WORKBENCH VOL. 69 NO. 2 ISSUE #282 • HOME THEATER CENTER • HOME THEATER PLANNER • CRAFTSMAN ROUND TABLE • JOBSITE TABLESAWS • ROUTER WORKSHOP: MORTISE & LOOSE TENONS
April 2004

NEW! TABLE SAW FENCE ADD-ON

ROUTER WORKSHOP—*Mortise & Loose Tenon Joints*

WORKBENCH®

WOODWORKING TO IMPROVE YOUR HOME®

April 2004

Home Theater

Versatile Custom Cabinets
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JOBSITE TABLE SAWS

CRAFTSMAN ROUND TABLE

Build Your Own Family Heirloom!

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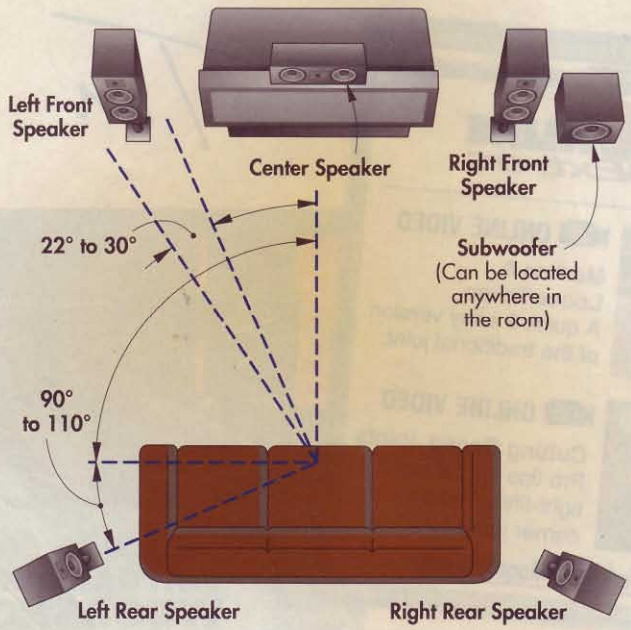

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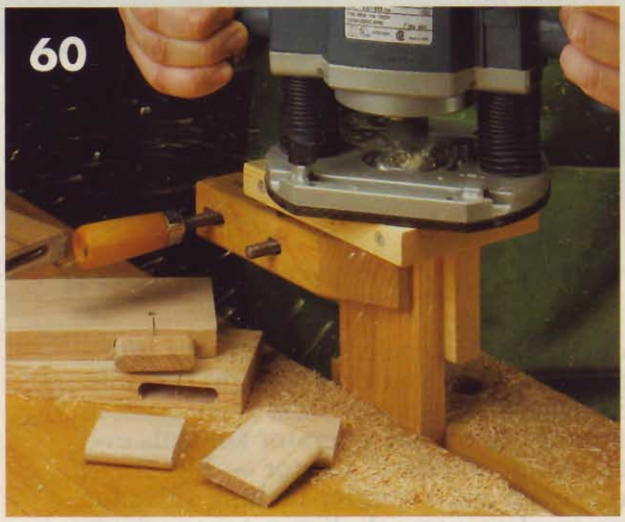

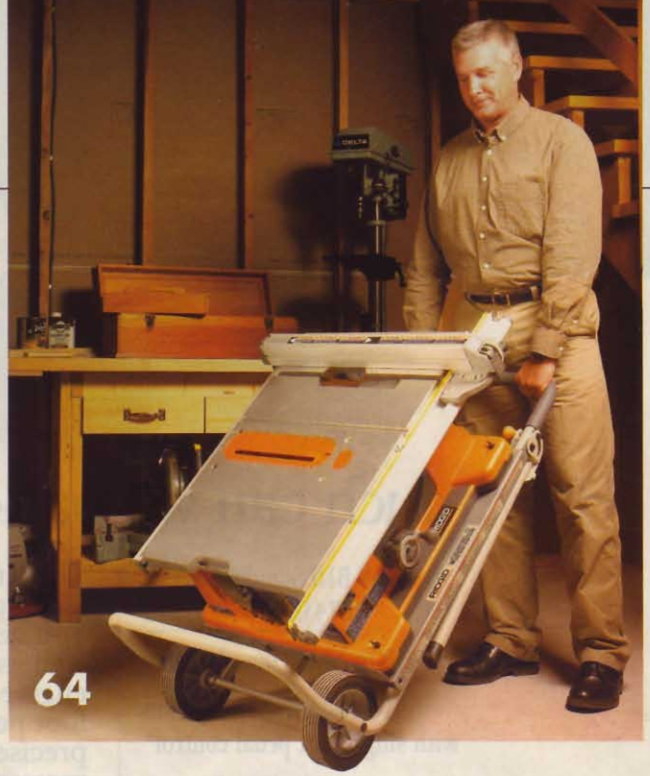

READER'S WORKSHOP

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TOOL CLOSE-UP

SKILL BUILDER

▼ We're having chicken tonight! Check out these humorous, handcrafted whirligigs in our Craftsmanship Close-Up *(page 94)*.
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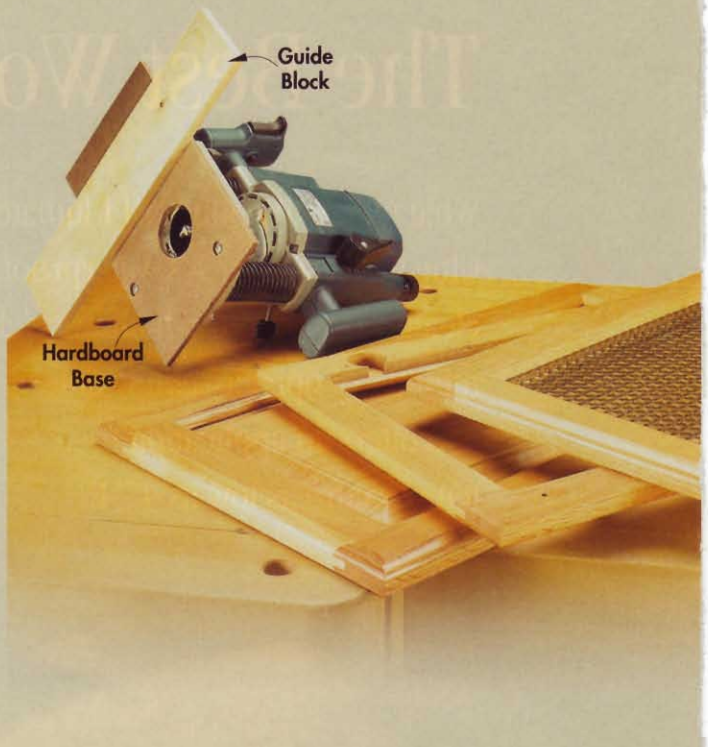
Questions & ANSWERS

touch of "glass" for CABINET DOORS



Q *The doors on my kitchen cabinets have wood panels surrounded by wood frames. Can I replace the panels with glass, or do I have to buy new doors?*

Dan Marsteller
Harrisburg, PA

A You can easily replace the wood panels with glass. All it takes is a plunge router equipped with a 1/2" straight bit and an edge guide. The idea here is to remove the back lip of the groove that holds the panel in the frame *(Illustration, below)*. With this lip removed, the panel comes out easily. Then the glass is set in its place.

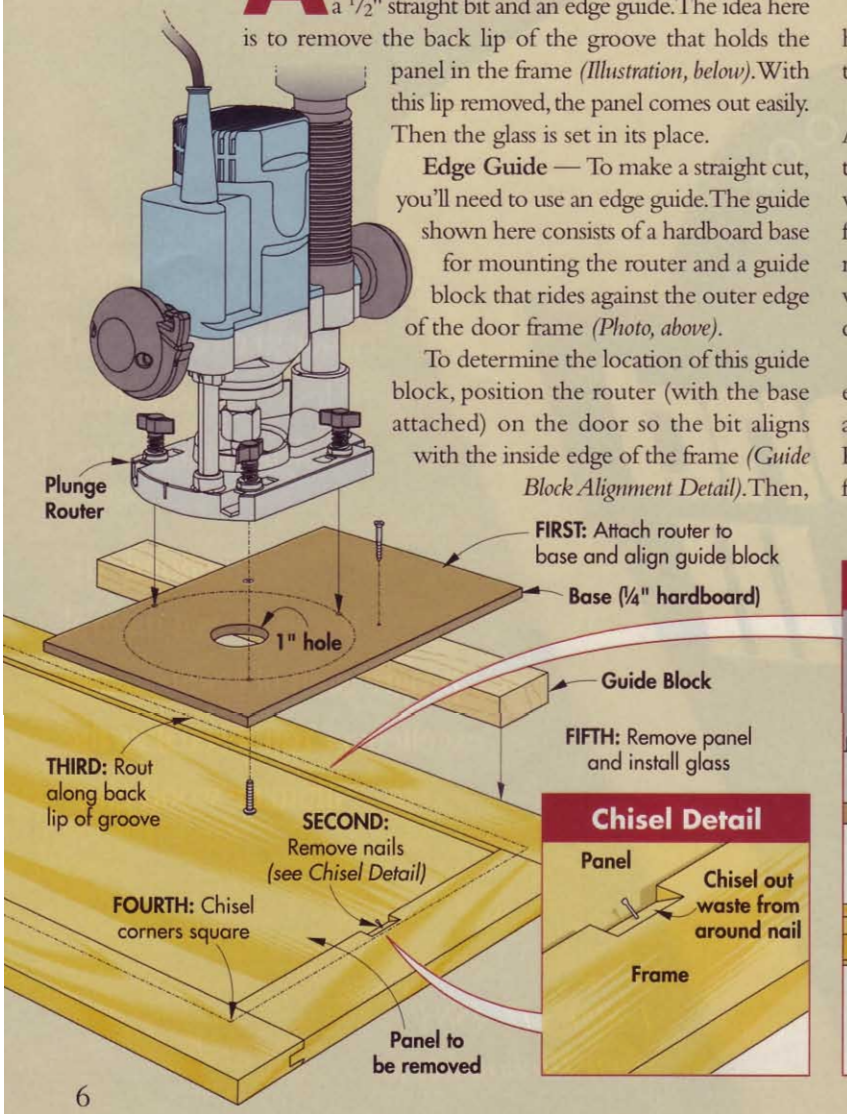
Edge Guide — To make a straight cut, you'll need to use an edge guide. The guide shown here consists of a hardboard base for mounting the router and a guide block that rides against the outer edge of the door frame *(Photo, above)*.

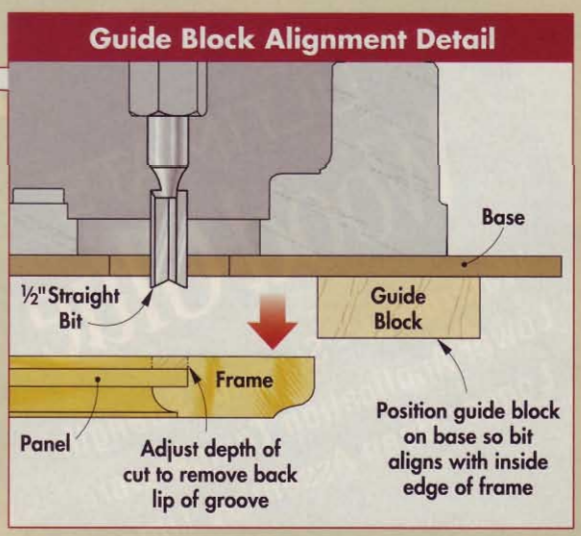
To determine the location of this guide block, position the router (with the base attached) on the door so the bit aligns with the inside edge of the frame *(Guide Block Alignment Detail)*. Then, set the guide block against the frame and attach it to the base with screws.

Before routing, check to see if there are any nails holding the panel. If so, chisel around them and remove the nails with a needle-nose pliers *(Chisel Detail)*.

Rout It Out — Now it's time to rout the frame. Adjust the depth of cut so the bit will just cut through the back lip of the groove that holds the panel. Then, with the door clamped down, plunge the bit into the frame and hold the guide firmly against the edge as you rout from left to right. Don't worry about routing all the way into the corner. You'll use a chisel to square up the corners after routing all four sides of the frame.

Add the Glass — The panel now should come out easily, but you may have to give it a few light taps with a mallet. With the panel removed, set the glass in place. Put dabs of silicone sealant in the groove to hold it firm. Then, add glass stops to secure it.





Questions & ANSWERS

router bit slips? CHECK THE COLLET

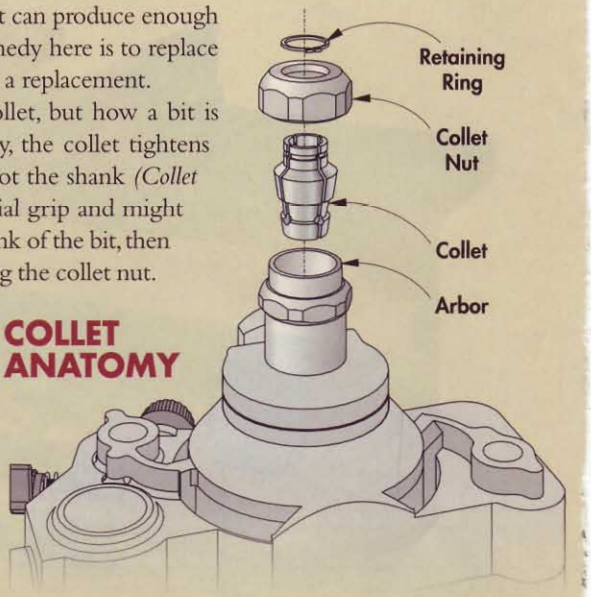
Q *Recently I was using my hand-held router to cut a dado. This worked great — until the bit slipped out and cut through the workpiece. What caused the bit to slip?*

Tom Miller
Enoree, SC

A The most likely cause is the collet — the split, cone-shaped sleeve that fits into the arbor of the router *(Collet Anatomy)*. When you tighten the collet nut, the "fingers" formed by the splits tighten around the shank of a bit so it won't slip.

With extended use, however, a collet can actually deform so it's oblong in shape, preventing the collet from exerting even pressure around the shank of the bit. If you're making a heavy cut, it can produce enough vibration to loosen the bit. The only remedy here is to replace the collet. Contact the manufacturer for a replacement.

Sometimes the problem isn't the collet, but how a bit is mounted. If you insert a bit too deeply, the collet tightens around the transition fillet on the bit, not the shank *(Collet Detail)*. Here again, the collet has a partial grip and might slip. To prevent that, "bottom out" the shank of the bit, then lift it back up about 1/8" before tightening the collet nut.



Stock Preparation Tip

Q *I know that good stock preparation is critical to a successful project. But even after I take time to machine lumber straight, flat, and square, it sometimes still bows or twists after the project is built. What can I do to prevent this?*

Lionel Robinson
Pensacola, FL

A There are several things you can do. First, be sure to let the wood acclimate to the moisture level in your shop for a few days before you get started. Second, when thicknessing stock, remove an equal amount of material from both sides. This helps balance any wood movement that occurs *after* it's machined. Finally, don't plane the boards to final thickness. Leave them a bit thick and set them on edge for a day *(see Photo)*. Then set aside any boards that bow or twist.

Finishing Fundamentals

removing STUBBORN STAIN

Q *I'm refinishing an old bookshelf and am having trouble removing the original stain. I've tried several paint and varnish removers, but the stain seems to have soaked more deeply into the grain than I've previously encountered. Is there hope for a successful finish to this project?*

Jeff Acord
Belgrade, MT

A Paint and varnish removers are designed to do just that — remove paint and varnish. These finishes dry on top of wood and can be softened and scraped clean using any number of chemical removers.

Stain, however, is designed to soak into the pores of the wood and cannot always be removed as easily as paint or varnish. Since the removers you have tried don't seem to be able to remove the stain, your next step may be to try a different brand. One I have had success with is Formby's Paint & Poly Remover.

This specific remover works great for two reasons. First, its active ingredient is methylene chloride, which eats through multiple layers of varnish, paint, and stain without disturbing wood's natural lustre. Second, the remover is formulated to develop a wax barrier as it dries, allowing the methylene chloride to work without evaporating.

The first step is to brush a heavy coat of remover over the surface *(Fig. 1)*. Take care not to over-brush, as this can break the wax barrier and allow air to reach the methylene chloride. Then, cover the coated area with wax paper or plastic food wrap to further slow the evaporation of the methylene chloride *(Fig. 1a)*.

Continued on page 12

▲ To remove stain, brush on a heavy coat of Formby's Paint & Poly Remover. Take care not to over-brush, as this can break the wax barrier that forms over the remover. Then, cover it with wax paper to further slow evaporation.

Workbench and **Bruce Johnson**, Minwax finishing expert, are teaming up to answer your finishing questions. This is the first in a series of questions answered by Bruce.

Send your finishing questions to:

Mail: Workbench Q&A
2200 Grand Avenue
Des Moines, IA 50312

Email: editor@workbenchmag.com

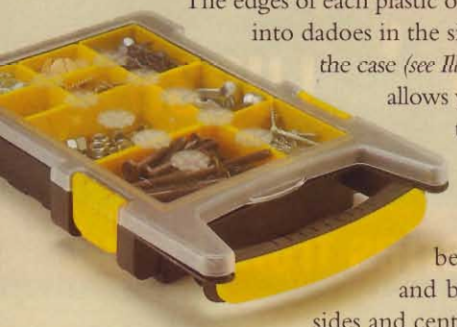
Winners receive a **FREE** Minwax Finishing Kit!

Tips & Techniques

organize those ORGANIZERS

▲ Plastic organizers slide in and out like drawers in this simple plywood case. It can also be mounted to a wall to free up space on your workbench.

Recently, I purchased several plastic tray organizers manufactured by the Stanley Tool Company. They have snap-on lids for keeping out dust and removable bins for storing a variety of small parts. To help organize my organizers, I built a plywood case that serves as a docking station for the trays.



The edges of each plastic organizer have lips that slide into dadoes in the sides and center dividers of the case *(see Illustration at right)*. This design allows you easy, drawer-like access to the organizers.

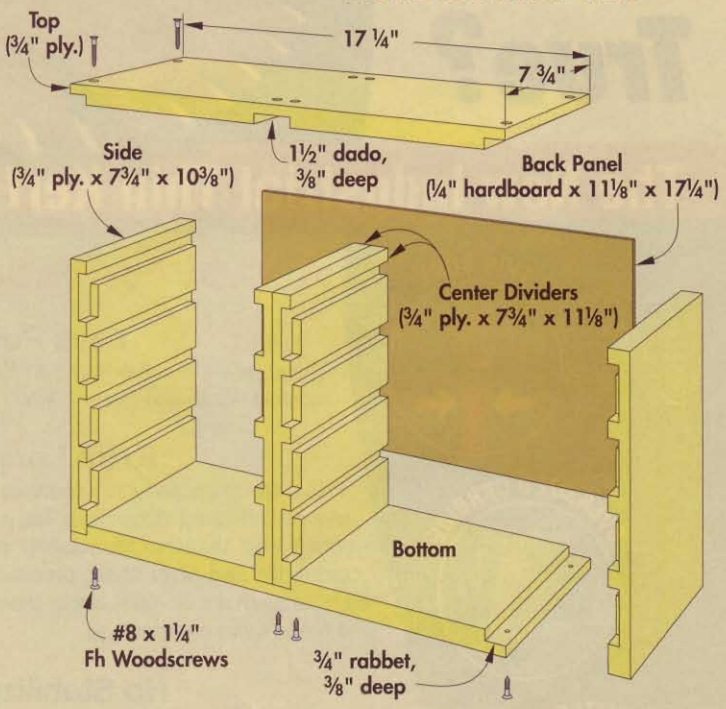
You can build the cabinet in just a few easy steps. First, cut the rabbets and dadoes in the top and bottom pieces to hold the sides and center dividers.

The next step is to cut a series of dadoes in the sides and dividers to hold the organizers. Notice there is a "leg" routed at the front of each dado. These legs support the thick part of the organizer near the latch, which prevents the trays from sagging. I cut the dadoes on a table saw, and followed up with a router for the "leg" cuts.

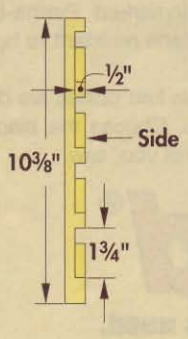
Assemble the pieces, and secure with woodscrews as shown. Attach the back panel with brads.

Chris Powell
Olive Branch, MS

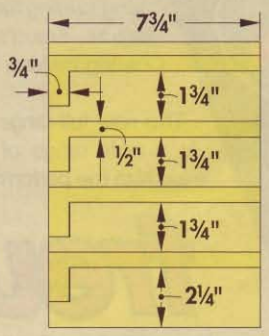
CONSTRUCTION VIEW

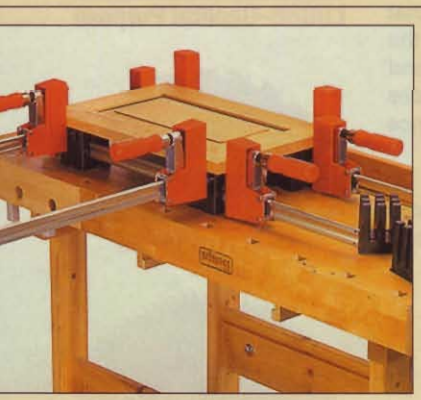


END VIEW



SIDE VIEW





BEST TIP!

For sending us his tip, Chris Powell wins a set of Bessey clamps in a kit that is designed for clamping up raised-panel doors!

Mail your Shop Tips to:
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Email: editor@workbenchmag.com

easy-access EXTENSION CORD

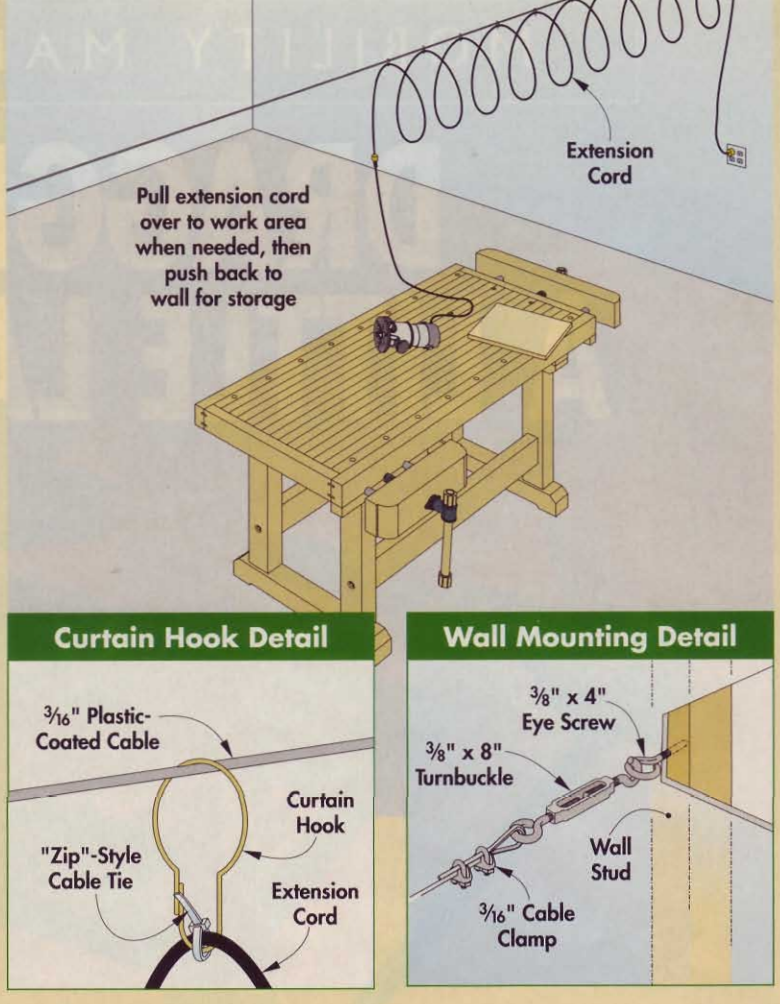
Tangles of extension cords in a workshop are not only annoying, but potentially dangerous. Here's a solution that keeps a cord stowed safely overhead.

The extension cord holder works like this: a plastic-coated cable is secured to two opposite walls, and the cord is tied to curtain hooks that can be pulled along the cable above a work area.

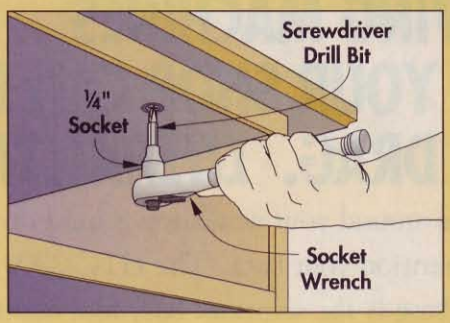
First, secure eye screws to opposite walls. Then, attach a turnbuckle to one of the eye screws (*Wall Mounting Detail*). Using cable clamps, secure the coated cable to the turnbuckle. Pull the cable tight while a helper installs the cable clamps, and then use the turnbuckle to tighten the cable.

Using "zip"-style cable ties, attach curtain hooks to the extension cord every 2 to 4 feet, and leave enough slack on both ends of the cord as needed. Wipe the cable with silicone to help the hooks slide more easily, and attach the hooks to the cable.

William Webb
Signal Mountain, TN



install screws in Close Quarters



Recently, when attaching a solid-wood top to a project, I had to reach in through a tight space to tighten screws. There wasn't enough clearance to use a cordless drill or screwdriver, but I remembered that screwdriver bits from my drill fit exactly into a 1/4" socket. I mounted the bit on the socket wrench and easily tightened the screws.

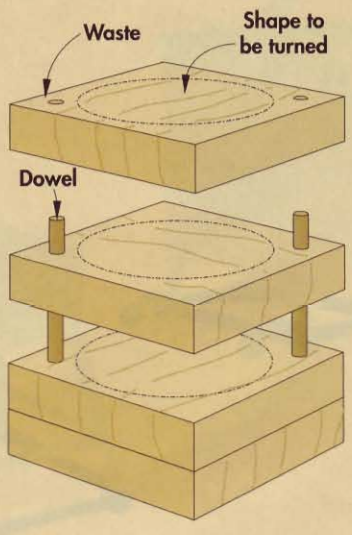
James Ganotes
Nipomo, CA

dowel "keys" align TURNING BLANKS

When gluing boards face to face to make turning blanks for my lathe, the pieces often slip in every direction as I apply pressure with clamps.

To remedy this, I came up with this solution. After all the pieces are cut, draw a circle on the bottom piece and drill two holes outside of the circle diagonally across from each other. Then, use dowels as keys that will hold all the pieces in line. Put the dowels (as tall as the finished blank) in the holes, and repeat the process as you glue successive pieces, sliding each one over the dowels.

Now the pieces won't slip when clamped. After the glue is dry, use a band saw to trim off the corners, including the dowels.



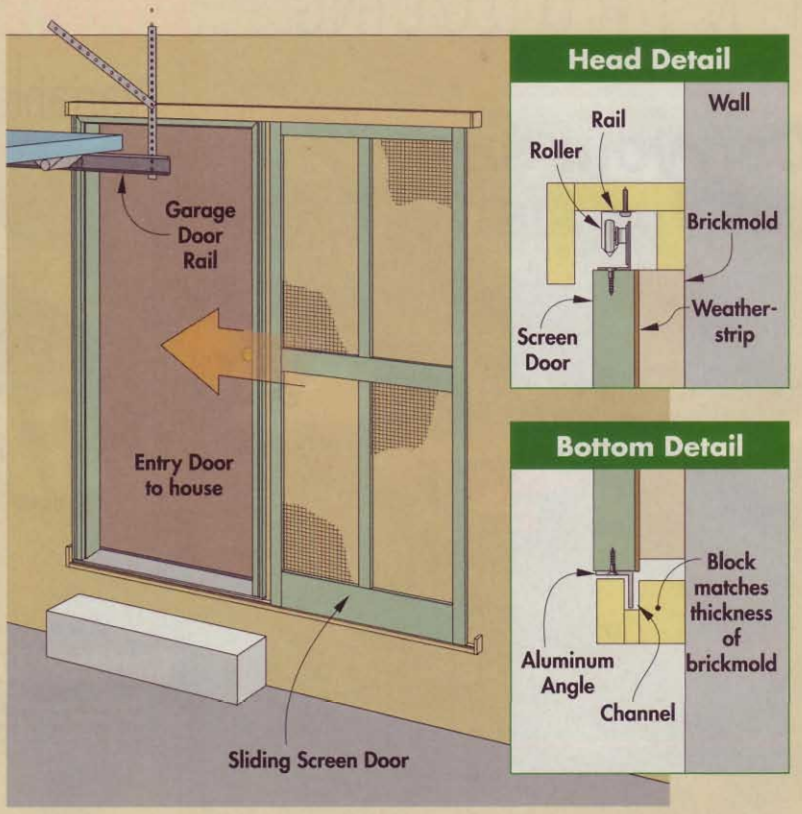
Frank Moore
Chesapeake, VA

sliding screen door SAVES SPACE

There isn't enough room in my garage for a swing-out screen door. After installing a pocket door inside my house, however, I realized that a screen door can slide to the side, too.

For about $60, I bought a wood screen door, a pocket door hardware kit, some aluminum angle, a few pieces of wood, and handles for the door. The pocket door rollers attach to the top of the screen door, where they ride along a rail attached above. The aluminum angle on the bottom of the door travels through a channel. To avoid interference from the brickmolding around the door, I had to build out from the wall *(see Head Detail and Bottom Detail at right)*.

Bruce Finney
Camillus, NY

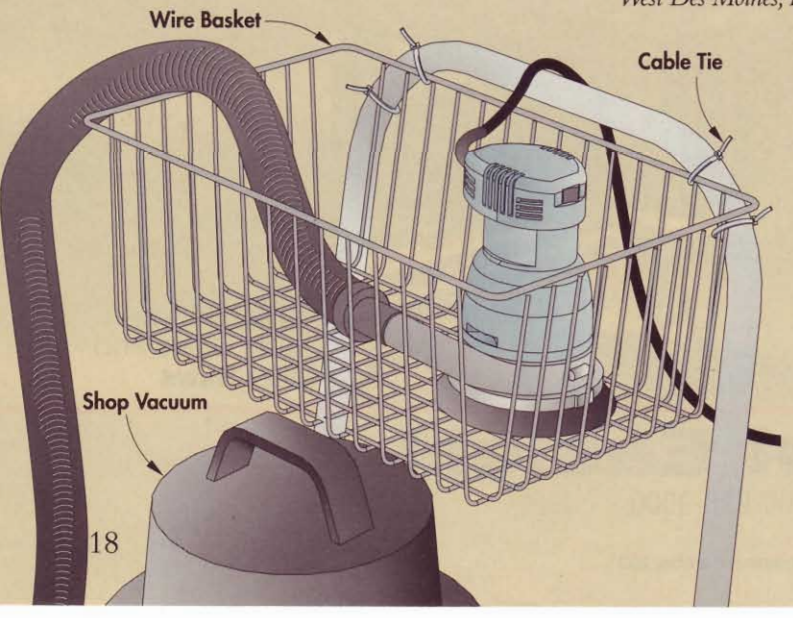


safe perch for POWER TOOLS

To keep dust under control, I connect as many of my portable power tools as possible to my shop vacuum. The problem is that after I put a tool down on the workbench, I inevitably become entangled in the vacuum hose, and the tool crashes to the floor.

To avoid this expensive situation, I bought a wire basket at a home center and attached it to the handle of my vacuum with plastic "zip"-style cable ties. Now, my tools have a safe place to rest between uses.

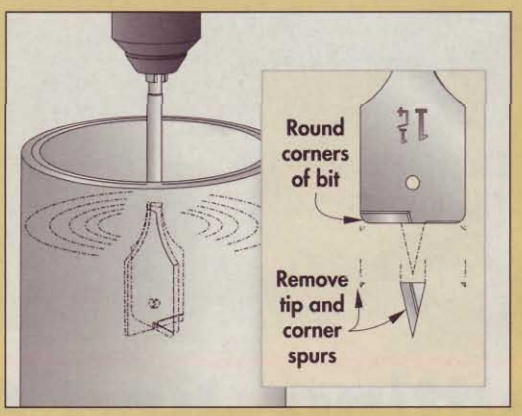
Jim Downing
West Des Moines, IA



new use for Old Spade Bits

I save dull spade bits to use as mixing blades for small cans of paint. For gallons, I use an extension. Make sure you grind off the points and round off the corners of the bits, or you could drill through the paint can. Chuck the bit into a variable-speed drill, and start slowly to avoid splatters.

F.E. Ralston
San Jose, CA



no-slip biscuit joiner

When using a biscuit joiner to cut slots in the end grain of a board *(Photo, right)*, the joiner tends to slip to the side. I found that attaching a piece of 80-grit self-adhesive sandpaper to the fence helps keep the joiner from slipping. Make sure the surface where you apply the sandpaper is clean and oil-free so the sandpaper will stick and stay in place.

Paul Muszynski
Harrison, ME

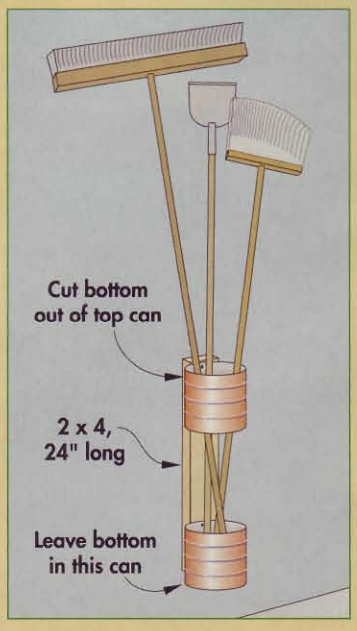
coffee cans

"Can" the Clutter

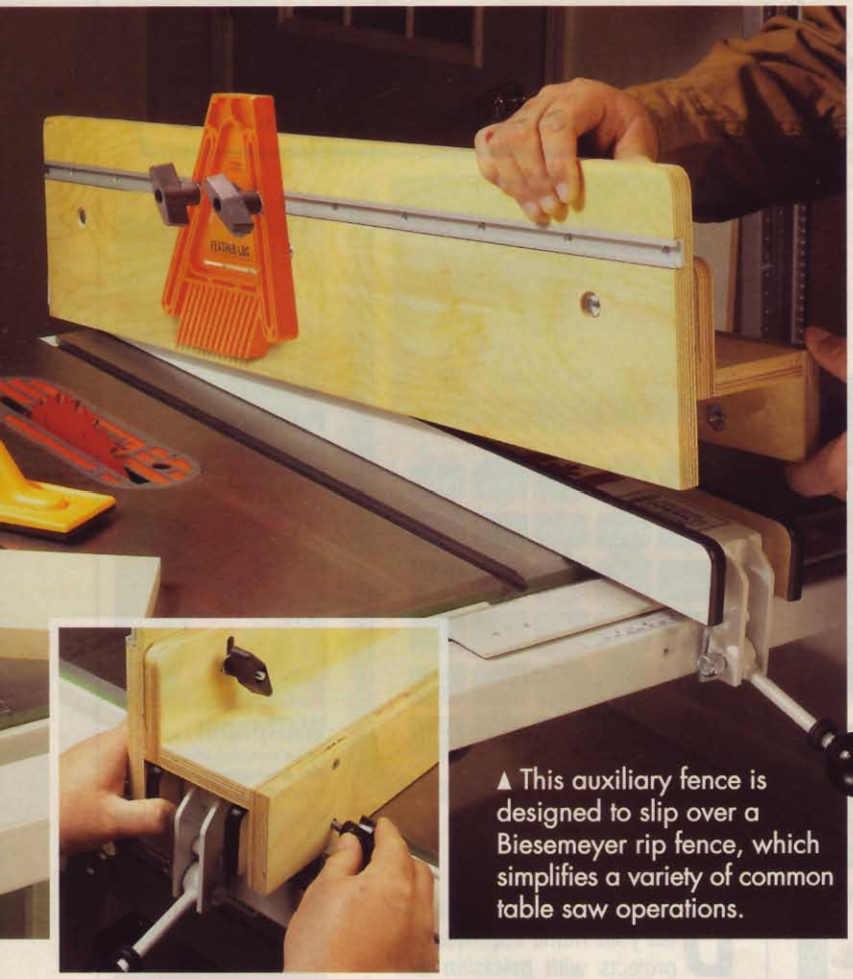
Here's a simple solution for storing long-handled tools like shovels and brooms — a couple of coffee cans nailed to a board that's attached to a wall.

The bottom can holds the ends of the handles, and the top can holds them upright.

Ray Louverison
Hemet, CA



multipurpose SLIP-ON FENCE



▲ This auxiliary fence is designed to slip over a Biesemeyer rip fence, which simplifies a variety of common table saw operations.

Adding an auxiliary fence to the rip fence on a table saw is a fairly common task. It's a good way to provide support for a large workpiece, like when cutting bevels to make a raised panel.

In addition, an auxiliary fence lets you "bury" the saw blade when cutting a rabbet. This way, the blade cuts into the auxiliary fence — *not* the rip fence.

The only problem is attaching an auxiliary fence can be a hassle. Clamps often get in the way as you make a cut. And if you use machine screws or bolts, it requires drilling holes in the rip fence.

Slip-On Fence — To solve that problem, Thomas Prejean of Sulphur, Louisiana, came up with an auxiliary fence that slips over the rip fence on a table saw like a saddle. Tightening two knobs on the back side of the fence "locks" it in place *(Inset Photo)*.

Height Adjustable — Besides its "easy-on, easy-off" capability, this fence also can be raised up off the surface of the table saw. This allows the blade to sit below the fence, which comes in handy when making cuts like those shown in the *Sidebar* below.

T-Track — One last feature is a metal T-shaped track housed in the fence. This T-track makes it easy to mount a featherboard, which is great for holding workpieces flat on the table saw.

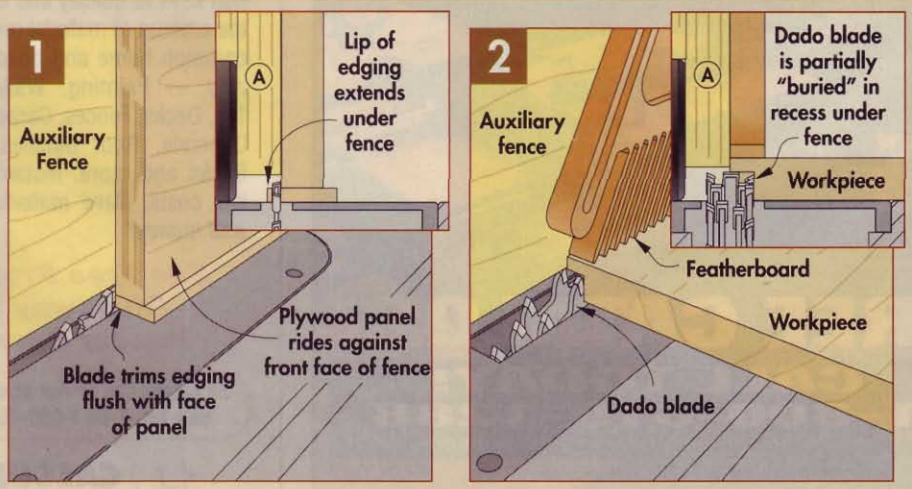
Fence Construction — This auxiliary fence consists of four main parts, all made from 3/4" Baltic birch plywood. A tall front face (A) and short back face (B) straddle the sides of the rip fence *(see Fence*

Raising the Fence to New Heights

Here are two situations where raising the auxiliary fence above the saw table comes in handy.

Edging — First, it's great for trimming solid-wood edging flush with the face of a plywood panel *(Fig. 1)*. Notice how the lip of the edging fits into the recess below the fence during the cut.

Rabbets — It's also convenient when cutting rabbets *(Fig. 2)*. With part of the dado blade under the fence, you can cut a full-width rabbet in one pass.



Assembly and End View Detail below). And a spacer strip (C) and mounting plate (D) form an L-shaped assembly that fits between the two faces.

When sizing the parts, determining the length is easy. They're cut to match the length of the rip fence (34", in my case). As for width, you can use the dimensions shown in the *Parts View* below — with one exception.

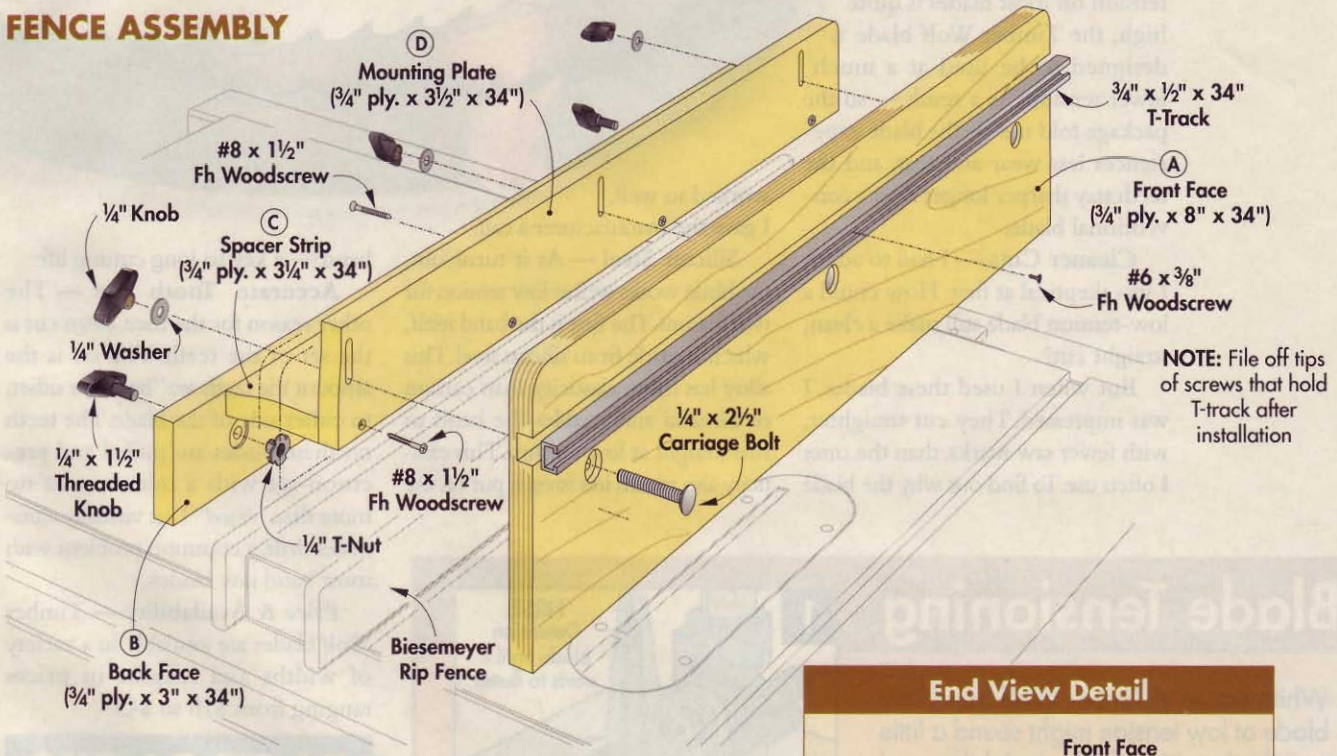
The exception is the spacer strip (C). This strip determines the fit of the auxiliary fence on the rip fence. The goal is a snug fit — not too tight and not too loose. To accomplish that, rip the spacer strip to width so that, once it's attached to the mounting plate, the L-shaped assembly that's formed matches the width of your rip fence.

Adjustment Slots — To make it possible to raise and lower the fence, the next step is to cut three adjustment slots in the mounting plate. Then drill counterbored shank holes in the front face for mounting bolts that pass through the slots. By loosening the knobs on these bolts, you can slide the front face up and down on the mounting plate. Tightening the bolts locks it in place.

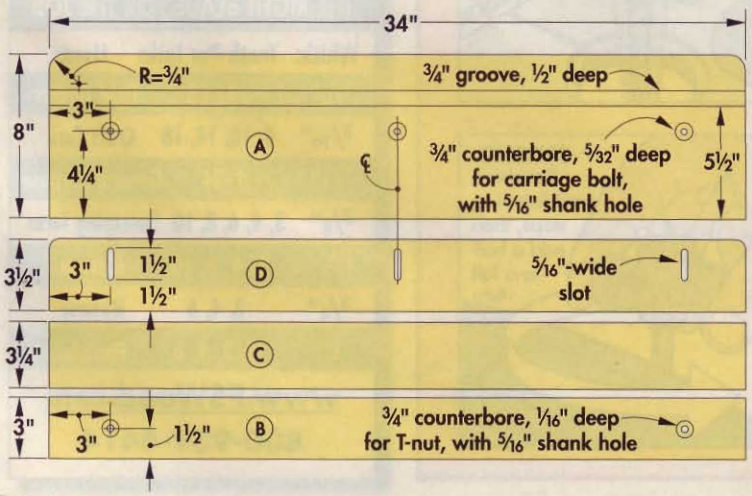
Mounting Hardware — The auxiliary fence is secured to the rip fence with a couple of plastic knobs that thread into T-nuts installed in the back face. Tightening these knobs exerts pressure against the rip fence, which "locks" the auxiliary fence.

Add T-Track & Assemble — All that's left is to cut a groove in the front face to hold the metal T-track. (T-Track can be purchased at www.Rockler.com) After fastening the T-track into the groove with screws, it's just a matter of assembling the fence, as shown below.

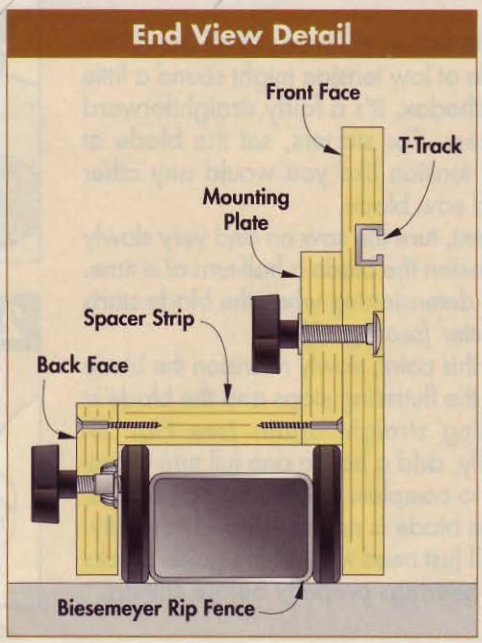
FENCE ASSEMBLY



PARTS VIEW



End View Detail



Low-Tension BAND SAW BLADES

On a recent tool shopping trip, two words on the package of a new Timber Wolf band saw blade caught my eye — "low tension."

Longer Life — While the tension on most blades is quite high, the Timber Wolf blade is designed to be used at a much lower tension. As a result — so the package told me — the blade experiences less wear and tear, and the teeth stay sharper longer than a conventional blade.

Cleaner Cuts — I had to admit I was skeptical at first. How could a low-tension blade still make a clean, straight cut?

But when I used these blades, I was impressed. They cut straighter, with fewer saw marks, than the ones I often use. To find out why the blade worked so well, I gave the manufacturer a call.

Silicon Steel — As it turns out, the blade works well at low tension for two reasons. The first is the band itself, which is made from silicon steel. This alloy has more elasticity than carbon or bimetal and enables the band to run straight at low tension. This elasticity also means less stress is put on the band — a key to long cutting life.

Accurate Tooth Set — The other reason for the nice, clean cut is the set of the teeth. The set is the amount the teeth are "bent," or offset, to either side of the blade. The teeth on these blades are milled and precision-set with a tolerance of no more than $1/2{,}000$". This virtually eliminates drift, a common problem with most band saw blades.

Price & Availability — Timber Wolf blades are available in a variety of widths and lengths in prices ranging from $15 to $45.

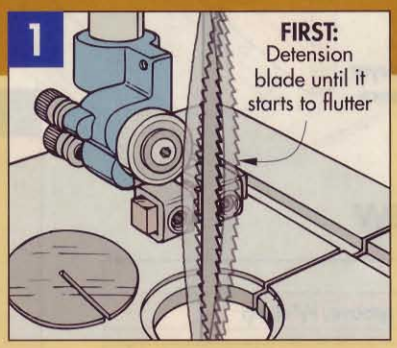
Blade Tensioning

While setting a Timber Wolf band saw blade at low tension might sound a little unorthodox, it's a fairly straightforward process. For starters, set the blade at high tension like you would any other band saw blade.

Next, turn the saw on and very slowly detension the blade a half-turn at a time. *Stop detensioning when the blade starts* to flutter *(see Fig. 1)*.

At this point, slowly retension the blade until the fluttering stops and the blade is running straight again *(see Fig. 2)*. Finally, add a half to one full turn of tension to complete the tensioning process.

The blade is now tensioned correctly. You'll just need to reset the guide blocks and bearings properly before cutting.



FAST FACTS
THE RIGHT BLADE FOR THE JOB

Width:	Teeth Per Inch:	Uses:
1/8"	14, 18	Tight Radius
3/16"	4, 10, 14, 18	Craft Cuts
1/4"	4–24	General Purpose
3/8"	3, 4, 6, 8, 10	Sweeping Turns
1/2"	3, 4, 6, 10	Resaw
3/4"	3, 4, 6	Resaw
1"	2, 3, 4, 6	Resaw

www.PSWood.com
800-939-4414

Burgess Edge System
A BETTER WAY TO EDGEBAND

When building projects out of plywood, gluing strips of hardwood to the exposed edge is the typical way to make the shelf look like a solid-wood panel.

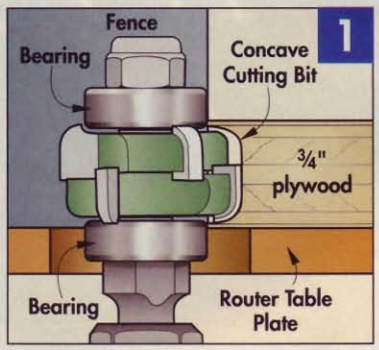
The problem is that applying these strips can get to be a real chore. They often slip out of alignment when you clamp them in place. And even worse, the strips can peel off if they get caught on something.

Improved Edgebanding — The Burgess Edge system eliminates both of these problems. This system consists of two router bits. One bit cuts a concave recess in the edge of a 3/4" plywood panel *(above left)*. The other makes a matching convex profile in a piece of hardwood *(above right)*. The result is perfectly aligned edgebanding *(Photo, below)*.

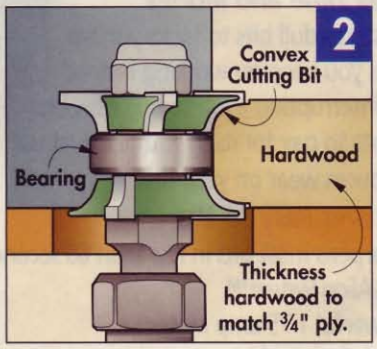
Adjust with Shims — To make this work, you may have to "fine tune" the bits. A set of supplied shims makes that a snap. The goal here is to shim the concave cutting bit so it leaves a thin lip of veneer on the top and bottom faces of the plywood after the cut. Then, set up the convex cutting bit with the same configuration of shims to create a matching profile in the hardwood.

Step by Step — Once the bits are adjusted properly, make the edgebanding by following the process shown below. Note that even though the concave cutting bit comes with bearings, using a router fence provides a more controlled cut *(Fig. 1)*. When you switch to the convex cutting bit, start by using an extra-wide board *(Fig. 2)*. After glue-up, you'll rip it down to a veneer thickness along the edge *(Figs. 3 and 4)*.

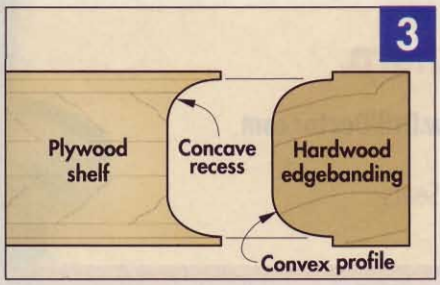
Pricing — The Burgess router bits are available for $129. For more information, visit www.BurgessEdge.com or call 802-233-1489.

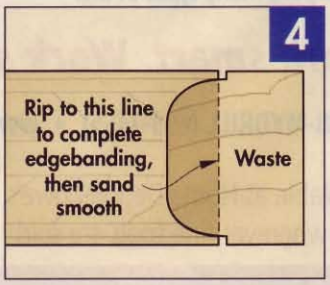


▲ **Rout Plywood:** First, rout the concave recess in plywood. A fence provides extra stability.



▲ **Rout Hardwood:** Then, rout the matching convex profile in hardwood the same thickness.





▲ **Add the Edge:** The hardwood edgebanding now locks in place with the plywood and aligns perfectly. After glue-up, rip the edgebanding to width on the table saw and sand it smooth *(Photo, left)*.

◄ **Finished Edge:** The routed pieces fit together like a nut in a shell, so the edgebanding won't slip when clamped. And the large glue surface creates a strong joint.

TIPS FROM THE WORKBENCH SHOP

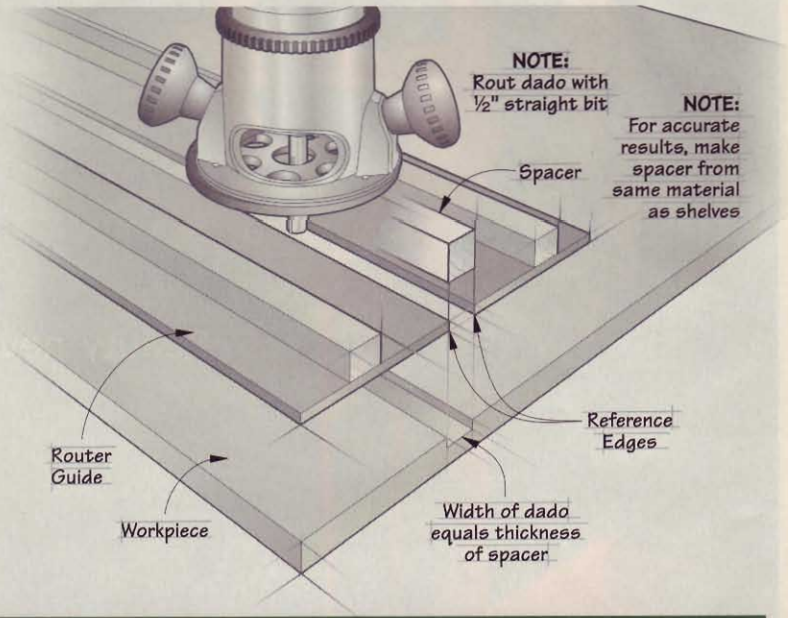
routing

DEAD-ON DADOES

The fixed shelves of the Home Theater *(page 38)* fit into dadoes cut in the side panels of the cabinet. To get perfect-fitting dado joints, I used a hand-held router, a $1/2$" straight bit, and a pair of shop-made guides.

The important thing about the guides is that each one has a "reference edge" that indicates the path of the bit. A spacer — made from the same material as the shelves — is sandwiched between these reference edges to establish the shoulders of the dado *(Illustration, right)*. Since the bit will cut precisely along the reference edges, the resulting dado will be exactly the correct width.

The *Sidebar* below explains how to make the guides. Refer to page 30 for information on setup and use.

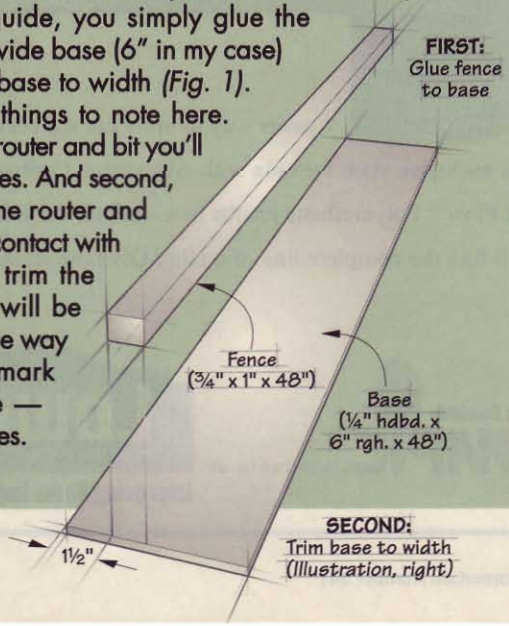


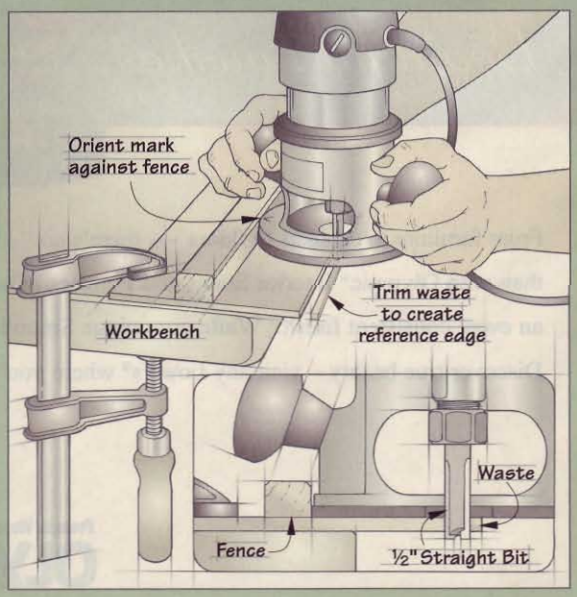
Shop-Made Router Guides

Each router guide consists of two parts: a $1/4$" hardboard base that serves as a platform for the router and a $3/4$"-thick wood fence that guides the base of the router *(see Illustration below)*.

To make the guide, you simply glue the fence to an extra-wide base (6" in my case) and then trim the base to width *(Fig. 1)*.

There are two things to note here. First, use the same router and bit you'll use to cut the dadoes. And second, make a mark on the router and keep that mark in contact with the fence as you trim the base. The router will be oriented in the same way — with the mark against the fence — when cutting dadoes.





Setup & Use

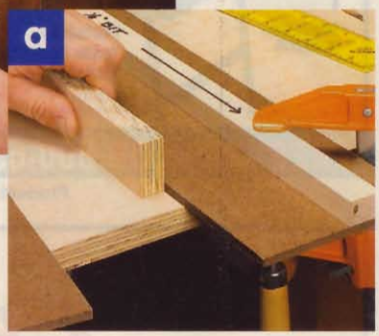
With both of the router guides completed, setting them up to cut a dado in the plywood panel only takes a few minutes.

Lay Out Dado — The first step is to lay out the location of one shoulder — and only one shoulder — of the dado. (I'll explain why you don't need to lay out both shoulders in a minute.) It's also a good idea to mark an 'X' on the waste side of the line to avoid accidentally cutting the dado in the wrong place.

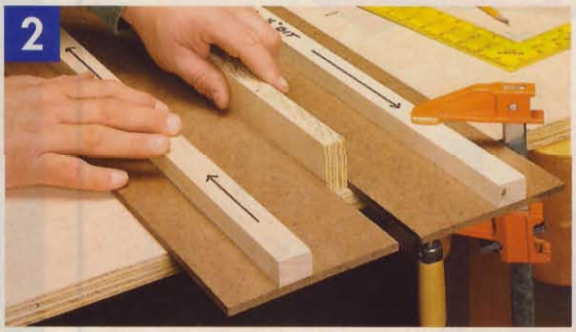
Position First Guide — Once the layout is complete, it's time to position the first router guide on the panel. This is where the reference edge on the guide comes into play. As you can see in *Figs. 1 and 1a*, the idea is to align this reference edge with the layout line on the panel. Then clamp the guide in place.

And Now the Second — The next step is to position the second guide. The idea is to align the reference edge of this guide with the other shoulder of the dado. But as I mentioned, there's no need to mark the location of this shoulder. Thanks to the spacer, it's automatic.

As you recall, the spacer matches the thickness of the shelf. (You'll want to use a scrap piece of the shelving material.) This means it's identical to the desired width of the dado. So you simply set the spacer against the first guide and butt the second guide against it *(Fig. 2)*.



▲ Align First Router Guide
To position the first guide, lay out the location of one shoulder of the dado. Align the reference edge of the guide with the layout lines and clamp it in place.

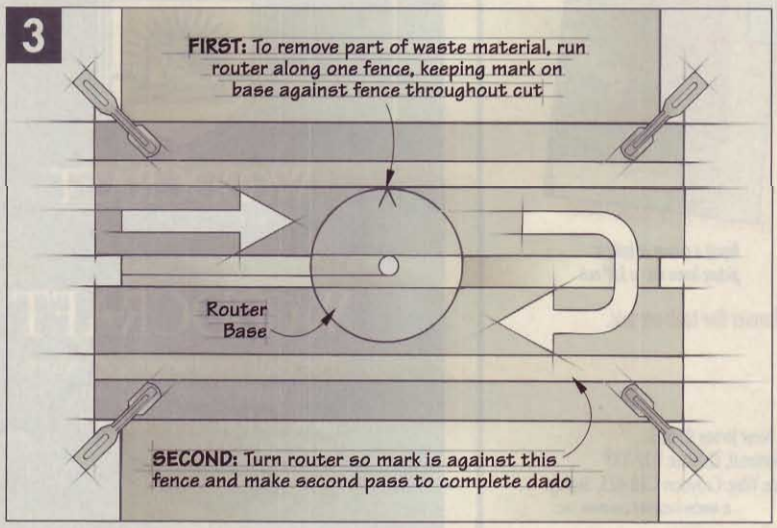


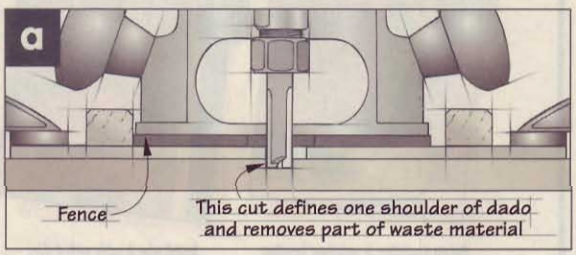
◀ Use Spacer As Gauge
To align the second guide, use the spacer as a thickness gauge. Set the spacer against the reference edge on the first guide, butt the second guide against it, and then clamp it in place.

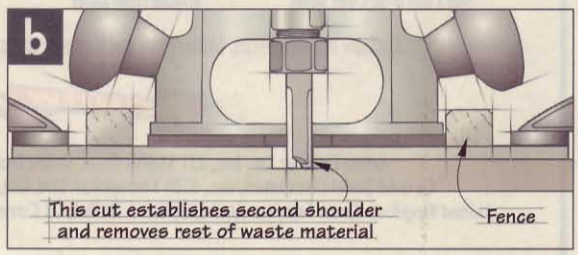
Rout Dado — After clamping the second guide in place and removing the spacer, you're ready to rout the dado. This is accomplished by making two overlapping passes.

To define one shoulder of the dado (and remove part of the waste material), turn on the router and hold it firmly against the fence on the first guide as you rout from left to right *(Figs. 3 and 3a)*. Don't forget to orient the mark on the base of the router toward the fence. This way, if the bit isn't exactly centered in the base of the router, it will still cut precisely along the reference edge of the guide.

After routing across the panel, turn the router so the mark is oriented toward the fence on the second guide *(Figs. 3 and 3b)*. Then rout along that fence in the direction shown. This produces a tight-fitting dado joint every time.







TIPS FROM THE WORKBENCH SHOP

tapers on a TABLE SAW

Using the table saw to make a long, angled cut on a workpiece can be a challenge. That's exactly what you have to do, though, when making the legs for the Craftsman table featured on page 52.

One consideration is how to make the tapered cuts safely. And since you'll need to make eight cuts altogether (two for each leg), what's the best way to ensure the tapers are identical?

The answer is a "sled" that's used to carry the workpiece through the saw blade *(see Photo above)*. A set of cleats attached to the sled hold the leg at the correct angle and prevent it from shifting during the cut.

Construction — This sled is made up of a base, a side cleat, and a front and back cleat *(Construction View, below)*. I used 3/4" medium-density fiberboard (MDF) for these parts, but plywood would also work fine.

The size of the base isn't critical. It just has to be large enough to hold the leg and cleats. Before attaching the cleats, set the rip fence to rip a thin sliver from the edge of the base. As long as you don't move the fence, this edge will indicate the path of the saw blade, and it will be used to align the workpiece on the sled.

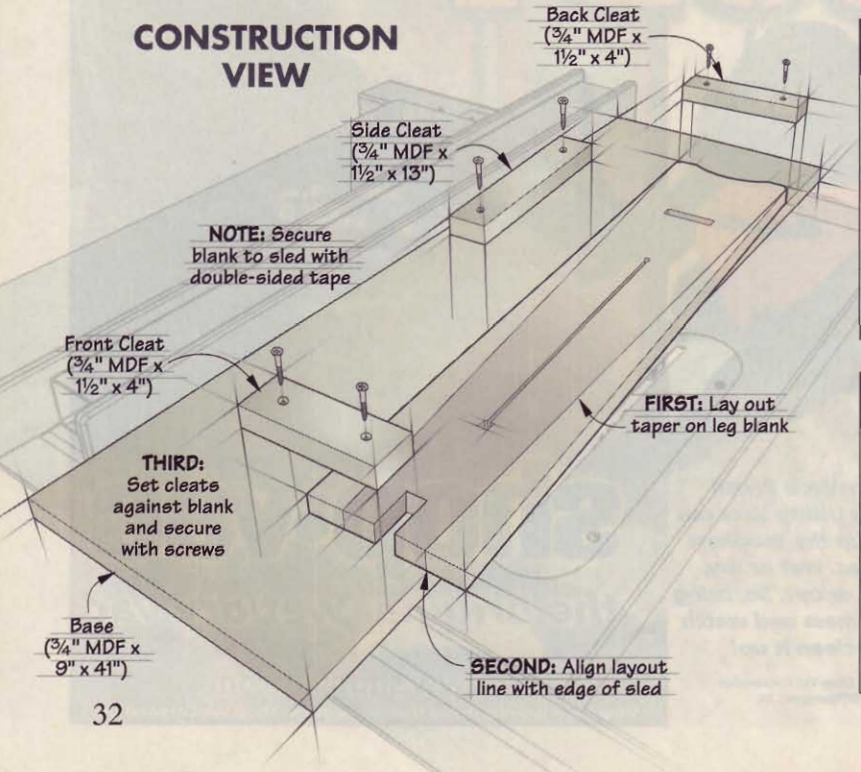
Layout — To do that, start by laying out the taper on one leg. The idea is to align this layout line with the cut edge of the sled. But first, to keep the leg from shifting while making a cut, attach several strips of double-sided tape. Then carefully align the leg as shown, and press it firmly into place.

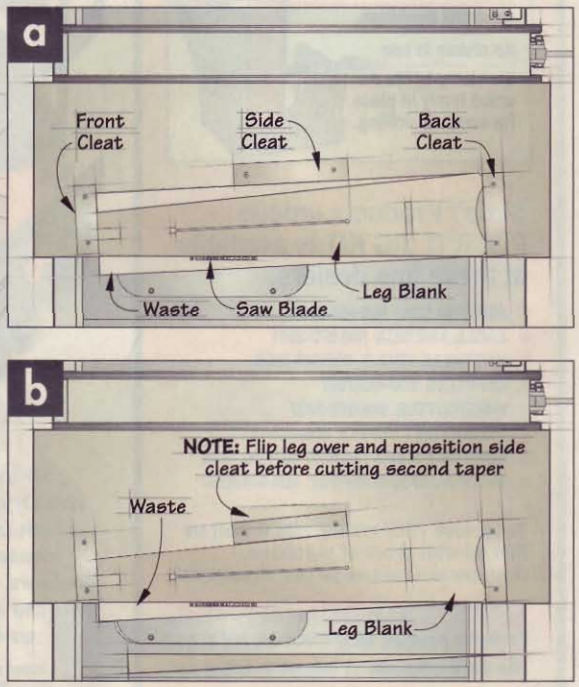
Attach Cleats — Once the leg is in place, butt the three cleats against it and screw them to the sled.

Time for Tapers — Now turn on the saw and slide the sled against the rip fence, removing a wedge-shaped waste section from one edge of the leg *(Detail a)*. Don't cut the taper on the other edge yet (the side cleat has to be repositioned first). Instead, go ahead and make the tapered cut on one edge of each remaining leg.

You'll need to flip the legs over to make the last four taper cuts. Lay out one taper as before, align it with the edge of the sled, and butt the side cleat against the leg *(Detail b)*. Attach the cleat and make the remaining cuts.

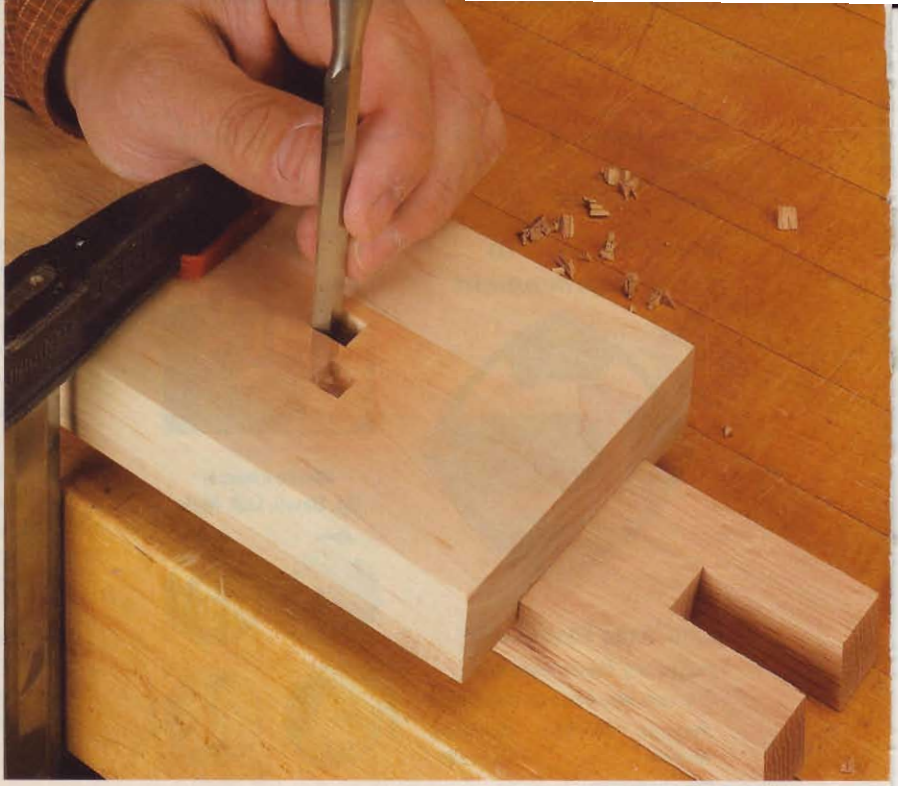
CONSTRUCTION VIEW





TIPS FROM THE WORKBENCH SHOP

chisel guide SQUARES MORTISE



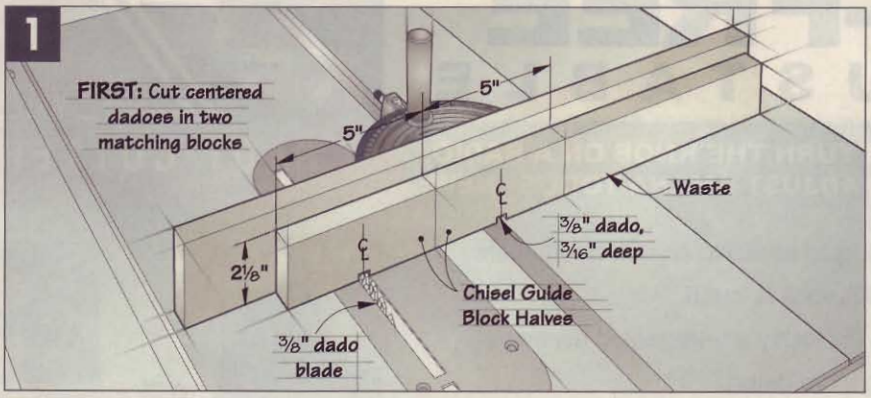
One of the decorative touches on the Craftsman End Table *(page 52)* is a long, narrow slot, which is punctuated at the top end with a square mortise *(Photo, left)*.

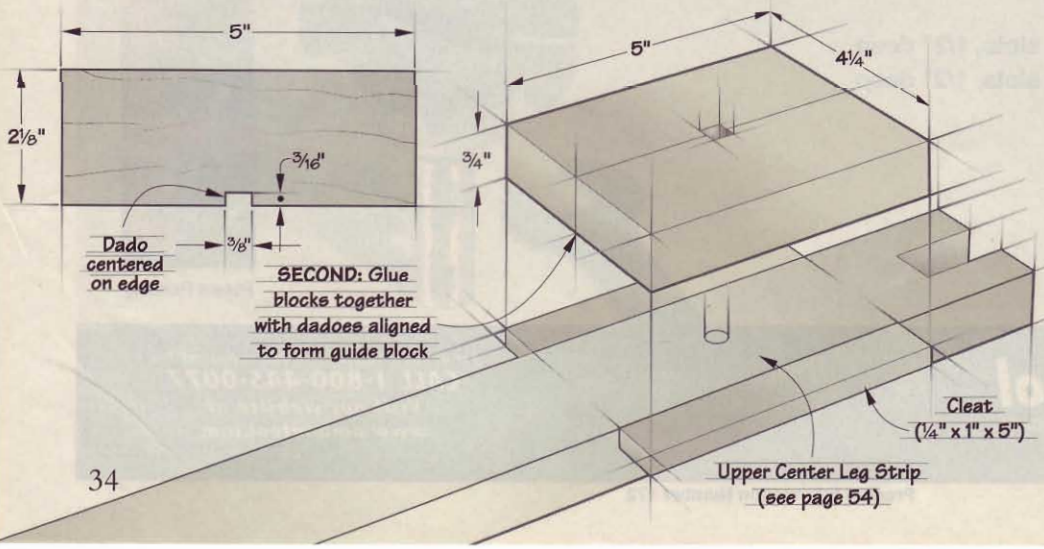
A quick way to cut this mortise is to drill a hole and then square up the sides with a chisel. It's this second part — the hand work with a chisel — that needs the most attention. Since the mortise is in a highly visible location, the sides have to be smooth, straight, and square. Plus, each mortise must be identical in size and located in the same place on the leg.

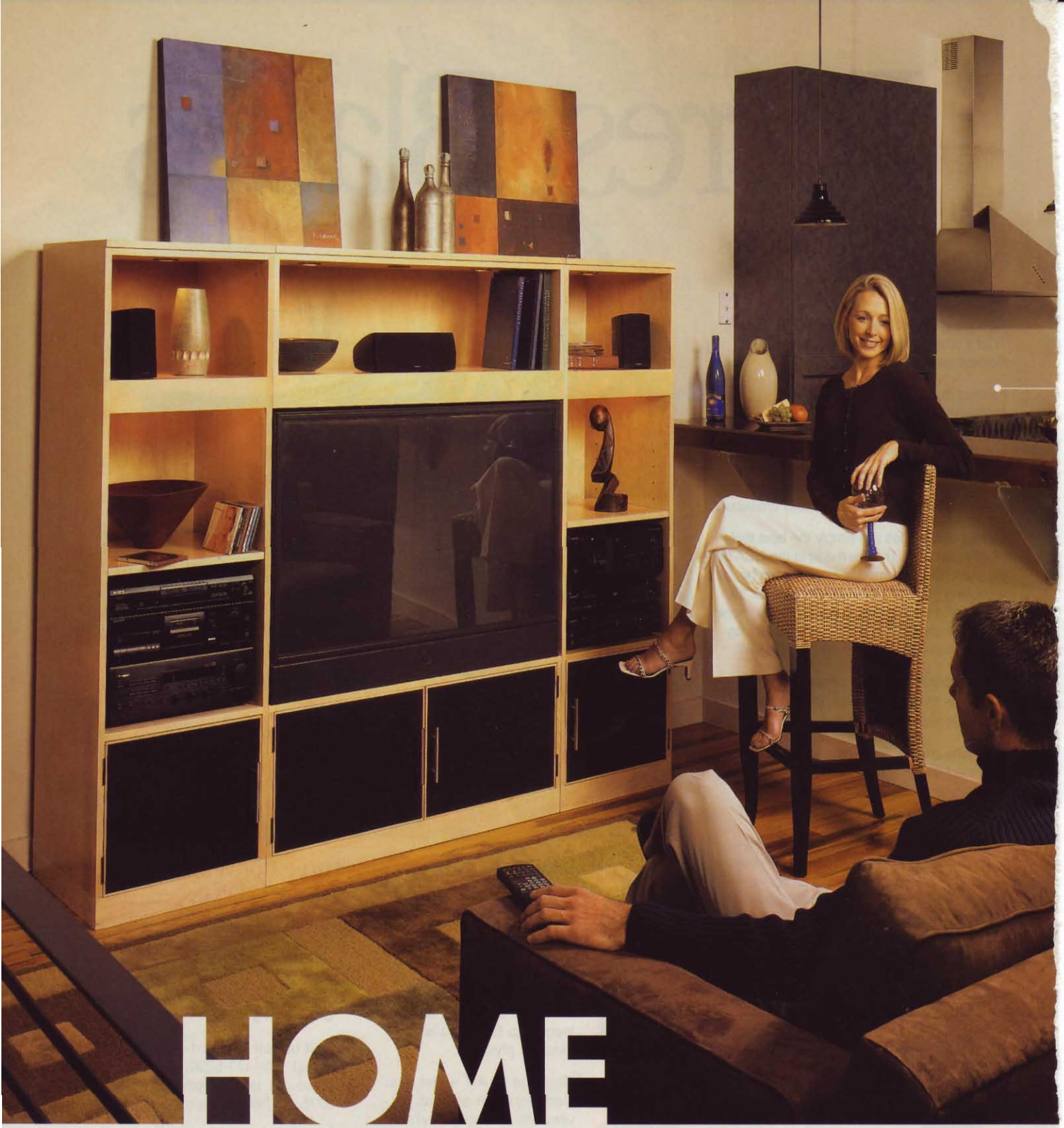
Guide Block — To accomplish that, I used a guide block that straddles the leg like a saddle. A mortise in this guide block makes it easy to hold the chisel straight up and down while paring the sides of the mortise in the leg *(Photo, above)*. Two cleats attached to the bottom fit against the leg, which automatically locates the mortise in the same place on the width of each leg *(Illustration, below left)*.

Of course, to make this work, the mortise in the guide block also has to have square, straight sides. That's accomplished by edge-gluing two blocks, each with a matching dado cut in the edge. By aligning the two dadoes, you end up with a square mortise. Note: For safety, cut the dadoes in an extra-long piece *(Fig. 1)*.

Using the Guide Block — To use the guide block, fit it over the leg and clamp it in place. Then hold the chisel against the block as you carefully pare the sides of the mortise. To avoid chipout, it's best to work from both sides of the leg, cutting halfway down from each side.







HOME THEATER

planning, construction & solutions

ONE CABINET STYLE, MULTIPLE OPTIONS

Designed to hold today's large-screen TVs and home theater components, this modular entertainment center can be built in a variety of configurations. Here, a pedestal cabinet supports a tabletop TV, and cloth-panel doors conceal the speakers.

Trade the pedestal for a floor-standing TV, then add doors with glass and plywood panels, and this versatile setup takes on a whole new feel.

Entertainment centers of the past weren't built to handle today's massive rear-projection, cinema-display televisions. Our updated design, however, fits the bill nicely. And though you might not realize it from the project's sleek and classy appearance, this modular design is simply a series of plywood boxes dressed up with solid-wood edging and optional doors. It can be built in a number of configurations, and some of the parts, like the towers or the TV pedestal, can be built as separate, stand-alone projects.

For a Big TV — In the configuration shown in the *Photo* at left, a tabletop rear-projection television rests upon a pedestal cabinet. The television and pedestal are bordered by towers that house audio/visual components, videos, compact discs, and other decor. Each tower has two fixed shelves (the upper and lower) and one adjustable shelf (the middle).

The towers are connected by a bridge that spans the top of the TV and provides additional storage or display space. This bridge is supported by hardwood cleats attached to the towers.

Also notice that the doors in the pedestal and towers are cloth-covered. We did this so we could tuck the speakers out of sight without sacrificing any sound.

The towers and TV pedestal each sit atop a hardwood base. Attached inside the base and hidden from view are four adjustable feet for leveling the units.

For a REALLY Big TV —A slightly different version of the home theater is shown in the *Photo* above. This time, the TV pedestal is gone to make room for a large floor-standing television.

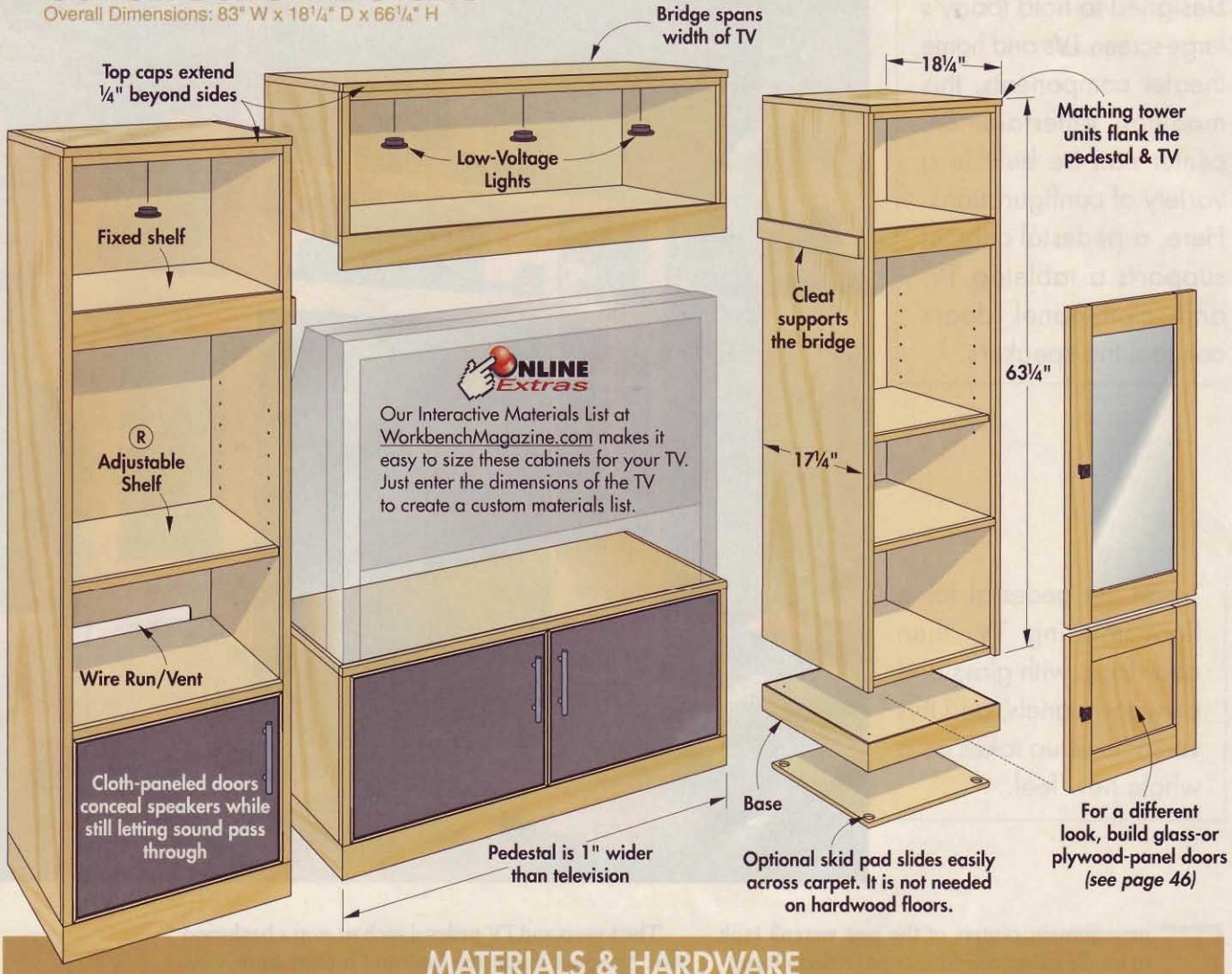
Otherwise the main elements of the center remain the same — a tower on each side of the television and a bridge across the top. Notice, however, that frame-and-panel doors have replaced the cloth-paneled doors for a more formal appearance.

From this view, you can see one final detail that's common to both versions of this home theater. Low-voltage lights cast a warm glow on the upper compartments in the towers and bridge. We also added incandescent tubular lighting under the upper fixed shelf to make it easy to see the controls of electronic components.

Before You Build — If the idea of creating a home theater appeals to you, but you don't know the difference between DVD and HDTV, we can help. Our "Home Theater Planning Guide" on page 48 has all the information you need to make your entertainment center the star in your very own home screening room.

Construction Details

Overall Dimensions: 83" W x 18¼" D x 66¼" H



MATERIALS & HARDWARE

	Part	Qty	T	W	L	Material
A	Pedestal Top/Bottom	2	¾"	16¼"	42"	Maple Plywood
B	Pedestal Sides	2	¾"	17¼"	15"	Maple Plywood
C	Pedestal Divider	1	¾"	16¼"	14"	Maple Plywood
D	Pedestal Back Panel	1	¼"	15"	42½"	Maple Plywood
E	Edging	1	¾"	¾"	65 ft.	Maple Hardwood
F	Pedestal Cap	1	¾"	17¼"	43"	Maple Plywood
G	Base Front/Back	2	¾"	3"	43"	Maple Hardwood
H	Base Ends	2	¾"	3"	18"	Maple Hardwood
I	Base Top	1	¾"	17½"	42½"	Maple Plywood
J	Pedestal Base Skid Pad	1	¾"	16⅜"	41⅜"	MDF
K	Tower Side Panel	4	¾"	17¼"	62½"	Maple Plywood
L	Tower Top	2	¾"	17"	19"	Maple Plywood
M	Tower Bottom	2	¾"	16¼"	19"	Maple Plywood
N	Tower Fixed Shelves	4	¾"	17"	19"	Maple Plywood
O	Upper Back Panel	2	¼"	19½"	13"	Maple Plywood
P	Middle Back Panel	2	¼"	19½"	34¼"	Maple Plywood
Q	Lower Back Panel	2	¼"	19½"	15¼"	Maple Plywood
R	Tower Adjustable Shelf	2	¾"	17¼"	187/16"	Maple Plywood
S	Tower Cap	2	¾"	17½"	18½"	Maple Plywood
T	Tower Trim Board	2	¾"	3"	18½"	Maple Hardwood

	Part	Qty	T	W	L	Material
U	Tower Shelf Cleat	2	¾"	¾"	18½"	Maple Hardwood
V	Tower Base Front/Back	4	¾"	3"	20"	Maple Hardwood
W	Tower Base Ends	4	¾"	3"	18"	Maple Hardwood
X	Tower Base Top	1	¾"	17½"	19½"	Maple Plywood
Y	Tower Base Skid Pad	2	¾"	16⅜"	18⅜"	MDF
Z	Bridge Top/Bottom	2	¾"	17"	42"	Maple Plywood
AA	Bridge Side Panel	2	¾"	17¼"	13½"	Maple Plywood
BB	Bridge Back Panel	1	¼"	42½"	13½"	Maple Plywood
CC	Bridge Cap	1	¾"	17½"	43"	Maple Plywood
DD	Bridge Trim Board	1	¾"	3"	43"	Maple Hardwood
EE	Bridge Shelf Cleat	1	¾"	¾"	41½"	Maple Hardwood
FF	Bridge Support Cleat	2	¾"	2¼"	17¼"	Maple Hardwood
GG	Door Rails (tower)	4	¾"	2"	18⅜"	MapleHardwood
HH	Stiles (tower & ped.)	8	¾"	2"	14⅞"	MapleHardwood
II	Door Panel (tower)	2	¼"	14¼"	17¾"	Plywood
JJ	Door Rails (pedestal)	4	¾"	2"	20⅝"	MapleHardwood
KK	Door Panels (pedestal)	2	¼"	14¼"	20"	Plywood

- (4) 6" Stainless steel bar-style door pulls
- (4) Pairs of 2½" bronze no-mortise hinges
- (4) Magnetic door catches
- (12) Corner supports with adjustable levelers
- (1) 36" x 68" roll of black speaker fabric
- (6) Low-voltage puck-style lights

NOTE: All hardware is available from Rockler.com or call 800-279-4441

big-screen support

TV PEDESTAL

I began work at the heart of this project — the pedestal that supports the television. It's a simple plywood case joined with dadoes and rabbets. A divider separates this unit into two compartments. Along with a plywood cap, it helps strengthen the case.

Size — The pedestal is designed to be 1" wider than the television. The dimensions shown here are for a 42"-wide, 30"-tall television. You'll need to measure your set and adjust the dimensions accordingly. **Note:** For a quick and easy way to do that, log onto WorkbenchMagazine.com and use our Interactive Materials List.

Construction — Begin by cutting the top, bottom (A), and sides (B) to size. Notice that the sides are wider than the top and bottom. This extra width is needed to accommodate two flush-mount doors (added later).

The next step is to cut rabbets in the sides to hold the top and bottom. You'll also need to cut a dado in the top and bottom for the divider (C). The only other joinery is a rabbet in the back edge of the sides to hold the back panel (D) *(see Back Detail below)*.

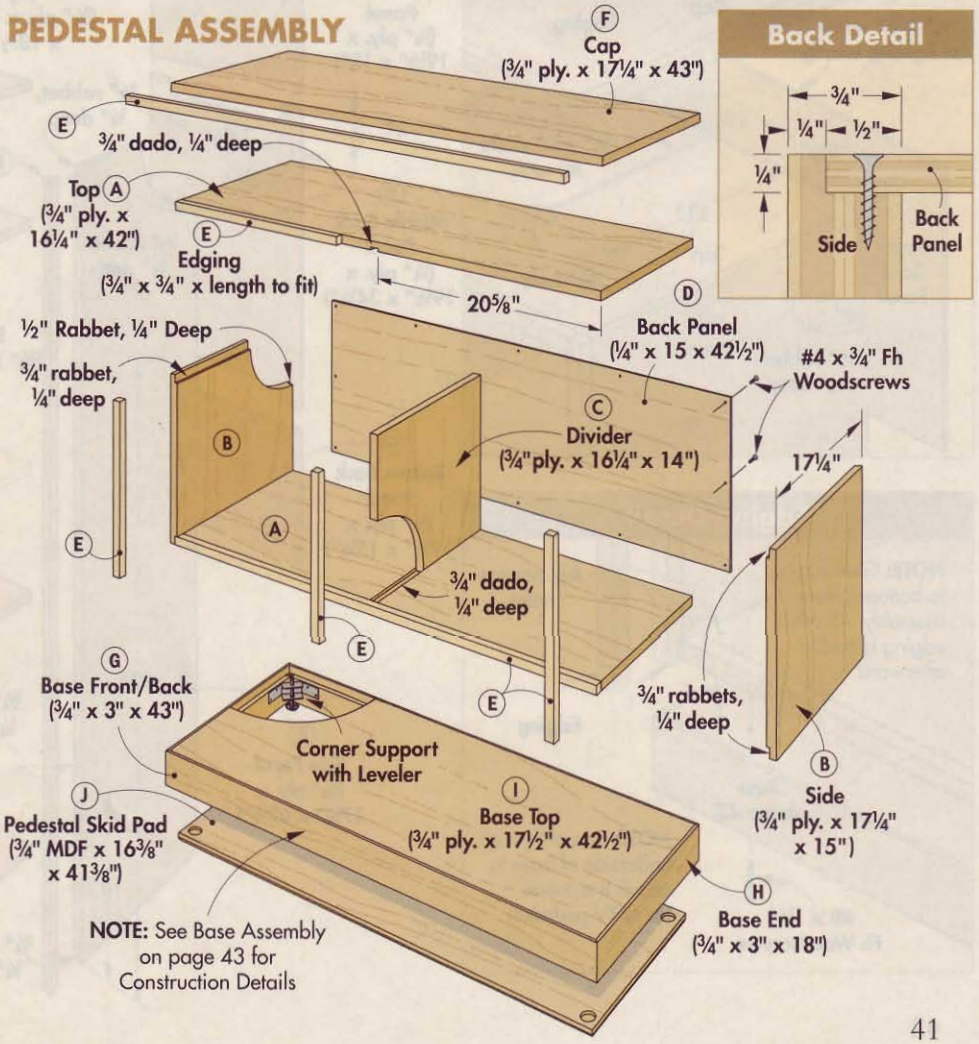
Edging — The exposed edges of the case are covered with hardwood edging (E). Because of the extra-wide sides, the edging on these pieces overlaps the edging on the top and bottom So you'll need to apply the edging as shown in the *Edging Detail* below.

Cap — After assembling the case, cut the large panel for the cap (F) to size, apply edging to the front edge, and glue it to the top of the pedestal.

Base — The last step is to build a base for the pedestal. It's a large version of the smaller bases that will sit under the tower. *(See page 43 for base construction details.)* If the pedestal will sit on carpet, you'll want to add the skid pad (J) to make it easy to slide.

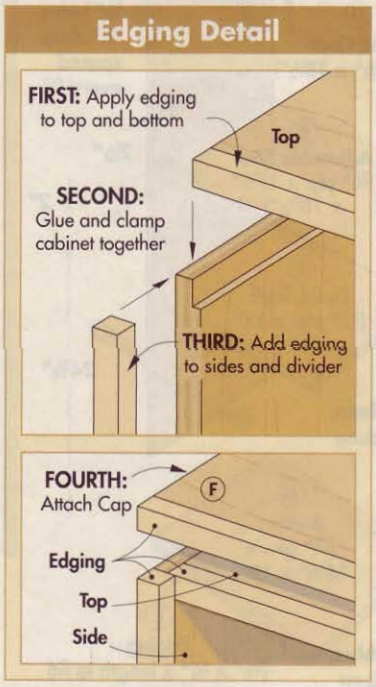
▲ Sizing the pedestal starts with your TV. Make the pedestal 1" wider than the TV.

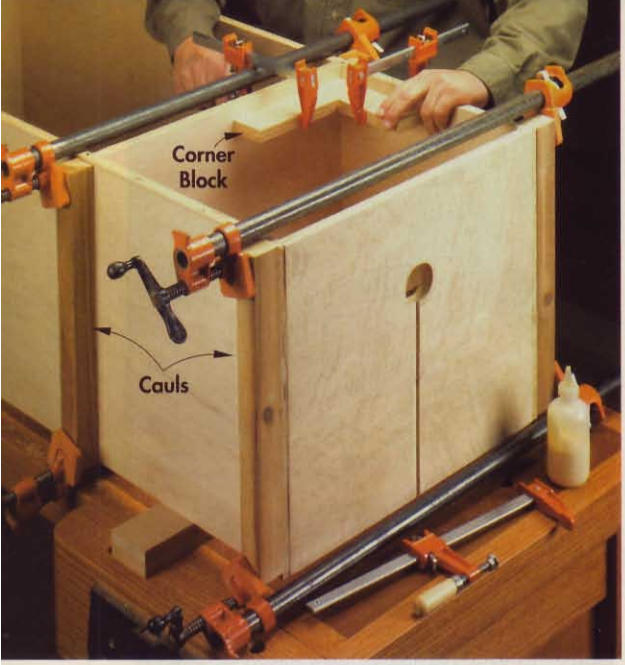
PEDESTAL ASSEMBLY



Back Detail

Edging Detail





▲ Cauls distribute the clamping pressure evenly. Shop-made corner blocks align the cabinet pieces square to each other.

expand the center with

TWO TOWERS

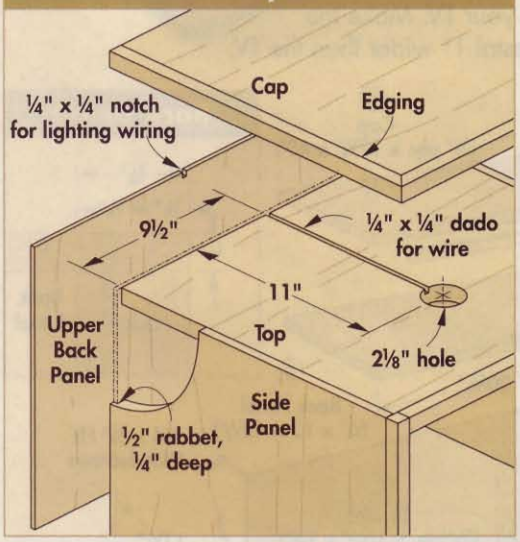
The two towers of this entertainment center, just like the pedestal, are simple plywood boxes. As before, the top and bottom are joined to the sides with rabbets. In addition, two fixed shelves fit into dadoes, and an adjustable shelf rests on shelf pins *(Tower Assembly, below)*.

However, there are several other important details of note in these towers. Here again, the bottom is narrower than the side panels to accommodate a flush-mount door. Then, of course, there are the shelf pin holes for the adjustable shelves. Notice also that the back panel is actually three pieces. I built the back in pieces, so it would be easier to make the openings in the middle panel. These openings provide access to run wiring into the cabinet, and they allow ventilation to keep electronic components cool.

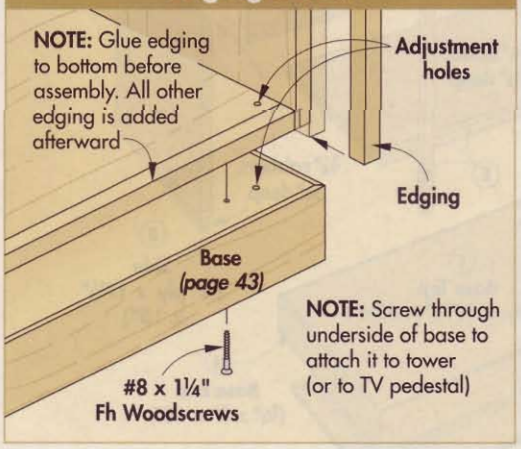
The final detail is the lighting. Low-voltage "puck" lights are installed in the top of the tower to illuminate the upper compartment. And I added tubular incandescent lights under the upper fixed shelf to make it easy to see controls on electronic components.

Before dealing with each of these details, however, you'll need to get

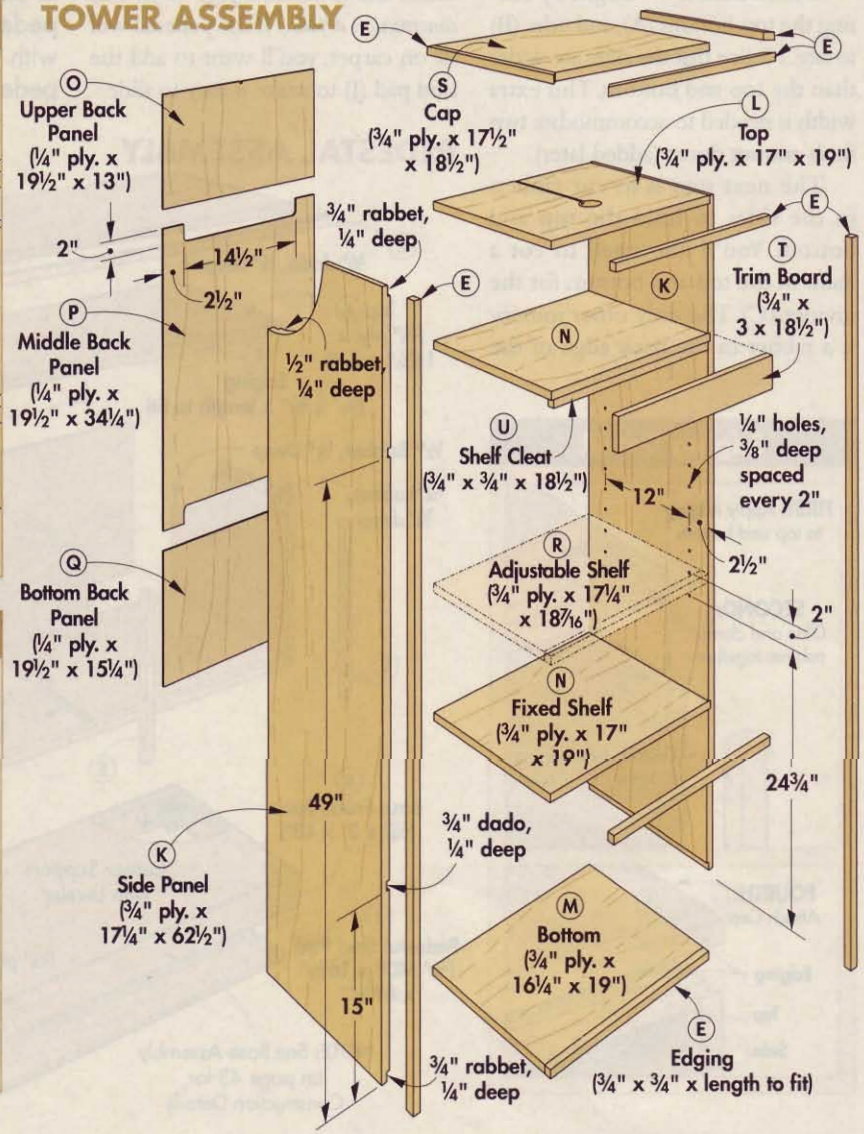
Tower Top Detail



Edging Detail



TOWER ASSEMBLY



some case work done. Start by cutting the tower parts to size. Then rabbet the side panels (K) to hold the top (L) and bottom (M). You'll also need to cut two dadoes in the side panels to hold the fixed shelves (N). Then, rabbet the side panels to accept the three back panels (O,P,Q), as shown in the *Tower Top Detail*, page 42.

Dealing With The Details — Now you're ready to tackle the details. First of all, locate and drill the shelf pin holes *(Tower Assembly)*.

Next come the holes for the low-voltage lights and the dadoes that will serve as wire channels. Locate and cut a hole in the top *(Tower Top Detail)*. Then rout a shallow dado from the hole to the back edge, using either a router table or a handheld router and an edge guide.

Assembly — Just as with the pedestal, you'll need to be mindful of a couple things as you assemble the tower. First, you'll need to apply edging (E) to the bottom of each tower *before* gluing up the cabinet *(Edging Detail)*. The rest of the edging is added after gluing and clamping the cabinet together *(Photo, page 42)*.

Once the tower is assembled, go ahead and add edging to the adjustable shelf (R), as well as the three pieces of edging that "wrap" the plywood cap (S). These pieces are simply mitered to length and glued in place. Finally, the upper fixed shelf is faced with a wide trim board (T). Here, a cleat (U) glued to the underside of the shelf provides a large surface area for gluing on this trim board.

Low-Voltage Lights

The low-voltage "puck" lights in the towers and bridge are wired to a transformer at the back of the cabinet. The lights fit into holes in the top, and the wires follow a channel routed in the top. The holes and channel, which both are completed before assembly, are covered by the cap.

cabinet-leveling bases

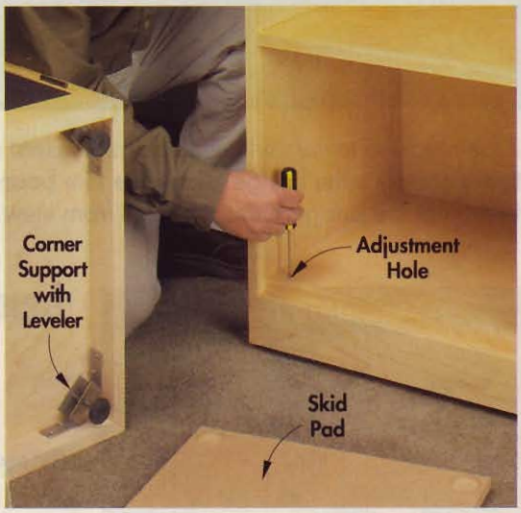
The towers and the TV pedestal are each supported by a hardwood base with four corner supports and levelers. Dimensions for a base to fit the towers are shown in the *Base Assembly*, below. The base for the TV pedestal is detailed on page 41.

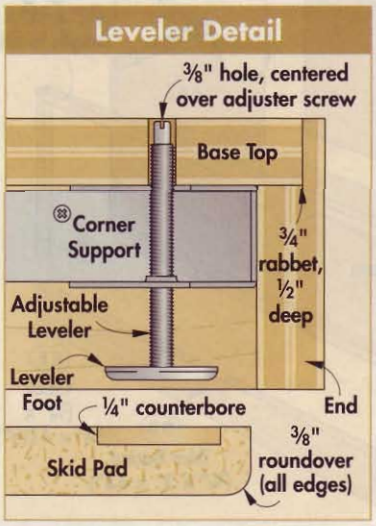
The base itself is quite simple — four hardwood frame pieces are rabbeted to accept a plywood top, mitered to length, and then joined with glue and biscuits.

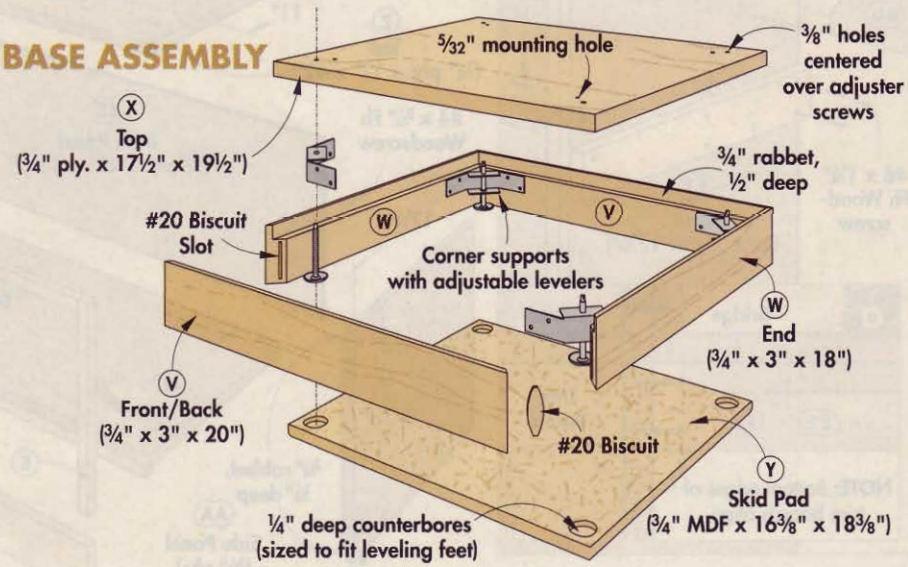
The stickler here is attaching the levelers and making them accessible from above the base. The solution is to drill holes in the top of the base and the bottom of the cabinet. This allows you to adjust the levelers with a screwdriver, as shown at right.

To locate these adjustment holes, use the corner support, with the leveler removed, as a drilling guide.

Optional Skid Pad — If you're planning to set up your home theater in a carpeted room, you'll want to make an optional skid pad for each tower and the pedestal. The pads make it easy to slide the cabinets.







▲ Connect the towers with the bridge. A cleat on each tower supports the bridge. The wide trim board on the bottom of the bridge hides the cleat from view.

spanning the towers

BUILD A BRIDGE

The final cabinet, and the most simple of the four to build, is the bridge that spans the opening between the towers. As with the pedestal, this cabinet is built 1" wider than the television.

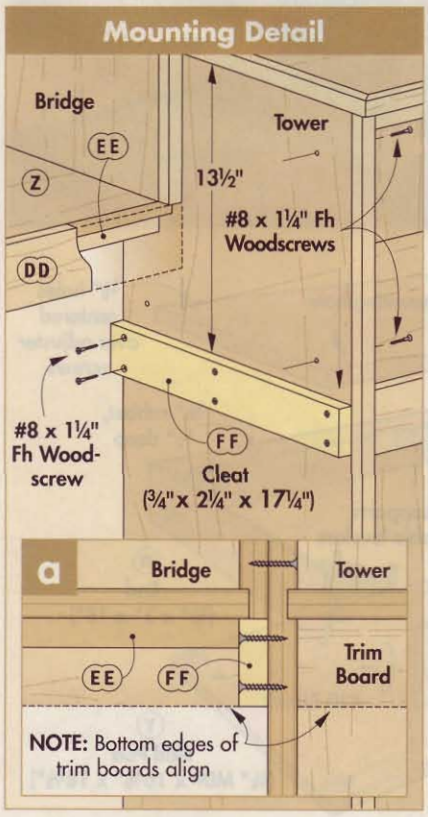
The reason the bridge is less complicated than the other cabinets to build is twofold. First, there are no shelves or dividers, so there are fewer pieces and less joinery. Second, all the edging is set flush. There are no overlaps or setbacks to allow for flush-mount doors like on the other modules.

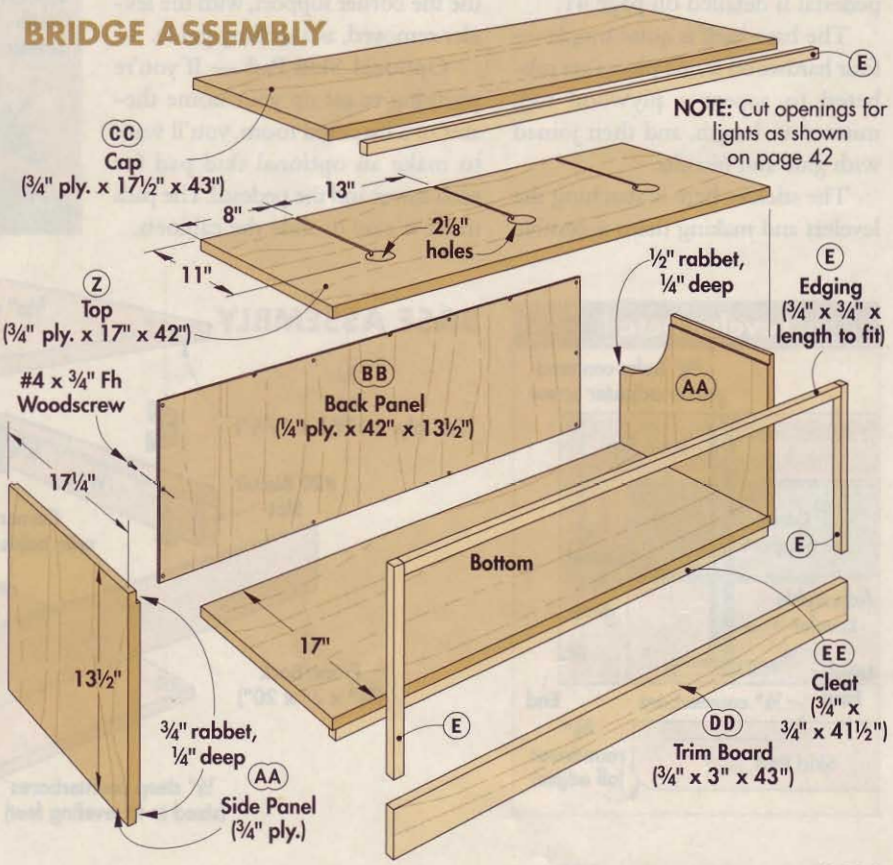
The bridge starts with some straightforward case construction — a top and bottom (Z) are joined to rabbeted side panels (AA), and a plywood back (BB) sits in rabbets cut in the side panels.

The bridge does have *some* elements of the other cabinets, however. For instance, you'll once again need to cut holes and rout wire channels for the low-voltage lighting. Again, these will be hidden by a plywood cap (CC). The lower edge of the cabinet is also faced with a wide trim board (DD), just like the upper fixed shelf on the towers. So again, you'll need to glue a hardwood cleat (EE) to the cabinet to support the trim board.

Bridging the Towers — Once the bridge is built, the next step is to attach it between the towers. The bridge is supported by a hardwood cleat (FF) on each of the towers *(Mounting Detail)*. Attach these hardwood cleats with woodscrews, position the towers, and set the bridge in place.

Finally, run a couple of woodscrews through each tower from the inside to secure the bridge.





sound-friendly DOOR PANELS

There was a time when enormous stereo speakers were all the rage. The more they dominated a room, the more "hi-fi" the stereo system was judged to be. Thankfully, those days are behind us. Today it's fashionable to have speakers that are heard and not seen. Our home theater embraces that particular auditory sensibility and hides the speakers in plain sight (or sound, if you will).

Cloth-Panel Doors — To accomplish that, the doors (one in each tower and two in the pedestal) are a variation on frame-and-panel doors. Actually, the real variation is the *panels*. They're pieces of 1/4" plywood with a large opening, like a picture frame *(Cloth-Panel Door Assembly)*. These panels are covered with speaker cloth. This allows the speakers to be hidden inside the cabinet with no interference to the sound from the speakers.

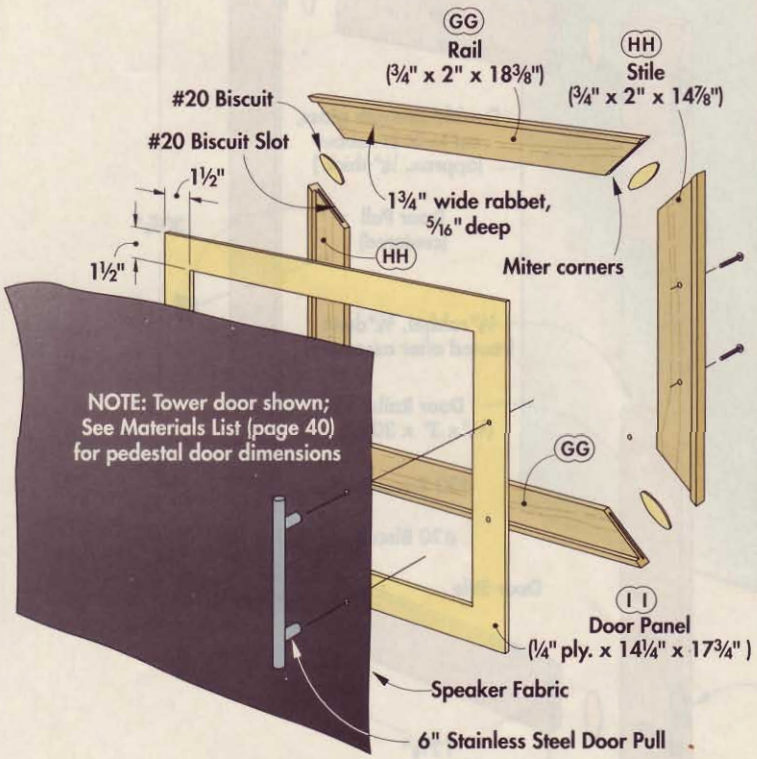
Build the Frames — Each frame is sized to fit into its respective opening with a 1/16" gap all around. The hardwood rails (GG) and stiles (HH) that make up each frame are rabbeted to accept the cloth-covered panel. These frame pieces are then mitered to length and assembled with biscuits and glue.

Add the Panels — To make each cloth-covered panel (II), start by cutting a piece of 1/4" plywood to fit inside the frame. Then, after cutting out the center of the panel, "upholster" it with speaker cloth as shown in the *Sidebar,* at right.

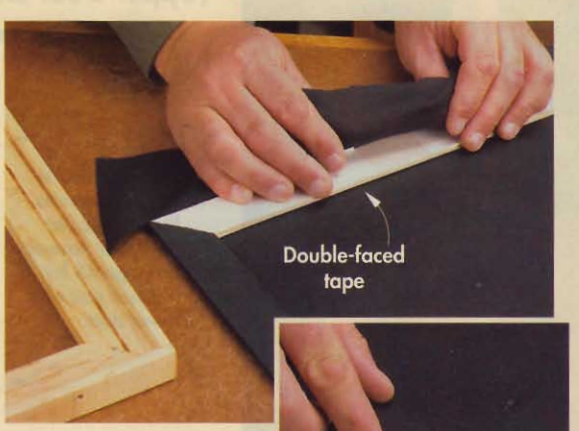
Now all that's left is to glue each panel into its frame, add door pulls, and install the doors. I used no-mortise hinges to attach the doors. (For a tip on doing this, see page 47.)

▲ Cloth-panel doors offer the perfect hiding space for today's small, but powerful speakers — without sacrificing sound quality.

CLOTH-PANEL DOOR ASSEMBLY



Cloth-Covered Panels



It's easy to make the cloth-covered panels *for the cabinet doors.*

The first step is to stretch speaker fabric (available at many audio/visual stores) across the plywood door panel. Cut the fabric at the corners so it will fold neatly around the panel and secure it with double-faced tape.

To install the panel, apply glue directly to the fabric. Then fit it into the door frame, pressing the panel firmly into place *(Inset Photo).*

DESIGN OPTIONS
FRAMED DOORS

Just as tiny televisions and enormous speakers are things of the past, so is the idea of a "one-size-fits-all" entertainment center. More to the point, though, one *style* doesn't necessarily fit all. So we're offering a few design options here for you to personalize this center to your taste and decor.

And as is so often the case, the simplest changes are the best changes. All we've done to dramatically affect the look of these home theater cabinets is swap the cloth-panel doors for glass- and plywood-panel doors.

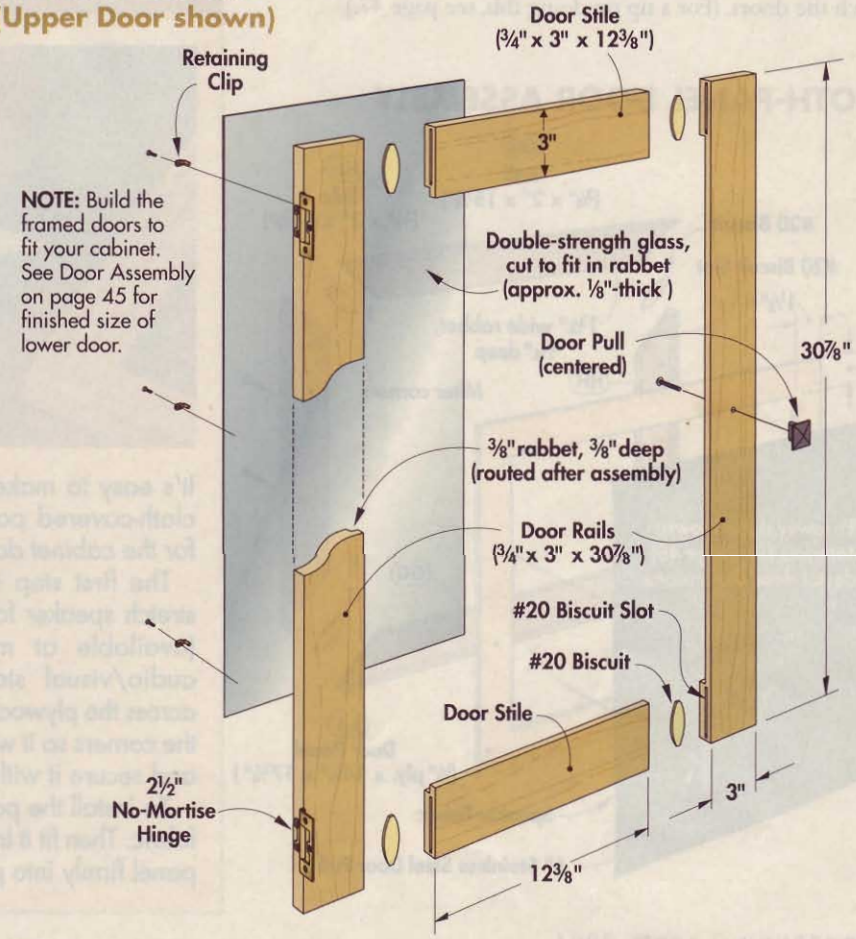
Frame & Panel Construction — Although the doors on this version look quite different from those featured on the previous pages, we are still beginning with a basic frame-and-panel construction. This time, however, the frames are noticeably wider, and the rails and stiles are assembled with butt joints and biscuits.

After gluing and clamping the frames together, you'll need to rout a rabbet around the back inside edge to hold the panels. A hand-held router with a 3/8" rabbeting bit makes quick work of this. Then square up the corners with a chisel.

Adding the Panels — From there, it comes down to selecting a panel *(see Photos on page 47)*. I opted for plywood panels in the lower doors and glass panels in the taller tower doors.

As another option (not shown), you could install cloth-covered panels. A black

FRAMED DOORS
(Upper Door shown)



fabric makes a nice contrast to the light maple cabinet. In this case, there's no need to remove the center of the panel (unless you have a speaker behind it). Just cut a 1/4" plywood panel to fit and cover it with fabric, as before.

Because the panel choices have such an impact on the look and feel of the entertainment center, it only makes sense that you be able to change them easily as your tastes and needs change down the road. To that end, I used panel retainers to secure the panels. That way, I can easily swap a glass panel for a wood panel if I decide I want a different look.

No-Mortise Hinges — One last detail of the doors is the hinge. For my money, no-mortise hinges are the way to go for a project like this. They're relatively easy to install, especially if you follow the steps below.

▲ Use plastic retaining clips that screw in at several places around the frame to hold the panel securely in place.

Installing No-Mortise Hinges

As the name implies, the advantage of using no-mortise hinges is you don't have to cut mortises. The downside is, with no mortises, you'll need some other way to align the hinges from the cabinet to the door. To do that, I use the hinge as an alignment device.

First, locate the hinge on the side of the cabinet with the barrel butted up to the edge *(Figs. 1 and 1a)*. Drill holes for the mounting screws using a self-centering bit and install the screws.

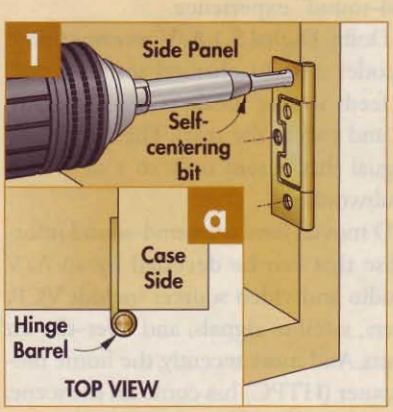
Next, position the door in the opening, using pennies as spacers to create an even gap around the door *(Fig.2)*. Mark the location of the hinge on the door. Then remove the door.

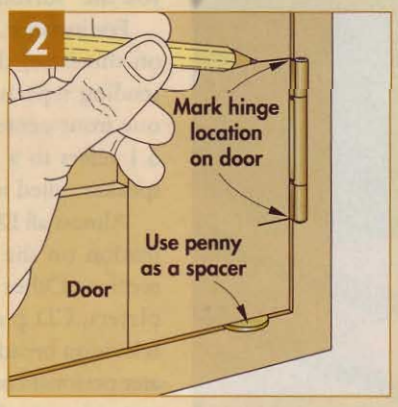
Now take the hinge off the cabinet and use it as a template for locating and drilling the screw holes in the door *(Fig. 3)*. The trick here is to *reverse* the hinge so you can use the barrel as a kind of edge guide to position the hinge perfectly *(Fig. 3a)*.

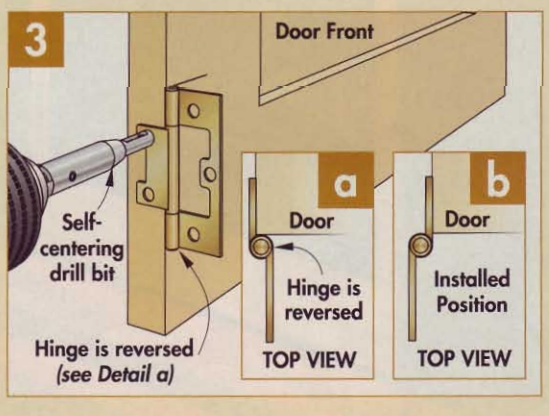
With the hinge reversed this way and aligned on the pencil marks, drill pilot holes for the screws. Then turn the hinge over and attach it to the door in the correct orientation.

Once both hinges are installed on the door, you can mount the door in the cabinet, using the screw holes you made earlier to register the door in its proper position.

▲ No-mortise hinges make mounting the doors quick and easy. I used pennies as spacers to create an even gap around the door.







HOME THEATER PLANNER

Don't be confused by the alphabet soup of DVD, HDTV, and DTS. Here's what you need to know to create a great audio-visual system.

Has the Home Theater Center on page 38 piqued your interest in creating your own personal cinema? Read on to find out what you need to know to duplicate the experience of seeing a feature film in a theater.

With a little planning, and the right electronic components, you'll be on your way. Key areas to consider are elements that affect the visual experience *(page 50)*, and factors that affect sound *(page 51)*. But first, let's run through things you need to know *(below)* and discuss guidelines for an effective home theater room *(right)*.

The Home Theater Difference — The "brain" of a home theater system is a component called an A/V (audio/visual) receiver. These usually look like a stereo receiver, but they function differently.

An A/V receiver takes in electronic signals from sources like DVD players or cable TV and distributes them to the television and speakers in a way that gives you the "surround-sound" experience.

For instance, a Dolby Digital 5.1 A/V receiver (more on this later) decodes a multi-channel sound signal, sending separate feeds to five speakers (two in front, one front-center, and two at the rear). The ".1" in the 5.1 refers to a signal that is sent only to a deep-bass speaker called a subwoofer.

Almost all DVD movies have surround-sound information on the disc that can be decoded by an A/V receiver. Other audio and video sources include VCR players, CD players, satellite signals, and over-the-air television broadcasts. And more recently, the home theater personal computer (HTPC) has come on the scene, promising to offer even more options. Stay tuned.

6 guidelines to a great HOME THEATER EXPERIENCE

The starting place for a home theater has to be the room in which you plan to locate it. The Illustration above highlights the factors you should consider.

Looking for more information about home theaters? Log on to our website, where we'll link you to some great sources! ONLINE Extras
WorkbenchMagazine.com

1 Know Your Room — The size of the room will affect your choice in televisions and sound systems. For instance, a 72" television in a 10-ft. space would be too large, and a 42" screen in a huge family room would be too small. A rectangular room is ideal with the television on one of the shorter walls.

2 Add Sound Absorbers — Sound bounces off hard surfaces like wood floors and bare walls, diminishing its quality. To avoid this, add sound-absorbing items like rugs, upholstered furniture, and curtains.

3 Reserve the Best Seat — Place furniture at the best angles for viewing and listening. See pages 50-51 for tips on viewing angles and how to place the speakers.

4 Dim the Lights — A dark room with dim backlighting offers the best setting for a home theater. Adding dimmer switches (as well as the sound-absorbing curtains) is an easy way to accomplish this.

5 See the Big Picture — The larger the room, the larger the TV you will want. A 40" display is the minimum starting point for most home theater setups.

6 Surround Yourself in Sound — Knowing what role each speaker plays will help you understand how to place them and what types to buy. Most systems have five speakers and a subwoofer, but some of the newer high-end systems might have six, seven, or more speakers. Below are the main types you'll encounter.

a Front Center Speaker — A key component, as about half of a movie's sound, including dialogue, comes from here.

b Front Speakers — Typically larger, and available in tower, bookshelf, and in-wall installations. The channel for these speakers carries mostly background sounds and spatial effects.

c Rear Speakers — Carrying the same types of sounds as front speakers, they help create the "surround-sound" experience. Installation options include freestanding, wall-mounted, or small speakers that sit on a table behind the main seating area.

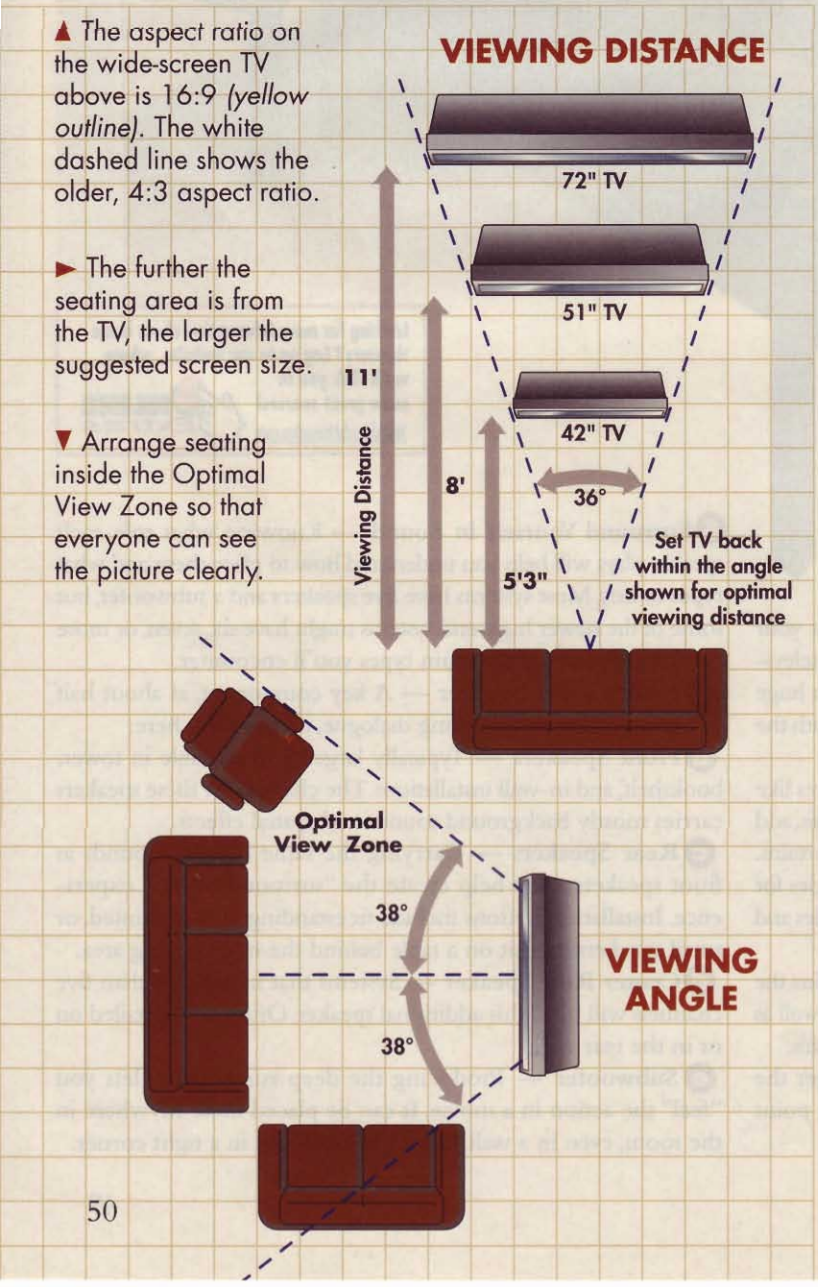
d Center Rear Speaker — Systems that have more than five channels will need this additional speaker. Often, it is installed on or in the rear wall.

e Subwoofer — Producing the deep rumble that lets you "feel" the action in a movie. It can be placed most anywhere in the room, even in a wall, but it's better if not in a tight corner.

▲ The aspect ratio on the wide-screen TV above is 16:9 *(yellow outline)*. The white dashed line shows the older, 4:3 aspect ratio.

► The further the seating area is from the TV, the larger the suggested screen size.

▼ Arrange seating inside the Optimal View Zone so that everyone can see the picture clearly.



it starts with a PICTURE

Buying a television used to be simple. Today, however, the options for generating and displaying video are incredible. With this in mind, concepts like aspect ratios, viewing distances, and viewing angles are important as you begin to plan and shop for your home theater.

Aspect Ratio — Many of the new (digital) televisions have viewing areas shaped like a movie theater screen. Most of these TVs have a width/height ratio of 16:9. A typical older (analog) TV is more square (4:3). This width/height ratio is known as a TV's aspect ratio.

Most DVDs can show a movie in the wide-screen mode, and as technology advances, more and more programming will be available in this cinema format. Therefore, I would recommend choosing a television or monitor with a 16:9 aspect ratio.

Viewing Distance — As I mentioned previously, the size of the display you choose should be based on the size of the room it will occupy. The *Illustration* at left offers suggestions on how large your TV screen should be in relation to the distance from prime viewing area.

Viewing Angle — Besides distance *from* the screen, it's also important to consider how far you will sit to the *side*. When viewed from a severe angle, the picture may appear dim. Arrange your seating within the Optimal View Zone, as shown in the *Illustration* below left. The zone is an average, depending on your display's quality.

Television Choices — What type of TV is best for you? The four main types are outlined below.

WHAT KIND OF TV?

■ **Traditional "Tube" TVs:** Available with flat screens, offer high picture quality, but can be large (deep), heavy, and limited in screen size.

■ **Rear Projection:** Mirrors in cabinet bounce picture onto back of screen. Prices have dropped, and picture quality has improved, but viewing angles may be more limited than on other types.

■ **Front Projection:** A ceiling-mounted unit projects the video image onto a large screen. Quality has improved on these, but the room must be nearly dark for the best results.

■ **Plasma:** Amazing flat displays up to 60 inches, with thin cabinet depth and wide viewing angles. Expensive, but prices dropping quickly.

finish it with SOUND

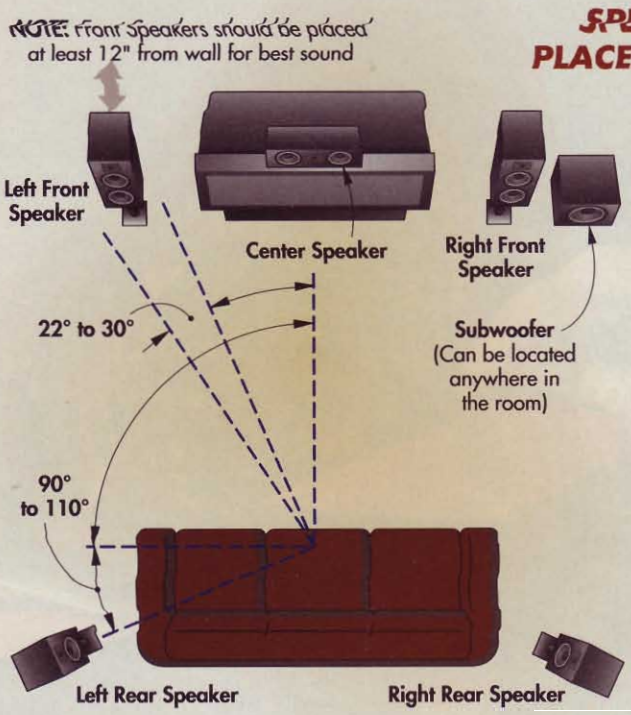
Actually *feeling* the low rumble of an explosion and ducking as the sound of the action roars over your head — these are the experiences that will make you feel like you're at the theater. Where you place speakers in your room, and the type of surround-sound equipment you employ are key to bringing this experience home.

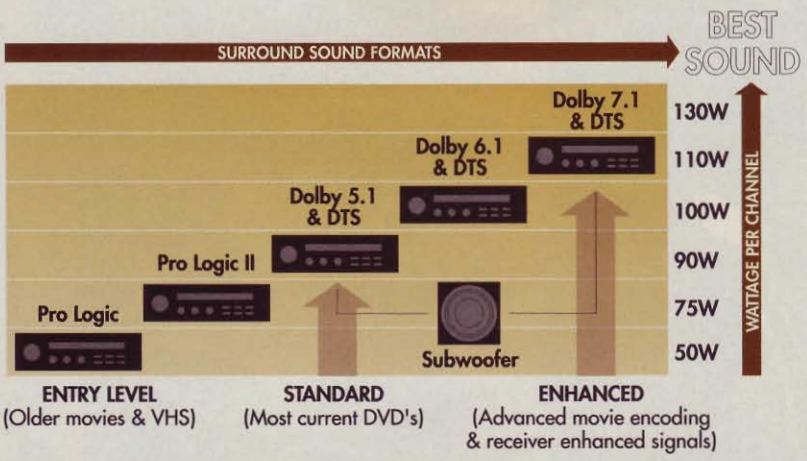
The Speakers — The *Illustration* at right addresses where to place speakers for optimum sound. The various types of speakers, and their roles in a home theater are discussed on page 49. To avoid disappointment, I'd suggest that you buy the highest quality speakers you can afford, and get them in sets that are meant to be used together in a home theater application.

Surround-Sound Formats — As discussed earlier, an A/V receiver takes coded sound information from a source like a DVD disc and sends that information to the correct speakers. That's why you hear different sounds in different locations throughout the room, just like in a movie theater. The technology in a receiver that makes this happen is known as the surround-sound format.

Most A/V receivers use Dolby Digital and/or DTS formats. When a format has numbers after it, like Dolby Digital 5.1 or DTS 6.1, that means the format supports systems that have that many sound channels (5 in a 5.1, for example), plus a subwoofer.

The *Illustration* right shows a hierarchy of formats and gives you an idea of what type of features to expect and how much power you'll need.





GET READY FOR HDTV

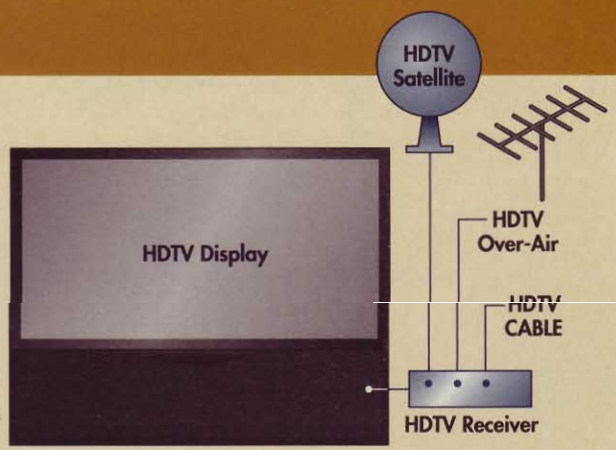
Talked about for years, high-definition television (HDTV) is slowly but surely becoming a mainstream television viewing format.

As you assemble your home theater, it's important to understand how your equipment will interact with this technology. In the immediate future, you may not be affected. But by 2006, most broadcasters will switch to HDTV signals.

Programming in this format is already becoming more common on over-the-air broadcasts, cable systems, and satellite networks. These signals are digital, in wide-screen format (16:9 aspect ratio), and provide picture quality and sound far superior to analog.

When shopping for a television, make sure you know if it is capable of receiving HDTV. A separate receiver box may be needed, or it could be built in.

Older, analog televisions are unable to receive high-definition signals. However, broadcasters will be required to simulcast analog signals, so you'll still be able to watch programming. The drawback will be that the images may be smaller if the program originates in high definition.



▲ HDTV signals can be received from three sources: over-the-air broadcasts, cable, and satellite. Only TVs that are HDTV-ready or HDTV-capable can receive this kind of digital signal.

classic craftsman
ROUND TABLE

Take a look at this table, and I know you'll find something to admire — whether it's the highly figured quartersawn red oak, the decorative slots in the tapered legs, or the dramatic grain patterns of the round tabletop and the cross-shaped shelf.

Appearances aside though, it's the woodworking techniques that are the most fascinating part of this project.

Angled Mortises — One technique involves making the legs. Notice that they tilt in toward the top. This means that the mortises near the bottom of the legs must also be cut at an angle.

Now cutting an angled mortise can be a tricky operation. So I simplified things by using a method that involves first cutting each leg into four pieces and then gluing it back together. The result is a perfect angled mortise in each leg.

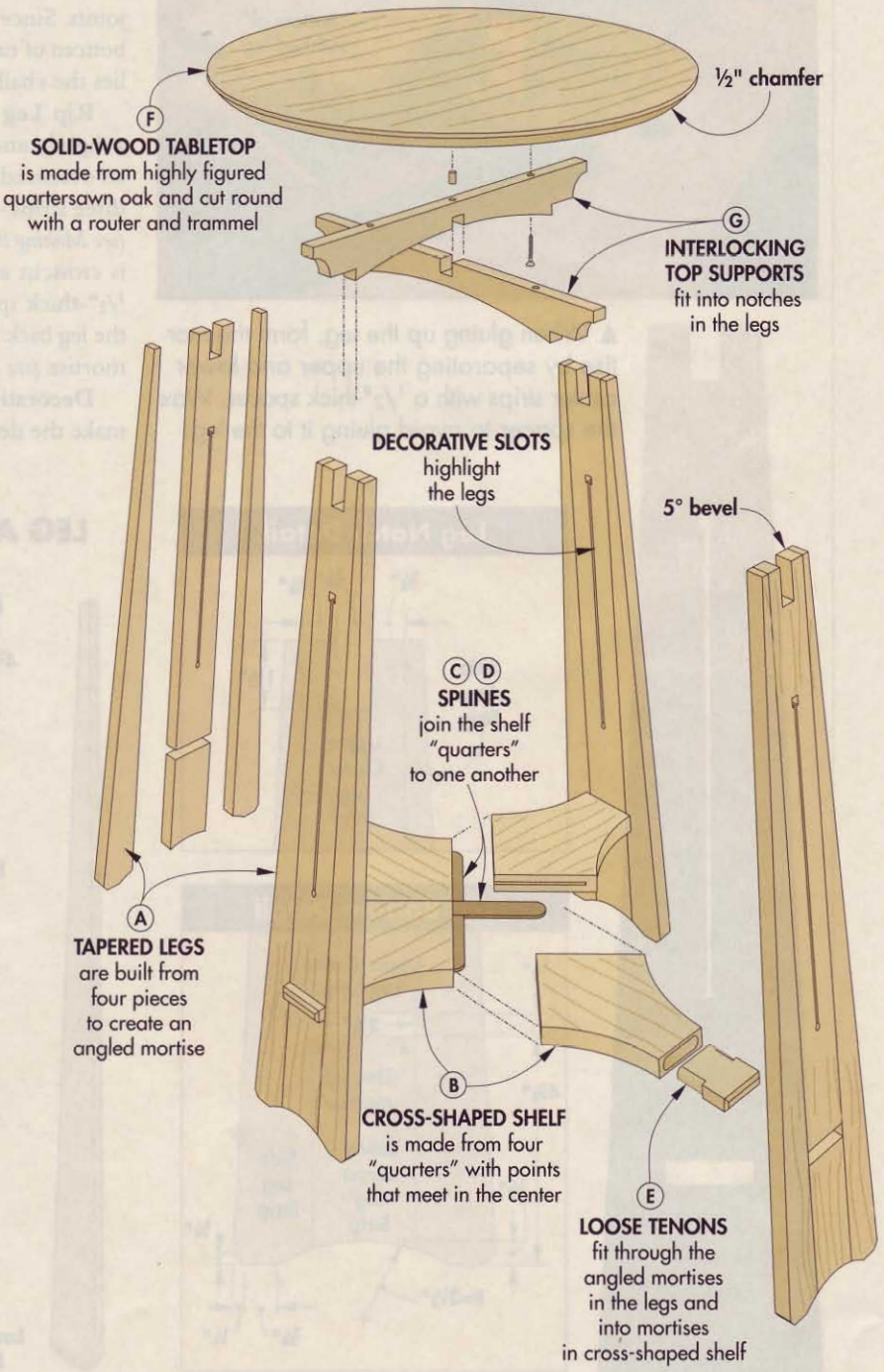
"Loose" Tenons — Of course, the angled mortises are only one part of the joinery used to connect the legs to the shelf. As you can see in the *Construction Details* at right, a "loose" tenon extends through the angled mortise in each leg and into a second mortise in the shelf.

These loose tenons are much easier to fit than if you were to cut tenons on the ends of the shelf. That's important, not just for strength, but because the exposed tenons are quite conspicuous when the table is assembled. (For an in-depth look at mortise and loose tenon joinery, see page 60.)

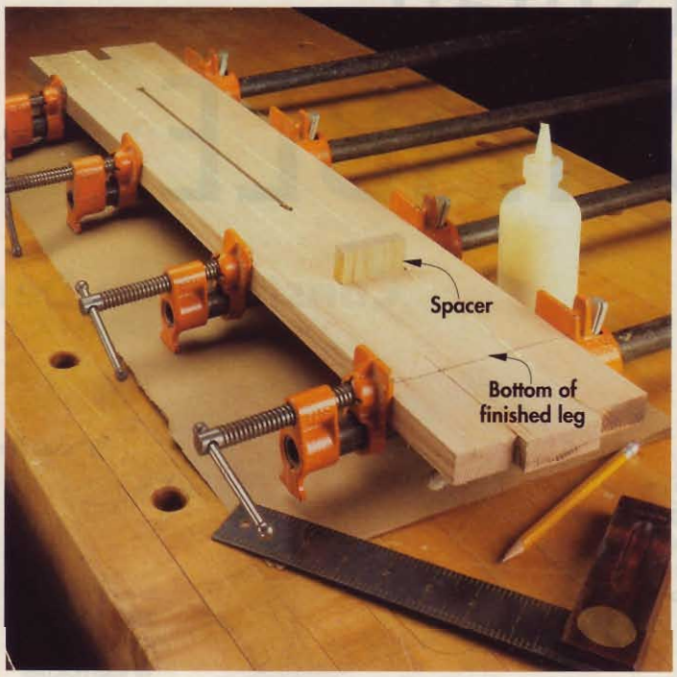
More Techniques — Well, as you can see, there's a lot of woodworking going on in this project (and I haven't even mentioned the techniques used to make the cross-shaped shelf and the round tabletop). To be honest, mastering these techniques is a bit of a challenge. But then again, that's what makes this table such a satisfying project to build.

Construction Details

Overall Dimensions: 22" W x 22" D x 27⅝" H



tapered TABLE LEGS



▲ When gluing up the leg, form the mortise by separating the upper and lower center strips with a 1/2"-thick spacer. Wax the spacer to avoid gluing it to the leg.

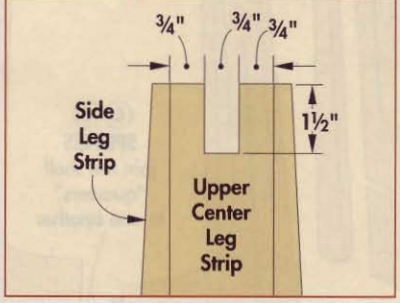
One of the most distinctive features of this table is the tapered legs, which are accentuated by a long, decorative slot *(Photo, below)*. In addition to the tapers, the legs also tilt in toward the top. This creates a rather interesting woodworking challenge.

To understand why, take another look at the *Construction Details* on page 53. Notice that the legs are connected to the shelf with mortise and through tenon joints. Since the legs are angled, the mortise near the bottom of each leg *also* has to be cut at an angle. Therein lies the challenge — making an angled mortise.

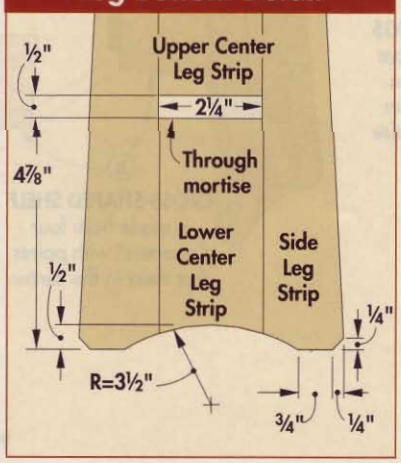
Rip Leg Into Strips — To accomplish this, I used a slightly unorthodox approach. It involves first ripping an oversized leg blank (A) of 3/4"-thick hardwood into three strips — a center leg strip and two side leg strips *(see Making the Legs on page 55)*. Then, the center leg strip is crosscut at a 5° bevel *(see Fig. 1, page 55)*. Using a 1/2"-thick spacer to separate these pieces when gluing the leg back together will automatically form the angled mortise *(see Photo, left)*.

Decorative Slot — But before doing that, it's best to make the decorative slot. Notice that this slot is punc-

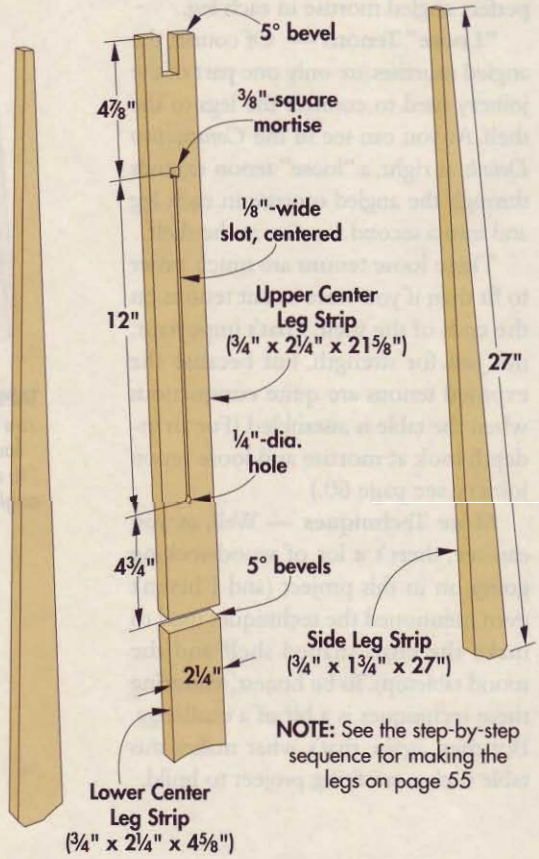
Leg Notch Detail



Leg Bottom Detail



LEG ASSEMBLY



NOTE: See the step-by-step sequence for making the legs on page 55

tuated by a square mortise at the top and a round hole at the bottom. To make these details, start by drilling two ¼"-diameter holes at the locations shown on the *Leg Assembly* on page 54.

Then, to square up the hole at the top of the slot, I used a shop-made chisel guide, as shown on page 34.

Now complete the slot by routing from one hole to the next on the router table using an 1/8" straight bit. This is a small bit, and it's pretty fragile, so rout the slot in two successively deeper passes from each side of the workpiece *(Fig. 2)*. Before making this cut, align the bit and the router table fence so that the bit is centered perfectly on the workpiece.

Notch for Supports — There's one final thing to do before gluing up the legs. That's to cut a notch in the top end of each upper center leg strip to hold the top supports *(Leg Notch Detail, page 54)*.

This notch is easy to make by using a 3/4" dado blade mounted in the table saw. To make the notch, you'll have to stand the workpiece on end, as shown in *Fig. 3* below. To hold the piece steady, clamp it to a tall fence attached to the miter gauge. Then cut the notch by making three successively deeper passes across the dado blade.

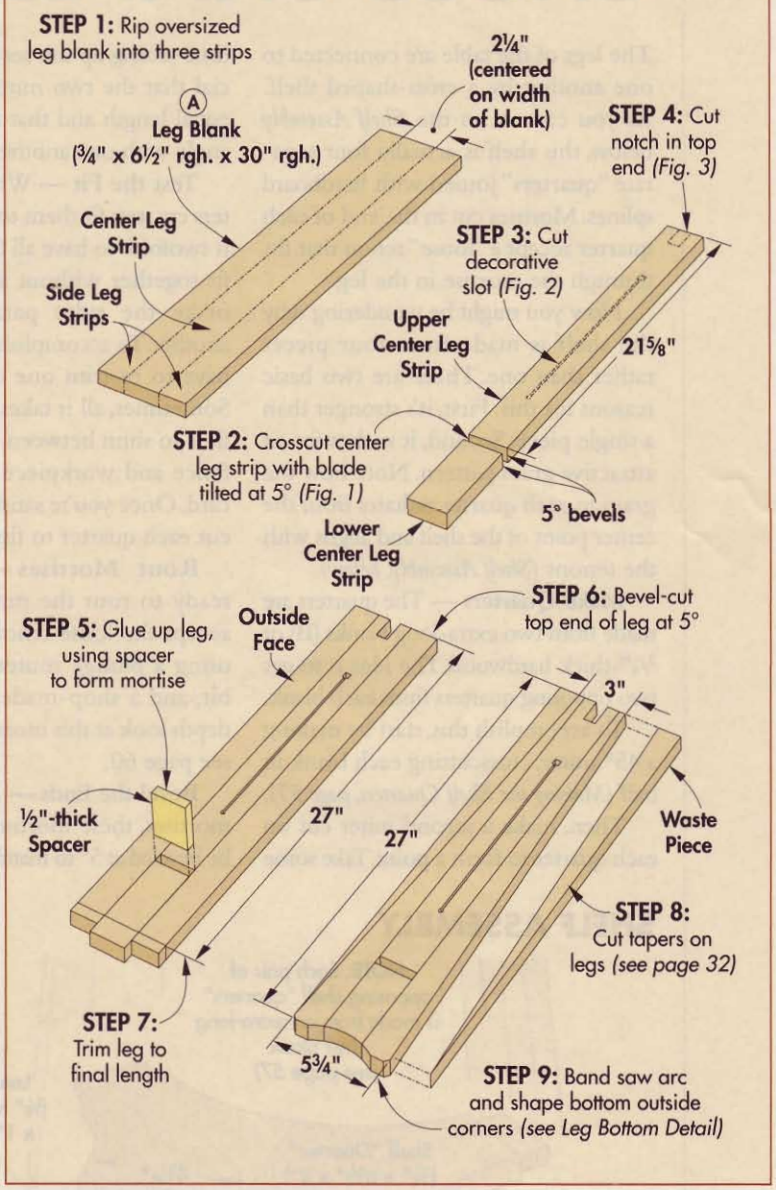
Leg Assembly — Now it's time to glue the legs back together. Position the side leg strips and upper center leg strip so their ends are flush. Then add the lower center leg strip, using a 1/2" spacer block to keep the mortise aligned *(see Photo on page 54)*.

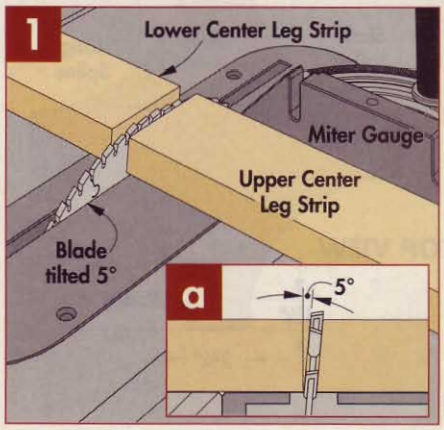
When the glue dries, scrape and sand the legs smooth. Trim the top end of the leg at a 5° bevel. Then cut the bottom end square as you trim each leg to final length.

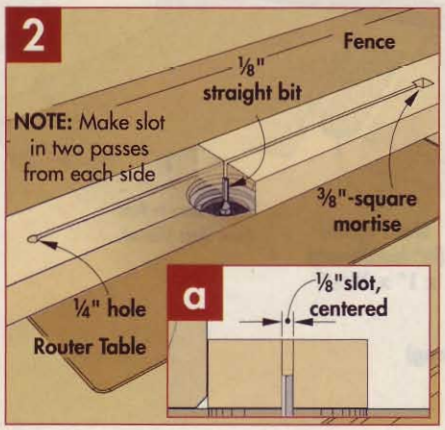
Make the Tapers — The next step is to make the tapers. I cut these using a simple taper sled on the table saw, which is explained in detail on page 32.

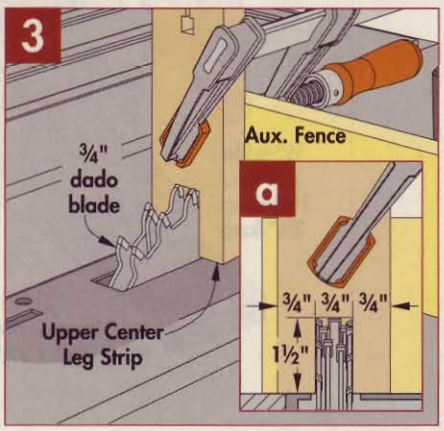
Decorative Arc — The final detail on the legs is a gentle arc on the bottom edge. Lay out the arc as shown *(Leg Bottom Detail, page 54)*, and use a band saw to cut the arc. Then "clip" off the outside corners at 45°.

Making the Legs









strong & stylish

CROSS-SHAPED SHELF

The legs of the table are connected to one another by a cross-shaped shelf. As you can see in the *Shelf Assembly* below, this shelf is actually four separate "quarters" joined with hardboard splines. Mortises cut in the end of each quarter accept a "loose" tenon that fits through the mortise in the leg.

Now you might be wondering why the shelf is made from four pieces rather than one. There are two basic reasons for this. First, it's stronger than a single piece. Second, it makes for an attractive grain pattern. Note how the grain in each quarter radiates from the center point of the shelf and aligns with the tenons *(Shelf Assembly, below)*.

Make Quarters — The quarters are made from two extra-long blanks (B) of $^3/_4$"-thick hardwood. The idea is to get two opposing quarters from each blank.

To accomplish this, start by making a 45° miter, crosscutting each blank in half *(Making the Shelf Quarters, page 57)*.

Then, make a second miter cut on each quarter to form a point. Take some time setting up this second cut. It's crucial that the two mitered sides are of equal length and that they form a 90° angle with one another.

Test the Fit — With all four quarters cut, test fit them together. The goal is twofold: to have all four mitered tips fit together without any gaps, and to make the sides parallel with one another. To accomplish that, you might have to re-trim one or more miters. Sometimes, all it takes to get a perfect fit is to shim between the miter gauge fence and workpiece with a playing card. Once you're satisfied with the fit, cut each quarter to final length.

Rout Mortises — Now you're ready to rout the mortises that will accept the loose tenons. I did this by using a plunge router, a spiral upcut bit, and a shop-made jig. For an in-depth look at this mortising technique, see page 60.

Bevel the Ends — After cutting the mortises, these mortised ends need to be beveled at 5° to match the angle of the legs *(Bevel Detail)*. This is easy to do by tilting the table saw blade to 5° and using a miter gauge to trim the ends.

A Place for Clamps — As they are, the quarters will be difficult to clamp because there are no parallel clamping surfaces. To solve this problem, I trimmed the two outer corners on each quarter.

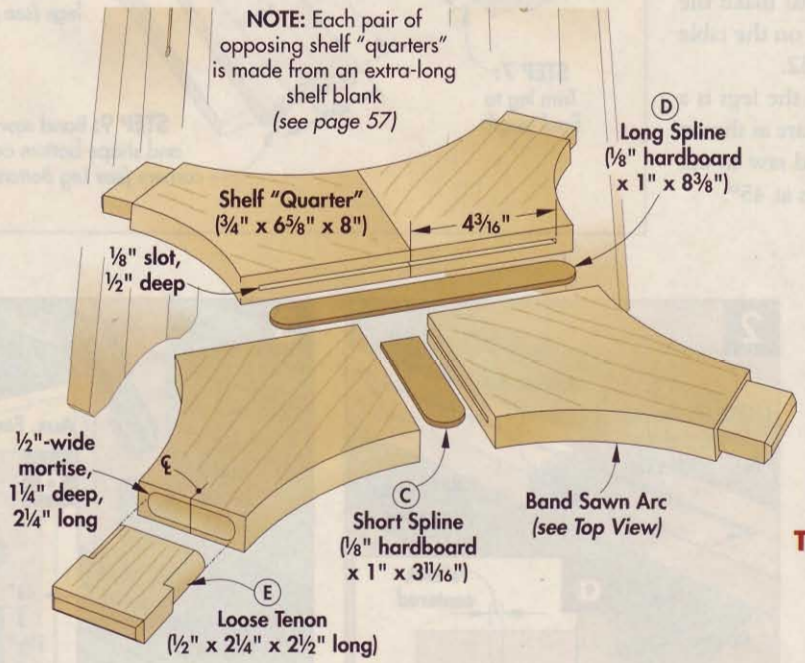
Grooves & Splines — The next step is to cut slots in the adjoining edges of the quarters to accept $^1/_8$" hardboard splines (C, D). I did this with a $^1/_8$" slot cutter mounted in a router table *(Slot Detail)*. Note that the slots stop short of the edges — otherwise, they'd be visible when you glue up the shelf.

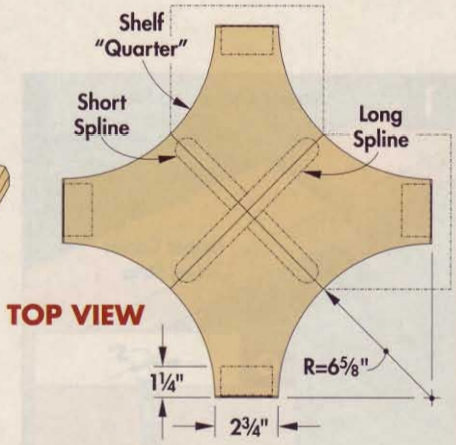
Glue-Up — Once the slots are cut, it's time to glue up the shelf. The sequence shown in the *Photos* on page 57 will ensure a trouble-free assembly.

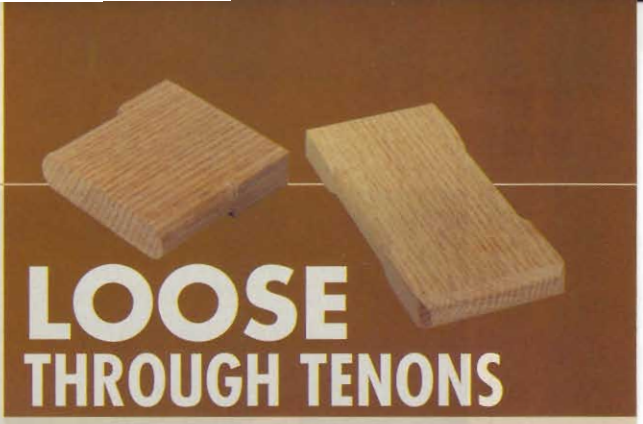
Mark Arcs — After scraping the dried glue, the next step is to cut four sweeping curves to form the cross-shaped shelf. Lay out the arcs, as shown below, use a band saw to make the curved cuts, and sand the edges smooth.

"Loose" Tenons — Now all that's left is to make the four loose tenons. Each tenon is a block of hardwood that fits *into* its mortise in the shelf and *through* the mortise in the leg. The basic technique for making loose tenons is explained on page 63. This through-tenon version is shown on page 57.

SHELF ASSEMBLY





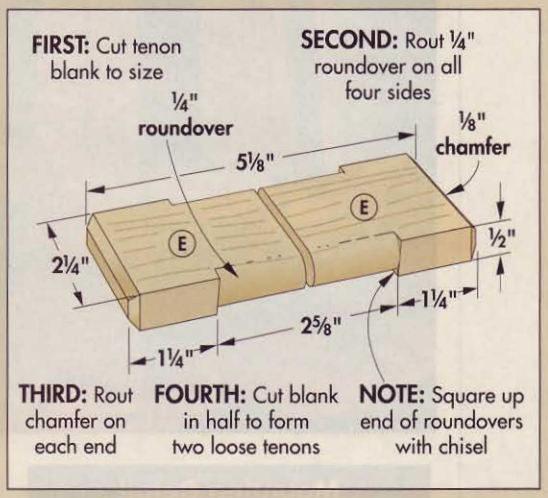


LOOSE THROUGH TENONS

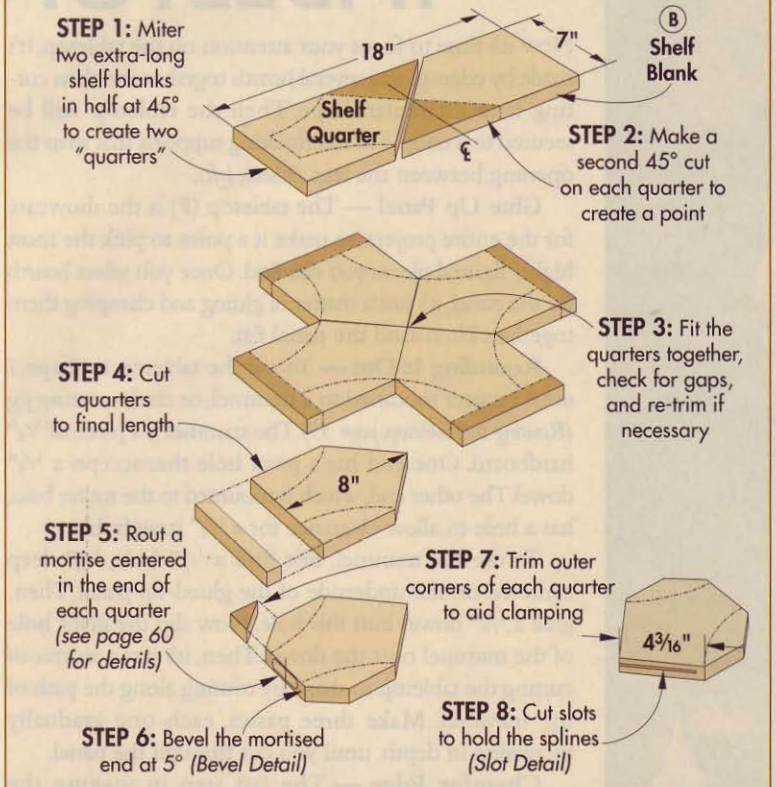
Not only are the tenons that join the shelf of the table to the legs *loose* tenons, they're also *through* tenons. They extend through the leg mortises, so the ends of the tenons are visible.

To ensure a good fit in the mortises in the legs *and* the shelf, these tenons have both square and rounded edges. And for appearance, there's a small chamfer on the end of each tenon.

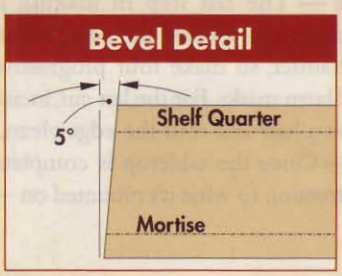
You can easily get two of these dual-edged tenons from a single blank *(see below)*.



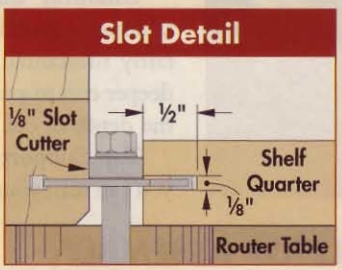
Making the Shelf Quarters



Bevel Detail



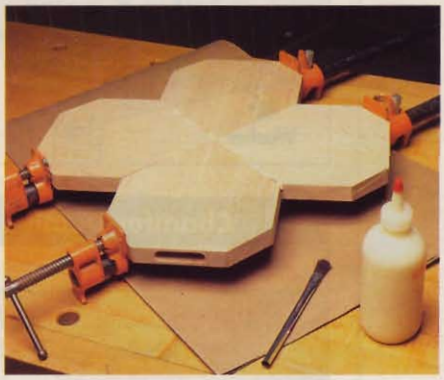
Slot Detail



THREE-STEP SHELF ASSEMBLY

▲ Glue and clamp the quarters in pairs, using the short splines to keep them aligned during glue-up.

▲ Next, make a light pass over the jointer with each of the halves to square the edge before final glue-up.



▲ Finally, glue and clamp the halves together. The long spline keeps them from shifting out of alignment.

adding a round TABLETOP

▼ Before gluing up the table base, dry clamp the shelf to the legs. Then set the top supports into the notches in the legs to check the fit.

Now it's time to focus your attention on the tabletop. It's made by edge-gluing several boards together and then cutting it to a circular shape. Then the tabletop will be secured to a couple of interlocking supports that span the opening between the legs *(Photo, left)*.

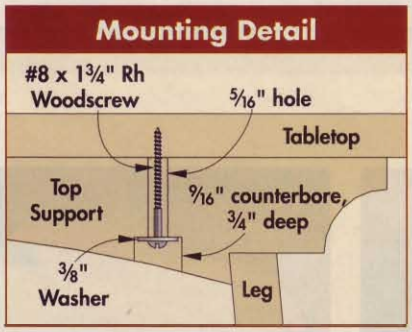
Glue Up Panel — The tabletop (F) is the showcase for the entire project, so make it a point to pick the most highly figured pieces you can find. Once you select boards for the panel, it's just a matter of gluing and clamping them together. Then sand the panel flat.

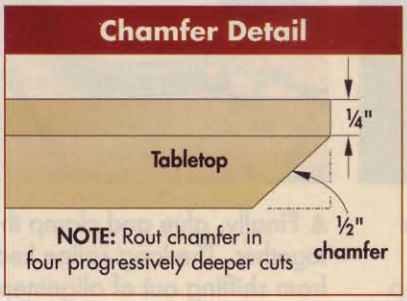
Rounding It Out — To cut the tabletop to shape, I used a router mounted to a trammel, or circle-cutting jig *(Routing the Tabletop, page 59)*. The trammel is a piece of 1/4" hardboard. One end has a pivot hole that accepts a 1/4" dowel. The other end, which is mounted to the router base, has a hole to allow clearance for a 1/2" straight bit.

To use the trammel, first drill a 1/4" hole, 1/2" deep centered on the underside of the glued-up panel. Then, glue a 1/4" dowel into this hole. Now slip the pivot hole of the trammel over the dowel. Then, it's just a matter of cutting the tabletop to shape by routing along the path of the trammel. Make three passes, each one gradually increasing in depth, until you cut through the panel.

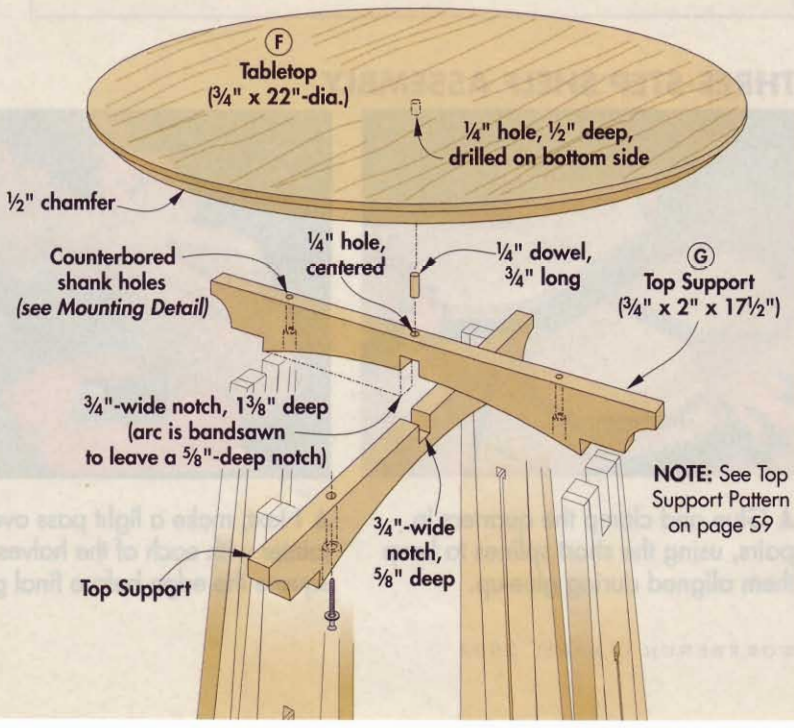
Chamfer Edge — The last step in making the tabletop is routing a chamfer around the edge. This is a fairly substantial chamfer, so make four progressively deeper cuts to avoid burn marks. For the last cut, increase the depth of cut just a hair and rout the edge clean.

Top Supports — Once the tabletop is completed, you can turn your attention to what it's mounted on — a





TABLETOP ASSEMBLY



pair of interlocking top supports (G).

As you can see in the *Assembly View*, these supports are simply notched to fit together. One thing to be aware of though is that the notches are cut in opposite edges — the *top* edge of the lower support and the *bottom* edge of the upper support. Also, the notch in the upper support is cut deeper than the one in the lower support. This way, once the arc in the upper support is cut, the notch will end up 5/8" deep, just like the matching notch in the lower support.

After cutting the notches (I used a dado blade mounted in the table saw), there's one more thing to do before cutting the top supports to shape. That's to drill a pair of counterbored shank holes in each piece, which will be used to mount the tabletop.

Band Saw to Shape — Now you can go ahead and cut the top supports to shape *(Top Support Pattern at right)*. A band saw makes quick work of this. One thing to pay attention to, though, is a small angled notch in the decorative ends of the supports. These notches will register the top supports against the legs. Since the legs sit at an angle, the notches are angled to match.

Table Base — Once the top supports are cut to shape and sanded, you're ready to assemble the base of the table. As always, it pays to dry assemble the base first *(Photo, page 58)*.

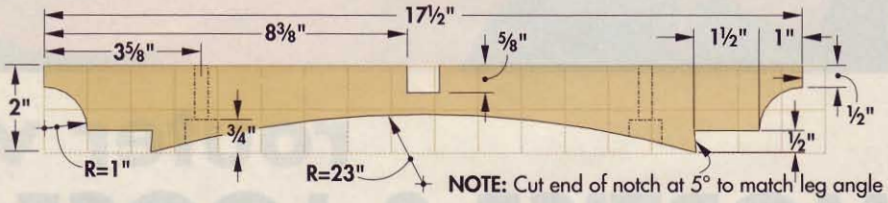
When you're satisfied with the fit, glue up the base in two stages. Glue the shelf to the legs first. Then, glue the top supports in place.

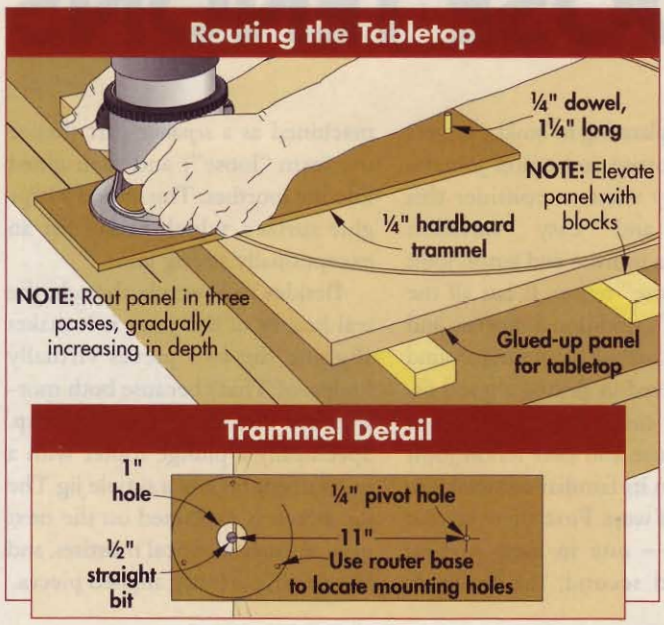
Attach Top — Now all that's left is to attach the tabletop. At this point, that dowel glued into the tabletop comes in handy once again. Since it's perfectly centered in the underside of the tabletop, you can use the dowel to center the base of the table on the top. All it takes is drilling a 1/4" hole centered in the top supports. Then flip the tabletop over on a benchtop and fit the hole in the supports down over the dowel *(Photo, right)*. Then the tabletop is secured with woodscrews.

▲ The dowel in the bottom of the tabletop makes a handy centering pin. Just lower the table base onto the dowel and fasten the top with screws.

TOP SUPPORT PATTERN (UPPER SUPPORT SHOWN)

(SQUARES EQUAL 1")





MATERIALS & HARDWARE

	Part	Qty	T	W	L	Material
A	Leg Blanks *	4	¾"	6½"	30"	Oak Hardwood
B	Shelf Blanks*	2	¾"	7"	18"	Oak Hardwood
C	Short Splines	2	⅛"	1"	3 11/16"	Hardboard
D	Long Spline	1	⅛"	1"	8⅜"	Hardboard
E	Loose Tenons	4	½"	2¼"	2½"	Oak Hardwood
F	Tabletop	1	¾"	22"-dia.	22"-dia.	Oak Hardwood
G	Top Supports	2	¾"	2"	17½"	Oak Hardwood

- (4) #8 x 1 3/4" Rh Woodscrews
- (4) 3/8" Washers
- (1) 1/4" Dowel, 1 1/4" long

*Rough dimensions shown

ONLINE Extras

Table Cutting Diagram

WorkbenchMagazine.com

WORKBENCH® CRAFTSMAN ROUND TABLE

Issue 282 Volume 60 Number 2 March/April 2004

MATERIALS LIST

	Part	Qty	T	W	L	Material
A	Leg Blanks *	4	¾"	6½"	30"	Oak Hardwood
B	Shelf Blanks*	2	¾"	7"	18"	Oak Hardwood
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F	Tabletop	1	¾"	22"-dia.	22"-dia.	Oak Hardwood
G	Top Supports	2	¾"	2"	17½"	Oak Hardwood

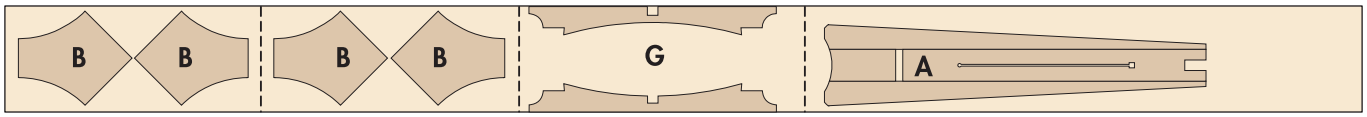
- (4) #8 x 1¾" Rh Woodscrews
- (4) ⅜" Washers
- (1) ¼" Dowel, 1¼" long

**Rough dimensions shown*

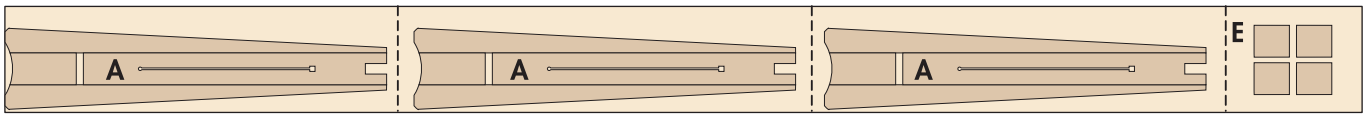
CUTTING DIAGRAM

¾" x 8" x 72" Quartersawn Red Oak Lumber

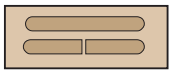
¾" x 8" x 96" Quartersawn Red Oak Lumber



¾" x 8" x 96" Quartersawn Red Oak Lumber



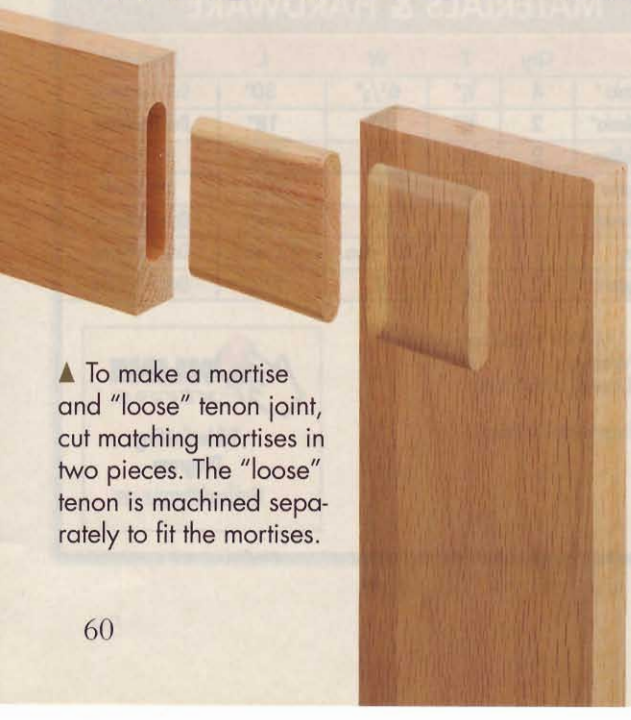
⅛" x 3" x 10" hardboard



C and D

router workshop

MORTISE & LOOSE TENONS



▲ To make a mortise and "loose" tenon joint, cut matching mortises in two pieces. The "loose" tenon is machined separately to fit the mortises.

If you're planning to build a project with mortise and tenon joinery, you may want to consider this quick and easy variation instead — a mortise and tenon joint with a "loose" tenon. It has all the strength of a traditional mortise and tenon joint *without* the fussing around that's involved in getting a good fit.

As you can see in the *Photo* at left, a mortise and *loose* tenon joint differs from its familiar namesake in a couple of ways. First, there are *two* mortises — one in each mating piece. And second, the tenon is machined as a *separate* part (hence the term "loose") and then glued into the mortises. This creates a large glue surface, which makes for an exceptionally strong joint.

Besides its strength, though, the real beauty of this joint is it makes aligning the two pieces virtually foolproof. That's because both mortises are cut using a *single* setup. Specifically, a plunge router with a spiral upcut bit and a simple jig. The jig, which is explained on the next page, ensures identical mortises, and as a result, perfectly aligned pieces.

build a mortising jig

Skill Builder

A plunge router makes quick work of routing mortises. All you need is a stable platform to prevent the router from tipping and an accurate way to guide the router bit.

This T-shaped jig accomplishes both things. The top of the jig provides a solid platform for the router. And an opening in the jig serves as a template for the mortise. In use, a guide bushing that's mounted in the base of the router "follows" this template, ensuring identical mortises every time.

The thing to keep in mind is it's the guide bushing, *not* the router bit, that rides against the sides of the opening. This means the opening must be slightly *larger* than the desired size of the mortise.

There are several factors to consider when sizing the opening: the width and length of the mortise, the size of the bit, and the outside diameter of the guide bushing. Use the formula in the *Jig Opening Detail* below to determine the correct size opening. **Note:** This opening is sized to create a 1/2" x 2 1/4" mortise when using a 1/2" bit and a 5/8" bushing (the same size as the mortises in the Craftsman table shown on page 52).

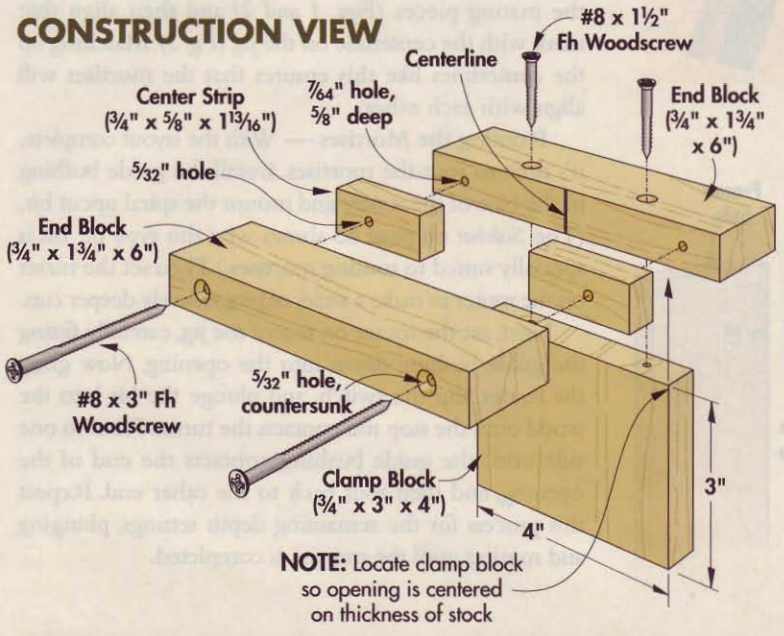
Jig Basics — The jig itself is quite simple. The top consists of four pieces: two end blocks and two center strips that form the opening *(see Box below for more on this)*. A centerline marked on one end block is used to align the workpiece from side to side. And a clamp block screwed to the top positions the workpiece from front to back.

ONLINE Extras

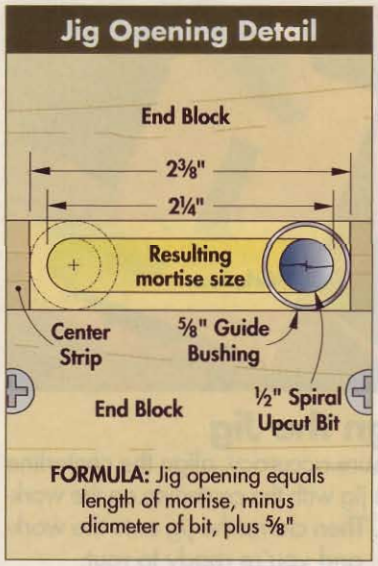
Video: Mortise & Loose Tenon Joints

WorkbenchMagazine.com

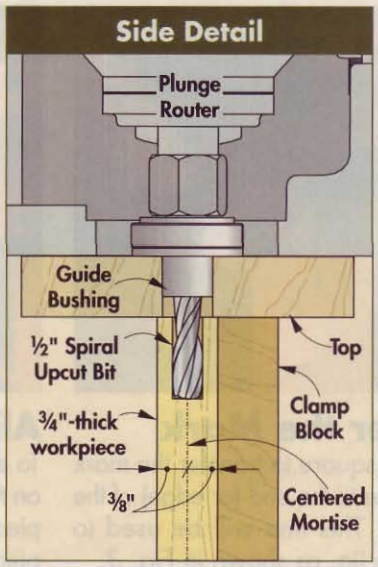
CONSTRUCTION VIEW



Jig Opening Detail



Side Detail

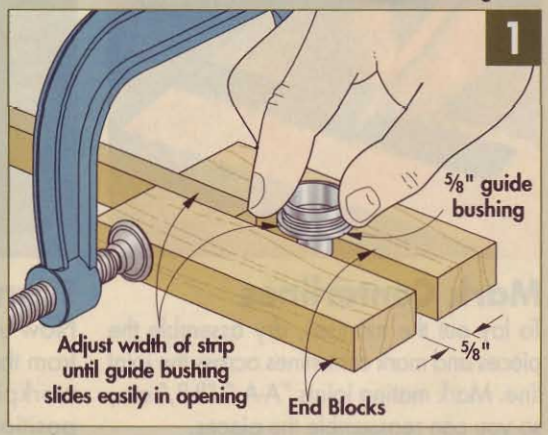


on bits & bushings

Before routing a mortise, you'll need to equip the router with two things: a 1/2" spiral upcut bit and a 5/8" guide bushing *(Photo, below)*.

When building the jig, the goal is to have the guide bushing slide freely in the opening without any play. To do that, I used the guide bushing as a gauge to determine the width of the center strips that form the opening.

Start by clamping a 5/8"-wide, extra-long workpiece between the two end blocks *(see Illustration below)*. Then slide the guide bushing back and forth to check the fit. If necessary "thin" the strip until the guide bushing fits just right. Then cut two pieces from the workpiece to form the center strips of the jig.



lay out, then rout MORTISES

▲ With the T-shaped mortising jig clamped to the workpiece, make a series of progressively deeper passes, routing from one end of the opening to the other to cut the mortise *(Inset)*.

Once the jig is assembled, routing the mortises goes like clockwork. You simply tighten the workpiece in a vise, clamp the jig against it, and rout back and forth *(Photo, left)*.

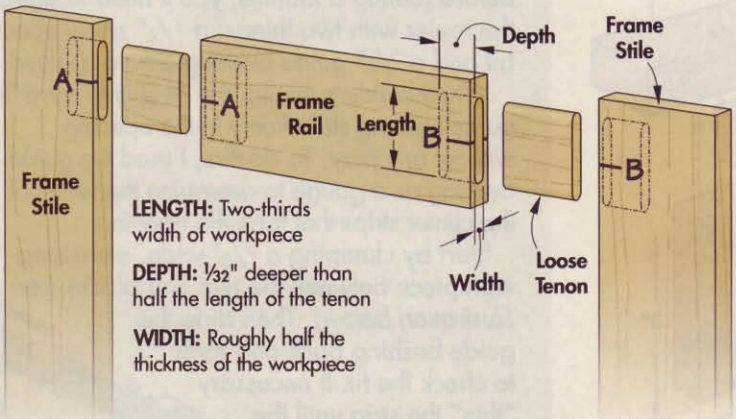
Keep in mind that the opening in this jig *(Inset Photo)* is sized to make the mortises in the Craftsman table *(page 52)*. If you plan to rout a different-sized mortise, it requires another jig — with a different-sized opening. And as I mentioned earlier, before making the jig, you'll need to determine the size of the mortise. A few guidelines for doing that are explained in the *Illustration* below.

Lay Out Mortises — Regardless of their size, though, the procedure for laying out the mortises is the same. The idea is to mark the center of the mortises on the mating pieces *(Figs. 1 and 2)* and then align that mark with the centerline on the jig *(Fig. 3)*. Matching up the centerlines like this ensures that the mortises will align with each other.

Routing the Mortises — With the layout complete, it's time to rout the mortises. Install the guide bushing in the base of the router and mount the spiral upcut bit. (The *Sidebar* on page 63 shows why this type of bit is specially suited to routing mortises.) Then set the turret on the router to make a series of progressively deeper cuts.

Next, set the router on top of the jig, carefully fitting the guide bushing down into the opening. Now grasp the router, flip the switch, and plunge the bit into the wood until the stop rod contacts the turret. Rout to one side until the guide bushing contacts the end of the opening, and then rout back to the other end. Repeat this process for the remaining depth settings, plunging and routing until the mortise is completed.

SIZING MORTISES



Mark Centerlines

To lay out the mortises, dry assemble the pieces and mark centerlines across the joint line. Mark mating joints "A-A," "B-B," etc., so you can reassemble the pieces.

Transfer the Mark

Now use a square to transfer the mark from the face to the end (or edge) of the workpiece. This line will be used to position the jig, as shown in *Fig. 3*.

Align the Jig

To ensure accuracy, align the centerline on the jig with the centerline on the workpiece. Then clamp the jig onto the workpiece, and you're ready to rout.

lessons for LOOSE TENONS

Skill Builder

Once the mortises are cut, you can turn your attention to the loose tenons. The tenons are cut, one at a time, from a long blank of "tenon stock" *(Photo, right)*. That part is easy enough, and I'll get back to it in a minute. The trick is making the tenon stock so it fits into the mortises.

Rip Stock to Width — To accomplish that, the first step is to rip a piece of hardwood to width. The idea is to rip the piece $1/16$" *narrower* than the length of the mortise. This provides a "fudge factor" that will let you make minor adjustments when it's time to glue the pieces together.

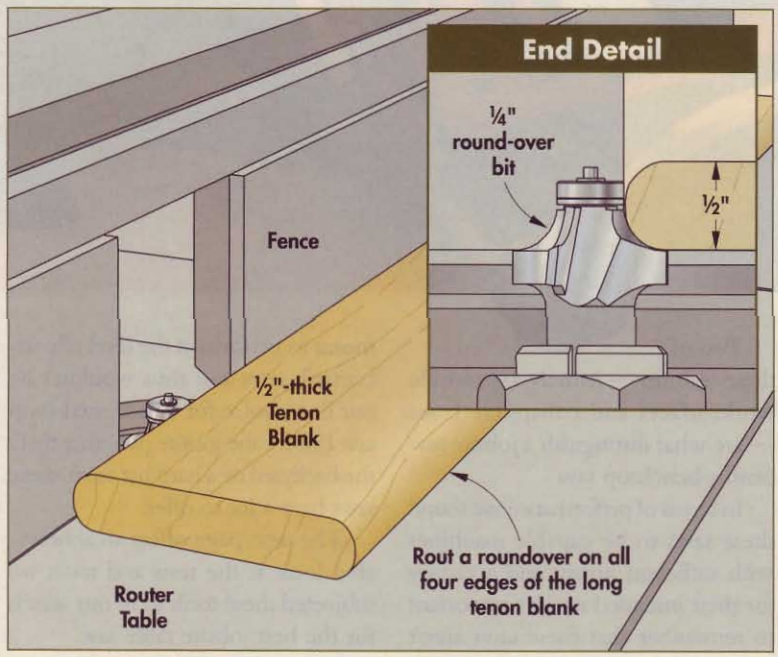
Thickness Stock — The next step is to plane the tenon stock to thickness to match the width of the mortise ($1/2$", in my case). The goal is to have the tenon slip into the mortise with a friction fit. So take some time to "dial in" the planer to get a piece that will fit just right. I use a narrow scrap piece as a test piece, planing it along with the tenon stock and using it to check the fit.

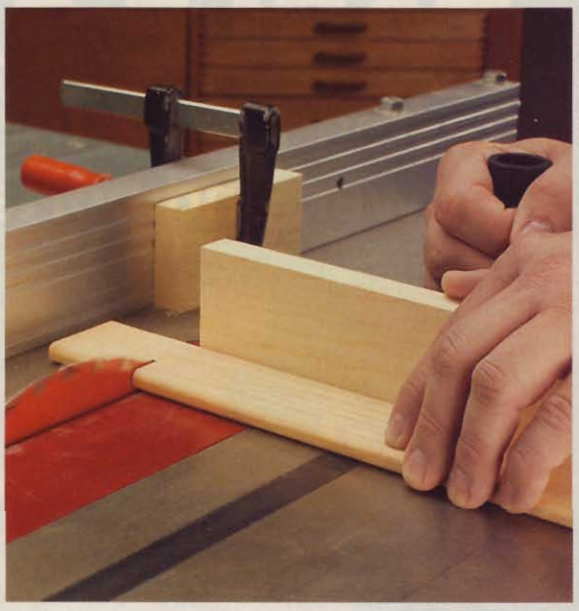
Of course, even if the thickness is dead-on, the square edges of the tenon stock won't fit the rounded ends of the mortise.

Round the Edges — The solution is to round the edges of the tenon stock to match the radius at the ends of the mortise. A roundover bit mounted in a router table makes quick work of that *(see Illustration below)*. Use a bit that's half the size of the thickness of the tenons. (For example, my tenons were $1/2$" thick, so I used a $1/4$" round-over bit.)

Trim Tenons to Length — Now you're ready to cut the tenons to length. You'll want to make them $1/16$" shorter than the combined depth of the mortises. This allows for excess glue at the bottom of the mortises.

To ensure identical length tenons, clamp a block to the rip fence several inches in front of the saw blade *(Photo, above)*. Then set the fence so the distance from block to blade matches the desired length of the tenon. Butt the end of the tenon stock against the block, and using a miter gauge, push the workpiece past the blade. Repeat this process to trim each tenon to length.





▲ For identical-length tenons, butt the tenon stock against a block clamped to the rip fence. Then use the miter gauge to guide the stock past the blade.

Spiral Upcut Bits

When it comes to routing mortises, there are three big advantages to using a spiral upcut bit *(Photo, below)*.

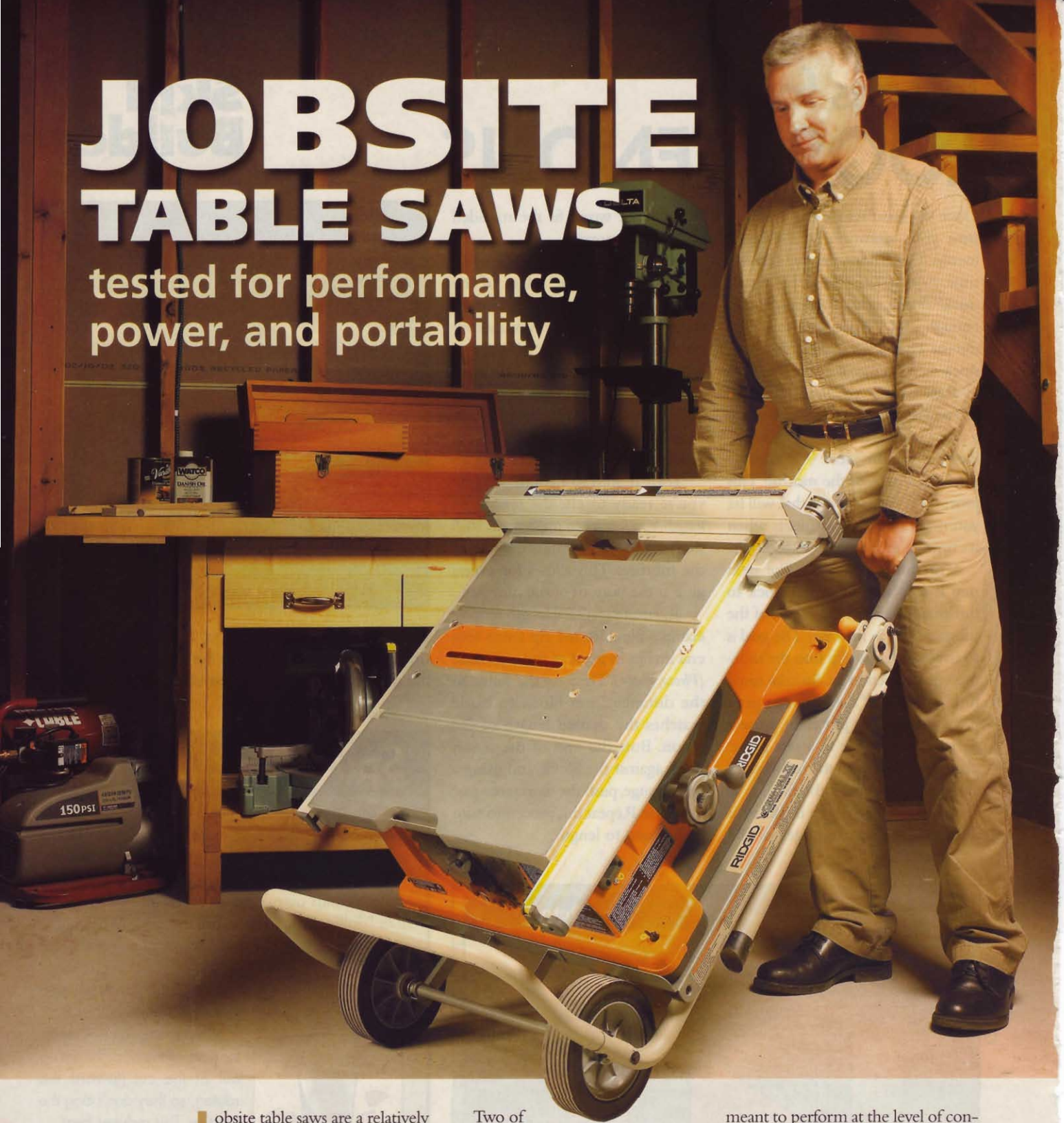
The Tip of the Bit Cuts — First of all, its cutting edge extends across the tip of the bit, which allows it to "drill" into the workpiece.

Smooth Clean Cuts — Another plus is the spiral cutting edges of the bit shear the wood fibers, producing a smooth, clean cut.

Chip Extraction — Finally, the flutes of the bit pull chips up out of the cut (toward the router), so they don't clog the mortise. This reduces heat build-up, which can damage the bit.

JOBSITE TABLE SAWS

tested for performance, power, and portability



Jobsite table saws are a relatively new category of power tool. Manufacturers have been touting benchtop and contractor's saws as ideal for the jobsite for years, but it's only been within the past 12 months that several new models have emerged with truly jobsite-friendly features included as standard equipment.

Two of these features — namely expandable worksurfaces and collapsible bases — are what distinguish a jobsite saw from a benchtop saw.

In terms of performance, we found these saws to be capable machines with sufficient power and accuracy for their intended use. It's important to remember that these saws aren't meant to perform at the level of contractor's saws and thus wouldn't be our first choice for a dedicated shop saw. But for the jobsite (whether that's the backyard or a hard hat area), these saws have a lot to offer.

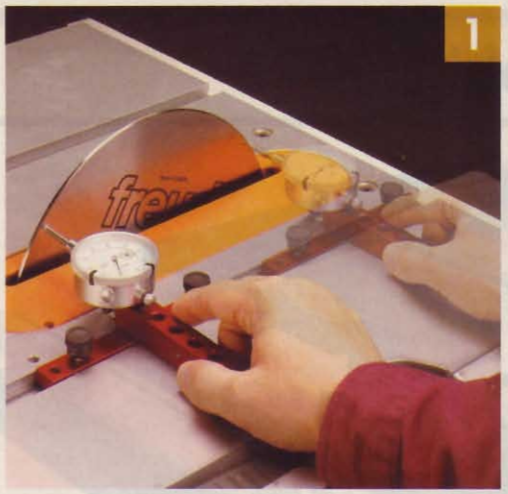
The next page offers an abbreviated look at the tests and trials we subjected these tools to in our search for the best jobsite table saw.

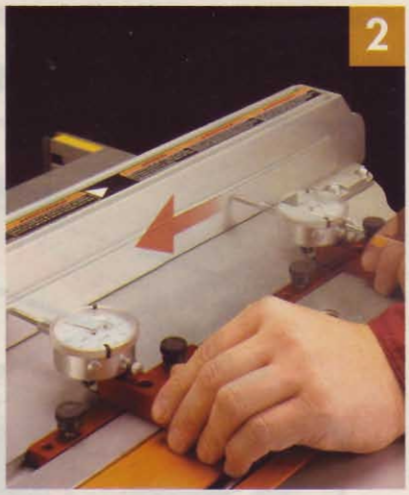
Saw Setup

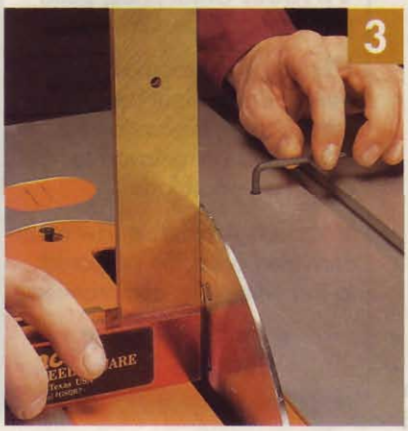
The miter gauge slots are the one constant on a table saw, so these serve as the starting point for measuring and adjusting all the other settings.

Each saw was fitted with a Freud calibration disk when measuring the blade for parallel and square. A dial indicator and try square were used to check the alignment.

It was during this step that we came to appreciate the saws with above-the-table blade adjustments.







▲BLADE & FENCE ALIGNMENT

A calibration disk and dial pointer were used to ensure that blades were parallel to the miter gauge slot *(Fig. 1)*. We also checked rip fences and, when necessary, adjusted them parallel with the miter gauge slot *(Fig. 2)*.

◄CHECK FOR SQUARE

Then we used the calibration disk and try square to test and adjust blades square to the table *(Fig. 3)*. Finally, we measured and adjusted the miter gauges using the calibration disk and try square *(Fig. 4)*.

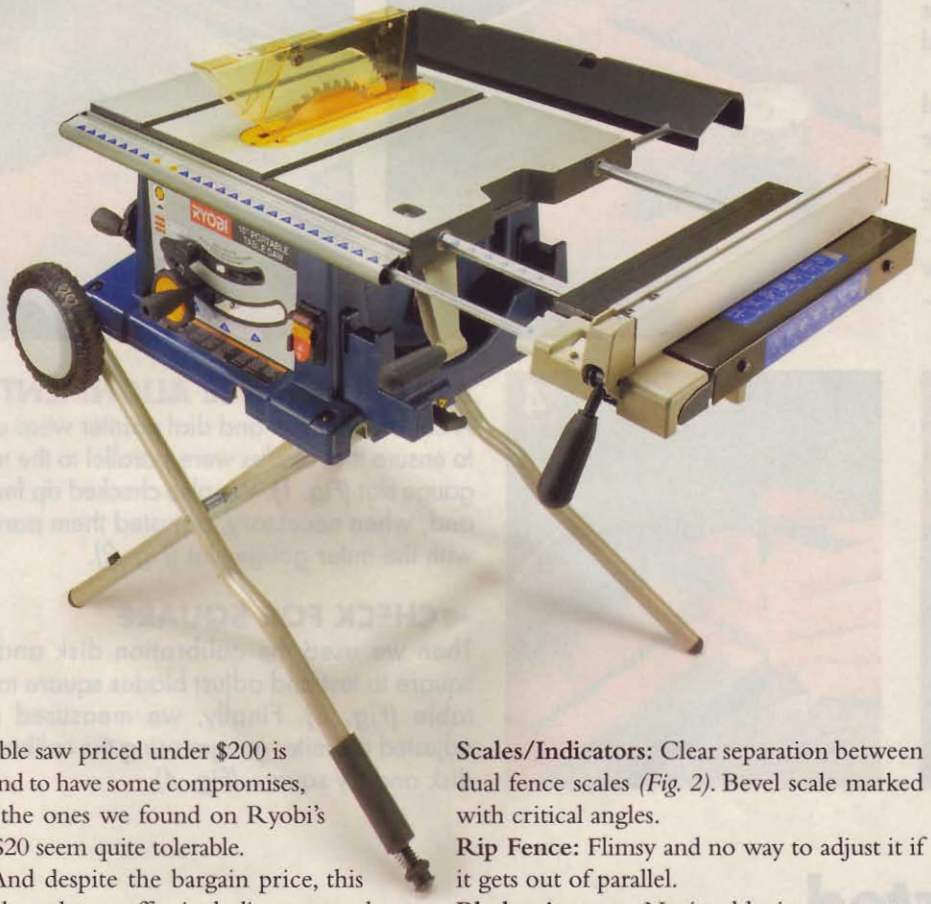
How We Tested

After ensuring an accurate setup, testing began in earnest with a series of ripping and crosscutting operations *(Photo, right)*.

Factory blades were used for the lion's share of the test, but we also mounted Freud blades on each saw to determine if any improvement would result *(Fig. 5)*. This also provided an excellent opportunity to gauge the blade-changing manners of each tool.

Finally, we set up a full-width, 8" dado blade to evaluate the capacity of each saw in that area and as one final check of blade changing *(Fig. 6)*.

Ryobi BTS20



A table saw priced under $200 is bound to have some compromises, but the ones we found on Ryobi's BTS20 seem quite tolerable.

And despite the bargain price, this saw has a lot to offer, including an excellent base, plentiful power, and above average controls and scales.

Condition/Assembly: Requires only the installation of wheels, outfeed table, and bumpers before it's ready to go to work.
Fence Alignment: Parallel right out of the box. Suffers from lack of adjustability.
Blade Alignment: Out of parallel by 1/32". Adjustment done underneath the saw.
Blade Stops: Dead on at 90° and 45°. Adjustments made underneath the saw.
Start Up: No soft start, but not overly abrupt.
Noise/Vibration: Reasonable considering the high RPM of this saw.
Power: Excellent.
Dust Collection: Only moderate amounts of dust left on tabletop and floor.
Blade Changing: Troublesome because of two collars that must be removed from the arbor to install a dado blade.
Mobility/Storage: One of the best bases in this group. Lightweight, sturdy, easy to fold. Extra points for the leveling foot *(Fig. 1)*.

Scales/Indicators: Clear separation between dual fence scales *(Fig. 2)*. Bevel scale marked with critical angles.
Rip Fence: Flimsy and no way to adjust it if it gets out of parallel.
Blade: Average. Noticeable improvement when cutting with premium blades.
Controls: High marks for using a handwheel to adjust the bevel setting.
Power Switch: Odd location, but easy to access once you get accustomed to it.
Blade Guard: Disappointing. Bent when it arrived. Anti-kickback pawls interfere with blade changes. Does not readily index to vertical when being re-installed.

At a Glance:

Price	$199
Motor	120v/15-amp
RPM	4,800
Blade	32-Tooth, Carbide
Table Size	26" x 17 1/2"
Table Ext.	Right & Rear
Fence Cap.	27"R/7"L
Max. Cut at 90°	3 5/8"
Max. Cut at 45°	2 1/2"
Dado Blade Cap.	8"x13/16"
Warranty	2 Years

Virtues: Great price; Solid performance; Excellent base.

Vices: Troublesome blade guard; Lightweight fence and miter gauge; Collars on the arbor must be removed to mount a dado blade.

Verdict: A capable saw at an unrivaled price. Be prepared to live with some compromise.

www.RyobiTools.com
800-525-2579

Mobile Position

▲ A leveling foot is a premium feature on this affordable saw.

▲ Dual rip scales are common on these saws. Ryobi does an excellent job of separating the scales to avoid confusion when using the table extension.

Craftsman 137.218300

At a Glance:

Price	$399
Motor	120v/15-amp
RPM	4,000
Blade	32-Tooth, Carbide
Table Size.	24" x 21"
Table Ext.	Right & Rear
Fence Cap.	24½"R
Max. Cut at 90°	3⅛"
Max. Cut at 45°	2¼"
Dado Blade Cap.	8"x13/16"
Warranty	1 Year

Virtues: Competitive price for a complete package with several outstanding features

Vices: Below average blade; Dust collection clogs; Awkward fence-locking lever.

Verdict: A very good saw with all the trimmings at an excellent price.

www.Craftsman.com
800-843-1682

WORKBENCH® AWARD OF QUALITY TOP VALUE

Craftsman offers the most complete package in this group (including extras such as a push stick and dado blade insert) at an excellent price.

Power and accuracy are good, though we did notice more vibration in this saw than in all others. Portability is excellent thanks to a well-designed stand, onboard storage for all components, and a spring-loaded retractable cord.

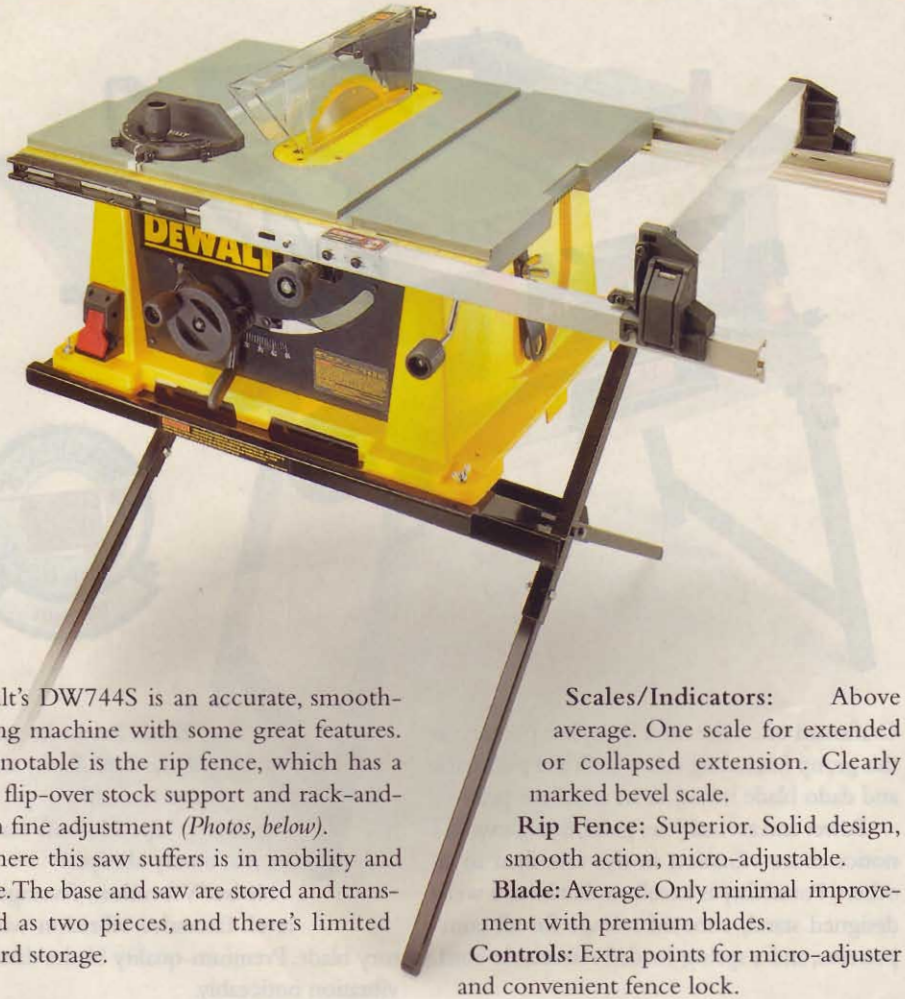
Condition/Assembly: Excellent. Packaged in three pieces: saw, stand, outfeed support. Assembles quickly and easily.
Fence Alignment: Accurate out of the box. Adjusts easily with hex bolts on top of fence.
Blade Alignment: Dead-on from the factory. Easily adjusted above the table.
Blade Stops: Accurate out of the box. Easily adjusted above the table.
Start Up: No soft start, but not overly abrupt.
Noise/Vibration: Average noise level. Excessive vibration with factory blade. Premium-quality blades dampened vibration noticeably.
Power: Some strain during heavy ripping. Improved cutting with premium blade.
Dust Collection: Dust and debris accumulates in the shroud and interferes with lowering the blade fully.
Blade Changing: Superior. Easy access arbor lock, one wrench, and plenty of space.
Mobility/Storage: Solid, easy-to-operate base. Extra credit for leveling foot *(Fig. 1)*.
Scales/Indicators: Dual rip fence scale can be confusing. Bevel scale is better.
Rip Fence: Tall, solid, and pre-drilled for auxiliary fence. Some racking. The "whale-tail" lever is awkward *(Fig. 2)*.
Blade: Below average. Strain and vibration were lessened with premium blades.
Controls: Average. No blade height lock.
Power Switch: Large, well-placed, and includes a lockout key for safety.
Blade Guard: Better than average. Easy to remove/install with one thumbscrew. Flips up for blade changes.

Mobile Position

▲A leveling foot makes this excellent stand adaptable to irregular surfaces.

▲These dual scales are easy to misread. And the "whale-tail" locking lever is unnecessarily large and awkward.

DeWalt DW744S



DeWalt's DW744S is an accurate, smooth-running machine with some great features. Most notable is the rip fence, which has a clever flip-over stock support and rack-and-pinion fine adjustment *(Photos, below)*.

Where this saw suffers is in mobility and storage. The base and saw are stored and transported as two pieces, and there's limited onboard storage.

Condition/Assembly: Not great. The base arrived bent and with no hardware for mounting the saw.

Fence Alignment: Fence was true out of the box. Adjustments are made easily with two bolts at the back of the saw.

Blade Alignment: Blade was aligned from factory. Adjustments are relatively easy with a pivot bracket on the back of the saw.

Blade Stops: Accurate out of the box. Easy to adjust from front of saw.

Start Up: No soft start, but not overly abrupt.

Noise/Vibration: Minimal.

Power: Lowest amp-rated motor in this group. Some straining was apparent.

Dust Collection: Highly effective.

Blade Changing: Plenty of room. Requires two wrenches.

Mobility/Storage: Poor. Base only collapses with saw removed. No cord wrap, fence storage, or blade guard storage.

Scales/Indicators: Above average. One scale for extended or collapsed extension. Clearly marked bevel scale.

Rip Fence: Superior. Solid design, smooth action, micro-adjustable.

Blade: Average. Only minimal improvement with premium blades.

Controls: Extra points for micro-adjuster and convenient fence lock.

Power Switch: Average. Large and well-placed, but no lockout. Has to be "flipped" from the side.

Blade Guard: A mixed bag. Flips over and out of the way for blade changes and has large anti-kickback pawls. Taking it on and off is time-consuming.

At a Glance:

Price	$499
Motor	120v/13-amp
RPM	3,650
Blade	24-Tooth, Carbide
Table Size.	26 1/2" x 19 1/4"
Table Ext.	Right
Fence Cap.	24 1/2"R/15 1/2"L
Max. Cut at 90°	3 1/8"
Max. Cut at 45°	2 1/4"
Dado Blade Cap.	8"x13/16"
Warranty	1 Year

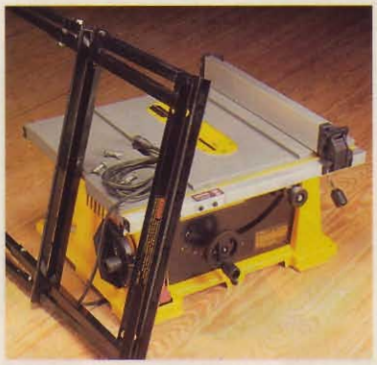
Virtues: Excellent accuracy; Smooth running; Outstanding fence and scale.

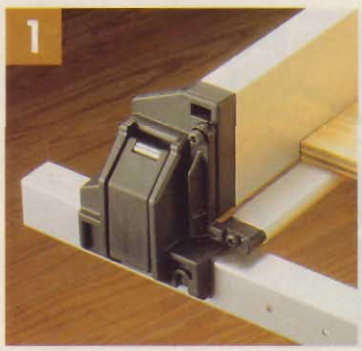
Vices: Must be broken into two pieces for storage/transport; Limited onboard storage.

Verdict: An outstanding saw with an unfortunately awkward base.

www.Dewalt.com
800-433-9258

Mobile Position





▲DeWalt's work support can be flipped into place when needed and retracted when it's not.

▲A large knob and rack-and-pinion gears make micro-adjustments to the rip fence fast and accurate.

Bosch 4000-07

At a Glance:

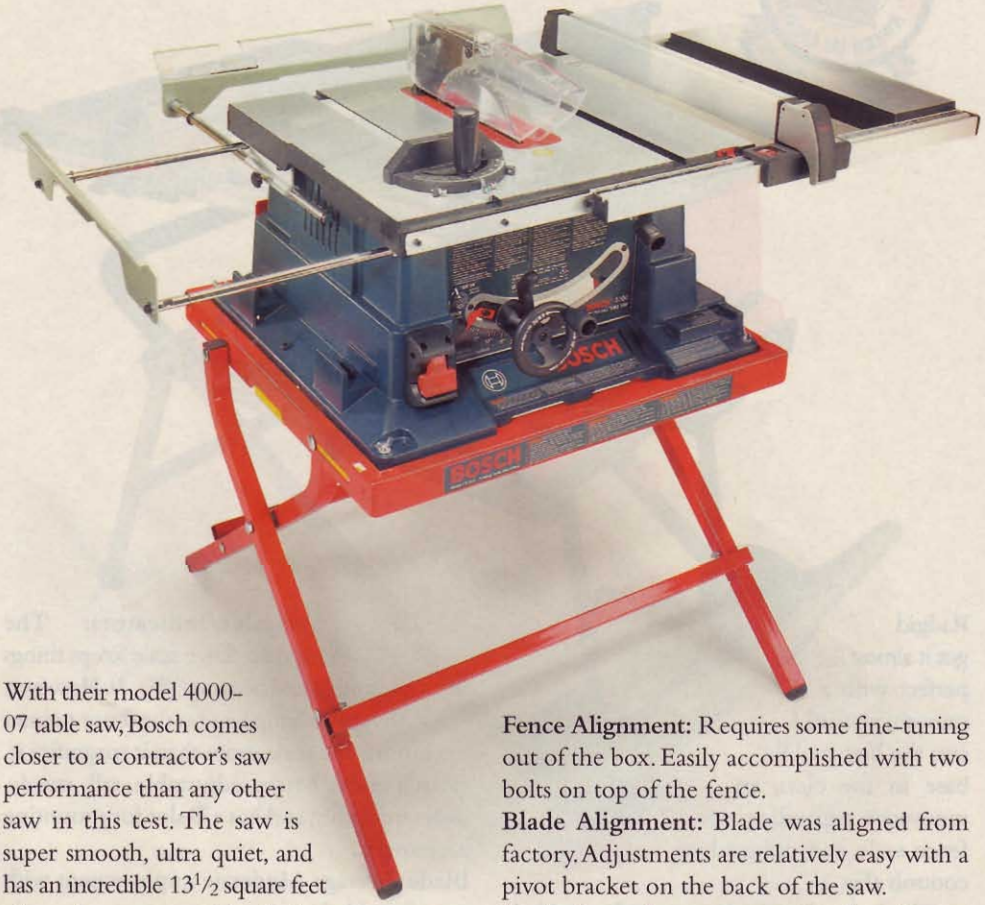
Price	$499
Motor	120v/15-amp
RPM	3,650
Blade	32-Tooth, Carbide
Table Size	29" x 21½"
Table Ext.	Right, Rear & Left
Fence Cap.	25"R/9"L
Max. Cut at 90°	3⅛"
Max. Cut at 45°	2½"
Dado Blade Cap.	8"x13/16"
Warranty	1 Year

Virtues: Enormous stock support; Powerful, quiet, and smooth running.

Vices: Too large for one person to move; Blade changing is troublesome; Below average dust control.

Verdict: Outstanding in terms of performance. Disappointing on a few details.

www.BoschTools.com
877-267-2499



With their model 4000-07 table saw, Bosch comes closer to a contractor's saw performance than any other saw in this test. The saw is super smooth, ultra quiet, and has an incredible 13½ square feet of stock support with all three extensions deployed.

Unfortunately, moving this saw around and setting it up is also reminiscent of a contractor's saw. It's just too big for one person.

Condition/Assembly: Average. The base requires some assembly, as do the left and rear stock supports. No hardware was included to attach the saw to the base.

Fence Alignment: Requires some fine-tuning out of the box. Easily accomplished with two bolts on top of the fence.

Blade Alignment: Blade was aligned from factory. Adjustments are relatively easy with a pivot bracket on the back of the saw.

Blade Stops: Accurate out of the box. Easy to adjust from front of saw.

Start Up: Bonus points for including soft start — not a common feature in this category.

Noise/Vibration: Negligible.

Power: Excellent.

Dust Collection: Below average.

Blade Changing: Arbor lock is real plus, but shroud leaves little room for blade changes.

Mobility/Storage: Poor. Requires two people to collapse and haul.

Scales/Indicators: Not great. Pointers are flimsy and dual scale can be confusing.

Rip Fence: Superior. It's tall, sturdy, and slides smoothly. Also easy to adjust.

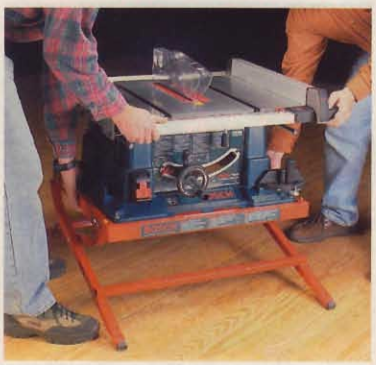
Blade: Average. Some improvement when cutting with premium blades.

Controls: Average.

Power Switch: Average. Large and well-placed, but no lockout. Has to be "flipped" from the side.

Blade Guard: Average. Requires blade to be at full height to remove insert. Tends not to stand up out of the way for visual setups.

Mobile Position



► Thanks for all the support! Bosch's three sliding extension wings provide the largest worksurface in this class of table saw and make cutting large sheets of plywood much less strenuous.

Ridgid TS2400LS

Ridgid got it almost perfect with a smooth, powerful saw, the best mobile base in the class, an innovative expanding rip fence scale, and outstanding controls *(Fig. 1)*.

The lack of outfeed support, flimsy blade changing wrenches, and a finish that rubs off the top *(Fig. 2)* represent the sum total of our complaints.

Condition/Assembly: Done. Roll it out of the box and go to work. No assembly required.
Fence Alignment: Required 1/32" adjustment. Easily accomplished with adjustment screws at front of fence.
Blade Alignment: Accurate from the factory. Easily maintained with tabletop adjustments.
Blade Stops: Precise right out of the box. Both 90° and 45° stops are adjusted at the tabletop.
Start Up: High marks for having soft start.
Noise/Vibration: Negligible.
Power: Excellent.
Dust Collection: Highly effective.
Blade Changing: Plenty of clearance, but the wrenches are awful.
Mobility/Storage: Unrivaled. Ridgid's base is easy to collapse, rolls around even when it isn't collapsed, and the saw has a storage space for all components.

Scales/Indicators: The expanding fence scale keeps things simple and accurate *(Fig. 1)*. However, the magnifying lens on the fence pointer distorts the scale more than it magnifies it.
Rip Fence: Micro-adjustable, tall, sturdy, slides smoothly, and has a T-slot for mounting accessories.
Blade: Average. Moderate improvement with premium blades.
Controls: Excellent. Large dial for setting bevel angle. Very effective blade height lock.
Power Switch: Large, easy to actuate, and has a lockout key. Unfortunately, it's placed a bit too high and too far back from the table edge to be a quick reach.
Blade Guard: Superior. Mounts to the back of the saw instead of through the insert. Indexes with two pins for perfect positioning.

At a Glance:

Price	$499
Motor	120v/15-amp
RPM	4,000
Blade	28-Tooth, Carbide
Table Size	30" x 21"
Table Ext.	Right
Fence Cap.	25"R/12"L
Max. Cut at 90°	3 1/8"
Max. Cut at 45°	2 1/4"
Dado Blade Cap.	8"x 13/16"
Warranty	3 Years

Virtues: Excellent base; Great performance; Outstanding features and controls.

Vices: No outfeed support; Finish rubbed off tabletop.

Verdict: Ridgid sets the standard for jobsite table saws. Represents the best of all worlds at a competitive price.

www.Ridgid.com
800-474-3443

Mobile Position

▲ The scale on the Ridgid's fence rail expands along with the extension table. A simple, but effective, micro-adjuster dials in the perfect fence setting *(Inset Photo)*.

▲ The finish on our saw began showing wear after only a few cuts. Ridgid assures us that the problem is solved.

TABLE SAW RATINGS

		RYOBI	CRAFTSMAN	DEWALT	BOSCH	RIDGID
SETUP & ADJUSTMENT	Condition of Saw/ Ease of Assembly	B	B	C	C	A
	Fence Alignment	B	A	A	A	A
	Blade Alignment	B	A	B	B	A
	Blade Stops	C	A	A	A	A
	Start Up	B	B	B	A	A
PERFORMANCE	Noise/Vibration	B	B	A	A	A
	Power	A	A	B	A	A
	Dust Collection	A	B	A	B	A
	Blade Changing	C	A	B	B	B
	Mobility/Storage	B	B	D	D	A
	Scales/Indicators	B	C	B	B	B
DETAILS	Rip Fence	C	A	A	A	A
	Miter Gauge	C	C	A	A	A
	Blade	C	C	C	C	C
	Controls	A	C	B	C	A
	Power Switch	C	A	C	C	C
	Blade Guard	D	C	B	C	A
	GPA	2.71	3.12	3.06	3.12	3.65

Final Recommendations

Editor's Choice

Ridgid TS2400LS

Nearly flawless. Best base, best fence, best scale ... best saw. An outfeed support and a more durable finish on the top would make this the perfect jobsite table saw.

Top Value

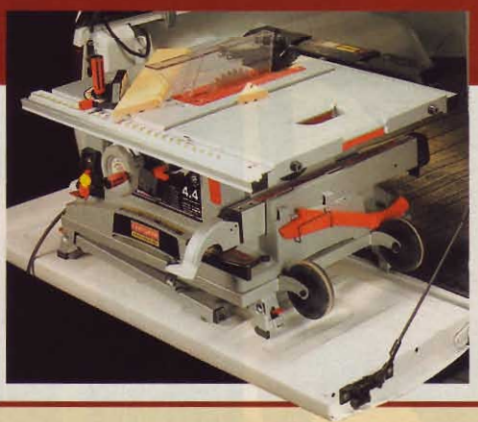
Craftsman

A complete "plug-and-play" table saw, right down to a push stick and dado blade insert. Performance is about par, suffering only slightly from mild vibration and labored cutting. At this price, that's nothing to grouse about.

Using a Saw in the Truck Bed

One noteworthy feature of several of these stands is that they are designed to sit level even when collapsed. The benefit of that is the ability to move the saw to the end of a truck bed *(Photo, right)* or even place it on the ground for a couple of quick cuts.

The Craftsman, Ridgid, and Bosch all have this feature. The Ryobi stand does not hold the saw level when collapsed, and the DeWalt stand removes for transport.



space-saving CLAMP STORAGE

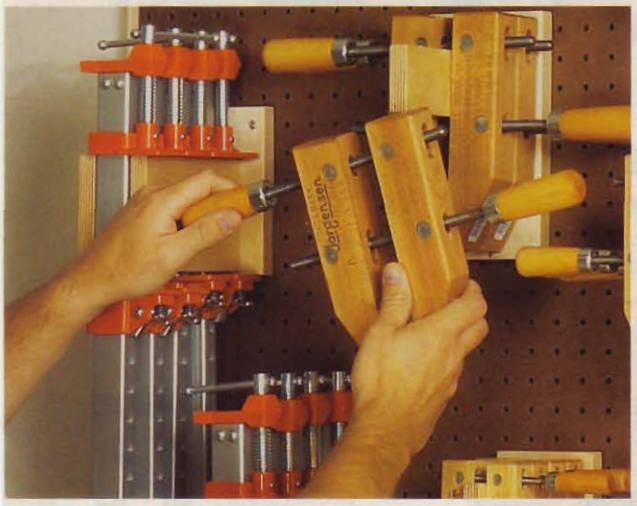
There's an old saying that you can never have too many clamps. I don't necessarily agree with that though. Many woodworkers I know really *do* have all the clamps they'll ever need. What they don't have though is a good way to store all their clamps, keep them organized, *and* hold them at arm's reach without gobbling up too much space.

One solution is to build this simple clamp storage system *(Photo, below)*. With this system, the clamps hang on plywood holders that are mounted to a pegboard wall unit. To save space, sturdy support arms on the holders let you stack clamps face to face, several clamps deep. So even a small bracket can hold as many as four clamps.

In addition to holding lots of clamps, the brackets can be quickly and easily rearranged if needed. That's where the pegboard comes in. Combined with a few plastic wall anchors, the pegboard lets you reconfigure the brackets in minutes.

Pegboard Wall Unit

Before you get started on the holders, the first step is to build the pegboard wall unit. The unit shown in the *Illustration* on the next page is 49" x 73". Of course, you may want



▲ Keep your clamps organized and at arm's reach with this simple shop storage project.

to size it differently depending on the number and type of clamps you have.

Regardless of its size though, the construction of this pegboard wall unit is the same. It's just a piece of 1/4" pegboard surrounded by a hardwood frame.

Start with the Frame — To build the frame, I started by ripping the rails (A) and stiles (B) to width from 3/4"-thick hardwood. (I used maple).

Notice that there's a wide rabbet in each frame piece that holds the pegboard. An easy way to cut this rabbet is to use the two-pass table saw method, as shown in the *Sidebar* below.

The frame pieces are joined together with miter joints and biscuits. The biscuits will reinforce the end-grain glue joints of the mitered ends, which aren't particularly strong by themselves. And later, when the pegboard panel is attached, it will span across the joint lines, strengthening them even further.

But first, you'll need to cut slots in the mitered ends of the frame pieces for the biscuits. Set the plate joiner to cut a slot for a #20 biscuit. After cutting the slots, it's just a matter of gluing and clamping the frame together.

Add a Pegboard Panel — Now you can turn your attention to the pegboard panel (C). It's sized to fit inside the shoulders of the rabbets around the frame.

With the panel cut to size, you can go ahead and glue and screw it to the frame. Then simply fasten the pegboard wall unit to the wall with screws *(see Wall Mounting Detail at right)*. Since it will be supporting quite a bit of weight when it's loaded with clamps, be sure to hit the wall studs.

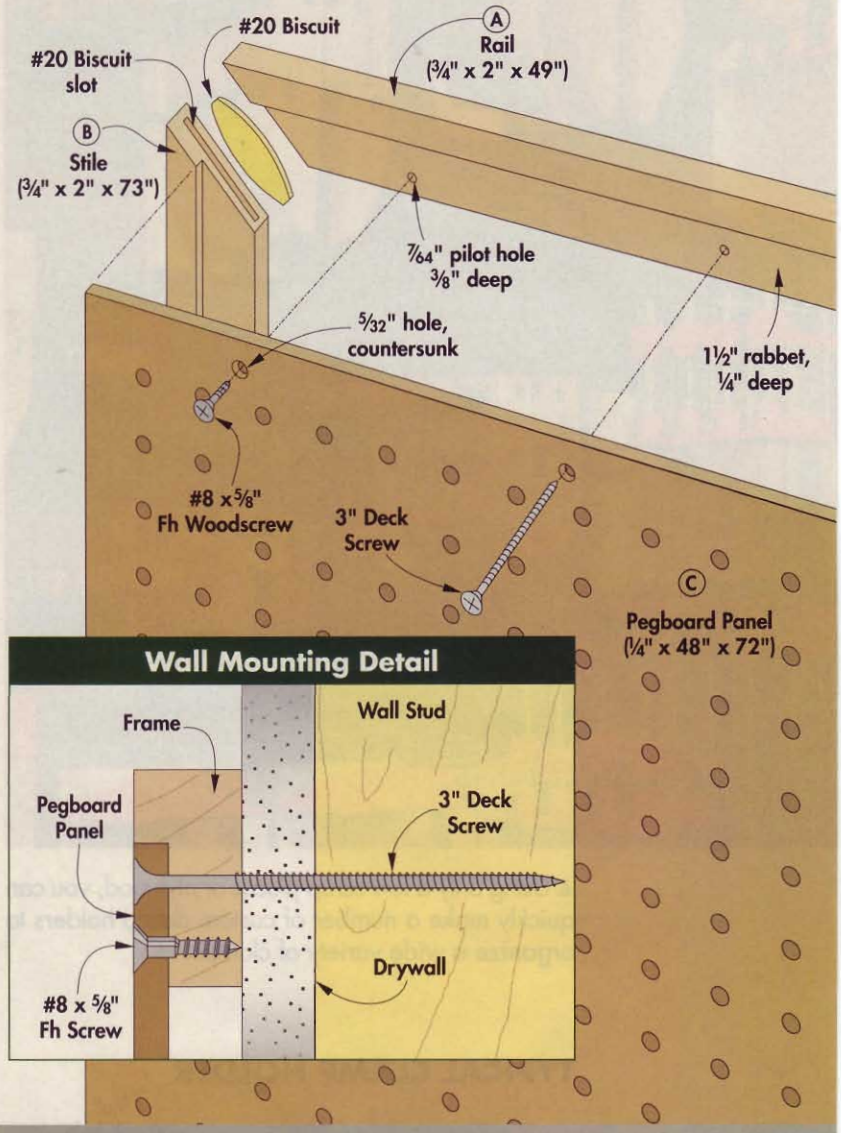
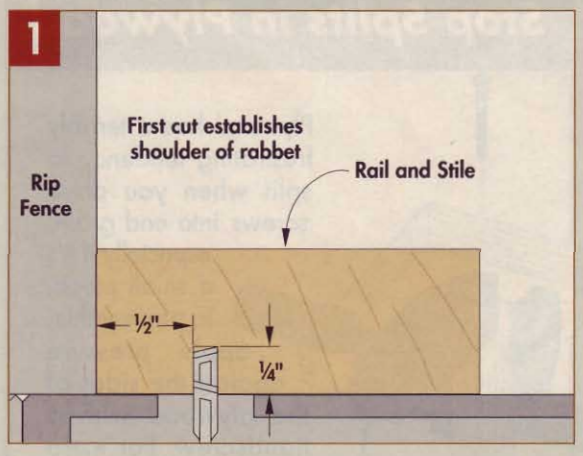
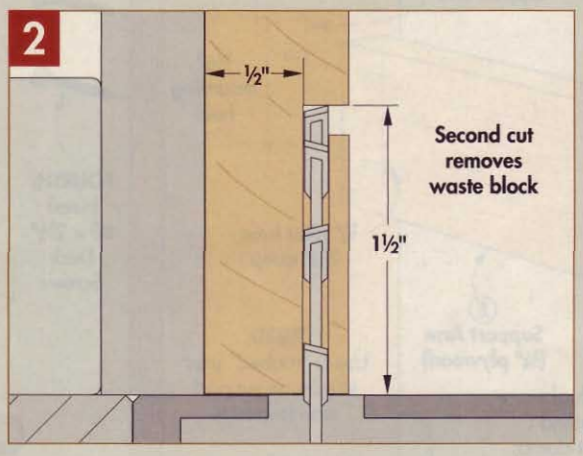


Table Saw How-To: Cutting Rabbets



▲ To cut a wide rabbet, start by adjusting the rip fence on the table saw to cut the shoulder in the face of the workpiece. Then, set the workpiece face down on the saw and make a single pass.



▲ Now readjust the fence and raise the saw blade so it intersects the saw kerf made in *Figure 1*. Set the workpiece on its edge to make the second cut, and use a push block to push it through the blade.

▲ Using only a few scrap pieces of plywood, you can quickly make a number of custom clamp holders to organize a wide variety of clamps.

custom CLAMP HOLDERS

The clamp holders that mount to the pegboard wall unit are designed with two things in mind — strength and simplicity. They're sturdy enough to hold heavy clamps. Plus their simple design makes it quick and easy to remove a clamp (or hang it back up).

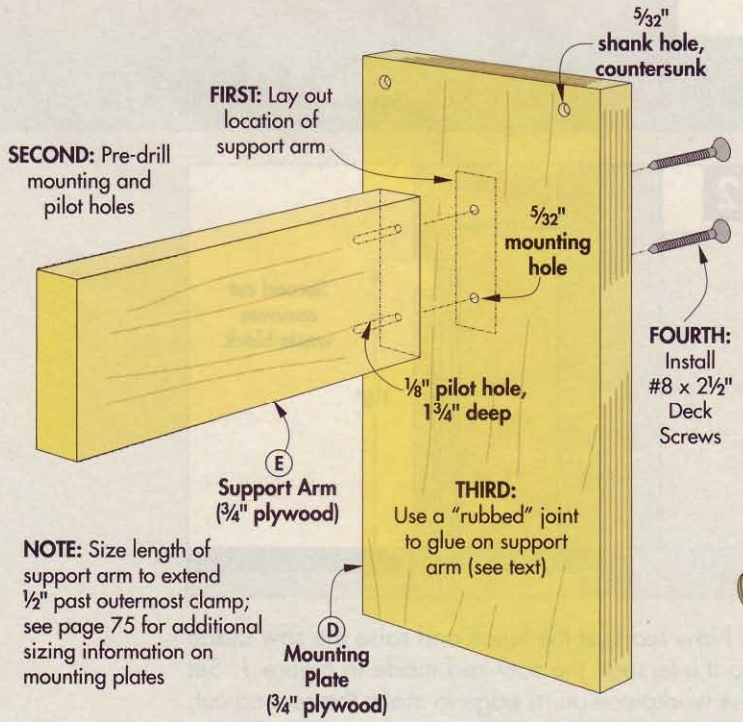
A typical clamp holder consists of a mounting plate (D) that attaches to the pegboard and either one or two support arms (E) to hold the clamps *(see Illustration below)*. (To customize holders for different clamps, see page 75.)

Materials — The mounting plate and support arms are both made from 3/4" plywood. I'd recommend using Baltic birch plywood. It has more plies and fewer voids than fir plywood, which increases its screw-holding ability. This is important because the support arms are secured to the mounting plates with glue and screws.

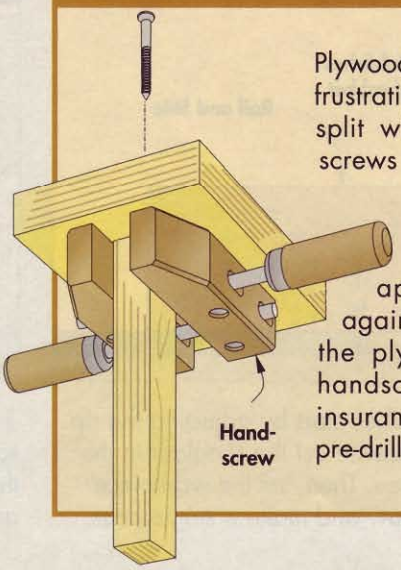
Rubbed Joint — Speaking of that, I used what's called a "rubbed joint" when gluing on the support arms. With this type of joint, there's no need to clamp the pieces together. That's a good thing, because most clamps don't have enough reach to do it.

To make a rubbed joint, start by laying out the location of the end of the support arm on the mounting plate *(Illustration, below left)*. Then apply a thin film of glue, position the arm on the mounting plate and slide it back and forth. After a half-minute or so, you should feel the glue begin to tack. At that point, align the arm and set the holder aside for about 20 minutes. Then install

TYPICAL CLAMP HOLDER



Stop Splits in Plywood



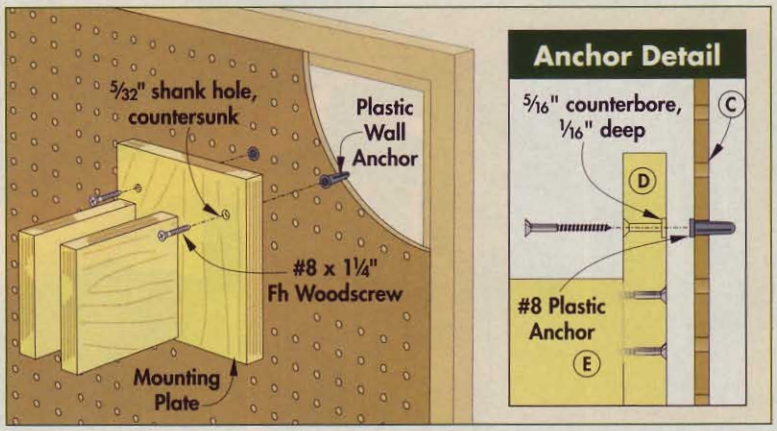
Plywood has a terribly frustrating tendency to split when you drive screws into end grain, especially if it's a small piece. To prevent this, apply pressure against the sides of the plywood with a handscrew. For extra insurance, be sure to pre-drill pilot holes.

screws from the back of the mounting plate to secure the arms *(see Stop Splits in Plywood on page 74)*.

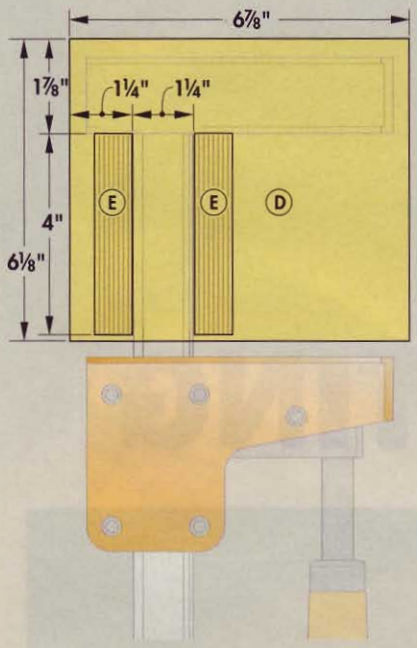
Mounting the Holders — Once the holders are completed, you're ready to mount them to the pegboard. They're held in place with screws and plastic wall anchors *(see Illustration at right)*. These anchors provide plenty of holding power — even for heavy clamps. Plus they make it easy to reposition the clamp holder as the need arises.

Just a quick note here. The rim of the wall anchors will stick out a bit from the surface of the pegboard *(Anchor Detail)*. As such, it won't allow the mounting plate to sit flat against the pegboard. To get around that, I drilled shallow counterbores in the back of the mounting plate to fit over the rims of the anchors.

MOUNTING THE HOLDERS



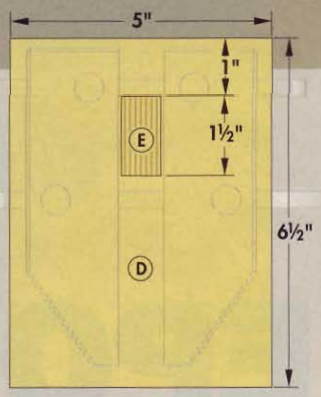
Sizing Guidelines



◄PARALLEL JAW CLAMPS

The design of these clamp holders works well, even for heavy clamps like these parallel jaw clamps. For this holder, the fixed jaw rests on a couple of support arms which also help to corral the bar of the clamp.

One thing to note about these clamps is the jaws are quite thick. So this holder is designed for two clamps instead of four like the others *(see Photo on page 72)*.

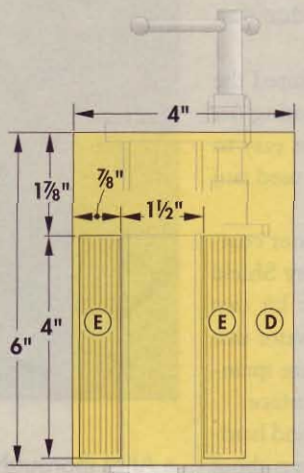


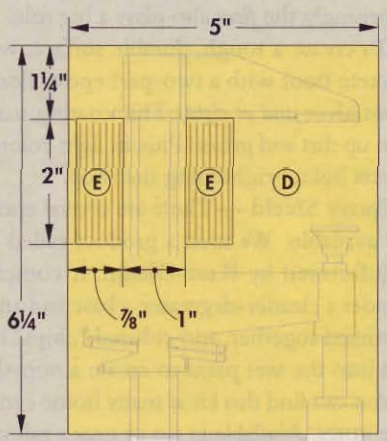
▲HANDSCREW CLAMPS

A single support arm holds handscrew clamps. To make it easy to slip them on and off, the arm is 1/2" narrower than the opening between the metal spindles of the clamp. As for the mounting plate, it's 1/4" larger all around than the "footprint" of the handscrew.

► ALUMINUM BAR CLAMPS

These aluminum bar clamps also fit between two support arms. And even though they're incredibly lightweight, the support arms are wider. This keeps the long bars on the clamps from rocking back and forth when you hang them up. Note: For both the steel bar and aluminum bar clamps, I spaced the support arms 1/4" further apart than the width of the bar.





◄STEEL BAR CLAMPS

The bar on these clamps fits between two support arms — one to hold the fixed jaw of the clamp and the other to prevent the clamp from swinging. The dimensions at left should handle all sizes of this clamp.

EPOXY FLOOR COATING

One comment I hear quite often about the *Workbench Ultimate Home Woodshop* is how clean and bright it is. That's due in part to the fluorescent lights in the shop. But there's more to it than that. Surprisingly, the *floor* also plays a big role.

To create a tough, durable surface, we painted the concrete floor with a two-part epoxy floor coating *(see Photos above and at right)*. This coating makes it easy to clean up dirt and grease. Plus, its light color (we used tan) reflects light, brightening the shop.

Epoxy Shield — There are several epoxy floor coatings available. We used a product called Epoxy Shield manufactured by Rust-Oleum. It comes as a kit that includes a cleaner-degreaser, a base and an activator that are mixed together, and colored "chips" that are sprinkled into the wet paint to create a non-slip surface.

You can find this kit at many home centers and hardware stores. Available in tan or gray, a gallon covers about 250 square feet and costs about $60. For information on mixing and applying this floor coating, turn to page 78.

After thoroughly cleaning the garage floor, the epoxy coating is simply spread onto the concrete with a standard 1/2" nap roller.

prep & paint

As with any paint job, the durability of this epoxy floor coating will only be as good as the preparation.

Inspect the Floor — The first step is to give the concrete floor a thorough inspection. Wide cracks or persistent moisture may indicate serious water problems. It's important to address those issues first, or else the floor coating may not bond to the concrete.

Clean & Degrease — Once you've determined that the floor is in good shape, the next step is to scrub it with the cleaner-degreaser, which is included in the kit. Start by hosing the floor down, or if it's particularly dirty, use a pressure washer. Mix the cleaner-degreaser with water. Then scrub it into the floor with a push broom, working in small sections so you can keep track of where you've been.

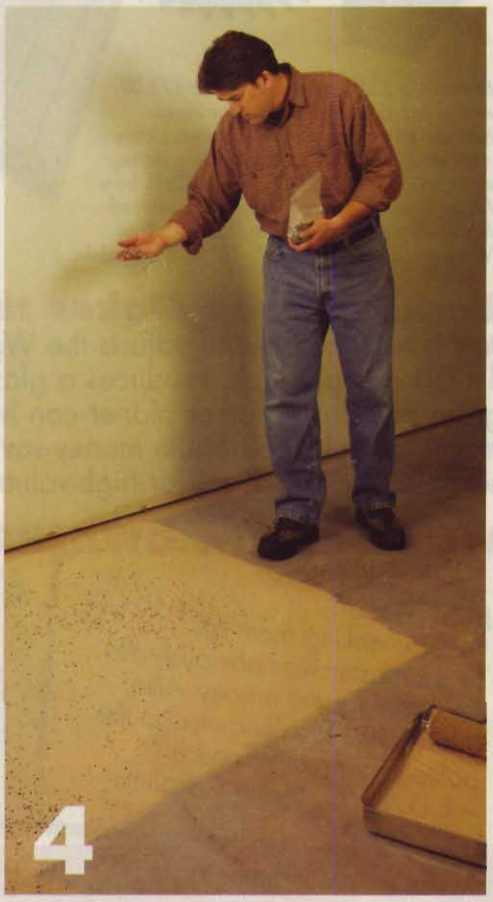
Two-Part Mix — After allowing the floor to dry (about 24 hours), mix the activator and base together *(Figs. 1 and 2)*. Then let the mixture sit for 60 minutes before applying it.

Paint the Floor — Now simply roll the paint on the floor *(Fig. 3)* and sprinkle the color chips *(Fig. 4)*. The coating has to cure for four hours before walking on the floor. Allow seven days before driving on it.

▲ Everything you need to cover a 250-square-foot floor is included in the basic kit.

▲ Pour the entire contents of the activator (Part A) into the base (Part B), as shown in *Fig. 1*. Then stir the mixture thoroughly *(Fig. 2)* and let it sit for 60 minutes.

▲ After applying the epoxy coating around the perimeter of the floor with a brush, use a 1/2" nap nylon roller to paint the floor in 4-ft. x 4-ft. sections. Use short, overlapping strokes, then long strokes to even out the surface.



▲ After rolling one section of floor, sprinkle on the color chips while the coating is still wet. Try to get even coverage, but there's no need to be too finicky here.