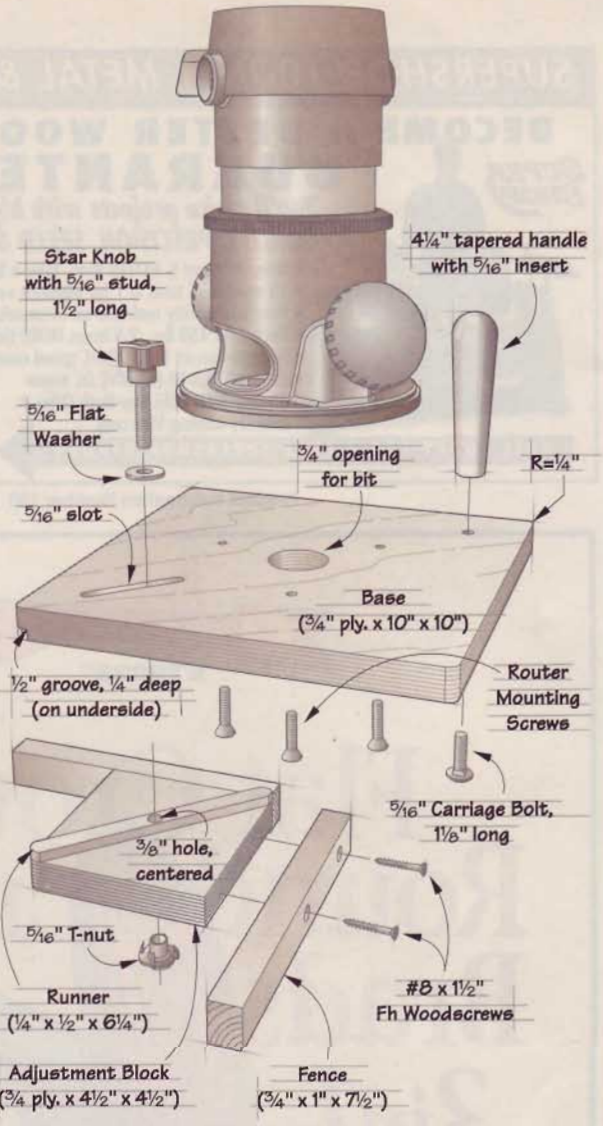
Step 6 — Using a ¾" hole saw, insert the pilot into the indexing hole in the blank, then cut an opening for the router bit.

Step 7 — Next, using a miter gauge on the table saw, trim the corners of the base at a 45° angle.

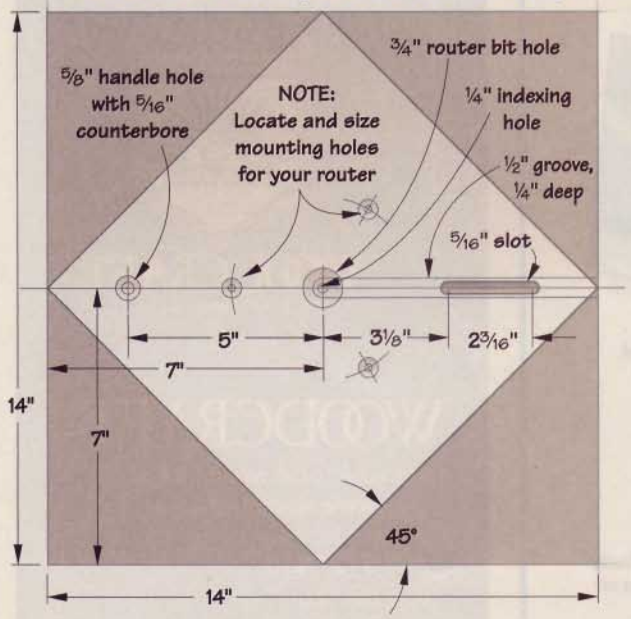
Step 8 — Make a 4½"-square fence adjustment block.

Step 9 — Cut a runner to fit the groove in the base. Then center and glue the runner diagonally across the adjustment block. Drill a centered hole for a T-nut and knob used to attach the fence to the base.

Step 10— Finally, screw the two fences to the adjustment block.

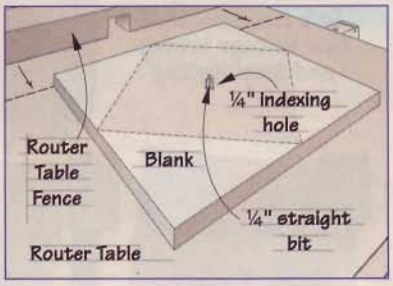


BASE BLANK (BOTTOM VIEW)



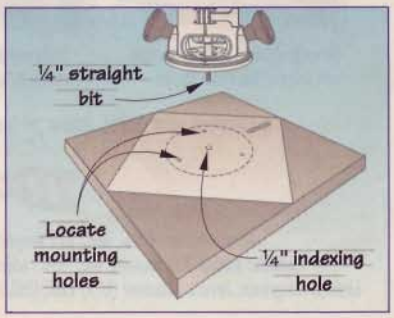
Router Table Fence Setup

To set up the router table fence to make a centered cut, chuck a ¼" straight bit in the router. Then lower the indexing hole in the blank over the bit, as shown. Now slide the fence against the blank and lock it in place.

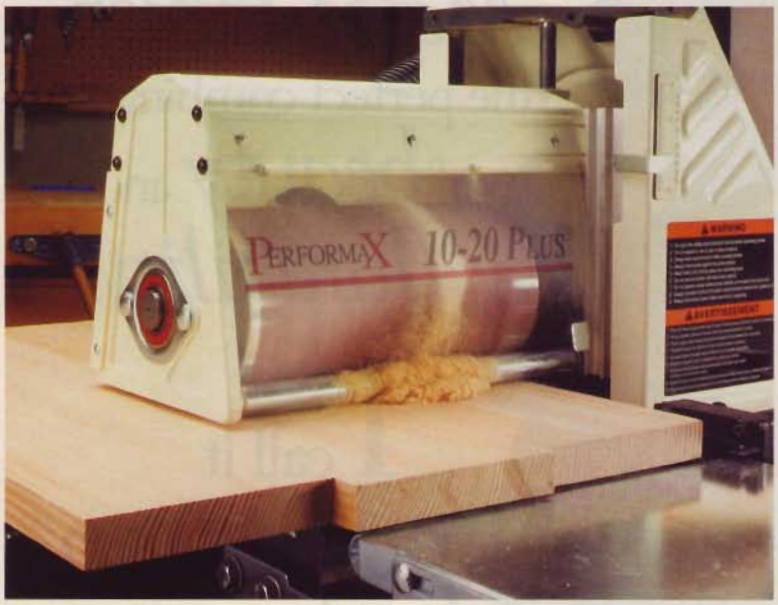


Locating Mounting Holes

An accurate way to locate the mounting holes for the router is to use the existing holes in the base of the router as a template. To do that, mount a ¼" straight bit in the router, lower the bit into the indexing hole, and then mark the hole locations.



TOOL Close-Up



▲ Finally, an affordable drum sander for the hobbyist's woodshop. This Performax sander makes quick work of flattening panels and cuts down on hand-sanding time for most projects by as much as 75 percent.

Performax 10-20 PLUS DRUM SANDER

A drum sander is a tool you usually think of in a professional cabinetry shop. This stationary machine is often a cabinetmaker's go-to tool for flattening panels and taking care of up-front sanding work on many parts of a project.

An *Affordable* Drum Sander — What made drum sanders off-limits to hobbyist woodworkers in the past was the cost ($1,000 to over $2,000). Performax has changed that with its 10-20 Plus Drum Sander. At $499, it's priced reasonably for woodworkers of all skill levels. Though it's smaller than the average drum sander, you won't find a lot of jobs around the shop it can't handle.

Accessories — Out of the box, the sander can be bolted to a bench and put to use. Or with a few add-ons like a stand ($80), infeed and outfeed tables ($80), and extra sanding strips (4-packs for $30), it becomes a permanent shop fixture. You'll also want at least 400 CFM of dust collection for this tool to be almost dust-free.

A Useful Shop Addition — If you're wondering if a drum sander would be useful, keep in mind that they have been shown to cut hand-sanding time by as much as 75 percent. So if you're not a big fan of sanding — and most of us aren't — a drum sander is worth a closer look.

For a look at the jobs this sander can handle, see the *Photos* below. And for a quick look at the features and setup involved with the Performax sander, turn to page 38.

Multiple Sanding Applications

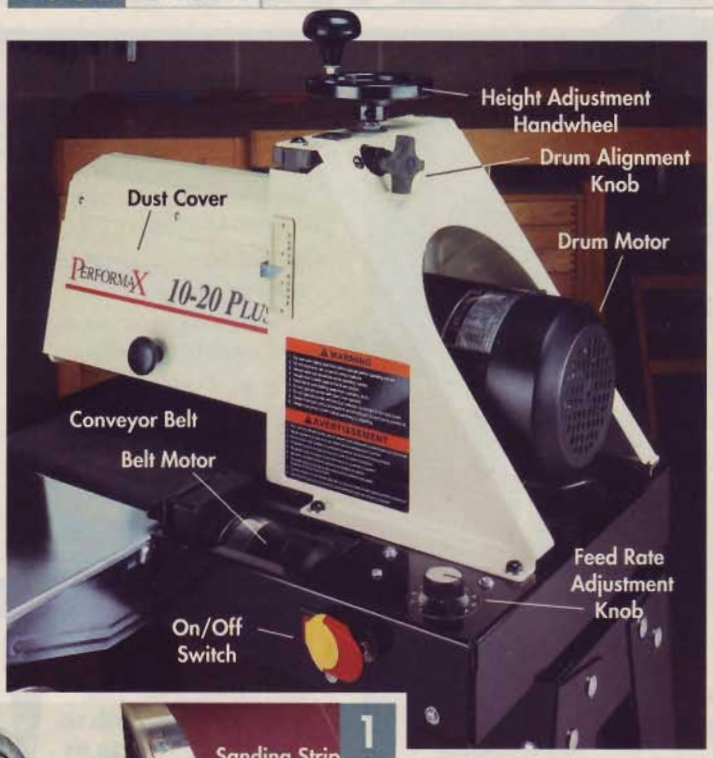
▲ WIDE PANELS
Flattening panels is a drum sander's best-known ability. By turning a panel edge-for-edge, this sander can handle a panel that's 20" wide.

▲ EDGE SANDING
The sander can handle edge grain with the same light touch. In this instance, you'll want to joint one edge first; then sand both edges smooth.

▲ THIN STRIPS
The drum can be lowered nearly all the way to the conveyor belt, making thin pieces (like edging strips as thin as 1/16") easy to sand as well.

▲ UP-FRONT SANDING
A drum sander takes care of the up-front sanding work on most projects. Usually a few light passes with a random-orbit sander finish the job.

drum sander ANATOMY



To give you an overview of how a drum sander works, let's take a quick look at the Performax. The sander has two motors with independent switches — one (with an adjustable feed rate) controls the conveyor belt that carries workpieces under the drum. The other motor operates the drum that does the sanding. A handwheel allows precise height adjustments to the drum.

The drum itself is a precision-machined aluminum cylinder that's wrapped with a sanding strip. As you feed a workpiece through the sander, the drum spins at 1,700 RPM to produce a smooth, even surface.

Sander Setup — After mounting the sander, the three steps that prepare it for use are choosing the desired sanding strip *(Fig. 1)*, tensioning the belt so it will track properly *(Figs. 2 & 3)*, and checking the alignment of the drum *(Fig. 4)*. The sander comes pre-wrapped with an 80-grit sanding strip, but strips are available in grits ranging from 36 to 220.

For more information on the Performax 10-20 Plus, visit www.WMHToolGroup.com or call 800-274-6848.

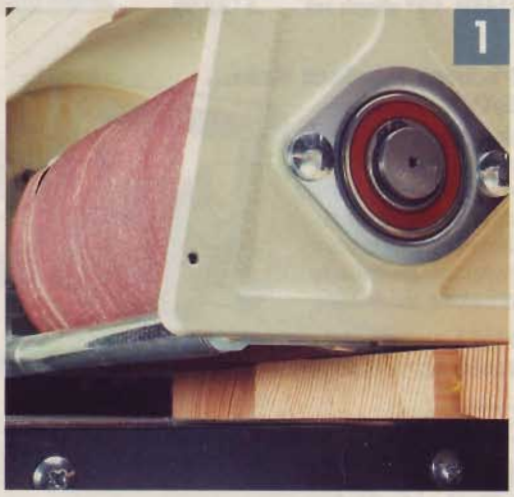
▲ Pre-cut strips wrap right on the drum. All you do is lock the strip in on the left side and wrap it tightly from left to right without overlapping.

▲ The conveyor belt is tensioned with two bolts. Built-in wrenches make adjustments easy.

▲ Phenolic "Trackers" that attach underneath the conveyor belt keep the belt properly aligned.

▲ Alignment of the drum is controlled with this star knob. An Allen screw locks the drum in place.

Advanced Class: Sanding A Wide Panel Flat



A few passes through the drum sander can even out imperfections, erase glue lines, and smooth the surface on a panel up to 20" wide.

The first step in sanding a wide panel is setting the drum depth. With the sander off, lower the drum until it makes contact with the wood, but you can still spin it by hand *(Fig. 1)*.

Once the depth is set, the key to sanding a wide panel is turning the panel edge-for-edge between passes *(Fig. 2)*. The sander tends to leave a small ridge in the center where sanding passes overlap. I discovered that I could erase this line by staggering the position of the panel and making a few more passes.

Skill Builder

BEADED-TENON

Tight Joints with Loose Tenons

Make super-strong joints in minutes with the versatile BeadLOCK joinery system. All it takes is a portable power drill, a twist bit, and a store-bought jig.

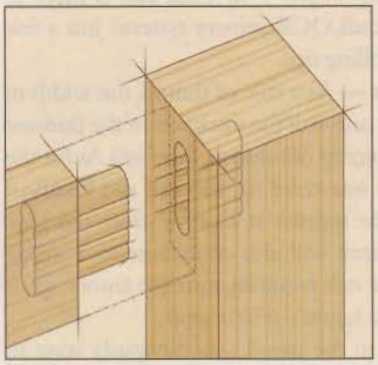
◀ This rail-and-stile face frame is only one example of the many applications for BeadLOCK's innovative joinery system.

When you think about making a strong, durable joint for a woodworking project, a portable power drill isn't the first tool that usually comes to mind — unless you're familiar with the BeadLOCK joinery system, that is.

This type of joinery is a variation of a traditional mortise-and-tenon joint. Using only a drill, a standard twist bit, and a store-bought jig, you simply drill a series of overlapping holes to form a mortise in each of the mating pieces *(Photo, above)*. Then glue a "loose" tenon into the mortises to join the pieces.

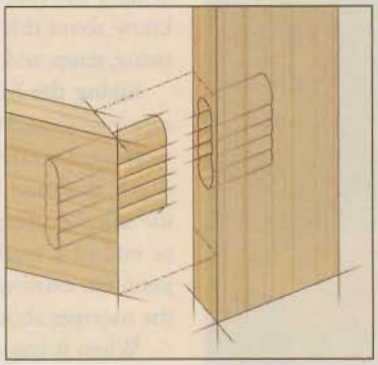
Beaded Tenons — As you can see, these loose tenons look as if they're made up of several dowels that are stuck together. Actually, a beaded profile has been cut into the tenon, so it will fit tightly against the scalloped sides of the mortises (hence the name BeadLOCK). This creates a sturdy mechanical connection. Plus, it provides a large glue surface that produces an incredibly strong joint.

Multipurpose Joints — But strength isn't the only thing this joinery system



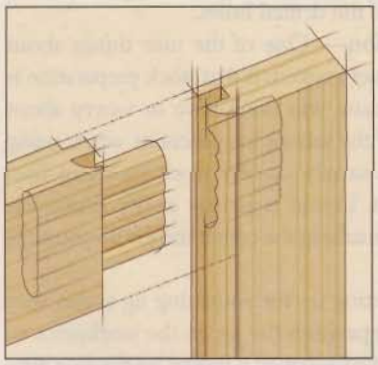
Offset Joints

Using the spacers included with the jig, it's easy to create an offset mortise and loose tenon joint.



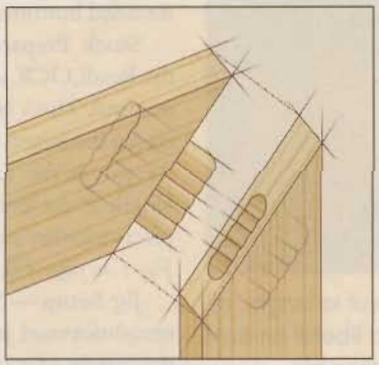
Angled Joints

Mortises are made square to the end of the piece, so angled joints don't require complicated setups.



Panel Door Joints

When building a glass panel door, adding a loose tenon reinforces a cope and stick joint.



Miter Joints

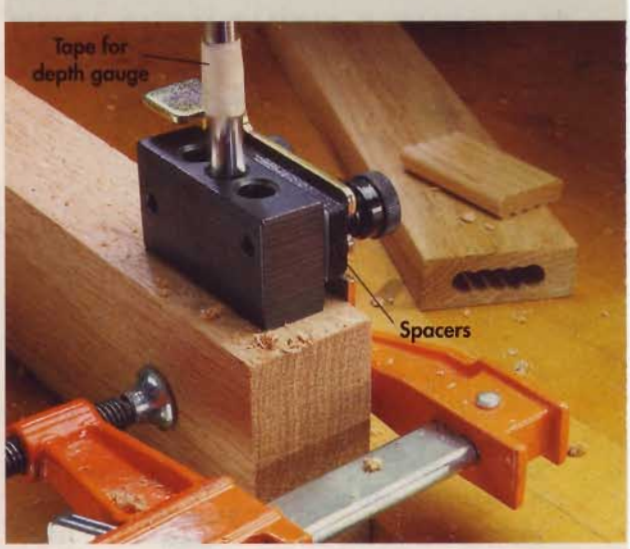
Using a loose tenon reinforces a miter joint by adding mechanical strength and a larger glue surface.

has going for it. It's also an amazingly versatile method that can be used on a wide variety of projects. In fact, you can use BeadLOCK loose tenons to build everything from a face frame on a cabinet to a frame and panel door to a table or chair *(see Illustrations above)*. And it's especially handy when connecting pieces at an angle, which would otherwise require fairly complicated joinery.

Consistent Accuracy — Above all, joints made with the BeadLOCK system are incredibly accurate — straight, flush, and square — every time. This is made possible by the precision-machined mortising jig. A hardened steel block with three holes acts as a guide for the drill bit. Attached to this guide block is a steel face plate, which is clamped to the workpiece. A small D-shaped "window" in the face plate is used to align the jig on the workpiece. Once the jig is in place, loosening and tightening a pair of knobs lets you slide the guide block back and forth and secure it in one of two drilling positions (more on that later).

The BeadLOCK SYSTEM

Each kit contains a hardened steel mortising jig, two lengths of beaded tenon stock, and a set of plastic spacers. Kits are available for either $3/8$"- or $1/2$"-thick birch tenon stock for around $30. A dual kit includes both sizes for $46. For more information, call 920-485-0350 or visit www.BeadLock.com

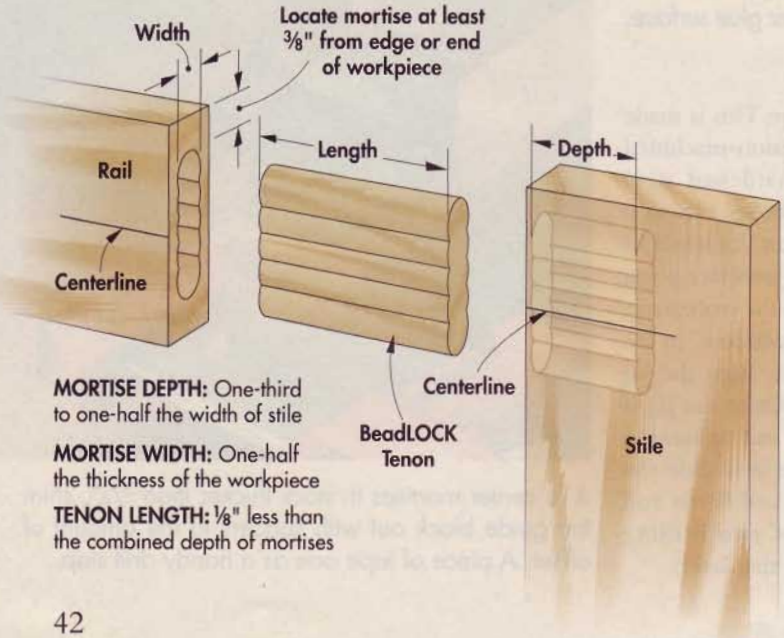


▲ To center mortises in stock thicker than $3/4$", shim the guide block out with spacers to the amount of offset. A piece of tape acts as a handy drill stop.

A Guide to Making

▲ Once the mortises are drilled and the tenon stock is cut to length, all that remains to complete the joint is glue-up. Just apply a liberal amount of glue to the tenons and inside the mortises prior to assembly.

PLANNING & SIZING YOUR JOINT



The beaded tenon stock is ready-made, and the jig makes drilling the mortises simple — so what else is there to know about this BeadLOCK joinery system? Just a few sizing, setup, and drilling tips.

Sizing the Joint — As a rule of thumb, the width of a mortise should be one-half the thickness of the thinnest workpiece you're joining *(Illustration, lower left)*. As for the depth, it should be one-third to one-half the width of the stile. Locating the mortise at least 3/8" from the edge or end of a workpiece will also contribute to a strong joint. For extra-wide rails requiring multiple tenons, space the mortises about a tenon's-width apart.

When it comes to the tenon, you obviously want to select the BeadLOCK tenon stock that matches the size of your mortise. Lengthwise, it's logical to assume that the stock would be cut to match the combined depth of both mortises. However, it's important to actually cut the tenon stock 1/8" *shorter* than that to allow for excess glue and the rounded bottoms of the drilled holes.

Stock Preparation — One of the nice things about the BeadLOCK joinery system is that stock preparation is minimal. That's because you don't have to worry about taking the length of the tenons into account when sizing the pieces. You can simply cut the stock pieces to final length at the outset. Layout is as easy as dry-fitting the pieces together and marking the centerline for the joint *(see Fig. 1 on page 43)*.

Jig Setup — Setting up the mortising jig is also very straightforward. Just position the jig on the workpiece so the straight edge of the D-shaped window on the face plate aligns with your layout line *(Fig. 2)*. Then clamp the face plate to the workpiece.

Drilling the Mortise — The jig's guide block slides back and forth between two settings. The idea is to drill one set of holes in each position *(see How It Works on page 43)*.

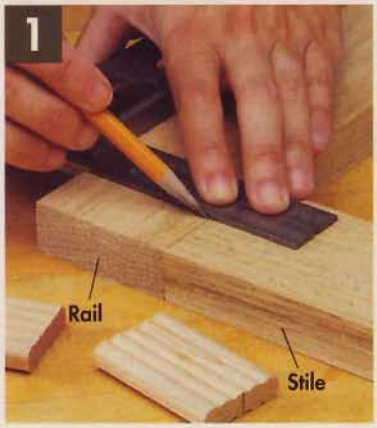
Securing the block in the "A" position with the thumbscrews allows you to remove the bulk of the mortise *(Fig. 3)*. Don't worry if your drill bit doesn't slip easily into the holes of the guide block. It'll fit, though you may have to work the bit into the hole before drilling.

With the jig still clamped in place on the workpiece, reposition the guide block to the "B" setting. This precisely locates the second set of overlapping holes that complete the mortise *(Fig. 4)*. The bent-over tab on the face plate is there to ensure that you drill only the correct remaining holes.

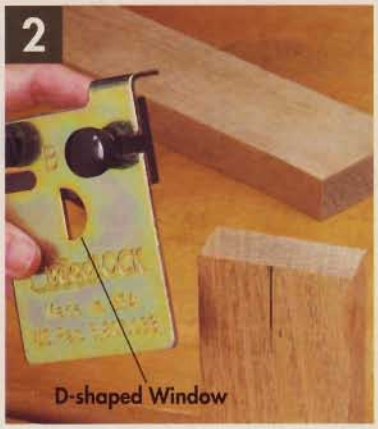
They may be called *loose* tenons, but they make very tight joints. Redrilling the first set of holes (those in the "A" setting) will clean out the mortise and ease the fit.

Assembling the Joint — After cutting the tenon stock and checking the fit of the joint components, all that remains is the glue-up, shown in the *Photo*, above.

Beaded Tenon Joints

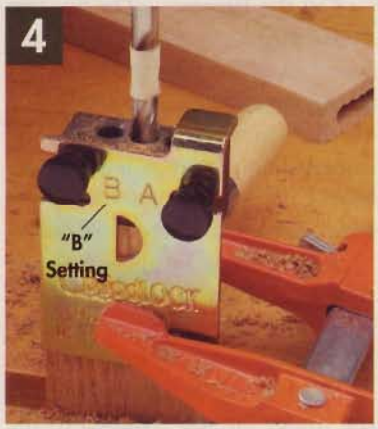


▲ To locate the center of the mortise, dry-fit the pieces together, then mark a line across the joint.



▲ Align the straight edge of the D-shaped window in the face plate with your layout line.

▲ With the jig clamped to the workpiece, lock the guide block to the ***left*** in the "A" setting. Drill holes.



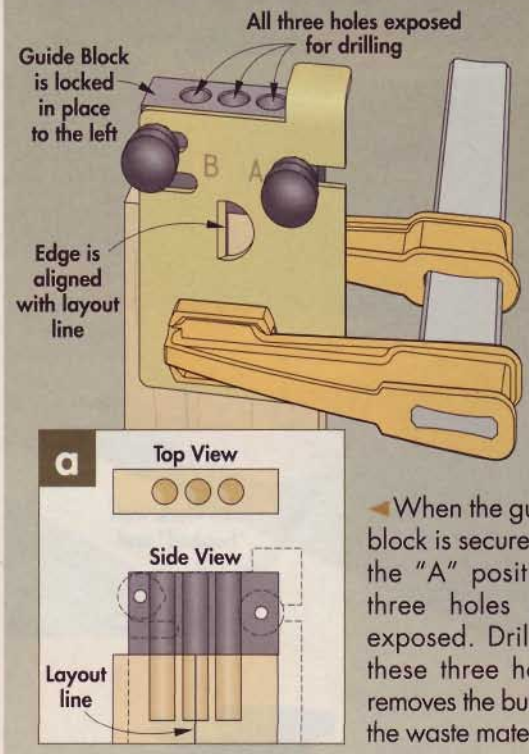
▲ Without unclamping, slide the guide block to the ***right***, secure it in the "B" position, and drill holes.

▲ Repeat the process described in Steps 2 through 4 to drill the mortise in the adjoining workpiece.

▲ Cut the tenon stock to length (1/8" less than combined depth of mortises), and assemble the joint.

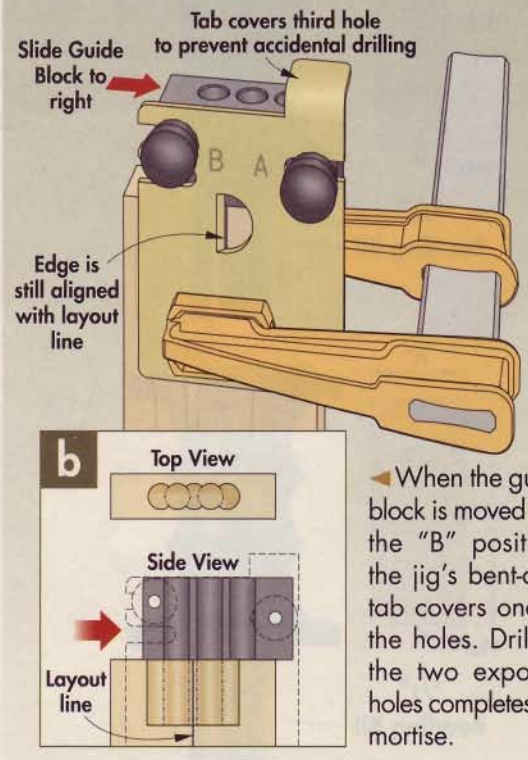
How It Works

Guide Block in "A" Position



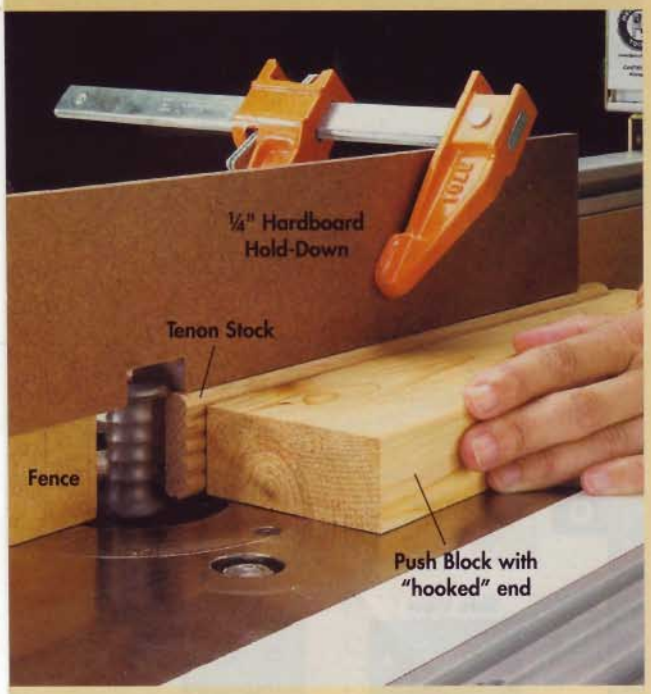
◀ When the guide block is secured in the "A" position, three holes are exposed. Drilling these three holes removes the bulk of the waste material.

Guide Block in "B" Position



◀ When the guide block is moved into the "B" position, the jig's bent-over tab covers one of the holes. Drilling the two exposed holes completes the mortise.

BeadLOCK TENON TIPS



Making Your Own BeadLOCK Tenons

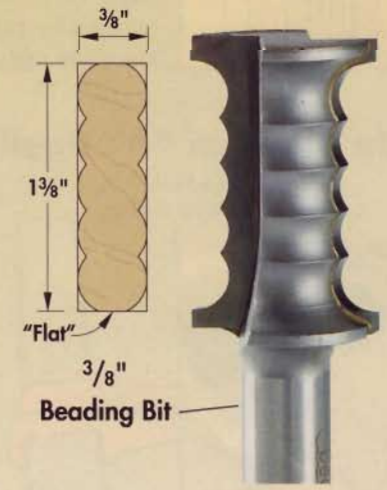
Though pre-milled BeadLOCK tenon stock is very affordable (around $6 for a package of three foot-long pieces), you might find yourself using this joinery system so much that you want to make your own stock. It's easy to do using BeadLOCK's specialized router bits. They're available for either 3/8"- or 1/2"-wide stock sizes for around $64 (both require a 1/2" collet).

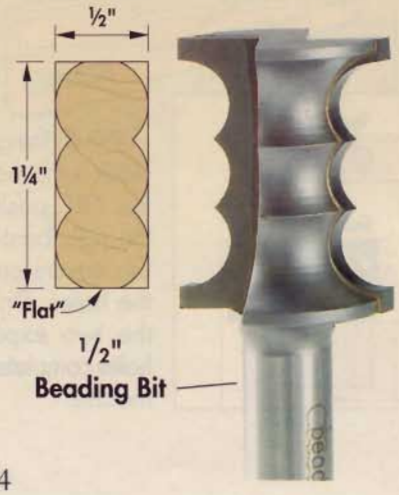
Cut the Blanks — The first step to making tenon stock is to prepare wood blanks. Plane the blanks to the appropriate thickness, and then rip them to width, according to the dimensions shown at left. I made blanks 12" long because they were easier to handle on the router table.

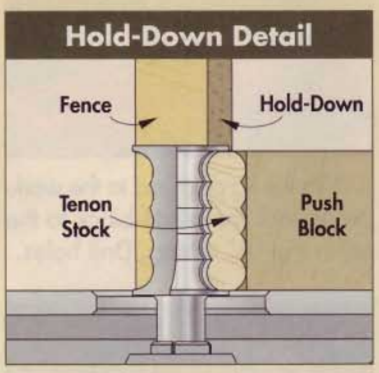
Router Table Setup — A couple of simple shop-made accessories will make routing the tenon stock easier, safer, and more exact. A piece of 1/4" hardboard notched around the router bit and clamped to the fence will hold the blank down *(Hold-Down Detail, right)*. And a push block cut with a "hooked" end will guide the stock past the router bit evenly and prevent kickback *(Push Block Detail, below)*.

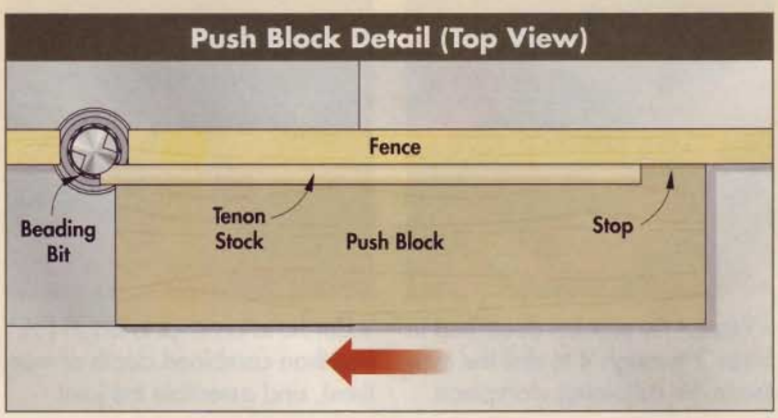
Using a piece of factory-milled tenon stock as a guide when setting the bit height reduces the time and number of test pieces this adjustment might take. The router bit is the right height when slight "flats" form equally on both edges of the stock *(Beaded Tenon Illustrations, left)*. Similarly, adjust the fence so that the depth of the cut just barely rounds the faces of the blank. You know you've got it right when the molded piece fits snugly in a mortise.

Rout the Stock — Now you're ready to rout. Mark one edge of each blank, and keep this edge facing up during both passes to ensure symmetrical beads.









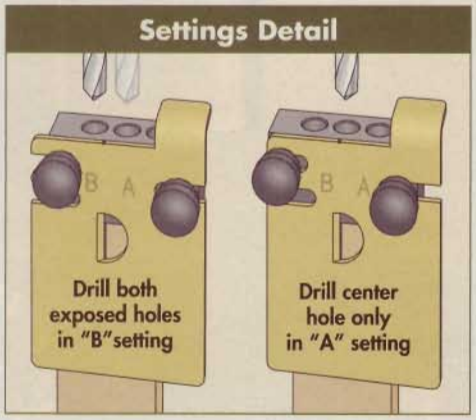
A Joinery Method for Narrow Stock

Just because BeadLOCK tenon stock comes in predetermined widths doesn't mean you have to always use the full width for a tenon. What about joining frame pieces that are too narrow to accommodate the tenon stock?

If you go with the joint-sizing dimensions I talked about on page 42, you'll see that it's not possible to make a viable joint with full-width tenon stock in a workpiece that's much narrower than 2". But say you want to join narrower pieces — $1\frac{5}{8}$" wide, for example. Your mortises would have to be $\frac{7}{8}$" long.

No problem. To form $\frac{7}{8}$"-long mortises, just drill only those guide-block holes that will result in a shorter, centered mortise. These holes are: *both* the exposed holes in the "B" setting, and then only the *center* hole in the "A" setting *(Settings Detail, left)*. Note that you'll be starting with the *"B"* setting for this procedure, rather than the "A" setting. The reason for this is that it's best to drill out the bulk of the mortise first, to prevent the bit from drifting.

Then, to produce the corresponding tenon, simply rip one of the "beads" from a length of $\frac{3}{8}$" tenon stock. Finally, round the cut edge with a sanding block so it fits the rounded end of the mortise.



▲ Adapt $\frac{3}{8}$" tenon stock to fit $\frac{7}{8}$"-long mortises by reducing it to three "beads."

shaker-style Cherry Vanity

elegant bath blends classic and contemporary

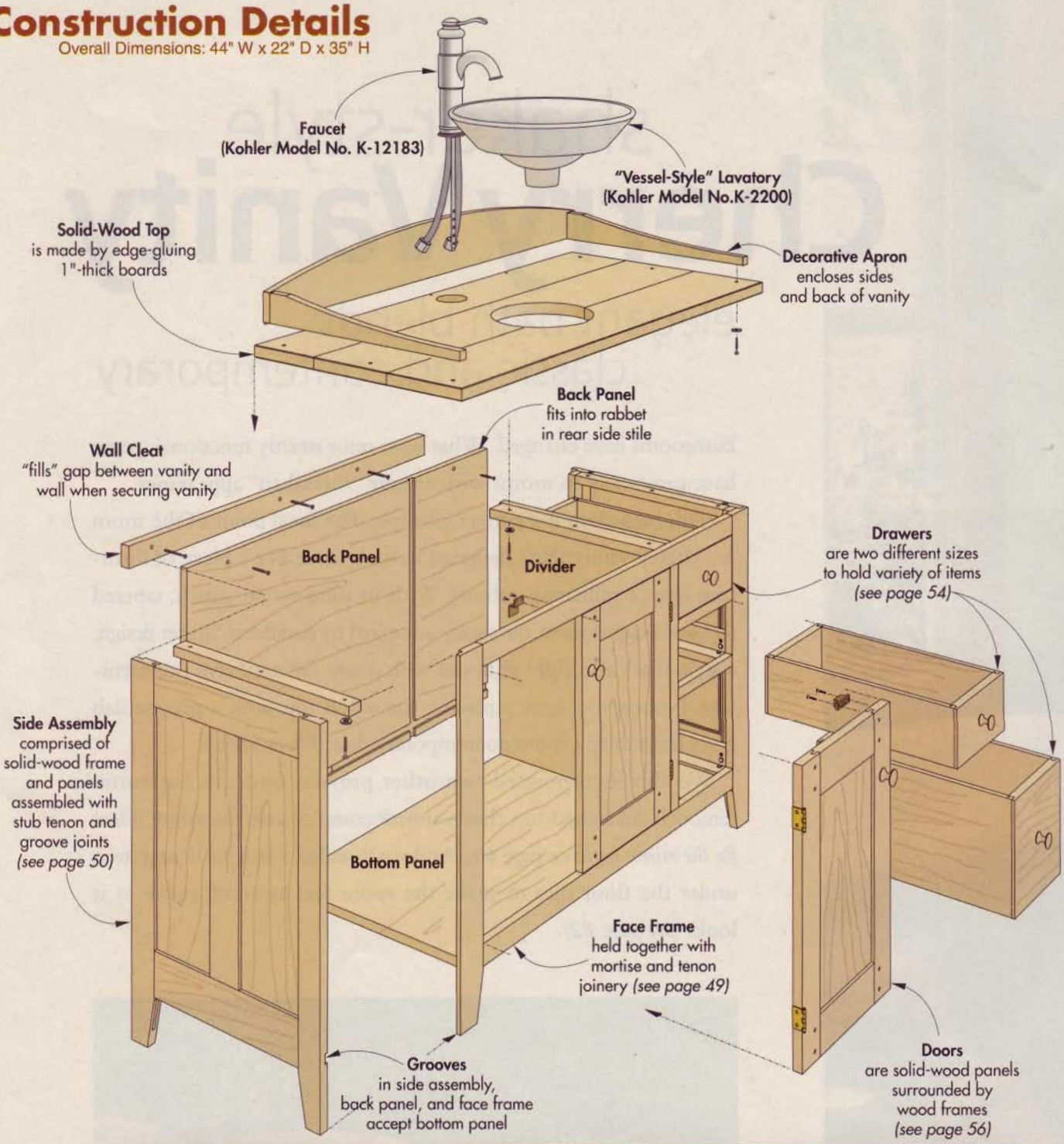
Bathrooms have changed. What were once strictly functional spaces have given way to rooms with a more "furnished" appearance.

This bathroom is a perfect example. The focal point of the room is a cherry vanity that's designed to look more like a piece of furniture than a utilitarian cabinet. With its solid-wood panels, tapered feet, and pegged joints, the vanity is inspired by traditional Shaker design, a style that's also right at home with many different styles of furniture. Notice, too, how replacing the wood top with a granite slab gives the vanity a more contemporary flair *(Photo, below)*.

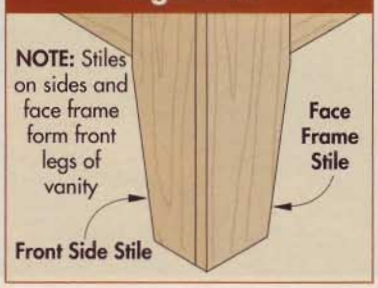
We also incorporated two other projects into this bathroom remodel. An arched-top, cherry mirror complements the vanity. *(Plans for the mirror begin on page 60.)* And we installed a radiant heat system under the floor tiles to make the room feel as comfortable as it looks *(see page 82)*.

Construction Details

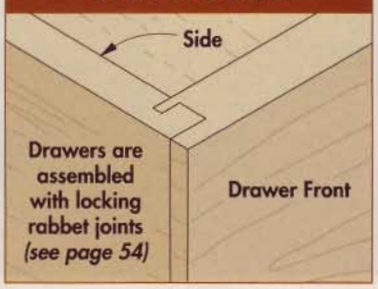
Overall Dimensions: 44" W x 22" D x 35" H



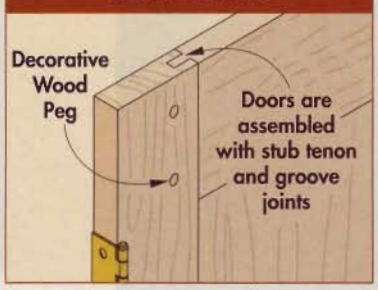
Leg Detail



Drawer Detail



Door Detail



mortise & tenon

FACE FRAME

A hardwood face frame covers the front of this vanity. It consists of three vertical stiles and four horizontal rails that form openings for the doors and drawers *(see Face Frame Assembly below)*.

An Overview — To create the appearance of a piece of furniture, each end stile of this face frame acts as a front leg of the vanity. More accurately, it makes up half the leg. The other half is formed by the front side stiles *(Leg Detail, page 48)*.

The face frame is constructed with 3/4"-thick rails and stiles, which are connected with mortise and tenon joints.

For the sake of proportion, all four parts of the face frame (A, B, C, D) are different widths.

As for length, the dimensions shown below take into account 1"-long tenons — which are typical — on the ends of the top and bottom rails, middle stile, and drawer rails.

Lay Out Mortises — After cutting the frame pieces to length, lay out the locations of the mortises according to the *Parts View*, below right. Notice that each of these mortises is 1/4" wide and 1" deep *(see Mortise Detail below)*. As you can see, the lengths of the mortises vary depending on which frame piece is tenoned to fit into it.

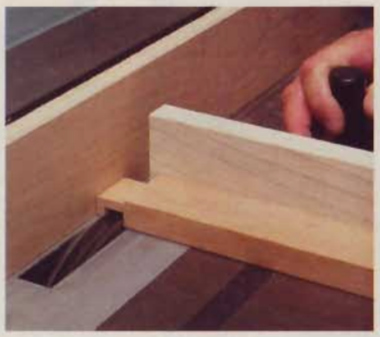
Make the Mortises — Once the layout is complete, you're ready to cut the mortises. I used a benchtop mortising machine to cut the square holes *(Photo, upper right)*. Of course, you could also drill overlapping holes on a drill press and then clean out the waste and square up the ends of the mortise with a chisel.

Cut the Tenons — The next step is to cut the tenons to fit the mortises. All of the tenons are 1/4" thick and 1" long *(Tenon Detail)*.

The width varies depending on which mortise the tenon fits into. To simplify things, the project is designed so that by cutting 1/4"-deep shoulders on all four sides, you'll end up with a tenon of the correct width. An easy way to accomplish that is to use a dado blade mounted in a table saw *(Photo, lower right)*.

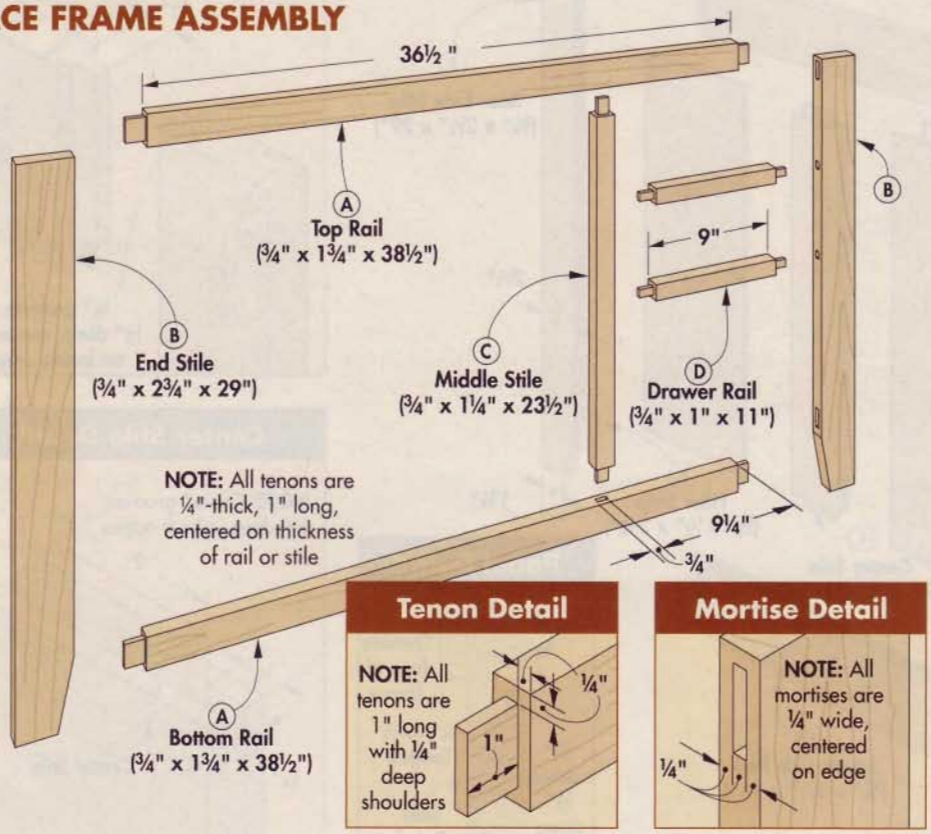
Tapered Feet — There's one thing left to do before assembling the face frame. That's to trim the bottom of the end stiles at an angle to form the tapered feet of the vanity *(Parts View)*. After sanding the edge smooth, just glue and clamp the face frame together.

▲ A mortising machine and a 1/4" square chisel and bit make quick work of cutting the mortises.



▲ To define the length of the tenon, butt the workpiece against an auxiliary fence, then make a pass.

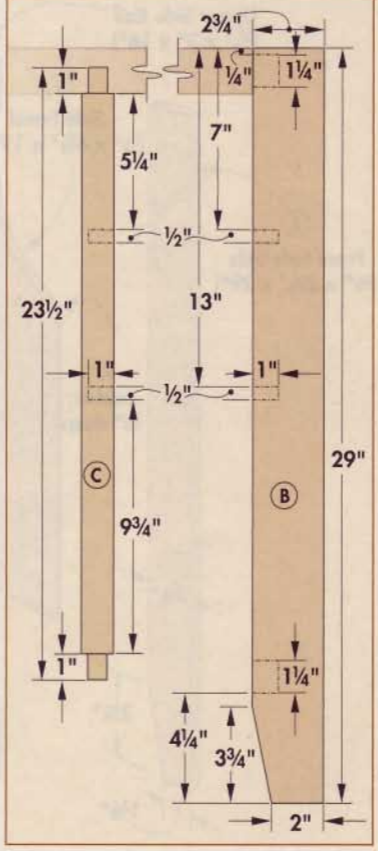
FACE FRAME ASSEMBLY



Tenon Detail

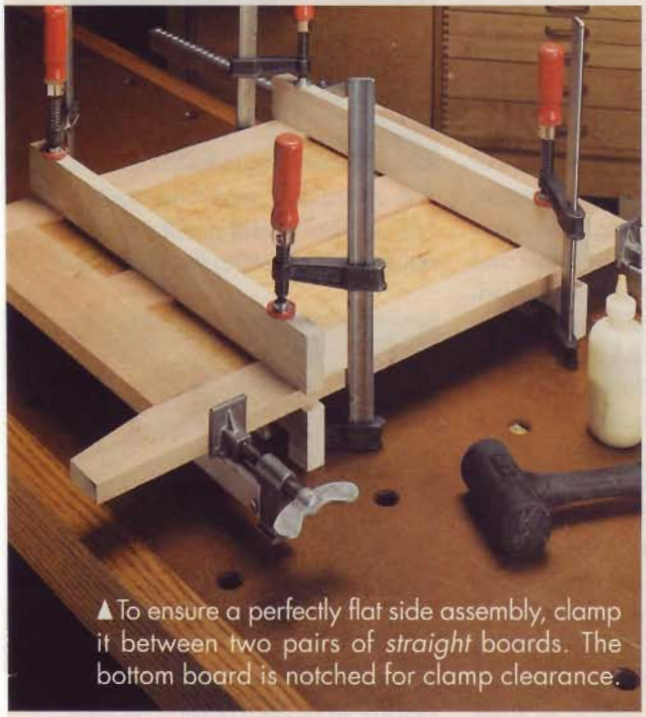
Mortise Detail

Parts View



building frame & panel

SIDE ASSEMBLIES



▲ To ensure a perfectly flat side assembly, clamp it between two pairs of *straight* boards. The bottom board is notched for clamp clearance.

Once the face frame is complete, you can turn your attention to the side assemblies. These assemblies consist of a divided wood frame that creates openings for a pair of solid-wood panels *(Illustration, below)*.

Build the Frames

The frame for each side assembly is made up of three stiles (two side stiles and a center stile) and two rails.

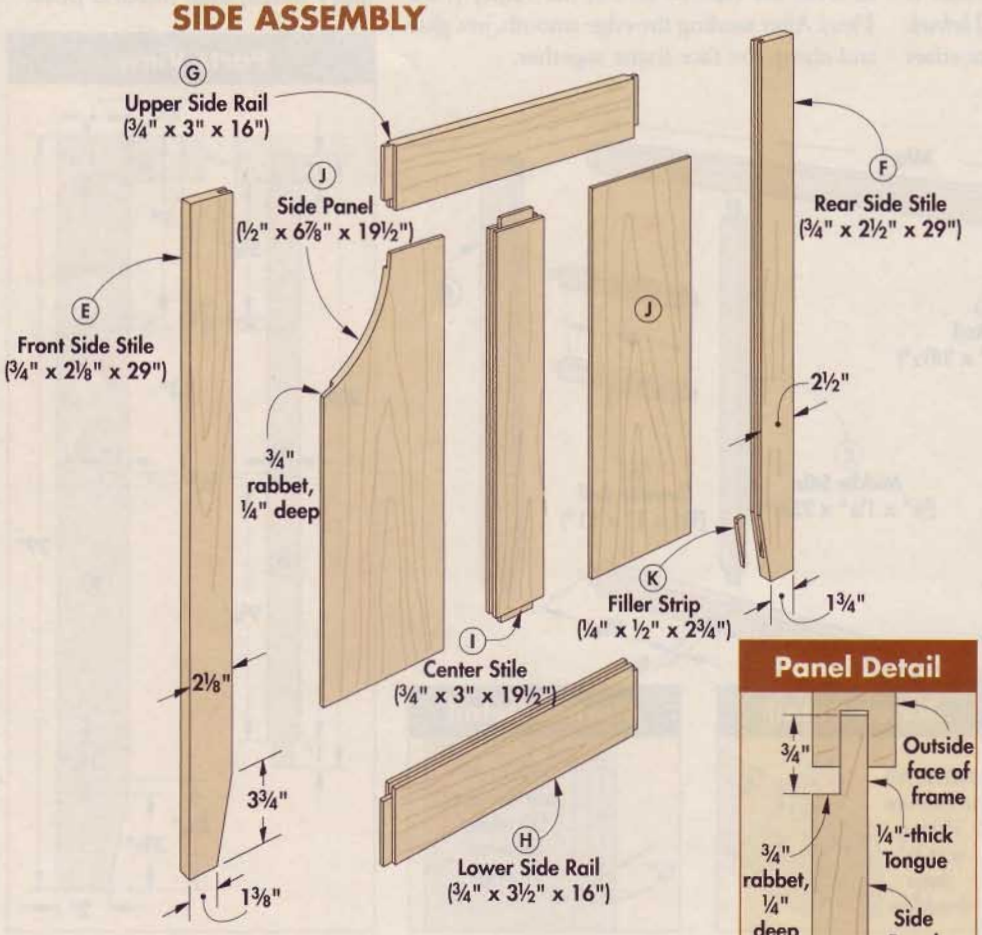
Like the face frame, all these pieces are $^3/_4$"-thick hardwood. And here again, they differ in width. In particular, note that the front side stile (E) is $^3/_8$" narrower than the rear side stile (F). This is so the stiles *appear* to be the same width once the side assemblies are connected to the face frame.

Also note that the upper side rail (G) is $^1/_2$" narrower than the lower side rail (H). And the center rail (I) is 3" wide, which provides a substantial-looking divider in the middle of the side assembly.

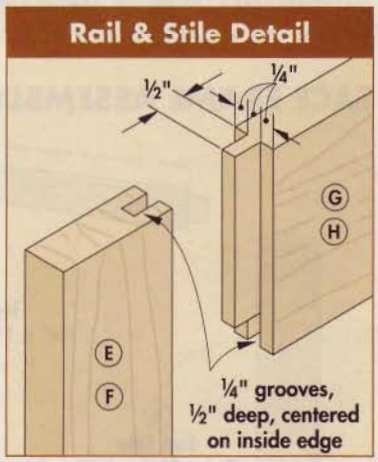
Stub Tenons & Grooves — To simplify construction, the frames are assembled with stub tenon and groove joints. Both ends of each rail have a stub tenon that fits into a groove in the stiles *(Rail & Stile Detail)*. And a tenon on each end of the center stile fits into grooves in the rails *(Center Stile Detail)*. The grooves in the frame pieces also accept the solid-wood panels. Note that the center stile gets a groove on both edges. All the other frame pieces are grooved on the inside edge only.

There's nothing complicated about cutting stub tenon and groove joints. Before you get started, though, take a minute to label each piece to avoid getting them mixed up. It's also

SIDE ASSEMBLY

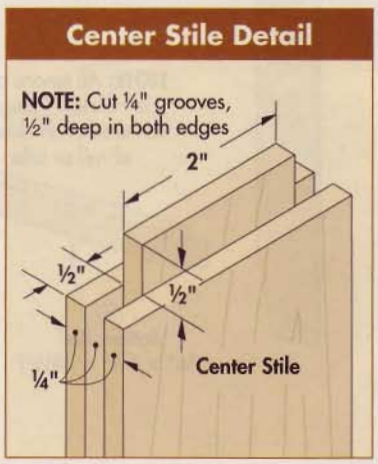


Rail & Stile Detail



Panel Detail

Center Stile Detail



a good idea to label the outside face of each piece and then use it as a reference when machining the joints *(see Stub Tenon & Groove Sidebar below)*.

Cut Tapers — The next step is to use a jig saw or band saw to trim the bottom of each side stile at an angle, once again forming a tapered foot. Since the stiles are different widths, adjust the width of the bottom end of the stiles accordingly.

Solid-Wood Side Panels

With the frames complete, it's time to start on the solid-wood panels. In keeping with the Shaker styling, I wanted the side panels to be flat on the outside for a clean, simple look.

The side panels (J) are made from $^1/_2$"-thick hardwood. For appearance, it's a good idea to cut these panels (and the panels for the doors that are added later) from boards that match closely in color.

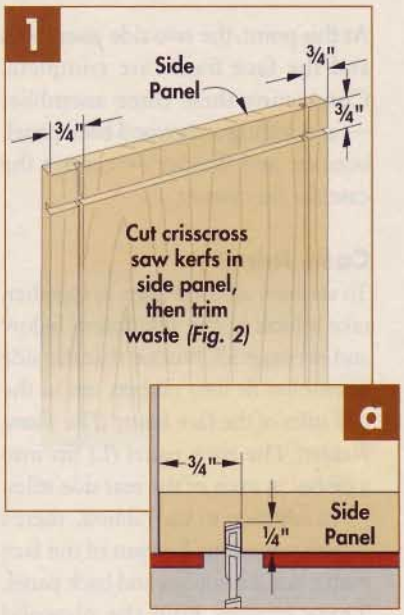
To determine the size of the panels, dry-assemble the frames, measure the openings, and then add $^7/_8$". That's $^1/_8$" less than the combined depth of the grooves. Once the sides are assembled, this will allow the panel to expand and contract with changes in humidity.

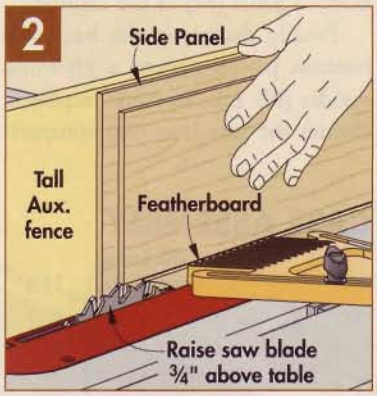
Tongues — If you look at the *Side Assembly Illustration* again, you can see there's a tongue on all four edges of the side panel that fits into the grooves in the frame pieces. Each tongue is formed by cutting a wide rabbet all the way around the back of the side panel *(Panel Detail)*.

To cut the rabbet, I used a two-step process on the table saw. First, with the panel lying flat, cut four shallow, crisscross kerfs *(Figs. 1 and 1a)*. Then stand the panel on edge and run it against a tall auxiliary fence to remove the waste material, leaving a $^1/_4$"-thick tongue *(Fig. 2)*.

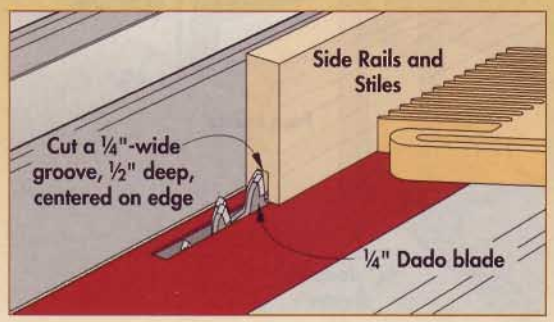
Assemble Side Panels — Now you're ready to assemble the side panels. The panels should "float" in the frames to allow for wood movement. So apply glue to the mating frame pieces. Then center a dab of glue on the tongue of the panel at the top and bottom, just to keep it centered in the frame. After fitting it all together, clamp it as shown in the *Photo* on page 50 to ensure a flat, square assembly.

The final step in making the side assemblies is to glue in a wedge-shaped filler strip (K) to cover the exposed groove in the tapered feet.

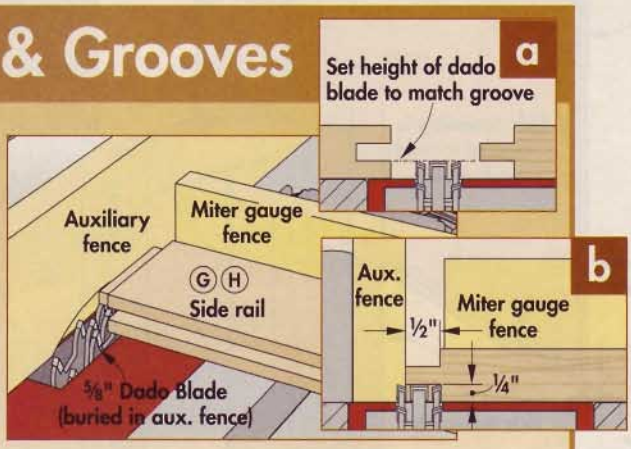




Cutting Stub Tenons & Grooves



▲ To cut the grooves, set the fence so the blade is centered on the edge of the workpiece. Then run the outside face of each piece against the fence.



▲ For the tenons, set up a wider dado blade and adjust its height as in *Fig. a*. Then, using the miter gauge, make two passes, one on each side.

bringing it all together

CASE CONSTRUCTION

At this point, the two side assemblies and the face frame are complete. Connecting these three assemblies — and adding a plywood back panel, bottom, and divider — creates the case for this vanity.

Case Joinery

To see how all these parts fit together, take a look at the *Illustrations* below and on page 53. Notice that the side assemblies fit into rabbets cut in the end stiles of the face frame *(Face Frame Rabbet)*. The back panel (L) fits into a rabbet in each of the rear side stiles.

In addition to the rabbets, there's a groove near the bottom of the face frame, side assemblies, and back panel. These grooves hold the plywood bottom panel (M) of the cabinet.

Finally, dadoes in the back and bottom panels accept a plywood divider (N). Like its name implies, it divides the case into two compartments, one for the plumbing under the sink and the other for the drawers.

Now, it might seem like cutting these joints is a pretty routine operation. Just mount a dado blade in the table saw and make the cuts, right? Actually there's more to it than that.

Grooves for Bottom — Take the grooves that hold the bottom panel, for instance. It might seem natural to run the top edge of the face frame and side assemblies against the table saw rip fence. The problem is the blade would be located quite a distance from the rip fence — too far to make the cut safely. As a result, it would be all too easy to twist the workpiece during the cut, causing it to kick back.

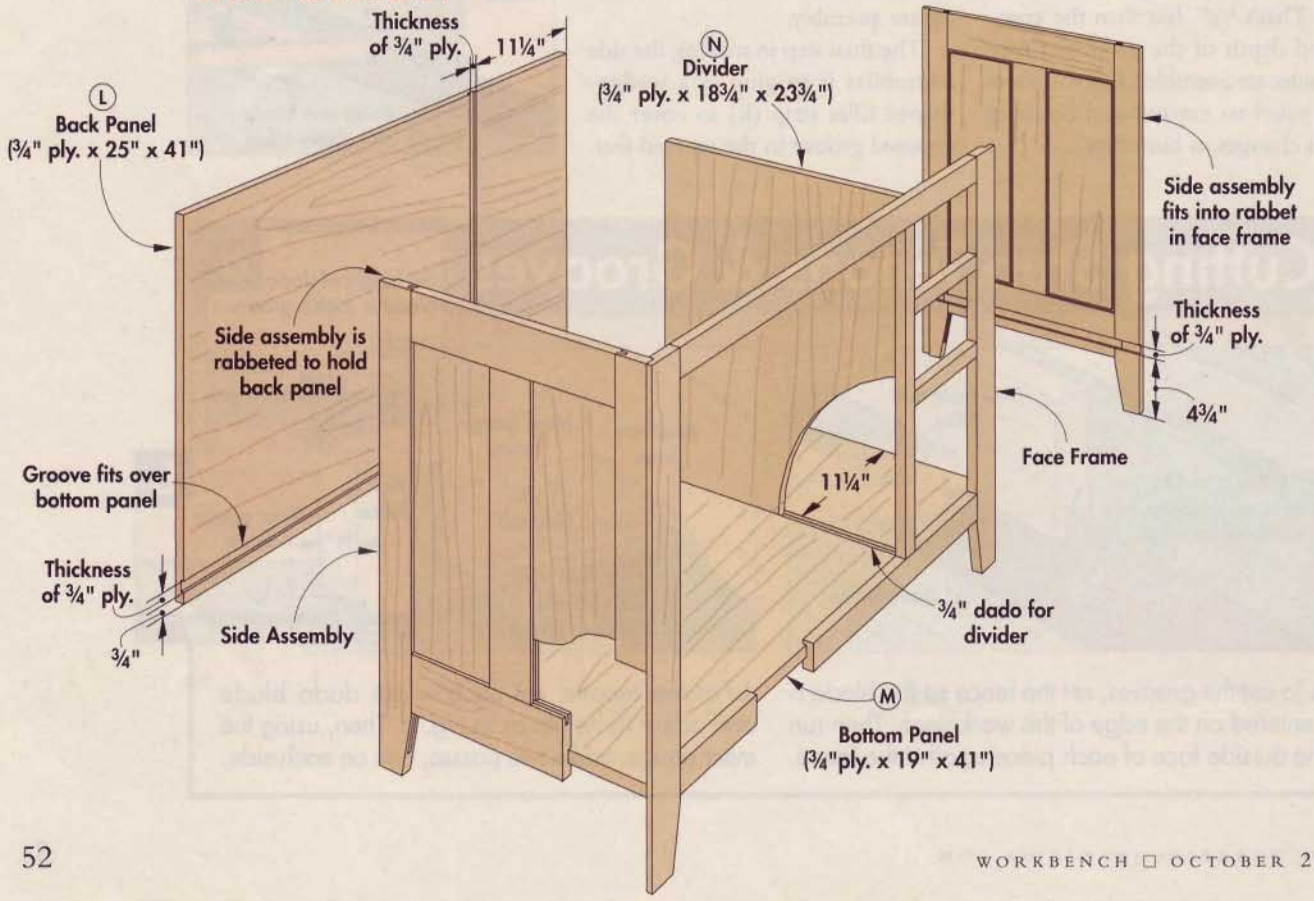
One way to prevent that would be to set the fence closer to the blade and run the feet of the face frame and side assemblies against it. That, however, presents another difficulty. The fence isn't long enough to provide continuous support for the span of the feet. This could cause the outboard foot to "hook" around the end of the fence partway through the cut, causing a dangerous situation. The solution is to temporarily attach a straight board to the feet and run it against the fence *(Upper Photo, page 53)*.

As for the corresponding groove in the back panel, there's no need to adjust the width or the height of the dado blade. Just reset the rip fence and make the cut.

Dadoes for Divider — Once the grooves are completed, you can focus on the dadoes in the back and bottom panels that hold the divider. Again, no need to adjust the dado blade. You'll also be able to cut both dadoes using a single fence setting.

Cut the Rabbets — That brings us to the rabbets I mentioned earlier. As you recall, the rabbets in the side assemblies hold the plywood back

CASE ASSEMBLY



panel, so they can be made using the same dado blade setup as the preceding cuts. This time however, the rip fence will have to be positioned right next to the blade. To prevent the blade from cutting into the fence, you'll need to attach an auxiliary fence. Adjust the fence so it just "kisses" the side of the blade. Then, with the rear side stile riding against the fence, make a single pass to cut each rabbet.

The procedure for cutting the rabbets in the end stiles of the face frame is almost identical, only these rabbets must be a hair wider. That's because they fit over the side assemblies, which are a full $^3/_4$" thick. So here, take a minute to readjust the dado blade for a slightly wider cut. Make test cuts and check the fit first. Then cut the rabbets in the face frame *(Photo, right)*.

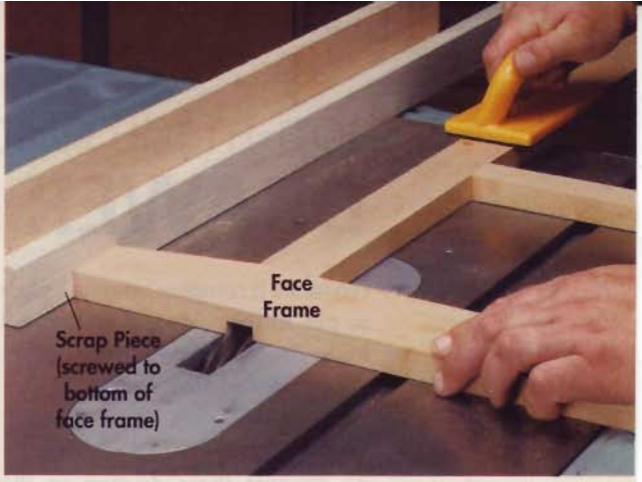
Assembling the Case

Once all the joinery for the case is complete, you're ready to put it together. This is a pretty large case for one person to assemble. So to make things go as smoothly as possible, I'd recommend rounding up a friend to help. Also, be sure you have enough clamps on hand. Finally, it's a good idea to use a slow-setting glue like liquid hide glue to allow plenty of working time.

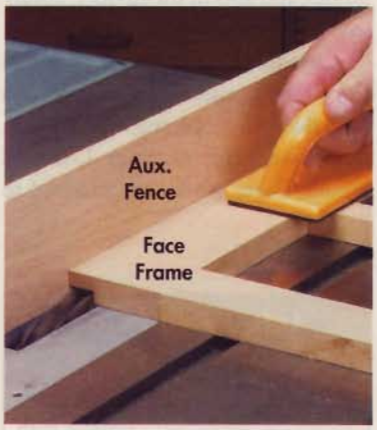
Before applying any glue however, don't forget to dry assemble the case, check how things fit together, and then make any necessary adjustments.

One more note — it's best *not* to permanently attach the back panel at this time. You can use it to help square up the case, but hold off on the glue for now. You'll appreciate having easy access to the back of the case when installing the drawer guides.

Glue-Up — With that in mind, brush glue into the appropriate joints. Then join the face frame with one side assembly and fit the bottom panel into place. Now slide in the divider. (It's also glued along the front edge where it meets the face frame.) Finally, add the second side assembly, set the back panel in place, and clamp the case.

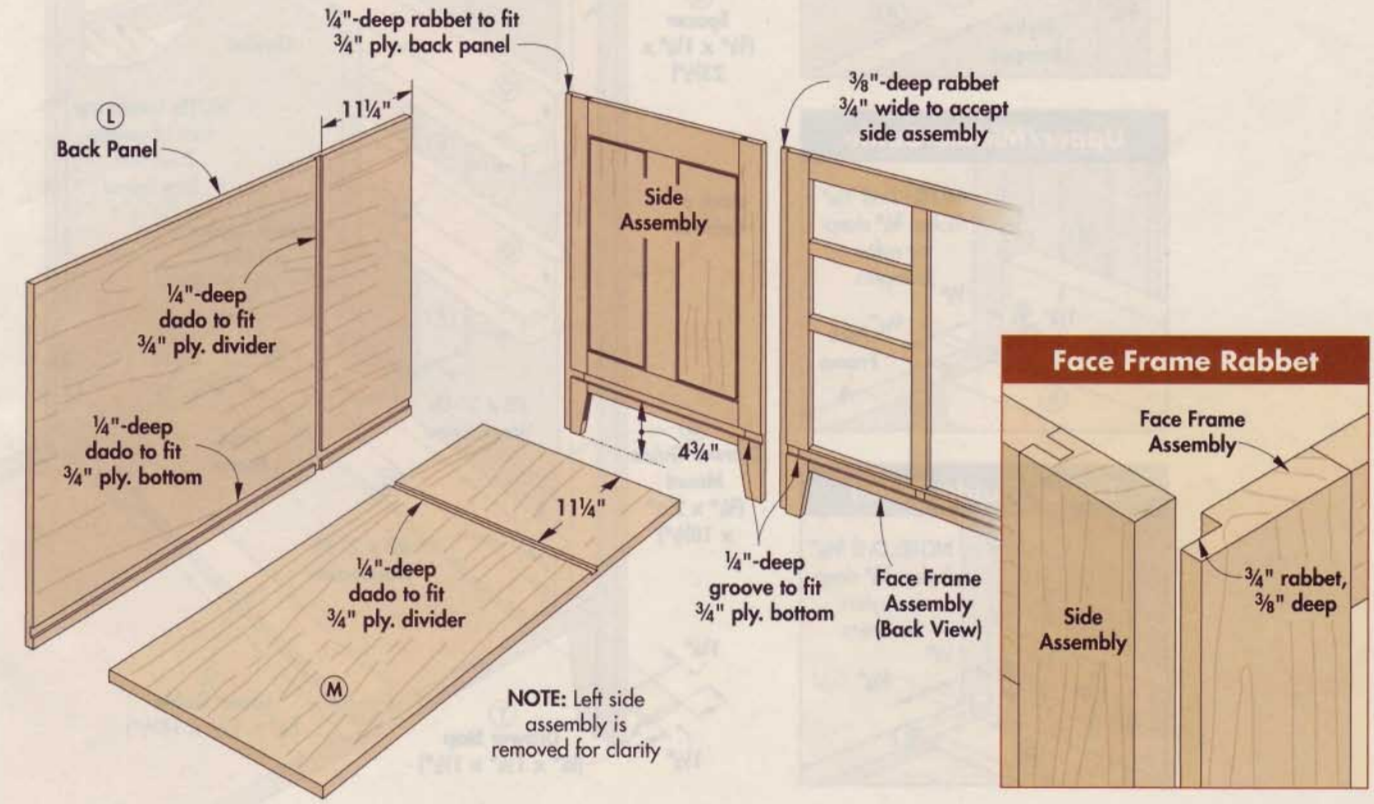


▲ When cutting the groove in the face frame and side assemblies, a board screwed to the feet provides a continuous surface that rides against the fence.



◄ To cut the rabbet in the face frame in a single pass, set the fence so it just grazes the blade. Then raise the dado blade to make a full-width, full-depth cut.

RABBET, GROOVE, & DADO LOCATIONS



shop-made guides &

DRAWER HOW-TO

No vanity is complete without a place to put all the odds and ends. A tall lower drawer and two smaller upper drawers provide that storage.

Guide System

To support these drawers in the opening, I added a simple system of wood guides *(see Illustration below)*. Nylon "bumpers" installed in these guides, and also in the divider, ensure smooth-sliding drawers *(Guide Details)*.

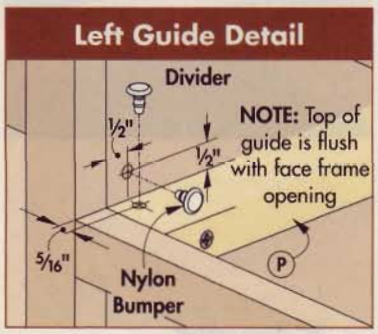
One thing to be aware of is that the drawer guides are different on each side of the opening. On one side, the drawers ride on three L-shaped guides. These guides are attached to spacers, which are used to "build out" the guides so they're flush with the face frame opening. On the other side, the guides are narrow strips of wood attached directly to the divider.

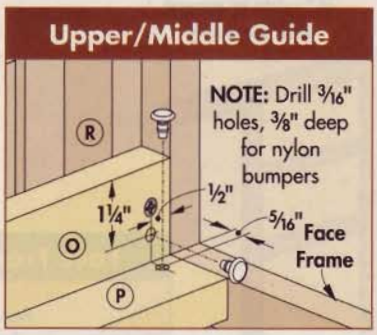
There's something else you may have noticed about these drawer guides. Specifically, the *lower* guides. That is, the horizontal leg of the L-shaped lower guide is *thinner* than the corresponding legs of the guides above it. Likewise, the lower guide on the "divider" side of the opening is thinner than the ones above it. This is necessary to make the lower guides flush with the bottom rail of the face frame.

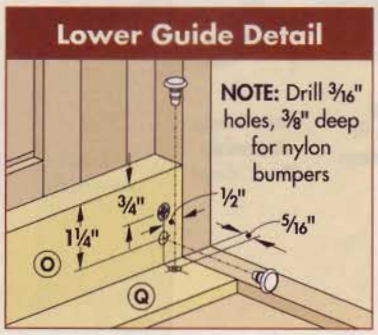
Make the Guides — There's nothing complicated about making the guides. Size the pieces according to the dimensions shown. Pre-drill all the mounting holes, as well as the holes for the nylon bumpers (in the guides *and* the divider). Then glue up the L-shaped drawer guides.

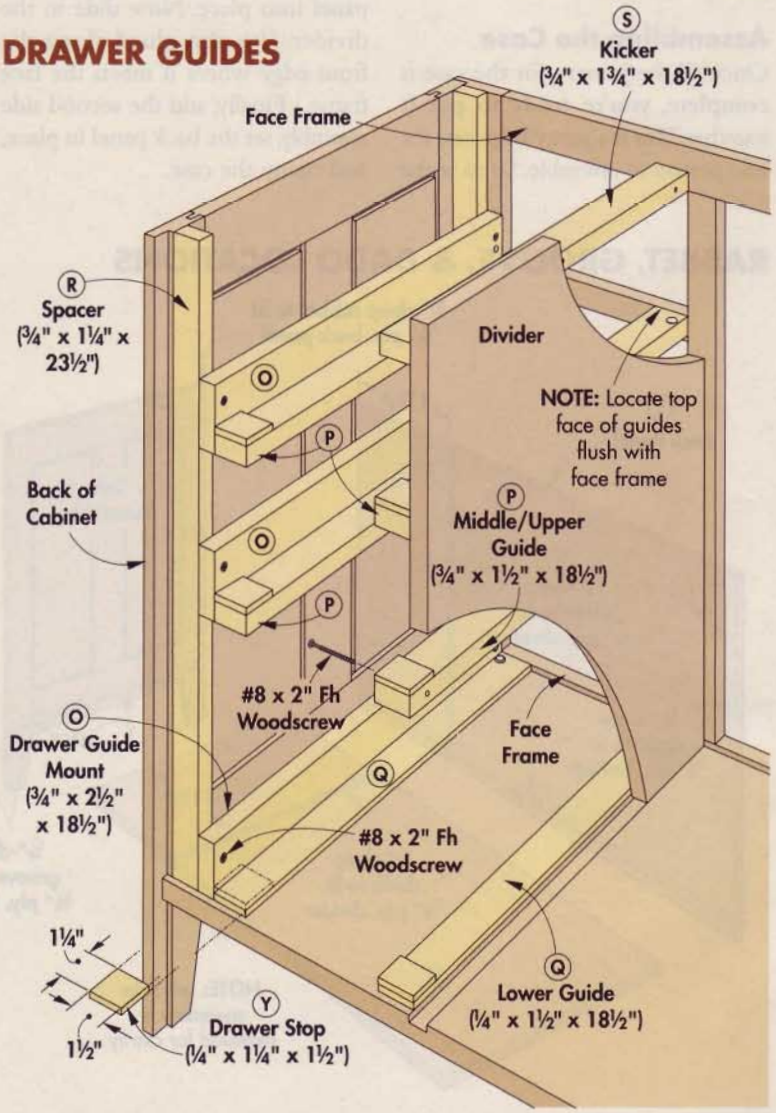
Before attaching the guides, you'll need to install the spacers (R) I mentioned earlier. These are just strips of $^3/_4$"-thick hardwood that are glued to the side assembly.

Install the Guides — Now it's time to install the guides. The important thing here is that they align from one side to the other. Otherwise, the









drawers will bind when you slide them in and out.

To ensure proper alignment, clamp them in position flush with the opening and secure them with screws. Then press the nylon bumpers into place. **Note:** To get the bumpers in the lower guides to fully seat, you'll need to drill those holes 1/8" deeper.

Finally, to prevent the top drawer from tipping down when it's opened, I added a hardwood kicker (S) on one side. It's positioned flush with the bottom edge of the top rail and glued to the divider.

Build the Drawers

Once the guide system is completed, the three drawers can be built to fit the openings. Actually, they're sized slightly smaller (1/16") than the opening to create a uniform gap all the way around. As for length, the drawers are 1 1/4" shorter than the depth of the opening.

As you recall, the drawers are different sizes (the lower drawer is taller than the upper drawers), but their construction is identical. The drawer fronts and backs (T, U) are made of 3/4"-thick hardwood, and the sides (V, W) are 1/2"-thick stock *(see Drawer Assembly Illustration at right)*.

Locking Rabbet Joints — For strength and durability, I used a tried-and-true joint to assemble the drawers — a locking rabbet joint. To withstand constant tugging on a drawer, it has a tongue on the front and back that fits into a dado in the side. (It's sometimes called a tongue and dado joint.) Whatever you call it, the *Box* below will walk you through the process of using a table saw to cut the joint.

Before you machine the parts, it's a good idea to label the inside face of each piece. Using this face as a reference will ensure consistent results. Also, use a backer block for support when you cut the groove in the end of the front and back pieces *(Fig. 1)*. It helps to hold the workpiece steady during the cut.

Once the joinery is complete, it's just a matter of cutting a groove in each piece to hold a 1/4" plywood bottom. After gluing up the drawers, I installed two additional nylon bumpers in the back of the drawer.

Drawer Stops — All that's left is to add the drawer stops (Y). These are wood blocks that "stop" the drawer flush with the front of the face frame when you close it. A quick way to determine the size of the stops is to install the drawer, position it flush in front, then measure the distance between the back and the end of the drawer guide. Then cut the stops to that size and glue them to the guides.

DRAWER ASSEMBLY

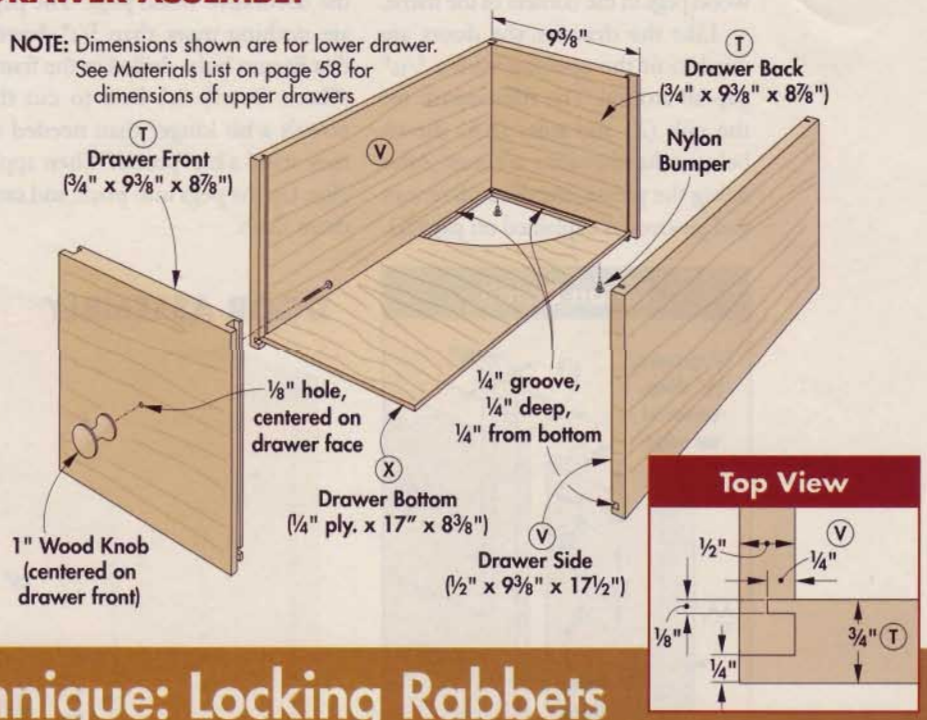
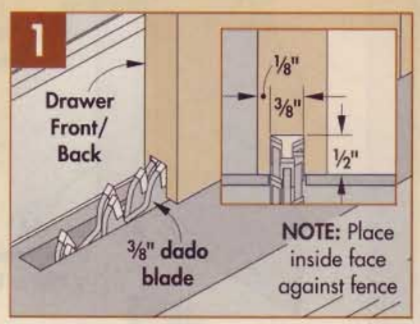
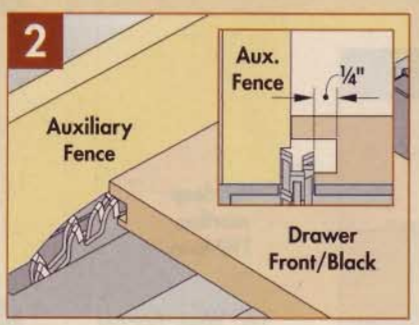


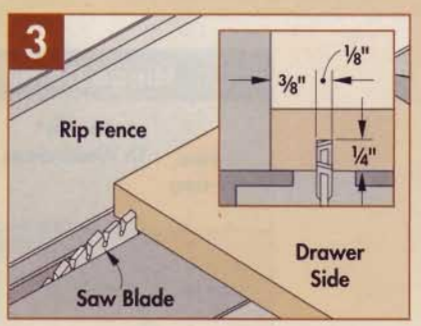
Table Saw Technique: Locking Rabbets



▲ With the drawer front (or back) standing on end, use a 3/8" dado blade to cut a groove in the end.



▲ Next, butt the end of the front (or back) against an auxiliary fence and trim the tongue to length.



▲ Replace the dado blade with a saw blade and cut a dado in the sides to accept the tongue.

adding cabinet doors & A SOLID-WOOD TOP

Two of the most distinctive features of this bathroom vanity are its frame and panel doors, and its solid-wood top.

Building the Doors

The construction of the doors is identical to the side assemblies. Each door consists of a solid-wood panel surrounded by a hardwood frame *(Door Assembly)*. Here again, stub tenon and groove joints are used to assemble the doors. Only this time, to add a decorative touch, I installed wood pegs in the corners of the frame.

Like the drawers, the doors are sized to fit the opening with a $^1/_{16}$" gap all around. The dimensions for the rails (Z) and stiles (AA) shown below take that into account. After sizing the pieces, cut the stub tenons and grooves, as explained on page 51.

Add the Panels — The solid-wood panels are next. They're wider than the panels in the side assemblies, so you'll have to edge-glue boards to make panels that are wide enough. Aside from that though, the procedure for making them is the same. That is, cutting rabbets on all four sides of each panel to form tongues that fit into the grooves in the frame pieces *(see page 51)*.

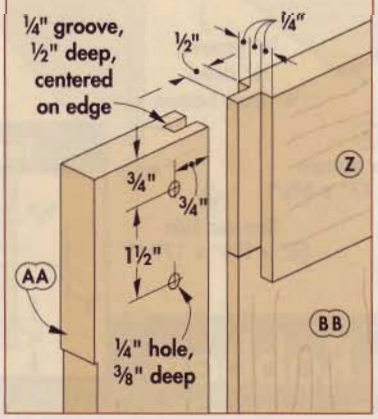
Decorative Pegs — After gluing and clamping the door, you can add the decorative wood pegs. The pegs are nothing more than $^1/_4$" dowels that fit into holes drilled in the frame *(Tenon Detail)*. It's best to cut the dowels a bit longer than needed so they stand a bit "proud." Then apply glue, tap the pegs into place, and sand them flush.

Install Doors — All that's left is to hinge the doors to the cabinet. The hinges I used are mortised into the door and surface-mounted to the face frame. This automatically establishes a $^1/_{16}$" gap between the door and the frame. Notice, too, that these hinges wrap around the door *(Hinge Detail)*. This makes it easy to hold them in place as you install screws in both the edge *and* the back of the door. Once that's done, position the door in the opening and secure the hinge to the frame.

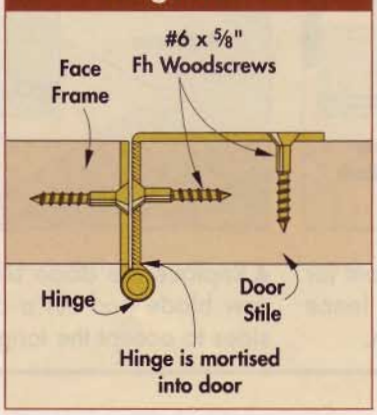
Topping It Off

This bathroom vanity is just about done. To complete it, I added a thick, solid-wood top and a three-part apron assembly *(see Top Assembly Illustration on page 57)*.

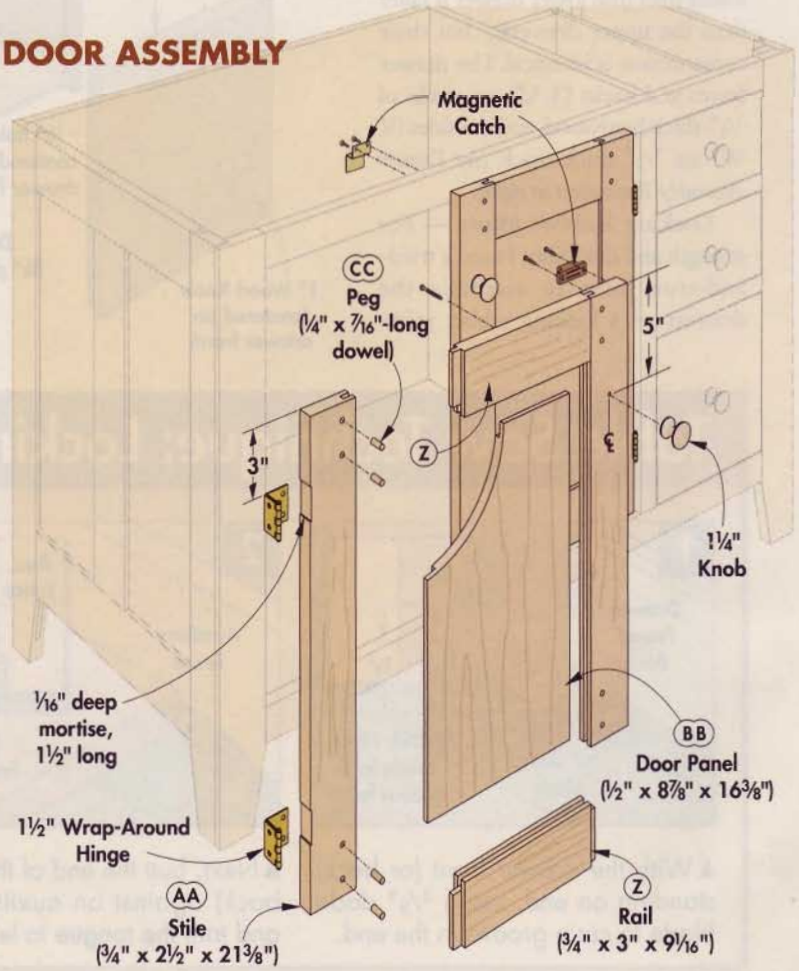
Tenon Detail



Hinge Detail



DOOR ASSEMBLY



▲ To prevent damage from water, seal the top with three coats of spar urethane.

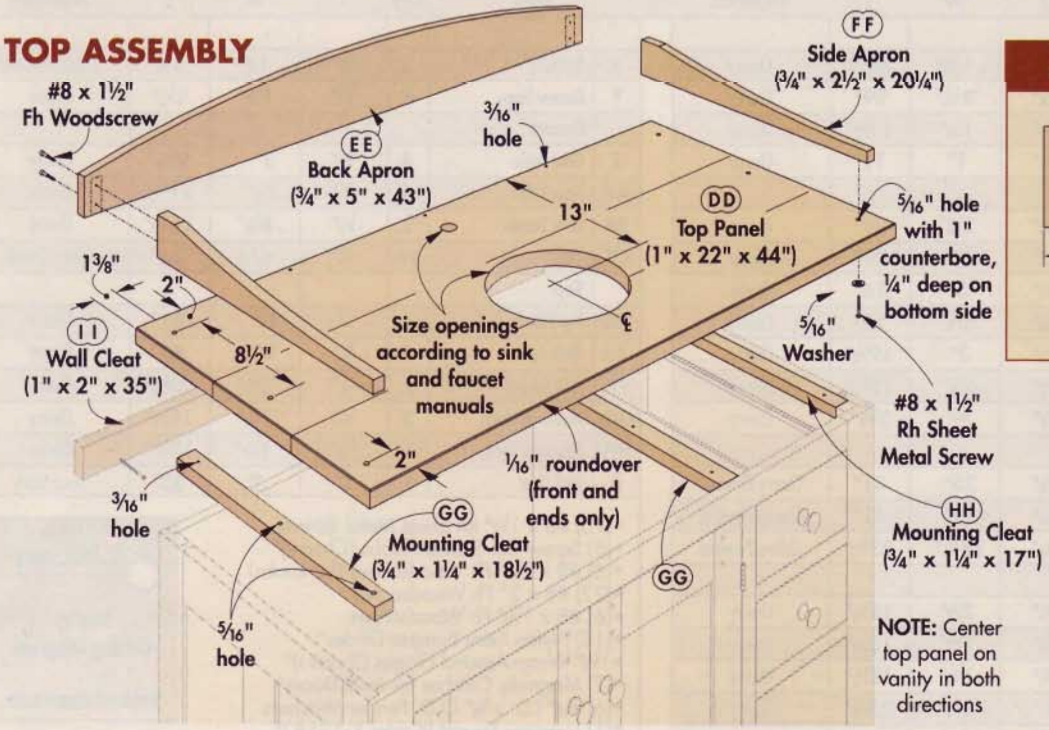
Edge-Glued Panel — The top panel (DD) consists of 1"-thick boards that are edge-glued together. Because of the moist environment of the bathroom, I'd recommend a waterproof glue like Titebond III. Apply the glue, then position the clamps in an over-and-under arrangement to ensure a flat panel.

Add the Apron — Now you can turn your attention to the apron. It's made up of three parts: a back apron (EE) and two side aprons (FF). After cutting the curved pieces to shape *(see Patterns below)*, they're screwed together to form the U-Shaped apron *(Apron Corner Detail)*.

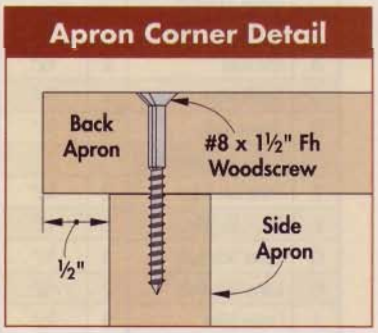
The apron is attached to the top with screws. To allow for expansion and contraction of the wood, the screws for the side aprons pass through oversize ($^5/_{16}$") shank holes that are counterbored on the bottom side for the screw heads *(Mounting Detail)*. Since the screw holes for the back apron are in line with the grain direction, they're standard size ($^3/_{16}$").

Install Top — With the apron in place, it's time to install the top. It's held in place with screws that pass through cleats (GG, HH) mounted to the cabinet. As before, wood movement must be taken into account to prevent the top from cracking. So here, the front and middle screws pass through oversize ($^5/_{16}$") holes in the cleat. The back screw, which goes through a smaller ($^3/_{16}$") shank hole, fixes the back edge of the top.

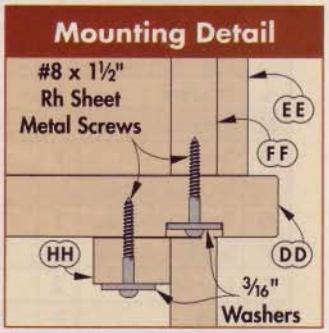
TOP ASSEMBLY



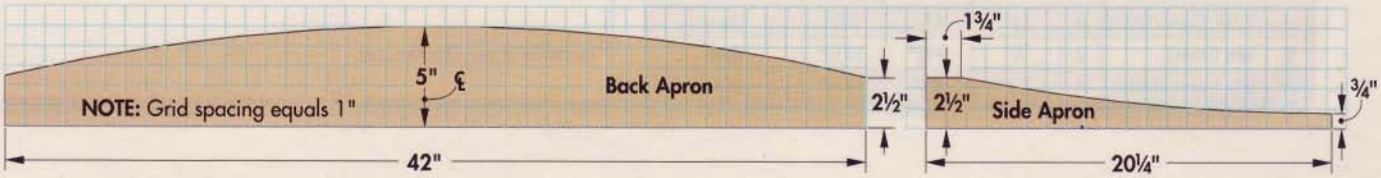
Apron Corner Detail

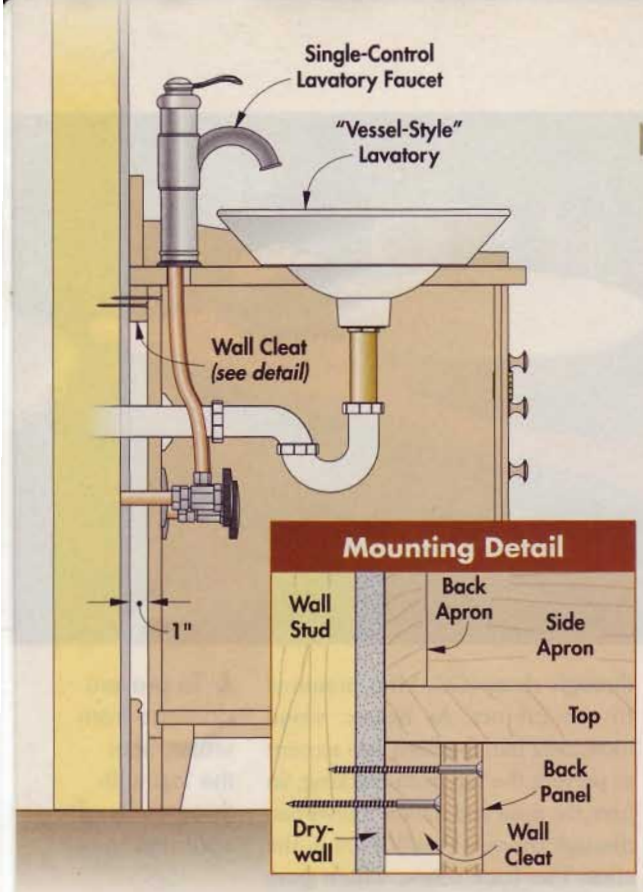


Mounting Detail



APRON PATTERNS





making connections

VANITY INSTALLATION

Typically, when a furniture project is completed, you just set it in a room and wait for the compliments. With this bathroom vanity, however, there's a bit more involved.

The biggest consideration is the plumbing for the sink. Depending on whether the pipes come from the wall or the floor, you'll need to cut an opening either in the back or bottom panel to accommodate them.

Also, if the vanity accidentally gets bumped, it could cause a pipe to get knocked loose. So you'll want to secure it to the wall to prevent that from happening.

Wall Cleat — An easy way to do that is to attach it to a wall cleat (II) that is, in turn, fastened to the wall *(see Illustrations at left and on page 57)*. The wall cleat is just a scrap piece of wood that's thicknessed to fill the void between the back panel and the wall (1", in my case). Screw this cleat to the wall studs, and then set the vanity in place and fasten it to the cleat with screws from inside the cabinet.

Just a note here. The screws only need to be "snugged" enough to keep the vanity from shifting. In fact, if you over-tighten them — and the wall isn't plumb — it could raise the feet of the vanity off the floor.

Now all that's left is to install the sink and faucet and make the final plumbing connections.

MATERIALS & HARDWARE

	Part	Qty	T	W	L	Material
	Face Frame					
A	Top/Bottom Rails	2	¾"	1¾"	38½"	Cherry
B	End Stiles	2	¾"	2¾"	29"	Cherry
C	Middle Stile	1	¾"	1¼"	23½"	Cherry
D	Drawer Rails	2	¾"	1"	11"	Cherry
	Side Assemblies					
E	Front Side Stiles	2	¾"	2⅛"	29"	Cherry
F	Rear Side Stiles	2	¾"	2½"	29"	Cherry
G	Upper Side Rails	2	¾"	3"	16"	Cherry
H	Lower Side Rails	2	¾"	3½"	16"	Cherry
I	Center Stiles	2	¾"	3"	19½"	Cherry
J	Side Panels	4	½"	6⅞"	19½"	Cherry
K	Filler Strips	4	¼"	½"	2¾"	Cherry
	Ply. Case Parts					
L	Back Panel	1	¾"	25"	41"	Cherry Plywood
M	Bottom Panel	1	¾"	19"	41"	Cherry Plywood
N	Divider	1	¾"	18¾"	23¾"	Cherry Plywood
	Drawer Guides					
O	Drawer Guide Mounts	3	¾"	2½"	18½"	Cherry
P	Middle/Upper Guides	4	¾"	1½"	18½"	Cherry
Q	Lower Guides	2	¼"	1½"	18½"	Cherry
R	Spacers	2	¾"	1¼"	23½"	Cherry
S	Kicker	1	¾"	1¾"	18½"	Cherry
	Drawers					
T	Front/Back (Lower)	2	¾"	9⅜"	8⅞"	Cherry
U	Fr./Bk. (Upper/Middle)	4	¾"	4⅞"	8⅞"	Cherry
V	Sides (Lower)	2	½"	9⅜"	17½"	Maple
W	Sides (Upper/Middle)	4	½"	4⅞"	17½"	Maple

	Part	Qty	T	W	L	Material
X	Bottoms	3	¼"	17"	8⅜"	Maple Plywood
Y	Drawer Stops	6	¾"	1¼"	1½"	Cherry
	Doors					
Z	Door Rails	4	¾"	3"	9 1/16"	Cherry
AA	Door Stiles	4	¾"	2½"	21⅜"	Cherry
BB	Door Panels	2	½"	8⅞"	16⅜"	Cherry
CC	Pegs	16	¼"	n/a	7/16"	Cherry Dowel
	Top					
DD	Top Panel	1	1"	22"	44"	Cherry
EE	Back Apron	1	¾"	5"	43"	Cherry
FF	Side Aprons	2	¾"	2½"	20¼"	Cherry
GG	Mounting Cleats	2	¾"	1¼"	18½"	Cherry
HH	Mounting Cleat	1	¾"	1¼"	17½"	Cherry
II	Wall Cleat	1	1"	2"	35"	Scrap Stock

- (15) #8 x 1½" Rh Sheet Metal Screws
- (5) Screw-On Shaker Knobs (Cherry)*
- (5) #8 x 1¼" Fh Woodscrews (for knobs)
- (22) #8 x 2" Fh Woodscrews
- (6) #8 x 1½" Fh Woodscrews
- (18) Nylon Stem Bumper Glides*
- 1½" Wrap-Around Hinges (2 pairs)*
- (2) Magnetic Catches for Inset Doors*
- (6) 3/16" I.D. x ¾" O.D. Fender Washers
- (1) Lavatory Faucet (Kohler K-12183)
- (1) "Vessel-Style" Lavatory (Kohler K-2200)

*Available at www.Rockler.com

ONLINE Extras
Vanity Cutting Diagram
WorkbenchMagazine.com

WORKBENCH®

Shaker-Style Vanity

Issue 285 Volume 60 Number 5 September/October 2004

MATERIALS LIST

MATERIALS & HARDWARE

	Part	Qty	T	W	L	Material
	Face Frame					
A	Top/Bottom Rails	2	¾"	1¾"	38½"	Cherry
B	End Stiles	2	¾"	2¾"	29"	Cherry
C	Middle Stile	1	¾"	1¼"	23½"	Cherry
D	Drawer Rails	2	¾"	1"	11"	Cherry
	Side Assemblies					
E	Front Side Stiles	2	¾"	2⅛"	29"	Cherry
F	Rear Side Stiles	2	¾"	2½"	29"	Cherry
G	Upper Side Rails	2	¾"	3"	16"	Cherry
H	Lower Side Rails	2	¾"	3½"	16"	Cherry
I	Center Stiles	2	¾"	3"	19½"	Cherry
J	Side Panels	4	½"	6⅞"	19½"	Cherry
K	Filler Strips	4	¼"	½"	2¾"	Cherry
	Ply. Case Parts					
L	Back Panel	1	¾"	25"	41"	Cherry Plywood
M	Bottom Panel	1	¾"	19"	41"	Cherry Plywood
N	Divider	1	¾"	18¾"	23¾"	Cherry Plywood
	Drawer Guides					
O	Drawer Guide Mounts	3	¾"	2½"	18½"	Cherry
P	Middle/Upper Guides	4	¾"	1½"	18½"	Cherry
Q	Lower Guides	2	¼"	1½"	18½"	Cherry
R	Spacers	2	¾"	1¼"	23½"	Cherry
S	Kicker	1	¾"	1¾"	18½"	Cherry
	Drawers					
T	Front/Back (Lower)	2	¾"	9⅜"	8⅞"	Cherry
U	Fr./Bk. (Upper/Middle)	4	¾"	4⅞"	8⅞"	Cherry
V	Sides (Lower)	2	½"	9⅜"	17½"	Maple
W	Sides (Upper/Middle)	4	½"	4⅞"	17½"	Maple

	Part	Qty	T	W	L	Material
X	Bottoms	3	¼"	17"	8⅜"	Maple Plywood
Y	Drawer Stops	6	¾"	1¼"	1½"	Cherry
	Doors					
Z	Door Rails	4	¾"	3"	9 1/16"	Cherry
AA	Door Stiles	4	¾"	2½"	21⅜"	Cherry
BB	Door Panels	2	½"	8⅞"	16⅜"	Cherry
CC	Pegs	16	¼"	n/a	7/16"	Cherry Dowel
	Top					
DD	Top Panel	1	1"	22"	44"	Cherry
EE	Back Apron	1	¾"	5"	43"	Cherry
FF	Side Aprons	2	¾"	2½"	20¼"	Cherry
GG	Mounting Cleats	2	¾"	1¼"	18½"	Cherry
HH	Mounting Cleat	1	¾"	1¼"	17½"	Cherry
II	Wall Cleat	1	1"	2"	35"	Scrap Stock

(15) #8 x 1½" Rh Sheet Metal Screws
(5) Screw-On Shaker Knobs (Cherry)*
(5) #8 x 1¼" Fh Woodscrews (for knobs)
(22) #8 x 2" Fh Woodscrews
(6) #8 x 1½" Fh Woodscrews
(18) Nylon Stem Bumper Glides*
1½" Wrap-Around Hinges (2 pairs)*
(2) Magnetic Catches for Inset Doors*
(6) 3/16" I.D. x ¾" O.D. Fender Washers
(1) Lavatory Faucet (Kohler K-12183)
(1) "Vessel-Style" Lavatory (Kohler K-2200)

ONLINE Extras
Vanity Cutting Diagram
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*Available at www.Rockler.com

WORKBENCH®

Shaker-Style Vanity

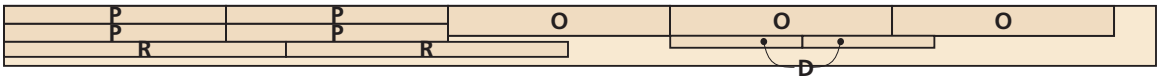
Issue 285 Volume 60 Number 5 September/October 2004

CUTTING DIAGRAM

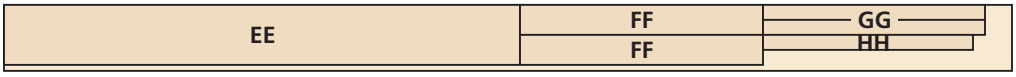
¾ x 5 - 96" CHERRY

¾ x 5 - 96" CHERRY

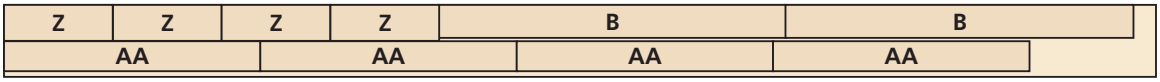
¾ x 5 - 96" CHERRY



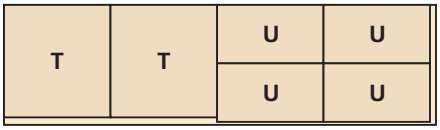
¾ x 5 ½ - 84" CHERRY



¾ x 6 - 96" CHERRY



¾ x 10 x 36" CHERRY



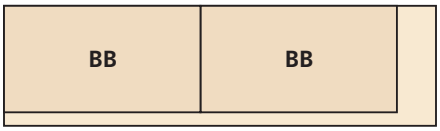
5/4 x 6 - 96" CHERRY (TWO BOARDS)

½ x 7¼ - 84" CHERRY

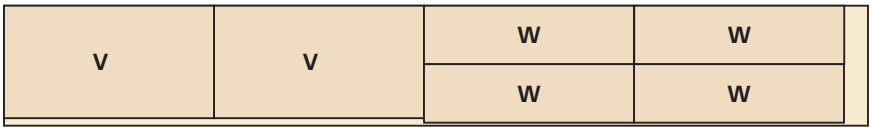
Issue 285 Volume 60 Number 5 September/October 2004

CUTTING DIAGRAM

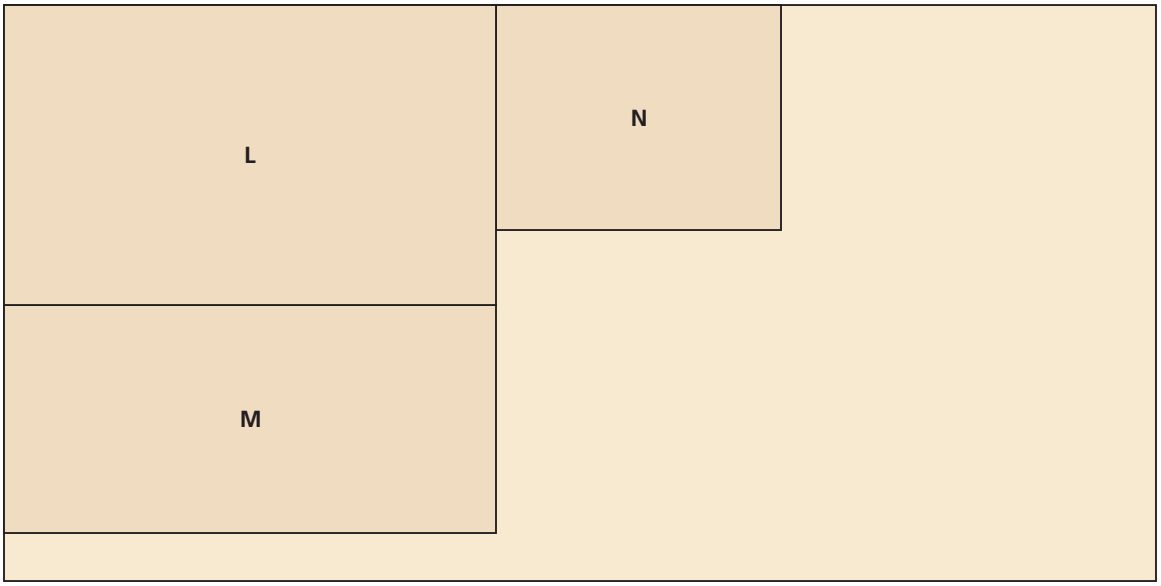
½ x 10 - 36" CHERRY



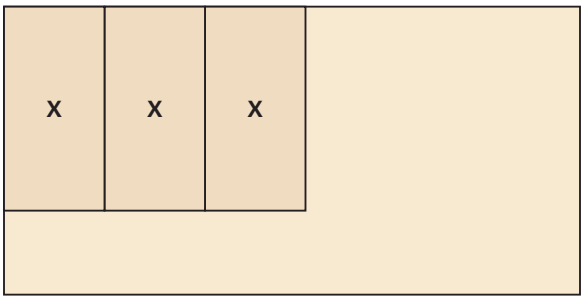
½ x 10 x 72" HARD MAPLE



¾ x 48 x 96" CHERRY PLYWOOD



¼ x 48 x 96" CHERRY PLYWOOD



arched-top Wall mirror

A simple wood frame — aside from the glass inside it, there isn't much more to this wall mirror. So just what makes this cherry wall mirror such a distinctive looking project? In a word, it's the arch.

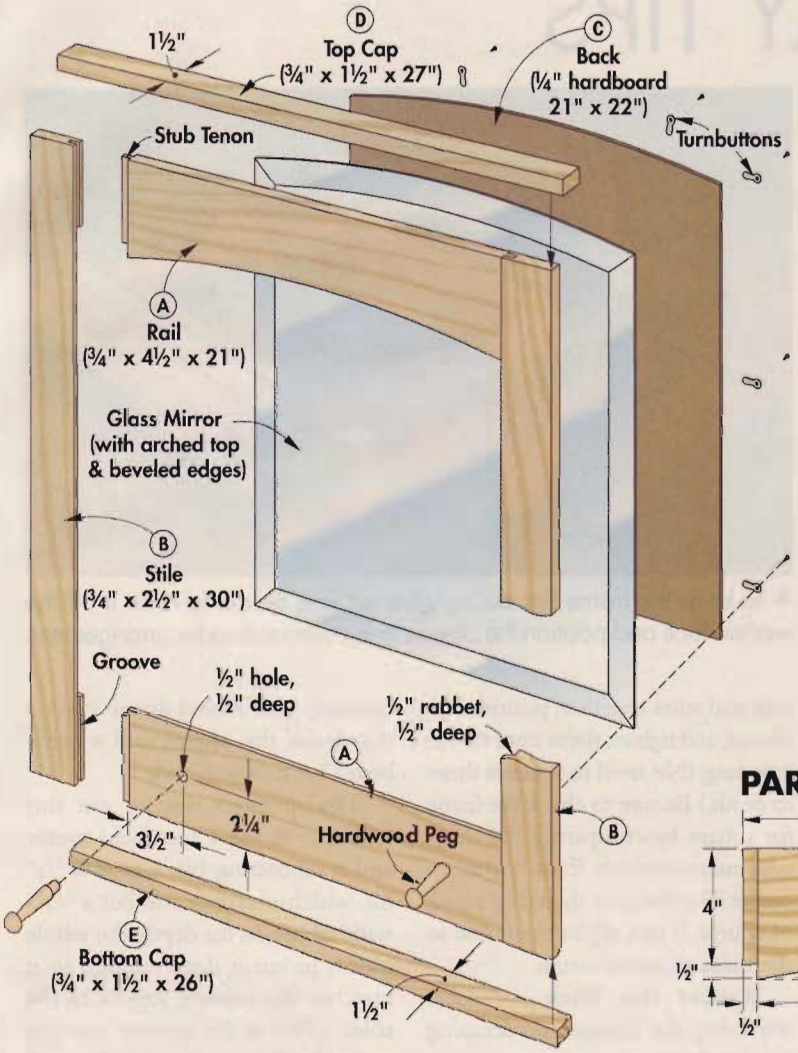
Granted, the arched top rail is a subtle detail. But this gently curved rail and the corresponding curve of the beveled glass mirror lend this project an elegance that belies its simple construction. These details also make the mirror an interesting woodworking project to build.

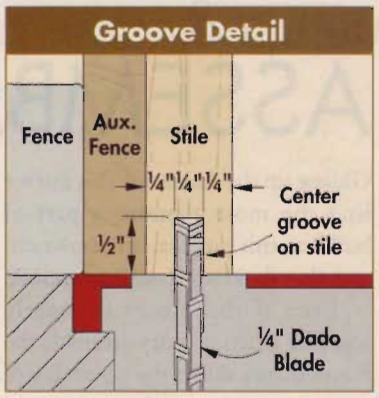
Take the frame, for instance. It has to be strong enough to support the weight of a heavy glass mirror. That doesn't mean it requires a lot of complicated joinery, though. As you can see in the *Construction View* on page 61, the frame is assembled with stub tenon and groove joints, which can be made quickly and easily. Then, to further tie the frame together, decorative cap pieces are attached to the top and bottom of the mirror.

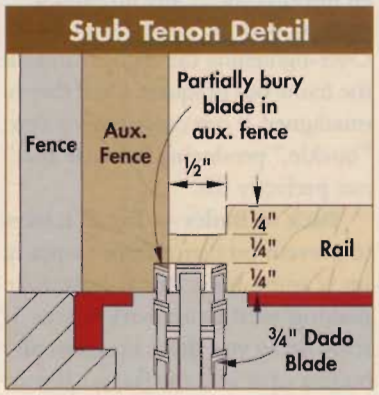
Build the Frame — For a quick overview of the frame construction, look at the *Illustration* on page 61. The frame — two

Construction View

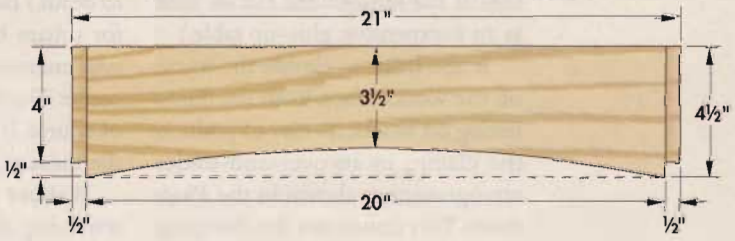
Overall Dimensions: 27" W x 1½" D x 31½" H







PARTS VIEW: ARCHED TOP RAIL



horizontal rails (A) and a pair of vertical stiles (B) — is made from ¾"-thick hardwood. (I used cherry, but walnut or maple would also make an attractive mirror.)

After planing enough stock to thickness to make the frame, rip the pieces to width and then crosscut them to length on the table saw.

Stub Tenons & Grooves — Now it's time to focus on the stub tenon and groove joints used to assemble the frame. As a rule, I cut the grooves first. It's easier to get the tenons to fit the grooves than vice versa.

Centered Grooves — Typically, the grooves are centered on the thickness of the frame piece, and this mirror is no exception. A ¼"-wide groove runs the length of the stiles. Of course, only a short part of the groove near the top and bottom of each stile actually houses the tenons. The mirror will sit in between — after the back of the groove is removed. That all happens later, though. Right now, go ahead and set up a ¼" dado blade in the table saw to make a ½"-deep cut *(Groove Detail)*. Then adjust the rip fence, and run each stile all the way through on its edge to cut the groove.

Cut Tenons to Fit — At this point, the joint is halfway done. Now it's time to cut the tenons on the ends of the rails to fit. The *Stub Tenon Detail* shows the table-saw setup for this operation. Here, a wide (¾") dado blade is partially "buried" in an auxiliary fence, exposing ½" of the blade. This way, by butting the rail against the fence, it cuts a ½"-long tenon (to match the depth of the groove).

As for depth of cut, raise the blade ¼" high. Then, using the miter gauge to guide the rail past the blade, make two passes, one on each side, to create a tenon of the right thickness.

Lay Out & Cut Arch — The only remaining work on the frame pieces is to cut the arch on the top rail. A flexible strip of wood makes it easy to draw the arch. First though, you'll need to lay out the end and center points of the arch *(Parts View)*. Then bend the strip to align with the layout marks, trace the curve, and cut the rail to shape on a band saw.

glue-up & ASSEMBLY TIPS

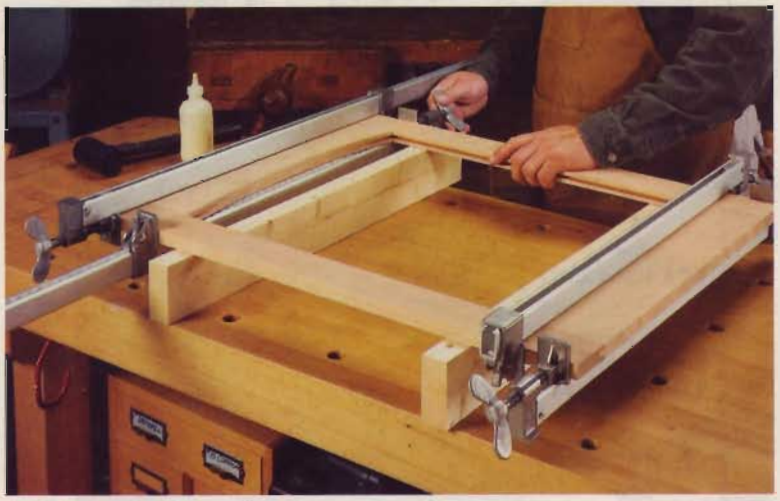
Gluing up the frame for this mirror isn't the most glamorous part of building this project. It is, however, one that deserves special attention.

Even if the pieces fit tightly together when you dry-assemble the frame, there's always the possibility of an unexpected — and unwanted — surprise after the project is glued up. Over-tightening the clamps can rack the frame out of square. Or, if they're misaligned, it can cause the joints to "buckle," producing a frame that's not perfectly flat.

Back to Basics — But all it takes to prevent problems from cropping up is some basic know-how. Like making sure your worksurface is truly *flat* so you don't inadvertently build a twist into the frame. (If your bench isn't flat, a solid-core door salvaged from the "scratch and dent" area of the lumberyard can be used as an inexpensive, glue-up table.)

It also helps to elevate the frame off the worksurface. With the frame resting on blocks, it's easy to position the clamps in an over-and-under arrangement, as shown in the *Photo* above. This distributes the clamping pressure evenly across the joint line, so you end up with a flat assembly.

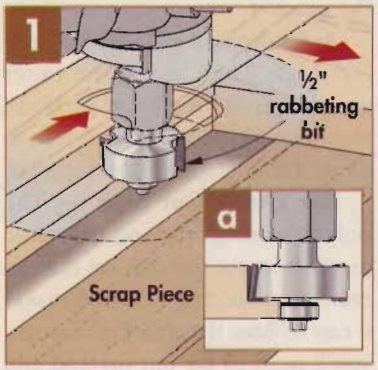
To assemble the frame, brush a thin coat of glue on the tenons and also into the grooves. Then fit the rails and stiles together, position the clamps, and tighten them until they're just snug. (No need to squeeze them to death.) Be sure to check the frame for square by comparing the diagonal measurements from corner to corner. The distances should be equal, of course. If not, adjust the frame so the measurements match.



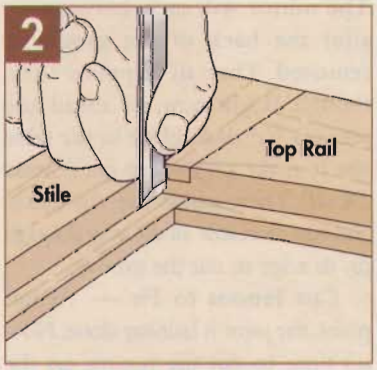
▲ To keep the frame flat during glue up, use blocks to raise it off the worksurface and position the clamps in an over-and-under arrangement.

Rabbet the Back — After removing the clamps and scraping the dried glue, turn your attention to the back of the frame. As you can see in the main *Illustration* on page 63, the back of the frame is rabbeted all the way around the edge of the opening. This rabbet forms a recess that holds the mirror and a hardboard back *(Side Detail)*.

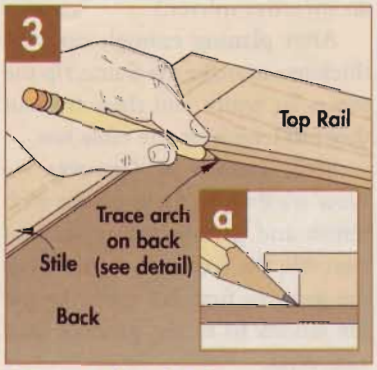
The quickest way to cut this rabbet is to use a handheld router and a rabbetting bit. I used a $^1/_2$" bit, which means it will cut a $^1/_2$"-wide rabbet. As for depth, the whole idea is to cut it deep enough so it matches the existing groove in the stiles. (This is the groove you cut earlier for the stub tenon and groove joints.) As you rout the rabbet in the stiles, you'll actually be removing the back side of the groove. Of course, there's no previous cut made



▲ Rout the Rabbet
To prevent chipout when routing the rabbet in the frame, make two successively deeper passes, routing from left to right.



▲ Clean Up Corners
Some handwork with a chisel is all it takes to clean up the rounded corners that remain after routing the back of the frame.



▲ Trace the Arch
With the hardboard back set into the rabbets in the stiles and bottom rail, trace the shape of the arched top rail on the back.

in the rails, so here, you'll be working with a "fresh" edge. In either case, don't try to "hog" out too much material in one pass. To avoid splintering the wood, it's best to make two successively deeper passes, routing from left to right *(Fig. 1, page 62)*. Then square up the corners with a chisel *(Fig. 2)*.

Add the Back — The next step is to add a hardboard back (C). It's cut to fit into the rabbeted opening in the back of the frame. This means transferring the shape of the arched top rail to the back. The best way I found to do that is to first rip the back to width to fit between the stiles (leave it extra-long for now). Then set the back into the bottom rabbet and trace the shape of the arch *(Figs. 3 and 3a)*. Once that's done, carefully cut the back to shape with a jig saw and sand the curved edge smooth.

Add Caps — Now it's time to add the top (D) and bottom caps (E) *(see Construction View on page 61)*. Made from $^3/_4$"-thick hardwood, the caps are identical in width, but making the top cap 1" longer resulted in more pleasing proportions. To ease the sharp edges of the caps, rout a small roundover on the front edges, and the top edge of the ends. Then just glue the caps in place.

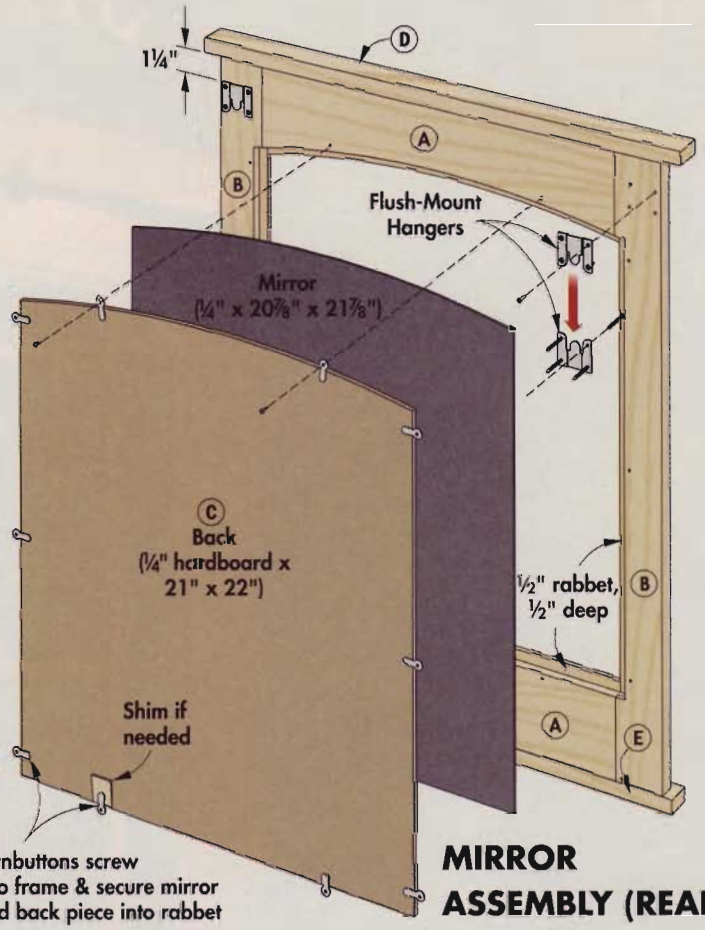
Shaker Pegs — Next, in a nod to the Shaker tradition, I added a couple of wood pegs. The pegs are simply glued into holes drilled in the bottom rail of the mirror.

Beveled Mirror — At this point, the woodworking part of this project is done. Now it's time to make a trip to the glass store to see about the mirror. A curved mirror like this is a more specialized item than a rectangular mirror. Not only that, I wanted a beveled-glass mirror, which is quite a bit more expensive than a flat piece of glass. (Mine cost $149.) The beveled glass looks great though, so I felt it was worth the money.

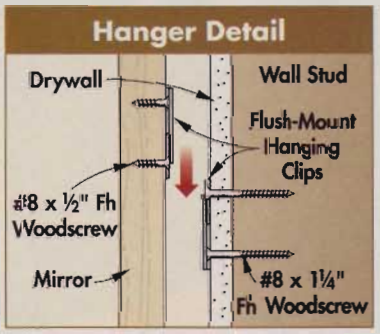
Of course, you'll want to make sure the glass fits the opening the first time. (There won't be a second chance at getting it to fit). Because of that, I'd suggest taking the mirror to the glass store and letting the pros measure the opening. That way, you're assured of a perfect fit.

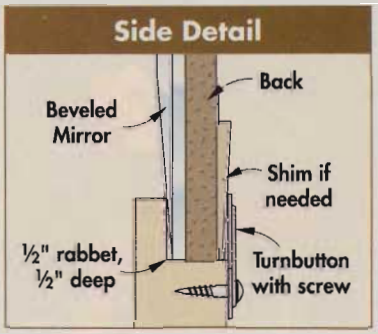
Final Details — With glass in hand, it's just a matter of inserting it into the framed opening. Then fit the back into place and secure it with turnbuttons installed in the back of the frame. To hang the mirror so it "hugs" the wall, I used the flush-mount clips shown below.

Flush-mount hanging clips from Rockler (item #29975) offer easy installation and keep the mirror flat against the wall.



MIRROR ASSEMBLY (REAR)





MATERIALS & HARDWARE

	Part	Qty	T	W	L	Material
A	Rails	2	¾"	4½"	21"	Cherry Hardwood
B	Stiles	2	¾"	2½"	30"	Cherry Hardwood
C	Back	1	¼"	21"	22"	Hardboard
D	Top Cap	1	¾"	1½"	27"	Cherry Hardwood
E	Bottom Cap	1	¾"	1½"	26"	Cherry Hardwood

- (10) Turnbuttons (Rockler #27912)*
- Flush-Mount Hangers (Rockler #29975)*
- (2) Shaker Pegs (Rockler #23382)*
- Beveled-Edge Mirror (20⅞" x 21⅞")

*Available at www.Rockler.com

ONLINE Extras — WorkbenchMagazine.com — Mirror Cutting Diagram

WORKBENCH®

Arched-Top Wall Mirror

Issue 285 Volume 60 Number 5 September/October 2004

MATERIALS LIST

MATERIALS & HARDWARE

	Part	Qty	T	W	L	Material
A	Rails	2	¾"	4½"	21"	Cherry Hardwood
B	Stiles	2	¾"	2½"	30"	Cherry Hardwood
C	Back	1	¼"	21"	22"	Hardboard
D	Top Cap	1	¾"	1½"	27"	Cherry Hardwood
E	Bottom Cap	1	¾"	1½"	26"	Cherry Hardwood

(10) Turnbuttons (Rockler #27912)*
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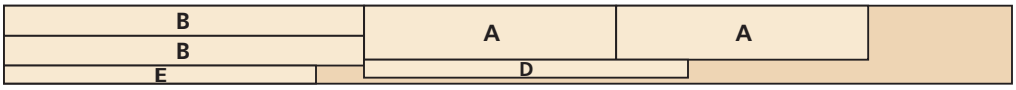
Beveled-Edge Mirror (20⅞" x 21⅞")

*Available at www.Rockler.com

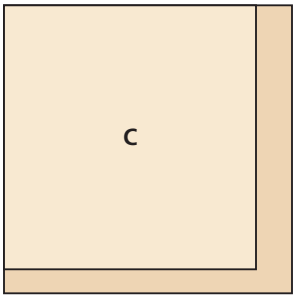
ONLINE Extras
WorkbenchMagazine.com
Mirror Cutting Diagram

CUTTING DIAGRAM

¾ x 6½ - 84" CHERRY



¼ x 24 - 24" HARDBOARD




5117

all-season STORM DOOR
with screen- and glass-panel inserts

With its thick, beefy frame, mortise and loose tenon joints, and a durable spar varnish finish, this all-season storm door is definitely built to last.

Buying a storm door at a home center is like going to an ice cream shop that sells only vanilla or chocolate. You can select any door you want, as long as it has a metal frame or vinyl cladding.

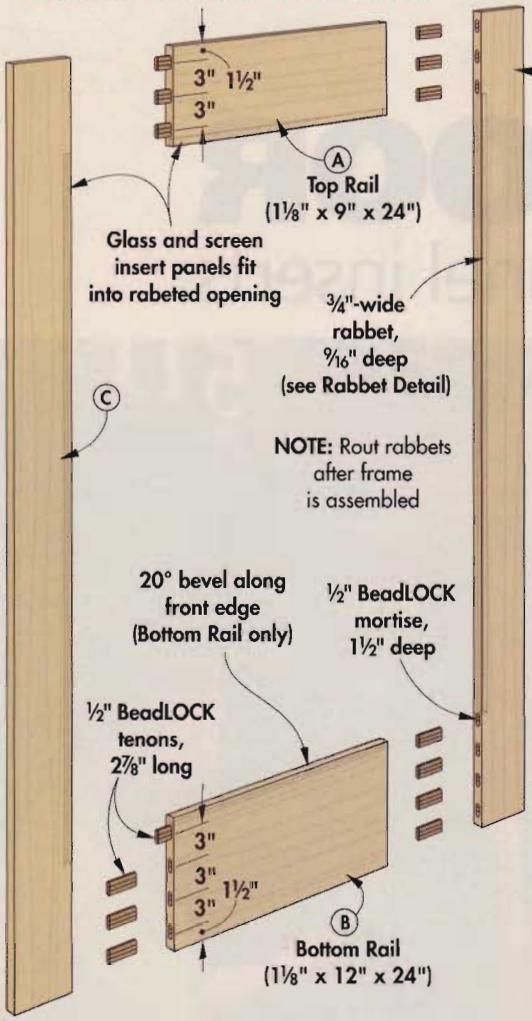
Well there's nothing wrong with those types of doors. It's just that I wanted one with a wood frame. So, rather than buy an expensive, custom-built unit, I decided to build my own storm door. As you can see in the *Photo* at left, it adds a warm, elegant look to the front of the house.

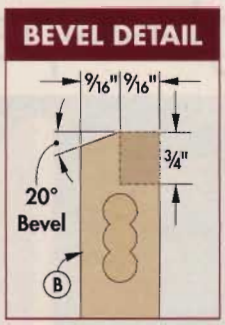
Two Inserts — To accommodate changes in weather, this door is designed with two separate inserts, one with tempered glass panels and another with a metal screen *(Photo, right)*. The inserts are interchangeable, and they're easily swapped with the flip of a turnbutton *(below)*.

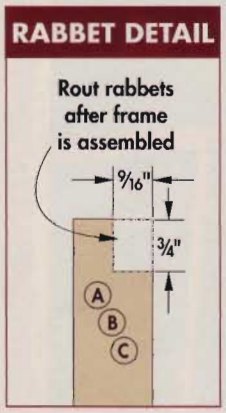
As versatile and attractive as it is, though, this is, after all, a *storm* door. So above all, it has to stand up to extremes of weather.

Built to Last — With that in mind, the door is built entirely from white oak, a strong, dense wood with moisture-resistant properties that make it ideal for outdoor projects. Of course, the door still needs a durable finish. For maximum protection, brush on a minimum of four coats of spar urethane.

a sturdy outer frame







It's the outer frame of a door that provides most of its strength. To that end, the outer frame of this door is designed with extra-wide rails that are connected to the stiles with sturdy mortise and "loose" tenon joints.

Sizing the Frame — Like any inset door, the outer door frame starts out a little oversized. To determine its length, add $\frac{1}{2}$" to the height of the door opening. As for width, it's built to match the opening (36", in my case). Finally, the thickness matches that of the door you're replacing ($1\frac{1}{8}$" is standard for most storm doors).

Rails & Stiles — Once you've figured out the size of the outer door frame, you can turn your attention to the rails (A, B) and stiles (C). The first step is to edge-glue boards together to make the wide rails. (A glued-up rail won't be as apt to twist as a single wide board.) Then rip the frame pieces to width and crosscut them to length.

Bevel Bottom Rail — The next step is to cut a bevel on the top outside edge of the bottom rail *(Bevel Detail)*. The purpose of this bevel is to shed water. A single pass on the table saw with the blade tilted to 20° makes quick work of cutting the bevel.

Mortise & "Loose" Tenon Joints — Now it's time to cut the mortise and loose tenon joints. To do that, I used a joinery system called BeadLOCK. It employs pre-milled "beaded" tenons and a special jig for drilling the mortises. (For more on this, see page 40.)

Once the joinery is done, glue and clamp the outer frame. I used a polyurethane glue because it's waterproof.

Rabbet Frame — All that's left to complete the outer frame is to cut a rabbet in the back of the opening to hold the insert frames. I used a $\frac{3}{4}$" rabbeting bit to do this *(Photo, below)*. But you can accomplish the same thing with a straight bit and the jig featured on page 32.

▲ To form a recess that holds the insert frames, rout a large rabbet around the back inside edge of the frame opening. The large router plate makes for a stable cut.

MATERIALS & HARDWARE

	Part	Qty	T	W	L	Material
A	Top Rail (Outer Frame)	1	1⅛"	9"	24"	White Oak
B	Bottom Rail (Outer Frame)	1	1⅛"	12"	24"	White Oak
C	Stile (Outer Frame)	2	1⅛"	6"	81"	White Oak
D	Rail (Insert Frame)	4	¾"	1½"	25½"	White Oak
E	Stile (Insert Frame)	4	¾"	1½"	61½"	White Oak
F	Vertical Divider (Glass Insert)	2	¾"	¾"	60"	White Oak
G	Horizontal Divider (Glass Insert)	2	¾"	¾"	24"	White Oak
H	Glass Stop	1	¼"	¼"	42'	White Oak
I	Vertical Divider (Screen Insert)	2	¾"	¾"	60"	White Oak
J	Horizontal Divider (Screen Insert)	2	¾"	¾"	24"	White Oak
K	Trim Strip (Screen Insert)	1	¼"	1"	15'	White Oak

- (6) Half-turnbuttons
- (90) ½" Brass Brads
- (14) ½" BeadLOCK Tenons
- (24) #6 x ½" Brass Fh Woodscrews
- Pneumatic Door Closer
- (2) Black Iron Spear Strap Hinge*
- (1) Rough Iron Passage Door Rim Latch*

* Available at www.VanDykes.com

ONLINE Extras — WorkbenchMagazine.com — Storm Door Cutting Diagram

insert frames

With the outer frame complete, you can set it aside for awhile and focus on the two insert frames. Eventually, these frames will be modified to hold either the glass panels or a screen. But for now, just build two identical assemblies.

The insert frames are designed to fit snugly in the rabbeted opening in the back of the outer frame. Shoot for a 1/16" gap all the way around the frame. You may need to pare down the size of the insert frame slightly so it will still fit after it's varnished later.

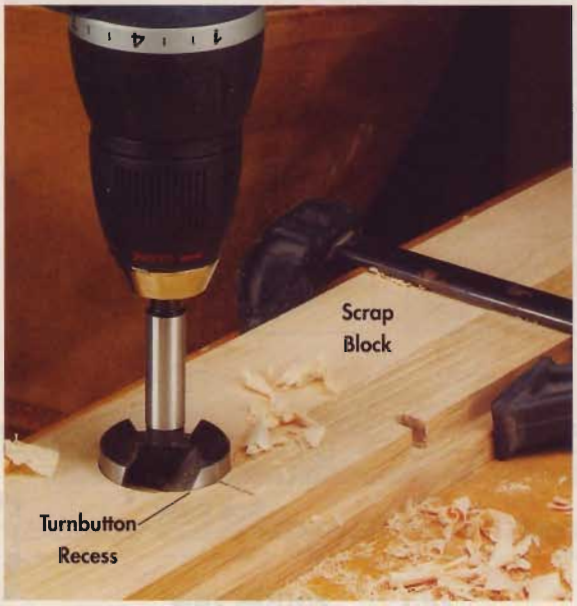
Each frame consists of two rails (D) and a pair of stiles (E) made of 3/4"-thick hardwood *(Illustration, right)*.

Half-Lap Joints — The frame pieces are assembled with half-lap joints. These joints are exceptionally strong because of their large face-to-face glue surface.

There are several ways to cut half-lap joints. I used a dado blade in the table saw (*Figures 1 and 2 below*). Make sure the blade is set to the proper height — exactly half the board's thickness.

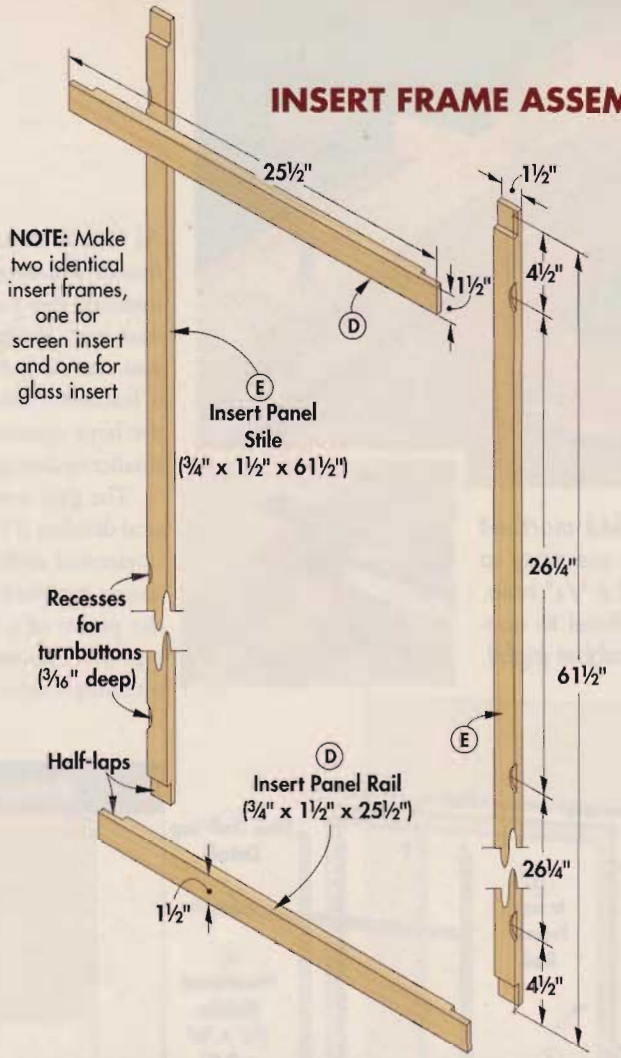
Recesses for Turnbuttons — The next step is to cut three shallow recesses in the outer edge of each stile. These recesses house the turnbuttons that secure the insert frames. Using a Forstner bit and a scrap piece of wood ensures a crisp, clean cut *(see Turnbutton Recess at right, and the Photo below)*.

Assemble Frames — Now it's just a matter of gluing and clamping the frame together. Clamp across both the width and length of the frame, as well as straight down on the corners to draw the joints together. And don't forget to check the frame for square.

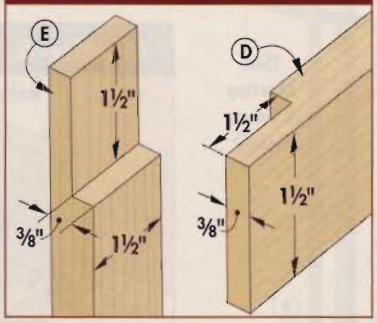


▲I used a 2" Forstner bit to drill the shallow recesses that hold the turnbuttons. To prevent tearout, clamp a scrap piece against the outer edge of the stiles.

INSERT FRAME ASSEMBLY

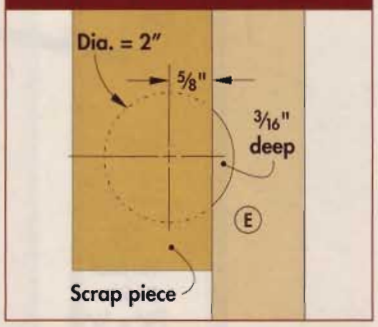


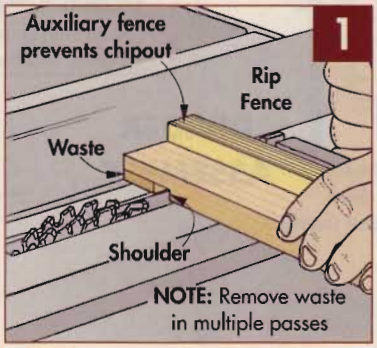
HALF-LAP DETAIL

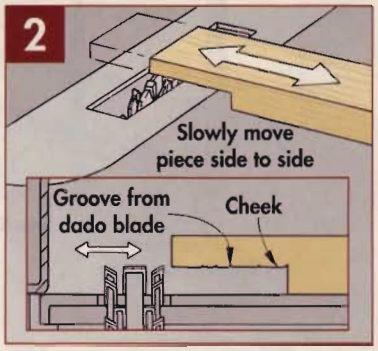


▲Start at the shoulder when cutting half laps on the table saw, and make multiple passes.

TURNBUTTON RECESS







▲To clean up the cheek, push the workpiece across the blade, slowly moving it side to side.

glass panel insert

► The rounded mortises in the frame are easy to make — drill a 1/4" hole, then use a chisel to connect it to the rabbet *(right)*.

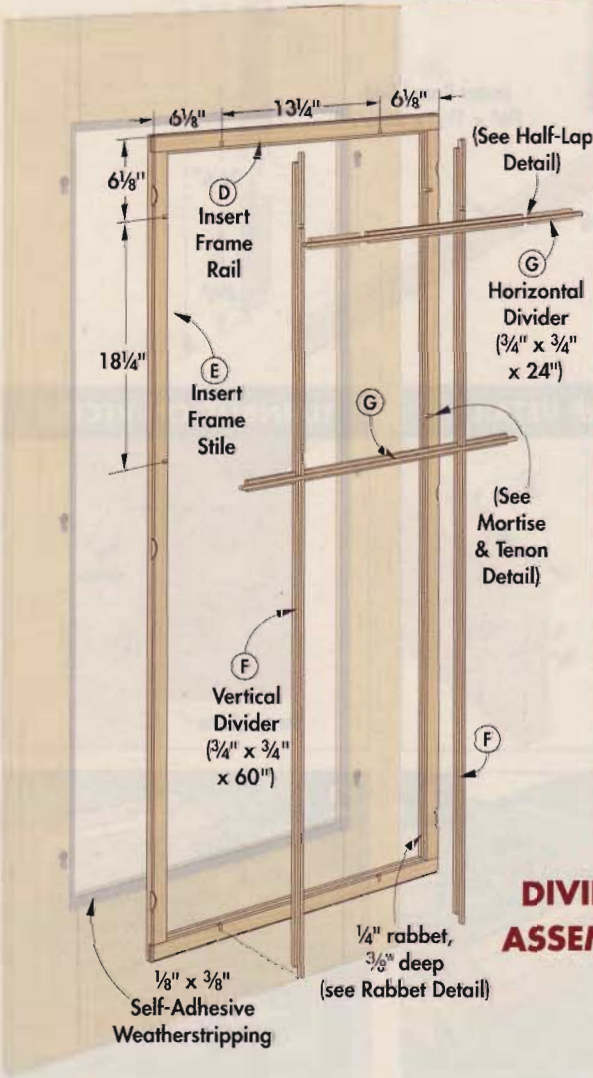
As I mentioned earlier, the insert frames will need some work before installing glass panels or a screen. Let's start with the glass panel insert. As you can see in the *Illustration* below, it features a wood grid that divides the large opening in the frame into smaller openings for the glass panels.

The grid consists of two long vertical dividers (F) and a pair of shorter horizontal dividers (G) that form a strong interlocking connection like the pieces of a puzzle *(see Photo on page 69)*. I know, the joinery looks a bit complicated, but it's actually very straightforward, as long as you take it a step at a time.

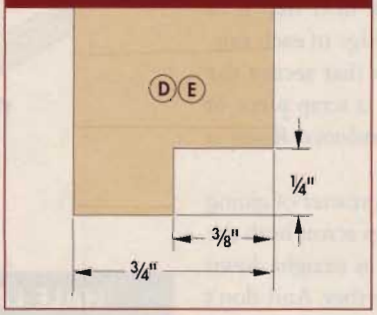
Rabbet Back of Frame — The first step is to flip the frame over so the back side faces up, and then cut a rabbet all the way around the edge of the opening *(Rabbet Detail)*. This rabbet forms a recess for the glass panels and the stops.

An easy way to cut this rabbet is to use a handheld router and a 1/4" rabbeting bit. To prevent splintering, it's best to make two successively deeper passes. Of course, the shape of the bit won't allow it to cut all the way into the corners, so you'll have to square the rounded corners with a chisel.

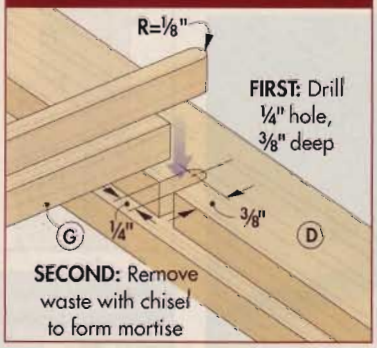
Make the Mortises — The next step is to cut shallow mortises in the frame to accept tenons on the dividers. There are eight mortises altogether (two in each rail and stile). As you can see in the *Mortise & Tenon Detail*, the mortises are rounded on one end and "open" on the other where they connect to the rabbets in the frame. A portable power drill, 1/4" Forstner bit, and a chisel are all



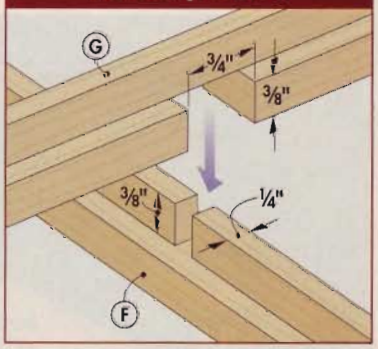
Rabbet Detail



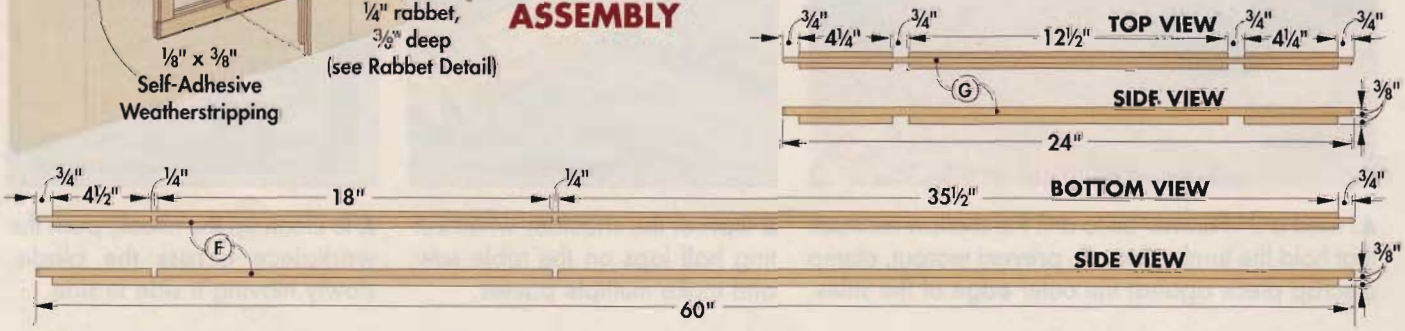
Mortise & Tenon Detail



Half-Lap Detail



DIVIDER ASSEMBLY



that's needed to make these mortises *(Photos, page 68)*.

Dividers — Once the mortises are completed, you can turn your attention to the vertical (F) and horizontal dividers (G). Each divider is a 3/4"-wide strip that's ripped from 3/4"-thick hardwood. **Note:** It's best to cut the strips extra long to start.

Like the insert frame, the dividers have to be rabbeted on each edge to hold the glass panels. A quick way to do that is with a 1/4" dado blade mounted in the table saw *(see Fig. 1 below)*. Using featherboards to apply both downward and sideways pressure helps ensure a controlled cut.

Time for Tenons — After trimming each divider to length, the next step is to cut a tenon on both ends to fit the mortises in the frame. Essentially, each tenon is a narrow "finger" with a rounded end to match the end of the mortise.

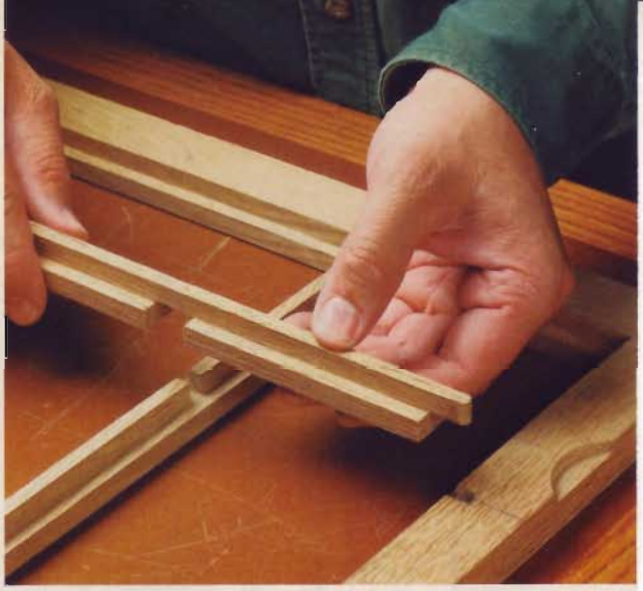
The finger is formed first by notching the ends of each divider *(Fig. 2)*. Then use a disk sander to shape the end to fit the mortise. Check the fit frequently to avoid removing too much material.

Half-Lap Joints — With the tenons complete, it's time to focus on the joinery used to assemble the dividers — half-lap joints. Like a typical half-lap, they're made by removing half the thickness (3/8") of the mating pieces. What's unusual is that, because of the T-shape of the dividers, you'll make two different-width cuts. Note the wide notch in the outer face of the horizontal divider *(Fig. 3)* and the narrow notch in the inside face of the vertical pieces *(Fig. 4)*.

Glue Up Grid — Now it's time for some assembly work. Dry-fit the grid together to make sure everything fits. Then glue in the dividers (vertical pieces first), applying clamping pressure directly over the joints.

Installing the Glass — As for the glass, the first order of business is to have the panels cut to fit the openings. For safety, it's important to get *tempered* glass. (It won't form jagged edges if it breaks.)

To seal out moisture, apply a bead of glazing compound around each rabbeted opening, then insert the glass. The panels are secured with hardwood stops (H), which are mitered to length and nailed in place.



▲ Tenons on the ends of the dividers are rounded to fit the mortises. Half-lap joints in the dividers form a strong interlocking grid that holds the glass panels.

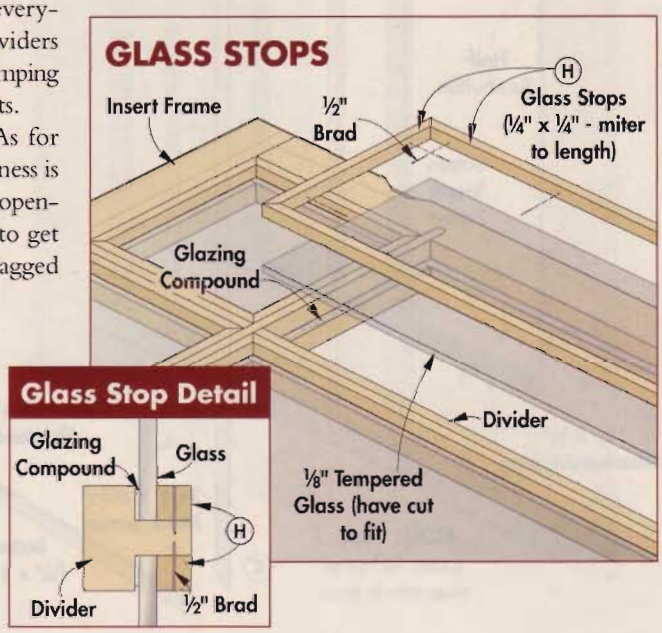
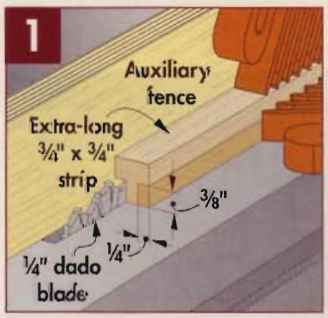
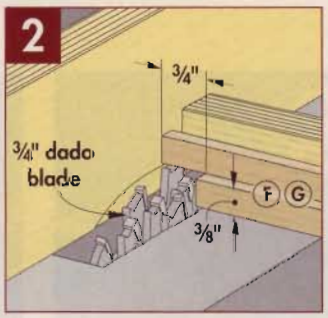


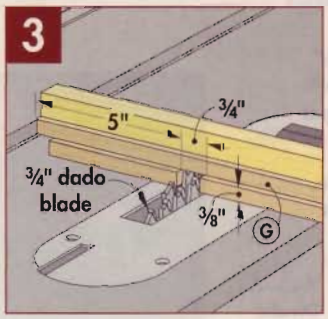
TABLE SAW HOW-TO: MAKING DIVIDERS



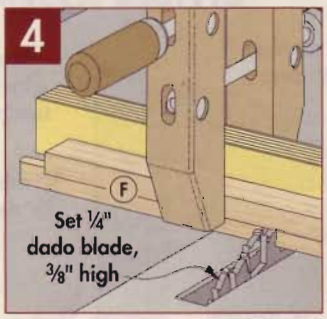
▲ To make each divider, mount a 1/4" dado blade in the table saw. Then cut a rabbet in both edges of an extra-long strip of wood to form a T-shaped piece. Now trim the divider to length.



▲ The next step is to form a tenon on both ends of each divider. To do that, cut a 3/4" notch in the wide face of each piece. Then sand the end of the tenon so it is rounded to fit the mortise.

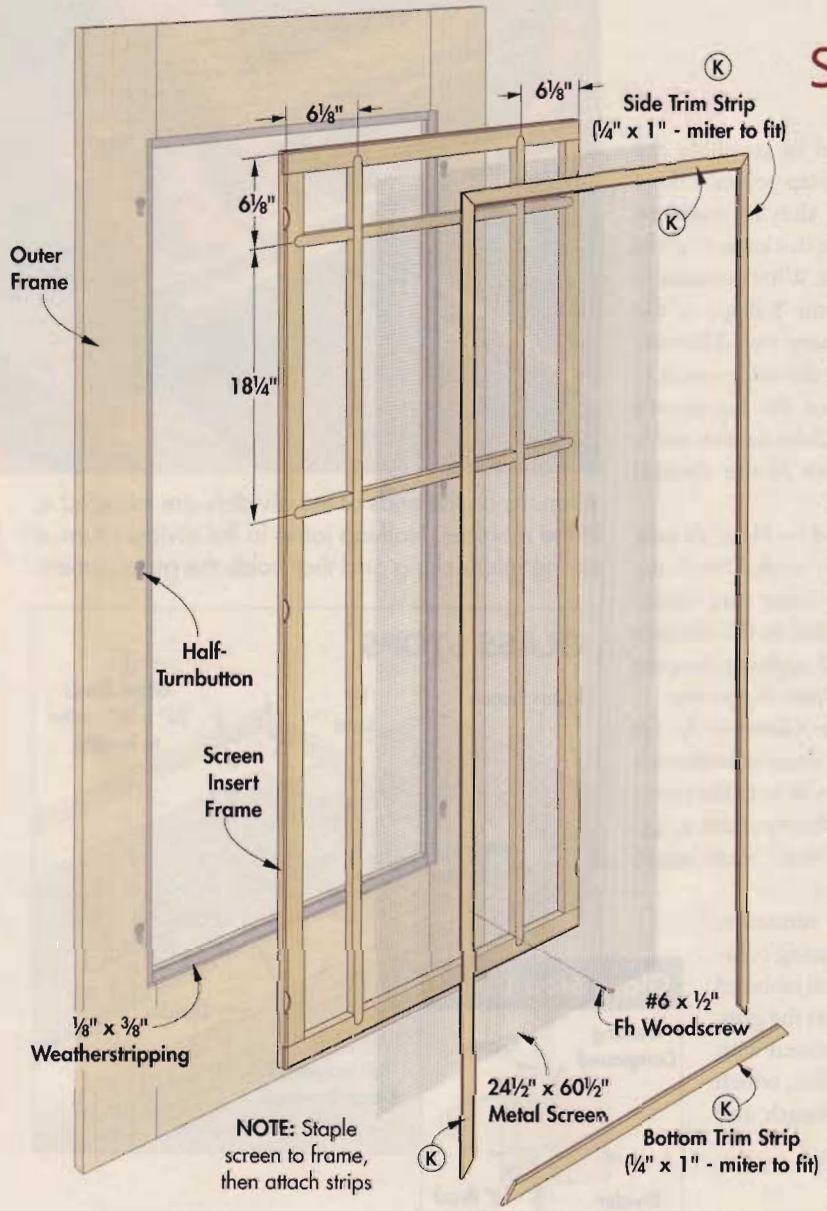


▲ Cutting the half-lap joints is the next order of business. With the fence removed, and using the same dado blade setup, lay out and cut two notches in the wide face of the horizontal dividers.



▲ Using a 1/4" dado blade, complete the half-lap joints by cutting two notches in the narrow "tongue" on the vertical dividers. To prevent the piece from rocking, clamp it to a miter gauge fence.

screen panel insert



The screen panel insert looks a lot like the glass insert. It begins with the basic insert frame, which is already built *(see page 67)*. Then a second wood grid is made and covered with a metal screen *(Illustration, left)*.

In spite of the similarities, though, there are several key differences. First, since there isn't any glass, there's no need to cut rabbets in either the insert frame or in the dividers that make up the grid. No rabbets also means the rounded mortise and tenon joints used for fitting the grid dividers into the frame will be larger.

Making the Mortises — Aside from the size difference, the process for cutting the mortises is the same. That is, drill a shallow counterbore in the frame with a ¾" Forstner bit, then remove the remaining waste with a chisel *(see Divider Assembly, below)*.

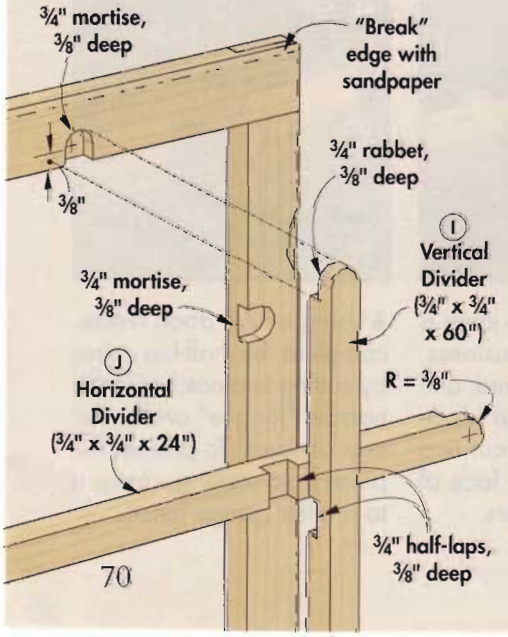
Add Dividers — The dividers (I, J) are added next. Again, they're ¾"-thick strips, ¾" wide. Notch the ends to form the tenons, and round the tenons on a disk sander until they fit snugly into the mortises.

As before, half-lap joints are used to assemble the pieces. After laying out the joints, use a dado blade mounted in the table saw to cut the half-laps. Just be sure to cut the laps in opposite faces of the dividers.

Assemble Insert — At this point, it's just a matter of assembling the grid. Glue in the horizontal dividers first, followed by the vertical dividers.

Screen Installation — The last step is to install the screen. I used metal screen because it won't stretch like nylon material. Trim the screen so it overlaps the edges of the frame opening by ½". Then, temporarily secure the screen with duct tape, and staple all around the perimeter *(Photo, below left)*. Finally, as shown in the *Photo*, below right, attach mitered trim strips (K) with countersunk screws to create a finished look.

DIVIDER ASSEMBLY



▲To install the screen, temporarily attach it to the insert frame with duct tape, then staple it about every inch around the perimeter *(Photo, left)*. A mitered trim strip covers the staples *(right)*.

door installation TIPS & TRICKS

When installing the storm door, the goal is simple — to end up with a consistent (1/8") gap between the door and the brickmold (the trim piece around the door). The trouble is the door opening is likely to be out of square.

The biggest challenge is to find out *where* the door needs to be trimmed so it fits properly. That involves a couple of things. First, measure the width and height of the opening at several locations. And check to see just how plumb and square the opening really is (or isn't).

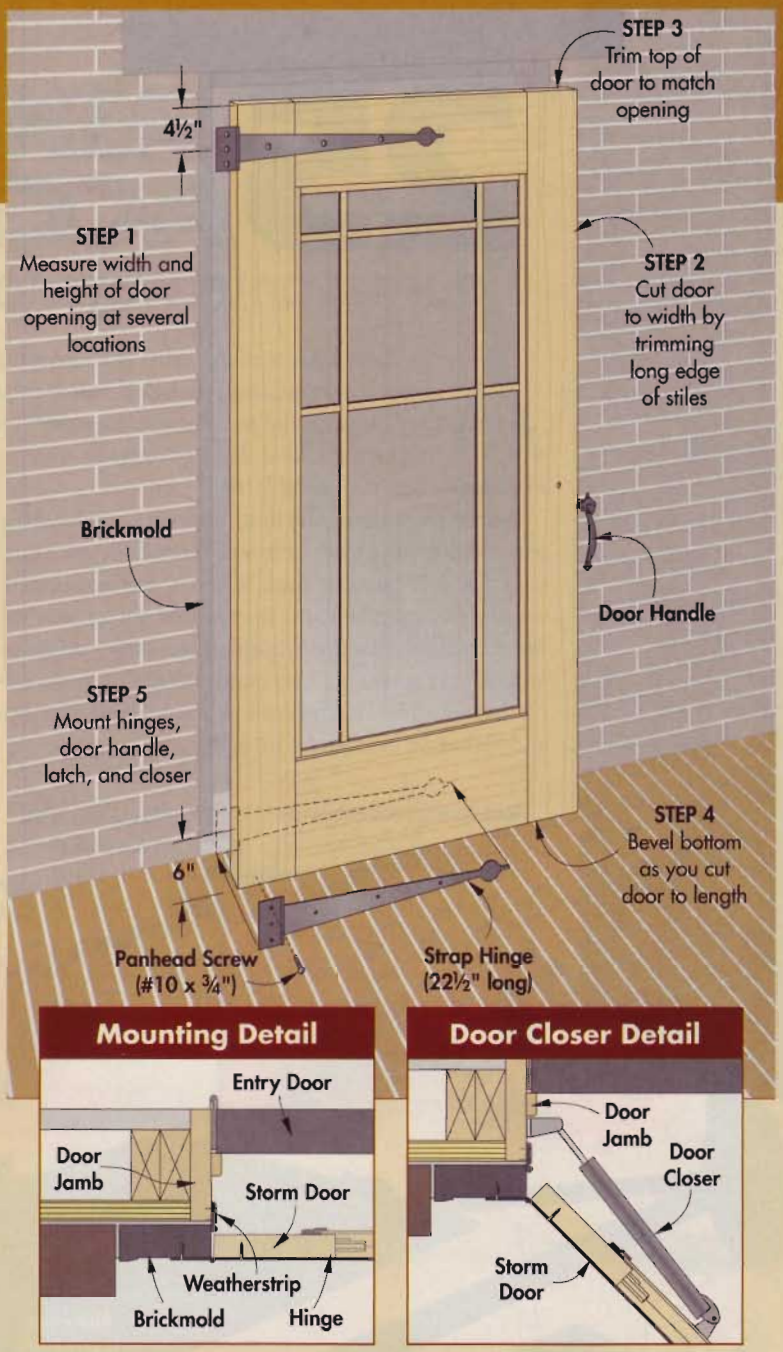
Cut Door to Width — With this information, the door can be cut to fit. I work on the width first. There shouldn't be much to trim off here. (Remember, the door is built to match the width of the opening). To determine the approximate amount, set the door in front of the opening and mark a line along each stile where it has to be trimmed. Then use a router to trim the door to width *(Fig. 1)*.

Trim the Top — Now that the width is established, check the top edge of the door. If the opening at the top isn't square, use the same router setup to trim the door just enough to match.

Cut to Length — Now that three of the sides fit the opening, the last step is to cut the door to length. To do that, the bottom edge of the door is beveled to match the threshold, which slopes down at an angle *(Fig. 2)*.

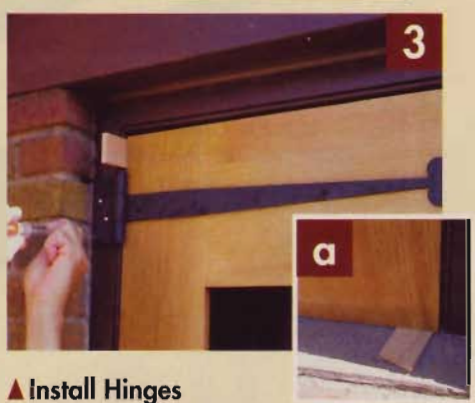
Mount Hinges — Once the door fits the opening, it's time to add the hinges. To match the hinges on the entry door, I used reproductions of vintage, forged-iron strap hinges. But the basic installation shown here applies to any strap hinge. Attach the hinge to the door first. Then shim the door to ensure a consistent gap *(Fig. 3)*, and fasten the hinge to the brickmold *(Mounting Detail)*.

Door Hardware — Finally, add a handle, latch, and and closer of your choosing *(Door Closer Detail)*.



▲ Trim Door to Width
After clamping a straightedge along the layout line, use a router and flush-trim bit to trim the door to width.

▲ Bevel Bottom Edge
Using a circular saw guided by a straightedge, bevel the bottom of the door. A strip of tape minimizes chipout.



▲ Install Hinges
Before mounting the hinge to the brickmold, shim the door to ensure that there's a consistent gap all around.

25 ADD-ON ACCESSORIES

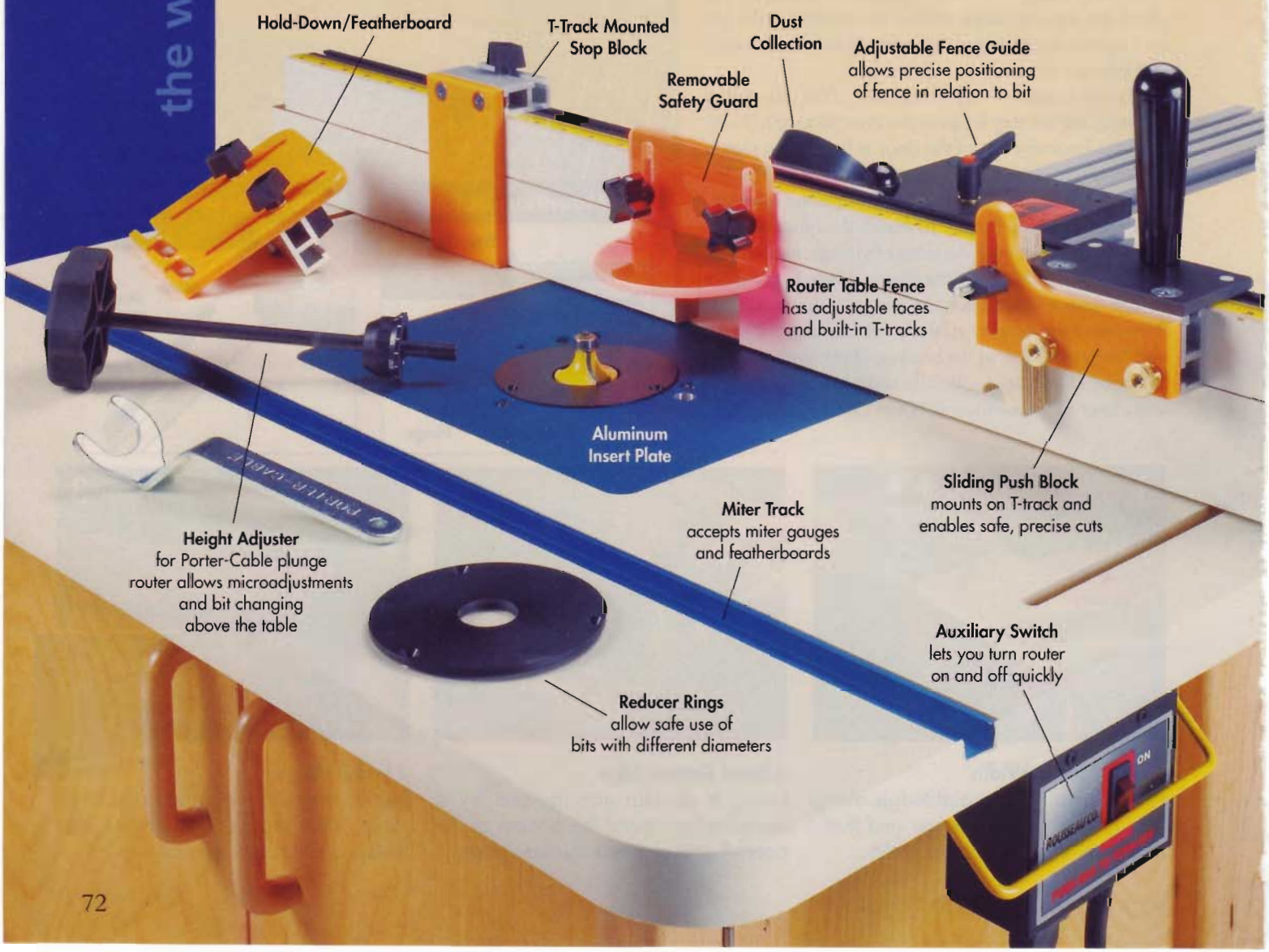
our favorite ways to rev up a router table

At its most basic, a router table is just a panel with a router attached to the underside of it. Cut a hole in the panel to let the router bit fit through, and the workpiece can be machined right on the tabletop.

Somewhere along the line, however, woodworkers realized that the router table was more than just a nifty trick for this essential tool. It was a concept revolutionary enough to change the way we use our routers. Router tables turn the average router into a precision woodworking machine, accurate enough to rout dead-on dadoes, and powerful enough to make raised panels and elaborate profiles on molding.

The result was the creation of a new tool for our shops — the manufactured router table. And to get an idea of how much the design has evolved from that panel with a router under it, just take a look at the *Photo* below. Aluminum insert plates, microadjustable fences, router lifts, auxiliary power switches, and T-track-mounted stops, hold-downs, and push blocks are just a few of the numerous enhancements you can add to a router table.

The next seven pages present some of our favorite accessories to maximize your router table for both basic and advanced routing techniques. And be sure to see the *Buyer's Guide* on page 78 for a rundown of router table add-ons and where to get them.



INSERT PLATES

One of the simplest, yet most important, router table accessories is the insert plate. The idea behind an insert plate is easy to grasp. It lets you pull the router out and change bits above the table. This way, you don't have to reach under the table every time you have to change a router bit.

Plate Extras — Today, insert plates come pre-drilled for your specific router. Some come equipped with other bells and whistles such as "corner snuggers" that lock the plate tightly in place and concentric rings for centering your router in the plate opening (like the Rousseau, *right*).

Reducer Rings — Another nice feature of insert plates is reducer rings, which lock or screw into a rabbeted opening in the plate. Reducer rings do just what their name suggests — they reduce the size of the plate opening to create the right amount of clearance around bits of different diameters. Most plates come with a blank ring that you can customize to create the proper-sized opening.

Plate Materials — Plates are available in a variety of different materials. Phenolic, plastic, and acrylic plates are less expensive ($25 - $50), while higher-end aluminum and nickel-plated ones are a little pricier ($55 - $100). We noted little difference between them, but a metal plate is a good choice for heavy routers.

Plate Sizes — Manufacturers size their plates to match their tables, so a Bench Dog plate won't fit in a Rockler table, and vice versa. Of course, you can always use your router to enlarge the opening if necessary.

◄ Most insert plates come pre-drilled and have rings for different bits. The Rousseau plate *(below)* has a few other nice add-ons.

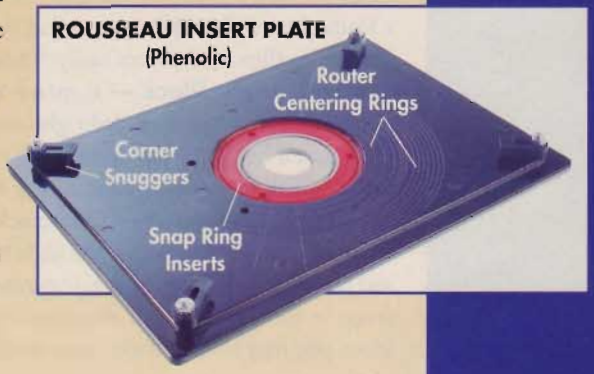


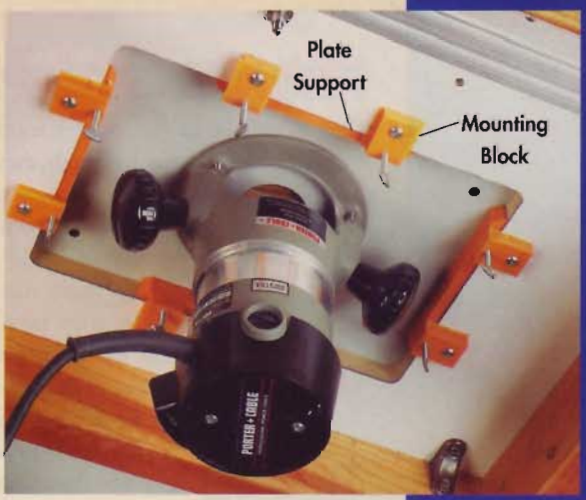
PLATE LEVELERS

On most router tables, the insert plate fits into a rabbeted opening in the table. The idea is for the plate to rest perfectly flush with the surface of the table. Oftentimes, though, this rabbet is a hair too deep, and the insert plate won't align flush with the table. The results are misaligned cuts and workpieces that catch on the lip of the plate.

Fixing the Plate — People try all kinds of things to correct this problem. I've seen everything from woodscrews driven into the rabbetted opening to plastic shims placed in the rabbet. But none of these fixes is what you would call an exact science.

Easy Plate Leveling — Luckily, Woodhaven has developed a foolproof plate-leveling system that *is* an exact science. These Stay-Tru Plate Levelers ($19) consist of mounting blocks that screw to the underside of the tabletop and plate supports that attach to the mounting blocks with thumbscrews. Adjusting the thumbscrews moves the insert plate up and down in the opening. By turning the individual thumbscrews, a plate can be leveled perfectly with the table in a matter of seconds *(Photos, right)*.

Using the Levelers — These plate levelers are most useful when you cut the opening in a router tabletop yourself. But they can be used on all router tables by removing the rabbeted portion of the opening. This is easy to accomplish by using a flush-trim bit in a hand-held router.



◄ Turning the thumbscrews on these plate levelers makes it easy to align an insert plate with the tabletop.

GLIDE BLOCK

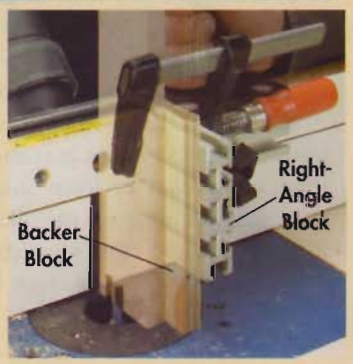
A push block's greatest assets are its ability to apply firm, even pressure to a workpiece and prevent injury by keeping your hands away from the bit. One of the most common push blocks is the rubber-bottom push block with a handle (shown in the top right *Photo* on page 75), which is available from a number of manufacturers.

Glide Block — Woodhaven's newest offering, however, is a slightly different take on this critical accessory. This new glide block ($45) slides in a T-track on the top of the router table fence to guide the workpiece precisely.

The glide block is attached to an extruded aluminum block that allows you to add several accessories. One example is a plastic adjustment mechanism that holds a wood push stick. Couple this push stick with a featherboard for side support, and you can machine narrow or thin workpieces easily *(Photo, top right)*.

Right-Angle Block — Replace this adjustment mechanism with the included right-angle block *(Inset, right)*, and it becomes easy to rout the ends of pieces. A backer block prevents chipout during such operations.

T-Track Accessories — One quick note on these T-track mounted accessories (the glide block, fence stop, and featherboard). These accessories often mount to the fence in different ways. If they don't fit your specific fence, you may have to make some small modifications.



▲ Woodhaven's glide block features a push stick *(above)* to rout thin pieces and a right-angle block *(right)* to rout the ends of pieces.

FENCE STOPS

When you need to start or stop routing a workpiece at a precise point along its length, then a stop attached to the router table fence is the right accessory for the job. A stop can be as simple as a wood block clamped to the face of the fence.

But many manufacturers have made stops even more convenient by making them a separate accessory that attaches to a T-track on the fence. A manufactured stop is a lot easier to adjust and clamp in place than a wood block.

Flip Stop — Of all the stop blocks I looked at, though, this Econostop ($35) was my favorite *(left)*. It's a *flip* stop, which means it flips down in front of the fence when you need it. And when you don't, it flips up out of the way. This eliminates the hassle of constantly removing and replacing stops between cuts.

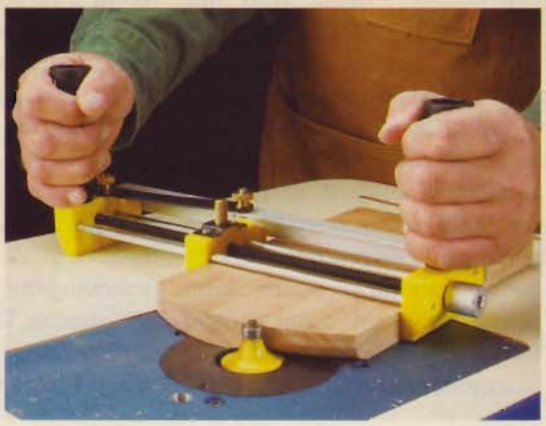
The Econostop is available at www.PrairieRiverWoodworking.com

HANDY HOLDER

This small-parts holder from MLCS proved itself quite valuable for freehand routing small workpieces. The yellow jaws of the tool adjust easily to apply firm clamping pressure to pieces up to 10" wide.

The two handles make it a snap to move and control the workpiece during a cut. And as you can see, they keep your hands well clear of the spinning router bit.

Another nice thing about this accessory is the price. At press time, it was available through the MLCS catalog for just $20 (see the *Buyer's Guide* on page 78).



FEATHERBOARDS

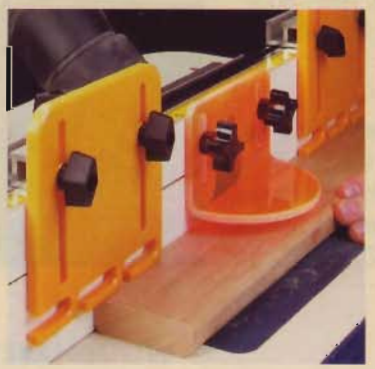
Running a piece of wood past a hunk of metal spinning at 20,000 RPM isn't the most predictable operation, which is why there's always a possibility the workpiece will kick out, lift up, or even kick back.

Thus the beauty of the featherboard. Whether mounted on a table or fence, it applies pressure against the workpiece, preventing it from lifting up or kicking out. Its flexible fingers allow workpieces to slide smoothly underneath them, but they prevent a piece from kicking back at you.

Feather-Loc — For router tables, most manufacturers offer hold-downs with the tried-and-true featherboard design. Of all the featherboards I looked at, Bench Dog's Feather-Loc ($25) is the most versatile. Not only can it act as a featherboard in both fence and table positions, but turning the Feather-Loc upside down makes it a handy stop *(top right)*.

Tandem Feather-Loc — When routing a tall workpiece on edge, Bench Dog offers a Tandem Feather-Loc *(far right)* for around $35.

Hold-Down — The Woodhaven hold-down ($16) is a slight variation on the typical featherboard design. Rather than having individual "fingers," this design is more like little feet, resulting in a hold-down that works extremely well.



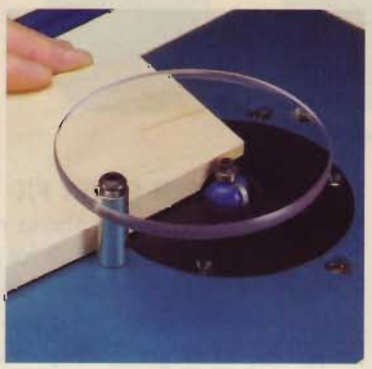
▲ These Feather-Locs from Bench Dog can be mounted on a fence as hold-downs or in a tabletop miter track as hold-ins.

SWITCHES & GUARDS

Another accessory that puts safety first is this auxiliary power switch from Rousseau *(right)*. Of all the power switches I looked at for this article, this one scored the highest marks because of its "crash bar" for quick shut-offs. The Bench Dog Power-Loc *(Top Photo, right)* is also a solid choice at $50.

Freehand Guards — For freehand routing a workpiece, these two guards from Bench Dog and Rousseau *(far right)* offer extra safety and convenience. The Bench Dog ($30) is a bit larger and features a dust port. The Rousseau ($11) easily pivots out of the way when not in use. Both freehand routing guards have built-in starting pins for easing the workpiece into a spinning bit.

▲ If you should need to turn off your router in a hurry, this auxiliary power switch from Rousseau ($35) features a handy crash bar.



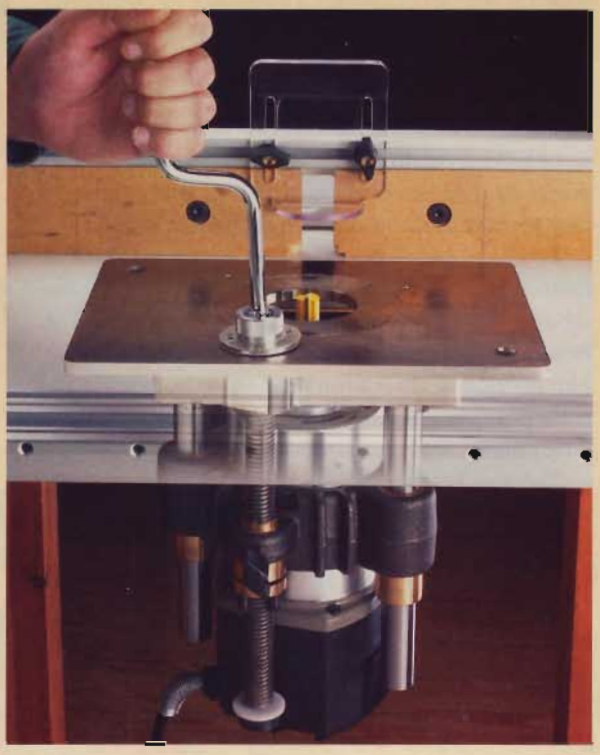
◄ These two safety guards from Bench Dog *(top)* and Rousseau *(bottom)* make freehand routing safer. Both have clear shields for greater chip control without obstructing the view.

advanced router ENHANCEMENTS

ROUTER LIFTS

The two most common gripes about router tables are that it's a pain to change bits and to set the depth of cut. A good router lift solves both problems. It lets you adjust the height of the router bit on the *tabletop*. Setting the depth of cut suddenly becomes simple and precise, and bit changes are accomplished *above* the table.

Fixed-Base Routers — For fixed-base routers, the basic lift design is a ring-shaped housing that is tightened around the router motor, holding it firmly in place. This housing is mounted to the insert plate, and height adjustments are made on the table using some form of ratchet or speed wrench. Three good examples of fixed-base lifts are shown on this page.



► BENCH DOG PROLIFT

With a speed wrench for quick height adjustments and an aluminum housing, the ProLift is a rock-solid lift. Models are available for large routers (like the P-C 7518, shown) for $360 and smaller routers (like the P-C 690) for $225.

▼ WOODHAVEN EZ LIFT

At just $160, the EZ Lift may be the most economical of the fixed-base router lifts. Its housing is phenolic, and you use your own ratchet to raise it *(Inset)*. Models are available for large and small routers.

▲ JESSEM ROUT-R-LIFT FX

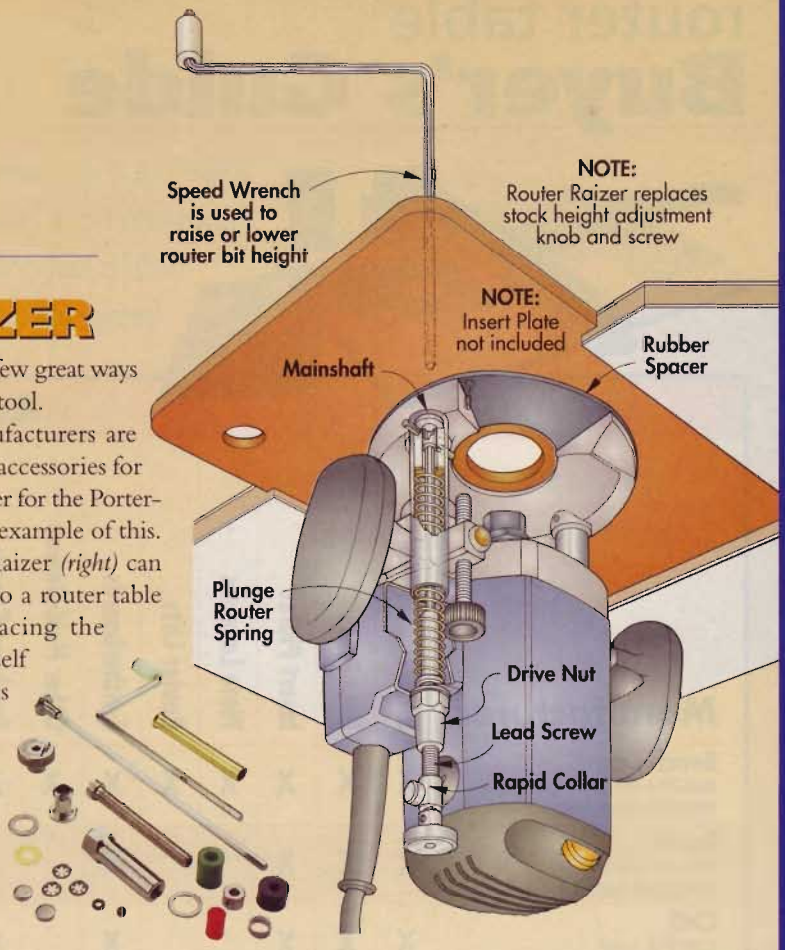
Jessem had the first fixed-base router lift, and their new Rout-R-Lift FX ($180) for smaller routers lives up to the company's strong tradition *(above)*. Jessem also offers a pro-grade Mast-R-Lift ($290) for larger 3 1/4-hp routers.

ROUTER RAIZER

If you own a plunge router, there are a few great ways to convert it into a handy router table tool.

Height Adjusters — Some manufacturers are beginning to make height adjusters as accessories for their specific plunge routers. The adjuster for the Porter-Cable 8529 shown on page 72 is one example of this.

Router Raizer — The Router Raizer *(right)* can turn just about any plunge router into a router table tool. This "lift kit" works by replacing the plunging mechanism on the router itself with its own hardware *(Photo)*. This enables the router body to move up and down and lock in place under the table *(Illustration, right)*. An included speed wrench makes these adjustments fast and easy. And for about $80, it's hard to beat the price.



◄ A Router Raizer uses the plunge mechanism of the router itself to turn a plunge router into an easily adjustable tool when placed in a router table. Hardware included is shown at left.

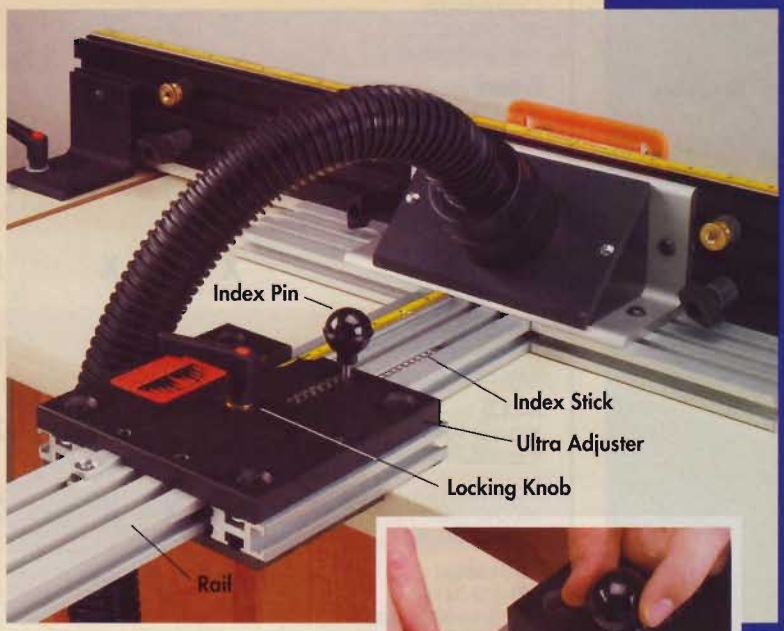
ULTRA ADJUSTER

A router lift will take care of precise *height* adjustments for cutting on the router table. And when you need to position the *fence* precisely, this Ultra Adjuster from Woodhaven ($100) fills the bill.

Adjuster Setup — The phenolic housing of the Ultra Adjuster is bolted or clamped to the back edge of a router table. An extruded aluminum rail passes through this housing and attaches to the router table fence. (It attaches directly to Woodhaven's fence, and an adapter is available for attaching it to other fences.)

Precise Cuts — What makes precise adjustments possible is a self-adhesive scale that's applied to the aluminum rail. The key is to place the scale so that it registers at "zero" when the fence is aligned with the center of a router bit. Once this is accomplished, you'll be able to see the precise distance from the fence to the center of the bit every time you move the fence. This is great for cutting dadoes and grooves when they must be at an exact location on the workpiece. A locking knob holds the fence in place at the correct setting.

Index Stick — Another nice feature of the Ultra Adjuster is an index stick and pin. This makes operations like routing flutes that need to be evenly spaced a lot easier to set up and cut. For each cut after the first, you simply release the index pin from the stick, move the fence, and then lock the pin in the stick in its new position.



► This Ultra Adjuster makes precise fence settings for operations such as cutting dadoes and grooves automatic. And the index stick and pin make it possible to align and cut multiple flutes and grooves without complex layout *(Inset)*.

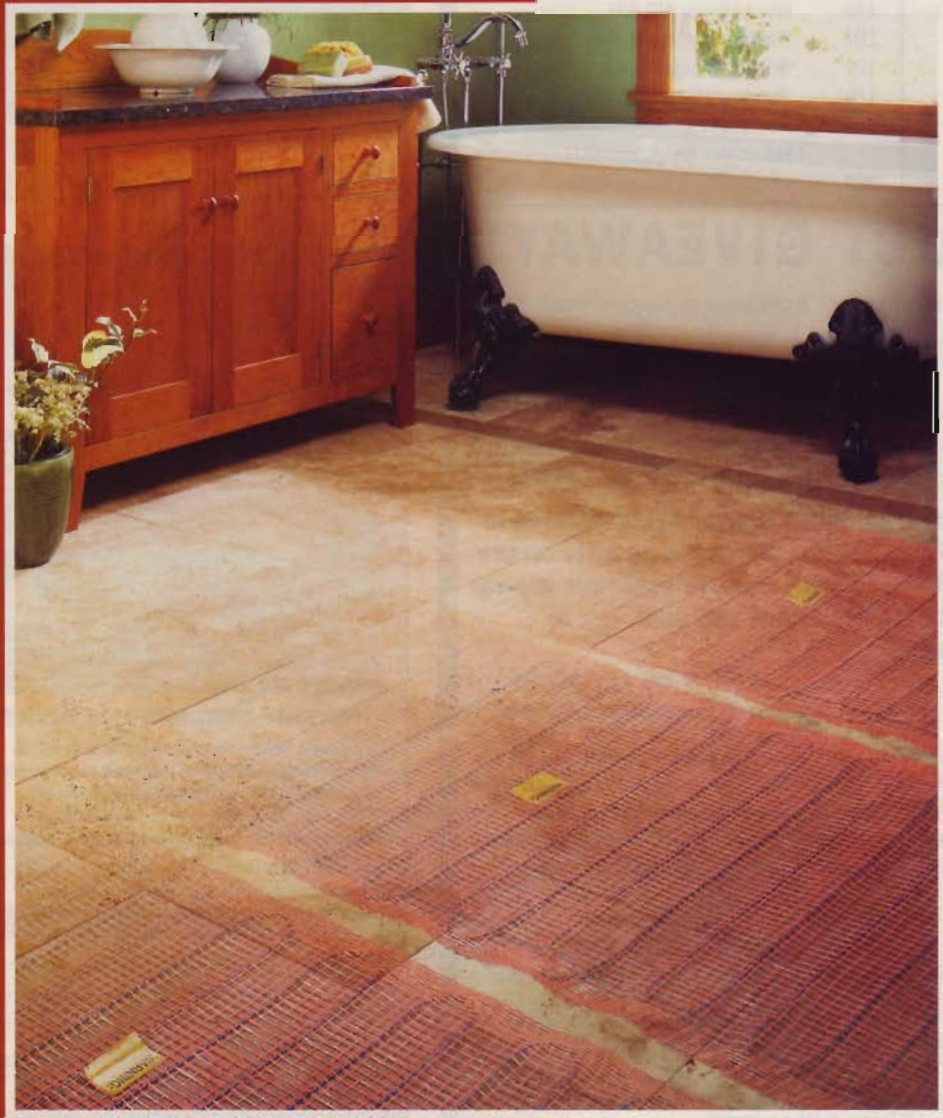
router table Buyer's Guide

There are a lot more router table add-ons than six pages can hold. Jointech's Premium Workstation *(left)* is just one great example. See the guide below for a rundown of all the accessories.

Manufacturer	Accessory													
	Router Table Fences	Dust Ports	Insert Plates	Plate Levelers	Router Lifts	Featherboards	Other Hold-Downs	Freehand Guards	Aux. Power Switches	Stop Blocks	Fence Adjustment Scales	Push Blocks	Small-Piece Holders	Miter Sleds
Bench Dog 800-786-8902 www.BenchDog.com	X	X	X	X	X	X	X	X	X	X				
Bosch 877-267-2499 www.BoschTools.com	X	X	X			X			X					
CMT 888-268-2487 www.CMTUSA.com	X	X	X			X		X						X
Craftsman 800-549-4505 www.Craftsman.com	X	X	X			X			X			X	X	X
Freud 800-472-7307 www.FreudTools.com	X	X	X			X								
Incra 972-242-9975 www.Incra.com	X	X								X	X	X		X
Jessem 866-272-7492 www.Jessem.com	X	X	X		X					X		X		X
Jointech 800-619-1288 www.Jointech.com	X	X	X		X	X	X			X	X	X	X	X
MLCS 800-533-9298 www.MLCSWoodworking.com	X	X	X		X	X			X	X		X	X	X
Rockler 800-233-9359 www.Rockler.com	X	X	X		X	X		X	X			X	X	
Rousseau 800-635-3416 www.RousseauCo.com	X	X	X			X	X	X	X					
Router Raizer 515-266-1293 www.RouterRaizer.com					X									
Veritas 800-871-8158 www.LeeValley.com	X	X					X	X		X		X		X
Woodhaven 800-344-6657 www.Woodhaven.com	X	X	X	X	X		X		X	X	X	X		X

Radiant Floor heating systems

The comfort of a warm floor is naturally the big attraction of radiant floor heating. But lower energy bills, dust-free air, even heat, and quiet operation are among the many other reasons people are "warming up" to the idea of radiant floor heating.



One of the upgrades we incorporated into the bathroom remodel featured on pages 46-58 was installing radiant heating under the floor. This is a type of system that transmits heat through the floor itself (rather than ducts) to warm a room from the ground up.

Radiant vs. Forced-Air Heat — Radiant in-floor heat has many distinct advantages over conventional forced-air heat. Radiant systems don't require ductwork or vents as forced-air systems do. This means greater decorating flexibility and freedom from recirculated dust that aggravates allergic conditions. Without air currents to dissipate it, radiant heat is less drying to the skin and provides greater comfort at lower thermostat settings.

Conventional forced-air heating systems operate by convection, which transports heat by *air*. The heated air, in turn, warms you indirectly. Airborne heat is at the mercy of air currents and tends to rise. As anyone who has painted a ceiling or changed a lightbulb knows, forced-air heat warms you from *head* to *toe*.

Radiant heating systems, on the other hand, bypass these disadvantages by transmitting draft-free heat directly to *objects*. So, at the same air temperature, you will feel significantly warmer in a room heated by a radiant system than a room heated by a forced-air system. With heat radiating from the floor directly to your body, you're warmed much more efficiently than by conventional means — from *toe* to *head*.

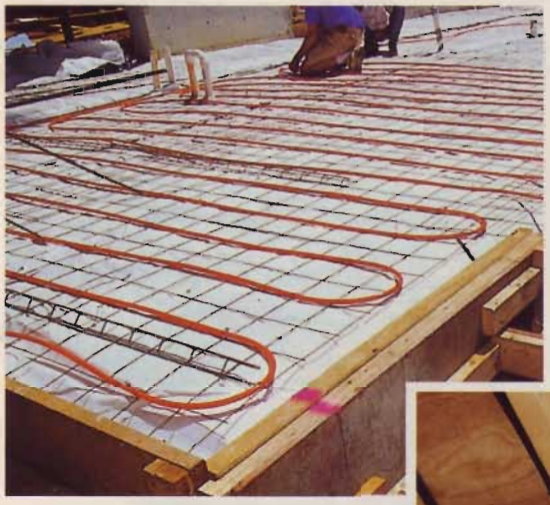
Hydronic & Electric — There are two basic types of systems available to provide the benefits of radiant heat: hydronic and electric *(see Sidebar on page 83)*.

A hydronic heat system consists of a network of looped tubing that circulates warm water — it's like having a radiator beneath your floor.

An electric in-floor radiant system delivers heat via wire cables that are imbedded in thinset concrete and covered with tile or stone — like an underlying electric blanket.

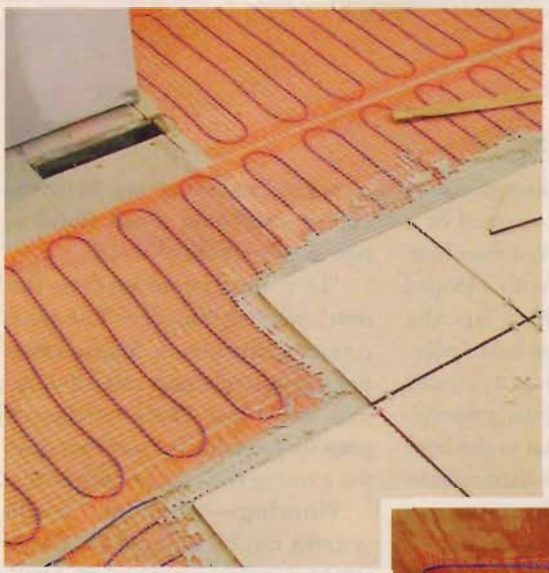
Read on for more about both hydronic and electric systems, and how to determine which one will best fulfill your heating needs.

Radiant Heat options

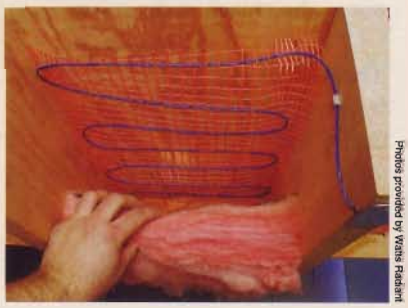


◄ IN-FLOOR HYDRONIC
The energy efficiency of a "wet" installation's thermal mass makes this system economically practical as a primary heat source.

BELOW-FLOOR HYDRONIC ►
"Dry" installations like this between-joist staple-up allow the integration of hydronic in-floor heating with an absolute minimum of disruption to existing flooring.



◄ IN-FLOOR ELECTRIC
Usually installed in a bed of thinset concrete and covered with tile, electric radiant in-floor heating is a manageble single-room project for do-it-yourselfers.



BELOW-FLOOR ELECTRIC ►
Electric radiant systems are also available for staple-up between exposed joists underneath an existing floor.

Above photos provided by Watts Radiant.

Photos provided by Watts Radiant

selecting a system–
5 QUESTIONS TO ASK

1 Primary or Supplemental Heat?
Most hydronic systems are designed to function efficiently as primary heating sources. But electric radiant systems aren't practical for carrying a home's entire heating load in most climates. They are best suited for supplementing a main heating system.

2 Whole House or Single Room?
If heating the entire house is your goal, a hydronic system is probably the best alternative. Due to the complexity of most hydronic systems, installation and operation are also most economical in whole-house applications. Because cost effectiveness is less relative to scale with electric radiant floor heating, it's more practical for single rooms and spot heating. Think of it as a radiant throw-rug.

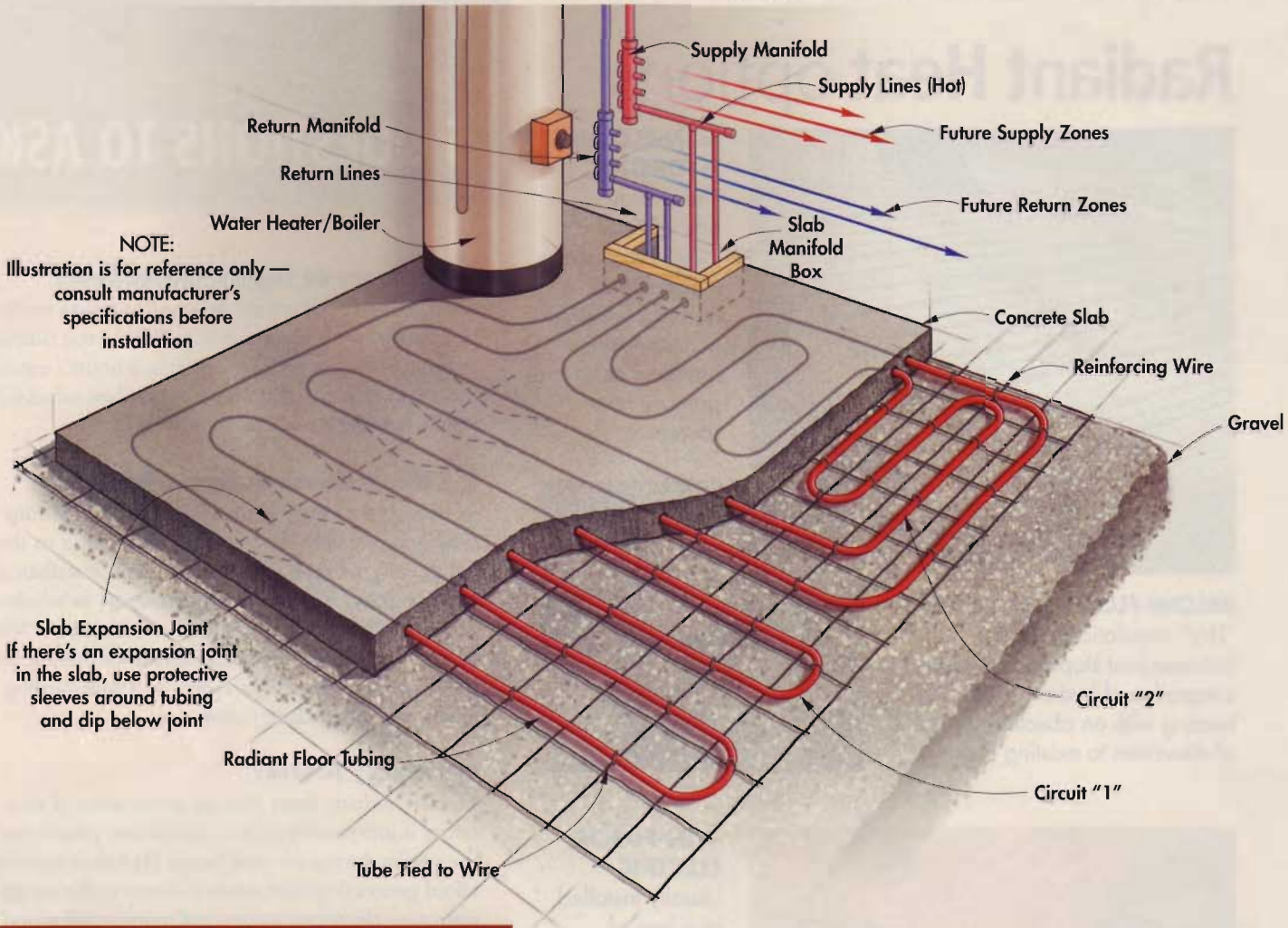
3 Energy Source?
Electric radiant floor systems make sense if electricity is inexpensive in your area or you plan to run the system during off-peak hours. Hydronic systems afford greater flexibility when it comes to the energy source — electricity, natural gas, propane, oil, wood, geothermal, or solar will all power hydronic systems.

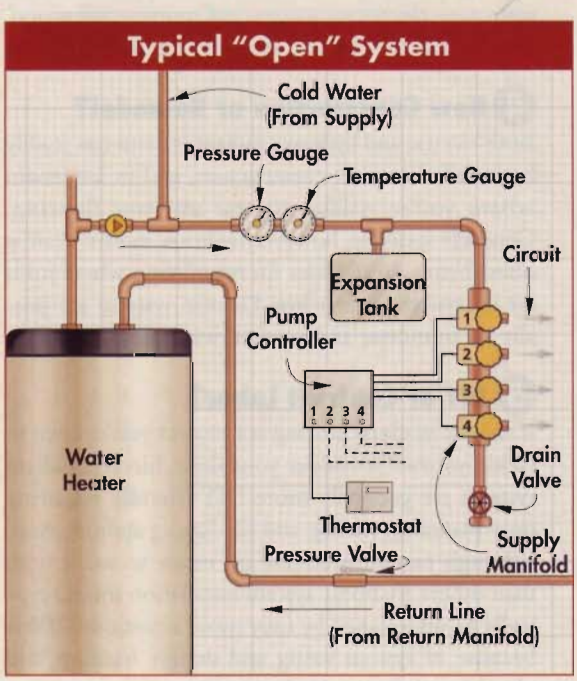
4 New Construction or Remodel?
Both electric and hydronic radiant systems can readily be installed in new construction, and in any room where you're willing to tear up your flooring. Generally speaking, however, hydronic radiant heating offers better possibilities for retrofitting where joists are accessible from below. Electric systems are usually set in mortar and covered with tile.

5 DIY or Contract Labor?
If radiant in-floor heating is a project you're keen to tackle yourself, consider your skills. Electric radiant systems are generally more DIY-friendly, requiring only planning, wiring, and tile-laying abilities. And, although certain products are easier to work with than others, hydronic system installation should typically be undertaken by only more ambitious DIYers because of system sizing and design, framing, and plumbing skills involved.

radiant floor heat

HYDRONIC SYSTEMS





Hydronic radiant in-floor systems use water (or antifreeze) warmed by a boiler or water heater to deliver heat. This is accomplished with a looped network of flexible tubing. Typically, the tubing is PEX (cross-linked polyethelyne) or EPDM (a synthetic rubber). Warm water flowing through the tubing transfers heat to the floor covering above, which then radiates out to the objects in the room.

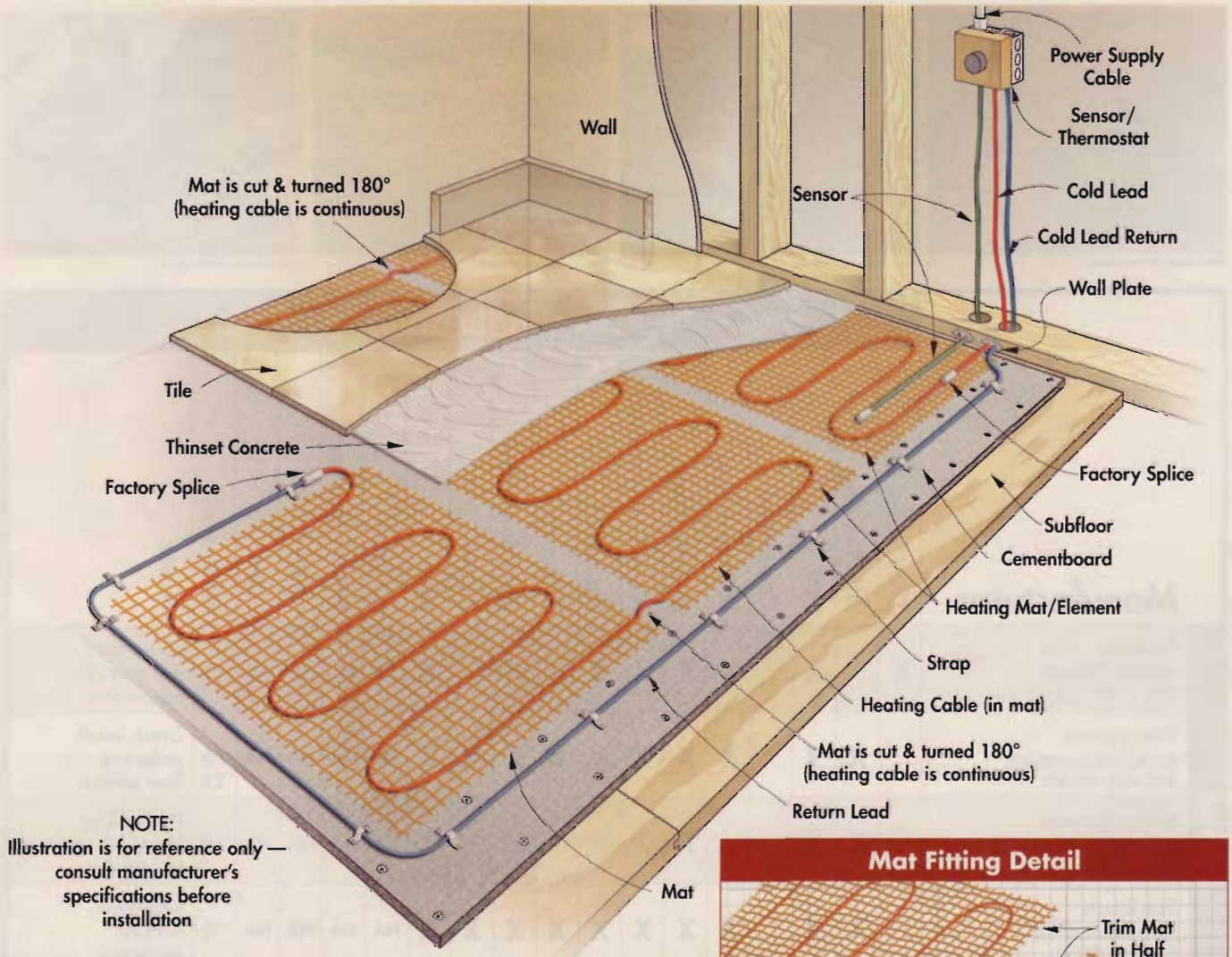
"Wet" vs. "Dry" Installations — There are two main kinds of hydronic radiant in-floor installations: "wet" and "dry."

The tubing of a "wet" system is imbedded in concrete, producing a thermal mass that heats and cools slowly for maximum energy efficiency *(Illustration, above)*. This type of slab installation is best suited to new construction.

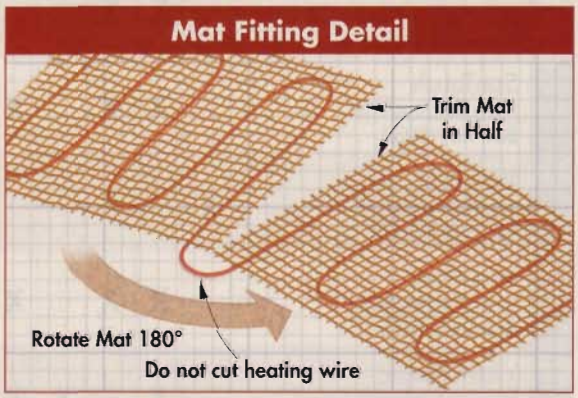
"Dry" installations are those that don't require concrete. The most common examples are systems incorporated into subfloors and between-joist staple-ups. These systems are great for remodels because they leave the existing flooring undisturbed.

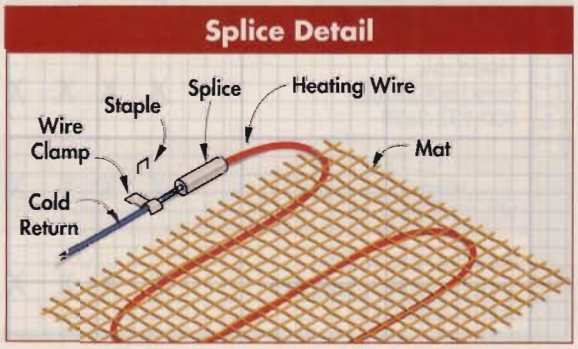
Flooring — Hydronic radiant systems can be covered by almost any kind of flooring: wood, tile, vinyl, stone, linoleum, laminate, and even low R-value carpets. A word about wood flooring, however: engineered materials work better for this application than solid wood because they're more stable.

ELECTRIC SYSTEMS



NOTE:
Illustration is for reference only — consult manufacturer's specifications before installation





Electric radiant systems warm floors by means of heating wire. The wire is arranged in a serpentine pattern, and usually imbedded in thinset concrete, then covered with tile or stone. The heat generated by the electrical current in the wires is transferred to the tile and then to objects in the room.

Cable vs. Mat — Electric radiant in-floor heating systems are available in two main forms: cable and mat.

A cable system is one in which the insulated heating wire is affixed directly to the substrate before being covered with mortar. While it's time-consuming to arrange and secure the cable, this type of system is typically more adaptable to odd-shaped floor plans, such as bathrooms with fixtures and cabinets to work around.

A mat-type electric radiant system is composed of cable arranged in an "S" pattern and woven into an easy-to-handle roll of mesh. Since the cables are fixed to the mesh, aligning them on the floor is virtually automatic. This makes mat systems simpler to install in situations where the layout of the floor is more nearly rectangular.

Flooring — When laid on top of an existing subfloor, electric radiant systems raise the height of the floor level significantly less than in-floor hydronic installations. With most electric systems, ceramic tile, marble, slate, or stone are the only floor covering options.

radiant floor heat

SYSTEMS SUPPLIERS

Photo provided by Watts Radiant

Photo provided by EasyFloor

Photo provided by Warmboard

Photo provided by Watts Radiant

	Manufacturer	Application																
		Tile/Stone only	All Flooring	DIY	Contractor	Whole-house	Single-room	New Construction	Remodel	Primary	Supplemental	Cable	Mat	Boiler	Water Heater	"Wet"	"Dry"	Warranty	Notes
ELECTRIC	**Nuheat** www.Nuheat.com 800-778-9276	X		X		X	X	X	X		X		X	NA	NA	NA	NA	25	60 standard mat sizes plus custom mats
ELECTRIC	**Warmzone** www.Warmzone.com 888-488-WARM		X	X		X	X	X	X	X	X	X	X	NA	NA	NA	NA	10-25	Zmesh installs under any floor surface
ELECTRIC	**WarmlyYours** www.WarmlyYours.com 800-875-5285		X	X			X	X	X		X		X	NA	NA	NA	NA	10	Environ II for carpet & laminate wood floors
ELECTRIC	**SunTouch** www.SunTouch.net 888-432-8932		X	X		X	X	X	X	X	X	X	X	NA	NA	NA	NA	10	UnderFloor mats for joist space
ELECTRIC	**Warmup** www.Warmup.net 888-WARMFEET	X		X			X	X	X		X	X		NA	NA	NA	NA	10	Heating wire taped directly to subfloor
HYDRONIC	**EasyFloor** www.FlorHeat.com 888-265-5455		X	X		X	X	X	X	X	X	NA	NA	X	X		X	25	Prefabricated thermal mass system
HYDRONIC	**Warmboard** www.Warmboard.com 877-338-5493		X		X	X		X		X		NA	NA	X	X		X	**	Structural subfloor and radiant panel in one
HYDRONIC	**HeatLink** www.HeatLink.com 800-932-3629		X	X	X	X	X	X	X	X	X	NA	NA	X	X	X	X	25	Integrated modular systems
HYDRONIC	**Watts Radiant** www.WattsRadiant.com 800-276-2419		X	X	X	X	X	X	X	X	X	NA	NA	X	X	X	X	*	Uses Onix tubing, which is more flexible than PEX
HYDRONIC	**Radiant Floor Co.** www.RadiantCompany.com 866-WARMTOES		X	X	X	X	X	X	X	X	X	NA	NA	X	X	X	X	***	Custom-designed systems for DIYers

* 25 yrs. on tubing, 2 yrs. on manifold **Limited lifetime structural warranty ***35 years, repair & replacement costs included

Tools & PRODUCTS

WORKBENCH APPROVED

an easy-load PALM SANDER

I love the convenience of a palm sander, especially when I'm working on small projects, in tight spaces, or doing edge sanding. But one of my biggest complaints about these tools is the hassle involved in getting the sandpaper loaded properly.

The Quarter-Sheet Finishing Sander Kit from Bosch (model 1297DK) eliminates that hassle. It features the SheetLoc system for attaching sandpaper to the tool. Just insert a quarter sheet of sandpaper into the grooves on the base of the sander. When you tighten the lever on the side of the base, the sheet is pulled flat and locked in place.

The sander (about $60) also features through-the-pad dust collection, and its filtered dust canister traps particles as small as .5 micron. To allow for this type of dust collection, you punch holes through the sandpaper by pushing the base down over a special "punch plate."

The soft-grip top handle fits easily in your hand for improved control while sanding. The shape of the base also allows you to sand close to vertical surfaces on three sides, and a new balancing system means less vibration and noise from the 2-amp motor. For more information, visit www.BoschTools.com

▲ Secure the sandpaper tightly in place with the SheetLoc mechanism *(above left)*, and then push the base of the sander down over the punch plate *(above right)* to make holes for dust collection.

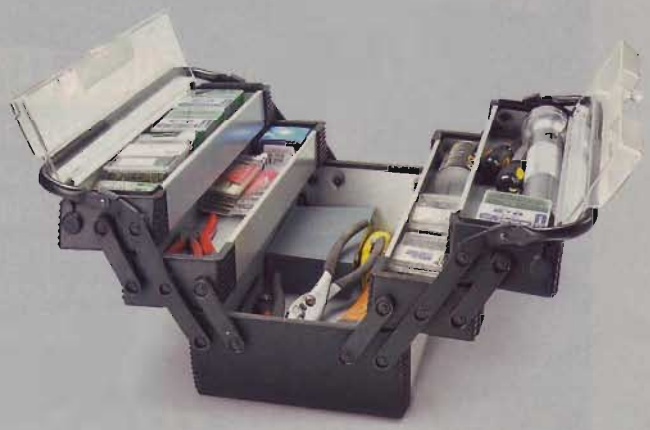
FatMax TOOL BOXES

Stanley's FatMax line of tools has been around for about five years now, and these are the first two tool boxes to join the lineup.

Below is the Professional Tool Box (about $30), a 25" unit that features a long handle and a unique latch mechanism. The handle either slides into a locked position (up) for carrying or unlocked (down) for lifting up the lid and accessing tools.

At right is the Cantilever Tool Box (about $40). Like the other model, it combines aluminum and plastic for a strong yet lightweight design. Its special hinge system allows it to open in a cantilever fashion, and items in the top compartments are visible through the clear plastic lid. Both models are available at home centers and hardware stores. Visit www.StanleyTools.com

◄ When the handle is in the "down" position, you can open the box. In the "up" position, it locks the box.



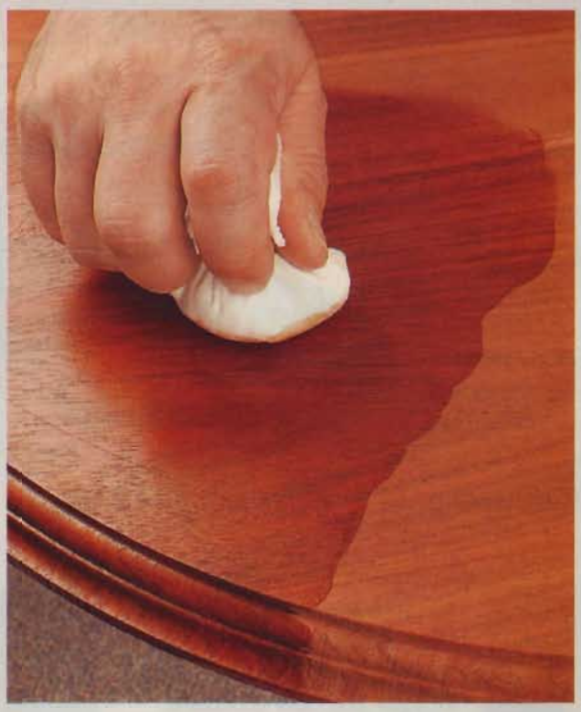
This tool box opens in a cantilever fashion for easy access to all the compartments. ►

a revolution in
FRENCH POLISHING

Old World craftsmen used a technique called French polishing to create lustrous finishes on fine wood furniture and cabinetry. While the results were often spectacular, few woodworkers use the technique today because the process is typically just too tedious.

That trend could change, though, with the introduction of Bulls Eye French Polish from Zinsser. In a matter of hours, you can achieve a beautiful French polish finish that formerly might have taken weeks. The secret is in the chemistry. The polish is formulated from a specially treated shellac combined with a lubricating solvent. This eliminates the need for messy and time-consuming applications of mineral or linseed oil that were required in traditional French polishing.

Each coat of Bulls Eye French Polish ($14.99 for a 16-ounce bottle) dries hard and smooth in minutes. For more information, visit www.Zinsser.com



▲ Simply wipe Bulls Eye French Polish onto a wood surface. It dries quickly and smoothly, and the surface is ready for another coat in just minutes.

top 20
COOL PRODUCTS

I'm always on the lookout for innovative products. That's why I was so interested when leaders from the building industry got together recently to make a list of the Top 20 Cool Products for homes. Ironically, the No. 1 "cool" product makes hot water. The Continuum tankless water heater *(above)* from Rinnai was praised for its compact size and energy efficiency. It provides hot water only on demand, so there's no wasteful reheating of water like with a traditional water heater. The products were featured at the Premier Building Show in San Francisco in June. To view information about these products, visit www.pcbc.com

a new angle
ON HAMMERS

Swinging a hammer all day can be a tiresome task. That's why I was curious to try out an innovative new line of hammers from the folks at Estwing. By employing a "Weight Forward" design, more power and weight are located up front on these hammers, making for easier nailing. Other improvements include a shock-reduction gasket on the strong fiberglass handle and a comfortable grip. Pulling nails is easier, too, thanks to the hammer's smooth, rounded surface on top. The hammers are available in 17- or 21-ounce models with either smooth or milled faces, and with 14"- or 16"-long handles. Prices range from about $30 to $40 each. For more information about these new hammers, visit www.Estwing.com

► Estwing's new line of Weight Forward hammers are made to be easier to swing than typical hammers and also to cut down on the amount of shock that a user feels when pounding.

fishing rod handle HANDIWORK

Ray Jorgensen loves working with wood almost as much as he loves fishing. By combining both passions, he creates fishing rod handles as functional as they are beautiful.

▲ Ray's elaborate inlay work evolved through a lot of experimenting on the table saw, lathe, and band saw. He uses mostly exotic-wood turning blanks, and glues up parts and pieces of each to achieve some very interesting designs. These glued-up blanks are then turned to final shape and size on a lathe to create the handles shown *above* and *below*.

Ray Jorgensen has been woodworking for 25 years, and fishing even longer than that. It's when he decided to put the two together that he knew he was onto something good.

Furniture to Fishing Rods — Fine furniture and home fixtures were Ray's typical projects in his home woodshop in Spencer, Iowa. But when he saw some hand-made cork fishing rod handles at a sporting show a few years back, he knew he wanted to try making them.

Like any good success story, Ray's first attempt at handle-making was a failure. "I didn't have much luck with cork," he says, "so I decided to try making them out of wood."

Rods Take Shape — Ray started by turning simple wood blanks to the shapes of fishing rod handles on his lathe. Before long, he was trying his hand at inlay work, cutting his wood-turning blanks into elaborate shapes and gluing up blocks made up of different exotic woods. It took a lot of experimenting (and a lot of scrapped fishing rod handles), but pretty soon, Ray's handles began to take form.

Opening Shop — Once his friends and family started asking for handles of their own, Ray decided to sell his work through a web site, ClassicCustomWood.com. Before long, orders for custom fishing rod handles were pouring in from as far away as California, Alaska, and Texas.

Ray's average price for a handle is $230, but it can vary depending on the amount of work involved. "The handle I made for a guy in California has 87 different blocks of wood — I should have asked a lot more for that one," laughs Ray.

For a closer look at Ray's handle-making technique, see page 96.

Photo courtesy of Les Jorgensen

▲ Ray makes spinning, casting, and fly rod handles, and each one is weighted properly for optimal casting. Curly maple, redheart, and koa are just a few of the many exotic woods he uses. Each finished rod handle gets a couple coats of Tru-Oil Gun Stock Finish to stand up to the great outdoors.

simple steps to an INTRICATE INLAY

▲ Once Ray starts turning this glued-up blank on the lathe, the elliptical pattern begins to take form. The result is this finished rod handle with four redheart ellipses that criss-cross each other around the entire perimeter of the handle *(Inset)*.

Ray's inlaid fishing rod handles may look complex, but one of the neatest things about them is how easy some of his techniques are to duplicate.

Take the finished handle shown in the *Inset Photo*, for example. Ray created this elliptical pattern with some simple table saw and lathe work.

Cut Blank — The handle starts on the table saw, where Ray cross-cuts the handle blank at 15° using a shop-made taper sled *(Fig. 1)*.

Glue in Strips — Next, he glues maple, redheart, and maple inlay strips between the cut sides of the blank to create the "white-red-white" inlay you see on the finished handle. Ray uses a piece of Corian countertop as a glue-up jig to keep all the pieces square and prevent the wood from sticking to it *(Fig. 2)*.

Clamp It Up — With the inlay strips in place, Ray clamps the blank from every direction to keep it square during glue-up *(Fig. 3)*.

Repeat Four Times — These three steps create one inlay strip. But in order to make the ellipse, Ray needs to make four intersecting inlay strips. Doing this is surprisingly easy, however. He simply makes a second crosscut on another side of the blank, adds the inlay strips, and glues the blank together again. By repeating this process four times, Ray creates a handle blank with four intersecting inlay strips *(Fig. 4)*.

Turn the Blank — The most interesting part of Ray's technique happens when he turns the blank on the lathe. What originally looked like "X"s on the sides of the blank begin to curve as the wood is turned to shape *(Photo, left)*. As Ray continues to turn, the result is the intricate elliptical shape shown in the *Inset Photo*.