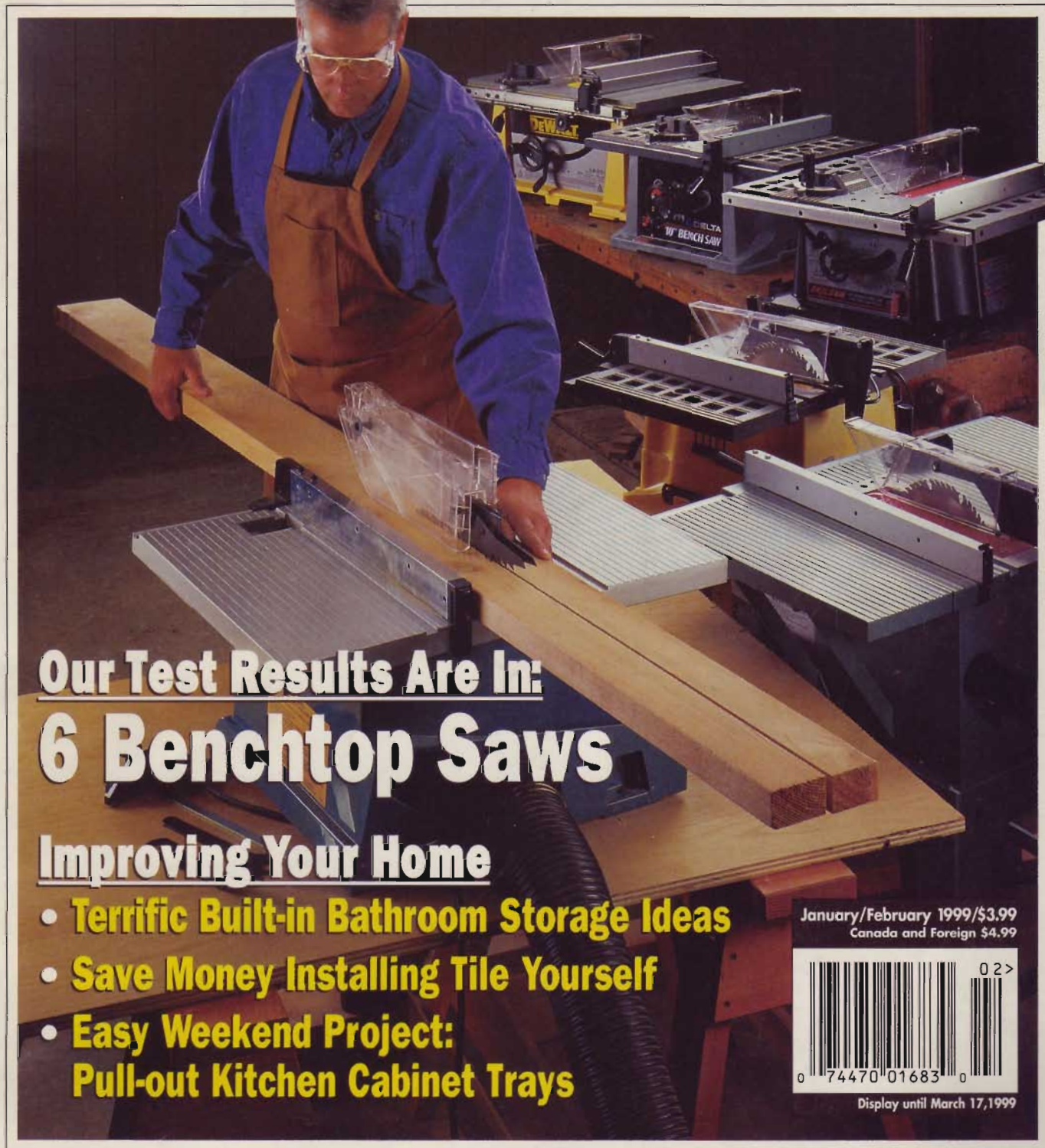


■ Great Bathroom Makeover ■ Easy Kitchen Upgrade ■

WORKBENCH[®]

THE ORIGINAL HOME WOODWORKING AND IMPROVEMENT MAGAZINE



Our Test Results Are In: **6 Benchtop Saws**

Improving Your Home

- **Terrific Built-in Bathroom Storage Ideas**
- **Save Money Installing Tile Yourself**
- **Easy Weekend Project: Pull-out Kitchen Cabinet Trays**

January/February 1999/\$3.99
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Our bathroom remodeling project included six cabinets. By following along as we build the base cabinet you'll know how to construct any of the others, or you can apply the techniques to built-in cabinets of your own design.

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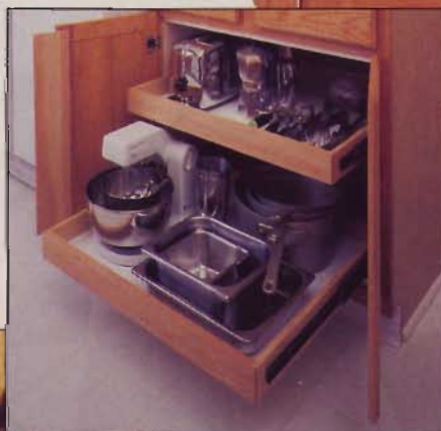
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A lowly metal aspires to long-lasting artistic heights.



Talking About Tools

Ever since the woodworking and home improvement bug bit, I've depended on reviews to help me make informed tool purchases. I've learned the important numbers — hp, amps, cutting capacity, chuck size, etc. — and sometimes gained a little insight into using tools.

Though this information has been helpful, I often thought it was incomplete. Specifications and technical tolerances can separate contenders from the also-rans, but what I really want is to learn how a tool feels in the hand, how it performs on the job, whether it's got muscle to spare or is more shina than substance.

Of course, everyone needs facts and figures before swapping hard-earned cash for a new trinket. But when gathering information, who do you prefer talking to about tools? Or about cars, trucks, and boats? Or fishing equip-

ment? Or anything? Most guys I know have the same answer — a friend with an opinion and firsthand experience.

What Reviews Are . . .

So, in a nutshell, our reviews emphasize hands-on experience. We put tools through a realistic regimen of tasks, things any of us do while working wood or making improvements around the house. After individually rating the highs and lows of each tool under review, we get together to air out our opinions. From these lively discussions emerge the strengths and weaknesses of each tool.

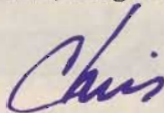
. . . And Aren't

But defining which tool is "best" is never simple. Occasionally, one tool rises above the rest, but more often several tools can be judged top performers depending on what different reviewers value (price, features, durability, balance, etc.). The best drill for someone boring a few pilot holes every year may not be the best drill for a pro using the tool every day.

It's also important to consider that most manufacturers are capable of making exceptional tools, but very few of us are willing to pay \$2,000 for, say, a router. For manufacturers, then, the challenge is choosing compromises that still yield a worthy tool at a price we can afford.

At *Workbench*, we're eager to tell you what we think of those compromises and to offer solid insight into the tools we handle. We'll declare our favorites, but it's important to bear in mind that

just because a tool does well in our review, it's not necessarily the ideal tool for you. Think of us as a friend with opinions and firsthand experience, and go from there.



Chris Inman, Editor

WORKBENCH

VOLUME 55

NUMBER 1

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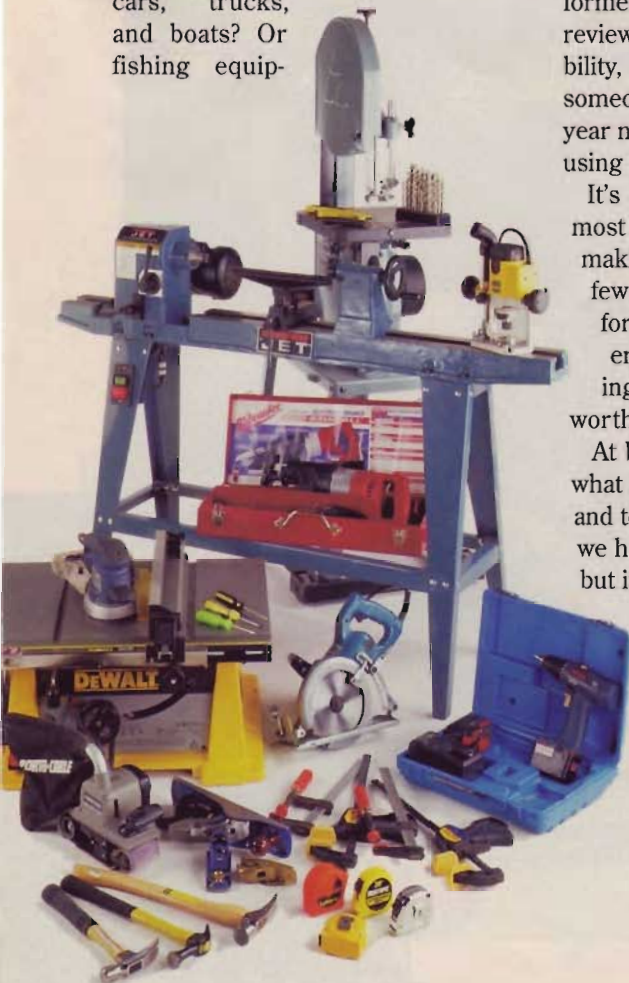


WORKBENCH (ISSN 0043-8057) is published bimonthly (Jan., Mar., May, July, Sept., Nov.) by August Home Publishing Company, 2200 Grand Ave., Des Moines, Iowa, 50312. *Workbench* is a registered trademark of August Home Publishing. Copyright © 1999 August Home Publishing Company. All rights reserved.

Subscription rates: Single copy, \$3.95. One year subscription (6 issues), \$15.94; two year sub., \$27.95; three year sub., \$39.95. Canadian/Foreign, add \$6.00 per year. Periodicals postage paid at Des Moines, IA and at additional offices. "USPS/Heartland Press Automatable Poly."

Postmaster: Send address changes to *Workbench*, PO Box 37272, Boone, IA 50037-0272.

Printed in U.S.A.



Questions & Answers

Reduce Lead Hazards when Stripping Painted Woodwork

Q I would like to strip all the paint from my century-old home's staircase and banister. There are several layers, the last of which appears to be exterior paint? What's the best way to strip the paint?

Joe Sullivan
Sayville, NY

A Given the age of your home, the paint in question almost certainly contains lead. (To find out, see the lead test kit featured on page 70). So you need to take a number of precautions to contain the paint you remove to avoid the risk of lead contamination and poisoning. The U.S. Environmental Protection Agency's Office of Pollution Prevention and Toxics has a free publication, *Reducing Lead Hazards When Remodeling Your Home*, that provides a wealth of information as well as a list of state lead program contacts. To get a copy, contact the EPA's National Lead Information Center at 1-800-424-LEAD and ask for publication number EPA 747-R-94-002. You can also order this or a number of other pamphlets online by visiting the center's web site (<http://www.epa.gov/lead/nlic.htm>).

In addition, check with local agen-

cies before beginning to make sure you comply with local disposal regulations, or hire a trained contractor to do the work for you.

At a minimum, you'll want to seal off the area from the rest of the house with polyethylene sheeting, wear a cartridge-type respirator when working, and buy or rent a vacuum equipped with a HEPA filter for cleaning up the debris.

Even with the proper protection in place, you want to minimize the creation of dust, so avoid sanding the painted surfaces. It's better to use a paint stripper — a thick-bodied paint remover works well on odd-shaped or vertical surfaces. When working indoors, I prefer to use a citrus-based stripper to reduce chemical fumes, although rubber gloves and eye-protection are still essential.

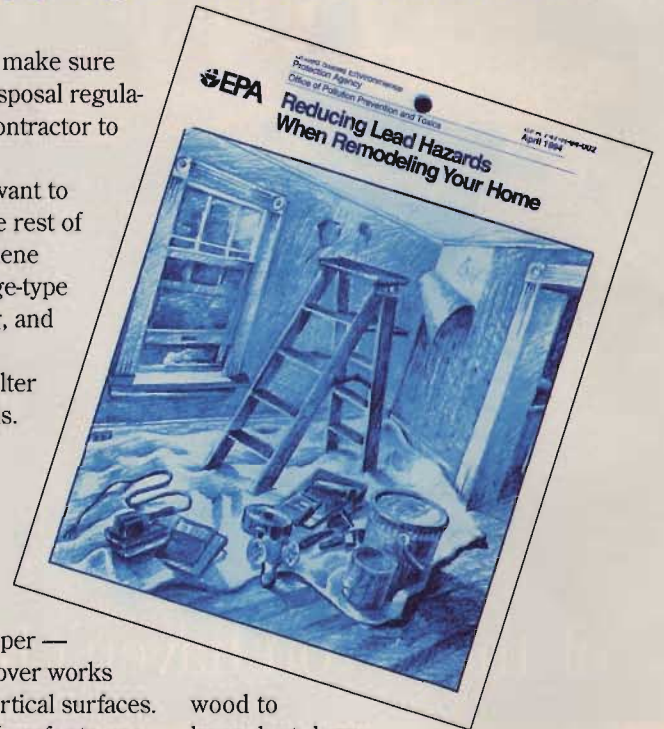
For larger, flat surfaces like stair treads and risers, I'd use a heat gun to loosen the paint. Make sure you use one that has a low heat setting (under 1100° F) since higher heat can create dangerous fumes and vapors. Follow up by wet sanding the

wood to keep dust down.

(An added benefit of wet-sanding is that it raises the grain and makes it easier to remove deep-seated paint.)

Wear the respirator whenever working around the paint, and wash your hands, clothing, and any tools with soap and water when you're finished.

Another alternative is to remove the decorative banister pieces and have them professionally stripped.

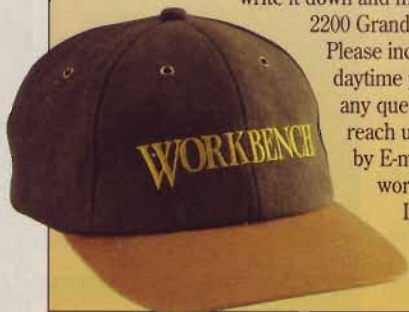


SHARE YOUR QUESTIONS!

If you have a question about woodworking or home improvement, write it down and mail it to WORKBENCH Q&A, 2200 Grand Ave., Des Moines, IA 50312.

Please include your name, address and daytime phone number in case we have any questions for you. You can also reach us via Fax at (515) 283-2003 or by E-mail message at workbench@workbenchmag.com.

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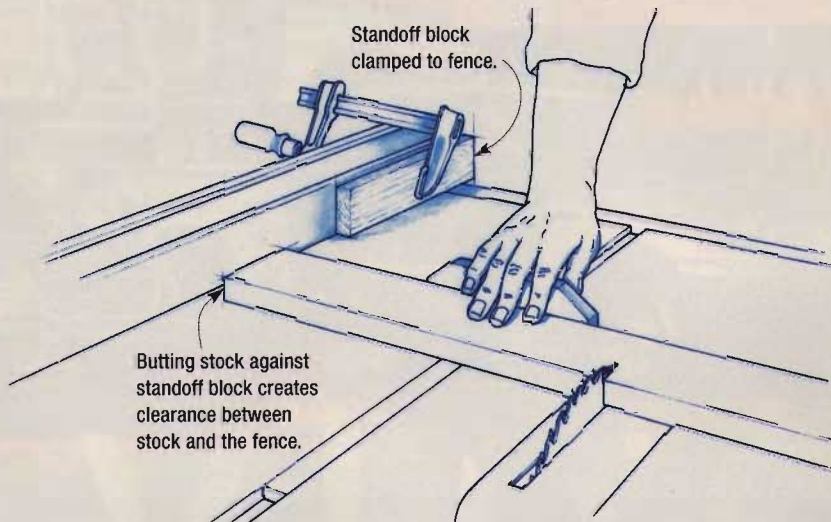
Standoff Block Allows Using Rip Fence as a Stop

Q In some of your illustrations, you show using the miter gauge to make a crosscut while using the rip fence as an end stop at the same time. I thought I had read somewhere that using the rip fence this way is dangerous. Why the discrepancy?

Wally Nova
Mission Viejo, CA

A It's not advisable to use the fence as a stop when crosscutting a board because the cutoff portion between the fence and blade can jam and create a kickback situation. For that reason, we don't show this technique in our illustrations.

We have shown a similar technique, however, in which a short piece of scrap is clamped to the fence well in front of the blade. You index your stock against this standoff block



before making the cut. Then, as you move past the block, you eliminate the potential for binding because the workpiece isn't butted against the fence. Another similar illustration

shows cutting dados. It's safe to use the fence to index dado cuts because the blade doesn't sever the board — there's no loose cutoff to get wedged between the fence and the blade.

Preparation is Key for Lasting Garage Floor Paint Job

Q I painted our concrete garage floor a few months ago, but the paint is already starting to peel. What kind of preparation work do I need to do and what paint works best?

Doris Ruble
Ft. Lauderdale, FL

A There are several types of paint available, but preparation is the key to success no matter which type you use. For the paint to bond, you first need to remove all the old paint and clean any grease or oil off the floor. Then scrub down the floor and let the entire surface dry.

In the past, it was common to use muriatic acid or an etching compound to dissolve a very thin layer of the concrete's surface. This not only cleaned the concrete, but roughed it up to provide a good mechanical bond for the paint. These products, however, along with solvent-based strippers and epoxy-coatings, were designed to be applied by professional contractors.



Today, most paint manufacturers carry a line of strippers and cleaners that are both easy to use and environmentally friendly.

One relatively new product we've seen is a two-part, water-based epoxy coating from Epoxi-Tech (1-888-683-5667). Sold as a kit, EpoxyShield

includes a degreaser, enough epoxy finish to cover 250 sq. ft., and small "chips" to scatter on the wet finish to add color and skid resistance.

United Gilsonite Laboratories (UGL) carries a latex concrete paint and cleaning product as part of its Drylok line. You can reach them at 1-800-272-3235.

Automotive Products Provide Buffing Alternatives

Q For many years, I used a product called Duffy's Elbow Grease to buff out the final coat of varnish. It's no longer available, so any suggestions on what I can use as a substitute?

Roy L. Ewen
Cedar Rapids, IA

A When I want an ultra-smooth finish on polyurethane, I buff the surface with a white Scotch-Brite pad, then follow up with 3M Finesse-it II, a liquid automotive-type polishing compound, and a buffing pad on my random orbit sander.

A more traditional approach is to use mineral oil and a rubbing compound such as pumice or rottenstone. A coat of paste wax adds luster, some protection from moisture, and reduces friction, which diminishes the occurrence of scratches.



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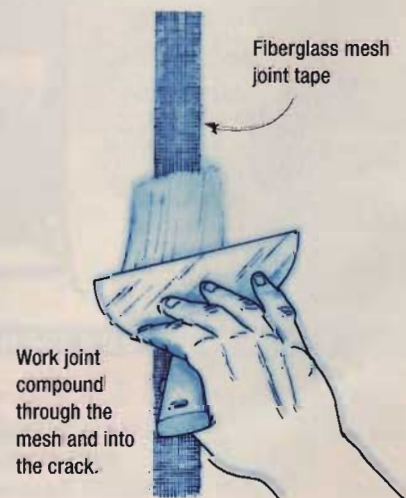
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Fiberglass Tape may Help Joints

Q Three years ago, we put an addition on our 45-year-old home. The drywall joints in the ceiling where the addition and the original house meet have cracked and opened up. I know this is due to seasonal movement and settling, but is there a way to repair the joint to prevent new cracks from forming?

Bill McDonald
Minneapolis, MN

A You can try using a double layer of fiberglass mesh joint tape, but chances are the crack will redevelop until the addition stabilizes with the rest of the house. A more extreme fix is to remove the drywall on either side of the joint to the nearest studs, and insert new drywall so that it bridges the house-addition junction. A simpler approach is to hide the crack by covering it with wood molding.



Work joint compound through the mesh and into the crack.

Horsepower Ratings Can Be Deceptive

Q In the Sept/Oct issue, you responded to Dave Milburn's question on table saw power by saying that a 3-hp table saw will require 220 volts. My Craftsman 10" saw is rated at 3 hp, but it runs on 110 volts. Are there different ratings?

Marquis Brandon
Peru, IN

A Horsepower ratings alone can be deceiving because not all manufacturers use the same rating system. Such ratings also depend on what type of motor you're talking about — universal or induction.

Universal motors develop more horsepower for short bursts than induction motors of similar size and weight. Tool manufacturers take advantage of this lightweight power by using universal motors in portable power tools and some light-duty stationary tools where you typically run the motor for only a few minutes at a time.

For "continuous duty" applications, you almost always find an induction motor linked to the machine arbor by a V-belt and pulleys. Most induction motors have horsepower ratings based on sustained run times.

Overload either type of motor, and they will work harder — develop more horsepower — for a brief period before they overheat and shut down. While technically correct, some manufacturers use the terms "develops" or "peak horsepower" to indicate this maximum output in an effort to make the tools seem more powerful.

A check of your saw's model number showed the saw has a 1½-hp induction motor. Your saw will muster 3 hp in response to a momentary load, but it won't be able to keep it up for long before its thermal protection breaker kicks out. And I'll bet the owner's manual says the saw "develops" 3 hp.

A more accurate power measure for motors is the number of amps a motor draws. Typically, a 110-volt, 1½-hp motor running at full load (but not overloaded) will draw 12 to 16 amps.

A 3-hp motor running at full load on 110 volts will draw 30 to 35 amps, which is far beyond the safe limit for most shop circuits.

If the motor can be adapted to operate on 220 volts, however, you reduce

the required circuit amperage by half.

If you'd like to find out more about electric motors, horsepower ratings, and amperage, check out the article *Demystifying Motors* in the June 1997 issue of *Workbench*.

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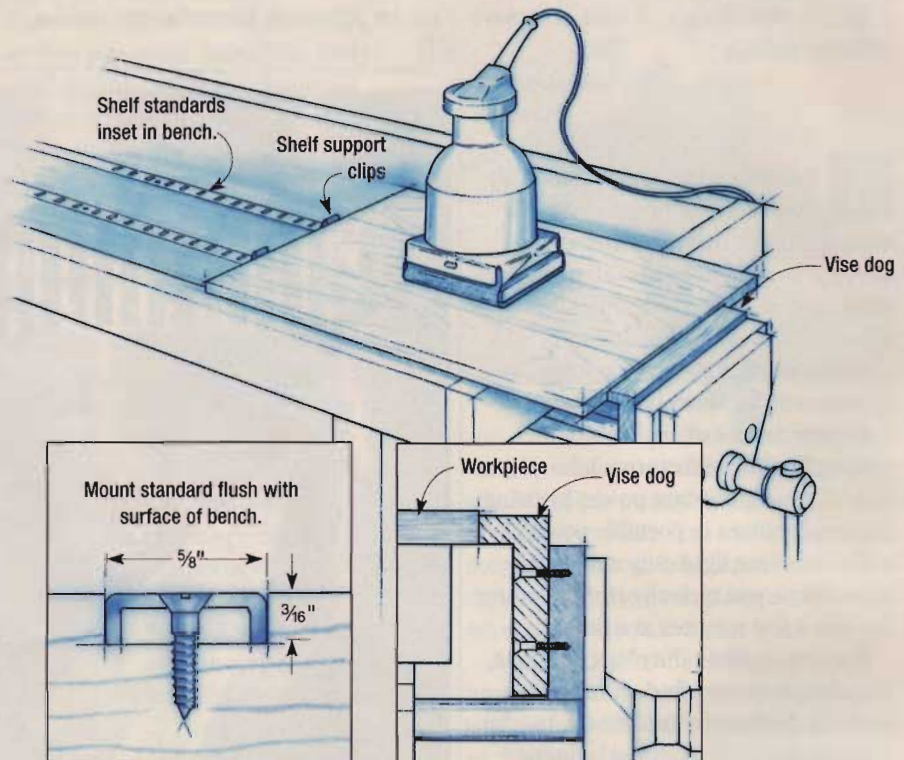
Shelf Standard Provides Adjustable Bench Dogs

I was always having trouble holding workpieces on my bench when sanding and routing. I tried one of those no-slip sponge mats, but was forever picking sponge out of my sander.

I solved the problem with a simple adjustable bench dog system using two metal shelf standards. With a router and a $\frac{5}{8}$ "-dia. straight bit, I cut two grooves into the top of my bench so the shelf standards would fit flush with the top of the bench. These grooves align with a wide dog I have mounted on my end vise.

Now when I need to clamp a workpiece, I install a shelf support clip at the appropriate position on the standard and tighten the vise. To keep shelf clips handy, I screwed a short piece of standard to one leg of the bench and install them there when I'm not using them.

Lewis A. Lowe
Sumter, SC



Periscope Eases Gutter Inspection



I got tired of hauling the ladder out every time I wanted to make sure the rain gutters on my ranch-style home weren't plugged with leaves. So I built a simple periscope that lets me keep both feet on the ground.

First, I took two 8"-long pieces of 1x6 and screwed them together at 90°. Then I mounted a small mirror (that cost me \$1 at a local discount store) to the underside of one of the 1x6's. Finally, I mounted the mirror assembly to an 8-ft. long 1x2 handle.

To use the periscope, I simply stand on the ground and hold the mirror up over the gutter. It saves me time when I give the gutters a quick check before a heavy rain.

Phillard Rydberg
Hallock, MN

SHARE YOUR TIPS, JIGS, AND IDEAS

Do you have a unique way of doing something? Just write down your tip and mail it to *Workbench Tips & Techniques*, 2200 Grand Ave., Des Moines, IA 50312. Please include your name, address, and daytime phone number. If you prefer, e-mail us at workbench@workbenchmag.com.

We'll pay you \$50-\$150 and send you a *Workbench* cap if we publish your tip.

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.



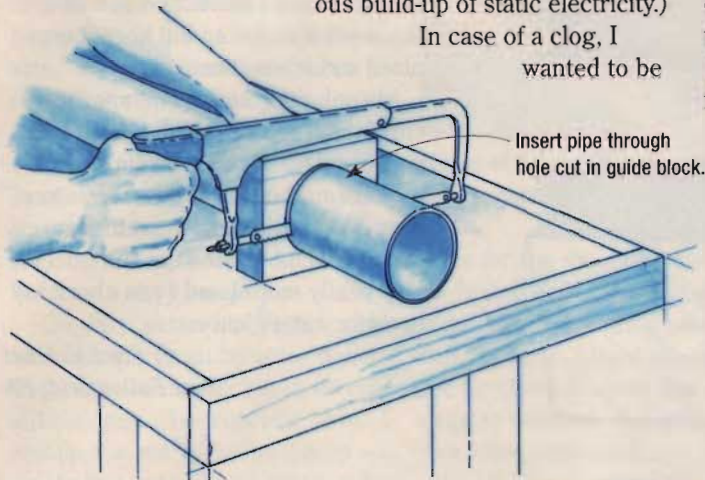
Tip Of The Month

Sponsored By The Stanley Works

Easy PVC Pipe Cut-off Guide

Recently, I installed some 4"-dia. PVC drain pipe in my shop for a dust collection system. (Before anyone asks, yes, I made sure I ran a bare copper wire through the pipe so it was properly grounded to prevent a dangerous build-up of static electricity.)

In case of a clog, I wanted to be



Insert pipe through hole cut in guide block.

able to disassemble the pipe, so I didn't glue the joints together. But to get tight fitting joints, I needed to cut the pipe ends squarely, a difficult task until I came up with a simple idea that works with pipe of all sizes. Using my drill press and wing cutter, I cut a hole the same size as the outside diameter of the pipe in a piece of 2x8 scrap. (You could also use a jigsaw to rough out the hole, then file and sand it to its final shape.)

After fastening this stock to a cleat, I clamped the cleat to the bench and slipped the pipe through the hole to the proper length. Then I used a hack saw to cut the pipe, keeping the saw blade flush with the guide block. The block also kept my left hand safely away from the blade while I sawed.

Francis Herzog, Jr.
Lincolnton, NC

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

Turn Buttons Key to Ceiling Drywall Installation

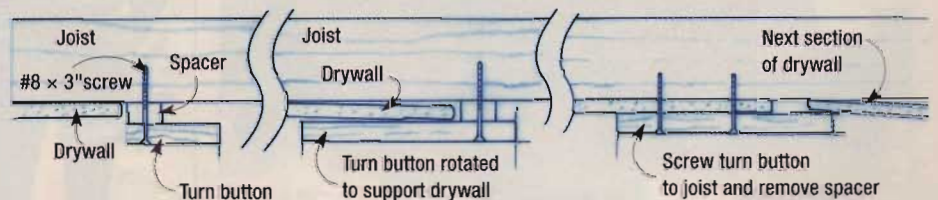
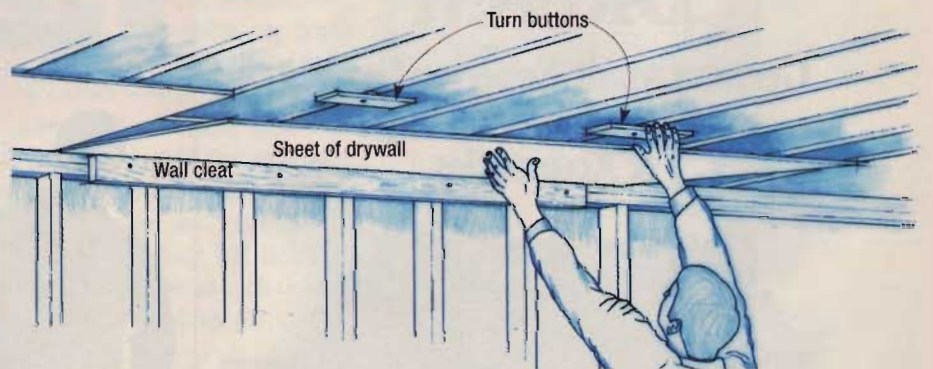
Occasionally in my remodeling business, I have to install drywall ceilings. Drywall lifts are expensive to rent and just aren't worth the hassle for small jobs. But that doesn't mean the drywall is any easier to handle.

The technique I use starts by mounting a 2x4 cleat to the wall, leaving a $\frac{3}{4}$ " gap between the top of the cleat and the ceiling joists. This gives me a ledge on which to rest one edge of the sheet of drywall.

To support the other edge, I screw a piece of 1x4 with a $\frac{3}{4}$ "-thick spacer block to the joists 49" over from the wall. The 1x4 pivots like an oversized turn button.

To install the drywall, I lift one edge onto the wall cleat, raise the opposite edge and rotate the turn buttons to hold the panel in place. Unlike a T-brace that you wedge under a sheet of drywall, my system lets you easily reposition the drywall.

When I get ready to install the next piece, I make sure the turn buttons are



aligned with the joist and drive a pair of screws through the turn buttons, the drywall, and into the joists. After removing the $\frac{3}{4}$ "-thick spacer and installing the next set of turn buttons, I lift the next sheet of drywall onto the

ends of the stationary boards, swivel the turn buttons then screw the drywall down. The few extra screw holes get mudded like the rest.

Al Steward
New Hudson, MI

Chain Cuts Paint

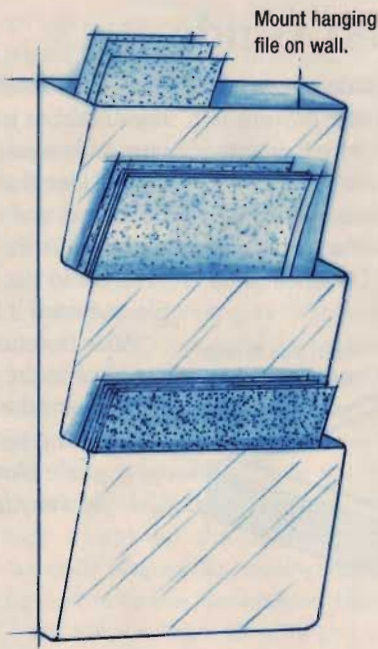
Here's an old trick I learned in the Navy for removing peeling paint from a metal pole or pipe.

Take a length of chain, such as a log chain, and wrap it a turn or two around the pole. Pull the ends of the chain back and forth, moving up and down the length of the pole, and watch the paint chips fly.

*Jack Derderian
Philadelphia, PA*



File Sandpaper Under "F" — for Flat



Storing sandpaper in a drawer used to drive me nuts. It seemed I was always digging through odds and ends to find the right grade of sandpaper. The new sheets were always on the bottom and I never knew when I was running low on one type until I used the last sheet. I wanted a way to store the sandpaper flat and to keep it organized and accessible.

My solution came from an office supply store — an acrylic hanging wall file. This inexpensive organizer mounts on the wall and lets me store a variety of grits right next to my bench. Even half- and quarter-sheets stay neatly stored and I can check my inventory at a glance.

*C. Scott Vincent
East Fallowfield, PA*

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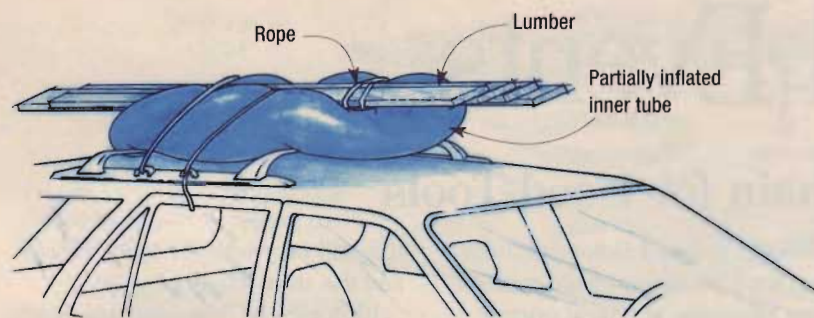
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Product Information Number 192



Inner Tube Tightens Tie-downs

Hauling lumber home on the roof of my car used to be a hassle until I found a little trick that protects the vehicle's paint and cinches the tie-downs tight. Before I start loading up, I put a deflated inner tube on the roof of my car. Once I've got the lumber tied down with rope, I use a little 12-volt portable air compressor — the kind that plugs into the cigarette lighter — to partially inflate the inner tube. This snugs up the ropes and protects the car's roof.

*William Ward
Garden, MI*

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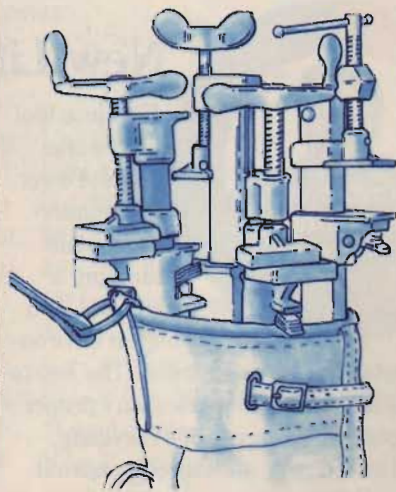
Product Information Number 187

Bag Your Clamps

Pipe-clamp storage in the shop is a headache, but an even worse problem is having to haul them to another part of the house for a repair job. I invariably bang them into a door jamb and gouge the trim.

An old golf bag purchased for a couple bucks at a garage sale provided my solution to this problem. The clamps fit neatly in the bag, which has a heavy-duty shoulder strap and pockets I can fill with dowels, glue, pipe couplers and other accessories I might need. Adding a wheeled cart offers even more convenience.

*Bob Settich
Des Moines, IA*



News and Events

ReTool: First Retail Chain for Used Tools

Cost-conscious woodworkers have always managed to save money by buying used tools, but hunting around for the good stuff is a hit-and-miss pursuit. Once in a while you can stumble onto a bargain at a pawn shop or a garage sale, but it still boils down to the luck of the draw. So how about having a reliable inventory of used tools available from a local retailer?

If a Minneapolis company has its way, the answer might be closer than you think. Grow Biz International, which develops franchises and retail networks for used and consignment merchandise, has targeted the hand tool and power tool market for its next venture. Already the company has franchised hundreds of stores for other product categories, including sporting goods (Play It Again Sports) and computers (Computer Renaissance). GrowBiz hopes eventually to franchise up to 500 ReTool stores nationwide.

Inventories at the ReTool stores include hand and power tools for woodworking, auto mechanic's tools, lawn and garden tools, construction tools, and accessory lines. Used and consignment tools are acquired from the public, and the stores also offer

discounted new and factory-reconditioned tools purchased from manufacturers. Examples of typical pricing show selling prices of used tools to be about half of the cost when new.

If you're selling tools instead of buying, a ReTool representative may be able to visit your shop to inspect and purchase tools right on site. Again,

this will vary with the types of tools and the store locations.

It's a sure bet that most woodworkers and home improvement junkies will like the ReTool concept for the savings on tool purchases, but if you think the franchise opportunity might be right for you, you can find out more from Grow Biz at (800) 269-4075.



New Life for NiCad Batteries

Cordless tool users take note. Power tool batteries contain cadmium, a toxic metal, and they pose an environmental hazard if discarded. The key to safe handling of batteries isn't proper disposal, however — it's recycling, and an industry-sponsored nonprofit

agency wants to make sure it happens.

Rechargeable Battery Recycling Corporation (RBRC) is setting up a number of programs to ensure that consumers have convenient outlets to take spent batteries from power tools, cordless phones, video cameras, and other products. Dubbed the "Charge Up to Recycle!" program, the effort is creating drop-off sites at retail stores, businesses, and public agencies, and even will be incorporated into existing

household waste collection programs in some cities. The extracted cadmium will be used to produce new batteries, and the nickel and iron go to produce stainless steel.

Actor Richard Karn ("Al" on the television show *Home Improvement*), is the spokesperson for the program's public awareness campaign.

To find a participating retailer or drop site near you, you can contact RBRC toll-free at (800) 228-8379.



Snow Thrower Follow-Through

You know that bittersweet feeling you get watching the season's first snowfall? The air smells crisp and clean, the sounds of the street are hushed underneath a pristine white blanket — then you realize you're going to have four hundred pounds of that sloppy wet stuff to clear from your driveway and sidewalks.

My appreciation of winter usually skips town about then, and I disrupt the stillness with the sound of a snow thrower engine. It turns out, however, that I've been too quick to park the snow thrower when I'm finished and ready to head inside for hot chocolate. The Outdoor Power Equipment Institute (OPEI) advises against leaving the machine as is when you're finished clearing snow. Instead, they recommend a few quick maintenance steps to make sure you and your machine are set to go when the next storm hits.

Some of the chores are routine — checking belts for wear, fasteners for tightness, tire pressure, and so on. Others aren't as obvious. First, you want to run the thrower for several minutes to clear any residual snow that might freeze-up the auger or impeller. Then shut the engine off and tackle any stubborn spots with a stick. Finally, top off the gas tank. Not only will this save you the trouble next time when you want to get the machine going, a full fuel tank forces moisture out and reduces the condensation of water into the gas.

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Product Information Number 181

Tiling for the Long Haul

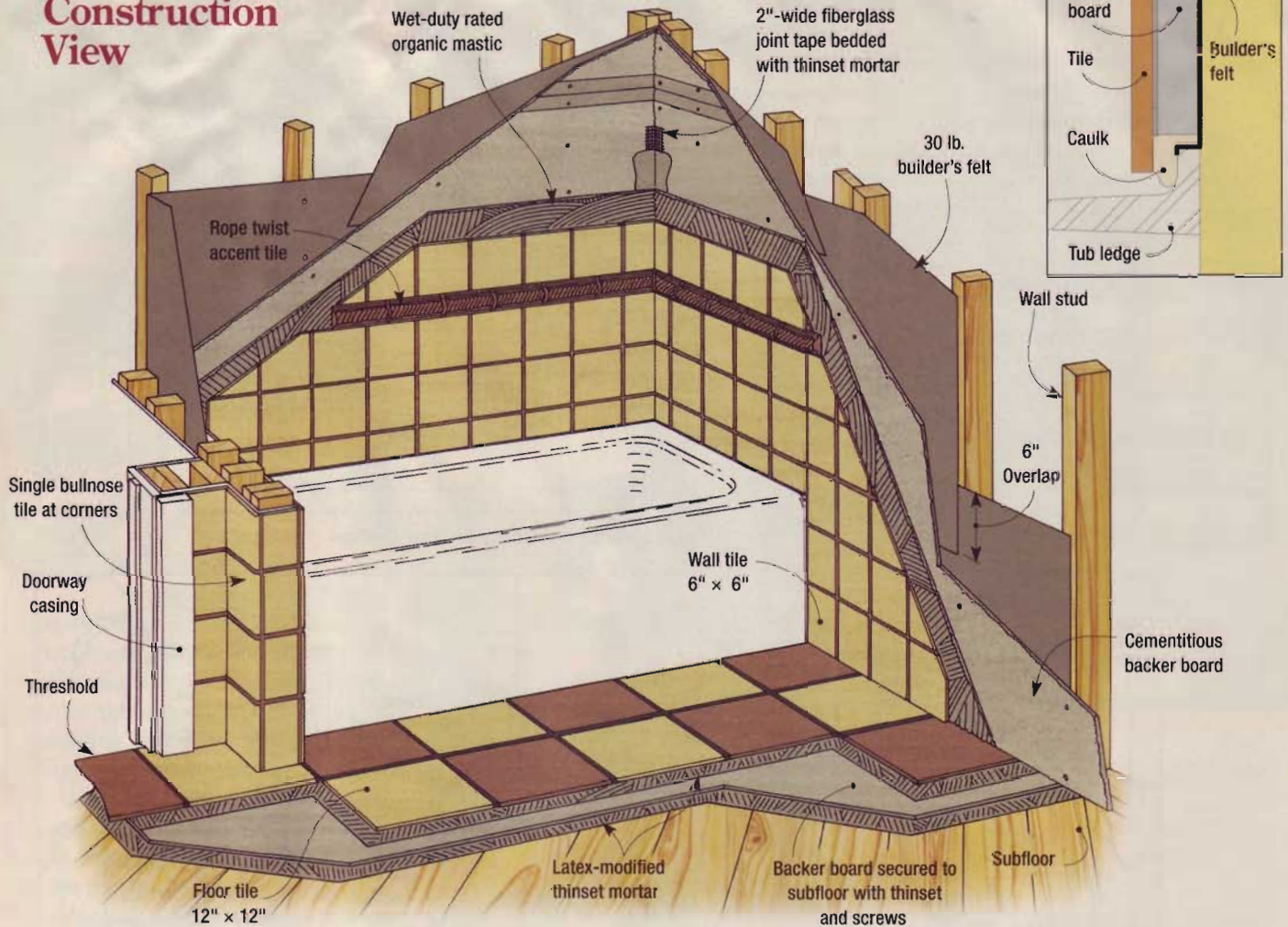
Tiling success depends on three things: quality tile, durable underlayment, and thoughtful consideration to layout in an imperfect room.

Call them unglamorous. Even uninspiring. But, when you're talking tile, never refer to underlayment and layout as unnecessary. In fact, these are the twin unsung heroes of any tilesetting project. Without them, tile is no better than glossy paint on a tar-paper shack.

Except for a few die-hard fans and some special circumstances, underlayments of hand-tamped mortar beds have largely given way to cementitious backer board (common brand names include Durock and Wonderboard) and modified gypsum board (ask for DensShield). These modern products are easy to handle and install, which is especially good news for DIYers. They're also suitable for all interior wet or dry area applications.

Bathroom Construction View

Rim Detail



Before installing backer board, you'll want to check the floor for level and the walls for plumb. The closer your walls and floors are to perfect, the easier it will be to lay the tile. But how far off is too far? Tile Council of America guidelines say a surface out of level or plumb by less than $\frac{1}{8}$ " in 10 ft. shouldn't be noticeable. In my opinion that's setting the bar awfully high, especially for older homes — $\frac{3}{8}$ " in 10 ft. you should be okay. Surfaces that will be tiled do need to be flat.

Floors and walls that are excessively out of whack will require some work. Stripping the room to the studs and joists will allow you to shim the framing or install 2x stock alongside the studs and joists to create plumb walls and level floors.

Installing Backer Board

After inspecting my walls and floors with a level, and making sure my subfloor was screwed down adequately, I laid backer board on the floor using latex-modified thinset mortar and screws (**Bathroom Construction View**). Be sure to spread mortar on the subfloor using a $\frac{1}{4}$ " square-toothed trowel, and drive $1\frac{1}{4}$ " or longer screws every 8" in line with the joists. Specialized screws with a self-countersinking feature and rust-resistant coating are available for use in cementitious backer board.

Next, it's a good idea to staple builder's felt to the studs in the "wet area" around the tub. Hang it horizontally, working up from the bottom, and overlapping the pieces at

least 6". The felt will protect the studs from water that might seep through the tile and backer board.

After the felt is up, screw backer board to the studs in areas you intend to tile, taking extra care around the tub to make sure the backer board hangs over the tub's rim (**Rim Detail**). On the remaining bathroom walls hang moisture-resistant wallboard.

Backer board seams need to be taped like wallboard joints — I like to use Durock's heavy-duty fiberglass tape for backer board, bedding it with thinset mortar. Since these seams will be covered with tile, they don't have to be as smooth as typical wallboard joints. Once you have all the joints taped you can move on to your tile layout.

Planning Ahead: The Virtues of a Layout Diagram

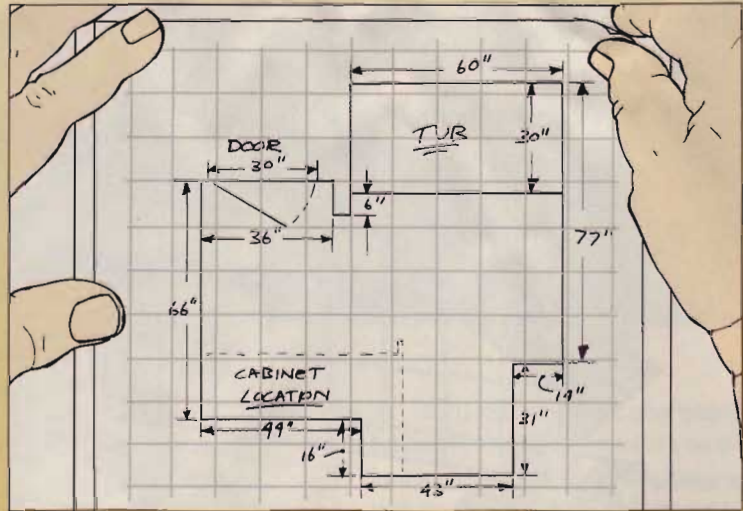
In my bathroom, both the doorway and the area in front of the tub were visually prominent, so I wasn't sure which one to emphasize with full tiles. By drawing my tiles to scale on

tracing paper, then moving the paper over my room diagram, I found the best layout without handling any tile.

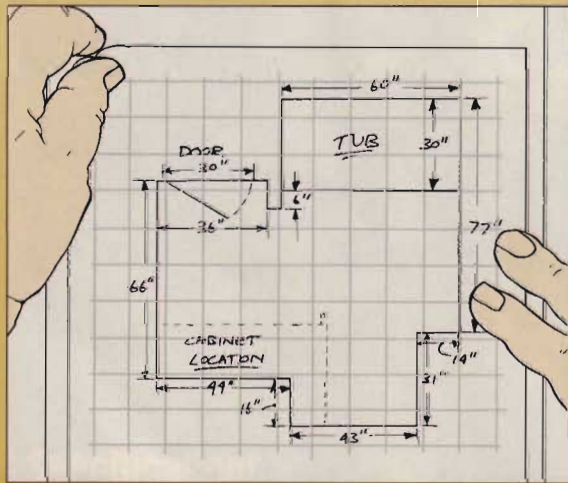
Creating a tile/joint list, like the one shown at left, provides a quick way to figure out how many tiles you'll need for your room.

Tile/Joint List

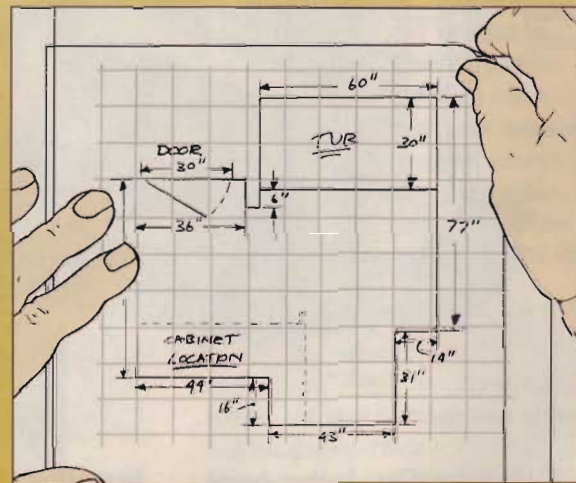
Tile + Grout Joint	Actual Measurement
1	12 $\frac{1}{4}$ "
2	24 $\frac{1}{2}$ "
3	36 $\frac{3}{4}$ "
4	49"
5	61 $\frac{1}{4}$ "
6	73 $\frac{1}{2}$ "
7	85 $\frac{3}{4}$ "
8	98"
9	110 $\frac{1}{4}$ "
10	122 $\frac{1}{2}$ "



Floor Layout — Compromise Option



Floor Layout — Option #1



Floor Layout — Option #2

Layout Decisions

Laying tile is all about making compromises. Since almost every room has features that can derail an ideal layout, you'll have to be flexible as you work through this part of the project. Bump-outs, nooks, windows, doorways, bathtubs, and cabinets are typical obstructions you'll have to tile around. And, as you've probably already found out, you should count on out-of-square corners, unlevel floors, and walls that are out-of-plumb. On top of that, you may find that the size of your tile varies a little (especially true of handmade tile).

Your job is figuring out how to lay tile in the most attractive way given these variables, which will, in turn, make the project more predictable.

The first tool you need for determining your layout is a set of room diagrams — for the floor and each wall you intend to tile (see *Planning Ahead*). To keep the scale consistent, draw the surfaces on graph paper, and include details that affect the tile layout — nooks, bump-outs, the tub, windows, and doors.

Once you have the surface diagrams ready you can create a grid on tracing paper representing the tile. Scale this grid the same as the

surface diagrams. To proceed you'll need to know the size and type of tile you intend to install, and settle on the width of your grout joints. Grout joint widths range from $\frac{1}{16}$ " to $\frac{1}{2}$ ". Any wider and the grout just won't hold up very well.

Here's a helpful tip. To get a dimension that's easy to compute, add the size of your tile to the width of one joint, and call it your tile/joint figure. My floor tiles are 12" square, and the grout joints are $\frac{1}{4}$ "-wide, so the figure I used was 12 $\frac{1}{4}$ " (**Tile/Joint List**). If your tiles are rectangular you'll need one tile/joint figure for the length and

another for the width. Expanding your list to include 10 tiles makes it easier to draw the tile grid.

Laying the tile grid over your floor diagram will allow you to find the best layout. As you move the tracing paper around think about where it's important to have full (uncut) tiles. The common practice is to choose visually prominent places — doorways or along the tub, for example. My bathroom offered two equally important locations, so I tried each option, then compromised between the two.

This is also a good way to estimate the quantity of tile you'll need, although you should purchase more than this number — you may break some tiles, or cut a few incorrectly. My rule of thumb is to buy 5-10% more if I'm using off-the-shelf tiles, and 10-15% more if the tiles are special ordered. I'd rather have extras than run short.

Snap to Attention

With your layout settled you can start preparing the floor. Keep in mind that the diagrams are excellent guides, but you won't want to treat them as gospel.

The first step is to create a baseline that will keep your rows of tile parallel and square to a prominent, reliably straight feature in the room. In my case, I found that the front of the bathtub was straight and square to an adjacent wall.

To position my baseline I set two tiles in front of the bathtub, and placed 1/4" spacers between the tiles and the tub as well as along the tiles' opposite edge (Figure 1). Using tile and spacers is more accurate than measuring. Next, I snapped a chalk line next to the outside spacers.

Once you have a line, check that it's square to an adjoining wall (Figure 2). A square corner is important because it's the starting point for laying the tile. If the line and wall are out-of-square a little, you can usually hide the difference in the grout spaces at the edge of the room. If they're out-of-square by more than 1/16" in 2 ft. you'll have to consider a compromise — adjust the line a little or find an altogether different site for the line.

Since I wanted full tiles at the doorway, I also needed to make sure that the threshold was parallel

PRO TIP

Hairspray — A Tiler's Secret Weapon

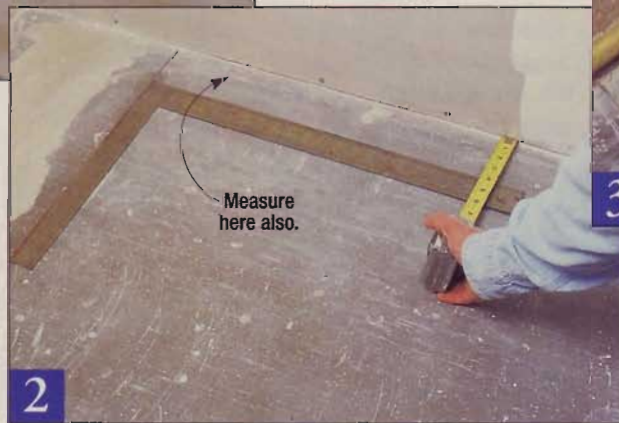
Chalk lines can disappear really fast in a work area, especially on floors where there's a lot of foot traffic. Take a tip from the pros and use hairspray to cover the lines.

The spray will protect the chalk without affecting any mortar or mastic coming later.



◀ To create a baseline start by setting two tiles against a straight feature in the room (the bathtub, in my case). Placing spacers on either side of the tiles allows for grout joints, then you can snap a chalk line.

▶ Align one leg of a framing square with the chalk line, then measure from the wall to the other leg at several places — a consistent figure means your line is square to the wall.



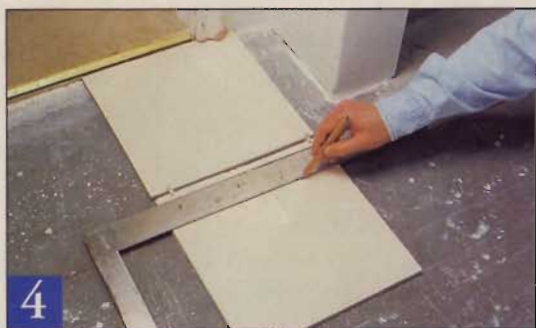
with the line. Here again, minor variances would have been okay, but anything over 1/4" would have required a line shift to avoid having cut tile in this prominent location.

After everything checks out the chalk line officially becomes your baseline. To keep the line from wearing away, you might want to try a trick I've seen tilers use (Pro Tip).

One final step before setting any tile is to cut the door casings to allow your tile to slide under (Figure 3). It's best to provide room for the tile plus a little more for the mortar.



▲ Cut the bottom of the door casing so the tile can slip under. Renting a casing saw (shown) is fine, though you can easily complete this step with a fine-toothed hand saw.



4 After dry-setting tiles in the doorway (with 1/4" spacers) align a straightedge with the baseline and mark the second tile.



5 Align tile marks with baseline and measure for the cut tile in front of the tub.



6 Mix dry latex-modified mortar with water, then let it stand for 10-15 minutes.

Final Preparations

According to my layout, putting full tiles at the doorway meant that I'd have cut tiles in front of the bathtub. To find the exact size of those cut tiles — so I could start setting tile here — I went through a multi-stepped process.

First I set a full tile at the doorway, placing 1/4" spacers between the tile and the threshold. Then I positioned more spacers and a second tile, and carefully marked that second tile (**Figure 4**). Then I set this marked tile in front of the tub, aligned its marks with the baseline, and measured for the cut tiles (**Figure 5**).

Cutting tile can be done using several different tools, all of which can be rented (see *Five Tools for Fitting Tile*).

As you prepare to set tiles, you'll want to get everything you need close at hand: plenty of tile, tile spacers, the snap cutter and nippers, and you'll need an adhesive.

For floors I always use dry (powder form) latex-modified thinset mortar and mix it with water (**Figure 6**). Thinset mortar can support tremendous weight, and the latex improves this ability even more, plus increases flexibility and adhesion far beyond what most mastics offer.

Mix a batch to a thick, pudding-like consistency, then set it aside for 10 to 15 minutes so it absorbs the liquid evenly — a process known as slaking. You'll know you have the proper mix if the mortar holds its shape on the trowel as it is scooped from the bucket.

Setting Tile

The place to start setting your tile is at the square corner formed by the baseline and the wall. For me, this meant laying a cut tile where the bathtub meets the wall.

Since cutting a tile exposes a sharp, square edge unlike the manufactured edges, you'll want to orient cut edges away from adjacent tile. This makes the cut edges less visible.

By the way, when pros need to mark a tile for cutting, they position it next to an adjacent tile (one that's already set) to make their marks. This method eliminates the possibility for errors that measuring invites.

Techniques for setting tile are pretty universal, whether for floors or walls, indoors or out. First

Five Tools for Fitting Tile

Straight cutting most tile is easy to do with a snap cutter, which you can rent for about \$20 a day (**Fig. A**). To use a snap cutter, grip the handle and press the scoring wheel against the tile, then drag the wheel across the tile's entire surface (including the taper at each edge). Next, you'll use either a second handle or the scoring handle to put pressure along each side of the score line to snap the tile in two.

If your tiles fail to break cleanly — the thickly glazed floor tile I used were stubborn — make several passes with the wheel to

deepen the scoring line. Save any broken tiles — you can recut them for smaller spaces.

Notching tile for fitting around a corner or plumbing fixture begins with a wet saw (**Fig. B**) or an inexpensive hack saw

equipped with a carbide blade (**Fig. C**). Wet saws can also cut any tile, something snap cutters can't claim. Renting a wet saw costs about \$50 a day (easily worth paying if you're in a hurry or have lots of cuts to make).





7 Spread 2-3 cups of mortar on the floor, then comb it out with the trowel's toothed-edge.



8 Begin tiling in the "square" corner. Twisting tiles a little ensures good mortar coverage.



9 Lay tile in small areas, and be sure to check often that all tile remains square to the first row along the baseline.



10 Even the best layouts may require narrow tiles. Hide them in inconspicuous places.



11 Spread grout with a float — diagonal passes avoid lifting grout out of joints.



12 Clean excess grout off tile with clean water and a sponge. Change water often.

spread mortar on a workable area, probably 3 ft. to 5 ft. square, and comb it out with a notched trowel (**Figure 7**). The trowel you select depends on the tile and adhesive you're using — ask your tile dealer for help here. As you set each tile firmly in the mortar, twist it a little to get good coverage (**Figure 8**).

Continue laying tile a few square feet at a time, using spacers whenever possible (**Figure 9**). My compromise layout did result in some narrow tiles, but since I had planned ahead I knew they would occur in inconspicuous spots — in one corner and behind the bathroom door (**Figure 10**).

Grouting the Joints

After setting all the tile, wait 24 hours before you remove the spacers — a needle-nose pliers makes this easy. With that task out of the way you can mix your grout. For wide joints ($\frac{1}{4}$ " or more), be sure to use grout with a sand additive, and I suggest using latex additive for the liquid portion of the mix. The ideal consistency for the mixture is similar to peanut butter.

Work the grout into the joints with a float, making sure you fill them to full depth (**Figure 11**). Once they're full, you'll find that working the float square to the joints tends to lift grout out, so always drag the float diagonally across the tiles for the final passes.

Let the grout dry for 15 minutes, then wipe the floor with a damp sponge (**Figure 12**). You'll have to rinse the sponge in clean water and wring it out frequently, otherwise you'll just push the grout around on the tile. Wait 10 to 15 minutes more, then repeat the process, and keep this up until all the grout haze is gone.

Once you've made the saw cuts for a notch, snap out the waste with a pair of tile nippers (**Fig. D**). If a hole is required, you can drill the tile with a carbide-tipped hole saw (**Fig. E**). Both tools can be rented.





13

Support wall tile with a straightedge. Align the top of the straightedge with the location of the bottom edge of the lowest row of full tiles (measured off your level baseline).



14

For support, put spacers above each tile as you move up the wall. This also keeps the tiles square to the straightedge.



15

Install accents the same way you do standard tile, though offsetting these joints from the others is most appealing.

Up the Walls

Before you begin tiling the walls, install all built-ins and wood trim. Working around these features requires finesse, but guarantees you won't face daunting surprises after the tile is in.

Setting wall tile is essentially the same as tiling the floor, except for one thing. On the floor, gravity works for you; on the walls, it works against you. As sure as rain, tile will slide down unless it's supported while the adhesive sets. To help with this, I recommend that you provide solid support for the

tile to rest on and use wet-duty rated mastic — it's premixed and cures faster than mortar.

Installing this support begins with establishing a continuous, level baseline around the room. Like the baseline on the floor, this will become the starting point for setting all the tile.

The ideal place for the baseline is at the bottom edge of a row of full tile that will appear on every tiled wall. Refer to your layout to find the best location, then transfer your mark around the room using a long level. I put my baseline at the bottom edge of a row of rope twist accent tile.

From the baseline you can measure down for the lowest row of full tile on any wall, which is where you secure the straightedge support (Figure 13). As you work around the room you can move the straightedge into position.

Spread mastic with a toothed trowel over a small area, then lightly press tile into position — twist them a little to improve the bond. Place spacers between every tile to

maintain support as you work your way up the walls (Figure 14). This goes for the rope twist tile as well (Figure 15). To allow for shower spray, be sure to install tile above the shower connection by at least 3" (Figure 16).

After the mortar sets you can remove the straightedge and lay in the lowest row of tile (Figure 17). Use spacers (or wood ripped to size) to support this row off the solid object below — the tub's ledge in this case. When working in the tub area, be sure to allow for caulk between the tub and tile.

Wait at least 24 hours for the mastic to dry, then grout the wall joints just like you did the floor joints (Figures 18 and 19).

Let the grout dry for a day, then caulk around the tub and brush a coat of sealant on the grout joints. Like the underlayment and layout, sealant is another unseen detail that contributes to a lasting tile project. In the end, everyone will see beautiful walls and floors, but only a few will understand that the real effort lies in the hidden details. ■



16

Protect walls from shower spray by tiling at least 3" above the shower connection. Notch or drill tile to fit around the fixture.



17

Once mastic on the full tile is dry, remove the straightedge and set the bottom row of cut tile (supported with spacers set on the tub's ledge).



18

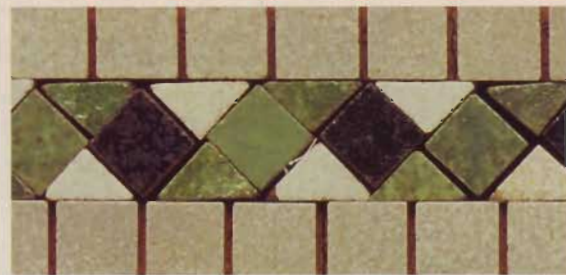
Spread grout mixed with latex into the joints. Once the joints are full, work the float diagonally to avoid pulling grout back out of the joints.



19

Use more buckets of clean water and a sponge to remove excess grout. Continue cleaning until all the grout haze is removed.

Ceramic Tile: Buying Smart



“Avoid trendy looks” is an old adage that applies to many things — clothes, hairstyles, and appliances quickly come to mind. But it goes double for ceramic tile. Why? Because unlike most decorative surfaces in your home, tile’s service life is measured in decades. Design professionals say they cringe

when homeowners use wallpaper or fabric swatches to pick out matching tile. They know a quality tile installation can endure for the lifetime of the house, so they recommend picking your tile first, then building other decorating choices around it.

As a homeowner formerly held hostage by a superb tile installation in a “Fifties pink” bathroom, I have to second this philosophy. Besides, color and texture are only two variables in choosing the right tile, so don’t lock onto a look until you find out something about the product’s pedigree.

Visiting a well-stocked tile showroom will put hundreds of options right in front of you, from budget grades that sell strictly on the basis of low price, to hand-made, elaborate, and very expensive specialty tiles. Budgetary discipline will help narrow the field, but neither dollars nor design sense alone will do. As much as any building material, tile has to be chosen thoughtfully for the right application.

Professional Help

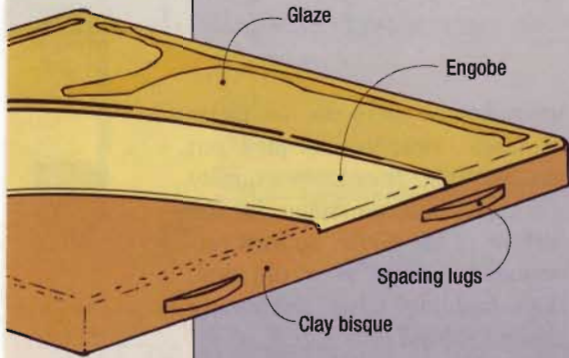
To get some tile-buying tips, I visited several tile distributors and a couple of home-improvement megastores in our area. In addition, I spoke with a tile industry association spokesman, a tile manufacturer, and even a manufacturer of tile-making equipment.

From each of these industry professionals I heard a common refrain — you need more than



Tile Anatomy Basics: A Dirt and Glass Sandwich

Ceramic tiles have two main components — the clay *bisque* (body), and the *glaze*, which is both decorative and protective.



After a bisque is formed and partially dried, it's sprayed with *engobe*, a bond coat that acts like a primer to prepare the clay for the glaze, which consists of pigments and powdered glass particles. The tilemaker must carefully match these materials to produce a successful tile. "It's not easy marrying glass to dirt," was the way one industry representative summed it up.

Most tiles are single-fired — one pass through the kiln hardens the clay and also melts and fuses the glaze. Additional glazes and multiple firings are

sometimes used to create other looks, but they add to the cost.

Firing also reduces the clay's porosity, making it more glass-like and less susceptible to moisture. A nonvitreous or semi-vitreous tile absorbs 3% or more of its weight in water, a vitreous tile less than 3%, and a porcelain tile is nearly impervious, at less than 1%. Because exterior installation in many areas involves freeze/thaw cycles that will swell (and crack) moisture-laden materials, a tile's resistance to water absorption can be critical to its lifespan.

good tile. What you're installing is a system, not a single product, and all of its components must work together. In fact, every one of my sources claims that the vast majority of tile job failures result from poor installation, not

defective tile. They stressed the necessity of a sturdy substrate, and of matching the mortar or adhesive material, and grout, to the tile as well as to the site requirements.

Match Glaze, Size To Use

Because a tile's durability factors so heavily into its suitability for a given use, one of its key ratings includes the strength of the protective outer surface called the glaze (see *Tile Anatomy Basics*). For example, a tiled entry foyer will see more grit and grime than a second floor bathroom surrounded by carpeted areas.

One objective measurement of

a glazed tile's durability is the new ISO (International Standards Organization) Tile Standard. This zero-to-five scale rates a tile's ability to withstand increasingly stressful wear conditions. You don't need to precisely match a tile's rating to your intended use, but you should make sure that it meets or exceeds that level. Here's a quick rundown of the categories:

- 0 – for decorative uses (walls) only
- 1 – light-duty residential floors, suitable for bare feet or soft footwear
- 2 – general residential floors, including kitchens
- 3 – residential entryways and light commercial use
- 4 – heavier traffic areas in commercial installations, including restaurants and office buildings
- 5 – commercial areas with heavy traffic, such as shopping malls

For residential applications, tile is often divided into two basic categories: floor tile and wall tile. With their thinner/weaker bisque or softer glaze, typical wall tiles aren't designed to stand up to foot traffic, so for a floor installation you can



often rule out a sizable share of the store's inventory. On the other hand, you can use floor tiles on walls, and many people do.

Your project's scale also helps narrow the choices. A few years ago, a typical floor installation featured 8" x 8" tiles. Today, the average floor tile size is 12" x 12". But many manufacturers are producing even larger tiles — 16" x 16", 25" x 25", even a colossal 24" x 36". Technically speaking, you could use these oversize floor tiles in a half-bath, but they would make the room seem even smaller than it is. (In addition, the larger the tile is, the flatter the floor has to be.) By the same token, tiny mosaics can look out of place in a large kitchen.


What You Pay For?

Almost any modern tile that's factory-produced will give durable and consistent results when it's properly installed and maintained. Obviously, this doesn't mean costs don't vary. They do, usually according to size, shape, manufacturing volume, and the complexity of the glazing and firing processes required to produce them.

A generic 4"-square tile suitable for a bathroom wall can sell for as little as 17 cents. Pick a 12" faux

stone floor tile and the per piece cost could top \$12. (That's for mass-produced tile, not handmade or custom pieces, which are much more expensive.) And these prices are just for the "field" tiles, the flat, square (or rectangular) ones used for most of the installation. Projects with multiple corners or surface changes might also involve specialty cove or bull-nose-edged tiles, costing from two to ten times as much as a field tile from the same product line. Typically, though, you'll use relatively few of these pricier shapes, especially on floor installations.

Keep in mind that one of the great things about ceramic tile is how gracefully it ages. Take advantage of this durability by picking something you can live with for a very long time. Walking through a

good tile showroom is the proverbial "kid in a candy store" experience. Have some fun with it. And don't be afraid to request samples you can bring home for a trial look. But for your sake and that of future generations, go classic. If you're still not convinced, go to the attic and track down an old photo of yourself wearing bell-bottom pants. That should do the trick. 



How To Build A Vanity

Lots about woodworking looks complicated. Some of it genuinely is, but by far most projects are based on a few simple techniques and a well-planned design. This is especially true of built-ins, and my remodeled

bathroom offers a perfect example. I built six cabinets into the room, all of which take advantage of the same basic construction. Once you know how to build the base cabinet described in this article you'll be in good shape to tackle any of the others (see page 40). So follow along for tips on design and workmanship, and perhaps learn that building face frame cabinets is far less difficult than you may think. In fact, with a table saw, dado set, drill, and a few common hand tools, you'll easily complete every step.

A Few Design Notes

Before any wood touches a saw blade there are a few design considerations to think through.

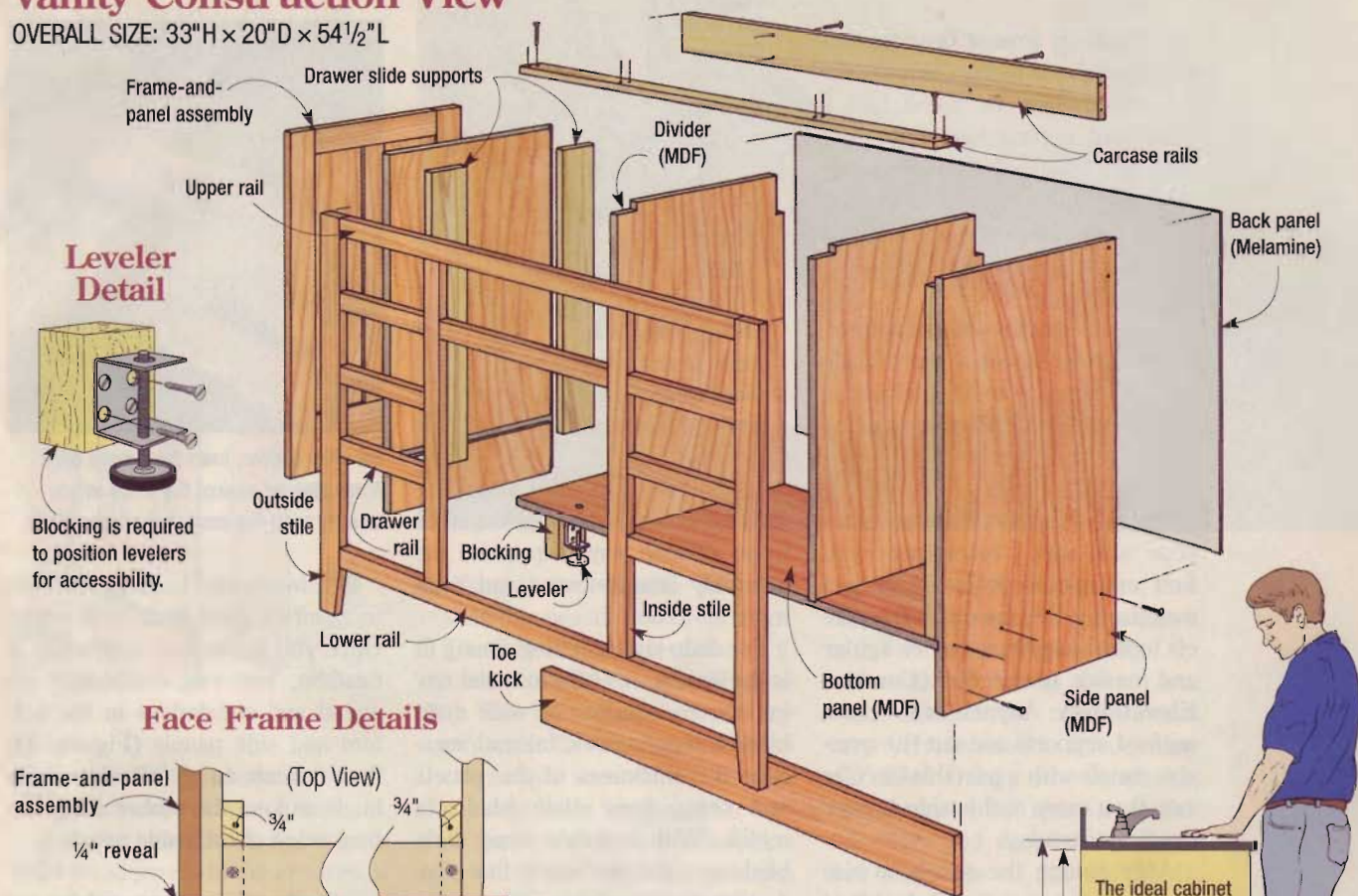
First, any built-in cabinet has to fit its intended space in the room (**Vanity Construction View**). This sounds obvious, but I know firsthand the nightmare of wrestling a cabinet into a space that was mismeasured. I also know it's very likely you'll run into walls that are out of plumb or have irregular high and low spots that make fitting a cabinet a challenge.

The answer is to measure carefully and build the cabinet with the installation in mind. A face

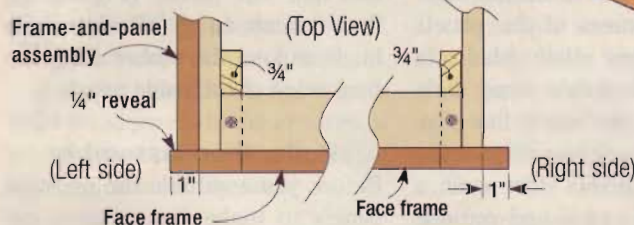


Vanity Construction View

OVERALL SIZE: 33"H x 20"D x 54 1/2"L



Face Frame Details



frame that overhangs the sides of the carcass allows you to slip the cabinet into position without interference. Then you can scribe the face frame edges to follow the contours of the wall.

On the left side of my cabinet, the face frame overhangs the carcass 1" to provide cover for the front edge of the frame-and-panel assembly that's installed over the carcass side, and allow a 1/4" reveal (**Face Frame Details**). A reveal hides minor irregularities in the fit between the face frame and the carcass. The right side of my face frame also overhangs the carcass by 1". Though excessive for scribing — 1/2" is plenty — keeping the face frame symmetrical makes all layout and assembly steps much easier.

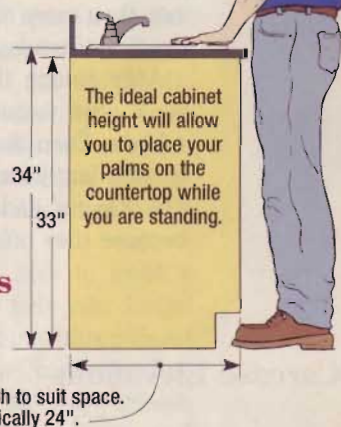
Another note about face frame construction concerns the inside stiles. To make drawer fitting easier, I prefer to position these pieces

so the edge facing the drawers is flush with the surface of the divider.

Speaking of dividers, if a cabinet isn't properly designed, you could end up with a divider interfering with the sink's drop-in location. So have the sink, and all hardware for that matter, on hand to avoid making this kind of mistake.

Finally, a word about height. Typical bathroom cabinets are 33" tall, which puts the countertop surface about 34" off the floor (**Typical Vanity Dimensions**). This is fine if you're of average height or compromising between many folks who'll use the bathroom (as with a family). On the other hand, a vanity built for your height can make a real difference in the way your back and shoulders feel while using the counter and sink. Try mocking up a countertop on saw horses and wood scraps to determine what the ideal height is for you.

Typical Vanity Dimensions



What You'll Need*

Lumber

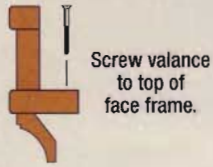
- (1) 3/4" x 4 x 8 sheet of cherry-veneered MDF
- (1) 1/4" x 4 x 8 sheet of melamine
- (34) bd. ft. of 3/4" thick cherry
- (45) lin. ft. of 1/2" x 4" soft maple or poplar
- (3) 8 ft. pieces of 1x4 pine or fir

Hardware**

- (2) pairs of partial wrap around, no mortise hinges
- (8) sets of Accuride full extension drawer slides
- (10) knobs
- (4) cabinet lifting levelers
- (22) #8 x 2" flat-head wood screws
- (6) #8 x 1 1/4" flat-head wood screws
- (32) #8 x 1" flat-head wood screws

*Your design may call for other material and hardware in different quantities.**All hardware is available from Rockler Woodworking and Hardware (1-800-279-4441).

Valance Detail



Screw valance to top of face frame.

NOTE: All hardware and lights are from Rockler Woodworking and Hardware (1-800-279-4441)

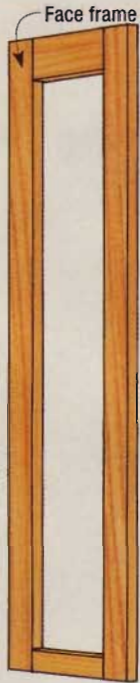
Valance Assembly

Valance assembly rests on medicine cabinets.

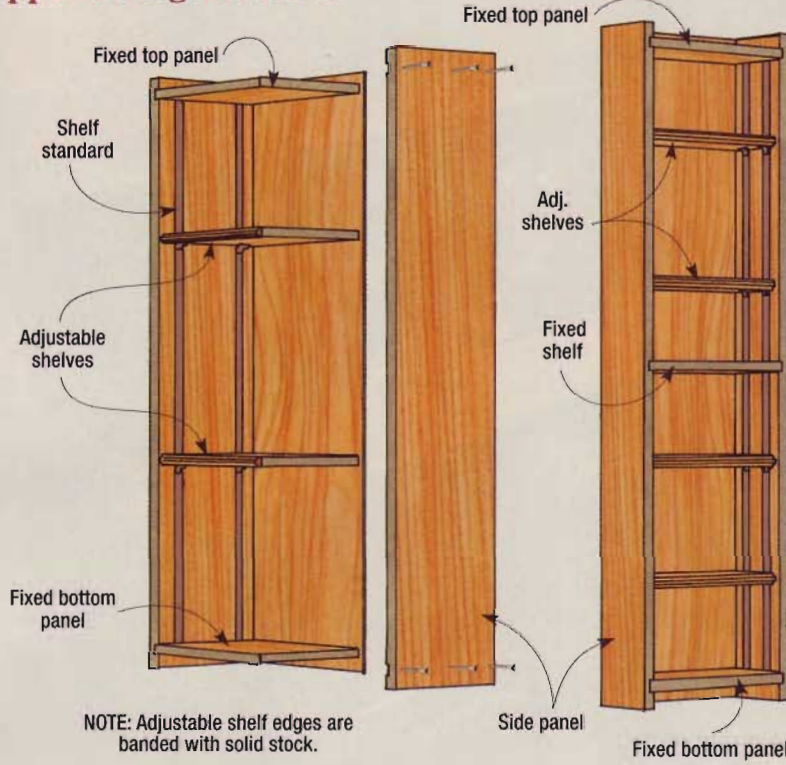
Cove molding

Puck-style halogen light

Upper Storage Cabinet



Face frame



Fixed top panel

Shelf standard

Adjustable shelves

Fixed bottom panel

Fixed top panel

Adj. shelves

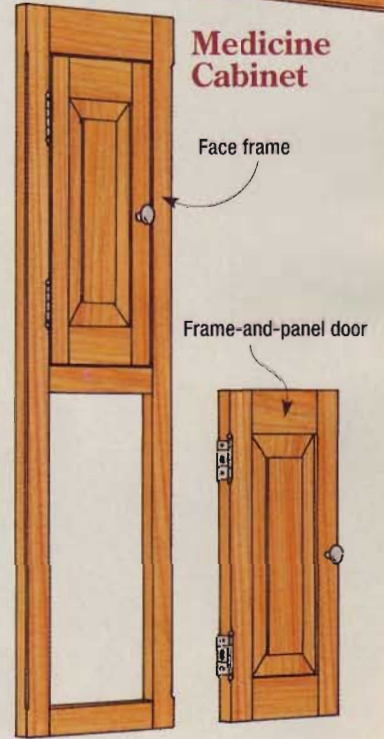
Fixed shelf

Side panel

Fixed bottom panel

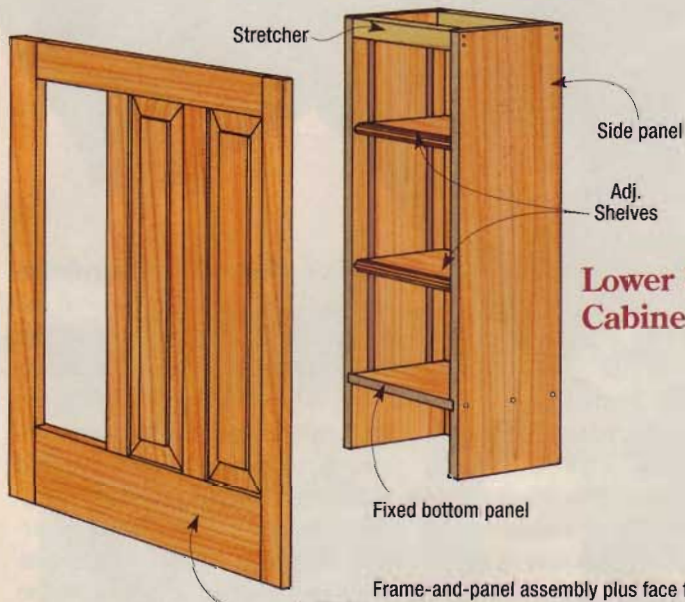
NOTE: Adjustable shelf edges are banded with solid stock.

Medicine Cabinet



Face frame

Frame-and-panel door



Stretcher

Side panel

Adj. Shelves

Fixed bottom panel

Lower Storage Cabinet

Frame-and-panel assembly plus face frame.
NOTE: This construction was necessary in our bathroom remodel. Your site requirements may vary.



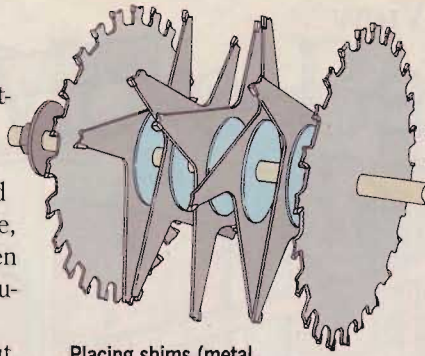
Cutting Sheet Goods

Much of your effort building built-in cabinets will be spent handling and cutting sheet goods. Full sheets of MDF or plywood are heavy and awkward to handle, so it's easy to make mistakes. Even the best woodworkers have trouble with them.

To get clean cuts without tearout, it's important to use a sharp blade with 50 or more teeth, maintain a steady rate of feed, and keep the stock pressed against the fence throughout the cut.

If you have outfeed supports for your table saw, I recommend you first cut pieces for your project oversize by $\frac{1}{4}$ " , then trim the panels to final size once they're lighter and easier to handle (**Carcase Elevations**). Anyone who lacks outfeed supports can cut the oversize panels with a portable circular saw, then move to the table saw for the final trimming.

After cutting the panels to size you'll want to cut the dados and rabbets. Even though you can get by with butt joints in this project, I like having dados and rabbets because they offer big advantages



Placing shims (metal, plastic, or even paper) between blades allows you to fine-tune the width of the dado cut.

when it comes time to assemble the carcass. Joints that go together in an obvious way help make the assembly less awkward and a lot more foolproof.

For dado joints, getting a snug fit is the key. So it's best to resist any impulse to install a $\frac{3}{4}$ "-wide dado blade and go to work. Instead, measure the thickness of the panels and setup your dado blade to match. With a wobble-type dado blade, just dial the hub to that size. A stack dado blade may require the use of shims (above). Here again, a sharp blade is a plus, and you can also minimize tearout by putting masking tape over the line of cut.



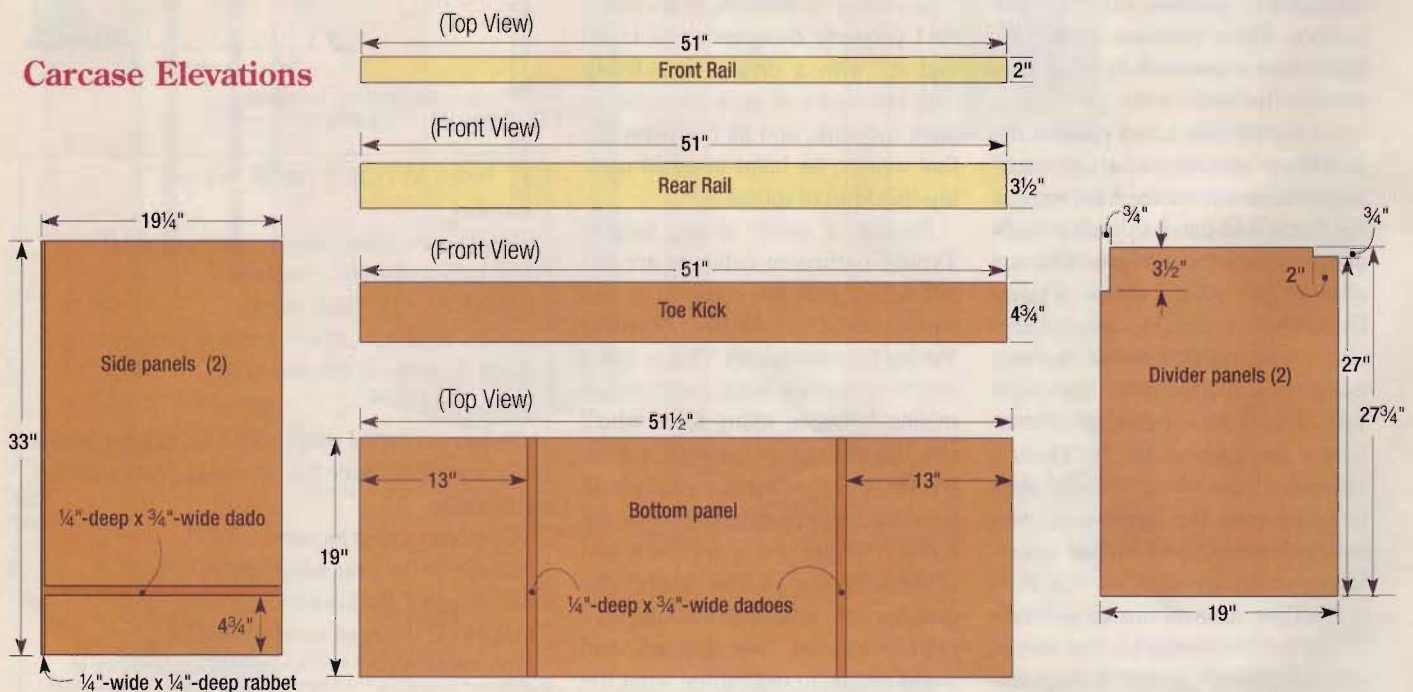
For crisp dados, keep the panel's edge firmly pressed against the fence as you steadily push the stock through the blade.

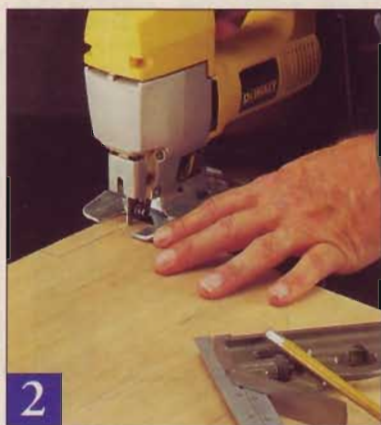
It's always wise to make test cuts to ensure a good fit at dado joints. Once you know your saw setup is dead-on, you can confidently go ahead and cut dados in the bottom and side panels (**Figure 1**), then switch to a $\frac{1}{4}$ "-wide dado blade and cut the rabbet along the back edge of each side panel.

Rails, then Assembly

Before you assemble the plywood panels to make the carcass, cut stock to size for the carcass rails. I use less expensive secondary

Carcase Elevations





2 A saber saw makes quick and easy work of cutting the notches in the divider panels, though a handsaw can do the job, too.



3 Make sure you square the dividers to the carcass rails before drilling countersunk pilot holes.



4 After spreading glue in the dadoes, put the panels together and drive screws into all the joints. The screws will draw the panels tight together without the need for clamps.

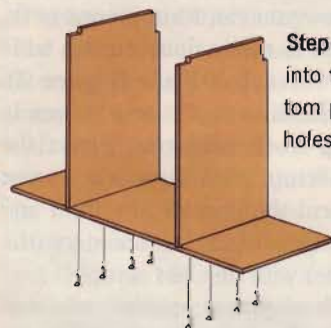
woods (pine, fir or poplar) for hidden parts like these. Once you've cut the rails, lay out and cut the notches in the dividers to fit them (**Figure 2**).

Another set of pieces machined from secondary wood is the drawer slide supports. These pieces position the slides so they pass by the outside stiles of the face frame. By cutting the front supports so they're $\frac{3}{4}$ " shy of the top end of the side panels, you'll be able to rest the front carcass rail on them to make strong, rigid connections.

Now comes a step overeager woodworkers often skip because they think it's a nuisance. Whenever I'm faced with a complex glue up, I first put everything together without glue to make sure all the pieces fit as they should. Who wants to discover a mistake when you've got glue dripping from all the joints? Even worse, that glue is setting from the moment it leaves the bottle, and any delay could jeopardize the strength of the joints or make it difficult to draw the joints tight.

So without using glue, put all the carcass parts together (see the **Assembly Sequence** below). Make sure you check everything for square as you proceed, especially the rail-to-divider joints. Clamp the carcass and drill countersunk pilot holes for all screws that will reinforce the joints (**Figure 3**). When you're confident your assembly checks out, take the carcass apart, spread glue in the joints, then reassemble it all in the same order. Drive the screws after checking again for square (**Figure 4**).

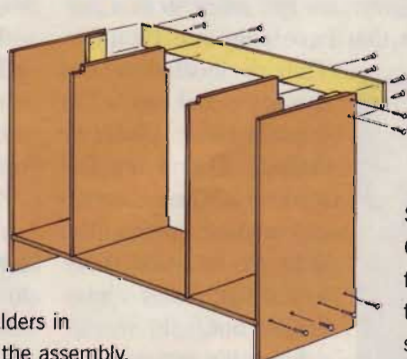
Assembly Sequence



Step 1: Slip the dividers into the dadoes in the bottom panel and drill pilot holes for the screws.

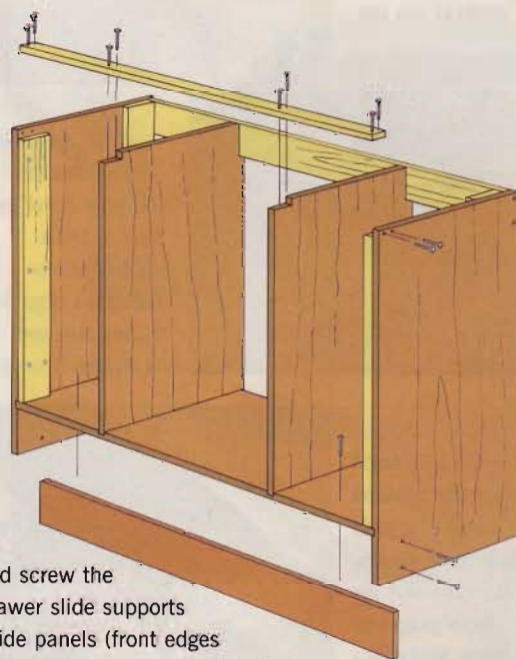
Step 2:

Position the side panels on the ends of the bottom panel, then drill pilot holes for the screws. Glue and screw the rear drawer slide supports to the side panels (their back edges should be flush with the rabbet shoulders in the side panels). Add the rear rail to the assembly, check for square, and drill pilot holes for the screws.

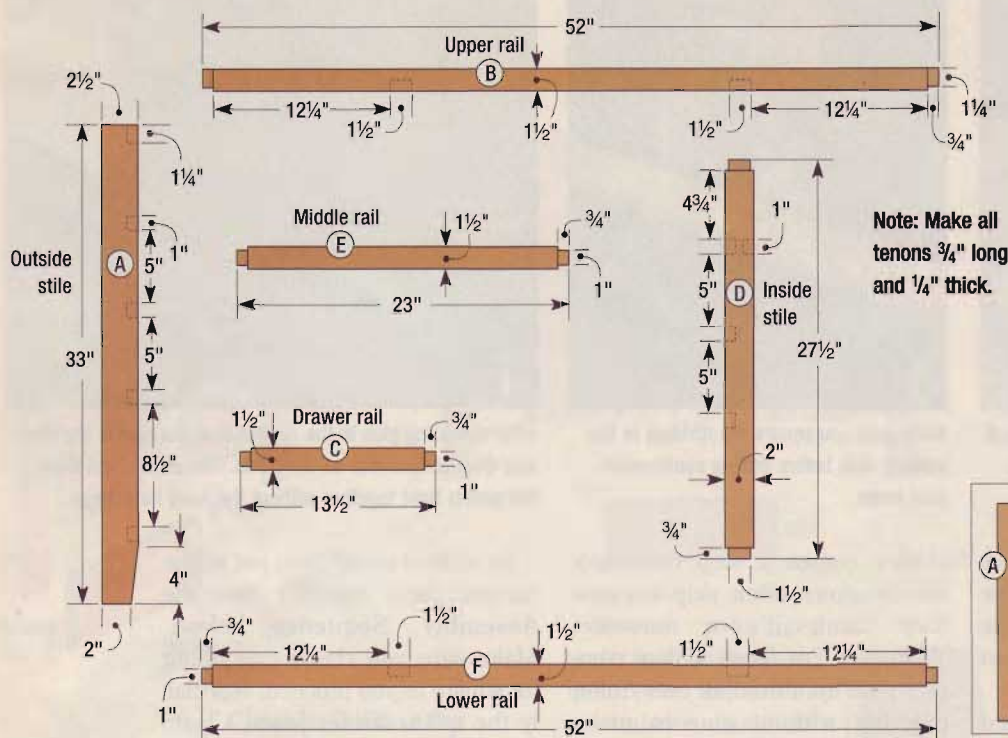


Step 3:

Glue and screw the front drawer slide supports to the side panels (front edges should be flush). Position the front rail, check for square, then drill the pilot holes. Slip the toe kick into position — $2\frac{1}{4}$ " back from the front edge of the side panels — and drill pilot holes.

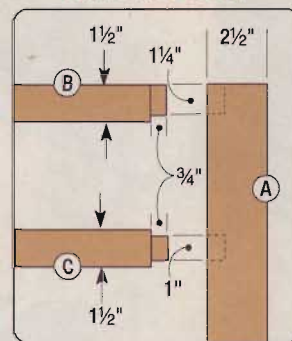


Face Frame Elevations

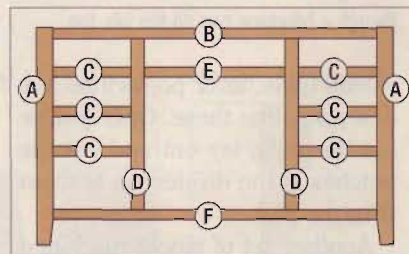


Note: Make all tenons $\frac{3}{4}$ " long and $\frac{1}{4}$ " thick.

Joinery Detail



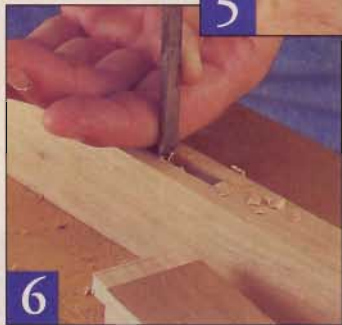
Face Frame Key



Once you've laid out the mortises, clamp a fence to your drill press table, set the depth stop, and bore out the waste as you can.



5



6

A couple of chisels — a narrow one for the width of the mortise and a wider blade for paring the sides — make quick work of mortise cleanup.

Cut each tenon cheek and shoulder with a $\frac{3}{4}$ "-wide dado blade, guiding the stock with the miter gauge and fence. Mounting a wood face will protect the fence from the blade.



7

Make the Face Frame

Face frame construction may look complicated because there are so many parts, but I assure you it's not. All it really boils down to is careful layout and repetitive machining steps (**Face Frame Elevations**).

I chose to use mortise-and-tenon joinery for making my frame. This joint is very strong and provides the frame with great resistance against racking, a quality the relatively weak plywood carcass desperately needs. Shouldered tenons are especially beneficial in this respect, and also cover slight imperfections in the fit of the joints.

There are two joints in this project that have only one shoulder. They're located where the upper rail meets the outside stiles (**Joinery Detail**). Had I left the top end of these mortises enclosed, in time the little bits of wood there would probably have broken out.

Since it's easier to cut tenons than it is to form mortises, I always com-

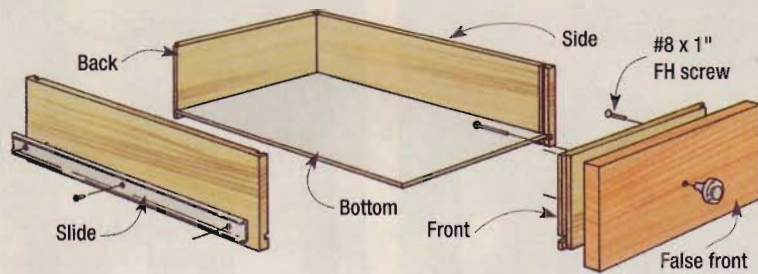
plete the mortises first, then fit the tenons to them. Use a drill press and a $\frac{3}{16}$ "-dia. bit to clear most of the mortise waste, making sure to bore the holes $\frac{1}{16}$ " deeper than the length of the tenons (**Figure 5**). This ensures the tenons won't bottom out when fitted in the mortises. Use chisels to complete the mortises (**Figure 6**).

Now you can form tenons to fit, which is easily done on the table saw with a dado blade (**Figure 7**). Just be sure to cut test tenons in scrap stock until you perfect the saw setup. With these tenons you can cut the cheeks (the front and back faces) and the shoulders (the edges) with one saw setup.

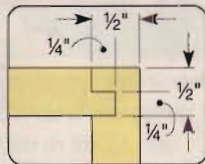
When gluing up the rails and stiles, check for square and make sure the assembly lies flat — a frame twisted during the glueup will become difficult to work with.

Once the glue dries and you sand all the joints flush, glue the face frame to the carcass. Be sure to check the carcass for square and position the face frame carefully — it would be a shame to shortchange any well planned overhang, especially a reveal.

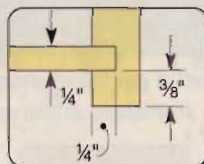
Drawer Construction View



Drawer Joint Detail



Bottom Groove Detail



SHALLOW DRAWER DIMENSIONS:

Front/back: $\frac{1}{2}$ " x 4" x $10\frac{1}{2}$ " (soft maple)
 Sides: $\frac{1}{2}$ " x 4" x 18" (soft maple)
 Bottom: $\frac{1}{4}$ " x $10\frac{1}{2}$ " x $17\frac{1}{2}$ " (melamine)
 False front: $\frac{3}{4}$ " x $4\frac{3}{4}$ " x $11\frac{1}{8}$ " (cherry)

DEEP DRAWER DIMENSIONS:

Front/back: $\frac{1}{2}$ " x $7\frac{1}{2}$ " x $10\frac{1}{2}$ " (soft maple)
 Sides: $\frac{1}{2}$ " x $7\frac{1}{2}$ " x 18" (soft maple)
 Bottom: $\frac{1}{4}$ " x $10\frac{1}{2}$ " x $17\frac{1}{2}$ " (melamine)
 False front: $\frac{3}{4}$ " x $7\frac{1}{8}$ " x $11\frac{1}{8}$ " (cherry)

Drawers Are Next

Drawers mounted on slides experience little resistance or wear, so tongue-and-groove joints are fine here (**Drawer Joint Detail**).

Size the drawer parts first, making sure to allow for the slides — the Accuride slides I used require $\frac{1}{2}$ " of space on each side of the drawer. Then machine the joints (**Figures 8 and 9**). Since you have the dado blade installed, cut the grooves for the bottom at the same time (**Bottom Groove Detail**).

Installing the slides is a snap if you make a plywood positioning jig that locates the slides exactly where you want them in the cabinet (**Figure 10**). Starting with the highest location, install the slides, then trim the jig for the next highest location, and so on.

When it comes to cutting and fitting inset drawer false fronts I have a couple of tips to offer. To begin with, instead of trying to calculate a consistent gap around each false front, cut your fronts to fit the face frame openings exactly — don't forget to cut a front for hiding the sink. Then bury all but $\frac{1}{16}$ " of the blade's edge in an aux-

iliary wood face clamped to your table saw fence (**Figure 11**). Raise the blade to $\frac{11}{16}$ " (for $\frac{3}{4}$ "-thick stock), and trim all four edges of each false front. Sanding off the small "tongues" that remain is easy with a sanding block and 100 grit paper. With this system I get perfect $\frac{1}{16}$ " gaps every time.

The consistency of the false front sizing makes fitting them in the cabinet very easy. With the drawer boxes installed, put double-face tape on the back surface of each false front. Next, set them into the openings without pressing them against the drawers, and slip pennies into position to center each front in an opening (**Figure 12**). When everything's set, press the false fronts to the drawers so the tape holds. Now you can pull out the drawer assemblies to drill pilot holes for the screws and knob hardware.

Position the false front that hides the sink using the technique described above, then screw blocks into place that overlap the back of this piece and the face frame.

Once it's positioned, put pressure on the false front so the double-face tape holds. Then pull the drawer assembly out to drill pilot holes and permanently mount the fronts with screws.



With a $\frac{1}{4}$ "-wide dado blade, cut grooves for the joints (sides only) and the bottom (sides, front, and back).



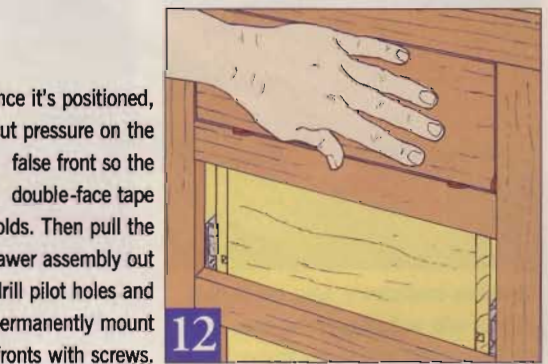
Keep the $\frac{1}{4}$ "-wide dado blade raised $\frac{1}{4}$ " to form the tongue at each end of the drawer front and back. Cut a test tenon first to get the fit right.



Use a positioning jig (scrap plywood will do fine) to support the drawer slides while you drive the mounting screws.



Trim $\frac{1}{16}$ " off each false front edge (blade raised $\frac{11}{16}$ "), then sand off what remains (inset photo).



Frame-and-Panel Construction View

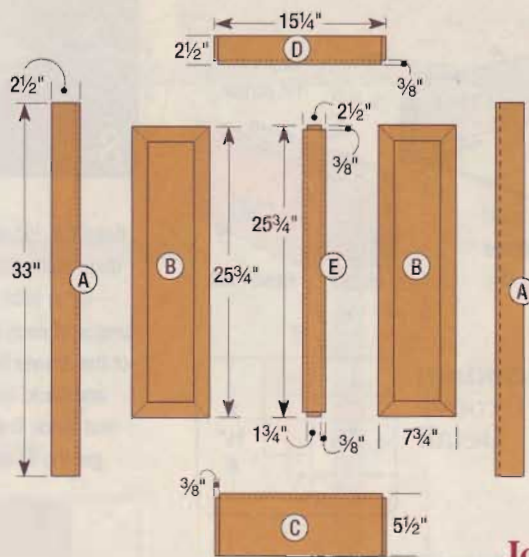


Classic Cabinetry

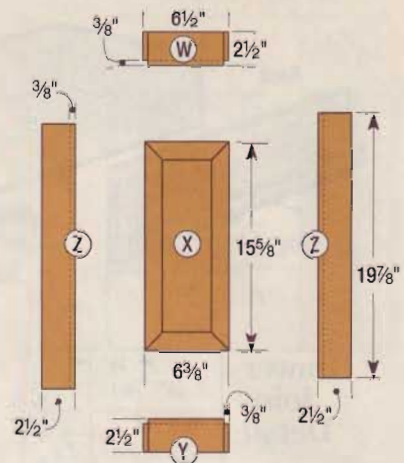
Frame-and-panel construction gives any cabinet a first-rate appearance. My vanity includes a frame-and-panel assembly for covering the left side of the carcass, and two frame-and-panel inset doors (**Frame-and-Panel Construction View** and **Door Construction View**).

I built my frame-and-panel assembly so it extends to meet another cabinet. Since this was a site-specific necessity, I've changed the dimensions here so the assembly covers the carcass side only, which is more typical (**Frame-and-Panel Elevations**). The doors match what I made (**Door Elevations**).

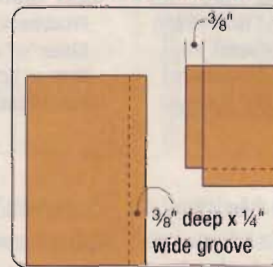
Frame-and-Panel Elevation



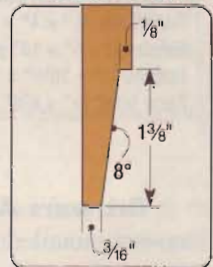
Door Elevation



Joint Detail



Panel Detail



Before you get underway please note that I size and install inset doors using the same sequence I described for the false drawer fronts.

Begin making all of your frame-and-panel structures by cutting stock to size for the rails and stiles. Next, to accommodate the panels and the tenons, rip a groove in the appropriate rail and stile edges (**Joint Detail**). By marking the front of each piece, then cutting the groove with the mark showing, you'll ensure that all the grooves are in the same position (**Figure 13**). This will make it easy to cut and fit mating tenons in an assembly line fashion.

When it comes to raising panels with a table saw I follow a two-step operation (**Figures 14** and **15**). Set up the saw carefully for each step (**Panel Detail**) and be sure to allow for expansion or contraction when determining the width of your panels — a loose fit in dry months, and a snug fit in humid weather.

Once the door parts are all machined, stain and apply one coat of finish to the panels. This way, even when the panels contract



13 To ensure consistency, have the front of all your rails and stiles facing away from the fence while cutting the grooves.

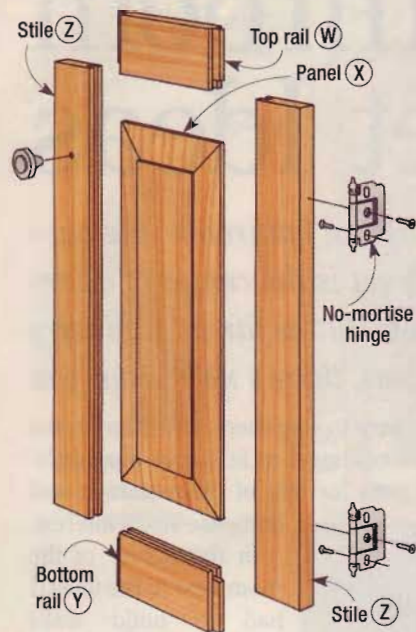


14 To raise panels, first define the raised area. Set the blade depth to 1/8", and clamp the fence 1 1/4" away. Cut four grooves into the panel's face (once with each edge against the fence).



15 Beveling the panel's edges 8° requires a tall support. Raise the blade to meet the grooves you cut in the face of the panel.

Door Construction View



after everything is assembled, all exposed areas will appear uniform.

And one more thing. Never glue solid wood panels in the grooves. If you do, the panels may crack as changes in humidity occur.

Final Details

Secure the frame-and-panel assembly to the carcass by driving screws from inside the cabinet. Make sure you screw into the assembly's frame, not the panels, or you may restrict the panels' ability to move once again.

A gapless installation is one sign of genuine craftsmanship, and




scribing is the valuable skill that makes this possible.

The first step is to level the cabinet in its installed position (Figure 16). The leveling hardware in my vanity made this a snap. All I had to do was slip a screwdriver through the access holes (drilled in the bottom panel) and turn the machine screws. Shimming the bottom edges of the cabinet also works.

Once the cabinet is level, set your compass for the widest gap between the face frame's edge and the wall, then mark the contour of the wall on the stile (Figure 17). Now shape the face frame edge to this line using a block plane and cabinet files. A belt sander will also do the job, though it requires a steady, seasoned hand. Angling the edge back a few degrees will make the final fitting easier.

Complete the scribing steps, then reposition the cabinet and screw it to the wall studs (Figure 18).

Countertop choices abound, and their installation requirements vary. I chose a solid surface material called Galaxy (shown above), manufactured by Avonite (1-800-428-6648) and supplied by North Star Services (1-800-383-9784). Solid-surface countertops look great and are easy to maintain. But, they're available only to certified pros who machine and install them for you.

Understanding how to build a base cabinet will help you design and build built-ins throughout your home. The methods I've described aren't the only options, but they're tried and true, and offer great results using just a few common tools. 



16

With the cabinet in position, adjust the leveling hardware (or shim the cabinet level). Then you can scribe the face frame.



17

Use a compass to transfer the contours of the wall to the face frame stile. Then shape the stile's edge to the line for a scribed fit.

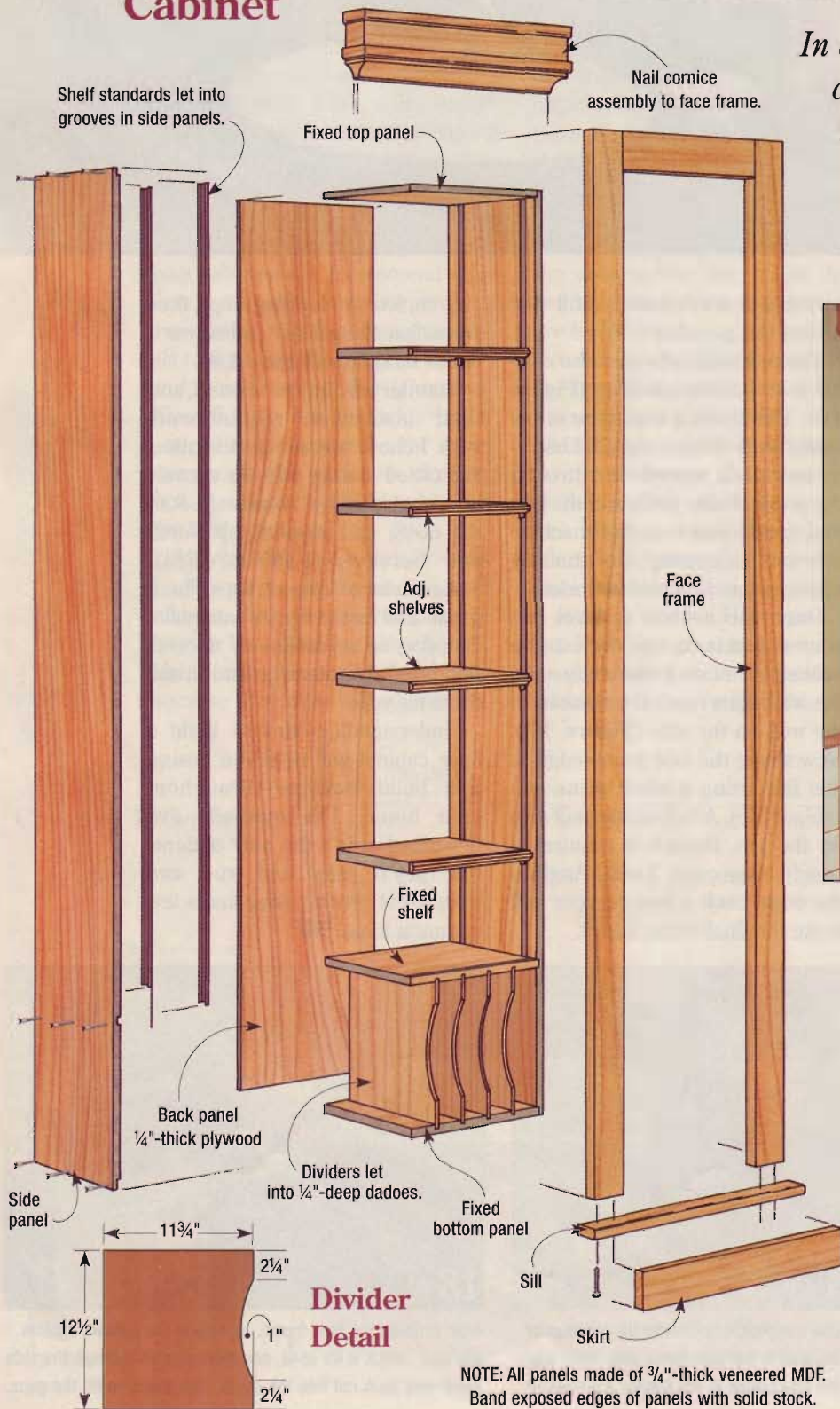


18

After scribing the face frame, reposition the cabinet against the wall, check it for level, and drive screws through the side panel and back rail into the studs. Use shims to fill the gaps.

More Bathroom Cabinet Ideas

Recessed Storage Cabinet



In a typical bathroom, the base cabinet is the center of attention. But as far as cabinetry goes, there's no reason you

have to stop there. In my bathroom I managed to fit in five more cabinets for lots of extra storage and immense visual interest.



In the corner of the room next to the toilet, I had to build walls around the waste stack and vent pipe. Between those pipes lay a 16"-wide space, which seemed a shame to lose. So I framed an opening in one wall and installed a cabinet there (at left). Essentially an MDF carcass with a solid wood face frame attached, this cabinet boasts an exceptionally useful magazine rack at the bottom.

In a nook behind the left end of the base cabinet I added two shelving units — one below the countertop and one above (at near right). Again, they're simple MDF carcasses with face frames attached.

In addition, on top of the base cabinet are two tall, shallow medicine cabinets (at far right). The valance that caps them off contains two halogen lights for illuminating the mirror and countertop.

All cabinets were constructed like the base cabinet — dadoes, rabbets, and screws for the carcasses, and mortise-and-tenon joinery for the face frames and doors. Though they were designed to fit my bathroom, they are easily adaptable to many situations.

Kitchen Cabinet Retrofit



My kitchen base cabinets looked great on the outside, but that tidy facade concealed an unruly jumble of pots and appliances. This mess was due in large part to the cabinets' inac-

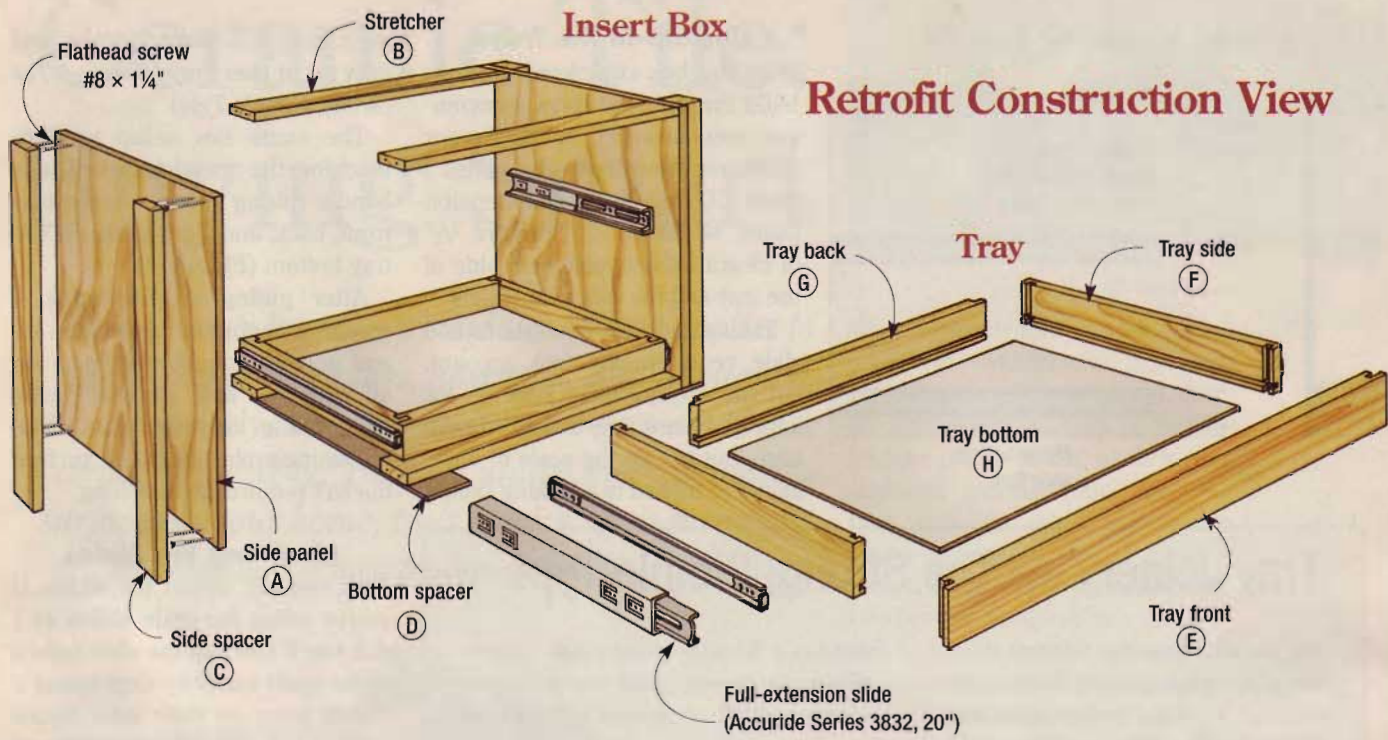
cessibility. The stile dividing each opening made it awkward to get in and out of the cabinets, and having to get down on my knees to see into the unlit cabinets was always a pain.

Despite their shortcomings, though, these cabinets were well-made, and less than five years old. So replacing them would have been

costly and wasteful. That left me puzzling over my only remaining option — retrofitting them with pull-out trays. There's nothing exceptional about this solution, but the way I built them is unique.

You see, I built a box to fit neatly into the cabinet compartment, then I built two slideout trays to fit

the box (**Retrofit Construction View**). This approach allowed me to do nearly all the work in the convenience of my shop, avoiding the trouble of hauling tools to the kitchen and turning it into a construction zone. I also avoided spending most of one day struggling inside the tight, dark quarters of the cabinet — the fate awaiting me had I site-built the trays in the usual piecemeal way.



A Big Opening

I began by carefully sawing the stile from the cabinet. Then I sanded its ends and attached it to one door (Figure 1). This technique spared me from having to match the finish on a new piece of wood. However, your cabinets may not lend themselves to this approach, in which case you'll have to make a piece from scratch.

Now measure the height of the opening and the cabinet's inside depth, allow 1/16" clearance both ways, and cut the box sides to size. To get the length of the four stretchers, measure the width of the opening, subtract the thickness of the two sides you just cut, and take off 1/16" for clearance.

Mock up the assembly and drill countersunk pilot holes so you can screw the box together (Figure 2). Then test-fit the box in the cabinet — a perfect fit will allow a little play as the box passes through the opening. Provided the fit checks out okay, back out the screws, add glue to the joints, then send the screws home permanently.

While the glue sets up, install spacers in your cabinet (if you have a face-framed cabinet) to fill the gaps between the cabinet sides and bottom, and the box (Figure 3). With my cabinets, the side spacers ended up 3/4" thick and the bottom spacers were 1/4" thick. Your cabinets may require spacers of different thicknesses.

Materials List

Insert Box:

- A (2) Side panels 1/2" x 23" x 21 1/2"
- B (4) Stretchers 3/4" x 2 1/2" x 26"
- C (4) Side spacers 3/4" x 3" x 21 1/2"
- D (2) Bottom spacers 1/4" x 3" x 17 1/4"

Trays:

- E (2) Fronts 3/4" x 2 1/2" x 25"
- F (4) Sides 1/2" x 2 1/2" x 22 1/2"
- G (2) Backs 1/2" x 2 1/2" x 24 1/2"
- H (2) Bottoms 1/4" x 22 1/4" x 24 1/2"

Hardware:

- (2) Slide sets Accuride #3832, 20"
- (18) Flat-head screws #8 x 1 1/4"
- (8) Flat-head screws #8 x 1"



1 After removing the stile, screw it to the back of one cabinet door. It will fill the gap between the doors when they're closed.

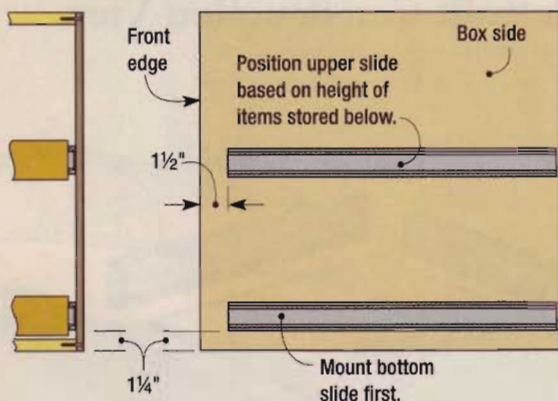


2 Screw the box together (no glue) and slip it into the cabinet to double check its width, height, and depth — a little play is ideal.



3 Using #8 x 1" flat-head screws, fasten spacers to the cabinet. To avoid splitting, first drill countersunk pilot holes.

Slide Mounting Details



Custom-fit the Trays

With the box completed you can build the slide-out trays. I encourage you, however, to have your slides on hand first. The slides I used (Accuride full-extension slides, series #3832), require $\frac{1}{2}$ " of clearance between each side of the tray and the box side panels.

Taking your box dimensions and slide requirements into account, cut the tray parts to size. As for joinery, I knew I needed sturdiness here, but not on the scale of dovetails, so I turned to a locking rabbet

joint, which is plenty strong and easy to cut (see *Tray Joinery — The Strong, Simple Type*).

The same saw setup used to machine the tray joints will also handle cutting grooves in the tray front, back, and sides to accept the tray bottom (Figure 4).

After gluing up the trays, I spread a couple of coats of an oil and polyurethane blend finish on all the tray and carcass parts, except the tray bottoms. The melamine's plastic-coated surface doesn't require any finishing.

Tray Joinery — The Strong, Simple Type

For durability at the front of my slide-out trays (where most stress occurs), I turned to a simple, very strong joint — the locking rabbet. This joint mechanically links each tray front to the sides, and the amount of surface contact permits plenty of glue coverage for even more strength.

At the table saw (or router table), machining this joint is easy. All you

need is a $\frac{1}{4}$ "-wide dado blade, a zero-clearance insert, and some careful measuring. To machine properly fitting joints, be sure your tray stock is perfectly flat (no cups or twists) and the end-cuts are square.

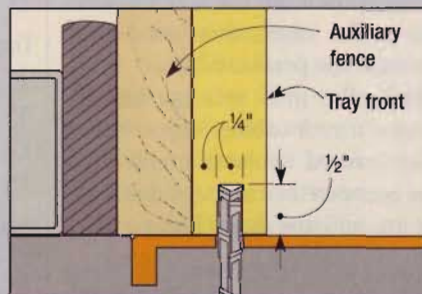
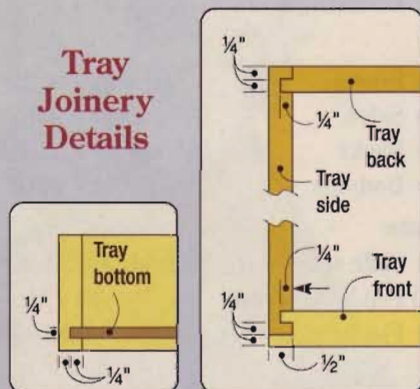
Where the tray sides meet the back, tongue and groove joints provide plenty of strength. They are cut at the same time as the locking rabbets, using Steps 2 and 3 below.

Mounting the Slides

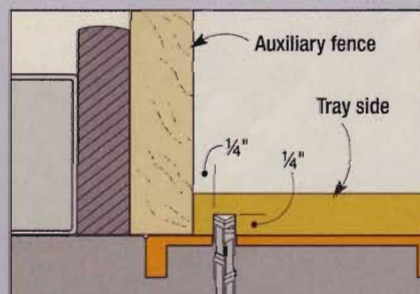
Now you can mount the slides. If you're using Accuride slides as I did, you'll find that the slide halves come apart easily by depressing a plastic lever on their side. Slides made by other manufacturers generally have a similar release. Once the slides are apart, center the appropriate slide half on each tray side and secure them with screws.

Mounting the cabinet half of the slides in the box requires a bit of investigation. I recommend positioning the slides for the lower tray as low as they can go, but for the upper tray you'll want to determine placement of the slides based on the tallest item you intend to store below it (**Slide Mounting Details**). Once you've determined the best location, mount the upper tray and test the operation of both trays, making sure they slide without binding.

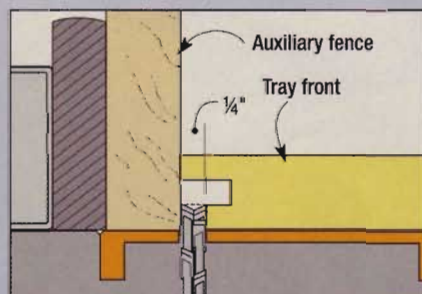
Tray Joinery Details



Step 1: Cut a $\frac{1}{2}$ "-deep groove centered in the ends of the tray fronts using a $\frac{1}{4}$ " dado blade. A zero-clearance insert is a must for safety.



Step 2: Without moving the fence, lower the blade height to $\frac{1}{4}$ " and cut dados in the inside face of each drawer side.



Step 3: Move the fence against the blade and trim both ends of the inside face of each tray front. Also rabbet the ends of each tray back.



4 Cut grooves for the tray bottoms, then test fit the melamine panel. If the groove is too narrow, adjust the fence for a second pass.

Box Installation

With the trays installed, you're just about home free — mounting the completed retrofit assembly in your cabinet is the quickest and easiest part of this project. Remove the trays to make the box lighter and to give you full access. Slide the box into the cabinet and make sure it's seated firmly against all the spacers (Figure 5). Then drive screws through the box into each spacer (Figure 6). When the box is secure, install the trays by reconnecting the slide halves. I had the entire installation done in about 10 minutes.

Following one more check on the tray slide operation, the last step in the project is remounting the cabinet doors (that is, if you even had to remove the doors at all for this project). This should be a simple operation since the hinges can be remounted using the original screw holes, though you may have to adjust the hinges slightly to get the stile into just the right orientation. I'm pleased to say that, with the doors closed on my cabi-



Slide the box into the cabinet — your spacers should center the box in the opening. Too much play? Try spot-gluing paper shims (playing cards are ideal) on the spacers.



Drive two #8 x 1 1/4" screws through the box sides into each side spacer to anchor the box in the cabinet.

net, it's hard to tell the stile was ever removed and reattached.

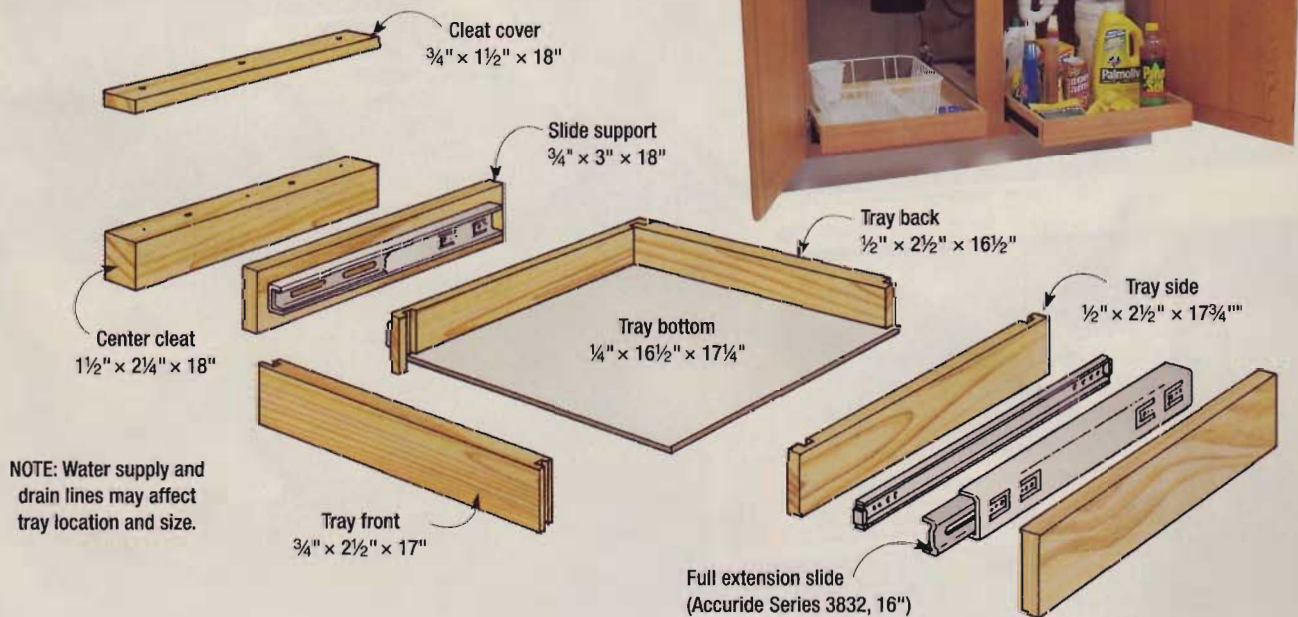
I was even more pleased after loading the trays. Gone are the days of getting down on my knees and reaching awkwardly into the cabinet to hunt in the dark for some hard-to-find item.

Based on this success I built a pair of trays to go under my kitchen sink (Under-Sink Tray Construction View). Although this system is different in several respects from the first, I'm including it as an idea that may be better suited to some of your kitchen cab-

inets. The basic tray construction is the same, but the cabinet's stile stays intact. A cleat mounted to the cabinet floor behind the stile supports the inboard-mounted slides.

As home improvement projects go, installing trays ranks high on my impact scale. It transforms a daily hassle into a pleasant task. Cost, in terms both of hours and money spent, is low — a rare combination indeed. In time, I'll add similar trays to all my kitchen base cabinets. ■

Under-Sink Tray Construction View



Benchtop Saw



Roundup

For raw cutting power and hair-splitting accuracy, you just can't beat a cabinet saw. With massive cast iron tables and three belts driving the blade, they also cruise along as smoothly as your Aunt Sally's big ol' Buick on a stretch of

fresh blacktop. It's no wonder this type of saw holds sway as the top tool in most woodworking shops. Unfortunately, these saws also seem to take on car-like dimensions when you try to park one in a small shop. And take it to a job site? Don't even think about it!

For small shops or on-site work, benchtop table saws provide a compact, lighter-weight, and affordable alternative to their bigger cousins. By using a circular saw universal motor for power and substituting aluminum and plastic for cast iron and steel, manufacturers whittle the weight and dimensions down to portable proportions.

But we wondered just what you sacrifice for the smaller package, so we put six popular 10" benchtop saws through their paces. Rather than work the saws over with a micrometer to measure machining tolerances, we concentrated more on using the saws the way you might — ripping and crosscutting framing stock and sheet goods.

In generating piles of sawdust, we found our analysis logically broke into four main categories: table tops, motors, fences, and controls. And while there's no denying these saws offer compact portability, we found compromises in each of these areas that directly affect performance.

Less Weight, More Vibration

Vibration was the single biggest problem we encountered. The heavy cast-iron top on a stationary saw — cabinet and contractor's alike — provides a flat, stable cutting surface that absorbs vibration like a sponge. The saws tested have cast aluminum tops which lack the heft to soak up vibration.

Similarly, the cast-iron arbor support assembly on stationary saws holds the blade steady in relation to the top, and trunnions lock it solidly in an upright or tilted position. In the Delta, Skil, and Pro-Tech benchtop saws, the motor mounts to a stamped steel saddle that pivots on a pin to raise and lower the blade. We found that these brackets flexed during cuts, adding to the vibration.



DELTA 36-540

(800) 438-2486



Virtues

T-slot miter gauge; stable, tubular steel fence

Vices

Crank turns counterclockwise to raise fence; tilt-lock is cumbersome

Verdict

Fewest amenities of any benchtop saw we tested

The DeWalt, Hitachi, and Makita saws' motors mount to a cast aluminum bracket that rides up and down on a pair of tracks or rods. These saws felt more solid — and safer — and their beefier motor mounts definitely reduced vibration, though they still lacked contractor-saw smoothness. While the six saws' price tags reflect these differences, we found other factors worth considering.

Testing from the Top Down

Except for some minor assembly and adjustments, these saws came out of the box ready to run — even the blades were installed. We added the hand cranks, blade guards, and assembled the fences, then checked the factory settings and made necessary adjustments.

As mentioned, all the saws have cast aluminum tops, primarily to retain strength while reducing

weight. Most of the saws have ribs or an open gridwork molded into the top for sawdust clearance.

Only the DeWalt has a continuous, smooth-surfaced top, part of the reason this saw weighs almost 65 lbs. — the most of any saw tested. In addition, DeWalt gives this heavy-duty top a non-stick coating similar to that found on frying pans. Boards glide over it, though, for safety's sake, there were times the surface was a little too slick.

Makita makes its top with slightly raised ribs running parallel with the blade, and the aluminum surface has a smooth coating so wood slides easily across it.

Specifications

Amps: 13
Volts: 120
Motor RPM: 3,650

Dimensions:

26"W × 17¹/₈"D × 11¹/₈"H

Weight: 40 lbs

Blade: 30T Carbide

Depth of Cut: 3" @ 90°
2¹/₂" @ 45°

Rip Capacity:

(Right of Blade) 11³/₈"

(Left of Blade) 11³/₈"

Warranty: 2 yrs

Factory Settings: Minor adjustments needed to 90° stop, blade, and fence.

Street Price: about \$180

▶ When we tried to raise the blade on the Delta, we got a surprise — the crank has a left-hand thread so you turn it "backwards" (counterclockwise) to raise the blade. The tilt-lock lever was also awkward to operate.



▶ Delta mounts the motor to a stamped steel bracket that hinges on a pivot pin. This bracket and similar ones on the Skil and Pro-Tech can't prevent vibration.

The Hitachi has a three-piece ribbed top — a 19¹/₂"-wide center section and two 7¹/₄"-wide wings — creating the widest cutting surface at 34". But its finish was rough and the sections were hard to align and keep level during assembly.

DEWALT DW744

(800) 433-9258

Virtues Excellent fence, large rip capacity; smooth table with cast insert; full dado capacity

Vices Too heavy; lacks control for fine-tuning blade tilt

Verdict Favorite of testers, but its hefty price is comparable with contractor-type saws



The one-piece brushed aluminum tops on the Delta, Skil, and Pro-Tech give the illusion of wings with a gridwork of openings along either side. These holes prevent sawdust from accumulating, but also can pinch your fingers when adjusting the fence.

One additional feature worth noting is the throat insert. Only DeWalt and Makita use a traditional throat plate that fits completely around the blade and adjusts flush with the table. The rest have small, rectangular plates that fit only along the right side of the blade, leaving gaps that can catch your workpiece. While dado inserts are available, the maximum dado width for all but two saws is 1/2" or less — the DeWalt and Makita accept a dado set 13/16"-wide.

Circular Saws at Heart

Manufacturers keep these saws compact by using the same type of direct-drive universal motor found in helical-gear ("sidewinder") portable circular saws. The motors in most of the saws are rated at 13 amps, although Makita and Hitachi use beefier 15-amp motors.

When you throw the switch on any of these saws, prepare yourself for an awakening — the high-pitched motor slams the blade to



▲ The rack-and-pinion fence on the DeWalt is excellent, rivaling high-priced after-market fences available for contractor saws.



▲ DeWalt molds a handy blade and wrench storage recess into the base.

operating speed in a fraction of a second. It's a jarring contrast to the quiet belt-driven induction motor, like the one in a cabinet or contractor's saw, that spins the blade smoothly up to speed.

But when you turn off most table-saws, including the belt-driven varieties, momentum keeps the blade

spinning for several seconds — still plenty of time for an accident to occur even though the saw is "off." That's why our testers appreciated the electric blade brakes found on both the Makita and Hitachi saws. The brake in the Hitachi was especially positive in halting the blade once the power was shut off.



Specifications

Amps:	13
Volts:	120
Motor RPM:	3,650
Dimensions:	26 ⁵ / ₈ "W × 22 ¹ / ₄ "D × 13"H
Weight:	64 lbs
Standard Blade:	30T Carbide
Depth of Cut:	3 ¹ / ₈ " @ 90° 2 ¹ / ₄ " @ 45°
Rip Capacity:	(Right of Blade) 24 ¹ / ₂ " (Left of Blade) 15 ¹ / ₂ "
Warranty:	2 yrs

Factory Settings: Minor adjustments needed to 90° stop, blade, and fence.

Street Price: about \$500

HITACHI C10RA

(800) 598-6657



Virtues Good power; positive blade brake; geared tilt adjustment

Vices Top and miter slot poorly designed; dated fence design doesn't stay parallel

Verdict Hitachi made a good start with the motor and carriage, but the top and fence place it a distant third



◀ The C10RA has a T-slot miter gauge, but the slots have tabs instead of a continuous groove. This makes it difficult to align the blade parallel to the miter slot.



◀ To adjust the blade tilt, push in the height adjustment crank to engage a rack-and-pinion gear system. Once engaged, turning the crank will tilt the blade.

Specifications

Amps: 15

Volts: 115

Motor RPM: 5,000

Dimensions:
34"W × 21¹/₈"D × 12¹/₈"H

Weight: 56 lbs
(w/o stand)

Blade: 36T Carbide

Depth of Cut: 3" @ 90°
2¹/₂" @ 45°

Rip Capacity:
(Right of Blade) 14¹/₂"
(Left of Blade) 14¹/₂"

Warranty: 2 yrs

Factory Settings: Adjustments needed to 90° & 45° stops, blade, and fence.

Street Price: about \$300 (w/stand)

To test the saws' power, we mounted identical 50-tooth combination blades on each saw and ripped 8/4 oak and "wet" pressure-treated 2x stock. While we had to slow our feed rate, none of the saws stalled or tripped the reset button. However, as mentioned earlier, the Delta, Pro-Tech, and Skil saws vibrated when we ripped the oak. In fact, the Skil chattered so badly we bought a second saw to confirm our test, and the results were the same.

Because the motor bracket in these three saws pivots on a single mounting point, the bracket can flex. Under load, this flexing allows the blade to "bounce" up

and down slightly, creating a rough cut and a dangerous situation for the operator.

Chances are you won't be ripping much 8/4 oak, and these three saws did perform somewhat better on the pressure-treated stock. You can improve that performance even more by investing in a decent thin-kerf blade when you buy the saw. Just don't expect to rip a clean edge.

Fences Run the Gamut

When DeWalt introduced the DW744 nearly two years ago, the fence system was like nothing else on the market, and that's still the case today. It locks solidly with a flip of a lever, and the rack-and-pinion adjustment lets you dial in the width you want — all the way out to an amazing 24¹/₂" rip capacity that is unmatched in this class.

Specifications

Amps:	15
Volts:	115
Motor RPM:	4,600
Dimensions:	27"W × 22"D × 11 ⁷ / ₈ "H
Weight:	40 lbs
Blade:	36T Carbide
Depth of Cut:	3 ⁹ / ₁₆ " @ 90° 2 ¹ / ₂ " @ 45°
Rip Capacity:	
(Right of Blade)	12"
(Left of Blade)	12"
Warranty:	1 yr
Factory Settings:	Minor adjustments needed to fence.
Street Price:	about \$325

MAKITA 2703
(800) 462-5482



Virtues Most powerful of saws tested; blade brake; blade tilt mechanism very smooth; rigid undercarriage

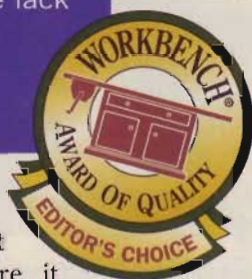
Vices Plastic base seems a bit flimsy; miter gauge and fence lack fine adjustment features

Verdict A good overall saw suitable for job site work

▶ The Makita's motor mounts to a cast housing that rides up and down on steel rods. This rigid system produced little vibration and operated very smoothly.



▲ The outer rim of the height adjustment crank turns independently and operates the Makita's blade tilt.



All the other saw fences lack a fine adjustment feature — you simply nudge them into position with your hand. The Makita 2703 has a well-built fence with a positive locking cam lever, but the fixed scale indicator means you must slide the rule attached to the table to fine-tune the scale setting.

Delta includes a steel-bodied fence that stays square and locks firmly in place. Though similar in design to Delta's, the fences on the Skil and Pro-Tech saws have aluminum bodies. We found it difficult to keep these fences parallel to the blade. And the fence locking cam on the Pro-Tech saw had a tendency to creep loose — an aggravating and potentially dangerous flaw.

Hitachi uses an older style screw-down clamping system on its aluminum fence. The handle

sticks straight out, where it can catch your clothing and get in your way. The fence also won't slide smoothly unless the extension wings are perfectly aligned — a task not easily accomplished since the support braces tend to "twist" the wings when you tighten the wing mounting bolts.

Controls Need Attention

All the saws have similar cutting capacities at 90° and 45°, but the quality of the controls you use to raise and tilt the blade varies greatly.

To raise the blade, all the saws employ a crank handle. These handles all turned relatively freely, until we tried the Delta saw. It has a left-handed thread so you turn the crank counterclockwise to raise the blade. When we

unpacked it, the crank had been turned clockwise until the mechanism had jammed, requiring a wrench to loosen the retaining nut. Once free, the crank operated smoothly, but I invariably forgot which way was "up" — a small problem, but one that kept cropping up every time I used the saw.

Delta's not alone, however, when it comes to "backward" controls. The tilt-lock lever on the Skil

PRO-TECH 4106
(800) 888-6603



Specifications

Amps:	13
Volts:	120
Motor RPM:	4,800
Dimensions:	26"W × 17 ⁵ / ₈ "D × 11 ¹ / ₄ "H
Weight:	40 lbs
Blade:	44T steel
Depth of Cut:	3" @ 90° 2 ¹ / ₂ " @ 45°
Rip Capacity:	(Right of Blade) 11 ¹ / ₄ " (Left of Blade) 11 ¹ / ₄ "
Warranty:	1 yr
Factory Settings:	Minor adjustments needed to 45° stop and fence.
Street Price:	about \$140

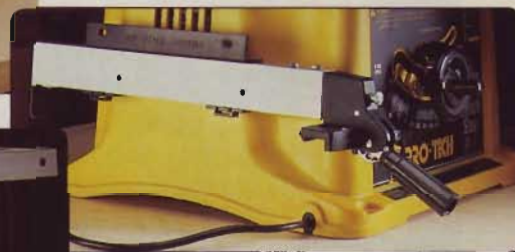
Virtues Built-in storage for fence, miter gauge, and wrenches; low price

Vices Fence prone to creep; lots of vibration; supplied with a steel-toothed blade

Verdict This saw was the surprise of the test group — it offered more amenities than some better-known brands for the least money



▲ On-board storage for the miter gauge and wrenches were nice additions to the Pro-Tech 4106.



▲ The fence stores neatly under the top. In operation, the Pro-Tech's cam-lever fence locking mechanism was prone to creep loose.

3400 has a left-hand thread so when you think you're tightening the ratcheting handle, it's actually getting looser (There are arrows showing which way is tight, but habit and instinct are hard to overcome.) To compound the problem, the lever's also too long, so it's easy to bang your knuckles into the underside of the top.

Adjusting the blade tilt on most of the saws, including the DeWalt, is an inexact science at best. You loosen the lock and manually pull the carriage into position. Just as they offer more power and a blade brake, Hitachi and Makita address this shortcoming.

Hitachi gives you a crank adjustment for tilt, but requires you to push the spring-loaded crank handle inward to engage rack-and-pinion gears. Loosen your grip and the handle pops back out at you.

Makita offers the best solution — an independent crank adjustment that fits around the outside of the blade height crank. It also uses rack-and-pinion gears like the Hitachi, but the action is quicker, smoother, and easier to operate.

Switch placement varied from saw to saw, but all were readily accessible. While some of the switches are too small for my liking, I can single out the large pad-

dle switch on the DeWalt as an excellent safety feature. You can flick it off with a quick swipe of your hand — important if you want to shut things down in a hurry.

Miter Gauges

For the most part, the miter gauges for these saws are too light, too short, and fit sloppily in the table grooves. Only the DeWalt saw is built to accept a full-size ³/₄"-wide miter gauge bar (and standard accessories such as featherboards and hold-downs).

Delta and Hitachi provide T-slot miter gauges, but the Hitachi C10RA's table doesn't have continuous slots. Instead, sections of the slot sides are bent upward. These tabs keep the miter gauge from tipping up, but they catch the end of

the bar and make it difficult to use the slot to align the blade.

The angle scales on all the gauges are coarse, but then you shouldn't consider using these saws for cutting precision-fit miters. Delta and DeWalt do provide adjustable stops for 90° and 45°.

Should You Buy One?

The greatest benefit these saws offer is portability. Their compactness and light weight makes them well-suited for job site work, especially if you have to use a car or truck to reach the project. And benchtop saws will get the job done. With any saw we tested you can rip, miter, crosscut, and perform any standard table saw operation you could want.

If, however, you're after a saw for building furniture or doing precise trim carpentry, I suggest looking seriously at a contractor's saw. These benchtop saws are okay for rougher work, but generally they lack the accuracy to produce consistently fine cuts, especially the three lower priced models.

Among the six saws we looked at, the nod has to go to DeWalt. But I'd have to think long and hard about

spending that much money for a benchtop tool. Its fence and ripping capacity put it in a class by itself, but at roughly \$500, it also costs three times what the Pro-Tech, Skil, and Delta saws sell for. One fellow in our shop said buying the DeWalt would be much easier to justify if the price was closer to \$400.

The Makita 2703 provides another solid option even though it falls short of the DeWalt in overall performance. The model tested was an early production version with a

"suggested retail price" of \$349. If the street price is \$325 or less, I think you'll get a lot for your money with the Makita.

Despite having a great motor, blade brake, and a nice blade tilt feature, the Hitachi falls short of the mark. To be in the hunt, this saw needs a better-designed, one-piece top and an improved fence.

The benchtop saw category is still young, so it's likely innovations are yet to come. Though I doubt performance will ever match that of their cast-iron cousins, these saws are sure to find a place in many tool arsenals, mostly as job-site saws for remodeling pros and home improvement enthusiasts. **TT**



▲ Blade alignment and tilt stop screws are easily accessible from above on the Skil and several other saws.

▲ The long lever and left-hand threads made the the Skil's tilt lock difficult to operate.

Virtues Flattest table surface of any saw; the fence scale is easy to read

Vices Vibrated badly; tilt lock very awkward

Verdict This saw vibrated so much it raised questions about safety

Specifications

Amps:	13
Volts:	120
Motor RPM:	4,800
Dimensions:	26 ⁵ / ₈ "W × 19 ¹ / ₈ "D × 11"H
Weight:	35 ¹ / ₂ lbs
Blade:	44T steel
Depth of Cut:	3" @ 90° 2 ¹ / ₂ " @ 45°
Rip Capacity:	
(Right of Blade)	12"
(Left of Blade)	12"
Warranty:	1 yr
Factory Settings:	Minor adjustments needed to 90° and 45° stops.
Street Price:	about \$160

SKIL 3400
(800) 301-8255





Benchtop Saw Station

Our review of benchtop table saws stirred up some debate and plenty of nostalgia among the Workbench staff. Some of us came into the craft when names like Oliver and Yates-American still appeared on machinery dealer invoices.

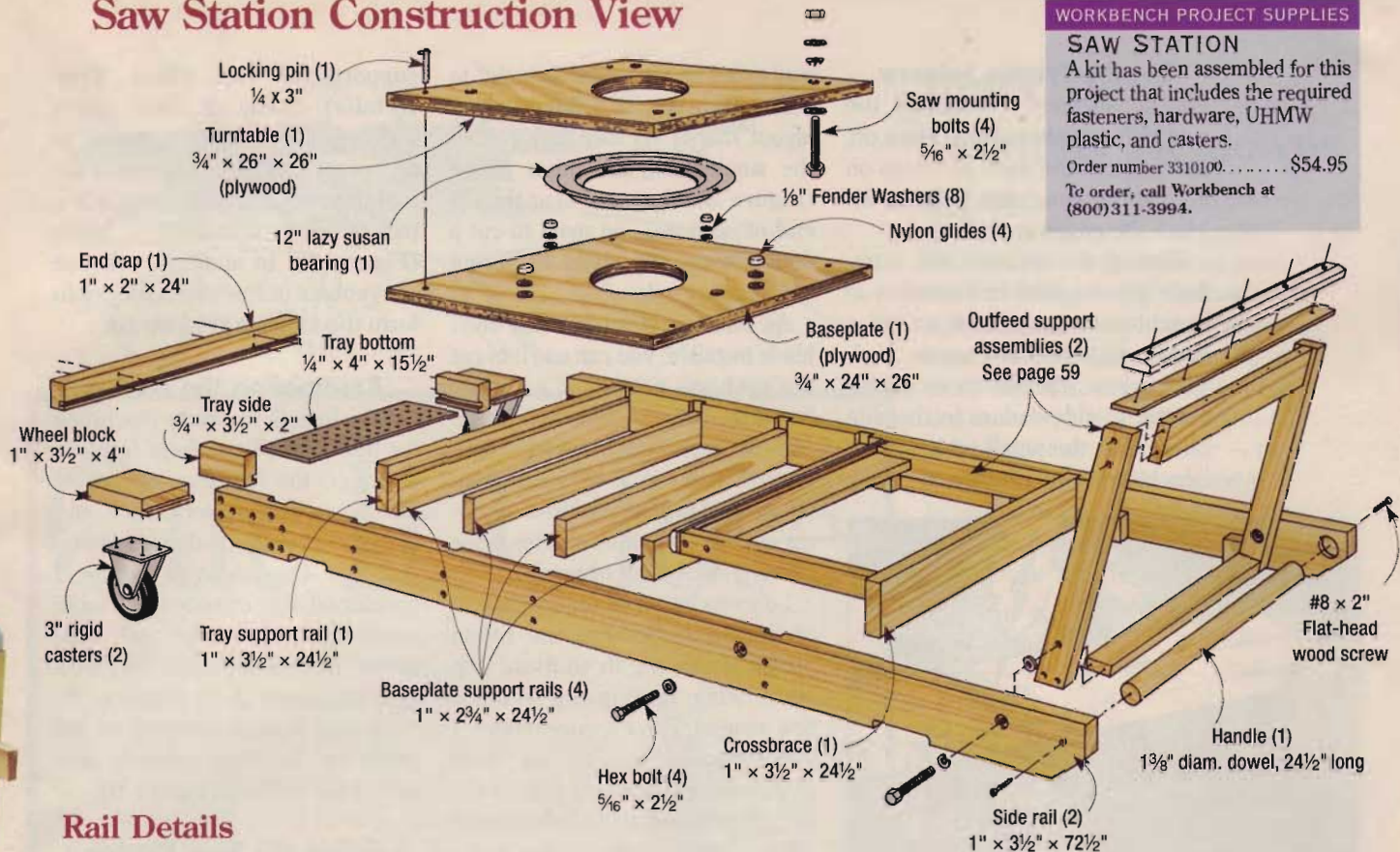
These industrial-duty iron workhorses dripped with horsepower and heft, and woodworkers lucky enough to use them quickly got spoiled. Who cared that they outweighed the average merchant ship and cast a shadow the size of Wisconsin?

Now, in the wisdom that only middle age and a benchtop saw test can bring, we've realized cast iron comes at a price. No one can dismiss the classic smoothness heavy metal provides, but the extra pounds sure snuff any hopes of having a truly portable machine.

But light weight also brings compromises. The six compact saws we tested (see page 46) all use plastic composites and aluminum to keep weight down, and each offers portability and reasonable performance for the cost. The benefits are genuine, but the saws' limitations still ride shotgun.

We can't boost their horsepower output, but this workstation helps cure some of the other shortfalls. First, the retractable outfeed supports lend a hand for both ripping

Saw Station Construction View



WORKBENCH PROJECT SUPPLIES

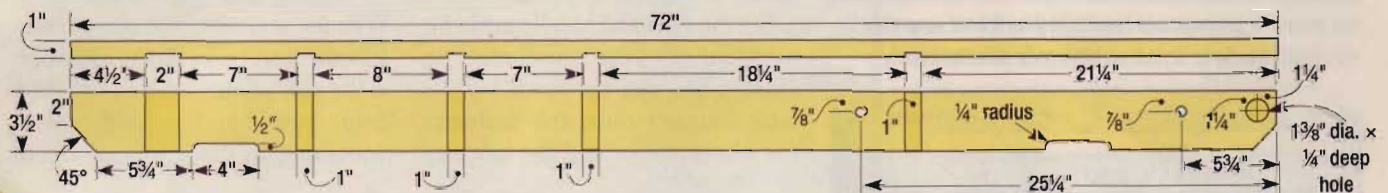
SAW STATION

A kit has been assembled for this project that includes the required fasteners, hardware, UHMW plastic, and casters.

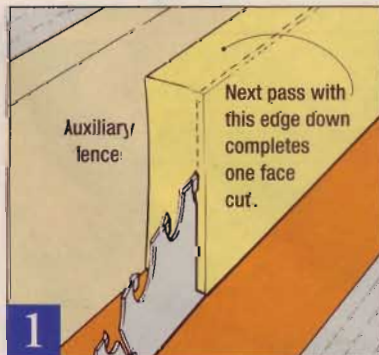
Order number 3310100 \$54.95

To order, call Workbench at (800)311-3994.

Rail Details



and crosscutting — thanks to the built-in turntable base — so the small saw table surface is less of a handicap. Second, the frame's weight helps tame vibration without sacrificing the saw's mobility. Casters on the tail end keep you rolling smoothly along.



A thin-kerf ripping blade will allow you to resaw 2x lumber for the frame stock. Ripping each face takes two passes.

Start with a Simple Frame

Those of you who've followed our series of portable workstations may find this design familiar (**Saw Station Construction View**). It shares the same frame structure as the planer project featured in the June 1998 *Workbench*.

The material for this workstation began life as 2x4 fir framing lumber. Milling it to 1" thick lets you machine any cup out of the boards, plus it makes the frame stronger but only slightly heavier than one built with 1x (3/4"-thick) stock.

To mill your stock, fasten a tall auxiliary fence to the table saw fence and rip each 2x4 with its convex surface (if any) facing the blade (**Figure 1**). One pass on each edge will trim this face flat, then you can set the fence 1" from the blade and rip the other face the same way.

What You'll Need

Lumber

- 48 lin. ft. 2 x 4 framing lumber
- (1) 1/2 sheet - 3/4" fir/pine plywood
- (1) 1/4" x 4" x 15 1/2" pegboard
- (1) 1 3/8" closet rod, 24 1/2" long

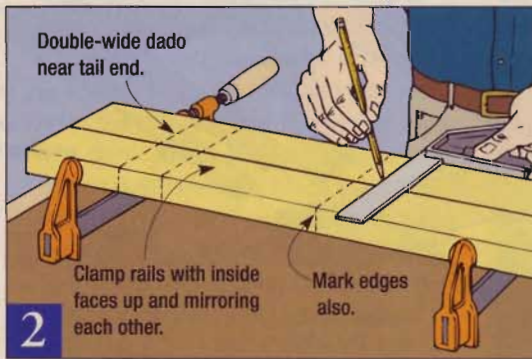
Hardware

- (8) 5/16" x 2 1/2" hex-head bolts
- (8) 5/16" nylon-insert lock nuts
- (4) 5/16" T-nuts
- (24) 5/16" flat washers
- (8) 1/8" i.d. fender washers
- (4) 7/8"-dia. nylon chair glides
- (50) #8 x 2" flat-head wood screws
- (24) #8 x 1 1/4" flat-head wood screws
- (1) 12" lazy susan bearing
- (8) #10 x 5/8" pan-head screws
- (1) 1/4" x 3" locking pin
- (2) 3/4" x 2 1/2" x 24" UHMW plastic
- (2) 3" rigid casters
- (8) 1/4" x 1" lag screws

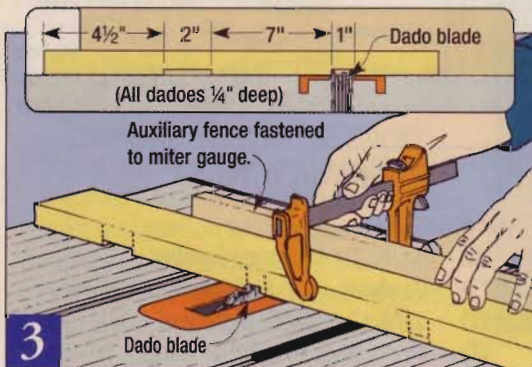
Cut the Frame Joinery

For consistency, I clamped the side rails together, inside faces up, and marked the dado locations on both at the same time (Figure 2). Mark the edges as well.

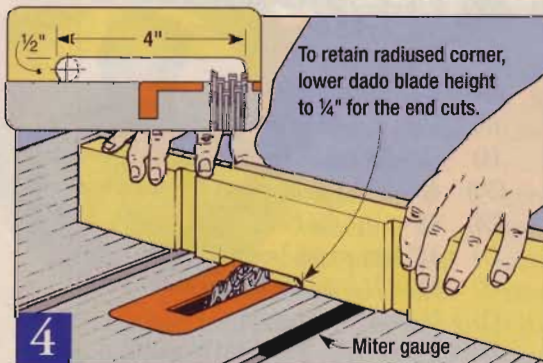
Cutting the dados will introduce you to another limitation of benchtop saws — most accept a dado width of only about $\frac{7}{16}$ ". That means it'll take three passes for the 1"-wide dados in the side rails. With the small table size of benchtop saws, there's no easy



It's easier to get accurate results in your frame assembly if you mark the dado layout on both rails simultaneously.



A small saw table makes it hard to set stops for the dados, so align the layout marks by eye and use the miter gauge.



After drilling $\frac{1}{2}$ " holes to define the ends of the sawhorse notches, cut the waste from the center with a dado blade.

way to set up the fence (or a jig) to index each cut, so I lined up my layout marks visually and guided the stock using the miter gauge (Figure 3). Note that near the tail end of each rail you need to cut a double-wide (2") dado to accept two support rails.

As long as you have the dado blade installed, you can use it to cut the sawhorse notches in each rail. But first, drill a $\frac{1}{2}$ "-dia. hole at the end of each notch layout, then remove the waste between them (Figure 4). The radiused inside corner this technique creates helps prevent splits from occurring.

I chose closet rod for the handle of the frame because the round profile allows me to shift my grip easily while moving the workstation around. For a secure mount, I counterbored a $\frac{1}{8}$ "-dia. hole ($\frac{1}{4}$ "-deep) in each side rail for the rod, then drilled a $\frac{1}{8}$ " hole at each counterbore's center for a screw.

Set the rails and handle aside for now and cut your crossbraces to length. You can cut stock for the table support rails, the end cap, the wheel blocks, and the side tray

supports as well (Tool Tray Details). Some of these parts require a $\frac{1}{4}$ "-wide groove to accept the pegboard bottom of the tool tray — easily done with a few passes over a standard blade (Figure 5). In addition, you can cut rabbets in the wheel blocks to form the tongues (Figure 6).

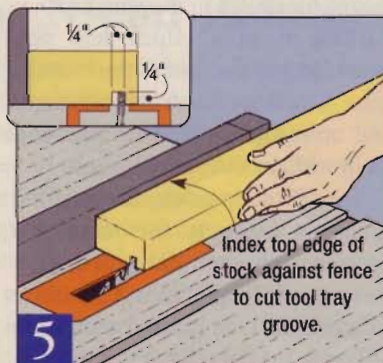
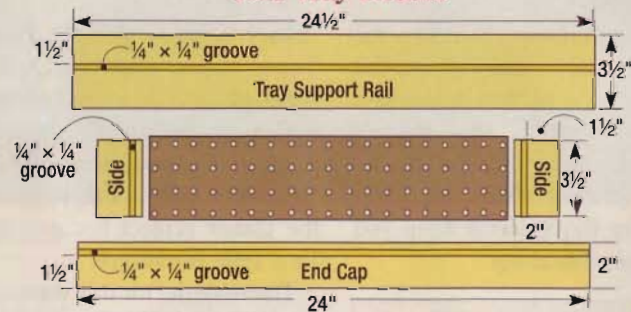
Assembling the Frame

Once I had all the parts machined for the frame, I set them in place — minus the tool tray and wheel blocks — on my workbench and brushed glue in the dados in one side rail. One piece at a time, I positioned the crossbraces, table supports, and closet rod, and drove screws through the side rails to secure them (Figure 7). With that done, I fastened all the parts for the tray assembly and added the end cap (Figure 8).

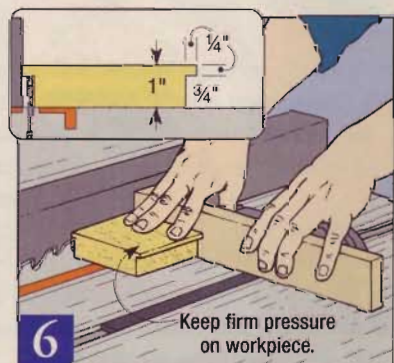
Building the Saw Platform

Without a doubt, the most user-friendly feature on this workstation is the pair of outfeed supports that help you handle long stock. Squeezing all the advantage out of

Tool Tray Details



Cut a groove in the end cap and tray support rail to accept the tool tray bottom.



Attach a backup fence to the miter gauge to cut the rabbets on the wheel blocks.

them, however, requires another innovative feature — a rotating saw mount that works for both ripping and crosscutting. Lazy susan hardware makes it all possible.

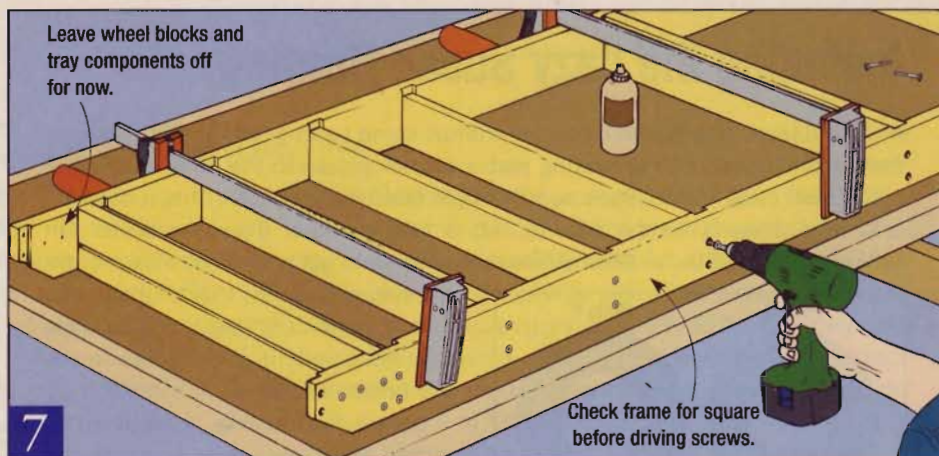
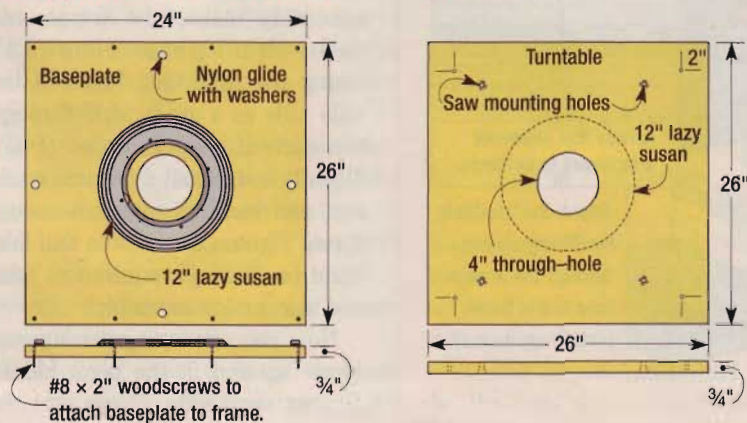
First, cut the plywood turntable and baseplate to size (**Baseplate and Turntable Details**). My 26"-square turntable is large enough to hold any of the saws in our test group. Once the panels are cut to size, draw diagonals on them to find their center, then jigsaw a 4"-dia. hole around these points (**Figure 9**). The holes allow at least some of the sawdust to fall through, and they provide access for dust extraction if you want to hook up a shop vacuum.

The lazy susan bearing is fairly stiff, but there can be some deflection of the turntable along its outside edges. To remedy this, I installed a set of nylon glides — one halfway along each edge of the baseplate — to provide extra support of the turntable.

So far, so good. But here comes the hitch. The lazy susan bearing creates a $\frac{3}{8}$ " gap between the panels, but the pad on these nylon glides is only $\frac{1}{4}$ " thick. So you have to make up the difference somehow. My solution was to drop a pair of $\frac{1}{8}$ "-i.d. fender washers over the nail shaft of each glide before driving them into the baseplate.

The only remaining step to complete on the baseplate in preparation for the lazy susan is to drill mounting holes for the screws.

Baseplate and Turntable Details

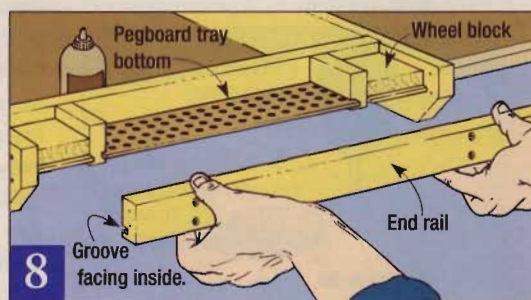


7 Having all the cross-members of the frame nest in dados makes accurate assembly much easier. Just glue the ends into both rails, snug everything up with clamps, and drive screws to lock it all together.

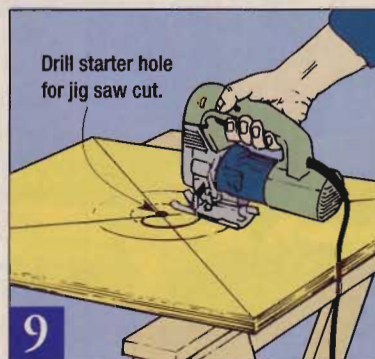
As for the turntable, you'll need to install bolts (with full-thread shanks) for mounting your saw to the turntable. I fixed these bolts to the turntable in a way that makes it easy to remove and reinstall the saw when necessary.

You'll have to counterbore for the bolt heads so they don't interfere with the rotation of the turntable (**Figure 10**), then you can drill through-holes for the T-nuts. Hammer a T-nut into each hole (from the top face of the plywood), then thread the bolts up from underneath and cinch them tight with a socket wrench. These bolts are now fixed mounting studs, so later you can just fit the saw over them and add washers and nuts.

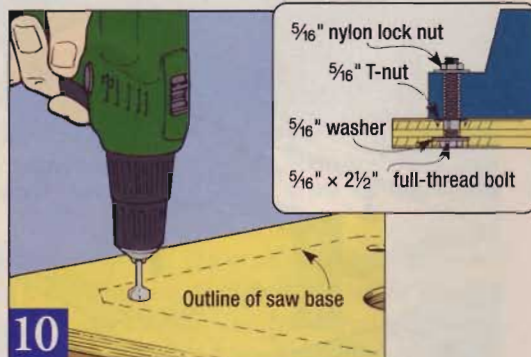
While you've got your drill handy, bore the four $\frac{3}{8}$ " holes in the turntable — one at each corner — to accept the locking pin.



8 It's simpler to fit the tool tray assembly together from the end, then fasten the end cap to close everything up.



9 Jigsaw a hole in the center of each plywood panel for help with dust control.

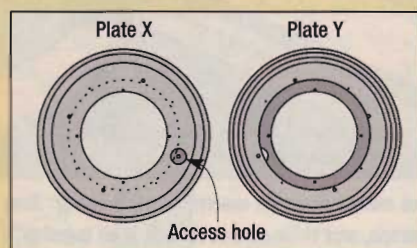


10 Drill counterbored holes in the underside of the turntable for the saw-mounting bolts.

Installing the Lazy Susan Bearing

At first glance, lazy susan bearings prompt some head-scratching. It appears that fastening one of the bearing plates blocks access to the other plate. But if you look closely, you'll see some simple features that solve this problem.

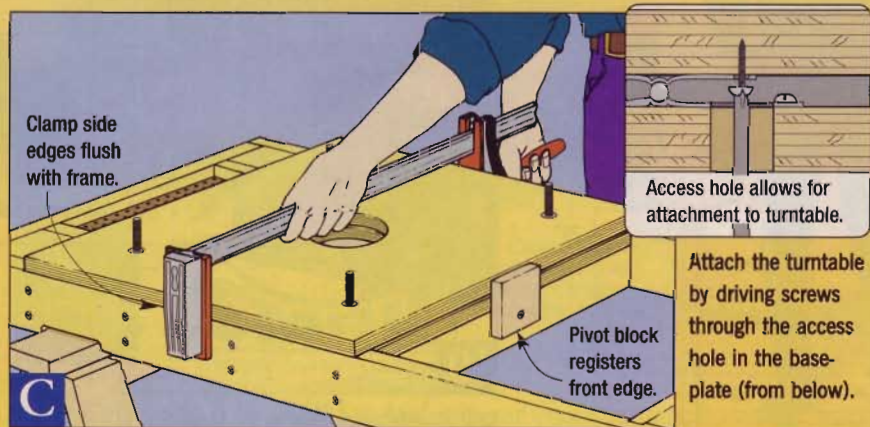
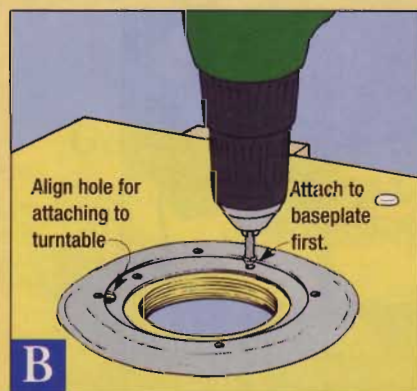
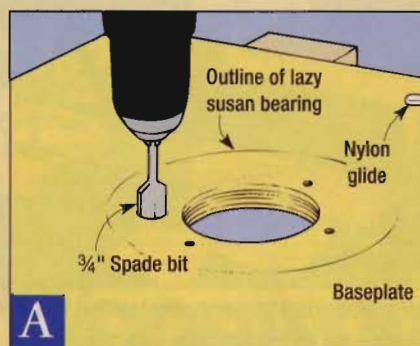
First, a plate 'X' of the bearing has a smaller inner diameter, so its rim extends inside plate 'Y'. This provides clearance to get screws into its mounting



ing holes. Second, the 'X' plate also has a larger ($\frac{3}{4}$ "-dia.) access hole that lines up with the ring of mounting holes in plate 'Y'.

Before the bearing is fastened to either panel, you have to mark the location of this access hole on the first wood panel (in my case this was the baseplate) for drilling a $\frac{3}{4}$ "-dia. hole (Figure A). Once the hole is drilled, align the lazy susan ('X' side down) on the baseplate and fasten it (Figure B), then screw the baseplate to the workstation frame.

For the turntable to work properly, you need it centered exactly on the baseplate. First, screw a pivoting stop block to the front baseplate support rail, then set the turntable against the block and clamp it flush with the frame sides (Figure C). With the workstation supported on a pair of sawhorses, the turntable will nest right where it's supposed to while you drive the first mounting screw through plate 'Y' from underneath (inset drawing below). Pivot the stop block down and remove the clamp so you can rotate the turntable a quarter-turn. Replace the clamp and block to drive another screw, then remove to spin the table and drive the rest.



Put Some Spin On It

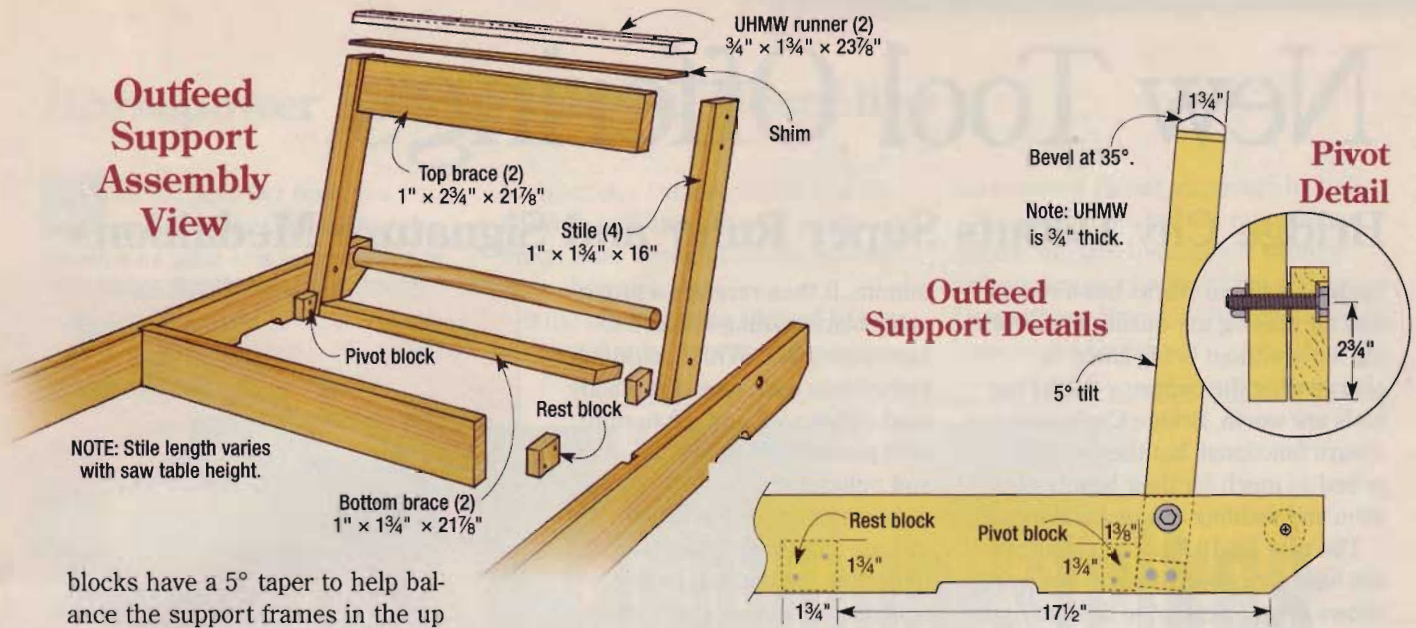
With the saw-mounting hardware installed, it's time to give the turntable its final and biggest engineering boost — adding the lazy susan bearing. Minus this hardware, the plywood panels will still rotate against each other without requiring a Herculean effort, but I wanted something better. The easier it is to change from crosscutting to ripping, the more likely I'll take advantage of this feature on a regular basis (*Installing the Lazy Susan Bearing*).

Adding Outfeed Support

The final steps of this project involve building and fitting the outfeed supports (**Outfeed Support Assembly View**). The frame of each support is a simple assembly of glued and screwed butt joints. To get close to the correct height, the frame stiles on the support assemblies should be 4" longer than the height of your saw from base to table top. At the top of each frame a beveled strip of UHMW (ultra-high molecular weight plastic, a dense polymer) provides a slick surface for workpieces to ride on. The final tweaking of the UHMW's height — to get the runners flush with the saw table — is done by adding a shim. Both support assemblies pivot down and out of the way when not in use. This requires careful installation — one at a time — to get the alignment right.

First, add rest blocks to the side rails (**Outfeed Support Detail**). Then clamp the outfeed support assembly inside the frame and flush with its top edge (Figure 11). Using the predrilled holes in the side rails as a guide, drill through the outfeed support frame (**Pivot Detail**) and install the bolts, washers, and locking nuts that secure them. Tighten the nuts so that firm hand pressure is required to raise and lower each assembly.

Now you can swing the support frame up and fit the pivot blocks against each stile. (Note that the



NOTE: Stile length varies with saw table height.

blocks have a 5° taper to help balance the support frames in the up position.) Use clamps for a test fit, then glue and screw the blocks to the side rails. Repeat this procedure with the second outfeed support assembly.

The UHMW plastic for the runners comes in square-edged strips, but with the help of a simple jig you can machine the bevel on your table saw (Figure 12). Careful — the plastic is very slippery.

To determine the final height for the supports, you need to mount your table saw on the workstation. Place the saw on the turntable and secure it to the mounting bolts. Then clamp a long straightedge to the saw's table, and clamp the runners on top of their outfeed support frames. Now measure the gap between the straightedge and the UHMW to find the thickness of the shims you need (Figure 13).

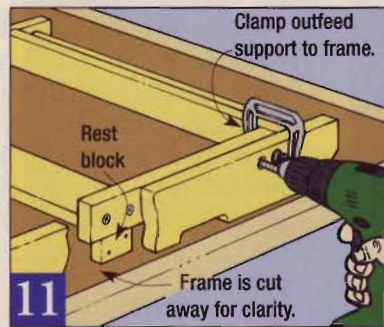
Machine the shims, then drill four 3/8"-dia. counterbores into the

top face of each UHMW strip. Now clamp the UHMW in place on the support frames (with the shims in between) and drill a 3/16"-dia. clearance hole in each counterbore. Screws secure both the UHMW and the shim (Figure 14).

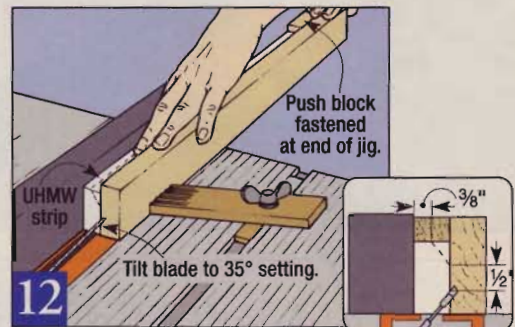
One final touch: With the turntable aligned on the frame, drill through the locking pin hole

at the right rear corner and into the baseplate below. Now you can install the locking pin. (I also tied a cord to tether the pin to the tool tray so it doesn't get lost.)

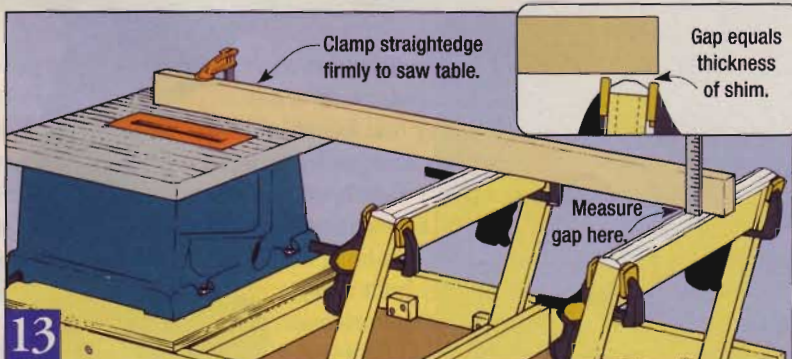
With this workstation, one good turn does deserve another. Your benchtop saw helped build the project. Now the project can lend a hand back to your saw. ■



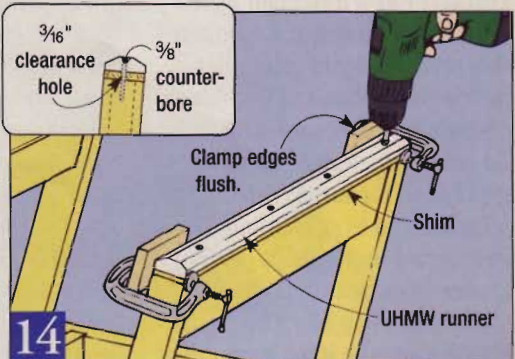
11 Using the frame rail holes as guides, drill through the outfeed support stiles so you can bolt them in place. Clamps help here.



12 Cutting the 35° bevel on the UHMW strips is safer using a jig. This setup shrouds the saw blade and helps push the workpiece.



13 When the outfeed support assemblies are bolted in place, set them upright and use a straightedge to find the gap (for shim thickness) between the table top and the runners.



14 Clamp the runners and shims in place atop the outfeed support frames and secure them with screws.

New Tool Offerings

Bridge City Debuts Super Ruler and Signature Medallions

Bridge City Tool Works has a reputation for making top-quality woodworking tools without being afraid to charge what the company thinks the tools are worth. Bridge City's tools are always functional, but they're often prized as much for their beauty of form and melding of wood and metal.

The new RS-18 Ruler System may not have any wood in sight, but it still shows great attention to design. And, it fits right into the company's apparent quality-justifies-price philosophy.

The RS-18 starts off as an 18"-long triangular extrusion of hardened alu-

minum. It then receives a proprietary black coating claimed to have zero glare. White markings etched into each face of the body read right-to-left and left-to-right, with graduations in $\frac{1}{32}$ ", $\frac{1}{16}$ ", and millimeters.

Accessories for the RS-18 include adjustable "storyboard" indicators, an end cap for hook rule use, and an axle and wheel assembly that allows you to roll the ruler for marking parallel lines. This "basic" rule sells for \$125.

Trammel points are optional, as

are five additional 18"-long sections that can be combined to make a 54"-long rule.

Also new from Bridge City are Signature Medallions that provide a unique way to personalize and identify your projects.

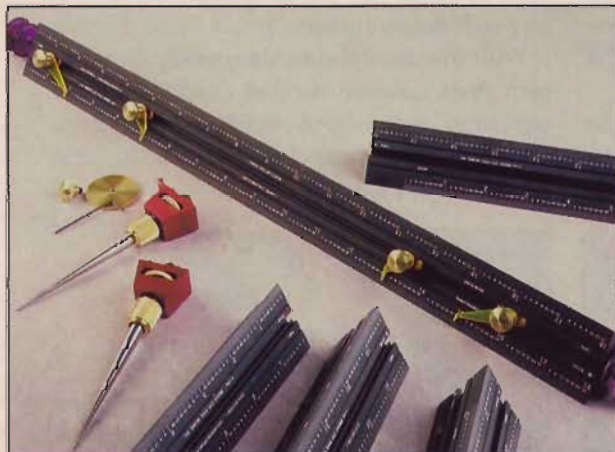
These 1"-diameter by $\frac{1}{8}$ "-thick medallions are cut from cherry, walnut, maple, or rosewood. You provide Bridge City with a signature, logo, or design,



and they laser-engage it into as many medallions as you desire. You just drill a hole in your project and glue the medallion in place. You can locate them inconspicuously, but with the right design the medallions make an attractive project accent.

A one-time fee of \$17.95 for a signature or \$35.95 for a logo gets your artwork set. Medallions cost \$2.50 to \$3 each, depending on wood and quantity.

For information on The RS-18 or Signature Medallions, contact Bridge City at (800) 253-3332, or on the web at www.bridgcitytools.com.



New 14.4-Volt Drill from Hitachi

Hitachi touts its new 14.4-volt cordless driver drill (model DS14DV) as a tool filled with premium features at a competitive price. But you might not notice the features at first blush. There's no cushioned grip, on-board bit storage, or flashy graphics. Of course, Hitachi has long catered to professionals concerned more about performance than bells and whistles.

It's when you slip a bit in the chuck and take it for a spin that you'll notice the drill's features. The chuck is a $\frac{1}{2}$ "-capacity

keyless single-sleeve model with shaft lock. You tighten the chuck with one hand, then click the chuck's outer sleeve back to lock it, so the bit can't work loose.

Driving the chuck is a rare-earth magnet motor that develops up to 305 in. lbs. of torque at 0-350 rpm in low range, or 0-1,200 rpm in high, and it's reversible. A 22-position clutch helps tame the torque, while a sensitive trigger switch provides excellent speed control. With the drill in low range and the



clutch set on drive (no slippage), the motor delivers so much power that I couldn't stop the chuck's rotation by hand, even at very slow speed.

The DS14DV comes with two batteries, a one-hour charger, and a nicely built carrying case. Street price for the kit should be around \$225. Call Hitachi at (800) 598-6657.

Second-Generation DigiTape Debuts

When the original DigiTape from L.S. Starrett Co. made its debut in 1994, I was intrigued, but not persuaded to toss out my conventional tape for one with a digital display. Now Starrett has developed the DigiTape Plus equipped with some new features that prompted me to take another look.



The DigiTape Plus shares the features of the original, including display readings in inches, feet-inches, or centimeters, measurement memory, and adding case length to measurements. The display now reads in fractional or decimal increments, and can be flipped to read from either side of the tape case. Memory has been increased to three measurements (from one), and the tape can even be patched into a computer for downloading data.

The 25-ft. carbon-steel blade is 1"-wide, and has a special coating to resist ultraviolet fading. Starrett's patented Tru-Lok blade lock holds the blade at your desired setting.

A DigiTape Plus will set you back around \$50. To learn more, you can contact L.S. Starrett Co. on the web at www.lsstarrett.com, or call (978) 249-3551.

Feature-Packed Porter-Cable Jigsaw

The venerable jigsaw is a tool that's hard to live without, but it hasn't gotten much respect until recently. Many manufacturers have added features and sophistication to jigsaws in the last few years, leaving those with old-style saws to play catch-up. Porter-Cable was one company left behind the curve on jigsaw technology, but with the new feature-laden model 9543 jigsaw, the company has caught up.

Blade changing — formerly an awkward task — now requires only squeezing a blade clamp and pulling out the old blade. Base-tilt adjustment is tool-free as well, thanks to a retractable handle. Positive stops at 0°, 15°, 30°, and 45° in both directions take the guesswork out of setting exact angles. Even tilted, a blade guide keeps blade deflection in check. A 6-amp motor powers the blade through a 1"-long stroke, while four orbit settings let you adjust the blade's aggressiveness.



Other highlights include metal and plastic sub-bases, an anti-splinter insert, and dust blower. An edge guide and a dust collection kit are available as accessories. Look for a street price around \$180. Call Porter-Cable at (800) 487-8665, or check www.porter-cable.com on the web.

Dremel Goes Pro

High speed rotary tools, such as the Dremel MultiPro, have always been popular among craft project builders and hobbyists, but have seen more limited use among professionals. Now Dremel has introduced the Professional High Speed Rotary Tool, designed to deliver the performance and durability demanded by pros. It also offers features that a casual user will find valuable as well.

To me, the tool's best feature is the fan-cooled motor with electronic speed control. Like the speed controls used on routers, it boosts current supply to the motor in response to load. This helps prevent bogging and stalling. Combined with soft-start and a 5,000-30,000 rpm speed range, the tool now has greater stamina and power. On/off and speed controls are now separate as well.

The Professional High Speed Rotary Tool is available in kits with a variety of accessories, carrying prices from around \$110 to \$150. You can check out Dremel's web site at www.dremel.com, or call (800) 437-3635 for information.



Cordless Circular Saw from Ryobi Packs 18-Volt Punch

I've got to admit that I've become addicted to cordless power tools. Other than a drill, my favorite of these tools is the portable circular saw. Jobs such as cutting roof sheathing in place or cutting plywood sheets are much easier with no cord to drag around. One of the newest cordless saws is an 18-volt model (R10730K2) from Ryobi. Its combination of features and price should make it a contender in this growing market.

The saw uses an 18-tooth carbide-tipped blade with an ultra-thin 1/16" kerf. Blade diameter is 5 1/2", giving it a 1 9/16" depth-of-cut at 90° — just enough to get through framing lumber. These minimalist blade dimensions help decrease loads on the saw's motor, and should yield longer run times per battery charge. Left-side blade mounting makes viewing the cut easy for us right handers.

All of these features are nice, but the best one may be price. Currently, the saw is available only in a combo-kit with an 18-volt drill. The drill has a reversible two-speed motor, 1/2" capacity, and 24-position chuck. The kit also includes two batteries and a one-hour charger, all in a plastic case. At \$279, it's priced well below many other 18-volt saw/drill sets on the market. You can contact Ryobi on the web at www.ryobi.com, or call (800) 525-2579.



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Products For Your Home



Quick-Connect Ladder Stabilizer

Over the last year I've spent a lot of time on an extension ladder restoring my home's second story windows. Working at heights is fine, but when I'm 20 ft. in the air, I like to feel as secure as possible. That means making sure the ladder's feet are well-planted, and using a ladder stabilizer.

While I like to use a stabilizer, I've never been fond of the low-tech mounting system for the one I own — a combination of U-bolts, plates, and wing nuts. The QuickClick ladder stabilizer from Werner Ladder Co. is different. I checked one out at the National Hardware Show last year, and was impressed with how it works.

On the QuickClick, a standard U-shaped stabilizer is mounted to a frame that slips over two adjacent ladder rungs. When you slide the QuickClick in place, a spring-loaded latch automatically locks it in place. The process is quick and reduces the possibility you'll install the stabilizer incorrectly. Removing the QuickClick is just as easy — release the locks and slide it off.

At around \$60, the QuickClick is pricier than other stabilizers, but it offers great convenience and peace of mind. One model fits most aluminum and fiberglass extension ladders. Contact Werner Ladder Co. at (724) 588-8600.

Remote Control Ceiling Fan

Casablanca Fan Co. has introduced a new line of Comfort Touch ceiling fans that allow you to control fan operation in ways you might not have seen before.

Most noteworthy of these new features is a wireless remote control. It allows you to turn the fan on and off, control its speed, and reverse fan direction. You can also turn on, off, and dim the fan's light with the remote.

In addition to remote control, Comfort Touch fans feature a thermostat that can automatically increase or decrease fan speed or shut the fan off in response to temperature changes. A mode called Home-Safe will switch the fan's light on and off in irregular sequences, making your home appear occupied when you're away.

Comfort Touch fan prices start at about \$400. Call Casablanca Fan Co. at (888) 227-2178.



Etchings Liven up Sinks

New Kitchen Exclusives Distinction sinks from Sterling Plumbing offer the durability and easy cleanup of stainless steel with a bit of added flair. The sinks are available with five different decorative patterns (rope twist, ivy, hearts, flowers, and links) etched into the rear ledge and sink rim. All are available with single or double 8"-deep bowl styles, and they're undercoated to reduce sound and condensation. Prices range from around \$190 to \$300. For more information you can call (800) 783-7546, or check Sterling Plumbing's web site: www.sterlingplumbing.com.

Minwax Spray

To simplify staining and finishing of hard-to-reach and intricate areas, Minwax has introduced Wood Finish stains and Polycrylic top coats in aerosol spray cans. Stains are available in standard Minwax colors, top coats come in satin or gloss. An 11.5-oz. can costs under \$10. Contact Minwax at (800) 523-9299 or at www.minwax.com.



Decorative Caps Add Style to Posts

When building a wood fence, deck, or porch rail, I'm often stymied by how to treat the tops of the posts. Square-cut post tops add no visual interest, and the exposed end grain invites premature rot.

One way to eliminate these problems is to add decorative post caps, such as the new models offered by Design House. Six caps are available in western red cedar or treated pine. Pyramid styles include plain wood, plastic-covered, or my favorite, copper-clad. A ball-topped cap and a flat top complete the selection. All caps have

moldings that form a pocket under the cap, allowing the assembly to slip over a standard 4x4 post. You then secure the caps to the posts with construction adhesive.

The caps carry a lifetime warranty against defects, and range in price from around \$12 to \$20 each. For more information, you can contact Design House at (800) 558-8700.



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Lock Your Door with Remote Control

I used to think a keyless remote for car locks was gimmicky. Then I got a car with one, and I've grown accustomed to locking and unlocking my doors with the touch of a button.

Now this same technology is available for home entry door locks, with AccessOne Remote Keyless Entry Systems from Titan locks (a division of Kwikset Corp.). Again, I greeted the idea with skepticism. But who knows, remote locks may prove just as handy at home as they have on my car.

AccessOne locks receive signals from a small keychain remote that locks and unlocks the door from up to 30 ft. away. A beep lets you know when the lock is secured. The lock is powered by four AA batteries that should last about a year. A key also operates the lock in standard fashion.

AccessOne remotes use "rolling code" technology, sending any one of

four billion possible signal codes with each use. Another button on the remote can control Genie Intellicode garage door openers (an adapter is available for other openers). Titan hopes to partner with automobile remote makers to add car door lock control to the remote as well. Another partnership will make sun visors with AccessOne controls available as a factory option on many new cars.

Other features include a light on the door interior that indicates when the door is locked, plus a safety relock option that automatically relocks the door after 30 seconds, and a guaranteed lifetime finish. The lock comes with two reprogrammable remotes, and additional units are available.

AccessOne deadbolts sell for around \$100, and complete handle-sets run about \$180. You can call Kwikset at (800) 527-5625.



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Lead Test Kit

If your home was built before 1978, chances are it contains lead-based paint. And if you plan to remove paint, it's a good idea to test it first.



LeadCheck swabs from Homax Products Inc. offer a way to do this without expensive paint analysis.

The swabs contain nontoxic, lead-reactive chemicals. Rub the swab on a painted surface and, if the swab's tip turns red, it means there's lead in the paint. The swabs are also useful

to check for dust that may have been missed during cleanup. A two-pack of swabs sells for under \$8. Call Homax at (800) 729-9029.



Ceiling Magic

Painting an interior ceiling always involves working overhead, and most times means painting white over white. All this makes it easy to miss spots and get uneven paint coverage. Ceiling Magic latex paint from Quality Paint Products won't make reaching overhead any easier, but does aim to simplify the challenge of getting even coverage.

Ceiling Magic is formulated to temporarily change color when you mix in a dye the company calls Color Guide. It turns the paint light blue, causing it to stand out from the ceiling's previous coat of white paint. With exposure to natural or artificial light the blue dye fades from the paint over several hours, leaving just the white color behind.

Color Guide dye works only with Ceiling Magic paint, and stays active for about one week once mixed in the can. After that, the paint is still usable, but can't be redyed. The dye is nontoxic and cleans up using soap and water, as does the paint.

Bright ceiling white is currently the only color available, but the company is working on tintable paints that will accept the Color Guide dye. A gallon of Ceiling Magic (with dye) sells for under \$20 from Quality Paint Products at (800) 980-0822, or www.qualitypaint.com on the web.

Odorless, Non-Toxic PVC Cement

If you've ever assembled PVC pipe and fittings, then you know the cement used to join them is messy, and it's made up of toxic chemicals that give off nasty fumes and make it potentially dangerous to work with.

The folks at The Gorilla Group (makers of Gorilla Glue for wood) wanted an alternative to standard PVC cement, and developed Gorilla PVC.

This cement is nontoxic, odorless, and cleans up (prior to curing) with water.

Gorilla PVC is also designed to work without a primer, but can be used with primer if required by local building codes. The cement is compatible with PVC drain, vent, and water supply pipes, plastic gas line and electrical conduit, and irrigation hose.

Of course, there is a price to pay for the attributes found in Gorilla PVC. A 16-oz. can carries a suggested price of \$12.95, as opposed to around \$4 for the same amount of standard PVC cement. But if you're looking for a non-hazardous, user-friendly way to join pipes, the price may be worth it. You can get more information from The Gorilla Group at (800) 966-3548, or on their web site: www.gorillaglu.com.



Brush Stuff

My least favorite part of painting has to be cleaning brushes and rollers. Brush Stuff Brush and Roller Conditioner, new from The Flood Co., should simplify this chore. Work this gel into a brush or roller before you start, and it stops paint from bonding to the bristles or roller. Brush Stuff also makes bristles more pliable. It works with latex, oil-base, and acrylic paints, and won't affect paint color or adhesion. Each 6-oz. tube contains enough gel for 100 applications and costs about \$6 retail. For more information, you can contact The Flood Co. at (800) 321-3444, or on the web at www.floodco.com.



Wrought Iron Beauty



Most metals are complex combinations of alloys, blended to have specific attributes. But primitive wrought iron, little more than raw ore plucked from the ground and forged, has for a thousand years had the right stuff for transforming workaday gates, screens, and lighting fixtures into works of architectural art. Simple wrought iron structures appear in Europe as far back as the 11th century, but it was the 14th through 18th centuries that saw wrought iron hammered, rolled, and twisted to amazing levels of detail. That these works have stood the test of time is testament both to the ironsmith's skill and the properties of wrought iron.

Low carbon content, relative softness, and a fibrous structure make wrought iron easy to shape. With just a charcoal fire, an anvil, hammers, and a few special tools, the smithy forms raw iron ingots into intricately ornamented bars and plates, then joins these into complex assemblies. As the iron is shaped, repeated heating and hammering hardens the metal's surface. This adds to the material's natural rust-fighting ability, and imparts a color and texture that make wrought iron grow more beautiful with age.

