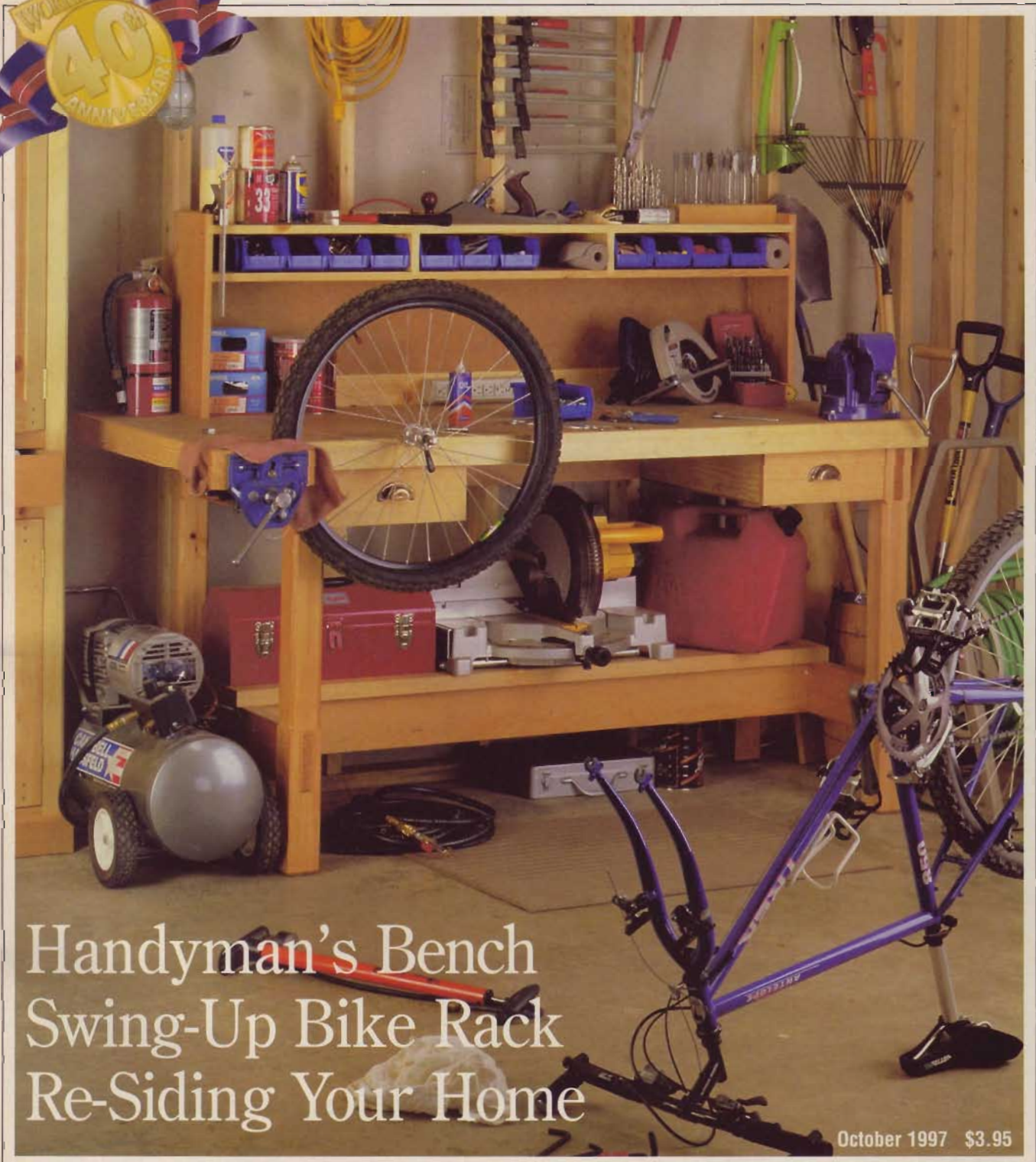


MULTI-USE
SHOP BENCH

SIDING OPTIONS ■ HANDCRAFTED DOOR ■ DRAWBORE JOINERY

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THE ORIGINAL HOME WOODWORKING AND IMPROVEMENT MAGAZINE



Handyman's Bench
Swing-Up Bike Rack
Re-Siding Your Home

October 1997 \$3.95

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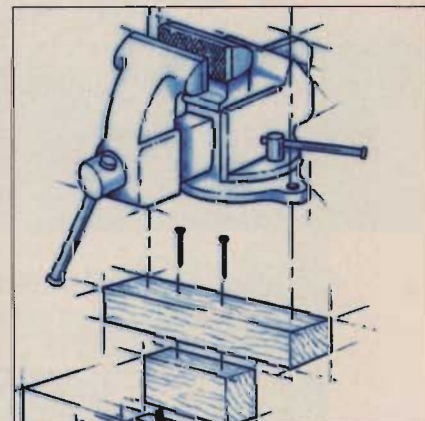
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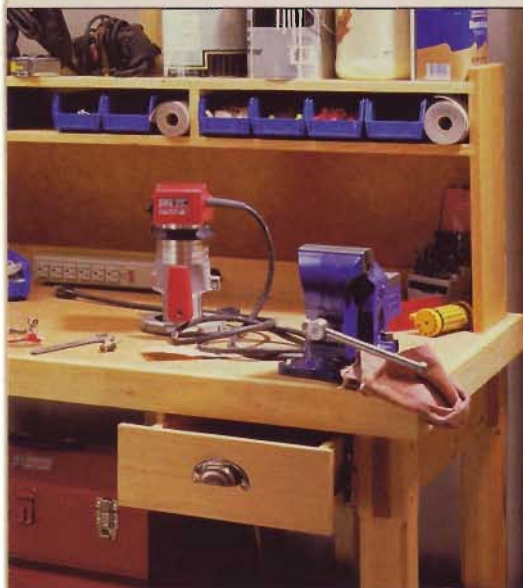
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Bench Lesson

Have you ever seen a bench that was so preciously made you couldn't imagine ever really using it in your shop? If I had a bench that was that beautiful, I'd just admire it now and then, but still use an old door thrown across a pair of sawhorses for the real work. I might even do what one friend of mine did — bring the bench into the dining room to use as a serving table.



Years ago, after I started getting serious about my shop (and learned from my first feeble attempt at a bench), I spent a lot of time trying to figure out what kind of bench I wanted. What I failed to think about enough was what kind of bench I *needed*.

Fine European-style benches are beautiful, and I admire the craftsmanship of the wooden vises more than anything. But I just can't imagine using one for the variety of work I do out in my garage shop. I'd feel awful if I gouged the maple top, or worse yet, spilled grease, oil, or paint on it.

Still, having a bench that says "craftsmanship" is important to me. So this time around I combined the best of both worlds (see page 44). I built a very sturdy workbench out of construction-

grade softwood lumber and two 4x8 sheets of medium-density fiberboard. And I used through-tenon joinery to hold much of this handsome and practical bench together.

Equipped with woodworking and machinist vises, this bench easily handles any challenging project I choose to tackle, and I don't cringe when fate comes calling and oil drips onto the top while I'm repairing the lawn mower.

So here's the lesson I've learned: it's important to avoid building a bench that exceeds my needs, because it doesn't pay to have a piece of furniture for a shop bench.

Help Wanted

Ready for a change? If you're experienced at woodworking and home improvement, have excellent writing skills, and would like to join the *Workbench* team as an Associate Editor, send your resume and cover letter to J. Moore, *Workbench*, 2200 Grand Avenue, Des Moines, IA 50312.

Corrections

Richard Cutler really likes the CD cabinet featured in our June, 1997 issue. During the construction, though, he discovered an error. The correct dimensions are:

- Sides: $\frac{3}{4}$ " \times $6\frac{1}{4}$ " \times 6"

K.W. Richter pointed out a couple of mismeasured pieces in the BBQ Cart. Here are the correct measurements:

- Side Panels: $\frac{3}{4}$ " \times $6\frac{5}{8}$ " \times $33\frac{3}{4}$ "
- Back Assembly pieces: $27\frac{3}{4}$ "-long
- Back Stile dados: cut 5" from end

Thanks, guys, for setting everyone straight. Please write these corrections into your issue for future reference.

Chris Inman, *Editor*

Safety Reminder: Woodworking and home improvement are rewarding hobbies. But there is risk of injury. Use the guards and read the manuals that come with your tools and equipment. And if you're uncertain about a technique, find an alternative with which you are more comfortable. Please take safety seriously.

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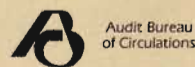
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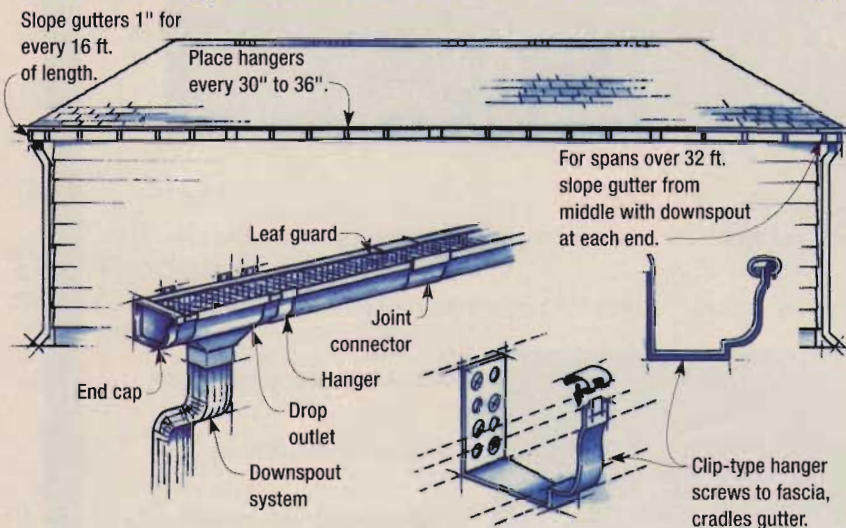
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Questions & Answers

Installing Gutters for Proper Drainage



Q I need to put up new gutters on my house. How do I make sure they are sloped for proper drainage?

John Markam
Raleigh, NC

A Hanging new gutters seems pretty simple. Just tack them up, add downspouts, and you're done, right? Well, not exactly. You do need to slope gutters correctly, but there are several other keys to making your gutters work correctly.

Gutters need to slope at a rate of about 1" for every 16 ft. of length to carry the water toward the downspout. Install downspouts no more than about 32 ft. apart. If you have a run longer than 32 ft., run the gutter from a high point in the middle, and put a downspout at each end.

You also need to consider how much rain your gutters can handle. If you have a large roof area to drain, a narrow gutter may not handle the volume of water coming off. The 5"-wide gutters you'll commonly find drain up

to 1,500 sq. ft. of area. Wider gutters are available for draining larger areas.

Another consideration is the material the gutters are made of. The most common materials are galvanized metal, aluminum, and vinyl. Wood and copper gutters are also available, but are much more expensive.

At home centers you're most likely to find galvanized and vinyl gutters, sold in 10 ft. lengths. You'll also need to pick up joint connectors, drop outlets, end caps, and hangers. There are several types of hangers available that attach to the roof or the fascia. I prefer the clip-type that mount to the fascia. They're sturdier than spikes, and their installation doesn't require putting holes in the roof. Place the hangers every 30" to 36".

If you use metal gutters, caulk the joints between sections to prevent leaks. Vinyl gutters usually have gaskets built-in or available separately.

Finally, if you have trees nearby, it's a good idea to install gutter covers to keep out leaves and debris.

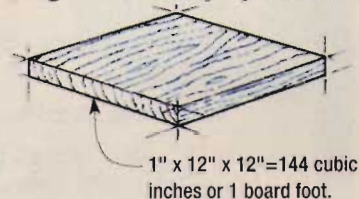
Board Footage

Q My local hardwood dealer sells lumber by the board foot. What is a board foot? How is it calculated?

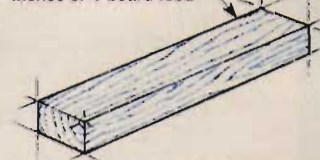
Jim Burke
Nashua, NH

A Unlike softwoods, which are sold in standard dimensions, hardwood widths and lengths are random. A board foot is the unit of measurement describing the volume of wood a board contains. One board foot equals 144 cubic inches.

Often, a board foot is illustrated as a board 1"-thick \times 12"-wide \times 12"-long, but you'll rarely find lumber in those dimensions. Any board containing 144 cubic inches of wood equals one board foot, regardless of its proportions.



2" x 4" x 18" = 144 cubic inches or 1 board foot.



To calculate the board foot content of a piece of lumber, multiply the board's thickness by its width, then by its length, all in inches, and divide by 144:

$$\text{bd. ft.} = \frac{\text{thickness} \times \text{width} \times \text{length}}{144}$$

For example, a 1" \times 9" \times 96"-long board equals 6 board feet (1 \times 9 \times 96 = 864 / 144 = 6). If this board were 1 1/2" thick, it would contain 9 bd. ft. (1.5 \times 9 \times 96 = 1296 / 144 = 9).

Also, hardwood thickness is expressed differently, in quarters of an inch. A 4/4 (say "four-quarter") board is 1"-thick. A 1 1/2"-thick board is expressed as 6/4. This often reflects the rough-sawn thickness. Surfaced lumber will be slightly thinner.

SHARE YOUR QUESTIONS

If you have a question about woodworking or home improvement, we'd like to see if we can answer it for you. Just write down your question and mail it to WORKBENCH Q&A, 2200 Grand Ave., Des Moines, IA 50312. Please include your name, address and daytime phone number in case we have any questions for you. If you like, Fax us at (515) 283-2003 or send a message to us at workbench@workbenchmag.com on the internet.

Proper Caulking Seals Gaps Around Windows

Q I need to re-caulk around some of my windows before the cold weather sets in. There are so many types of caulk available I can't figure out which one to use. Can you help?

Martin Little
Grand Island, NE

A There are a lot of manufacturers selling caulk, and most offer quite a few varieties. So the selection can be overwhelming. For outdoor use, you'll need a caulk that can expand and contract with seasonal changes and withstand temperature extremes. An outdoor caulk also has to resist moisture and adhere to a variety of surfaces.

The most common caulks you'll find are latex-based, and often have additives to increase their durability. Rather than pure latex caulk, which doesn't last well in outdoor applications, look for the more durable acrylic latex variety.



Even more durable silicone caulks are also available. But silicone is tough to paint, so color choices are limited.

Since caulking around windows is not high on my list of favorite chores, I don't want to do it very often. So I choose an acrylic latex with silicone added. This type is flexible, durable, and can be painted to match the house.

To have a caulking job last a long time and provide a good seal, you also need to prepare the surface and apply the caulk properly.

Start by removing old caulk, dirt, and debris from the joints. Prime the joints if recommended by the caulk manufacturer. If any joint is larger than 1/2"-wide by 1/2"-deep use foam backer rod to fill the gap.

When you caulk, start at one end of a joint, and push your caulking gun, rather than pulling it, to force caulk into the gap. Dampen your finger and shape the caulk. Then let it dry as recommended before painting.



Howard Packer, Newtown, CT, General Contractor

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Replace a Screen Using Simple Tools

Q I need to replace some window screens that are in aluminum frames. A spline is used to hold them in. Is replacing the screens a tricky job?

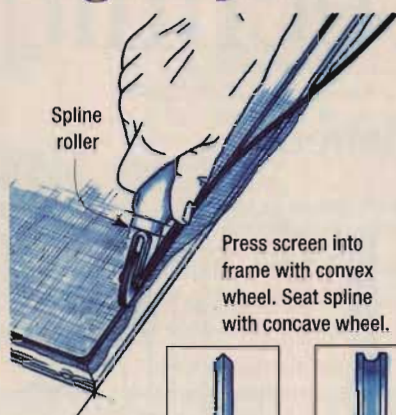
Harvey Johnson
Terre Haute, IN

A Installing new screen isn't difficult. It just takes a little time and the right tool. New screen and spline are available at your local hardware store or glass shop.

Make sure the new spline you buy is the same diameter as the old spline. You'll also need a spline roller. This tool has a wheel on each end to help push the screen and spline into the channel in the frame.

First remove the old spline and screen. If the spline is still flexible you can re-use it, but if it's cracked, replace it. Cut the screen fabric about 2" larger than the frame opening.

Make sure the weave of the fabric is square to the frame, then use the con-



vex wheel on the spline roller to push the fabric into the frame grooves. Gently pull any wrinkles out of the fabric as you work around the frame. Then use the roller's concave wheel to install a continuous length of spline, bending it at the corners. Finally, cut away excess screen with a utility knife.

Brass Screw Blues

Q I used solid brass woodscrews on a recent project, and was frustrated when I twisted off the heads of several screws. How can I prevent this?

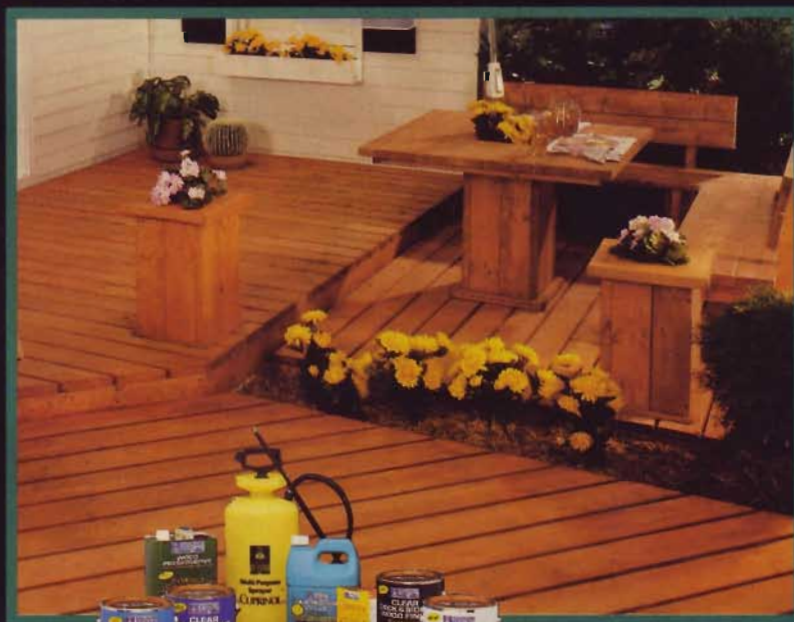
Doc Buzzetti
Bella Vista, AR

A Brass is much softer than steel, so you have to be careful when you drive solid brass screws. I recommend not using a power driver.

First you need to make sure your pilot hole is large enough. I generally use a bit one fractional size larger than I would for a steel screw. To decrease friction and make the screw turn more easily, rub some beeswax, paraffin, or even bar soap on the threads.

You may also be able to use screws made of brass-plated steel instead of solid brass. Or try an old woodworkers' trick. Cut the threads in your pilot hole by driving in a steel screw the same size as your brass screw. Then remove it and install your brass screw.

It's not the elements that ruin most decks. It's rotten advice.



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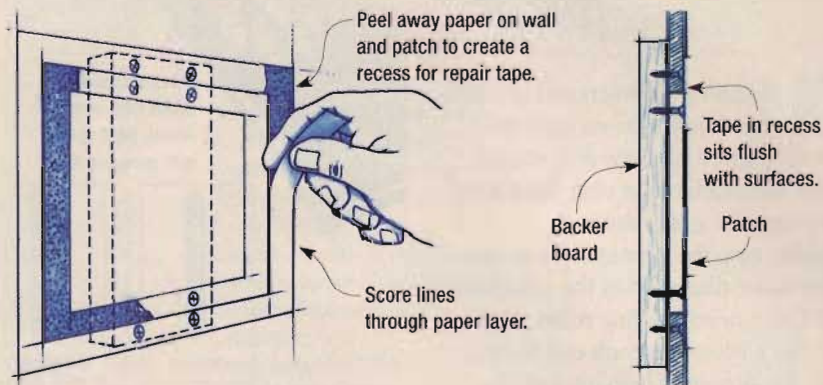
Tips & Techniques

Patching Drywall Revisited

In your April, 1997 issue you told Stacy Miller how to fix a hole in drywall. I used the same technique you described, but with one difference. I think it makes a cleaner patch.

I first squared up the hole with a drywall saw, inserted a backer board behind the hole, and screwed in a patch to fit the hole, just as you advised. Before taping the joint, however, I used a utility knife to score lines on the patch and the wall around all four sides of the patch. The lines are spaced just a little farther apart than the width of the joint tape.

Then I peeled off the paper layer of the drywall between these lines, making a recess for my tape to sit in. That made it sit closer to flush with the surface, and meant I didn't need to



build up as much compound to smooth the joint.

In this case, I found that self-adhesive fiberglass tape didn't adhere very well to the underlying surface of the drywall. To make it adhere better, I spread a thin layer of joint compound

in the recess first, then embedded the tape using my drywall knife.

I sanded and finished the patch as you suggested. It came out smooth and was hardly noticeable.

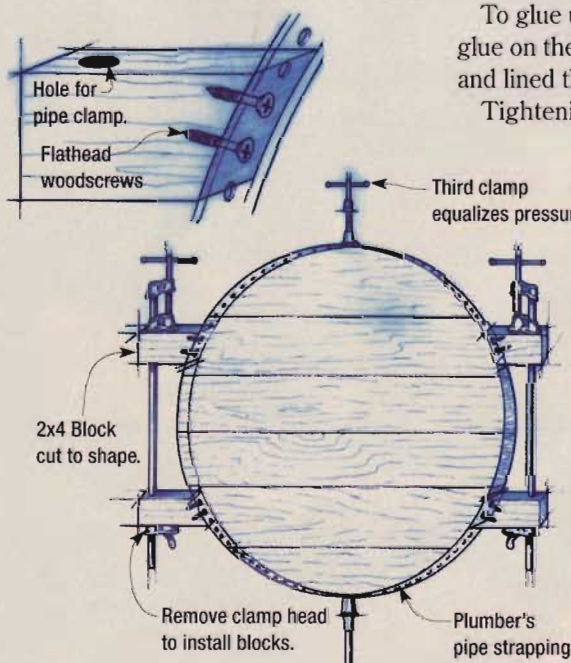
*Stephen Mack
Newark, DE*

Pipe Strap Helps Glue Round Objects

At an auction I picked up an antique table that was in need of regluing and refinishing. Most of the job was no problem, but I was stumped by how to glue the round top back together. I couldn't find any clamps that would do the job, so I made my own.

At the hardware store I picked up a 10 ft. length of perforated metal pipe strapping. I made four short blocks from scrap 2x4s, then drilled holes through the blocks, so I could slip them onto my pipe clamps. I cut one end of each block to approximately match the curve of the table top's edge. Then I slid the blocks onto my clamps by taking off the moveable clamp heads.

Before attaching the strapping to the blocks, I dry-assembled the top and put the clamps in position on each side. I pulled the strapping between the two clamps and cut it to proper length. After moving the table top pieces out of the way, I attached the pipe strapping to the blocks with flat-head wood screws.



To glue up the table top, I spread glue on the edges of all of the boards, and lined them up between the clamps.

Tightening the clamps pulled the strapping tight and drew the top together. To get more consistent clamping pressure, and to pull the joints together tight in the middle of the table, I added a third pipe clamp across the top, over the strapping. Once this clamp was tight, I went back and retightened the outside clamps. This method worked great for me.

*Jack Cornish
Sinks Grove, WV*

SHARE YOUR TIPS, JIGS, AND IDEAS

If you have a unique way of doing something, we'd like to hear from you. Just write down your tip and mail it to WORKBENCH Shop Tips, 2200 Grand Ave., Des Moines, IA 50312. Please include your name, address and daytime phone number in case we need to reach you. If you like, Fax us at (515) 283-2003, or e-mail us at workbench@workbenchmag.com on the internet. We'll pay you \$50-\$150 if we publish your tip.

Clean-Cutting Plywood

When cutting plywood sheets it's difficult to keep the face layer from splintering as the blade exits the cut line. Working with hardwood plywood can be especially tough, since the edge often shows on my finished project.

Using a sharp blade and orienting the sheet so the blade cuts the good face on the down-stroke helps, but may

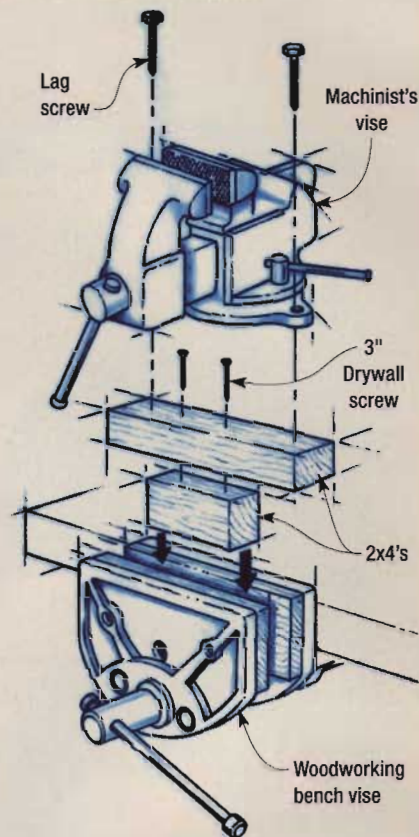
not stop the splintering altogether.

To stop the veneer layer from splintering, I lay a reliable straightedge on my layout lines, then score the face of the plywood with a sharp utility knife. When cutting, I make sure my saw blade cuts right at the score line.

*Pat Ericksen
San Francisco, CA*

Metal Vise Mount

Occasionally, I need to use a vise to hold something, like a part from an engine, but don't want to scar my wood-faced woodworking bench vises. To avoid the problem, I bought a small 2½" machinist's vise that's just right for most jobs.



This little vise is very handy, but I couldn't find a good mounting spot for it in my shop where it wouldn't get in the way. And I struggled to come up with a convenient way to simply clamp it in place when I wanted to use it.

To solve my problem, I lag screwed the vise onto a base made of two short 2x4's screwed together to form a T-shape. Now when I need my machinist's vise, I clamp it in my woodworking bench vise and it's ready to use.

The lower board on my base is on edge, giving the vise jaws plenty to grab, while the upper board sits flat on top of the vise, adding stability. Plus, my machinist's vise is easy to remove and store away when I don't need it.

*Jack Martin
Mount Vernon, WA*

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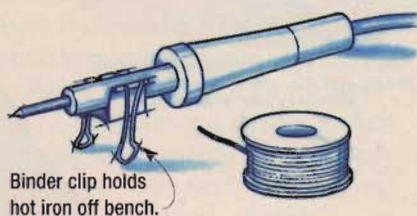
Soldering Stand

My small pen-type soldering iron doesn't have any stand or support, so I'm always worried about burning my bench top when I set the iron down.

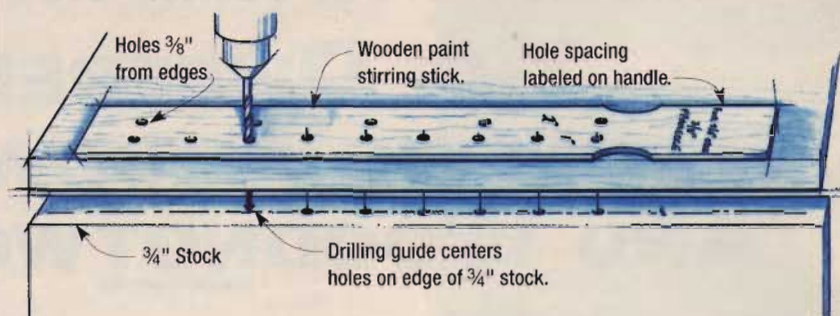
Rather than take time to build a stand, I use a large binder clip meant to hold a large stack of paper together. I just slip the binder clip on the shaft of my soldering iron, and use the clip's handles as legs.

This setup is also handy for supporting the soldering iron in position when I need to hold something with both hands, or to hang the iron on a hook for storage.

*Allan Kirschner
Indianapolis, IN*



Drilling Guides from Paint Stir Sticks



Every time I buy a can of paint, the people at the store give me one or two wooden stirring sticks. After a while, I had a large stockpile accumulated. Rather than throw them away, I came up with a use for them in my shop.


When joining pieces together I find it time consuming to measure out the right spot to drive a nail or screw, or to drill my pilot holes. By drilling holes through the stirring sticks, I make them into handy layout guides.

For joining $\frac{3}{4}$ " stock, for instance, I have sticks with the holes posi-

tioned $\frac{3}{8}$ " from the edge. That way, I can align either edge of the stick with the edge of my board, and when I drill through, the holes are centered exactly on the mating piece. I have several set up this way, with holes 1", 1 $\frac{1}{2}$ ", and 2" apart.

To make my guide sticks easy to identify, I write the hole size and spacing on the handle. Best of all, if I break or wear out a stick, I have a ready supply of cheap replacements.

*Michael J. Doherty
Vanscoy, Saskatchewan*

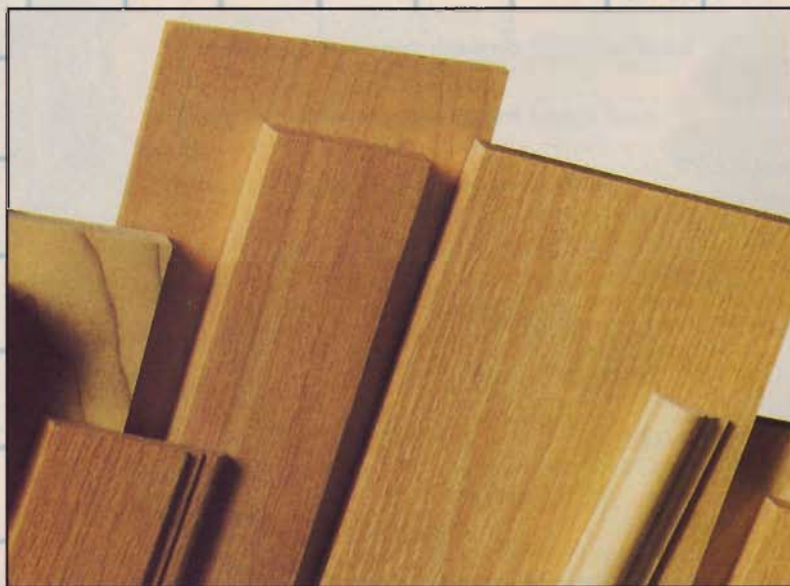
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News and Events

Institute Encourages Steel Recycling

Today, most of us have access to facilities for recycling newspaper, certain plastics, glass, and aluminum and tin cans. So what consumer product would you guess has the highest recycling rate? You may be surprised to find that it's none of the above.

According to the Steel Recycling Institute, North America's most recycled consumer product is the automobile. If you compare the amount of steel recycled from junked cars with the amount of steel used to produce new cars, the recycling rate for automobiles in 1996 was 97.9%.

With something the size of a car, it's easy to see the value of the recyclable products it contains. That's why virtually every car taken off the road is recycled. Unfortunately, not everyone

sees that the steel in a can or an appliance is just as valuable.

Why should you or I care? If you're not concerned about the environmental impact, just think about recycling's economic benefits. As resources become more scarce, extracting them from the earth takes more energy and money. For every ton of steel recycled, 2,500 lbs. of iron ore, 1,400 lbs. of coal, and 120 lbs. of limestone are saved. Currently, steel recycling saves enough energy annually to power about one-fifth of the households in the United States — about 18 million homes.

As lumber prices increase, steel is also being used more in framing new



construction. The Steel Recycling Institute and steel manufacturers

hope to see 25% of new homes framed in steel by the year 2,000. A typical 2,000 sq. ft. house can be built with steel from six recycled cars.

To learn more about the Steel Recycling Institute, or to find local recycling facilities, check out their web site at www.recycle-steel.org. Or call them at (800) Yes-1-Can.

Historic Lumber From the Depths of Lake Superior

Scott Mitchen was exploring Lake Superior for shipwrecks, and was continually frustrated by the thousands of logs littering the bed of Chequamegon Bay (near Bayfield, Wisconsin). But he gradually realized that it was a classic case of not being able to see the treasure for the trees.

Mitchen learned that during the second half of the 19th century, sawmills ringed the bay. On the nearby Apostle Islands, lumber operations felled trees and floated them in loose rafts to supply those mills. But some of the timber became waterlogged and sank. For the next 125 years, the 36°F water preserved the wood.

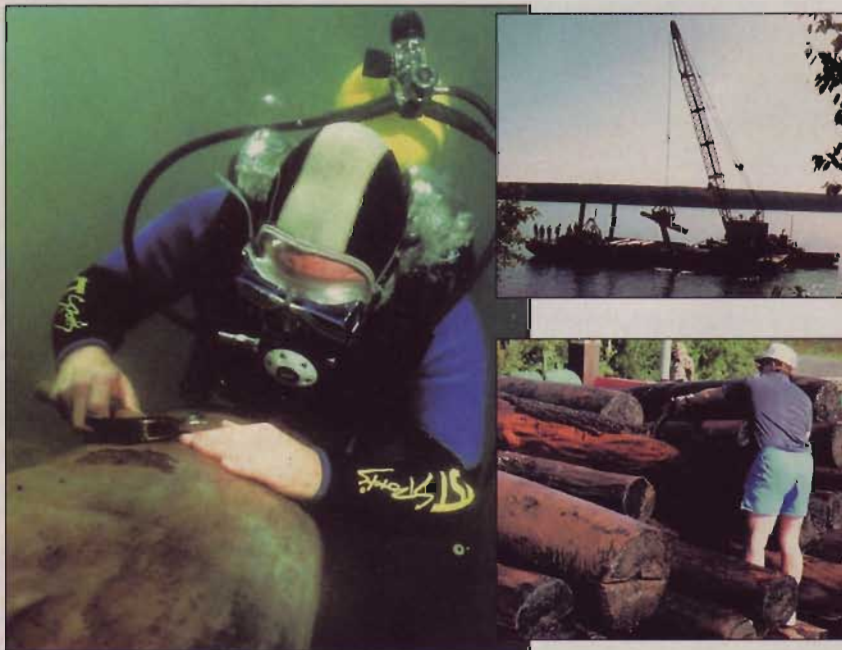
Mitchen helped form Superior Water-Logged Lumber Company, Inc. to bring some of the historic timber to the surface, then mill and dry it.

The wood's heritage is an appealing conversation point, and you can own a piece of that history by purchasing hard maple, red oak, and yellow birch lumber from 1/8" to 1 3/4" thick.

The samples I saw have fancy figure in the grain, but the really fancy figures were in the price list. "Select" 1"-thick lumber, 6" wide, with "Best" quality figured grain lists at \$3.13 per

lineal inch — over \$75 per board foot! Other boards start at around \$9 per board foot.

Contact Superior Water-Logged Lumber Co. at (715) 685-9663.



Eco-Timber Sells Tropical Hardwoods with a Conscience



the problem with Aaron Maizlish, his former University of California roommate. They realized that merely falling in line behind the environ-

mentalists who advocate boycotting all tropical timbers wouldn't motivate the lumber companies to change their practices. Instead, they aimed to lure the lumber companies'

Jason Grant saw the devastation of South American rainforests firsthand in 1990. When he returned to Berkeley, California, Jason discussed

customers away by offering an environmentally responsible alternative.

The theory sounded good, but neither Grant nor Maizlish knew anything about the timber business. So they added Eugene Dickey to the team and formed Eco-Timber in 1993. The company purchases its tropical hardwoods only from logging companies whose practices are certified by non-profit environmental groups, such as the Rainforest Alliance.

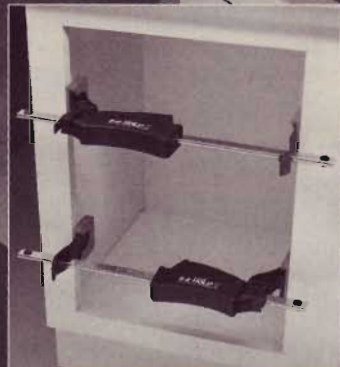
Eco-Timber furnished chicozapote flooring for a Banana Republic's store in Los Angeles, and machiche flooring for their Sacramento location. The company also supplied environmentally correct lumber for a special line of Les Paul model Gibson guitars.

But in addition to its corporate customers, Eco-Timber also sells lumber to individual craftsmen. To get a free price list of the wide variety of species available, call Eco-Timber at (510) 549-3000, or by fax at (510) 549-3001.

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Product Information Number 171

Re-Siding Your Home

When a house exterior needs a facelift, sometimes repainting isn't the answer. Severe weathering or other mishaps might have damaged the siding, or maybe it's just time for a brand

new look to breathe some life into that tired old homestead.

Personally, I don't need that much incentive to find an alternative to exterior painting. Done right, it requires hours of tedious prep work, and it may not solve the problems that caused the old paint to fail in the first place. I'd rather spend the time on a solution that promises to last a little longer.

Replacing siding is likely to cost more up-front than repainting, but as a long-term investment you can easily end up ahead, especially if you value the time you'll save later.

The biggest single advantage will come from switching to a low- or no-maintenance siding, and both natural and engineered materials give you a lot to choose from (see *Siding Options*, page 24).

This project was among the priorities we had for the *Workbench* house — not just for the upgrade, but for the opportunity to try out a product called Pro-1 LockSide, from ABT Building Products Corp. (ABTco; (800) 334-3551).

LockSide provides a good example of newer-generation materials commonly referred to as engineered wood products. Unlike sawn lumber, these materials are reconstituted from shredded wood fibers or chips that are mixed with a resin binder, then formed under intense heat and/or pressure. The result is a product more uniform and more dimensionally stable than solid wood. Also, many have factory-applied coatings that last much longer than paint.



Prep Counts Here, Too

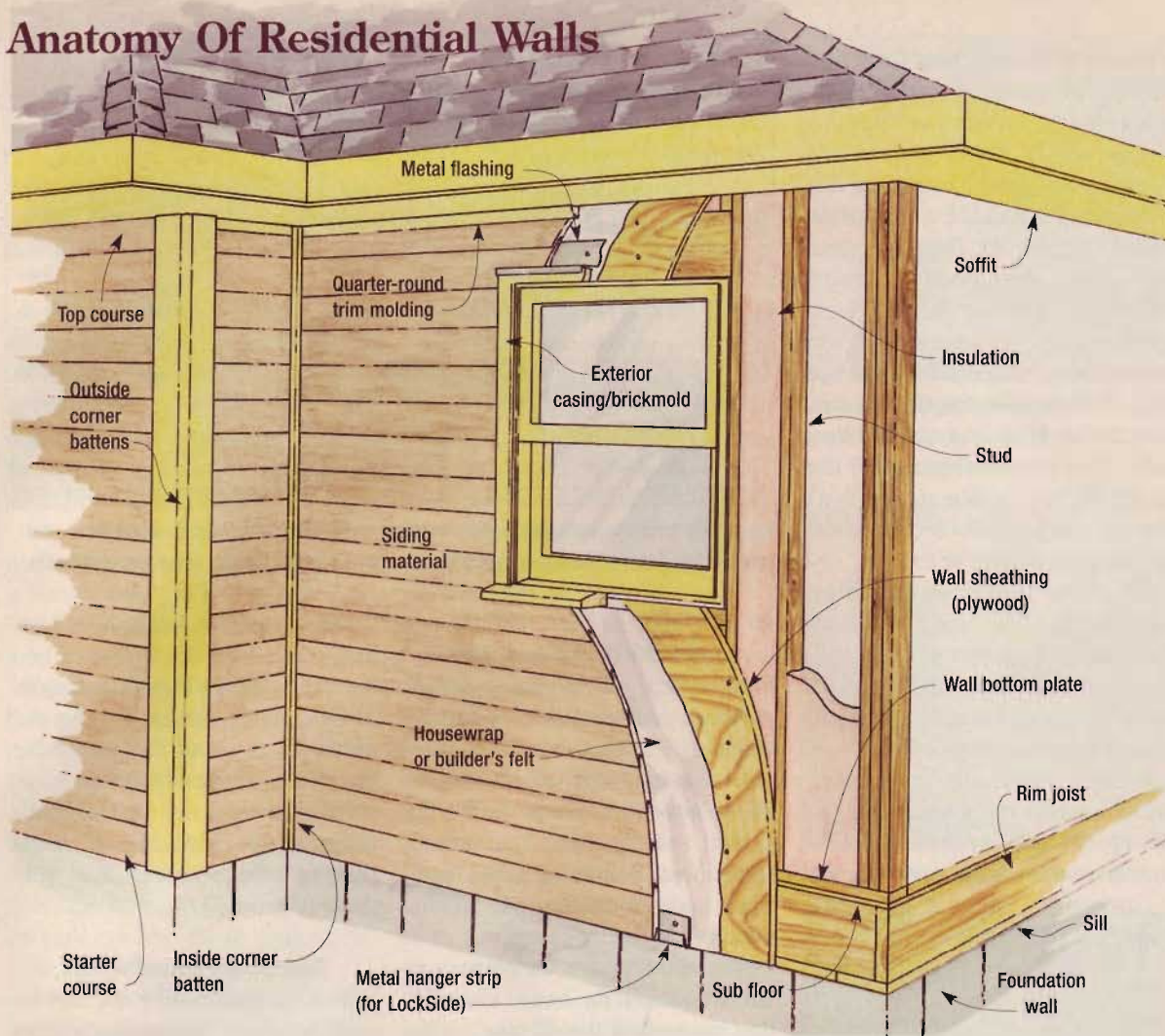
Just like painting, a re-siding job calls for some prep work. Work in sections so you don't have the whole house exposed at one time.

You may have to cut away old caulking around window and door frames before you can start stripping the siding off. Otherwise the process should go quickly. A flat-bodied pry bar and a hammer will take off almost anything, but use

leverage rather than brute force to get the job done. Nails and other debris will be popping loose from the wall as you work, so wear eye protection.

If there's builder's felt (tar-impregnated paper) underneath the old siding, it will probably get damaged as you strip the walls. You should plan on replacing that as well — it's the sheathing's last defense if water outwits the siding.

Anatomy Of Residential Walls



Start the Cover-up

Once you've taken it all off, so to speak, you can begin restoring the house's weathertight exterior. Stripping the old materials should have given you an idea of the various layers that protect your home from the elements (**Anatomy of Residential Walls**). Be forewarned: potential problem areas occur where the walls are interrupted (by windows and doors, for example) or where surfaces meet, such as at inside or outside corners. And engineered materials often require some special installation techniques, so get and follow the manufacturer's guidelines.

Take the opportunity to seal any gaps around windows and doors with expanding foam insulation (**Figure 1**). Give the stuff a few hours to harden, then trim away the excess with a utility knife.

Begin the re-siding process by re-wrapping the wall sheathing. Felt is the old standby, but housewraps have nearly replaced it. These wraps — specially designed fabrics up to 9-ft. wide — are lighter than builder's felt and a little easier to apply. (For more about housewraps, see *Housewrap Update* on page 28).

Applying wrap is simple, but try to recruit a partner if you're working with a wide roll. Starting near an outside corner, fasten the wrap with roofing nails or a staple gun (**Figure 2**). Then pull it taut around the corner, and keep fastening as you work your way along the other walls.



1 With the old siding removed, you may uncover gaps around windows and doors. Fill them with expanding foam insulation.



2 Housewrap installation should start at an outside corner, where the material can be overlapped. Fasten with nails or staples.

Nailing Down the Details

Before the starter course of siding goes up, all the trim and flashing details should be in place. You'll need battens at each inside and outside corner to shield the ends of the siding (**Figure 3**). The top ends of the battens should butt up against the soffit, and the bottom ends extend past the wooden sill (to establish your baseline). Before cutting the battens to length, however, check the height of the window sills. They're probably not all the same, but try to plan so you don't end up with a narrow section of siding underneath any of them.

To make this clear, here's an example: the LockSide material we used has an exposure of 7" for each course, so sill heights that are close to a multiple of 7 (say, 49") will give me a full course below a window, or one that needs only minor trimming. I always try to line the courses up for the smallest possible notches at the sill. As a rule, I'll aim

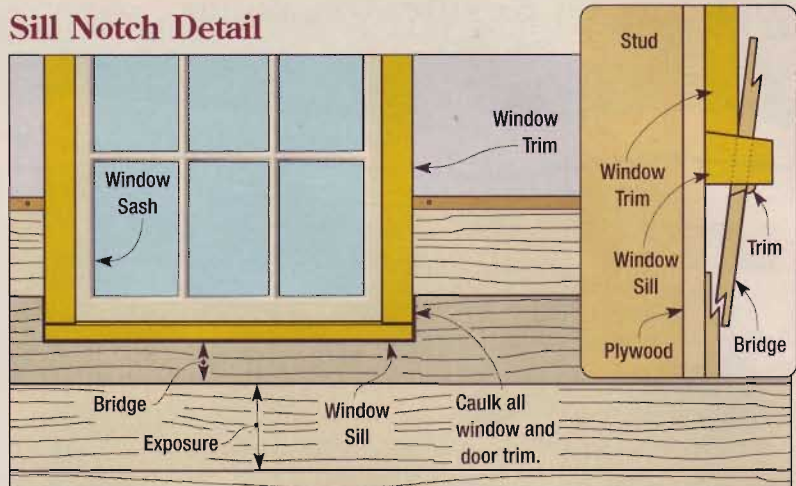


When making battens for outside corners, be sure to rip one batten narrower than the other to keep the assemblies symmetrical.



A decorative edge dresses up this batten corner, which is caulked at the wood joint and where each board meets the wall.

Sill Notch Detail



Try to plan your course layout so that notching for window sills doesn't create weak, narrow bridges. Also, if the siding drops in place like LockSide (inset), cover gaps with trim.

for a "bridge" at least half the siding's full width (**Sill Notch Detail**). Bridges that are too narrow look awkward and are difficult to handle without breaking.

As I mentioned, varied window sill heights often mean there's no perfect solution here. Still, minor adjustments help if you make them when you set the baseline for the battens and starter course.

One more note on the realities of construction: if the house's foundation has settled, the sill may not be level, but it's probably still safe to use it as your reference. A small discrepancy won't be noticeable, and if you correct for it at the sill, you'll end up having to compensate for the difference when you get to the top course of siding. Major corrections here end up closer to eye level and tend to be more apparent, so I try to avoid them.



Aluminum flashing above header trim will divert water away from the tops of windows and doorways, keeping them dry.

When you've established a baseline, mark it on the walls and corners, then cut the battens to length. At the outside corners, overlap the edges as you nail the battens in place, then caulk where they meet each other and the wall surfaces (**Figure 4**). Finally, install metal flashing over doorways and windows (**Figure 5**).

Specialty Hardware

With some materials, you'd now be ready to install the starter course of siding. But LockSide has an interlocking profile edge, so it requires one more step — nailing a metal starter strip in place (**Figure 6**). This strip locks the bottom of the starter course next to the wall. The siding has an offset that drops the front edge about 1/2", so the starter strip has to be raised off the end of the battens to compensate.



Some starter courses go directly against the wall, but LockSide requires a metal strip to hold the siding in at the base.

When you install a metal starter strip, drive only a few nails to hold it in place, leaving the heads backed off slightly in case you need to remove them. Then hang a piece of siding on the strip and check to see that it's level (**Figure 7**). If it's okay, remove the board and secure the strip with a few more nails.

By now you may feel like this project is all warm-up and no pitch, but the fun stuff is finally at hand. Begin by hanging the starter course on the starter strip and nailing through the flange at the top of the siding (**Figure 8**). If your house has wood, plywood, or OSB (oriented strand board) sheathing, you can nail directly to it without regard for hitting the studs. Our house has a fiberboard sheathing that's really not suitable as a nailing base, so I nailed only at stud locations.

LockSide comes in 16-ft. lengths, so for walls under that length you can butt the ends directly against the battens. (Incidentally, I recommend painting all the battens and trim before installing the siding — it's faster and requires much less masking and cleanup work.) ABTco offers color-matched caulking, which should be used wherever the siding butts against trim.

For long walls, you'll have to splice lengths of siding together. Regardless of sheathing type, I always make these joints land on studs so I get a solid nailing base. Unlike the beveled-end overlaps common with clapboard and other types of wood siding, LockSide


calls for simple butt joints where two lengths meet. Sealing the ends with paint and caulk helps keep water from invading, but for more consistent results the company recommends using its ABTco Joint Moldings (**Figure 9**). These aluminum connectors nest over the ends of each board and help divert water that might otherwise migrate behind the siding. They too should be caulked, then painted with touch-up paint to match the siding.

LockSide is a blind-nailed siding, so called because the nails securing the top flange of each board are hidden as you install the next course. When you get to the top of the wall, though, you have to face-nail the last course (**Figure 10**). Also, because the top course must drop-fit over the previous one, you will end up with a small gap between the siding and the soffit. If you want, you can use most any trim, but I used a 1" quarter-round molding to cover this (**Figure 11**).

Finishing Touches

To finish up, apply caulking at all the trim junctures, and touch up nail heads and other details with the finish paint. LockSide's finish has a 15-year limited warranty (though there's some fine print), so your paint brush can rest a while.

With LockSide or other composite wood sidings, you need to caulk and regularly inspect seams to protect the material's ends and edges. Even when correctly primed, these surfaces are more vulnerable to moisture than the face of the siding, which has an embossed surface that's uniformly sealed.

Take special care at window sill notches, where rainfall will be draining directly onto inside corner cutaways — the perfect place for water to collect. Edge-swelling and a delaminating finish are telltale signs that excess moisture is getting inside the core of the siding. If that happens, composites can degrade faster than wood. 



7 With the metal starter strip tentatively nailed in place, hang a length of siding and check it for level and baseline height.



8 Begin by nesting the starter siding course in the starter strip and nailing through the top flange. Locate any joints over studs.



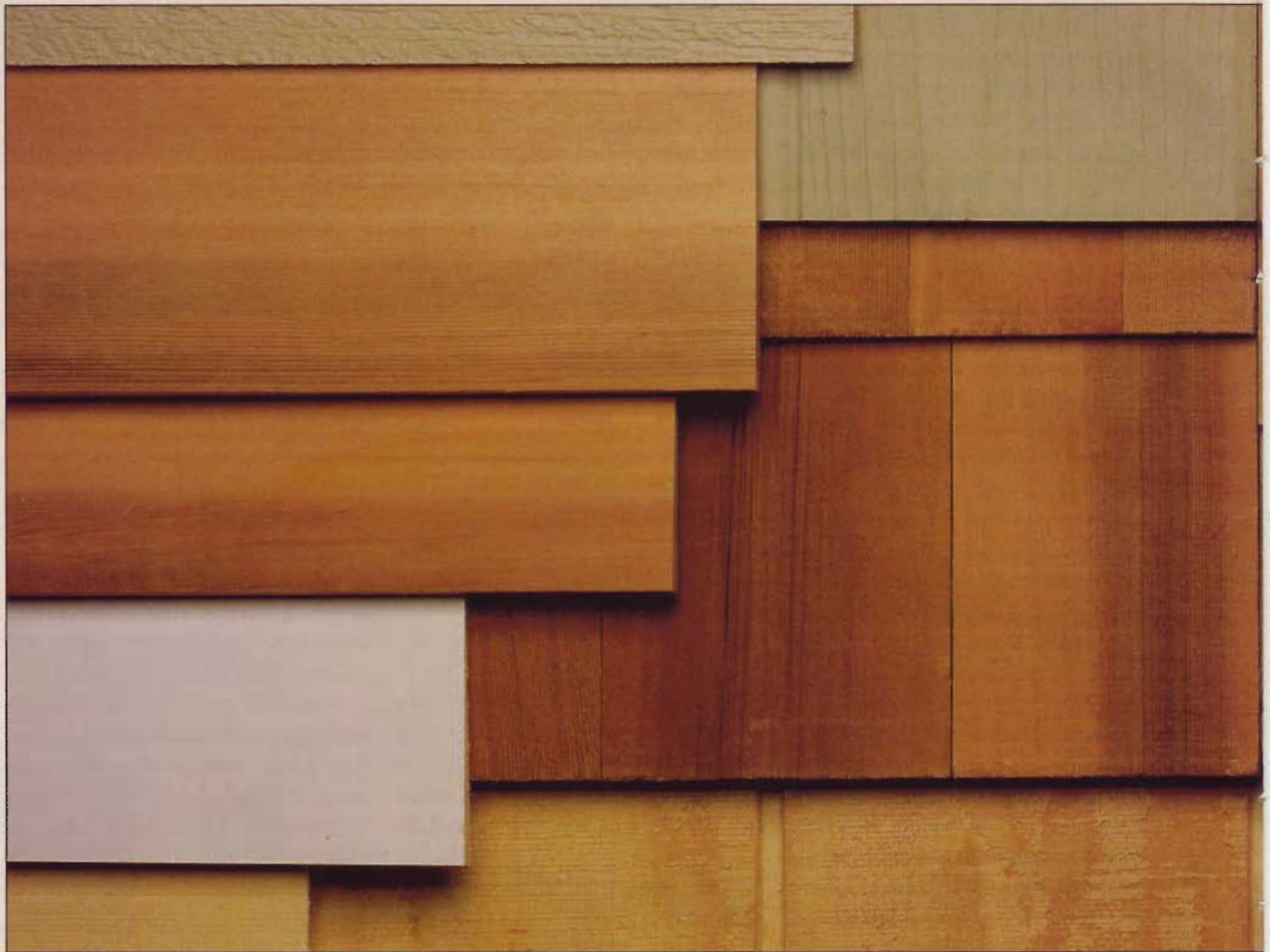
9 Custom-matched aluminum joint moldings help seal splices on long walls, but caulk will add some extra insurance.



10 The last course of siding will probably have to be trimmed to fit, removing the top flange. Face-nail these pieces.



11 Because LockSide drops into place, you'll have a small gap above the top course. Nail molding in place to cover this space.



Siding Options

Re-siding a house will mean a tiring workout for your arms, plus more trips up and down a ladder than you ever wanted to make. Still, the physical work may not be the most exhausting

part of the project. It can be just as tough to pick the right materials. If you shop at just one or two local suppliers, you're likely to find the selection limited, with stuff that might not be right for your house. So what's the answer?

Start by learning basic material types first. These include wood, wood composites, vinyl, metal, fiber cement, and masonry.

As for features, durability and good looks are obvious goals, but there's more to siding than meets the eye. How about cost, the ease of do-it-yourself installation and maintenance, fire resistance, tool requirements, color choices, or compatibility with your regional climate or neighborhood? You can see how quickly the list grows.

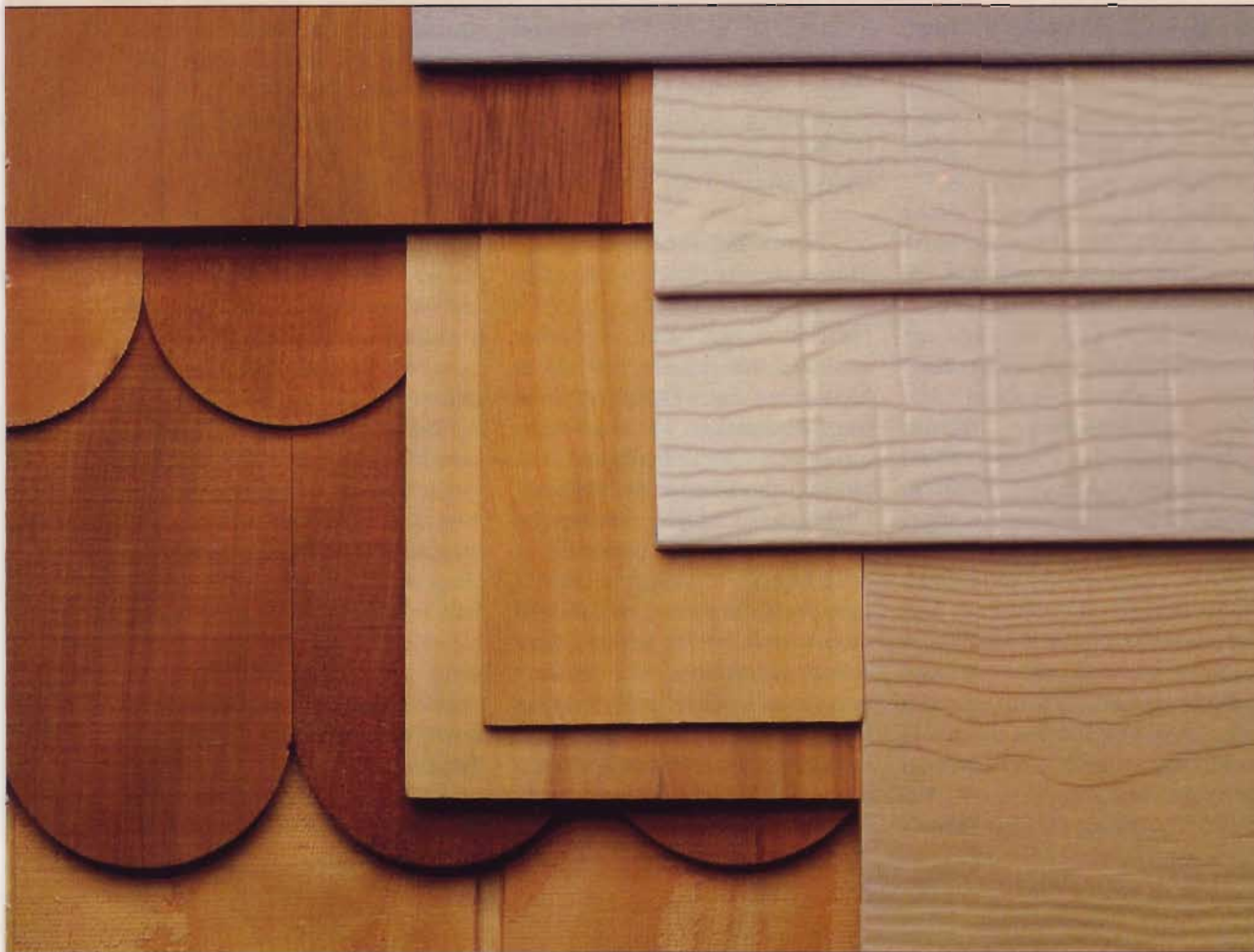
The maze becomes manageable if you can sort out the big decision first. Do you want a natural or man-made material? People often assume that engineered or non-wood materials install more easily, require less maintenance, and look cheap compared to the real thing, but that assessment isn't necessarily true anymore.

Choosing Good Wood

Let's consider wood siding first — it's a familiar and traditional material that provides a frame of reference for some of the newcomers, such as vinyl or wood composites.

Western red cedar and redwood are the two tree species most commonly milled for siding. The heartwood of each contains chemical extractives that help prevent insect and moisture damage. Also, white pine siding used to be common in the eastern United States, where some mills still produce it.

Unfortunately, old-growth trees that yield the best siding are growing increasingly scarce, or are part of habitat forests now declared off-limits to logging. Their wood is



denser and more stable, but also pricier than the lumber from commercially managed trees. The best "Clear All Heart" grades are enhanced by sawing the log in quarters or radially from the center out (**Milling Detail**). This reduces shrinking, cupping, and swelling, so paint adheres better.

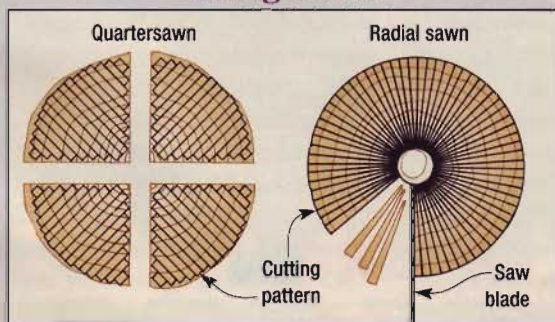
Except for the occasional board-and-batten or vertical tongue-and-groove facade, most other wood siding is oriented horizontally,

installed from the bottom up. Each course overlaps the one below it so water sheds properly. The simplest variation is clapboard — planks of uniform width and thickness that are face-nailed in overlapping courses (**Wood Lap Siding Detail**). Bevel siding is tapered and sometimes has a rabbet on the lower inside edge, making the courses self-aligning.

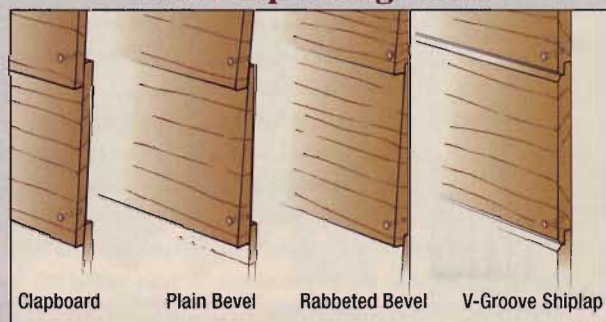
Wood shingles are also a popular choice for siding. Most are

Western red cedar or Eastern white cedar. Both species weather well, but red cedar will eventually turn almost black if left unfinished, and it produces black streaks if fastened with ordinary steel nails. White cedar shingles, left unfinished, will age to that weathered gray look typical of a New England seaside cottage. Like lumber, shingle grades vary. For a home, I'd specify #1 "R&R" (resawn and rebuffed) — with square-cut ends.

Milling Detail



Wood Lap Siding Detail



Engineered Wood Siding

If you like natural wood but can't splurge for premium material, engineered wood products offer a blend of looks, generally lower cost, and low maintenance.

Whether it's a plywood siding such as T-111 or a composite hard-board material, these products will differ from sawn lumber siding in several ways. First, the logs are processed differently, either sliced into veneers or shredded. The plies or chips are then coated with binder resins and reassembled into panels or boards, usually in large hot-presses that form them into shape. Most are also factory-finished (or primed), and dimensional stability is good. Ends and cut edges tend to be vulnerable to water penetration, so proper sealing and caulking is a must. If the color is factory applied, the manufacturer will usually offer touch-up paint for nail heads, plus color-matched caulking for trim work.

Style choices include plywood with vertical grooves that suggest tongue-and-groove boards, various types of traditional lap siding, and panels that mimic the look of hand-troweled Tudor stucco walls.

Fiber Cement Siding

This is another material formed in presses or molds, but a mixture of portland cement, sand, and other additives replaces some of the cellulose fiber (wood pulp) found in wood composites. Most manufacturers offer both planks and panels, and the fiber helps add flexibility to what would otherwise be an excessively brittle material.

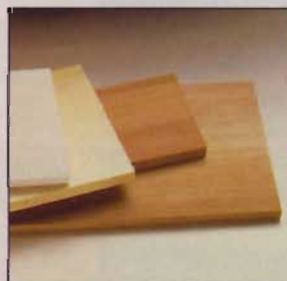
Fiber cement siding is heavier than wood and must be handled more carefully, but it does offer definite advantages. It won't burn or rot, and it's extremely resistant to termite damage. You can get smooth or wood-textured surfaces, and good dimensional stability helps paint adhere. If you like

the natural off-white color, you can simply apply a clear sealer (an acrylic latex type). Paints and stains should also be latex.

Because fibrous cement can crack from repeated hammer blows, power fastening with a pneumatic nail gun is recommended. Also, the material is tough on carbide cutting edges, so most manufacturers recommend diamond saw blades, hole saws, and drill bits for working and shaping it. This is no big deal for contractors, but for a home project these requirements might tip the scales toward a more practical alternative. But if you're after a code-compliant fire rating or a rot-free surface, this siding offers a solution.

Along the same lines, brick and stone veneer produce fireproof exteriors that also require minimal maintenance. Most people use these as accent materials, though, to define the lower portion of the wall or set landscaping apart.

NATURAL WOOD SIDING



LAP SIDING

Milled in widths from around 4" to 8", lap siding is installed in overlapping horizontal courses. Wood species commonly used include Western red cedar, redwood, and Eastern white pine. Vertical-grain boards hold paint well, and semi-transparent or solid-color stains require even less maintenance. Left unfinished, the wood will turn gray. Most profiles are face-nailed. Fasteners should be hot-dipped galvanized or stainless steel.

SOURCES

Common profiles of cedar and redwood lap siding are widely available through local lumberyards and home centers. For specialty items, contact the following:

- Bear Creek Lumber (800) 597-7191
- Granville Mfg. (pine) (802) 767-4747
- Ward Clapboard Mill (802) 496-3581

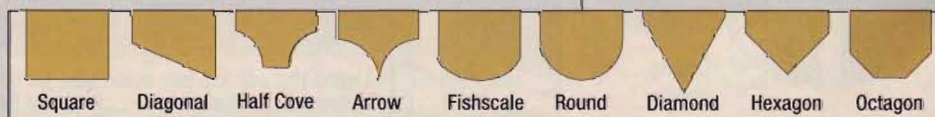


SHINGLE SIDING

Sold in boxes, bundles, or prefabricated panels, shingles will be cut from Eastern white cedar (lighter samples in photo) or Western red cedar. Typical length is 16"-18"; widths are random from 2" to 12". Stain finishes reduce maintenance, and solid-color formulas look just like paint. Left unfinished, the white cedar will age to a uniform silver-gray, while red cedar will turn gray-black. Prefab panels speed installation, but can cost up to three times as much. End cuts include a variety of shapes for decorative treatments (below), but the standard is a square-butt #1 "R&R" (resawn and rebuted). Grades #2 and #3 common are cheaper but less uniform. Shingles can be nailed or pneumatically stapled, always with galvanized or stainless steel fasteners. Cost varies widely with grade and exposure (course spacing).

Local lumberyards and home centers commonly sell cedar shingles for siding and roofing applications. Most stock #1 red cedar and order other grades. White cedar shingles are harder to find, but Maibec Industries of Quebec, Canada will ship them through vendors in the states. Call (800) 363-1930. (They will answer the phone in French, but quickly switch to English for U.S. callers.) For panelized red cedar shingles, call:

- Cedar Valley (800) 521-9523
- Shaketown (800) 426-8970



Vinyl: Changing Faces

Some building contractors have a phrase to sum up their preference for siding: "Vinyl is final." It's not literally true, but as far as painting goes, the claim is on the mark.

The color of vinyl siding is molded into the material, so "renewing" it is just a matter of a quick rinse with a garden hose. This saves you substantial time and money over repainting, but changing colors means having to re-side the house.

What is changing about vinyl siding is the variety of styles now being introduced — traditional shingle patterns, "historically correct" lap siding, even lattice and gingerbread trim.

Like other materials, however, vinyl does age. It can grow brittle over time, and color can fade from prolonged exposure to direct sunlight. Better grades are formulated to resist both of these problems, and are thicker (up to .048", versus about .040"-.042" for lower grades).

Unlike most siding choices, vinyl systems feature a full assortment of soffit and trim components that make installation faster and offer the same properties. The material can often go directly over old wood siding, and square-footage gets covered quickly due to the panelized design.

Still, installation can't be sloppy. Vinyl shrinks and expands more than wood, though it does so in response to temperature rather than moisture. If you install the material in cold weather and don't leave room for summertime expansion, the siding will buckle when it warms up. Installation guides are very clear about how to plan for seasonal movement, so read the instructions before you nail the stuff up.

Wolverine is one manufacturer that's tackled the problem of vinyl flexing with a unique solution — a small fiberglass tube in the channel of its Benchmark™ siding

keeps lines straight and helps lock overlapping panels together.

Metal: Still a Player

The development of vinyl may have put a dent in the steel and aluminum siding business, but metal is by no means forgotten.

Like vinyl, aluminum and steel siding systems include matching trim, and the material can often be installed over old wood siding. There are differences, though.

First, metal siding is more rigid. This tends to keep the lines crisp and straight, but localized impacts can dent both aluminum and steel.

Second, the color is applied rather than integral to the siding. In earlier days, peeling paint gave metal siding a bad name, but most of today's coatings are chemically fused and warranted for life.

Just like wood or other engineered sidings, metal can work if it fits your needs and budget. Any of them will get you covered. ■

ENGINEERED WOOD



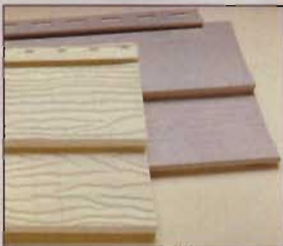
PANEL AND LAP SIDING

Made from wood plies or shredded wood fiber, these products offer the workability of solid wood but in a more stable form. Plywood siding is normally sold unfinished; composite panels and lap siding will typically have primer applied or already be coated with a finish color. Advantages include uniform working properties and factory-applied finishes, plus textures and patterns that mimic traditional wood or stucco siding.

SOURCES

- ABT Building Products Corp. (800) 334-3551
- Georgia Pacific Corp. (800) 284-5347
- Masonite (800) 647-7080
- Temple Inland Forest Products (800) 231-6060

ENGINEERED NON-WOOD



VINYL, ALUMINUM, STEEL

Vinyl siding features integral (molded-in) color, including wood grain tones. New styles include a traditional shingle look. Must be installed to allow for seasonal movement. Metal siding has applied colors — fused finishes often guaranteed for life — plus textured patterns. Impacts can cause dents. Vinyl and metal systems have matching trim components.

- CertainTeed Corp. (800) 782-8777
- Georgia Pacific Corp. (800) 284-5347
- Rollex Corp. (800) 251-3300
- Wolverine (888) 838-8100



FIBER CEMENT SIDING

More often than not, fiber cement siding is installed by professional crews. A mixture of cement, cellulose fiber, and other materials, these products are fireproof, extremely rot-resistant, and come in panels or as lap siding. Like most composites, these materials must be stored dry, handled with some care, and properly fastened, preferably by power nailing. All exposed surfaces must be sealed or painted.

- ABT Building Products Corp. (800) 334-3551
- FCP Inc. (Cemplank) (888) 327-0723
- James Hardie Building Products (800) 942-7343 (NOTE: Some distributors sell only to contractors.)



Housewrap Update

Siding is definitely the front-line defense when it comes to protecting your house from weather, but it can't always fight that battle alone. Wind and rain team up for assaults

that can get water past the siding and into the sheathing and structural framing of walls. To make sure that doesn't happen, you need to have some backup.

Builder's felt — rolls of heavy, tar-impregnated paper — still performs this duty under roof shingles, but nowadays it's more common for walls to get covered with housewrap. Fastened with staples or roofing nails, these high-tech fabrics are lighter and more tear-resistant than felt paper, making them easier to install. Also, roll widths range from 3 ft. to 9 ft., making for faster coverage and fewer laps. These aren't the only differences, though.

Housewraps typically have a

special weave designed to stop liquid penetration but allow the passage of water vapor. Until recently, the only debate was about how effectively different brands do this. Now, some building designers question whether this is even the best strategy for protecting exterior walls from water.

Wraps Put to the Test

In theory, the strategy goes like this: the wrap will shed rainwater, but the normally occurring water vapor inside the wall can pass through, preventing the slow, cumulative moisture damage that can occur in non-vented spaces.

Recently, however, a group of researchers and building design consultants in Massachusetts discovered an unforeseen problem. It seems that real-life conditions can undermine the ability of housewraps to protect structures. If water makes its way past the siding and the wall gets heated up by the sun, the water turns to a pressurized vapor that passes through

the wrap. There it will condense (return to a liquid state) on the sheathing when the wall cools. As liquid, the moisture is now trapped behind the wrap, where it can cause the wood sheathing to rot.

Tests also showed that extractives in cedar and redwood can leach onto housewraps and undo their water-shedding capabilities.

The tests, conducted at the University of Massachusetts at Amherst, showed builder's felt and DuPont's Tyvek housewrap to be the most effective shields, though Tyvek's seal did degrade from exposure to the cedar extractives.

Paul Fiset, the university's Director of Building Materials and Wood Technology, cautioned that the tests aren't conclusive, but said some precautions are useful. These include back-priming wood siding to seal extractives in, using furring strips to create vented air space between the siding and the wrapped sheathing, and/or opting for traditional builder's felt wrap (the thicker 30-lb. weight). ■



Ergonomic Tools

Tool manufacturers all over are taking great pains to ease the pain out of your handyman work. How? By creating a new generation of hand and power tools

based on ergonomics — the science of matching a tool to the person doing the job.

Ergonomics involves engineering, biomechanics, physiology, behavioral science, medicine, and anthropometry (the study of measurements of the human body). Manufacturers then use information from all these fields to design safer, more user-friendly tools.

Although there are many new tools on the market labeled “ergonomically designed,” some experts are quick to point out that there is no such thing as a mass produced ergonomic tool. That makes sense, because a truly ergonomic tool fits one individual doing one job. Saying that one tool is ergonomically correct for all people and all jobs is like believing that one garment can actually fit people of all sizes and shapes.

Besides comfort, the driving force behind ergonomic design is reducing your risk of cumulative trauma disorders (CTDs). These injuries result from poor tool design, awkward working positions, and highly repetitive

motions. The most common example is Carpal Tunnel Syndrome.

You don't need to be a full-time tool user to risk injury from a CTD. Even office jobs, like working at a computer, may build up inflammation in your arm and wrist tendons. And you may go home to your shop and unwittingly continue to aggravate your tendons as you use your tools. When swollen tendons press against delicate nerves, the resulting pain tells you to rest or change your ways.

Red Devil, Hyde, Stanley, Hart, Vermont American, and other manufacturers have rethought the design of many basic hand tools,





It may look like a banana, but Stanley's utility knife is a serious tool that keeps your wrist in the desired neutral position.



Devilbiss moved the paint cup in the OMX design to minimize strain on your wrist. The gun flips to spray horizontal surfaces.



Matching tool size to the job is a prime ergonomic principle. I've switched to a small tape measure for benchtop chores.



An industrial anti-vibration glove helps protect delicate nerves from damage. Bicyclist's padded gloves also work well.

such as hammers, screwdrivers, putty knives, and even utility knives. The goal is to make tools that are easier and more comfortable to use.

Keep Risk At Arm's Length

Ergonomically designed tools can reduce injury-causing conditions such as poor wrist position, vibration, repetition, strained grip, and soft-tissue stress.

The Devilbiss OMX spray gun is a good example of how thoughtful design can tackle the problem of poor wrist position. Spray guns usually have the paint cup mounted ahead of your fingers, creating a strain on your wrist holding the gun in its operating position.

But the innovative OMX design relocates the paint cup over your hand and wrist, and tests at Ohio State University prove that this weight relocation makes a measurable difference in reducing fatigue.

Better balance is one reason many woodworkers now favor T-handle drills instead of the front-heavy pistol-grip design.

Several manufacturers, including Fiskars and Stanley Tools, have transformed the utility knife from a lowly toolbox knockaround into an ergonomic beauty. When you use one of these designs, you immediately notice that you can work without cocking your wrist at unnatural angles.

Bad Vibes

Pad and orbital sanders are one source of vibration that can cause wrist inflammation, which can lead to a tingling sensation or numbness in your fingers that feels like you're still holding onto the sander long after it's switched off.

This is commonly known as Vibration White Finger Disease. More technically, it's named Raynaud's Syndrome. But

you'll be happier if you don't need to remember either name. You can reduce your risk by limiting sanding sessions to 1/2 hour and using a glove designed to absorb vibration.

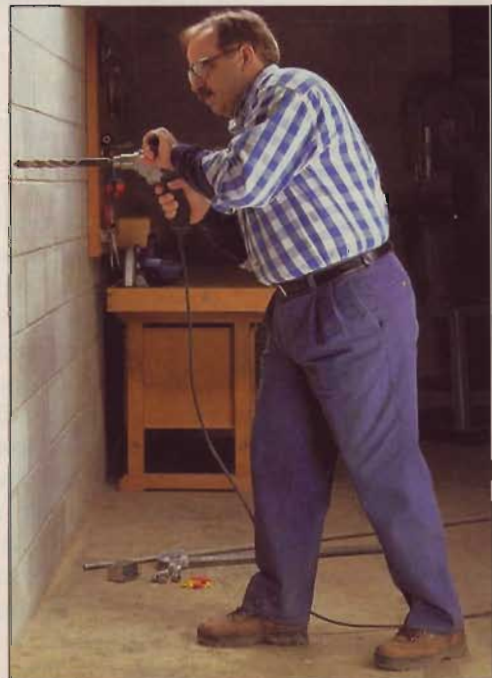
Again and Again

Repetitive work can be mind-numbingly boring. It can also lead to physical numbness or pain.

If you can spread repetitive work over several days, you'll give your body a better chance to recover. But if you can't do that, you'll still reduce the risk of injury by keeping your repetitive work sessions short (30 minutes or less). During your breaks, gentle stretching can help unknot both mind and muscles. You can also change your work position slightly, bringing other muscles into play to redistribute the exertion. Another strategy is to alternate hand-intensive repetitive work with other chores.

Get a Handle on Grips

You'll notice that many of the ergonomically designed tools have padded and textured grips. These serve several important functions that help reduce your effort.



A balanced stance gives you maximum power, safety, and control. Keep your elbows close to your body.

For example, perspiration on a wooden hammer handle can force you into a strained white-knuckle grip. But many cushioned handles include channels that increase air flow to keep your hand dry.

And when you remember one of the laws of physics — every action has an opposite and equal reaction — you start to see another reason for padded handles. Isaac Newton was no carpenter, but he would be quick to explain that your effort to drive a nail is matched by the nail's effort to pound the hammer into your hand, wrist, and arm. Soft tool grips help to dissipate that shock.

In addition, padded handles assist in preventing soft tissue damage that can be caused when skin, muscle, tendons, and nerves are squeezed between your bones and a tool handle.

Whenever possible, use a power grip instead of a pinch grip. A power grip is the usual “shake hands with your hammer” position, and it spreads the force over a large area. By contrast, a pinch grip, as the name implies, concentrates stress on your fingers.

When selecting tools to buy, let your hands try them on for size. Closing your eyes will allow your hands to see more clearly.

And try to get over the idea that bigger is better. For more years than I want to admit, I used my 25-ft. tape measure in the shop. Then I realized that I rarely used even half its length when working indoors. So I bought a 12-ft. tape that's lighter and easier to handle. I still have my big tape measure, but I save it for large-scale construction projects.

Good Work Habits Help

As you work, continually re-think your methods and tool selection to make the job as strain-free as possible. Become an ergonomic engineer by selecting tools that fit you and are appropriate to the job.

Keep your working posture balanced and comfortable. And

speaking of comfort, good working conditions are more than a luxury. For example, poor shop lighting can make you hunch over to see layout lines, and cold temperatures in the shop significantly raise the risk of muscle and tendon strain.

A realistic assessment of your strength will also help reduce injury. By age 55, the typical male has lost 15% of the muscle mass he had at age 25. But you can use 30 years of additional knowledge to compensate. For example, you can buy smaller toolboxes or unload some of the tool iron you lug around. One report estimates that the average toolbox tips the scales at an arm-wrenching 60 pounds! If you absolutely insist on a jumbo toolbox, look for one with wheels and a handle.


What to Buy and Why

Can ergonomically designed tools save you from the pain of cumulative trauma disorders? The answer is a simple yes and no.

Remember that there is no true “ergo tool” as such. A lot of thought is going into the design of these new tools, but you can't count on the manufacturers to do all of the thinking for you.

Check the grip, balance, and working position of a wide variety of tools until you find one that's right for the job you need it to do, as well as for your hand size and strength. A tool that's an ergonomic dream for another person could be a painful nightmare for you.

And unless you have the money to toss out all your old tools, start by looking at replacing those that you use most frequently or have been uncomfortable to work with in the past.

The responsibility for preventing injury is still yours. And while the new ergonomic tools in the hardware store give you more choices than ever before, constantly using that gray tool between your ears is your best defense against injury. 



The Sears Craftsman SST tool box has a handle and wheels that can save your back. Push, don't pull, to eliminate twisting.



A non-slip padded grip on this nail set helps absorb shock. The larger size also gives you better control with less pressure.



Equipping your shop for a variety of comfortable working positions reduces strain on muscles and tendons.



Swing-Up Bike Rack

It's a fact of nature — no house ever has enough storage.

And this is especially true if your basement or garage is filled with shop equipment.

I know I want to devote as

much prime floor and wall space in my garage as I can to machinery, tools, clamps, and lumber.

So when it came time to find room for storing my new bike, I could only look upward for help.

My ceiling was the last unused piece of real estate that hadn't already been spoken for.

But to use this space, I couldn't just hang the bike from hooks. If I did, my nose, after running into the bike time after time, would begin to resemble a prizefighter's. So I needed to devise a way to have the bike hug the ceiling above my head.

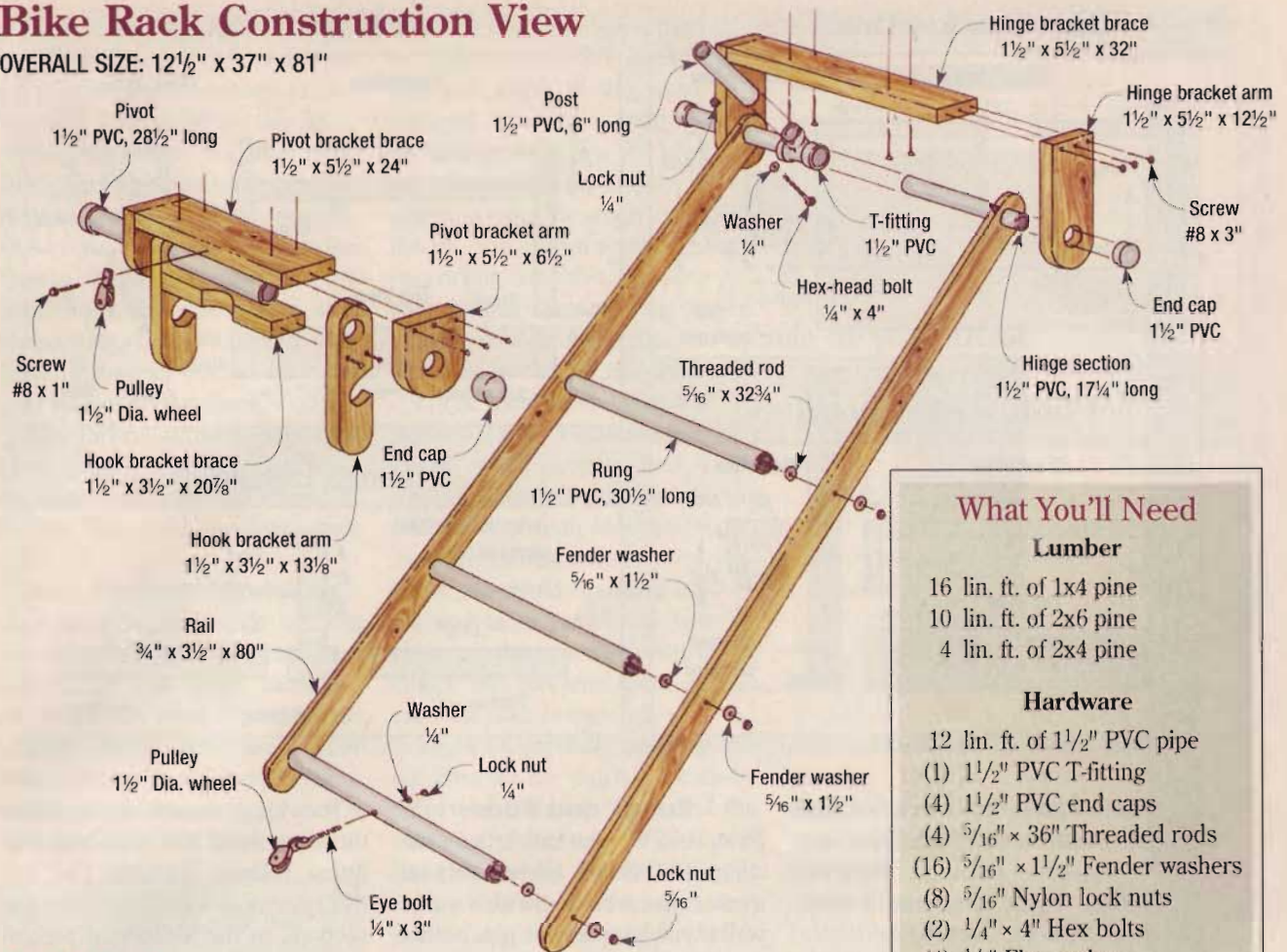
The bike rack I came up with fits the bill perfectly. And with the help of a rope and two pulleys, swinging the bike up and down is almost effortless.

Using PVC pipe for parts of the bike rack helps keep the weight down, and makes it easy to create the swinging action (**Bike Rack Construction View**). Besides the PVC pipe, you'll need 1x and 2x pine, threaded rods, and a few pieces of hardware.

My bike rack hangs from an unfinished ceiling. To raise the bike as high as possible, one end of the handlebar and a pedal fit between two joists. If you intend to mount the rack to a drywall covered ceiling, you'll need to lengthen the

Bike Rack Construction View

OVERALL SIZE: 12½" x 37" x 81"



What You'll Need

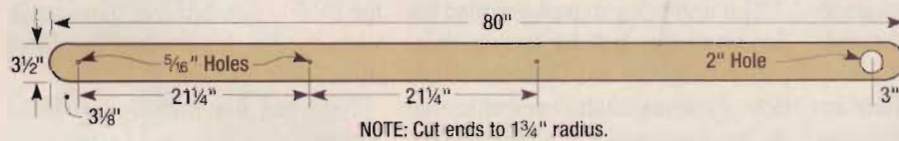
Lumber

- 16 lin. ft. of 1x4 pine
- 10 lin. ft. of 2x6 pine
- 4 lin. ft. of 2x4 pine

Hardware

- 12 lin. ft. of 1½" PVC pipe
- (1) 1½" PVC T-fitting
- (4) 1½" PVC end caps
- (4) 5/16" x 36" Threaded rods
- (16) 5/16" x 1½" Fender washers
- (8) 5/16" Nylon lock nuts
- (2) ¼" x 4" Hex bolts
- (4) ¼" Flat washers
- (3) ¼" Nylon lock nuts
- (2) Pulleys (1½" dia. wheels)
- (1) ¼" x 3" Eye bolt
- (24) #8 x 3" Flathead screws
- (1) #8 x 1" Flathead screws

Rail Detail



bracket arms 10" to 12". This way the bike pedal and handlebar will hang below the ceiling. You may also want longer bracket arms if your ceiling is exceptionally high — you need to be able to reach the rack and release the catch when you want to lower the bike.

All this brings up a good point. Please keep in mind that, depending on your bike or storage circumstances, you may have to alter this design by adjusting the size or locations of some parts.

Machining the Rails

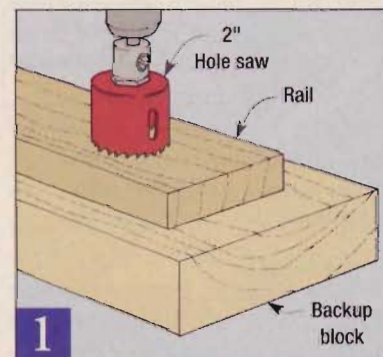
I recommend getting underway by making the rails. Cut 1x4 stock for the rails and lay out the drilling locations for the threaded rods

and the PVC hinge assembly (**Rail Detail**). I spaced the rungs to suit my bike. You may want to space them differently to avoid having them interfere with your bike's pedals, handlebar, and wheel hubs. I recommend setting a rail alongside your bike (align the rim of the bike's back wheel with the hinge hole location) to make sure the hole locations are offset from the bike parts I just mentioned. If they do line up, adjust the rung hole locations a few inches to steer clear of any conflict.

Once you've settled on the rung locations, drill holes for the threaded rods using a 5/16" brad point bit, and use a 2" hole saw for boring the hinge holes (**Figure 1**).

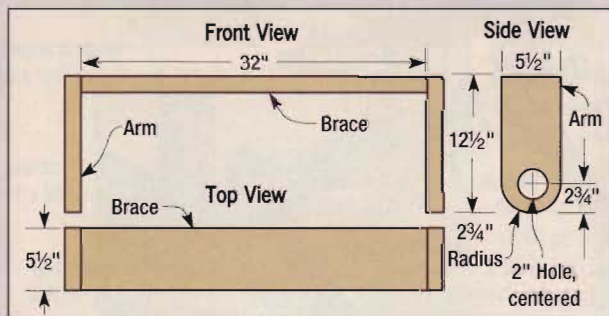
Build the Brackets

The hinge bracket, pivot bracket, and hook bracket are made of 2x stock, which you can now cut to length. Next, lay out the hole

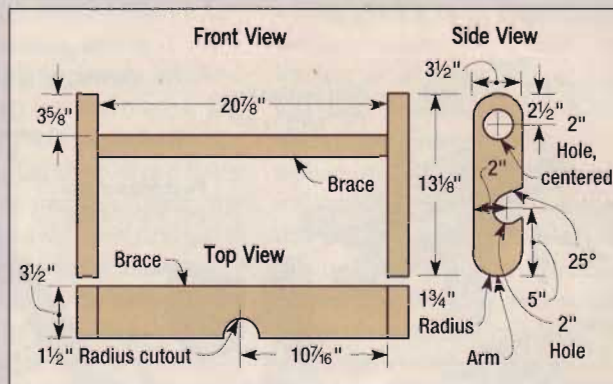


Cut holes with a 2" hole saw for the PVC pipe. The oversized holes provide ample room for some pieces to pivot.

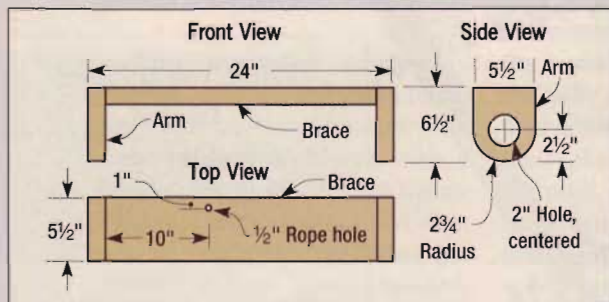
Hinge Bracket Detail



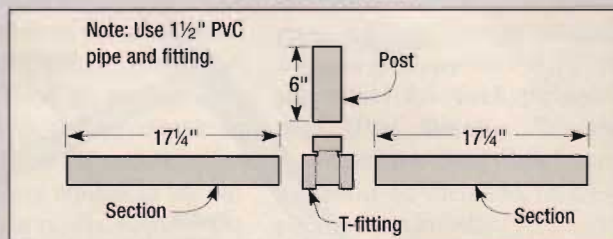
Hook Bracket Detail



Pivot Bracket Detail



Hinge Detail



locations, the curved cutout, and the rounded ends on the appropriate pieces (**Hinge Bracket Detail**, **Pivot Bracket Detail**, **Hook Bracket Detail**).

Cut all the large holes with the hole saw first (including a starter hole in each hook arm for the catch cutouts), then switch to a $\frac{1}{2}$ " bit and drill the rope hole in the pivot bracket base. Wrap up the machining by using a band saw or saber saw to complete the catch cutouts in the hook-arms, and to shape the cutout in the hook bracket brace and the rounded ends on all the arms.

Rungs and Rods

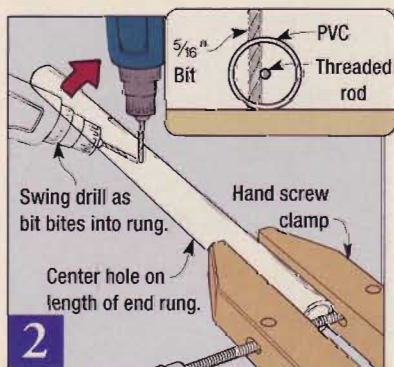
Next, cut PVC pipe to length for the rungs. PVC is easy to crosscut with a miter saw. A table saw also works well if you support the pipe with a miter gauge and an auxiliary fence.

The end rung must be drilled to accept an eye bolt for mounting a pulley (**Figure 2**). Drill this $\frac{5}{16}$ " hole off-center so the eye bolt misses the threaded rod after the rail assembly is constructed.

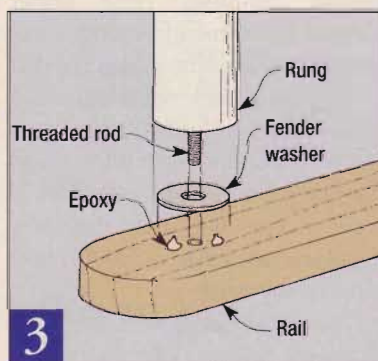
To give the rungs a toehold on the rails, and to keep them centered on the threaded rods, epoxy a $\frac{5}{16}$ " \times $1\frac{1}{2}$ " fender washer around each hole (**Figure 3**).

The hinge assembly includes three pieces of PVC pipe and a T-fitting (**Hinge Detail**). Cut the PVC pieces to length and glue the sections to the T-fitting. I recommend using glue specifically meant for PVC — available at most hardware stores. Just follow the label directions.

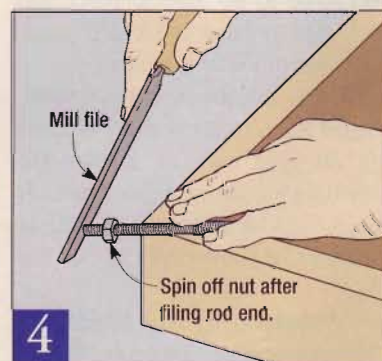
Now cut the threaded rods to length with a hacksaw. I always follow an old pipefitters' trick to guarantee that the nuts spin onto the rods without any fuss. Turn an ordinary $\frac{5}{16}$ " hex nut onto each rod before cutting them to length (**Figure 4**). Then, after complet-



2 Begin drilling the eye bolt hole with the bit square to the pipe, then correct the angle as the bit bites into the PVC.



3 You can prevent the PVC rungs from slipping by using epoxy to mount a fender washer around each threaded rod hole.



4 After cutting each threaded rod to length with a hacksaw, file the end to remove any dangerously sharp edges.

ing the cuts, file the ends to remove any burrs or sharp edges and spin the nuts off to restore all the threads to their original pitch.

Assembly

Now you can put the rail assembly together. Slip the rails onto the hinge assembly, then add the threaded rods and PVC rungs. Secure both ends of each threaded rod using a fender washer and a $\frac{5}{16}$ " lock nut. After tightening the nuts, center the hinge between the rails and drill $\frac{1}{4}$ " holes for the hex-head bolts (Figure 5). Secure the hex-head bolts to the rails with flat washers and lock nuts.

While the rail assembly is still easily within reach, join a pulley to the eye bolt and fasten this hardware to the end rung (Figure 6).

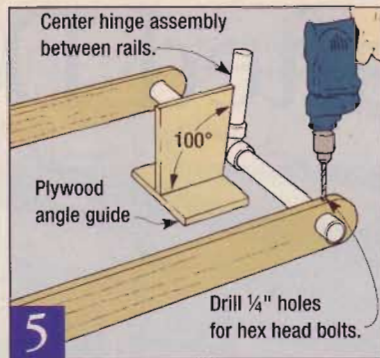
Pulling all the sections together begins with the hinge bracket and rail assembly (Figure 7). Slide the bracket arms onto the hinge, then secure the arms to the brace and glue PVC end caps onto the hinge.

Next, screw the hook bracket arms and pivot bracket arms to their respective braces. Slip the hook bracket inside the pivot bracket and slide the PVC pivot into position (Bike Rack Construction View). Glue end caps onto the pivot.

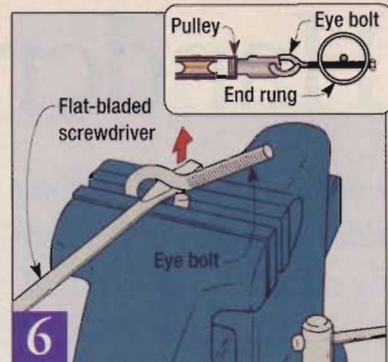
Mounting the Bike Rack

Securing the bike rack to the joists is a two-person operation. Start by having your helper hold the hinge bracket assembly up to the joists while you drill pilot holes through the brace and drive the screws. Next, slip the hook-arm catch cutouts onto the end rung and swing everything up to the ceiling. Align the hook arm bracket with the rail assembly, then drill pilot holes and drive the screws.

Mount the remaining pulley to the pivot bracket brace and thread the rope — I chose inexpensive cotton sash cord — through the pulleys (Figure 8). Tying a knot into the end of the rope will secure it to the pivot bracket brace.



Center hinge assembly between the rails, then use an angle guide to tilt the post before drilling holes for the locking bolts.



Pry the eye bolt open with a flat bladed screwdriver. After connecting the pulley, use the vise to squeeze the eye closed.

Hoisting Your Bike

Since most bikes are heavier in the back, I suggest hanging the back wheel over the hinge post. This puts the greatest weight close to the pivot point of the rack, making it easier to raise and lower the bike.

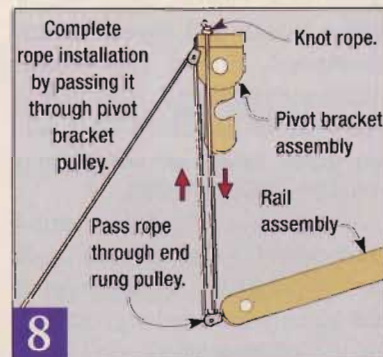
Now pull the rope and feel how little effort it takes to raise the bike rack. As the rail assembly swings up to the ceiling the end rung should push the hook bracket aside for a moment and slip smoothly into the catch cutouts. It all happens just like clockwork if the rail assembly and hook bracket are aligned.

Finishing the bike rack is optional, although I rubbed on two coats of oil finish to protect it from grease or dirt coming off the bike.

I suppose there are more elegant ways to store a bike. But for making use of available space in a packed basement or garage, I can't imagine a better method. And in a garage, it still allows room for a car underneath. Now all I need to do is design something similar for my lawn tractor!



Slip the hinge bracket arms onto the PVC hinge assembly, then drill countersunk pilot holes and screw the arms to the base.



Thread the rope through the pivot bracket hole to the end rung pulley, then back up to the pivot bracket pulley.



Handcrafted Door

I've always thought anyone who builds custom projects into a home should be committed. Not to an institution (though that too is arguable), but to seeing the work through to a

satisfactory end. If there's a down side to craftsmanship, it's the high standard it sets for what follows.

Of course this rule operates in other areas of life. No five-star restaurant covers its prize-winning veal parmigiana with Cheese Whiz. And imagine if Leonardo Da Vinci had grown impatient with *The Last Supper* and painted the minor apostles as stick figures.

When the time came for a new screen door at the *Workbench* house, I kept this principle firmly in mind. We had just installed a brand new custom deck railing and a cedar and copper trellis (*Workbench*, August 1997 issue). With surroundings like that a store-bought aluminum door was not going to cut it, not when I could build one of wood.

A cedar frame was the natural choice for the screen door, both for its durability and because it had already provided a great look for the other projects. And if it's assembled and finished properly, the door will benefit from cedar's dimensional stability and resistance to warping.

Designing for Strength

A door frame like this is a big assembly, but it doesn't really contain that much material. As in chair construction, only relatively small amounts of surface area are dedicated to joinery, so the joints have a lot of work to do.

Given the size and shape of the parts of my door frame, the mortise-and-tenon joint is ideal. It has



plenty of inherent mechanical strength, provides generous gluing surface, and can be pegged to make it even stronger. And except for a slight variation in tenon width on the short center stile, all the joinery in this project can be cut to the same dimensions (**Screen Door Construction View**).

Before you start planning the setups for cutting the joinery, though, you'll need to buy and prepare the cedar lumber. You may have a doorway that's slightly wider or narrower than mine, but chances are you'll need the same rough lumber sizes. Since you're not buying much material, I would

Construction View

OVERALL SIZE: 1 1/8" x 32" x 80"

NOTE: Dimensions are based on a 32" door.

Stile
1 1/8" x 4 1/2" x 84"

Screen door latch assembly

Drawbore peg
3/8" dia. x 1 1/2"
(rough length)

Bottom rail
1 1/8" x 6" x 27 1/2"

Center stile
1 1/8" x
4 1/2" x 29 1/2"

Top rail
1 1/8" x 6" x 27 1/2"

Middle rail
1 1/8" x 6" x 27 1/2"

NOTE: Trim horns after assembly
(see Figure 11)

Door safety chain

Screen fabric

Trim molding
1/4" x 1 1/8"
(cut to required lengths)

Pneumatic door closer

Flathead brass screws
#6 x 5/8"

Loose pin
3" x 3" butt hinge

What You'll Need

Lumber

18 lin. ft. of 2x6 clear cedar/fir
8 lin. ft. of 2x8 clear cedar/fir
3 lin. ft. of 3/8" oak dowel

Hardware

#6 x 3/4" flat head brass screws
24" x 72" bronze screen fabric
Screen door latch assembly
Door closer, safety chain
3" x 3" loose-pin door hinges

suggest splurging on the best stock you can find: clear, vertical-grain cedar 2x6 and 2x8 lumber. It will move and twist less than plain-sawn wood (**Lumber Detail**). Douglas fir is a suitable alternative if you can't find good cedar locally, but it too should be a select grade and kiln-dried for stability.

If you had a long-bed jointer and a thickness planer on last year's Christmas list and your gift-givers came through, consider yourself armed and ready for door-making. Though not absolutely necessary, these tools will make it much easier to pull this project off successfully. But if you don't have them, just buy your wood at a lumberyard that can dimension it for you.

It might seem wasteful to mill off so much material to get your finished dimensions, but there's a reason for it here. The assembled door must be flat and square if it's going to fit and close properly, and the surest guarantee for that is to start with lumber that has been milled straight and square. It's like

Lumber Detail

Plain-sawn



Quartersawn

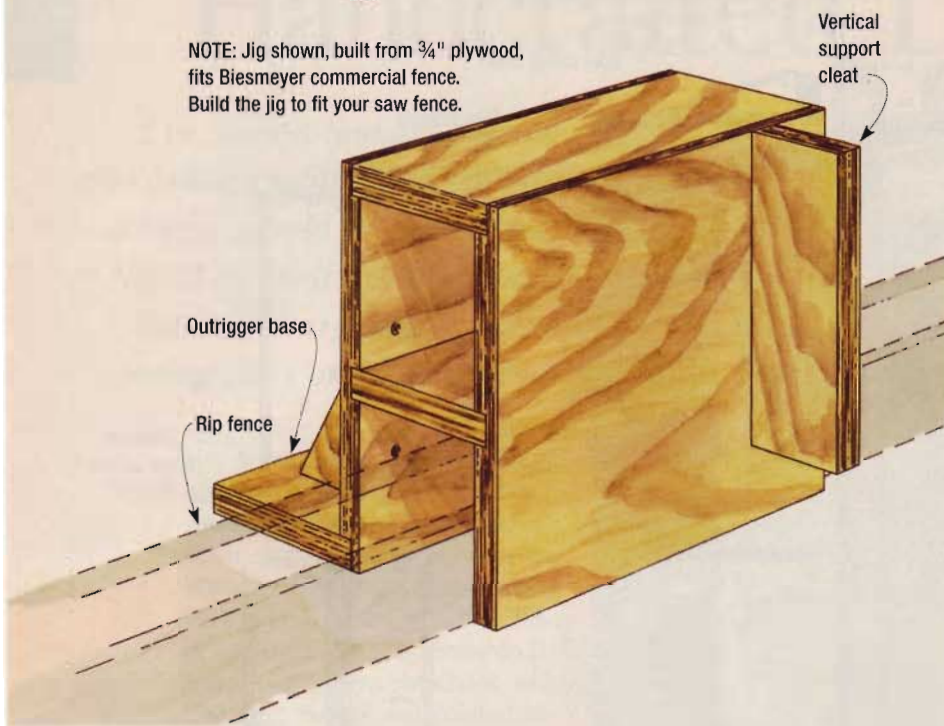


With growth rings perpendicular to the board's face, quartersawn lumber has a straighter, vertical grain pattern.

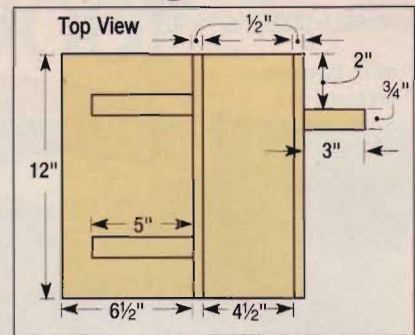
being accurate with the foundation of a building — it makes the subsequent work easier. Once you've jointed one face and one edge of each board to get reference surfaces, you can plane the stock to the required thickness and width.

Tenon Jig Construction View

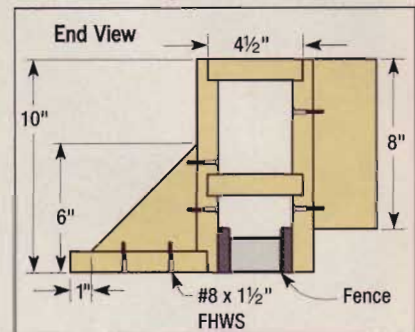
NOTE: Jig shown, built from 3/4" plywood, fits Biesmeyer commercial fence. Build the jig to fit your saw fence.



Jig Detail



Jig Detail



Cut the Tenons First

Because drilling and chiseling the mortises involves a lot of handwork and yields results that might vary, start with the tenons first. You can machine them quickly, and they'll provide a reliable reference as you pare each mortise to fit.

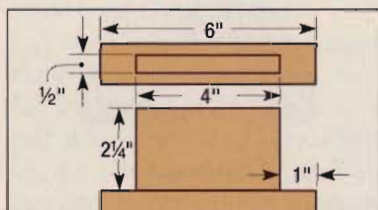
Of course there's nothing wrong with cutting the tenons by hand as well, but for me this just wasn't practical. With enough fussing I can get them pretty accurate, but I didn't want to give up that much time or lose the control the table saw offers. For projects like this door, I have to

admit I'm more pragmatist than purist. Besides, the mortises gave me time to practice my hand skills.

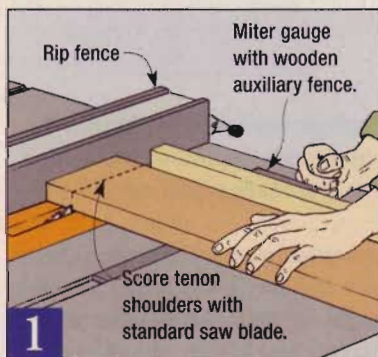
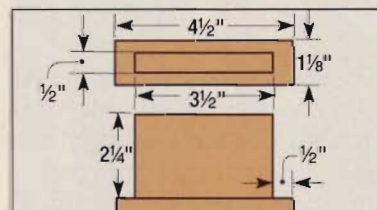
Any number of machines or power tools will cut the tenons, but I opted for just my table saw, a 10" combination blade, and a shop-built jig (**Tenon Jig Construction View and Details**). Along with accuracy, your biggest concern should be a good gluing surface. These joints will handle some serious stress, so you want a clean fit and a good glue bond. (For dimensions, see the **Tenon Details**.)

First, make the shoulder cuts with the stock lying on the table (**Figure 1**). Then separate the waste from the tenons. The jig supports the workpiece vertically, guiding it along the rip fence and past the blade (**Figure 2**).

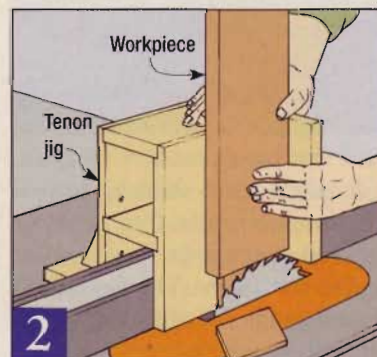
Rail Tenon Detail



Stile Tenon Detail



1 With the fence as an end stop, make cuts to define the tenon shoulders. Adjust the depth when shifting from face to edge.

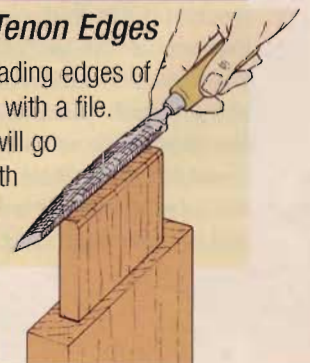


2 After cutting the shoulder edge waste away, pivot the workpiece and reset the fence to cut the cheeks off the tenon.

PRO TIP

File the Tenon Edges

Ease the leading edges of each tenon with a file. The joints will go together with less effort.



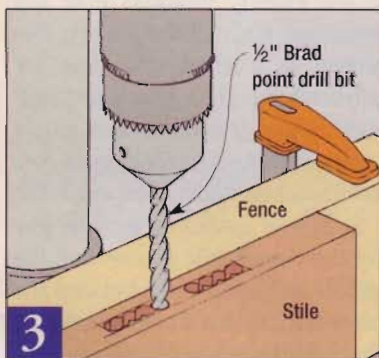
The rails and the center stile are the only pieces that require tenons, and they're all short enough to handle easily with help from this jig.

Make the cuts for the edge shoulders first, then reposition the fence so you've got the correct offset for removing the waste from the cheeks. Keep in mind that the dimensions for the center stile tenons are slightly different than those of the rail tenons, so you'll have to readjust the fence setting.

After you cut all the tenons, take a few minutes to chamfer their leading edges with a file (as shown in the **Pro Tip** on the previous page).

Deep Pockets: Mortising

Compared to the work on the tenons, you'll find the mortises slow-going, but don't panic — you've got only eight of them to cut. I didn't mind in this case — the cedar cuts easily, and next to using a sharp plane, chopping mortises is some of my favorite hand work.



Use the drill press to rough-out each mortise to the proper depth. Start with the end holes, then work toward the middle.

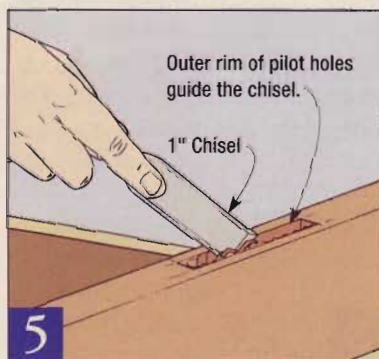


To square the mortises up, start with end cuts (across the grain). You can use a mallet, but cedar won't need brutal hits.

Before you do any chisel work, however, you'll need to hog out some of the waste material. Start by setting up the drill press with a 1/2" brad point bit, and clamp a fence in place to center the stock under the bit. You'll need some help supporting the stiles, so use a long auxiliary table or rig up some freestanding supports on either side of the drill press.

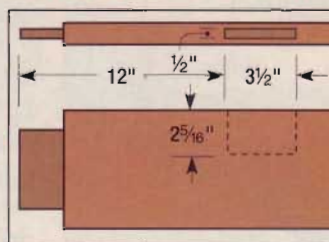
If you look carefully at the **Screen Door Construction View**, you'll notice that I allowed an extra 2" in length at each end of both side stiles. This extra stock, called a horn, helps you avoid breaking out the end of the stock as you clean up the mortises with a chisel. You can trim them off once the door is together.

Begin by carefully marking layout lines for the mortise locations. (**Mortise Details**). Then drill the waste out of the center of each mortise (**Figure 3**). I drilled holes at each end of the mortises first, then worked my way through the mid-section. This way, I'm less likely to get careless from the repetition and inadvertently work past the ends of the mortise. This might sound like one of those "don't ask me how I know this" tips, learned after a huge mistake, but it's actually just some practical wisdom one of my woodworking mentors passed on to me. He liked to develop techniques with built-in safeguards, figuring the smallest reminder was

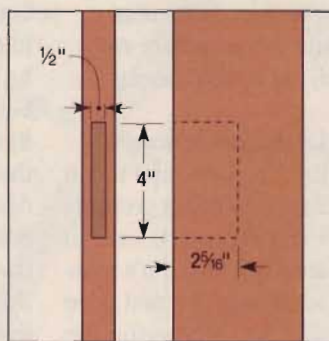


After leading with the end cuts, use a wider chisel to hand-pace the sides. As you work deeper, keep alternating tools.

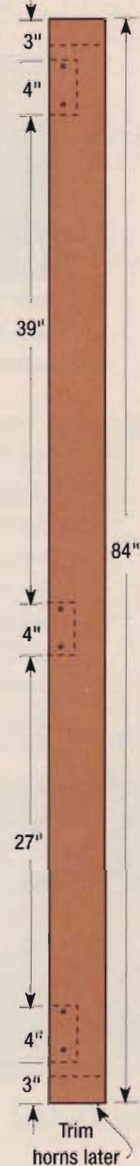
Rail Mortise Detail



Stile Mortise Detail



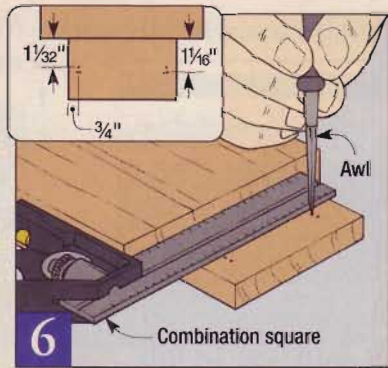
Stile Mortise Locations



more reliable than the best memory. Though it's not foolproof, the strategy has saved me plenty of aggravation and more than a few dollars in expensive lumber I might have wasted.

To cut the remaining waste out of the mortises, I always lead with the narrow chisel for squaring the ends. Driving the 1/2" chisel with a mallet, make scoring cuts as deep as you can without forcing or jamming the tool (**Figure 4**). (This varies with the wood's density, but you'll get a feel for it right away.) Then switch to a wider chisel, say about 1", and guided by the hole rims, hand-pace material from the sides of the mortise (**Figure 5**).

Alternate between the ends and sides as you get deeper into the mortise, *always* leading with the end cuts. Squaring them first makes it more likely that the chisel work on the sides will pop the waste out freely rather than split the wood along the grain, which would ruin the mortise. As you finish each mortise, try a test fit with the tenon it's supposed to house, and mark them as matched pairs.



Back-marking the tenon for the offset holes goes faster with a square or other reference tool, plus it helps accuracy.

Pegs Lock the Joinery

Pinning the mortise-and-tenon joints with hardwood pegs prevents them from coming apart, even if the glue bonds fail. But if it's muscle you're after, you can add even more strength by drawboring the joints together (see *Drawbore Joinery*, page 42). Done correctly,

drawboring builds in tension that helps keep the door frame taut.

The companion article I mentioned outlines the basics involved in drawboring, but there are a few details specific to this project.

Start by boring the two peg holes through each mortise, using the drill press and a $\frac{3}{8}$ " twist drill bit. (I like the look of pegged joinery, so I drilled the front of the door frame, but this does leave the pegs exposed to weather.) The hole depth should be 1", enough to bridge the mortise but stopping shy of the other face of the workpiece. When you've got all the holes drilled, dry-assemble the door frame and gently press a $\frac{3}{8}$ " brad-point drill bit into each hole so the point leaves a sharp dimple in the tenon. Then disassemble the frame and use a square to lay out the offset marks on each tenon (**Figure 6**).

I've got a combination square with a 1"-wide blade that's ideal for getting consistent results here, leaving me an offset of about $\frac{1}{32}$ ". I just butt one edge of the blade against the tenon shoulder and use a sharp awl to make a starter hole for the drill bit. Using the square this way not only eliminates a separate measuring step, it prevents the differences likely if you were to place the tool freehand on each tenon. (A wooden spacer cut to the desired width is another option.)

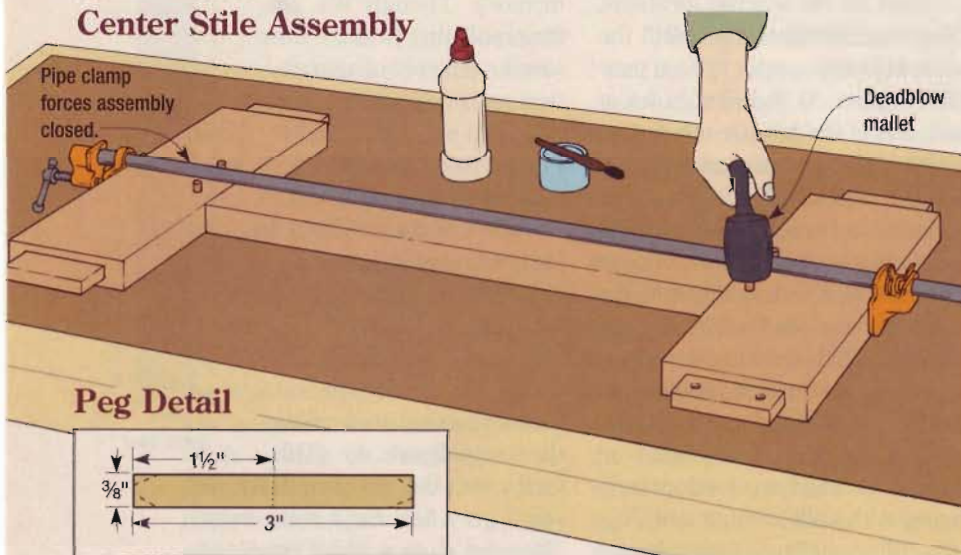
With the marking done, chuck the brad-point bit into the drill press and bore through the tenons.

I used short sections of $\frac{3}{8}$ " white oak dowel that each yielded two pegs (**Peg Detail**). This made them easier to hold while I sanded a chamfer on each end; then I simply cut them in half.

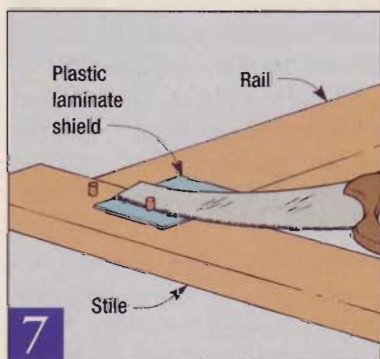
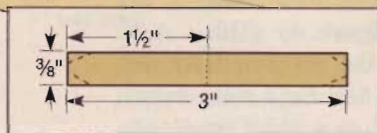
Ready for Glue-up

At this stage you've already dry-fitted the door together at least once, so the glue-up shouldn't hold any surprises. With all the joinery, this project is a good candidate for polyurethane glue, which provides great water resistance and ample working time. Exterior-grade yellow glue is also fine if you work fast.

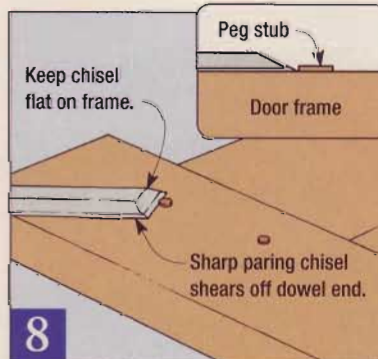
Start your assembly work by gluing the center stile tenons into the middle and lower rails. I closed the joints tight with a single bar clamp, checked the assembly for square, spread glue in the dowel holes, and drove the pegs home with a small mallet (**Center Stile Assembly**).



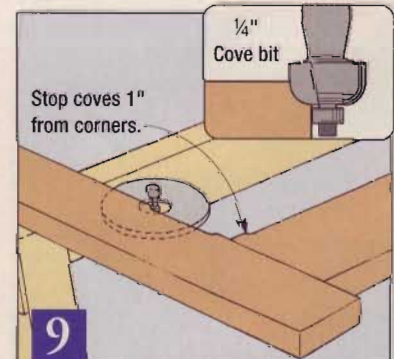
Peg Detail



With a thin laminate shield to protect the door face, use a hand saw to cut most of the excess length from the pegs.



Pare the remaining peg stub away with a sharp chisel. Keep the chisel back flat on the door, cutting to the center of the peg.



A cove detail dresses up the facade of the door frame. Use layout marks or a spacer block to hold back 1" at the corners.

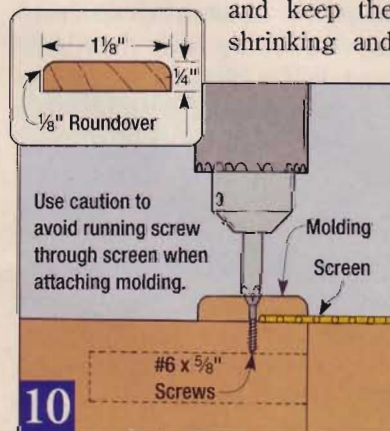
When this lower sub-assembly is together, you can fit the rail tenons to one side stile, then the other, and pull the frame closed with a few bar clamps. Check the inside corners with a framing square, and even if you're using a large bench surface you know is flat, stand at one end of the frame and check visually for twist or any other distortions before you drive the pegs in.

About $\frac{1}{2}$ " of each oak peg will be standing proud of the door frame. To clean these up, I made a simple shield by drilling a $\frac{1}{2}$ " hole in a scrap piece of plastic laminate, placed it over each peg, and used a small hand saw to remove most of the excess length (Figure 7). To cut away the remaining stub, I removed the shield and used a sharp chisel to pare the peg flush with the frame (Figure 8). You'll get better results if you work around each peg so you're always cutting in towards the center.

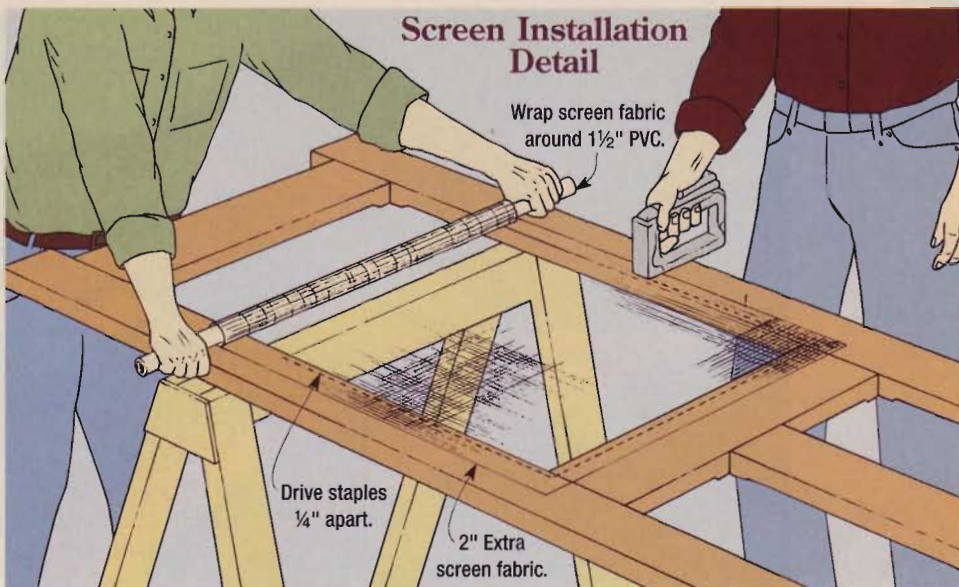
Add the Finishing Touches

I decided to dress up the exterior face of the door frame by routing a $\frac{1}{4}$ " cove around the screen openings (Figure 9). I stopped the cove detail 1" from each corner. Don't rout the back face — the screen and trim molding mount there.

Western red cedar holds up well outdoors, but there are several reasons I didn't want to leave the door unfinished. First, a properly applied finish will block water penetration and keep the shrinking and



10 Making sure the screws clear the edges of the screen fabric, fasten the cedar molding to the door frame. Use brass screws.



swelling of the wood to a minimum, reducing stress on the glue joints. Second, the inside and outside faces of the door will live separate lives, with extreme differences in exposure to sunlight and moisture. Since you can't balance the environment, you have to settle for neutralizing the differences as much as possible, and a finish will do that.

Finishes also make it easier to retain the original color of the cedar, especially if you use a product with an ultraviolet inhibitor. I used three coats of an exterior spar varnish, the first coat cut 1:1 with mineral spirits.

For screen fabric, bronze was the perfect counterpart to the cedar — it looks classy and is very durable. It will be easier if you can recruit another pair of hands to

help you at this stage, so you can pull the screen fabric tight and flat before stapling it (Screen Installation Detail). Allow up to 2" extra screen material along each edge, and have your helper unroll it from a large wooden dowel or a piece of $1\frac{1}{2}$ " PVC pipe, keeping the tension uniform. When all three openings have been covered, trim the screen to about $\frac{1}{2}$ " past the opening edges. The cedar screen molding is next. I had routed the top edges with a $\frac{1}{8}$ " round-over bit and varnished the stock while it was in rough lengths. Now I just mitered the ends and fastened the trim with some brass screws (Figure 10). Try a test run on scrap first — cedar is usually pretty soft, but you may need to drill pilot holes so the screws don't break off.

At this point, recheck your doorway for dimensions and any out-of-square corners. As you trim the horns off the stiles, you can adjust the cut so the door fits properly (Figure 11).

I used loose-pin butt hinges, surface-mounted to the frame and to the edge of the jamb, to hang my door. If you want the hardware to be less obtrusive, mortise the hinges into the door edge and the jamb face, leaving just the pin and hinge knuckle exposed. ▀



11 After checking your door opening for exact dimensions and angles, trim the door to fit. This removes the stile horns.



Drawbore Joinery

Anyone who frequents wood-working tool shows knows how many new gadgets arrive every year, each promising accuracy, speed, and better results. Some aim at improving our skills,

others at making skill irrelevant, and a few will surely gather more dust than they generate.

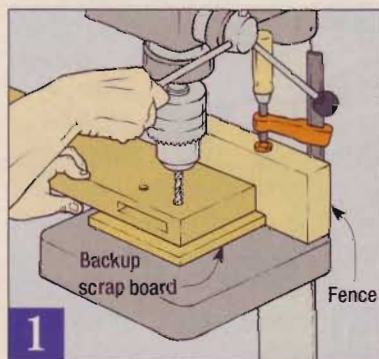
I like watching the constant stream of new ideas, but the more I see the more I appreciate the ingenuity of the early woodworkers, craftsmen who made do with simple tools and techniques.

Drawboring is one of those great techniques, relying on nothing more than wooden pegs and several holes drilled through a

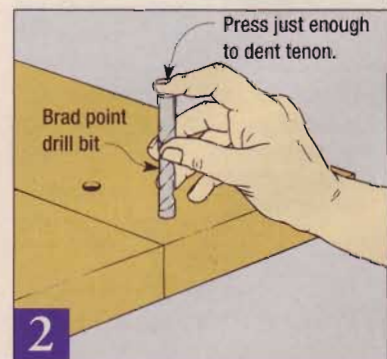
mortise-and-tenon joint. The hole positions are shifted slightly to create a permanent tension in the joint, almost like building a clamp right into the assembly.

The principle is simpler than the recipe for ice cubes. A straight peg

driven into the slightly offset holes draws the tenon into the mortise, forcing the shoulder tight against the mortised piece. The amount of offset varies with the scale of the joinery — furniture components may require no more than $\frac{1}{32}$ "



1 Determine the best peg hole locations and drill through the mortise. The holes can be drilled through or stopped blind.



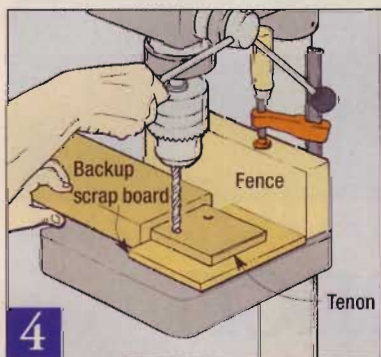
2 Dry-fit the joint together and use a brad-point drill to mark the tenon. Press lightly to leave a small, fine dimple.

but for a joint in a large timber-frame structure, you can stagger the holes by as much as 1/4", especially if the lumber is green enough to give way as the peg is driven. One caution — too much of an offset will overstress the joint during assembly and literally break the wood apart. If you're not sure, cut some extra parts and do a few trial runs first.

Measure Twice, Drill Twice

After you test-fit the tenon in the mortise, disassemble the joint and bore the peg holes through the mortise (**Figure 1**).

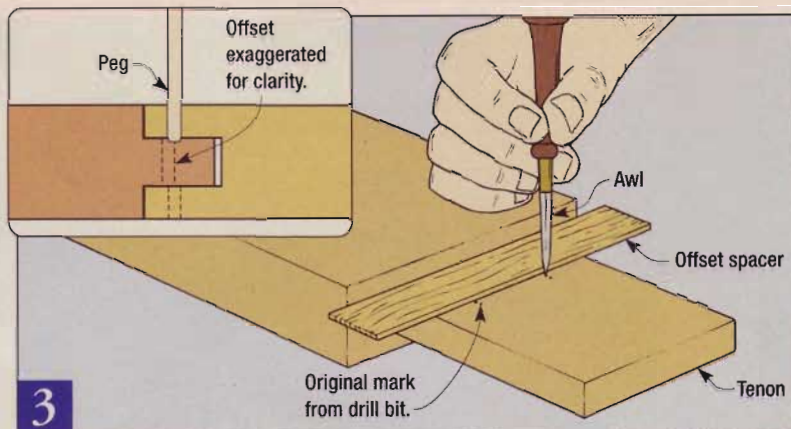
Like the offset, the peg position should be scaled to the joinery. Going more than halfway down the length of the tenon leaves it weak and prone to splitting; too close to the shoulder weakens the sides of the mortise. This varies with the wood species and the proportions of the joint, but as a general guideline, the distance from



4 Using your drill press (if possible), bore the peg holes through the tenon. A backup block helps prevent tearout.



5 A belt sander makes quick work of the end chamfer on each peg. Don't skimp here — that "nose" is your navigator.



3 Disassemble the joint and mark the tenon holes at the appropriate offset. When drilled accurately and pegged, the staggered holes pull the joint tight (see inset detail).

the center of the hole to any edge or corner should be no less than twice the peg diameter. Within these limits, though, I usually try to stay close to the shoulders. That way, a gap won't open up in the joint if the wood shrinks — the movement will stay to the outside of the pegs.

After you drill the first holes, dry-fit the joint again and use a brad-point drill to mark the face of the tenon (**Figure 2**). Press the bit just enough to leave a small, sharp dimple. If you create a large dent there, chances are you're deforming the very spot where the offset mark needs to go. Finesse this step and save your muscle for disassembling the joint. Then figure the offset you want and mark the new hole locations on the tenon (**Figure 3**).

When you drill these holes, use a block underneath to support the back of the tenon (**Figure 4**).



6 Use a clamp to close the joint, then check the assembly for square. Drive the pegs with a deadblow or wooden mallet.

Prior to the final assembly, you'll also need to customize your pegs. I cut short lengths of hardwood dowel rod (fluted dowel pins create gaps at the hole edges) and sand a chamfer on the leading ends so each peg can maneuver through the offset holes (**Figure 5**).

Attention to Detail

I also ease the leading edges of the tenon slightly so it will enter the mortise more easily and give the excess glue a little room. When you're ready for final assembly, spread glue inside the mortise and (lightly) on the tenon, then force the joint closed with clamps. Check the assembly for square, then drive the pegs (**Figure 6**).

You can vary some details if you want — the pegs can be left proud or pared flush with the wood surface. Also, they can stop shy of the back of the joint or continue through the assembly. And the tenon itself can be "blind" (concealed inside a closed mortise) or "through" (extending to or past the far side of an open mortise).





Handyman's Bench

I should have been more suspicious when my neighbor with the skinflint reputation offered me some scrap lumber, "free for the hauling." But I was young and poor at that

time and wanted to build a workbench in the worst way. Little did I realize how something free could be so costly.

My enthusiasm carried me through the hard work of pulling the nails from the lumber, and then patiently straightening them

with hammer taps on the concrete garage floor. But when I was finally ready to start cutting, I realized why my neighbor had been eager to get rid of the lumber.

Simply using the word "warped" doesn't begin to explain the complete range of lumber defects I surveyed. But I figured that I could overcome the bad lumber with a strong arm and the coffee can full of salvaged nails.

After a weekend of hammering and sawing, I had assembled a workbench. Of course, I hadn't taken the time to draw any plans, so the only way I could tell that I

was finished was when the lumber was used up. Then I kept hammering until the coffee can was empty. I stepped back for a look. Then I stepped back further.

I nicknamed that project "my 30-foot workbench," which had nothing to do with its actual length. It meant that it didn't look too bad from 30 feet away.

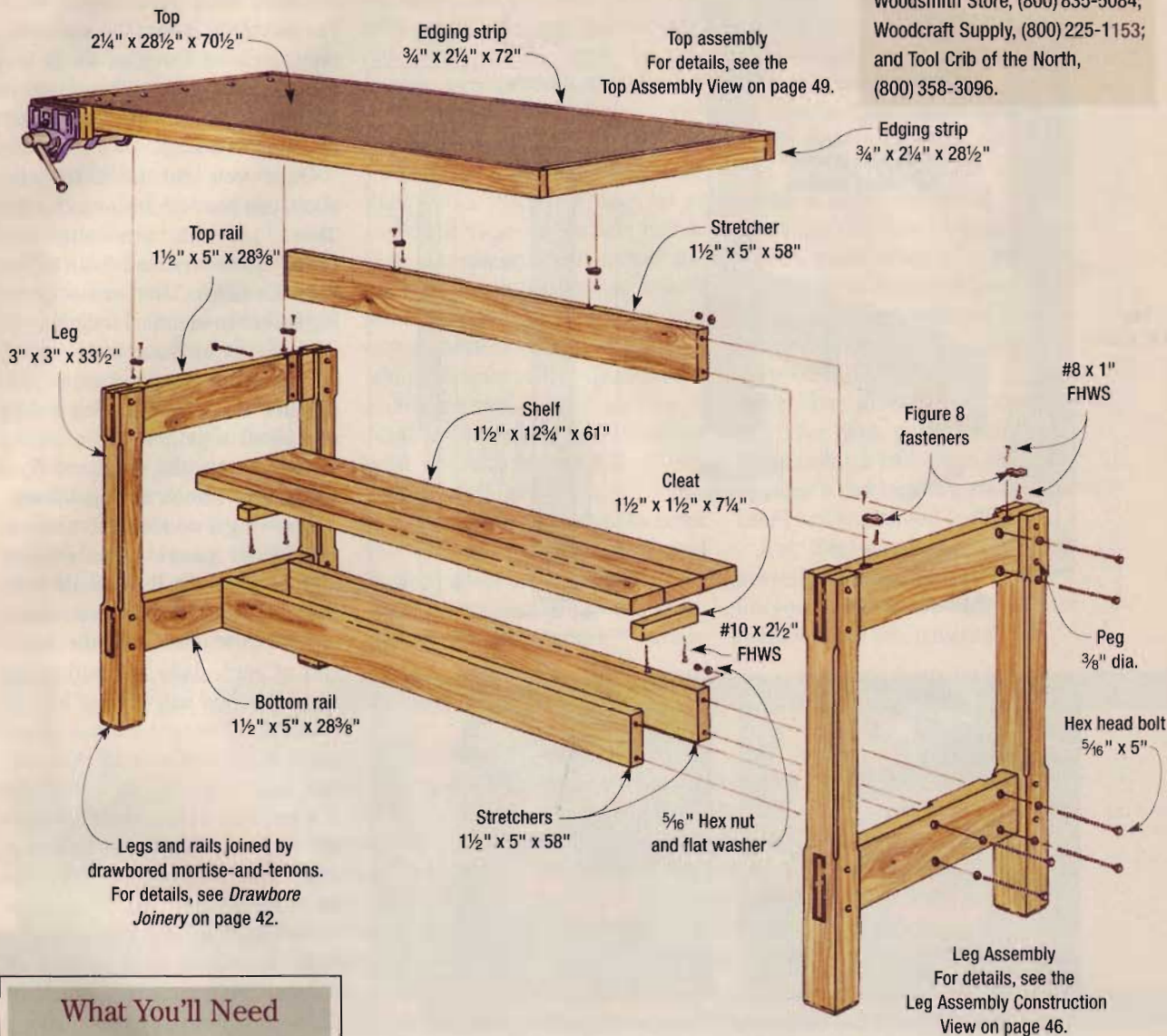
Built for Strength

By the time that first bench gave up its spirit, I had learned a few things about woodworking. So for its replacement, I designed a bench with unshakable joints, a dead-flat

Bench Construction View

OVERALL SIZE: 35 $\frac{3}{4}$ " x 30" x 72"

Note: This workbench project calls for a Record 52ED vise, a model that's widely available. Three mail-order sources are: Woodsmith Store, (800) 835-5084; Woodcraft Supply, (800) 225-1153; and Tool Crib of the North, (800) 358-3096.



What You'll Need

Lumber

- (8) 8 ft. 2x6 Douglas fir
- (4) 8 ft. 2x4 Douglas fir
- (3) 8 ft. 1x4 Pine
- (2) 3/4" x 4' x 8' MDF

Hardware

- (6) Figure-8 fasteners
- (12) 5/16" x 5" Hex-head bolts
- (24) 5/16" Flat washers
- (12) 5/16" Hex nuts
- (20) 6d Finish Nails
- (2) 3/8" x 3' Dowels
- (12) #8 x 1" FH wood screws
- (4) #10 x 2 1/2" FH wood screws
- (1) 3/4" x 2" hex-head bolt

top, and enough mass to keep it firmly anchored during the most intense work sessions. Instead of nails, this bench has drawbored mortise-and-tenon joints and reliable nut-and-bolt connections (**Bench Construction View**).

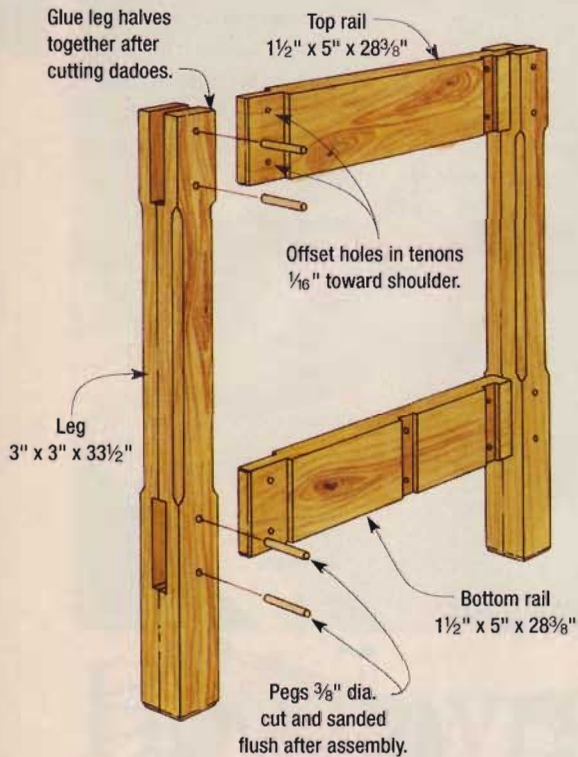
The top is laminated from three layers of medium-density fiberboard (MDF) for a flat working surface. This heavyweight material contributes enormously to the bench's solidity.

I've often wanted to work while sitting, but the design of my old bench made that awkward. In this

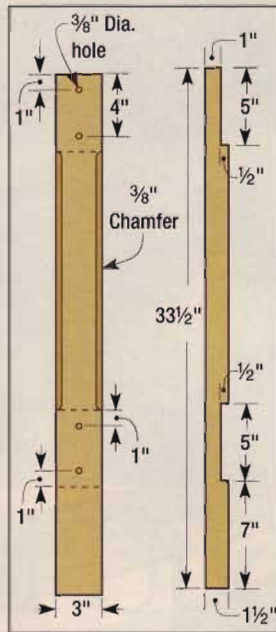
bench, I located the lower stretchers toward the back. That way, I can pull a stool right up when I have detailed work to do or just need a break.

The bench also features several convenient options (See *Bench Accessories; Boxed Drawer and Shelf* beginning on page 52). You can build either or both of them now or add them later. The drawers keep frequently used tools and accessories within easy reach, and the shelf stores more tools and fasteners, so the bench top is always ready for your next project.

Leg Assembly Construction View



Leg Details



Start With the Legs

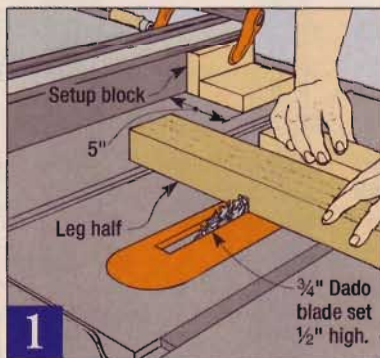
At the lumberyard, my past experience with poor quality material helped me pick out wood that I wouldn't have to struggle with. For strength, durability, and economy, I chose Douglas fir. If you want to make your bench from hardwood, birch and maple are traditional choices.

Once you get back to your shop, use your table saw to rip the 2x4s to width, removing the rounded corners from both edges (**Leg Details**). Then crosscut the leg halves to identical length.

Next, set up your table saw to cut the dados for the bottom rails (**Figure 1**). When the leg halves are glued together, these paired dados create the mortises (**Leg Assembly Construction View**).

Screwing a wooden extension to your miter gauge helps prevent tearout when the dado blade exits the stock. This will give you clean, precise cuts. First, cut the lower end of each dado by butting the end of the leg half against a setup block clamped to the fence. Then, register the bottom end of the leg half against the rip fence and cut the top end of the dado (**Figure 2**). After making both end cuts, make several passes to remove the waste between them.

Now you can turn your attention to the mortise at the top of the leg halves. Make certain that the dados making up this mortise are the same size as the lower dados. That way, all your rails can be identical in width.

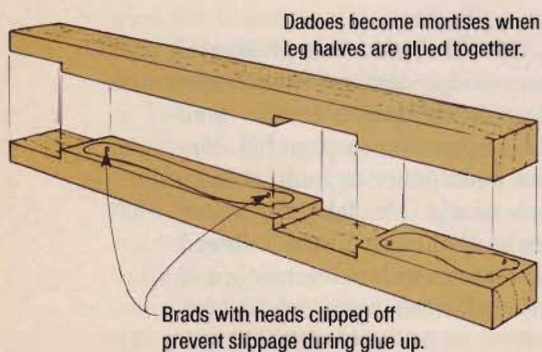


1 A setup block clamped to your table saw's rip fence helps you accurately position the leg half for the first dado cut.



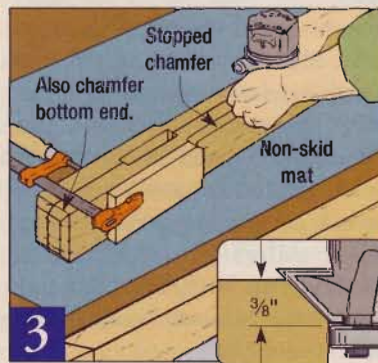
2 To cut the top end of the dado, butt the leg half against your rip fence. Remove the waste (shaded area) to finish the joint.

Leg Glue-up Detail



Brads with heads clipped off prevent slippage during glue up.

Dados become mortises when leg halves are glued together.



3 Clamp scrap blocks to the legs to keep from routing chamfers too far. Make several light passes to prevent tearing out wood.

Leg Halves Become Legs

After you've milled all the dados, glue the leg halves together in pairs (**Leg Glue-up Detail**). To keep the parts from creeping, partially drive brads into one leg half in each pair, then clip their heads about $\frac{1}{16}$ " above the wood. When you apply clamping pressure, the brads will be buried into the other leg half for a non-slip glue up.

Align the leg halves with their ends and edges flush to line up the

mortises. I used a small piece of scrap wood to remove any glue that oozed into the mortises. After the glue joints cure, unclamp the legs and sand all their surfaces.

Chuck a chamfering bit into your router, and rout the chamfer at the bottom of each leg.

Next, make a light pencil mark all around each leg to define the limits of the stopped edge chamfers. Clamping blocks at the start and stop points of each chamfer will guarantee great results (Figure 3). Rout the chamfer along each edge of the leg.

Drawboring Unites Legs

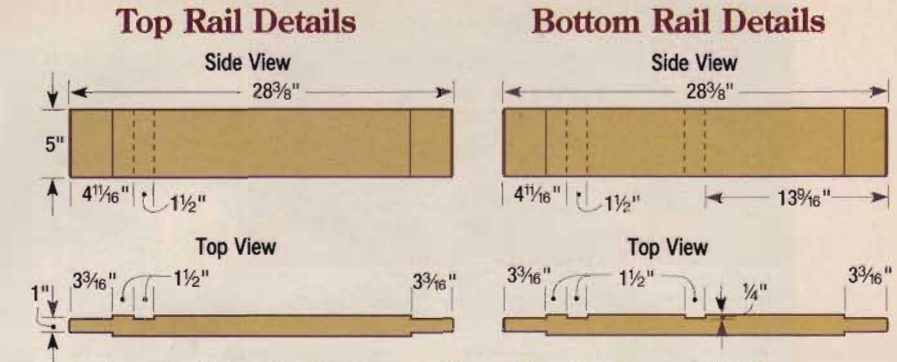
Maybe the memory of driving all the nails in the first bench — and the wobbly results — motivated me to make extra strong joints in this bench. The mortise-and-tenon joints get additional muscle power from the time-honored technique of drawboring (see *Drawbore Joinery* on page 42).

This system has proven itself brawny enough to hold timber-frame houses and barns together for hundreds of years, so it certainly is more than adequate for a hard-working bench.

Carefully lay out the peg hole locations along the centerline of each leg, then drill them with a brad-point bit chucked into your drill press (Leg Details).

Workin' on the Rails

Cut the rounded corners off the stock for the rails, and rip them to



width after double-checking the size of the upper and lower mortises in the legs (Top and Bottom Rail Details).

Before you cut the tenons on the ends of the rails, double-check the width of the legs. I designed my tenons to protrude $\frac{3}{16}$ " beyond the legs. To ensure tenons of consistent length, clamp a stop block to the wooden extension on your miter gauge (Figure 4). Zero in on a perfect fit by cutting a test tenon in scrap lumber that is the exact thickness of your rails. Don't make the tenons so tight that you need to hammer them into the mortises. That would damage the hammered ends, and could split the legs.

The rails have dados to seat the stretchers. Each top rail has one dado, and the bottom rails have two (Top and Bottom Rail Details). After laying out the dado locations, cut them with the table saw (Figure 5).

Mark the location of the bolt holes in the rails, carefully centering them in the dados you just cut. Use your drill press to bore holes square to the stock.

Chamfer the Tenon Ends

I scratched my head for a while trying to figure out how to machine the chamfers on the ends of the tenons. Then I realized that I was confusing myself by thinking only of power tools.

When I used my block plane, I had the chamfers done in a few minutes (Figure 6). Chamfering the short edges first will help prevent tearout. If you're a stickler for subtle points, note that the top edge of the top rail tenon is not chamfered. When chamfering the cheek edges, I worked from both ends toward the center.

Sand the rails, then lay out the legs and rails in their assembled positions and mark them. I always take the time to do this when I'm working with mirror-image assemblies. It helps to prevent embarrassing mistakes.

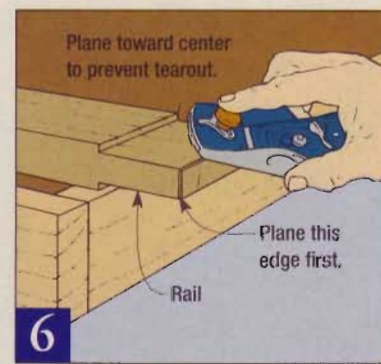
Join the rails and legs, using the procedure detailed in (*Drawbore Joinery* on page 42). Using a fine-toothed saw, cut off as much of the peg waste as you can. Then sand the end of the pegs flush with the surface of the legs.



4 When you cut tenons, clamp a stop block to your wood miter gauge extension. This guarantees that all tenons are identical.

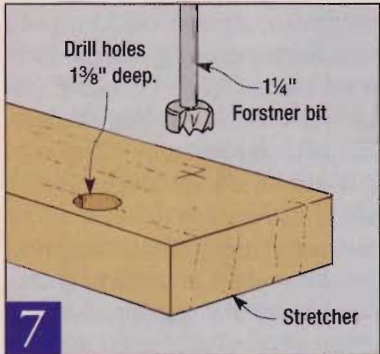
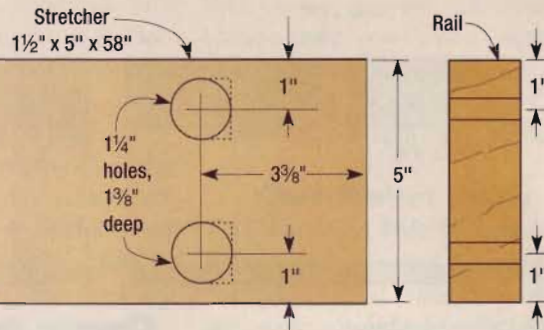


5 Use this table saw setup to cut dados for seating the stretchers. The bottom rails have two dados; the top rails have one.

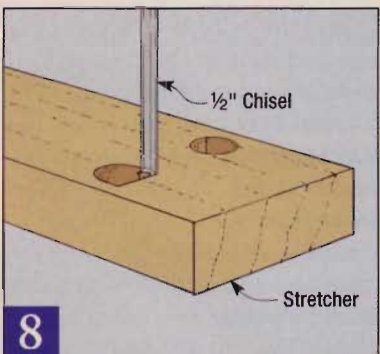


6 A sharp block plane is the perfect tool for chamfering the tenon ends. No plane? Use a sanding block held at a 45° angle.

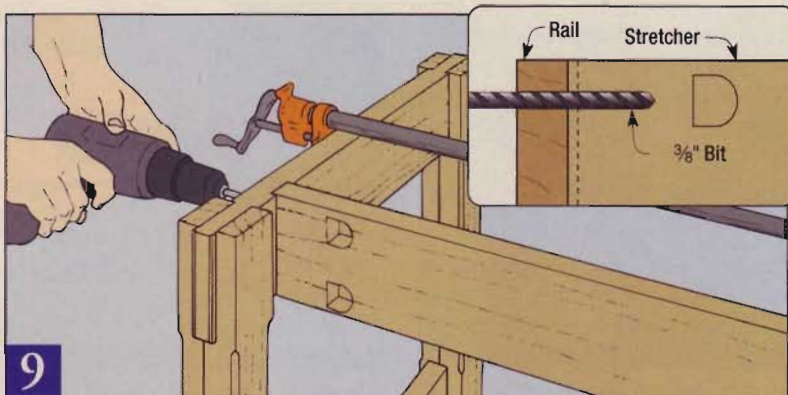
Stretcher/Rail Detail



7 Nuts and bolts join the stretchers to the rails. Begin shaping the recesses for the nuts by drilling holes into the stretchers.



8 Complete the recesses by squaring one end of each hole. This creates a flat bearing surface for the washer and nut.



9 Clamp the stretchers to the leg assemblies and drill the bolt holes into the stretchers. Drill the holes as deep as you can, then disassemble the base and complete the holes.

Stretchers

Use a rip cut at the table saw to square up one edge of your stock for the stretchers. Crosscut the stretchers to identical length, and rip them to final width.

Even though this workbench is designed as a permanent fixture for my garage, I wanted to be able to take it apart in case I move to a new house. I settled on a nuts and bolts system for both strength and straightforward construction.

At first, I was going to simply drill completely through the stretchers to create a home for the nut. But then I looked at the number of subtle design touches I had already built into the bench and decided to try something a bit more refined. To keep the nut concealed from the front of the bench, I chose to machine recesses into the back face of the stretchers.

Lay out the hole centerpoints on the stretchers (**Stretcher/Rail Detail**). To avoid breaking through the front surface of the stretchers when you drill, you will

need to use a Forstner bit (**Figure 7**). Then grab a chisel and square one end of the recessed area (**Figure 8**). This provides a flat bearing surface for the lock nut and flat washer.

Drill Into Stretcher Ends

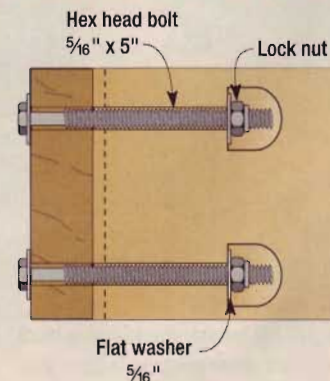
Now you can use the holes in the rails as guides for drilling into the ends of the stretchers. But to do this, you'll need to temporarily clamp the stretchers between the leg assemblies. Try to recruit an extra pair of hands to help you line up all of these parts. Clamp the leg assemblies to the stretchers, making sure to align the top edge of each stretcher with the top edge of the rails (**Figure 9**). I used pipe clamps to hold the assembly together for drilling.

Chuck a $\frac{3}{8}$ " bit in a hand-held drill, and use the holes in the rails as guides to drill into the end grain of the stretchers. Unless you have a long bit, you'll need to disassemble the stretchers from the rails to complete the drilling. Drill all of the stretchers, then assemble the base with bolts, nuts, and washers (**Nuts and Bolts Detail**).

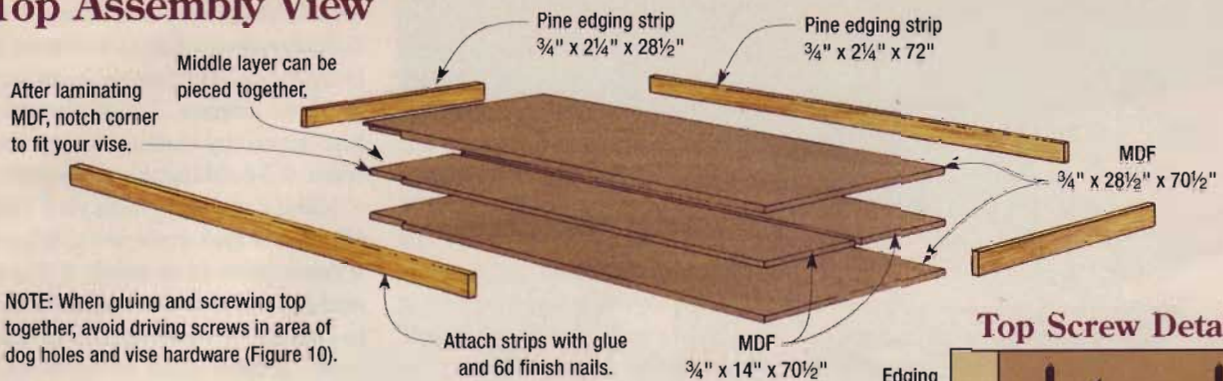
On To the Shelf

To make the shelf, joint and edge-glue 2x stock to get the necessary width, then rip and crosscut the panel to its final size (**Bench Construction View**). Screw on two cleats to position the shelf and help keep it flat. The cleats and gravity hold the shelf in place.

Nuts and Bolts Detail



Top Assembly View



NOTE: When gluing and screwing top together, avoid driving screws in area of dog holes and vise hardware (Figure 10).

Learning From the Past

The uneven top on my first bench caused me nearly continuous frustration, and I always promised myself that my next bench would have a much better work surface. My first thought was a top like those on the European-style workbenches I had always admired.

But after thinking about it some more, I ended up ruling out a thick laminated solid-wood top. The wide swings in temperature and humidity in the garage would make it extremely difficult to keep any solid-wood top flat.

I finally decided to use medium-density fiberboard (MDF), a manufactured sheet that's consistent and tough. And MDF will give you a top that's flatter than a stretch of the Kansas Turnpike. That means you'll be able to count on your bench top as a dependable reference surface when you're assembling other projects on it.

MDF's weight also adds to the stability of the bench. Once you set the laminated top onto the base, this bench is not going anywhere. That's a far cry from my first bench and its habit of scooting around in the garage. With it, I sometimes felt I was chasing my work.

Move To the Top

Cut the upper and lower laminations of the top from separate sheets of MDF (**Top Assembly View**). For economy, use the leftover material to piece together the middle layer.

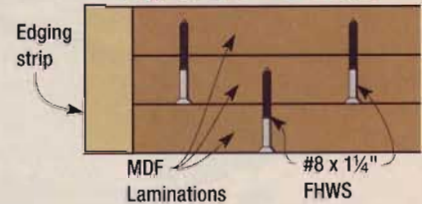
By the time you have the three layers of MDF laminated together, you won't want to carry it far. That's why I assembled the top upside-down on a pair of sawhorses as close as I could get to the bench's final home. I put some straight 2x4s on edge

between the sawhorses to keep the MDF from sagging under its own weight as I worked on it. I didn't want to discover a crown in the assembly when I turned it over.

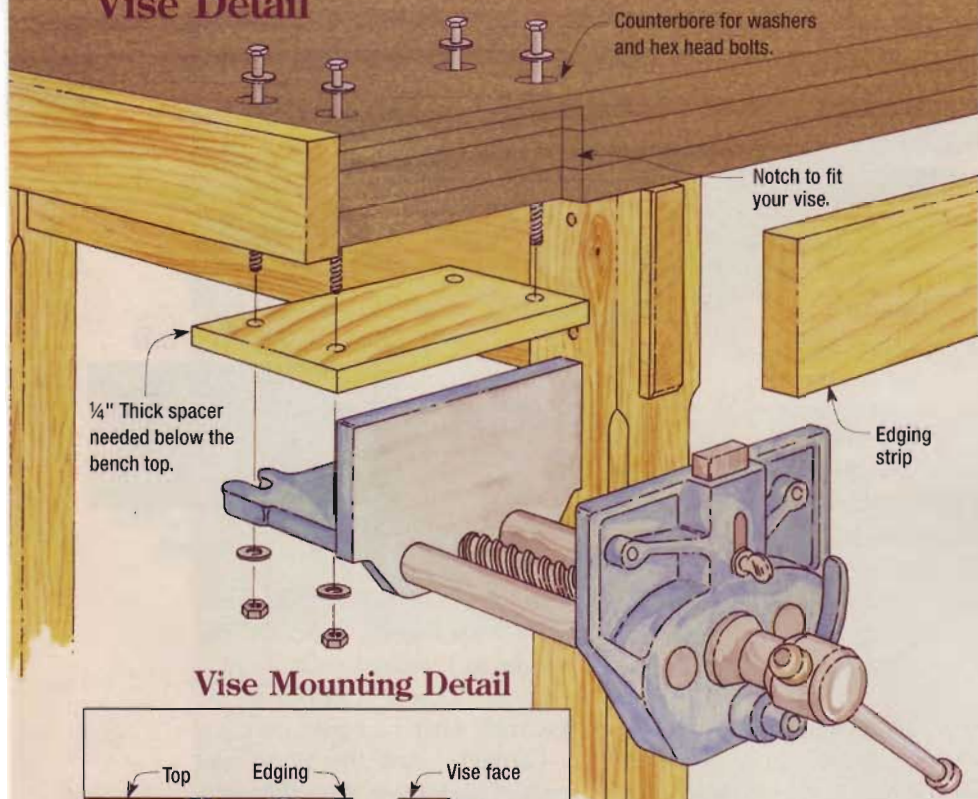
Carefully align the edges and ends of each layer, then drill countersunk pilot holes to attach them together with glue and screws (**Top Screw Detail**).

A couple of tips: first, be sure to stagger the screw locations so they don't run into each other. And don't go overboard on the amount of glue — that will create a slippery situation that makes the assembly process

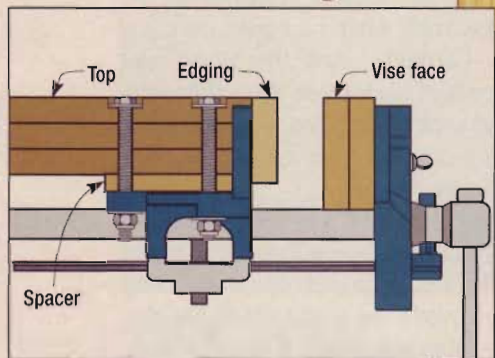
Top Screw Detail



Vise Detail



Vise Mounting Detail



more difficult. Be careful not to drive screws into the area where you will later drill the bench dog holes (**Figure 10**).

Everybody Needs a Vise

I installed a Record 52ED wood-working vise on my bench, and to

do that I had to notch into the corner of the laminated workbench top (**Vise Detail**). The vise you choose may require a similar notch, so it's a good idea to have your vise on hand to verify the exact size of the notch you need to cut.

Once you have the vise, lay the top upside-down and mark the vise mounting bolt locations. Drill the holes, then make a spacer block like I did to make the upper edge of the vise lower than the top (**Vise Mounting Detail**).

You may want to recruit a brawny neighbor to help you flip the top

over. In fact, if you don't happen to live next door to Arnold Schwarzenegger, you may need to invite two or three friends. Finish the vise installation by counterboring the holes and cinching the bolts tight.

Make a vise face to fit your vise (**Figure 11**). I made mine from a leftover piece of 2x stock, but you could make yours from hardwood to gain a little more durability. One trick I learned is to leave the vise face a bit rough. A slightly textured surface will give the vise face a stronger grip on wood workpieces.

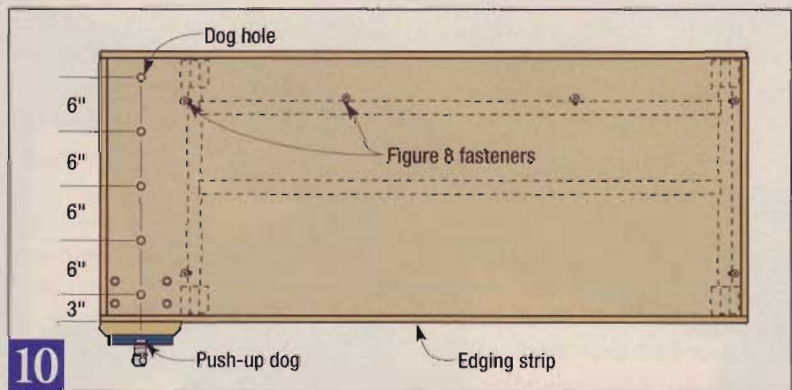
Screw the vise face to the vise jaw so its upper edge is flush with the MDF bench top. This is easy to do — you simply tighten the vise to hold the face in position.

On the Edge

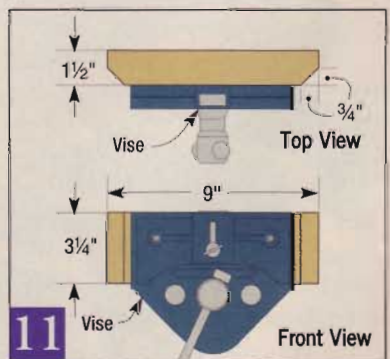
Attaching edging strips to the laminated top is the next step, so rip your stock to width. You could miter the corners, if you want, but they are difficult to install with quality corners. Instead, I used simple butt joints. I attached the end pieces first, then the strips on the front and back of the bench.

Driving a few 6d (2"-long) finishing nails through the edging strips is the most direct method of attaching them. Glue is not absolutely necessary, but I added some for good measure.

If you can position the top edges of the strips perfectly flush with the MDF top, you'll save yourself some work. But if you have to settle for less than perfect, try to posi-



After installing the vise, lay out the dog hole locations. The centerline of this row of holes is aligned with the middle of the push-up dog built into the body of the vise.



Size the wood face to suit the vise you choose. Clamp the face into position with the vise, then drive the mounting screws.

tion them slightly proud of the top surface, then plane, scrape, or sand them flush with the MDF. Also sand the faces of the strips. As a finishing detail on the edging strips, I routed a $\frac{1}{4}$ " chamfer along their top and bottom edges.

A Pilot Makes Drilling Fly

After I marked the row of holes for the bench dog, I realized that getting the top to the drill press was out of the question. But I wanted to make sure that the holes were perpendicular to the top.

To accomplish that, I devised a multi-step process. If I drilled an accurate pilot hole through the top, I reasoned, I could then use it to guide a $\frac{3}{4}$ " spade bit.

I drilled a hardwood block at the drill press to create a pilot hole jig, and then used this jig to guide the bit in my hand-held drill (Figure 12). Because of the top's thickness, I had to complete the pilot holes without the jig. But by that time, the holes were already deep enough into the top to control the pilot bit accurately.

After you drill all the pilot holes, use them to guide the spade bit that enlarges the holes to final size (Figure 13). Although you still do have to exercise some care to keep the drill square to the top, the pilot hole creates a path of least resistance that guides the point of the spade bit. As a finishing touch, rout a chamfer around the perimeter of each hole (Figure 14). The bench dog is simply a 2"-long hex-head bolt with a $\frac{3}{4}$ " shank.

Attach the Top

I selected figure-8 fasteners to attach the laminated bench top because they are easy to install and are nearly invisible. The fastener placement is not critical — I used two on each rail and two on the upper stretcher (refer again to Figure 10). Drill the counterbores and pilot holes into the rails and stretcher, then screw on the fasteners (Figure-8 Detail).


To slide the top into position, you may want to call in the same crew that helped you turn it over. Secure it with screws through the figure-8 fasteners.

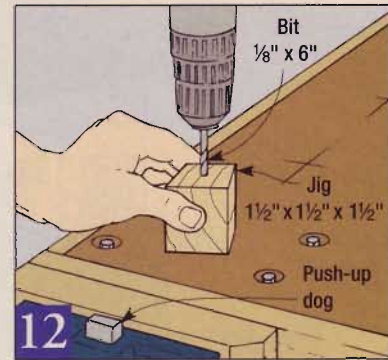
To keep grime from grinding into the wood and the MDF top, I wiped on three coats of Watco, a penetrating oil finish. Glue has a tough time sticking to a surface finished with Watco, so any squeeze-out from project assemblies will wipe up easily. To prevent spontaneous combustion from oil-soaked rags, don't leave them wadded up — spread them out to dry in a well-ventilated area or soak them in water.

Expanding the Uses

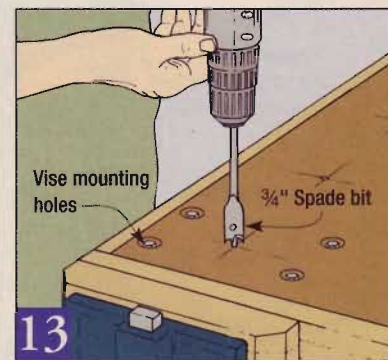
As I mentioned earlier, I'm realistic enough to know that this bench will be used for much more than cabinetmaking and detailed woodworking. I figure that this is where I will sharpen my lawnmower blade, clean up parts while I'm working on my car, and repair everything from gardening equipment to bicycles. Actually, "repair" may not be the right word. At least this is where I take those things apart.

To help me handle those utility chores, I added a machinist's vise to the right front corner of the workbench. I chose a Record model 5VSB, but you may already have a vise on hand that will work well.

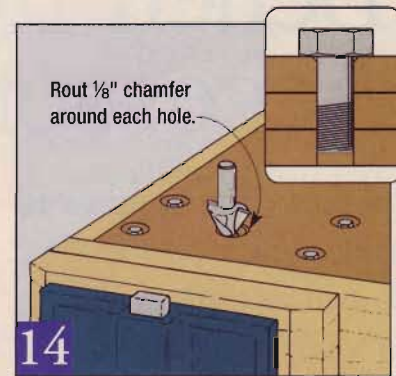
And to keep the top clean during even the dirtiest of those chores, I keep a piece of cardboard handy. It took me a long time to get a bench with an inviting work surface. I'm not going to mess it up now. 



12 Use a pilot hole jig (made at the drill press) to drill accurate starter holes at each bench dog hole location.



13 Hold your drill as square to the top as possible, and let the pilot hole steer the point of your spade bit into the MDF top.



14 Complete the bench dog holes by routing a chamfer around the rim. Make dogs by cutting off $\frac{3}{4}$ "-dia. hex-head bolts (see inset).

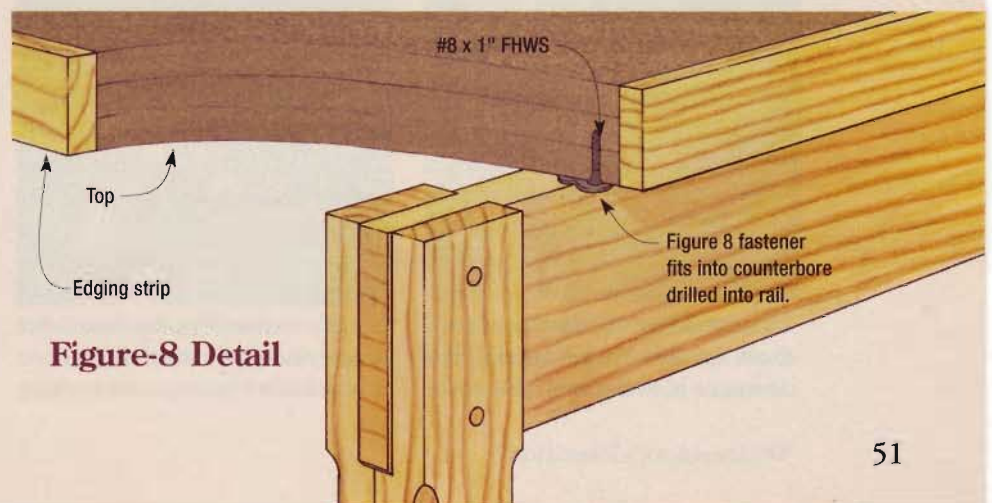
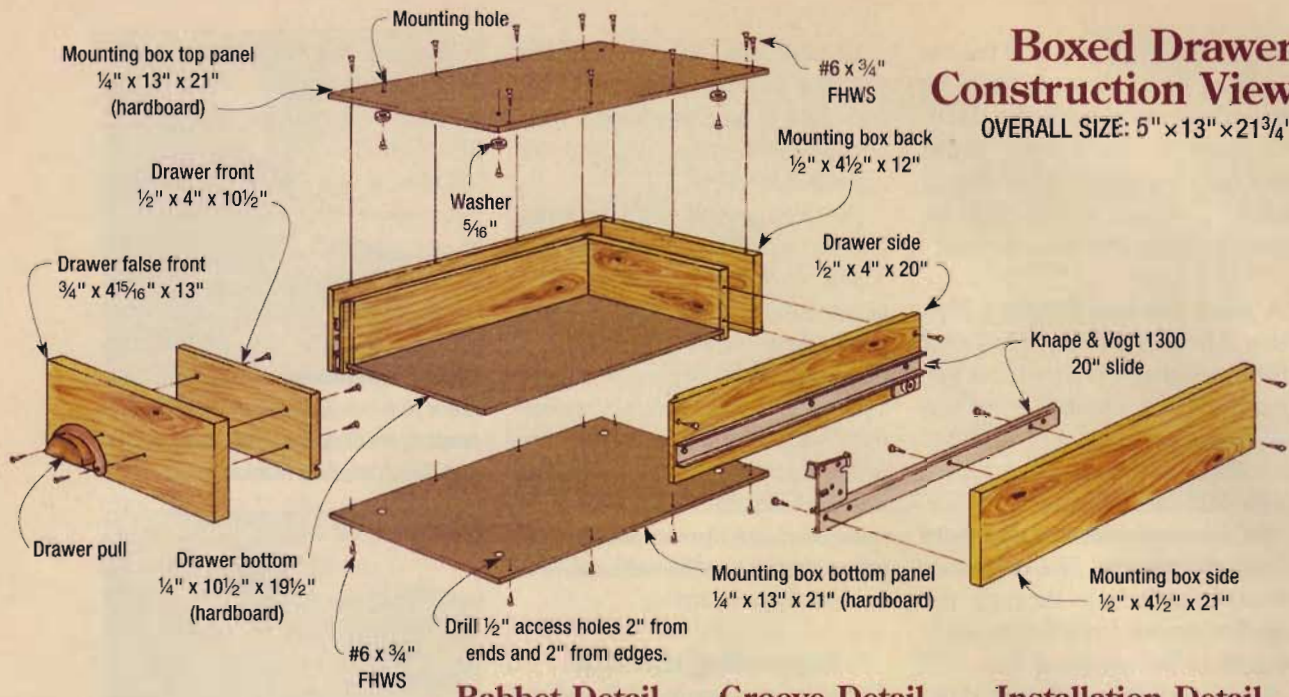


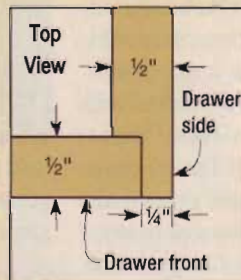
Figure-8 Detail

Boxed Drawer Construction View

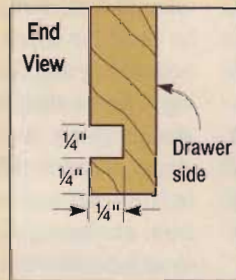
OVERALL SIZE: 5" x 13" x 21³/₄"



Rabbit Detail



Groove Detail



Installation Detail



Bench Accessory: Boxed Drawer

If you want to get organized in a hurry, build a pair of these simple drawer units and hang them under your workbench, below a shelf, or anywhere you need additional storage space.

I designed the drawer for easy construction and installation. It features no-nonsense corner joints — glued rabbets reinforced with screws. Joinery of the mounting box is even easier. And when you're ready to install the mounting box, access holes through the bottom panel let you easily screw the unit into position.

The ball-bearing drawer slides I chose for this project require $\frac{1}{2}$ " clearance between each side of the

drawer and the mounting box. I've found that you can oversize this side clearance by a little bit (up to about $\frac{1}{16}$ "), but you can't make it even a hair smaller than $\frac{1}{2}$ ". To be on the safe side, I decided to make the drawers first. I could easily adjust the size of the mounting box, if necessary.

After ripping and crosscutting the drawer sides, front, and back, cut the rabbets in the sides (**Rabbit Detail**). Then cut the groove for the drawer bottom (**Groove Detail**). Double-check the size of the drawer bottom during a dry assembly, and cut it to size.

Now you can assemble the drawer with glue and two screws in each corner. Cut the false front to size, but don't attach it yet.

To make the mounting box,

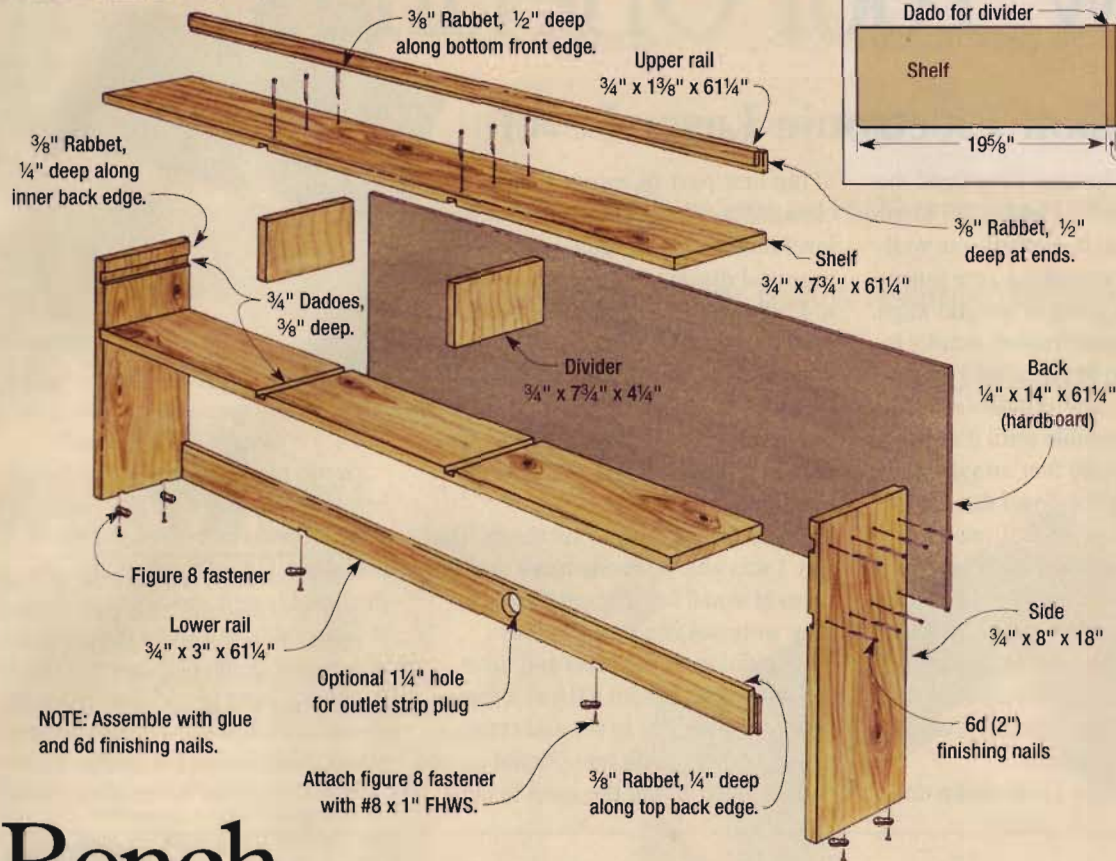
start by ripping and crosscutting the sides and back. Next, cut the top and bottom hardboard panels. Drill access holes through the bottom panel, and mounting holes in identical locations through the top panel. Assemble the mounting box with glue and screws. I installed the drawer slides inside the mounting box before adding its top panel.

Position the false front so its lower edge is flush with the bottom of the mounting box. Attach the false front with screws driven from inside the drawer. Adding the pull completes the drawer.

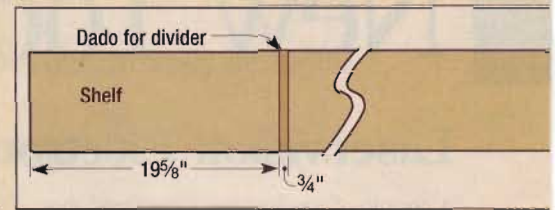
Install the mounting box with screws (**Installation Detail**). This is easy enough to do by hand, but a long bit in a power screwdriver makes it even easier.

Shelf Construction View

OVERALL SIZE: 8" x 18" x 62"



Shelf Detail



Bench Accessory: Shelf

If the right place to put away a tool is closer than the wrong place, you're much more likely to put it in the right place. And that means you'll have a much better chance of finding it the

next time you need it. I designed and built this accessory shelf for the workbench to create a wealth of right places — all within arm's length — to store tools, fasteners, and accessories

I purchased some plastic storage bins at a home center to organize the screws and nails I use most often. If you're also going to do that, buy the containers before building in case their size forces you to change the shelf dimensions.

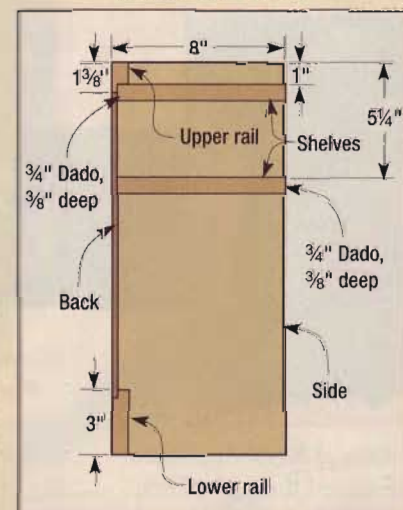
Start construction with the sides. Rip them to width and cross-cut to length, then use a dado blade to cut the rabbet along the back edge of each side (**Section View**). Next, cut the shelf dados into the sides.

Double-check the width for the shelves by measuring from the front edge of the side to the rabbet along its back edge. Once you've done that, you can rip the shelves to width, crosscut them to length, and mill the dados for the dividers (**Shelf Detail**).

The upper and lower rails are the same length as the shelves, but these parts have rabbets cut into their ends and along one edge.

Clamp the shelf unit together to check the fit of the parts. Cut the back to fit into the rabbet, and trim

Section View



the dividers to fit between the shelves. After making any adjustments, you're ready to glue the assembly together. I reinforced the glued joints with 6d (2"-long) finishing nails.

I routed a chamfer along all edges and ends (except the bottom), and mounted the shelf to my bench with figure-8 fasteners. ▀

New Tool Offerings

Laservision Electronic Laser Level

A couple of weeks ago, I received the new Laservision 6.0 Level from Zircon Corp. for testing. Its arrival was well-timed, as I was building a new fence and had a lot of posts to set and align.

My job was made easier, thanks to this level's laser. It's mounted in one end of the level, and projects a beam of light that's invisible until it strikes an object (up to 150 feet away), where it shows up as a small red dot.

To set my fence posts, I used the Laservision's standard level functions first. Rather than a bubble vial, it has an LCD display with a series of lines and arrows that indicated which end of the level I needed to adjust. In addition, an audible tone sounded when I had my first post plumb.

Then I placed the Laservision on top

of the first post (it automatically changed from plumb-reading to level-reading), and again used the tone and display to level

it. I turned on the laser, and instead of using a line level, I set the additional posts so the spot from the laser hit them. That way I was able to easily mark and cut them at equal heights, and I knew they were set in a straight line.

In addition to the level and laser functions, the Model 6.0 has a memory that allows you to set and retain a slope reading. With an optional mount you can also attach the level to any

camera- or surveyor's-style tripod.

Zircon made the level easy to calibrate. By placing it on any near-level surface, you can reset its accuracy in two steps. Out of the box, the laser on the unit I tested was about an inch off at 50 ft. away, but I was able to reset it in a couple of minutes using a hex key.

The 18"-long Model 6.0 retails for about \$170, and comes with a carrying pouch. Call Zircon Corporation at (800) 245-9265 for more information.



Wet/Dry Vacuums from Dirt Devil



guards to keep them from catching as you pull the vacuum around.

Dirt Devil also learned that people hated figuring out where to store attachments, so the Wet/Dry Plus has a removable bin on the side that holds all of the accessories, plus has space for supplies.

For added versatility, you can remove the motor and use it as a blower. The filter stays in the lid, and the motor is compact so you can carry it easily.

Two Wet/Dry Plus models are available. The 8-gallon model sells for about \$80, and has a 3.5-hp motor. The 16-gallon model has a 5-hp motor, and sells for around \$100. Both models come with a 2 1/2"-diameter, 7 ft.-long hose, two extension wands, a crevice tool, floor squeegee, and an upholstery tool. Call Royal Appliance Mfg. Co. at (800) 321-1134.

When the folks at Royal Appliance Mfg. Co. designed their new Dirt Devil Wet/Dry Plus vacuums, they asked consumers about their preferences. They learned that people wanted a vacuum that wouldn't be likely to tip over, and one with good on-board attachment storage.

To keep the vacuum from tipping, they gave it a low center of gravity by recessing the motor in the lid. They also made the vacuum wider at the bottom, and the wheels ride behind



Cordless Light

Two new cordless flexible floodlights from DeWalt use the same XR battery packs as their other cordless tools to provide up to 3 hours of light on a single charge.

The 12-volt DW917 and 14.4-volt DW918 are sold without battery packs or chargers, so they are intended for people who already own DeWalt cordless tools. But battery packs are available separately.

I found the floodlights produce a clear, bright light, and the flexible neck helps you aim the light easily.

You'll pay around \$35 for the DW917, and about \$40 for the DW918 (both without batteries). For more information contact DeWalt Industrial Tool Co. at (800) 433-9258.

Maverick Adjustable Sawhorse

Few new tools have arrived lately that have gotten as much attention from the *Workbench* staff as Stamar Tools' Maverick Sawhorses. All of us have seen a lot of different sawhorses, but rarely any with truly unique features.

The Maverick's most notable feature is that the height of the sawhorses can be adjusted from 28" to 38", and each leg adjusts independently so you can set them up level on uneven ground. Safety catches and locking knobs keep the legs positioned. Also, the legs fold flat against the horse body so you can transport them easily.

Mavericks were designed by a contractor, and are built from 14- and 16-gauge steel tubing with a rust-resistant powder-coat paint finish. A tray holds a 2x4 that supports your workpiece.

Stamar offers several accessories including a router table and a miter saw stand that fit on a single sawhorse, allowing the other to be used as a work support.

Buying a pair of Mavericks is an investment, since they cost around \$75 each. But they are versatile, and seem built to last. For information or the location of your closest retailer, call Stamar Tools at (888) 989-9929.



Carver's Knife

Even if you're not a carver, you'll find a lot of uses around the shop for the new Carver's Knife from Veritas. It comes with a dozen super-sharp scalpel blades in three shapes that you'll never have to sharpen. Instead, you can toss the dull blade and lock in a new one. An oval-shaped anodized aluminum handle provides a firm grip.

The knife, with four blades in each of the three shapes, sells for \$12.95. Replacement blades sell in packs of ten for \$2.50. Call Veritas/Lee Valley Tools at (800) 871-8158.

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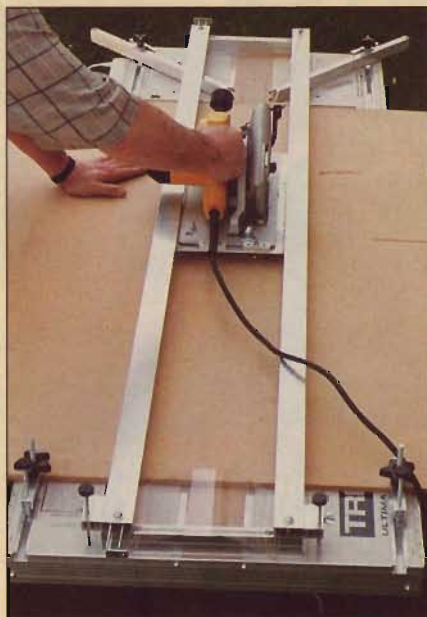
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Multi-Purpose Miter Table Allows Accurate Angle Cutting

Most of us have used portable circular saws for rough-cutting boards and plywood, but we rarely think of them as precision cutting tools.

That's why I was impressed with the very accurate cuts I got using the Trim Tramp Three Fence Miter Table. Using it with my portable circular saw, I made cuts that would normally require a table saw or compound miter saw. For most cuts, the best method for cutting is to pull the saw backward through your stock, so the blade cuts on the down-stroke to reduce tear-out.

The Trim Tramp consists of a saw table with two adjustable miter fences, and a crosscut fence for making 90° cuts. Rails above the table guide your saw, which you mount to a removable sole plate. The saw stays attached to the sole plate, although you can remove it for freehand use, then remount it in the guide rails without having to make adjustments.



The fences permit mitering on the left and right, with stops at 45° and 90°. Well-marked scales make it easy to lock in at exact angles, and there are guides for cutting crown molding to fit any

corner angle. To crosscut, a fence pops up from a recess in the table.

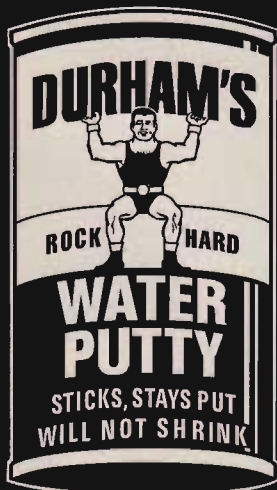
With the new Ultimate Remodeler Model 400 you can crosscut boards up to 50" wide, and miter stock up to 33" wide. Plus, you can remount the saw under the table for ripping boards and panels. The Model 400, which retails for \$475, also cuts siding and truss lumber to fit roof pitches as shallow as 3-in-12. Extruded aluminum construction keeps the weight down to 65 lbs.

Trim Tramp's original Professional Model 300 sells for \$249 and has many of the same features. It allows you to crosscut boards up to 20" wide and miter boards up to 16" wide, but doesn't have rip capability.

A new Do-It-Yourself Model 125 sells for \$149. It's similar to the Model 300, and lets you crosscut boards up to 16" wide.

You can contact Trim Tramp at (800) 387-8746 for more information.

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Product Information Number 186

Workbench ■ October 1997

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Products For Your Home

Stylish Hoods Bring Flair to Kitchen

A new line of cooking ventilation products from Thermador brings high fashion to the kitchen in an area often overlooked — range hoods.

Thermador looked to Europe for styling influences, designing hoods with curved lines and glass and steel. Available finishes are white, black, and stainless steel.

All of the new hoods have push-button controls and either halogen or fluorescent lighting. They also have an extra-high exhaust fan speed that works for ten minutes, then reverts back to your previously set speed. After 40 hours of use, an indicator light lets you know that it's time to clean the grease filter.



The hoods have exposed (chimney-type) exhaust vents. You can adjust the chimney length to accommodate your kitchen design and ceiling height. Hood widths range from 36" to 54", and are available for wall-mount and island installation.

At press time, pricing for the hoods had not been set. Call Thermador at (800) 656-9226, ext. 15.

Miracle Cover

Miracle Cover from Pro Tect is a new water-based silicone rubber sealant that can be applied to wood, concrete, masonry, tile, and other porous surfaces. You can brush or spray the sealant on directly, or mix it into oil- or water-based paints and finishes.



Earl Bowers, the President of Pro Tect, says Miracle Cover seals for up to 20 years, and stretches to accommodate structural movement of up to 300%.

One gallon of Miracle Cover sells for \$24.95, and covers 150 to 275 sq. ft. Call Pro Tect at (800) 545-0826.

Pre-Cut Raised Panel System Adds an Elegant Touch

I always wanted to add the elegance of real wood paneling to my dining room, but couldn't justify spending thousands of dollars on custom millwork and devoting many hours of work to fitting each piece.

The new Raised Panel System from New England Classic Interiors is designed to give the look of full custom millwork with less effort and expense. It's designed so a do-it-yourselfer can plan, order, and install everything with a minimum of fuss.

The system components are made from an MDF (medium-density fiberboard) substrate, which is less expensive and more stable than solid hardwood. They're offered with a smooth paintable surface, or with unfinished oak or maple veneer.

The system includes rails, stiles, base shoe, and caps. Optional casings for doors and windows, as well as smaller fill-in panels are available. All components have pre-cut joinery, and wider stiles are included for fit-



ting into corners. Panels come in 9" and 12" widths and two heights so you can assemble them with rails and stiles to 32" or 36" overall heights. Components can be combined to cover a whole wall.

I checked out system pieces with the oak veneer covering, and was impressed with their solid wood look, quality construction, and simple assembly. The brochure gives sample

layouts, a planning grid, and guides that help you calculate the number of component packs you'll need.

The manufacturer claims using their system is three to five times less costly than custom work. To add 36"-tall panels to an average 13 ft. by 15 ft. dining room, plan on spending around \$1,000 to \$1,300. Call New England Classic Interiors toll-free at (888) 880-6324.

Ready-To-Install Block Windows

A friend of mine with an older home had a bathroom with a window right above the bathtub. Years of moisture from shower spray and condensation had taken their toll on the sash and sill, meaning the window needed to be replaced.

Rather than using another conventional window, he decided to replace it with glass block. It looks great, and works just as well as he'd hoped, but preparing the opening and laying up the block was hard work. He wished there was an easier alternative.

Now a company called Pacific Accent offers pre-framed glass block windows that can be dropped in place like a standard window unit. Some models even have a flip-in vent to provide increased ventilation.

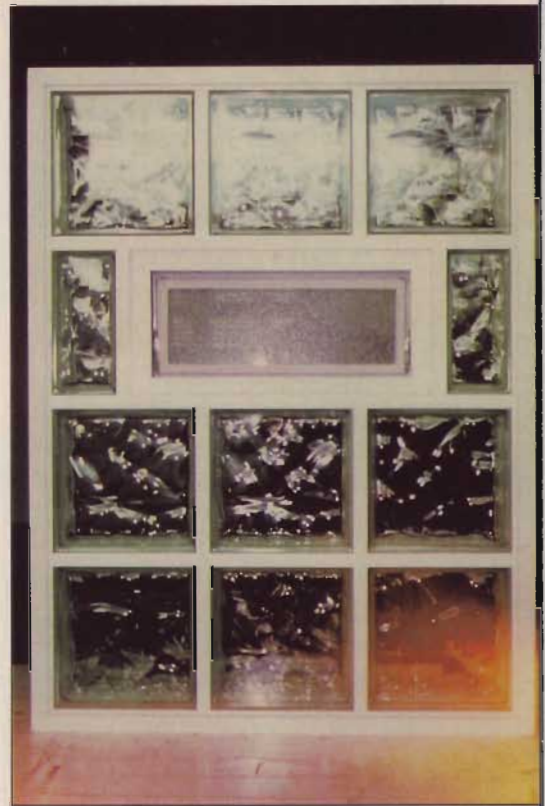
Pacific Accent windows are available for exterior and interior applications, in wood, metal-clad, all-metal versions, or with wood interiors and metal-clad exteriors. All cladding is

powder-coat finished for durability. The windows are manufactured in a variety of standard rough-opening sizes, or can be custom-sized.

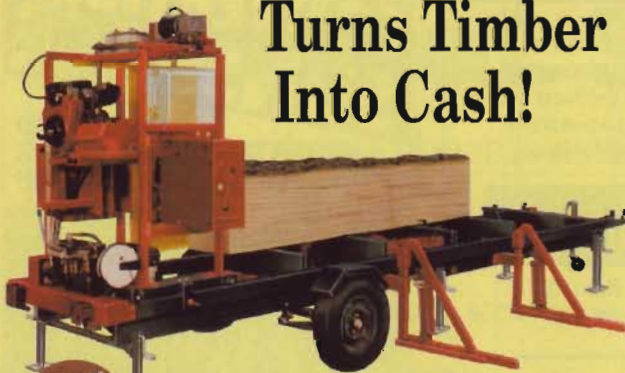
Other options include different glass patterns and colors, factory-applied brickmold, and different jamb widths. You can also order custom powder-coat finish colors to match your paint scheme or to match the cladding on windows from other manufacturers.

According to the folks at Pacific Accent, their window prices are comparable to, or cheaper than, the traditional glass block windows laid up by a mason. Their studies show masons charge anywhere from \$35 to \$90 per sq. ft., while Pacific Accent windows run about \$40 per sq. ft. The addition of a flip-in vent adds around \$50 to the total cost of a window.

For information on glass block windows contact Pacific Accent Product Group at (541) 389-5033.



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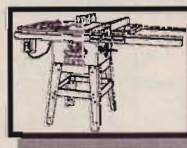
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A Legacy of Stone

In an age when fax modems can compress global transit into a matter of seconds, it's easy to forget that some remarkable things in life happen much more slowly — and often leave a legacy more enduring than a digital code.

The great cathedrals of Europe and England easily rank among these lasting human achievements. Many required over a century to build, and each involved generations of skilled artisans — quarrymen, masons, carpenters, blacksmiths, glass makers, and others. It's the work of the stone-carvers, though, that really defines these massive buildings and makes them seem timeless.

Limestone blocks were cut to shape using templates provided by the master mason, and each typically carried three markings. These coded inscriptions worked like blueprints and accounting ledgers, identifying not only the stone's position in the structure, but the quarryman who cut the rough block and the carver who did the final shaping — so both would be paid for their labor. (Even in such heavenly pursuits, worldly cares were not forgotten.)

More experienced carvers did the demanding work on arches, buttresses, and tracery, the delicate stone frames supporting stained glass windows. And a few highly trained sculptors carved statuary — gargoyles, scenes of village life, saints, and Biblical figures depicting the narratives of Christian tradition. Some say these silent faces carry codes too, messages from their makers. If so, they're harder to decipher.

