■ Shaker-Style Kitchen Shelf ■ Double-Duty Loft Bed ■

WORKBENCH®

THE ORIGINAL HOME WOODWORKING AND IMPROVEMENT MAGAZINE

Build A Classic Cedar Fence

Plus–

- How To Set FENCE POSTS
- Get Great Results From Our Small Shop DRILL PRESS TABLE

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HOMEWRIGHT

26 Classic Cedar Fence

Panelized construction makes it easy to machine parts and assemble our fence in the convenience of your shop. This building approach yields tight-fitting joints and a highly predictable installation — advantages often lacking in site-built projects.

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WEEKEND

36 Shaker-Style Shelf

A handsome shelf for displaying mementos is one way to dress up an under-achieving wall. We hung ours in the kitchen, though it could serve equally well in any room of your home.

40 Shelf Options

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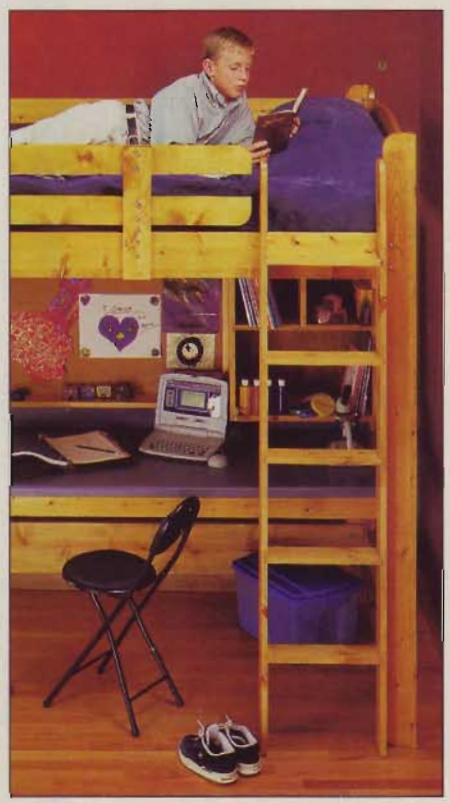

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WOODWORKING

42 Child's Loft Bed

In your kid's overcrowded bedroom, the only relief may be to move some things off the floor. By stacking a twin bed over a generously sized desk, you'll gain double-duty service from a single footprint.

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56 Drill Press Table

Upgrade your drill press' capabilities and get better results with this high-performance table. The adjustable fence and stop block system is ideal for accurate, repetitive drilling, and the integrated drawers will safely store your drill bits and accessories.

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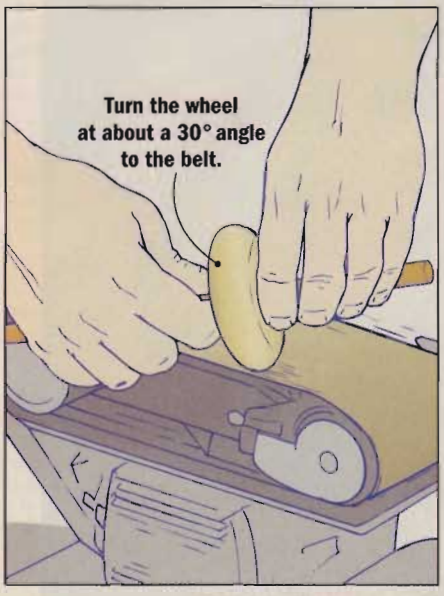

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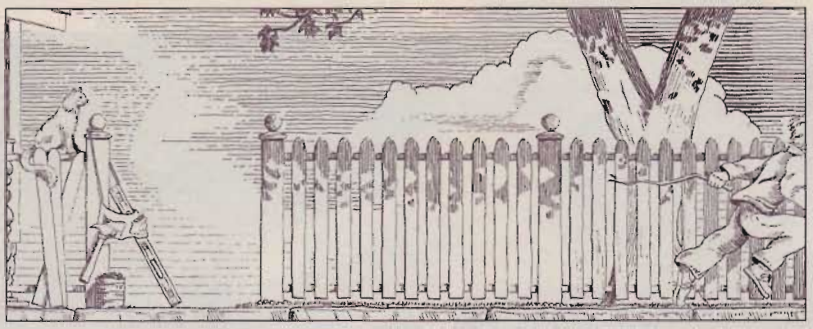

LETTER FROM THE EDITOR

A Good Fence

Poet Robert Frost fairly mocked a neighbor for saying "good fences make good neighbors," but generally speaking, I believe there's a strong case to be made for fences. The crux of the matter is knowing what makes a good fence.

Measured in practical ways, a good fence protects children and prevents them from wandering off, it keeps animals under control, provides security and privacy and sometimes beauty. Any of these benefits is reason enough to build a fence of your own, but even greater benefits are possible.

A good fence is an invitation to civility. It's a boundary, not a barrier. As a sort of neutral zone between property lines, a good fence encourages neighborly chats and points of view, but sets limits on neighborhood intrusions.

A good fence demonstrates the values and concerns of those who live behind it. Are they solitary, whimsical, guarded, nature-loving, classical, modern? Attitudes are an influence — I know they affected our fence design (at left).

While many of us seek a stronger sense of community, and wish for neighbors and business-owners who know us by name and reputation, we also crave our privacy. It's complicated, this struggle to manage the transitions between our private and public lives, but mostly it seems to come down to courtesy and respecting reasonable boundaries. Which isn't all that different from finding balance in a well-designed, well-placed, well-built fence . . . a good fence.

Chris

Chris Inman, Editor

WORKBENCH

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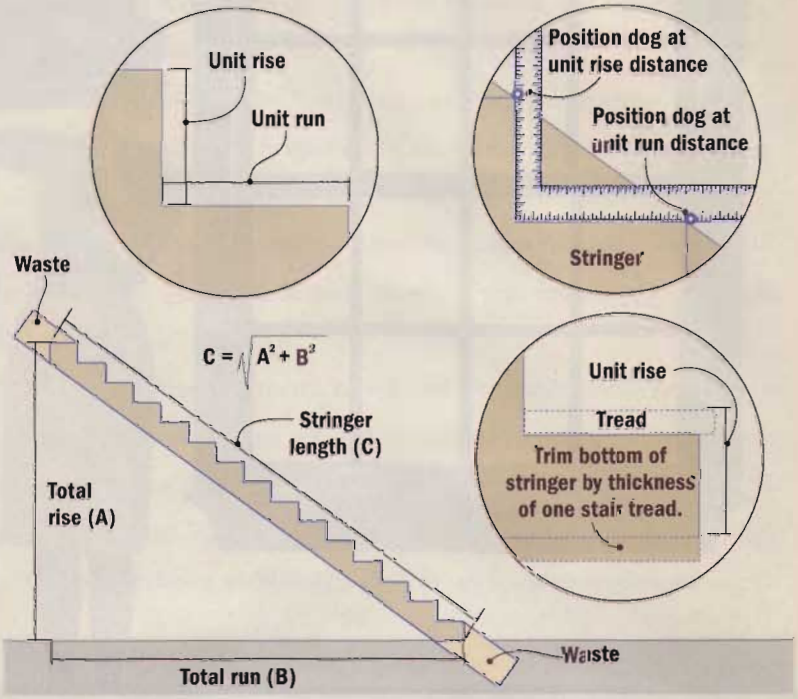
Questions & Answers

Use 7-10 Rule to Lay Out Stairway Stringers

Q *Is there an easy way to calculate how to cut stair stringers to fit from ground level to a platform 9-ft. above the ground?*

Mario Arena
Scipio Center, NY



A Many books have been written on the subject of building stairs — such as *Basic Stairbuilding* by Scott Schuttner (1990, Taunton Press) — but here's a very brief overview. You need to use something called the 7-10 rule. It says that, in general, individual steps should be 7" high (unit rise) and 10" wide (unit run). However, you'll have to adjust things to fit.

To do this, you divide the total rise (the vertical distance between levels, including finished flooring) by 7". In your case, the total rise is 108" (9 ft. × 12" per ft.), which when divided by 7" gives you 15.429. In round numbers, that makes 15 steps. To get the actual rise for each step (unit rise), divide the total rise by the number of steps — 108 ÷ 15 = 7.2, or just a hair over $7^3/_{16}$".

With unit rise calculated, you can figure the unit run. The rule of thumb is that the sum of one riser and one tread width should be 17" to 18". In your case, the unit run could be $9^{13}/_{16}$" (17 – $7^3/_{16}$) to $10^{13}/_{16}$" (18 – $7^3/_{16}$). For simplicity, let's use 10". To find total run, multiply the unit run by the number of steps (15); your total run would be 150". Which finally brings us to the stringers that support the stairs. Stringers are usually cut from 2x12 stock. The length is determined as shown, with extra at each end for waste. Layout each step using a framing square. You'll need to subtract the thickness of one stair tread from the bottom end so the first and last steps will have the correct rise.

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Vinyl Siding Repair Is a Snap with the Right Tool

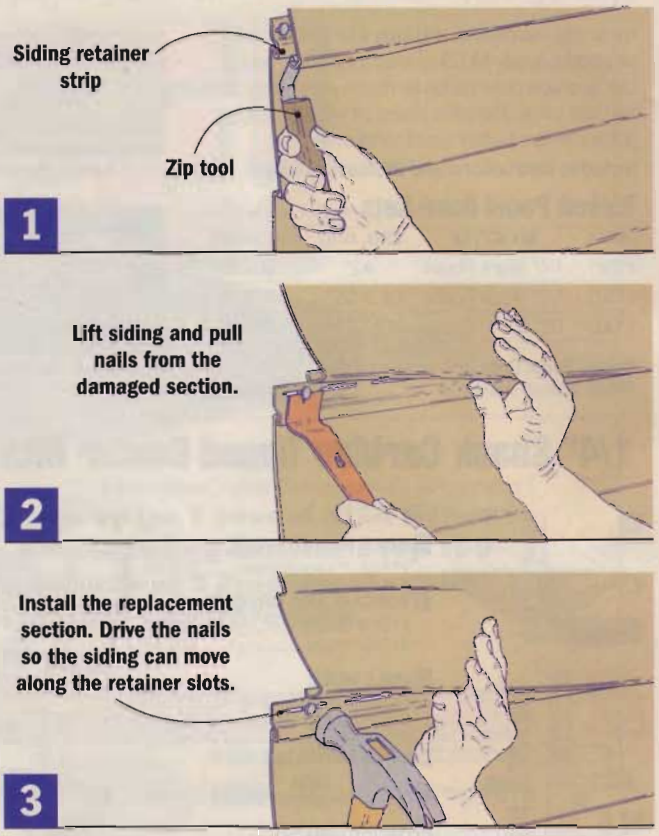
Q *I need to patch some vinyl siding on my house. The area to be repaired is about 10 rows up from the bottom. How can I "open" the siding to patch in a new piece?*

Al Mesale, Jr.
Worcester, MA

A One of the beauties of vinyl siding is that you can easily make such repairs. Using a special implement that siding installers call a zip tool, you can "unlock" a piece of siding from the one below it. The tool is basically a custom prybar that pops the lip of the upper piece out of the retainer strip of the piece below.

To repair a damaged piece of siding, slide the zip tool in from one end to unhook the piece directly above the damaged one. Lift the upper piece enough to remove the nails holding the damaged piece in position. With the nails removed, use the zip tool to unhook the damaged piece from the one below it.

Hook the replacement piece over the retainer strip below it, and drive nails in the mounting slots. The nail head should just barely contact the vinyl so the siding can expand and contract. Then use the zip tool to reattach the upper piece.

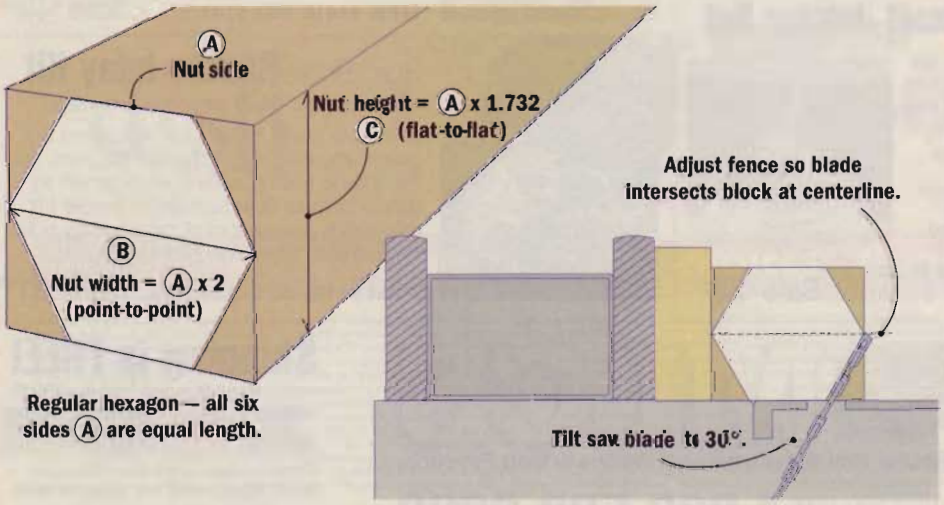


Creating a Wooden Hex Nut a Tough Nut to Crack

Q *Our woodworking class is making threaded wood nuts and bolts. We've tried to create a hex nut, but can't seem to get it right. How do you cut a hex-shape?*

Scooter Finch
El Dorado (High School), AR

A A hex nut's shape is a regular hexagon, meaning it has six sides of equal length and all the angles are the same. I calculated everything from that, but if you're not interested in a geometry refresher lesson, here's a shortcut.



Start with a piece of stock about 2-ft. long that's exactly twice as wide (point-to-point) as the length of one side of the hexagon you want. For example, to make a nut with 1" sides, the stock must be 2" wide. Next, you'll need to rip this stock to the proper thickness (flat-to-flat) — multiply the length of one side of the nut by 1.732.

With the blank ripped to size, draw a centerline across the width of the block to show the point-to-point location. Tilt your tablesaw blade to 30° from vertical and place the stock with the wide face against the table. Adjust the fence until the blade just intersects the centerline. Lock the fence, then carefully bevel all four corners of the stock.

This will give you a long hex-shaped piece which you crosscut into nut blanks. Drill and tap the blanks to fit your threaded bolts.

Loose-fitting Biscuit Slots Allow Room for Glue

Q *I was watching Norm Abram (New Yankee Workshop) and noticed on a recent project that he had to tap his biscuits into place. My biscuit joiner slots are loose. Am I doing something wrong?*

Owen Curtis
St. Louis, MO

A I can't speak to Norm's particular situation, but there's probably nothing wrong with your biscuit joiner or your technique. Most biscuit joiners are designed to cut a kerf that is slightly wider than the thickness of the wooden biscuits. This leaves plenty of room for both glue and the biscuit. If they fit tightly, you run the risk of having the biscuits squeeze all the glue out, resulting in a weaker, glue-starved joint.

Most biscuits are machine stamped from thin stock with a die cutter under great pressure. As they absorb glue, the compressed biscuits actually swell up to create a tight-fitting joint. Biscuits can also swell up from excess humidity in the air. To prevent this, I keep them tightly sealed in their original plastic container until I'm ready to use them. There's nothing worse than a soggy biscuit.

Keep Finish Fresh

Q *I bought a quart of polyurethane and used about half of it for one project. When I opened it to use on another project, it had gelled up. What caused this and is there a way to avoid it?*

Dennis Hackert, Jr.
Westmoreland, TN

A The larger volume of air in the half-empty can causes the remaining finish to congeal. There are several ways to prevent this, depending on how much trouble you want to go to for a couple of dollars worth of finish.

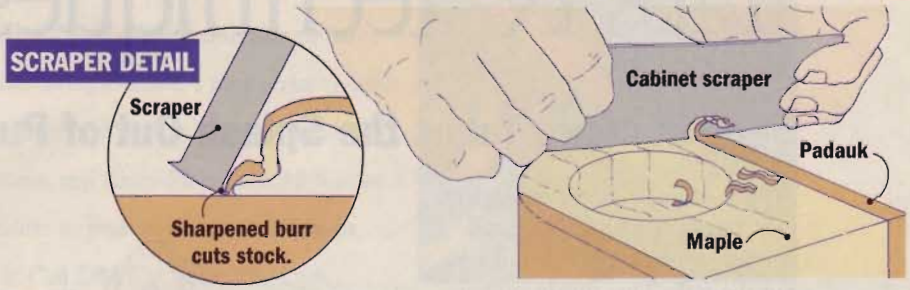
The simplest way is to buy smaller containers so you basically use up all the finish on one job, but that's not always practical or cost effective. Another method is to switch the contents to a smaller container or dump glass marbles into the can to raise the level of finish and reduce the volume of air.

A product called Bloxygen (1-805-542-9219) is an inert gas that you can spray into the can just before you seal it. The heavier-than-air gas creates a buffer layer between the finish and the air so the finish won't start to cure and form a skin or gel.

Use Scraper to Keep Padauk from Discoloring Maple

Q I'm working on a project that has maple and padauk laminated together. When I sand it, the reddish padauk dust discolors the maple. What can I do to prevent this?

Bob Lamprey
Orlando, FL



A The secret is not to sand it, since sanding creates fine dust particles of padauk that get trapped in the grain of the maple. The back and forth action of sanding also helps force these padauk particles into the maple.

Try using a cabinet scraper. The scraper's burr pulls very fine shavings as it cuts across the surface. These shavings are larger than sanding particles and won't "stain" the maple. When you use the scraper, work with the grain for the smoothest results. A cabinet scraper, like all cutting tools, works best when it's properly sharpened.

Blade Bushings

Q I have an old Craftsman 8" table saw with a 1/2"-dia. arbor. I've made bushings from 1/2"-5/8" (ID-OD) gray plastic water pipe, and wondered if I can use these bushings on a stacked dado set?

George Gast
New Bern, NC

A You might get by with such a bushing for a single blade (although a steel bushing made for this purpose would be best). Many circular saw blades, especially those 7 1/4" in diameter, are sold with just such a steel reducer bushing that you force fit into place.

I'd avoid using any bushings on the stacked dado set. Keeping the bushings in the proper place, especially when adding shims to widen the cutting path, is tricky. A misaligned blade or chipper can throw things dangerously out of balance.

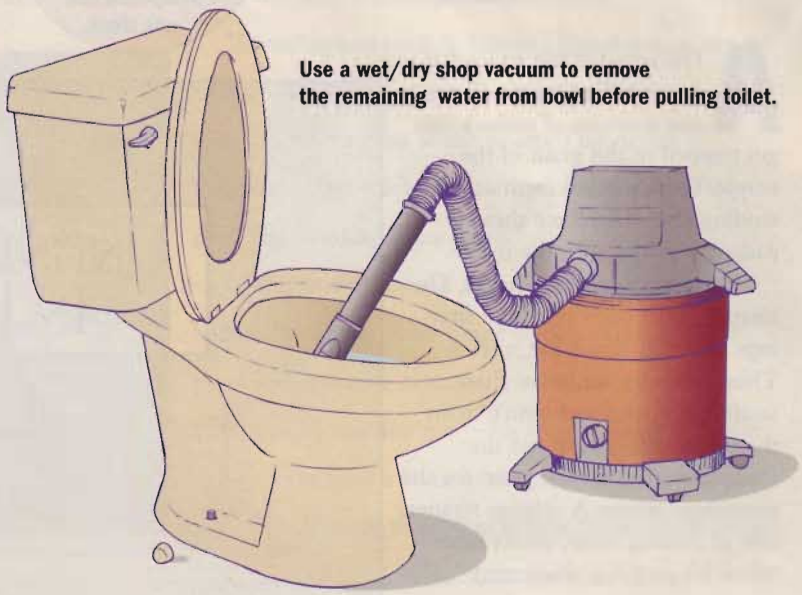
Tips & Techniques

Shop Vacuum Takes the Splash Out of Pulling a Toilet

Typical of many home remodeling jobs, our upstairs bathroom still needed to be functional throughout the redo. That meant pulling the toilet during construction, then reinstalling it at the end of each work day.

Every morning I turned the supply line off and flushed the toilet, but water remained in the tank and bowl — and splashed out on the floor when I moved it. After the first such spill, I had my wet/dry shop vacuum close at hand to suck the water up off the floor. Then it struck me that I could use the vac to drain the remaining water from the toilet *before* I moved it. I haven't had a spill since.

Bob Neale
Joliet, IL



Use a wet/dry shop vacuum to remove the remaining water from bowl before pulling toilet.

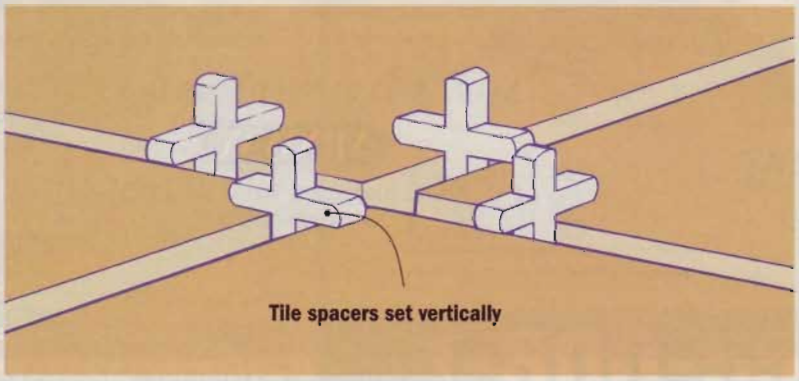
Turn Tile Spacers on Edge to Save Time

I read your article on installing ceramic tile (*Tiling for the Long Haul*, Jan/Feb 1999 issue) and thought I'd pass along a tip I've used with a good deal of success.

Like you, I use plastic spacers to position my tile, however, I don't place them in the corners the way you showed them (and the way the manufacturer intended) with one spacer laying flat at the intersection of four tiles.

Instead, I place four spacers "vertically" near the corners of the tile. This requires quite a few more spacers (a cheap and reusable item), but it makes removing them a whole lot easier. You don't have to use needlenose pliers or a screwdriver to pull them out, which greatly reduces the chance of chipping the tiles.

Richard Kemper
King of Prussia, PA



Tile spacers set vertically

SHARE YOUR TIPS, JIGS, AND IDEAS

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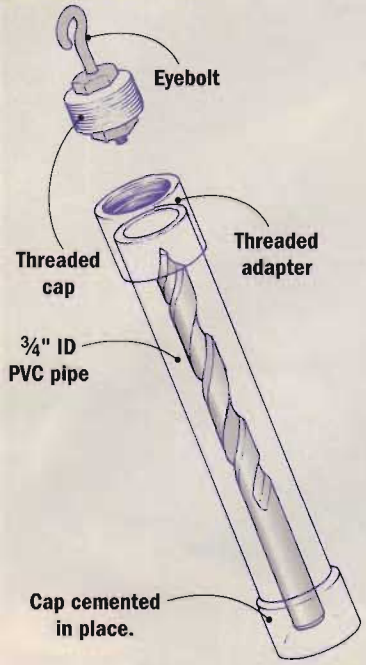
In addition, The Stanley Works is sponsoring Tips & Techniques, and will send an award for the tip in each issue that best describes the creative use, care or application of tools.

Protect and Store Long Bits in PVC Pipe



I have several extra-long drill bits I use only occasionally. These bits are too long for the drawer where I keep my regular bits and they cost enough that I don't want them knocking around in a larger drawer with a bunch of other tools.

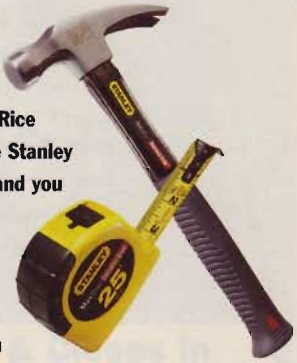
To protect the bits and store them where I can find them, I made some hanging cases out of PVC pipe. Smaller diameter bits each fit easily in ½" ID pipe, while ¾" ID pipe handles the larger bits. The bottom cap gets cemented in place on both sizes. To hang the small bits, I drill a hole through another cap and install an eyebolt. Then I scuff up the top end of the pipe with a rasp to create a friction fit for the cap.

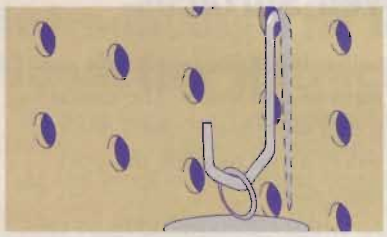
Securing the heavier bits calls for using a threaded cap. I install the eyebolt in the male cap, then glue the threaded female end in place on the pipe.

Randy Rice
Freeport, IL

In recognition of his tip, *Workbench* reader Randy Rice wins these tools from The Stanley Works. Send us your tip and you could be a winner too.

The Stanley Works
New Britain, CT
www.stanleyworks.com





Curtain Hooks Hold Tight on Pegboard

Most of the pegboard hooks on the market don't want to stay put on the pegboard. When you lift up a tool, the hook often comes along with it.

I've found that curtain hooks work well and are even cheaper than the least expensive pegboard hooks. Turned upside down, the pointed pin that goes into the drapery fabric fits through the hole in the pegboard. For real holding power, I use the long hooks designed to hold up heavy drapes.

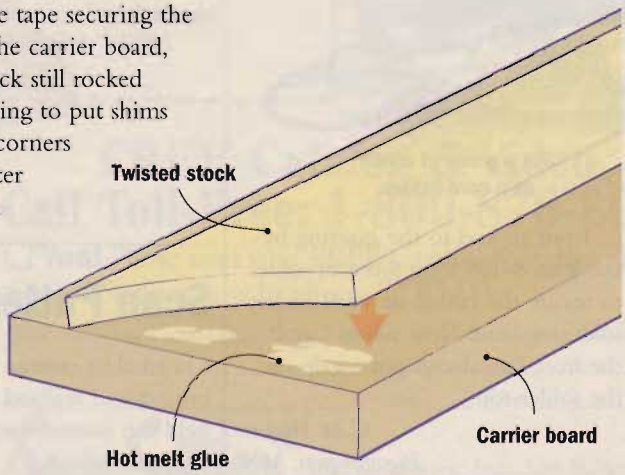
Cesar Ramirez
Sanger, TX

Hotmelt Glue Helps Salvage Twisted Stock

I had a couple of pieces of 5/4 oak that had a slight twist in them. I didn't want to throw them out or chop them into short pieces. I figured I could turn them into thinner, flat stock with my benchtop planer, but I needed a flat side to work from.

Since I've used a carrier board to plane thin stock, I decided to mount the twisted stock to it. Even with double-face tape securing the leading end to the carrier board, however, the stock still rocked slightly. I was going to put shims under the high corners until I got a better idea. I built up a blob of hot melt glue under the area. The glue kept the board from rocking and also held it in place. A couple passes through the planer gave me a flat surface, so I removed the stock from the carrier board, flipped it over and planed the other side flat.

L.K. Bolay
Oak Harbor, OH



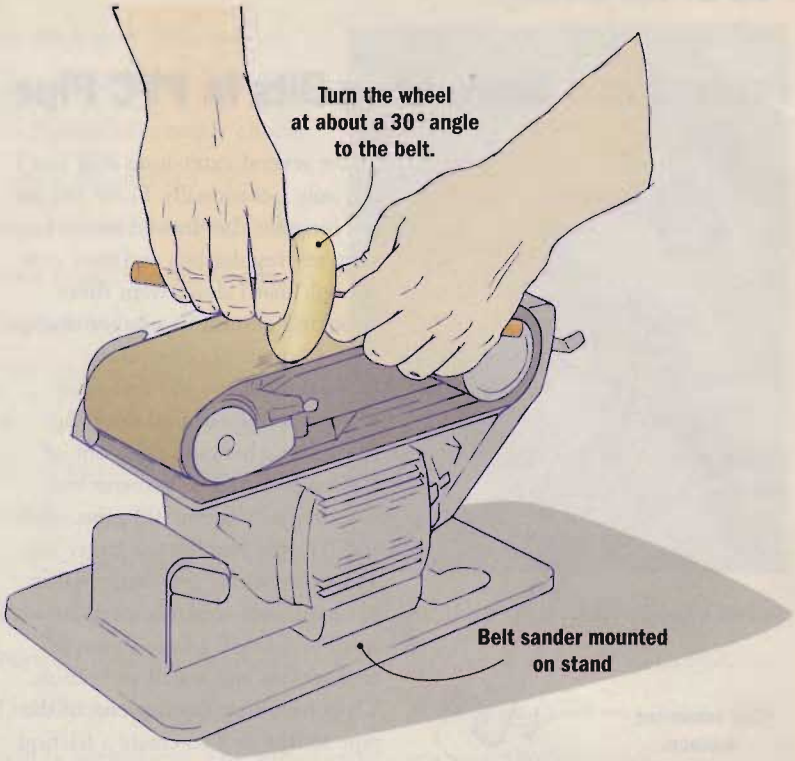
Belt Sander Puts a Smooth Spin on Toy Wheels

I've tried several methods for sanding wooden wheels, but nothing works as well as rolling them against a belt sander.

After using a hole saw to cut my wheels, I mount a wheel blank on a length of 1/4"-dia. dowel. Then, with the sander running, I bring the wheel into contact with the belt. If you keep the wheel lined up with the belt, the wheel just spins. But turn the dowel at about 30° to the belt and you create enough drag that the belt sands the wheel's edge as it turns it.

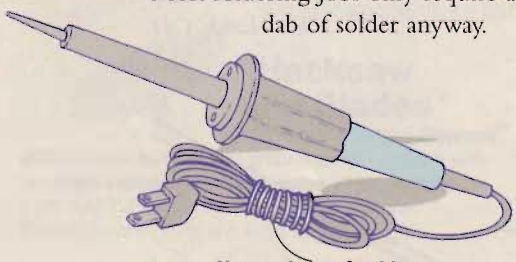
I let my fingers rub against the wheel to act as a thrust bearing to keep the wheel from tracking off the belt. To round over the wheel's edges slightly, I tip the dowel so only the wheel's edge meets the belt.

George Platt
Grand Junction, CO



Bind Cord with Twist of Solder

Those seldom-used little rolls of solder can be a nuisance to keep track of. I could usually have the job done and the iron cooled off in the time it took me just to hunt down the missing roll of solder. Most soldering jobs only require a dab of solder anyway.



Use a piece of solder as a cord holder.

I put an end to the hunting by using an 8-12" long piece of solder to secure the coiled up cord on my soldering iron. Now when I grab the iron, I've always got a grip on the solder too.

C.M. Wegner
Bloomington, MN

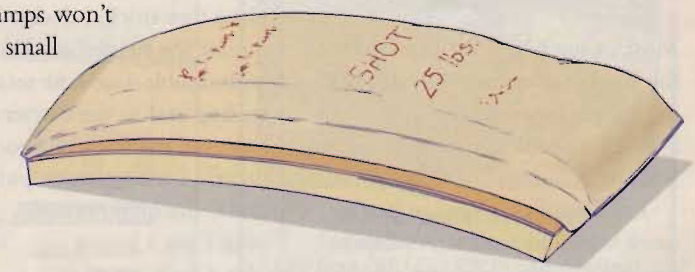
Shot Bag Clamps Curved Surfaces

One of the handiest clamps I own is a 25-lb. bag of #7 shot, originally destined for reloading shotgun shells. The lead's density makes it heavier than a similar-sized sandbag, so it provides concentrated holding power.

I use it for clamping curved and irregular parts, or when regluing loose veneer situated where normal clamps won't work. The small diameter pellets inside the bag help it conform to odd shapes. The canvas bag is also soft enough that I don't worry about marring the workpiece surface.

It also comes in handy on my bench as a hold-down when I can't get a clamp to reach.

Robert Morris
Woodbridge, VA



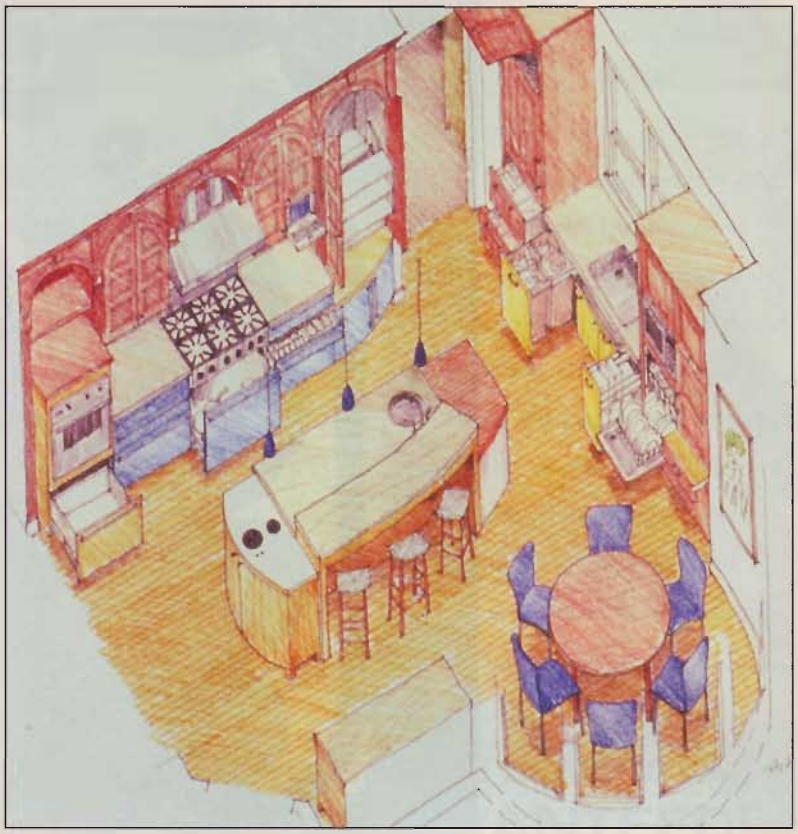
Scan Patterns to Create Custom Sizes

I needed to enlarge a pattern for a project and realized my computer held the answer. I scanned in the original, enlarged it on screen and printed it the size I needed. For larger patterns, print it in sections.

Bob Newman
Rockville, MD

News & Events

Hardware Manufacturer Predicts the Look of Future Kitchens



Hafele America, a manufacturer of furniture and cabinet hardware, has given us a glimpse at kitchens of the future. The company's vision was developed by kitchen designers and unveiled at Hafele's 1998 Trendsetters Symposium.

The designers see a kitchen that's wide open rather than a separate, walled-off room like kitchens of old. The room will be a social center, where the whole family gets involved in meal preparation and entertainment activities. To accommodate multiple chefs and tasks, there will be countertops at various heights, and you'll start seeing double: dual sinks, refrigerators, and even a second range.

Those who aren't cooking will still enjoy activities in the kitchen, such as watching a flat-screen television mounted to the wall, or searching the internet on a kitchen computer that will act like a super appliance. You'll use it to scan and inventory groceries, organize recipes, print shopping lists, and control other kitchen functions.

Hafele also predicts new cabinet styles, where the entire unit pulls down or out, maximizing storage and improving accessibility for everyone in the family.

If you dread the stereotype that "modern means sterile," don't worry. The symposium presenters predict more decorating with personal items, a mix of antiques, wood cabinets, and stainless steel appliances creating a space filled with warmth from more than just the stove.

Makita Celebrates Cordless Anniversary

Take a look in the tool box of most any DIY'er, and I bet you'll find at least one cordless tool. It seems a cordless drill is now standard issue in every tool arsenal, and cordless versions of circular saws, jig saws, and reciprocating saws are becoming more common. For those of us now addicted to untethered tools, it's hard to remember life without them.

It was just 20 years ago, though, when the first cordless tool hit the market — the model 6010D drill from Makita U.S.A. While this drill would seem primitive and underpowered by today's standards, it was the first shot fired in what became a tool revolution.

To celebrate this anniversary, Makita is offering free labor throughout 1999 on service and repairs of any Makita cordless products. Just take the tool to one of the 50 Makita Factory Service Centers. The company will also mark the occasion with two limited edition drill/driver sets. For information call Makita at (800) 462-5482.

Wood Preservers Seek Century's Best

The American Wood Preservers Institute (AWPI), an association representing the pressure-treated lumber industry, is sponsoring the Century's Best Awards, a search for the best pressure-treated lumber structures. To be eligible, your structure must contain a majority of treated lumber, and fit into one of these categories: deck, dock, garden, playground, or any structure showing innovative use of pressure treated lumber. Category winners receive a sculpture, and the overall winner gets a trip to Sundance Resort. Get entry forms from the AWPI at (800)356-2974, or at www.awpi.org. Entry deadline is August 2, 1999.

Multi-Tool Update

In *Toolbox On Your Belt*, our review of multi-tools in the March/April issue, we listed an incorrect telephone number for Schrade. The correct number is (800)272-4723.

Vanity Revision

Eagle-eyed *Workbench* reader Bud Norris discovered a couple of errors while building the bathroom vanity in the Jan./Feb. 1999 issue. In the Face Frame Elevations on page 36, both the upper rail (B) and lower rail (F) should be 51" long. Some screw quantities in the What You'll Need list on page 33 were also off. You'll need (40) #8 × 2" flat-head wood screws, and (26) #8 × 1¼" flat-heads.

Lawn Contest

Lowe's Home Improvement Warehouse and Briggs & Stratton are searching for the country's best lawns with The All-American Lawn Contest. Grand Prize is $5,000, plus there are nine $250 First Prizes, and a $1,000 prize drawn randomly from non-winning entries.

Lawns are judged on appearance, health, creativity, character, and care program. You can get rules and entry forms at Lowe's stores, on the company web site (www.lowes.com), or at www.briggsandstratton.com. Or write your name, address, and daytime telephone number on a 3"×5" card and send it, with a photo and a one-page description of your lawn care program to: All-American Lawn Contest, PO Box 1835, Elgin, IL 60121-1835. Entry deadline is July 31, 1999.

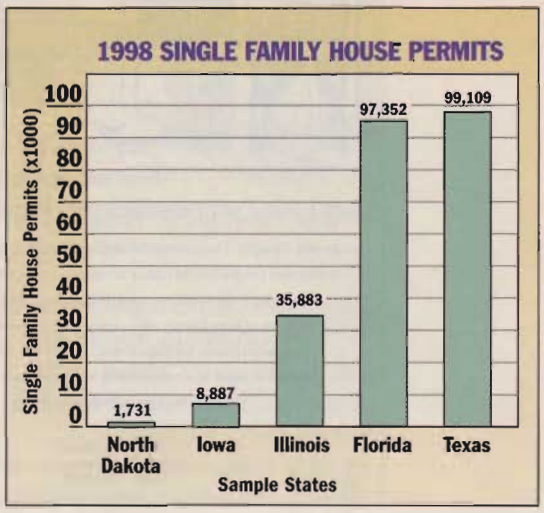
1998 Home Building Rates Remain High

If it seems like new houses are popping up everywhere you look, there's good reason. Fueled by low inflation, and low mortgage interest rates, new home construction continued at a staggering rate in 1998.

According to the United States Census Bureau, building permits were issued for over 1.1 million single family homes in 1998. Add in multiple-family dwellings (duplexes, townhomes, apartments, etc.), and the total tops 1.6 million.

As you might expect, home building doesn't occur at the same rate everywhere. In Washington, D.C. where space is scarce, 255 permits were issued. North Dakota, a state not known for overcrowding, issued permits for just 1,731 homes.

On the other end of the spectrum are states like Florida and Texas. Permits in Florida totalled more than 97,000. In Texas, the figure is in excess of 99,000 — 57 homes for every one home built in North Dakota.



Guide Helps You Improve Air Quality Inside Your Home

People always talk about going outside "to get a breath of fresh air." According to the National Safety Council (NSC), there may be more truth to that old saying than you realize.

The NSC cites environmental studies showing that air inside homes is often more polluted than the outdoor air — sometimes worse than the air quality in industrialized cities. The problem comes into focus when you realize that most Americans spend 90% of their time indoors, 65% of it at home.

You can help protect yourself and your family by identifying the potential hazards in your home, then taking steps to eliminate or control them.

To help you do that, the NSC published an eight-page brochure called *Breathe Easy: a Home Environmental Safety Guide*. In this guide, you'll learn more about the hazards of lead, radon, secondhand smoke, carbon monoxide, volatile organic compounds (VOCs), and more. You can get a copy of *Breathe Easy* by sending $1 to Heggen & Associates, PO Box 5025, Evanston, IL 60204-5025.

You can tap into information on indoor air quality and a variety of other topics by visiting the National Safety Council's web site: www.nsc.org.

Help Choosing the Right Contractor

Even if you're a dyed-in-the-wool DIY'er, at some point you'll likely have a project that requires the services of a professional contractor. For advice on choosing the right contractor you can look to a new pamphlet from the Federal Trade Commission (FTC), the National Association of Homebuilders (NAHB) Remodeling Council, and the National Association of Consumer Advocacy Administrators. *Home Sweet Home...Improvement* outlines the basics on finding a qualified contractor, what credentials to look for, and warning signs to help you spot unscrupulous contractors.

Home Sweet Home...Improvement guides you through finding and using references, and the questions you should ask about their satisfaction with the contractor and the work performed. In addition, there's information on financing, licensing, insurance, and record keeping. Plus, there are guidelines on what to look for in a properly-written contract.

You can get a free copy from the FTC at (202) 382-4357, or on the web at www.ftc.gov. For more information, write to: NAHB Remodelers Council, Dept FT, 1201 15th St. NW, Washington, D.C. 20005. or check out www.remodelingresource.com.

Reading Leaves

Go to a psychic and they may tell your future by reading tea leaves; likewise, to learn about the future of a tree you just have to read its leaves.

According to the National Arborist Association (NAA), leaves tell much about a tree's health. Look for any leaves that are off-color, misshapen, or distorted. Thinning in the canopy (the uppermost portion of the tree) can also indicate problems, as can earlier-than-normal color change in the fall.

For help reading your tree's psychic signs, you can call an NAA-member arborist. To find one in your area, contact the NAA at (800) 733-2622. Or you can search (using your zip code) on the National Arborist Association's web site: www.natlarb.com.

Classic Cedar Fence

A fence should be a natural extension of a home's style, provide a measure of privacy, and reflect the homeowner's values. The chain-link fence that enclosed my yard failed on all counts, so deciding to remove it was easy. Coming up with the right replacement, however, required a lot more thought.

I wanted to gain some privacy without turning my property into a walled fortress. Good looks, low maintenance, and sturdy construction were my other considerations.

The classic design I settled on met all those expectations and more. Alternating wide and narrow infill boards — set with small gaps — screen the yard, but still let light and air pass through. The arches and evenly spaced slats along the top further enhance the open, airy feel.

Weather-resistant cedar was a natural choice for the material, but it's a soft wood prone to splitting, so the construction techniques had to address this problem. Sandwiching the infill boards and slats between paired rails provides strength, yet allows rain water to drain away. An added bonus with this design is that the fence looks equally nice inside or out, unlike most fences which present their better side to the neighbors.

FIND THE SECTION SIZE

A primary rule for building a visually appealing fence is to keep the spacing between posts uniform. Preliminary measurements of the yard confirmed that I could build uniform 8-ft.-long sections. I chose to build them first and set my posts later, even though it required more precise post placement than building the fence on site.

Building the bulk of the fence in standardized modular sections meant I could assemble them in the convenience of my shop, regardless of the fickle springtime weather. It also allowed me to operate in a true mass production mode, cutting all the individual parts for all the sections at once. Then I performed each assembly step on every section before moving outside.

When it came time to erect the fence, a simple spacer system ensured that the posts were exactly where I needed them (see *Setting Fence Posts* on page 34).

SELECT STRAIGHT STOCK

A straight fence starts with straight lumber, but it was tough finding 1x4's at my local lumber yard that weren't crooked or full of knots. Since I needed some 1x12 stock as well, I decided to look for it instead, and found a rack with some beautiful 16-footers. Quickly calculating lumber yield in the wider boards, I bought most of the pile. Even though it meant ripping a few boards to get the narrower widths I needed (not a pleasant task given cedar's irritating sawdust), the resulting straight-grained stock was worth the extra trouble.

Cut the lower and upper rails to length, align the ends, then use a tape and a square to mark the infill board locations — mark both edges of each infill board.

Align the infill boards and mount them with two offset screws in each. Leave the top ends 1/8" proud of the upper rail.

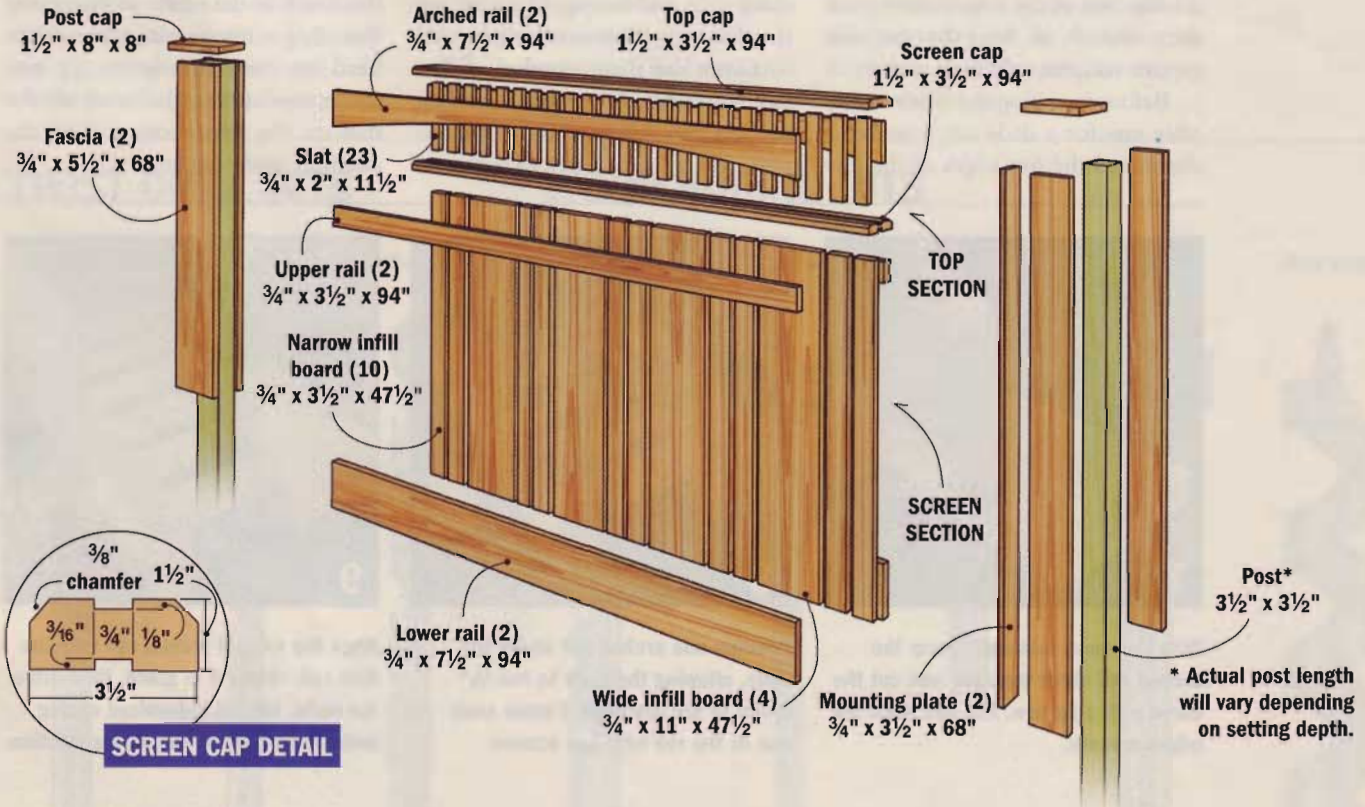
START WITH THE SCREEN

One of the beauties of this fence is its repetition of elements. The "screen" — named for its role in screening the yard from view — consists of an alternating pattern of narrow and wide infill boards separated by 1"-wide gaps (FENCE CONSTRUCTION VIEW). As I ripped the infill boards to width, I noticed that the color varied greatly from one board to the next. I kept this in mind so that later, when I assembled the screens, I could mix the boards to make sure each section contained a similar blend of light and dark.

With the parts cut and sorted, I placed one upper and one lower rail together and carefully marked the location of the infill boards (FIG. 1). Next, I began attaching the infill boards to the lower rail (FIG. 2). Use screws here for strength — the heads will be hidden by the opposing rail. Allow the infill boards to extend 1/8" past the top edge of the upper rail as you screw the infill boards in place.

FENCE CONSTRUCTION VIEW

OVERALL SIZE: 69½"H x 3½"W x 95½"L



Tilt the table saw blade to 45° and cut a 3/8" chamfer on the top corners of all the 2x4 screen and top caps.

Plough a 3/4"×3/16" groove in the bottom of the caps. Lower the blade 1/16" and groove the screen caps' top face.

Layout the centers of the slats (every 3") along the groove in the screen cap. Drill a 1/8" pilot hole at the marks.

(The infill boards' protruding ends will fit into a grooved screen cap.)

Clamp the opposing upper and lower rails in place on top of the infill boards, making sure each pair of rails is aligned. The opposing rails get nailed in place.

MOVE TO THE TOP SECTION

My main concern in designing the top section was keeping the bottoms of the slats firmly fastened to the screen cap so the slats wouldn't twist out of position if they warped or shrank. To keep the slats in check I decided to cut a shallow groove in the top face of the screen cap — just deep enough to hold the slat ends captive without collecting water.

Before swapping the blade in my table saw for a dado set, however, I chamfered the top edges of the 2x4 caps to help shed rain (FIG. 3). Next, I installed a 3/4"-wide dado blade and ploughed a groove in the bottom face of all the screen and top caps (FIG. 4). The groove in the bottom of the screen cap fits over the ends of the infill boards that extend beyond the upper rails. Finally, plough a groove in the screen cap's top face to accept the slats.

Each 8-ft. fence section has 23 slats — 368 total to complete my 16 sections. To efficiently handle such volume, rip all your stock to width first, then use your table saw and a miter gauge equipped with an auxiliary face and a stop block to cut the slats to a consistent length.

Given the sheer number of slats needed, this repetitive cutting motion can lull you into carelessness, so stay alert for kickback and keep your hands safely away from the blade. Also watch out for small offcuts that may creep back into the spinning blade.

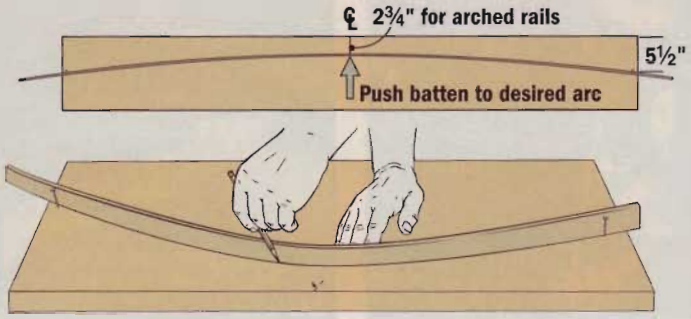
As added insurance against slat movement, screws hold the slats to the screen cap. I marked out the slat centers along the groove in the screen cap. (I also marked the edge locations to make positioning the slats easy.) Then, I drilled a 1/8"-dia. pilot hole completely through the cap on the center marks (FIG. 5). This helps prevent splitting the slats and the screen cap near its ends. It also creates some clearance around the shank of the screw so that as the threads go into a slat, the screw's head can draw the slat snugly into the groove (FIG. 6). Install all the slats on the screen cap and set the assembly aside for now.

With the curve laid out, clamp the arched rail stock together and cut the curve with a jig saw. File and sand the edges smooth.

Position one arched rail under the slats, allowing the slats to run 1/8" proud of the top edge. Fasten each slat to the rail with two screws.

Align the second arched rail with the first rail, clamp it in place, then drive the nails. Use 6d galvanized casing nails as you did on the screen section.

Position each slat in the grooved screen cap, hold it firmly in place, and drive a screw to anchor the assembly.



SKILL-BUILDER

Use a Batten for Long, Graceful Curves

Laying out a long curve, like the one on the arched rail, is simple if you know how to use a batten. This thin flexible strip of wood bends uniformly as you flex it between two end points. For this project, temporarily drive a finish nail in the stock at each end, 5½" from the top edge. Place the batten below the nails and push it along the center line of the board until you get the desired curve. Clamps can help hold the batten in place while you mark out the curve on the stock.

CUT THE ARCHED TOP RAILS

One of the most distinguishing features of this fence is the arched top rail. It was also the most fun to fabricate — especially after cutting all those slats.

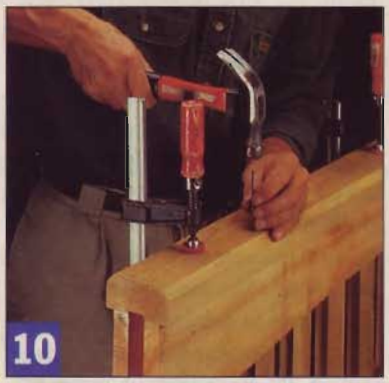
Laying out the curve requires a flexible wood strip that boatbuilders call a batten (see the *Skill-Builder*). I created mine by ripping a ¼"-thick piece off the edge of a 10-ft.-long cedar 2x4. Once I had the curve marked, I clamped the arched rail blanks together and gang-cut them with a jig saw (FIG. 7). This gave me two perfectly matched rails.

Attach the arched rails to the slats just as you did the screen rails and infill boards. Screw through the slats into one arched rail (FIG. 8), then nail the opposing arched rail to that assembly (FIG. 9). Be sure to allow the slat ends to protrude ⅛" beyond the rails' top edges. Complete the top section by aligning the grooved top cap over the slats and nailing it in place (FIG. 10).

COMBINE THE SECTIONS

With the screen and top sections built, it's time to bring them together to complete a fence section. At first, I tried positioning the top section with the screen standing upright, but it was pretty awkward. It worked better if I laid the screen down flat and clamped the top section in position. Nail through the screen cap and into an upper rail about every 6" (FIG. 11). Then flip the assembly over and drive nails along the other side of the screen cap.

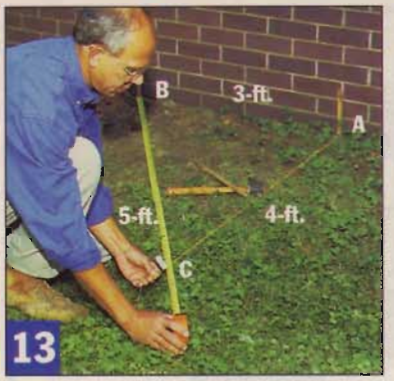
The addition of the mounting plates further ties the top and screen sections together (FIG. 12). If your fence site is level, go ahead and install the mounting plates now. If your site slopes, see *Building a "Level" Fence on Uneven Terrain* on page 30 to learn how the mounting plates are used to compensate for changes in elevation.



Clamp the top cap to the top section assembly and nail it in place. Drive 6d galvanized casing nails through the cap and into the arched rails.

Lay the screen section on a flat surface, fit the infill boards in the grooved screen cap, then clamp and nail the top section in place.

For installations on level ground, fasten the mounting plates where the caps and rails meet the plates. Drive two #8 × 3" deck screws at each joint.



Use the 3-4-5 rule to establish a square corner. With two sides fixed at 3-ft. and 4-ft., move the string line until the distance between points B & C is 5-ft.

Place one end of a straight-edged board atop the first stake, then drive a second stake until the board is level. The difference in the stake heights is the drop.

Position each fence section between pairs of posts and shim the section so the rails are level. Clamp the plates to the posts while you drive the screws.

ESTABLISHING THE FENCE-LINE

With all the fence sections built, I was anxious to get them installed so I could show off all my hard work (and be able to once again park the car in the garage). But installing a fence that's both straight and level isn't a job you want to rush.

Start laying out the fence-line at a corner location or another fixed point. In my case this was the side of the garage. After establishing the location for the first post next to the garage wall, I laid out a string line at 90° to the building, then drove stakes at each post location (FIG. 13).

I'd always thought my yard was fairly flat, but to check it out, I used a straight-edged board and a level to establish a level line between the stakes (FIG. 14). My yard was level from the garage to the side of the lot, but it dropped 24" from that point to the back lot line (32 ft.), requiring me to step the fence down the slope. Since it took four sections to span this distance, I had to drop the top of each successive panel roughly 6" below the previous one. This also required the posts for the staggered sections on the slope to be 6" longer than those on level ground. (I set mine extra long, then cut them to the proper height.)

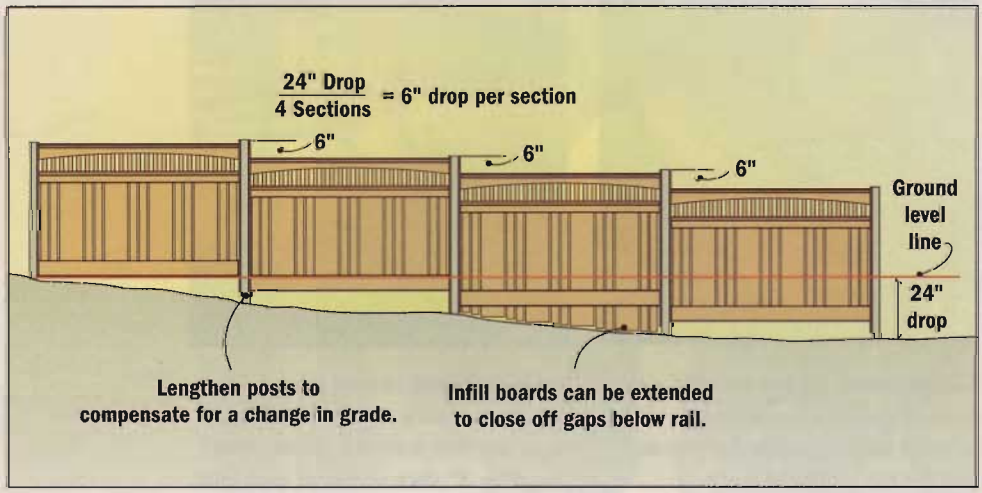
With the post alignment, position, and height determined, I dug the holes and set the posts (see *Setting Fence Posts* on page 34). After the concrete had cured for several days, I was ready to install the fence sections.

INSTALL THE PANELS

Up to this point, I easily managed the sections by myself, but to jockey and install them between the posts, I needed a helper. Beginning at the posts nearest the garage, I positioned a section with the top of one mounting plate flush with the top of the first post. After clamping this plate to the post, I adjusted the other end of the section until the rails were level, then drove screws through both mounting plates to fasten the fence section to the posts (FIG. 15).

Where the fence steps down a slope, you'll need to adjust the position of the "downhill" mounting plate *before* you install it on the panel (MOUNTING PLATE STEPS).

BUILDING A "LEVEL" FENCE ON UNEVEN TERRAIN



You want to step down a slope so that each fence section remains level and the drop from one section to the next is uniform. To do this, extend a level line from the ground at the top of the slope to the end of the run and measure the amount of drop. Divide the drop by the number of sections to determine how much you should lower each consecutive section. On steep ground, you may need sections that are half as long as a standard section, or use infill boards that extend below the lower rail to close off gaps.

Make sure the tops of the adjacent mounting plates are flush with the top of the post. Shim the lower end of the mounting plates if necessary.

Nail fascia boards over the posts to hide the pressure-treated wood and to give the posts extra visual weight. Install fascia on both front and back.

Screw the hinges to the gate, shim the gate plumb in the opening, then screw the hinges to the post framing.

To mount the next offset section, align the "uphill" mounting plate flush with the top of the post (FIG. 16). Then repeat the previous installation steps.

ADD THE FINISHING TOUCHES

Though the fence appeared complete from curbside, I had a few more steps to go before it was finished. To mask the pressure-treated posts and make them appear more substantial, I added 1x6 cedar fascia to the front and back of each field post, and 1x8 fascia on the corner post (FIG. 17).

The posts also got square caps made from 2x10 cedar. I chamfered the top edges slightly with my table saw and nailed them in place.

HANG THE GATE

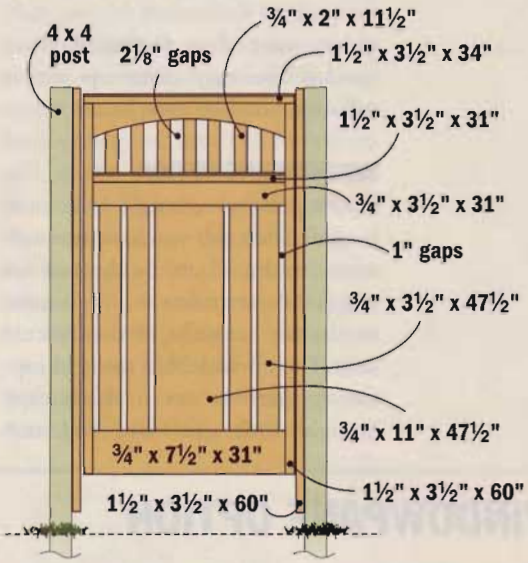
No fence is complete without a gate and I built one to match the fence sections, including the arched top section (GATE ELEVATION). At 34" wide, it gives me plenty of clearance for my lawn mower. If you need a wider opening, create a pair of facing gates for wide-open access.

I allowed for mounting a 2x4 to the post on either side of the gate opening to give me surfaces for mounting the hinges and latch hardware (FIG. 18).

Although I styled this fence to fit with my house, its modular construction allows for many variations. You'll find three top section options on page 32 that may better suit your tastes and your home's style.

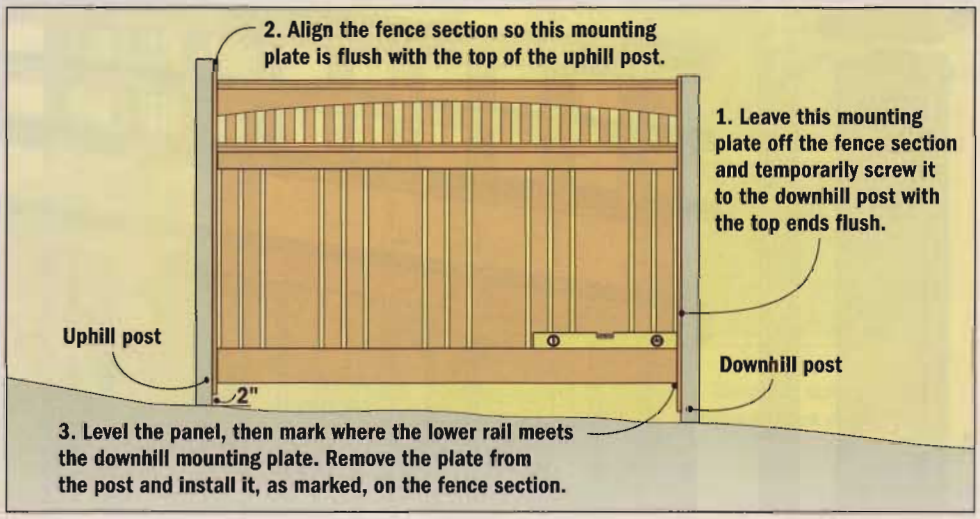
GATE ELEVATION

(FRONT VIEW)



MOUNTING PLATE STEPS

You'll need to compensate for the slope change on the "downhill" mounting plate. (Otherwise, the plate sticks up above the top of the post and leaves an exposed section of post below.) Use the procedure shown to position the downhill mounting plate. With the position determined, install the downhill plate on the fence section. Then reposition the fence section between the posts, placing blocks under the mounting plates to hold it at the correct height. Drive screws to mount the section to the posts.



Fence Options

The fence I built, with its upper sections made up of arched rails and narrow slats, looks great at my home. But what if you like the basic look of my fence, yet don't think it's quite right for you? Well, the solution may be within easy reach, because one of the best features of this fence design is its flexibility. By keeping the screen sections of the fence the same as mine, but changing the top sections to suit your preferences, you could have the look you're after. I've illustrated three options. You may come up with a variation you like even better.

WINDOWPANE OPTION

Looking for something a little more formal? Then this windowpane-style upper section could be the one for you. Its construction is very similar to the top sections of the fence I built. The 2"-wide slats are held captive in grooves cut in both caps. Straight 1x2 grid and top rails replace the arched rails of my fence, and give a more formal appearance. I can imagine this fence going well with a Victorian cottage, a colonial two-story, or even a bungalow.

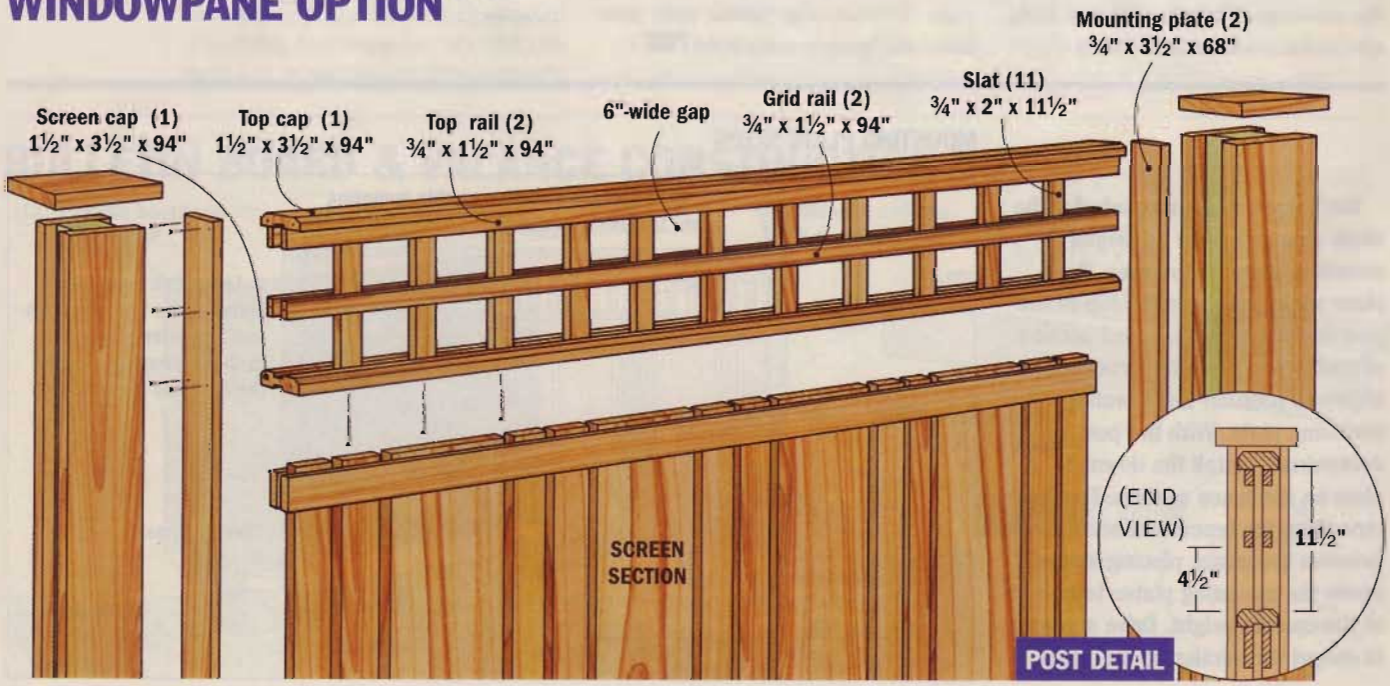
RANCH OPTION

To mimic the long, low lines of a ranch-style home, I would use three rails to span the distance between the posts.

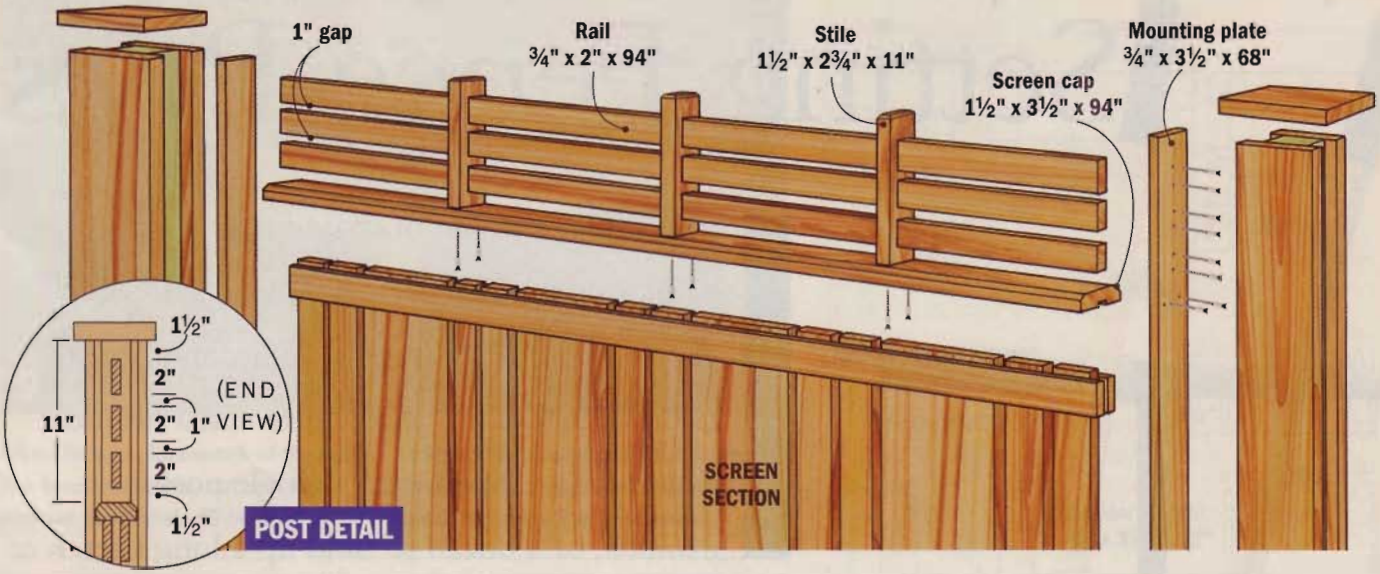
With this design, you still chamfer the edges of the screen cap — the evenly spaced stiles, ripped from 2x4 stock, sit on the cap and are held there with screws driven from below. The 1x rails pass through mortises formed in the stiles. Once they're laid out, these mortises can be quickly machined by drilling overlapping $^{3}/_{4}$"-dia. holes to remove the bulk of the waste, then use a chisel for the final clean up.

I also recommend chamfering the top of each stile to dress up the exposed ends. A table mounted

WINDOWPANE OPTION



RANCH OPTION



router equipped with a chamfering bit works best.

After completing the mortises you can slide the rails and stiles together and screw the stiles to the screen cap. You'll still be able to fine-tune the rail positions at this point, but once you have them set, drive a 4d finish nail at each stile-to-rail joint to lock everything in place. Drive screws through the mounting plates and into the cap and rails to help hold it all together.

MIXED MATERIALS OPTION

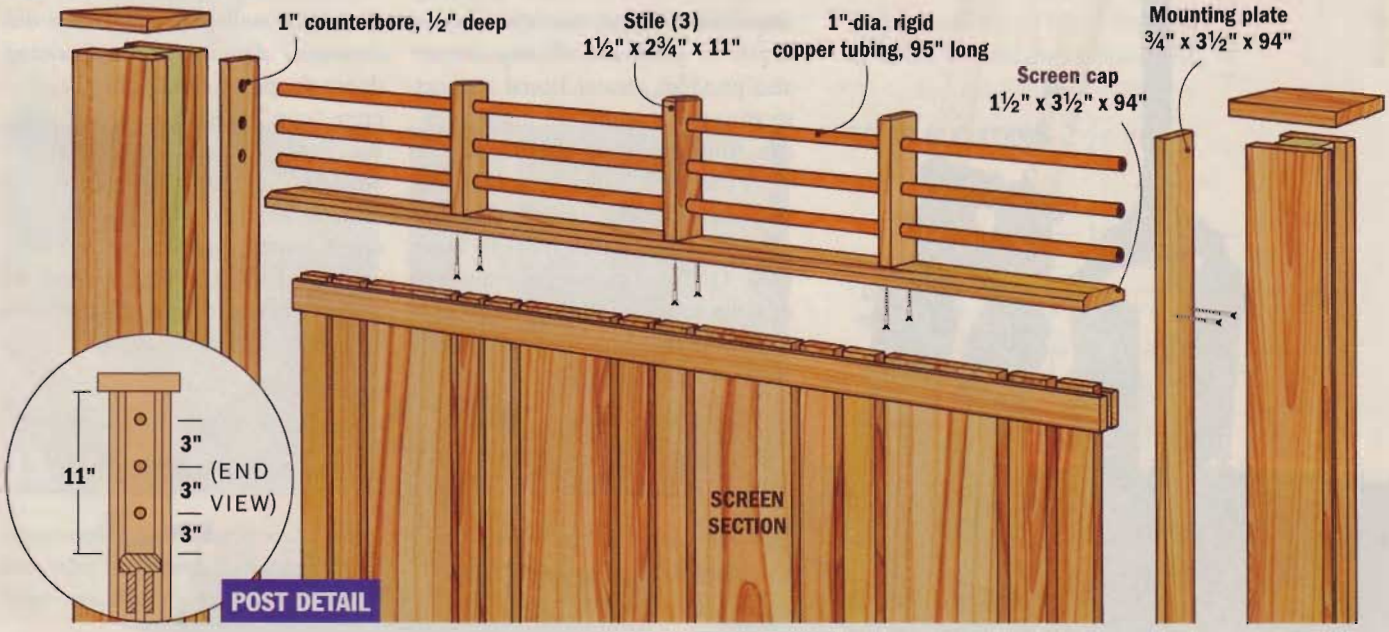
Thinking beyond wood options opens up lots of possibilities. Using rigid copper pipe, for example, creates an interesting contrast that will mellow over time — copper takes on a greenish patina as it ages.

This kind of copper, widely used for plumbing, is available at home centers and hardware stores. Generally speaking, 1"-dia. and ¾"-dia. are best for this application, and both come in 10-ft. lengths.

Like the ranch option, start by cutting the stiles to size and drill holes for the pipes. Slide the stiles onto the pipes, then screw the stiles to the cap so they're evenly spaced. Drilling ½"-deep counterbores in the mounting plates provides a way of holding the pipes in place.

These are just three ideas, but many looks are possible. Once you toss different post cap and fascia treatments into the mix, the potential options expand even more.

MIXED MATERIALS OPTION



Setting Fence Posts

Setting posts is one of those jobs where it really pays to do it right the first time. It's not a complex process, but a few common mistakes can result in premature post failure and a heap of extra work. Whether it's a single post for a mailbox, or a dozen to hold up a long stretch of fence, follow these simple steps and you'll set posts that will still be standing straight and tall years from now.

CAN YOU DIG IT?

Probably the single biggest mistake people make when setting posts is not sinking them deep enough. If you don't go below the frost line, seasonal movement of the soil due to the freeze/thaw cycle can literally push your posts out of the ground.

By going below the frost line, you ensure that frost won't form under the end of the post where it can push the post upward. Typically, you should go down at least 24", but check with the local building inspector to find out the proper depth in your area. Going deeper also provides greater lateral support so your posts won't lean under pressure from the wind or other forces.

A clamshell digger (near left) or a post auger (far left) is standard equipment for digging post holes by hand (FIG. 1). If you have a great number of holes to dig or the soil has a high clay content, consider renting a power auger. The post hole diameter should be roughly three times the post thickness (12" for a 4x4) so the concrete footing around the post will be thick enough to provide the required strength.

When you reach the proper depth, flare the walls of the hole, starting about 12" above the bottom to create a bell shape. This provides additional resistance to the upward forces of the frost.

REST THE POST IN A GRAVEL BED

The second most common mistake beginners make is to encase the entire bottom end of the post in concrete. As any post dries and shrinks, it will pull away from the concrete, allowing water running down the post to collect in this concrete "cup." This in turn can cause the post to rot prematurely. (It's advisable to use pressure-treated lumber anytime the wood is in direct contact with the ground.)

Instead, set the post on top of several inches of gravel to allow water to drain away (FIG. 2).

Use a clamshell digger or post auger to dig the hole below the frost line. Once you reach the proper depth, flare the lower end of the hole.

Place several inches of gravel in the bottom of the hole. The post should rest directly on the gravel so water traveling down the post can drain away.

Drill holes in the post and insert ½"-dia. steel rebar. The rebar anchors the post securely in the concrete footing.

Inserting rebar through holes in the post anchors it in the concrete footing. This keeps the post from moving up or down once it shrinks away from the concrete (FIG. 3).

LINING THINGS UP

If you're setting a single post, you need worry only about getting it plumb. Setting multiple fence posts, however, requires that the posts also be aligned and spaced correctly.

Stretching a string line is the easiest way to establish a fence line. Offsetting the string line a given distance from the posts — 6" for example — gives you room to work without bumping the string.

To set the first post, drive a pair of stakes into the ground at right angles to each other and about 3-ft. from the post hole. Screw a 5-ft. long brace to each stake. Place the post in the hole, and adjust it to the proper offset distance from the string.

Now slide one brace into position, adjust the post until it's plumb in one plane (side-to-side), recheck the offset, then screw the brace to the post (FIG. 4). Plumb the post in the other direction (front-to-back) and secure the second brace. A post level secured to the post gives you readings in both planes and frees your hands.

With the post secure, mix a batch of concrete and carefully shovel it around all sides of the post (FIG. 5). Bring it up in even layers, or lifts, to just above ground level. Thrust a stick repeatedly into the concrete as you go to mix the layers and work out any air bubbles.

SPACING OUT THE POSTS

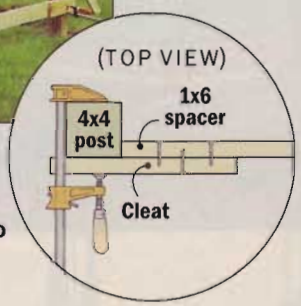
With one post set, you can move on to the next. A pair of simple spacers accurately duplicates the width of the fence section that will fit between the posts. The spacers, with cleats that overlap the posts, get clamped between the posts (FIG. 6).

Once the second post is positioned properly to the first post and aligned to the string line, brace it plumb and pour the footing. Then follow the same procedure for subsequent posts.

Before you install the fence sections, let the concrete cure for several days so it achieves most of its overall strength. With a little patience, you'll avoid cracking a footing and your post installations will remain rock-solid.

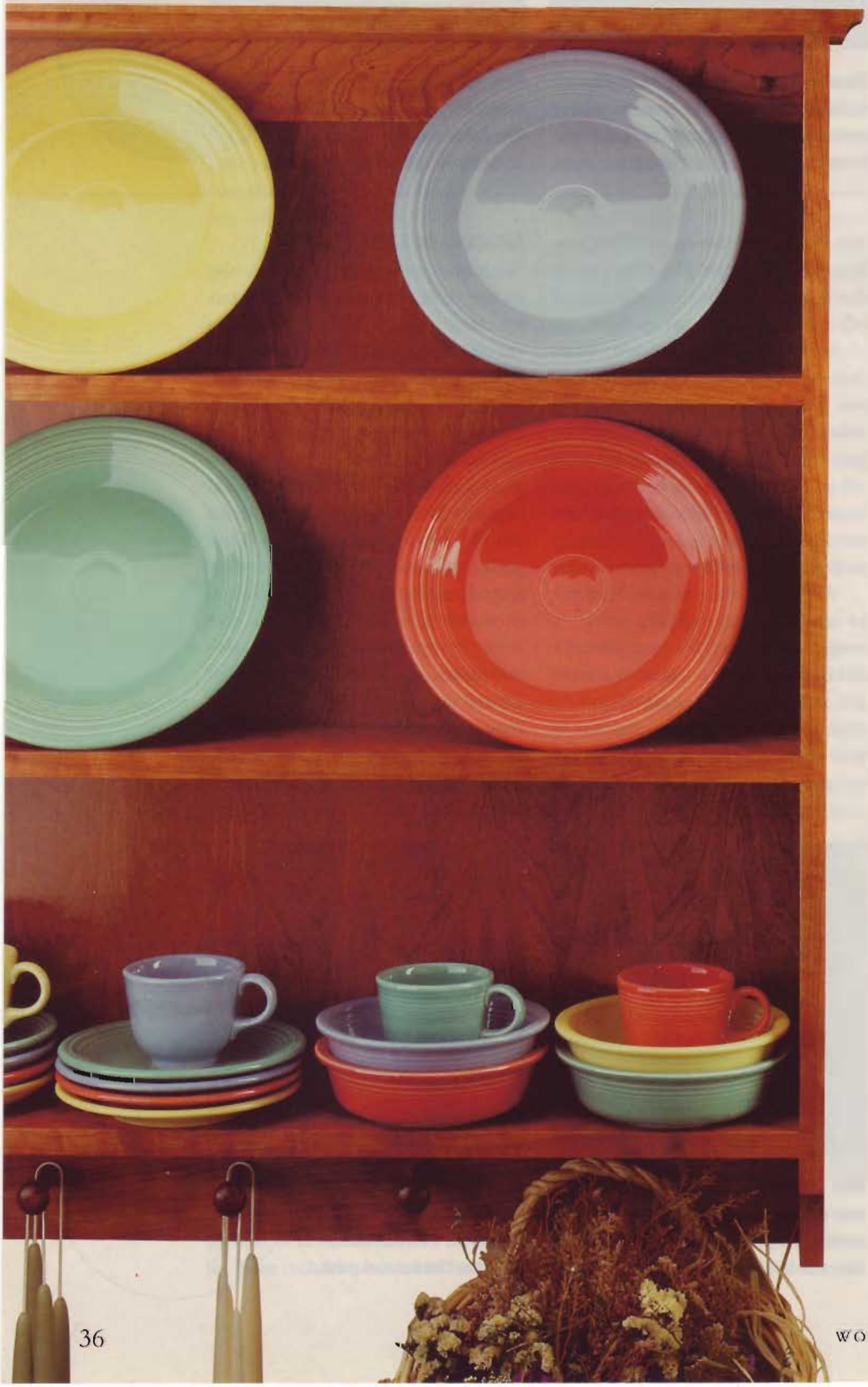
Plumb the post side-to-side and attach a brace. Then plumb and brace it front-to-back. A post level attached to the post leaves both hands free.

With the post braced plumb, fill the hole with concrete, bringing it up around the post in even layers. Take care not to shift the post out of plumb.



With one post secure, use a pair of spacers the same length as a fence section to position the second post.

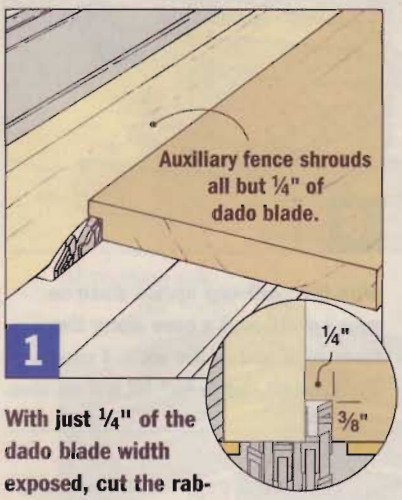
Shaker-Style Shelf



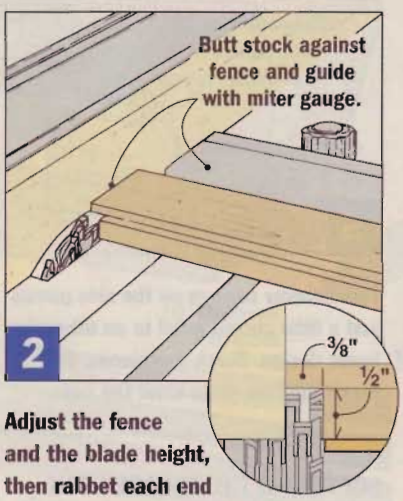
Only woodworkers with far too much shop space (not that I've ever met any) would have much tolerance for bare walls, idle areas that aren't crammed with tools, jigs, and lumber. I think a wall that doesn't do anything but hold up a building is just plain lazy.

Of course, the cluttered chaos in my shop isn't the best look for a home's interior. Take my kitchen, for example. It's hard to find a more utilitarian space in the house, but outfitting it like an industrial shop wouldn't do. I had a blank kitchen wall just begging for a more useful life, but it bordered a high-traffic area where even the modest 12" depth of a standard wall cabinet was too much. Besides, the kitchen had plenty of enclosed storage.

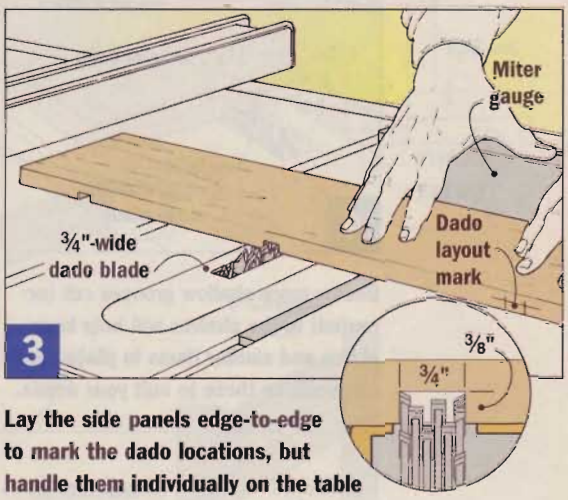
This Shaker-style shelf added function to the kitchen without the bulk of more cabinetry. Not only does it have a lighter look than a wall cabinet, it lets you add character and color to a room by displaying favorite objects. Its clean lines, wood pegs, and cherry wood recall the Shaker look, and so does its utility — keeping everyday items close at hand, easy to store and retrieve. (Need a different look? See *Shelf Options* on page 40.)



With just ¼" of the dado blade width exposed, cut the rabbets for the back panel.



Adjust the fence and the blade height, then rabbet each end of the upper and lower rails.



Lay the side panels edge-to-edge to mark the dado locations, but handle them individually on the table saw when making the cuts.

START WITH SIMPLE JOINERY

Most home centers or lumber yards stock some ¾"-thick hardwoods, but if cherry isn't one of them, a local hardwood retailer can supply and mill the stock you need. You can concentrate on the joinery and details (SHELF CONSTRUCTION VIEW, SIDE PANEL ELEVATION).

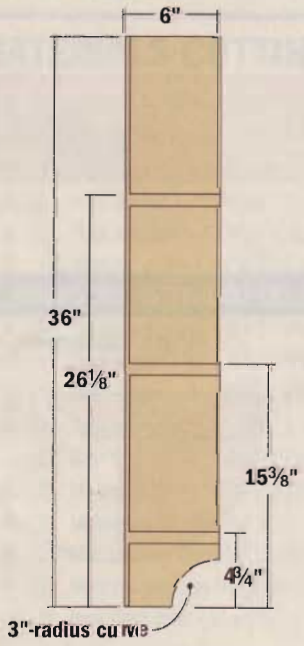
With the lumber dimensioned, install a ¾"-wide dado blade and a sacrificial auxiliary fence on your table saw. Start by rabbeting the back edges of the side panels and the upper and lower rails (FIG. 1). The rails also get a rabbet at each end (FIG. 2), but you have to adjust both the fence position and the blade height beforehand. These end rabbets let the rails nest flush with the back edges of the side panels.

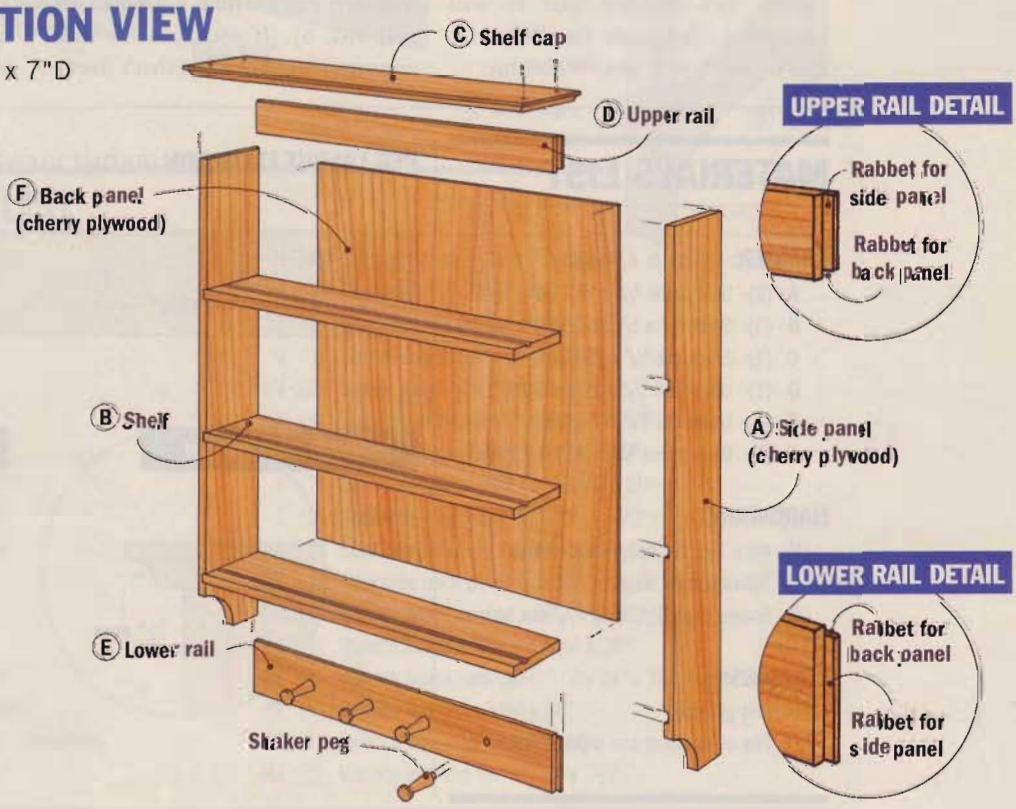
To cut the dadoes (three in each side panel), move the rip fence aside to expose the full ¾" width of the dado blade. Lower the blade height to ⅜" and use the miter gauge to guide the stock (FIG. 3).

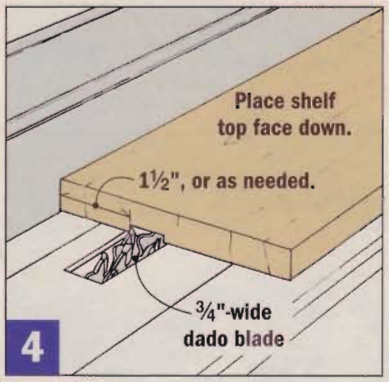
SHELF CONSTRUCTION VIEW

OVERALL SIZE: 36¾"H x 32"W x 7"D

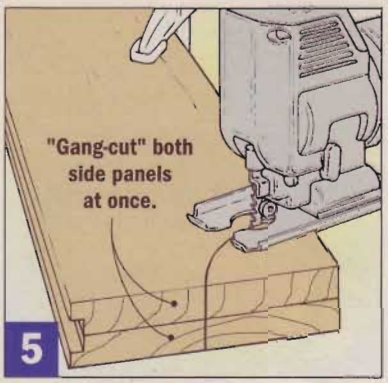
SIDE PANEL ELEVATION







One or more shallow grooves cut (or routed) in the shelves will help keep plates and similar items in place. You can position these to suit your needs.



The cutaway corners on the side panels add a little curved relief to an otherwise linear design. Stack the pieces, cut them together, then sand the cuts.

With the shelf cap upside down on your bench, rout a cove along the front edge and at the ends. I used a ½" cove bit, but a ⅜" bit will do also.

There's one last detail you can add while you have your dado blade set up, but it's optional. If you want to display plates on the shelves like I did, cut a ¾"-wide groove (about ⅛" deep should do) in the top face of each shelf (FIG. 4). This will keep plate rims captive so they don't slide off the shelf, and it helps with framed pictures and other standing objects as well. More typically, a rounded cutter is used for this detail so the bottom of the groove is contoured rather than flat. It's another option to consider, but it will require an edge guide for the router and a core box (round-nose) bit.

SOFTENING THE SQUARE LOOK

Staying consistent with the Shaker style means keeping the lines simple, but this doesn't mean that straight and square is the answer for every detail. I cut arcs at the front lower corner of each side panel (FIG. 5). The arc radius measures 3" from the corner, but this dimension isn't critical. Just use a compass or the rim of a 3-lb. coffee can to lay out the arcs before cutting them with a jig saw. I also routed a ½" cove on the front and end edges of the shelf cap (SHELF CAP DETAIL, and FIG. 6). (If you have the more common ⅜" cove bit, that's fine.)

The wood pegs on the lower rail reflect another favorite Shaker touch. A typical Shaker home would feature dozens of them, used to hang coats, kitchen items, and even chairs. (If your local retailers don't stock Shaker pegs of this size, you can order them from a number of catalog sources, including Woodcraft at 1-800-225-1153 or Rockler at 1-800-279-4441.)

To achieve a clean, snug fit for the pegs, the holes must be drilled straight and to a consistent depth (PEG LAYOUT ELEVATION). Using a drill press is the most reliable way to do this, but if you don't have one

MATERIALS LIST

LUMBER: (15 bd. ft. 4/4 cherry)

A	(2)	Side panel	¾" x 6" x 36"
B	(3)	Shelf	¾" x 5¾" x 29¼"
C	(1)	Shelf cap	¾" x 7" x 32"
D	(1)	Upper rail	¾" x 2½" x 29¼"
E	(1)	Lower rail	¾" x 4" x 29¼"
F	(1)	Back panel	¼" x 29¾" x 30¼"

HARDWARE:

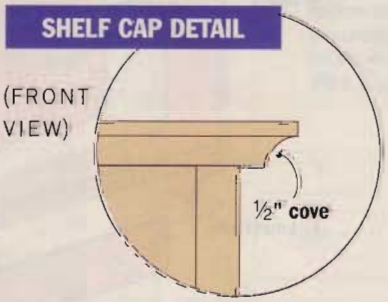
(4) #8 x 1¼" flat-head wood screws
(4) ⅜"-dia. wood plugs
(4) Shaker pegs 3½" long, ½"-dia. tenon

FINISHES:

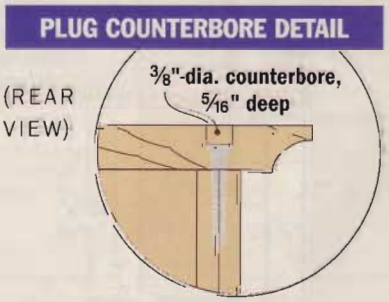
(1) Pint gel stain
(1) Pint oil-polyurethane wipe-on finish

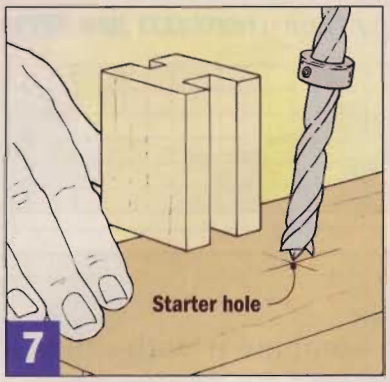
PEG LAYOUT ELEVATION (FRONT VIEW)

SHELF CAP DETAIL

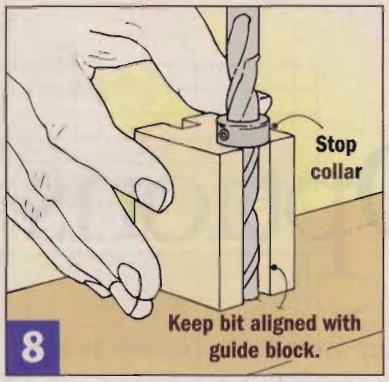


PLUG COUNTERBORE DETAIL

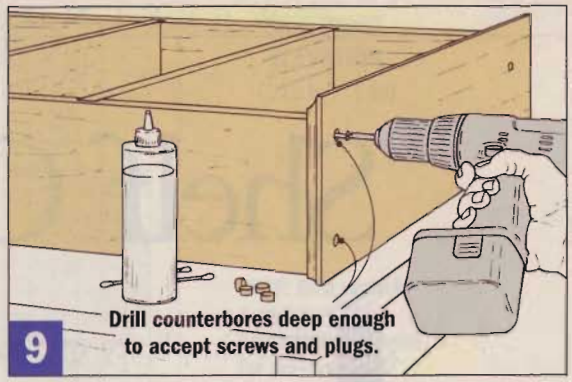




To get accurate holes for the peg tenons, locate a sharp brad-point drill bit at the hole center, then move your drill guide block into position.



Snugging the guide block up against the drill bit automatically aligns the bit for straight drilling. A stop collar limits the hole depth to 5/8".



Set the assembly on its back to fasten the shelf cap. Drive the screws, swab glue in the counterbores, then tap in the plugs and trim/sand them flush.

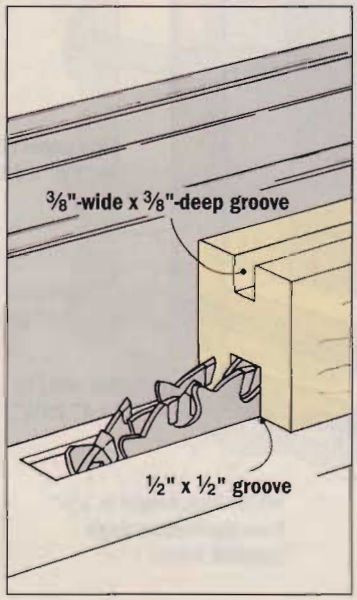
you can make a simple guide that helps control both the angle and the cutting depth of the drill bit (see the SKILL-BUILDER). Dimple each hole center location with an awl, then set a 1/2"-dia. brad-point bit in place and use the guide block to align it for drilling (FIG. 7). To limit the depth to 5/8", use a stop collar or a masking tape flag so the bit doesn't blow through the back of the cleat (FIG. 8). You can also use this setup (with a 3/8"-dia. bit) to drill holes for the shelf cap plugs, but they must be shallower (PLUG COUNTERBORE DETAIL). Have your plugs on hand to figure the correct depth.

ASSEMBLY AND FINISHING

The last part you need to cut for this project is the back panel. I used 1/4"-thick cherry plywood here, cut to nest inside the rabbeted edges of the side panels and the rails. It helps to set this panel in place as you clamp the shelf assembly, but glue only the shelves and rails in place. The carcase will stay square until the glue sets, then you can remove the panel and fasten the shelf cap with glue and screws (FIG. 9). Use a cotton swab to spread a little glue in the counterbores, then insert the plugs and tap them home. Whether the screw plugs are store-bought or shop-made, they'll probably stand proud of the surrounding wood surface. A few passes with a hand plane will trim them closer, and a sanding block will get them flush.

I chose to apply my stain and finish to the project while the back was still detached. It made wiping and sanding the oil/urethane finish (between coats) a lot easier.

I fastened the back panel with 3/4"-long brads, glued the pegs in, then drilled a couple of mounting holes through the upper rail. These holes should correspond to stud locations in your wall so you can mount the shelf securely.



SKILL-BUILDER

Low-Tech Drill Guide is Easy to Make

If you count speed, accuracy, and convenience important in your shop, a drill press fits the description. But you can still get good results without one. You can cut multiple guide blocks from a length of 2x2 with grooves (to match drill bit diameters) cut in opposite faces. By keeping the bit captive on three sides, the block all but guarantees correct alignment. The end of the block can also act as a depth stop against a bit collar or the drill chuck itself.

Shelf Options

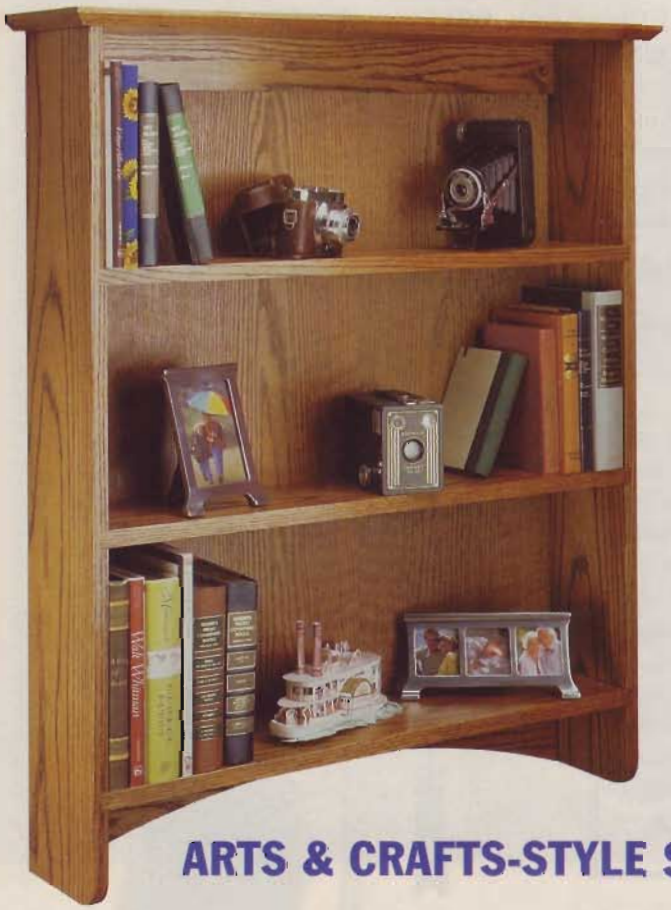
The simplicity of Shaker furniture makes it easy to combine it with other styles, but if the cherry shelf I made for my kitchen just won't work with the stuff you've already got in your home, here are a couple of variations on the theme. Both of these versions share the same basic construction of the Shaker-style original, but offer different looks.

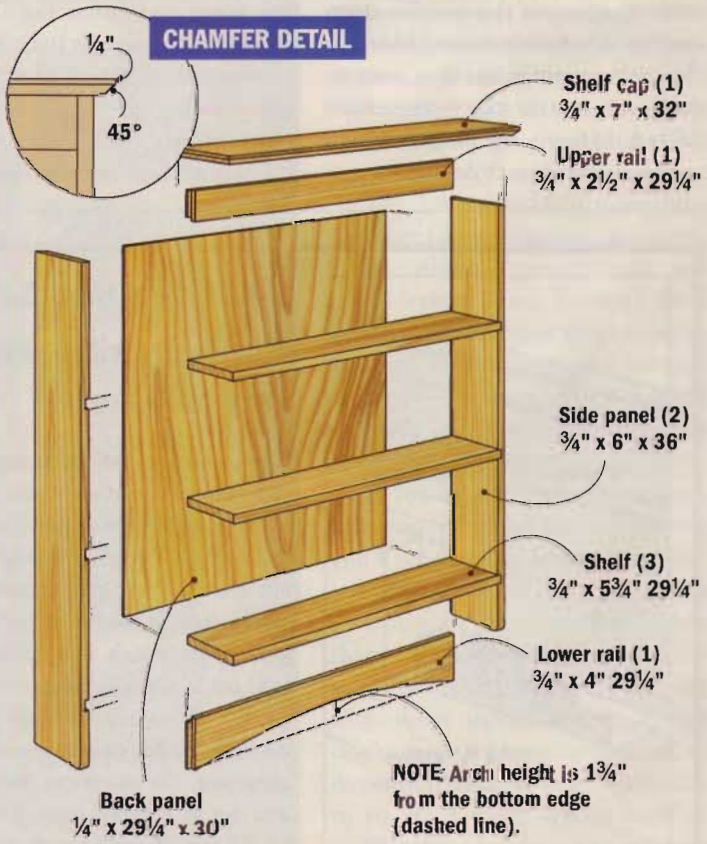
First, an Arts & Crafts-inspired version in oak. Like the shelf I built, this one isn't a pure reproduction, but its roots are easily recognizable. The example shown features plain-sawn red oak, with its characteristic reddish cast and "cathedral" figure (the large sweeping grain arcs). Coupled with the beveled shelf cap and the arched lower cleat, this gives the shelf some of the flavor of the Craftsman style (another name for the Arts & Crafts look), but switching to quartersawn white oak would bring it even closer to an original. Like the cherry I used for the Shaker version, quartersawn white oak is often associated with particular furniture styles such as Mission or Arts & Crafts, and adds an authentic look.

GOIN' COUNTRY

The wood choice for the last design option — knotty pine — establishes this version as rustic beyond a doubt. The curved contours echo the look of traditional country furniture. And even though it's a big departure from the hard-line look of the other units, it isn't really any tougher to build.

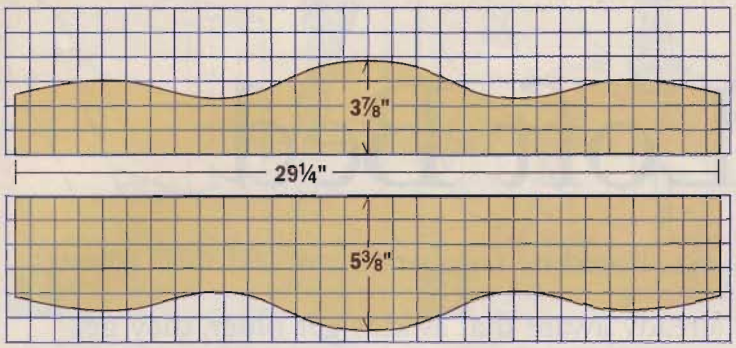
Following the same sequence is still important, though — cut the joinery first, then cut the curves.



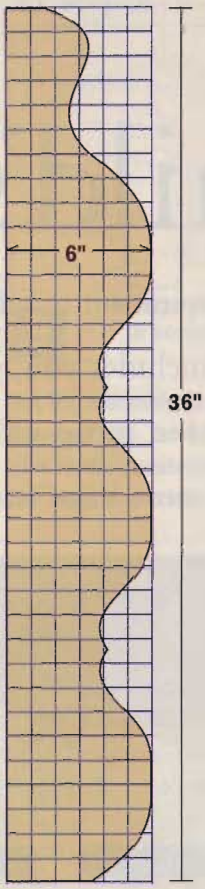


ARTS & CRAFTS-STYLE SHELF

UPPER RAIL ELEVATION (FRONT VIEW)



LOWER RAIL ELEVATION (FRONT VIEW)



SIDE PANEL ELEVATION
(SIDE VIEW)

NOTE: Grid scale is 1 square = 1". Also, dado locations for shelves are identical to those of Shaker-Style Shelf.

With all the scrollwork on the side panels, you're removing straight edges that are useful as reference surfaces for machining the dadoes. Note also that rather than plywood, individual pieces of pine bead board are used for the back panel.

SOME NOTES ON FINISHING

While I'm on the subject of wood species, I should add that each of the three woods used for these shelf units got finished a little differently. The oak was pretty straightforward — just an oil-based stain for color and several applications of a wipe-on oil/urethane for a top coat. But cherry and pine are both known for splotching and staining unevenly. I used a gel stain for a more uniform tone on the Shaker shelf, and a stain controller on the country-style pine shelf, then a honey-colored oil stain. All top coats were wipe-on finish.

COUNTRY-STYLE SHELF

Child's Loft Bed

The inspiration for this project should be familiar to any seasoned parent. If that includes you, you're already aware that as kids get older, they get involved in more and more things — sports, hobbies, computer clubs. Their list of "must-have" stuff grows along with their bodies, until closets and dresser drawers can't begin to hold it all. Where a room addition isn't an option, furniture can add usable space by going up instead of out — something families with bunk beds already know. But what if you need to stack function instead of the kids themselves? With a generously sized desk, a pair of sturdy bookcases, and a handy bulletin board, this bed design does just that.

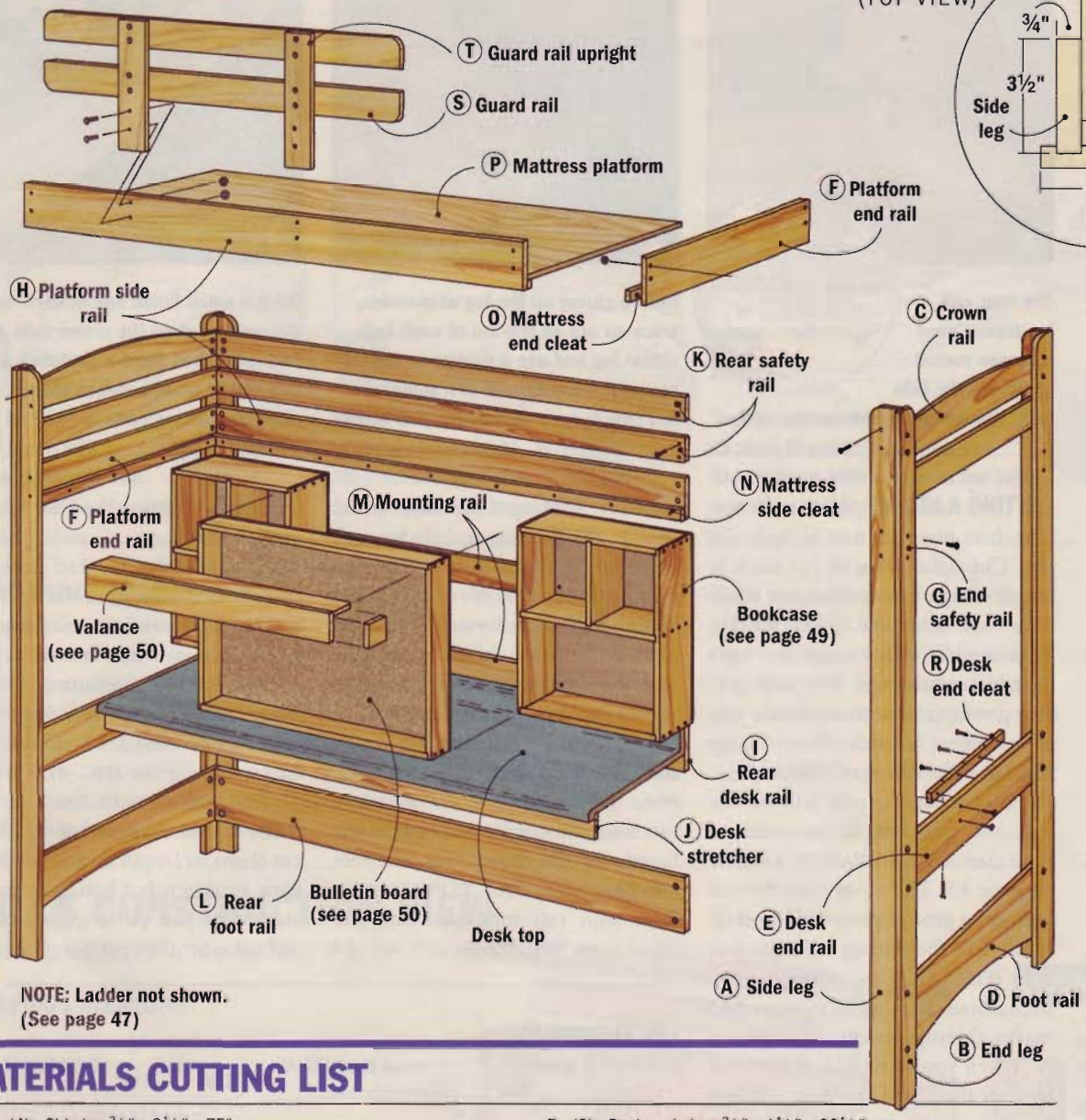
Best of all, the project is an easy-to-build group of simple assemblies. By using standard dimensional pine lumber, a laminate countertop for a desk surface, and very basic joinery, I managed to get the bed done in just a couple of weekends.

The job of holding everything together falls to fasteners — namely a few dozen carriage bolts and wood screws. These fasteners allow the bed frame and all of its components to break down into portable sections — a must with a finished assembly as big as this (LOFT BED CONSTRUCTION VIEW).

If you take a look at the construction view and the cutting list, you'll see that I've designed the project around "run of the mill" lumber — that is, $^3/_4$"-thick stock in widths that come standard from the sawmill: $1^1/_2$", $3^1/_2$", $5^1/_2$", and so on. This keeps things simple, so you don't need a planer or jointer to dimension stock, or even a table saw to rip it. A miter saw or portable circular saw, a router, a jig saw, and a drill will cover all the basics.

LOFT BED CONSTRUCTION VIEW

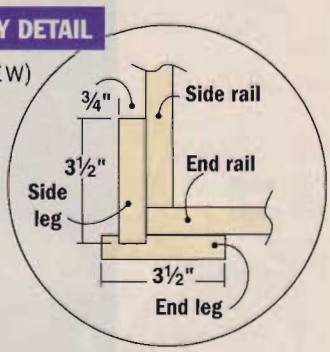
OVERALL SIZE: 75"H x 42½"W x 79"L



NOTE: Ladder not shown. (See page 47)

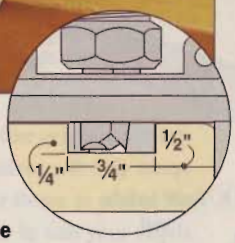
LEG ASSEMBLY DETAIL

(TOP VIEW)



MATERIALS CUTTING LIST

A	(4)	Side leg ¾" x 3½" x 75"	
B	(4)	End leg ¾" x 3½" x 75"	
C	(2)	Crown rail ¾" x 5½" x 41"	
D	(2)	Foot rail ¾" x 7½" x 41"	
E	(2)	Desk end rail ¾" x 5½" x 41"	
F	(2)	Platform end rail ¾" x 5½" x 41"	
G	(2)	End safety rail ¾" x 3½" x 41"	
H	(2)	Platform side rail ¾" x 5½" x 76"	
I	(1)	Desk rear rail ¾" x 5½" x 76"	
J	(1)	Desk stretcher ¾" x 3½" x 76"	
K	(2)	Rear safety rail ¾" x 3½" x 76"	
L	(1)	Rear foot rail ¾" x 7½" x 76"	
M	(2)	Mounting rail ¾" x 3½" x 76"	
N	(2)	Mattress side cleat ¾" x 1½" x 76"	
O	(2)	Mattress end cleat ¾" x 1½" x 38½"	
P	(1)	Mattress platform ¾" x 39½" x 76" (plywood)	
Q	(1)	Rear desk cleat ¾" x 1½" x 74½"	
R	(2)	Desk end cleat ¾" x 1½" x 22½"	
S	(2)	Guard rail ¾" x 3½" x 54"	
T	(2)	Guard rail upright ¾" x 3½" x 16¼"	
U	(2)	Ladder upright ¾" x 3½" x 72"	
V	(5)	Ladder rung ¾" x 3½" x 14½"	
W	(4)	Bookcase side panel ¾" x 9¼" x 24"	
X	(2)	Bookcase top panel ¾" x 9¼" x 20"	
Y	(2)	Bookcase center shelf ¾" x 9¼" x 20"	
Z	(2)	Bookcase lower shelf ¾" x 9¼" x 20"	
AA	(2)	Bookcase divider ¾" x 9¼" x 10½"	
BB	(1)	Bookcase back panel ¼" x 20¾" x 24" (hardboard)	
CC	(2)	Bulletin board rail ¾" x 3½" x 35¼"	
DD	(2)	Bulletin board stile ¾" x 3½" x 24"	
EE	(1)	Bulletin board back panel ¼" x 24" x 36" (hardboard)	
FF	(1)	Valance top ¾" x 3½" x 36"	
GG	(1)	Valance fascia ¾" x 3½" x 36"	
HH	(2)	Valance end cap ¾" x 3½" x 2¾"	



The four end leg pieces need a groove routed to accept the side legs. Use an edge guide on the router.

Before gluing up the leg assemblies, trace an arc on the top of each individual leg and use a jig saw to cut the contour. A coping saw can substitute but may leave a slightly rougher edge.

Drive a small finish nail at each end of the arc layout on the crown rails and foot rails, then bend a yardstick or a thin slat of wood between them to mark the cutting line.

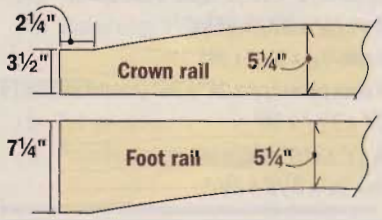
GETTING A LEG UP

The best place to start is with the legs. Cut eight pieces of 1x4 stock to length using a power miter saw if you have one, otherwise, mark the cut lines carefully with a square and use a portable circular saw. (For help getting great results with a portable saw, see *Using a Circular Saw* in the Mar/Apr 1999 issue of *Workbench*.)

Four of these pieces will be side legs, and they can be set aside for now (see LEG ASSEMBLY DETAIL on page 43). The other four, the end legs, get a groove routed along their inside face for joining with the side legs (FIG. 1). The grooved joint strengthens the leg assemblies and makes glue-up easier.

When you've routed all four end legs, set them and the four side legs on your bench and mark the positions of all the horizontal rails and their fasteners (LEG ELEVATIONS). You'll be drilling the bolt holes later — just prior to assembly. Mark also the curved outlines at the top of each leg, and cut them to shape with a jig saw or coping saw (FIG. 2).

ARCHED RAIL ELEVATIONS



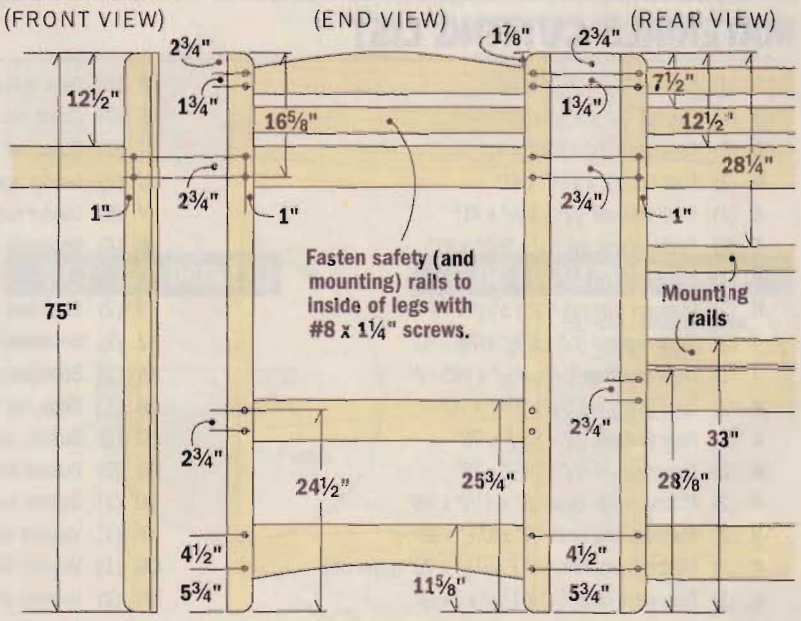
After sanding the cuts, spread glue in the grooves and clamp each leg assembly together. If setting up a lot of clamps for this step doesn't appeal to you and you don't mind exposed fastener heads along the end legs, you can drive screws to secure them (glue is still required).

MAKING THE RAILS

Now return to your curve-cutting mode so you can lay out and cut the boards for the crown rails and foot rails (ARCHED RAIL ELEVATIONS). Start with 1x6 and 1x8 boards for these parts, respectively, and lay out the curves (FIG. 3). Due to the greater shrinkage in wider boards, you may find that the 1x8 stock you buy varies a little from the width in my plans. To avoid errors, always use the top edge of the boards as your reference when measuring for the curve layout (or the bolt hole locations yet to come). Then make the cuts with a jig saw (FIG. 4).

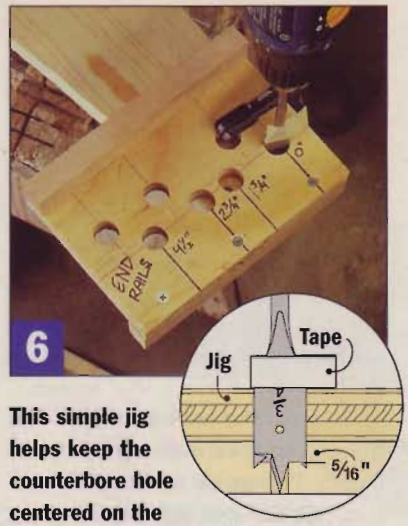
The other rails for the end frames have straight edges, so just cut them to length and set them on your workbench. Then grab the leg assemblies you put together earlier and dry-fit the parts required to

LEG ELEVATIONS



Make the short straight cuts at each end of the crown rail and foot rail contours first, then follow through with the curved cut. Stay just outside the line, then clean it up by sanding.

Dry-fit the end rails to each leg assembly and clamp all of this onto your workbench (with scrap stock underneath). Then you can drill perfectly aligned ¼"-dia. bolt holes.



This simple jig helps keep the counterbore hole centered on the pilot hole. Tape "flag" limits depth.

make one end frame. Use the layout lines on the legs to position each rail. After checking the assembly for square, clamp it together on your bench top, with scrap stock underneath to protect the bench.

Except for the mounting rails and the lower safety rails, all of the rail-to-leg connections on the bed frame are secured with carriage bolts. The domed heads look nicer than hex-head bolts, and they're far less likely to injure someone. Of course, hex nuts and flat washers are still required to secure the bolts, but I drilled ¾"-dia. counterbores on the inside faces of the rails so the nuts and washers would be recessed.

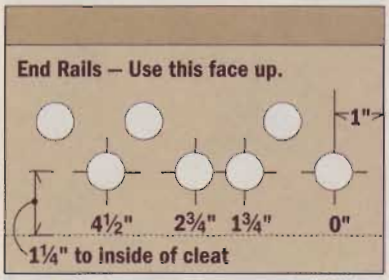
Drilling these holes, however, is a stage of the project where keeping the construction simple (bolted connections instead of complex joinery) actually introduces a complication or two of its own. Normally I'd drill the counterbore first, then the through-hole for the bolt — a method that helps keep the holes aligned and because counterboring around an existing pilot hole often causes drill bits to drift off center. But this time I was hampered by the tight clearance at the inside corners where the leg assemblies and rails meet. Since drilling into the corners was impractical, I had to clamp the rails to the legs and drill the ¼"-dia. through holes (FIG. 5). Then I unclamped the stock to counterbore the rails using a two-sided jig (see *Simple Counterbore Jig*).

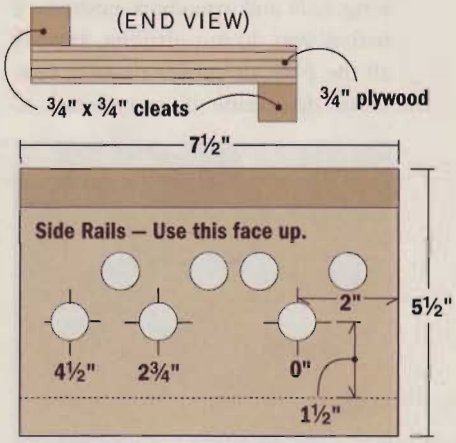
To use the jig, butt the appropriate cleat to the end of the rail, center the jig holes over the predrilled bolt holes (on the inside face), and counterbore (FIG. 6). At this stage, you'll be working on just the rails for the end frames. The rails that connect the two end frames will come later.

SIMPLE COUNTERBORE JIG

Whenever I need to drill holes in multiple parts, I try to set up a jig or other shop aid to get better results. The small bolt holes on this bed frame weren't a problem, but I did need a way to restrict the larger counterbore bit so it didn't stray off the center of the pilot holes. I drilled guide holes (at the same intervals I used for the bolt holes) in a scrap of ¾"-thick plywood and put a cleat on it for consistent positioning from the board end. Then I realized that the holes in the end rails had a different offset from the longer rails at the front and rear of the bed. The solution was making the jig two-sided — one offset for the end frame rails, another for the long rails that connect the two end frames. I accomplished this by drilling a second series of holes and adding another cleat on the opposite face of the jig. Mark the face you need to use for each rail type, and designate one hole in each series as the '0' for a consistent starting point. The other holes line up from there.

NOTE: Dimensions shown at guide holes indicate center-to-center distance from "zero" mark.





FITTING THE RAILS

Everything drilled and counterbored for the end frames? Great — now you can bolt those assemblies together. Press each carriage bolt in through an end leg and rail, and tap the head with a hammer to seat it. Then run a flat washer and nut onto the other end and tighten. Because the nut will be recessed in the counterbored hole, you'll need a ratchet wrench and a $^{7}/_{16}$" socket.

After you've assembled both end frames, cut all of the longer stock to length. This group includes the rear foot rail, the desk rail and stretcher, two platform side rails, two mounting rails, and two safety rails.

The most reliable way to get these parts attached to the end frames is to secure them with clamps, then drill through both the legs and rails at the same time — just like you did with the end frames, but with one notable difference. Handling larger components — the longer stock and preassembled end frames — makes benchtop assembly impractical. You have to stand the end frames up to fit the rails into position, and recruiting someone else to help will make this task much easier. It can be done solo, but it will take longer.

Even if you have to borrow a few clamps to do it, try to get all the long rails and stretchers positioned before you do any drilling. Having all the parts there will make it easier to determine if everything's in the right place. Use a framing square to check alignment of the frame, then drill the $^{1}/_{4}$"-dia. holes through the side legs and rails (FIG. 7). Watch the exceptions — the rails that get fastened with screws, for example, and the front side legs, which don't get safety rails. Unclamp the rails and repeat the counterbore procedure you used earlier for the end rails, but this time orient the jig for the side rail offset. Bolt the frame together now, but keep in mind that you'll be disassembling the bed later for finishing and final setup.

Complete the platform frame by fastening support cleats to the platform rails (FIG. 8). I also fitted the $^{3}/_{4}$"-thick plywood panel (FIG. 9), but didn't screw it to the cleats yet. Having the panel in place will keep the whole bed assembly square as you fit the desk top and other parts.

Clamp the long stock to the end frame assemblies and check for alignment and square. Then drill the bolt holes.

Fasten 1x2 cleats to the inside faces of the platform rails. These support the plywood panel for the mattress.

GUARD RAIL AND LADDER

The guard rail assembly at the front of the bed bolts together like the bed frames (GUARD RAIL ELEVATION). Cut 1x4 stock to length for the uprights and rails, and cut the curve on the rail corners with a jig saw. Like before, I did the drilling on the clamped-up assembly rather than on the individual parts, but now I had plenty of room to work, so I counterbored and drilled (in that order) without having to unclamp the boards. Once I bolted the guard rails and uprights together, I clamped this assembly to the front platform rail, then drilled and bolted it in place.

The ladder is almost as simple to build as the guard rail assembly, but it relies more on joinery than fasteners (LADDER ELEVATIONS). To add strength, the rungs fit in dadoes in the uprights. I could have routed

Use your router base to check the spacing of the guide rails on the dado jig. Then recheck square and fasten.

You can save time and reduce mistakes if you mark identical parts, like these ladder uprights, simultaneously.

With the ladder uprights still clamped together, align the dado jig with layout marks on the workpiece, then rout.

After the basic framework of the bed has been assembled, cut and fit the plywood panel that will be used to support the mattress. This will help keep the bed square while you fit the desk top and other accessories.

these just by clamping a guide board in place over and over, but I figured that a simple jig would let me work faster and more accurately, and could also be used for routing the dadoes in the bookcases later (DADO JIG ELEVATIONS).

The jig is a simple frame of 1x4 stock (FIG. 10). Two parallel boards act as guide rails to keep the router base captive and tracking straight, while the other two, set perpendicular to the first pair, straddle the workpiece(s) you're routing. I built the jig so one of these lower "straddling" rails could be repositioned for stock of various widths.

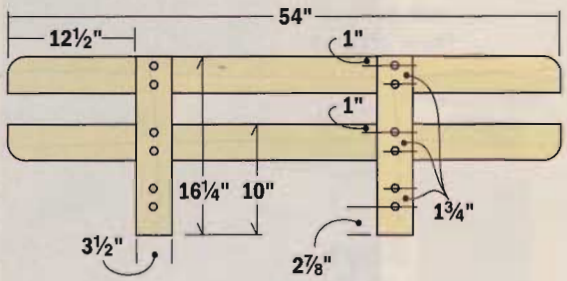
The ladder uprights are narrow enough to clamp together and mark simultaneously (FIG. 11). They can be routed the same way (FIG. 12). Then mark and cut the curved outline at the top end of each upright. Sand any rough edges, then dry-fit the rungs (no glue) into the uprights' dadoes and clamp the ladder together. Drill two countersunk pilot holes at each rung connection (FIG. 13). Disassemble the parts, spread glue in each dado, then clamp the assembly together again and fasten the joints.

For safety and stability, the ladder must be secured to the bed frame. I placed the right upright next to the bed's right leg assembly and drilled four countersunk holes for screws (FIG. 14). I also drilled a hole from inside the platform frame to secure the other ladder upright.

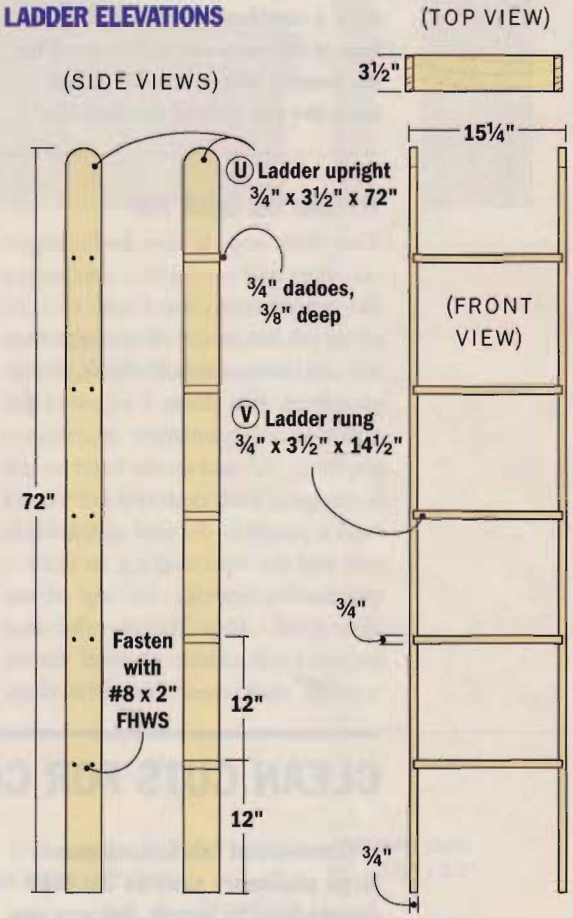
Dry-assemble the ladder to make sure everything fits. Check for square, drill for screws, then assemble with glue.

Clamp the ladder to the right front leg assembly of the bed and drill pilot holes for screws, but don't fasten yet.

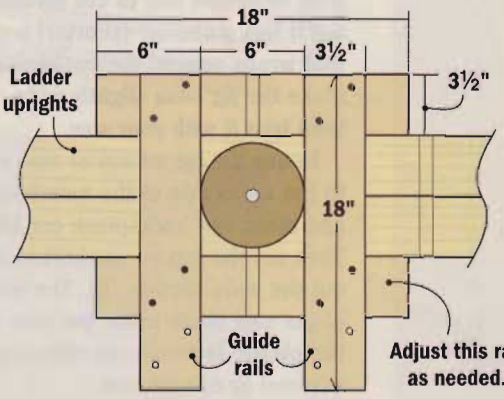
GUARD RAIL ELEVATION (FRONT VIEW)



LADDER ELEVATIONS

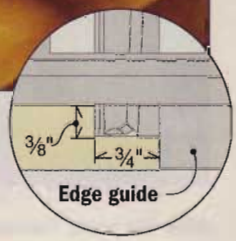


DADO JIG ELEVATIONS (TOP VIEW)



Slide a combination square along the tops of the desk end rails to mark for the support cleats. This 3/4" offset hides the raw ends of the desk top.

The front of the desk top needs support also. After the desk cleats are fastened to the rear and end rails, install the desk stretcher.



Use clamping cauls to prevent tearout as you rout the rabbets.

FITTING THE DESK TOP

The desk top is the bed's largest accessory, and supporting it requires a few additions to the frame — 1x2 cleats on the inside of the rear desk rail and the two desk end rails. Before mounting the cleats, I adjusted the blade of a combination square to a depth of 3/4" and set the head on the top edge of each desk end rail. Then I held a pencil at the end of the blade and slid the square along to mark a positioning line for the top of the cleat (FIG. 15). Transfer this line height to the desk rear rail for its support cleat, then screw the cleats in place (LOFT BED ELEVATIONS). Finally, cut a 1x4 to length for the desk stretcher and fasten it to the desk rails with screws (FIG. 16).

For the desk top itself I used a postformed laminate countertop, the type sold at most lumberyards and home centers. Odds are your retailer won't cut this to length when you buy it, but you can do that yourself with a circular saw and a simple jig (see *Clean Cuts for Countertops*). Check the fit after you cut the desk top to length, but fasten only one or two screws at each end, just enough to hold it in place. Like the ladder and the plywood mattress platform, the desk top won't get permanently installed until you set up the bed for use.

MAKING THE BOOKCASES

If you're going through with all of the options for the project, the bookcases are next, and these are built from 1x10 pine (BOOKCASE CONSTRUCTION VIEW). Again, it's simple routed joinery that aligns the parts for assembly and helps hold things together, starting with rabbets at the corners. I reinstalled the edge guide on my router and, using the

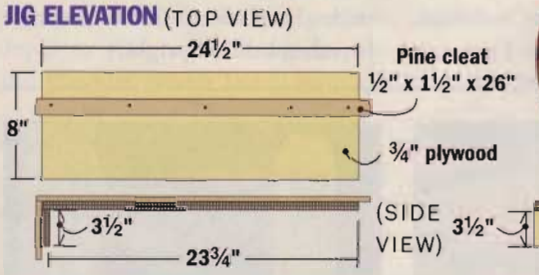
CLEAN CUTS FOR COUNTERTOPS

Commercial fabricators use large stationary saws to cut their countertops to length, but you can get accurate results with a circular saw and a shop-built jig.

The jig mimics the simple guide a lot of people use to cut plywood, but it has a second (shorter) leg that wraps around the backsplash. Make the jig base slightly wide, then trim it with your saw.

To use the jig, clamp or screw it to the underside of the countertop and make the backsplash cut (A). Then set the top on sawhorses and cut the wide section (B). The teeth of the saw blade enter the face of the plastic laminate, so chipping is minimal or nonexistent.

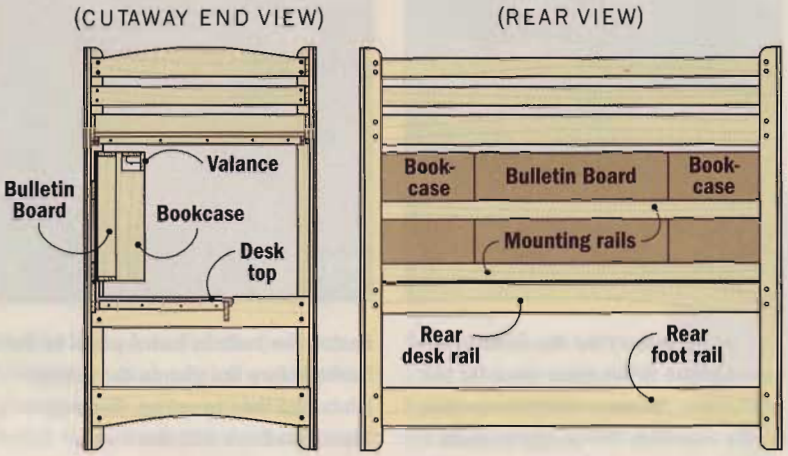
JIG ELEVATION (TOP VIEW)



JIG TRIMMING DETAIL

Shift the adjustable rail on your dado jig so it fits snugly over the bookcase side panels, then rout the shelf dadoes. Clamp the stock securely.

LOFT BED ELEVATIONS



same 3/4"-dia. straight bit as before, I cut rabbets at each end of the bookcase side panels (FIG. 17).

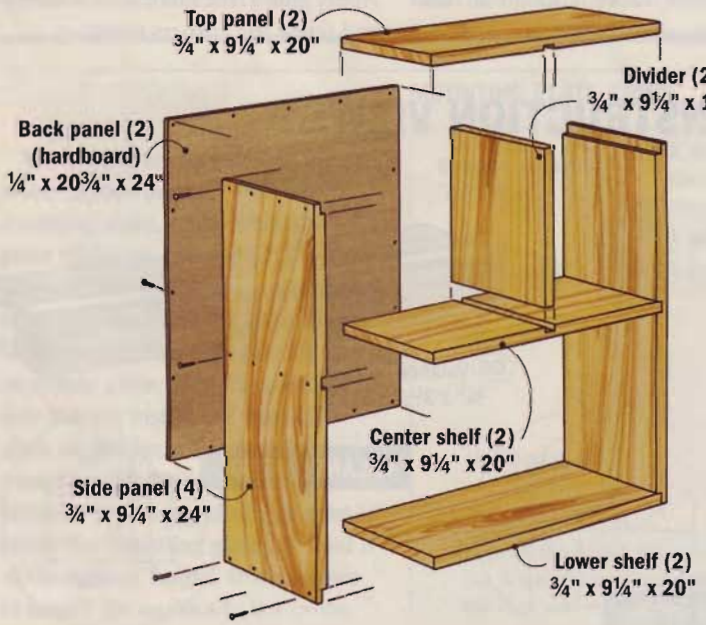
With the rabbets cut, I removed the router's edge guide and adjusted my shop-built dado jig to the width of the 1x10 stock. I marked layout lines for the dadoes in the side panels, the top panel, and the center shelf, then routed them (FIG. 18).

At this stage, you can clamp the parts together dry, check for square, and measure for each divider. Fit the dividers, then cut two pieces of 1/4"-thick hardboard for the bookcase back panels. Set the panels in place and drill countersunk pilot holes around their edges for screws, and also in the side panels (at the dado and rabbet locations). Remove the clamps and free the parts so you can get glue in the dadoes and rabbets, then clamp each assembly together again and drive all the screws.

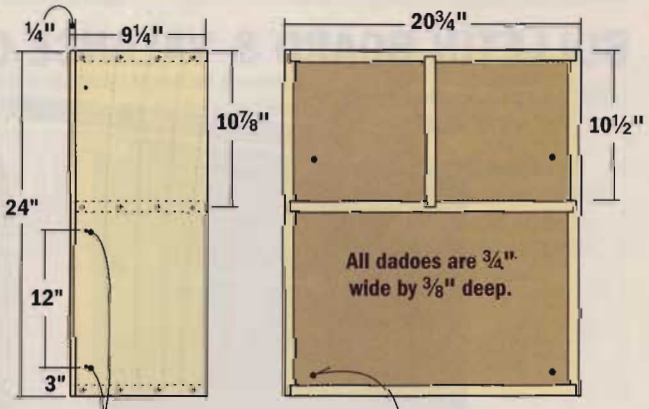
Next, apply a bead of glue on all the back edges of the bookcases and set the back panels in place. Secure them with screws.

Because the screws in the joints and in the back panels provide plenty of holding power while the glue is setting up, you can remove the clamps and install the bookcases right away. Set either bookcase in place on the backsplash of the desk top and butt it against the inside corner of its rear leg assembly. Drill countersunk pilot holes through the back panel and into the mounting rails at the rear of the bed frame, then drive 1"-long screws to secure the bookcase to the rails. Repeat the procedure for the other bookcase, butting it tightly to the opposite leg assembly. For more strength, you can also drill and drive screws through the bookcases' side panels directly into the adjacent legs.

BOOKCASE CONSTRUCTION VIEW



BOOKCASE ELEVATIONS (TOP VIEW)



NOTE: If bookcases will support heavy loads, use additional mounting screws through side pannels.

Mounting screws through back panel.

The rabbet joinery for the bulletin board frame is the same used for the bookcases. Measure and cut carefully so the assembly fits snugly in place.

Fasten the bulletin board panel to the frame before the glue in the corner joints has time to set up. The edges should be flush with the frame.

The lightweight valance requires only two mounting screws — one at each end. Check the fit, but don't fasten it until you're assembling for good.

BULLETIN BOARD AND VALANCE

Because this project was inspired by the need to get more function out of the square footage in the room, it seemed foolish to leave the area between the bookcases idle. I thought additional storage space might crowd the desk, though, so I added a bulletin board instead, and a small valance to conceal a fluorescent desk lamp.

Measure the opening between the bookcases and you'll probably find, like I did, that you won't be able to match it exactly with a store-bought bulletin board. You could buy and install a smaller unit, but you'd lose one key advantage of a custom-built board — the sturdy and tight-fitting frame helps stiffen the entire bed assembly (BULLETIN BOARD & VALANCE CONSTRUCTION VIEWS). To get this advantage, though, you have to measure and cut the frame parts carefully so the bulletin board fits snugly, but not so tight you have to force it into place.

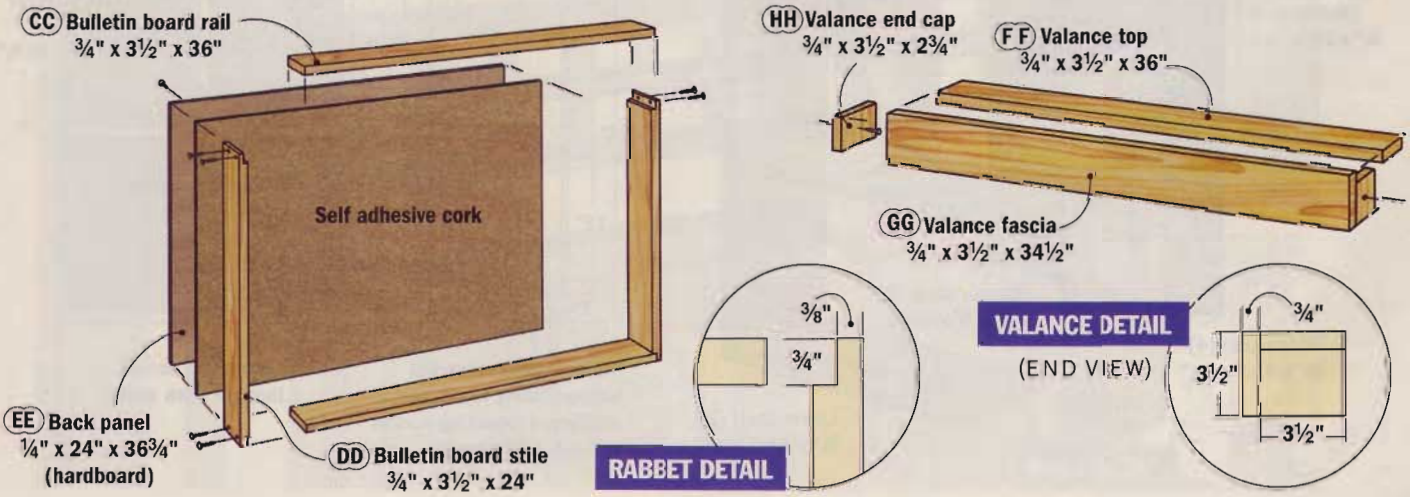
After cutting the frame stock to length rout rabbets in the stiles (RABBET DETAIL). Use a 3/4"-dia. straight bit and an edge guide (FIG. 19).

Dry-fit the frame together with clamps and check it for square, then drill the countersunk holes for the assembly screws. Cut a piece of 1/4"-thick hardboard to size for the back panel. Use this back panel as a template for your cork, but cut the cork oversize (about 1"-2" extra each direction should do) so you can trim it clean after gluing.

If you're lucky enough to find self-adhesive cork, you can just peel off the backing paper and press it onto the panel, then trim the edges flush with a utility knife. If you have to glue the cork yourself, you can brush white or yellow glue on the back panel, then set the cork in place and cover it with a piece of plywood and some heavy objects. You can also use spray contact adhesive to bond the cork to the back panel, but this requires extra care — there's no adjusting the pieces once they contact each other.

Wait until the cork-covered back panel is ready for installation to assemble the bulletin board frame. This will let you align the frame square against the panel before the glue in the corner joints sets up. Apply glue to the rabbets, then clamp and screw the corners together.

BULLETIN BOARD & VALANCE CONSTRUCTION VIEWS



A NOTE ABOUT MATTRESS SUPPORT

Like bunk beds and other nonstandard setups for children, this loft bed design forgoes the conventional pairing of a mattress with a separate box spring underneath. The arrangement I used instead provides a reasonable bed height without sacrificing the clearance necessary for the desk area below, but it changes the requirements for supporting the mattress.

Bunk bed manufacturers often solve this problem with one of two specialty products. The first is a single-unit mattress and support combination — a cushion atop a rigid wooden panel or frame. Neither the frame nor the cushion portion of this hybrid assembly is as thick as the separate components would be, but for the smaller bodies these mattresses are intended to support, this lighter-duty approach is usually sufficient.

Other manufacturers use a conventional mattress atop a "bunkie board," a 2"-thick platform that provides support like a box spring, but without the bulk or weight.

The ¾"-thick plywood panel I used as a mattress platform does this also, and fastening it helps tie the entire bed frame together, an advantage you don't get with either a hybrid bunk bed mattress or a bunkie board.

If you already have a bunk bed mattress, you can place it right over the plywood. Or if you have a standard mattress but want more support, set 1x4 slats underneath the plywood before fastening it.

Next, apply glue along the back edges of the frame and set the panel in place, cork side facing the frame. Drill countersunk pilot holes and fasten with screws (FIG. 20). Finally, remove the clamps and press the bulletin board into place between the bookcases. Secure it to the mounting rails with screws.

None of the individual assemblies for this project are difficult to make, but the valance is downright easy (BULLITIN BOARD & VALANCE CONSTRUCTION VIEWS). Simply cut 1x4 stock to length and glue the top and fascia together, then cut two short (2¾") lengths of 1x4 stock and glue them in as end caps (VALANCE DETAIL).

An hour or so in clamps should be enough to let the glue set, then you can drill holes for the mounting screws (FIG. 21). Check the fit of the valance between the bookcases, but don't install it. Since it's the last part you have to build, you can disassemble the bed for finishing.

FINISHING AND FINAL ASSEMBLY

Light sanding with 120-grit paper should take care of any sharp corners or edges on the bed parts. If you want a more rounded edge, use a block plane first and then follow up with sandpaper. You can rout the edges with a ¼"- or ⅜"-radius roundover bit, but be sure to complete this step before assembling the bed, when you have full access to all the pieces.

The need to match existing furniture may require staining the bed before you apply a sealing finish. Pine will accept oil-based, waterborne, and gel stains, but don't trust the color charts to get you an accurate match. Test the stain on leftover stock before you apply any to your project. Also, pine is notorious for abrupt grain shifts that cause stains to splotch, so apply a stain controller first if this is a concern. Follow up with the full-color stain, then allow 24 hours drying time before you apply a clear finish.

If you brush on a film-type finish such as a polyurethane varnish, sand between coats to knock down any raised grain or dust nibs.

When you're ready to reassemble the bed, follow the same sequence you used to build it. And though you want a rigid assembly when you're done, don't crank all the carriage bolts tight until everything's in place. A little flexibility will make it easier to fit all the pieces together until the process is complete.

WHAT YOU'LL NEED

LUMBER

- (6) 1x2 pine, 8 ft. long
- (24) 1x4 pine, 8 ft. long
- (6) 1x6 pine, 8 ft. long
- (2) 1x8 pine, 8 ft. long
- (3) 1x10 pine, 8 ft. long
- (1) ¾" × 4 ft. × 8 ft. fir/pine plywood
- (1) ¼" × 4 ft. × 8 ft. hardboard

HARDWARE

- (64) ¼" × 1½" carriage bolts
- (64) ¼" flat washers
- (64) ¼" hex nuts
- (65) #8 × 1¼" flat-head wood screws
- (20) #8 × 2" flat-head wood screws
- (12) #8 × 1" flat-head wood screws
- (6) sq. ft. sheet cork, ⅛-¼" thick

Drill Bit Basics

They may not elicit the same tool junkie fever some folks get from a premium dado blade or a professional set of carbide-tipped router bits, but drill bits are as valuable a group of cutting tools as any you'll find in your shop. Calculate how many projects you could finish without them, and I'd give odds it's a short list. Drill bits are unsung heroes that do a simple but critical job and do it quietly, and their design and proper use is at least as complex as that of most saw blades and router bits.

CUTTING TOOLS, WITH A TWIST

Like saw blades and router bits, drill bits are cutting tools, designed to work best under certain conditions and with certain materials. They need to have the correct geometry and metal to hold a sharp edge, but they suffer a serious disadvantage when it comes to discharging the waste material they produce.

Unlike saw blades and other cutting tools that create an exit path to get rid of the chips they generate, drill bits end up getting in their own way. This is especially true of bits where the shank and cutting diameters are equal. The sidewall of the hole blocks the escape route for chips, which have to travel up through the drill's flutes to exit the cutting area. Even under the best of circumstances, it's not a very efficient process. To make matters worse, the cutting edges are in constant contact with the workpiece, so they take a beating from the unrelieved friction and heat. Push a bit beyond its limits, and you'll take the temper out of the steel, ruining its

ability to hold a cutting edge. That's the first thing to remember about drills — that the rotational speed (rpm), feed rate, bit type, hole diameter, and workpiece properties must be balanced to avoid heat build-up or tool failure. For deep holes especially, backing the bit out periodically to clear chips will help dissipate the heat before it's a problem.

Keep in mind also that the forces involved change rapidly for larger holes. It's the *area* of the circle, not the diameter, that represents the material you're removing. For example, a 1"-dia. hole is *four times* larger than a 1/2" hole, though its diameter is only twice as great. For safety's sake, large-diameter bits have to rotate at significantly slower speeds than smaller drills do.

TWIST DRILLS: THE BASIC MODEL

Twist drills are easily the most common type around today, in part because they are so versatile. Most are made from high-speed steel, which can withstand high temperatures without "burning." They can be used to drill almost any metal, plastic, wood, or composite material, but in larger sizes (over 1/2") they can get pretty expensive, especially relative to other types of bits.

Because twist drills are designed for use with metal, they feature a slightly blunted nose that won't deform under pressure against a hard surface. The tradeoff for this feature is a tendency to spin away from the intended hole center, a habit known as walking or skating.

Recently, manufacturers have been grinding new tip profiles on twist drills to make them stay put when starting a hole. Called "pilot-points" or "bullet-points," these do improve a bit's precision, but their complex geometry usually means do-it-yourself sharpening isn't an option. Whatever their shortcomings, standard twist drills can at least be sharpened easily on a bench grinder or with an inexpensive drill sharpening accessory.

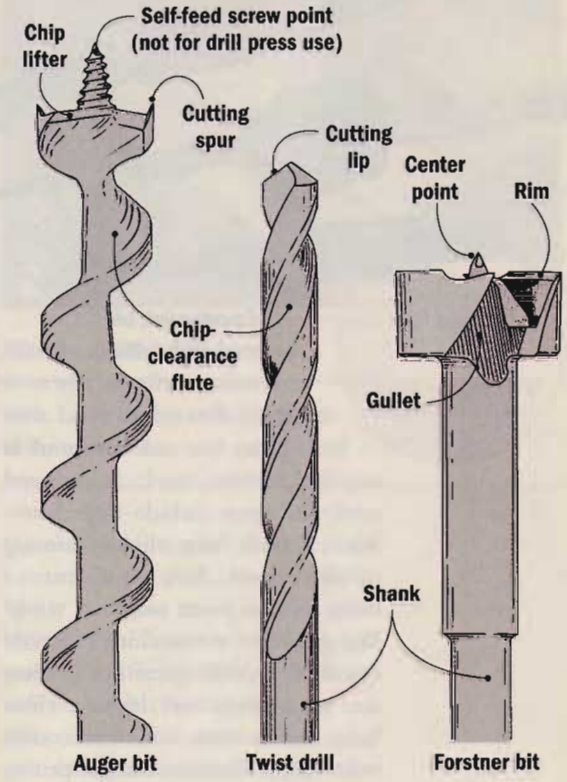
Titanium-nitride (TiN) coatings on some bits add hardness and a self-lubricating property, but this gold-colored microthin coating improves metal-drilling only, with little or no difference in wood.

WOOD-BORING BITS

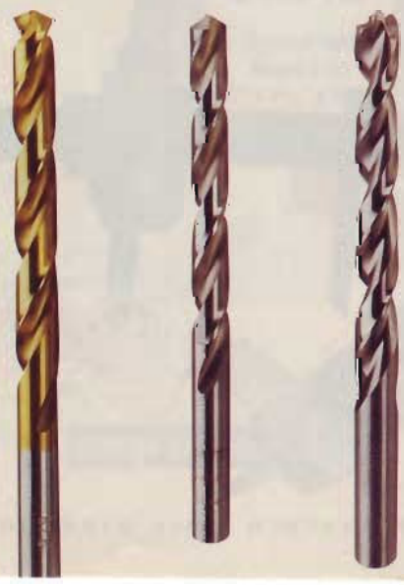
Wood is softer and machines differently than metal, and specialized bits have evolved for drilling it.

For instance, drill bits designed for wood have a center point that contacts the workpiece immediately to keep the bit placement precise. Also, cutting spurs score the wood at the perimeter of the hole so the fibers at its edge are cut cleanly rather than torn.

DRILL BIT ANATOMY



TWIST DRILL BITS



WOOD BORING BITS

SPECIAL-PURPOSE BITS

Brad-point bits can be found in regular carbon steel, high-speed steel, and even carbide-tipped versions. Grinds vary slightly among manufacturers, but all feature a sharp center point and two wing-like spurs that are machined directly out of the drill's spiral flutes. They cut aggressively and leave a clean hole, but as with twist drills, sizes over 1/2" in diameter can get pricey.

Spade bits, in sizes from 1/4" to 1 1/2" and priced from about $3-$6, solve the cost problem but leave a rougher hole than most other bits. The flat steel heads of these bits are ground with two short spurs and a long triangular center point. The simple design creates a scraping rather than cutting action, so the wood fibers are torn rather than cut. Spade bits see a lot of use in rough carpentry — counterboring bolt holes for a deck frame, for example, or drilling through studs for wiring.

At the other end of the precision range is the Forstner bit. Like other wood-boring bits, Forstners have a center point for locating the bit, but from there the differences grow. Rather than one or two cutting spurs that score the perimeter of the hole, these bits feature two large cutting rims that together cover about half the hole's circumference. This large contact area allows Forstner bits to do drilling acrobatics you can't pull off with an ordinary bit — overlapping holes, partial arcs at the edge of a board, drilling at steep angles, and more — though some tricks require a drill press.

Some large Forstners feature a "saw tooth" rim, designed to dissipate heat and cut more aggressively. The multispur bit, a similar design but with only one chip lifter and gullet, is not a true Forstner bit. Among these two you'll find a wide range of diameters (up to 4") and prices (from $3 to over $100 each).

If depth and not diameter is the objective, ship augers typically offer at least 12" of usable length with a continuous spiral flute to help clear chips. Common sizes run 3/8" to 1 1/2", with prices up to about $50.

SPECIAL-PURPOSE DRILLS

Some applications or materials call for special-purpose drill bits. Holes for wood screws can be modified or produced with a cone-shaped

BIG DRILLING WITHOUT BIG SPENDING

Precision drill bits machined from solid steel rod get costly in larger sizes. Some affordable alternatives include, clockwise from left, hole saws, an adjustable circle cutter or "fly cutter" (for drill press use only), and an expansion bit for a bit brace.

Masonry bit (standard-duty)

countersink bit, a combination countersink/pilot drill, or a spring-loaded self-centering bit, designed for use with hinges and hardware. A plug cutter, while not technically a drill bit, lets you make custom wood plugs for counterbored screw holes, but it does require a drill press.

Thinking of building your own kitchen cabinets? If European-style cup hinges are part of the design, you'll need a 35mm hinge-boring bit. Splurge for the carbide-tipped version (about $20) — the cutting edges hold up much better in plywood and particleboard.

Brick, concrete, and other abrasive materials will eat any steel bit for lunch, so use masonry bits here. They have a thick carbide tip brazed on the end of the drill so it can withstand hammering and abrasion.

SET YOURSELF UP FOR DRILLING

For hole sizes up to 1", these four sets can handle the drilling chores for most home shops. Look for an "HSS" stamp on the twist drills — it means high-speed steel, the best grade.

Twist drill set (1/16"-1/2"), HSS $25-$45

Spade bit set (3/8"-1"), $10-$15

Countersink and pilot drill set (#6-#12), $15-$20

Brad-point set (3/16"-1/2"), $20-$45 (Carbide-tipped $75)

BUYING THE BASICS

For drill types you'll use a lot, buying in sets is more economical than picking the bits up piecemeal, but to get quality you should expect to pay $100+ for the sets shown above.

Specialty bits and larger sizes are best purchased as need arises. You'll learn which bits end up seeing more use, and occasional replacement of those few makes more sense than a costly set of bits that sit idle.

DON'T FORGET TRADITIONAL TOOLS

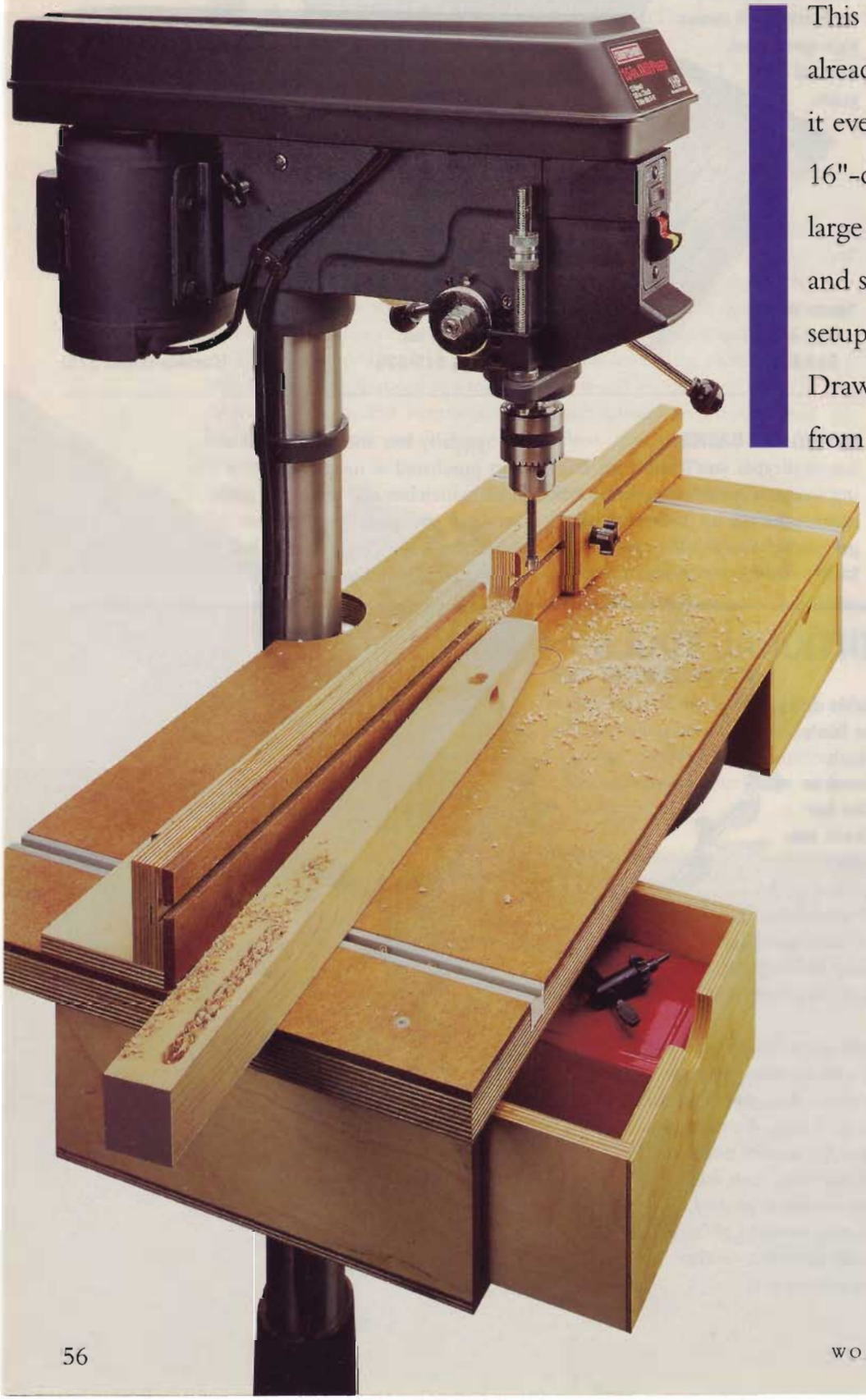
There's no denying that cordless portable drills and stationary drill presses handle the lion's share of drilling responsibilities in today's woodworking shops, whether professional or hobbyist. Still, hole-drilling is one of the few tasks where traditional tools and methods can rival the efficiencies of power machinery.

Using a bit brace and auger (A) was one of the first woodworking skills I learned, and even today it remains one of my favorites. It's quiet, safe, and like using a well-tuned hand plane or a sharp carving tool, it telegraphs the unique characteristics of your workpiece directly into your hands.

Breast drills (B) feature a hand-crank assembly for powering the drive shaft, plus a frame extension with a contoured steel plate that's pressed against the user's chest. Body weight steadies the drill and helps push the bit forward as it cuts. A cousin, the "egg-beater" hand drill (C), works better for smaller holes and sports a hollow wood handle for bit storage. Push drills (D) drive small bits by rotating when the handle is pushed.

Woodworking tool catalogs still sell new versions of these traditional tools, and older models — my favorites — also surface regularly at flea markets and garage sales.

Drill Press Table



This drill press table takes an already versatile tool and makes it even better. At 3-ft. wide by 16"-deep the table has space for large workpieces, and its fence and stop-block system simplifies setups and repetitive drilling. Drawers wring additional storage from otherwise wasted space.

Most parts of the drill press table are $\frac{1}{2}$"-thick plywood, with hardboard skins added (**Drill Press Table Construction View**). I used Baltic Birch plywood because it's very rigid, and the hardboard creates smooth work surfaces. The trade-off for these choices is weight — my setup weighs 45 lbs. Medium density fiberboard (MDF) would also work, but would be heavier still.

Building this project doesn't require fancy joinery, just dadoes and rabbets, plus glue and screws. Tool requirements are straightforward, too. You'll need a table saw and dado blade, a router, jig saw, drill, and a few hole saws ($1\frac{1}{2}$", 2", $2\frac{1}{8}$"). And, of course, you'll need a drill press.

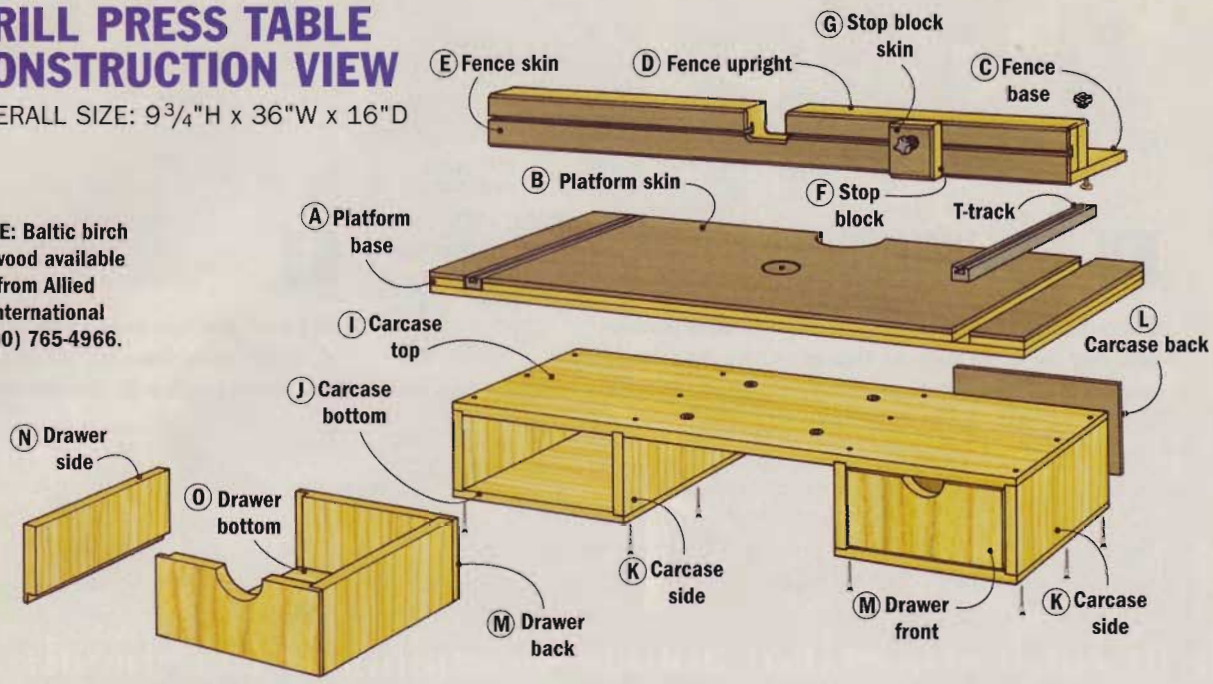
START WITH A STABLE PLATFORM

Though I was using rigid plywood, I was still concerned the drill press table could sag over time. To prevent this, I built the main platform from two layers face-glued together (PLATFORM ELEVATIONS).

When I glue pieces face-to-face like this, I usually cut the layers oversize, adhere them with contact cement, then trim the assembly to

DRILL PRESS TABLE CONSTRUCTION VIEW

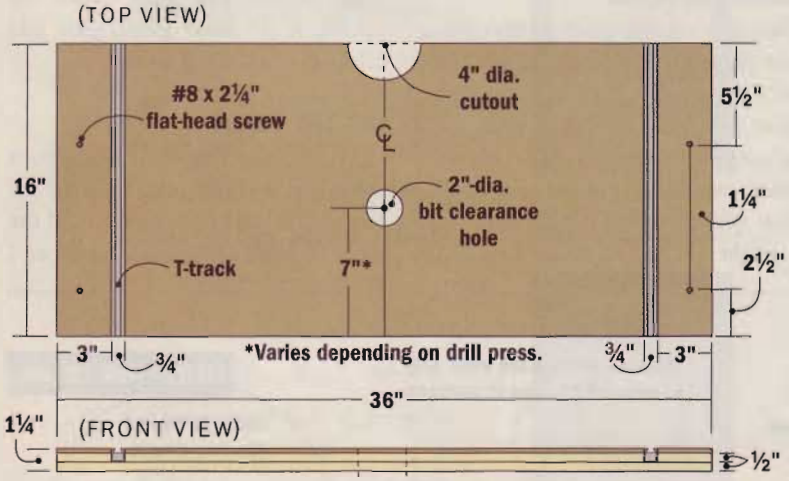
OVERALL SIZE: 9¾"H x 36"W x 16"D



NOTE: Baltic birch plywood available from Allied International (800) 765-4966.

A complete hardware kit is available for this project from Workbench Project Supplies. See the What You'll Need list on page 61 for information. You can also download a free detailed cutting diagram from our web site at www.workbenchmag.com.

PLATFORM ELEVATIONS



MATERIALS CUTTING LIST

PLATFORM:

A (2) Platform Base 1/2" x 16" x 36"
B (1) Platform Skin 1/4" x 16" x 36"

FENCE:

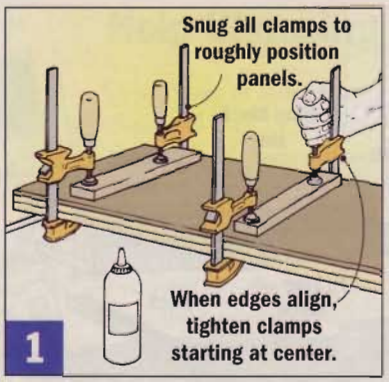
C (1) Fence Base 1/2" x 3 3/4" x 36"
D (2) Fence Upright 1/2" x 2 1/2" x 36"
E (1) Fence Skin 1/4" x 3" x 36"
F (1) Stop Block 1/2" x 2 15/16" x 2 1/2"
G (1) Stop Block Skin 1/4" x 2 15/16" x 2 1/2"
H (4) Stop Block Key 1/4" x 5/16" x 2 1/2"

DRAWER UNIT:

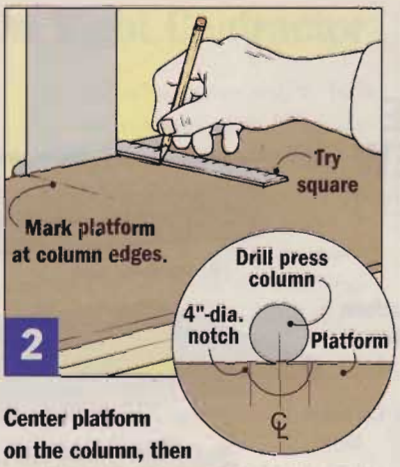
I (1) Carcase Top 1/2" x 12" x 34"
J (2) Carcase Bottom 1/2" x 12" x 10 1/4"
K (4) Carcase Side 1/2" x 12" x 4 3/4"
L (2) Carcase Back 1/4" x 4 3/4" x 10"
M (4) Dwr Front/Back 1/2" x 3 15/16" x 9 3/16"
N (4) Drawer Side 1/2" x 3 15/16" x 11 3/4"
O (4) Drawer Bottom 1/2" x 11 3/4" x 4 3/4"

exact size. But in this case my usual technique presented a couple of problems. The pieces for this project required almost all of my 60" × 60" sheet of Baltic Birch, so I needed to cut each piece to exact size. Contact cement grabs, as the name implies, on contact, and I didn't want to risk misaligning two pieces sized to final dimension. Using yellow wood glue made better sense.

Yellow glue has a long working time, and allows you to position each piece exactly before clamping. When spreading it over large areas, though, you have to work quickly to get both surfaces covered before the glue begins to set up. To buy more time you can thin the glue by adding a few drops of water per teaspoon of glue (thin it no more than 5% by weight). Then spread glue on both platform layers and clamp them together, making sure to keep the edges aligned.



Use cauls to distribute clamping pressure over the whole platform. Tighten middle clamps first, then work outward.



Center platform on the column, then mark the location for a clearance notch.

Drill a ¼"-dia. hole centered on the platform's width. Later, this will guide a hole saw to create a bit clearance hole.

Once this glue-up dries, cut a ¼"-thick hardboard skin to matching size, then glue and clamp it to the platform (FIG. 1). As you tighten the clamps, keep an eye on the edges to make sure the pieces don't creep.

After unclamping the platform, set it on your drill press table so it's centered on the column, then mark the platform to indicate the column position (FIG. 2). Measure between these points, add about ½" for clearance (4" total in my case), and set a compass to mark a half-round notch. Cut the notch with a jig saw, then sand it smooth.

Now center the platform on your drill press table again so the notch clears the column by about ¼" all around, and drill a ¼"-dia. hole (FIG. 3). This hole will help you align the drawer carcase, and it provides the center point for a 2"-dia. hole you'll drill later.

To complete the platform, you need to cut two dadoes for the aluminum T-tracks. They accept ¼"-20 hex bolts that are used as mounting studs for the fence.

Place the platform face down on the saw table and cut a ¾"-wide dado near each end of the platform (FIG. 4). You'll need to drill pilot holes and counterbores in the tracks, then attach the tracks with screws.

MAKE THE FENCE

Building the fence starts with cutting the plywood base and upright pieces to size (FENCE ELEVATIONS). Make sure your blade's cutting angle is accurately set at 90°. If it's not, your fence won't be square. After cutting the pieces to size, glue the two upright pieces together using the same methods as you used earlier when gluing up the platform layers.

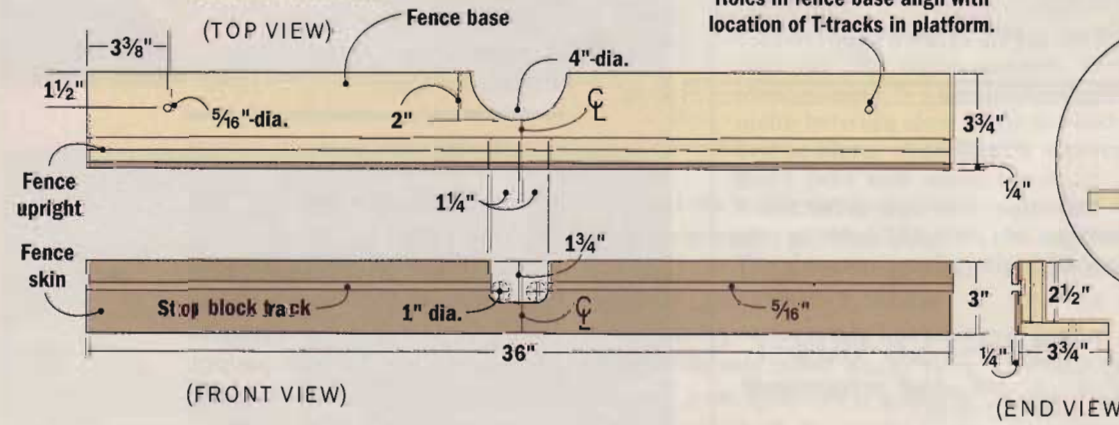
While the glue sets on the upright, place the fence base on the platform — align their back edges. Transfer the column clearance notch to the fence base, then cut it out and sand the opening. Also, drill 5/16"-dia. holes, aligned with the locations of the T-tracks in the platform, for the fence mounting bolts.

Unclamp the upright and dry fit it to the fence base. Align the lower edge of the upright with the front edge of the base and check for square. If all looks good, glue and clamp the pieces together.

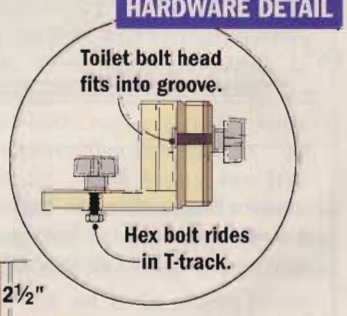
CUT THE T-SLOT

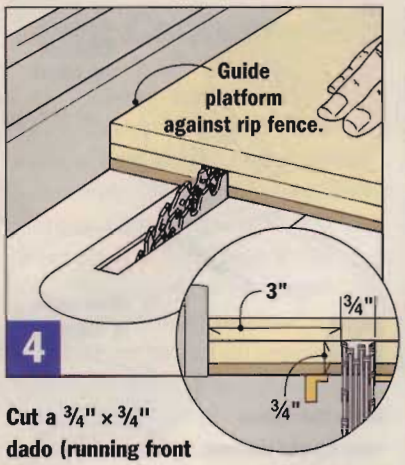
At this point you can turn your attention to cutting the T-slot in the fence upright. I could have used the same aluminum T-track here as I

FENCE ELEVATIONS

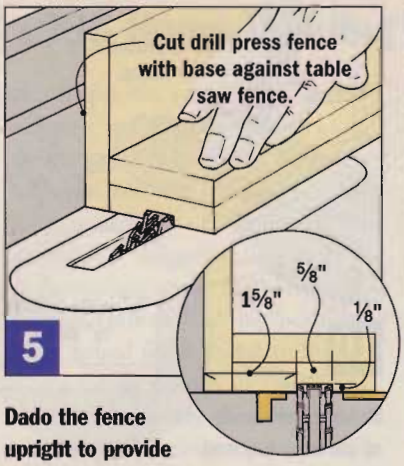


HARDWARE DETAIL

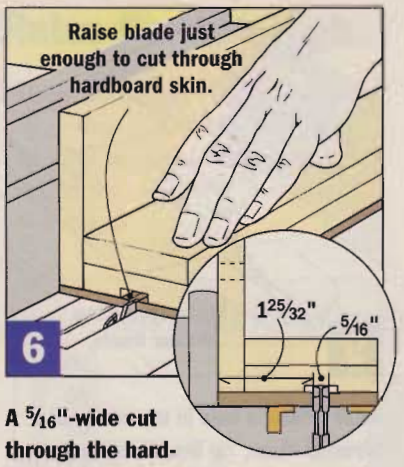




Cut a 3/4" x 3/4" dado (running front to back) near each end of the platform.



Dado the fence upright to provide clearance for the head of a toilet bolt.



A 5/16"-wide cut through the hardboard skin completes the fence T-slot.

installed in the platform, but this slot won't get used as often as those in the platform. So I decided to save a few dollars and make a T-slot that accepts a standard toilet flange bolt (HARDWARE DETAIL). This takes several steps.

First, set a 5/8"-wide dado blade to make a 1/8"-deep cut. Plough a groove in the upright using your table saw's fence as a guide (FIG. 5).

Now cut hardboard to size for the fence skin. Spread glue on the fence upright (not on the skin), keeping it about 1/8" away from the groove's edges so squeezeout doesn't get into the groove. Align the fence skin with the upright, and clamp the assembly together. Yes, this covers the groove you just cut, but don't worry, the next step will reopen it.

To complete the T-slot, set your dado blade for a 5/16"-wide cut, raise the blade just over 1/4"-high, and cut a slot so it's centered on the width of the groove in the upright (FIG. 6).

Notching the fence upright provides clearance for the drill press chuck when drilling close to the fence (FIG. 7). Drill holes to form the corners, then cut out the waste and sand the opening smooth.

Finally, rout a 1/8" chamfer around the fence skin. This eases the sharp edges and, more importantly, will keep saw dust from interfering when butting stock against the fence.

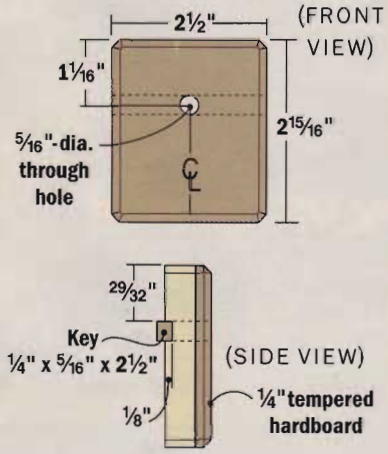
FASHION THE STOP BLOCK

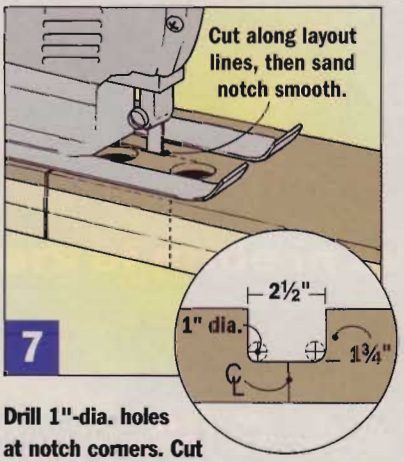
Making the stop block isn't complicated, but does require careful handling of small pieces. The block is a single layer of plywood with a hardboard skin. A piece of hardboard glued into a groove in the back of the block acts as a key to guide the block in the fence's T-slot (STOP BLOCK ELEVATIONS).

After gluing up plywood and hardboard for the block and cutting it to size, cut a groove in its back face to accept the hardboard key (FIG. 8). When working with small pieces like this, I prefer to use a push block designed for use with a jointer. This push block style has a large handle that keeps my hand well away from the blade, and a padded rubber sole that grips the workpiece well.

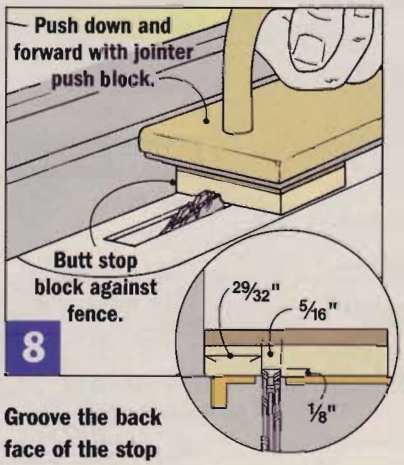
Next, rip a 5/16"-wide strip of hardboard for the key, cut it to length, and glue it into the groove in the block. After the glue dries, drill a 5/16"-dia. hole through the block and key for the toilet bolt to pass through. Chamfers sanded on the edges of the block's hardboard skin serve the same purposes as those on the fence.

STOP BLOCK ELEVATIONS

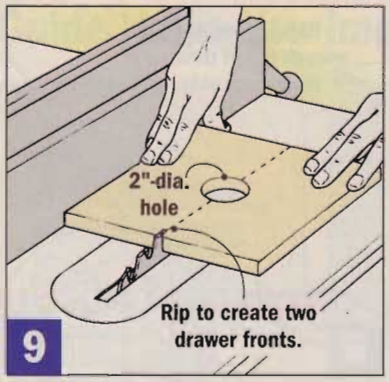




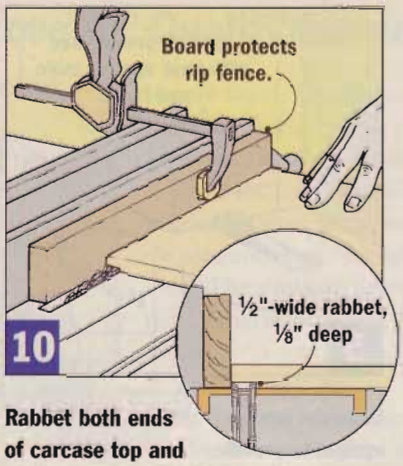
Drill 1"-dia. holes at notch corners. Cut opening with a fine-tooth jig saw blade.



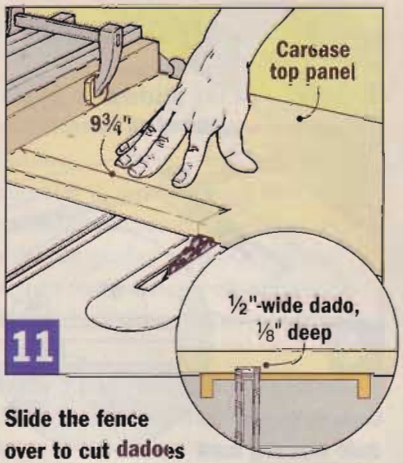
Groove the back face of the stop block to receive the hardboard key.



After drilling a hole in the center of a plywood blank, rip the piece into two equal halves to make the drawer fronts.



Rabbet both ends of carcase top and bottom panels to accept carcase sides.



Slide the fence over to cut dadoes in the top panel for the carcase sides.

DRAWERS ADD VERSATILITY

Work on the drawers and drawer carcase starts with the drawer fronts, which feature half-round cutouts for pulls (DRAWER ELEVATIONS). You could make the cuts individually using a jig saw, but it's easier to drill a 2"-dia. hole centered in an oversize ($^1/_2$" × 8" × 9$^3/_{16}$") blank, then rip the blank in half (FIG. 9).

Next, cut the remaining drawer and carcase parts to size (DRAWER CARCASE ELEVATIONS), then remove your standard table saw blade and install a $^1/_2$"-wide dado blade to cut all the joinery in the carcase and drawers. I recommend clamping a sacrificial board to the rip fence to protect it from the dado blade. Slide the fence against the blade and rabbet each end of the carcase top panel and bottom panels (FIG. 10). Then readjust the fence and cut dadoes in the carcase top (FIG. 11).

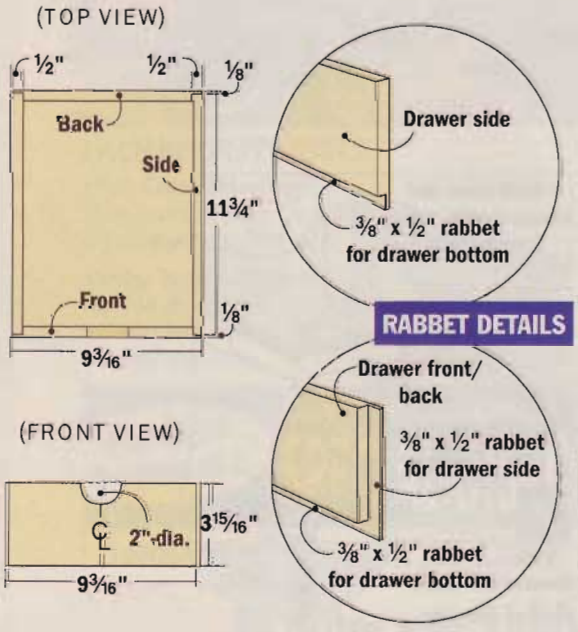
For the drawer joints, raise the blade for a $^3/_8$"-deep cut, and butt the saw fence against it. Rabbet both ends of each drawer front and back panel (RABBET DETAILS). Next, rabbet the lower inside edge of each drawer front, back, and side panel to receive the drawer bottom.

When all the rabbets are cut, you can glue up the drawers (FIG. 12). Also assemble the carcase using glue and #6 × 1$^1/_4$" flat-head screws. Two back panels made from $^1/_4$"-thick hardboard get mounted with brads.

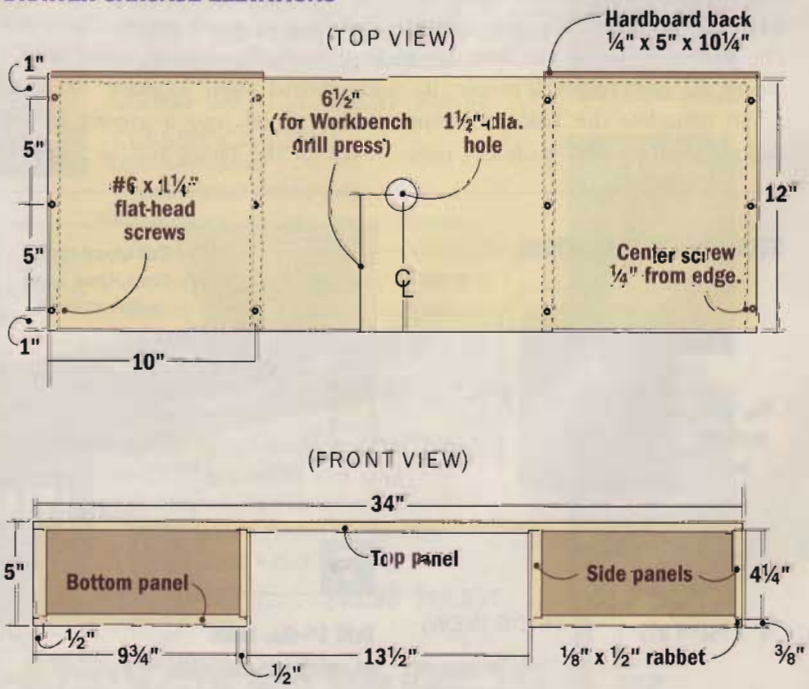
T-NUTS EASE INSTALLATION

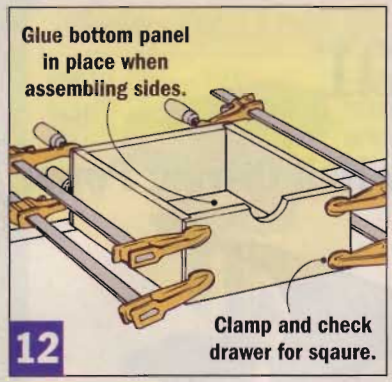
Since I may occasionally want to remove the drill press table from my drill press, I wanted fasteners that were easy to use and secure. I decided on T-nuts and bolts.

DRAWER ELEVATIONS



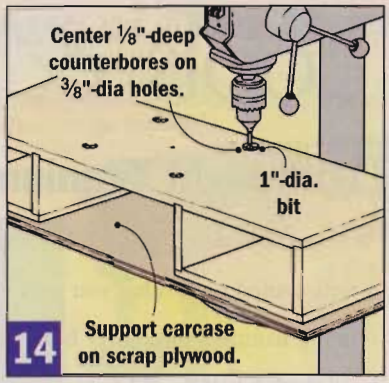
DRAWER CARCASE ELEVATIONS





Glued joints are plenty strong for the drawers. The bottom panel should hold things square, but double check.

Use a pencil to mark locations of the table's mounting holes. If your table doesn't have holes, drill your own.



Drill ⅜"-dia. holes through the carcase top panel from below. Then flip the carcase over and add counterbores.

To mark the T-nut locations, temporarily clamp the platform and carcase together — the platform overhangs ½" in front and 1" at each end. Then set the assembly on your drill press (FIG. 13). Position the assembly so the ¼"-dia. hole in the platform lines up with a ¼" bit chucked in the drill press, then mark from below for the T-nuts. Drill to continue the ¼" hole through the carcase top panel, then separate the platform and carcase.

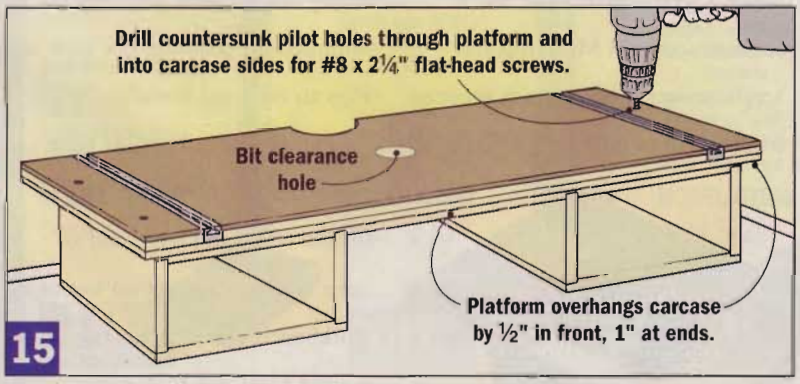
Drill T-nut holes through the carcase top panel at your marks, then turn the carcase right side up and drill counterbores in the top panel, centering the bit on the holes you just drilled (FIG. 14). Make sure the flanges on the T-nuts sit slightly below the top's surface.

The last feature to add is a bit-clearance hole through the platform and carcase. Drill a 2"-dia. hole in the platform using a hole saw and the ¼" hole as a guide. Switch to a 1½"-dia. hole saw, and drill through the carcase top panel, again centering the bit on the ¼"-dia. hole.

When the platform and carcase come together, the hole combination creates a shelf that supports a plug I insert to support small workpieces, or when I'm drilling stopped holes. The plug is cut from a blank glued up in layers like the platform. A plug cut with a 2⅛"-dia. hole saw (which has an inside-diameter just under 2") slips perfectly into the hole in the platform.

Before final assembly of the drill press table, I wiped a couple coats of oil finish on all the parts. Friends rib me about finishing shop fixtures, but I find it helps them last longer and stay cleaner.

I mounted the carcase to the platform with screws only (FIG. 15) That way I can get to the T-nuts if I ever need to. And who knows, this table is so sturdy it may outlast the drill press, meaning I'll need to move the T-nuts to fit the table to a different machine.



Flat-head wood screws in countersunk holes secure the carcase to the platform, but allow for disassembly if necessary. Make sure the platform overhangs the carcase evenly at the ends, and that the bit clearance holes align.

WHAT YOU'LL NEED

LUMBER

(1) ½" × 60" × 60" Baltic Birch plywood
(1) ¼" × 24" × 48" tempered hardboard

HARDWARE

(1) ¾" × ¾" × 36" aluminum T-track (must be cut into two 16" lengths)
(28) #6 × 1¼" flat-head wood screws
(4) #6 × 1" round-head wood screws
(4) #8 × 2¼" flat-head wood screws
(1) 5/16" × 1¾" toilet flange bolt
(5) 5/16"-ID flat washers
(4) 5/16"-18 flanged T-nuts
(4) 5/16"-18 × 2" hex-head bolts
(2) ¼"-20 × 1½" hex-head bolts
(2) ¼"-ID flat washers
(2) ¼"-20 thru-hole star knobs
(1) 5/16"-18 thru-hole star knob

HARDWARE KIT:

A kit has been assembled for this project that includes the T-track (a 3-ft. length you can cut to size), star knobs, hex bolts, toilet bolt, T-nuts, and wood screws.

Order number 3311100 . . . . . $21.95

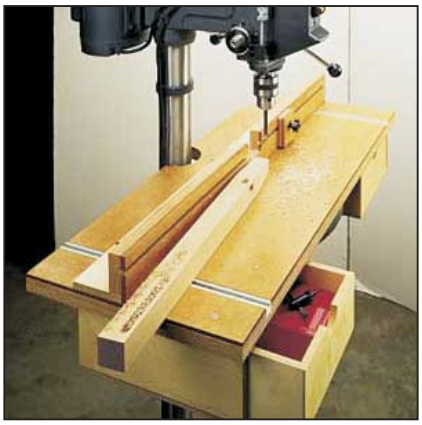
To order call Workbench Project Supplies:
(800) 311-3994

WORKBENCH®

DRILL PRESS TABLE

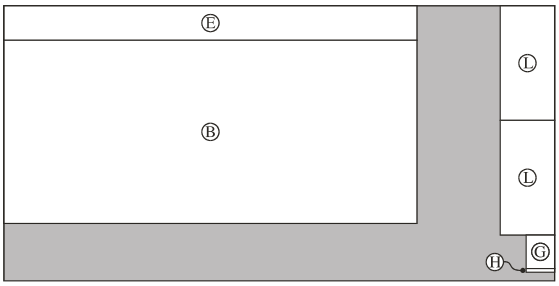
Issue 253 Volume 55 Number 3 May/June 1999

MATERIALS LIST

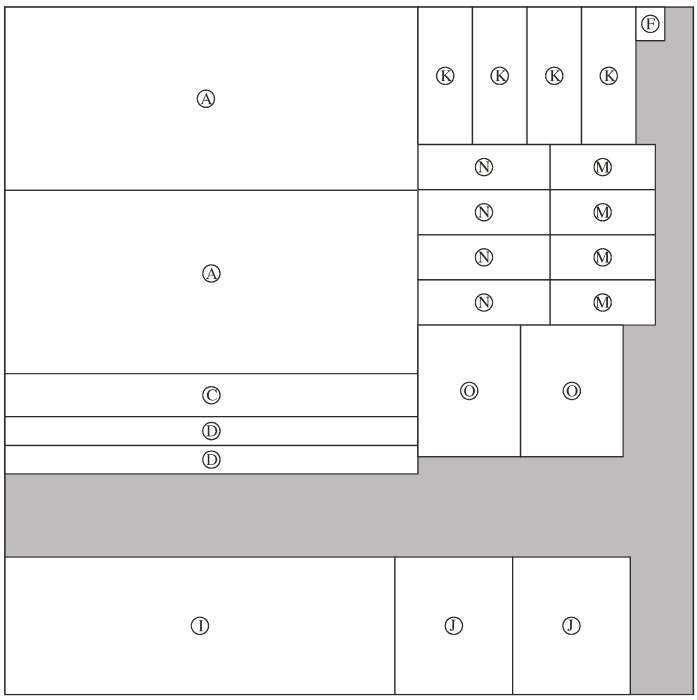


A	(2)	Platform Base (Baltic Birch)	1/2" x 16" x 36"
B	(1)	Platform Skin (Tempered Hardboard)	1/4" x 16" x 36"
C	(1)	Fence Base (Baltic Birch)	1/2" x 3 3/4" x 36"
D	(2)	Fence Upright (Baltic Birch)	1/2" x 2 1/2" x 36"
E	(1)	Fence Skin (Tempered Hardboard)	1/4" x 3" x 36"
F	(1)	Stop Block (Baltic Birch)	1/2" x 2 15/16" x 2 1/2"
G	(1)	Stop Block Skin (Tempered Hardboard)	1/4" x 2 15/16" x 2 1/2"
H	(1)	Stop BlockKey (Tempered Hardboard)	1/4" x 5/16" x 2 1/2"
I	(1)	Carcase Top (Baltic Birch)	1/2" x 12" x 34"
J	(2)	Carcase Bottom (Baltic Birch)	1/2" x 12" x 10 1/4"
K	(4)	Carcase Sides (Baltic Birch)	1/2" x 12" x 4 3/4"
L	(2)	Carcase Backs (Tempered Hardboard)	1/4" x 10" x 4 3/4"
M	(4)	Drawer Front/Back (Baltic Birch)	1/2" x 3 15/16" x 9 3/16"
N	(4)	Drawer Sides (Baltic Birch)	1/2" x 3 15/16" x 11 1/2"
O	(2)	Drawer Bottom (Baltic Birch)	1/2" x 11 1/2" x 8 15/16"

CUTTING DIAGRAM



1/4" x 24" x 48" Tempered Hardboard

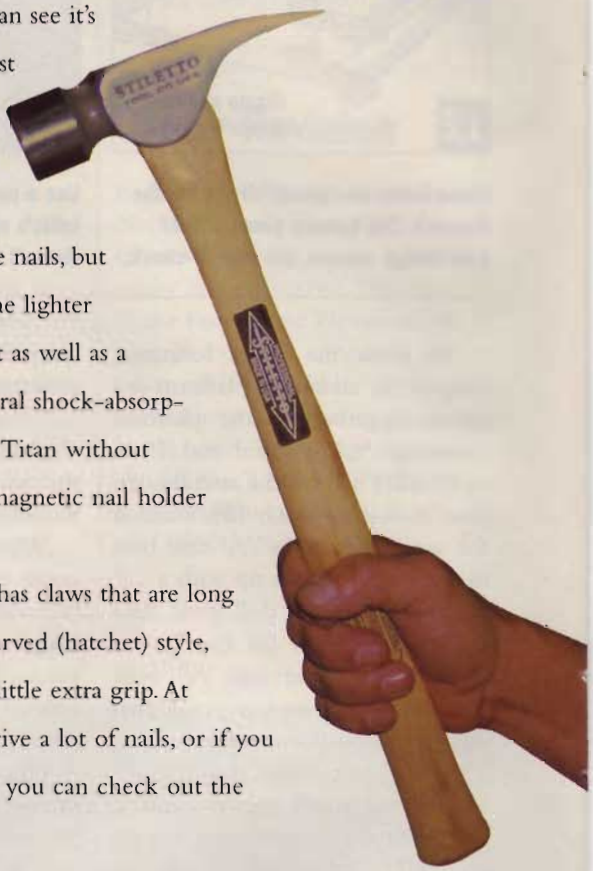


1/2" x 60" x 60 Baltic Birch

Tools & Shop Gear

Lightweight Titanium Hammer Packs Heavy Nail Driving Power

When you look at the Titan hammer from Stiletto Tool Co., you can see it's a well-crafted tool. What you *can't* see is that this may be the lightest framing hammer you'll ever hold. The reason? A solid titanium head that's a half pound lighter than a conventional steel head, so the hammer weighs just 14-oz. instead of the typical 24-oz.



Logic would dictate that more weight is better for driving large nails, but according to Mark Martinez, the Titan's inventor, this isn't true. The lighter head yields a faster, more powerful swing, he says, driving nails just as well as a steel-head framer, but with less fatigue to the user. Titanium's natural shock-absorption keeps vibration in check as well. I drove nails easily using the Titan without swinging hard, and found vibration was minimal. I also liked the magnetic nail holder that allows one-handed nail starting.

The Titan is available with either a milled or smooth face, and has claws that are long and fairly straight. The long ash handle, available in a straight or curved (hatchet) style, offers great leverage. You can get an epoxy coating if you prefer a little extra grip. At around $65 this hammer isn't cheap, but may be worth it if you drive a lot of nails, or if you simply like well-made tools. Contact Stiletto at (800) 987-1849, or you can check out the company's web site at www.stilettotools.com.

For Here Or To Go? CMT Offers Router Tables in Two Sizes

CMT USA, a company well-known for router bits, now offers router tables. The Industrio table has a laminate-covered MDF top and acrylic router insert plate. A recessed track accepts a table saw-style miter gauge. Faces on the aluminum fence slide to surround the bit for workpiece support, and they can be shimmed for jointing. The table sits atop an enclosed melamine cabinet.

The Industrio Portable table uses the same insert plate with a smaller fence and table, and an open base you can set on top of a workbench. Retail prices are around $399 and $199 respectively. Call CMT at (888) 268-2487 or the company's web site: www.cmt.com.

Porter-Cable Unveils Plunge Router at Home Builders' Show

This year's International Home Builders' Show marked the debut of Porter-Cable's first dedicated plunge router for the mid-range market, the model 7529. It has a 2-hp, 12-amp motor and an array of features, including speed control, soft start, and a unique power switch system.

There are two switches on the router — one on top, and one in the handle. During freehand use, you squeeze the handle switch. For table-mounted use, you lock the handle switch on, and use the toggle switch on the motor housing.

Another notable feature is a microadjust depth-of-cut knob that moves the bit in increments as fine as $^1/_{128}$". There's also a turret/depth rod setup for making stepped cuts. Unlike the rotating turret on most routers, this turret is fixed. You rotate the depth rod with your thumb, enabling you to reset depth between passes without letting go of the router handles. Plunge range is $2^1/_4$".

The 7529 also has integrated dust removal, a $3^1/_2$" opening in the sub-base, and an adapter that accepts Porter-Cable routing templates. Bit changing requires just one wrench, thanks to a spindle lock. Look for a retail price around $245. Contact Porter-Cable at (800) 487-8665, or on the web: www.porter-cable.com.

Lighted Screwdriver

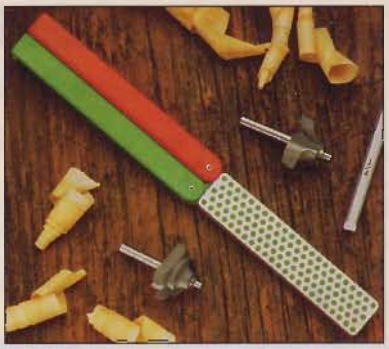
The Craftsman Driver Light from Sears has a handle that houses a battery-powered bulb. Aimed toward the screwdriver's tip, the light helps illuminate your work. A kit with the driver and nine bits is $20; a 20-piece kit is $30. Call (800) 377-7414 www.sears.com/craftsman.

New 1/2" PowerCollet from Jacobs

Jacobs Chuck Mfg. Co. has introduced a larger version of its PowerCollet router chuck, which debuted as a 1/4"-capacity model in 1997. This new model also allows changing bits without wrenches, but the new model accepts the 1/2"-dia. shank bits preferred by serious do-it-yourselfers and professionals.

Currently, there are 1/2" PowerCollets available for some Porter-Cable, Makita, Bosch, and DeWalt routers, and more models will be introduced. The $50 price includes mounting hardware and a 1/4" shank adapter. Contact Jacobs at (800) 866-5753, or on the web at www.jacobschuck.com.

Diamond Whetstone with Two Grits



Diamond Machining Technology Inc. (DMT) has expanded its line of diamond sharpening stones with the Double-Sided Diafold, a new series created by welding two grits of monocrystalline diamond surface together. Available grits are Coarse/Extra-Coarse, Fine/Coarse, and Extra-Fine/Fine. All feature two-piece handles that close over the stones to protect them when not in use. Suggested retail price is $37.50 each. Call DMT at (800) 666-4368.

Quick-Cutting Drywall Saw

The Pro-Rocker drywall/keyhole saw from Vaughan and Bushnell Mfg. Co. is designed to make quick work of drywall cutouts. The blade has eight teeth per inch and it features a self-starting tip that allows you to plunge the blade through drywall without drilling a pilot hole. The plastic handle has a contoured thumb rest. Expect the Pro-Rocker to sell for around $14. Contact Vaughan and Bushnell on the web at www.hammernet.com, or call (815) 648-2446.

Product Information Number 179

Kobalt Tools Team Lowe's and Snap-On

Lowe's Home Improvement Warehouse has teamed with J.H. Williams, a division of Snap-On Tools, to develop a new line of mechanic's tools. With Snap-On's stellar reputation among service professionals, I figured the tools — sold under the Kobalt name — deserved a look.

The Kobalt line consists of over 300 products, including combination wrenches, sockets and ratchets (available separately or in sets), and tool storage units. The U.S.-made tools are forged from tempered alloy steel, and have a polished chrome finish.

Wrenches and sockets follow a popular new trend with a design that contacts bolts and fasteners on their flat sides, rather than at the points. This design is intended to provide more torque, and to reduce slippage that rounds off fasteners.

I compared prices and found Kobalt tools priced higher than sets at some home centers ($116 for a 69-piece socket set, for example), but their machining and finish quality was first rate — as I expect from Snap-On. Kobalt tools carry a lifetime warranty. Contact Lowe's at (888) 356-2258, or at www.kobalttools.com on the web.

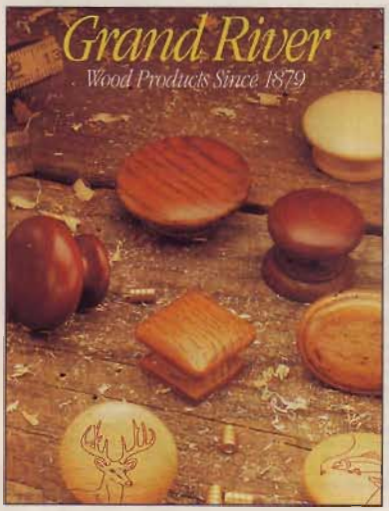
Twisted Fluorescents Fit More Fixtures

Compact fluorescent light bulbs use less energy and last longer than conventional incandescent bulbs, but are too tall to fit some light fixtures. Twister Bulbs from Lights of America have a spiraled light tube that fits 95% of fixtures that accept standard bulbs. The bulbs are available in 15-, 20-, and 25-watt models (60-, 75-, and 100-watt incandescent equivalents) for around $10 to $12 each. Call Lights of America at (800) 321-8100.

Wooden Specialties

Grand River Wood Products has been a supplier to furniture and cabinet manufacturers for 120 years, and is now making its wares available to the rest of us. The company's new catalog is filled with knobs, table tops and legs, appliqués, moldings, stair parts, and more.

Grand River's selection of knobs is among the best I've seen. It includes a variety of styles and wood species, with many available finished or unfinished. Production quality of all the company's components appears first rate. Call Grand River Wood Products at (800) 475-4001.



Home & Yard Products

New Garbage Disposal Powered by Water, Not Electricity

I always see great examples of new technology at the International Home Builders' Show. This year's show certainly had it's share in every category, but one new product that caught my eye wasn't one I normally associate with high-tech. It was the HydroMaid garbage disposal from Environmental Systems and Solutions Inc. It's powered by water instead of an electric motor.

You mount the HydroMaid to the sink and drain line like any other disposal, then connect the unit to your cold water supply and mount a water shutoff valve (supplied with the unit) atop the sink. Turn on the valve, and water pressure drives a piston that rides in a circular chamber surrounding the unit (see the cutaway at left). The piston rotates almost completely around, then reverses direction, driving a stack of moveable cutters past another set that is fixed. This chops waste into very fine bits. At the same time, water sprays into the disposal, washing the particles down the drain.

According to company president Ron LaFord, the disposal cuts waste into much finer particles than does an electric disposal, without using any more water. It's also very quiet. Since waste is cut and not just shredded, the HydroMaid will handle fibrous foods such as celery, and will even cut through chicken bones. If you drop in something the disposal can't handle, it will stop. I watched as a spoon got dropped in, causing the unit to shut down. The spoon suffered no damage.

Suggested price for the Hydromaid is $299. It carries a 10-year warranty, and the company will buy used units back and recycle them. Call (888) 824-9376, or go to www.hydromaid.com on the web.

Fiber-Cement Shingles Look Like Wood

New Shingleside shingles from James Hardie Building Products look like cedar shingles, but they're made of fiber-cement, a blend of portland cement, sand, and cellulose fiber. Like cedar shingles, these accept stain or paint, and they're packaged in random widths (6", 8", and 12") for a natural look. But their composition makes them resistant to fire, rot, and insects. Installation is similar to cedar, but these shingles are heavier and harder to cut. Warranted for 30 years. Cost is about $180 per 100 square feet. Call (888) 542-7343, or check www.jameshardie.com on the web.

Outward-Swinging Patio Doors Feature Retractable Screen

If you want to install patio doors, you have to choose between sliders, or doors that swing (often called French doors). I like French doors, but most of them swing inward, intruding on interior space when open. Plus, most of these doors don't have any kind of screen to keep bugs from getting inside.

One new option is the Frenchwood out-swing door series from Andersen Corp. Several heights and widths are available, including a 4-ft. width to fit in tight spaces. To keep the elements out, the doors feature continuous weatherstripping and adjustable hinges. All models have double-pane low-E glass. You can get a variety of grill and hardware styles, and special "Art Glass" panels.

To keep the bugs out, there's an optional retractable screen. It mounts to the interior door frame, and rolls out of sight when not in use. A standard height (6'8") door 6-ft. wide (the most popular size) sells for around $1,400. The screen is $350. Warranty is 20 years on glass and 10 years on everything else. Contact Andersen at (800) 426-4261 or www.andersenwindows.com.

No-Slip Tool Grip

To reduce blisters caused by garden tools, Ames Lawn and Garden Tools offers Handle Wrap. This padded tape has a non-slip surface plus a raised ridge for grip. A 3-ft. length sells for around $5. Contact Ames at (800) 725-9500 or www.ames.com.

Bathroom Fixtures Recall Bygone Days

If you like the looks of old-style bathroom fixtures but want modern efficiency and performance, check out Reminiscence bathroom fixtures from American Standard. At the center of the line is a claw-foot style tub. It's made of acrylic and features molded arm and head rests. Also included in the line are a round-front toilet, lavatories in pedestal or countertop styles with raised back-splashes, and a console lavatory. All are available in the company's full range of colors. A white pedestal sink lists for $395, a white tub for $1,100. Call (800) 524-9797 or go to www.us.amstd.com on the web.

Acquired Character

Look beyond the peeling paint and years of grime, and an old wooden toolbox can tell wonderful stories.

You just need to use your senses. Careful inspection of its design and the execution of the joinery tells a lot about the craftsman who built it. Customized tool holders speak of the builder's ingenuity and the kind of tools he owned, even though the original tools may have long since disappeared.

Rub your hands over the dings and scars acquired from decades of use and you can imagine the job sites the box may have visited. You may even be able to catch a whiff of the machine oil or camphor the builder used to keep rust at bay.

Combined, these traits give each box its own unique character — something you just don't find in the stamped steel or molded plastic tool chests of today.