

TABLE SAW TEST: 4 NEW HYBRID SAWS REVIEWED

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February 2005

TOP
10

INNOVATIVE

TOOLS

2005

Innovative TOOL

A W A R D S



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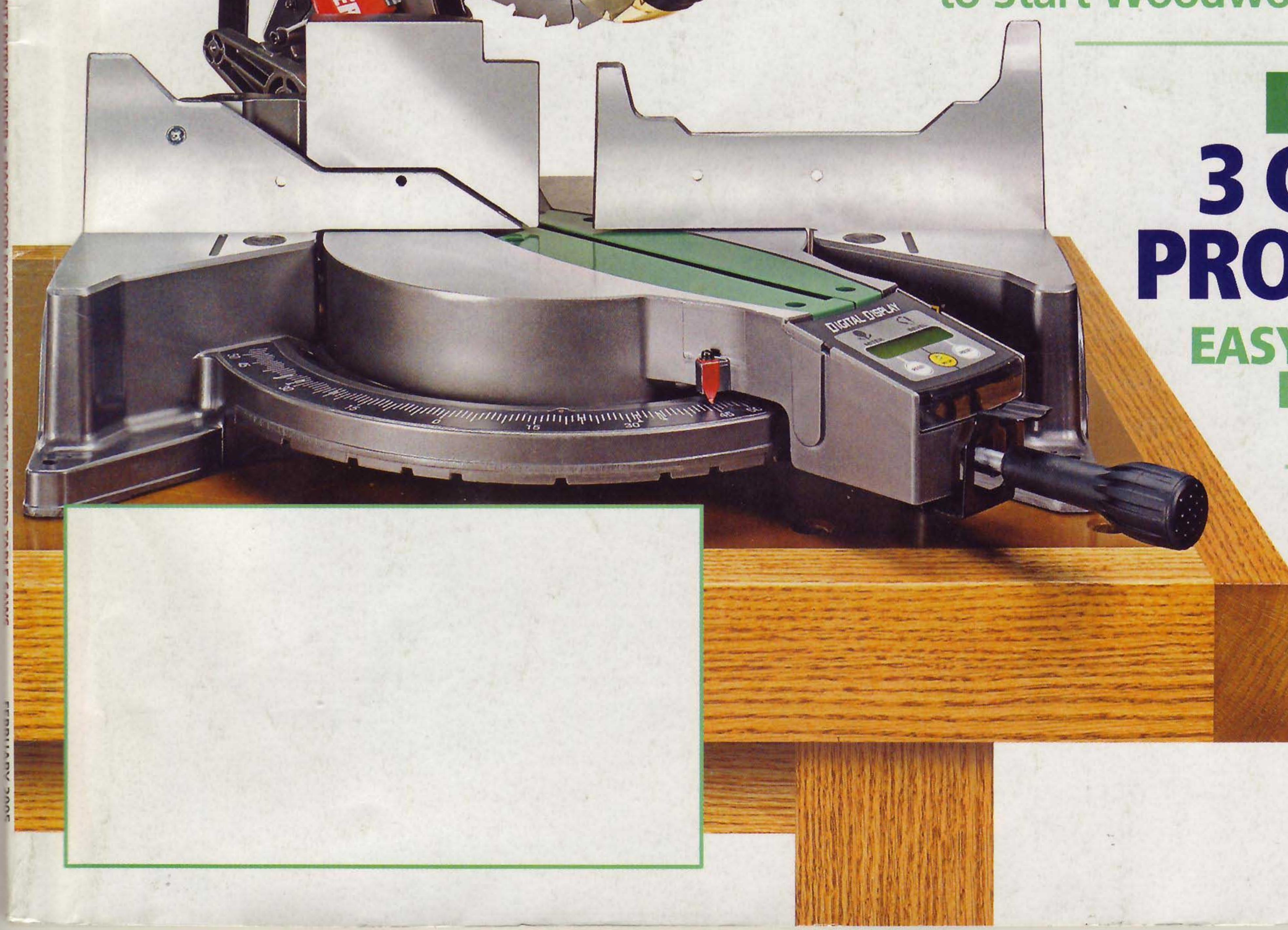
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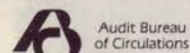
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EDITORIAL

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email: Editor@Workbenchmag.com

EDITOR'S NOTES

I always look forward to the new year. One reason is this annual special issue that we devote largely to the tools of our trade. In addition to our regular in-depth tool test (a review of new "hybrid" table saws in this issue), it's the time when we make our much anticipated announcement of *Workbench's* Top 10 Innovative Tool Awards.

Top 10 Tools — In preparation for these awards, the *Workbench* editors have been busy trying out hundreds of new tools.

Most of these tools performed their jobs very capably. A select few have actually raised the bar for their particular tool category by providing either a safer, a more accurate, or a more efficient way to work wood. These are the tools we selected as this year's 10 most innovative. For a complete run-down of these breakthrough tools, turn to page 56.

Bench Basics — Now there's no doubt that having the right tools is a huge help when building a project. But as every woodworker knows, it's the skills in using those tools that really make or break a project.

That's where *Bench Basics* comes in. This new series of articles and online extras focuses on the essentials of woodworking. Whether you're just getting started, or you're a seasoned craftsman, *Bench Basics* will provide you with all the information you need to improve your skills. In this issue (beginning on page 40), we take a look at the most fundamental "tool" of all — the shop.

Tim





WORKBENCH® February 2005 C O N T E N T S

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Solid-wood construction, half-lapped grids, and knock-down hardware make for a simple, sturdy boot bench that you can build in a weekend.

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This easy-to-build divider features a lighted display cabinet, stone-clad pedestal, and decorative wood column that will transform the entry of your home.

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Contractor or cabinet saw? These "hybrid" table saws combine the best of both worlds. We test-drive four new saws to see which ones make the cut.





IN EVERY I S S U E

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This shop-made workstation features a pair of adjustable hold-downs that secure long boards before, during, and after the cut.

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Three Workbench project designers share their secrets for sharpening tools fast on the jobsite. Hone your own sharpening skills by learning their shortcuts.

BENCH BASICS

40 Setting Up Shop

In this premiere installment of Bench Basics, we explain the pros, cons, and consequences of setting up shop in a basement, garage, or outbuilding.

SKILL BUILDER

54 Half-Lap Joinery

Half-laps are a strong joint used for building frames, grids, and latticework. This table saw technique makes cutting them easy and accurate.



◀ The goal of a half-lap joint is to remove half the thickness of the mating pieces so their faces fit flush. Our table saw tips and techniques make it easy to achieve that perfect fit.

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Questions & ANSWERS

the basics of SPRAY FINISHING

Q I've always applied finish by brushing or wiping it on, but I'd like to try spraying. Does spraying offer any advantages, and what equipment will I need to get started?

David Valish
Schuyler, NE



Standard Spray Gun



HVLP Conversion Gun



HVLP Turbine System



▲ You can achieve professional-looking spray finishes in your shop with either paint or clear topcoats by using a high-volume, low-pressure (HVLP) sprayer.

A The main advantage of spraying is speed. Plus, spraying lays down a smooth finish that's free of brush marks.

If these benefits appeal to you, then you first need to choose the right sprayer. All fall into one of two categories: standard, or high-volume, low-pressure (HVLP).

Standard Sprayers — A standard spray gun (top left) draws from an air compressor and sprays out air and coating material (paint or finish) at high pressure (up to 80 psi). Standard sprayers, though, have

transfer efficiency (how much coating reaches the surface) as low as 20 to 45 percent. That means 55 to 80 percent of the finish you spray bounces off the surface as overspray. These sprayers cost as little as \$25.

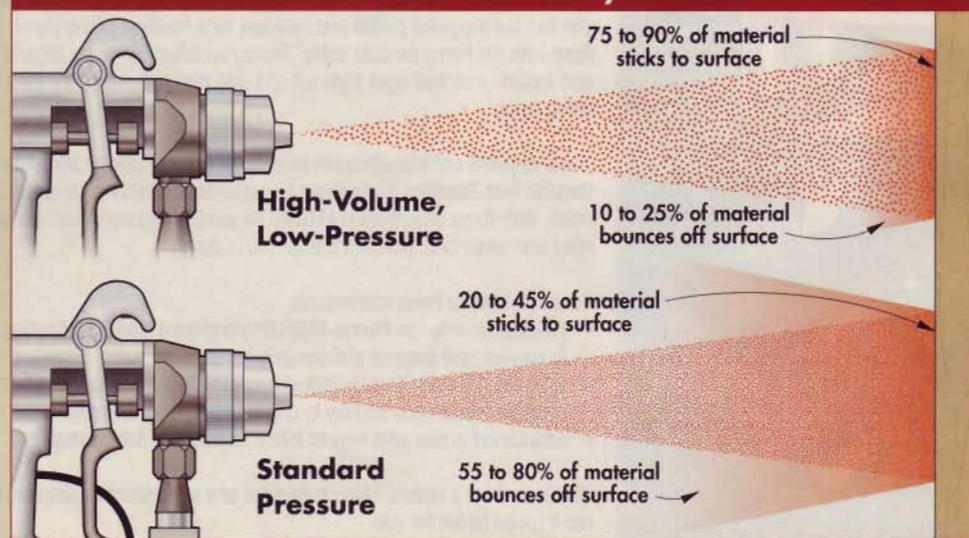
HVLP Sprayers — High-volume, low-pressure (HVLP) sprayers, on the other hand, deliver a high volume of air and coating at low pressure (15 to 50 psi). This yields a transfer efficiency of 75 to 90 percent (see illustration below).

If you already have an air compressor, you can get an HVLP "conversion" sprayer

(middle left). It comes with a regulator that lets you reduce the pressure at the gun. (The gun shown is a "gravity-feed" version with the cup on top. "Siphon feed" models have a cup on the bottom.) These usually cost \$50 or more.

Another option is to use an HVLP turbine (bottom left). It produces airflow using an integral fan instead of an air compressor. Most turbines are designed for professionals and cost \$250 to \$1,000. But the Fine Spray from Wagner sells for less than \$125. Learn more at WagnerSprayTech.com

Transfer Efficiency



rated horsepower vs. TRUE TOOL POWER

Q When tool shopping, I've noticed that manufacturers seem to be all over the board with their horsepower ratings. Is there a way I can reliably gauge true power from these ratings?

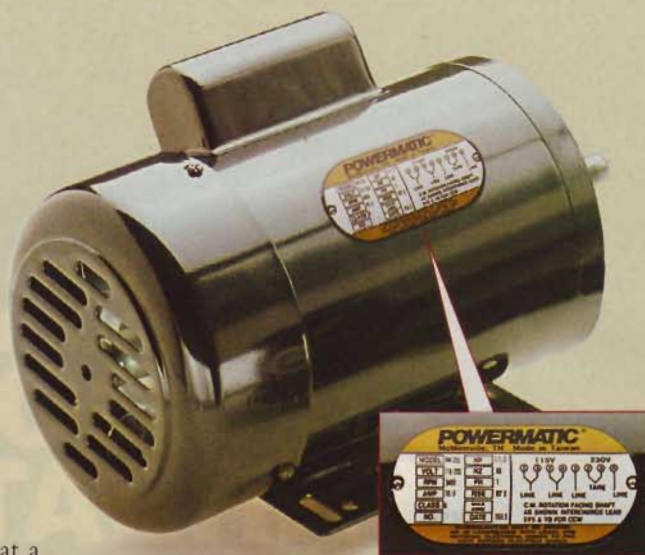
Jeff Miles
Cedar Rapids, IA

A Looking just at horsepower on tool motors can be deceiving. That's because there's no widely accepted standard for horsepower ratings. Some manufacturers rate their tools using "maximum-developed" motor horsepower. Others use "continuous-duty," or *actual* horsepower. You can still reliably judge power, though, if you understand two ratings: amps and watts.

Amps — Every motor has an amperage rating that tells how many amps the motor

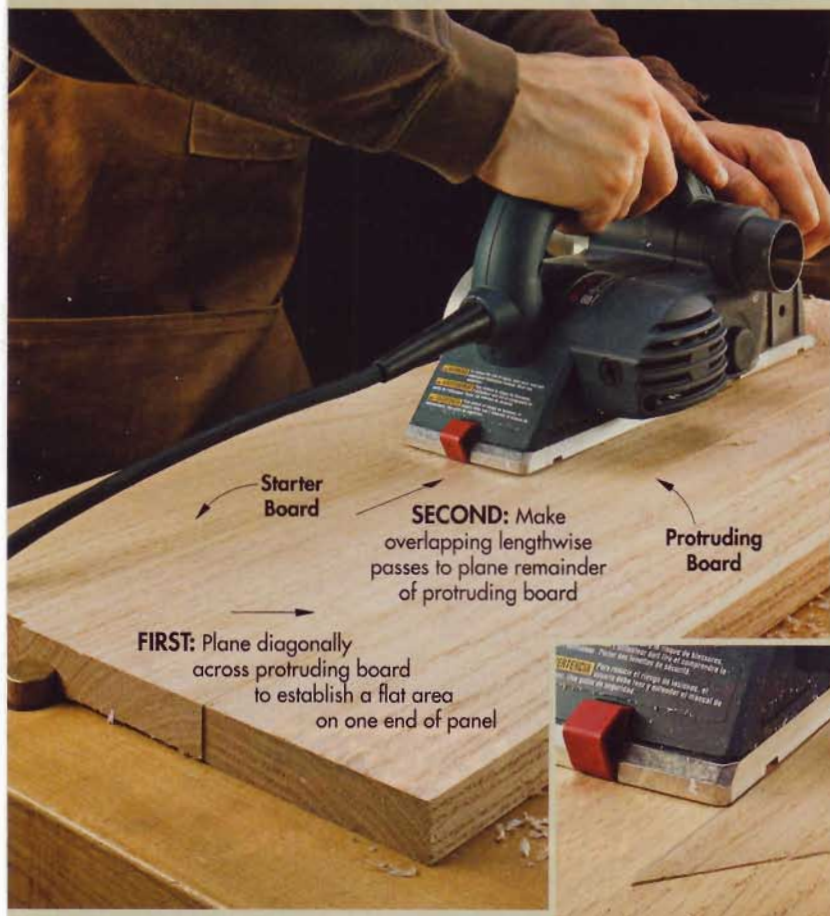
draws under full load at a specific voltage. This number never lies because the motor can't draw more amps than this. As a rule, a higher amp rating means a more powerful motor.

Watts — Motor construction dictates how much power the motor can produce at a given input amperage. This power is measured in watts, the most reliable measure of power. Many motor labels don't list watts, but you can calculate it easily by multiplying amps by volts. For example, a



motor rated on the label at 18 amps at 120 volts develops 2,160 watts (18×120).

Many people, by the way, rewire such tools as table saws for "more power." But if you double electrical voltage, amp draw drops by half. That means a motor develops the same power whether it's wired for 120 volts or 240. Rewire the above motor, then, and it will draw just nine amps. Yet output remains 2,160 watts (9×240).



power planer PANEL FLATTENING

Q One board in a panel I glued up is uneven and sticks up above the others on the finished face. Can I shave the board flush with my power planer?

Steve Mawhorter
Millbury, OH

A I generally use a belt sander to make protruding boards flush in panels. But if a board sticks up $1/16$ " or more, a power planer can do the job faster. Just be careful, or you can gouge the workpiece.

First, set the planer on the board you want to match (call this the "starter"). Then set the cutting depth to slightly less than the height of the protruding board.

Make diagonal passes across the protruding board. To minimize gouging, overlap each pass, push down on the planer with only your back hand, and avoid tipping the planer as you work.

Once you've planed an area at one end of the panel large enough for the planer to sit on, switch to lengthwise passes to remove remaining waste (Photos, left).

keep rain out UNDER A DECK

Q I'm building a patio under my second-story deck. Is there a way to create a "roof" under the deck, so I can use the patio when it rains?

Doug Halverson
Denver, CO

A You can add a lot of functionality to the area under a deck by shielding it from water that runs down between deck boards. You might not be able to catch all of the runoff, but you can certainly stop enough of it to make the space suitable for storage or additional outdoor living space.

Products Available — A number of companies make products designed to catch and manage water that drips through deck boards. Marketed under names like DrySpace, RainEscape, and Dry-B-Lo, they're mounted under the deck joists so they pitch away from the house and channel water toward the outside. There, the water can run out or flow into a gutter attached to the deck.

The biggest problem with these commercial systems is cost. Depending on the system and the complexity of your deck, you may spend \$4 or more per square foot, even if you install the system yourself.

Homemade Solution — You can create your own deck drainage system using corrugated roofing material (*Illustration*). It's available in a variety of sizes and materials, including metal, fiberglass, and PVC. In my area, I found 48" × 79" sheets of PVC roofing for about \$13 each. They were available in several colors.

To install corrugated panels, start by cutting spacer blocks from 2x stock. Place a spacer about every two feet along each joist if the roofing panel runs parallel to the joists, or on every joist if the panel runs perpendicular to them. Each spacer should be slightly taller than the last to establish a pitch of about 1/4" for every 4 feet.

After cutting the spacers, screw them to the bottom of each joist. Then secure the panels by driving screws through them and into each spacer. Seal each screw with a dab of silicone caulk.

At the outside of the deck, you can hang a skirt board to cover the exposed ends of the panels, as shown. Or mount a gutter inside the rim skirt board, and pitch it toward a downspout located on one of the deck posts.

Powder Coating in the Shop



Q In the October 2004 issue, a gentleman asked about powder coating metal. You said you must have it done professionally, but a friend of mine said he thought he'd seen a kit advertised for powder coating at home. Do you know anything about this kit?

Aaron Olmstead
Cincinnati, OH

A I checked with the folks at the Eastwood Company, a supplier of tools for automobile restorers. They do offer a DIY powder coating system.

The HotCoat system costs about \$130 and comes with everything you need, including a sprayer, a power supply to charge the powder and the workpiece, and three colors of powder. (There are about 75 colors available.)

After spraying, bake the workpiece in an electric oven (use an old range or toaster oven you no longer cook with) to cure the powder. Learn more about the system at HotCoat.com

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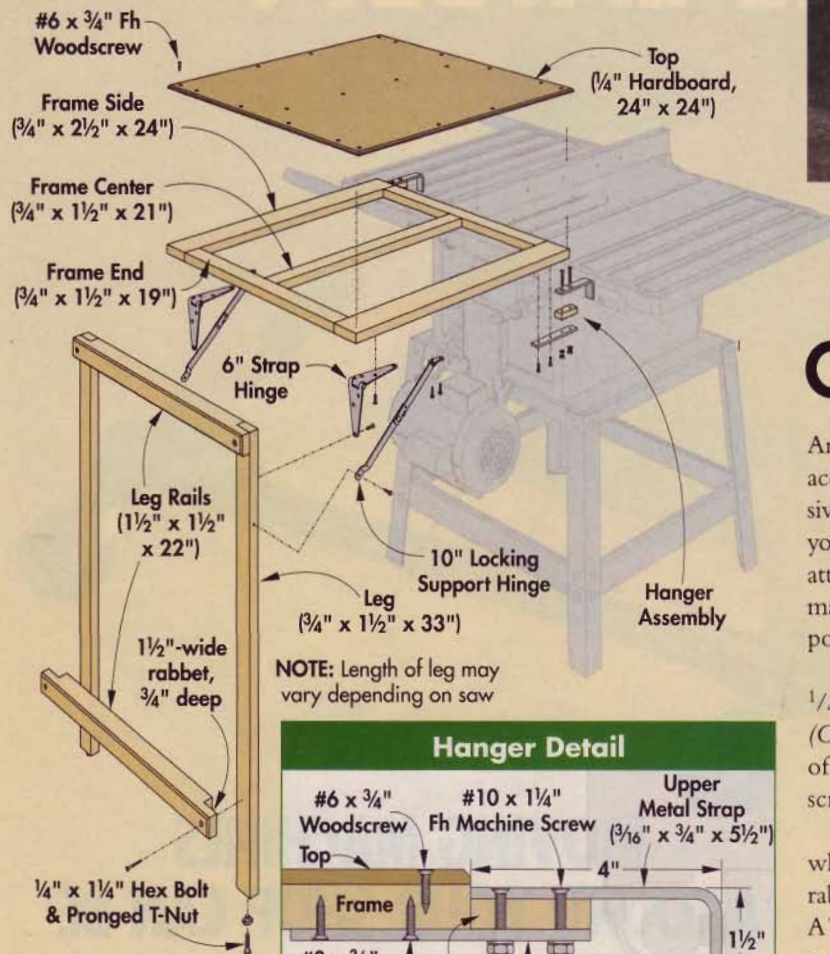


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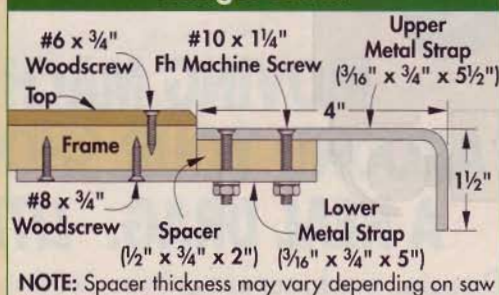
Tips & techniques



CONSTRUCTION VIEW



Hanger Detail



stow it for storage: OUTFEED SUPPORT

An outfeed support for a table saw is an indispensable accessory. And it doesn't need to be elaborate or expensive to do its job well. Take this one, for example. When you need to cut a long board or wide panel, you simply attach it to the table saw by means of a couple of shop-made hangers (*Inset Photo*). When you're done, the support can be removed in seconds and folded for storage.

Top — The top of this outfeed support is a piece of 1/4" hardboard that attaches to a wood frame (*Construction View*). The frame consists of several pieces of 3/4"-thick stock that are simply cut to length, then screwed to the top.

Legs — The outfeed support is held up by two legs which are connected by a pair of thick rails. The rails are rabbeted to fit over the legs and fastened with screws. A T-nut and bolt installed in the bottom of each leg lets you adjust the height of the support for uneven floors.

The legs are connected to the top with strap hinges. And a pair of locking support hinges prevent the legs from collapsing during use.

Hangers — To attach the outfeed support to the table saw, you'll need to add the two hangers. Each hanger consists of two metal straps with a wood spacer block sandwiched in between them (*Hanger Detail*). The upper strap is bent to fit over the back rail of the rip fence. (I bent the strap in a machinist's vise.) The lower strap, which is straight, is cut to length and screwed to the top frame.

As for the spacer block, size it so the outfeed support will sit just a hair below the table saw. Then secure it between the two straps with machine screws and nuts.

BEST TIP!

For sending us this feature tip, Albert Dowd wins a new BT3100 Ryobi table saw!

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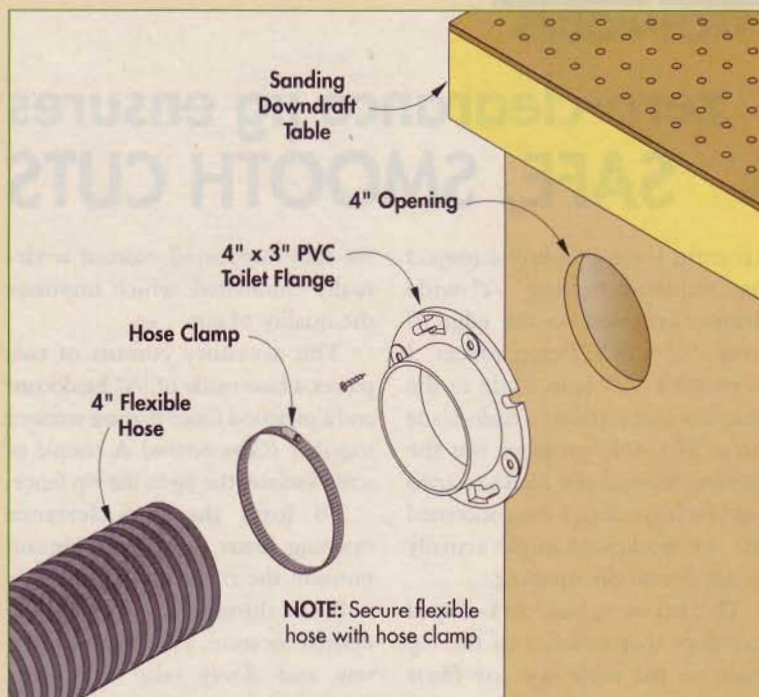


Albert Dowd
Concord, NC

flex-hose HOOK-UP

Connecting a 4" flexible hose from a dust collector to a shop-made fixture (like the sanding downdraft table shown here) can be a nuisance. The outside diameter of all the 4" metal HVAC fittings I've seen is just a bit too large to get the hose to fit over them. So I have to cut slits in the fitting and then compress it to make the hose fit.

To avoid all that fussing around, I used a 4" x 3" PVC toilet flange to make a dust collection port. The flex hose fits snugly over the flange. And best of all, it doesn't require any modification. **Note:** Toilet flange fittings are available at most home centers.



*Jacques Paquette
Somerset, MA*

▲ An easy way to connect a dust collector's 4" flexible hose to a shop-made fixture is with a common toilet flange.



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zero-clearance jig ensures SAFE, SMOOTH CUTS

Recently, I was building a project that required cutting $\frac{1}{4}$ "-wide grooves centered on the edge of some $\frac{3}{4}$ "-thick frame pieces. I mounted a $\frac{1}{4}$ " dado blade in the table saw, and installed a dado blade insert. The only problem was the opening around the blade seemed huge. So big, in fact, I was concerned that the workpiece might actually tip down into the opening.

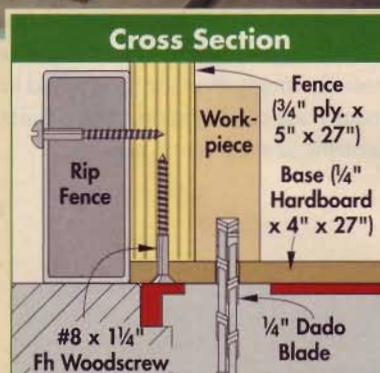
That led me to build an L-shaped accessory that attaches to the rip fence on the table saw (see *Photo above*). It creates a "zero-clearance" opening that provides support for the workpiece right up next to the dado blade. As a result, there's no way for the piece to drop into the opening. And since the wood fibers

are fully supported, tearout is virtually eliminated, which improves the quality of cut.

This accessory consists of two pieces: a base made of $\frac{1}{4}$ " hardboard and a plywood fence that are screwed together (*Cross Section*). A couple of screws secure the jig to the rip fence.

To form the zero-clearance opening, lower the dado blade and position the rip fence so the blade will cut through the base at the desired location. Then turn on the saw and slowly raise the blade through the base. Additional openings can be made for cutting grooves in stock of different thicknesses.

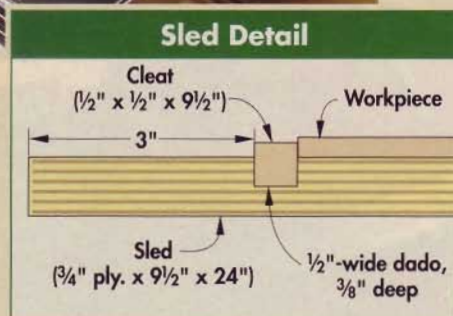
*Anthony D'Alessandro
Williamsburg, VA*



▲ This simple L-shaped jig creates a zero-clearance opening for a dado blade, which results in a safe, chip-free cut.



▲ This shop-made sled lets you safely plane short pieces of wood. Strips of double-sided tape and a cleat hold the pieces in place.



planer sled salvages SHORT PIECES

With the cost of lumber, I'm not crazy about throwing out short scrap pieces of wood. But planing short pieces (less than 12" long) isn't recommended by most manufacturers. That's because the pieces can get caught between the feed rollers and chewed up by the blades.

To salvage these pieces, I use a simple sled to plane them to thickness (see *Photo*). The "shorts" ride piggy-back on the sled, which is long enough to go through the planer safely.

The sled is a piece of $\frac{3}{4}$ " plywood with a cleat near the back end (*Sled Detail*). The cleat, together with strips of double-sided tape, hold the short pieces in place during machining.

The cleat fits into a dado near the back edge of the sled. Size the dado so the cleat sticks up about $\frac{1}{8}$ " above the surface of the sled. This way, you can plane material down to that thickness.

To use the sled, affix the short strips to the surface, as shown. Then pass the sled — and the strips — through the planer until you reach the desired thickness.

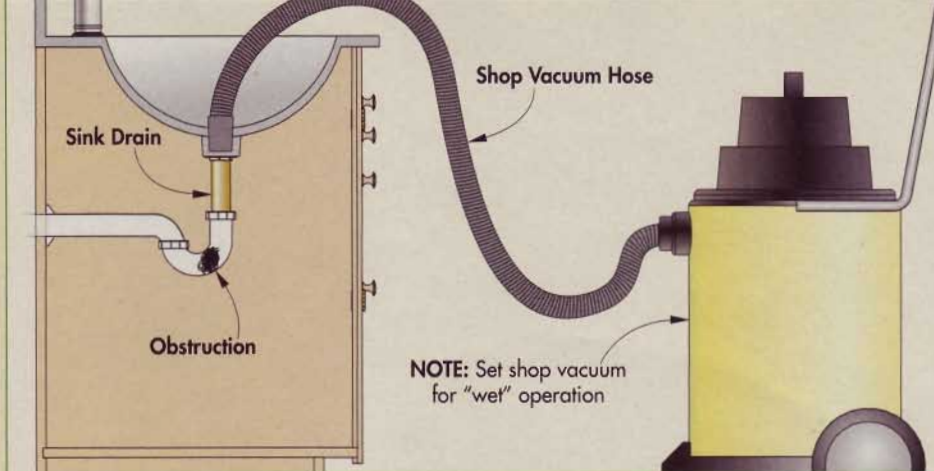
*Russ Brown
Bethlehem, PA*

shop vacuum ENDS CLOGS

Frustrated by repeated attempts to unclog my sink with expensive liquid drain cleaners, I resorted to my shop vacuum. And what started almost as an act of desperation became my first choice when it comes to fighting clogged drains.

Just fit the nozzle of the vacuum hose tightly in the drain opening. Make sure the vacuum is set for "wet" operation, and then switch it on. It should remove the obstruction in seconds.

David Cooke
Chattanooga, TN



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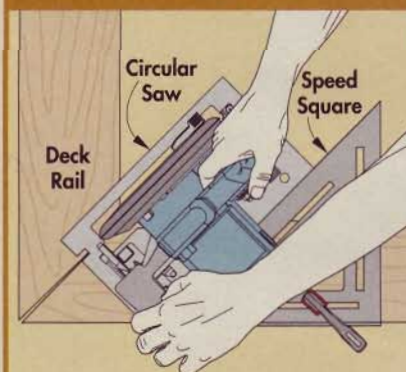
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perfect 45° miters



While installing the handrail on my newly constructed deck, I found that the 45° miters I had so carefully cut didn't fit tightly together. As it turned out, a variation in the deck meant that the boards came together at an angle slightly less than 90°.

Rather than guess at the angle and recut the boards on my miter saw, I clamped the boards into position and used a circular saw to cut across the joint. This created matching angles — and a perfect-fitting miter joint.

Jason Melton
Calumet, MI

Finishing Fundamentals

finishing tips for WINDOWS & DOORS

Q I need to stain and finish the wood on my new windows, window trim, and doors. Do you have any good tips for applying stain and finish to vertical surfaces like this to prevent runs and drips and ensure a consistent look?

Matt Stoddard
Ankeny, IA



A The first challenge when staining windows (and sometimes doors) is the glass. Glass can actually absorb stain, so it's a good idea to apply strips of painter's tape before you begin. And be sure to remove the tape right after completing the project to avoid disturbing the finish.

Also, carefully remove, label, and store locks, latches, and pulls to decrease the possibility of leaving runs and drips.

Conditioner — Many woods absorb stain unevenly, leaving blotches. To prevent this, first sand and remove the dust, and then apply a liberal coat of pre-stain wood conditioner with a foam brush (*Photo, above*).

Gel Stain — Let the conditioner sit for 10 to 15 minutes, and then — before it dries — apply a coat of stain. I recommend a gel stain for windows. It's a thick, heavy-

bodied stain that is less likely to run or drip than liquid stain. The use of pre-stain wood conditioner will lighten the stain color, so test the conditioner/stain combination on a scrap piece to make sure it's what you want before applying it to the windows.

Apply the gel stain with a foam brush, working from the top down (*Fig. 1*). Let the stain absorb for one to ten minutes, depending on the darkness you desire. Then wipe the surface with a clean rag.

Fast-Drying Poly — The stain should dry in eight hours, after which you can apply finish. For protection, durability, and easy application, I suggest fast-drying polyurethane. Apply it in thin, even coats with a natural-bristle brush, and shine a worklight on the wood to detect runs before they dry (*Fig. 2*). Twenty minutes after each

coat, open and close the sash to ensure the finish doesn't bond the window shut.

Spar Varnish — The windowsill takes a lot of abuse from water and sunlight. For that reason, use spar varnish to finish it. This type of finish has UV inhibitors to make it more resistant to peeling and fading (*Fig. 3*). When it dries, the varnish matches so well that no one will realize you used two different finishes to protect your windows.



▲ After putting on wood conditioner to prevent blotches, apply gel stain with a foam brush to minimize runs and drips.



▲ Fast-drying polyurethane is durable and brushes smoothly on windows. Use a worklight to detect runs or drips.



▲ Finish the windowsill with spar varnish to protect it from sunlight and moisture. It will match the rest of the finish fine.



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

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fast fix for GLUE SMUDGES



Q On a recent project, an ugly glue smudge appeared as I applied the stain. Is there a good way to remove the smudge while the stain is still wet? Or do I have to let it dry, sand the project, and restain the entire thing? What can I do to prevent this from happening in the future?

David Johnson
Raymond, ME

A If you notice stain not “taking” in a particular spot, the key is to address the problem quickly before the stain sets.

Quick Fix — After wiping the smudged area (Fig. 1), take a scraper and rake it gently over the area to remove glue residue (Fig. 2). If you’re working in a tight space, then use a sharp chisel to scrape the wood fibers. Just hold the chisel with the bevel facing away from you, and gently pull it toward you.

After scraping, use 180-grit sandpaper to sand the area. Then, gently sand a small portion of the stained wood around that area. This creates

a seamless transition between stained and unstained wood, so any color differences won’t be noticeable (Fig. 3). Finally, carefully wipe away dust, and continue applying stain (Fig. 4).

Prevention — To prevent this from happening in the future, try dry-assembling the project first, and then taping off any areas where squeeze-out may occur before gluing it up. Another tip is to rub the project down with mineral spirits and check it with a light before staining it. This will make clear any areas where finish might not take. And finally, always scrape glue squeeze-out first, then sand, before you stain.

▲ A dried glue smudge won’t allow stain or finish to penetrate the surface of the wood. Fortunately, there’s an easy fix to this dilemma if you act fast.



▲ First, remove as much of the wet stain from the wood as possible with a clean rag.



▲ Next, use a scraper to remove the glue residue, scraping down to bare wood.



▲ Hand-sand the spot, and also gently sand the stained area around it for a seamless transition.



▲ After wiping away dust, resume applying stain to the project for a flawless, smudge-free finish.

better bits for making RAISED PANEL DOORS

If you're serious about making raised panel doors, then give Freud's new raised panel bits a closer look. These router bits have some big advantages over other raised panel bits — most notably in the way they cut.

Most raised panel bits have two carbide cutting edges on a body that's 2" to 3" in diameter. The bits remove so much material that a series of progressively deeper passes is often necessary to achieve a smooth surface.

2+2 Technology — Freud has improved on this situation by adding two more cutters to its raised panel bits. Moreover, the two large cutters cut upward, and the two small cutters cut downward to generate a shearing action that creates flawless, consistent cuts, even on end grain (Art, left).

Backcutter — Freud also added a backcutter to these bits. This means

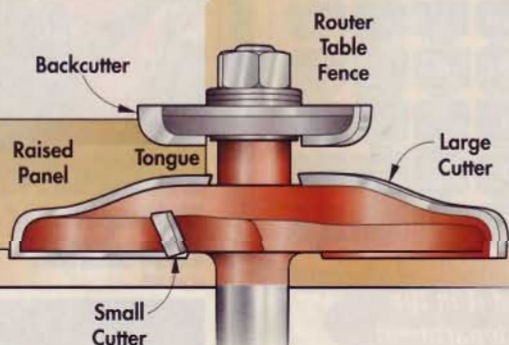
that one bit can cut both sides of a panel in one pass. The cut creates a tongue that fits into grooves in the door rails and stiles. This is a marked improvement over other raised panel bits, which require you to rabbet the back of the panel to fit into grooves.

The Freud bits are designed to cut $\frac{3}{4}$ "-thick stock and require a router table equipped with a fence and a variable-speed router. (The bits should run at 10-12,000 RPM.) It takes a few test cuts to get the depth and fence settings just right, but once in use, these bits cut more smoothly than any other raised panel bits I've used.

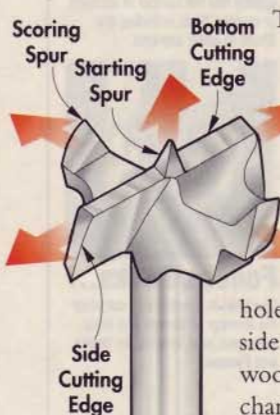
The Freud bits are available with three different profiles — bevel, cove, and ogee (shown) — for \$110 each, or in a kit with rail and stile bits for \$200. Visit FreudTools.com, or call 800-472-7307 for more information.



▲ Freud's new raised panel bits (ogee profile shown) have two extra cutters for smoother, faster cuts on raised panels.



a drill bit for CURVED HOLES



The new 3D drill bit from Trend resembles a standard Forstner bit. But it cuts in ways that a Forstner bit can't.

How It Cuts — The bit has sharp cutting edges on the sides, as well as the bottom of the bit (Art, left).

So once the bit enters a hole, pivoting the drill causes these side cutting edges to curve into the wood, creating a curved or widened channel. The result is a drill bit with some great DIY applications.

DIY Uses — One of the tasks a 3D bit excels at is cutting a curved channel that enters the face of a

board and exits through the edge — an application that comes in handy for running cable, stereo wire, or electrical conduit (Photo, right).

The bit can also create an open channel along the face of a workpiece for putting wire below the surface of the wood. To do this, you simply drill until the cutterhead is about halfway into the board. Then, pivot the drill sideways and cut along the surface. It works great as a standard drill bit, too.

Trend's 3D bits are available individually in diameters from $\frac{1}{4}$ " to $1\frac{1}{4}$ ", or in four- and eight-bit kits. For more information, call 859-485-2080, or visit Trend-USA.com



▲ Cutting curved holes in wood is just one of many home improvement tasks this new 3D drill bit from Trend can tackle.

The Cutting EDGE

an easy answer to HOLE SAW MISTAKES

Home improvement is hardly an exact science. And inevitably, there are going to be times when you need to enlarge an existing hole to serve a new purpose. Replacing an old lockset is one job that often comes to mind.

In the past, your best option was to expand the hole carefully with either a jig saw or a keyhole saw. But the folks at Starrett have greatly simplified the tricky process

of enlarging a hole with their appropriately named "Oops" arbor.

How It Works — The concept of the "Oops" arbor is fairly simple. Essentially, a hole saw the diameter of the original hole becomes a "pilot saw" for centering the larger hole saw as you cut (*Top Photo, left*).

This is accomplished by the "Oops" arbor itself, which is just a smaller arbor that's tightened into the main hole saw arbor where a twist bit usually goes. First, the larger hole saw screws in place on the main arbor. Then, the "Oops" arbor is attached, and the smaller "pilot" hole saw screws onto it (*Bottom Photo, left*).

The "Oops" arbor costs about \$7 at McFeelys.com and other retailers.



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miter saw WORKSTATION

When cutting a long board on a miter saw, it must be secured in place to keep it from lifting off the saw and causing a potentially dangerous situation. *Workbench* reader Dennis Satriano of Center Moriches, New York, solved this problem with the miter saw workstation shown at left. It provides support for long boards, plus it has two hold-downs that secure the board during and after the cut. The hold-downs can be adjusted for different stock thicknesses by sliding them up and down a metal bar (*Inset Photo, left*).

Though it's designed for use with a miter saw, this versatile workstation isn't necessarily tool-specific. It's equally capable of supporting and securing wide stock during circular saw operations as well (*Photo, lower left*).

In use, the miter saw rests on two long rails. Attached to these rails are four stock supports. The two middle supports are slotted to hold aluminum bars. Directly above the middle supports, the two hold-downs are also slotted to slide up and down on these bars. Wing nuts "lock" the hold-downs in position.

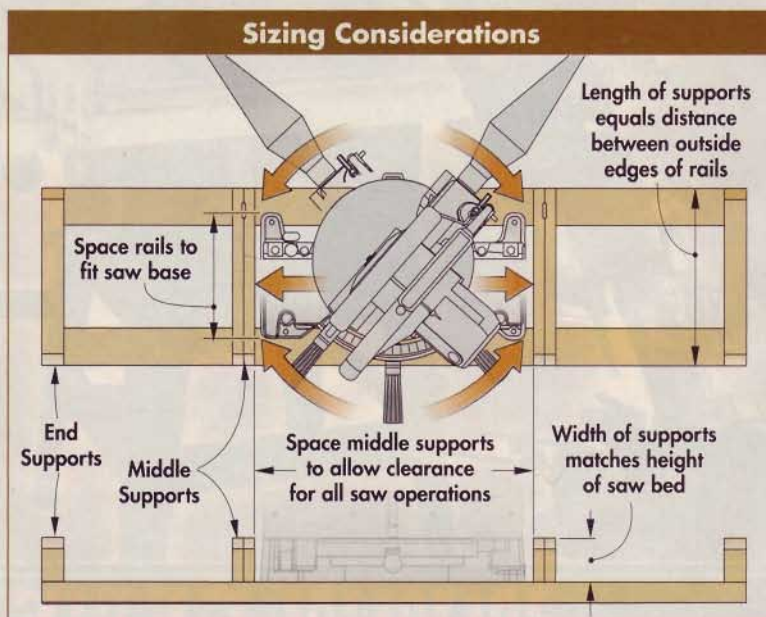
Sizing Considerations — The miter saw workstation shown here is sized to fit a Makita 10" miter saw. You'll probably need to change some of the dimensions shown on page 30 to fit your particular saw (see *Sizing Considerations*).

With that in mind, there are three things to take into account. First, the rails need to be spaced to accommodate the saw's mounting holes. The distance between the outside edges of the rails determines the length of the supports and hold-downs. Second, the width of the supports has to match the height of the saw bed. And third, the middle supports must be spaced to allow clearance for the saw throughout its full range of movement.

▲ This portable miter saw workstation provides stable support for cutting long boards. Two hold-downs adjust to accommodate stock thickness (*Inset Photo*). Tightening the knobs "locks" them in place to secure stock during and after the cut.



▲ The workstation is as handy on the jobsite as it is in the shop. Removing the miter saw lets you perform circular saw operations with ease.

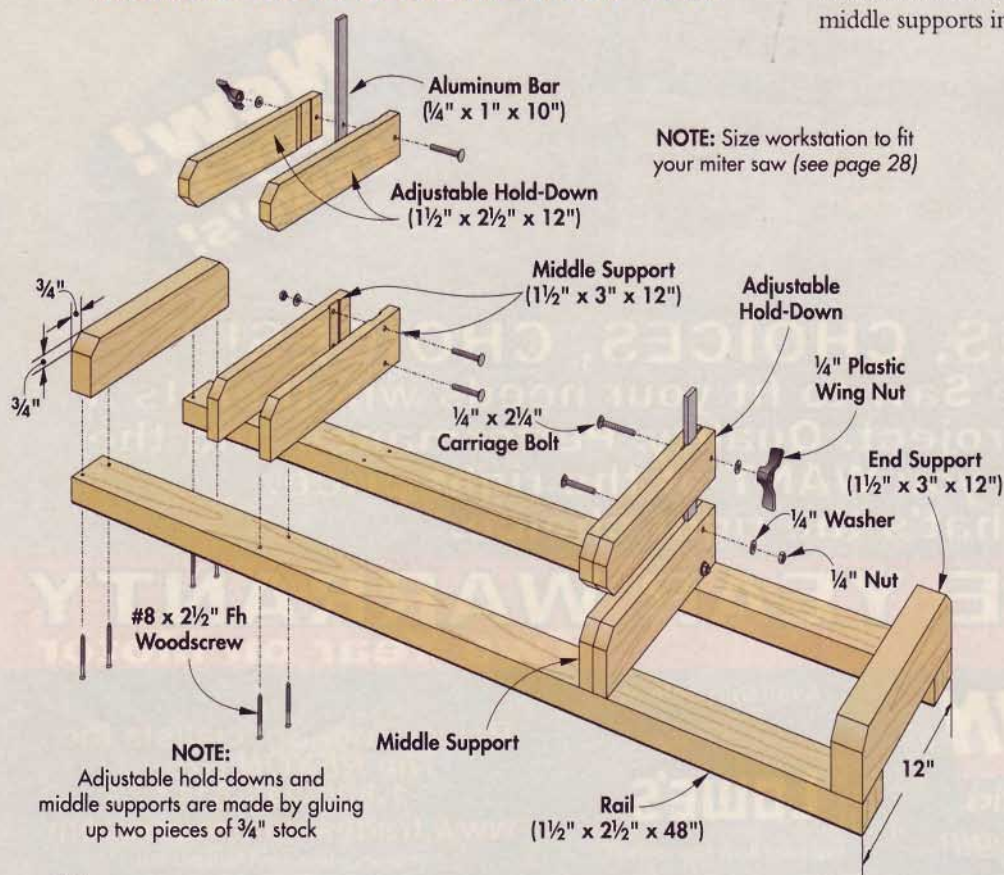


building the station



▲ To cut the kerf in the end of the hold-downs, use a tall auxiliary fence to guide the workpiece through the cut. Clamping the workpiece to a notched scrap block ensures a safe, controlled cut.

WORKSTATION CONSTRUCTION VIEW



As you can see, the only tricky part to building this cutting aid is sizing the components. That done, all you need to do is machine the pieces and put them together.

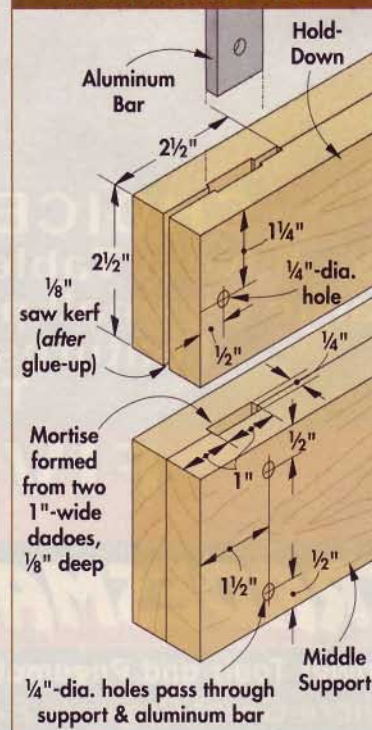
Rails & End Supports — To build this workstation, start by cutting the two rails to size and spacing them as explained earlier. Then you can cut the end supports to length. Remember that the width of the supports needs to match the height of the saw bed. Miter the corners of the end supports, and attach them to the rails with glue and screws.

Middle Supports — While the middle supports are the same dimensions as the end supports, they're composed of two pieces rather than one solid piece. The reason is simple. Each half is dadoed so that, when glued together, the dados form a mortise to receive the aluminum bar that the hold-downs ride on.

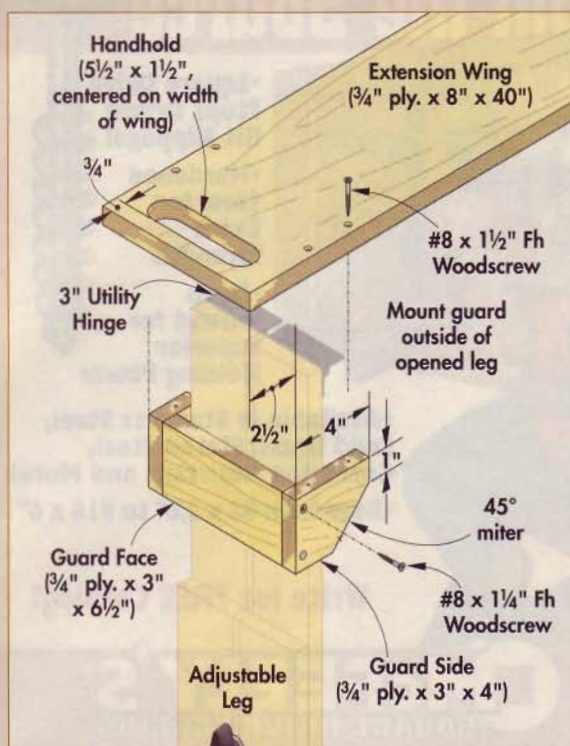
Adjustable Hold-downs — The last components of this system are the adjustable hold-downs. They're built the same way as the middle supports, with only a slight variation. To lock the hold-down in place, you need to create a gap behind the mortise that pinches shut around the aluminum bar when you tighten a knob. This is done by cutting a kerf in the hold-down after glue-up (see *Photo, left, and Hold-Down Detail, below*).

To finish up, install the aluminum bars in the middle supports and hold-downs. Raise the assemblies to their full height, then swing the saw through all its cutting modes to make sure there's clearance. Then screw the middle supports in place. ■

Hold-Down Detail



Reader's Workshop FOLLOW-UP



SAFETY UPGRADE: MITER SAW STAND

In the Reader's Workshop department of the December 2004 issue (page 42), we featured a shop-made miter saw stand that sits on a mobile tool chest. This station has a folding extension wing with an adjustable leg that is hinged to the wing. A magnetic catch keeps the leg tight against the wing in the closed position. But when you open (unfold) the wing, there's a potential for the leg to release from the magnetic catch, causing it to pinch your fingers against the wing.



To prevent that, we recommend making the following additions to the miter saw stand:

1. Attach a U-shaped guard made from ¾" plywood to the wing outside of the opened leg, as shown in the *Illustration* at left. This protects your fingers from getting pinched.

2. Cut a handhold near the end of the extension wing.

3. Remove the magnetic catch from the leg to avoid the possibility of the leg suddenly releasing as you raise the wing.

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Sharp **IN 60 SECONDS**

A dull tool can bring your work to a standstill, especially when you're away from the shop. Here are three carpenters' secrets for getting a sharp edge fast, anywhere, with just a few supplies.

For most carpentry jobs, you don't need a perfectly honed chisel. When it comes to, say, cutting a hinge mortise in a door (see *Photo above*), you just need a sharp chisel. And you need it fast.

So how sharp is "sharp"? And how fast is "fast"? We recently posed these questions to three *Workbench* project designers — with over 80 years of combined carpentry experience.

Though their methods of getting a sharp edge differ, their answers were the same. The

chisel or plane iron has to be sharp enough to slice cleanly through the grain without chipping the surface. And no more than 60 seconds should be spent getting that sharp edge.

Of course, it goes without saying that one of the keys to fast sharpening is having supplies that are easily portable or readily available at any jobsite. Our project designers' recommendations for these sharpening supplies, and their sharpening shortcuts, start on page 36. But first, let's look at the anatomy of a sharp edge (*page 35*).

anatomy of a **SHARP EDGE**

The cutting edge of a chisel or plane iron is formed by the intersection of the bevel and back. For a sharp edge, the bevel and back must meet at such a fine point that the line between the two almost disappears (*Art, right*).

Back — One key to this sharp edge is having a flat back. This seems like it should be a given. But if you were to lay a straightedge across the back of a typical off-the-rack chisel, you'd find that the back isn't perfectly flat.

So the first step is to flatten the back. To do that, "color" the back of the chisel with a marker. Then grind the back as shown in *Fig. 1*. When the marks disappear, the back is flat.

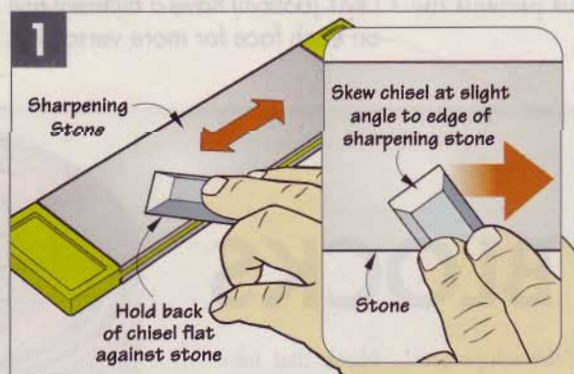
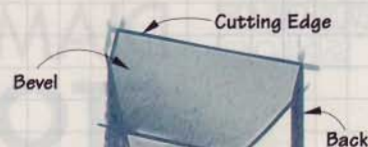
This may take awhile, but you should only have to do this once for the life of the chisel. Once it's flat, it stays flat.

Bevel — The bevel is the angled face at the tip of the chisel. On a well-sharpened chisel,

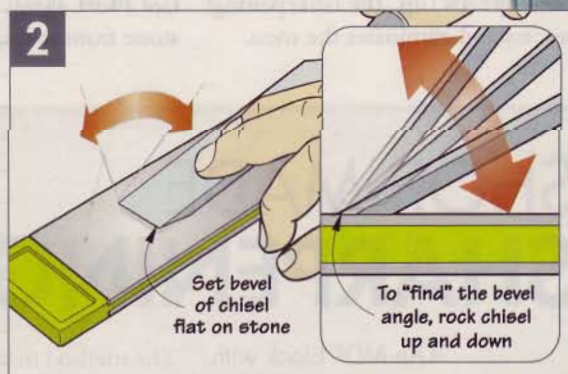
the bevel is at one consistent angle. (The one exception to this rule is if you grind a micro-bevel on the blade. See page 38 for more on this.) Maintaining the consistent angle of the bevel is the most important step in the sharpening process, so it's crucial to "find" the bevel by rocking it on the sharpening surface until the bevel sits flat (*Fig. 2*).

To "lock" the bevel at this angle, position your index and middle finger directly over the bevel, and just above the sharpening surface (*Fig. 3*). Your other hand should be positioned slightly back on the chisel. Apply firm pressure downward, and keep your arms fixed at your sides, moving only your body back and forth as you slide the blade across the surface.

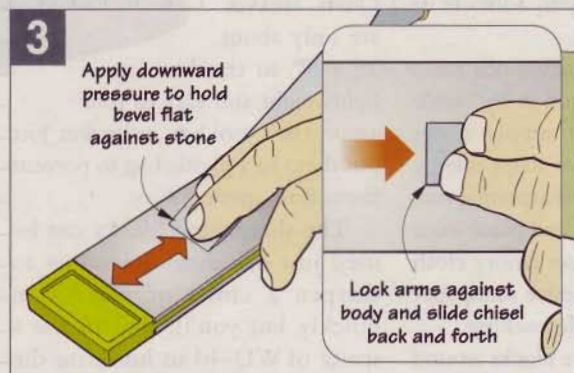
Burr — After a few strokes, a small "hook," or burr, will form on the back of the chisel. This is easy to remove as shown in *Fig. 4*.



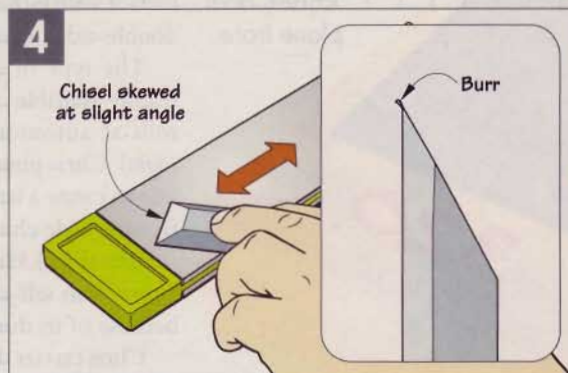
▲ To flatten the back, hold the chisel flat against the sharpening surface and apply downward pressure as you slide it across the stone.



▲ Rock the chisel up and down until you "find" the bevel angle. You'll know it's correct when you feel it sitting flat on the stone.



▲ Position your fingers directly above the bevel and apply pressure downward as you slide the chisel back and forth across the stone.



▲ To remove the burr left after honing the bevel, hold the back of the chisel flat on the stone and use light pressure as you slide it back and forth.

DIAMOND STONES

Workbench project designer Ken Munkel has been remodeling homes for 40 years. For getting a quick edge on his chisels and plane irons, he's come to rely on diamond benchstones (see *Photos, right*).

Diamond Advantage — Like other sharpening stones, diamond stones remain stationary while the tool slides over the surface (*Art on page 35*). But diamond stones offer several advantages that are specific to the jobsite.

First, diamond stones are the perfect size to carry around in a tool box or bucket, and their hard surface won't get damaged by being banged around. Unlike oilstones or waterstones, diamond stones are used dry. This speeds up the sharpening process and eliminates the mess.

Double-Sided Stones — The new *double-sided* diamond stones are well-suited to jobsite sharpening, as they have a different grit on each face of the stone. Ken recommends purchasing a stone with "fine" (600 grit) on one side for removing nicks and "extra fine" (1,200 grit) on the other side for fine sharpening. The stones are available from Eze-Lap (775-888-9500, Eze-Lap.com) and DMT (800-666-4368, DMTSharp.com) for around \$40 to \$60 (*Photos, right*).

One other note: you'll want to place a non-skid pad underneath the stone before you begin sharpening (see *Photo above*). This prevents the stone from sliding.



▲ These double-sided diamond stones from Eze-Lap (*top*) and DMT (*bottom*) have a different grit on each face for more versatility.

SHOP-MADE SHARPENING BLOCKS

◀ An MDF block with emory cloth attached to the face makes a simple but effective sharpening block for chisels and plane irons.

The method that *Workbench* project designer Chris Fitch recommends is these shop-made "sharpening blocks." They're just MDF blocks with emory cloth attached to the surface with either spray adhesive or double-sided tape.

The type of emory cloth most readily available comes in 3/4"-wide rolls at automotive supply stores (*right*). Chris puts two strips side by side to create a large sharpening surface for wide chisels and plane irons (see *Photo, left*). He uses emory cloth rather than self-adhesive sandpaper because of its durable backing.

Chris carries three blocks around on the jobsite: 180- and 320-grit blocks for a quick two-step sharpening job, and an additional 80-grit

block that he uses to remove nicks from the blades. The MDF blocks Chris makes are only about 2" x 8", so they're lightweight and easy to tote around in a tool box or bucket. Just put them in a plastic bag to prevent them from getting dirty.

The sharpening blocks can be used just like diamond stones to sharpen a chisel or plane iron quickly, but you'll want to use a spritz of WD-40 to lubricate the block before you sharpen. As with the diamond stones, a non-skid pad keeps the block from sliding.



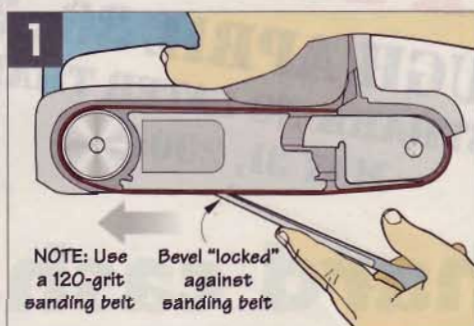
INSTANT EDGE: BELT SANDER

Sharpening a chisel or plane iron with a belt sander may seem a little unnerving. But project designer Kent Welsh swears by this technique as the fastest way to get a sharp edge.

Before letting the sparks fly, though, there are a few things to be aware of. First, sparks can cause a fire if they land in a pile of dust and chips, so remove the dust bag and set the sander on a clean surface like a concrete floor. And second, set the sander on its side so the belt is on the left and running away from you. This way, the

chisel won't tear the belt.

Start with the belt sander turned off. Then, "find" the bevel just as before, and hold it flat against the belt. This is important, as the sander sharpens so fast that you only have one chance to get it right. Now keep the chisel (or plane iron) locked tightly against the sanding belt and give the trigger a pull (Fig. 1). A few seconds is usually all it takes. Then, remove the burr (Fig. 2, below).



▲ Hold the bevel flat against the sanding belt, get a firm grip, and pull the trigger. A few seconds should do the trick.



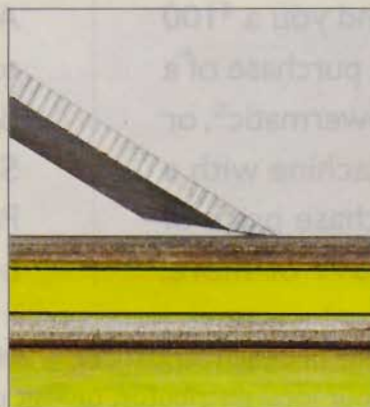
▲ To remove the burr, turn off the sander. Then set the back of the chisel flat against the belt and pull it across at an angle.

QUICK EDGES IN A PINCH

When speed is of the essence, these two tips will give you a sharp edge in just a few seconds.

Micro-Bevel — A micro-bevel is simply a steeper angle ground onto the tip of the bevel where it meets the back of the chisel (left). Less material is being removed, so the sharpening goes much more quickly (Photo, near right).

Drill Bit — Another technique is to use the shank of a high-speed steel twist bit like a burnishing rod to "crisp up" the cutting edge of the chisel, as shown in the far right Photo.

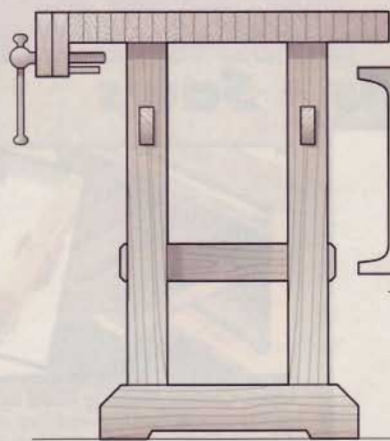


▲ To create a micro-bevel, first find the bevel as shown in Fig. 2 on page 35. Then, raise the chisel just a hair, and make a few quick passes over the stone.



▲ The shank of a twist bit can put a quick edge on a dull chisel. Rub the shank firmly against the cutting edge, sliding it across both the bevel and back of the chisel.

Micro-bevel



BENCH BASICS

FUNDAMENTAL SKILLS FOR BETTER WOODWORKING

Experts in any craft know that to be successful, you have to pay attention to the basics. Whether it's a pro golfer who still practices his swing, or a master woodworker who measures twice and cuts once, they'll tell you to concentrate on the fundamentals in order to improve your skills.

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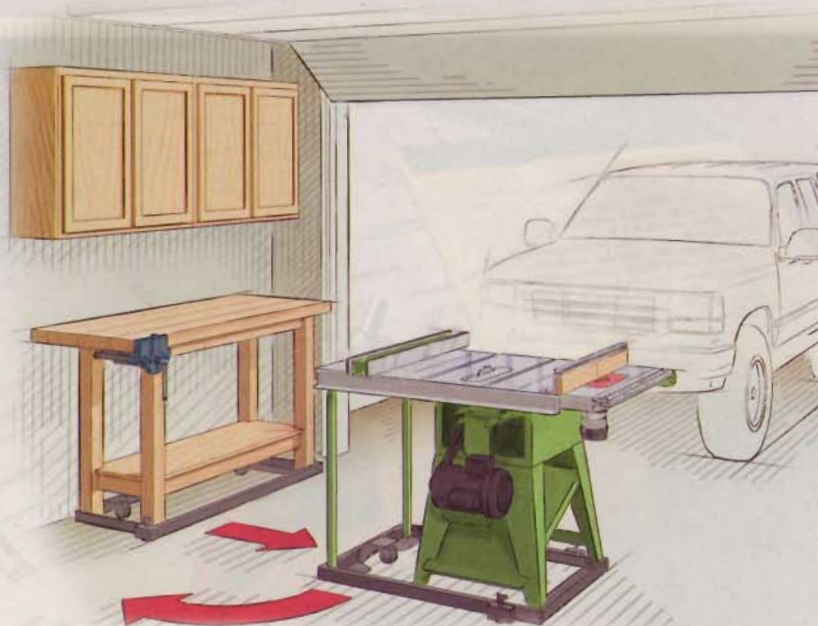
Plus, every installment of Bench Basics offers more information through online extras. They dig deeper into interesting subjects, or offer additional insights that will make you a better woodworker — by paying attention to the basics.



IN THIS ISSUE: **SETTING UP SHOP** pg.42

If you really want to get into woodworking, you need a workshop. You might be able to make do with a cobbled-up space, but you'll have a tough time getting the results you want without extra effort. Unfortunately, not many of us have access to a full-blown cabinet shop, or the means to build one. But that doesn't mean you can't put together a fully functional shop in a space you already have.

In this first installment of Bench Basics, we'll help you understand workshop necessities, such as storage, power, and lighting. Then we'll guide you through the pros, cons, and consequences of setting up shop in your basement, garage, or a separate building.



COMING SOON...

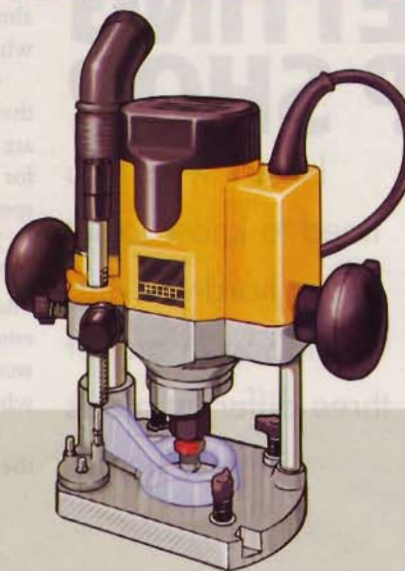
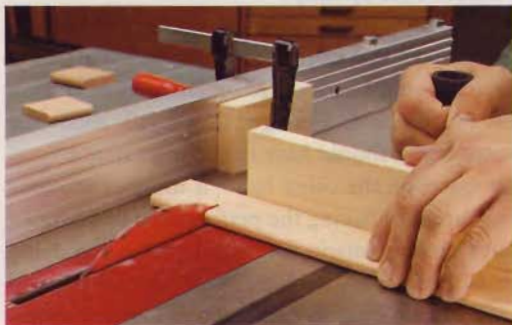


TOOLS & SHOP LAYOUT. Once you decide where to put your shop, you need to know what tools to equip it with and where to set them up. We'll show you how to lay out your shop for efficient workflow.

LUMBER SELECTION SECRETS. A shop full of tools won't do you any good without wood. In this article you'll learn about the different types and grades of lumber, plus how to select the lumber that best suits your project and budget.

TABLE SAW BASICS. The table saw is the core tool in woodworking. To achieve success, then, you need to understand how one works. Here, you'll learn your way around a table saw by practicing the proper techniques for making the most common cuts.

CHOOSING & USING ROUTERS. The router ranks close behind the table saw in importance and versatility. We'll help you sort through all the styles and prices to pick the type of router that's right for you. Plus, we'll show you how to put your router to work by using it to cut several useful woodworking joints.





SUREFIRE STRATEGIES FOR SETTING UP SHOP

Here's what you need to know to set up a hard-working workshop in any of three different areas in your home.

People trying their hand at woodworking for the first time often have a lot of questions — and for good reason. There's a lot to learn. The first questions are almost always the same: Which tools should I buy, and where should I set up shop?

Choosing tools might seem intimidating because of the many choices that exist. But, for the most part, tools are easy to get your hands on. Manufacturers offer tools for most every task and budget. (We'll talk about the specific tools you should have in the next issue.)

Shop space, on the other hand, is tougher to come by. We all dream of having the perfect shop building — one that's custom-made for woodworking and big enough to hold every tool we want. But in the real world, we usually have to carve out shop space somewhere within the confines of the property we have.

For most of us, that means setting up shop in either the basement or garage. The luckiest among us may

WORKSHOP NECESSITIES



SPACE. Your shop has to hold all your tools and supplies with floor space to spare for work areas. Think about headroom, too, because low ceilings and long boards don't always get along. If your shop lacks adequate space, consider whether areas nearby could be annexed for storage or jobs like assembly and finishing.



WORKSURFACES. You can't get much done without sturdy places to set your work. A traditional cabinetmaker's bench might be the ideal, but a basic folding workstation or solid-core door laid on sawhorses will work. Building a top for the table saw even makes it a suitable work surface, and a few clamps can "pinch hit" for a vise.



ACCESS. Shops have unique access needs. You have to get heavy, bulky tools in, as well as long boards and plywood sheets. A straight route in and a large doorway simplify this. Don't forget, either, that those projects you build will have to find their way out.



LIGHTING. Quality work requires good lighting. Fluorescent lamps provide economical shop lighting that doesn't cast harsh shadows. In specific work areas, add incandescent or halogen task lighting. For safety's sake, put lighting on its own circuit.



POWER. Woodworking tools use a lot of electricity. Big routers may draw as many as 18 amps, which will max out a 20-amp circuit. Table saws can draw even more. If you have only one shop circuit, you can't run another tool, like a dust collector, at the same time. You need at least two 20-amp circuits for outlets. Three is better. If your big tools (table saw, etc.) can be rewired to run on 220 volts, do it. They'll draw half the amps, leaving more power available to drive other tools.

have an outbuilding, or at least the space to erect one, that can serve as a dedicated workshop.

Each of these spaces comes with its own advantages. And, to be honest, there are some compromises. At right you'll find a quick overview of the pros and cons of each. In the next few pages, we'll talk in detail about specific considerations you'll face when setting up a shop in a basement, garage, or dedicated building.

Wherever it's located, your shop has to be equipped with some key necessities in order to function well for woodworking. A list of those appears above. Chances are that no prospective shop space will have all of these until you make some upgrades. Even a dedicated building may not offer everything you need, unless you've built it specifically as a woodworking shop. And you'll probably have to buy or build some items designed for the craft, like storage cabinets and a workbench. But that's half the fun of getting started in woodworking.



STORAGE. Shops quickly fill with stuff that takes over available work space. And without enclosed storage, everything gets lost or covered with dust. Storage doesn't have to be expensive. Use old kitchen cabinets or shop-built versions. Lumber requires solid racks to keep it flat and avoid damage from moisture.



CLIMATE CONTROL. Heating and air conditioning may sound like luxuries, but without one or both, you'll lose a lot of potential shop time. Plus, wide swings in temperature and humidity cause tools to rust and lumber to warp and crack. Cooling proves easy, but heating requires more care to guard against explosive fumes and dust that may get to a pilot light.



VENTILATION. Shop air also needs to be clean. Airborne dust can ruin wet finishes, not to mention your lungs. And some common shop solvents give off dangerous fumes. Windows are the easiest way to ventilate, or you can add an exhaust fan. Just make sure it has an explosion-proof motor.



DUST COLLECTION. The best way to create a clean shop is to capture dust at each tool, before it can escape to the floor or air. A shop vacuum works for some tools, but larger tools require a dust collector. You can roll a small collector from tool to tool. Or, run ducts to multiple tools and connect them to a central collector. Use a circulating air filter to get rid of tiny dust particles in the air.



SECURITY/SAFETY. A shop needs to offer a safe environment for those who use it and the tools it contains. Cut off power to tools if anyone besides yourself (kids especially) can get to them, and protect your investment with sturdy locks and adequate insurance.

SHOP LOCATION PROS & CONS

	PROS	CONS
BASEMENT SHOP	convenient location, climate control, good security, easy access to electricity	restricted access, noise and dust get into house, can be damp, low headroom, dark
GARAGE SHOP	easy access, convenient location, isolated, ample space, storage options	requires electrical upgrades, shared space, reduced security, climate control issues
DEDICATED SHOP	can be customized, ample space, storage options, isolated	high cost, land availability, requires dedicated systems, may be hard to access

BASEMENT SHOP

Some basements get finished and used as living space, but many are left unfinished and underutilized. If yours fits the latter description, it's filled with untapped potential. So why not turn at least some of it into a shop? After all, a basement comes already equipped with two of the most important — and most costly — necessities: climate control and electrical access. But a basement shop *does* pose a few unique challenges.



Cramped Quarters. Storage of household stuff eats basement space, as do “mechanicals,” such as the furnace and water heater. Plus, ceiling heights are often 8' or shorter, which complicates material handling.

Plenty of Power. Most basements don't have enough outlets. But you can add them by tapping into your home's existing service panel. If no extra space exists in the panel, run a sub-panel to the workshop area.

High Security. Few locations are more secure than a basement. The tools inside won't be seen by outsiders unless you invite them in.

Awkward Access. Getting tools and materials into and out of a basement shop is tough. Stairs are often steep with low clearance overhead. And they may be located well inside the home, meaning you have to negotiate corners just to get there. Walkout basements offer great access but may require you to trek through the yard to get to the shop.

Low Airflow. Because most basements have small windows, you should add an exhaust fan for effective ventilation. This is of primary importance in a basement, as dust and fumes can invade the rest of the home and pose a health risk.

Comfortable Environment. Most basements already have climate control from the home's existing system. To prevent dust and fumes produced in the shop from getting into the rest of the house, add filters to air-return vents in the shop.

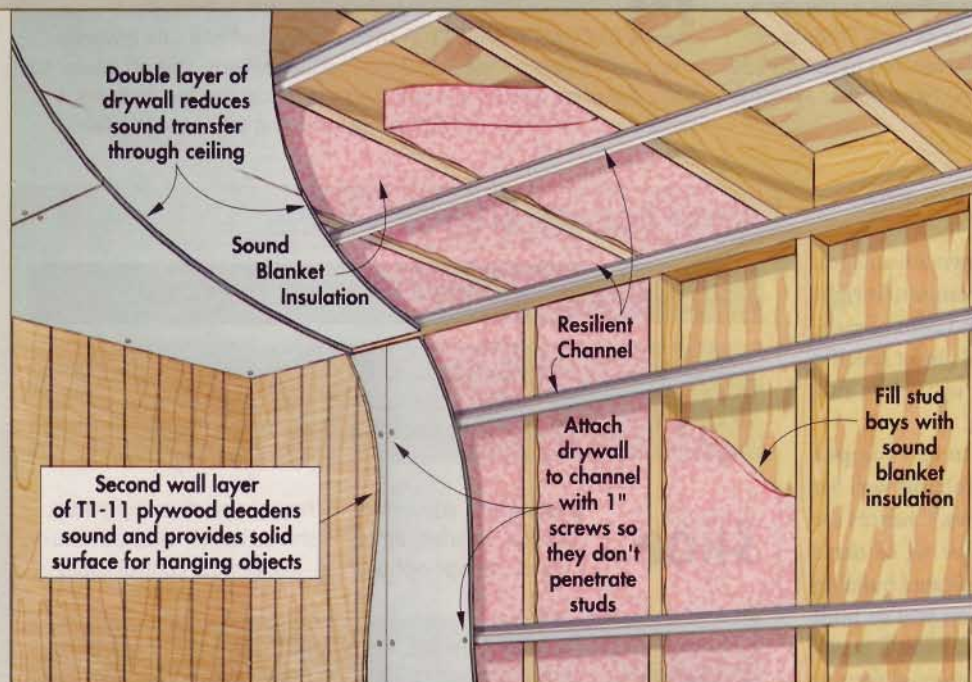
Keeping Warm AND Safe. Dust and fumes that get into the house are annoying, but if they reach a furnace burner, they can be deadly. Don't build a shop in the furnace room unless the furnace is a “separated combustion” model that draws combustion air from outdoors. You may be able to enclose a standard furnace.

BENCH BASICS ONLINE

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GO ONLINE FOR:

- More strategies for noise control
- Downloadable Garage-Shop Projects & Ideas



▲ Sound travels through walls as vibrations that can turn surfaces into giant loudspeakers. Layers and mass stop these vibrations from escaping.

LOCK IN NOISE

A dust collector can keep chips and dust under control, but there's still no device that will suck up shop noise. Table saws, thickness planers, and shop vacuums often put out 80 or more decibels (dB) of sound.

This is a big problem in a basement shop because those noises invade living areas. Stopping them requires special measures.

To keep sound from escaping, install sound-deadening insulation in joist and stud bays. Then pad the studs or floor joists, or hang the drywall on metal “resilient channel” (see the Illustration at left). These methods isolate the drywall to stop vibrations from transferring through the wall.

To further deaden sound, add a second layer of wall material. This adds mass, which reduces vibration.

GARAGE SHOP

In most homes, you won't find a better spot for setting up a woodworking shop than the garage. The garage's potential comes from its loads of open space and isolation from living quarters. Garages also have plenty of wall space on which you can build storage and worksurfaces. Because the garage is a multi-use space, you will likely have to build in storage space for non-shop items and make tools mobile in order to park cars inside.

Wide Open Spaces. Garages have loads of open area, and many feature ceiling heights of 9' or more. Of course, tools have to share the space with cars, but you can make even big tools portable by following the advice in the *Sidebar* at right.

Easy Access. The overhead door makes access easy because you can back your load up to (or into) the shop. Add a passage door so you can get in and out easily, too.

Vast Ventilation. Once again, a large door proves its worth by allowing unlimited ventilation. Since you may not want the door open at times, though, add windows.

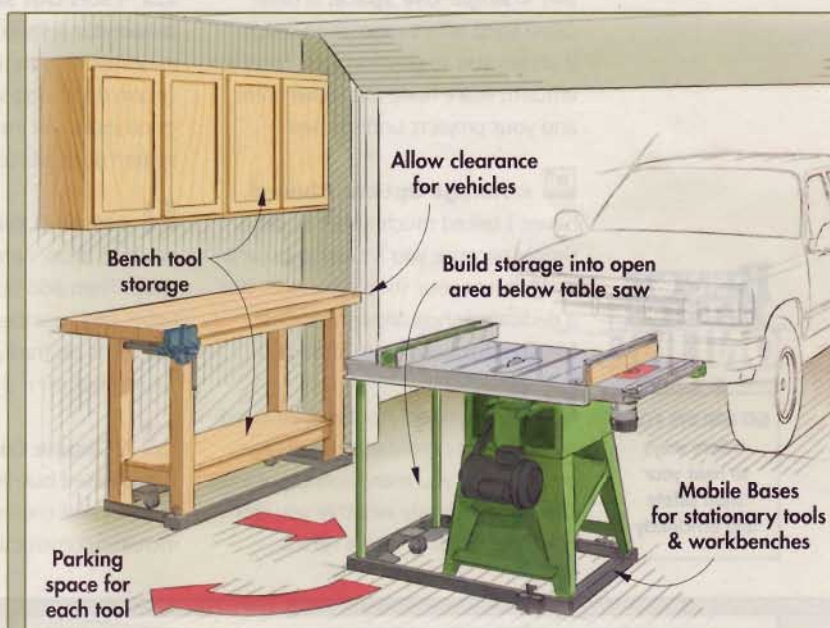
Full View. An overhead does compromise security by showing all of your tools to every passerby whenever you open the door, especially if your garage sits close to the street. Protect your shop with sturdy locks and blinds.

Access To Power. Many attached garages house the electric service panel for the home, so you can tap into it to add shop circuits. If your service panel is full, located elsewhere, or the garage is detached, then run a feed line to the garage, and install a sub-panel to power the shop.

Few Outlets. Garages (detached especially) have minimal electric capacity. You'll have to run wires from the service panel to power outlets and tools. Be sure to use heavy-gauge wire and high-quality 20-amp receptacles.

Add Lighting Easily. Most garages are lit with just a bare bulb or two, but you can easily swap those fixtures for fluorescent units that will fully light the space. In cooler climates, make sure to get fixtures with electronic ballasts that will still work at low temperatures.

Control the Climate. Even an attached garage may not be heated or cooled. A window air conditioner makes cooling easy, but heating requires more care. For safety, any gas heater in the shop should have separated combustion. Or use an electric unit. See the *Sidebar* on page 46 for more information about shop heating.



▲ You can have a fully functional shop and garage in one building. Make tools and shop fixtures mobile, then designate "parking" space for each one.

MOBILITY BRINGS VERSATILITY

When woodworking tools move into a garage, cars, yard equipment, and bikes often get evicted. Or those items take over and bury the tools.

But putting a woodworking shop in the garage doesn't mean you have to clear everything else out. I've had a garage shop for years that functions very well and still allows space for all the other stuff. No, I don't have a huge building. I simply have wheels under many of my tools, as shown in the *Illustration*.

With these wheels, I can "park" tools around the perimeter of the garage, and roll them into place when needed. I take over both stalls for elaborate projects, or use just one and keep my wife's car in the other.

How you mobilize is up to you. Commercial mobile bases are available either custom-sized for particular tools or in "universal" styles that you customize. You can fit a mobile base to a workbench or other hard-to-move shop fixtures, though you may have to modify the base.

Shop-built mobile bases present another great option. Designing your own bases lets you customize them to meet your needs. When possible, build in storage to keep related tools and accessories together.

DEDICATED SHOP

Every woodworker dreams of having a stand-alone shop building where he can work on projects without interference. If you're lucky enough to have an extra building lying around, or if your property offers space for one, you can build a shop with fewer compromises than one located in the basement or garage. Building a dedicated shop takes a larger investment, though, because it requires dedicated systems and more construction or finish work.



Single-Use Space. A dedicated shop offers more than space — it allows you to position your tools for efficient work flow, and leave them and your projects undisturbed.

Storage Options Abound. I haven't talked much about storage, simply because you'll have to build it in wherever your shop is located. But a dedicated shop allows the most freedom in building in storage.

Controlled Access. Dedicated shops accept overhead and passage doors, giving you many access options. The site will dictate whether you can reach the building with a vehicle.

Sort Out Security. It's tougher to monitor a shop that's not located in or next to your house. So install strong doors and windows secured by good locks. An inexpensive alarm system adds peace of mind.

Make It Bright. Install windows to allow natural light in your shop. Then add fluorescent overhead lights and incandescent task lights. Put lights on their own circuit, so they won't shut off if a tool trips a breaker.

Climate Control Adds Cost. A dedicated building requires its own heating and cooling systems, which increase construction costs. Cooling a

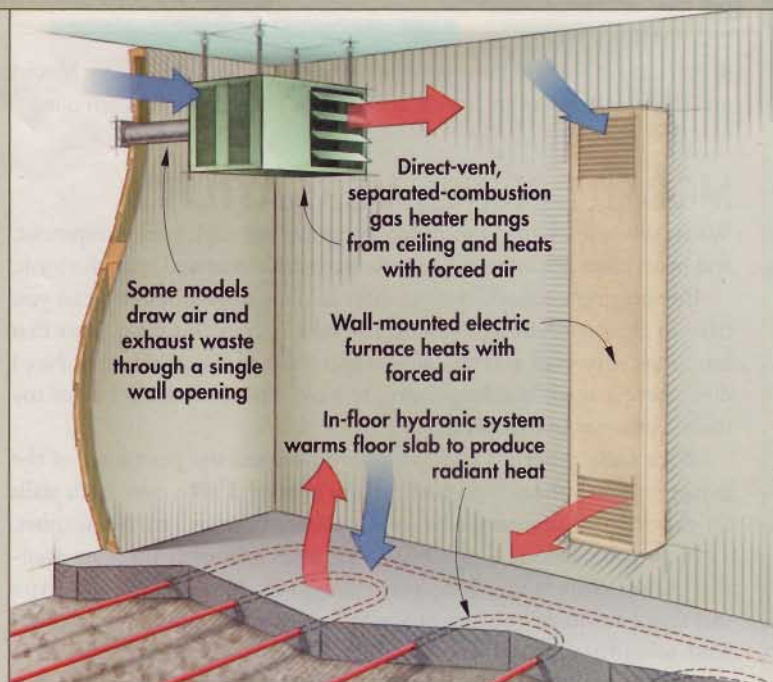
shop is easy — just use a window air conditioner. Heating gets more involved, but a variety of systems exist that work very well in a shop environment (see the *Sidebar below*). Be sure to seal all gaps, insulate, and install vapor barriers to make the climate control system efficient.

Ducts Control Dust. Locating tools "permanently" makes dust collection more efficient. That's because you can run rigid duct to tools and rely less on suction-robbing flexible hose. Plan for dust collection as you plan your shop layout to ensure adequate capacity and ducting without too many twists and turns.

**BENCH
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GO ONLINE FOR:

- More ways to heat your shop safely and efficiently



▲ In-floor hydronic heating systems provide great shop heat, but have to be built in. The others retrofit easily.

WHAT'S COOL IN HEATING

Winter has long been designated "woodworking season." So you'll need a heating system if you don't live in a warm climate. A space heater may be adequate, or you may have to install a more powerful system.

I've known many woodworkers who heated their shop with a wood-burning stove, often stoked with scrap wood and "mistakes." But you have to tend the fire while using the shop and are left with no heat at all when the shop isn't in use. Plus, you usually have to increase insurance coverage if you have a wood-burning stove.

Thankfully, gas and electric heating systems well-suited to workshops are commonly available. Both types come with compromises.

A gas system requires that you run lines or install a propane tank. This increases construction costs. But gas heat is efficient and usually cheaper than electric. Electric heaters cost more to run, but cost less to install. **Note:** 220-volt heaters are more efficient than 110-volt units.

Whichever system you choose, add a thermostat, so you can heat the shop just enough to keep the interior above freezing when the shop isn't in use.



backdoorboot BENCH

sturdy & stylish seating—*plus storage!*

It's tough to keep wet, muddy boots out of the house. But you *can* keep them organized and out of the way with this sturdy bench. Not only does it offer a comfortable place to sit and change your shoes, but the slatted shelf underneath also lets you store boots and other gear.

Made entirely of solid ash, the bench uses knock-down hardware fittings to tie the end frames to the seat and shelf. These fittings provide a simple way to assemble the bench. More importantly, they provide a rock-solid connection that prevents the bench from racking.

Although this bench is primarily a utilitarian project, I wanted to “dress” it up a bit. That’s accomplished with a wood grid at each end that’s assembled with half-lap joints. As an option, you may want to paint the grids and add a matching seat cushion (*Photo, right*).



building the END FRAMES

The design of this backdoor bench is very straightforward. As you can see in the *Illustration* below, it consists of two end frames that support a slatted seat and shelf.

I began by building the end frames. Each frame consists of two rails (A) and two stiles (B) that are cut to size from $\frac{3}{4}$ "-thick hardwood (*End Frame Assembly*, page 51). These frame pieces are assembled with stub tenon and groove joints, as shown in the *Stub Tenon & Groove Detail*.

Cut the Grooves — The first order of business is to cut a groove in the inside edge of each frame piece. I used a $\frac{1}{4}$ " dado blade in the table saw to do this. The setup is identical to one used to cut grooves in the seat and shelf rails (refer to Fig. 1 on page 53). Note how the rip fence is positioned so the blade is centered on the thickness of the frame piece. After locking the fence, set the blade height ($\frac{1}{2}$ "), and then make a single pass to cut each groove.

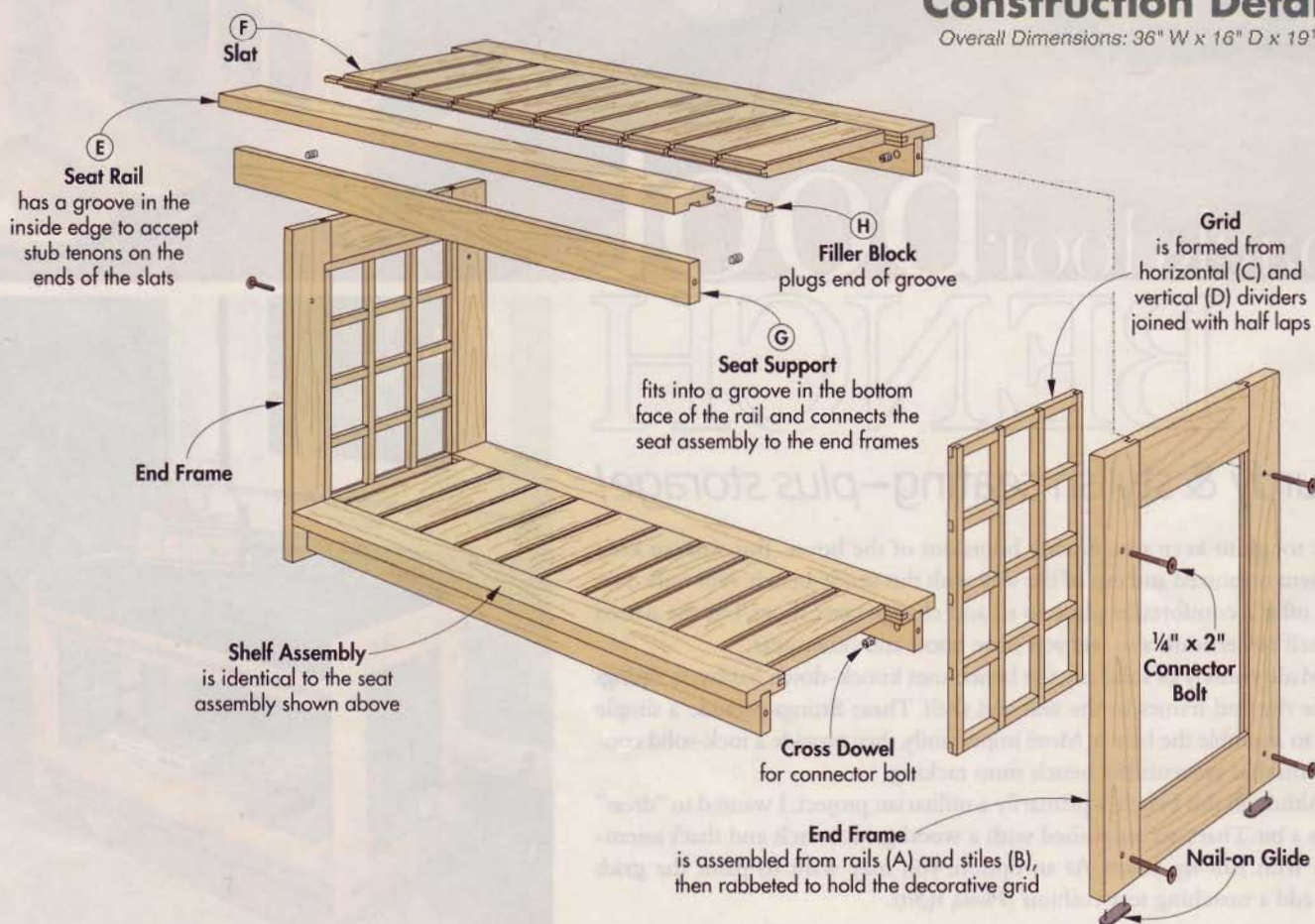
Make the Stub Tenons — With the grooves completed, you can turn your attention to the stub tenons on the ends of the rails. Here again, you'll be using a dado blade. Only this time, set it up for a $\frac{3}{4}$ "-wide cut and "bury" part of it in an auxiliary fence. The fence will be used as a stop to establish the length of the tenon. Since

▲ The grid fits into a rabbet that's routed in the back inside edge of the frame. To create a shadow line between the grid and the frame, I eased the outer edges of both assemblies with a sanding block (right), then glued the grid in place.



Construction Details

Overall Dimensions: 36" W x 16" D x 19½" H



the tenons are $\frac{1}{2}$ " long, leave $\frac{1}{2}$ " of the dado blade exposed. (A similar setup is shown in Fig. 2 on page 53.)

After positioning the fence, the next step is to set the blade height. The goal is to adjust the blade so that by making two passes (one on each face), it forms a snug-fitting tenon. To accomplish that, start by raising the blade to $\frac{1}{4}$ " and make test cuts in a scrap piece that's the same thickness as the rails. Check the fit and "tweak" the blade height if needed.

Once you're satisfied with the setup, go ahead and cut the tenons in the rails. To do that, butt the end of each rail against the fence and use the miter gauge to push it through the blade. Now flip it over and make the second pass to complete the tenon.

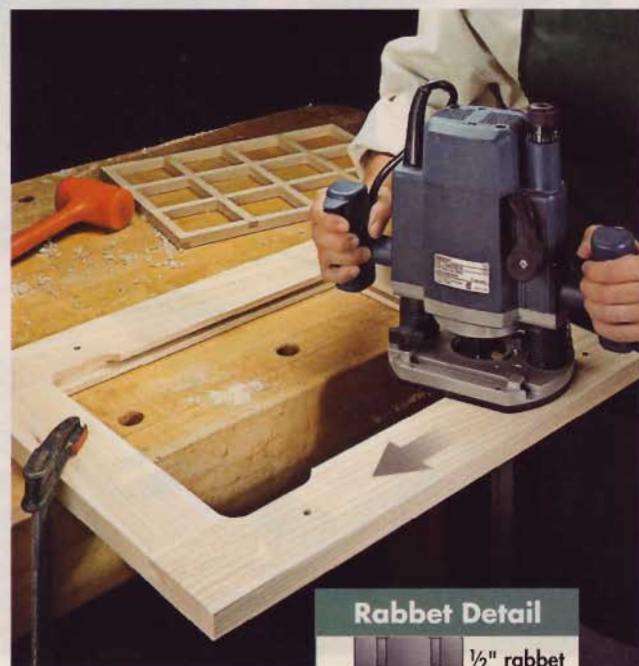
Holes for Connector Bolts — Before gluing up the frames, there's one more thing to do. That's to drill two holes in each stile for a pair of connector bolts that will be used to

connect the end frames to the seat and shelf assemblies.

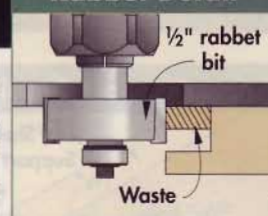
Rout the Rabbets — Next, to accept the grid, you'll need to rout a rabbet around the back inside edge of each frame. A handheld router with a $\frac{1}{2}$ " rabbet bit makes quick work of this job (see *Photo at right and Rabbet Detail*). The bit removes the back lip of the groove that was cut earlier. After routing the rabbet, square the corners with a chisel.

Half-Lapped Grids — At this point, it's time to focus on the decorative wood grids. Each grid is made up of five horizontal dividers (C) and four vertical dividers (D) made from $\frac{1}{2}$ "-thick hardwood. The dividers are assembled with half-lap joints, a process that's detailed on page 54.

After cutting the half-laps, glue up the grid. Use a sanding block to "break" the adjoining edges of the grid and the frame. Then glue the grid into place (*Photo, page 50*).

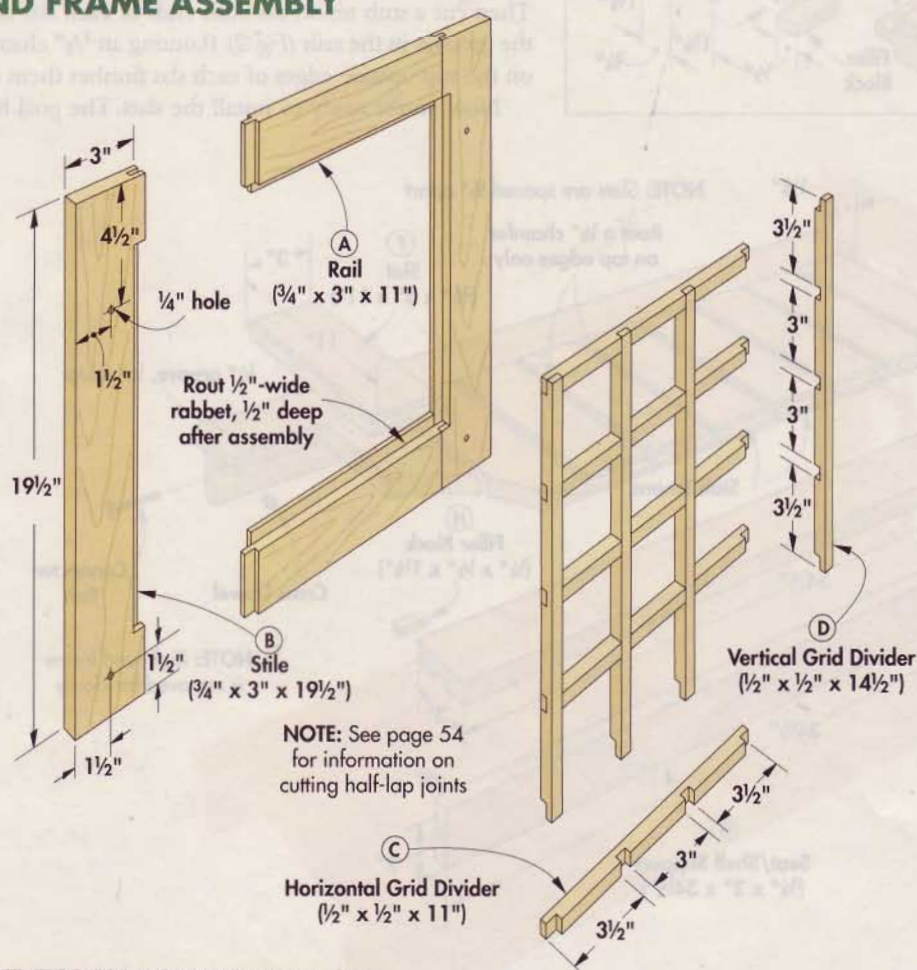


Rabbet Detail

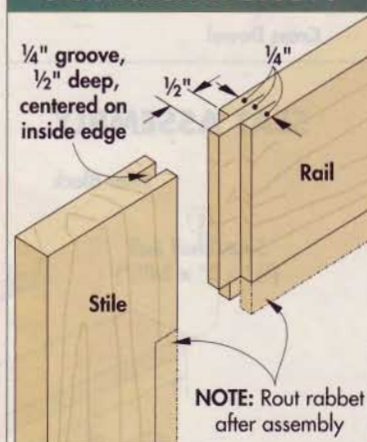


▲ To accept the grid, rout a rabbet in the back inside edge of the frame. Note how the bit removes the back lip of the groove.

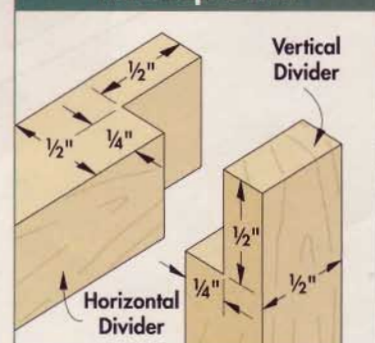
END FRAME ASSEMBLY



Stub Tenon & Groove



Half Lap Detail





▲ Hardboard spacers ensure even spacing of the slats. Short filler blocks plug the exposed ends of the grooves.

add a slatted SEAT & SHELF

The seat and shelf assemblies that span between the end frames of this bench are identical (*Seat Assembly Illustration*). Each assembly consists of two long rails connected by a number of evenly spaced slats. A pair of supports prevents the assembly from sagging.

Make the Rails — Start by cutting the rails (E) to size from $\frac{3}{4}$ "-thick hardwood. That done, you'll need to cut two grooves in each rail: one to accept the slats and the other to fit over the support.

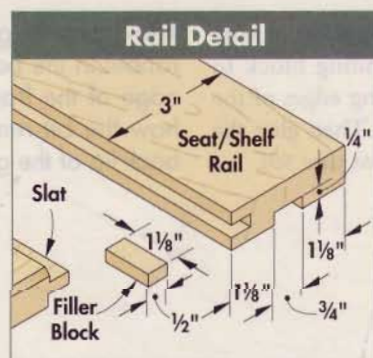
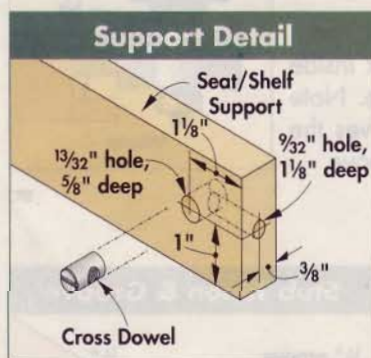
The groove in the inside edge of the rail is sized to accept $\frac{1}{4}$ "-thick stub tenons on the slats (*Rail Detail*). As with the end frames, cut this groove using a $\frac{1}{4}$ " dado blade on the table saw (*Fig. 1 and Groove Detail*). Then glue in short filler blocks (H) to "plug" the exposed ends of the groove.

The second groove, which is centered on the bottom face of the rail, will fit over the seat/shelf supports. To cut this groove, set up a $\frac{3}{4}$ " dado blade, adjust it for an $\frac{1}{8}$ "-deep cut, and make a single pass over the blade.

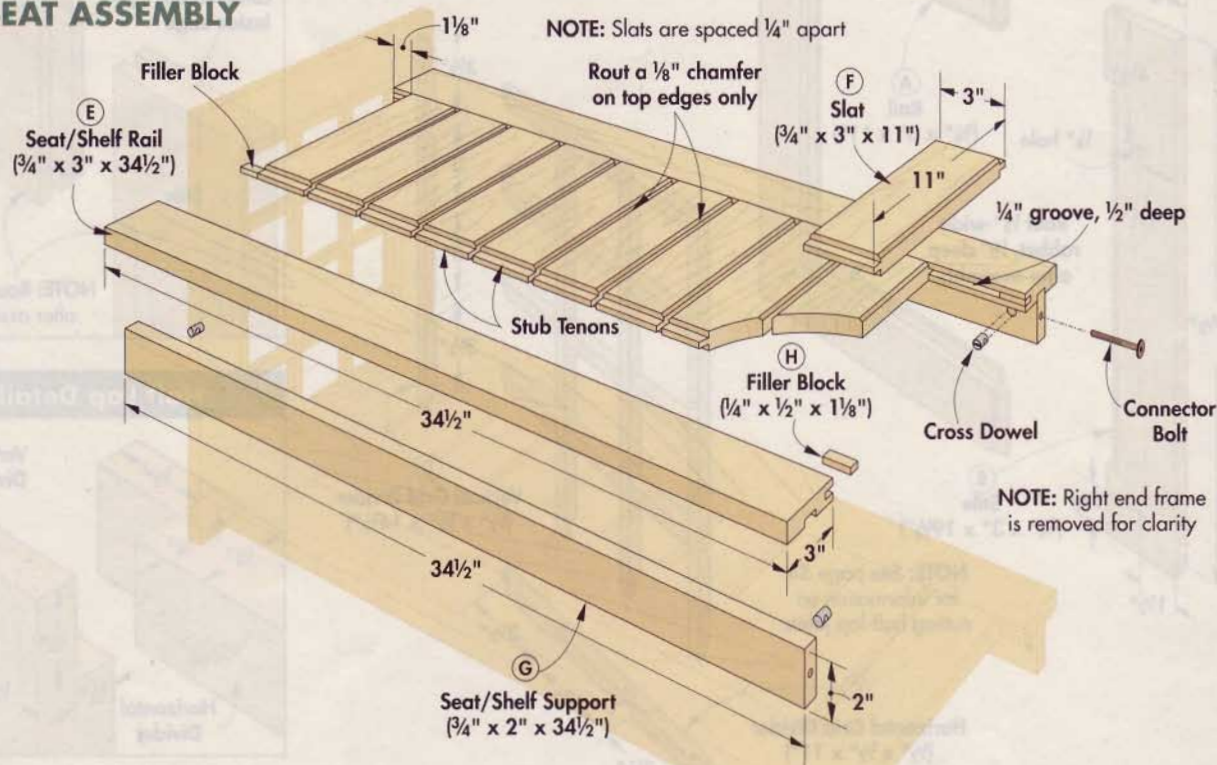
Add the Slats — At this point, you can set the rails aside and turn your attention to the slats (F). There are 20 slats altogether (ten each for the seat and shelf).

Start by cutting the slats to size from $\frac{3}{4}$ "-thick stock. Then cut a stub tenon on both ends of each slat to fit the grooves in the rails (*Fig. 2*). Routing an $\frac{1}{8}$ " chamfer on the top outside edges of each slat finishes them off.

Now you're ready to install the slats. The goal here



SEAT ASSEMBLY



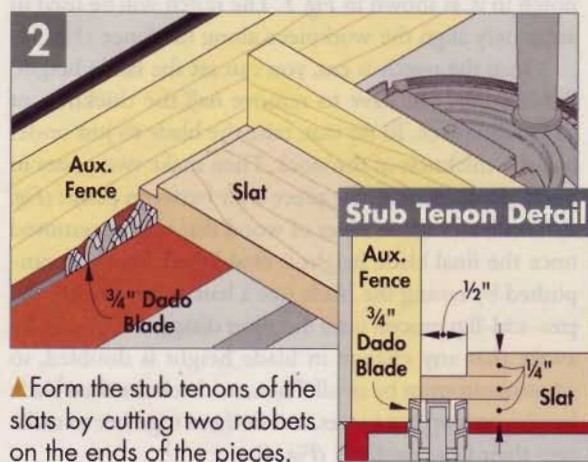
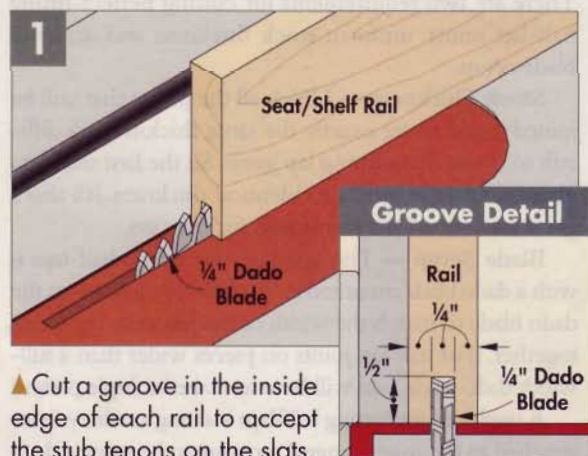
is to space the slats evenly ($\frac{1}{4}$ " apart). Inserting $\frac{1}{4}$ " hardboard spacers between the slats provides uniform spacing between them (Photo, page 52). It's a good idea to dry-fit the slats and rails before you apply glue. Then center a dab of glue on the top and bottom of the tenons, and fit the slats into place.

Add the Supports — All that's left is to add the hardwood supports (G). As I mentioned, the supports help strengthen the seat and shelf, but they also serve another important purpose. Let me explain.

Housed in both ends of each support is a threaded cross dowel. Each cross dowel accepts a connector bolt that passes through the pre-drilled holes in the frames (see Sidebar at right). Threading the connector bolts into the cross dowels "locks" the bench together.

To make this work, you'll need to drill a hole in the face of each support to hold the cross dowel. That's easy enough to do. But drilling the hole for the connector bolt is a bit trickier. That's because it goes into the end grain of the support. This end grain has a tendency to make the drill bit veer off course. To prevent that, I use a shop-made guide block (see Sidebar at right).

After drilling the holes, it's just a matter of gluing and clamping the supports to the rails. Then insert the cross dowels, fit the seat and shelf between the end frames, and install the connector bolts.



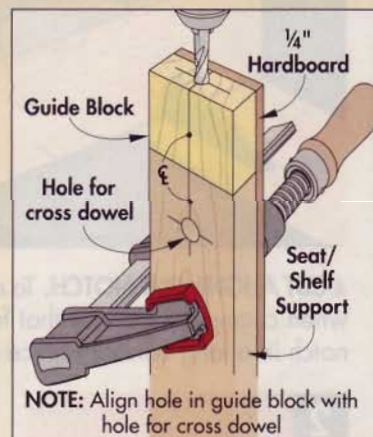
cross dowels & CONNECTOR BOLTS

Cross dowels and connector bolts produce the 90° connections that join the end frames to the seat and shelf of the bench. Typically, this hardware is used in the joinery of "knock-down" projects to make them easy to disassemble and move. In this case, though, I was after a strong, simple way to join parts. This hardware does that, plus it allows me to "snug up" the bench if the connections ever loosen up.



Quick Tip: Drill Guide Block

An easy way to drill a straight hole into the end of a board is to use a simple guide block. It's just a block of wood with a hole drilled in it that's used to guide the drill bit. A piece of hardboard attached to the block lets you clamp it to the workpiece. When drilling the hole for the connector bolt in the end of the seat/shelf support, be sure the hole in the guide block aligns with the hole for the cross dowel.



MATERIALS & HARDWARE

Part	Qty	T	W	L	Material
A Frame Rail	4	$\frac{3}{4}$ "	3"	11"	Ash
B Frame Stile	4	$\frac{3}{4}$ "	3"	19 $\frac{1}{2}$ "	Ash
C Horizontal Grid Divider	10	$\frac{1}{2}$ "	$\frac{1}{2}$ "	11"	Ash
D Vertical Grid Divider	8	$\frac{1}{2}$ "	$\frac{1}{2}$ "	14 $\frac{1}{2}$ "	Ash
E Seat/Shelf Rail	4	$\frac{3}{4}$ "	3"	34 $\frac{1}{2}$ "	Ash
F Slat	20	$\frac{3}{4}$ "	3"	11"	Ash
G Seat/Shelf Support	4	$\frac{3}{4}$ "	2"	34 $\frac{1}{2}$ "	Ash
H Filler Block	8	$\frac{1}{4}$ "	$\frac{1}{2}$ "	1 $\frac{1}{8}$ "	Ash



- (4) 1 $\frac{3}{16}$ " Dbl. Nail-on Glides (Item #18665) *
- (4) Cross Dowels (Item #31823) *
- (4) 2" Connector Bolts (Item #31849) *

* Items available at 800-233-9359 or www.Rockler.com



MATERIALS LIST



MATERIALS & HARDWARE

Part	Qty	T	W	L	Material
A	4	3/4"	3"	11"	Ash
B	4	3/4"	3"	19 1/2"	Ash
C	10	1/2"	1/2"	11"	Ash
D	8	1/2"	1/2"	14 1/2"	Ash
E	4	3/4"	3"	34 1/2"	Ash
F	20	3/4"	3"	11"	Ash
G	4	3/4"	2"	34 1/2"	Ash
H	8	1/4"	1/2"	1 1/8"	Ash



(4) 1 13/16" Dbl. Nail-on Glides (Item #18665) *

(4) Cross Dowels (Item #31823) *

(4) 2" Connector Bolts (Item #31849) *

* Items available at 800-233-9359 or www.Rockler.com

CUTTING DIAGRAM

A	A	B	B	E
A	A	B	B	E
E		E		

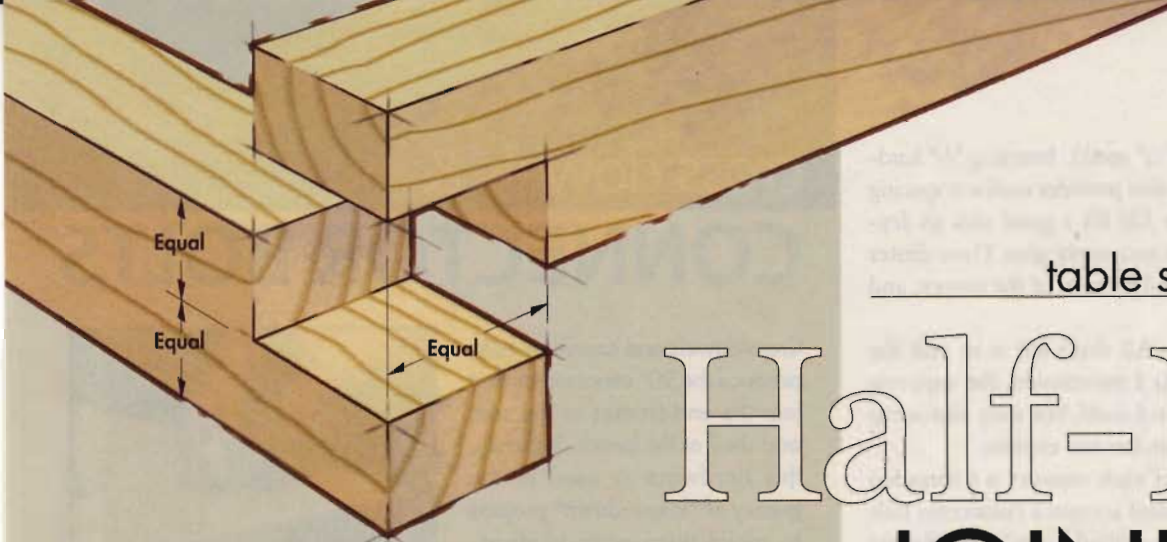
3/4" x 10" x 96" Ash

G	F	F	F	F	F
G	F	F	F	F	F
G	F	F	F	F	F
G	F	F	F	F	F

3/4" x 12" x 96" Ash



1/2" x 6" x 48" Ash



Skill Builder

table saw technique

Half-Lap JOINERY

Table Saw Setup



▲ CUT ALIGNMENT NOTCH. To accurately align the workpiece when cutting the dados that form the half-laps, cut a deep notch in a long auxiliary fence attached to the miter gauge.



▲ SET BLADE HEIGHT. With the blade height set to just under half the thickness of the workpiece, make two cuts in the end of a test piece, flipping it between cuts (2). Raise the blade slightly and repeat the process until the sliver is gone (3).



◀ TEST FIT. Once the blade height is adjusted, cut rabbets in two test pieces, and check to see if they fit flush.

A half-lap joint is exactly what the name implies — a joint with half the thickness of each mating piece removed so that overlapping pieces fit flush. This provides a strong face-to-face glue joint that is useful for building frames, lattices, and grids (like the grids in the backdoor bench on page 49, or the entry divider on page 62).

Stock Prep & Table Saw Setup

There are two requirements for cutting perfect-fitting half-lap joints: uniform stock thickness and accurate blade setup.

Stock Thickness — Unless all the pieces that will be joined together are exactly the same thickness, it's difficult to create flush-fitting lap joints. So the first step is to plane all of your blanks to identical thickness. It's also a good idea to make a few blanks for test cuts.

Blade Setup — The quickest way to cut half-laps is with a dado blade mounted in the table saw. Just set up the dado blade to match the width of the pieces to be joined together. (For half-lap joints on pieces wider than a full-width dado blade, you will have to make multiple passes.)

A useful aid for cutting half-laps is a long auxiliary fence attached to the miter gauge. I recommend cutting a deep notch in it, as shown in Fig. 1. The notch will be used to accurately align the workpiece along the fence (Fig. 5).

Once the notch is cut, you can set the blade height. Remember, you have to remove *half* the thickness of each workpiece. To do that, raise the blade to just under half the thickness of the stock. Then make two passes in a test blank, flipping the piece over between passes (Fig. 2). This leaves a thin sliver of wood that will be removed once the final blade height is established. That's accomplished by raising the blade just a hair and repeating the pass-and-flip process until the sliver disappears (Fig. 3). Be aware that any change in blade height is doubled, so adjustments must be small. Then, to check the final blade height, cut two test pieces, and fit them together to make sure their faces are flush (Fig. 4).

Cutting Half-Laps

Once the setup is completed, you're ready to cut the half-lap joints. If you're building a half-lapped frame, this is just a matter of cutting rabbets in the ends of the frame pieces. For pieces with multiple half-laps (like those required for the grids on the backdoor bench), you'll have to cut a series of rabbets and dados.

Now cutting all those rabbets and dados individually would be pretty time-consuming, and it would increase the potential for misaligned cuts. For a shortcut that ensures accuracy, I cut dados in extra-wide blanks and then rip the blanks into strips. Each blank should be wide enough for all the "like" pieces (either horizontal or vertical), plus a little extra to allow for the saw kerfs between pieces.

Cutting the Dados — Start by marking the dado locations on the blank. Then align these marks with the notch in the miter gauge fence, and push the blank over the dado blade with the miter gauge (Fig. 5). If your project requires half-laps that are an equal distance from the ends of the workpiece, be sure to clamp a stop block to the fence for repeatability. Using the same stop-block setting and flipping the blank end for end between cuts ensures a perfect match-up of horizontal and vertical pieces during grid assembly.

Ripping the Strips — With the dados cut, the next step is to rip the strips to width from the blank (Fig. 6). After ripping the first strip, check to make sure it matches the width of the blank's dado (Fig. 7). Once you get a snug fit, rip all the remaining pieces.



▲ **DEAD-ON DADOES.** After laying out the locations of the dados on an extra-wide blank, align the marks with the notch in the miter gauge fence. Then clamp a stop block to the fence and make the cut.



▲ **RIP STRIPS.** Now set the fence to rip a strip that slips into the dado with a friction fit (see Fig. 7).

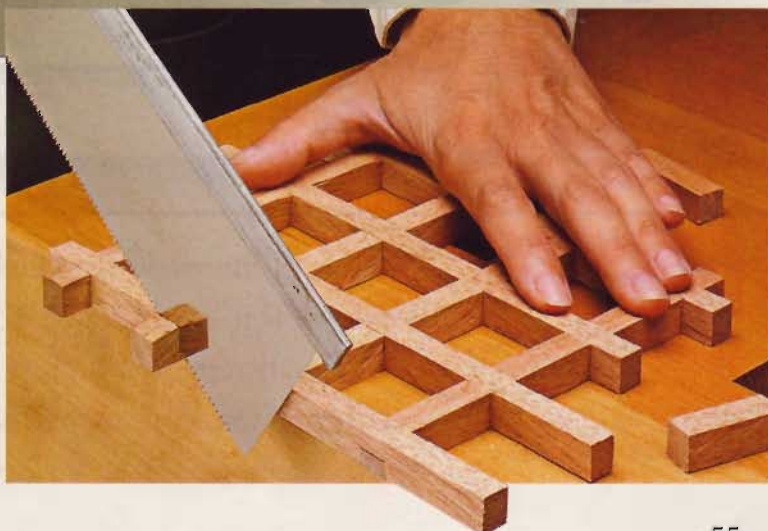


▲ **CHECK THE FIT.** Once you're satisfied with the fit, rip the remaining strips from the blank.

MAKING SMALL GRIDS

When making half-lap joints for small grids (like those in the entry divider), it's best to work with an extra-wide blank that's also extra long. This will allow you to safely cut the joints on the table saw.

Depending on the size of the grid, you may be able to get pieces for two (or more) grids from one blank. In that case, I cut a series of dados (no rabbets) in the blank. Then, after ripping the strips from the blank, I crosscut the grid dividers about an inch or so longer than needed. This means the ends of the dividers will stick out when you assemble the grid, but they're easy to trim flush with a hand saw (Photo, right).



TOP 10 INNOVATIVE TOOLS 2005



The tide of innovation swelled once again in this, the fourth year of the *Workbench* Top 10 Innovative Tools Awards. Riding the crest were these 10 tools, which represent a cross section of manufacturers serving the full spectrum of tool consumers. Indeed, this year's list demonstrates that innovation comes in all sizes, at all price points, and from all around the world.

BLACK & DECKER

Dragster Belt Sander

Black & Decker's radical new Dragster belt sander may represent the first significant improvement to belt sanders in the 80-plus years they've been around.

The Dragster features a low-profile front wheel that delivers 25 percent more sanding surface than previous 3" x 21" models and allows the sander to get three times closer to the edge of adjoining surfaces (floor to baseboard, for instance). Additionally, a retractable hood exposes the top of the sanding belt for use in a variety of applications, including squeezing into spaces where belt sanders couldn't possibly reach before (*Photo, above*). Finally, a three-position adjustable handle maximizes user control and comfort.

The Dragster sells for around \$70. Visit BlackAndDecker.com, or call 800-544-6986 for more.



WORKBENCH
TOP
10
UNUSUAL
TOOLS
2008

► The Dragster's low profile offers more sanding surface, better access to corners, and the ability to reach into tight spots.

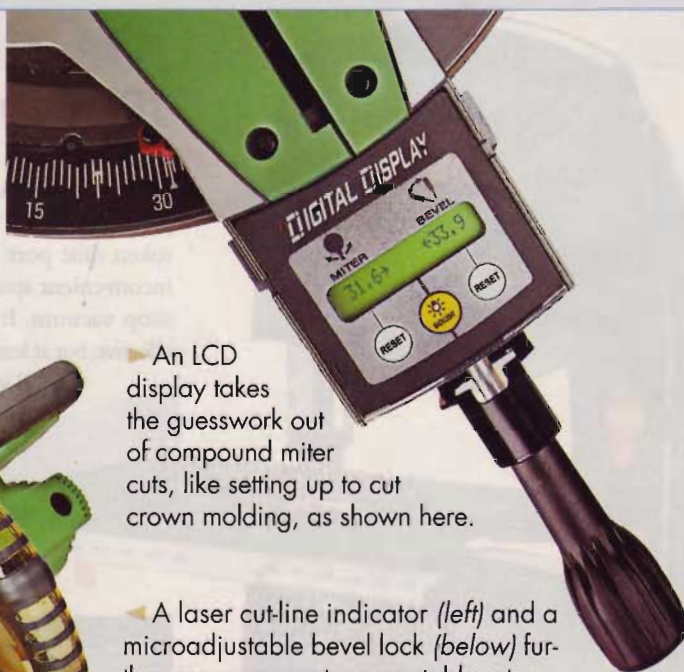


HITACHI

12" Digital Miter Saw

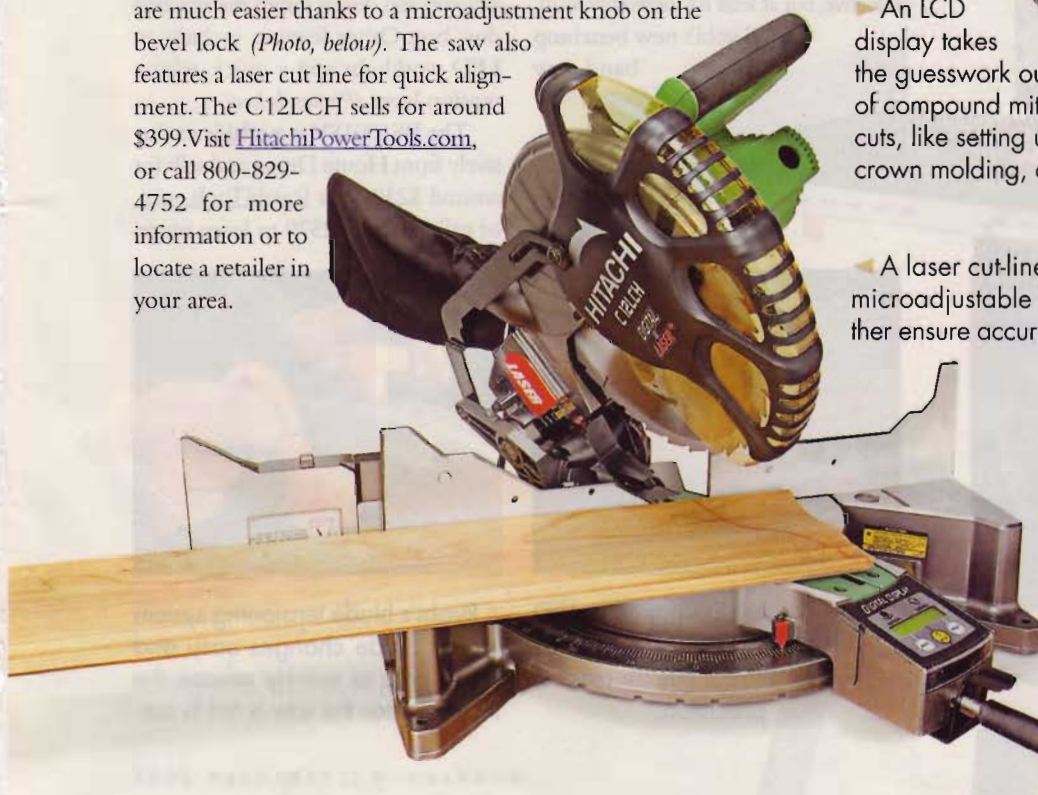
A new miter saw from Hitachi (Model C12LCH) offers the latest in power tool technology with a digital liquid crystal display (LCD) that shows the bevel and miter angle of the saw.

The LCD readout indicates angle settings in half of a degree (.5°) through most of the range of adjustment. But it also indicates the specific angles for cutting crown molding flat (31.6° miter, 33.9° bevel). Such precise setups are much easier thanks to a microadjustment knob on the bevel lock (*Photo, below*). The saw also features a laser cut line for quick alignment. The C12LCH sells for around \$399. Visit HitachiPowerTools.com, or call 800-829-4752 for more information or to locate a retailer in your area.



► An LCD display takes the guesswork out of compound miter cuts, like setting up to cut crown molding, as shown here.

► A laser cut-line indicator (*left*) and a microadjustable bevel lock (*below*) further ensure accurate, repeatable setups.





DEWALT Cordless Nailer

After four years of research and development, DeWalt has managed to deliver what no other manufacturer has in the past — a cordless finish nailer that works as fast as the user.

The four- to five-nails-per-second cycle rate of these nailers eclipses the cycle rates of competitive products and is more than fast enough for even the most demanding trim installations. These are also the only cordless nailers that offer sequential firing for precision nail placement or “bump firing” for increased speed (*Photo, above*). Other features include an LED worklight, belt clip, and tool-free jam clearing.



▲ DeWalt's new 16-gauge cordless finish nailers are the first such tools that can realistically keep pace with the user.

DeWalt offers the nailer in eight models, including 12-, 14.4-, and 18-volt versions, and with straight or angled magazines. Prices range from \$380 to \$400. Visit DeWalt.com, or call 800-433-9258 to learn more.



RYOBI 10" Band Saw

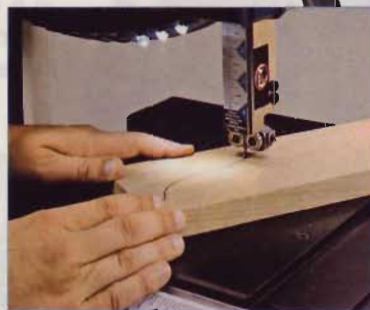
Dust control on benchtop tools in general — and benchtop band saws in particular — has long consisted of a token dust port (usually in a really inconvenient spot) and a screaming shop vacuum. It's never been very effective, but at least it's incredibly loud.

Ryobi's new benchtop band saw

(model BS1001SV) offers the first effective and quiet alternative.

The BS1001SV Silent Vac incorporates a radial fan in the lower wheel to create a highly efficient dust collection system. It draws dust from the tabletop and directs it into the attached dust bag. Other features include an LED worklight and a quick-release tension lever (*Photos, below*).

The BS1001SV is available exclusively from Home Depot and sells for around \$230. Visit RyobiTools.com, or call 800-525-2579 to learn more.



▲ A high-intensity LED worklight illuminates the cut line for greater precision.



▲ Ryobi's blade tensioning system makes blade changes easy and allows you to quickly release the tension when the saw is not in use.

TRITON

Plunge Drill

Triton's new 18-volt cordless hammer drill features a fully retractable plunge mechanism that guarantees perpendicular drilling, along with several other benefits.

For example, the face of the plunge mechanism has a non-slip pad for precision drilling in tile or other smooth surfaces. It also accepts a couple of multi-function attachments: one for drilling on corners or in round stock and another for repetitive drilling tasks, such as shelf pin holes.

The Plunge Drill sells for around \$290. Visit TritonWoodworking.com, or call 888-874-8661 for more.



▼ Triton's new cordless drill ensures perpendicular drilling with a retractable plunge mechanism.



SKIL

X-Shop

Although Skil didn't invent any new tools or develop any new technology with their X-Shop, we still have to laud their ingenuity in creating this comprehensive and affordable entry-level shop system.

The X-Shop is built around Skil's 10" benchtop table saw. Each wing of the saw has an opening that accepts insert bases for four different power tools (Skil or other brands). By simply swapping one insert for another, you can quickly transform either wing of the saw into a router

table, drill press, sanding station, or scroll saw. When you need the full capacity of the table saw, simply place blank inserts into the openings.

The X-Shop sells for around \$380 and includes the table saw, storage cabinet, router fence and insert, as well as inserts for a jig saw and belt sander. The drill press insert, power drill, router, belt sander, and jig saw are sold separately.

Visit Skil.com, or call 877-754-5999 for more information.

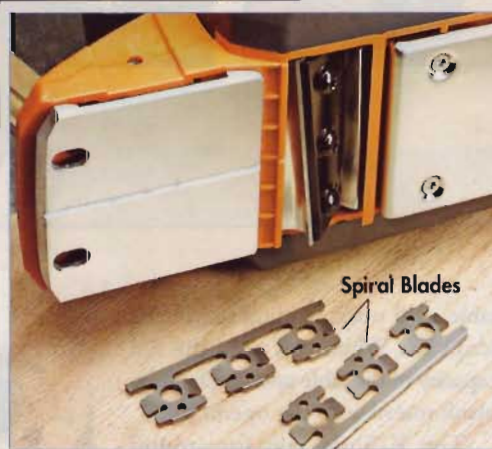


▲ By changing inserts, the wings of this Skil table saw can quickly be turned into a drill press, scroll saw, sanding station, or router table. When not in use, the inserts and tools store in the cabinet.





▲ End grain is no problem for the spiral blades of Ridgid's portable power planer. The blades are self-indexing, so they're easy to replace. A wrench for blade changing is included with the planer.



RIDGID

Handheld Planer

Ridgid's new cordless handheld power planer (model R848) is engineered to handle the tough planing jobs that professionals face every day and DIY'ers face all too often. This 3 $\frac{1}{4}$ ", 18-volt planer features spiral cutting blades that run at 11,000 RPM (or 22,000 cuts per minute) to produce smooth cuts with less chipout than conventional blades.

The spiral blades make a "shearing" cut that is less likely to damage a workpiece. Anyone who has ever tried to shave the bottom of a door without tearing apart the end grain will appreciate this feature (*Photo, left*).

Another advantage of the spiral blades is that they cut more efficiently, which can increase the run time of a cordless planer significantly.

The R848 has a 0 to $\frac{1}{16}$ " depth adjustment with "micro" settings for fine depth control. It can also make rabbet cuts up to $\frac{1}{2}$ " deep.

The planer kit includes a chip collection bag, edge guide, one battery, a 30-minute charger, one extra set of spiral blades, and a wrench for changing the blades. The kit comes packaged in a plastic carrying case.

The complete kit sells for around \$200 at Home Depot and other tool retailers. Visit Ridgid.com, or call 800-474-3443 for more information.

MILESCRAFT

Orbiter

The Milescraft Orbiter is unlike any other right-angle drilling attachment out there. That's because it's not limited to only right-angle drilling.

You see, while all other right-angle drilling

attachments are limited to a single perpendicular position, this attachment from Milescraft can be set at virtually any angle.

This is thanks to two half-spheres that rotate independently of each other. A unique beveled gearing system inside the spheres makes this dual-axis rotation possible, while sacrificing very little torque or speed.



The Orbiter features a $\frac{3}{8}$ " keyless chuck and a soft-grip handle. The handle is also the locking mechanism that holds the two spheres in the desired position. The Orbiter can be used with any drill $\frac{3}{8}$ " or larger.

The Milescraft Orbiter sells for approximately \$30 at Lowes. Visit Milescraft.com, or call 815-874-2400 for more information.



▲ The Milescraft Orbiter goes well beyond right-angle drilling with independently rotating spheres that offer almost infinite angle settings.

DEWALT

Recip Saw

DeWalt's new DW304PK reciprocating saw features a four-position blade clamp specifically designed for flush cutting.

The blade clamp accepts the saw blade in the two standard vertical positions (teeth facing up or down) and also offers two horizontal positions (teeth facing right or left).

This makes the saw adaptable to just about any cutting situation, including cutting close to floors, walls, or ceilings where clearance is limited. The result is less user contortion with fewer broken blades and errant cuts.

The DW304PK sells for about \$100. Visit DeWalt.com, or call 800-433-9258 for more information.



► A four-position blade clamp and a tool-free blade release make the new DW304PK from DeWalt one of the most adaptable reciprocating saws on the market.



► This versatile new saw features a 10-amp motor that delivers up to 2,800 strokes per minute with a 1 1/8" blade stroke.

PORTER-CABLE

Circular Saw

With its one-of-a-kind Quik-Change system, Porter-Cable's new line of circular saws enables users to easily change the circular saw blade without a wrench and still secure the blade just as tightly.

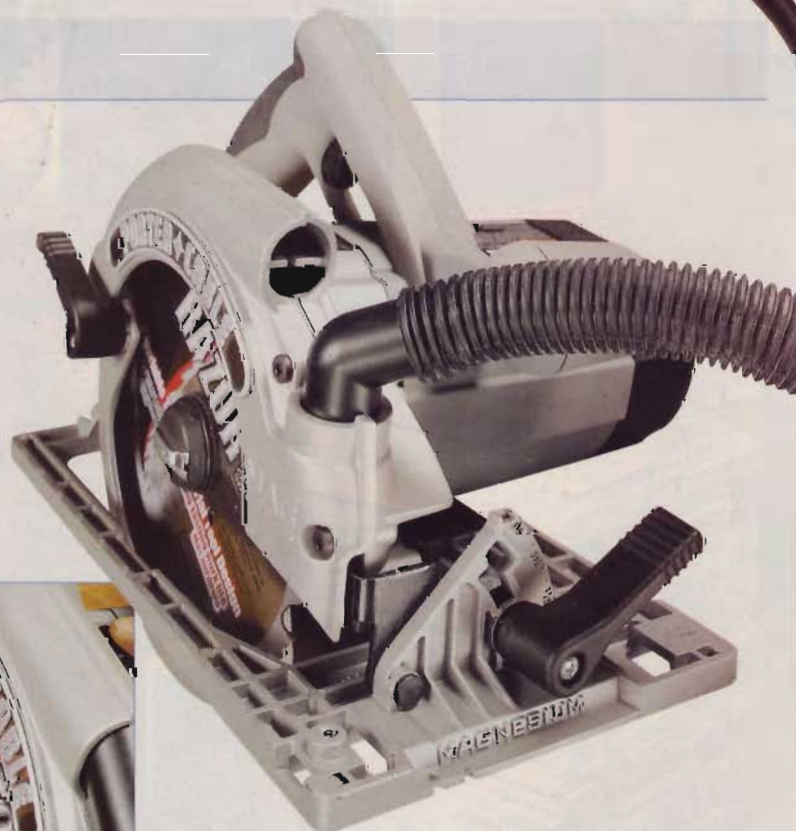
The keyless blade-change system is a big time saver. And it also makes it more likely that users will actually change the blade to better match the work at hand.

This ingenious blade-changing system is available on several Porter-Cable circular saw models, including left- and right-blade versions.

Of course, the saws also include the features that have been the mark of Porter-Cable quality all along, including lightweight magnesium motor housings and integrated dust control nozzles.

The saws sell for \$130 and up. Visit PorterCable.com, or call 800-487-8665 for more information.

► A pivoting dust nozzle and lightweight magnesium housing are standard fare on all Porter-Cable MagSaws with Quik-Change.



► Installing a new blade is quicker than ever, and just as secure as with a wrench, thanks to Porter-Cable's keyless Quik-Change system.

Elegant entry divider

You never get a second chance to make a first impression. The saying is old, but true, and it explains why so many homes are built with grand entryways that impress visitors but take up a lot of space.

Our entry divider, on the other hand, proves that less can be more by packing a lot of "wow" into just a little space. It defines your entryway, and definitely makes a great first impression.



DISPLAY CABINET

the finer details.....



A



B

The primary role of this project is to divide a home's entryway from the rest of the room. But it's filled with features that make it beautiful, not just functional.

For starters, there's the display cabinet. On the side that faces the room, it has glass-panel doors and adjustable glass shelves inside (Photo A). Easy-to-install "puck" lights illuminate items on display. On the entryway side, those same lights shine through decorative grids and mica panels (Photo B).

At one end of the cabinet sits a pedestal that's wrapped with "cultured" stone. It adds a unique look to the project, and supports a square wood column that connects the cabinet to a bulkhead above. Mitered trim adds personality to the column, as does a light set behind another set of decorative grids (Photo C).

The bulkhead finishes off the divider in high style, with panels that match the display cabinet and additional display lighting.



C

an easy, yet elegant DISPLAY CABINET

This display cabinet starts as a cherry plywood case built with simple tongue-and-dado joints (*Display Cabinet Assembly*). A face frame on one side creates openings for three doors. The other side also gets a face frame that surrounds a plywood back panel. Inside the case, vertical dividers and glass shelves form compartments for display items.

To build the case, start by cutting the plywood case top and bottom (A), ends (B), dividers (C), bottom supports (D), and back (E).

You'll notice in the *Back Panel Illustration* on page 65 that the back appears to be three individual panels.

Actually it's just a single piece. Decorative kerfs cut around the perimeter and near the middle make it look like individual panels. The face frame glued around the panel perimeter completes the look.

To create the look of individual panels, set the table saw blade at $\frac{1}{8}$ " and cut the decorative kerfs (*Case Back Detail*).

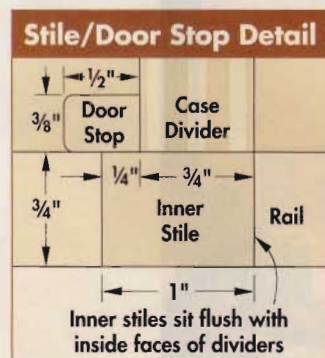
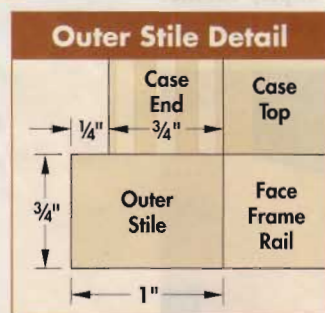
The next step is to make the tongue-and-dado joints. Start by cutting rabbets to form a tongue on each end of the case top and bottom (*Tongue & Dado Detail*, page 65). Then, cut dados in the case ends to accept the tongues.

With that done, cut dados in the top and bottom for the dividers (*Case Illustration*, page 65).

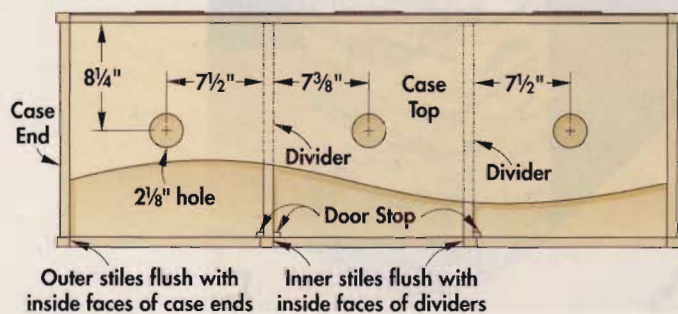
Now bore holes in the case top for the lights (*Case Top View*, below). Then cut openings in the case back for the decorative wood grids (*Photo*, page 65), and file the edges smooth.

With this done, glue and screw the case together. Then drill shelf-pin holes in the ends and dividers.

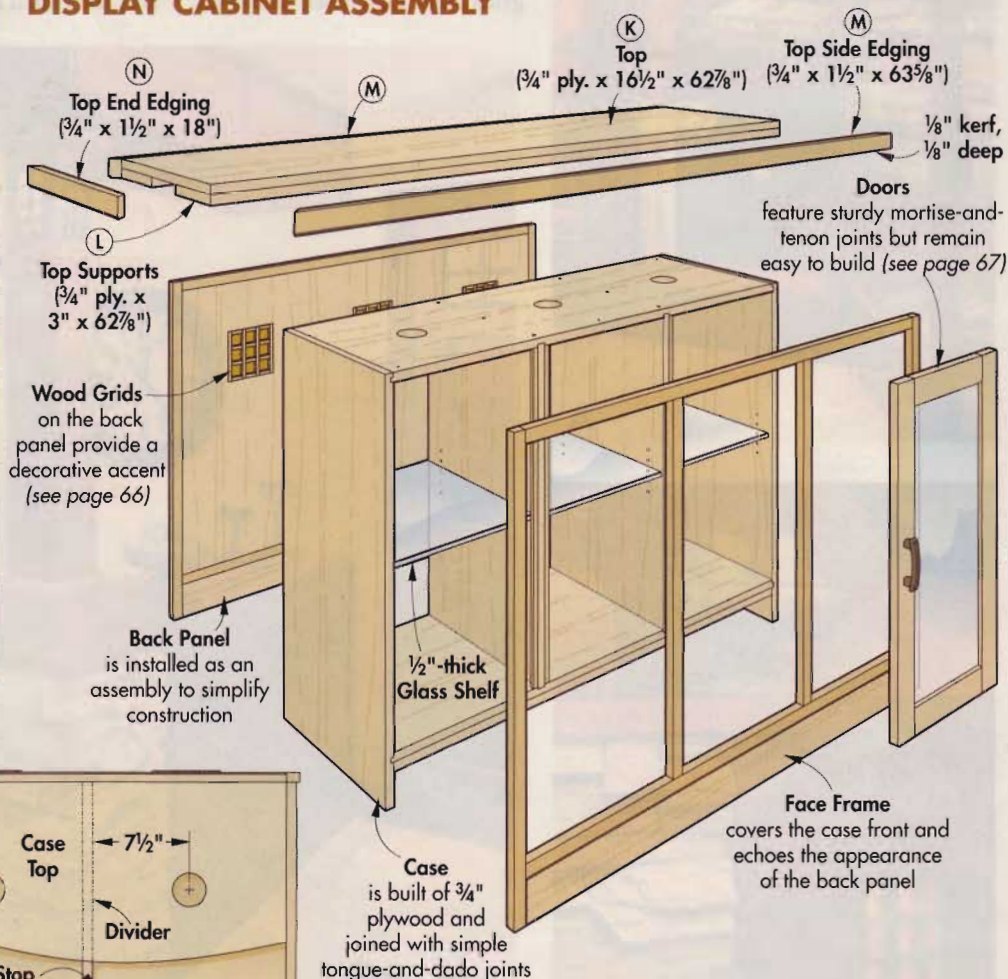
Face Up to the Frames — With the case assembled, you can turn to the face frames (*Back Panel and Face Frame Illustrations*, page 65). The frame pieces are similar on the front and back, but are installed differently. The



CASE TOP VIEW



DISPLAY CABINET ASSEMBLY



back frame is glued around the back panel *before* installation. The front frame gets applied to the case piece by piece.

Note also that the face frames overhang the case by $\frac{1}{4}$ " on each end. This allows you to scribe against the wall, if necessary, when you install the cabinet. At the other end, the overhang forms a recess to receive the column pedestal.

To make the frames, cut the rails (F), outer stiles (G), inner stiles (H), toe-kick rails (I), and door stop (J) from solid stock (cherry, in our case). The toe-kick rails have a kerf on *both* ends and the *top* edge to mimic the back panel.

That done, glue the stiles and rails to the plywood back. Once the glue dries, glue this assembly to the case, making sure to create the $\frac{1}{4}$ " overhangs.

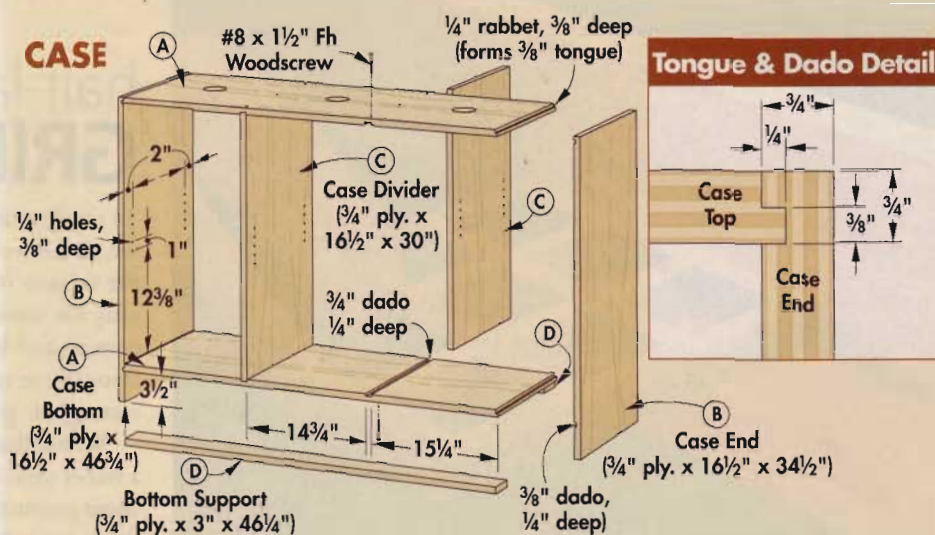
Next, glue the front frame pieces to the case. Align each with the ends and dividers as shown in the *Stile/Door Stop Detail* and *Top View* on page 64.

Top It Off—A top completes the cabinet (*Display Cabinet Assembly*). Cut the main top (K) and two top supports (L) from $\frac{3}{4}$ " plywood, then glue them together. The space between the supports provides a channel for the wiring.

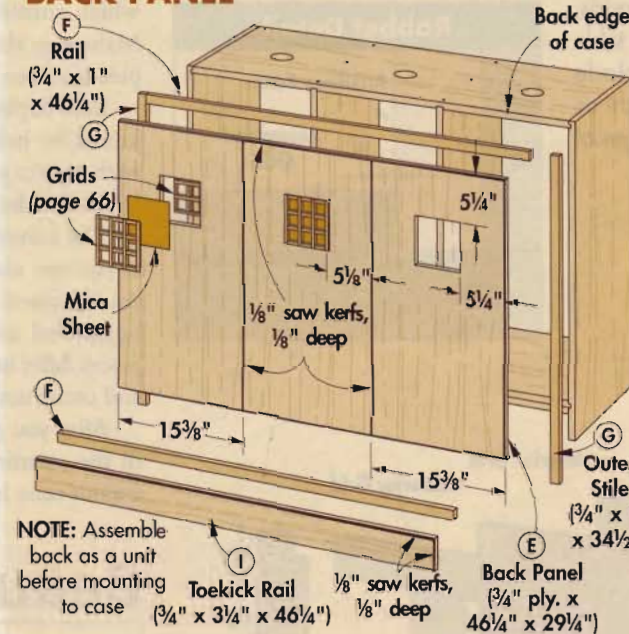
Hardwood edging (M, N) wraps around three sides of the top. Make the edging pieces extra long, then cut a decorative kerf in the bottom edge of each one. Now miter and trim the edging, and glue it to the top.



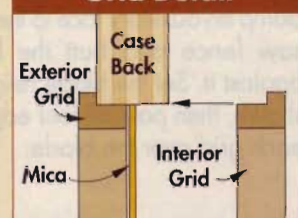
▲ To form the grid openings, drill starter holes, and remove the waste with a jig saw. Tape prevents chipout.



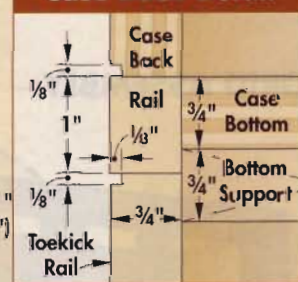
BACK PANEL



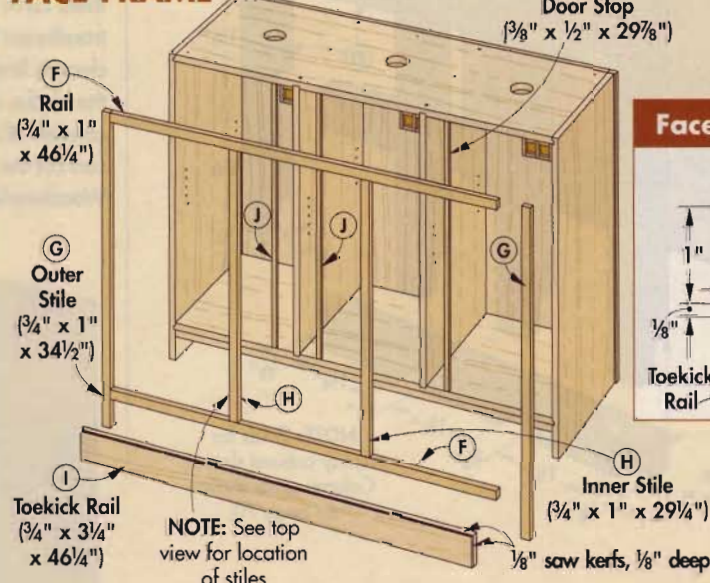
Grid Detail



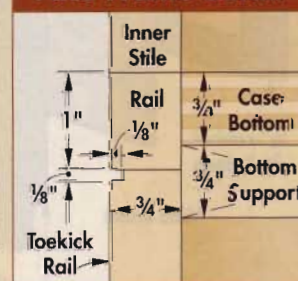
Case Back Detail



FACE FRAME

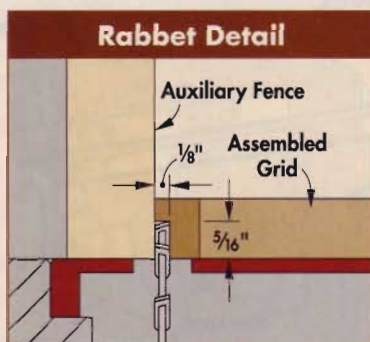


Face Frame Detail

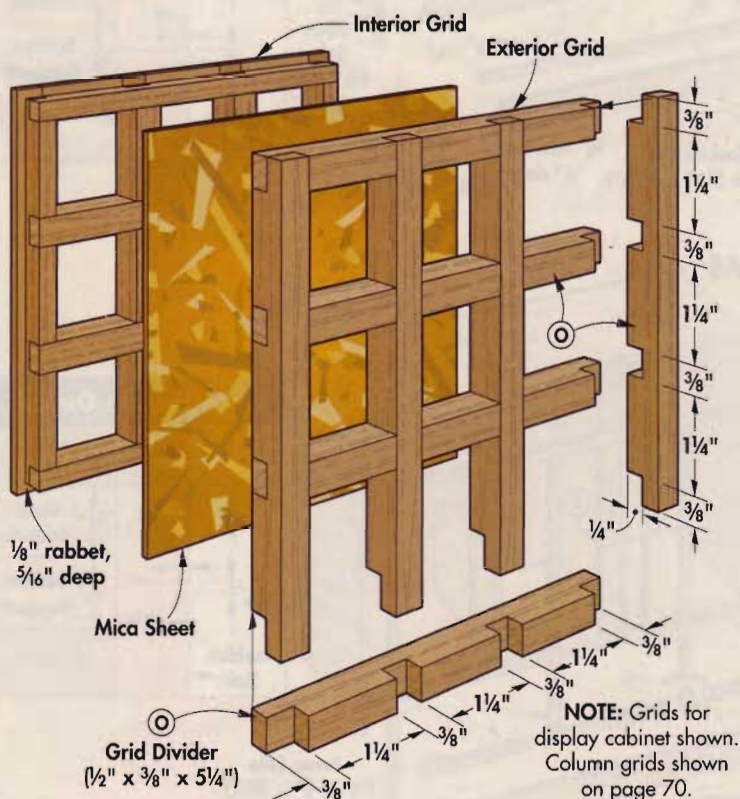




▲ To form $\frac{1}{8}$ " rabbets on the grids, clamp an auxiliary face to the table saw fence and butt the blade against it. Set the blade height as shown, then pass all four edges of each grid over the blade.



GRID ASSEMBLY



NOTE: Grids for display cabinet shown. Column grids shown on page 70.

half-lapped GRIDS

To create a unique decorative element on this project, we added wood grids to the display cabinet back and the column (*Grid Assembly*). Though the display cabinet only has three openings, it has six grids — three outside and three inside. (The three inside are visible through the cabinet's glass doors.) The column gets four rectangular grids (one on each outside face).

When illuminated from behind, the grids glow with a warm tone. That's thanks to sheets of mica, a mineral-based product that may be best known to woodworkers for its use in Arts and Crafts lamps. See the *Sidebar* below to learn more about this unique material.

The grids in our project are made of mahogany, which contrasts nicely with the cherry when stained. Mahogany also has tight grain that looks great on small pieces and isn't likely to tear out as it's machined.

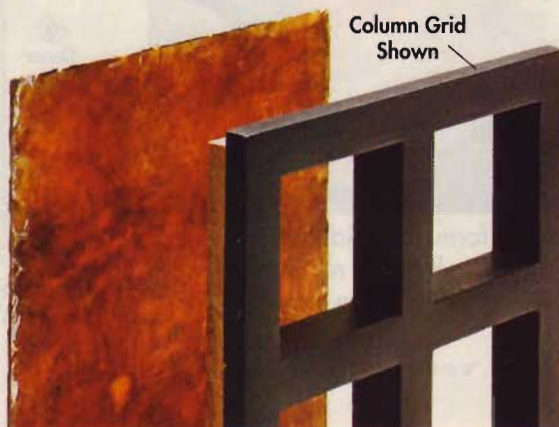
Each display cabinet grid consists of eight dividers (O) joined by half laps. You may think making 48 pieces with perfect joints would be tough, but it's not. See the "Skill Builder" on page 54 to learn an easy technique.

The column grids are rectangular instead of square, as you can see in the *Column Assembly* on page 70. So you'll have to make three vertical dividers (P) and five horizontal dividers (Q) for each grid. Though these pieces differ in length from the cabinet grids, the spacing and construction methods remain exactly the same.

After you glue up and trim the grids, rabbet each to fit the opening (*Photo, above left*). Then stain them (a walnut tone looks great) and set them aside for now.

Beauty by the Slice

People familiar with mica usually think of it as a mineral, but it's actually a group of more than 30 minerals. All of them form as blocks made up of flat, flaky crystals. The translucent flakes glow with colors that range from almost clear to brown. Pure mica sheets are simply sliced from the blocks, but most sheet mica available to woodworkers consists of individual flakes laminated using resins. You can cut the sheets with a utility knife. You'll find mica at Woodworkers Supply: www.Woodworker.com



mortise-and-tenon CABINET DOORS

The doors of the cabinet feature solid cherry frames with large glass panels that let display items show through (*Door Assembly*). The glass fits into a rabbet cut in the back face of each door after assembly, and shop-made stops hold the glass in place.

Because the glass offers no strength to the door assemblies, I decided to beef up the frames with mortise-and-tenon joints (*Mortise & Tenon Detail*). They don't take much longer than some "simpler" joints and ensure strong doors that aren't likely to rack or twist.

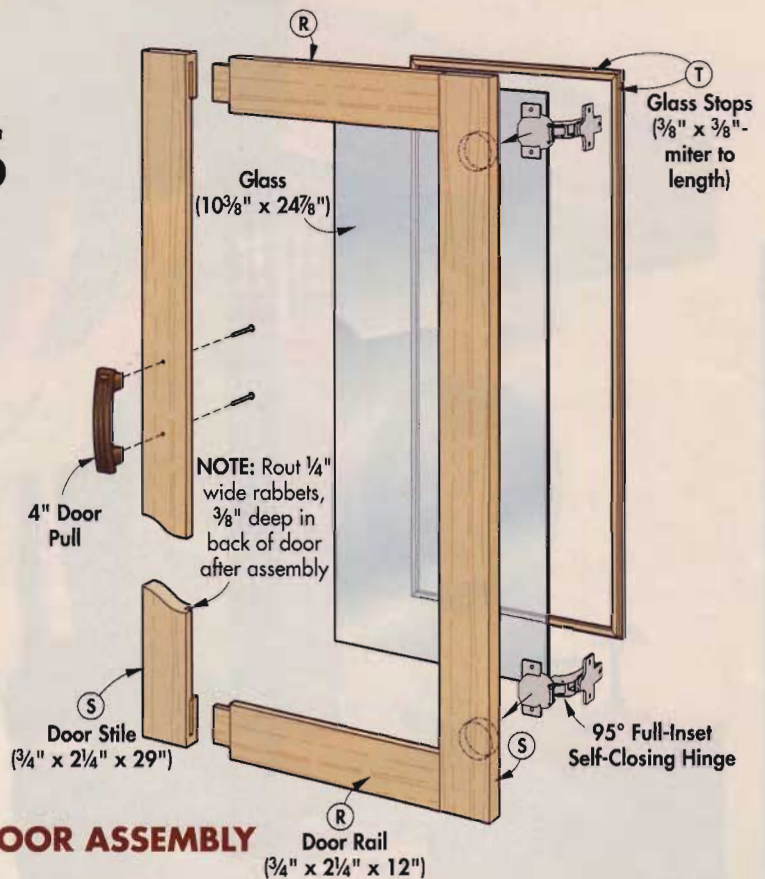
Start by cutting the door rails (R) and stiles (S) to width and length. Next, cut the mortises in the stiles. I drilled out most of the waste using a $\frac{1}{4}$ " Forstner bit, then squared up the mortises with a chisel. Then, form the tenons on the rails. You can do this many ways. I used a table saw set up with a dado blade.

Now you can glue up the doors. I always dry-fit them first to prevent any surprises, such as ill-fitting tenons. Then glue them up and check for square.

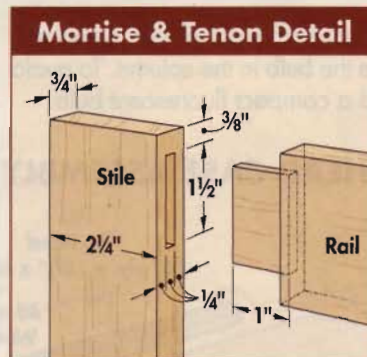
After the glue sets, drill holes to receive the cups of European-style hinges (*Hinge Location Detail*). These hinges really make door mounting easy because they can be adjusted to fit the door perfectly in its opening.

Now cut the rabbet that will receive the glass in the back face of each door. You can accomplish this easily with a $\frac{1}{4}$ " rabbeting bit in a handheld router. To ensure a smooth rabbet, make two passes to achieve the full $\frac{3}{8}$ " depth. Square up the corners using a chisel. **Note:** Have the glass cut $\frac{1}{8}$ " narrower and shorter than the opening.

Finally, make the glass stops (T). The techniques in the *Sidebar* below make it easy. Miter the completed stops to length to fit the opening in each door. Then install them with small wire brads in pre-drilled holes.



DOOR ASSEMBLY

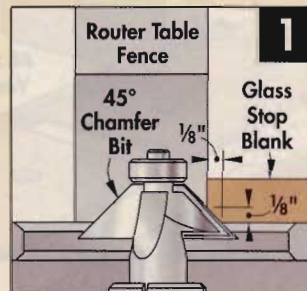


Making the Glass Stops

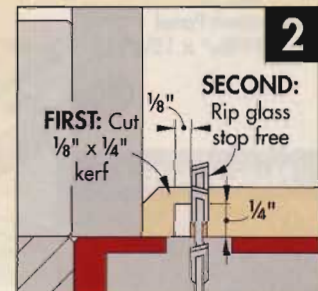
Small parts, such as the glass stops used in the doors, are easier to make if you cut them from larger blanks.

Start with a long piece of $\frac{1}{2}$ " stock about 5" wide. Chamfer both corners of one face at the router table, *Step 1*.

Now you can form the rabbets that fit over the door frames. This takes only two cuts, *Step 2*. First, cut a kerf, as shown, then move the fence and rip the stop free. Repeat the steps to make more stops from the same board.



▲ Use the fence as a guide and expose only a portion of the bit for a clean chamfer.



▲ One pass with the blade raised $\frac{1}{4}$ " forms the rabbet. Another pass cuts the stop.

over the top BULKHEAD

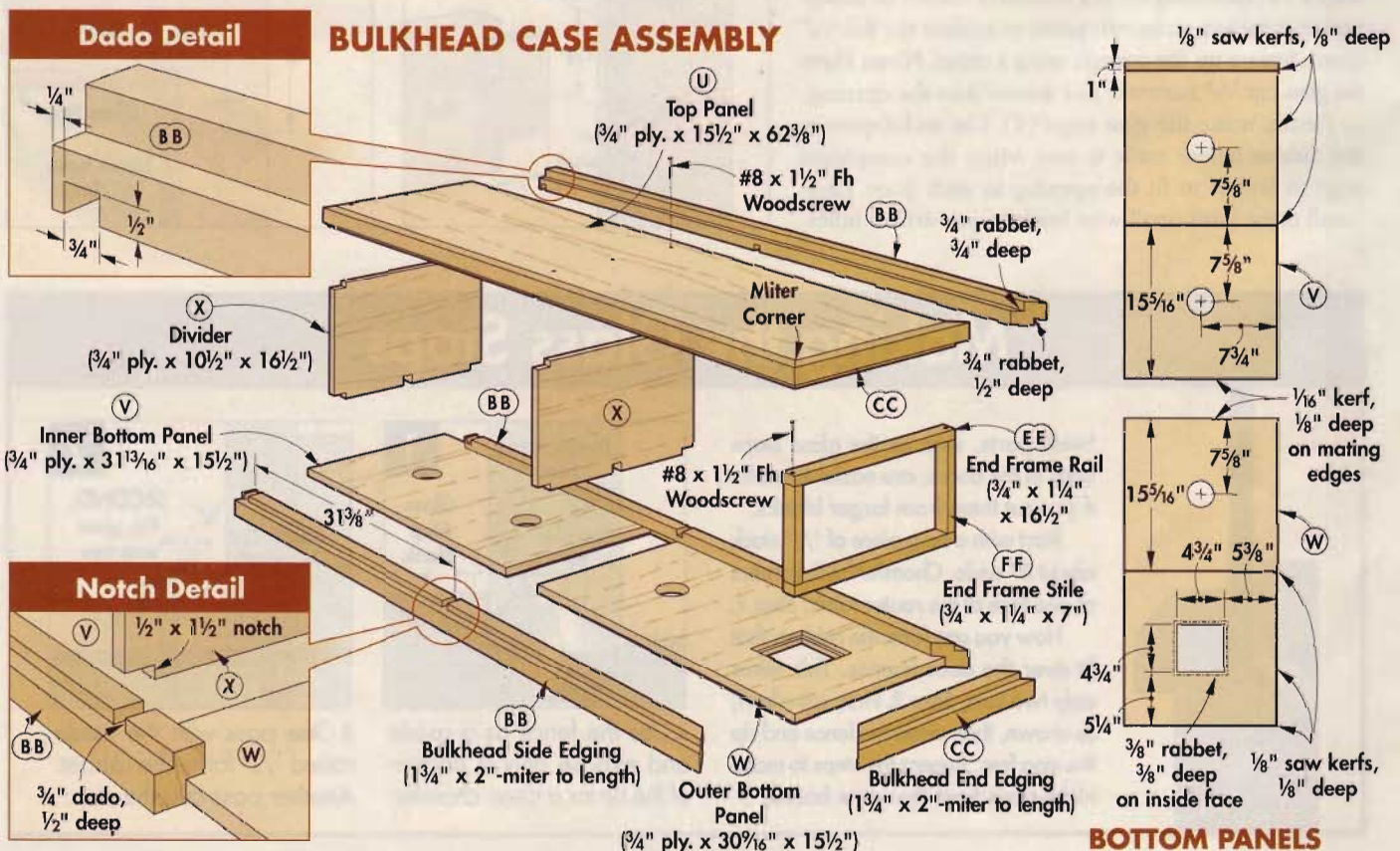
Mounted to the ceiling, the bulkhead features lighting to illuminate items sitting on the display cabinet. This part of the project consists of a plywood top and bottom with thick hardwood edging (*Bulkhead Case Assembly*). Dividers separate the top and bottom, except at the end of the column. There, an open frame and a removable panel allow access to the column light (*Photo, left, and Panel Assembly, page 69*). Plywood panels with decorative kerfs enclose the bulkhead.

The idea is to assemble most of the bulkhead in the shop. That will allow you to lift it into place (with help), then reach inside and attach the bulkhead to the ceiling. Then you simply glue the side panels in place.

Cut the Plywood — Get underway with the bulkhead by first cutting the plywood top (U) to size. Note: I made this piece from leftover cherry. Because it won't be seen, though, any $\frac{3}{4}$ " plywood will do. Next, cut two bottom panels (V, W) to size from $\frac{3}{4}$ " cherry plywood.

The bottom consists of two separate panels rather than a single long one. That's because the grain runs *across* the panels, rather than lengthwise. You'll see, once you cut the side panels, that this allows the grain to wrap around the bulkhead. This means that these bottom panels need to be crosscut from the end of a plywood sheet.

▲ The bulkhead has a removable panel that allows you to reach in and change the bulb in the column. To avoid heat build-up, we used a compact fluorescent bulb.



Notice that the bottom panels have slightly different dimensions. This allows the decorative kerfs in all the parts to align after assembly.

Now cut the remaining plywood pieces for the bulkhead: the dividers (X), sides (Y), access panel (Z), and light-fixture panel (AA).

Here again, you'll need to bore holes in the bottom panels for puck lights and cut the opening that will later receive the light fixture panel (*Bottom Panels, page 68*). Also cut the decorative kerfs in the bottom, side, and access panels.

Now notch the corners of each divider (*Notch Detail, page 68*). Also cut a notch for the wiring to pass through. Then rabbet the light-fixture opening and panel, and notch one corner (*Fixture Panel Detail*).

Add Edging — The bulkhead side and end edging (BB, CC) start out as extra-long blanks. The *Bulkhead Edging Detail* shows that each piece gets two different size rabbets. One allows the edging to fit over the top (or bottom). The other receives the side panels. Cut the rabbets as shown in the *Photo, right*.

In addition, each piece of side edging gets two dadoes sized to hold the dividers (*Dado Detail, page 68*).

Before moving on to assembly, cut four bulkhead end edging pieces (DD) to size as well.

Access and Assembly — At the column end of the bulkhead, a frame replaces the divider. Build the frame by cutting the end frame rails (EE) and stiles (FF) to size. Glue and screw the frame together, and you're ready to assemble the bulkhead.

Assembly begins with gluing the top and bottom panel edging in place. I found it easiest to first miter the side edging to length (making sure to not cut off the dadoed ends). Then miter the end edging to fit, and glue up the bulkhead top and bottom assemblies.

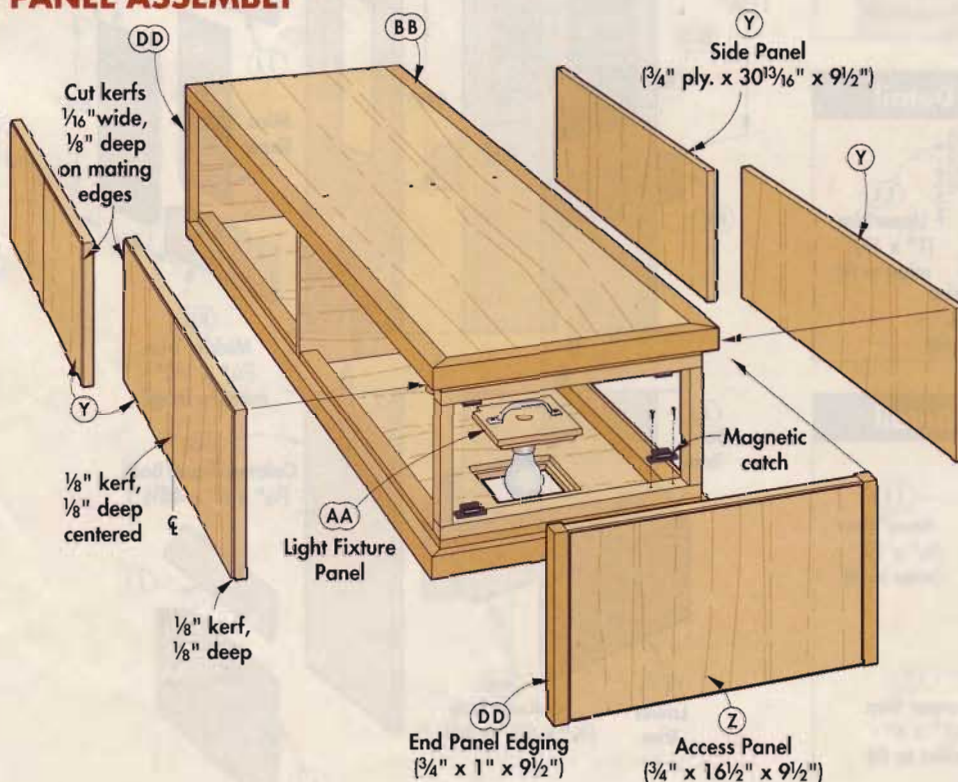
Once the glue dries, set the bulkhead top assembly on your bench with the inside face up. Glue the dividers in place. Then glue the end frame in position on top of the end edging. Now spread glue on the exposed edges of the dividers and access frame, position the bulkhead bottom assembly, and clamp it tight.

To wrap up bulkhead assembly, glue two pieces of bulkhead end edging to the access panel. Glue the other two to the exposed edges of the divider at the opposite end of the bulkhead. Mount magnetic catches to the end frame, and screw their strike plates to the access panel. **Note:** You'll mount the side panels later, after installing the bulkhead.

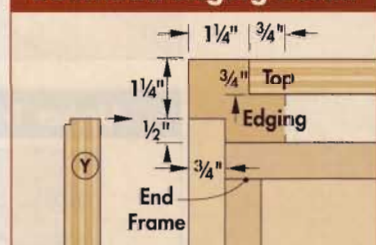


▲ Use an auxiliary fence butted against a $\frac{3}{4}$ " dado blade while rabbeting the edging. Cut one rabbet with the blade raised to $\frac{1}{2}$ ", and the other at $\frac{3}{4}$ ".

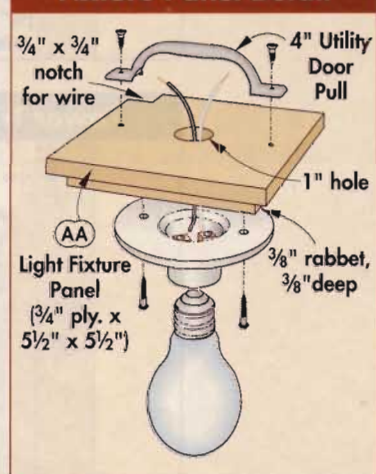
PANEL ASSEMBLY

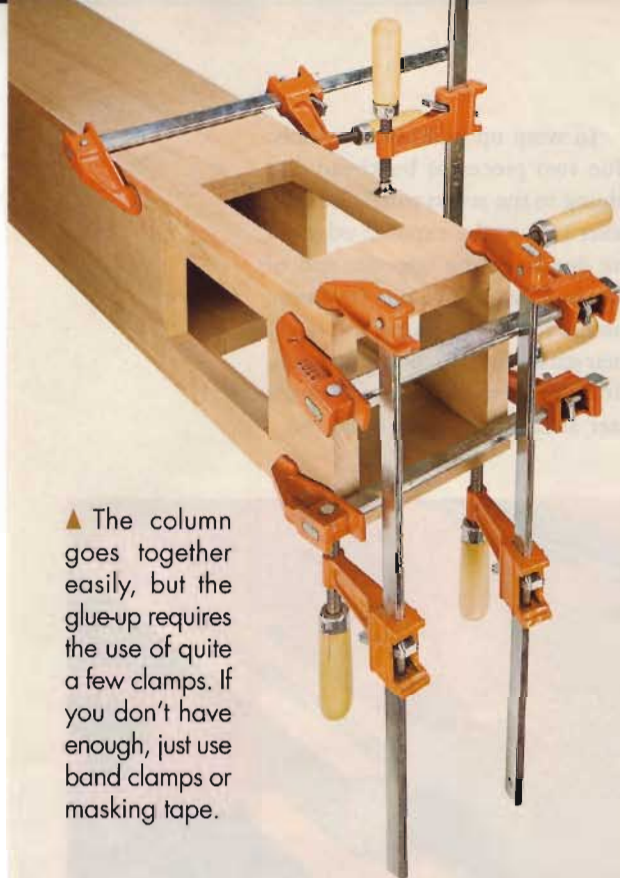


Bulkhead Edging Detail



Fixture Panel Detail





▲ The column goes together easily, but the glue-up requires the use of quite a few clamps. If you don't have enough, just use band clamps or masking tape.

create the COLUMN

A square column joins the display cabinet to the bulkhead. The column has openings with half-lapped grids to complement those on the display case. Trim at the top, bottom, and midsection adds visual interest and covers any gaps when the column is installed (*Column Assembly*).

By the way, this column length fits a standard 8-foot ceiling. If your ceiling height differs, measure from floor to ceiling, then subtract 4 feet to determine correct column length.

To build the column, cut the front and back (GG) and sides (HH) from $\frac{3}{4}$ "-thick hardwood. Then lay out and cut the grid openings.

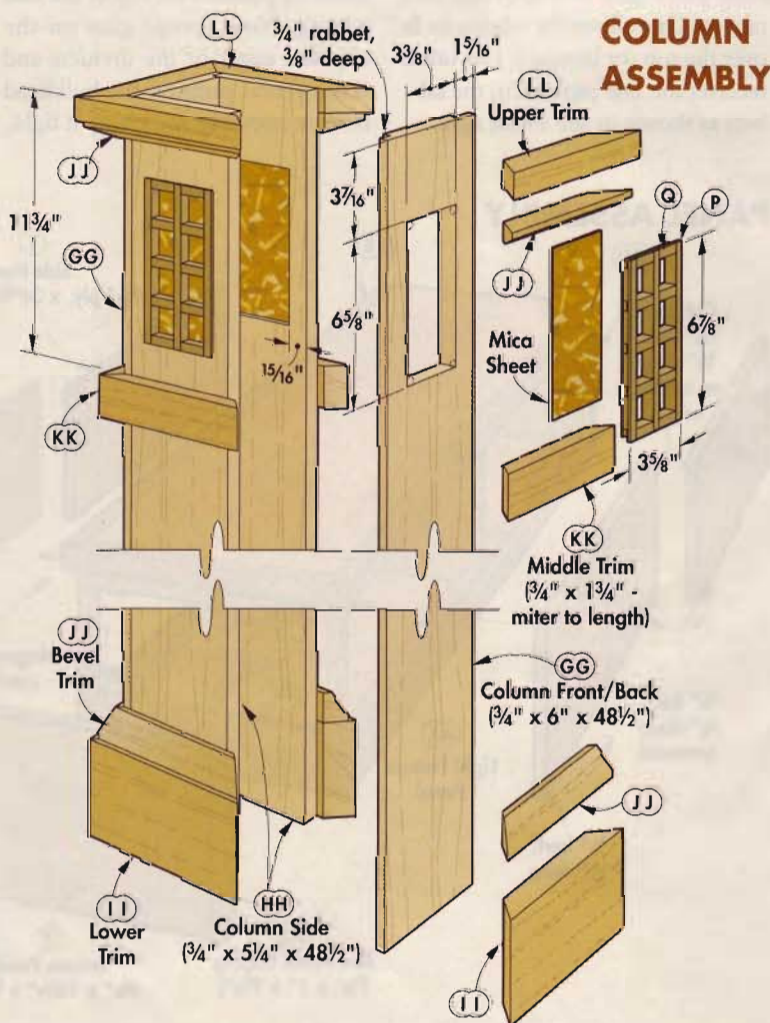
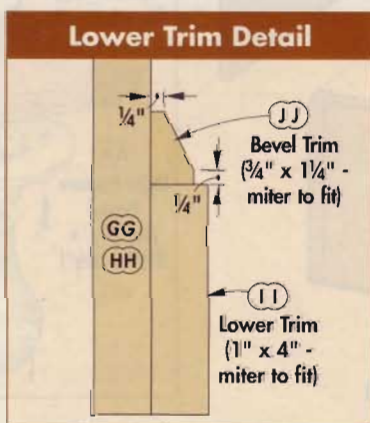
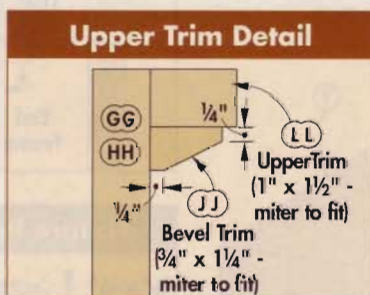
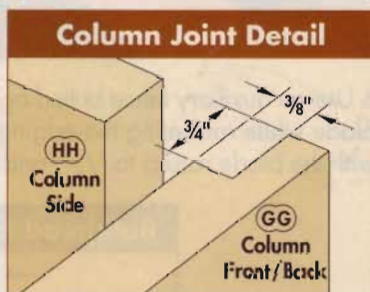
The column is assembled with rabbet joints on the front and back. These receive the side panels and

create a strong glue joint. Cut the rabbets in the column front and back (*Column Joint Detail*), and then glue up the column (*Photo, left*).

Add the Trim — Now you can cut the trim pieces (II, JJ, KK, LL). Rather than cut them to individual length, it's best to machine long strips of each type. Then miter them to fit when installing the column.

One thing to be aware of is that the beveled trim at the top and bottom is identical. It's just oriented differently (*Trim Details*).

Head For the Finish — At this point, I sanded all the parts of the divider and stained them (I used Bartley's Pennsylvania Cherry). Then I applied a coat of boiled linseed oil and three coats of polyurethane.



make a sturdy PEDESTAL

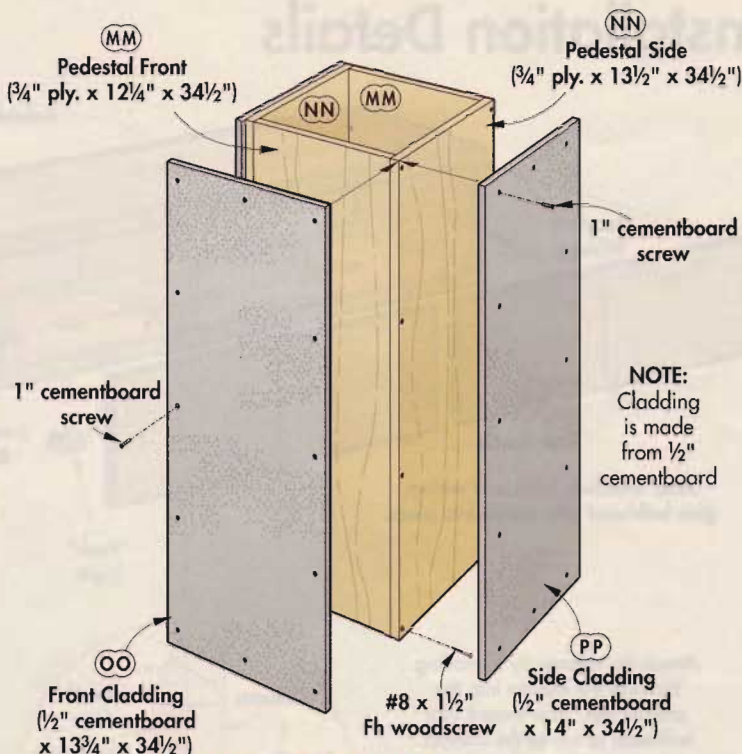
The stone-clad pedestal is one of the most interesting features of this project. And after all of the careful cutting and precise fitting you've done, you'll be pleased that the pedestal is simple. It's just a plywood box clad in cementboard (*Pedestal Assembly*). This material bonds well to the mortar that's used to attach the stone.

To build the pedestal, cut the front, back (MM), and sides (NN) from $\frac{3}{4}$ " plywood. These parts are hidden, so you can make them from scrap plywood.

Assemble the pedestal by butting the sides between the front and back and then screwing them together.

Complete the pedestal by adding the front cladding (OO) and side cladding (PP). Cementboard can be scored and snapped like drywall. That means your cuts might not be exact, but it doesn't matter. This cladding will get buried under the stone. Simply screw the cladding to the pedestal.

The Big Payoff—With the pedestal done, you've tackled the hard parts of this project. Now you can install the divider in your home, as shown on page 72.

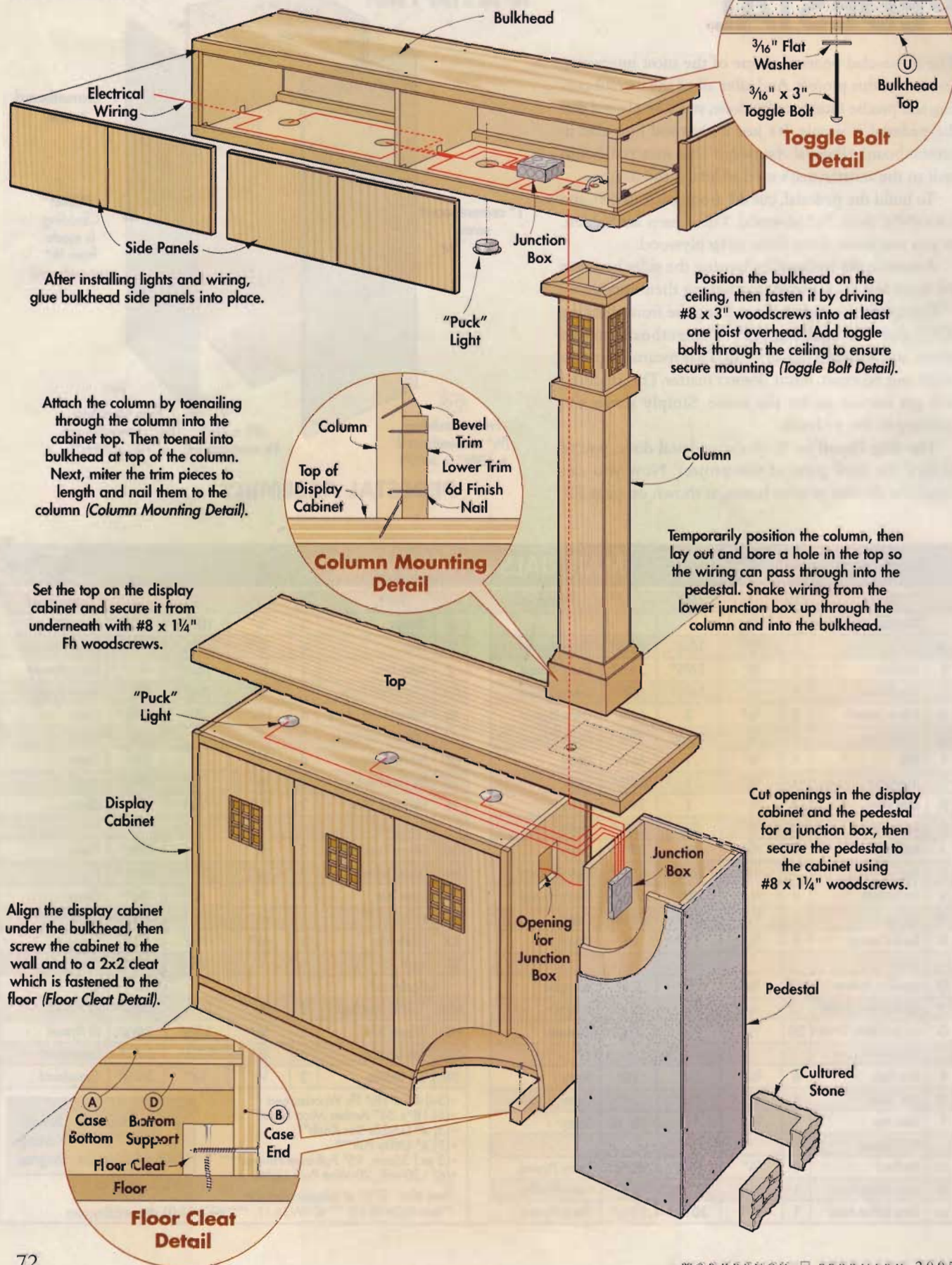


PEDESTAL ASSEMBLY

MATERIALS & HARDWARE

Part	Qty	T	W	L	Material	Part	Qty	T	W	L	Material		
Display Cabinet						X	Dividers	2	3/4"	10 1/2"	16 1/2"	Cherry Plywood	
A	Case Top/Bottom	2	3/4"	16 1/2"	46 3/4"	Cherry Plywood	Y	Sides	4	3/4"	30 13/16"	9 1/2"	Cherry Plywood
B	Case Ends	2	3/4"	16 1/2"	34 1/2"	Cherry Plywood	Z	Access Panel	1	3/4"	16 1/2"	9 1/2"	Cherry Plywood
C	Case Dividers	2	3/4"	16 1/2"	30"	Cherry Plywood	AA	Light Fixture Panel	1	3/4"	5 1/2"	5 1/2"	Cherry Plywood
D	Bottom Supports	2	3/4"	3	46 1/4"	Cherry Plywood	BB	Bulkhead Side Edging	4	1 3/4"	2"	63 5/8"	Cherry
E	Cabinet Back	1	3/4"	46 1/4"	29 1/4"	Cherry Plywood	CC	Bulkhead End Edging	2	1 3/4"	2"	18"	Cherry
F	Rails	4	3/4"	1	46 1/4"	Cherry	DD	End Panel Edging	4	3/4"	1"	9 1/2"	Cherry
G	Outer Stiles	4	3/4"	1	34 1/2"	Cherry	EE	End Frame Rails	2	3/4"	1 1/4"	16 1/2"	Cherry
H	Inner Stiles	2	3/4"	1	29 1/4"	Cherry	FF	End Frame Stiles	2	3/4"	1 1/4"	7"	Cherry
I	Toe Kick Rail	2	3/4"	3 1/4"	46 1/4"	Cherry	Column						
J	Door Stops	3	3/8"	1/2"	29 7/8"	Cherry	GG	Column Front/Back	2	3/4"	6"	48 1/2"	Cherry
K	Top	1	3/4"	16 1/2"	62 7/8"	Cherry Plywood	HH	Column Sides	2	3/4"	5 1/4"	48 1/2"	Cherry
L	Top Supports	2	3/4"	3"	62 7/8"	Cherry Plywood	II	Lower Trim	1	1"	4"	36"	Cherry
M	Top Side Edging	2	3/4"	1 1/2"	63 5/8"	Cherry	JJ	Bevel Trim	1	3/4"	1 1/4"	36"	Cherry
N	Top End Edging	1	3/4"	1 1/2"	18"	Cherry	KK	Middle Trim	1	3/4"	1 3/4"	36"	Cherry
Grids						LL	Upper Trim	1	1"	1 1/2"	38"	Cherry	
O	Base Grid Dividers	48	1/2"	3/8"	5 1/4"	Mahogany	Pedestal						
P	Col. Grid Vert. Dividers	12	1/2"	3/8"	6 7/8"	Mahogany	MM	Pedestal Front/Back	2	3/4"	12 1/4"	34 1/2"	Fir Plywood
Q	Col. Grid Horiz. Dividers	20	1/2"	3/8"	3 3/8"	Mahogany	NN	Pedestal Sides	2	3/4"	13 1/2"	34 1/2"	Fir Plywood
Doors						OO	Front Cladding	1	1/2"	13 3/4"	34 1/2"	Cementboard	
R	Door Rails	6	3/4"	2 1/4"	12"	Cherry	PP	Side Cladding	2	1/2"	14"	34 1/2"	Cementboard
S	Door Stiles	6	3/4"	2 1/4"	29"	Cherry	ONLINE Extras WorkbenchMagazine.com Divider Cutting Diagram (34) #8 x 1 1/2" Fh Woodscrews (1) 18" x 36" Amber Mica Sheet* (3) 4" Double-Bar Knob** (1) 4" Utility Pull*** (3 pr.) 35mm, 95° Full-Inset Hinges**** (6) 120-volt, 20-Watt Puck Lights *Item #941-2731 at Woodworker.com **Item #02A18.10; ***#01W36.11; ****#00B03.01 at LeeValley.com						
T	Glass Stop	1	3/8"	3/8"	18" (L)	Cherry							
Bulkhead													
U	Top Panel	1	3/4"	15 1/2"	62 3/8"	Cherry Plywood							
V	Inner Bottom Panel	1	3/4"	31 13/16"	15 1/2"	Cherry Plywood							
W	Outer Bottom Panel	1	3/4"	30 9/16"	15 1/2"	Cherry Plywood							

Installation Details





it's time for final INSTALLATION

1 Enlist a helper and use a 2x4 "deadman" to hold the bulkhead against the ceiling. Screw through joists where possible, then fill in with toggle bolts.

2 Position the display cabinet. Shim it level and plumb, then screw the cabinet to the wall and floor cleat.

3 Screw the pedestal to the end of the base. Secure all wiring and route the wire that runs up the column before you attach the cabinet top.

4 Fish the wiring up through the column and into the bulkhead. Then plumb the column and toenail it to the cabinet top and bulkhead.

5 Miter the trim pieces to length around the column, then secure them with finish nails. An air nailer does this without jarring the assembly.

6 Dry-stack and trim each course of cultured stone to get a tight fit. Then "butter" each piece with mortar and affix it to the pedestal. You can find more information about cultured stone, plus full step-by-step instructions for installing this unique material at WorkbenchMagazine.com



MATERIALS LIST



MATERIALS & HARDWARE

Part	Qty	T	W	L	Material
Display Cabinet					
A Case Top/Bottom	2	3/4"	16 1/2"	46 3/4"	Cherry Plywood
B Case Ends	2	3/4"	16 1/2"	34 1/2"	Cherry Plywood
C Case Dividers	2	3/4"	16 1/2"	30"	Cherry Plywood
D Bottom Supports	2	3/4"	3	46 1/4"	Cherry Plywood
E Cabinet Back	1	3/4"	46 1/4"	29 1/4"	Cherry Plywood
F Rails	4	3/4"	1	46 1/4"	Cherry
G Outer Stiles	4	3/4"	1	34 1/2"	Cherry
H Inner Stiles	2	3/4"	1	29 1/4"	Cherry
I Toe-kick Rail	2	3/4"	3 1/4"	46 1/4"	Cherry
J Door Stops	3	3/8"	1 1/2"	29 7/8"	Cherry
K Top	1	3/4"	16 1/2"	62 7/8"	Cherry Plywood
L Top Supports	2	3/4"	3"	62 7/8"	Cherry Plywood
M Top Side Edging	2	3/4"	1 1/2"	63 5/8"	Cherry
N Top End Edging	1	3/4"	1 1/2"	18"	Cherry
Grids					
O Base Grid Dividers	48	1/2"	3/8"	5 1/4"	Mahogany
P Col. Grid Vert. Dividers	12	1/2"	3/8"	6 7/8"	Mahogany
Q Col. Grid Horiz. Dividers	20	1/2"	3/8"	3 3/8"	Mahogany
Doors					
R Door Rails	6	3/4"	2 1/4"	12"	Cherry
S Door Stiles	6	3/4"	2 1/4"	29"	Cherry
T Glass Stop	1	3/8"	3/8"	18" (L)	Cherry
Bulkhead					
U Top Panel	1	3/4"	15 1/2"	62 3/8"	Cherry Plywood
V Inner Bottom Panel	1	3/4"	31 13/16"	15 1/2"	Cherry Plywood
W Outer Bottom Panel	1	3/4"	30 9/16"	15 1/2"	Cherry Plywood

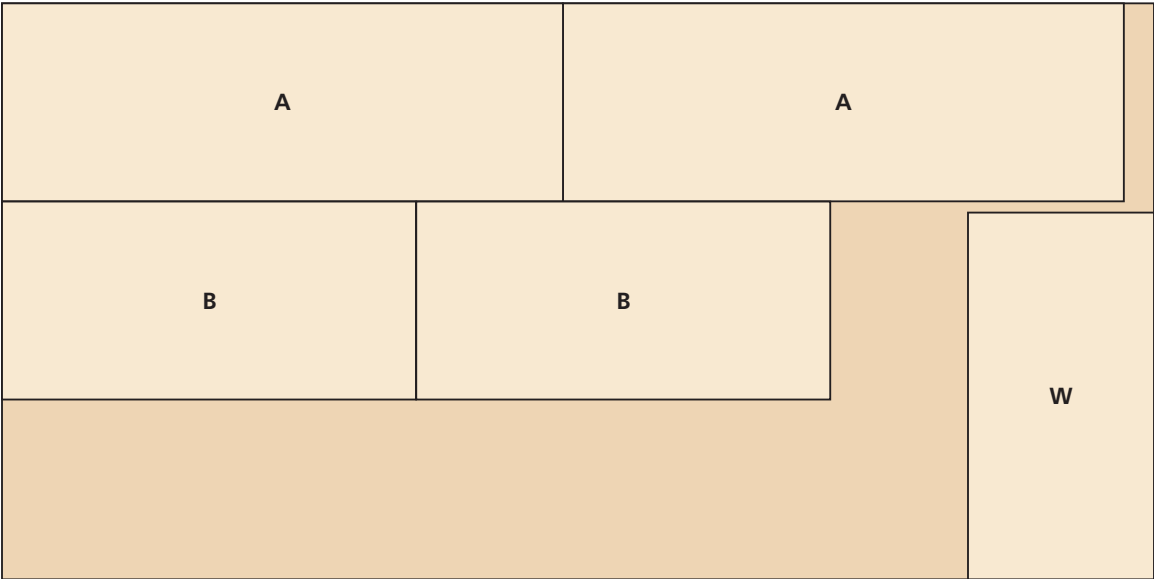
Part	Qty	T	W	L	Material
X Dividers	2	3/4"	10 1/2"	16 1/2"	Cherry Plywood
Y Sides	4	3/4"	30 13/16"	9 1/2"	Cherry Plywood
Z Access Panel	1	3/4"	16 1/2"	9 1/2"	Cherry Plywood
AA Light Fixture Panel	1	3/4"	5 1/2"	5 1/2"	Cherry Plywood
BB Bulkhead Side Edging	4	1 3/4"	2"	63 5/8"	Cherry
CC Bulkhead End Edging	2	1 3/4"	2"	18"	Cherry
DD End Panel Edging	4	3/4"	1"	9 1/2"	Cherry
EE End Frame Rails	2	3/4"	1 1/4"	16 1/2"	Cherry
FF End Frame Stiles	2	3/4"	1 1/4"	7"	Cherry
Column					
GG Column Front/Back	2	3/4"	6"	48 1/2"	Cherry
HH Column Sides	2	3/4"	5 1/4"	48 1/2"	Cherry
II Lower Trim	1	1"	4"	36"	Cherry
JJ Bevel Trim	1	3/4"	1 1/4"	36"	Cherry
KK Middle Trim	1	3/4"	1 3/4"	36"	Cherry
LL Upper Trim	1	1"	1 1/2"	38"	Cherry
Pedestal					
MM Pedestal Front/Back	2	3/4"	12 1/4"	34 1/2"	Fir Plywood
NN Pedestal Sides	2	3/4"	13 1/2"	34 1/2"	Fir Plywood
OO Front Cladding	1	1/2"	13 3/4"	34 1/2"	Cementboard
PP Side Cladding	2	1/2"	14"	34 1/2"	Cementboard

(34) #8 x 1 1/2" Fh Woodscrews
(1) 18"x 36" Amber Mica Sheet*
(3) 4" Double-Bar Knob**
(1) 4" Utility Pull***
(3 pr.) 35mm, 95° Full-Inset Hinges****
(6) 120-volt, 20-Watt Puck Lights

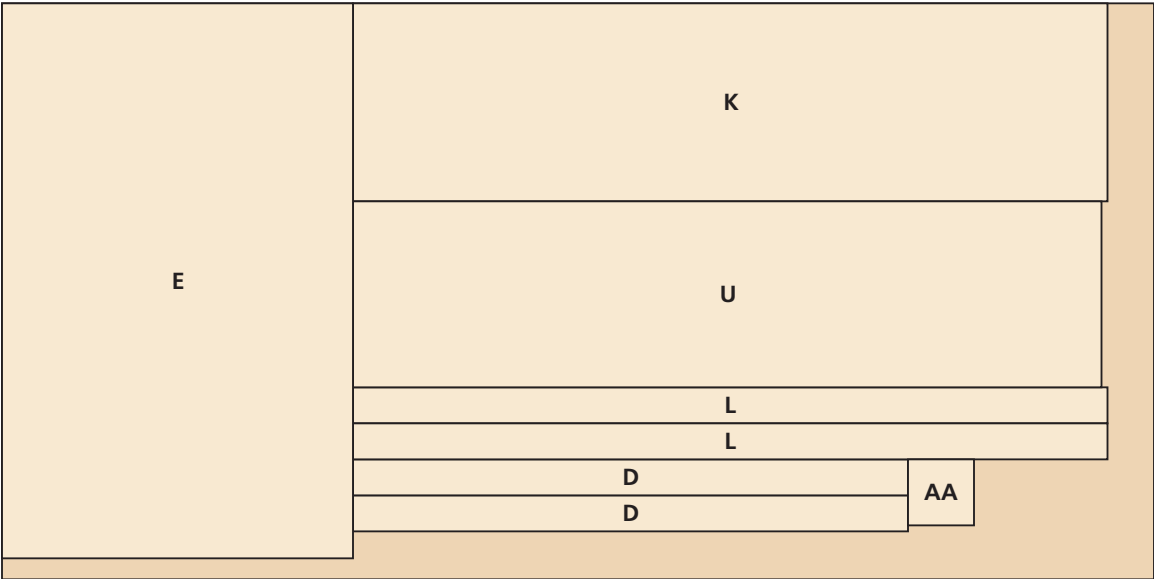
*Item #941-2731 at Woodworker.com
Item #02A18.10; *#01W36.11; ****#00B03.01 at LeeValley.com

Online Extras
WorkbenchMagazine.com
Divider Cutting Diagram

CUTTING DIAGRAM

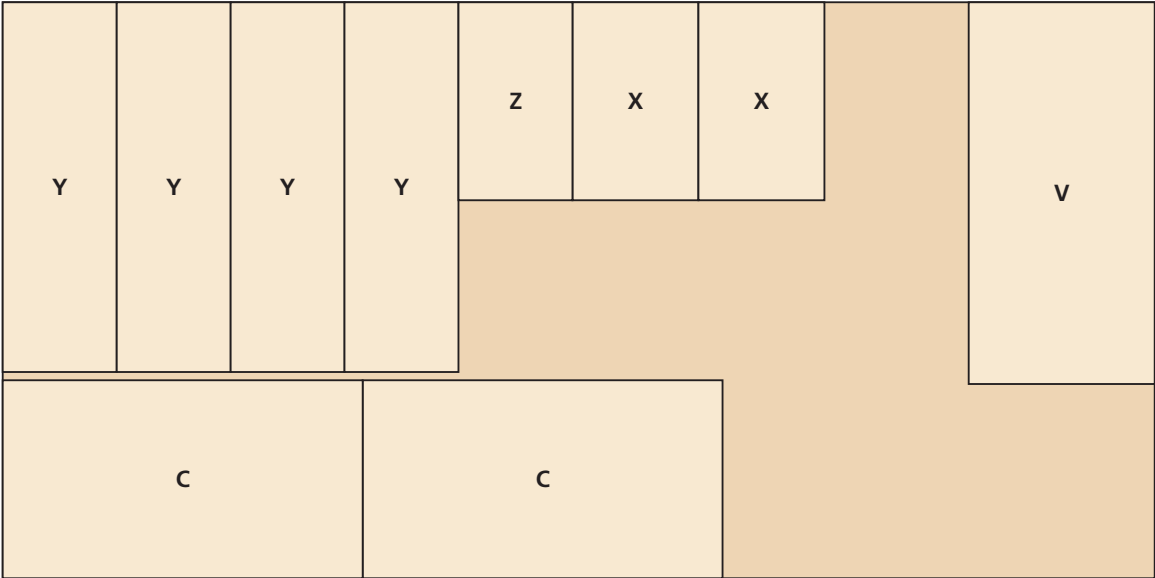


3/4" x 48" x 96" CHERRY PLYWOOD

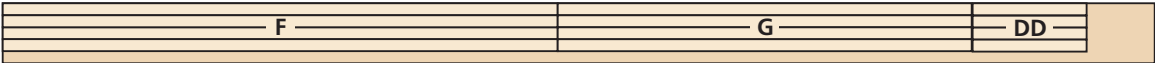


3/4" x 48" x 96" CHERRY PLYWOOD

CUTTING DIAGRAM



3/4" x 48" x 96" CHERRY PLYWOOD



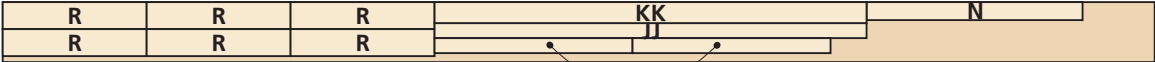
3/4" x 5" x 96" CHERRY @ 3.33 BD. FT.



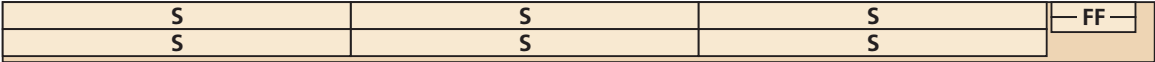
3/4" x 5" x 96" CHERRY @ 3.33 BD. FT.



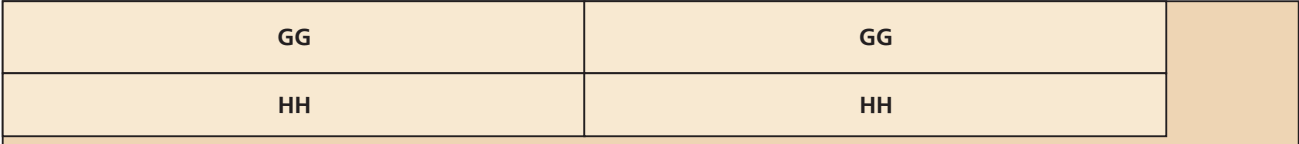
3/4" x 4" x 96" CHERRY @ 2.7 BD. FT.



3/4" x 5" x 96" CHERRY @ 3.33 BD. FT.

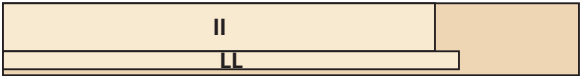
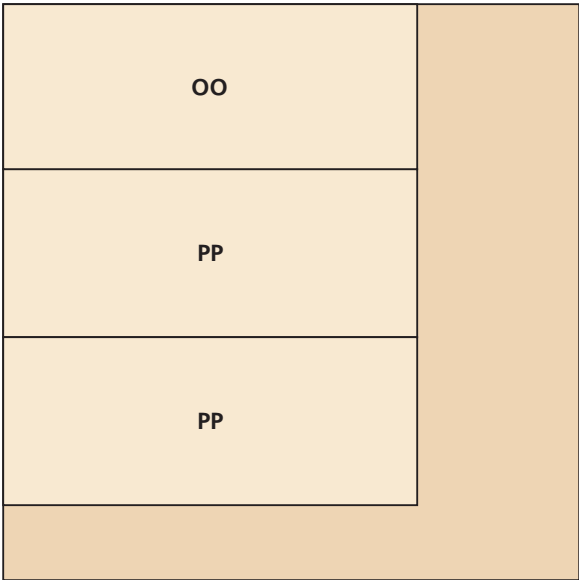
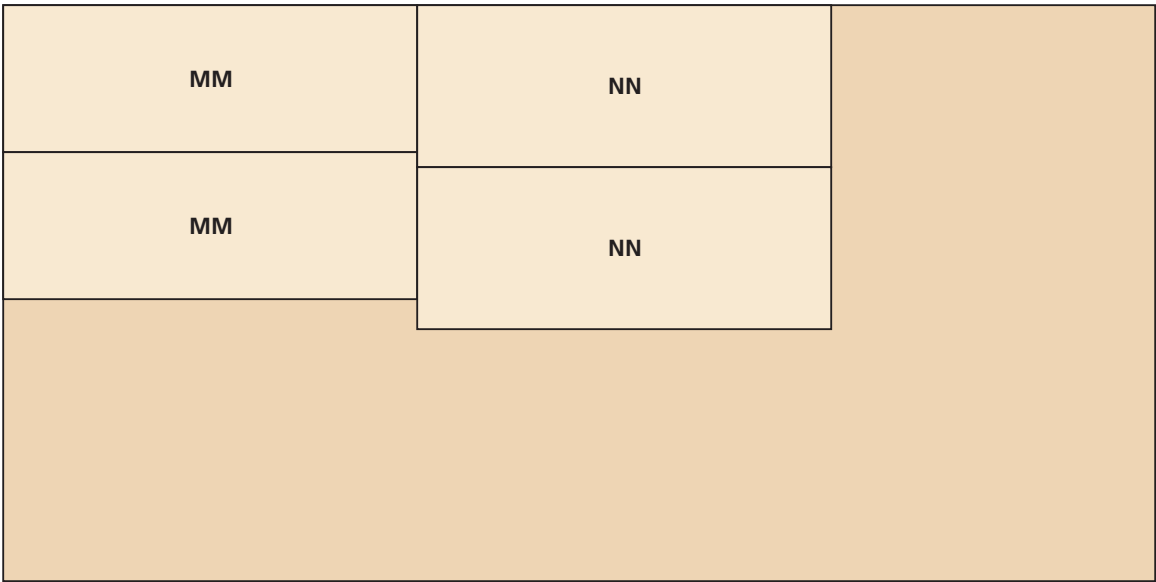
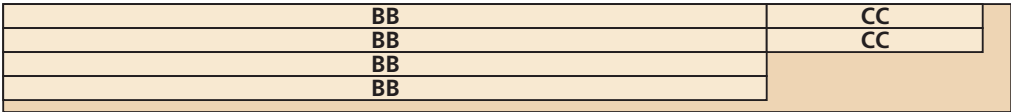


3/4" x 5" x 96" CHERRY @ 3.33 BD. FT.



3/4" x 12" x 108" CHERRY @ 9 BD. FT.

CUTTING DIAGRAM



HYBRID TABLE SAWS

The Latest (and Greatest) Choice in Table Saws for the Home Woodshop

TRUNNIONS:

Most of the saws in this category have contractor-style trunnions (mounted to the tabletop). The Craftsman trunnions are more cabinet saw-like. (Illustration, page 75)

BLADE TILT:

These hybrid saws have left-tilting blades, like cabinet saws.

MOTOR LOCATION:

The motors on these saws are located inside the bases, connected directly to the trunnions, like a cabinet saw.

DUST COLLECTION:

Three of these saws have 4" dust ports in their cabinet. The General International has the option of connecting a 2 1/4" hose inside the cabinet. The DeWalt table saw has only a 2 1/4" dust port.

BASES: Two saws have cabinet-style bases. The other two have "partial" cabinets.

Every serious woodworker has, at one time or another, wrestled with the question of whether their next table saw (or perhaps their first table saw) should be a contractor's saw or a cabinet saw.

Contractor's saws are an attractive choice because they are relatively economical while still being highly capable. But the power, precision, and dependability of a cabinet saw are worth every dime. It's a tough choice.

It might seem that adding a third category of table saw — one that bridges the gap between contractor's saws and cabinet saws — would only serve to further confound the wavering woodworker. But I don't think it has to.

On the contrary, after testing four of these new "hybrid" saws, it's my considered opinion that this is precisely the saw that most home woodworkers should have. And choosing from within this new category is what this test is all about. But before we get into the specifics of each saw and how it performed in our tests, let's spend a few minutes clearing up just what makes a table saw a "hybrid."

WHAT'S A HYBRID SAW?

Although each of the table saws in this test is considered a “hybrid,” you need only compare the *Photos* at the bottom of this page to see that these saws are hardly cast from a single mold. But a closer look reveals that these saws are similar on many important counts (see the *Illustration on page 74*).

Cabinet-Like Bases

The first similarity lies in the bases, or cabinets, that support these saws and house the inner workings. Granted, there are two distinct styles represented here, but in each case, the cabinet is an integral part of the saw (and not just a bolt-together stand like that on a contractor's saw).

This design makes for a sturdier saw and goes a long way toward

dampening vibration and noise. In most cases, manufacturers also use the cabinet as an important part of the dust collection system by building hoppers into the cabinet to direct dust toward a dust port. The one exception in this group is the DeWalt. This particular saw has an open cabinet and uses a shroud around the blade to direct dust toward a 2 $\frac{1}{4}$ " dust port (see the *Photo on page 79*).

Motors

In terms of power, the motors on these saws are comparable to contractor's saws — at or slightly below 2 hp. And just like contractor's saws, hybrids typically use a single belt to transfer power from the motor to the arbor (compared to as many as

three on a cabinet saw). The location of the motor, however — inside the cabinet and supported by the trunnions — is pure cabinet saw design. This allows for shorter belts and greater power transfer than the contractor design offers. Attaching the motor to a more solid structure further diminishes noise and vibration.

Trunnions

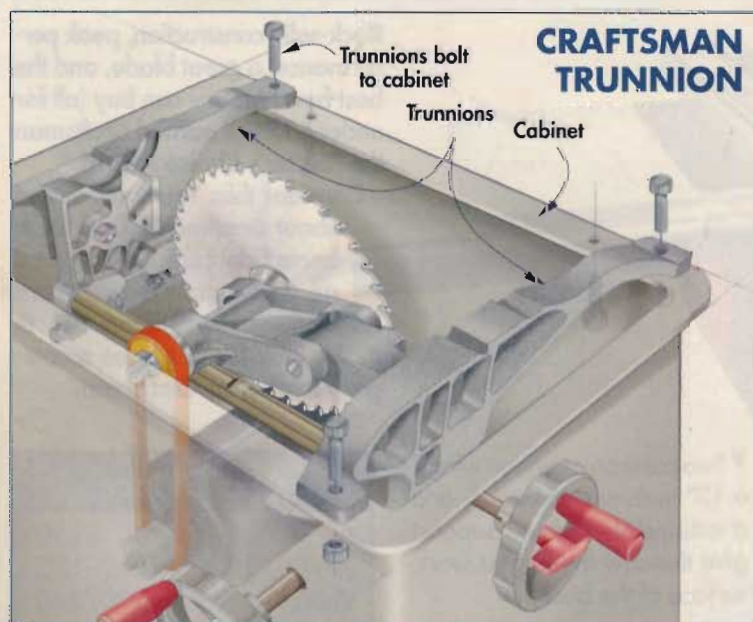
Most of these hybrid saws use the same trunnions (the assemblies that hold the blade arbor in position under the tabletop and also provide the tilting action of the blade) as their contractor brethren. The trunnions are bolted to the tabletop and are smaller than the trunnions used on cabinet saws.

Craftsman, however, nudged its saw one step closer to cabinet saw quality with a set of massive trunnions that bolt to the cabinet rather than the tabletop (*Illustration, left*).

This configuration offers a couple of advantages, including better vibration dampening and easier adjustment. As a result, we'd expect this saw to maintain an accurate setup more reliably than those with contractor-type trunnions.

Blade Tilt

The most significant cabinet-saw characteristic that these saws borrow is a left-tilting blade. Many woodworkers feel that left-tilting blades are more user-friendly than right-tilt blades. In the past, left-tilt blades were available only on cabinet saws.



4 Hybrid Saws Reviewed



Craftsman



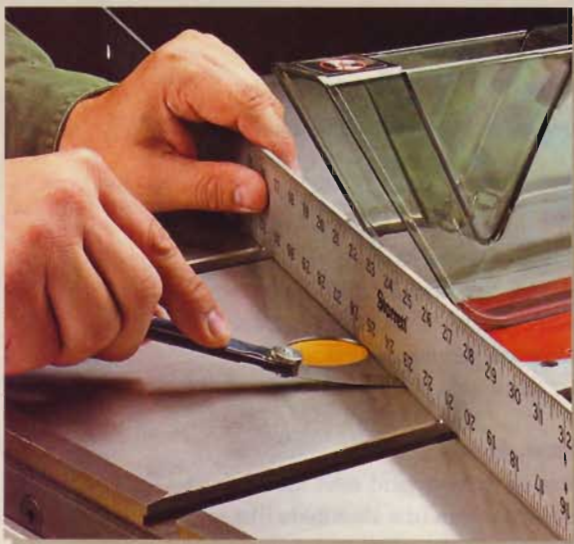
General International



JET



DeWalt



▲ A feeler gauge and a straightedge established the flatness of the table and extension wings.

Saw Setup

With tools, just as with people, first impressions count. And my first impression of these saws was good.

Each saw arrived well-packed and complete with every part the manual said I should find in the box. All of the saws went together with relative ease. Only the Craftsman took a little longer to assemble, but that's only because this saw comes with so many extras.

After putting the saws together, my first test was to simply plug them in and start them up. Not much of a test, I know, but think of it as that first handshake.

Without exception, the saws started softly and powered up to

working speed smoothly and quietly. The General International, in particular, impressed me with its purring, vibration-free performance.

Furthermore, I couldn't find a single power switch in the bunch to complain about. They're all mounted within easy reach and are too large to be missed.

Testing Priorities

With the introductions behind me, I set my sights on gauging the relative strengths and weaknesses of each of these hybrid saws.

The first order of business was to make sure each saw was tuned to the same tolerances. This was quick work, since most saws came out of



Craftsman OR35504

Rock-solid construction, peak performance, a great blade, and the best fence money can buy (all for under \$1,000) earned Craftsman the "Editor's Choice Award."

Consider this: You could spend about another \$1,000 for a bona fide cabinet saw, and all you'd gain is one more horsepower. Hardly seems worth it. We look for this to be a category leader for Craftsman.

▼ Two castiron extension wings, a 12" melamine extension, and a collapsible outfeed support give this saw the largest work-surface of the bunch.

At a Glance

Price:	\$950
HP:	1 ³ / ₄
Volts:	120/240
Amps:	15/7.5
RPM:	3,450
Max. Cut @ 90°:	3 ³ / ₈ "
Max. Cut @ 45°:	2 ¹ / ₄ "
Max. Rip, Right:	30"
Max. Rip, Left:	18"
Table Dim.:	27" x 56"
Wings:	Cast Iron
Blade:	40T Carbide
Weight:	400 lbs.

www.Craftsman.com
800-897-7709

▲ The Craftsman was the only saw in our test group that offered a quick-release blade guard and splitter.

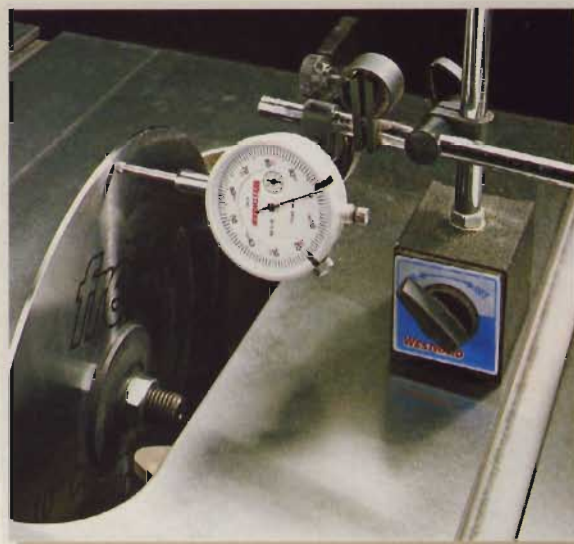
the box spot-on. Only the Jet required a bit of tweaking to get the blade parallel to the miter gauge slots, and the DeWalt fence needed a bit of fine tuning to bring it in line. Both issues were corrected in short order.

Next on the list was measuring the tabletops for flatness. If a top isn't flat, you'll have a bear of a time making accurate cuts.

Once again, I was pleased to find that most tops were indeed dead flat. The General International, however, showed a slight dish (.03") on my first measurement (Photo, page 76). This turned out to be the result of the cast-iron extension wings being tipped up slightly at their outside edges. I was able to remedy the

problem by placing shims between the wings and the saw table. (I used small pieces of dado blade shims for this.) After about 10 minutes of fiddling with it, I was able to bring the extension wings into the same plane as the main table.

After tabletops came the arbors. A wobbly arbor will result in rough cuts, lost horsepower, and undue wear on a blade. I measured for runout with a dial indicator and a calibration disc (Photo, right). None of the saws exceeded .005" of runout, which is well within acceptable range. The Craftsman and DeWalt saws turned out to be particularly steady, with each showing only .003" of runout.



▲ Arbor runout was measured using a dial indicator on a magnetic base and a calibration disc.

General International 50-220 M1

The table on this saw required some shimming to get the wings in line with the table. And the fence on this saw left a little to be desired.

But even if you spend \$100 more for the optional Biesemeyer-style fence and a few bucks for shims, this is still the most affordable saw in the test. And in light of all its other strong points, it deserves the honor of "Top Value."



At a Glance

Price:	\$750
HP:	2
Volts:	110/220
Amps:	11.4/5.7
RPM:	3,450
Max. Cut @ 90°:	3 ⁵ / ₁₆ "
Max. Cut @ 45°:	2 ⁵ / ₁₆ "
Max. Rip, Right:	30 ¹ / ₂ "
Max. Rip, Left:	13 ⁵ / ₈ "
Table Dim.:	27" x 44"
Wings:	Cast Iron
Blade:	None
Weight:	316 lbs.

www.General.ca
514-326-1161

► The General International saw offers a choice of connecting a 4" hose to the cabinet, or a 2¹/₄" hose to a shroud around the blade.



▲ The bevel lock is in an unusual location on this saw, but provides a solid hold on the bevel setting.





Cutting Performance

After a full day of assembling and tuning the saws, I was anxious to get down to the real business of table saws: cutting wood. So I started straight in ripping 2"-thick walnut boards.

I was primarily interested in the power these saws turned out, but also wanted to get a sense of cut quality. To ensure I was comparing saws and not blades, I equipped each saw with an identical 60-tooth blade.

On the power score, only one saw disappointed. The Jet SuperSaw was unable to complete a rip cut without tripping its overload fuse. The rest of the saws in the test powered through these rip cuts without any trouble whatsoever.

▲ Ripping 2"-thick walnut revealed the power of each of these hybrid table saws.

In all fairness to the Jet, ripping a long, thick board with a 60-tooth blade is asking a lot. And when I switched to a 24-tooth rip blade, the saw performed admirably. So while power may be an issue for the Jet, it's not a crippling weakness.

As far as cut quality goes, I didn't find any clear winner, as all the saws produced adequately smooth cuts.

Fences & Miter Gauges

In addition to power ripping, I performed a variety of other cutting operations that were intended to gauge the accuracy of the fences, miter gauges, guards, and splitters.

The fence question was really no contest, as there just isn't any better

Jet 3301



The Jet SuperSaw is a stout table saw (only the Craftsman weighs more) with some real strong points, like superior dust collection and excellent fit and finish.

Unfortunately, the saw proved a bit underpowered during our testing, and I have to admit to being skeptical about the durability of the belt-driven blade lift (*Inset Photo*). In short, this saw isn't my first choice in this category.

At a Glance

Price:	\$1,000
HP:	1 ³ / ₄
Volts:	115/230
Amps:	12/6
RPM:	4,000
Max. Cut @ 90°:	3 ¹ / ₈ "
Max. Cut @ 45°:	2 ¹ / ₈ "
Max. Rip, Right:	32 ³ / ₄ "
Max. Rip, Left:	8"
Table Dim.:	27" x 41 ³ / ₄ "
Wings:	Cast Iron
Blade:	None
Weight:	398 lbs

www.JetTools.com
800-274-6848

▲ The Jet blade guard has independently moving sides that offer excellent visibility and increased safety.

◀ A big question mark on the Jet table saw is their belt-driven blade lift. This is just one more maintenance item.

fence to be had than a Biesemeyer, so Craftsman gets the nod on this count.

Nonetheless, the Jet and DeWalt fences are pretty good. While not quite as smooth or rock-solid as the Biesemeyer, they slid reasonably well, locked down parallel, and only deflected under significant pressure.

The General International's fence, on the other hand, left a little to be desired. My chief complaint is that the front fence rail came in two pieces that were joined by a coupler. Not surprisingly, the scale was only accurate on one side of the joint. As soon as the indicator crossed the joint, it was off by about $\frac{3}{16}$ ". This fence also had a tendency to tip off the rail as I slid it back and forth.

The good news is that General offers a Biesemeyer-style fence as an option on this saw, and it only raises the price about \$100. I highly recommend this option, since this will still cost less than the other saws.

Miter gauges were a mixed bag. Jet and Craftsman each included an aluminum fence with their miter gauge. Craftsman included a stock hold-down and movable stop with their miter gauge fence. The Jet had set screws in the miter bar for snugging the fit in the miter slot.

None of the miter gauges, including the ordinary versions from General International and DeWalt, showed any excess play in their respective miter slots.



▲ Each miter gauge was checked for play in the miter slot and for general quality.

DeWalt DW746X

The DeWalt DW746 is the saw that started the hybrid craze. It now has earned a well-deserved reputation as a good saw with almost unlimited expandability.

In order to remain competitive against the newcomers to this category, however, DeWalt will have to replace the stamped steel wings with cast-iron wings and upgrade to a fully enclosed cabinet with enhanced dust collection.

At a Glance

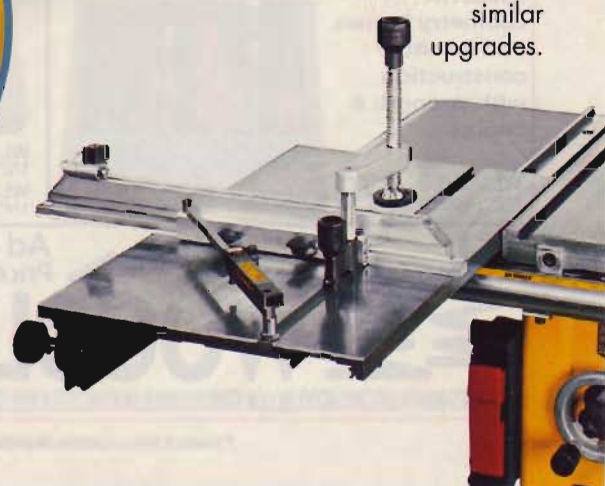
Price:	\$900
HP:	1 $\frac{3}{4}$
Volts:	120/240
Amps:	15/7.5
RPM:	3,000
Max. Cut @ 90°:	3 $\frac{1}{8}$ "
Max. Cut @ 45°:	2 $\frac{1}{8}$ "
Max. Rip, Right:	30"
Max. Rip, Left:	16"
Table Dim.:	27" x 40 $\frac{3}{4}$ "
Wings:	Stamped Steel
Blade:	30T Carbide
Weight:	254 lbs.

www.DeWalt.com
800-433-9258



▼ The expandability of the DeWalt — with accessories such as this sliding cut-off table — is one reason this saw has gained such a following. Only the Jet offers similar upgrades.

▲ DeWalt could improve this table saw with cast-iron extension wings and an enclosed cabinet.



The Pressure-Treated TRANSITION

One full year after the voluntary ban on Chromated Copper Arsenate (CCA) went into effect, it's safe to say that the surplus of CCA-treated lumber has been exhausted, and alternative materials now fill the racks at your local lumberyard. That makes it more important than ever that you understand the new pressure-treated lumber and how to use it to your greatest benefit.

Most of the new "environmentally friendly" pressure-treating chemicals are copper based, just like CCA. The difference is that these new chemicals do not contain inorganic arsenic, which is the ingredient that brought CCA such fierce criticism.

Currently, products treated with Alkaline Copper Quaternary (ACQ-C, ACQ-D, or ACQ-D Carbonate) and Copper Azole (CBA-A or CA-B) comprise most of the CCA replacement market.

Both of these treatments work like CCA in that they eliminate wood fibers as a food source for insects and fungus, which in turn contributes to wood decay. And all indications are that these treatments are as effective as CCA in preventing decay for many decades.

KEY DIFFERENCES

Despite the similarities between new pressure treatments and the old CCA, there are a few important differences to take note of.

Cost — The new stuff is going to cost you more — about 15 to 20 percent more. This is due to the increased copper content. The new chemicals, lacking the inorganic arsenic of CCA, rely almost entirely on copper as the fungicide and pesticide. Copper is expensive, so the cost of the lumber has to reflect that.

Varying Grades — The second difference is that not all pressure-treated lumber is created equal these days. In the past, the relatively low cost of the CCA chemical made it possible for manufacturers to pump every board full of the stuff.

Now, because of the higher cost of new chemicals, manufacturers are a bit more modest with its application. The key is to check the end tags of the boards to ensure they are rated for your intended use (*Sidebar at left*).

Corrosion Danger — The most important difference, though, is that new chemicals are *much* more corrosive than CCA. So the hardware that worked fine in CCA won't stand up to the new chemicals. That means hardware selection is essential to the longevity of your outdoor projects. To help sort that out, we've put together a guide for selecting hardware to be used with pressure-treated lumber that begins on page 86.

▲ Production of CCA-treated lumber stopped a year ago. By now, everything you will find on lumber racks is treated with new chemicals.

Deciphering End Tags



Gone are the days of simply loading your cart with pressure-treated lumber and knowing it will resist decay wherever you use it.

These days the treatment levels vary, so you'll need to consult the end tag of each board to ensure that it matches your intended usage. The *Illustration* above is one example of an end tag. The design of these tags can vary widely, but the critical information remains the same.

The most important thing to look for is the application. Each board will be rated for "Ground Contact" (for boards that will touch the soil or be buried), "Above Ground" (for decking not in direct contact with soil), "Foundation," sometimes abbreviated as "FDN" or "PWF" (for use in wood foundations), or "Salt Water" (for direct contact with salt water, such as in piers or docks).

Modern MATERIALS

NAILS & SCREWS

Stainless Steel Nails are available in limited sizes and styles and are roughly three times as expensive as galvanized nails.

Hot-Dip Galvanized Nails are easy to find and reasonably priced. Just be sure the label reads "hot-dip galvanized" and not just "galvanized" or "hot galvanized."

Hot-Dip Galvanized Screws are hard to find and often of poor quality. Better choices include McFeely's No-Co-Rode screw (shown here) or polymer-coated screws (shown below).

Polymer-Coated Screws are quickly becoming the screw of choice when working with pressure-treated lumber. Many brands even offer warranties against corrosion.

Stainless Steel Screws are the best choice for fastening pressure-treated material in any environment. Their high price, however, makes them impractical for most projects.

The treated wood industry recommends hot-dip galvanized or stainless steel nails and screws in pressure-treated lumber. Unfortunately, as clear as this guideline seems, trying to find this hardware among the racks and racks of nails and screws in a typical home center can be a confusing and frustrating experience.

Galvanized — One important point I learned while shopping for nails and screws is that "galvanized" and "hot galvanized" are *not* the same as "hot-dip galvanized." So unless the label specifically says "hot-dip galvanized," the hardware may not be recommended for pressure-treated wood.

Another way to know if the nails or screws you're looking at are appropriate is to check the packaging for the phrase, "Conforms to ASTM A153." This tells you that the zinc coating on the nails or screws meets the standards set by the American Society for Testing and Materials for use in pressure-treated lumber.

Of course, it may be as simple as finding a box of nails or screws that proudly proclaims itself, "Recommended for use in ACQ and all other pressure-treated lumber."

If you can find any or all of those phrases on a box of screws or nails, then you've found the right hardware and can build with confidence.

Stainless Steel — Stainless steel screws are easy to find, but they are incredibly expensive. Stainless steel nails are just as expensive, but the choices are more limited. Fortunately, most industry information says that stainless steel hardware is only necessary under the most severe circumstances.

There is no ASTM standard for stainless steel, but Type 304 or 316 stainless steel fasteners are recommended industry-wide. Type 316 is for the most corrosive environments, such as marine applications. In most other cases, Type 304 will suffice.

Once again, you'll have to check labels closely to find the type of stainless steel or a phrase that specifically says the hardware is intended for use in ACQ and other pressure-treated material.

Other Screw Choices — Hot-dip galvanized screws are pretty rare. And even if you find them, you may not want to use them. The thick zinc coating that results from this process commonly clogs the threads and the recesses in the heads of the screws, so several screws in every box will be unusable.



▲ Nails and screws intended for use in new pressure-treated lumber will be labeled "ASTM A153" or specifically mention new chemicals.

200 HOURS



400 HOURS



600 HOURS



These photos clearly show the importance of using the right fasteners in treated lumber. To the left are ThickCoat nails from Stanley-Bostitch. Notice how they have corroded far less than the nails on the right, which have a more typical zinc coating.

Fortunately, there are alternatives beyond costly stainless steel. For example, McFeely's, offers its No-Co-Rode screws, which are mechanically galvanized but still meet ASTM A153 for zinc coatings. McFeely's sells these screws for use in all pressure-treated wood, but it does not warrant against corrosion.

Another popular alternative is polymer-coated screws. These are available from several manufacturers and tend to be priced between galvanized and stainless steel fasteners.

At present, there is no ASTM standard for polymer coatings, but several independent tests have confirmed the corrosion-resistant performance of these screws. Your best bet is to look for screws that offer a warranty and specifically state that they can be used in pressure-treated lumber.

Modern MATERIALS



Lag Screws

are rarely marked with type or ASTM standards. Fortunately, most galvanized or stainless steel lag screws will hold up well in pressure-treated lumber, according to a representative from the American Society for Testing and Materials.



Carriage Bolts

are also poorly labeled. But the galvanized and stainless steel hardware sold in home centers and hardware stores should perform well.

CARRIAGE BOLTS & LAG SCREWS

These larger fasteners are rarely marked as clearly as their smaller counterparts, so searching for any reference to standards, types, or warranties is a futile effort. According to an ASTM customer service representative, however, most of the galvanized and stainless steel fasteners you'll find in hardware stores will do the trick in all but the most demanding environments. (Marine applications absolutely require Type 316 stainless steel.)

CONNECTORS

Joist hangers, hurricane ties, post anchors, and other metal connectors are every bit as susceptible to corrosion from the new pressure-treating chemicals as screws and nails. And just as with nails and screws, hot-dip galvanizing or stainless steel offer the solution.

Once again, don't mistake standard galvanized connectors with hot-dip galvanized. To be absolutely certain that the connectors you're using are hot-dip galvanized, look for the "TZ" line of fasteners from USP Structural Connectors or the "ZMax" line from Simpson Strong-Tie. Otherwise, look for a label that says the connectors conform to ASTM A653.

Both USP Structural Connectors and Simpson Strong-Tie also offer stainless steel connectors, but these may be a little more difficult to find on store shelves. If you live in a coastal environment or are planning a marine structure, you may need to special-order these from a local building supplier.



▲ Stainless steel and galvanized connectors are available from USP Structural Connectors and Simpson Strong-Tie.

MORE INFORMATION

American Wood-Preservers' Association

awpa.com ♦ 334-874-9800

Southern Pine Council

SouthernPine.com ♦ 504-443-6612

Environmental Protection Agency

epa.gov ♦ (202) 272-0167

FASTENER SOURCES

McFeely's

McFeelys.com ♦ 800-443-7937

Stanley Bostitch

Bostitch.com ♦ 800-556-6696

PrimeSource

PrimeSourcebp.com ♦ 800-676-7777

Senco

Senco.com ♦ 800-543-4596

USP Structural Connectors

USPConnectors.com ♦ 800-328-5934

Simpson Strong-Tie

StrongTie.com ♦ 800-999-5099

FLASHING

The most difficult piece of hardware to locate may very well be flashing. Standard aluminum flashing absolutely *cannot* be used in contact with the new pressure-treated lumber. It will start corroding almost as soon as you attach it.

The alternatives are flexible membrane flashing, galvanized flashing, or copper flashing.

None of these three is in ready supply at the home centers in my area, and even the commercial building supplier I turn to for hard-to-find materials had to special-order copper flashing (*Photo, right*).

PLAN AHEAD

Clearly some advance planning is in order if you hope to gather all the hardware necessary for a long-lasting outdoor project built with new pressure-treated lumber.

The Web sites and phone numbers listed in the *Box* at left will be excellent resources for information and materials. 



▲ You may have to special-order copper flashing from a building supplier.

Tools & PRODUCTS

WORKBENCH
APPROVED

palm-sized CORDLESS DRIVER

The new Skil iXO cordless drill/driver is a palm-sized powerhouse that holds its battery charge even after two years of non-use.

Weighing in at just over 10 ounces and measuring about 5½" square, the iXO is the ideal tool to keep in a drawer for those occasional fix-it jobs.

A 3.6-volt Lithium Ion battery provides the power. The biggest advantage to a Lithium Ion battery is its ability to hold a charge for an extended period of time when the tool isn't in use.

Other user-friendly features include a forward and reverse indicator to keep you turning in the right direction, and a soft-grip handle for comfort.

The iXO comes packaged in a carrying case that offers a variety of storage options. The case can sit open-faced inside a drawer, can be mounted to a wall or any other flat surface, or can simply be laid down just about



▲ The iXO, with its 34 bits, 200 fasteners, and a battery that's ready on demand, is a perfect addition to any "catch-all" drawer.



anywhere on its non-marring soft-grip feet. The kit includes a 34-piece bit set with a variety of Phillips, standard, Torx, and Allen bits, as well as 200 fasteners of various types and sizes.

Look for the iXO cordless drill/driver on Amazon.com or other major retailers for around \$50. To learn more, visit Skil.com or call 800-754-5999.



laminate TRIMMER

Ridgid has raised the bar for laminate trimmers with a model that features a 6-amp motor (the second-most powerful in the category) and variable-speed capability (the only laminate trimmer with this feature).

The R2400 also boasts a microadjustable rack-and-pinion height adjustment, two edge guides, and the Ridgid cord package that consists of a 12-foot rubber cord with an illuminated tool icon on the plug and a hook-and-loop cord wrap.

Look for the Ridgid R2400 laminate trimmer at Home Depot for around \$120.

Visit Ridgid.com or call 800-474-3443 for more information.

◀ Ridgid's new laminate trimmer features a powerful motor, precision adjustments, and variable-speed operation.

ShopStrop

SHARPENING

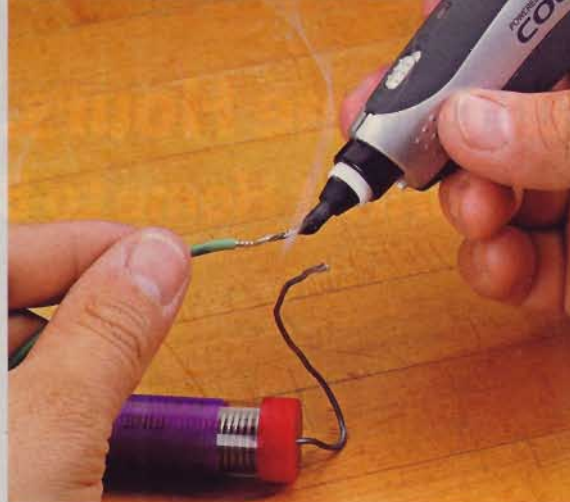


This compact sharpening system turns any drill press into a capable honing and sharpening center. The ShopStrop kit includes the sanding platform, six sanding discs, leather honing wheel, honing compound, tool rest, and an instructional video. The kit sells for about \$100. Visit BigLeg.com or call 877-220-2699 to learn more.

cold heat SOLDERING

The Cold Heat soldering iron is a cordless tool that seems to defy the laws of nature. Powered by four AA batteries, the Cold Heat tip reaches 800° in about one second. It cools down almost as quickly, since the tip is heated only during active soldering. It's possible to solder up to 700 joints on a single battery pack.

The Cold Heat tool is perfect for electrical projects using 18- to 24-gauge wire and other small projects where precision soldering is required, such as jewelry repair. It works with regular, lead-free, or silver-based solder from 18 AWG to 24 AWG, but performs best with solder of 18 AWG (0.040 inches or 1 mm in diameter) to 20 AWG (0.032 inches or 0.8 mm in diameter). However, you should determine the solder wire gauge based on the



▲ Compact and cordless, the Cold Heat soldering tool heats and cools amazingly fast. Four AA batteries provide the power source.

requirements of your project. The Cold Heat is not recommended for soldering of large metallic components that require a lot of heat transfer.

Expect to pay about \$20 for a Cold Heat soldering tool, along with a carrying case and one replacement tip. Visit ColdHeattools.com or call 800-398-8866 for more information or to purchase a tool.



ryobi's one+ SYSTEM

Ryobi's new One+ system is designed to offer consumers new freedom to create their own cordless tool combinations without purchasing duplicate tools or paying extra for batteries they don't need.

If you already own any of Ryobi's 18-volt tools, you can now add individual tools to your assortment without the additional expense of another battery and charger — or yet another flashlight.

Of course, Ryobi will still be offering several cordless combination kits, including a starter kit that contains a 1/2" drill, circular saw, flashlight, two batteries, and a one-hour charger for \$119.

From there you can grow your tool set by choosing from any of the 22 tools sold individually. Additional batteries sell for \$25 each or two for \$40. Ryobi tools are available exclusively at Home Depot.



▲ A plug-in lanyard with a nylon carrying strap and a metal clasp for hanging the tool is included with every individual tool in the Ryobi One+ system.

bosch IMPACTOR

Bosch has jumped into the hottest new category of cordless tools with the introduction of three new impact drivers. The Bosch Impactor line includes 9.6-, 12-, and 14.4-volt models.

All three tools boast the most speed and power available in their respective classes. Each also features a 1/4" hex quick-change chuck, a trigger-activated LED work light, and a belt clip. Impactor kits come with two NiCad batteries, a one-hour charger, and a carrying case. For more information, call 877-267-2499 or visit BoschTools.com



▲ Bosch offers the highest speed and power currently available in three sizes of cordless impact drivers.