5 Editors' Choice
BEST Home Improvement Web Sites

WORKBENCH®

THE ORIGINAL WOODWORKING AND HOME IMPROVEMENT MAGAZINE

Build Your Own Custom Kitchen Cabinets

NEW space-saving BENCH

PERFECT DOVETAILS
3 Simple Jigs Make It Easy

SPECIAL FEATURE Follow Along on a Professional Home Inspection Tour

September/October 2000/$3.95
Canada and International $4.95
10>
0 09281 01683 0
Display until November 15, 2000

Contents

Build Your Own
40
Kitchen Cabinets

Don't settle for store-bought kitchen cabinets. Get the style, size, finish, plus all those little extras you always wanted when you build your own.

RAISED PANELS

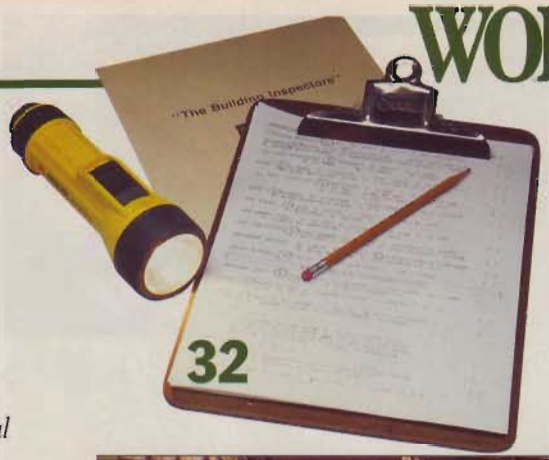
LIGHTED VALANCE

BEVELED-GLASS DOOR

3/8" INSET DRAWERS

BUILT-IN CUTTING BOARD

CUSTOM HARDWARE

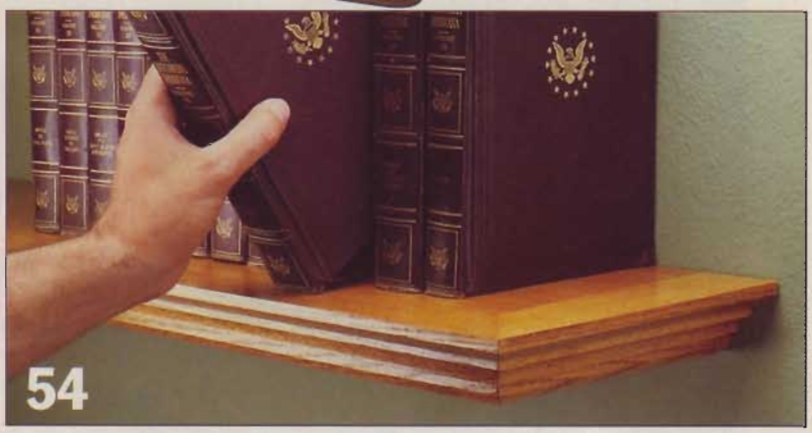


32
Tips From A Home Inspector

Is your house hiding costly secrets? Here are some tips from a professional home inspector that will help you spot a home's trouble spots.

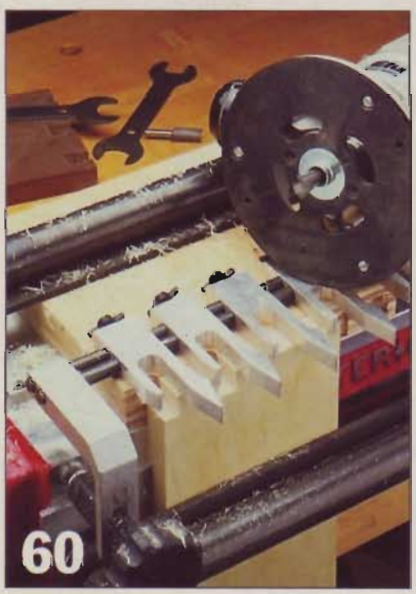
54
Super-Strong Shelving

These shelves seem to "float" unsupported. Their hidden strength will amaze you.



60
Dovetail Jig Basics

Nothing says "craftsmanship" like dovetails. And nothing makes them easier to cut than the right jig.



66
Fold-Down Workbench

No room in your shop for a full-size bench? No problem. Small in size, this sturdy fold-down version is big on features.

DEPARTMENTS

EDITOR'S NOTES

We had a good discussion around here the other day about the cost of our "labor." No, I'm not talking about how much we get paid to work for *Workbench* magazine. I'm talking about how much we "pay" ourselves to work in our home shops.

The discussion came about as we were adding up the costs of building the cherry kitchen cabinets shown on the cover. I wanted to compare our costs with the price of buying a set of stock cabinets from a store. We included the cost of all the hardwood, plywood, hardware, finish, and even the special panel raising router bit to make the door panels.

But then I asked, "What about the cost of our labor?" Of course, when you bring up the whole question of paying for labor everyone has an opinion. As for me (and I suspect most of you), woodworking is a hobby. Sure sometimes I'll get paid to make or fix something. But for the most part, I enjoy working in my shop so much that I don't even consider my labor a "cost." Payday for me is the day I install a project like these cabinets and sit back and enjoy them.

DOVETAIL JIGS

When you're working for "free," you can afford to add some details. One of the details I wanted to include in the kitchen cabinets was dovetail joints.

With so many joints to cut, a dovetail jig was the only way to go. So, how do you choose one? As you'll see in the article on pages 60 to 65, start by evaluating your needs — and don't overbuy.

The half-blind dovetail jig and the bit we used to cut all of the joints for the cabinets cost less than $100. Even if you throw that into the materials cost for the kitchen cabinets, you'll still come in under the cost of store-bought cabinets. That also means you'll have another jig for your shop. And, like clamps, you can never have too many jigs, right?

Doug

HOW TO REACH US

Editorial Questions:
Workbench Magazine
2200 Grand Ave.
Des Moines, IA 50312
e-mail: editor@workbenchmag.com

Subscriber Services:
Workbench Customer Service
P.O. Box 842
Des Moines, IA 50304-9961
Phone: (800) 311-3991
Fax: (515) 283-0447

On The Internet:
www.WorkbenchMagazine.com

Free Weekly Woodworking Tip:
www.WoodworkingTips.com

Online: www.WorkbenchMagazine.com
- Access your account
- Check on or make a subscription payment
- Change your mailing or e-mail address
- Tell us if you've missed an issue
- Renew your subscription

WORKBENCH

VOLUME 56 NUMBER 5

EDITOR Doug Hicks
ASSOCIATE EDITORS Kerry Gibson
David E. Stone
ASSISTANT EDITORS Bill Link
Kevin Shoesmith
Joel Hess
ART DIRECTOR Robert L. Foss
SR. GRAPHIC DESIGNER Mike Mittermeier
SR. ILLUSTRATORS Erich Lage
Susan R. Jessen
ILLUSTRATOR Mark S. Graves

CREATIVE DIRECTOR Ted Kralicek
SENIOR PHOTOGRAPHER Crayola England
PROJECT COORDINATOR Kent Welsh
SHOP MANAGER Steve Curtis
SHOP CRAFTSMAN Steve Johnson
PROJECT DEVELOPER Ken Munkel
ELEC. PUB. DIRECTOR Douglas M. Lidster
PRE-PRESS IMAGE SPECS. Troy Clark
Minniette Johnson

PRESIDENT & PUBLISHER Donald B. Peschke

ADVERTISING SALES MANAGERS
Mary K. Day (515) 282-7000 ext. 2200
George A. Clark (515) 282-7000 ext. 2201
DIRECT RESPONSE ADVERTISING SALES MANAGER
Lisa Wagner (407) 645-5165
ADVERTISING COORDINATOR
Kelsey Hare (515) 282-7000 ext. 2135
PUBLISHING CONSULTANT
Peter H. Miller (202) 362-9367

MPA Magazine Publishers of America
Audit Bureau of Circulations

WORKBENCH (ISSN 0043-8057) is published bimonthly (Jan., Mar., May, July, Sept., Nov.) by August Home Publishing Company, 2200 Grand Ave., Des Moines, IA 50312.
Workbench is a registered trademark of August Home Publishing.

Subscription rates: Single copy, $3.95. One-year subscription (6 issues), $15.94; two-year sub., $27.95; three-year sub., $39.95. Canadian/Intl., add $10.00 per year. Periodicals postage paid at Des Moines, Iowa, and at additional offices.
"USPS/Perry-Judd's Heartland Division automatable poly."
Postmaster: Send address changes to *Workbench*, PO Box 37272, Boone, IA 50037-0272.

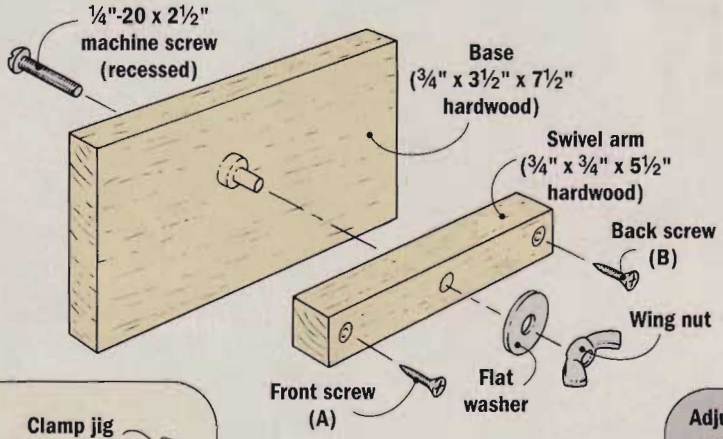
Printed in U.S.A.

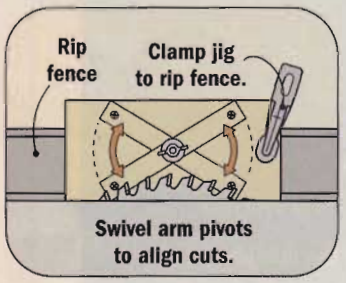
AUGUST HOME PUBLISHING COMPANY

President/Publisher: Donald B. Peschke • **Corporate Services:** *Director of Finance:* Mary R. Scheve *Controller:* Robin Hutchinson • *Senior Accountant:* Laura Thomas • *Accounts Payable:* Mary Schultz • *Accounts Receivable:* Margo Petrus • *Production Director:* George Chmielarz • *Production Coordinator:* Noelle M. Carroll •*Network Administrator:* Cris Schwanebeck • *New Media Manager:* Gordon Gaippe • *Web Site Art Director:* Gene Pedersen • *E-Commerce Analyst:* Carol Pelz-Schoeppler • *Web Site Product Specialist:* Adam Best • *Web Site Content Managers:* Terry Walker, David Briggs • *Human Resources Assistant:* Kirsten Koele • *Facilities Manager:* Julia Fish • *Receptionist:* Jeanne Johnson • *Administrative Assistant:* Sherri Ribbey • *Mail/Delivery Clerk:* Lou Webber • **Circulation:** *Subscriber Services Director:* Sandy Baum • *New Business Manager:* Todd Bierle • *Senior Graphic Designers:* Mark Hayes, Robin Dowdell • *Promotion Manager:* Rick Junkins • *Renewal Manager:* Paige Rogers • *Billing & Collections Manager:* Rebecca Cunningham • *Marketing Analyst:* Kris Schlemmer • *Assoc. Marketing Analyst:* Paula M. DeMatteis • *Assistant Subscription Manager:* Joy Krause • **Special Publications:** *Executive Editor:* Douglas L. Hicks • *Associate Editor:* Craig Ruegsegger• *Assistant Editor:* Joe Irwin • *Senior Graphic Designer:* Chris Glowacki • *Graphic Designers:* Vu Nguyen, Stacey L. Krull, April Walker Janning • **Products Group:** *Operations Director:* Bob Baker • *Customer Service Manager:* Jennie Enos • *Warehouse Supervisor:* Nancy Johnson • *Buyer:* Linda Jones • *Administrative Assistant:* Nancy Downey • *Technical Service Representative:* John Audette • *Customer Service Representatives:* Anna Cox, Tammy Truckenbrod, Deborah Rich, April Revell, Jeanette Rankin • *Warehouse Staff:* Sylvia Carey, Dan Spidle, Sheryl Knox • **Woodsmith Store:** *Manager:* Dave Larson • *Sales Staff:* Wendell Stone, Jim Barnett, Kathy Smith, Larry Morrison, Harold Cashman, Tim Rundall, Tim Thelen • *Office Mgr.:* Vicki Edwards

Questions & Answers

No Dado Blade? This Jig Helps Cut Dadoes With a Standard Blade





Q *I don't have a dado blade for my table saw yet. Is there any way to cut dadoes with a standard blade?*

Gordon Bean
Springfield, OR

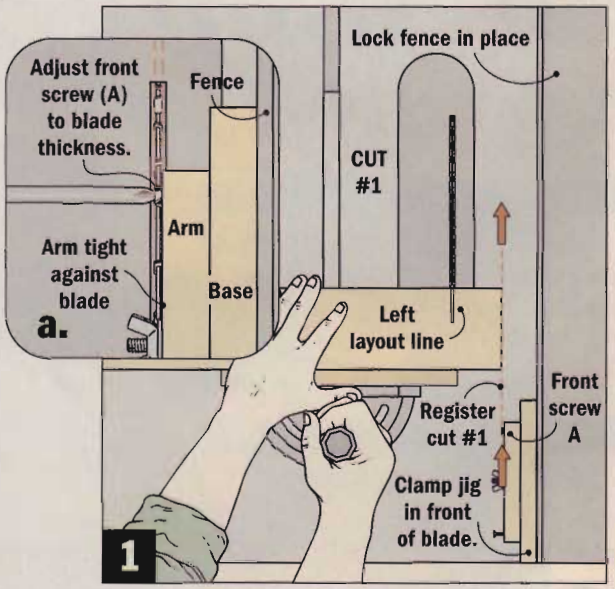
A Yes, you can. A dado is simply a groove cut all the way across the grain of a board like the one right below the operator's hand in the photo above. You can cut dadoes on the table saw by making multiple passes over a single blade, or a single pass over a multiple-cutter dado head set to match the thickness of the sides.

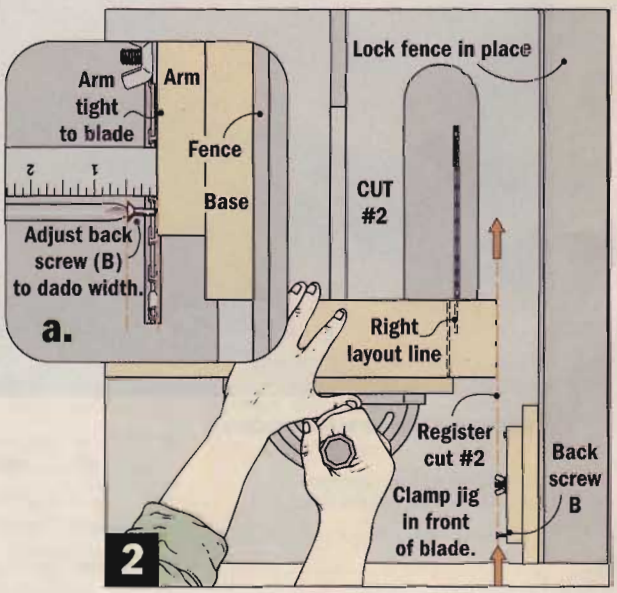
When using a standard blade, aligning the shoulders of the dado accurately to the blade is the most important part of making the cuts. Here's a simple jig you can build in your shop to help you do that.

To set up the jig, clamp it to the fence and adjust the front screw (A) so the distance it protrudes from the jig matches the thickness of the blade *(Fig. 1a)*. Adjust the back screw (B) so the distance it protrudes matches the desired dado width ($1/2$" in *Fig. 2a*).

Now, lay out the position of the dado on a test piece. Next, lock the rip fence in position (with the jig attached) so the blade aligns with the left layout line when screw A butts against the end of the board *(Fig. 1)*. Then cut the first shoulder. Next, pivot the swivel arm down and align the second cut by butting the stock against screw B. Then make the second (right) shoulder cut *(Fig. 2)*. You can "fine-tune" the position of the shoulders by adjusting screw B.

Once set, cut the shoulders in your actual workpiece. Then clear the waste between the shoulders.





Setting "Invisible" Nails

Q *I enjoyed your "Trim Carpentry Secrets" article in the July/Aug. issue. Can you suggest any ways to cover nail holes when fastening molding to furniture besides countersinking brads and using wood putty?*

Lori VanMeter
Santa Barbara, CA

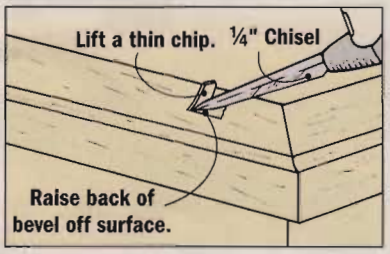
A One method used by finish carpenters for years is blind nailing. To do this, you lift up a small chip, set a nail, and then glue the chip back in place.

I've had good success using a special tool called an "invisible nailer." You'll see in the photo above that this tool resembles a miniature plane with a tiny chisel for a blade. To order an Invisible Nailing Kit, which includes a small bottle of high-tack fish glue, call Lee Valley at (800) 871-8158 or www.leevalley.com and ask for Kit No. 05K51.20 ($21.50).

If you don't want to buy an invisible nailer, you can use a small chisel (¼" or smaller) as shown below. The goal is to curl up a thin chip without breaking it off *(Step 1)*.

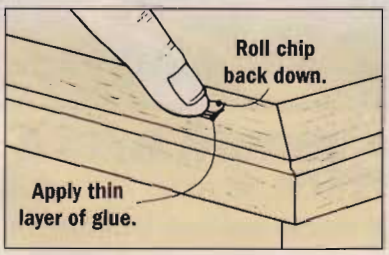
After setting a thin brad underneath the raised chip *(Step 2)*, spread a very thin layer of glue under the raised area and roll the chip back in place with your thumb or finger *(Step 3)*. If you spread the glue in a thin layer, it should set within a few minutes.

After the glue has dried completely, you can sand the surface flat as shown in *(Step 4)*. Then finish or paint as planned.

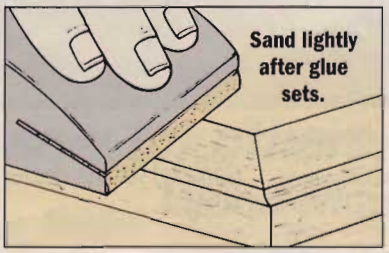


STEP 1: Wiggle a chisel forward or tap it lightly with your palm to raise a chip.

STEP 2: Tap a brad most of the way with a tack hammer. Finish with a nail set.



STEP 3: Use your thumb or finger to carefully roll the raised chip back down.



STEP 4: Be sure to wait until the glue dries completely before sanding.

Tips & Techniques

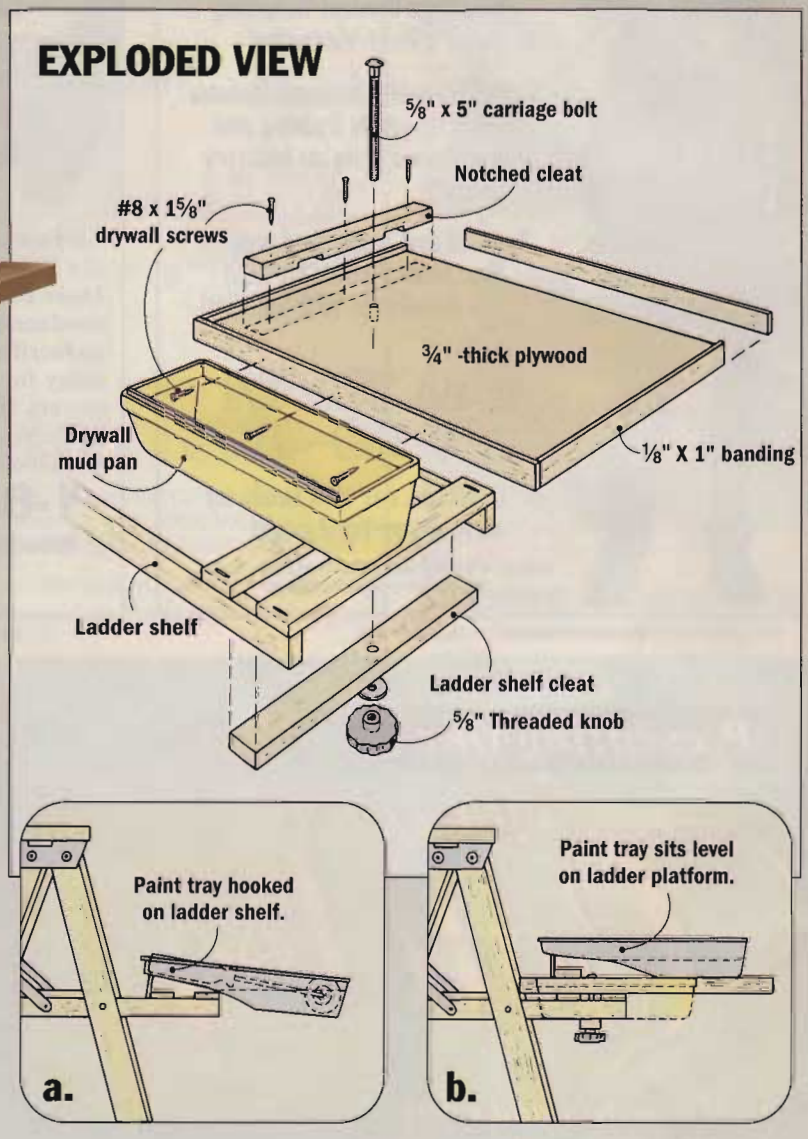
FEATURED TIP

Platform Supports Your Paint Tray

When I repainted my living room recently, I was worried about paint spilling from the roller tray. I'd bought a tray that was a little larger and deeper because it meant being able to paint longer between refills. But when I hung the tray from the small shelf on my step ladder, it sagged and nearly dumped paint on the floor *(Fig. a)*.

The ladder needed a larger platform to support the tray so the tray sits level *(Fig. b)*. To solve the problem I built a platform from ¾"-thick plywood as shown in the *Exploded View* above. It's a couple inches both wider and longer than the paint tray to help catch stray drips. I also added some ⅛" × 1" banding around the edge to contain slightly larger spills that escape the tray.

The tray's feet hook under a notched cleat fastened to the top of the platform. Three screws hold this cleat in place.



To create a storage space for the roller or brushes while refilling the tray with paint, I screwed a plastic drywall mud pan to the side of the platform. This also comes in handy for holding small parts when installing light fixtures or a ceiling fan.

The platform is fastened to the ladder shelf by a carriage bolt and a cleat that spans the support arms on the shelf. A threaded knob holds the cleat tightly in place.

Loren Larsen
Racine, WI

Congratulations to Loren Larsen for submitting this issue's Featured Tip. In recognition of his tip, Loren will receive $250 worth of tools from The Stanley Works.

Locating Wallboard Cutouts Made Easy

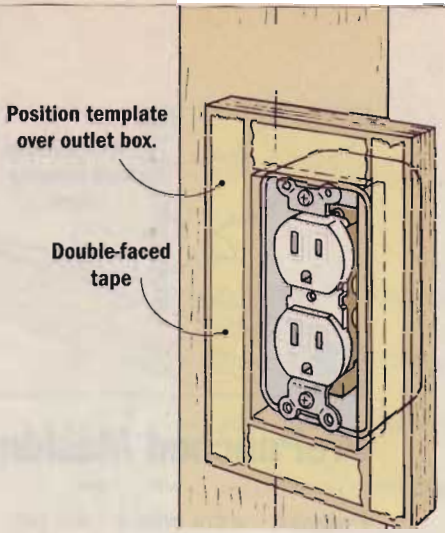
The worst part about hanging drywall was cutting out around electrical outlets. Measuring only got me close — there was always extra trimming (and dust) and the hole usually wound up slightly oversized.

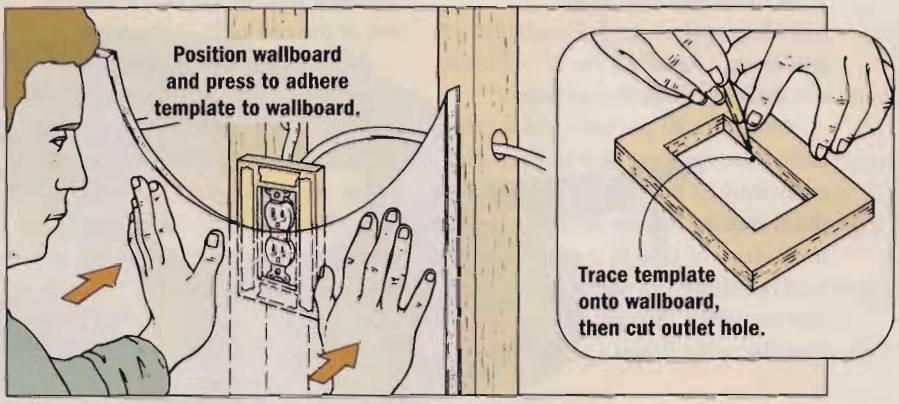
Then I made a template that lines the hole up perfectly over the outlet. I started with a rectangular scrap of ¾"-thick plywood and traced the outline of an electrical box on one side. Then I cut out the center area so the template would easily slip over the outlet box.

To use the template, I put some double-faced carpet tape on one side of the template and slip it over the wall-mounted outlet with the tape side facing out. Then I position the sheet of wallboard on the wall and press it against the template. With the tape holding the template to the back of the wallboard, I lower the wallboard down.

To cut the hole, I trace around the template with a pencil and remove the template. Then I make the cut with a utility knife or keyhole saw. You could also leave the template in place and use a router or laminate trimmer with a pattern-cutting bit, but it raises more dust.

Mark Graves
Runnells, IA





Ordinary Bins Make Handy Stacked Storage

Recycling bins took up a bunch of space in my garage until I came up with a rack that keeps them accessible in a small amount of space.

The rack is a simple plywood box with an open front. I used ¾"-thick plywood for the sides, top and bottom, and ¼"-thick plywood for the back. The back helps make the cabinet square and holds it rigid.

I fastened 1x2 cleats (in pairs) to the inside of the sides to support the plastic containers. You could use about any type of plastic container as long as they are a consistent width and have a sturdy lip to hang on the cleats. (I used plastic laundry baskets from the local discount store.)

If the pop cans leave sticky spills in the bottom of the basket, I just rinse it out with the garden hose. I liked the idea so much that I built a second rack to hold all the kids' sporting goods, toys, and boots.

Doug Hicks
Urbandale, IA

Share Your Tips, Jigs, and Ideas

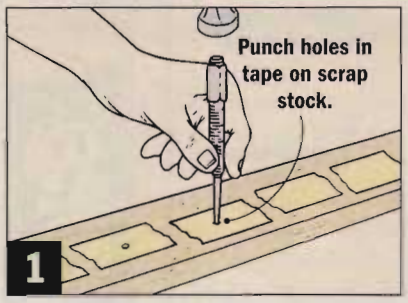
Do you have a unique way of doing something? Just write down your tip and mail it to:
***Workbench* Tips & Techniques**
2200 Grand Ave.
Des Moines, IA 50312.

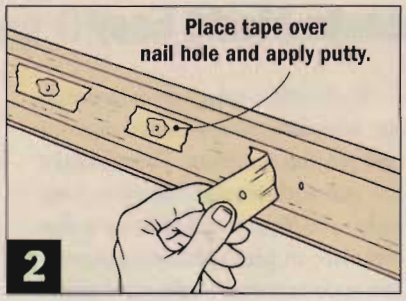
Please include your name, address, and daytime phone number. If you prefer, e-mail us at: Editor@WorkbenchMagazine.com

You'll receive $75-$200 and a *Workbench* hat if we publish your tip.

Also, The Stanley Works will award $250 in Stanley Tools for the Featured Tip in each issue.

For a free woodworking tip every week via e-mail, go to WoodworkingTips.com.





PrePunched Masking Tape Ends Putty Mess

I enjoyed the tips from a finish carpenter that appeared in the July/August issue. So I thought I'd pass along a tip that I use to minimize the work of filling in nail holes.

After I install the trim and set the nails, I use masking tape to keep the putty only in the nail holes. To do this, I start by loosely adhering some small strips of tape to a piece of scrap.

Then I use my nailset and a hammer to punch through the tape and into the scrap. When I peel the tape off, the center stays stuck to the scrap, leaving a hole in the tape the same size as the nail hole in the trim.

Next, I position the hole in the tape over the nail hole in the trim and stick the tape down. Now the putty will just fill the nail hole without filling in the wood grain around the hole. Once the putty dries, I just peel off the tape. It eliminates having to sand off excess putty.

Abel Villarreal
Taft, TX

Weather Stripping Keeps Cabinets Clean

Dealing with dust in the shop is something everybody faces. In my shop, it ended up everywhere, even inside the closed cabinets where I store my magazines, shop manuals, and plans.

For starters, I bought a dust collector and an air cleaner. But to keep the dust out of the cabinets, I applied some foam weather stripping around the edge of the cabinet door. It took some trimming around the hinges so the hinges wouldn't bind.

It worked so well on that cabinet that I added weather stripping to the other doors and drawers around my shop. Now my tools stay cleaner and I don't have to blow the dust off an issue of *Workbench* to see the projects.

Gerald Floyd
Denver, CO

Bottle Up your Sharp-edged Tools

I got tired of accidentally bumping and dulling the irons on my hand planes so I came up with an inexpensive guard.

Using a utility knife, I cut a large hole in the side of an oval-shaped shampoo or liquid soap bottle. The hole should be a little narrower than the width of the plane and extend through one end of the bottle, as in the photo above.

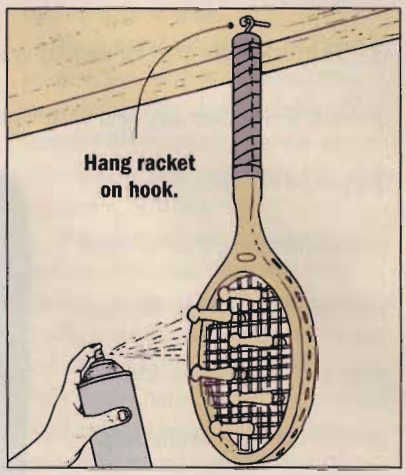
When you slip the plane in, the plastic sides along the hole grip the plane and hold the guard in place.

Jim Dalen
Omaha, NE

Tennis Racket Holds Small Parts

Painting small parts is always a pain, but I make it easier by wedging them into the stringed openings in an old tennis racket.

Justin Origer
Binghamton, NY



Workbench Interactive

www.WorkbenchMagazine.com

Five Must-See Web Sites for Every Home Improver

Hot Site

The Internet is sometimes referred to as the information superhighway, and just like a real highway, it does suffer the occasional traffic jam.

Take home improvement Web sites for example. Just go to your favorite search engine and type "home improvement" in the text line and see what you get. You might want to fasten that virtual seat belt first, though. Because you're about to land in the online equivalent of an L.A. freeway in heavy fog — lots of traffic going nowhere fast.

Of the nearly 2 million matches you'll get to your query, only a handful will have the how-to content you're looking for. The trick is to find that handful and then bookmark them for future reference.

After spending quite a bit of time online, we've found five Web sites that you'll be able to count on to guide you through almost every home improvement you can imagine.

Granted, we didn't actually look at 2 million sites. But we did look at quite a few of them. You can see the entire list of sites we considered for this story by visiting our Web site at www.WorkbenchMagazine.com. There's also a more detailed explanation of the criteria we used to grade these sites and comments about each.

The five that we found the most helpful are listed below along with comments to help you get the most out of each site.

HOMETIME®

www.Hometime.com

The people who bring you this popular TV show have done a great job of repackaging their 30-minute programs into online DIY projects.

Surprisingly, the site isn't cluttered with video clips from the program. Instead, they use a few well-selected still frames from the shows to support the text in each article. And the articles are among the best I've seen online.

Virtually every aspect of home-improvement is covered in 13 categories of articles. I'd like to say that one particular topic stands out as being the best represented, but in truth, I'd be comfortable starting just about any project by looking for instructions on this site first.

The organization of this site is also better than most. The best example of that is the cross-referencing they provide inside each category. For instance, if you're looking for information on sweat soldering copper, you'd enter the Plumbing and Electrical Area of the site. There you'd find an article titled "Sweating Copper." But on this same page, you'll find links to Books, Videos, and Users' Forums where you can find more information on the same subject. By doing this, the site designers have put everything you need within just couple of mouse clicks.

Drawbacks: The how-to photos are a little too small. There aren't enough videos in the bloopers' area.

CornerHardware.com™
YOUR HOME FOR HOME IMPROVEMENT™

www.CornerHardware.com

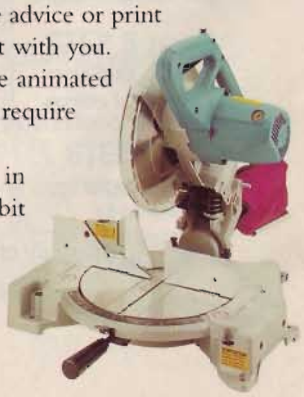
This site is loaded with content; more than 200 projects, tips, and product comparisons. The instruction is written in a friendly style, is easy to follow, and seems quite sound. Each how-to article is accompanied by quality illustrations and occasionally with animated demonstrations.

This site is also one of the few that does a good job of offering you a chance to buy what you need for a project without making you feel like you're getting a sales job. I actually started to appreciate the shopping lists that accompany the projects. Seeing a list of tools and materials for each job helps you get a feel for the scope of the project.

What really makes this site a standout is the Live Help feature. This feature works like a real-time chat, which lets you ask a home-improvement question and get a quick response from the site's experts. This online help desk is staffed 24 hours a day, 7 days a week — so they're on-call whenever you need them. They even e-mail you a transcript of your chat session when it's over. That way you can save the advice or print it out and take it with you.

Drawbacks: The animated demonstrations require Shockwave.

The typeface in the articles is a bit small; I was feeling some eyestrain after a few pages.

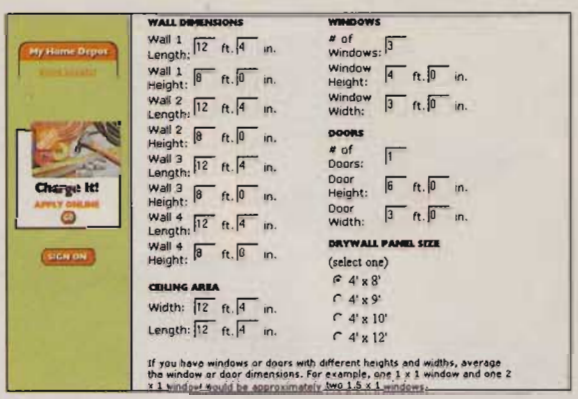


Top 5 Home Improvement Sites Continued From Page 18

www.HomeDepot.com
This is the home page for the familiar home centers that are sprouting up all over the country. But I was pleasantly surprised to find that content seems to be just as important as commerce on this site.

It's also very easy to navigate this site. All the how-to content is organized under folder-like tabs on the opening page and then divided into categories and subcategories on each new page. That makes for a little more clicking around than I usually like, but as long as I get where I need to go, I'm willing to overlook it.

Another feature I like about this site is the tips that appear on each page. These little tidbits of information are punctuated with a picture of a Home Depot professional, giving the site a very personal feel. Call me sentimental, but I really like the way that takes the corporate edge off this site.



Be sure to check out the Calculators area, too. These simple programs can do the math on a number of your projects, like how many drywall panels it takes to cover a room.

Drawbacks: No online shopping or price comparisons are possible yet.

HOME PROJECT.COM

HomeProject.com This site is one of the newest home improvement sites on the Web, but it already has an abundance of informative how-to articles in its Build and Learn Library. The nearly 200 articles are organized into eight categories to help streamline your search.

You'll also want to be sure to browse through the Home Safety articles, which can be found in the Build and Learn area. These articles go way beyond "wear safety glasses" and cover things like asbestos, lead-based paint, and safe handling of urea formaldehyde insulation.

The best part of this site, though, might be the Dream and Design area. Here you can design your ideal garden, kitchen, or bathroom using a simple downloadable program. The program will even schedule your project and track your progress.

Drawbacks: Some of the how-to articles in the Build and Learn library could really benefit from additional illustrations to help clarify some of the techniques.

LOWE'S
Home Improvement Warehouse

www.Lowes.com
Here's another site from a familiar home center. And this site merits a bookmark on your Internet browser just because of the sheer volume of DIY content it provides. There are well over 200 articles in the How-To Library alone.

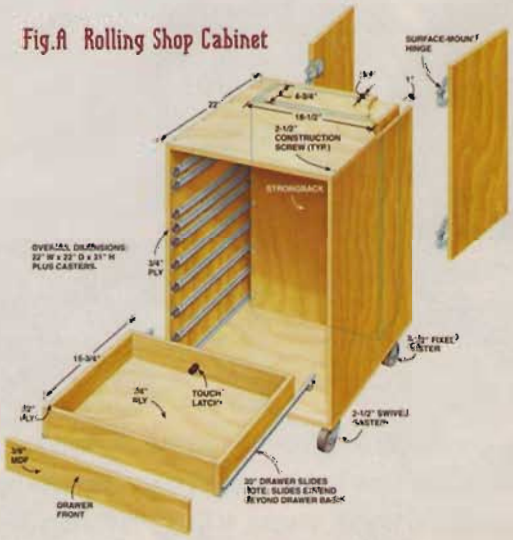
This massive collection of articles is divided into 16 categories with several articles in each category. The articles are well-written and usually accompanied by helpful illustrations or photographs.

In particular, I liked the Roll Around Shop Cabinet project, which is in the Storage and Organization category.

With the cutting diagrams, step-by-step photos, and clear instructions in this article, I'm sure this would be a snap to build. Of course that's just one example in the vast library.

Drawbacks: No interactive content. No online shopping or price comparisons are possible yet.

Fig.A Rolling Shop Cabinet



How would this vintage radial arm saw stack up against today's tools?

They don't make 'em like they used to... or do they?

Woodworkers love to talk about tools. And nothing gets a conversation going like comparing today's tools to those of a generation ago. Here's a little of what's being said about this topic on the Internet.

WEEKLY OPINION: *Courtesy of www.woodworking.org*

How do today's tools compare to those of 30 years ago?

FROM OUR WOODNET FORUMS:

I was in my grandfather's garage the other day and came upon his old Craftsman table saw. It had a date on the side that said, I believe, 1956. When I asked about the saw, my grandfather told me he'd used it to build his entire house. Then he said, "They don't make 'em like that anymore."

I quietly agreed with him out of respect. But when I really thought about it, I wondered, with all the advancements in engineering and technology, can a table saw sold that long ago compare to today's models?

— *kevin1971b*

Check out a 1950 model Unisaw and compare it to a brand new one. Other than the company having changed names, there's not a tremendous difference.

They are much less expensive today, though. Compare your current salary to your grandfather's 1956 income and figure out how many hours he had to work to buy that saw.

— *Dave Arbuckle*

I think we see these well-made relics from the past because they were built well and survived over the years. The junk tools got thrown out.

The same thing is happening today. I will take care of my table saw and pass it down to my kids. They will probably look at that tool as representative of all today's tools without ever knowing about the junk tools I got rid of.

— *Steve Magi*

Today we have many tools of the same type at different price points, which lets us choose the tool that will do the job for us. But, this large selection of tools may also be the reason for the "they don't make 'em like they used to mentality" as people buy the lower end tools and expect them to perform like a top-of-the-line tool.

— *Fred Klein*

For more on this subject, or to post your own opinion, visit our discussion forums at www.forums.woodnet.net. This thread was posted July 9 in the Woodworking Tools forum.

Around The House

Garage Door Check-Up

In a lot of homes, the garage door may be the most used door in the house. But, unless something drastic happens, most of us never give the garage door very much thought.

Taking a look at the *Garage Door Anatomy* drawing below shows you this door has a *lot* of parts. But, by spending just a little time each year on maintenance, you can easily keep your garage door operating safely and smoothly.

ANNUAL MAINTENANCE

Grease and debris will often clog up the tracks and can cause the door to bind and jump. So I like to thoroughly clean the entire door, especially the tracks. It's an easy job and can greatly improve its operation.

After cleaning, I also check to make sure the door is operating smoothly. To do this, raise and lower the door several times and watch for indications of worn rollers and tracks that are out of plumb.

If it's not plumb, it's easy enough to fix. Just loosen the lag screws on the track brackets and make the adjustments (see the photo and *Detail a*). Then, lubricate the tracks with a quality lithium grease.

Constant wear and tear can cause the rollers to go bad. A good spray lubricant will quiet all the squeaks and groans. But if they're worn, be sure to replace or repair them.

Most new garage doors are made from steel, and for good reason. Non-metal doors warp easily. And, even a little water damage can affect their operation. So it pays to prime and paint the doors as part of *regular* maintenance. Be sure to scrape away any peeling paint and always use an oil-based primer.

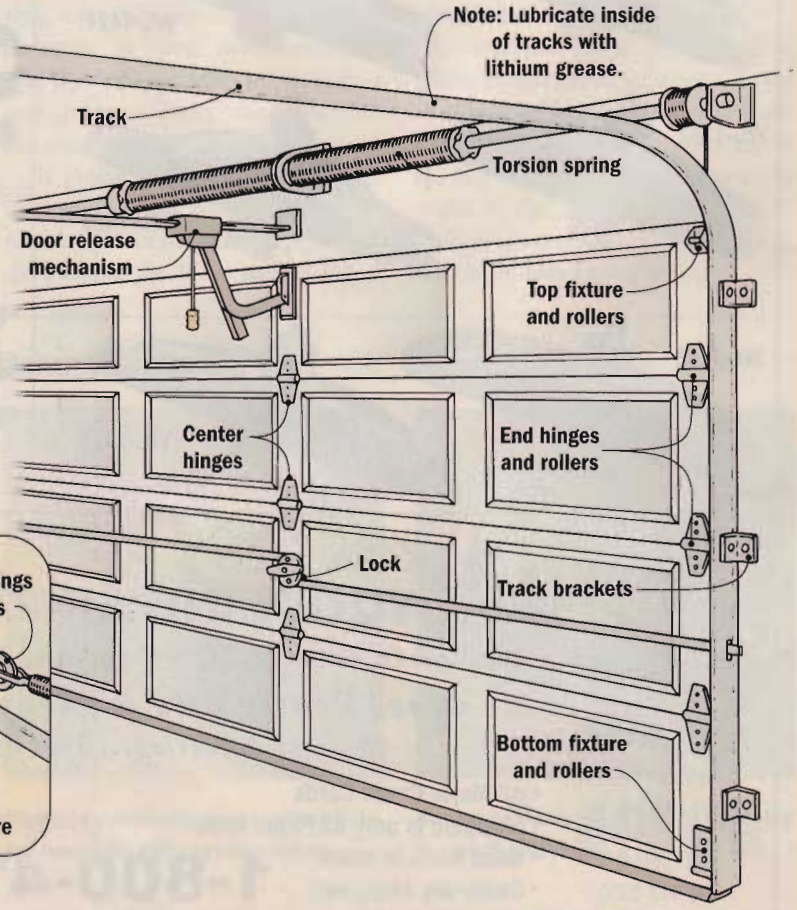
Another important check-up is a balance test. Start by closing the door and then (if you have an automatic opener) pull the door release mechanism (see the *Garage Door Anatomy* drawing).

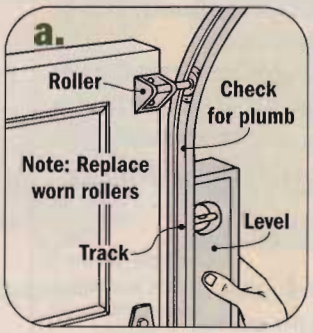
After raising the door waist high it should stay open on its own. If it doesn't, it could be out of adjustment. Fixing it is a job for a qualified service representative.

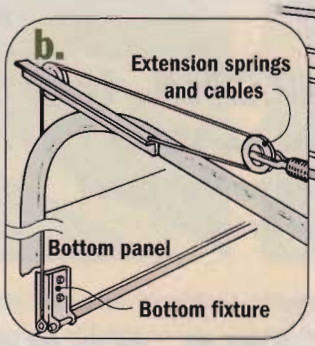
JOBS FOR A PRO

Finally, some jobs are best left to a professional. Garage doors are heavy rascals with lots of springs and stuff under loads of high tension. Always have a professional check the bottom fixtures and all the cables and springs (either torsion or extension), for excessive wear (see *Garage Door Anatomy* and *Detail b*). These parts are under high spring tension, so avoid trying to repair them yourself.

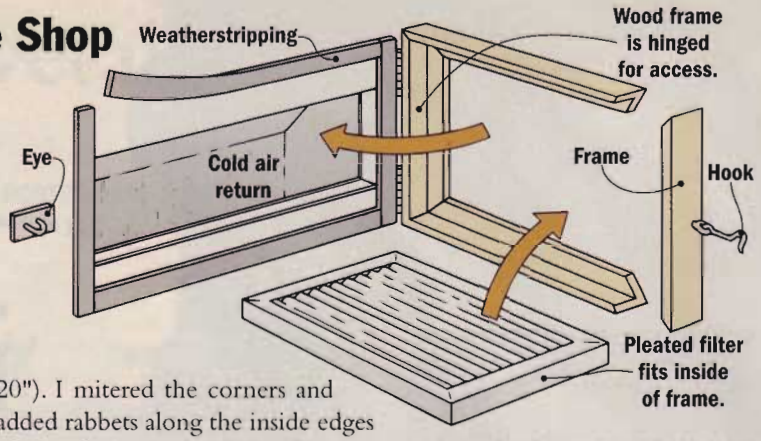
GARAGE DOOR ANATOMY







Keep Fine Dust in the Shop



A dust collection system does a good job with large wood chips. But the very fine dust that gets into the air usually ends up in places you don't really want it. If your shop is in the basement or in a heated garage, dust will often end up in the filter of the furnace.

There's a way to stop the dust before it gets that far. Simply place an individual filter over each cold air return in or near the workshop.

First, build a frame sized to hold a pleated filter, (my filter was 10" x 20"). I mitered the corners and added rabbets along the inside edges of the frame to hold the filter in place. A pair of hinges allows me to easily change the filters. And, a hook and eye latch keeps it shut tightly. I finished by adding self-adhesive foam weatherstripping to the wall.

Locating Wall Studs

Finding studs behind drywall (to hang cabinets, for example) can often be like solving a mystery. So when I'm faced with this problem, there are several areas I look at for "clues" to finding studs, see the drawing below.

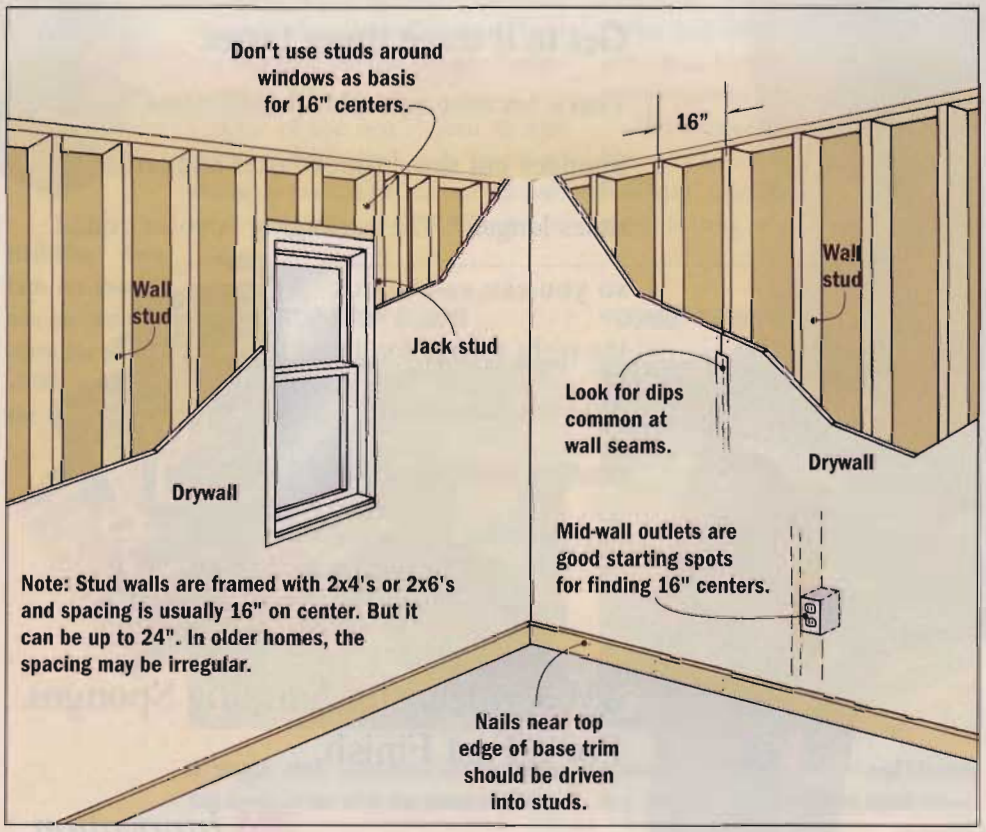
Note: Once you've found one stud, you can *usually* assume the rest are on 16" centers.

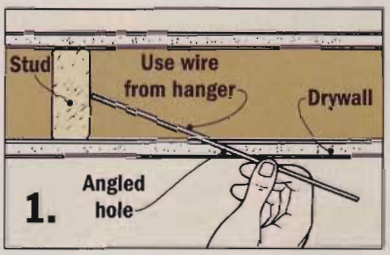
First, try to find drywall seams, they usually meet on a stud. And outlet boxes are almost always nailed to one side of a stud, see drawing.

Nail holes in the top of the baseboard are great spots to look for stud locations. Especially if a good finish carpenter did the job.

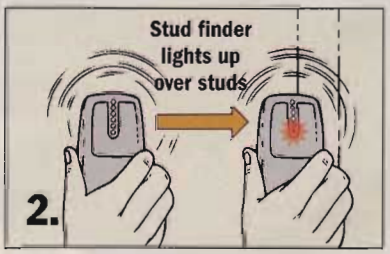
Another obvious place for studs is around windows. But the jack studs that frame windows (or doors) are often between the standard 16" on-center wall studs. So don't rely on them for finding adjacent studs.

If all else fails, try drilling a diagonal hole and use a wire to probe for the nearest stud *(Fig. 1)*. Pinch the wire and use it as a gauge. Or use an electronic stud finder. It measures the density of the space behind the drywall *(Fig. 2)*.





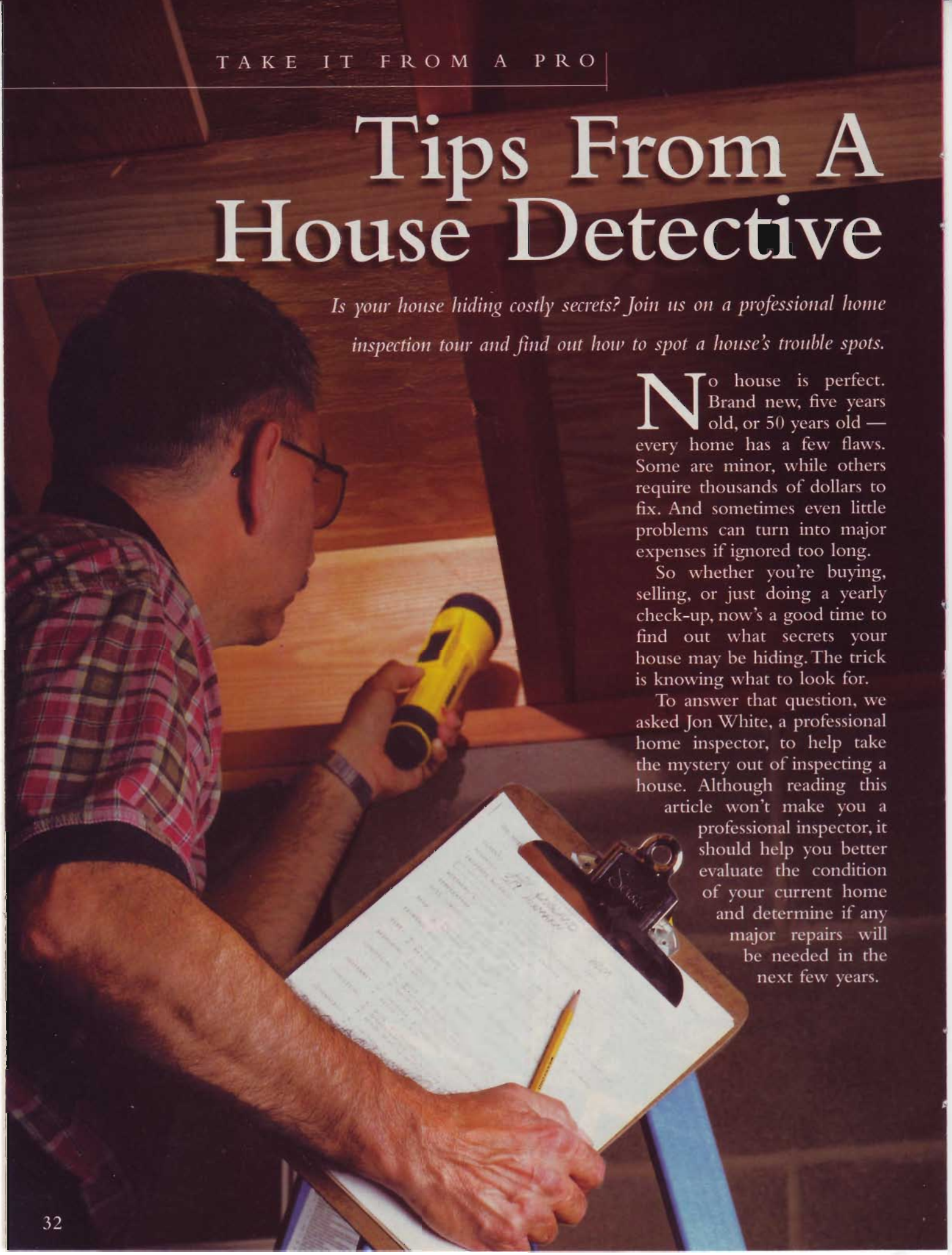
Drill a diagonal hole in the drywall. Use a straight piece of wire to probe inside the cavity to find the nearest stud. Pinch wire to use as a gauge.



An electronic stud finder works great. (Note: For best results, don't skimp, buy the best one you can afford.) They usually work well on smooth drywall.

Tips From A House Detective

Is your house hiding costly secrets? Join us on a professional home inspection tour and find out how to spot a house's trouble spots.

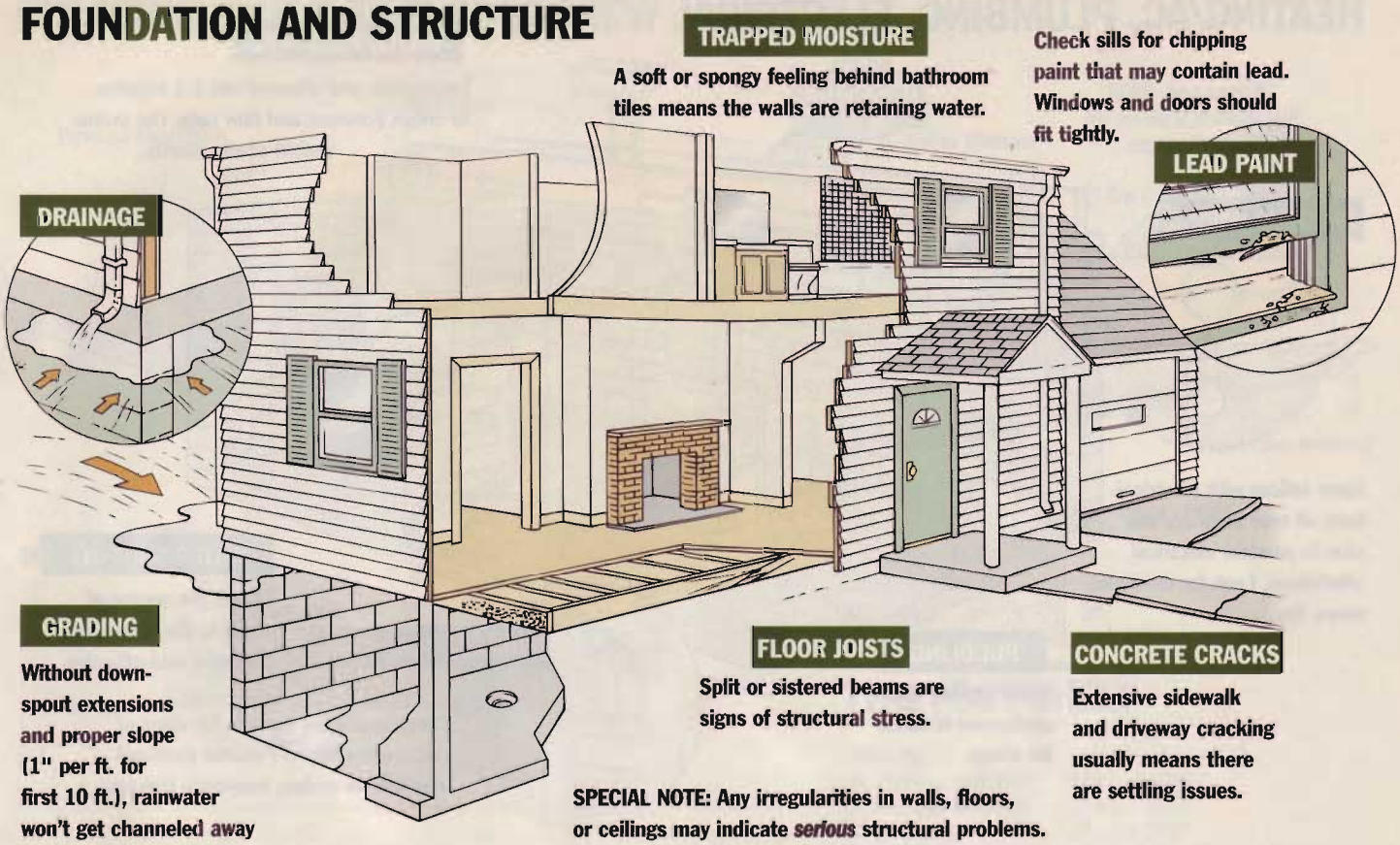


No house is perfect. Brand new, five years old, or 50 years old — every home has a few flaws. Some are minor, while others require thousands of dollars to fix. And sometimes even little problems can turn into major expenses if ignored too long.

So whether you're buying, selling, or just doing a yearly check-up, now's a good time to find out what secrets your house may be hiding. The trick is knowing what to look for.

To answer that question, we asked Jon White, a professional home inspector, to help take the mystery out of inspecting a house. Although reading this article won't make you a professional inspector, it should help you better evaluate the condition of your current home and determine if any major repairs will be needed in the next few years.

FOUNDATION AND STRUCTURE



Many people get hung up on cosmetic issues when inspecting a house. Sure, the kitchen counters look good. And maybe some of the wallpaper doesn't fit your tastes, but you can take it down along with the paneling in the playroom.

"What they really should be evaluating are a home's 'security points:' heating and air conditioning, plumbing, electrical, roof, and the foundation," Jon says. "Find out what's happening beneath the surface."

While real estate agents constantly promote "location, location, location," home inspectors stress "structure, stucture, structure."

FIRST STOP: THE BASEMENT

With that in mind, we began our tour underground. As I followed Jon into the basement, he encouraged me to ask as many questions as possible.

"A homeowner needs to think like Columbo," he said. "If you see something that doesn't quite look right or make sense, find out why."

Taking his advice, I asked what problems are the most difficult to detect? "Anything that's hidden behind walls or has been freshly painted," he said.

Start by examining the basement walls and ask yourself if everything seems logical. If a window opening is crooked, but a finished wall is straight, that could be a sign that something's going on with the structure behind the finished wall.

We spent a fair amount of time looking for signs of structural stress, such as bowing walls and severe cracks in the ceilings, floors and walls. Jon did point out a small crack in the ceiling plaster, but downplayed its significance. "Very seldom is that a sign of structural problems so don't be alarmed."

The only indications of a potential problem were a split ceiling beam and signs of sagging in a few joists. "That could be the result of long-ago settling or maybe from the weight of a partition wall above," Jon said. "I think a few joist hangers should take care of it. Nothing to get too concerned about."

WATCH OUT FOR WATER SEEPAGE

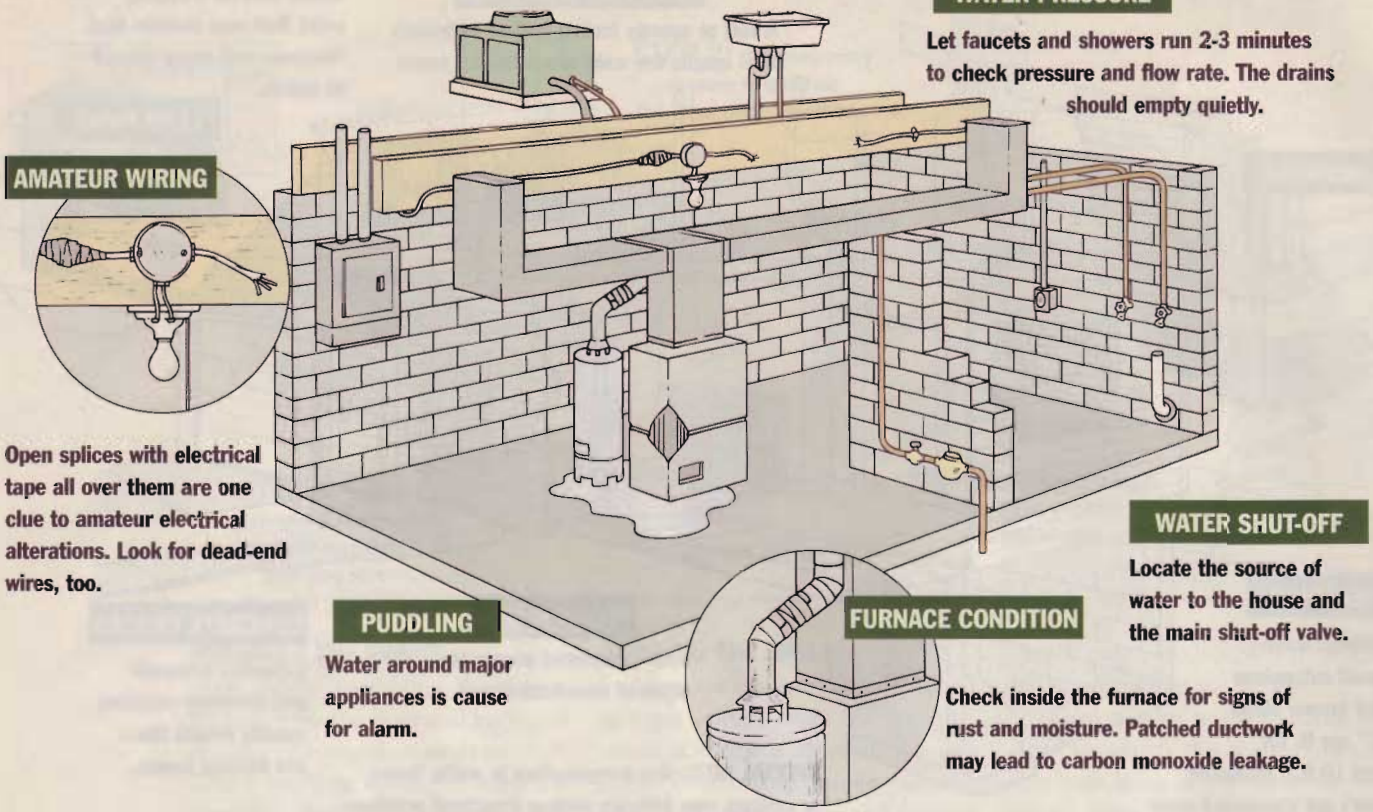
Next, we examined the basement for signs of water, such as stains, mildew, an odor of dampness, and cupping floors. We did notice dampness in one corner.

All basements are leak-prone, but you shouldn't have to mop the floor or pull up soggy carpet every time you get a heavy rain. If you suspect water problems, the first step is determining where the water is coming from. You have four possible suspects: rainwater, groundwater, leaky plumbing, and condensation.

"I'll bet money the downspout extension is missing or maybe the gutters are clogged on that corner of the house," Jon said. "We'll check when we go outside."

With a thumbs up for structural integrity, we headed toward the furnace room.

HEATING/AC, PLUMBING, ELECTRICAL



FACTS ABOUT THE FURNACE

Once we had completed our structural investigation, we were ready to move onto the heating, plumbing, and electrical systems. We began with heating.

Age and condition are the two most important factors to consider with all household appliances, especially furnaces because they're costly to replace. "Surprisingly, people simply don't maintain their furnaces like they should," Jon said.

The first thing he did was plug in a tester and check for carbon monoxide leakage. "Every homeowner should have one of these," Jon said.

Two other common problems are excessive moisture and rust inside the unit, which can cause a heat exchanger to fail prematurely. "You'd be surprised, but I see this most often in newer, more efficient units," Jon said. "Best way to avoid problems is to have your furnace professionally serviced at least every two years."

We continued our heating inspection by making sure that the ductwork was in good condition and there wasn't any asbestos-containing material in the insulation. And before we left, Jon showed me how to turn off the system in an emergency.

DETECTING PLUMBING PROBLEMS

Beyond the obvious leaky drains and pipes, uncovering plumbing problems is a little tricky because so much is hidden behind the walls.

"So how can you tell if a house has plumbing problems?" I asked.

"Check for good water pressure and flow rate," Jon said, as he turned on a shower. "Let it run for a good 2-3 minutes." As the water drained out, he told me to listen for a sucking sound. "That's a sign that maybe the main drainage pipes aren't connected properly," he said.

NEXT STOP: ELECTRICAL PANEL

"Looks like a giant octopus," I said, as Jon removed the cover of the electrical service panel. But upon close inspection, I learned the tangled web of wires wasn't all that bad.

He explained that most older homes are retrofitted from two-wire service to the standard three-wires: two 120-volt hot lines and a single neutral line entering the panel. "See that sheathed cable. That's a good sign that the retrofit was done properly," Jon said. He pointed out the main breaker, along with the individual 120-volt breakers and the 240-volt breakers for the water heater, stove, and clothes dryer.

Aluminum wiring is another concern with older homes. "What you want is all copper," Jon said. As a final check, he scanned the panel one last time for loose wires.

"Handyman wiring is one of the scariest things I see on home inspections," Jon said, as he closed the panel. "In one case, a homeowner added a circuit to the basement he was finishing off and messed it up so many ways it would make your head spin."

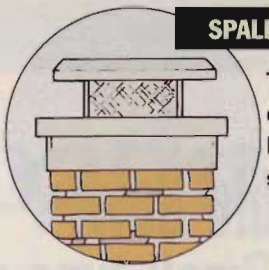
One way to tell if an amateur has been messing with the wiring in a house is to look for open splices with electrical tape all over them and price tags from the local hardware store still on the parts. You should also check for wiring that dead-ends.

"When you see those things, beware," Jon warned.

ROOF AND ATTIC

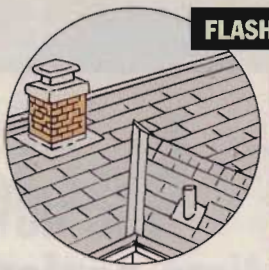
VENTILATION

Ventilation allows heat to escape quickly. Make sure insulation between sheathing and top plate doesn't block airflow.



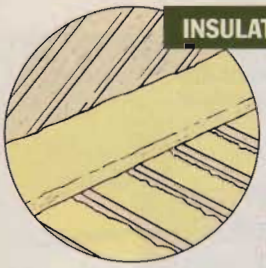
SPALLING

Tuck-point chimneys and brickwork to seal out water.



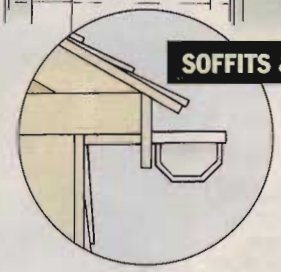
FLASHING

Leaks often occur where a pipe or chimney pokes through the roof. Protect these areas with metal flashings to divert water. Avoid aluminum around concrete, mortar or cement; they'll make it corrode.



INSULATION

Adequate insulation reduces heat entering an attic. Rule of thumb (unfinished attic): one layer of loose-fill or batt insulation between floor joists, with a second layer of batts crosswise over the joists.



SOFFITS & FASCIAS

Ice dams, broken shingle edges, even sagging shingles can lead to wood decay in soffits and fascias. Repair damaged spots right away.

ON TO THE MAIN FLOORS

After leaving the basement, we did a quick — but thorough — inspection of the remaining floors. There was a little sag in the living room floor, caused by a partition wall that wasn't properly supported from below. Jon recommended a support beam be installed under the wall.

Then he checked a few electrical outlets for open ground and wiring reversals. "Anyone can do this with a simple device that costs a few bucks."

He used a moisture meter around the toilet and against the shower walls to check for dampness. "You can also push on the tiles to feel for a spongy sensation," he said.

In the nursery, Jon talked about lead-based paint in older homes and how kids will inhale the dust or eat the chips. "The best thing you can do is limit the number of windows sills children have access to."

Up in the attic, Jon first checked the sheathing for signs of moisture damage. With the rafters, he inspected for structural stress. "Attic insulation and ventilation are important issues, too," Jon said. He explained how poor ventilation dramatically compromises roof life. "It's one defect that shouldn't be overlooked."

TAKE A STROLL OUTSIDE

When we got outside, Jon quickly confirmed the cause of our damp basement: a missing downspout and poor grading. He also pointed out where the siding was contacting the ground. "That's an open invitation to termites, bugs and water," he said.

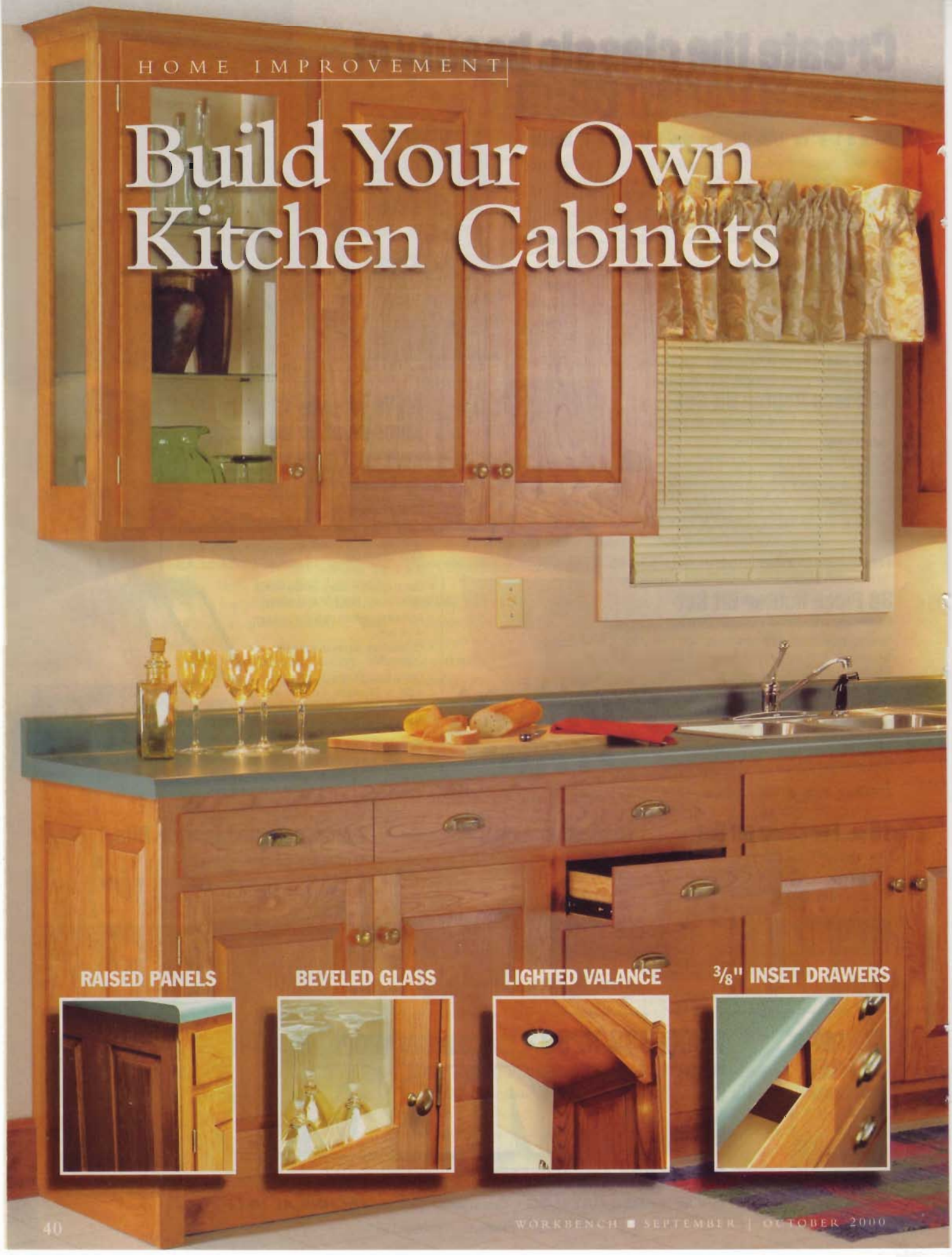
After that, things started to look up — literally. "Roof failures are one of the most common flaws I encounter," Jon said. "A lot of homeowners would rather patch than repair. Two layers of shingles should be the limit." (A tip: If the roof is too steep to safely walk on, you can see a lot with a good pair of binoculars.) As we strolled across the peaks and valleys, we didn't notice any lifting or buckling shingles, sure signs of age or disrepair. All the flashing was in place. Jon did indicate some tuck-pointing repair needed on the chimney.

After the 2½-hour inspection, Jon summarized his findings and underscored the poor grading as the worst potential problem. Although a home inspector doesn't give a house a pass or fail grade, I felt comfortable this house was in good condition and only needed a few minor repairs. I was confident it wasn't hiding any secrets.

HOW LONG WILL IT LAST?*

ROOFING		SIDING AND PAINT	
Asphalt Shingles	15-30 yrs.	Exterior Paint	7-10 yrs.
Tile Roofing	50 yrs.	Interior Paint	5-10 yrs.
HEATING & AIR CONDITIONING		Wood Siding	10-100 yrs.
Furnaces	18 yrs.	Metal Siding	50+ yrs.
Air Conditioners	15 yrs.	Aluminum Siding	20-50 yrs.
Heat Pumps	15 yrs.	Vinyl Siding	50 yrs.
Boilers	30 yrs.	* Source: National Association of Home Builders	
Water Heaters	11-14 yrs.		

Build Your Own Kitchen Cabinets



RAISED PANELS

BEVELED GLASS

LIGHTED VALANCE

3/8" INSET DRAWERS

If you've dreamed of building a kitchen full of cabinets, stop dreaming and start building. Here's what you need to know to get custom results for half what stock cabinets cost.

For many home woodworkers, outfitting a kitchen with handcrafted cabinets is *the* dream project. Who hasn't looked at stock cabinets built with particleboard, hotmelt glue and staples and thought, "I could build something a whole lot better than this for half the money."

And they're right. By building your own cabinets, you can upgrade materials and construction methods. You're also not locked into "stock" sizes. The style, look, finish, and features are completely up to you.

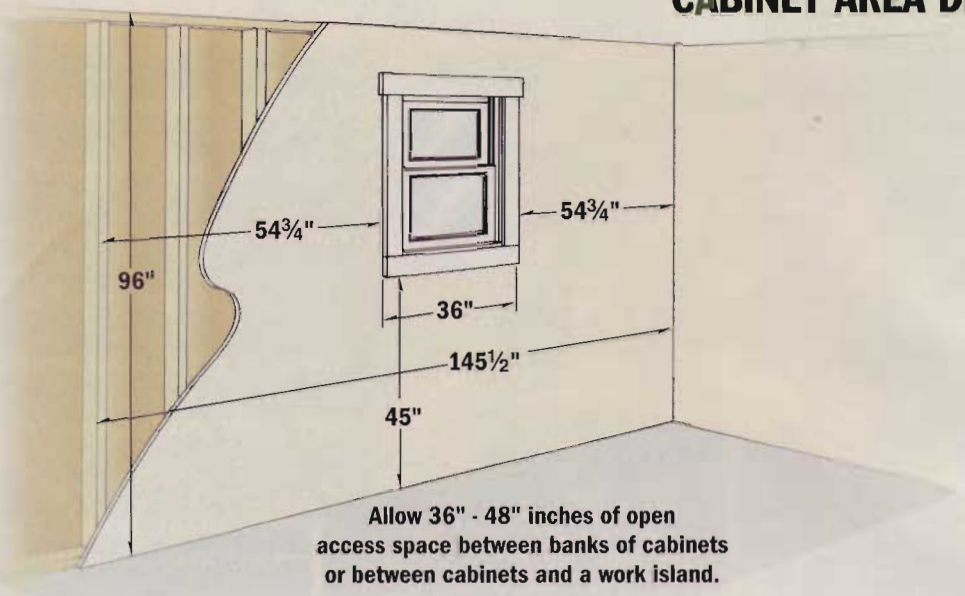
If you think about it, cabinets are just a bunch of boxes. The only real challenge is the size of such a project. And that's manageable as long as you know where to get started and how to proceed.

In the following pages, we'll walk you through how we built these cabinets and how they compare with stock cabinets purchased from a home center. And hopefully inspire you to consider building your own.

CUTTING BOARD

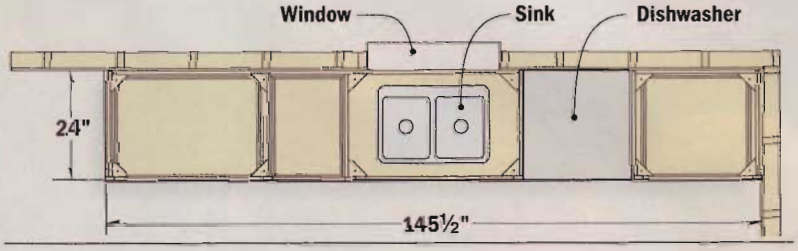
CUSTOM HARDWARE

CABINET AREA DIMENSIONS



Allow 36" - 48" inches of open access space between banks of cabinets or between cabinets and a work island.

FLOOR PLAN



BUY OR BUILD?

Unless you're independently wealthy, there's a limit on how much you can spend for store-bought (stock) cabinets. The typical approach is to pick out what you like, then whittle away at the extras to stay within budget.

But suppose you could spend that same amount on materials. By discounting the labor (after all, this is time spent in the shop), you can keep some of those extras and upgrade the materials and improve the quality. I found this out first-hand with this kitchen project.

Because kitchen configurations can vary so greatly, I built one basic wall of cabinets shown above. The wall measures just over 12 feet long and has a double-hung window centered within the space. I wanted the sink to be located directly underneath the window. Since there isn't a soffit in this room, I could use extra-tall (42") wall-hung cabinets.

To help justify building the cabinets, I decided to do a little comparison shopping. So I took the layout to a local home center and asked them to fill the space with stock cabinets. The stock cabinets I selected were a raised-panel style in red oak that fell slightly above mid-range in price. (See the description and photo of these cabinets at the bottom of the opposite page).

To outfit the kitchen with these basic, no-frill oak cabinets (see the next page), the estimated cost was $2,553. When I asked them to price the same set-up in cherry, it jumped to $3,403. Shipping to our door was another $110.

By contrast, materials for the cherry cabinets I built cost less than $1,400. And my design included a

PLANNING AND IDEAS

Obviously, you can't just start building cabinets without extensive planning. While we don't have room to address those issues here, we can steer you in the right direction.

Some of the best information on kitchen layout and design that I found was published by kitchen cabinet manufacturers. The free brochures at home centers contain checklists of what to consider: appliance sizes, utility locations, and the types of activities and features that are important to you. They provide grids for laying out the kitchen and are excellent sources for ideas on cabinet styles and layouts.

For additional reading, check out *Kitchens That Work: A Practical Guide to Creating a Great Kitchen* by Martin and Richard Edic (Taunton, 1999), and *Building Traditional Kitchen Cabinets* by Jim Tolpin (Taunton, 1994). Check your library or contact Taunton Press at (800) 477-8727.

20"-deep above-counter pantry unit with a built-in cutting board and a knife rack (see page 52). Such a unit wasn't available in stock cabinetry except as a 24"-deep, full-height pantry unit that overwhelmed the small space.

In fact, the cost was so far below stock cabinets I was able to add in a few more extras. One particularly nice touch was the display cabinet with beveled glass in both the door and the exposed side. The cabinets also feature custom frame-and-panel cabinet ends and a cove molding along the ceiling.

MATERIAL CONSIDERATIONS

If you stop by any home center you can find stock cabinets in oak, maple, cherry, hickory, pine, and birch. In most cases, at least the face frames, doors, and drawer fronts will be solid wood.

If you build your own cabinets, you're not limited to these materials (see some other options top right).

Another advantage is being able to select and match grain pattern and color. Manufacturers can't afford to spend time doing this. Instead, grain patterns are random and they use a toner to give the wood a uniform color and appearance.

The materials used commercially for cabinet carcases, drawer boxes, shelves, and interior divider panels can vary widely. Usually, at least some of these parts are made from vinyl-covered particleboard or melamine.

Because my cabinet project required relatively small quantities of material for these parts, the total cost difference to upgrade from ½"-thick melamine to ¾" veneer plywood was fairly insignificant.

RAISED PANEL SUBSTITUTES

I decided to build these cabinets using raised panels. And I'll admit it added both time and cost to glue up solid wood panels, but I thought it was worth it.

A quicker, less expensive option is to build flat panel doors using ¼" veneer plywood (see the top photo at right).

If painted cabinets will work in your kitchen, you might want to consider milling the raised panels in medium density fiberboard (MDF) and building the rails and stiles in poplar. Inexpensive MDF offers the added advantage of being stable, compared to the expansion and contraction of solid wood panels.

My shop-built cabinets feature ⅜" inset, solid cherry raised panel doors with wide rails. These features weren't available in stock cabinetry.

STOCK CABINET COSTS: (Raised-panel red oak)

(2)	Wall Cabinets (12"D x 27"W x 42"H)	$475.54
(2)	Wall Cabinets (12"D x 30"W x 42"H)	492.90
(1)	Three-drwr. Unit (12"D x 30"W x 18"H)	301.94
(1)	Base w/Pots/Pans Drwr. (24"D x 30" W)	377.27
(1)	Base w/Trays (24"D x 36"W)	380.99
(1)	Base w/4 Drwr. (24"D x 18"W)	194.37
(1)	Sink Base (24"D x 42"W)	221.34
(1)	Scalloped Valance	49.60
(1)	3"-Wide Base Filler	17.67
(1)	3"-Wide Wall Filler	26.66
(2)	Matching Toe kick Panels	14.88
TOTAL		$2,553.16

NOTE: The costs shown do not include countertop. The stock cabinets as priced do not come with knobs and drawer pulls. Stock cabinet installation is available from most dealers at $30-$50 per linear foot.

SHOP-MADE MATERIAL COSTS:

4/4 Cherry - 100 bd. ft @ $4.95/bd. ft. (Face frames, doors, drawer fronts, toekicks)	$495.00
4/4 Birch - 30 bd. ft @ $2.69/bd. ft. (Drawer sides, nailers, blocking)	80.70
¾" Birch plywood - 5 sheets @ $52.50/sheet (Carcase sides, bottoms, dividers, shelves)	262.50
¼" Birch plywood - 5 sheets @ $18.69/sheet (Carcase backs, drawer bottoms)	93.45
22" Accuride full extension drawer slides (11 pr. @ $13.50/pr)	148.50
18" Accuride full extension drawer slides (1 pr @ $12.50/pr)	12.50
Beveled glass (2 pieces)	100.00
Bin pulls (antique brass) - 16 @ $1.40 ea.	22.40
Knobs (antique brass) - 11 @ $1.10 ea.	12.10
Hinges (antique brass) - 12 pr @ $1.99/pr.	23.88
Miscellaneous hardware	30.00
Stain and Finish	60.00
TOTAL	$1,341.03

STOCK CABINETS: OVERVIEW

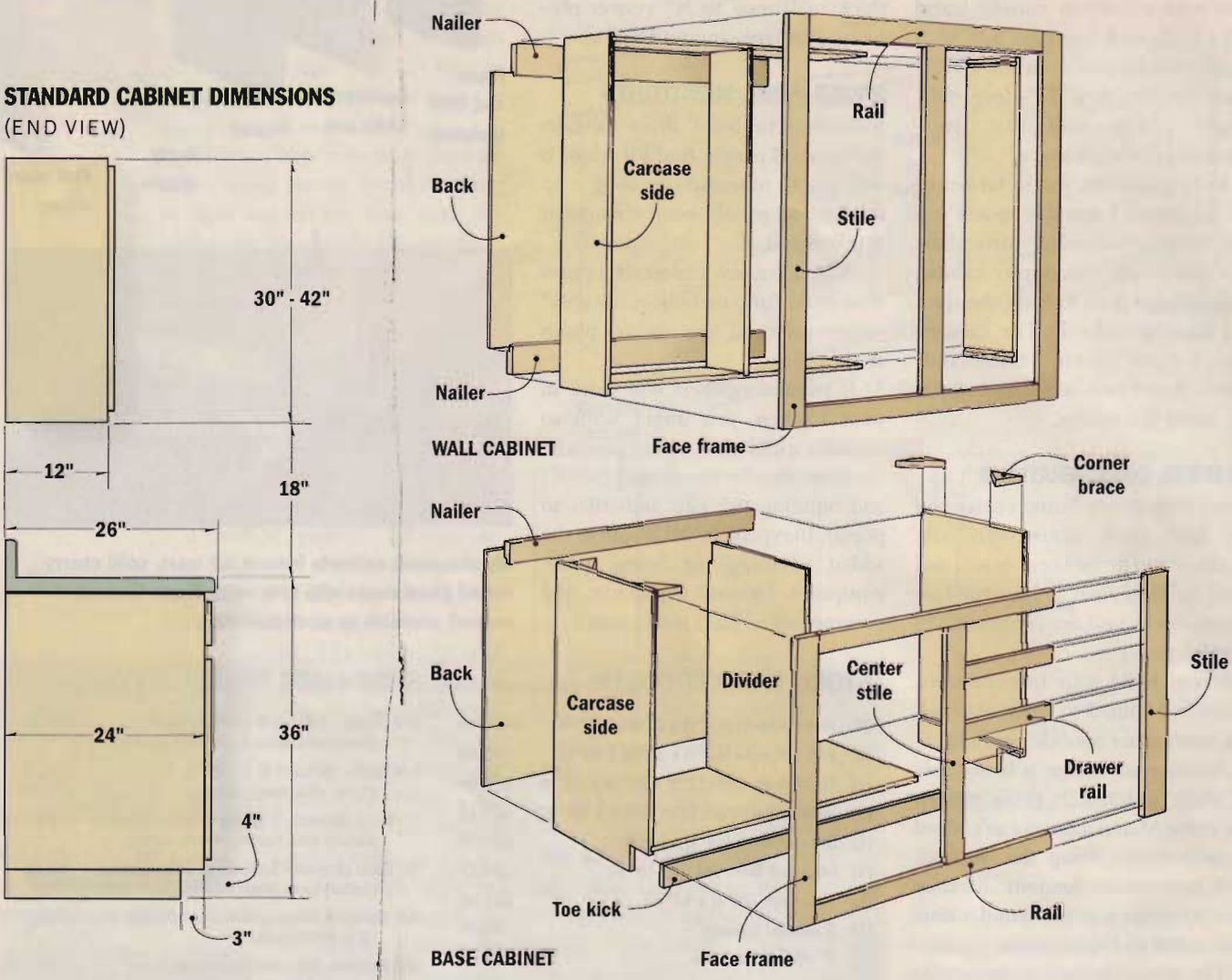
So you could see the actual differences between stock cabinets and our shop-built units, we bought two base cabinets and two wall-hung units built by a nationally-known manufacturer.

We had to order them through a local home center — few distributors actually carry an inventory of cabinets. Even with the current building and remodeling boom, it took just four weeks for delivery.

These cabinets, pictured at right, were a basic straight frame-and-raised panel design that represented the upper middle price range. For additional cost, we could have upgraded some components (more decorative arched panels, plywood side panels, and heavier drawer slides).

At the bottom of the following pages we'll show construction details of these cabinets.

ANATOMY OF A CABINET



CABINET STANDARDS EXPLAINED

If you think about it, cabinets are really furniture for the kitchen. And like most furniture, stock cabinets are built to standard dimensions that make them comfortable to work at.

The primary dimensions for cabinets are shown in the *End View* above. The surface of a countertop is typically 36" high, ideal for most kitchen tasks.

Standard depth for base cabinets (not including the countertop) is 24". If they're deeper, it puts you farther away from the wall cabinets and limits how far up and out you can reach.

Base units also have a toe kick space that's 3" deep and 4" high. The toe kick lets you stand up close to the cabinets without bumping your toes.

Standard wall cabinet depth is usually 12" — just deep enough to hold most dinner plates. The height can range from 30" to 42", depending on whether the room has a soffit.

There's usually 18" of separation between the countertop surface and the bottom of the wall cabinets. This puts the middle shelf in the upper cabinets at roughly 72" — a height most people can still reach without getting a step stool.

Width for most stock cabinets varies from 12" to 48", in 3" increments. The drawback here is that not every wall space neatly fits this 3" scheme. My 12' 1⅓"-long wall, for example, would have required me to buy a filler strip and trim it to 1½"-wide to "extend" the stock cabinets.

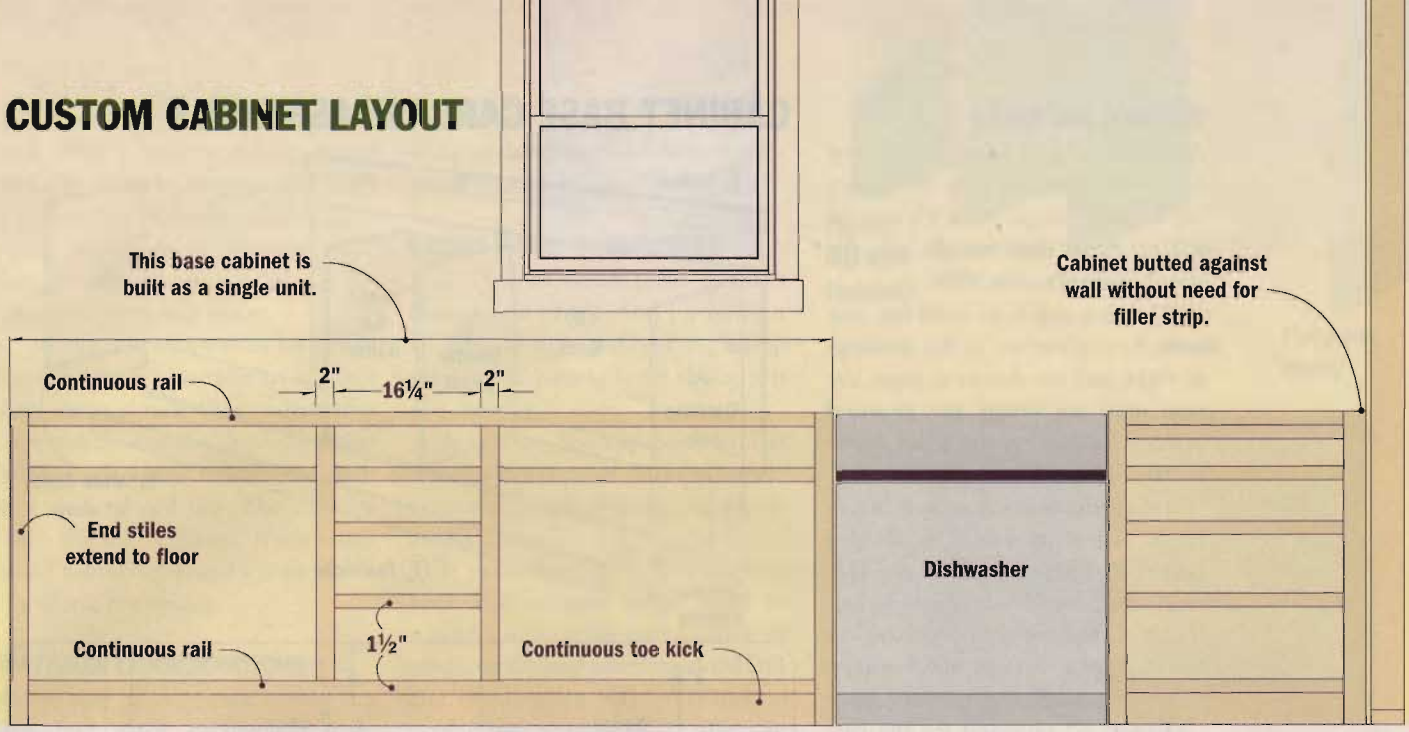
SIZED TO FIT

The beauty of building your own cabinets is that you're not locked into these dimensions. They can still serve as a guide, but you can vary them to fit your particular needs.

For example, you can vary heights and widths to easily work around strange door and window configurations. A shorter base cabinet puts the counter at a height that makes kneading and rolling out dough easier for bakers.

While some manufacturers now offer "universal design" cabinets that accommodate persons with physical disabilities (including those in wheelchairs), you can really tailor your shop-built cabinets to meet individual needs. It's all of those custom

CUSTOM CABINET LAYOUT



touches that provide one of the greatest incentives for building instead of buying.

MAXIMIZE THE SPACE

The concept behind stock cabinets is that manufacturers build a variety of small, easy-to-handle units that can be combined to fit most any situation. They're easy to mass produce and sized so the cabinet companies can get maximum usage from standard sized sheet goods. And compact sizes (42" widths or less) are easier to ship and store.

While this approach works well for the manufacturers, distributors, and installers, it winds up wasting space. Especially in a small kitchen where space is extremely valuable, you don't want to waste even a few extra inches.

At first glance, the main section of cabinets in the two drawings on this page look similar. Look closer and you'll see that large base cabinet at the left (*above*) is a single unit compared to the three separate stock cabinets (*below*).

By building one large unit, it eliminated the double stiles and gaps between the separate cabinets (see the photo at right). I was able to use this extra space to make drawers that are 14¼" wide inside, compared to only 13" in the stock unit.

There's another advantage as well. It took less material — two end panels, two dividers, and four stiles vs. six end panels and six stiles on the stock set. I also think the continuous rails and toekick, and the single stiles give my cabinets a much cleaner look.

Cabinets this large can be hard to move once they're assembled (that's another reason you can't buy a stock cabinet this size). But as you'll see on the next page, the parts can be machined ahead of time and easily assembled in the kitchen just prior to installation.

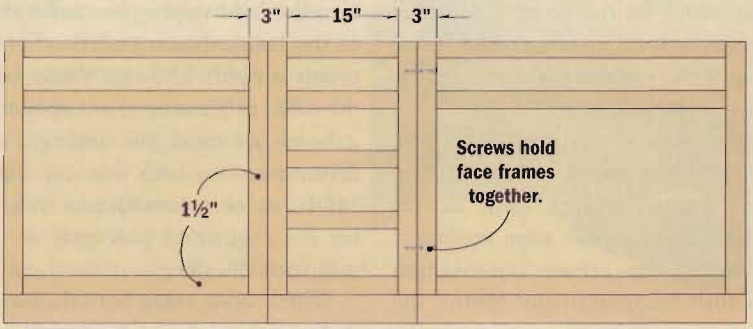
When you lay out your cabinets, look for the natural breaks between cabinet sections, such as gaps for appliances. For example, I designed my base cabinets in two sections, fitting them on either side of the dishwasher. The larger unit incorporates the sink base, a drawer unit and a drawer-and-doors base.

A single stile and a ¾"-thick plywood divider panel separate compartments in the large base unit.

STOCK CABINETS: MULTIPLE BOXES TAKE EXTRA SETUP

When you install stock base cabinets, you have to shim the cabinets plumb and level to the room and each other — a time consuming process. Once they're lined up, the face frames are clamped together and long screws driven to fasten the face frames together.

You also wind up with a double-wide stile (with a joint line) where two cabinets meet. It just doesn't look as clean and consistent as single width stiles.



BUILDING THE BASES

At this point, you've seen some of the basic considerations that went into my kitchen design. Now it's time to roll up the sleeves and get into the actual construction.

The first step is to build the base units. As you can see in the drawings at right and on the next page, the base units are simply big plywood boxes with dividers and a face frame on the front.

I built the boxes (carcases) out of birch veneer plywood. I decided against melamine or MDF core plywood because those materials lose much of their strength once you cut through the outer skin/veneer. (They also produce some nasty dust.)

I used ¾" plywood for the carcase sides (A), the carcase bottom (B), and the divider panels (C). The back (D) is ¼" plywood.

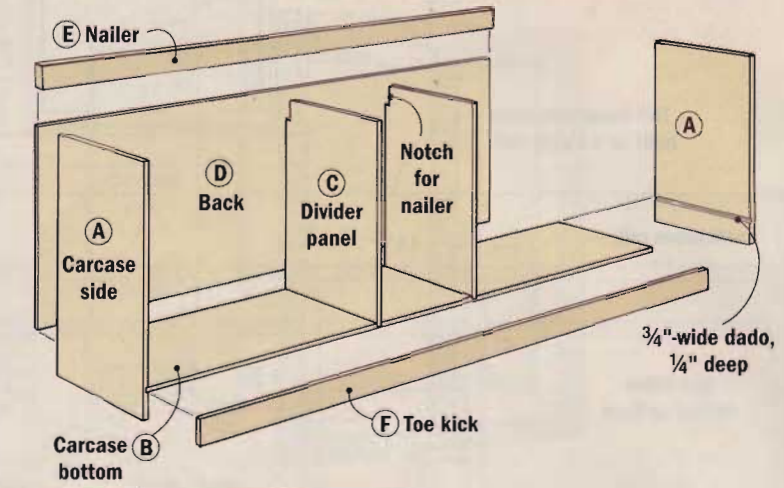
The nailer (E), used for mounting the cabinet to the wall, is solid birch. Since the toe kick (F) is the only exposed portion of the carcase, I made it from solid cherry.

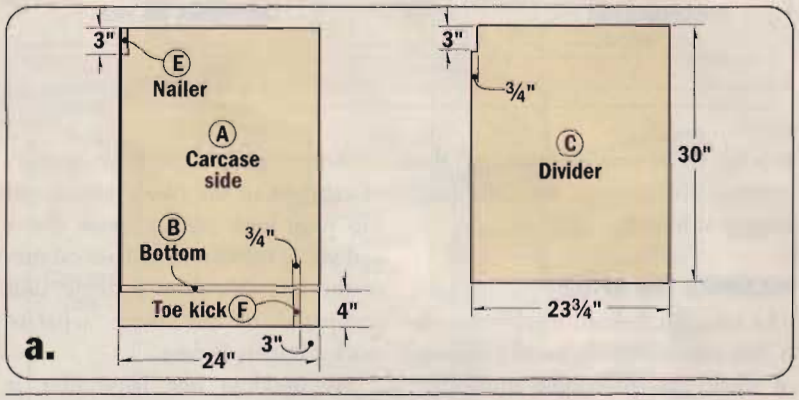
One trick I learned early on was to perform all similar machining operations together. That way, I didn't waste time switching tool setups back and forth. For example, I cut all the cabinet parts to size first, then installed my dado blade and made all the joinery cuts.

The bottom fits into a dado cut in the carcase side. The toe kick supports the bottom.

The nailer fits between the carcase sides and against the back. A brace adds support.

CABINET BASE CARCASE ASSEMBLY





USE SIMPLE JOINERY

Joinery in the carcases is simple but strong. Dadoes are cut in the sides (A) to accept the bottom (B), and rabbets are cut along the back edge of the sides for the back (D) as shown in the photos at left and the drawing above.

The bottom is dadoed for the divider panels (C) and grooved on the lower face for the toe kick (F). Besides strength, these dadoes and grooves help keep things lined up squarely during assembly.

To fit the nailer (E) in place, I notched the top corner of the divider panels using a jigsaw. Screws hold the nailer to the divider panels and the carcase sides.

The plywood back completes the carcase and helps square up the entire assembly. I glued and clamped the back to the nailer and nailed it to the sides, divider panels, and bottom using ¾"-long ringshank nails. The rings grab the wood so the nails won't loosen up over time.

STOCK CABINETS: CARCASE CONSTRUCTION

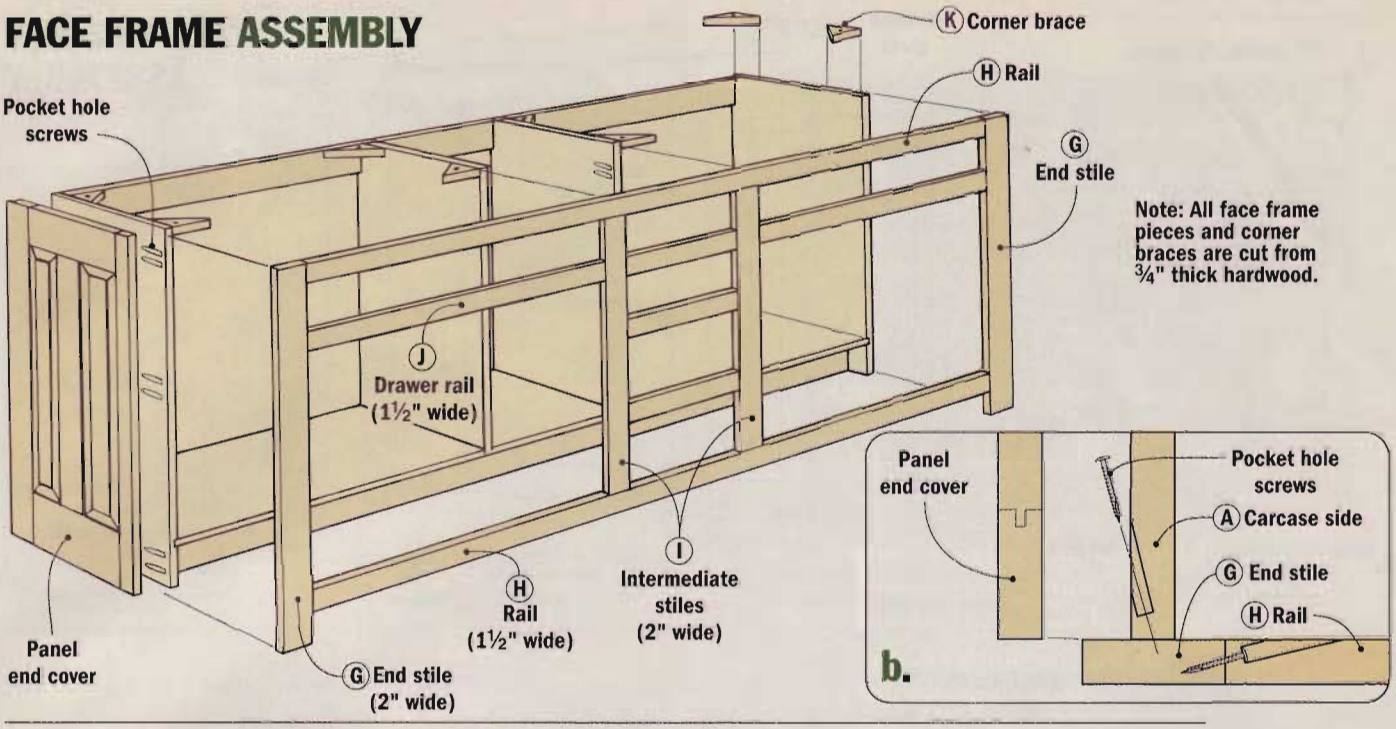
So you could see the actual differences between stock cabinets and our shop-built units, we ordered two base cabinets and two wall-hung units.

When they arrived, the overall fit and finish was rough — doors and drawers weren't aligned, some drawer slide attachment screws were missing.

However, the carcase construction was a real disappointment. Before the cabinets were even removed from the box, the lightweight pine nailer on one of the base cabinets pulled off (see the photo at right). The only things holding the nailer in place were a couple of small dabs of hot-melt glue and two staples driven from the back side into a pair of MDF braces. It would take little force for the cabinet to pull away from the wall with this design.

The carcase sides, bottom, back, and shelves were all vinyl-covered particle board. The sides and bottom were both ½"-thick and the back was ⅜"-thick. The bottom was set into dadoes cut in the sides and hot-melt glued in place.

FACE FRAME ASSEMBLY



ADD THE FACE FRAMES

Face frames dress up the front of the cabinet and add structural strength as well. When building face frames in the past, I've used dowels, biscuits, and even mortises and tenons to join the horizontal rails and vertical stiles.

The size of this project, however, was the perfect excuse to try out a new technique. I'd heard that pocket hole joinery was a quick and accurate way to assemble face frames and this project proved it.

Looking at the completed cabinets, the stiles and rails all appear to be the same width. The rails (H) are 1½" wide, but the doors overlap the intermediate stiles (I) on two sides, so I made them 2" wide so the amount left exposed was the same as the rails.

The end stiles (G) are left wider to cover the framed end panels that get added later or to give you some extra for scribing to the wall.

One other added feature of my face frame design is that the end stiles extend down to the floor. This gives the base units a furniture look while covering the carcase ends.

With the face frame parts cut to width and length, the pocket hole jig (shown at right) is used to drill a couple of angled holes on the back side of the rails (H). Then the end stiles (G) and rails, are lined up and clamped together.

Once everything's positioned, two screws are driven across the joint (you don't even need glue). The intermediate stiles (I) are then attached to the rails the same way, followed by the drawer rails (J).

Before installing the face frame on the carcase, I applied finish to the inside surfaces of the carcase and stain and one coat of finish to the face frame. It lets you get to both sides of the face frame and eliminates the need for masking off the carcase.

The pocket hole screws came in handy again when it was time to attach the face frame to the carcase (*Detail b*).

Corner braces (K) complete the base cabinet. These help stiffen the carcase and provide a way to fasten the countertop to the base.

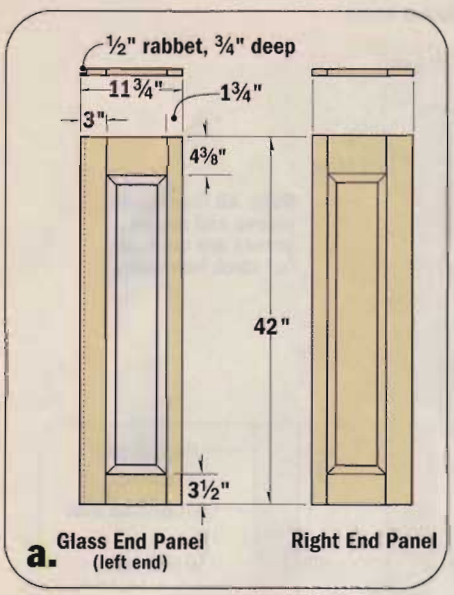
To find out more about pocket hole joinery, turn to pages 74 and 87.

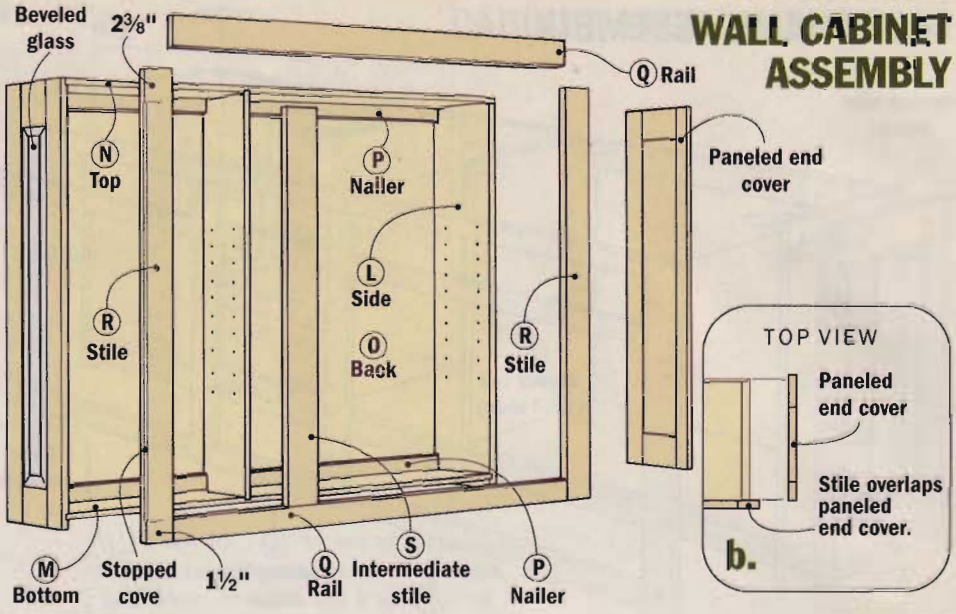
STOCK FACE FRAMES

Like my cabinets, the face frames on these cabinets were ¾"-thick solid wood. And the stiles and rails were held together with pocket hole screws.

Instead of mounting flush with the carcase sides, the stock cabinets' stiles had a shallow groove cut in the back side to accept the carcase sides (photo at near right). To hold the face frames to the carcase, the manufacturer used hot-melt glue and triangular shaped pneumatic fasteners.

As you can see in the photo at the far right, the grain patterns and even wood color used in the rails and stiles vary greatly. While the faces were sanded smooth, some of the rail and stile edges still showed saw marks from when the parts were ripped to width.





Adjustable, edgebanded plywood shelves will support heavy loads without sagging.

WALL CABINET CONSTRUCTION

The basic construction of the wall cabinets is similar to the base units. The ¾"-thick plywood carcase sides (L) are dadoed for the bottom (M), and rabbeted for the top (N) and back (O).

The main difference (besides the shallower depth) is the addition of a second nailer (P). While the floor supports the load for base cabinets, wall cabinets must support their own weight plus the weight of what you put in them. With mounting screws driven through the nailers and into the wall framing, these cabinets are rock solid.

As mentioned earlier, this kitchen didn't have a soffit. So I opted for 42"-tall cabinets that extend to the ceiling. Seldom used items go on the harder-to-reach top shelves. But at least when this stuff is stored inside the cabinets — instead of on top of 30" or 36" cabinets — it doesn't collect dust.

In a larger kitchen, I might have considered using a mix of short and tall cabinets to provide display areas for plants or collectibles and create a visual break.

The shelves in the upper cabinets are ¾"-thick plywood with birch edgebanding (see photo at left). To keep things simple, I drilled a series of evenly spaced (2" apart), ¼"-dia. holes in the carcase sides for adjustable shelf support pins. To position these holes consistently, I used a 2" × 30" strip of pegboard as a drilling guide.

The face frames go together just like those for the base cabinets — with pocket-hole joinery. The rails (Q) are drilled, then screwed to the end stiles (R). The intermediate stile (S) is screwed to the rails.

To keep the compartments wide open, I let the doors butt together, eliminating the need for a divider stile. This was also possible because the plywood shelves are strong enough to resist sagging. Many stock cabinets have extra shelf pins in the divider stile to hold up the center of the shelves.

The exposed ends of the cabinets receive frame-and-panel covers, so I made the corresponding stiles wide enough to overlap both the carcase end and cover *(Detail b)*. For added interest, I routed a ¼" stopped cove along the length of the exposed stiles as shown above.

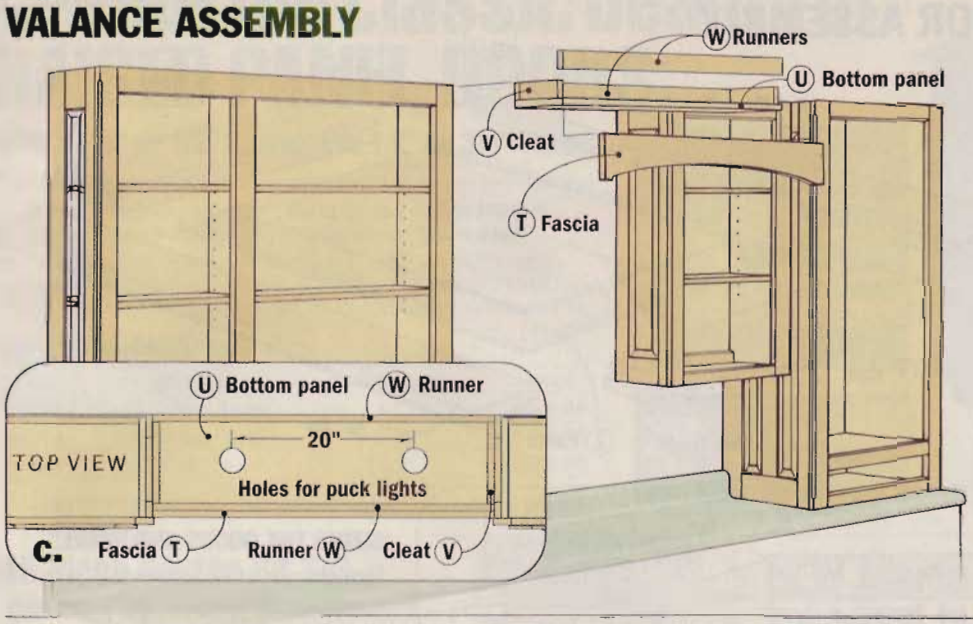
STOCK CABINETS: WALL UNIT CONSTRUCTION

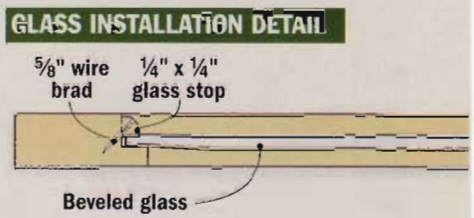
Construction and materials used on the stock wall units were similar to the stock base units. The ½"-thick particleboard top and bottom fit into dadoes cut in the ½"-thick particleboard sides.

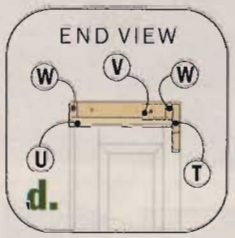
The backs were mere ⅛"-thick pressboard and add little to the structural integrity of the cabinets. The cabinets had nailers (7/16"-thick pine) at the top and bottom as well as a ½"-thick plywood brace across the center of the back. But that's not much to support the cabinets when they're fully loaded with china.

The face frames were joined with pocket hole screws, but held to the carcase with those triangular-shaped pneumatic fasteners. While the shelves were a full ¾"-thick, they were just vinyl-covered particleboard and were held in place with plastic shelf pins.

VALANCE ASSEMBLY







CREATING CUSTOM DETAILS

Most of the custom features I added to the wall cabinets came about because I couldn't find anything similar in stock cabinets. For example, I could buy a cabinet with a glass door, but couldn't find one with a glass end panel.

So, I created a display cabinet by building a paneled end cover frame and installed glass instead of the wood panel — *Glass Installation Detail*. Unlike the other cabinets, this frame is part of the carcase. So once I assembled the frame, I cut a dado and rabbets in the inside face to accept the carcase top, bottom and back.

You'll notice in *Detail a* that the rear stile is wider than the front one and that the rabbet is cut deeper than the ¼"-thick back. That extra strip allows you to easily scribe the cabinet to the wall.

I considered building some shallow cabinets to go above the window, but decided lights shining on the sink below were more important than the small amount of storage space to be gained. The simple valance shown above bridges the window and connects the two banks of cabinets.

The arched fascia (T) attaches to the ¾" plywood bottom panel (U) and runner (W). Two cleats (V) attach to the cabinets to provide a mounting surface for the bottom *(Detail c)*.

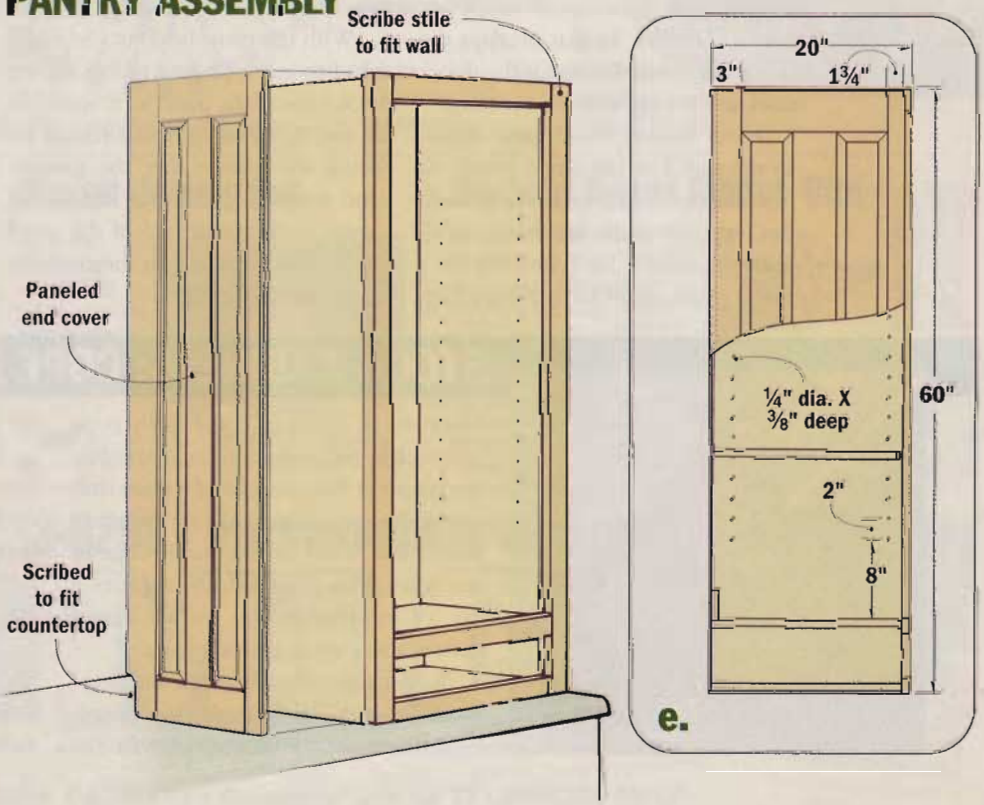
The bottom panel holds two xenon "puck" lights (see page 53) and hides the wiring and ceiling. Once the wall cabinets were installed, I added matching surface-mounted pucks on the cabinets' underside to brighten up the countertop work areas.

The tall pantry cabinet, to the far right above and detailed in the drawings below, was another extra I added. For starters, it's 20" deep and that extra depth easily holds cereal boxes and food containers too large to fit in regular 12"-deep cabinets.

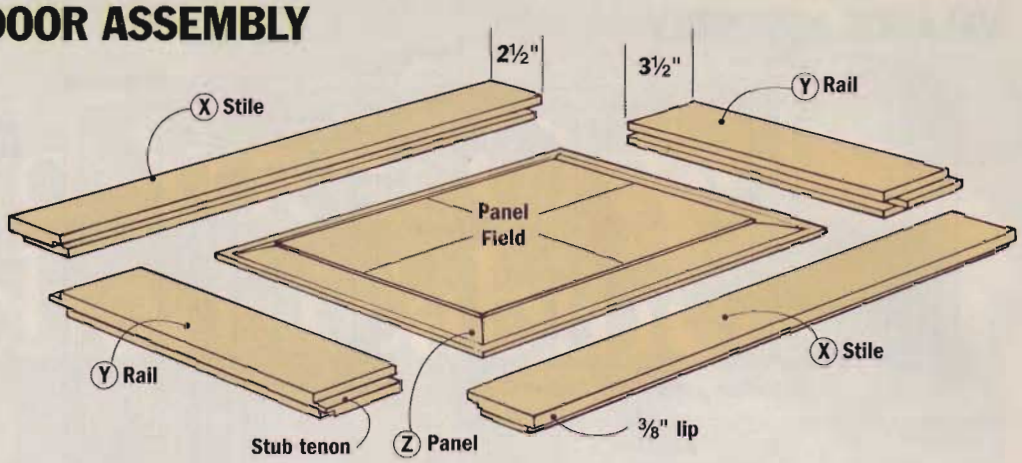
It also runs from the counter to ceiling (60"). The only way to get that height in stock cabinets was to stack a 42"-cabinet on top of an 18"-high drawer unit.

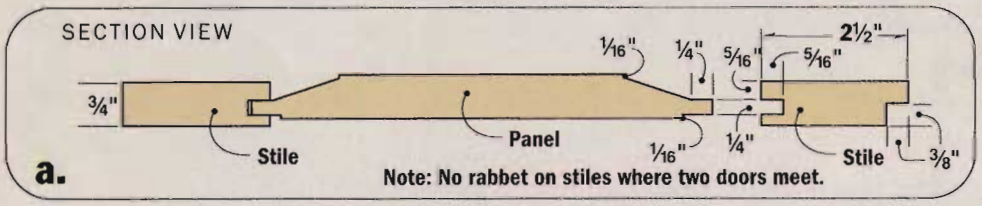
As you'll see on page 53, this cabinet also contains a built-in cutting board and knife rack in the pullout drawer.

PANTRY ASSEMBLY



DOOR ASSEMBLY





STREAMLINE THE DOORS

All the stock cabinets I looked at had overlay doors. The doors aren't set into the face frame, but lay completely on top of it. That ¾" thickness sticking out always looks a little clunky to me.

That's why I decided to use ⅜" inset (sometimes called partial overlay) doors and drawer fronts on my cabinets (see drawings above). They have a ⅜"-thick lip that overlaps the face frame while the rest of the door's thickness is inset into the opening.

I also wanted raised panel doors. In the past, I've cut raised panels on my table saw, but even a sharp blade can leave saw marks and burns, especially in cherry. So I invested in a raised panel router bit (see page 87).

The bit cut smoothly, eliminating most of the sanding. The bit profile I chose cut a flat bevel *(Detail a)*.

MAKING THE FRAMES

To keep the doors simple, I used stub tenon and groove joinery on the stiles (X) and rails (Y) as shown in the *Door Assembly View*. To fit the panel (Z) to the frame and get it positioned properly, I made a number of test pieces.

With the panel field cut 5/16" high, I had to cut a shallow rabbet on the back edge of the panel so it would fit in the ¼"-wide grooves *(Detail a)*. You'll also notice that the grooves (and tenons) are shifted slightly off center so the front face of the panel won't protrude too far beyond the surface of the frame.

SIZING THE DOORS AND PANELS

Before you start cutting, it pays to work out all the door and panel sizes on paper. Start by measuring the openings in the face frame. As a general rule, doors should be at least twice as tall as they are wide. This makes it easy to know if an opening needs one or two doors.

To account for the lips and hinges and have some room for adjustment, I added ½" to both the width and height of the opening.

For example, the opening on the pantry cabinet measured 24" wide × 50⅛" high. The total width for the two doors was 24½", so I made each door 12¼" wide × 50⅛" high.

With the door sizes set, the rail length and panel width can be calculated. The stiles are 2½" wide, so the door width minus 5" gives you the size of the opening inside the frame.

But you have to add ⅜" to that distance to account for the two 5/16" grooves for the tenons and panel. So for the 12¼"-wide pantry doors, the

STOCK CABINETS: COPE AND STICK DOORS

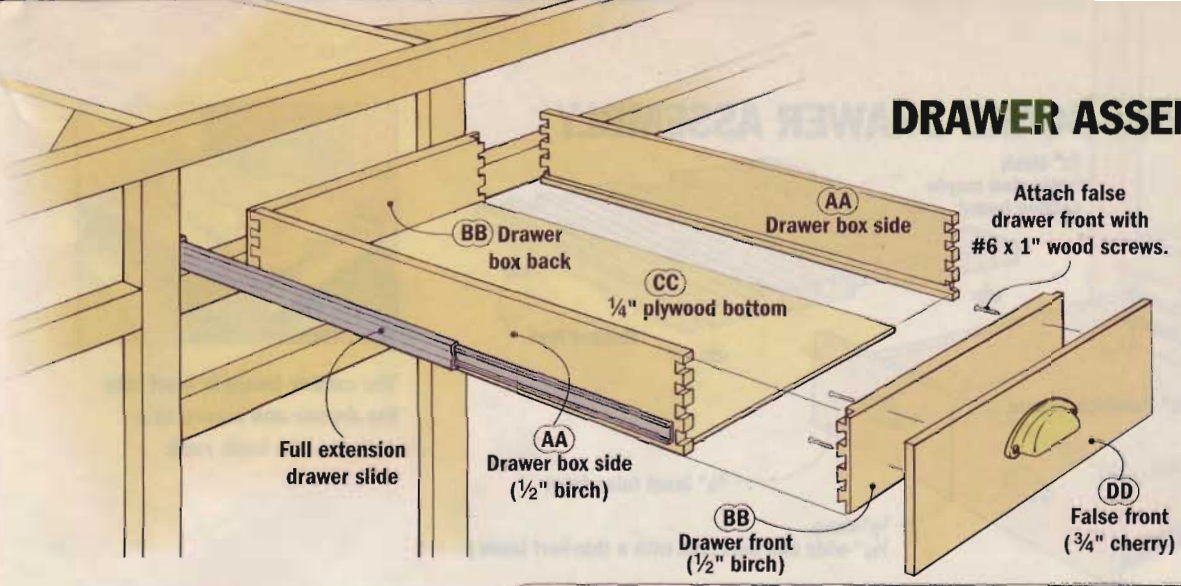
Many stock cabinets come with cope and stick construction on the doors (see the photo at left). Instead of a plain stub tenon, the ends of the rails are coped to match the profile on the inside edge of the stiles. This joint usually requires a pair of matched router bits or shaper cutters and creates a strong joint.

To visually reduce how the full overlay doors stick out from the face frame, a profile is cut around the outer face of the door frame. A vinyl bumper insert on the back of the frame cushions the door when it closes — a nice touch.

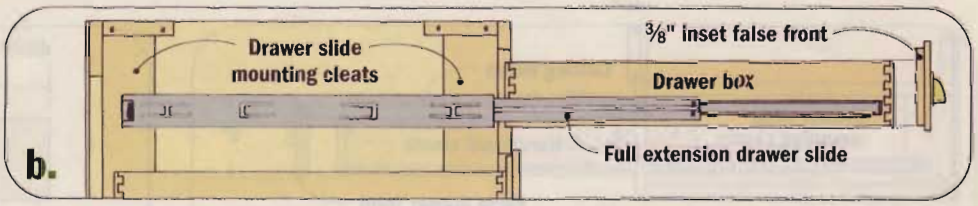
The panels on the stock cabinets we bought were solid wood, but like the face and door frames, the grain patterns varied widely.

On the cabinets with doors that butt together, the gap between the doors wasn't uniform, but could be adjusted easily by fine-tuning the hinges.

DRAWER ASSEMBLY



The drawer boxes feature ½" birch sides joined at the front and back with half-blind dovetails



rails would be 7⅞" long (12¼" - (2½" + 2½") + (5/16" + 5/16").

To allow for some cross-grain expansion, I made the panels ⅛" narrower than the length of the rails.

To determine panel height, subtract the total width of the two rails (7") from the door height. (The rails are wider — 3½" — than the stiles.) Then add back in the ⅜" for the two grooves to get total height. Since panels will expand a little lengthwise, subtract 1/16" from this total.

Once all the dimensions were nailed down, I cut to size and labeled the panels, rails, and stiles for each door. Using the test pieces I made earlier as a setup guide, I machined the grooves in all the rails and stiles.

With the grooves cut, I cut the "deeper" face of all the stub tenons, then lowered the blade and cut the other, shallower face. Then I routed the the profile in all of the panels.

Next, I dry-fit the frames around the panels. Only the rails and stiles get glued together — the panels should "float" in the frames. But before gluing the doors up, I applied stain to the panels. This ensures uniform color across the entire panel, even if it shifts slightly in the frame.

With the doors assembled, you can cut the rabbets that create the lip *(Detail a)*. But don't rabbet the door stiles where two doors will meet.

DOVETAIL DRAWERS

One stock cabinet feature I copied was half-blind dovetail joinery for the drawers (see the *Drawer Assembly View*). A dovetail joint's interlocking pins can stand up to the strong forces exerted when a drawer is yanked open or slammed shut.

You might think it took a long time to cut dovetails for 12 drawers. But once I got my dovetail jig adjusted, the actual cutting went quickly. (For more on dovetails and dovetail jigs, turn to page 60.)

All the drawers in each bank are identical in size except for height. Even the ¼" plywood bottom panels (CC) are the same.

ADD FALSE FRONTS

False drawer fronts (DD) simplify the drawer installation. They let you install the drawer slides and box first, then position each front so it lines up properly on the face frame opening.

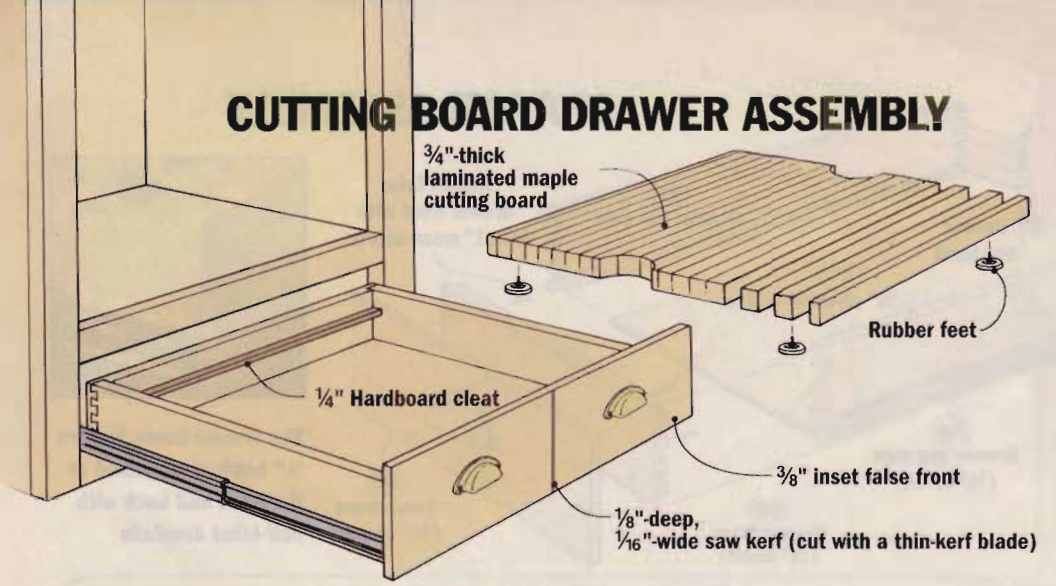
Like the doors, the drawer fronts are lipped for a ⅜" inset, as shown in *Detail b*. And you size the false fronts the same way as the doors, adding ⅞" to the opening's size.

STOCK CABINETS: DRAWERS, HARDWARE

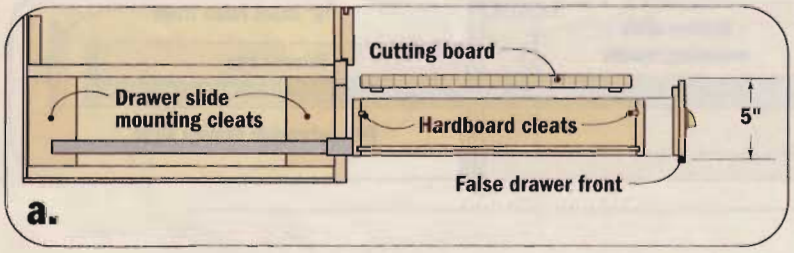
The drawers in the stock cabinets we bought had dovetail joints and were equipped with full extension undermount-style slides. The drawer portion mounted to the underside of the drawer so the slide was hidden (although you lose a little bit of drawer height).

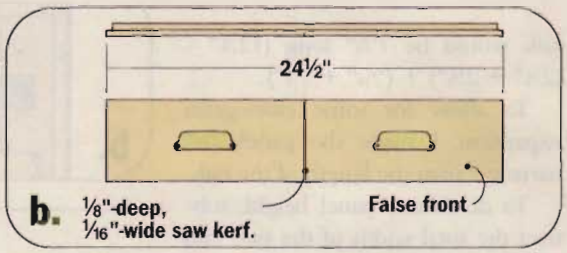
Plastic catches (top right photo) on the underside of the drawer, clipped onto the slides and allow slight adjustments in the position of the drawer. The slides operated fairly smoothly and had a positive, self-closing feature.

The hinges (pictured lower right) were a Euro-style cup hinge designed for face-frame cabinets. One nice feature is that they allow minor adjustments to the door position — both up and down and side to side. Because of the overlay style of door, these hinges were hidden from view when the doors were closed.



The cutting board is inset into the drawer and serves as a cover for the knife rack.





MOUNTING THE SLIDES

The side-mounted drawer slides used throughout the cabinets need to be mounted flush with opening in the face frame. To do this I first screwed mounting cleats at the front and back of the cabinet on both sides of the drawer openings *(Detail a)*. These cleats, made from 2x4 stock, were planed down until they fit flush with the face frame. The cabinet part of the slide fastened to these cleats.

LOOK FOR THE EXTRAS

Now that you've seen how the basic boxes go together and also some of the more dramatic features, it's time to take a look at some extra features that aren't as obvious.

One feature I'm proud of is the drawer built into the pantry cabinet. Designed to look like a pair of drawers to echo the twin doors above it, the one large drawer holds a cutting board and knife rack *(Cutting Board Drawer Assembly* and *Detail b)*.

The laminated maple cutting board rests on ¼"-thick hardwood cleats fit into the front and back panels *(Detail a)*. The cutting board has rubber feet and is designed with built-in handholds to lift out for use. But if counter space is limited, you could use the cutting board while it's in the drawer.

The great thing about this drawer is that it got an old free-standing knife-block off the countertop, yet the knives are still handy. At 18" deep and 23" wide, the drawer easily holds a flat knife rack with space left for storing small cutting boards or other knife accessories. (The knife rack was featured in the January/February 2000 issue of *Workbench*.)

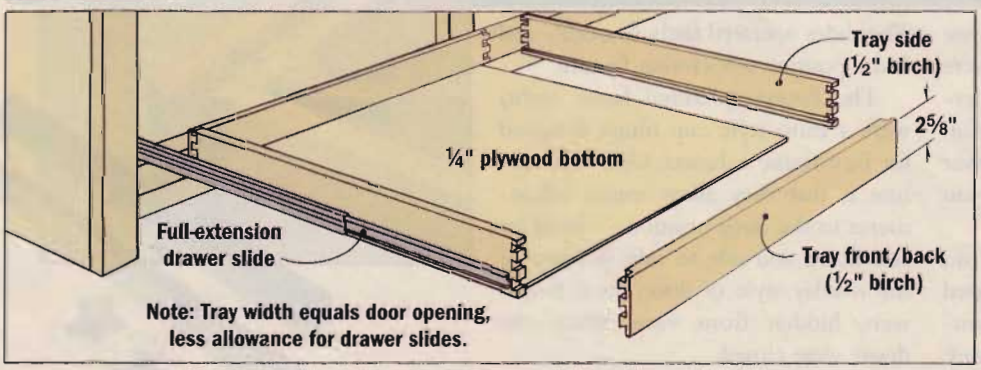
TRAYS REPLACE SHELVES

Another hidden feature is tucked away behind the doors in the base cabinets. Instead of fixed shelves or ones that rest on adjustable shelf pins, the base cabinets feature pull-out trays, as shown at left below.

Like the drawers, these shallow trays ride on full extension slides. They make it easy to organize and access pots, pans, and storage containers that normally get stacked haphazardly in fixed-shelf cabinets.

Such trays are available as an option in stock cabinetry. (It cost an extra $54 to add four small pullout trays to the standard 36" wide base unit pictured back on page 43.)

To get wide-open access to the space, I designed my base cabinets with two wide trays that spanned the full door opening. The plywood carcase is rigid enough that a center stile between the doors wasn't necessary.



CHOOSE CUSTOM HARDWARE

One way to put your own touch on the cabinets is with hardware. Since the drawer slides and hinges are tied to the cabinets' design, it's best to get them early in the planning process. But the knobs and pulls can wait until you've got the cabinets built.

The stock cabinets I priced did not come with door knobs or drawer pulls — these were available as an option in a limited number of styles.

On ³/₈" inset doors and drawer fronts, pulls and knobs are a necessity. But you can choose from hundreds of stock or special order styles available at home centers or from mail order catalogs (turn to page 86 to find out where I ordered the hardware for the cabinets shown here).

Hardware customization doesn't have to stop with knobs and pulls. Many of the special bins, racks, and turntables offered as options by cabinet manufacturers are available from mail order catalogs such as Woodworker's Supply (800–645-9292) and Rockler Woodworking and Hardware (800–279-4441).

FINAL TOUCHES

As mentioned earlier, I also added low-voltage puck lighting to the valance, shown in the photo right, and under the cabinets to light the countertop work areas. I chose xenon lights because they burn brighter than halogen bulbs and produce less heat. The three-light kit, order no. 73549 - $99.99, is from Rockler.

The finishing touch was the addition of a 2" cove molding along the top of the wall cabinets. It dresses up the cabinets, but more importantly it helps hide any gaps between the cabinets and ceiling. Since I couldn't find a cove molding this size in cherry, I stained a birch molding to match the cabinets.

Finish on the cabinets is a stain covered with three coats of polyurethane. To get the look of aged cherry, I used a mixture of three parts Zar cherry stain with one part Wood-Kote Cherry Jel'd Stain. The latter gel stain minimizes blotching that sometimes occurs with cherry.

Building your own kitchen cabinets is a big job — probably the largest woodworking project you'll ever take on. But the quality that you can build into them and the daily use they'll get make it one of the most worthwhile projects I can think of to improve your home.

Puck-style xenon lights and cove molding add finishing touches.

Turn to page 86 to find out where the cabinet hardware came from.

Floating Shelves

An invisible mounting system and an internal framework give this shelf "magical" strength. And, although it looks unusual, it can be built and installed with common materials.

I've always wanted to build a shelf that would hang on a wall without any visible means of support. The challenge was to design it so it looked as good as it worked. By using a web frame for a substructure and then "skinning" it with plywood, I came up with a shelf that is both strong and lightweight. Then, by dressing the edges of the shelf with shop-made molding, I hid the substructure and gave the shelf an attractive profile.

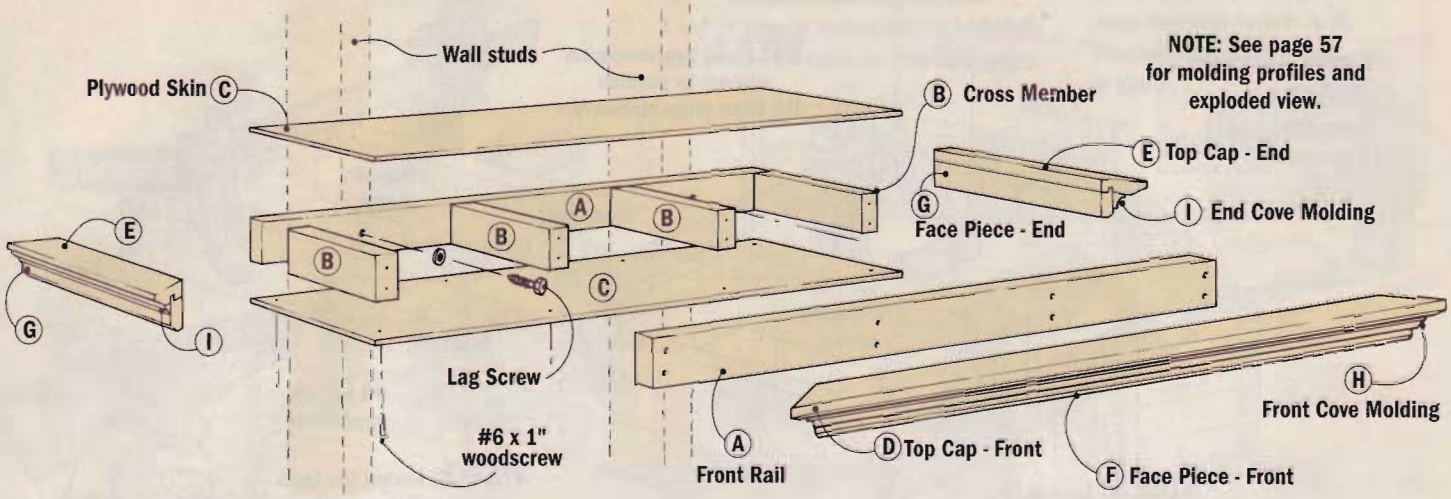
If the molding looks like it takes a shaper or a high-priced router bit to make, look again. It's actually three different pieces of material. You can make all three pieces in your shop if you want to, or you can do what I did, and buy the $\frac{1}{2}$" cove molding.

The magical mounting system is really just lag screws that are driven through the back rail of the web frame (*Mounting Plan View*, next page). By positioning the lag screws to hit wall studs, these shelves are capable of holding as much as a full set of encyclopedias.

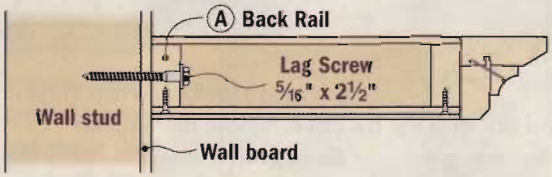
Besides being a remarkably sturdy shelf that appears to float on the wall, this design can be customized to fit almost any space, however large or small. The length of the shelf can be adjusted almost without limit, though the width really shouldn't exceed about 12". (Note: On the next page, you'll find Materials Lists for the three shelves shown in the photo at left.)

Everything you need to build the shelves is available at most home centers.

FLOATING SHELF EXPLODED VIEW



MOUNTING PLAN VIEW



HIDDEN STRENGTH

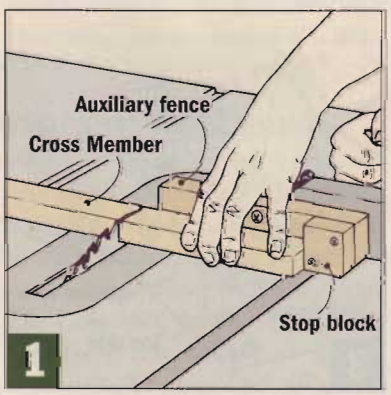
The foundation of this shelf design is the web frame, which is made up of front and back rails and several cross members. The frame not only defines the size of the shelf, but also gives the shelf most of its strength. As you'll see later, the top plywood skin does a lot to firm up the shelf as well.

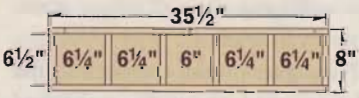
For now, though, let's just concentrate on the web frame.

CUTTING THE FRAME PIECES

Start by cutting the front and back rails (A) and the cross members (B) to size from ¾"-thick stock. I chose hard maple for the web frame in my shelves because of its strength and stability. Soft maple or poplar would also be good choices.

Consistency in these pieces is critical for the shelf to be square and symmetrical, so use a stop block on your table saw to make sure you're cutting identical pieces *(Fig. 1)*.





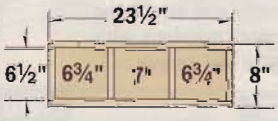
THREE FOOT SHELF

LUMBER:

A	(2) Front/Back Rails	¾" x 1½" x 35½"
B	(6) Cross Members	¾" x 1½" x 6½"
C	(2) Plywood Skins	¼" x 8" x 35½"
D	(1) Top Cap - Front	¾" x 2½" x 40½"
E	(2) Top Cap - Ends	¾" x 2½" x 10½"
F	(1) Face Piece - Front	¾" x 1⅝" x 37"
G	(2) Face Piece - Ends	¾" x 1⅝" x 8¾"
H	(1) Front Cove Mldng.	¾" x ¾" x 38½"
I	(2) End Cove Mldng.	¾" x ¾" x 9½"

HARDWARE:

(24) #8 x 2" Fh woodscrews
(3) 5/16" x 2½" Lag Screws
(3) 5/16" Washers
(12) #6 x 1" Fh woodscrews
(10) 1" Finish nails



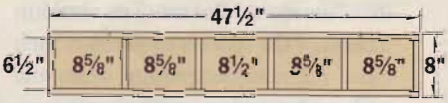
TWO FOOT SHELF

LUMBER:

A	(2) Front/Back Rails	¾" x 1½" x 23½"
B	(4) Cross Members	¾" x 1½" x 6½"
C	(2) Plywood Skins	¼" x 8" x 23½"
D	(1) Top Cap - Front	¾" x 2½" x 28½"
E	(2) Top Cap - Ends	¾" x 2½" x 10½"
F	(1) Face Piece - Front	¾" x 1⅝" x 25"
G	(2) Face Piece - Ends	¾" x 1⅝" x 8¾"
H	(1) Front Cove Mldng.	¾" x ¾" x 26½"
I	(2) End Cove Mldng.	¾" x ¾" x 9½"

HARDWARE:

(16) #8 x 2" Fh woodscrews
(2) 5/16" x 2½" Lag Screws
(2) 5/16" Washers
(8) #6 x 1" Fh woodscrews
(8) 1" Finish nails



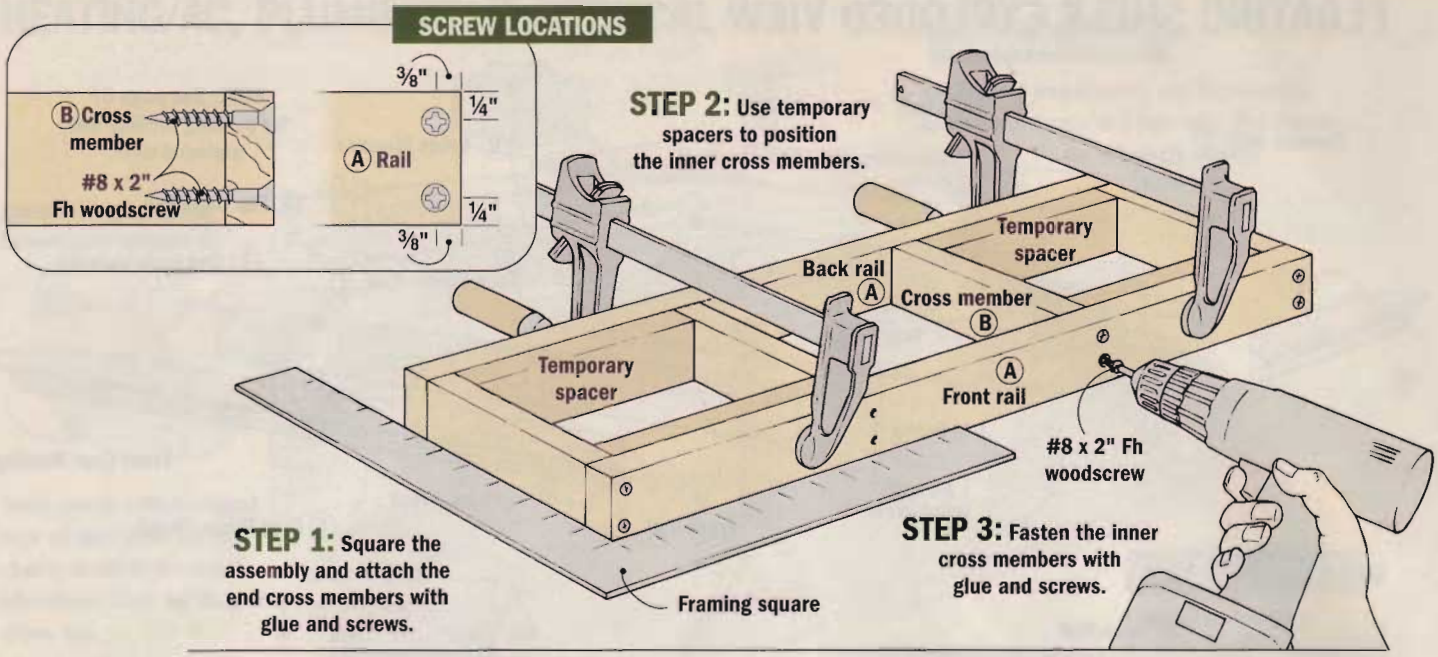
FOUR FOOT SHELF

LUMBER:

A	(2) Front/Back Rails	¾" x 1½" x 47½"
B	(6) Cross Members	¾" x 1½" x 6½"
C	(2) Plywood Skins	¼" x 8" x 47½"
D	(1) Top Cap - Ends	¾" x 2½" x 52½"
E	(2) Top Cap - Side	¾" x 2½" x 10½"
F	(1) Face Piece - Front	¾" x 1⅝" x 49"
G	(2) Face Piece - Ends	¾" x 1⅝" x 8¾"
H	(1) Front Cove Mldng.	¾" x ¾" x 50½"
I	(2) End Cove Mldng.	¾" x ¾" x 9½"

HARDWARE:

(24) #8 x 2" Fh woodscrews
(3) 5/16" x 2½" Lag Screws
(3) 5/16" Washers
(12) #6 x 1" Fh woodscrews
(12) 1" Finish nails



ASSEMBLE THE FRAME

Now begin assembling the frame, starting with the front and back rails and a cross member at each end. Use a framing square to keep the assembly true while you glue and screw the cross members between the front and back pieces as shown in the illustration above.

To fill in the remaining cross members, I took the extra step of cutting a couple temporary spacers to help position the cross members while I fastened them to the frame.

Cut the spacers to match the distance between the cross members ($6\frac{3}{4}$" in the case of the 2-ft. version). Then use the spacers to position each cross member, beginning from the ends and working in. That will leave a larger space between cross members in the center of the shelf, but that spacing isn't really critical.

SKINNING THE SHELF

I said earlier that much of this shelf's strength comes from the top plywood skin that is glued to the web frame. It's the considerable glue surface between the frame and the skin that accounts for this extra muscle. Once the $\frac{1}{4}$" skin is glued in place, it becomes virtually impossible for the frame underneath to twist or bend.

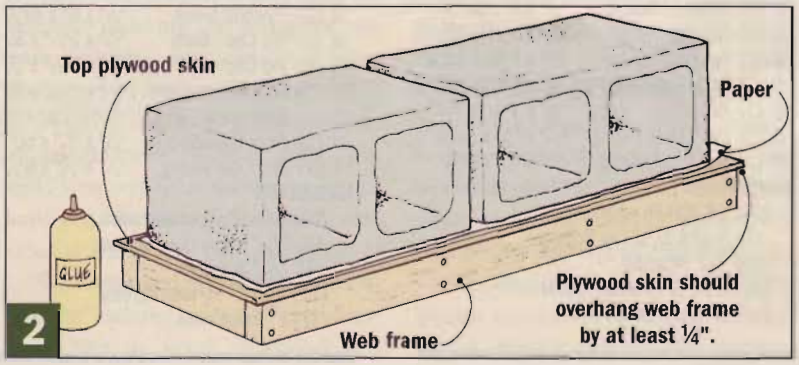
Although the top and bottom plywood skins are attached differently and at different times, they can be made at the same time. Start by cutting the two skins (C) slightly oversize. Cut them large enough so they will hang over all edges of the frame by at least ¼".

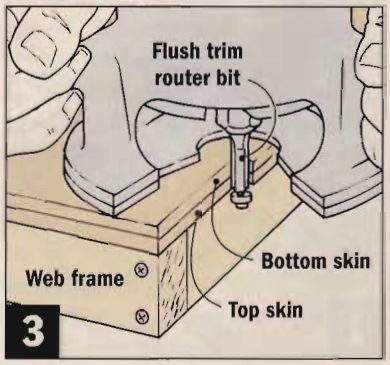
Now glue one of the skins to the web frame as shown in *Figure 2*. I used a couple of concrete blocks to put pressure on the entire skin, but you could do the same thing with paint cans or even a toolbox. When the glue has dried, remove the weights.

Then you're ready to trim the skins to match the frame. You can size both skins at the same time by using some double-face tape to temporarily stick the bottom skin to the one you just glued on. Next, use a router with a flush trim bit to trim the skins to fit the frame (*Fig. 3*). Remove the bottom skin and get rid of the tape. Set that skin aside for the time being and get started on the built-up molding.

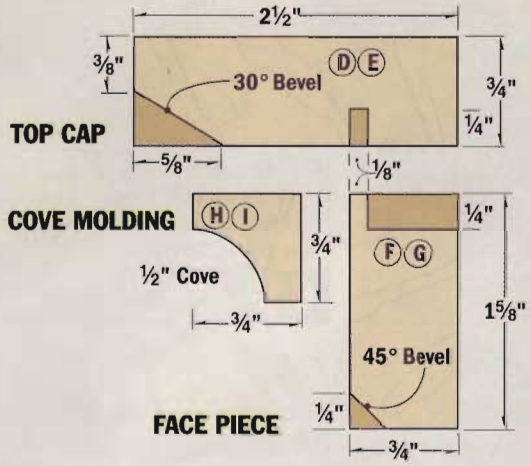
MAKING THE MOLDING

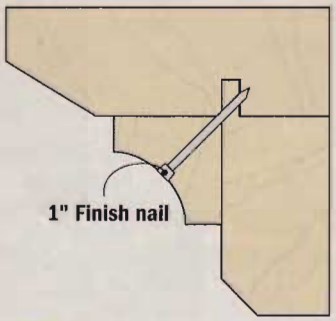
To dress up the edges of the shelf, I decided on a built-up molding that's made with two pieces of shop-made molding and some ½" cove molding that can be found at most home centers or lumber yards. Of course, if you have a ½" cove router bit, you

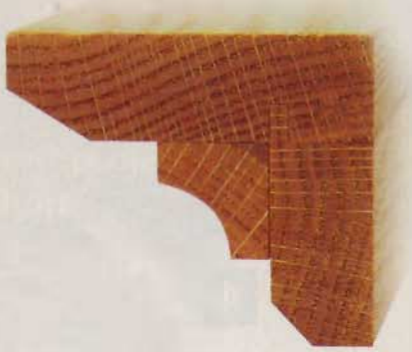




MOLDING PROFILES







NOTE: Bevels should be cut on the face piece and top cap after they are assembled.

could always make the cove molding in your shop as well. I found it was just as economical to buy what I needed for this project.

The other pieces of the molding are the top caps (D, E) and the face pieces (F, G). These pieces are joined using tongue and groove joinery. The tongue and groove isn't for strength, but rather to help align the pieces while you glue and clamp them.

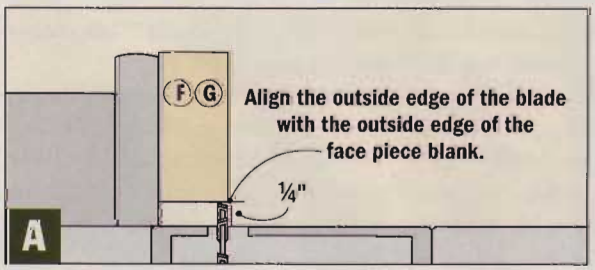
To start making the molding, cut ¾"-thick blanks for the top cap and face piece. The blanks need to be long enough to cover the front and the ends of the shelf.

Now set up your table saw to cut the groove in the top cap molding. Here's a tip: Use the thickness of the face piece as a setup gauge as shown in *Figure A*, below. Then set the blade to cut a ¼"-deep groove, and after checking your setup with a test cut in some scrap, cut the groove in the top cap stock *(Fig. B)*.

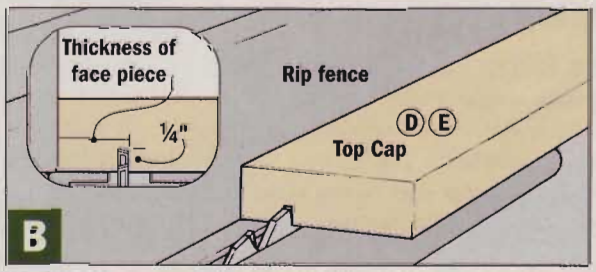
Next, make the matching tongue on the face piece blank. I did this by leaving the saw blade set at the same height and making a shoulder cut in the edge of the stock *(Fig. C)*.

Compare the thickness of the tongue to the groove in the top cap before moving on to the next step. It's better if the tongue is a little too thin and allows glue to fill the void than to have the tongue be too thick and not fit in the groove at all. Once you're satisfied that the tongue is the right thickness, turn the stock on its side and trim away the waste *(Fig. D)*. Sneak up on this cut to avoid cutting the tongue.

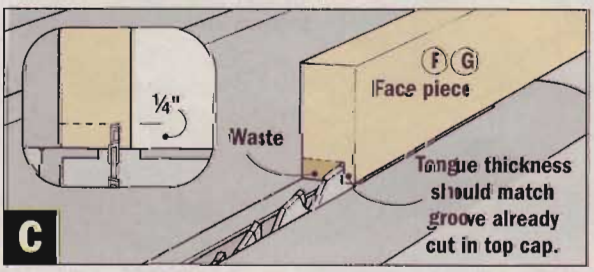
MACHINING THE MOLDING



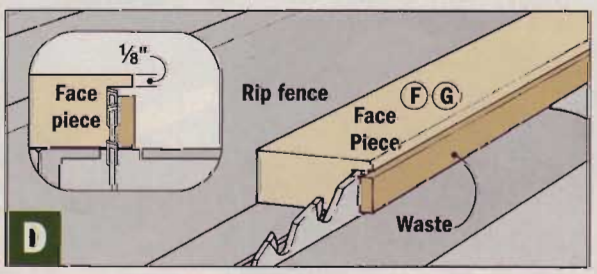
To set up for cutting a groove in the top cap blank, use the face piece blank as a gauge to position the rip fence.



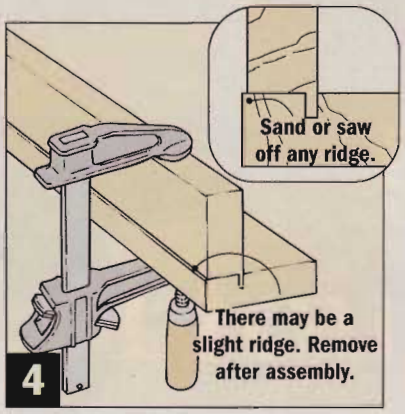
Cut a groove in one face of the top cap molding stock. Leave your blade height set up this way for the next step.



Using the same blade height as the last step, adjust the rip fence and make a shoulder cut on one edge of the face piece blank.



Now lay the face piece blank face down and remove the waste by sneaking up on the cut.



Glue and clamp the pieces together the way they're shown in *Figure 4*. The thing to be careful of here is that the two pieces stay square to each other. I noticed that when I clamped them together, the clamps had a tendency to push the face cap forward (as is if the L was closing on itself). By simply making sure the clamps were centered on the thickness of the face cap stock, the two pieces were held square.

When the glue dries and the clamps can be removed, you might notice that the two pieces don't align perfectly at the back *(Fig. 4 detail)*. It's easy to true the pieces up with a pass through the table saw or by sanding.

CUTTING THE BEVELS

After flattening the back of the two-piece molding, the next step is to cut some bevels on the assembled piece. It may have occurred to you to cut these bevels *before* gluing the pieces together, and that was originally what I had in mind too. But as sometimes happens, I got one step ahead of myself and had the pieces glued together before I even thought about the bevels. It seemed like a pretty silly mistake at first, but it didn't take me long to realize that it actually worked out better this way.

What I found is that having the L-shaped molding assembled before I cut the bevels gave me a much more substantial workpiece to hold onto as I passed it through the table saw *(Figs. 5 and 6)*.

That was especially helpful on my table saw with a right-tilt blade. I had to position the fence on the left side of the blade to make these cuts, which isn't at all dangerous, but it does feel strange. The larger workpiece increased my confidence in this unusual process quite a bit. Another good safety tip for making cuts like this is to keep the thumb on your right hand hooked on the rip fence.

APPLYING THE MOLDING

Now you're ready to apply the molding to the shelf. Start with the front piece. Miter each end of a piece of molding so the back edge of the molding piece will align perfectly with the front corners of the shelf. Clamp the molding to the shelf temporarily as a guide for laying out the miters on the end pieces.

To make these end pieces, start by mitering one end of another piece of molding. Be sure to leave the piece long enough that it extends past the back of the shelf a couple inches. Hold it or clamp it in place and check the fit of the miter. You may have to adjust the fit of the miter as shown in the *Skill Builder* on this page.

Once you're satisfied with the fit, mark the back end of the molding and cut it off square *(Fig. 7)*. Now repeat these steps to cut and fit the molding on the other end of the shelf.

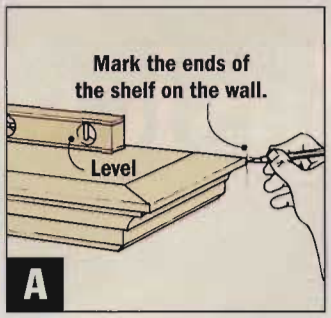
SKILL-BUILDER

Fine-Tuning Miter Cuts

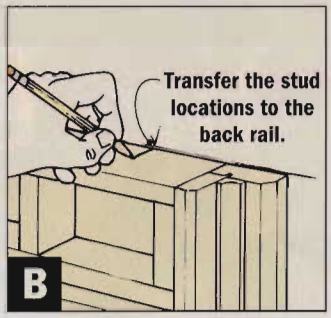
Until miter saws come equipped with micro adjustments, the best way to dial-in those critical cuts is by shimming the workpiece in the saw.

If the miter is open at the front, place the shim near the blade. If the opening is at the back of the miter, position the shim away from the blade as shown here.

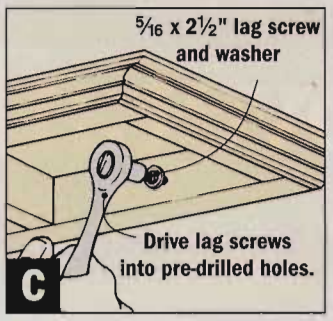
FLOATING SHELF MOUNTING SEQUENCE



Hold the shelf against the wall. Mark the wall at the ends of the shelf. Now locate all the wall studs in between the marks.



Hold the shelf against the wall and transfer the stud locations to the back stretcher. Drill 3/8"-diameter holes in the stretcher.



Drive the lag screws with a wrench or ratcheting driver. Be sure the shelf is level before snugging the screws down.

When all the lag screws are driven and the shelf is secure on the wall, attach the bottom plywood skin with woodscrews.

Next, glue and clamp the molding to the shelf, again starting with the front piece and then adding the ends.

Finally, miter cut and apply the store bought cove molding (H, I) following the same procedure. Then glue and nail the cove in place *(Fig. 8)*.

ADDING THE BOTTOM SKIN

The bottom plywood skin, which has already been routed to size, is the final piece of the shelf. It doesn't get installed permanently until the shelf is attached to the wall, but there are a couple things that can be done to get it ready.

Start by turning the shelf upside down on your workbench and setting the plywood skin in place. Now lay out the locations of the screw holes on the bottom skin. I used three screws into each rail spaced about 8" apart. Predrill and countersink holes at these locations. Then go ahead and temporarily screw the bottom skin in place so you can finish the shelf as one piece.

I chose a golden oak stain and two coats of penetrating oil finish for my shelf. Fill the nail holes in the cove molding with matching wood putty after the first coat of oil.

HANGING THE SHELF

The hidden mounting system of this shelf means you may have to compromise a bit on where you hang it, particularly with the 2-ft. version. It's important that the shelf be fastened to at least two studs.

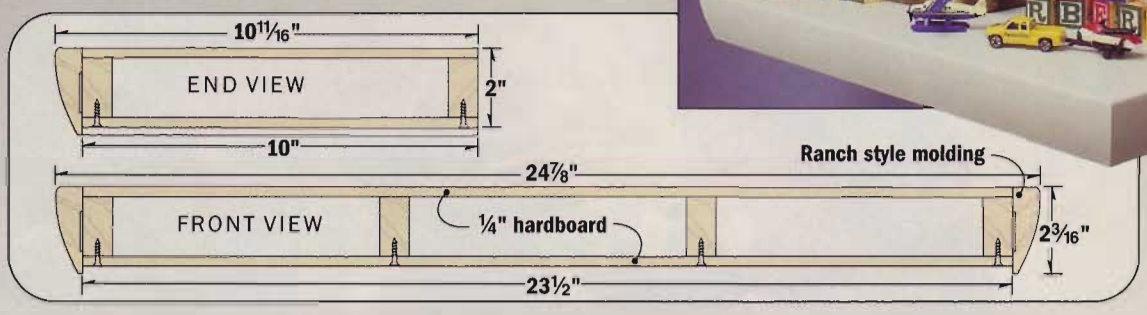
Follow the *Floating Shelf Mounting Sequence* above to position and hang your shelves for the best affect.

Finally, arrange your books, trinkets, or heirlooms on the shelves and wait to see which impresses your guests the most: your knick-knacks, or the invisible support that keeps them on the wall.

Design Option: Store-Bought, Ranch-Style Edging

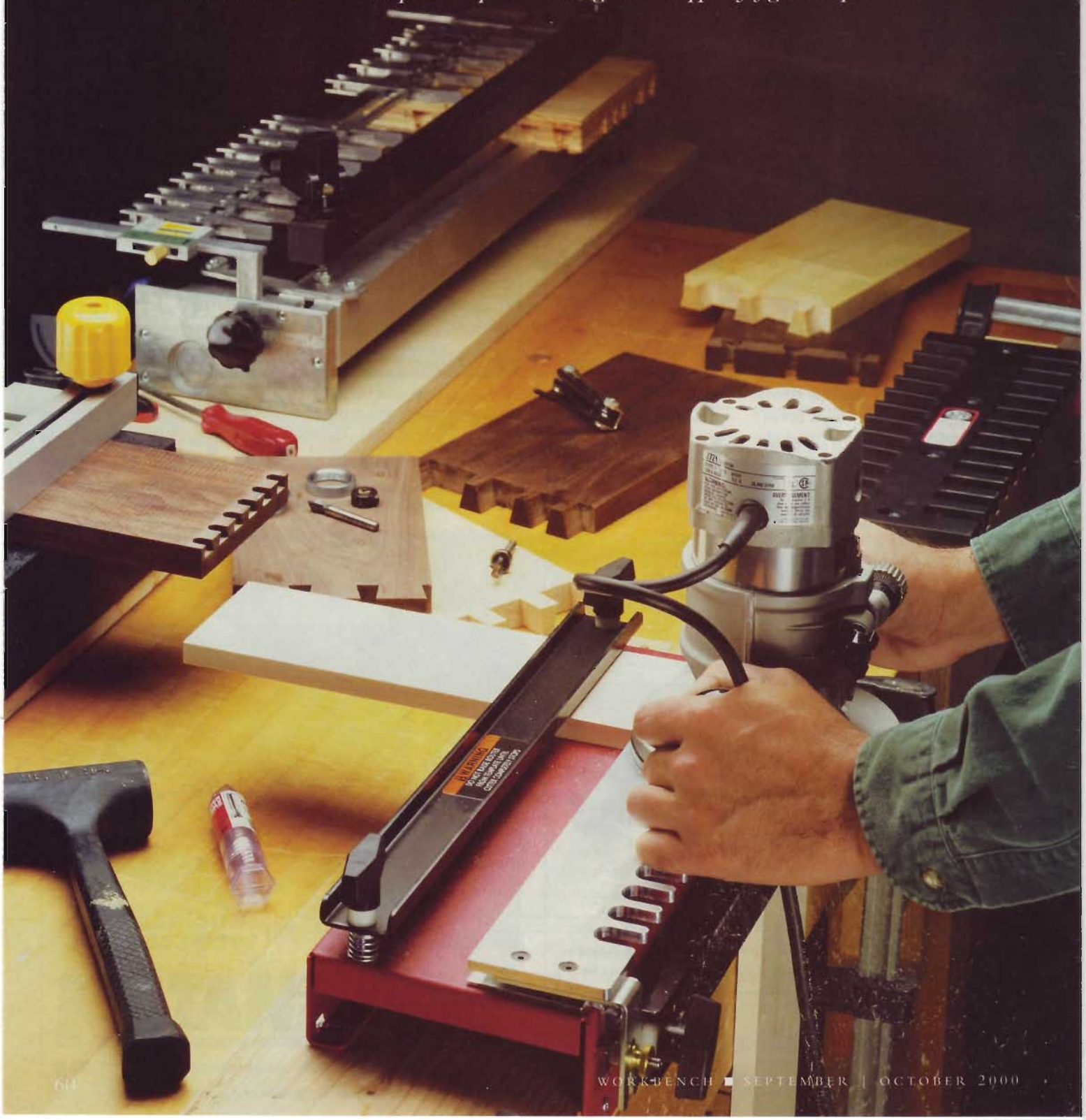
A less formal, painted version of this shelf is perfect for a kid's room or any room in the house with a casual setting.

The construction of the shelf is essentially the same; only the materials are different. Ranch-style molding replaces the built-up molding on the oak version, and hardboard skins are used in place of plywood. The sub-frame is built a little wider in this version since the molding doesn't add as much width.

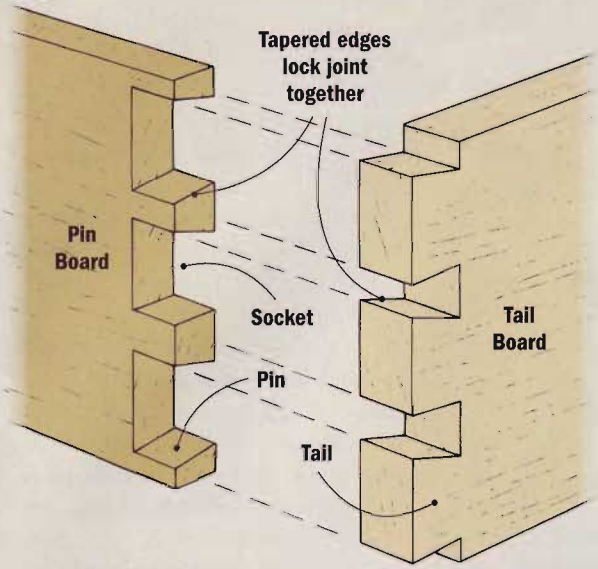


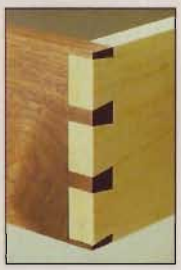
Dovetail Jig Basics

With a router and a dovetail jig, it's surprisingly easy to cut craftsman-quality dovetails. The hardest part may be deciding which type of jig to buy.



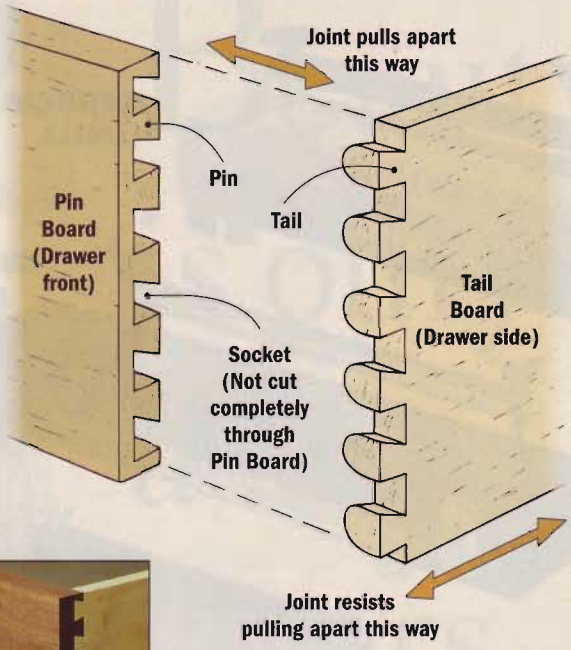
THROUGH DOVETAILS





The pins and tails are visible on both sides of a through dovetail joint. This joint looks great from any angle.

HALF-BLIND DOVETAILS



Because the sockets are cut just partway through the pin board, half-blind dovetails are only visible on one side.

Whether they're hidden in a drawer joint or left exposed to grace the corners of an heirloom blanket chest, dovetails say "craftsmanship." These strong, attractive joints conjure up images of the master woodworker hand fitting every piece.

But these days, you can buy a variety of specialized jigs that work with a router to cut dovetails with surprising ease. Combine that variety with a wide range of prices, though, and it can be tough to figure out which jig best suits your needs.

Deciding which jig is right for you is easier if you know how each one works. The jigs can be broken into three categories, and I'll get into that shortly. But first, let me talk a little bit about dovetail joinery.

A BRIEF TALE ABOUT TAILS

Let's face it, woodworkers today have it pretty easy. Biscuit joiners, brad nailers, and good glue and screws make joinery relatively simple. But before such conveniences, there was still need to strongly join boards. The dovetail was one ingenious solution.

The drawings above show how flared "tails" cut in the end of one board slip into tapered sockets in the mating board. That board also has "pins" between the sockets. The interlocking pins and tails create a strong joint, even without fasteners or glue.

Interestingly, the look of the tails is what appeals to many people. But the fact dovetail joints look great is really a happy accident. Strength is the dovetail's strong suit. Grab the pin board and try to pull the joint apart — it's just about impossible.

THROUGH DOVETAILS

The first dovetails were what we now call "through" dovetails, shown at left above. The ends of both boards are visible in this kind of joint. Today, through dovetails are common on boxes and blanket chests where they make a great decorative accent.

HALF-BLIND DOVETAILS

Half-blind dovetails (above right), on the other hand, are only visible on one side of the joint. The tails are shorter and fit into sockets cut only partway through the pin board's thickness. Half-blind dovetails are typically used when there's need for a strong joint that's hidden from view.

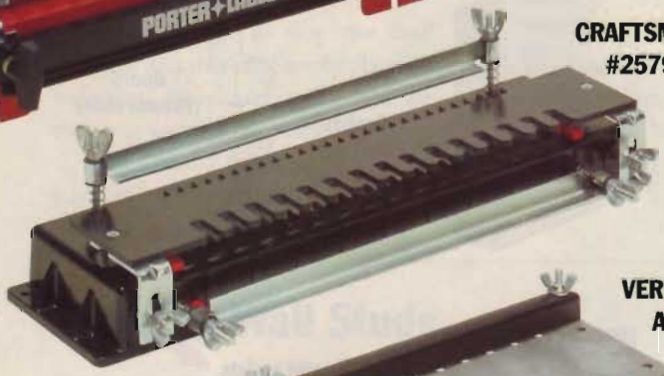
That makes half-blind dovetails great for drawer joints. The "pin" board is used as the drawer front, so the joinery doesn't show. Pull the drawer open, and the sides have no choice but to come along with the front since they're locked together.

Even non-woodworkers are often familiar with half-blind dovetails, since they're used in many high quality kitchen cabinets.

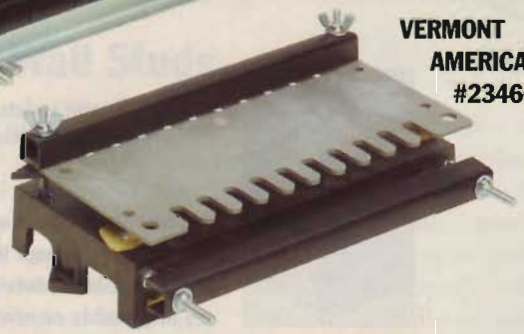
With these things in mind, let's look at the three main types: jigs that cut half-blind dovetails, those that cut through dovetails, and combination jigs that cut both. (I won't get into "positioning" jigs, such as the Incra, here. I'll save them for a later time.)

Half-Blind Dovetail Jigs

PORTER-CABLE #4112



CRAFTSMAN #25790



VERMONT AMERICAN #23460

Half-blind dovetails are great to use on drawers, since the joint is visible only from the side.

Having a half-blind dovetail jig is like setting up a miniature assembly line in the shop. If you're building kitchen cabinets or a chest of drawers, buying one of these jigs is a good place to start.

One of the best reasons to start with a half-blind jig (pictured above) is price. They are, in general, the least-expensive dovetail jigs. The Vermont-American only cost me $40 at a home center. The Porter-Cable, even with its all-metal construction, was still under $100. Other half-blind jigs — and there are a bunch of them — are priced somewhere in between.

Need more reasons to buy one? No problem. As I said, if you're building drawers, these jigs are great. Setting one up just to make drawers may seem like a hassle. And I'll admit it, setup does takes a little time, but it only has to be done once. After that, all that's needed for tight fitting joints is a bit set at the proper cutting depth.

Once the initial setup is done, you can turn out drawers quicker than with about any other joinery method. Plus, since the joints lock tightly together, getting the drawer glued up square is easy.

Part of the reason half-blinds are so quick and easy is that both of the mating boards are clamped and cut at the same time, as shown in *Figure 1*. Stop blocks on the jig even establish the necessary offset between the pieces automatically.

The router — fitted with a dovetail bit — rides on a template often called a comb *(Fig. 2)*. A bushing mounted to the router base follows the template's fingers, guiding the router and bit, as shown in *Figure 3*.

To use the jig, just move the router in and out of the template's fingers. It's almost foolproof. I say almost because you can mess up by *lifting* the router *up* after cutting, rather than *sliding* it *out*. Do this, and the bit may chew right through the template. I'm not too proud to admit that I've done it before, but only once!

On the downside, most half-blind jigs won't accept very wide boards. But drawers usually aren't more than 5" or 10" high.

EASY-SETUP STOP BLOCK

A single stop automatically positions the workpieces with the proper offset.

"COMB" TEMPLATE

A template guides the router and bit, cutting tails and sockets at the same time.

GUIDE BUSHING

A guide bushing, secured to the router base, follows the template's fingers.

Through Dovetail Jigs

If your woodworking leans more toward building boxes and hope chests than building drawers, a through dovetail jig may be a better choice for you.

That's because these jigs allow you to create dovetails that look like those traditionally cut by hand.

When it comes to jigs that only cut through dovetails, there are just a couple players in the market. The model 1500 from Keller (near right) is one of a few from that company. The Katie Jig at far right is about the only other choice. Expect to pay around $150 and $250 respectively, including bits.

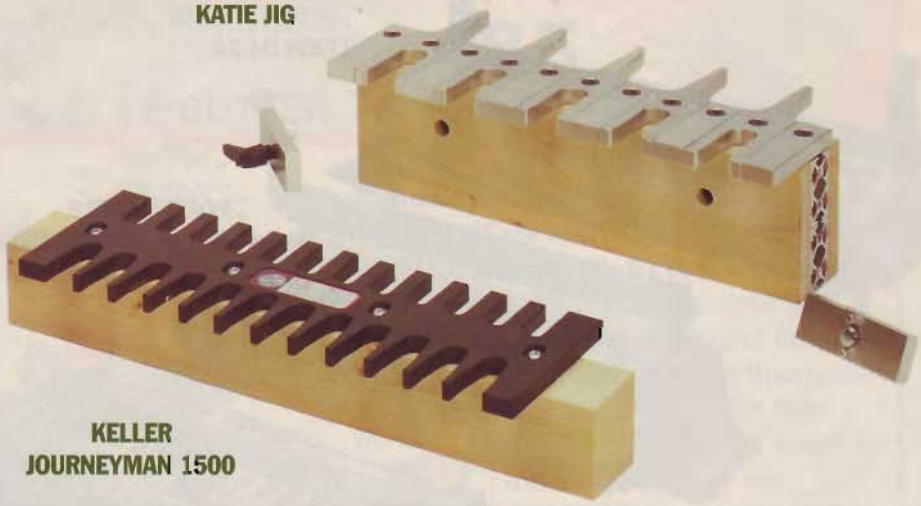
You'll quickly notice that these jigs look quite a bit different than the half-blind models. They don't have clamping bars or knobs; just a two-sided template attached to a base. And instead of the workpiece clamping to the jig, the jig clamps onto the workpiece.

As *Figure 4* shows, the template on a through jig is two sided. One side is for the tails, the other for the pins. That means each board gets routed separately.

Plus, these jigs require two different bits. A tapered dovetail bit cuts the tails, and a straight bit cuts the pins. And instead of using a bushing, these bits are guided by a bearing, as shown in *Figure 5*.

Two bits and a two-sided template means through jigs require more setup time than half-blind jigs.

KATIE JIG



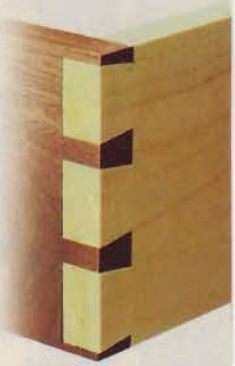
KELLER JOURNEYMAN 1500

The first board to be joined has to be aligned, at least initially, by eye. Then this marking gets transferred to the mating board. Because of that, there's more chance for error. The Katie does have simple stops that help with alignment of the remaining boards, and it's designed so both workpieces can be clamped to the jig at one time.

With either jig you also have to switch bits to cut a complete joint. To keep from switching bits constantly, the manufacturers advise cutting all the tails, then all the pins. Again, alignment can be an issue. If you're lucky enough to have two routers, setting up the straight bit in one and the dovetail bit in the other really speeds up the process.

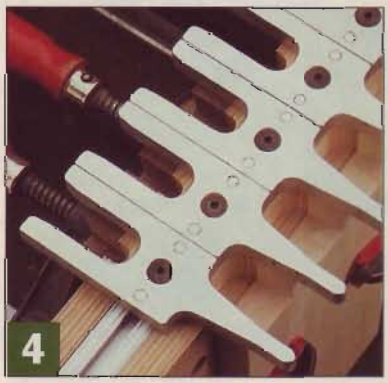
While their design does make them more complicated to use, these jigs offer a nice benefit. As *Figure 6* shows, either jig will handle stock wider than the jig itself.

There are a couple other things worth mentioning about these jigs. The Keller and Katie are remarkably similar in basic looks and operation. In fact, both use the same router bits. But the spacing between the template fingers is adjustable on the Katie, which allows cutting dovetails of varied sizes for more of a hand-cut look.



Through jigs cut "traditional" dovetails faster and more easily (for most folks) than cutting them by hand.

TWO-SIDED TEMPLATES

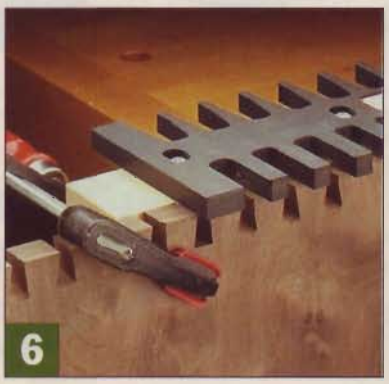


Through jigs have two-sided templates, one for the pins, one for the tails.

BEARING-GUIDED BITS

Two bearing-guided bits — one straight, one dovetail — are used with these jigs.

UNLIMITED WIDTH CAPACITY



Wide stock is no problem for through jigs. Just move the jig and keep cutting.

Combination Dovetail Jigs

Standard half-blind dovetails

Variably-spaced through dovetails

Box joints

Now you've seen jigs that cut just half-blind dovetails, and jigs that cut strictly through dovetails. And they work great. But what happens if you want to be able to cut both through and half-blind joints? That's when you may want to look at one of the big dogs of dovetailing, the do-it-all combination jigs.

As the name implies, these jigs will cut half-blind and through dovetails. In some cases, combination jigs will cut other joints such as box joints, sliding dovetails, and dovetails with unusual shapes.

It probably goes without saying, but expect to pay more for a combination jig than for either type of single-purpose jig. How much? Prices range from around $120 for the Craftsman at bottom left, to $350 or so for the Leigh at top left. Again, there are models priced in between.

Don't think, though, that you'll get everything you need to cut every joint for that price. Manufacturers differ on this. Craftsman includes both through and half-blind templates. The Porter-Cable comes with a half-blind template only. Leigh's template can cut both types of joints. All manufacturers offer accessory templates, as shown in *Figure 7.*

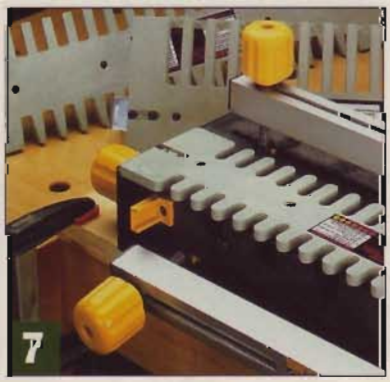
Though you will lay out more money to fully accessorize these jigs, their versatility is impressive. And remember that the Porter-Cable and Leigh jigs were designed with professional woodworking and cabinet shops in mind. You could park a truck on either one.

Like half-blind jigs, combination jigs are stationary, with the workpieces clamping to the jig. And that means there are restrictions on the width of stock the jigs can handle. Sizes up to 24"-wide will accommodate most any need, though.

In order to cut so many types of joints, combination jigs do have a lot of stops that need adjusting *(Fig. 8).* On some jigs you can also adjust spacing between pins, and even the width of the pins *(Fig. 9).*

If you want to do it all, a combination jig may be for you.

MULTIPLE TEMPLATES



By using multiple templates, combination jigs cut a variety of joints.

ADJUSTABLE STOPS

Stops on combination jigs adjust independently for different operations.

ADJUSTABLE SPACING

Some templates allow variable spacing to give the dovetails a hand-cut look.

DECISIONS, DECISIONS

A one-page description of each type of dovetail jig can't possibly tell you everything you need to know before buying one. But my idea here isn't to recommend a specific brand. What I can do is offer some insight on which type to buy, based on my own experience, and that of the *Workbench* staff.

I said up front that the variety of jig types and prices complicates making a decision. But if you're looking for your first dovetail jig, I think the choice is simple — buy a half-blind jig.

First, half-blind models are by far the least expensive. And to me it doesn't make sense to pay for extra bells and whistles that may not get used. Down the road, you can always upgrade to a more sophisticated model.

Second, half-blind jigs are the easiest to understand. Cutting dovetails means working with your pieces inside out and backwards. That's confusing enough without needing to make umpteen adjustments just to get started.

Third, we all dream of building heirloom projects. But for most DIY woodworkers (at least those of us at *Workbench*) the projects on the must-do list get higher priority than any on the want-to-do list. For me the must-dos include shop-built kitchen cabinets (see the story on page 40), night stands, a chest of drawers, and a computer desk for a friend.

All of those projects have one thing in common: drawers. And I have yet to find a faster, simpler way to build drawers than with a half-blind jig. Try it sometime and I think you'll agree. (By the way, my jig is the simple kit version, shown at right.)

Once you've mastered half-blinds, you may get the itch to try through dovetails. Then you'll have to decide which way to go — a through jig or combination jig. Things get a bit more sticky here.

To my eye, jigs that cut just through dovetails are easier to use for projects like blanket and hope chests. These projects usually mean dealing with panels that are long and wide. That makes them tough to wrestle into a jig. Clamping the jig to the workpiece and being able to move it to accommodate wide stock is easier.

So when do I recommend a combination jig? If you want the freedom to cut both types of dovetails, and you'll be cutting a lot of them, a combination machine may be your best choice. And by all means, if you do any production-type work, get one of the heavy-duty models.

While you're out shopping, don't forget there are a few other things you'll probably need to get started. They're shown below.

ACCESSORIES AND OPTIONS

Dovetail jigs don't usually come with everything you need. Be sure to check the package for anything else you have to buy. Chances are you'll need a bit (or bits) and at least one size guide bushing. For information on dovetail jig and accessory manufacturers, see *Sources & Resources* on page 86.

Bits: Half blind jigs just require one bit, generally a ½"-cut, 14° dovetail bit. Through and combination jigs require a straight bit as well. Invest in good quality, carbide-tipped bits for the best performance.

Bushing-guided dovetail bits

Bearing-guided dovetail bits (with collet)

Guide Bushings: Router manufacturers make guide bushings for their routers, or you can pick up a universal base and guide bushing set for under $20 that fits most round-base routers.

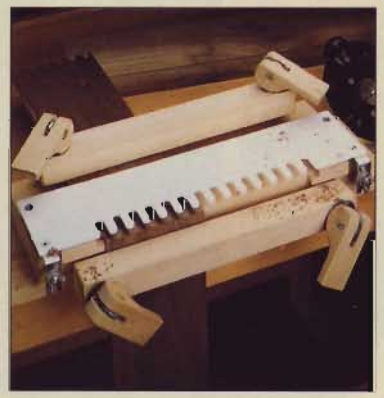
Porter-Cable guide bushing

Vermont-American universal base and bushings

Ready-to-Assemble Dovetail Jig: This jig kit has been a favorite of woodworkers since our friends at *Woodsmith* magazine designed it over a decade ago. The kit includes the solid maple body, all hardware, and a template for cutting ½" dovetails. You supply a ½", 14° dovetail bit and a 7/16" guide bushing.

#5002-200 . . . . . $89.95

Call Workbench Project Supplies at (800) 311-3994. Use CODE B100



Space-Saving Bench

No room in your shop for a full-size workbench? No problem. This sturdy fold-down version is perfect when space is at a premium. Small in size, it's big on features.

When we began thinking about featuring a new workbench plan, we asked Ken, one of our designers, to come up with a design that met the two most important criteria of all good benches:

1. The benchtop had to be strong enough to withstand daily pounding.
2. It had to be sturdy, not something that was going to scoot across the floor like a tool cart on wheels when you tried to plane a board.

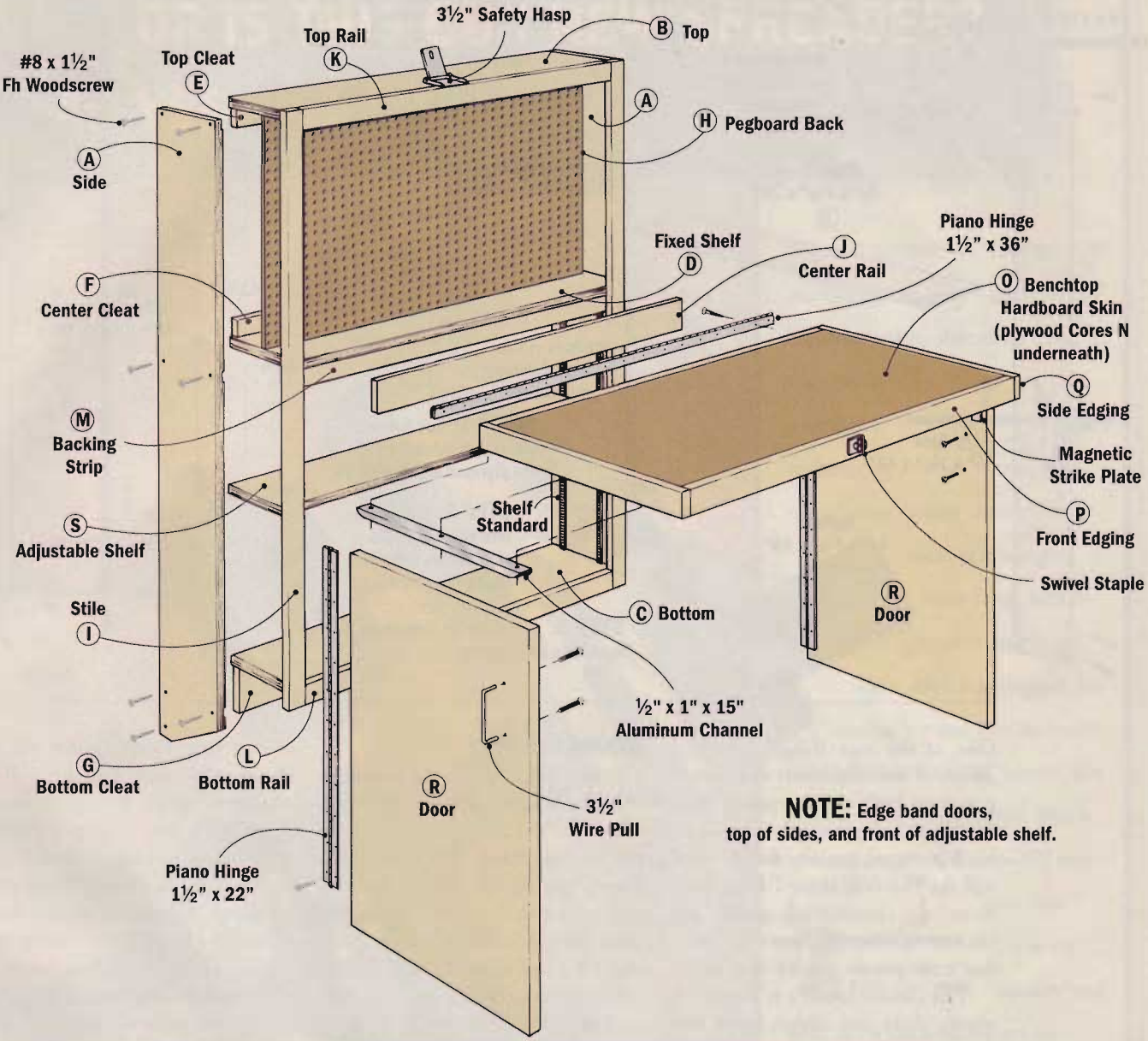
Did I mention it couldn't take up any more space than a standard card table?

Well, this fold-down version passes with flying colors. The solid benchtop provides a durable surface for assembling, sanding, even finishing. Plus, fastening the cabinet to the wall makes it sturdy enough to stand on.

Now for the best part. It also offers plenty of storage. And when it's time to close shop, the bench folds up out of the way.

FOLD-DOWN BENCH CONSTRUCTION VIEW

OVERALL SIZE: 36¼"W x 47"H x 26¼"D (Open), 9⅝" (Closed)



NOTE: Edge band doors, top of sides, and front of adjustable shelf.

MATERIALS LIST

LUMBER:

A	(2) Sides	¾" x 7¼" x 47"*
B	(1) Top	¾" x 7¼" x 35"
C	(1) Bottom	¾" x 7¼" x 35"
D	(1) Fixed Shelf	¾" x 7¼" x 35"
E	(1) Top Cleat	¾" x 1½" x 35"
F	(1) Center Cleat	¾" x 1½" x 35"
G	(1) Bottom Cleat	¾" x 3½" x 35"
H	(1) Pegboard Back	¼" x 17¼" x 34¾"
I	(2) Stiles	¾" x 1½" x 44¼"
J	(1) Center Rail	¾" x 2¼" x 33¼"
K	(1) Top Rail	¾" x 1½" x 33¼"
L	(1) Bottom Rail	¾" x 1½" x 33¼"
M	(1) Backing Strip	¾" x 1½" x 34¾"
N	(2) Bnchtp Cores	¾" x 16½" x 34¾"
O	(1) Hardboard Skin	⅛" x 16½" x 34¾"
P	(2) Frt/Back Edging	¾" x 1⅝" x 34¾"
Q	(2) Side Edging	¾" x 1⅝" x 18"
R	(2) Doors	¾" x 16½" x 24"*
S	(1) Adjustable Shelf	¾" x 7¼" x 34"*

HARDWARE:

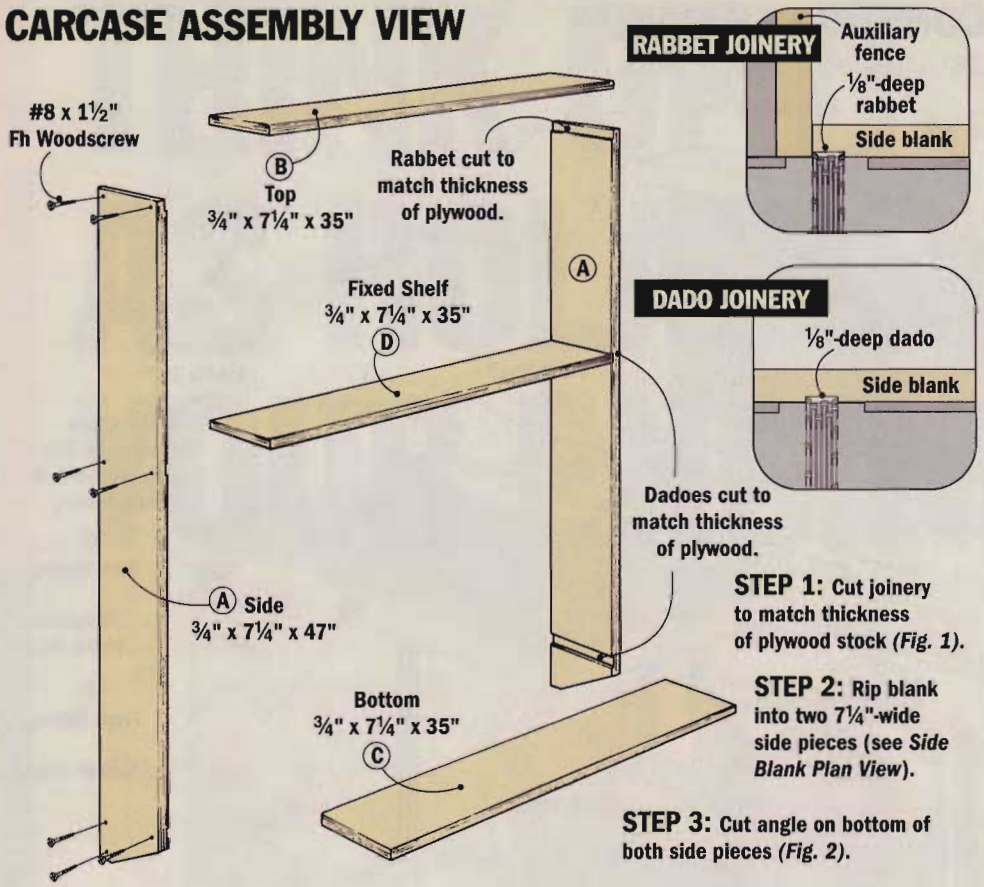
- (14) #8 x 1½" Fh woodscrews
- (10) #8 x ¾" Fh woodscrews
- (4) #8 x 1¼" Fh woodscrews
- (1) 1½" x 36" Piano Hinge
- (2) 1½" x 22" Piano Hinges
- (1) ½" x 1" Alum. Channel (cut two 15"-long sections)
- (4) 24"-Long Shelf Standards w/screws
- (2) Magnetic Catches w/screws
- (1) Safety Hasp w/screws
- (3) 3½" Wire Pulls w/screws
- (4) 3½"-long Hardened Screws f/mounting
- ⅞" x 17' 6½" Veneer Edge Banding

CUTTING DIAGRAMS:

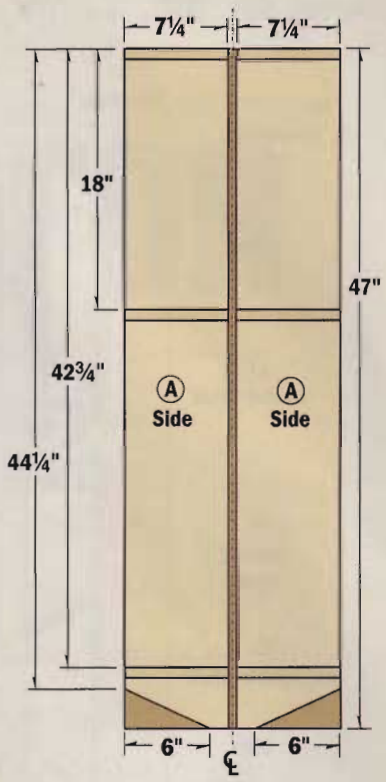
Turn to page 86 for information about obtaining cutting diagrams for this project.

*Apply veneer tape to the edges of the doors, the top of the side pieces, and the front edge of the adjustable shelf.

CARCASE ASSEMBLY VIEW



SIDE BLANK PLAN VIEW



One of the nice things about the design of this fold-down workbench is that it's built almost entirely from one sheet of plywood. I used ¾" birch plywood, but any flat plywood will do. The only thing I'd stay away from is construction-grade ply because it often has bows or warps that make precise joinery impossible.

The carcase joinery is simple — mostly dado and rabbet joints that are fastened with glue and 1½" woodscrews. I started by building the carcase. It's an open box with a fixed shelf *(Carcase Assembly View)*.

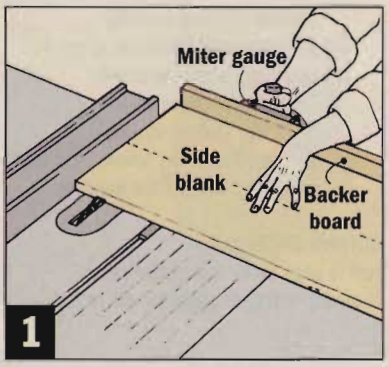
MAKING THE SIDES

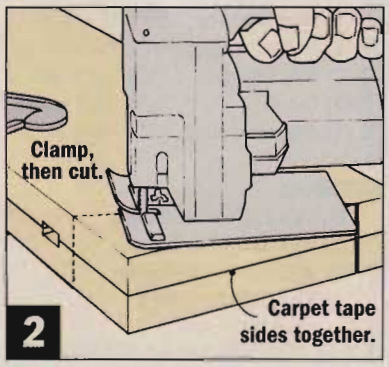
The first step is to cut the two sides (A). Here's a tip: Start with an extra-wide (15") blank for these side pieces *(Side Blank Plan View)*. This allows you to cut the dadoes and rabbets across both pieces at the same time so they'll be perfectly aligned. Later, after all the joints are cut, the blank can be ripped in half.

The first joint to cut is a rabbet on one end of the blank *(Rabbet Joinery)*. Then cut a dado near the opposite end *(Dado Joinery)*, and another dado slightly above center to accept a fixed shelf. (Note: Don't assume the ¾"-thick stock you bought will be exactly ¾" thick. It's a good idea to make some test cuts in a piece of scrap before making the actual cuts.)

You'll see in *Figure 1* below that I used both the miter gauge and the rip fence (as a stop) when cutting these joints. This is safe because you're not cutting all the way through the workpiece. Notice that the joints are cut all the way across the blank. There's no need to cut stopped dadoes or rabbets because hardwood edging will eventually cover the carcase edges.

Once the joinery is cut, go ahead and rip the two mirrored sides to 7¼" wide. There's one more detail on the sides. Take a look at *Figure 2* to see how I cut matching angles on the bottom of each piece using a jig saw.





CUTTING THE TOP, BOTTOM, SHELF

The carcase top (B), bottom (C), and fixed shelf (D) can be cut next. They're all identical — ¾"-thick plywood cut to the same width as the sides (7¼") and 35" long.

After they're all cut to size, you can start assembling the pieces that will make up the finished cabinet.

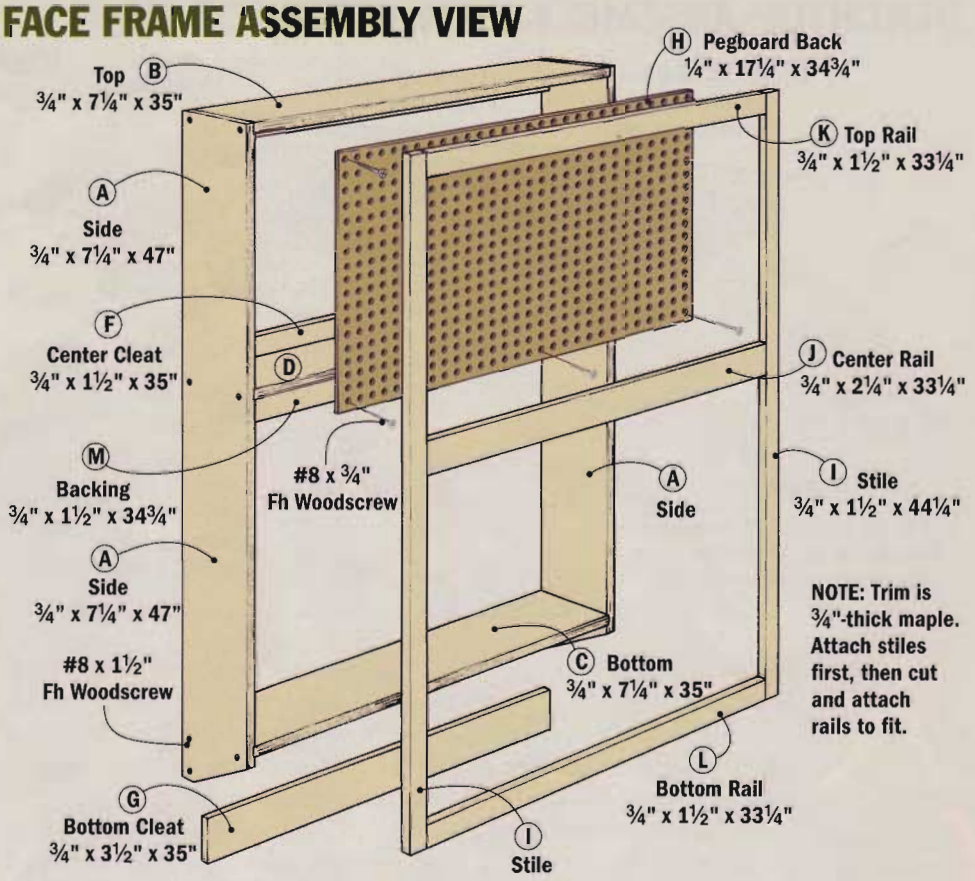
ASSEMBLING THE CABINET

Take a look at the *Cabinet Assembly Sequence* below to see the steps I used to put the pieces together. In *Figure A*, the basic carcase is assembled. To do this, glue and screw the top (B) and bottom (C) in place, along with the fixed shelf (D). Clamp across the carcase's width while the glue dries.

With the carcase still lying face down, measure between the sides to get an exact length for three hardwood cleats (E, F, G). These offer extra support and provide a solid surface for attaching a pegboard back. After cutting the cleats, glue and clamp them into the carcase *(Fig. B)*.

Now, flip the assembly onto its back to attach the 1/4" pegboard back panel (H). This is a cut-to-fit step. An advantage of using pegboard is that you can attach it by screwing through the *existing* holes directly into the top and center cleats *(Fig. C)*.

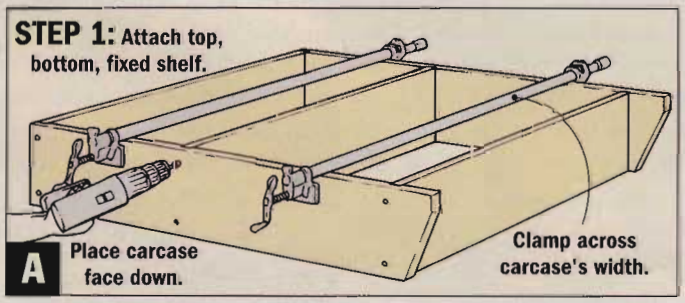
FACE FRAME ASSEMBLY VIEW

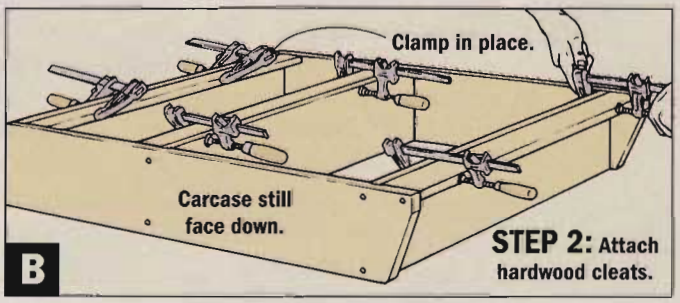


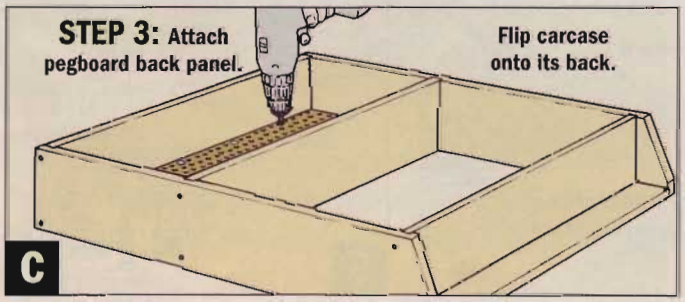
ATTACHING THE FACE FACE

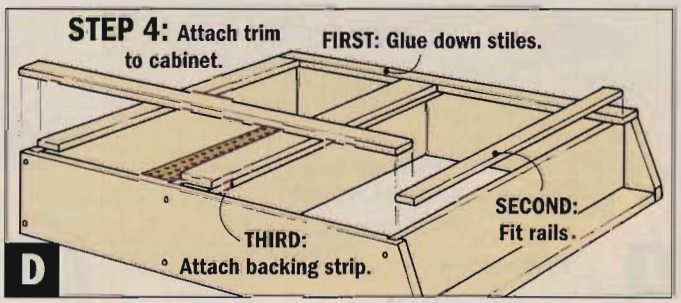
To complete the cabinet, I covered the exposed plywood edges on the front with 3/4"-thick maple trim as seen above in the *Face Frame Assembly View*. I attached the stiles (I) first, then cut rails (J, K, L) to fit between them as shown in *Figure D*. This way the exposed end grain is on the top and bottom of the cabinet, where it isn't noticeable. (Note: The center rail (J) is wider than the other two.) To give the fold-down benchtop extra support, I added a backing piece (M) behind the center rail (J).

CABINET ASSEMBLY SEQUENCE

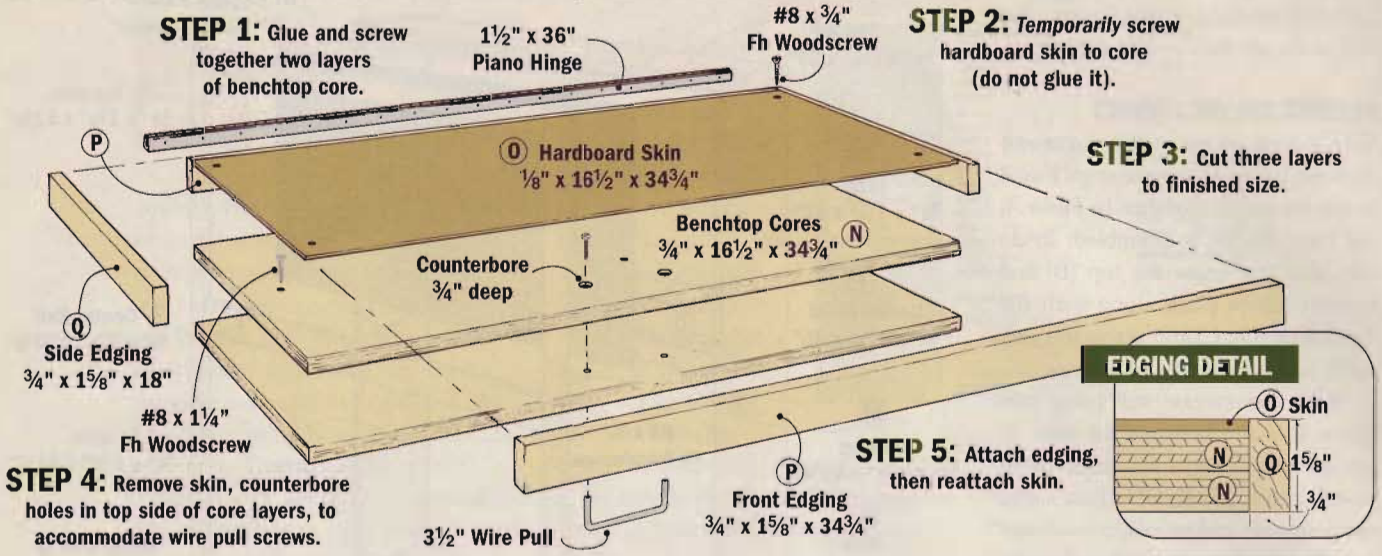








BENCHTOP ASSEMBLY VIEW (WITH EDGING)



BUILDING THE BENCH

After completing the cabinet, work can begin on the fold-down benchtop. To create a strong work surface, I used a three-layer top as you'll see above. Two pieces of ¾" plywood are glued together to form a solid core. And a ⅛"-thick removable hardboard skin provides a durable work surface. The entire benchtop is edged with ¾"-thick solid wood.

To make the benchtop, start by rough cutting the two core (N) pieces and the hardboard skin (O) slightly oversized. You'll cut them to finished size later.

Next, spread an even coat of wood glue on one layer of the plywood core. Position the second layer of plywood on top of the first and apply pressure so the two layers adhere. If you can't get clamps in the middle of the top, you can screw them together to keep the layers from shifting while the glue sets, or use contact cement. (If you countersink four #8 x 1¼" woodscrews, you can leave them in place permanently.)

The next step is to *temporarily* screw (don't glue) the hardboard skin in place *(Fig. 3)*. I used four #8 x ¾" woodscrews instead of simply gluing on the skin so that it could be easily replaced if it gets banged up later. As an added bonus, this also gave me access to attach the screws for a pull, which I'll get to shortly.

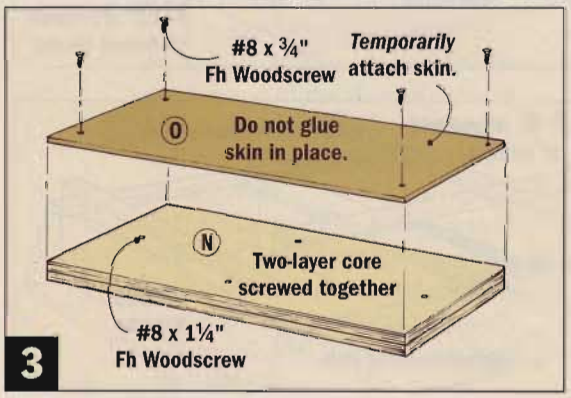
With the three layers assembled, cut the benchtop to finished size as shown in *Figure 4*. Notice that the length of these pieces is 1½" less than the overall width of the cabinet. This leaves room to attach the ¾"-thick solid wood edging (P, Q, R) all around the benchtop as you can see above.

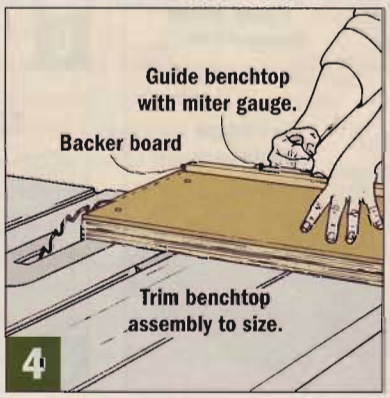
SOMETHING TO CONSIDER

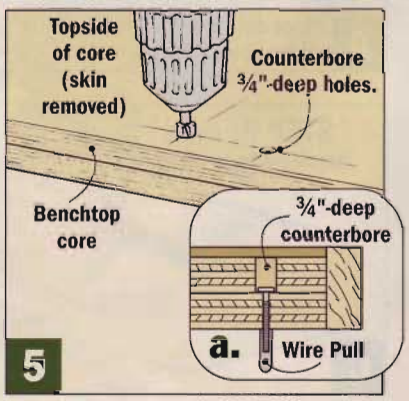
There's one more thing to take care of before you actually apply the edging. And that's to remove the hardboard skin and set it aside for awhile. You're probably wondering why. I try to avoid attaching then removing pieces when I'm building projects as much as possible. But in this case, I think it's justified. Here's why:

I wanted to attach a wire pull as a door handle to my benchtop, but the screws that came with it weren't long enough to reach through both layers of the benchtop core and the hardboard skin.

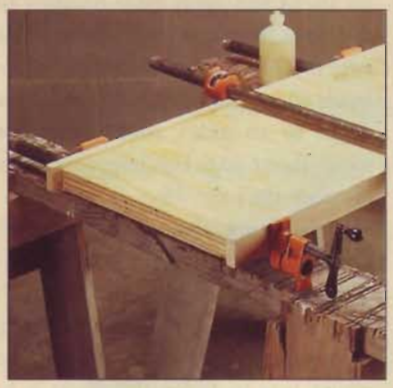
To get around this problem, I counterbored holes in the topside of the benchtop core as seen in *Figure 5* below. This allowed me to sink the pull screws halfway through the core *(Fig. 5a)*. Now go ahead and drill the holes, but don't get in a







ATTACHING SOLID WOOD EDGING



STEP 1: Glue extra-long front and back strips flush with the bottom of the benchtop core. Clamp in place.

STEP 2: Trim ends flush using the table saw. Side edgings can be attached and trimmed the same way.

STEP 3: Use a block plane to remove a thin shaving. Leave edging just a hair above the surface of the hardboard skin. Remove the last bit with a sanding block.

hurry to actually attach the pull quite yet. First you need to cover the exposed edges of the benchtop.

COVERING THE EDGES

You could use veneer to cover the benchtop edges. But on projects that are going to take a few knocks, I prefer solid wood edging.

Take a look at the series of photos above to see the steps I used for attaching the solid wood edging. The first step is to rip front and back edging strips (P) from a piece of 1x4 stock. I like to cut these pieces a little long so I don't have to worry about getting them flush at the ends when I'm clamping them in place *(Step 1)*. Then I can come back after they've dried and trim them flush with the benchtop core *(Step 2)*. Simply repeat these steps for the side edgings (Q).

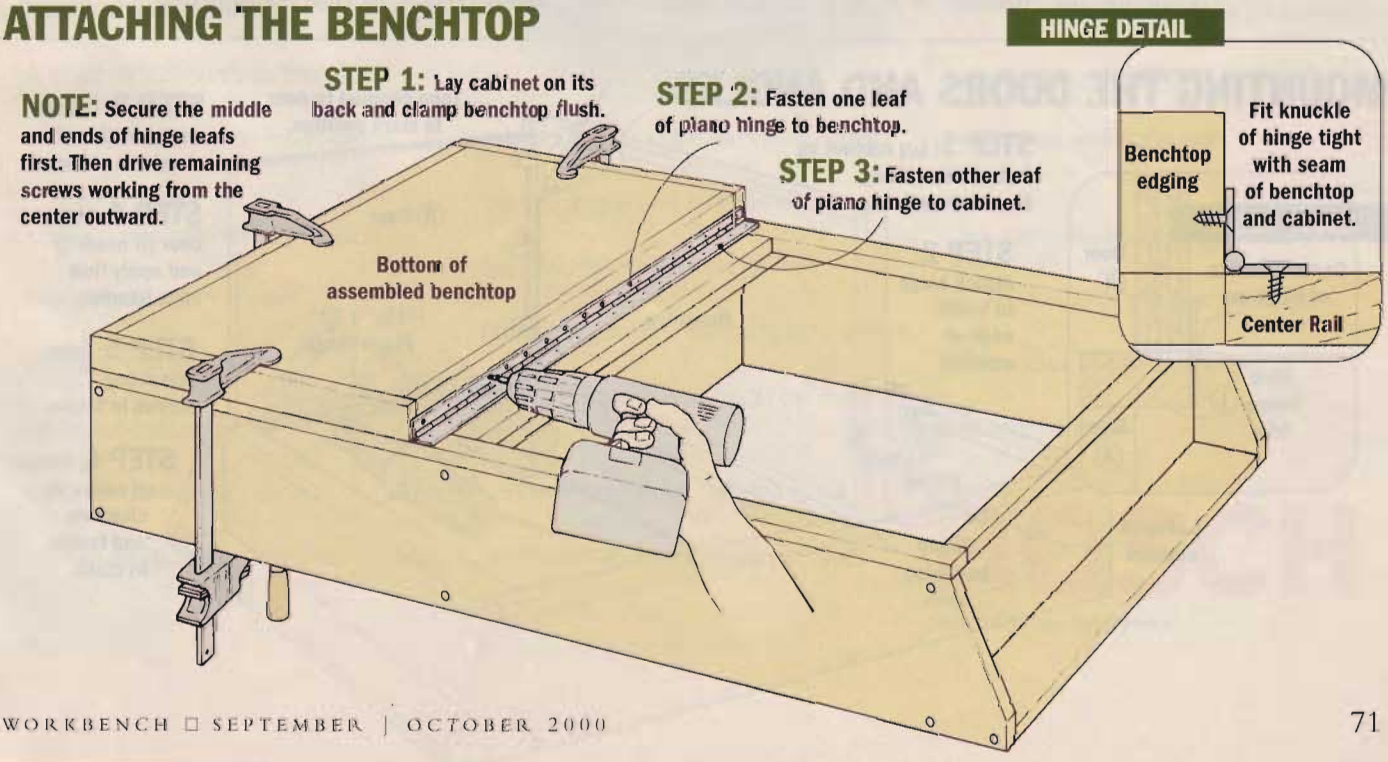
Now you can mount the door pull and screw the hardboard skin piece you set aside earlier back in place. Next plane and sand the edges of your assembled benchtop smooth *(Step 3)*. Go easy. You only want to remove material from the edging — not the hardboard or plywood.

ATTACHING THE BENCHTOP

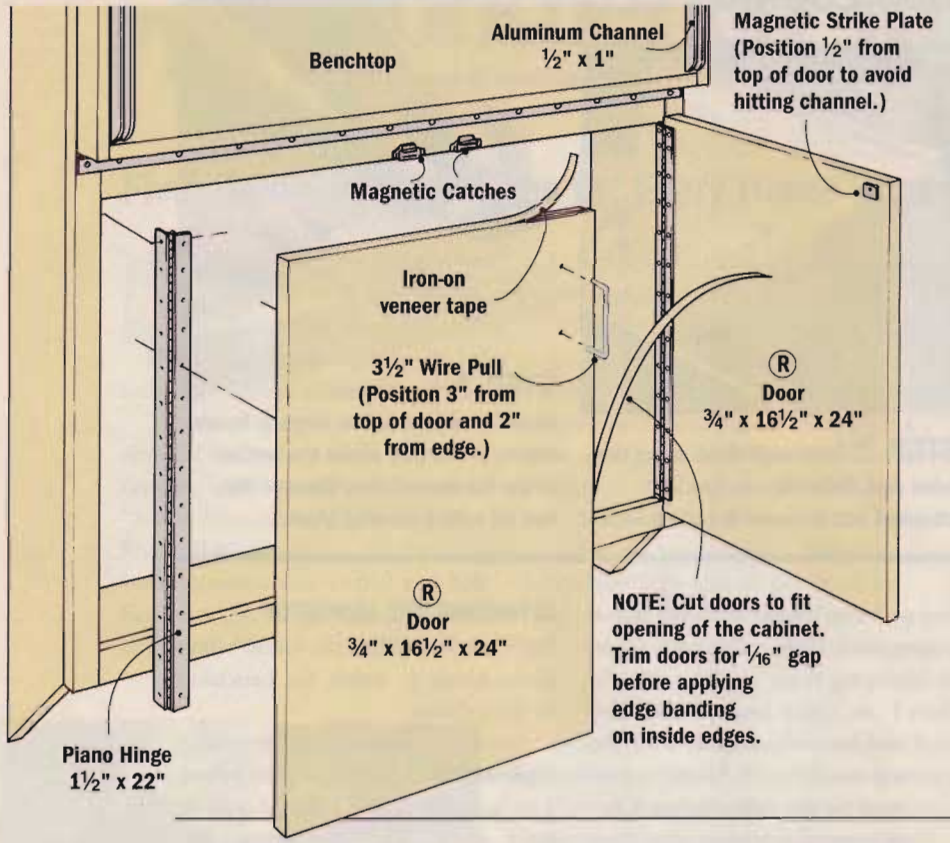
For extra strength, I used a 36"-long piano hinge to attach the benchtop to the cabinet.

Start by clamping the benchtop flush with the cabinet as seen below. The knuckle of the hinge should fit tight along the seam where the benchtop and cabinet meet *(Hinge Detail)*. Secure one hinge leaf to the benchtop first with a screw in the middle and on both ends, then work from the center outward. Repeat this procedure to attach the other hinge leaf to the cabinet.

ATTACHING THE BENCHTOP



DOORS ASSEMBLY VIEW



ATTACHING THE DOORS

Once the benchtop is attached, the next steps are to add two lower doors and two aluminum channels on the bottom of the benchtop.

In addition to covering the bottom of the case, the doors also support the benchtop when it's folded down for use. Because of this, I needed a way to hold the doors secure in the open position. By capturing their top edges in channels, I was certain the doors wouldn't close if they accidentally got bumped.

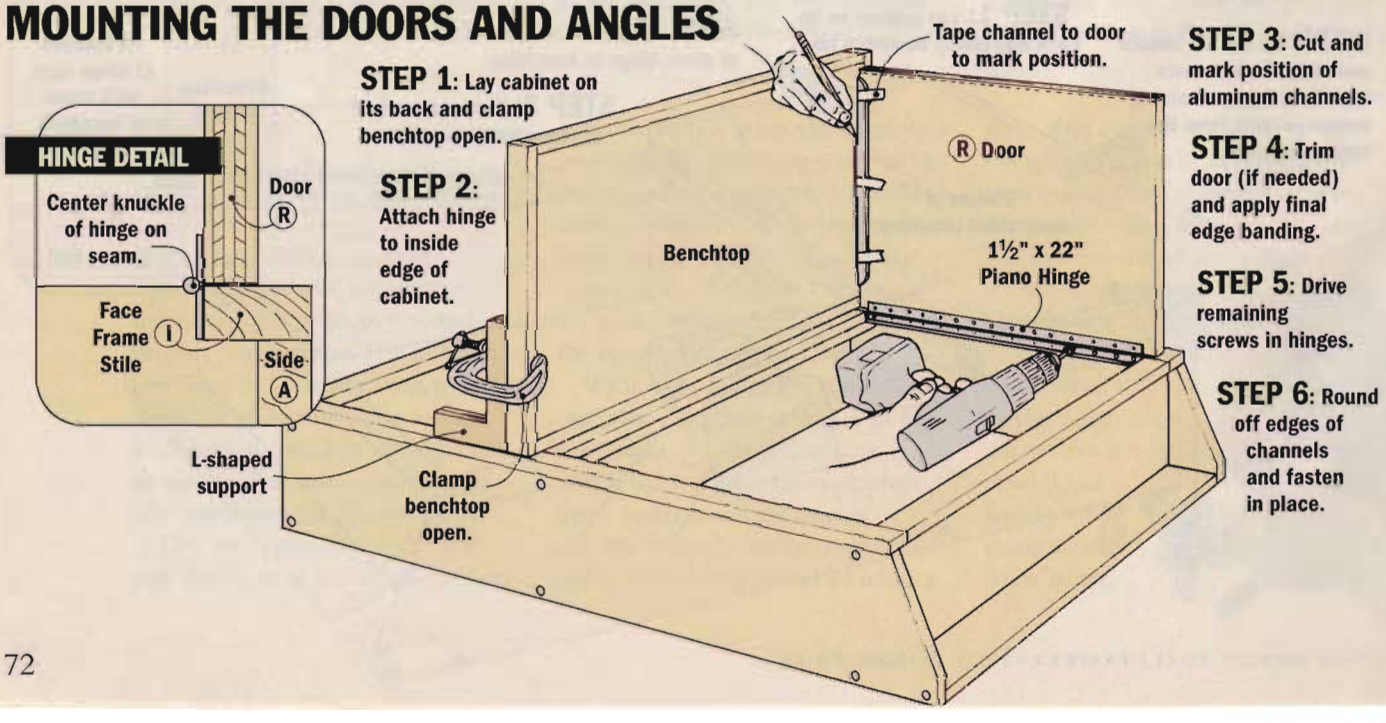
Start with the doors. They're two identical pieces of edge-banded ¾" plywood (R) cut to fit the opening of your cabinet *(Doors Assembly View)*. After cutting the doors to fit the opening (mine were 16½" x 24"), go ahead and apply edge banding to the tops, bottoms, and the outside edges. (Don't apply banding to the *inside* edges quite yet. You'll trim the doors to an exact *width* later.) For more about edge banding, turn to *In the Shop* on page 76.

Positioning the doors becomes critical because they support the fold-down bench. To provide as much support as possible, I used a 22"-long piano hinge to attach each door. The easiest way to fasten the doors is to lay the cabinet on its back and clamp the benchtop in the open position as you'll notice in the drawing below.

I found it helpful to start by fastening the hinges to the inside edge of the cabinet face frame first with three screws, aligning the screw holes with a center punch. Center the knuckle on the seam where the door and face frame meet *(Hinge Detail)*. This will create a slight (⅛") gap when the doors are opened.

Now's a good time to cut the aluminum channels to length (15") and mark their locations. To do this, tape a channel to the top of the door as seen below. With the channel tight against the bottom of the benchtop, move the door into position and drive three screws into the hinge to hold the door in place. The other door can be fastened the same way.

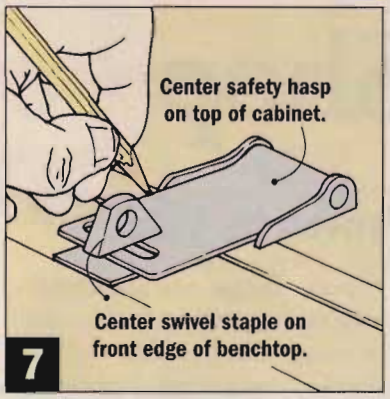
MOUNTING THE DOORS AND ANGLES

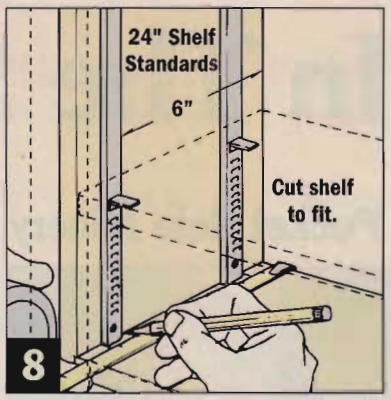


Before driving the remaining screws in the hinges, remove the clamp on the benchtop and make sure the doors operate easily and are aligned. You may need to trim a bit off the inside edge of each door before you apply the final strip of edge banding. What you're looking for is a consistent $1/16$" gap. Now drive the remaining hinge screws.

Before fastening the aluminum channels to the bottom of the benchtop, it's a good idea to round off their edges with a file so that they don't scuff up the doors. After softening the edges, fasten the channels to the benchtop.

To make it easy to open and close the doors, I installed a pair of wire pulls for handles and two magnetic catches (one for each door) as shown in the *Doors Assembly View* on the previous page. Finally, I centered a safety hasp on the top of the cabinet *(Fig. 7)*. This serves a dual purpose. First, it secures the benchtop in the closed position and second, it allows you to add a padlock to secure the contents of the cabinet.





ADDING A SHELF

All that's left to complete the fold-down workbench is to add a $3/4$" edge-banded plywood shelf in the bottom part of the cabinet.

To support the adjustable shelf, start by positioning four shelf standards (two on each side) equally spaced from the front and back edges of the sides *(Fig. 8)*. Then measure lengthwise between them to get an exact length for your shelf. Cut a shelf (S) to fit, then apply banding to the front edge.

While I was banding the shelf, I also added small banding strips to the exposed tops of both sides of the cabinet. This is the only other part of the cabinet that receives banding.

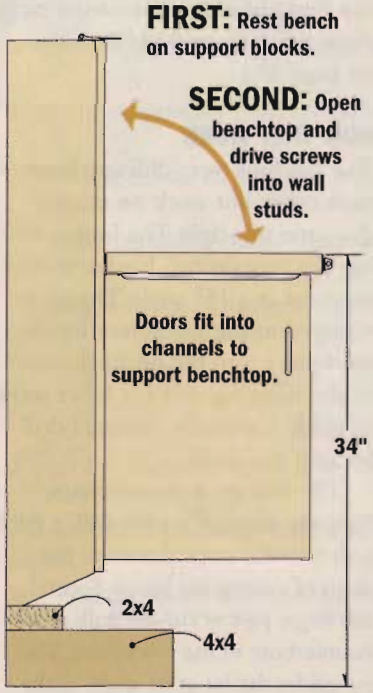
MOUNTING THE WORKBENCH

Now that the workbench is complete, it can be mounted to a wall. Before actually mounting it, you'll want to determine the ideal height to position the bench so that it's comfortable. Here's a tip: A good way to determine benchtop height is to stand holding the palm of your hand parallel to the floor and measure the distance from the floor to your palm. (For me, that was 34".)

Take a look at the photo below to see how I fastened the workbench to the wall. The nice thing about this method is that you can do it alone.

To support the cabinet, I used two short lengths of 4x4's and a 2x4 cut a little bit longer than the width of the cabinet, see *Mounting Detail* below. This will allow you to accurately position the height of the workbench and keep it level.

MOUNTING DETAIL

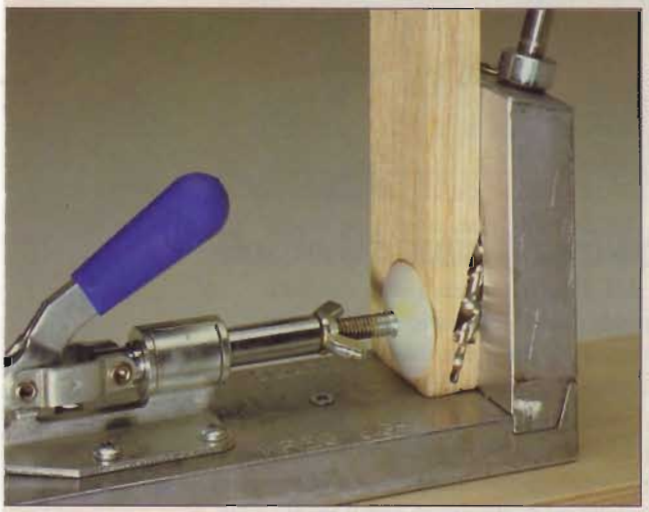


Carefully maneuver the workbench into position on top of the 2x4. Finally, to attach it to the wall, fold down the benchtop to gain access to the back. Now it's just a matter of driving six $3\frac{1}{2}$"-long hardened screws (three in the top cleat and three in the middle cleat) through the existing holes in the pegboard back into the wall studs.

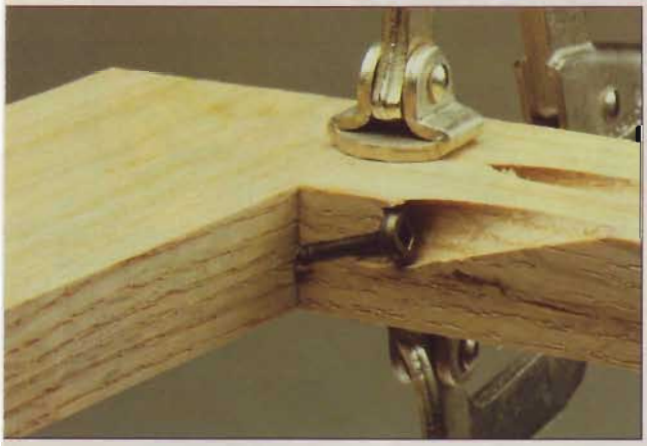
After using your first fold-down workbench a short while, you'll probably want another one for the laundry room or basement.

In The Shop

Pocket Hole Joinery Proves Its Value



The cutaway above shows a stepped bit drilling a pilot hole and a pocket hole in the workpiece. Notice that the point of the drill bit stops short of the end of the board.



Another cutaway shows a self-tapping screw seated in the pocket hole. A special clamp holds the faces flush.

LEFT: The Kreg Jig.
BELOW: The Rocket.
Both are from Kreg Tool Company.

If you're like me, you've probably seen those pricey pocket hole jigs in woodworking catalogs and wondered a couple things: First, how do they work? Second, why would I ever need one?

Until recently, I wouldn't have been able to answer either question. But the kitchen cabinet project on page 40 gave me the chance to find out just how pocket hole joinery works and why it's one of the best things to come to the woodshop in a long time.

A pocket-hole joint couldn't be much simpler. It's basically a butt joint that's held together with woodscrews. What makes this technique unusual is that the screws are driven into elliptical-shaped holes bored at an angle into one of the mating pieces. Boring the holes requires a jig and a special drill bit.

We used two different styles of jigs for our kitchen cabinets: The Kreg Jig and The Rocket, both from Kreg Tool Company. (You can find ordering information on these jigs in *Sources and Resources* on page 87.)

HOW THEY WORK

The jigs look very different from each other, but work on exactly the same principle. The bodies of the jigs contain two hardened-steel tubes set at a 15° angle. The jig is clamped to the workpiece (or the workpiece into the jig, in the case of the Kreg Jig) and the tubes serve to guide a specially designed drill bit into the stock.

The drill bit does two things. First, the point of the bit drills a pilot hole into the stock that stops just short of exiting the board. Second, the larger part of the bit drills a deep counterbore in the workpiece. The jig guides the bit at an angle so the pocket hole and pilot hole are angled into the wood. It's kind of like toenailing with screws.

To control the depth of the pocket, the bit has an adjustable stop collar. The depth of the counterbore determines how far the woodscrew will penetrate the mating piece of stock.

What's interesting about this technique is that the pilot hole doesn't go into the mating piece of stock. Instead, the system relies on self-tapping screws to make their own way. That's one of the reasons pocket hole joinery is so simple — you only have to drill one piece of stock. Which means you don't have to worry about registering the pieces until you're actually screwing them together.

DRY JOINERY TECHNIQUE

Another nice feature of this technique is that, in most cases, you don't need to glue the joints. The woodscrews offer all the strength you need for most projects. If a joint is going to be under a lot of stress, then I would recommend gluing in addition to the screws.

I really appreciated not having to bother with glue when I built the face frames for the kitchen cabinets. By using pocket hole joinery, I didn't have to rush while trying to bring several glue joints together at the same time.

If there's a downside to pocket hole joinery, it's the big holes that get bored into the workpiece. Usually you can plan the joinery so the holes are hidden on the back of the workpiece. Otherwise, there are plugs available to hide the holes. And it's important to remember that you wouldn't want to use this technique when the look of the back of the joint is critical.

Iron-on Edge Banding Offers Simple Solution to Exposed Edges

Constructing projects from sheet goods often means you have to cover the ends of the wood to hide the ply or particleboard core. And even though the *Space-Saving Bench* on page 66 is a shop project, I decided to give the exposed edges on the adjustable shelf and lower doors a finished look.

Rather than go to the trouble of making hardwood edge banding and then gluing it on, I decided on a simpler solution — hardwood veneer edging.

There are several types of veneer edging, but the kind I like to use has hot-melt glue already applied to the back. It's available at most home centers and is remarkably easy to use. All it takes is a standard clothes iron to heat the glue while applying the banding to the edge of the board *(Fig. 1)*.

After applying the edging, and while the glue is still hot, use a roller or a block of wood to press it down and get rid of any wrinkles *(Fig. 2)*.

The edge banding is available in several widths, so choose banding that is slightly wider than the thickness of the stock you're working with. That way it doesn't have to be lined up perfectly as you apply it.

The excess width can be trimmed off with a razor knife or a special edge trimmer that you can buy at the same place you found the veneer *(Fig. 3)*. Sand the edges lightly and the piece is ready for finishing *(Fig. 4)*.

As simple as this edging is to use, there are a few lessons I learned while using this stuff the first time.

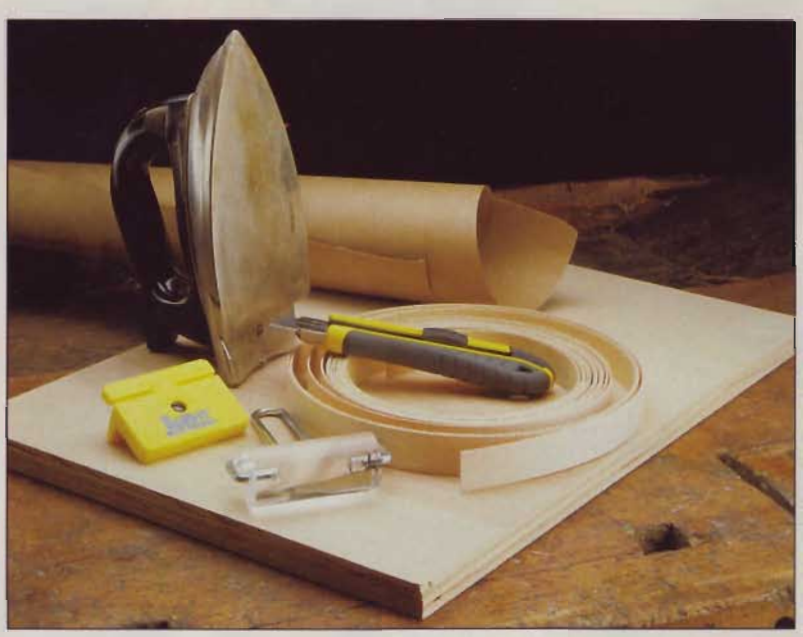
First, use a piece of kraft paper (a brown paper grocery sack worked for me) or aluminum foil between the iron and the banding to keep from scorching the banding.

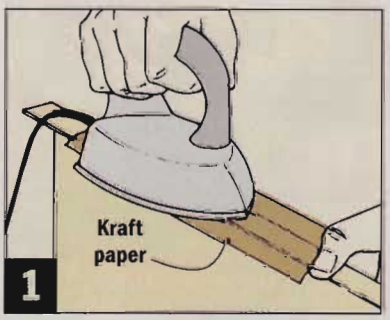
Second, take some time to experiment with heat settings on your iron before working on a piece that matters. The instructions on the package recommended the "cotton" setting on my iron. But I found a slightly cooler setting worked and didn't give the veneer the glazed look that overheating can cause.

Third, be careful trimming the excess. As thin as this stuff is it tends to tear along the grain, even using a trimming tool.

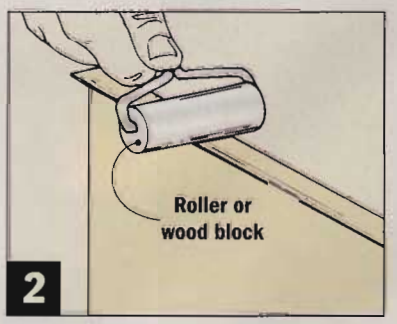
One last thing to watch out for is the places where the veneer was spliced together onto the adhesive backing. This is usually a fingerjoint that's mostly invisible. These spots peel and separate, when the banding is applied on a curved surface.

Fortunately, if you do have problems, you can just reheat the banding and it will come right off.

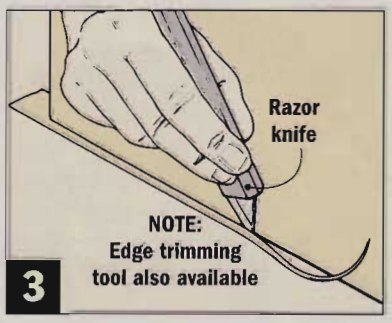




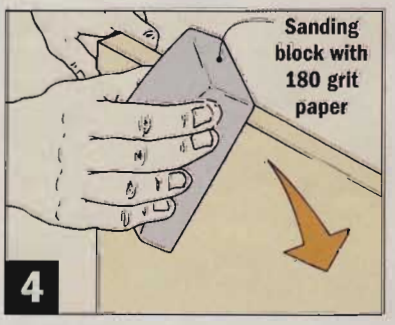
Move the iron steadily and don't let it sit too long in any one place.



Use long strokes and firm pressure to flatten the banding with a roller.



Let the glue cool completely before trimming the excess veneer.



Sand lightly with the grain to avoid tearing the thin veneer.

Sources & Resources

Custom Hardware for Your Kitchen Cabinets

When you build your own kitchen cabinets, you'll probably want to accent them with some unique hardware, as well. We certainly did when we designed the kitchen cabinets that are featured on page 40 in this issue.

The drawer pulls we used are called "Cast Shell" with an old brass finish. They're available by mail order through Lee Valley. We chose the $3^3/_4$" size, but they also come in 3" size. To order the drawer pulls, call (800) 871-8158 and ask for Part No. 01A57 ($1.20 each when ordering 10 or more).

The cabinet doors feature matching hollow knobs, also available from Lee Valley. They're sold in plain or concentric ring styles. We used 35mm x 28mm plain, Part No. 01A56.35 ($1.40 each when ordering 10 or more).

To attach the doors, we decided on a Partial Wrap Free Swinging hinge for $^3/_8$" inset doors. We found just what we wanted in antique finish from Woodcraft (800) 225-1153. Ask for Part No. 130137 ($1.99 each pair).

You'll find a variety of drawer slides at your local home center. Ours came from Woodcraft. They're Accuride 3832A Full-Extension slides, Part No. 27D07 ($13.99 a pair when ordering five or more pairs).

NAHI-National Assoc. of Home Inspectors-
www.nahi.org
(800) 448-3942

ASHI-American Society of Home Inspectors-
www.ashi.com
(800) 743-2744

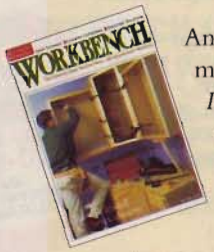
Hunting for a Good Home Inspector

Finding a good home inspector (see *Tips From A House Detective*, page 32) is like finding a good doctor. You need to carefully check the inspector's credentials before making your final decision.

Perhaps the best sources are friends or co-workers who can recommend home inspectors they've used. That's how we came across Jon White of The Building Inspectors in Des Moines, IA, who helped us with this article.

Whatever your referral source, make sure the home inspector is a member of the American Society of Home Inspectors (ASHI) or the National Association of Home Inspectors (NAHI). This way you can be more certain of his or her professional qualifications, experience, and business ethics.

Check Out Our Web Site for All Kinds of Information . . .



Another article you might find useful is *Installing Kitchen Cabinets* (April 1998). You can find this article on our Web site.

Just log on to:
www.WorkbenchMagazine.com
and click on: ARTICLES

A Free Cutting Diagram is available for the *Fold-Down Workbench* (page 66) in this issue. Just click on:

CUTTING DIAGRAMS

If you don't have Internet access, you can still receive the cutting diagram by sending a self-addressed stamped envelope to:

Workbench Magazine
2200 Grand Ave.
Des Moines, IA 50312

Write clearly on the envelope which diagram(s) you want.

Plus, we researched some of the top home improvement Web sites available (see *Workbench Interactive*, page 18). You'll find a brief description of each one and direct links to them on our site.

Dovetail Jigs

Craftsman (800) 377-7414
www.sears.com/craftsman

Porter-Cable (800) 487-8665
www.porter-cable.com

Vermont American (800) 742-3869
www.vermontamerican.com

Keller & Co. (800) 995-2456
www.kellerdovetail.com

Katie-Hampton Hse. (317) 881-8601
www.katiejig.com

Leigh Industries (800) 663-8932
www.leighjigs.com

Jigs for Making Pocket-Hole Joints

After using the Pocket Hole Jig to attach the face frames on the kitchen cabinets (page 40), I know why it's called the "Rocket." It makes drilling the angled holes for the screws that hold a pocket-hole joint together incredibly fast and accurate. We also used a Kreg Jig to construct the cabinet face frames. Much larger than the "Rocket," the Kreg Jig is designed to be mounted to a workbench.

Both jigs are made by the Kreg Tool Company, (800) 447-8638 or www.kregtool.com. They're also available by mail-order from

Rockler Woodworking and Hardware at (800) 279-4441 or www.rockler.com. The "Rocket" is Item No. 22446 ($59.99). The Kreg Jig is Item No. 49866 ($129.99).

Surfacing Bit for Cutting Raised Panel Doors

To cut raised panel doors for the kitchen cabinets (page 40), I used a Freud 2+2 Raised Panel Bit shown here. Given the bit's size, I recommend using at least a 2 hp table-mounted router with variable-speed control. Then you can slow the bit for a safe, clean cut. And as with any surfacing bit, it's best to make cross grain cuts on the panel ends first to avoid tearout. To order the bit, call (800) 635-5140 or www.toolcrib.amazon.com and ask for Item No. 99-516 ($84.99).

Miniature Marvels

At initial glance, this Chippendale highboy and chair appear life-size. Now take a closer look. Built in 5/16 scale, they're actually only 26" and 10" tall, respectively.

When it comes to classical furniture styles, George Reid is an authority. For more than 50 years, Dayton, Ohio's, most prominent families have turned to him to build and repair finely crafted heirloom furniture.

But what a lot of people may not know is that Reid also builds miniature furniture that's every bit as detailed.

"People are surprised when I tell them how long it takes to build my miniatures," he says.

For example, the walnut highboy shown here took about 378 hours to complete; 120 hours was spent on the mahogany chair. True to the Chippendale style, both feature cabriole legs with ball-and-claw feet. Notice, too, the richly carved acanthus leaves and rock-and-shell motifs, or rococo ornamentation, as they're commonly known.

To create such delicate carvings, Reid first makes finished-size drawings of each separate carving. He then tapes the drawings onto the assembled furniture and punches pin holes along the patterns every 3/16" before connecting the holes with a pencil. It's this attention to details that make people marvel at Reid's miniatures.