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*that you
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KITCHEN UPDATE

REVIVE YOUR OLD
COUNTERTOPS WITH
SIMPLE ADD-ONS **Page 54**

GARAGE DOOR MAKEOVER

FANCY FACELIFT FOR DRAB DOORS
— FOR LESS THAN \$150! **Page 60**

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of Circulations

WORKBENCH (ISSN 0043-8057) is published bimonthly (Feb., April, June, Aug., Oct., Dec.) by August Home Publishing Company, 2200 Grand Ave., Des Moines, IA 50312. Workbench is a trademark of August Home Publishing. Copyright ©2006 August Home Publishing Company. All rights reserved.

Subscription rates: Single copy, \$4.99. One-year subscription (6 issues), \$22; two-year subscription, \$33; three-year subscription, \$44. Canadian/Int'l. add \$10 per year. Periodicals postage paid at Des Moines, Iowa, and at additional offices. Postmaster: Send address changes to Workbench, PO Box 37272, Boone, IA 50037-0272. Canadian Subscriptions: Canada Post Agreement No. 40038201. Send change of address information to: PO Box 881, Station Main, Markham, ON L3P 8M6. Canada BN 84597 5473 RT Printed in U.S.A.

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EDITORIAL

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EDITOR'S NOTES

If I had to categorize this issue's featured shop as a piece of architecture, I'd say it was *minimalist*. It is, after all, a fully functional shop with a "footprint" of only 50 square feet. That's less than half the size of a single-car garage. Or about the size of one of those small storage sheds you see at the home center.

In short, this shop is small. And since it is so small, we've incorporated a number of space-saving strategies to make every square inch of space work as hard as possible.

These include simple things like putting tools on mobile bases, mounting a router table to the table saw, and building a roll-out cutoff bin to keep the workspace neat and tidy. We also installed manufactured cabinets, arranged them to optimize the workflow in the shop, and used the cabinets as a foundation for a pair of sturdy benchtops that do double-duty as a miter saw station.

These are just a few ideas that make this small shop work "big." The rest are detailed in the article beginning on page 40. Whether your shop is in a corner of the garage or tucked away in the basement, I'm sure you'll be able



to put these space-saving strategies to work. Speaking of that, we've included several short videos at WorkbenchMagazine.com so you can see the shop in action.

Small-Scale Projects — Our space-saving shop certainly proves the adage that good things come in small packages. And the kitchen counter update (page 54) and garage door makeover (page 60) continue that idea.

Both of these are small-scale projects that will make a big impact on your home. And you can knock them out in a weekend — even in a small shop, of course.

Tim

COVER STORY

This compact home shop proves you can have a fully functioning shop without taking over your basement or garage. It offers ample storage, two large benchtops, and five separate workstations—all in 50 square feet of space.

40



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HOME & SHOP PROJECTS

40 Space-Saving Home Shop

Discover new strategies for making a small shop work big. Like using inexpensive cabinets to create multipurpose workstations, building a flip-top planer cart, and converting a miter saw into a precision cutting tool.

54 Kitchen Counter Update

Transform your kitchen with a remarkably simple plate rail and tile backsplash. You can build them both — from start to finish — in a weekend.

60 Garage Door Makeover

Give your garage door a custom look, without the cost, by adding shop-made windows. Built from PVC lumber, they'll last forever, and they're a snap to install.

90 Sharpening Stone Holder

This simple project keeps your bench stone handy, protects it from damage, and holds it steady while sharpening.



60

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- 14 Questions & Answers**
Sound advice on keeping blades sharp, collecting dust on a router table, & tuning up band saws
- 24 Tips & Techniques**
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- 32 Finishing Fundamentals**
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WORKBENCH ONLINE

Check out WorkbenchMagazine.com for cutting diagrams, plans, and bonus content. From this issue, you'll find:

- Cutting Diagrams: Home Shop
- Home Shop: Interactive Shop Planner
- Videos: Setting up the Home Shop
- Article: Board Breakdown Techniques



TOOL REPORTS

70 Circular Saw Buyer's Guide

This underrated tool is more versatile and precise than you might think. We'll help you select the saw that's right for you, and then show you how to unlock its true potential.

86 Choosing & Using Twist Bits

At a glance, all twist bits may look the same, but they're not. We cut through the differences in metals, tips, flutes, and shanks to help you pick the best bit for every task.

94 Porta-Mate Miter Saw Workcenter

From machine supports that accept a number of power tools to a built-in worklight and power strip, the Porta-Mate is one tool stand that truly has it all.

SKILL-BUILDING TECHNIQUES

66 Working with PVC Lumber

PVC lumber won't rot, works like wood, and looks great, so it's ideal for outdoor projects. Learn how to cut, shape, fasten, and paint it here.

78 Five Steps to Perfect Boards

A great-looking project always starts with "well-dressed" boards. Here's a simple five-step process for getting boards flat, straight, and square.

THE COOLEST THING IN CORDLESS:

Drill-Powered Scooter

A torque-multiplying drive system turns an ordinary cordless drill into a versatile power plant capable of heavy lifting or, in this case, an entertaining diversion.

While walking the aisles of the International

Hardware Show recently, I had to yield at one particular intersection to a full-grown man riding a pint-sized scooter that appeared to be powered by a cordless drill (*Photo, right*). It took me a couple aisles to catch up to the scooter and confirm that an 18-volt drill was indeed the only power source driving the aluminum mini-bike.

This is possible thanks to a drive module from DPX Systems (*Inset Photo*). The scooter is really just a means of drawing attention to this new technology that also has more practical applications, like powering an engine hoist or a water pump, which DPX Systems was also demonstrating at the show.

The secret of the module is that it actually multiplies the torque of the drill. Exactly how much is a secret the company isn't willing to divulge just yet. But whatever that multiplication factor is, it's enough to push the drill-powered scooter up to 15 mph and



By multiplying the torque from a standard cordless drill, the DPX Drive System can power this mini-bike up to 15 mph.



to lift a Harley Davidson motorcycle with a hoist.

Of course, the run time of the drill is a limiting factor, but for occasional use when large gas- or electric-powered motors aren't practical, the DPX Systems Drill-Powered Module could be a viable alternative.

The technology is ready for production, but DPX Systems is currently considering its options for bringing the product to market. For more information visit DPXSystems.com or call 702-799-9924.



By changing the mounting harness, a variety of cordless drills can be used to power the system.



Excellence in Design

Workbench magazine is proud to have once again been a part of the San Diego Fine Woodworkers Association (SDFWA) Design in Wood Exhibition. As in years past, *Workbench* sponsored the Excellence in Design award for the exhibition. Selected as this year's winner was Brian Carnett for his "Trestle Side Table" (*Photo*). The table features a maple top and walnut leg structure. Brian employed standard mortise-and-tenon joints

along with pegged mortise-and-tenon joints to construct the table.

The table, along with the nearly 300 other entries in the exhibit, were on display at the San Diego County Fair, which runs through July 4 of each year.

For more on the SDFWA and the Design in Wood Exhibition, including additional photos from the exhibit, visit SDFWA.org

A TREE-MENDOUS DISCOVERY

American Chestnut

A recent discovery of American chestnuts in Georgia is a huge leap forward in the effort to create a blight-resistant strain of this venerable American tree that was nearly made extinct by chestnut blight in the early 1900s.

The small stand of trees was discovered near a hiking trail in Franklin Delano Roosevelt State Park, not far from the namesake president's Little White House at Warm Springs.

In cooperation with the American Chestnut Foundation, a group committed to restoring the American chestnut to native forests, the Georgia Department of Natural Resources' Wildlife Resources Division will cross-pollinate these wild trees with the Chinese chestnut, which is naturally resistant to blight.

The goal is to produce a tree that is identical to the American chestnut while possessing the disease resistance of its Chinese cousin.

For more information on this and other recent discoveries of American chestnut trees, as well as the ongoing efforts to restore the trees, visit the American Chestnut Foundation's website at ACE.org or the Georgia DNR site at GADNR.org.



American chestnut trees that survived a blight that killed most of their kind are growing strong in Georgia.

PROJECT EVERGREEN:
GREENCARE FOR THE
TROOPS

Having a family member deployed overseas while serving in the military is difficult. But one commonly overlooked challenge is that a missing family member can make even everyday tasks like mowing the lawn overwhelming.

But an organization known as Project Evergreen has set out to remove at least that burden from military families whose primary breadwinner is currently serving overseas.

The effort is known as "Greencare for Troops," and it strives to match affected families with local lawn and landscape contractors who have volunteered their services for the project.

Families interested in participating in Greencare for Troops can get more information by visiting ProjectEvergreen.com or calling 877-758-4835.



Recycling Batteries with Al

Summer is coming to an end, and hopefully you've either finished, or are nearly finished, with all of your large outdoor projects for the year. But that may also mean that the batteries in your cordless tools are near their end. If so, Richard Karns, Al from TV's "Home Improvement" (Photo), along with the Rechargeable Battery Recycling Corporation want to remind you to recycle any Nickel-Cadmium, Nickel-Metal-Hydride, Lithium-Ion, and Small-Sealed-Lead batteries that have reached the end of their useful life.

To locate a drop-off center in your area, visit the website for the Rechargeable Battery Recycling Corporation (RBRC.org) or call 678-419-9990.

200,000 TOYS & COUNTING

ToyMakers Look to Grow

On June 1 of this year, a small group of Florida woodworkers with big hearts quietly shipped their 200,000th toy bound for a hospitalized child.

The group goes by the name the ToyMakers. They make simple wooden toys that are then distributed to more than 25 agencies that serve hospitalized children.

Despite their simple design, the toys make a big difference in the lives of kids being treated in children's hospitals and clinics across the country. And the children are able to keep the toys and take them home at the end of their treatment.

The toys have also been sent to children whose lives have been disrupted by floods, hurricanes, and even war in Afghanistan and Iraq.

It has taken nearly 25 years to reach the 200,000 toy mark, but the ToyMakers are not ready to slow down. In fact, in recognition of the milestone, the ToyMakers are anxious to start additional toy-making groups in other parts of the country. Currently, besides the original Florida group, there are ToyMaker groups in Alaska, Tennessee, and North Carolina.

For help starting a ToyMaker group in your area, including plans for the toys and contacts to help distribute them, contact Tom Laughlin at tom-bon@msn.com or by calling 727-868-9342.

You can also learn more about the ToyMakers and their generous efforts by visiting their website at TheToyMakers.org



The ToyMakers have shipped 200,000 toys just like these to children's agencies around the world.

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- Lonnie Bird

TWO-PRONGED APPROACH TO ROUTER TABLE

Dust Control

Use both ports and big hoses to get maximum dust-collection efficiency.

Q: My router table has a dust port in the fence and another one in the cabinet. When should I use one versus the other?

Jerry Gray
Omaha, NE

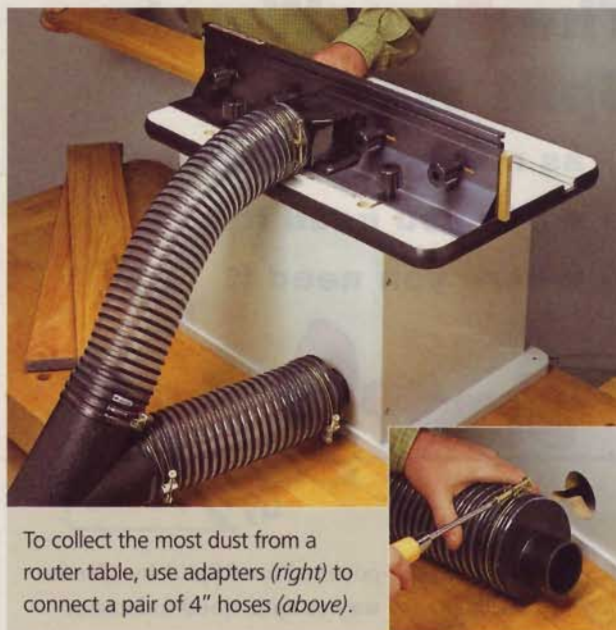
A: Having two dust ports in a router table gives you great versatility. Which one to use depends on the type of routing you're doing.

Any time you are using the fence to guide the workpiece, that port is the one to use. It's located close to the bit, and the bit's rotation pushes dust and chips

directly into the port, which makes it very efficient.

When freehand routing or routing the face of a workpiece, though, you can't use the fence-mounted port. In those cases, connecting a hose to the cabinet produces suction around the bit and does a relatively good job of collecting dust.

To get the best possible dust-collection performance, connect hoses to both ports, as shown in the *Photo* above. Just run a single hose from the dust collector, and then split it with a Y-fitting to run a hose to each port.



To collect the most dust from a router table, use adapters (right) to connect a pair of 4" hoses (above).

The ports on most tables are sized for a 2 1/4" shop-vacuum hose. That means if you want to connect to a dust collector, you'll need to use an adapter to step up to 4"-diameter hose.

If possible, connect the adapters and 4" hose directly to the fence and cabinet.

If clearance is too tight for standard "funnel" style adapters, offset adapters are available (*Inset Photo*).

If you have to connect using 2 1/4" hoses, keep them as short as possible. That's because dust-collection efficiency drops off dramatically as hose diameter decreases.

USE GOOD CLEANING HABITS TO

Keep Blades Sharp

Q: I've invested in a high-quality, carbide-tipped table saw blade. What can I do to make it last as long as possible?

Darren Johnson
Naples, FL

A: To ensure long life and smooth cuts, keep the blade clean and sharp. Cutting generates heat that softens resins in the wood, and some

of that resin builds up on the blade teeth and body (*near right*). This generates more heat, which dulls the carbide.

To prevent that, clean your blade any time it shows buildup. Just soak it with blade-and-bit cleaner, and then scrub to remove any stubborn buildup (*far right*).

Sharpening — It's also important to sharpen carbide-tipped blades before they



Resin buildup on a saw blade reduces blade life.



Removing buildup keeps the blade sharp longer.

get too dull. That's because carbide is made up of tiny grains that break away as the blade dulls. The more grains that break away, the more

carbide has to be ground off. Sharpen a blade as soon as cuts get markedly rougher, or when cutting requires more feed pressure than normal.

GOT QUESTIONS? WE HAVE ANSWERS!

Include full name, address, and daytime phone number. You'll receive one of our handsome **Workbench** caps if we publish your question.

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Forums: Forums.WoodNet.net

Mail: Workbench Q&A, 2200 Grand Ave., Des Moines, IA 50312





A strip of tape makes a quick clamp cover to prevent stains during glue-ups.

Tape Tames Clamp Stains

Q: Why do pipe clamps leave dark stains on some woods during glue-ups, but not on others?

Matt Sullivan
Reno, NV

A: These stains occur when moisture in the glue causes a chemical

reaction between the iron oxide in the pipes and tannic acid in the wood. In woods that contain a high concentration of tannic acid, such as oak and ash, the reaction is more pronounced. You can prevent these stains easily, though, by covering the pipe with masking tape (Photo, left).

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Pick the Right Extension Cord

Q: I need a couple of good extension cords for my shop. How do I know what size and type to buy?

Jim Spencer
Dayton, OH

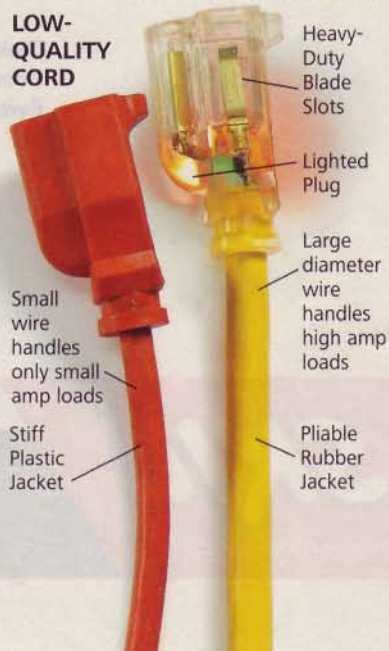
A: First, make sure the amp rating on the cord is greater than the amp draw of the tool. Either find the amp rating on the tool, or look for cord requirements in the owner's manual.

Two things determine a cord's amp rating. First is the size, or gauge, of the wire. A lower gauge number means larger wire and more amperage capacity. Second is cord length. As it increases, amp capacity decreases.

For running shop tools, use a 10- or 12-gauge cord no longer than 35 feet. And select a cord with high-quality features, as shown below.

HIGH-QUALITY CORD

LOW-QUALITY CORD



PAPER SHIMS SIMPLIFY

Band Saw Setup

Q: No matter how carefully I cut with my band saw, the blade twists and produces inaccurate cuts. Adjusting the blade tension helped but didn't solve the problem. How do I keep the blade running straight?

Bob Mitchell
Bellingham, WA

A: Proper blade tension reduces blade twist but won't control it completely. To do that, a band saw uses two sets of blade guides — one above the table (Photo), and the other below. Any time you change blades, you need to reposition both sets of guides.

As the Illustration at right shows, each set of guides consists of two mechanisms. The thrust bearing sits behind the back edge of the blade to

prevent it from being pushed backward as you cut. A pair of guide blocks flank the blade to prevent it from moving from side-to-side.

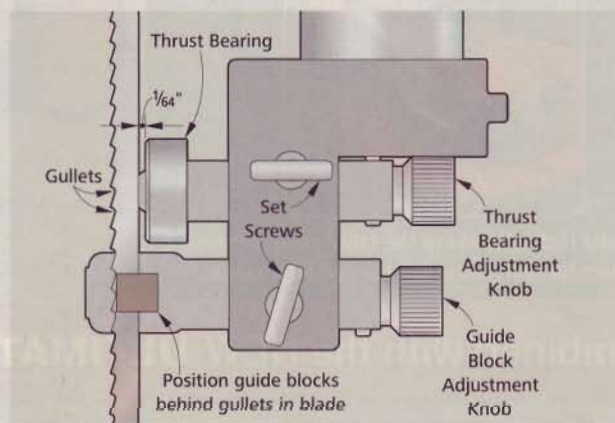
Start by setting the thrust bearing. After loosening the set screw that holds it in position, turning a knob moves the bearing forward or back. Use playing cards to set a gap of about $\frac{1}{64}$ " between the face of the bearing and the back edge of the blade.

Next, set the guide blocks. For this, just wrap a dollar bill around the blade to achieve a gap of a few thousandths of an inch (Inset). Next, turn the adjusting knob to position the leading edges of the blocks just behind the blade gullets.

That done, repeat these steps to set up the guides located below the table.



Playing cards make it easy to set clearance between the blade and thrust bearing (above). A dollar bill positions the guide blocks (right).



BUILDING BETTER DRAWERS:

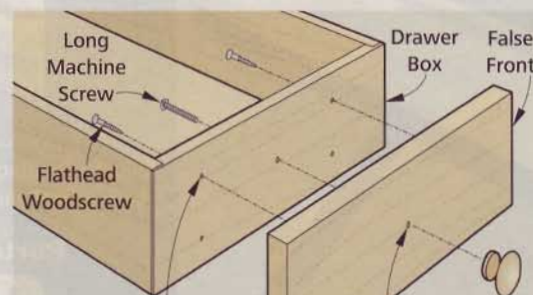
Knob Know-How

Q: I'm building drawers with false fronts, and the knobs I purchased came with mounting screws that were too short to reach through both the false front and the drawer box. Can I mount the knobs to the false fronts before I install them on the drawer box?

Doyle Larsen
Ann Arbor, MI

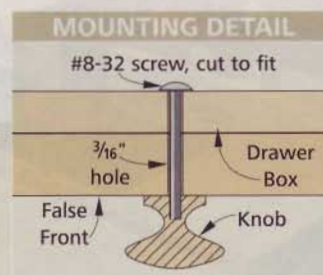
A: You could attach the knob to the false front with a short mounting screw, but if it works loose, you won't be able to tighten the knob without removing the false front.

To avoid this hassle, you should mount the knob after



FIRST: Align the false front, and then mount to drawer box with screws

SECOND: Drill hole for mounting knob, and then secure it with an extra-long screw



Electrician's multi-purpose pliers have threaded holes that let you cut several sizes of screws cleanly.



use the same #8-32 machine screws. So I just keep a box of #8-32 $\times$ 2 $\frac{1}{2}$ " screws on hand. That way, I can cut one to the length I need using electrician's pliers (right).

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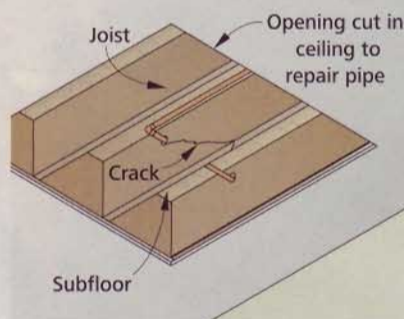
QUESTIONS & ANSWERS

ADD MENDING PLATES TO

Reinforce a Floor Joist

Q: I recently had to patch a drywall ceiling because of a leaking pipe. When I removed the drywall, I found a crack in one floor joist. It runs between a hole drilled in the joist and the edge that's a couple of inches away. The crack looks pretty old, and it hasn't opened up. Do I need to repair it? If so, how?

Mary England
Des Moines, IA



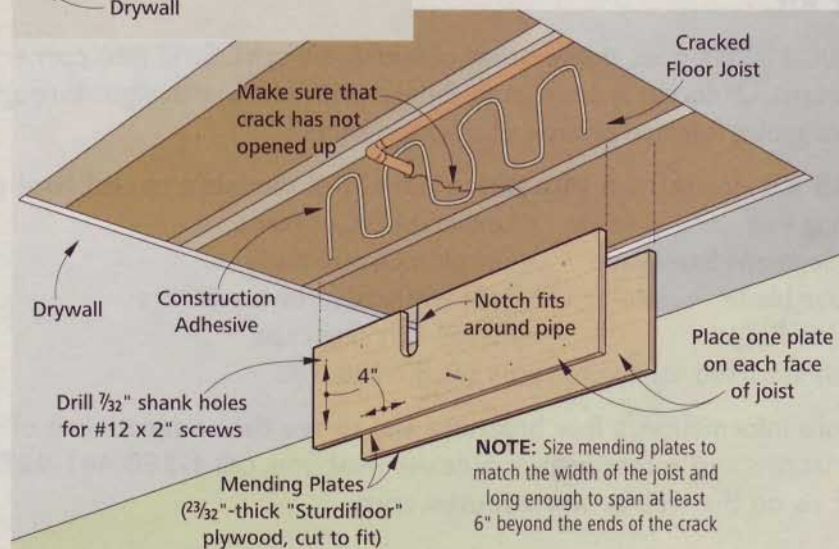
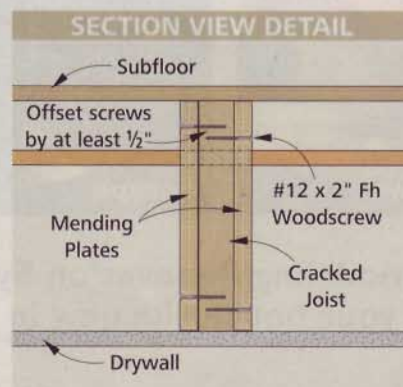
A: Since the crack hasn't opened up, the joist hasn't been severely weakened, so you don't need to be concerned about the joist failing. But you need to reinforce the area to ensure that the crack doesn't progress any further.

Make Repair Plates — Severely cracked joists should be examined by a professional, and may need to be replaced

or repaired with steel reinforcements called "flitch plates." But to fix a minor crack like this, you can make mending plates from $\frac{23}{32}$ "-thick "Sturdifloor" plywood that's normally used for making subfloors (Illustration, below).

To make the plates, cut them to the same width as the joist and long enough to span at least 6" beyond each end of the crack. Then lay out and drill two rows of mounting holes for #12 x 2" mounting screws. Space each hole 1" to 2" from the edges of the plates and no more than 4" apart. You'll need to offset the holes in the plates so that the screws don't hit one another (Section View Detail, left).

To mount the plates, apply construction adhesive, and then clamp the plates to the joist while you drive in the screws.



NOTE: Size mending plates to match the width of the joist and long enough to span at least 6" beyond the ends of the crack

PIPE-CLAMP

Benchtop Vise

No vise? No problem. All you need are two pipe clamps and some 2x4 scraps to build your own benchtop vise.

My bench has no vise or bench dogs for securing a workpiece to the top. So I built this benchtop vise using a pair of "deep reach" pipe clamps and three scrap 2x4s.

Like any vise, this one has two jaws. One jaw is adjustable, so the vise can be used to hold workpieces in a wide range of sizes (Photos). The other jaw is fixed. This fixed jaw, along

with a mounting block at the other end of the vise, is used to attach the vise to the bench (Construction View).

To build the vise, first cut the two jaws and the mounting block to size. Then drill two holes in the face of each piece for the pipes to pass through (Hole Locations).

Next, cut rabbets on the top edges of the adjustable jaw and the fixed jaw to form a shoulder for the workpieces to rest in (Jaw Detail).



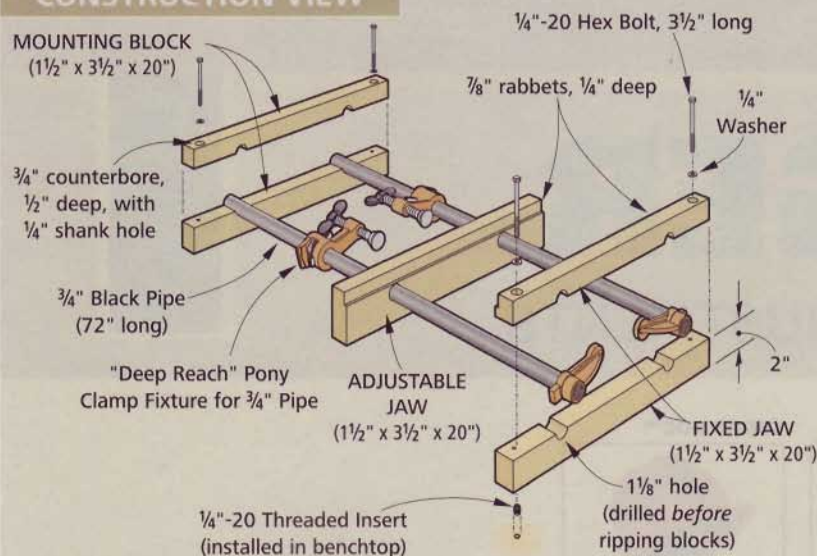
This benchtop vise has a wide range of adjustment that makes it ideal for holding long boards (above) or wide panels (left).

Then drill holes in the edges of the fixed jaw and mounting block (Mounting Block Detail). These holes will receive bolts that pass through these parts and into threaded inserts that get installed in the benchtop (see Construction View).

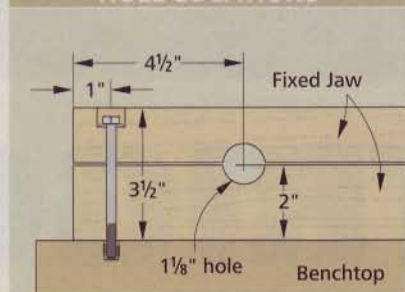
That done, you can rip the fixed jaw and the mounting block into two pieces. This lets you tighten these pieces around the pipes and assemble the vise for use.

Thomas James
Yucca Valley, CA

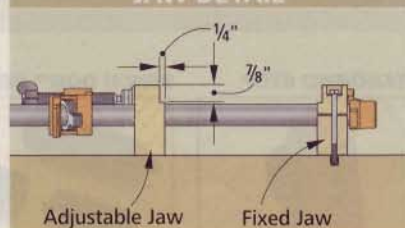
CONSTRUCTION VIEW



HOLE LOCATIONS



JAW DETAIL



BEST TIP WINNER!

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SLIDE-OUT TRAY HOLDS

Project Plans

I like to keep project plans handy, but don't want them cluttering up my benchtop. So I built this slide-out tray to hold the plans. The tray was inspired by the sliding keyboard on my computer desk. I just pull it out to look at the plans (*Photo*) and then push it in when I'm done.

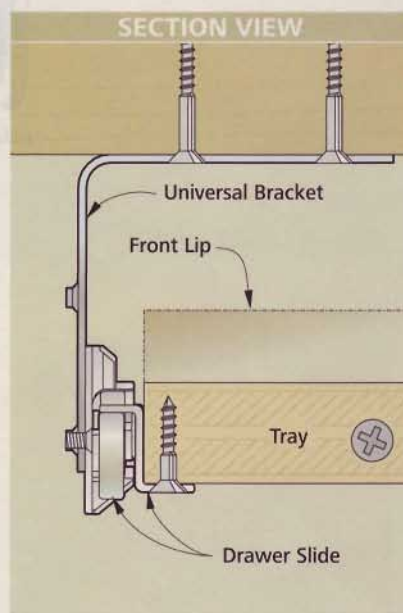
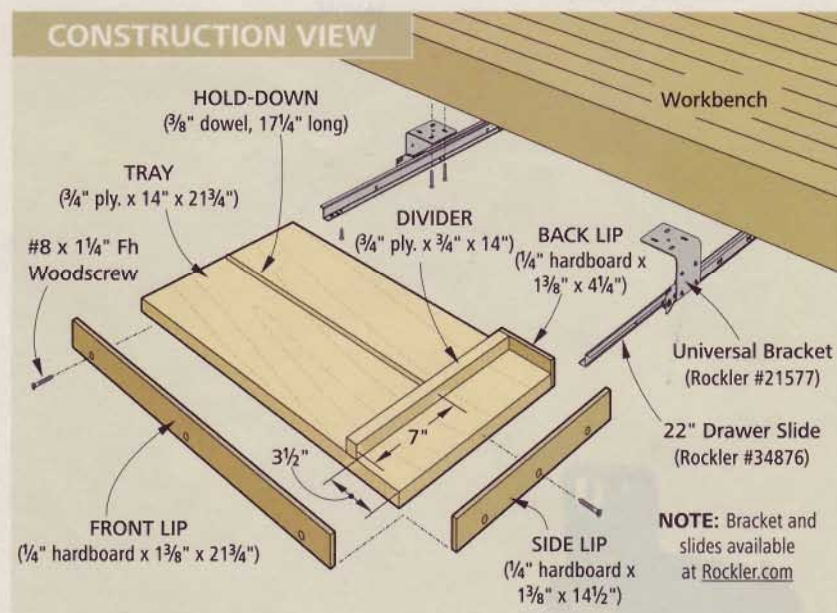
The tray slides on a pair of drawer slides that I mounted to the bench using universal brackets. The tray itself is just a piece of $\frac{3}{4}$ " plywood with

a hardboard lip at the front to help hold items in place (*Construction View*). A couple more pieces of hardboard and a divider form a compartment for pencils, rulers, and other supplies. The divider also serves another purpose. I drilled a hole in one edge and inserted a dowel to make a hold-down for keeping the plans open as I work.

Stephen Morris
Aiken, SC



Now you see them, now you don't. Pull project plans into view with this handy slide-out tray. It mounts underneath the benchtop to keep the surface free for your work.



Quick Tips

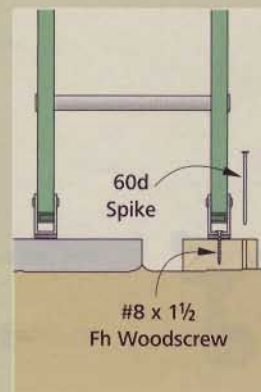


PHOTOGRAPHIC MEMORY

Any time Robert Helseth of Minneapolis, MN, has to disassemble a complex mechanism for service or repair, he takes digital photos at various stages of the process. Then he can reference the photos to ensure he gets everything reassembled correctly.

ON THE LEVEL

To prevent his extension ladder from slipping when shimmed on uneven ground, Jim Cooper of St. Louis, MO, screws the foot of the ladder to a scrap board. For even greater stability, Jim uses a large nail to stake the board to the ground whenever practical.



Quick Tips

**THE CLEAR SOLUTION**

When cleaning a brush, it isn't the solvent itself that's particularly hard on the bristles — it's the way you soak the brush. If the bristles sit on the bottom of the jar, they get deformed and clogged with gunk.

To prevent that, I suspend my brush in the solvent. Just drill a hole in the brush, insert a dowel through it, and set the dowel on the rim of the jar.

*Phil Nguyen
Columbus, OH*

**SPINDLE-STRIPPING AID**

Spindles present a special challenge if you need to strip off the old finish. That's because no scraping tool fits the shape of the curved surfaces.

Nylon stockings work well, however. Just apply stripper to the spindle, and then rub the stocking back and forth around it in a "toweling off" motion. The stocking conforms to the curve of the spindle. It also provides abrasion to help remove the old finish.

*Ben Moody
Allentown, PA*

GOING BACK TO REGULAR TOOLS GOING BACK TO





PICKY DETAILS

There's no easy way to refinish woodwork that has a lot of intricate fluting or carved details. But it helps to use a scraping tool capable of fitting into these hard-to-reach areas — a common nutpick.

Alice Blessing
Frankfort, KY



COME CLEAN

Getting paint off old hardware is no fun. But I found a "solution" that's painless and inexpensive (though it's a bit strong-smelling).

Just soak the hardware in a jar of solution that is made up of two parts water and one part ammonia. Soaking the hardware overnight loosens the paint, so it should come right off under running water. If the paint is a little stubborn, use a brass bristle brush to gently remove the paint without damaging the hardware.

Todd McBride
Des Moines, IA

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MAKE AN IMPACT WITH

Metallic Paint

Add punch to projects with this unique paint. It creates a durable surface with the look of hand-hammered metal.

For the space-saving home shop in this issue (page 40), we wanted a hard, durable surface for the pegboard storage panels. But beyond that, we wanted something that would look good, too.

That's why we decided to dress up the pegboard with a special "metallic" paint. The paint dries to a hard finish, and it creates the look of metal that's been lightly tapped with a hammer.

This metallic paint (we used Hammerite) differs from standard paint in a couple of ways. First, it creates a much *harder* surface. This is because the paint contains millions of

glass flakes that interlock as it dries.

The second difference is the "hammered" look of the paint itself. Two types of silicone in the paint create this effect. One type has particles of aluminum in it, and the other contains glass beads. As the paint dries, they produce the bumpy texture that gives the paint its "hammered" appearance (*Inset Photo, right*).

Hammerite is often used on metal but works well on other materials like pegboard and MDF. For these materials, sand the surface with 120-grit sandpaper, so the paint can adhere to it.

The paint can be sprayed, brushed, or rolled. To get a consistent look, use a mohair roller with a 1/4" nap.



This Hammerite paint gives shop projects the interesting look of "hammered" metal. Sanding the surface lightly and then using a mohair roller yields the best results.

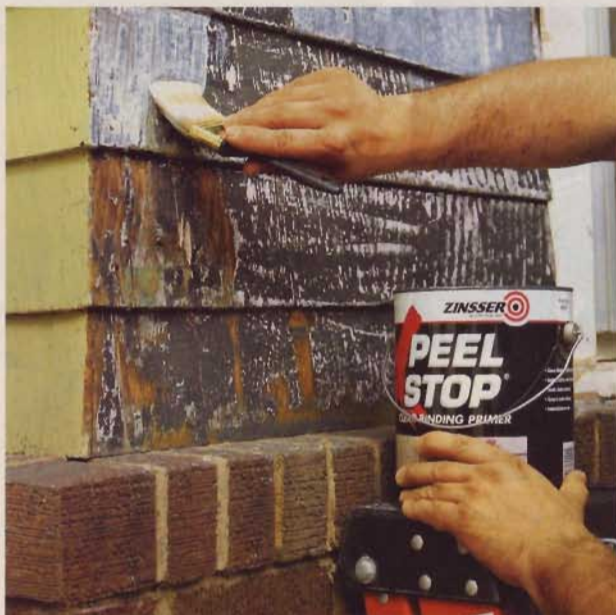
You'll want to roll on the paint differently than you're used to, as "over-rolling" the surface can make it look too smooth. So load the roller, and roll it firmly and smoothly across the surface (*Photo, above*). Then, rather than rolling backward, pick the roller up, and make a second pass that slightly overlaps the first. One coat is all you need.



Up close, it's easy to see the textured appearance of Hammerite.



Hammerite Rust Cap's metal finish paints are available in 11 different colors (five are shown here) at many home centers and hardware stores for about \$10 a quart. To find a dealer in your area, visit Kilz.com or call 866-774-6371.



To achieve a crack- and peel-free surface, scrape as much paint as you can get with a hand scraper. Then brush on Peel Stop to seal the surface before you prime and paint.

REPAINTING YOUR HOUSE?

Skip the Scraping

Q: Is there any way I can repaint my house without having to spend hours scraping the old peeling paint first?

Doug Spoonhour
Jackson, MT

A: You can't eliminate scraping completely, but you can cut back on it substantially by using a product called Peel Stop.

Common practice when repainting is to scrape all the peeling paint, and then sand to feather out the edges of the paint. This prevents old paint from peeling when the job is done.

But you can eliminate some scraping (and all the sanding) by applying Peel Stop. It seeps into any checks in the paint or peeling areas and glues them down, preventing them from peeling once the primer and paint coats are applied.

What this means is you only need to scrape off the loose, flaking paint before applying Peel Stop. The product dries quickly, so you can prime in four hours.

Peel Stop is available for about \$20 a gallon at many paint stores. Call 732-469-8100 or visit Zinsser.com for more information.

Love Wood?

“I really love the process of thinking through how a cabinet goes together...”

Mike McGlynn specializes in Arts & Crafts furniture and has built pieces that appear in the National Register of Historic Homes. He is truly passionate about woodworking. Whether selecting wood, hardware or the perfect finish, he counts on Rockler to provide quality tools and supplies.



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EasyCoper

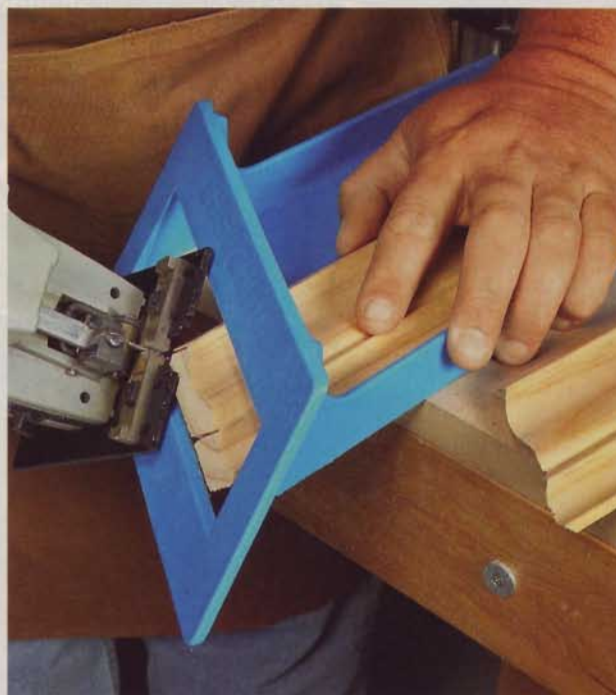
Coping cuts are easier, faster, and more accurate using a jig saw and these new cutting guides.

The EasyCoper allows you to use a jig saw, rather than a regular hand-held coping saw, to make the intricate coping cuts necessary for seamless joints in crown molding.

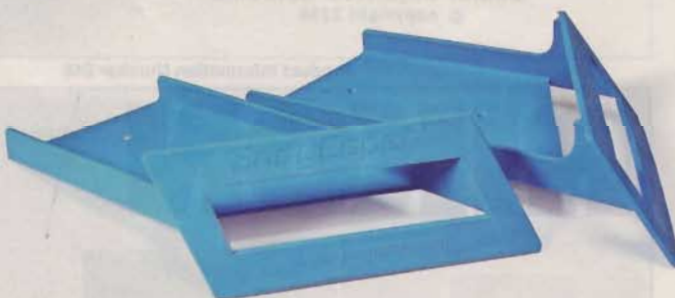
Made of a lightweight, durable plastic, EasyCoper can handle crown molding up to 5½" wide. The cutting aids are sold in sets of two, one for coping right miters and one for coping left miters. The jigs are preset

for crown molding with a 52°/38° spring angle, which is the most common variety sold in the U.S. However, crown molding with a 45° spring angle can be coped using a shim to align the end cut with the fixture surface. A template for making the shim is included with the EasyCoper.

The EasyCoper sells for about \$35. For more information or to locate a retailer, call 336-375-9401, or visit EasyCoper.com.



The EasyCoper holds the jig saw at the perfect angle while you trace the profile of the crown molding, which is first miter-cut in the conventional manner.



BETTER HEARING PROTECTION

Electronic Earmuffs



ProTech's PA4000 includes the headset, carrying case, battery, and audio cable. You provide the iPod.

Passive hearing protection (like standard ear muffs and foam earplugs) isn't enough to protect you against the full range of harmful noise frequencies that you encounter when using tools in your shop or around your house. These devices do a good job of filtering out mid- and high-frequency sounds but are ineffective against low-frequency sounds that are generated by fans, gas engines, and large electric motors.

The best protection against low-frequency noises is a pair of electronic noise cancellation (ENC) earmuffs like the NoiseBuster PA4000 from ProTech Communications. These ear muffs use technology that defeats

low-frequency sound waves by generating an opposite sound wave that cancels the harmful noise. This is the same type of protection that airport ground crews and others who are subjected to almost constant harmful noise have been using to protect their hearing for years.

This technology is just now becoming popular with DIYers as we become more aware of the hearing damage that can result from even occasional tool usage.

A pair of NoiseBusters, complete with an audio cable for connecting your iPod, or other device, will set you back about \$160. Visit NoiseBuster.net or call 800-468-8371 for more information.

Powerful New Quick-Grip

Quick-Grip clamps, and other similar competitive models, have long been a compromise between convenience and performance.



But you won't sacrifice clamping power to gain convenience with the new Quick-Grip XP from Irwin.

A patented Power Lock system inside the clamp can apply up to 550 pounds of clamping pressure, putting this Quick-Grip clamp on par with conventional bar and pipe clamps. The bar of this clamp has also been beefed up for the increased pressure. Of course, fast adjustments and one-handed operation are still hallmarks of the Quick-Grip.

For more information, you can visit Irwin.com or call 800-464-7946.

A 14-gauge, powder-coated steel frame, 1¼" butcher block top, ball bearing drawers, and a pegboard back are standard fare on Gorilla Rack workbenches.



GORILLA RACK WORKBENCH

Rapid Rack Industries' new Gorilla Rack line of heavy-duty workbenches combines premium construction with affordable pricing and easy setup. The 4-ft. model shown here (GRB 7560) comes complete for about \$80. For more information, and to locate a dealer in your area, visit GorillaRack.com or call 800-736-7225.

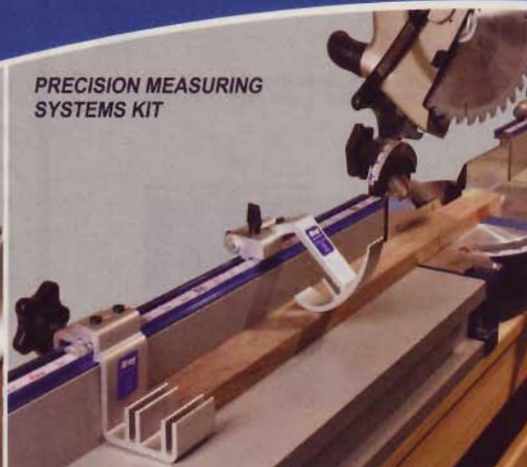
Build Precision into your Shop!



**PRECISION
BAND SAW
FENCE**

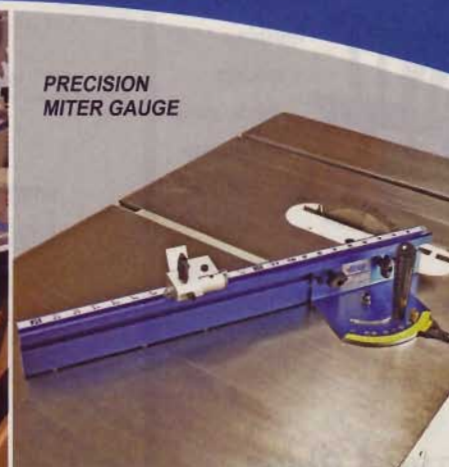
Versatile fence mounts to most 14" band saws and features easy adjustability for blade drift.

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EZ-CLUTCH CLAMP RELEASE

The EZ-Clutch Quick Release System from Rockler is a lever that straddles the clutch plate stack and lets you disengage the clutch by simply lifting up. Two types of quick releases are available to retrofit popular bar and pipe clamp styles. Both varieties sell for about \$4 each.

Visit Rockler.com

or call

800-279-

4441

for more

information.



INFINITE ATTIC

Convert an empty attic into storage space with these aluminum saddles that use the space between trusses to create a continuous platform. A basic kit costs \$25 and covers 32 square feet. Visit InfiniteAttic.com or call 877-288-4277 for more information.



MAGNETIC HOOK

Milwaukee Electric Tools' new heavy-duty tape measure simplifies one-person operation with a magnetic tip as well as an end hook for securing the tape end. A 25-foot model sells for about \$15. Visit MilwaukeeTool.com or call 800-729-3878.



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SPACE- SAVING HOME SHOP

Create your own functional, hardworking shop in just 50 square feet of space. Made from pre-assembled cabinets and other inexpensive materials, it features five separate workstations, plus storage for tools and supplies.

For many of us, there just isn't enough space for a big workshop. We end up sharing shop space with the garage or basement, which usually means one of two things. The tools get spread out and take over the entire space, or they get put in long-term parking against the wall, and they're seldom used.

Although enlarging your shop may not be an option, it is possible to make the space you *do* have more efficient. And that's precisely the idea behind this home shop.

Although it's hard to tell from the *Photo*, this shop has an unbelievably small "footprint" of only 50 square feet (the size of a small storage shed). Yet it functions like a much larger shop.

Five Workstations — The secret to making such a small shop work "big" is due in part to a unique arrangement of tools and cabinets that creates five major workstations. These include a station for the table saw, router, miter saw, and planer. And there's a large, sturdy benchtop on each side of the miter saw station.

Each workstation can be set up in a matter of seconds. Equally important, it can be reconfigured just as quickly to perform a secondary function or get stowed out of the way.

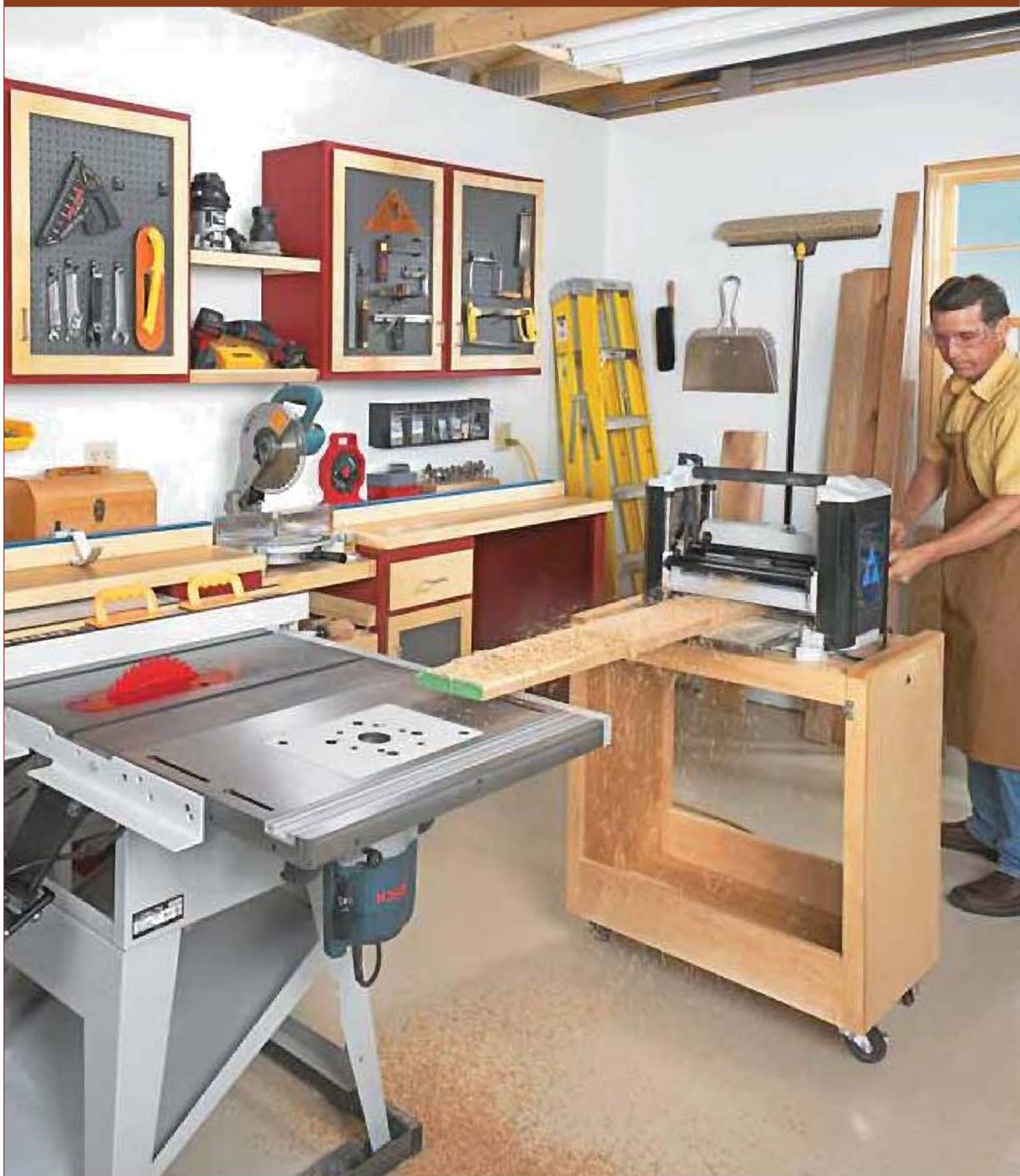
Space-Saving Strategies — But these workstations are really only one part of the story of this shop. We've also incorporated a number of space-saving strategies, which are detailed on pages 42 and 43. Or you can visit WorkbenchMagazine.com to see videos of these space-saving strategies in action.

Time & Money — Of course, lack of space isn't the only limiting factor when setting up a shop. You also have to consider time and money.

To save both time *and* money, we purchased six pre-assembled cabinets for about \$240. Two shop-made end assemblies create tool nooks for the workstations. And we customized the cabinet doors with pegboard panels.

Finally, we built benchtops, fence extensions for the miter saw, a flip-top planer cart, and a cutoff bin — all to get this shop working to its full potential.



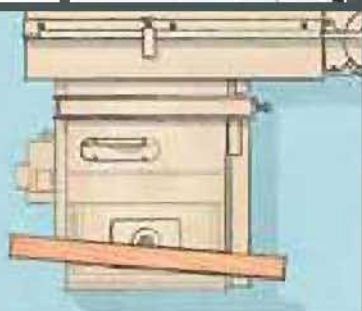


HOME SHOP WORKSTATIONS

Manufactured Cabinets make it quick, easy, and affordable to set up a small, yet fully functional shop

Tool Shelves mount level or at an angle for convenient access

Cutoff Bin holds scraps, chips, and dust from miter saw, and pulls out for emptying



ROUTER STATION

To save space, the router table is mounted to the table saw, which is housed in a tool nook. There's no need to move the table saw to work at the router station.

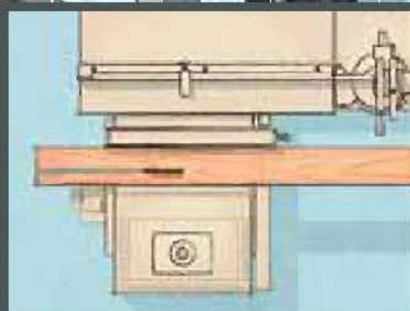
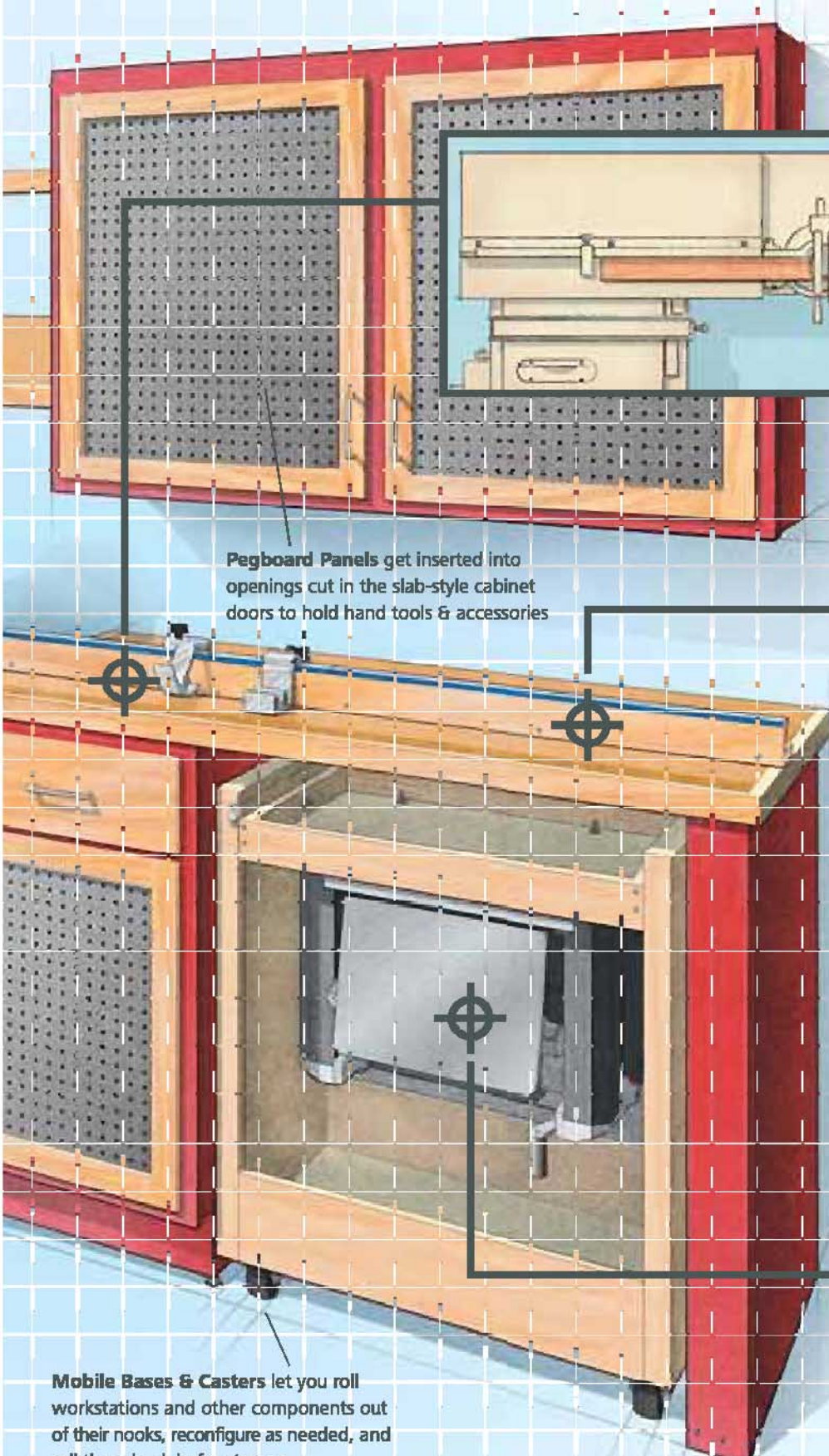
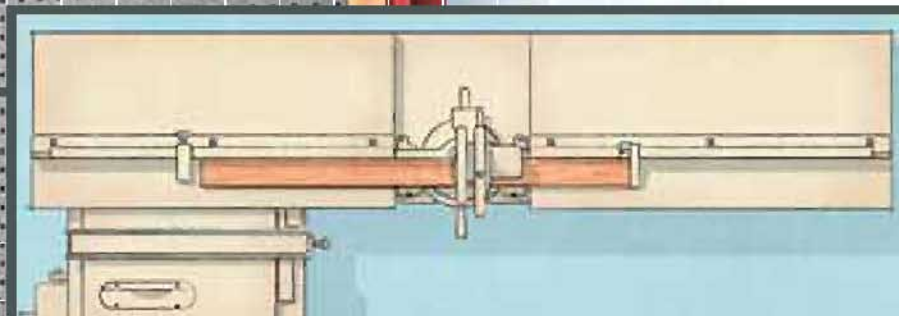


TABLE SAW STATION

Even when tucked into its tool nook, the table saw still provides plenty of capacity for ripping or crosscutting most boards (*illustration, above left*). If you need to rip sheet material or wide boards, simply roll the saw out on its mobile base (*above right*). Once the cut is completed, park the saw back in its nook.

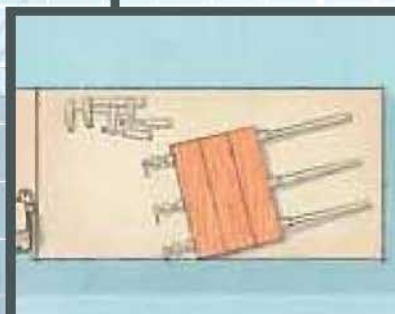


Pegboard Panels get inserted into openings cut in the slab-style cabinet doors to hold hand tools & accessories



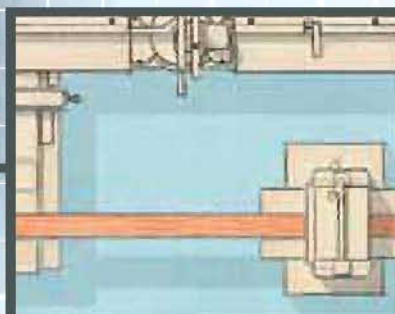
MITER SAW STATION

Side supports and fence extensions offer almost 10 feet of crosscutting capacity at the miter saw station. A stop-block system gives the saw built-in precision.



WORKBENCH

To create a large, sturdy work surface, simply remove one (or both) miter saw fence extensions, which are attached with knobs and threaded inserts.



PLANER STATION

The planer mounts to a flip-top cart. In the "up" position, boards feed out over the table saw. Rotate the flip-top to store the planer in its tool nook.

Mobile Bases & Casters let you roll workstations and other components out of their nooks, reconfigure as needed, and roll them back in for storage

End Assemblies team up with lower cabinets to support benchtops and create tool "nooks" that hold the table saw and planer cart

Store-Bought Shop Cabinets

Setting up this type of shop offers two big advantages. First, it takes shape amazingly fast. And second, the shop is surprisingly inexpensive to build.

The reason for both is the cabinets, which are pre-assembled cabinets purchased from a home center. The cabinets are made of particleboard, and

they have slab-style MDF doors with birch veneer on the front. To add more storage, we cut openings in the slab doors and installed pegboard panels.

Now particleboard doesn't make for fine cabinetry, but a coat of paint helped dress the cabinets up a bit. And the best part is they only cost \$240.

In addition to the obvious storage benefits, the lower cabinets play a key role in the workflow of the shop. Along with two shop-made end assemblies, these cabinets form tool nooks for the table saw, miter saw, and planer stand (*Lower Cabinet Spacing, below*). They also provide sturdy support for the benchtops that flank the miter saw.

Getting Started—For this shop, we purchased four 24"-wide upper cabinets and two lower units (a 12"-wide and an 18"-wide cabinet).

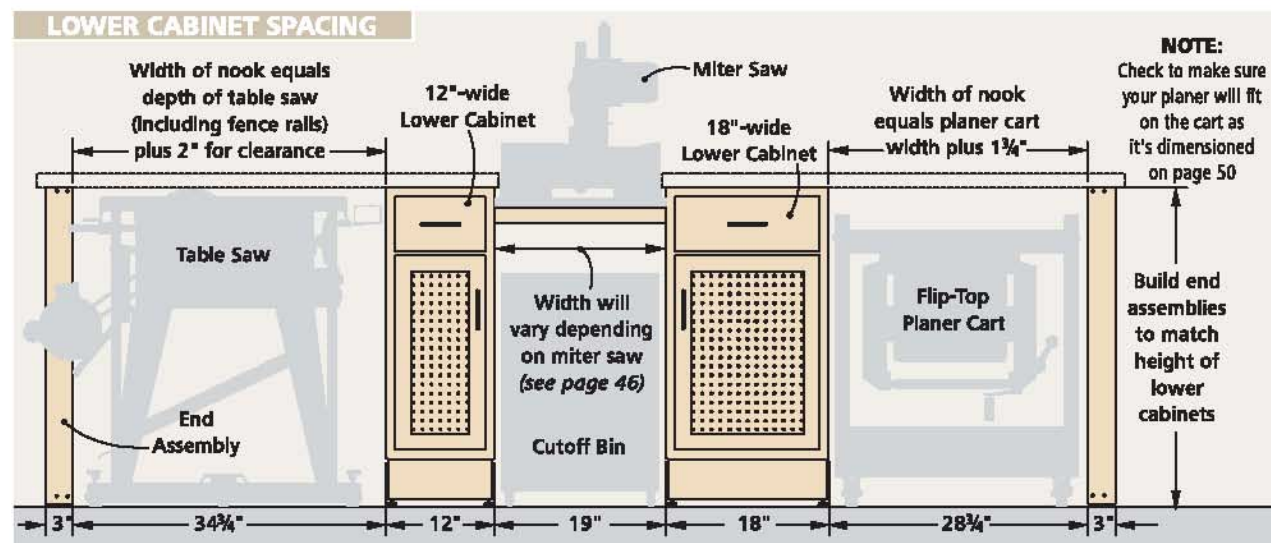
So why are there two different-width lower cabinets? It has to do with the miter saw station. We wanted to provide plenty of support for long boards, but didn't want the station to be more than 10-feet long. In order to fit the lower cabinets, end assemblies, and tool nooks within that space, one cabinet had to be narrower than the other.

Of course, this is how *our* shop was laid out. Your own situation may be a little different, in which case, feel free to adjust the number or sizes of cabinets accordingly.

Pegboard Panels—No matter what arrangement you end up with, one very useful modification is to add pegboard panels for storage (*Pegboard Panels*). The panels fit into openings that are cut in the slab doors of the cabinets. After removing the doors from



Pre-assembled cabinets make it quick and easy to build a miter saw station. Custom pegboard panels add storage.



the cabinets, a jig saw and a handheld router make quick work of cutting the openings (see page 82 for more on this).

Once that's done, cut a rabbet around the inside edge of each opening to hold the panel (*Door Rabbet Detail*). You can use a handheld router with a rabbeting bit for this. Then square up the corners of the rabbet with a chisel.

Now cut the pegboard panels (A) to fit the openings. The panels will look best if you lay them out in such a way that there's even spacing between the holes and the edges of the opening.

After cutting the panels to size, you may want to paint them. We used a metallic-finish paint for durability (see page 32). To protect the doors, and to create a nice contrast, brush on a couple coats of polyurethane.

Once the finish dries, glue and screw the panels into their openings.

End Assemblies—The next step is to build the two end assemblies. Each assembly starts out as a $\frac{3}{4}$ " plywood end panel (B) that's cut to match the height of the lower cabinets. To add rigidity, the panel is framed with four pieces of $\frac{3}{4}$ "-thick hardwood.

To help strengthen the end assemblies, and to make it easy to align the parts, the side frame pieces (C) are connected to the end panel with tongue and groove joints (*Tongue & Groove Detail*). A simple way to cut these joints is with a table-mounted router and a $\frac{1}{4}$ " straight bit. (We've detailed this technique on page 84.)

Once the joinery is completed, glue and clamp the side frame pieces to the end panel. Then cut the top and bottom frame pieces (D) to fit between the sides.

Before attaching the top and bottom frames, there's still a little work to do. First, you'll need to drill holes in the top piece for the screws that will be used to mount the benchtop. And second, drill holes in the bottom piece for two levelers that will be used to level the end assemblies. While you're at it, go ahead and install four of these same levelers in each lower cabinet, as well. These fit into holes drilled in the bottom edges of the cabinet sides.

PEGBOARD PANELS

NOTE: 12"-wide lower cabinet door shown

#8 x $\frac{1}{2}$ " Fh Woodscrew

SECOND:
Cut out, flush-trim, and rabbet opening in cabinet door (page 82)

3" Wire Door Pull

(A)
PEGBOARD PANEL
($\frac{1}{4}$ " perf. hardboard x cut to fit)

$\frac{1}{2}$ " rabbet, $\frac{1}{4}$ " deep

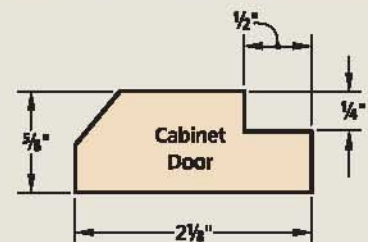
THIRD: Cut pegboard to fit, and glue and screw it in place

FIRST: Lay out opening $2\frac{1}{8}$ " from each edge of door

Slab-Style Factory Door

$2\frac{1}{8}$ "

DOOR RABBET DETAIL



END ASSEMBLIES

(D)
TOP FRAME
($\frac{3}{4}$ " x $2\frac{1}{4}$ " x $22\frac{1}{2}$ ")

(B)
END PANEL
($\frac{3}{4}$ " ply. x 23 " x $34\frac{1}{2}$ ")

(C)
SIDE FRAME
($\frac{3}{4}$ " x 3 " x $34\frac{1}{2}$ ")

#8 x $\frac{1}{2}$ " Fh Woodscrew

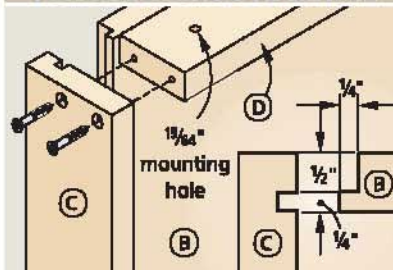
$\frac{1}{4}$ " groove, $\frac{1}{4}$ " deep, $\frac{1}{2}$ " from edge

$1\frac{1}{16}$ " Leveling Furniture Glide

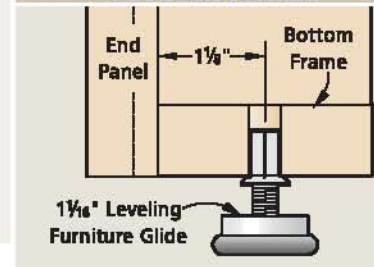
(D)
BOTTOM FRAME
($\frac{3}{4}$ " x $2\frac{1}{4}$ " x $22\frac{1}{2}$ ")

$\frac{3}{8}$ " hole, $1\frac{1}{2}$ " from end

TONGUE & GROOVE DETAIL



LEVELER DETAIL





HEAVY-DUTY BENCHTOPS

Every shop needs a large, sturdy benchtop for assembling projects. This shop, in spite of its small size, has *two* of them—one on each side of the miter saw (Photo, left).

The benchtops, along with a shelf that spans the opening between the

lower cabinets, are integral parts of the miter saw station. The miter saw, which sits between the benchtops, mounts to the shelf (Illustration, below). When cross-cutting a long board, the benchtops act as side supports. They're also used as mounting platforms for two long fence extensions (Photo, near left).

Build the Benchtops — Each benchtop (E) is a thick slab that's made up of two layers of $\frac{3}{4}$ " MDF. Hardwood edging covers the ends and front edge of the top.

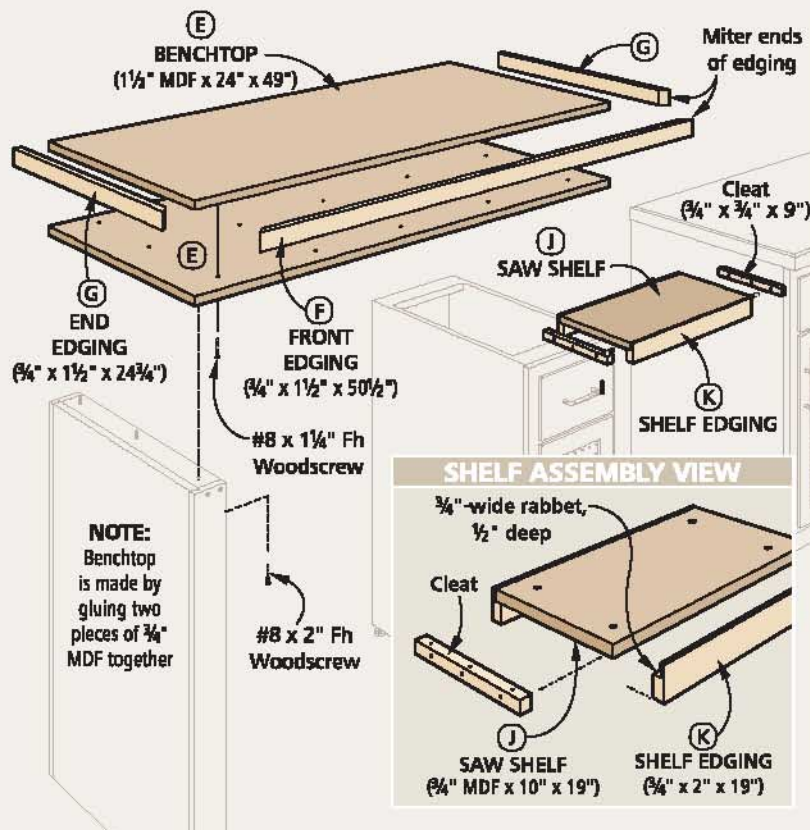
As always when face-gluing pieces together, the challenge is getting the edges of the pieces flush. They have a frustrating tendency to slip out of alignment when you clamp them together. To prevent that, the trick is to pre-drill holes in the pieces and then use screws to "clamp" them together.

Start by cutting both pieces to final size and then dry-clamping them together. Check that the edges are properly aligned, and then drill

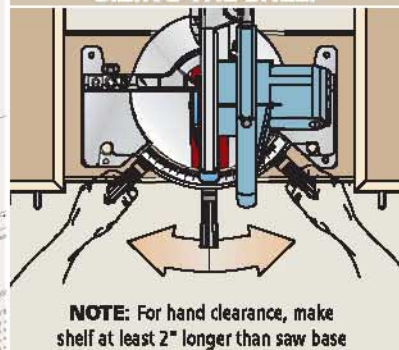


Large, sturdy benchtops are ideal for project assembly (above left). They also act as a mounting platform for the long fence extensions (above right).

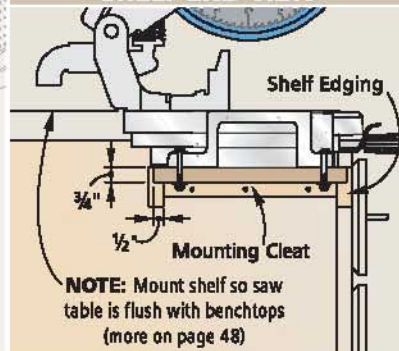
BENCHTOP ASSEMBLY VIEW



SIZING THE SHELF



SHELF END VIEW



countersunk shank holes, spaced about 10" apart to distribute pressure evenly. Follow up by drilling pilot holes, and then remove the clamps. Now apply glue, stack the pieces together, and drive in the screws.

After the glue dries, rip the edging (E, G) to width and miter it to length. Then glue and clamp the edging in place.

Fence Extensions—The next step is to add the two long fence extensions for the miter saw (*Fence Extension View*). The benefit of these extensions is you can clamp stop blocks to them to make repeat cuts quickly and accurately.

Another option is to attach an after-market measuring and stop system, like the kit from Kreg Tools shown below.

Each fence extension is an L-shaped assembly that matches the length of the benchtop. It's made up of a hardwood face (H) and a base (I).

You'll need to drill mounting holes in each fence base for knobs that will be used to lock the fence extensions in place (*Mounting Detail*). Also, cut a small recess in the bottom outside edge of the fence face to form a pocket for dust. This way, the dust won't build up against the fence and affect the accuracy of the cut.

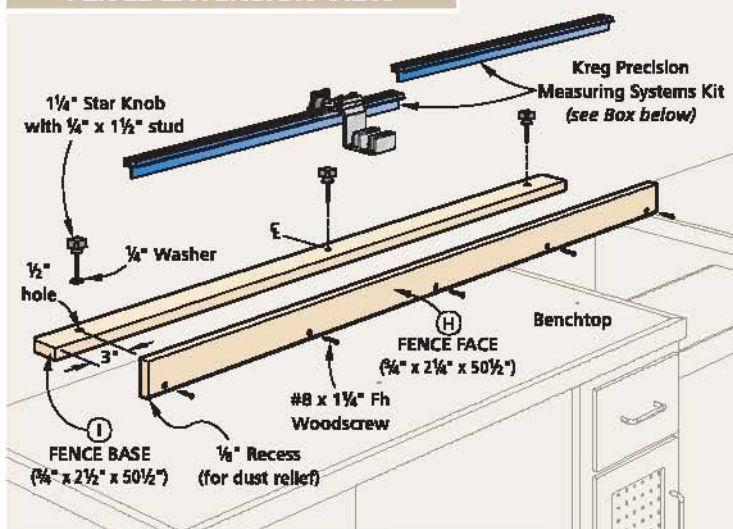
Miter Saw Shelf—After gluing and screwing the fence extensions together, you can concentrate on the miter saw shelf (J). It's a piece of $\frac{3}{4}$ " MDF with wide edging strips (K) on the front and back to keep the shelf from sagging under the weight of the saw (*Shelf Assembly View*).

When determining the length of the shelf, keep in mind that you'll need enough "knuckle room" to operate the controls of your miter saw. When you rotate the table 45° in either direction, you should have an inch or so of clearance between your hand and the lower cabinets (*Sizing the Shelf*).

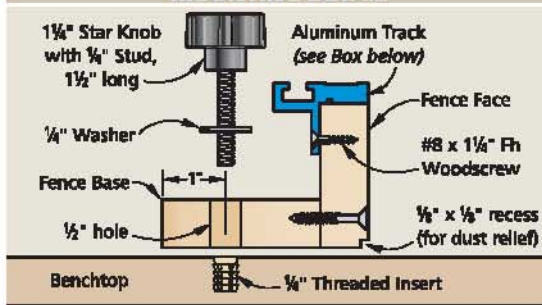
As for the width of the shelf, it has to be deep enough to accommodate the base of the saw. Just make sure the mounting bolts won't be too close to the edges.

Now go ahead and cut the shelf and edging to size. Next, cut rabbets in the edging to accept the shelf. Then glue and clamp the edging in place.

FENCE EXTENSION VIEW



MOUNTING DETAIL



Add a Kreg Kit

Quick setups and precision cuts — two good reasons why we installed this Precision Measuring Systems Kit on our miter saw station. Manufactured by the Kreg Tool Company, the kit has an 8-foot metal track that mounts to any $\frac{3}{4}$ "-thick fence, two self-adhesive tapes, and two stop blocks.

To set up a cut, simply align a cursor on the stop block with the desired board length. Lock the stop, butt the board against it, and cut the board. There's no measuring, marking, or cutting to a fuzzy pencil line.

The "production" stop block is ideal for making multiple cuts of the same length. It has two cursors, so you can use it on either side of the blade.

The "flip stop" has a curved arm that raises up when you push a work-



piece against it. That makes it handy for first trimming one end of a board square and then butting that squared-up end against the stop and cutting the piece to length (*Photo, above*).

The Precision Measuring Systems Kit sells for \$140. For ordering information, see the Materials List on page 53.



We used spacers to elevate the benchtops and provide clearance for the table saw (*Inset Photo*). After installing the benchtops, align the fence extensions to the miter saw fence by clamping a straightedge across them (*above*). Drill mounting holes in the benchtop, using the holes in the extensions as a guide.



STATION ASSEMBLY

Whether you're setting up a shop like this in a garage, basement, or even a small shed, the process of installing the various components of this shop is the same.

Plan the Layout — The first step is to lay out the locations of each component. Start with the lower cabinets and end assemblies, since they establish the spacing of the tool nooks. Using the *Illustration* on page 44 as a guide for the spacing, mark their locations on the wall (*Illustration, below*). Also, marking a level line on the wall will make it easier to level the lower units.

Now you can lay out the location of the upper cabinets, as well as the two shelves that get sandwiched between them (*Photo, page 49*). The shelves are centered over the miter saw, and the cabinets simply butt against the shelves.

Install Upper Cabinets — It's easiest to install the upper cabinets first. These cabinets aren't heavy, but they are a bit awkward to handle, so it's a good idea to round up a friend to help. Also, to simplify installation, attach a temporary cleat to the wall, and use it to help support the cabinets.

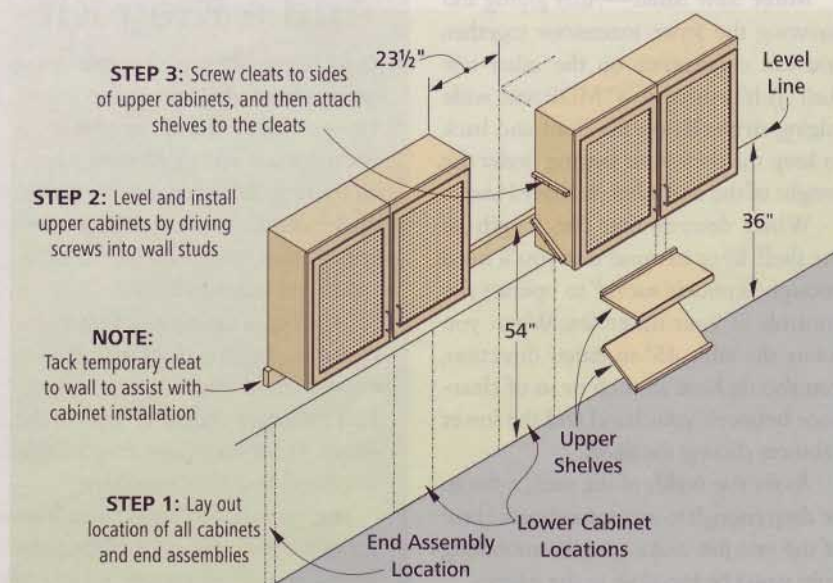
10 Simple Steps to Installing the Shop Components

There's nothing complicated about setting up the components for this space-saving shop. Just follow the 10 steps shown here, and your shop should be up and running in a day or less.

There are three distinct phases to this part of the project: mounting the upper cabinets to the wall (*Illustration, right*), installing the lower units and benchtops (*center Illustration*), and then adding the miter saw and fence extensions (*Illustration, far right*).

One thing to keep in mind is that the cabinets will be fairly heavy once they're loaded with tools and supplies. To support that weight, drive screws through mounting cleats in the cabinets and into the wall studs. Or, use hollow-wall anchors if you can't hit a stud.

Note: If your cabinets don't have mounting cleats, you can easily make your own from scrap wood.



After laying out the location of all the components, the first step is to install the upper cabinets. A temporary cleat attached to the wall forms a handy ledge that helps support these units while you fine-tune their position. After leveling the cabinets, screw them to wall studs. Then mount the upper shelves to cleats attached to the cabinets.

Start by setting the first pair of cabinets in place. Level the cabinets, shimmiing as needed. You also want to align the front faces of the cabinets. Once that's done, screw the sides of the cabinets together through the face frames. Then screw the cabinets to the wall studs.

After mounting the second pair of cabinets, you can add the shelves (L). These are $\frac{3}{4}$ " MDF panels with hardwood edging in front and back (*Upper Shelf Illustration*). Note that one piece of edging extends below the shelf and the other above it. This gives you two shelf-mounting options (*Photo, above*).

Add Lower Units — The lower cabinets and end assemblies are next. You've already marked their locations, so just move them into position (*Illustration, below*). Adjust the levelers, so all the units are even with the level line. Then screw them to the wall.

Mount the Benchtops — With the lower units in place, you're ready to mount the benchtops. Set the tops in place before attaching them permanently, and check to see if your table saw will fit underneath. Standard height for manufactured cabinets is

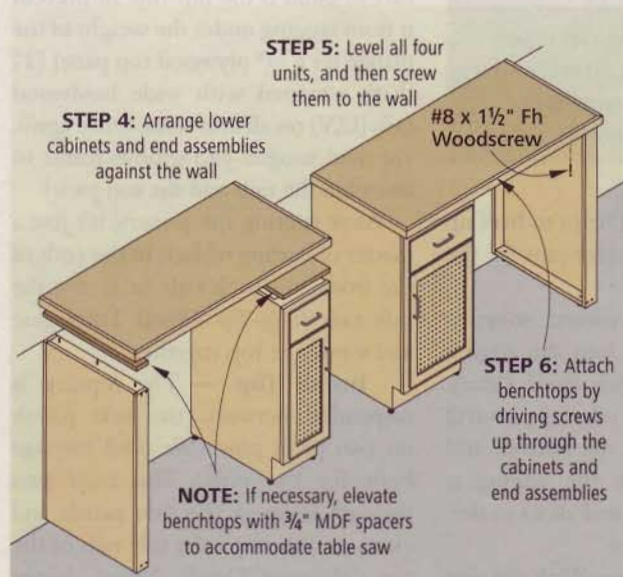
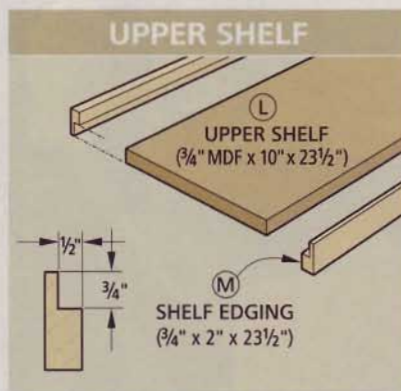
34½" tall, which wasn't high enough for our saw (even with the adjustment provided by the levelers). So we raised the benchtops by adding spacers to the tops of the cabinets and end assemblies (*Inset Photo, page 48*).

Mount Miter Saw — After screwing the benchtops in place, the next step is to mount the miter saw. It gets bolted to the miter saw shelf (*Shelf End View, page 46*), and then the shelf is screwed to cleats that are attached to the lower cabinets. To locate these cleats, position the shelf so the miter saw table is flush with the benchtops. Then butt the cleats against the bottom of the shelf, and screw them in place.

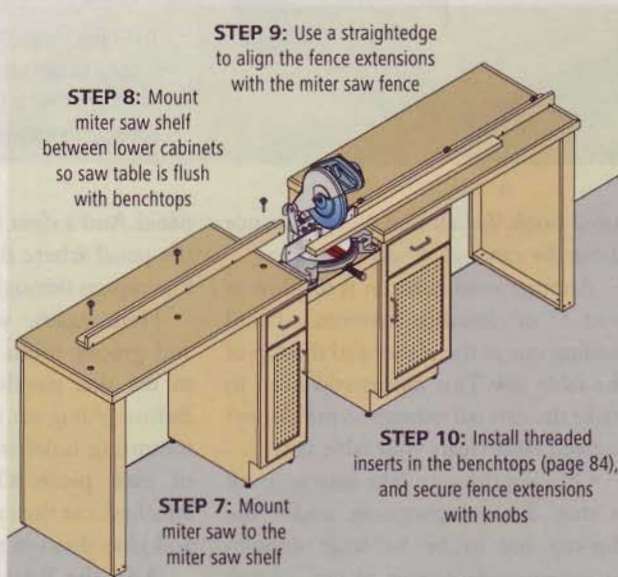
Fence Extensions — All that's left to complete the miter saw station is to install the fence extensions. They're held in place with knobs that thread into inserts in the benchtops. To locate the threaded inserts, align the fence extensions with the miter saw fence (*Photo, page 48*). Then use the mounting holes in the base of the fence extensions as a guide to drill holes for the inserts. (For a tip on installing inserts, see page 84.)



The upper shelves can be mounted level (with the front edging facing down) or at an angle (edging up).



Next, arrange the lower cabinets and end assemblies against the wall. Adjust the levelers to compensate for uneven floors, and then screw each unit in place. Add spacers (if needed) to elevate the benchtops. Then screw the benchtops in place.



To set up the miter saw station, bolt the miter saw to the shelf (*see page 46*). Then attach cleats to the lower cabinets to support the shelf. Position the cleats so the miter saw table is flush with the benchtops. Finally, install the fence extensions.

MATERIALS LIST



MATERIAL LIST

Part	Qty	Size	Material	
PEGBOARD PANELS & END ASSEMBLIES				
A	PEGBOARD PANELS	6	¼" x cut to fit	Perforated Hardboard
B	END PANELS	2	¾" x 23" x 34½"	Baltic Birch Plywood
C	SIDE FRAMES	4	¾" x 3" x 34½"	Maple
D	TOP/BTM FRAMES	4	¾" x 2¼" x 22½"	Maple
BENCHTOPS, SHELVES, & FENCE EXTENSIONS				
E	BENCHTOPS	4	¾" x 24" x 49"	MDF
F	FRONT EDGING	2	¾" x 1½" x 50½"	Maple
G	END EDGING	4	¾" x 1½" x 24¾"	Maple
H	FENCE FACES	2	¾" x 2¼" x 50½"	Maple
I	FENCE BASES	2	¾" x 2½" x 50½"	Maple
J	SAW SHELF	1	¾" x 10" x 19"	MDF
K	SHELF EDGING	2	¾" x 2" x 19"	Maple
L	UPPER SHELVES	2	¾" x 10" x 23½"	MDF
M	SHELF EDGING	4	¾" x 2" x 23½"	Maple

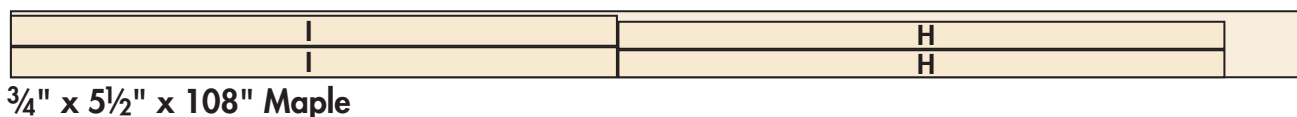
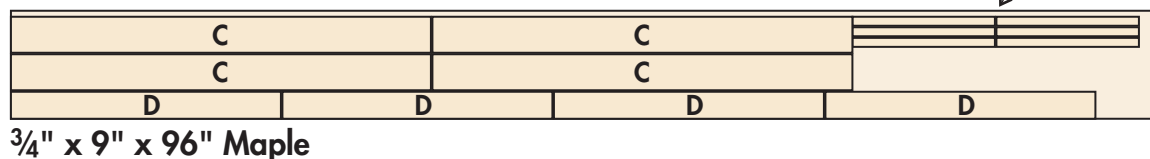
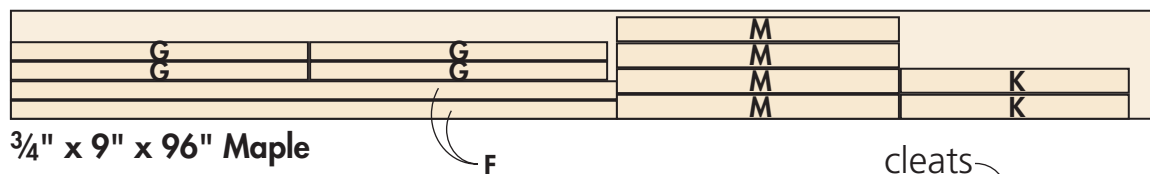
HARDWARE & PRE-ASSEMBLED ITEMS:

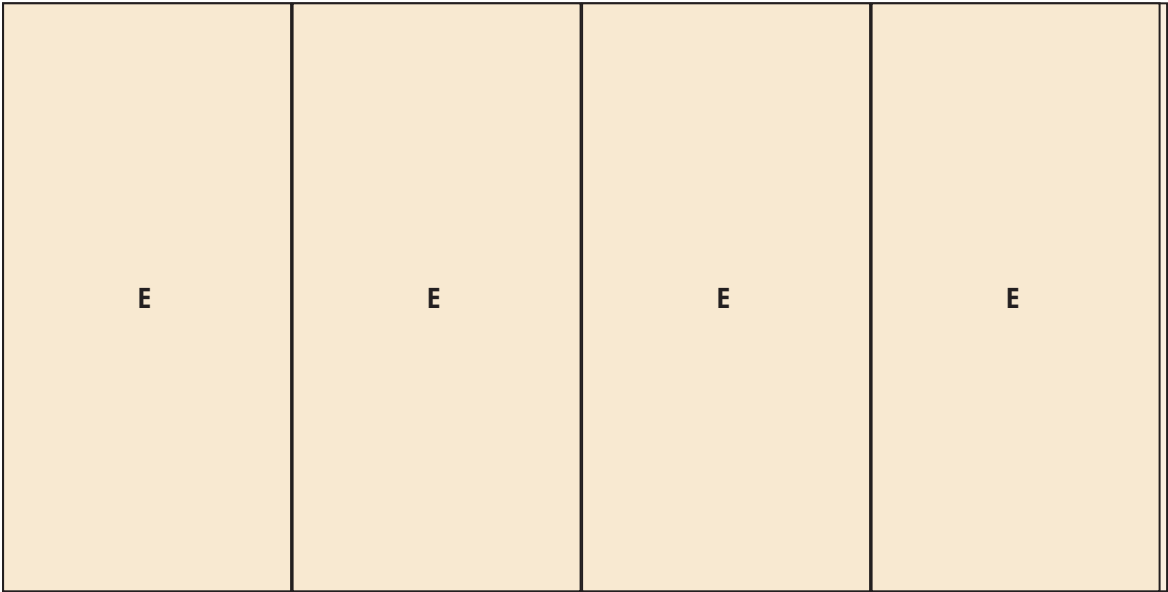
- (16) #8 x 1 1/2" Fh Woodscrews
- (12) #10 x 3" Fh Screws
- (12) 1 1/16" Leveling Furniture Glides*
- (8) 3" Chrome Wire Door Pulls*
- (10) #8 x 1 1/4" Fh Woodscrews
- (6) 1/4" Threaded Inserts
- (8) 1/4" Washers
- (6) 1 1/4" Star Knobs w/ 1/4" x 1 1/2" studs
- (16) #14 x 3/4" Ph Machine Screws
- (16) #8 x 5/8" Ph Machine Screws
- (1) Kreg Precision Measuring Systems Kit (#KMS8000)**
- (6) Continental Birch Cabinets* - Four 24" Uppers, One 18" Lower, One 12" Lower

** (Item available at KregTools.com or 800-447-8638)

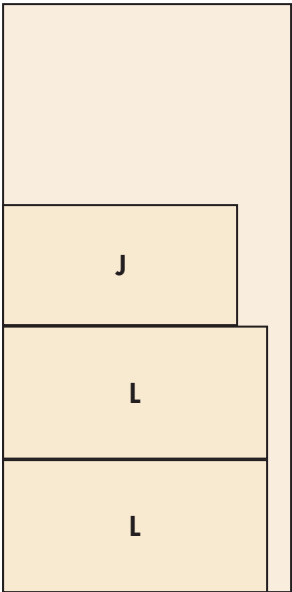
* (Items available at Lowe's stores. To find a store in your area, visit Lowe.com, or call 800-445-6937)

CUTTING DIAGRAM

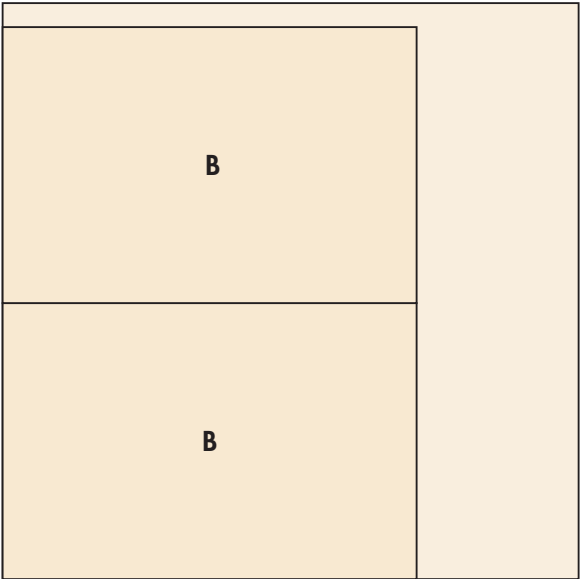




$\frac{3}{4}$ " x 49" x 97" MDF



$\frac{3}{4}$ " x 49" x 24" MDF



$\frac{3}{4}$ " x 48" x 48" Baltic Birch Plywood

Flip-Top Planer Cart

Another space-saving strategy in this shop is to mount your planer to a cart with a "flip-top." To plane stock to thickness, simply roll out the cart, and rotate the top so the planer is right-side up. When you're done, spin the top around so the planer is upside down, and roll the cart into its nook.

Sizing the Cart — The most obvious thing to consider when sizing the cart is that it has to fit inside its design-

The cart consists of two side assemblies connected by a bottom panel and two wide rails (*Construction View, page 51*). The flip-top, in addition to its main job, strengthens the upper part of the cart.

Side Assemblies — The first step is to build the two side assemblies. Each one starts out as a plywood side panel (N) with hardwood edging (O) covering the front and back edges. A cap piece (P) covers the top of the side

hardwood rails (S) that are, once again, joined with tongue-and-groove joints.

One thing to note is that the rails will end up shorter than the bottom panel. This is necessary because of the side edging, which sticks out past the inside face of the side panels (*Bottom Corner Detail*). The shorter rails will allow the parts to fit tightly together.

Having said that, though, it's best to start with rail pieces that are an inch or two longer than needed. That way, when it's time to assemble the cart, you can cut them for an exact fit.

But first, rout the tongue-and-groove joints just as before (*Bottom Corner Detail*). Then trim a short section of the tongue off the bottom panel, so it will fit around the side edging.

Now you can dry-clamp the bottom panel between the side panels. This is when you cut the bottom rails to final length. Cut them to fit between the side edging, and then glue and clamp them to the bottom panel. Then drive long screws through the pre-drilled mounting holes in the edging and into pilot holes in the rails. Use shorter screws to fasten the side and bottom panels together.

Flip-Top — The final part of this cart to build is the flip-top. To prevent it from sagging under the weight of the planer, it's a $\frac{3}{4}$ " plywood top panel (T) that's wrapped with wide hardwood rails (U,V) on all four sides. Once again, we used tongue-and-groove joints to assemble the rails and the top panel.

After routing the joinery, it's just a matter of cutting rabbets in the ends of the front and back rails to accept the side rails (*Flip-Top Detail*). Then glue and screw the top together.

Install Top — The flip-top is suspended between the side panels on two pivot pins. (We used carriage bolts for the pins.) The bolts pass through holes in the side panels and cleats, and through the side rails of the top (*Mounting Detail*). Nylon sleeves prevent the threads of the bolts from chewing up the wood. And lock nuts tightened on the ends of the bolts hold everything together.



The "flip" top on this cart makes it easy to set up the planer for use (left) or stow it underneath for compact storage (right).

nated nook. We allowed 3" of clearance above the cart and $\frac{7}{8}$ " on each side.

Another consideration is to allow at least 1" of clearance between a board feeding out of the planer and the top of the table saw. This means you need to make the cart tall enough so the planer's outfeed table clears your table saw.

One last thing to take into account is that the compartment under the flip-top has to be large enough to accommodate your planer. There's plenty of room for the Delta planer shown here. (It's 18½" tall, 21½" wide, and 10" deep). For larger planers, you may have to modify the dimensions.

panel. And a cleat (Q) helps to beef up the panel where the pivot pins for the flip-top go through.

Here again, we routed tongue-and-groove joints to join the edging to the side panels (*Side Panel Detail*). Before gluing on the edging, pre-drill mounting holes near the bottom end of each piece. Once the edging is attached, cut the caps and cleats to size, and glue them in place.

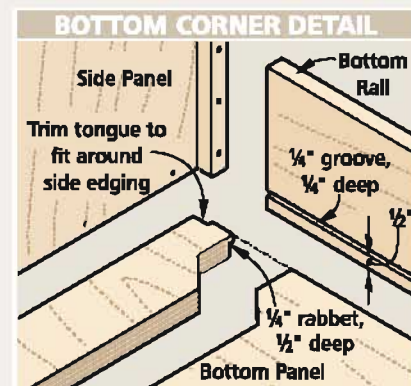
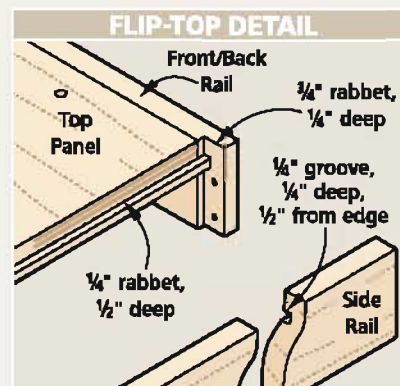
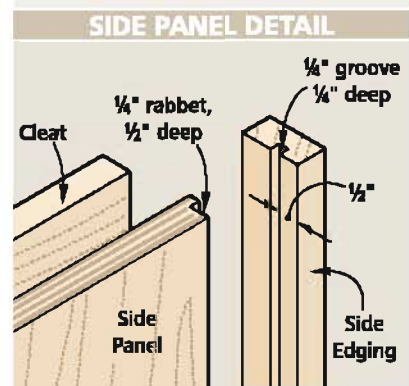
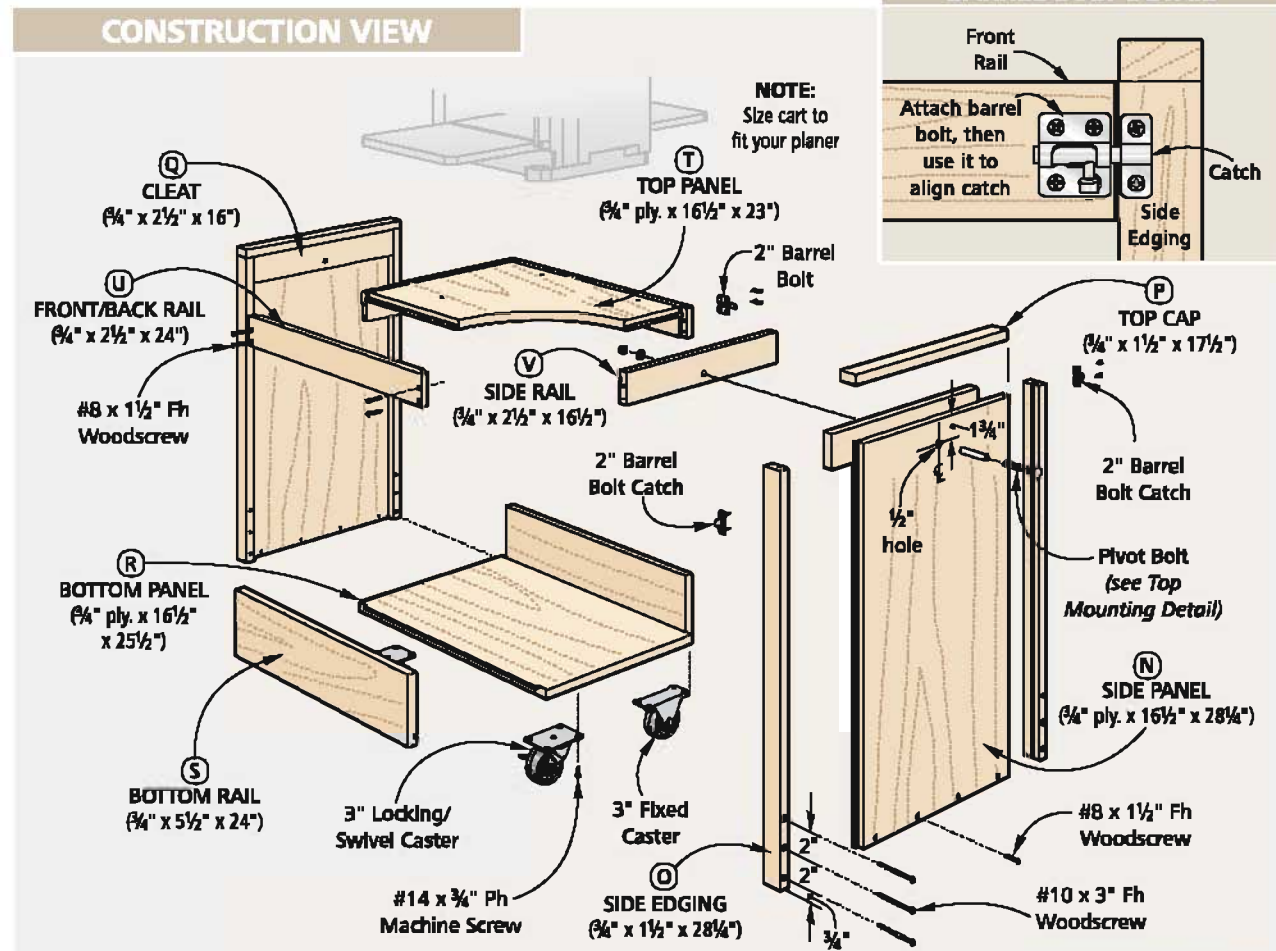
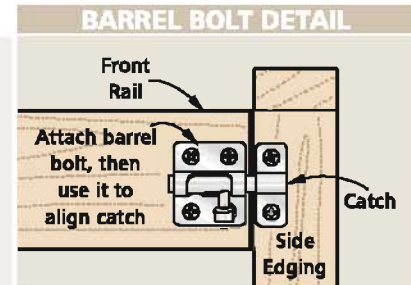
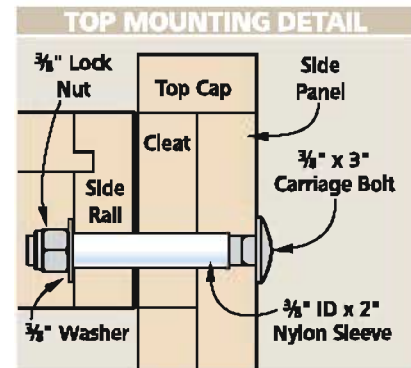
Add the Bottom — With the side assemblies complete, turn your attention to the bottom of the cart. It's a U-shaped assembly that consists of a plywood bottom panel (R) and two

For smooth operation, all the holes, on both sides of the cart, must align. To do that, clamp the top in position, carefully lay out the hole locations, and then drill all the holes.

Install Barrel Bolts— Although the top is intended to rotate, you also have to be able to “lock” it in place. That’s accomplished by mounting a barrel bolt to the front edge of the flip-top (*Barrel Bolt Detail*). The bolt slides

into a catch attached to the side edging. You’ll need to attach a second catch on the other side for when the planer is upside down. Note: You’ll have to buy two barrel bolts (even though you only use one) because catches aren’t available separately.

Final Details — All that’s left is to mount the casters and the planer. Position the planer so its weight is balanced on the top. Then bolt it in place.



MATERIALS LIST



MATERIAL LIST				
Part		Qty	Size	Material
PLANER CART				
N	SIDE PANELS	2	¾" x 16½" x 28¾"	Baltic Birch Plywo
O	SIDE EDGING	4	¾" x 1½" x 28¾"	Maple
P	TOP CAPS	2	¾" x 1½" x 17½"	Maple
Q	CLEATS	2	¾" x 2½" x 16"	Maple
R	BOTTOM PANEL	1	¾" x 16½" x 25½"	Baltic Birch Plywo
S	BOTTOM RAILS	2	¾" x 5½" x 24"	Maple
T	TOP PANEL	1	¾" x 16½" x 23"	Baltic Birch Plywo
U	FRONT/BACK RAILS	2	¾" x 2½" x 24"	Maple
V	SIDE RAILS	2	¾" x 2½" x 16½"	Maple

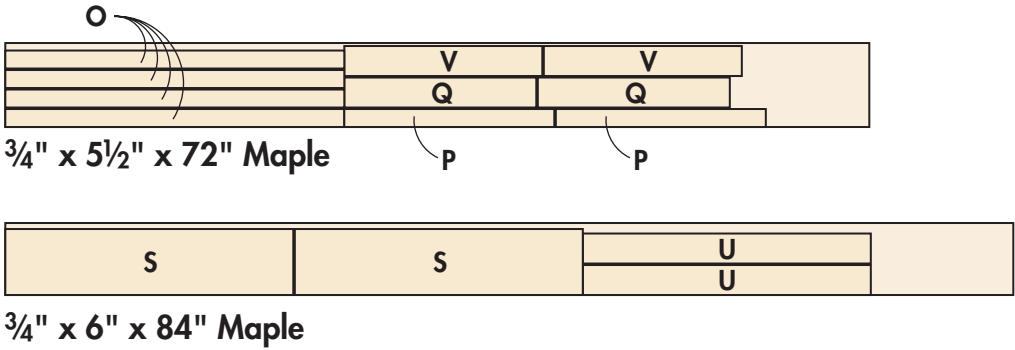
HARDWARE & PRE-ASSEMBLED ITEMS:

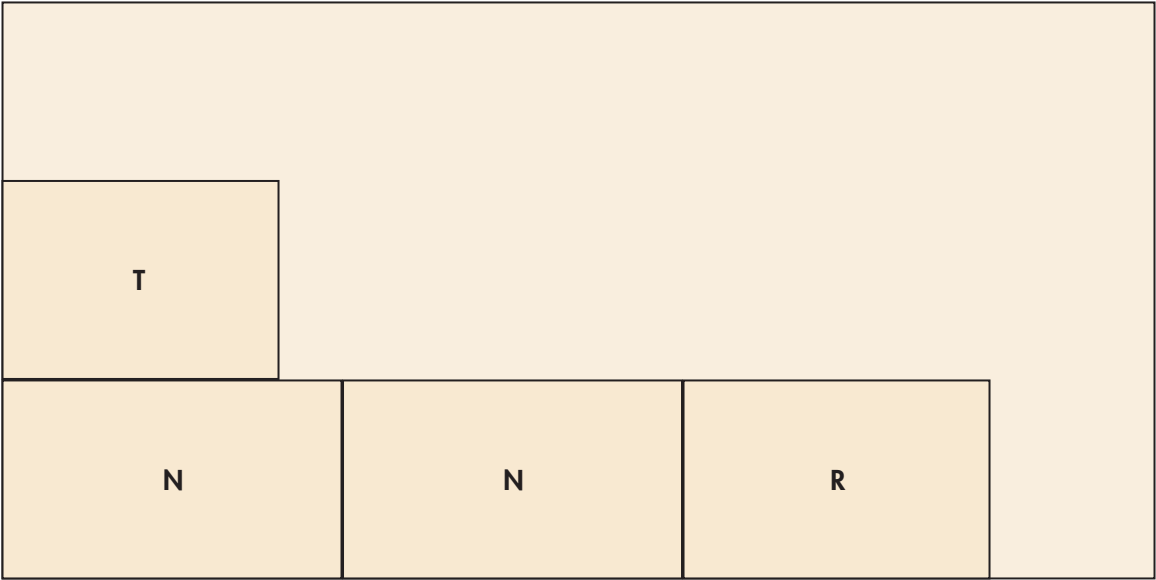
- (16) #8 x 1½" Fh Woodscrews
- (12) #10 x 3" Fh Screws
- (2) ¾" Carriage Bolts, 3" long
- (2) ¾" ID Nylon Sleeves, 2" long
- (2) ¾" Washers
- (2) ¾" Nuts
- (2) 2" Barrel Bolts*
- (2) 3" Swivel-Locking Casters*
- (2) 3" Fixed Casters*

** (Item available at KregTools.com or 800-447-8638)

* (Items available at Lowe's stores. To find a store in your area, visit Lowe.com, or call 800-445-6937)

CUTTING DIAGRAM





3/4" x 48" x 96" Maple Plywood



The bin's sturdy construction allows you to roll it around easily, yet it's still light-weight enough to pick up and empty.

Pull-Out Cutoff Bin

Regardless of the many space-saving tips employed in this shop, they won't make it more efficient if scrap pieces litter the floor and benchtop.

To keep the shop neat and tidy, we built this roll-out bin to fit under the miter saw. It holds cutoffs from the miter saw and table saw. And it collects dust and chips from the miter saw, which is one of those tools that seems to defy dust collection.

This bin is designed with two things in mind. First, it has to be sturdy enough to hold a heavy load. And second, it has to be light enough that you can empty it easily.

To reduce the weight of the bin, the sides are made from lightweight $\frac{1}{4}$ " Baltic birch plywood (*Construction View, below*). For strength, we used $\frac{3}{4}$ " plywood panels for the front and back panels, and then rabbeted them to hold the sides and bottom. Gluing and screwing these parts together creates a sturdy bin that will stand up to years of use.

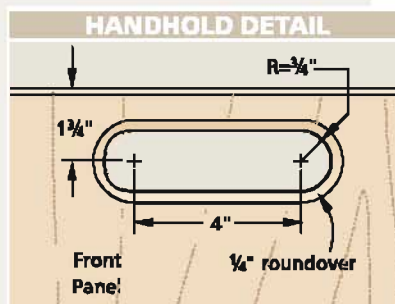
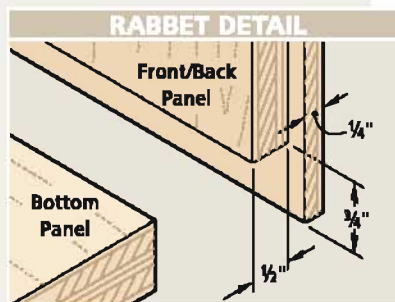
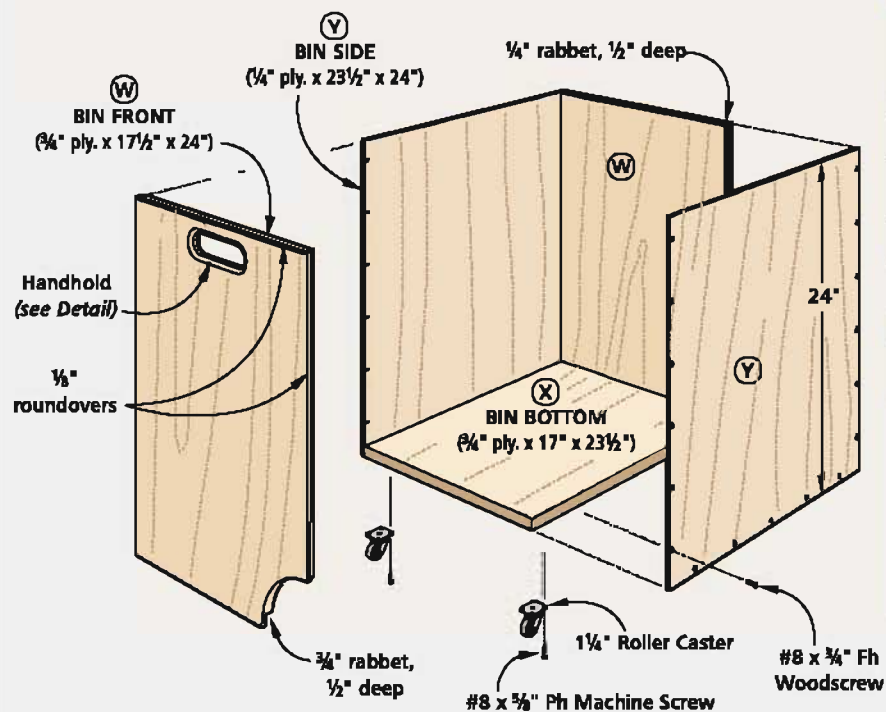
Sizing the Bin—You'll want to make the bin about $1\frac{1}{2}$ " narrower than its opening to make it easy to roll in and out. As for the depth of the bin, it matches the depth of the lower cabinets (24"). Finally, the bin is about 8" shorter than the height of the opening so you can toss in scraps. It also allows room for dust "baffles" that get added later.

Bin Basics—This bin has such a simple, straightforward design that you can cut all the parts to size in minutes. Cut the front, back (W), and bottom (X) from $\frac{3}{4}$ " plywood. Then cut the $\frac{1}{4}$ " plywood sides (Y) to size.

Ready for Rabbets—Before you can turn that stack of parts into a bin, you'll need to cut the rabbet joints in the front and back panels. There are two sizes of rabbets. A narrow rabbet in each edge accepts the sides of the bin (*Rabbet Detail*). And a wide rabbet in the bottom edge holds the bin bottom.

You can cut both rabbets with a $\frac{3}{4}$ " dado blade mounted in the table saw. This requires attaching an auxiliary

CONSTRUCTION VIEW



fence to your rip fence. For the narrow rabbet, "bury" a portion of the dado blade in the auxiliary fence so that only 1/4" is exposed. Then cut the rabbets, making a single pass for each one.

As for the wide dado in the bottom edge of the front and back panels, all that's needed is to move the fence away from the blade until the entire 3/4" width of the blade is exposed. Here again, you can cut these rabbets in a single pass.

Make the Handhold—The last step before assembling the bin is to cut an opening for a handhold in the front panel. After laying out the handhold, drill holes to form the ends of the opening with a 1 1/2" Forstner bit. Then use a jig saw to cut between the holes. A little filing and sanding will clean up any rough edges that are left. Then to create a comfortable grip, round the edges, inside and out, with a handheld router and a 1/4" roundover bit.

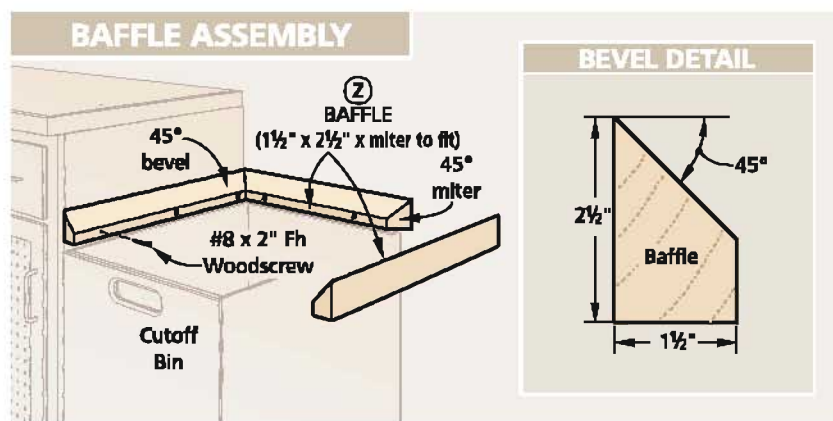
Assemble the Bin—Now you can glue and screw the bin together.

Then finish up by screwing casters to the bottom of the bin.

When you roll the bin into its opening, you'll notice a generous amount of space between the bin and the lower cabinets. That's the clearance you planned in at the beginning of this project. That space makes it easy to park the bin, but it allows dust and chips from the miter saw to fall down around the bin.

Baffles—That's where the baffles (Z) come in. These are scrap pieces of wood with a bevel on the top edge that funnels dust into the bin. To make the baffles, rip a 45° bevel on a long 2x4 (*Bevel Detail*). Then miter the baffles to length, and screw them in place. ⁷[Baffle](#)

—Written by Wyatt Myers, project designed by James R. Downing, illustrated by Erich Lage



MATERIAL LIST

Part	Qty	Size	Material	
PEGBOARD PANELS & END ASSEMBLIES				
A	PEGBOARD PANELS	6	1/4" x cut to fit	Perforated Hardboard
B	END PANELS	2	3/4" x 23" x 34 1/2"	Baltic Birch Plywood
C	SIDE FRAMES	4	3/4" x 3" x 34 1/2"	Maple
D	TOP/BTM FRAMES	4	3/4" x 2 1/4" x 22 1/2"	Maple
BENCHTOPS, SHELVES, & FENCE EXTENSIONS				
E	BENCHTOPS	4	3/4" x 24" x 49"	MDF
F	FRONT EDGING	2	3/4" x 1 1/2" x 50 1/2"	Maple
G	END EDGING	4	3/4" x 1 1/2" x 24 3/4"	Maple
H	FENCE FACES	2	3/4" x 2 1/4" x 50 1/2"	Maple
I	FENCE BASES	2	3/4" x 2 1/2" x 50 1/2"	Maple
J	SAW SHELF	1	3/4" x 10" x 19"	MDF
K	SHELF EDGING	2	3/4" x 2" x 19"	Maple
L	UPPER SHELVES	2	3/4" x 10" x 23 1/2"	MDF
M	SHELF EDGING	4	3/4" x 2" x 23 1/2"	Maple
PLANER CART				
N	SIDE PANELS	2	3/4" x 16 1/2" x 28 1/4"	Baltic Birch Plywood
O	SIDE EDGING	4	3/4" x 1 1/2" x 28 1/4"	Maple
P	TOP CAPS	2	3/4" x 1 1/2" x 17 1/2"	Maple
Q	CLEATS	2	3/4" x 2 1/2" x 16"	Maple
R	BOTTOM PANEL	1	3/4" x 16 1/2" x 25 1/2"	Baltic Birch Plywood
S	BOTTOM RAILS	2	3/4" x 5 1/2" x 24"	Maple
T	TOP PANEL	1	3/4" x 16 1/2" x 23"	Baltic Birch Plywood
U	FRONT/BACK RAILS	2	3/4" x 2 1/2" x 24"	Maple
V	SIDE RAILS	2	3/4" x 2 1/2" x 16 1/2"	Maple

Part	Qty	Size	Material	
CUTOFF BIN				
W	BIN FRONT/BACK	2	3/4" x 17 1/2" x 24"	Baltic Birch Plywood
X	BIN BOTTOM	1	3/4" x 17" x 23 1/2"	Baltic Birch Plywood
Y	BIN SIDES	2	1/4" x 23 1/2" x 24"	Baltic Birch Plywood
Z	DUST BAFFLE	3	1 1/2" x 2 1/2" x cut to fit	Pine

HARDWARE & PRE-ASSEMBLED ITEMS:

- (6) Continental Birch Cabinets* - Four 24" Uppers, One 18" Lower, One 12" Lower
- (32) #8 x 1 1/2" Fh Woodscrews
- (12) 1 1/16" Leveling Furniture Glides*
- (8) 3" Chrome Wire Door Pulls*
- (10) #8 x 1 1/4" Fh Woodscrews
- (1) Kreg Precision Measuring Systems Kit (#KMS8000)**
- (6) 1/4" Threaded Inserts
- (8) 1/4" Washers
- (6) 1 1/4" Star Knobs w/ 1/4" x 1 1/2" studs
- (62) #10 x 3" Fh Screws
- (2) 3/8" Carriage Bolts, 3" long
- (2) 3/8" ID Nylon Sleeves, 2" long
- (2) 3/8" Washers
- (2) 3/8" Nuts
- (2) 2" Barrel Bolts*
- (2) 3" Swivel-Locking Casters*
- (2) 3" Fixed Casters*
- (16) #14 x 3/4" Ph Machine Screws
- (34) #8 x 3/4" Fh Woodscrews
- (4) 1 1/4" Roller Casters*
- (16) #8 x 5/8" Ph Machine Screws

*(Items available at Lowe's stores. To find a store in your area, visit Lowe.com, or call 800-445-6937)

** (Item available at KregTools.com or 800-447-8638)

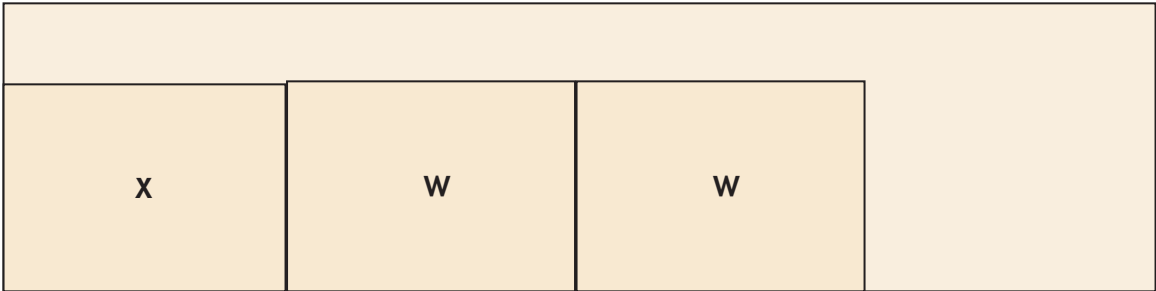
MATERIALS LIST



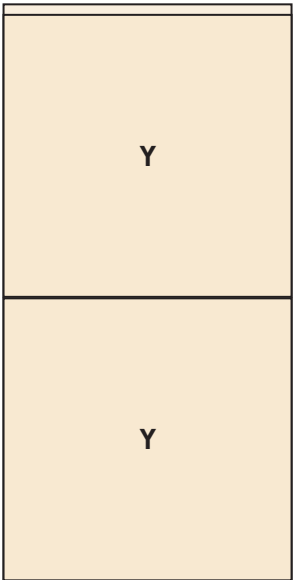
MATERIAL LIST				
Part		Qty	Size	Material
CUTOFF BIN				
W	BIN FRONT/BACK	2	¾" x 17½" x 24"	Baltic Birch Plywood
X	BIN BOTTOM	1	¾" x 17" x 23½"	Baltic Birch Plywood
Y	BIN SIDES	2	¼" x 23½" x 24"	Baltic Birch Plywood
Z	DUST BAFFLE	3	1½" x 2½" x cut to fit	Pine

- HARDWARE & PRE-ASSEMBLED ITEMS:**
- (4) 1¼" Roller Casters*
 - (34) #8 x ¾" Fh Woodscrews
- * (Items available at Lowe's stores. To find a store in your area, visit Lowe's.com, or call 800-445-6937)

CUTTING DIAGRAM



¾" x 24" x 96" Maple Plywood



¼" x 48" x 24" Maple Plywood

Kitchen Counter

RAIL & TILE

UPGRADE



A flavorless kitchen doesn't necessarily require a whole new recipe. Spice up the kitchen you have with this tasteful plate rail and backsplash. It's the perfect garnish to an existing post-formed countertop.



If you've lost your taste for your dull, "post-formed" kitchen countertop, you're not alone. This type of countertop, which is characterized by a built-in backsplash and drip edge, has been standard issue in new and remodeled kitchens for years, and for good reason. They're inexpensive, have an all-in-one design that makes them easy to install, and the plastic laminate surface is almost indestructible. The drawback is that they are typically quite bland.

But replacing a post-formed countertop isn't the only way to breathe new life into your kitchen. Just compare the *Before* and *After* photos of this kitchen, and you'll see how it was resuscitated with a new coat of paint and the installation of this wood plate rail and tile backsplash.

The combination plate rail/backsplash can easily be adapted to fit your kitchen. Just use the same wood for the plate rail that your cabinets are made of (oak in my case), and be creative

in selecting the backsplash material. (I used one row of square, "tumbled" tiles with an accent row of rectangular tiles imprinted with leaf silhouettes.)

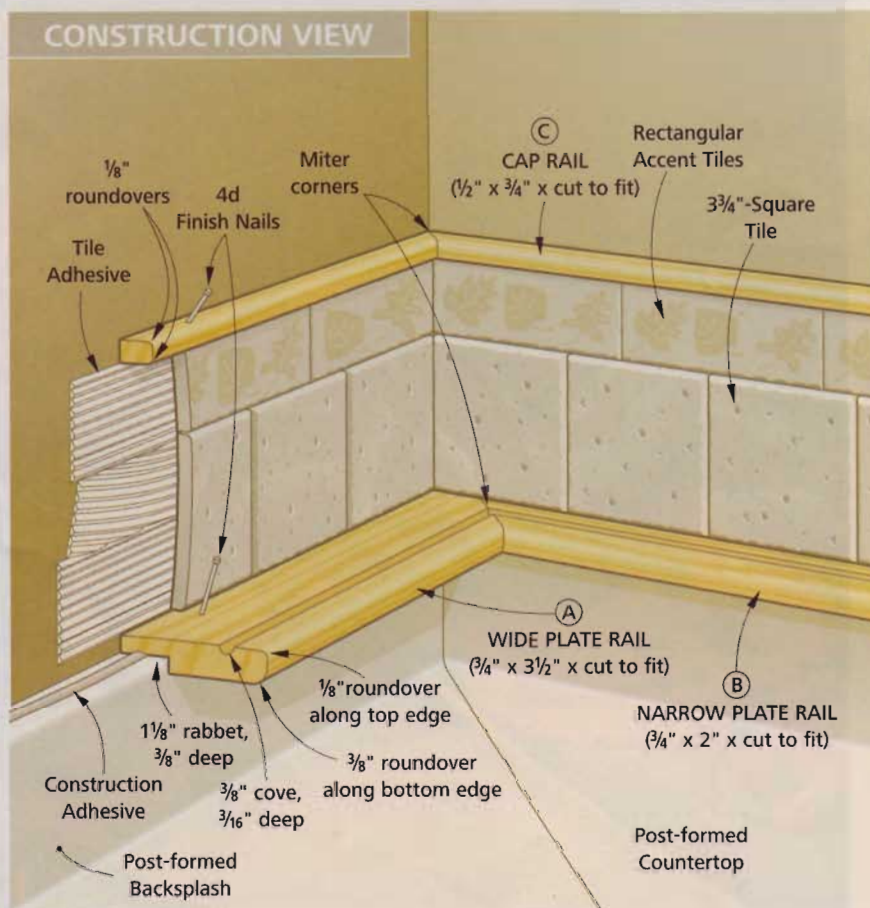
And don't let the dramatic impact of the project fool you; you should be able to complete this kitchen counter update in about a weekend and only have to order out for one meal.

BEFORE

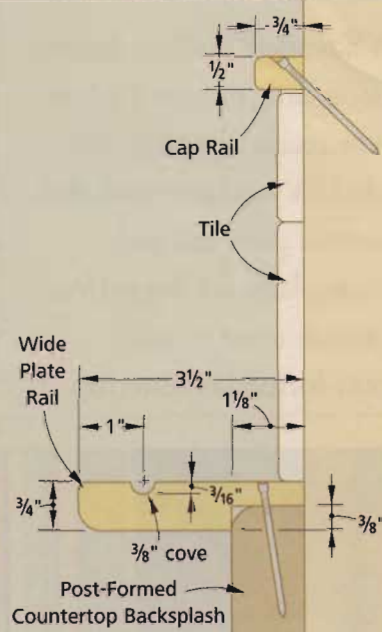


Although completely functional, this outdated post-formed countertop made for a bland kitchen.

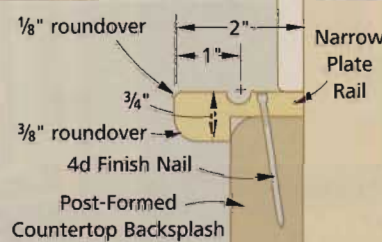
CONSTRUCTION VIEW



FULL SECTION DETAIL



NARROW RAIL DETAIL



BUILD & INSTALL PLATE RAIL

This kitchen counter update uses some very basic ingredients: a plate rail made of $\frac{3}{4}$ "-thick oak, two rows of tile to make the backsplash, and then a piece of $\frac{1}{2}$ "-thick oak for the cap rail (*Illustration, above*).

However, if you look closely, you'll see that I made the plate rail in two different widths. I had to do this in my kitchen because I needed a narrower plate rail to fit behind the faucet. Depending on your space, you may be able to get away with making all of your plate rail the same width.

Make Extra-Long Pieces — The first step in making the plate rails (A, B) and the cap rail (C) is to determine the lengths you need. This is dictated by the length of your countertops and whether there's a window or anything else on the wall that will interrupt the run of the cap rail. So you'll want to get some measurements before heading to the shop.

Once you know the lengths you'll need, you can cut the plate rails and cap rail to size. I highly recommend that you cut the pieces at least a foot longer than you need. This extra length will come in handy later when you're trying to fit the tricky miter joints together.

Once your pieces are cut to rough length and ripped to width, you're ready to rout a few details in them.

First, you need to rout a groove in the plate rails for plates to nest in. Use a $\frac{3}{8}$ "-radius cove bit for this, and set your router table fence to cut the groove 1" from the front edge of the plate rails.

Next, you can round over some of the edges. In the case of the cap rail, both of the outside edges get routed with a $\frac{1}{8}$ " roundover bit. Then you can use the same router bit to ease the *top edge only* on the plate rails. Now swap that bit for a $\frac{3}{8}$ " roundover bit and soften the bottom edge of the rails.

This slightly larger radius helps down-play the appearance of a thick edge on these pieces.

Backsplash Rabbet — The next step in making the plate rails is to cut a rabbet in the bottom of the rails, along the back edge. This rabbet will allow the rails to hide the curved edge of the post-formed backsplash. It's a wide rabbet, so you'll want to cut it on the table saw using multiple passes.

With that done, you can sand all of the pieces and stain them to match the cabinets. The quickest way to find a matching stain is to take a cabinet door to a local paint store and ask them for help matching the color. This can save a lot of time experimenting with different stain recipes. After staining, you'll also want to apply at least three coats of spar varnish to protect the wood from water damage.



The end of the wide plate rail will have to be notched, so it will clear the adjoining backsplash.

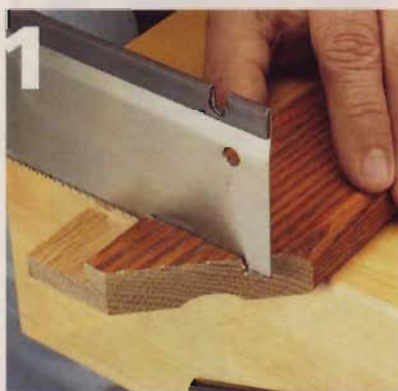
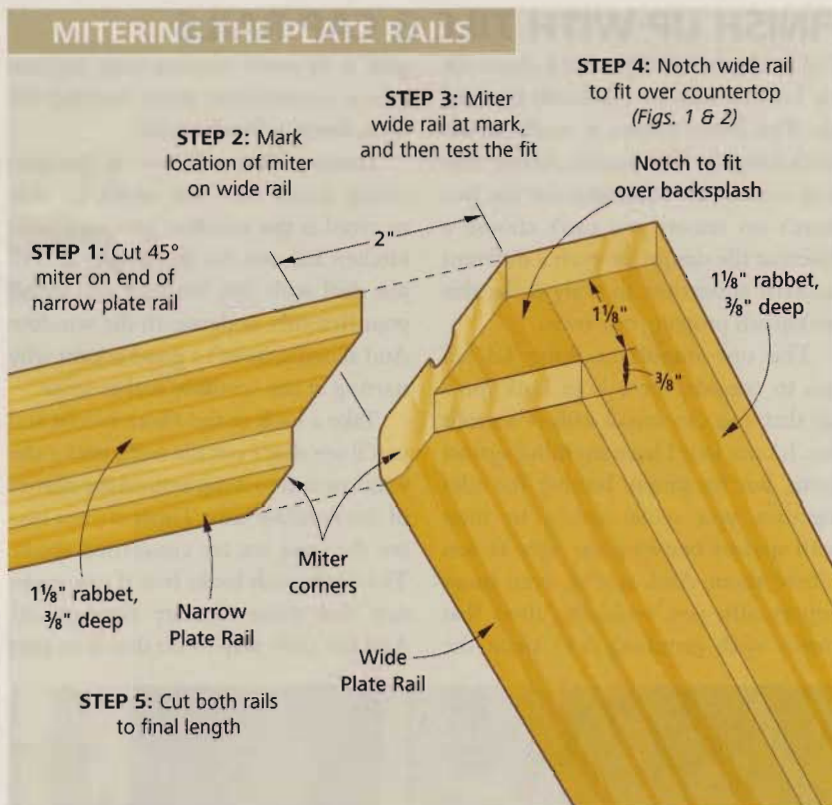
Installing the Rail — With all of the pieces made, you're ready to start installing the plate rail. This is where you're going to run into a couple of small challenges.

The first is the miter joint where the plate rails meet in the corner. Because these rails are different widths, you can't simply miter them and expect a seamless connection. Rather, you'll have to cut a partial miter on the wide plate rail (*Illustration, right*). The dimensions shown in the illustration should get you close, but it may take a bit of fine-tuning to get these pieces to fit perfectly.

After that, you'll have to cut a notch in the underside of the wide plate rail. This needs to be done so the end of this rail will fit over the adjoining post-formed backsplash (*Photo, above*). You can cut this notch easily with a handsaw (*Figs. 1 & 2*).

Now you're ready to attach the rail to the countertop. Start by laying a bead of construction adhesive along the top of the backsplash (*Fig. 3*). Then position the wide rail on the backsplash, and fasten it with finish nails in pre-drilled holes. Countersink the nails, and fill the holes with wood filler (*Fig. 4*).

Installing the narrow rail is essentially the same process, but this time you won't need to notch the underside of the piece at the mating end (or the other end, for that matter). Simply miter it to length, and attach it with construction adhesive and finish nails.



1] First cut across the grain to establish the end of the notch. Cut only as deep as the existing rabbet.



2] Lay the saw blade on the rabbet, so it can serve as a guide as you cut in from the end to complete the notch.



3] Apply a narrow bead of construction adhesive along the top of the backsplash to secure the plate rail.



4] Use a nail set to countersink the finish nails. Then fill the holes with wood filler that matches the stain color.

FINISH UP WITH TILE & CAP RAILS

The backsplash design that I chose for my kitchen uses two different types of tile. The lower course is made of tile that's roughly 3¾" square. Above that is an accent row of rectangular tile. But there's no reason you can't choose a different tile design, or even a different material altogether, to truly make this backsplash project your own.

The one important thing I'd tell you to consider here is to look for a tile that you can install *without* a grout line. It's not that I have anything against grout, but by simply butting the tiles together, you avoid having to mess with spacers between the tiles as you adhere them. And, maybe even more importantly, you avoid the mess that comes with grouting. And since the

goal is to avoid turning your kitchen into a construction zone, keeping the mess down is fundamental.

Center Yourself — A complicating factor that you won't be able to avoid is the window, provided your kitchen has one. So you might as well just deal with this head-on and install your first tiles underneath the window. And actually, there's a good reason why starting at the window makes sense.

Take a look at the *Photo*, below, and you'll see that I cut tile to fit under the window and to wrap around the corner of the window trim. Those corner tiles are the ones we are concerned about. The backsplash looks best if you make sure that these tiles are symmetrical. And the only way to do that is to start

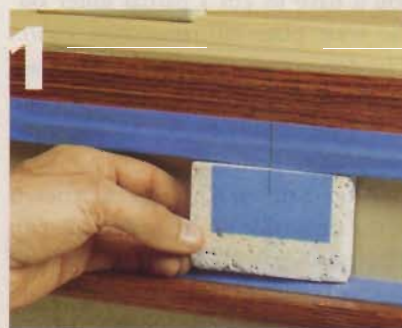
in the center of the window and work your way out.

So begin by measuring between the plate rail and window trim to determine how tall to cut your tile. Then cut the tile and center it underneath the window (*Fig. 1*). Continue to cut and dry-fit tile underneath the window until you reach the corner. By the way, a tile saw like the one I'm using here can be rented for about \$40 a day.

Now you can lay out the corner tiles (*Figs. 2 through 4*). Use the tile saw to cut out the notch (*Fig. 5*) and then a pair of nippers to square up the corner of the cut (*Fig. 6*).

Continue dry-fitting tile along the plate rail until you come to the corner and/or the end of the countertop, where you may once again have to measure and cut a tile to fit.

Dry-fit the tile along both walls. And do this for both courses of tile if, like me, you're using two. This way, you can have all your tile cut and ready to go before applying tile adhesive to the wall.



1] Align the center of the first tile with the center of the window trim. Masking tape makes the lines easier to see.



5] Now go to the tile saw, and cut the notch in the tile to fit around the corner of the window.

Apply Adhesive — Remove the dry-fit tiles, and set them aside for now. Then, if you haven't already done so, mask the window trim and plate rail with painter's tape to avoid getting any tile adhesive on it.

Before you start spreading the adhesive, lay out a horizontal line on the wall that represents the top of the tile row. This will show you how much area to cover with the adhesive.

To apply the adhesive, place a dollop of it on the wall, and spread it evenly with a notched trowel (Fig. 7). Leave the adhesive below the pencil line by about $\frac{1}{4}$ ". This will prevent adhesive from squeezing out above the tile line and causing problems when it's time to install the cap piece.

After applying adhesive to one wall, place the bottom row of tiles first. Press each tile firmly into the adhesive, giving it a slight twist to ensure complete coverage on the back of the tile. Then follow the same press-and-twist procedure to add the top course.

Cap Piece — After allowing the adhesive to dry, you can attach the cap piece. This is a simple matter of mitering it to length and then attaching it with finish nails (Fig. 8).

One thing I need to point out is that I had to nail this piece on differently on each wall. Along the wall behind the sink, I toenailed the piece from the top. But along the other wall, the cabinets made it difficult to get a hammer in position above the cap rail, so I had to nail this piece through the edge. In both cases, I was able to make the nail holes disappear by filling them with matching wood putty.

Seal the Tiles — The finishing touch for the backsplash is to protect the tile against staining by applying a sealer. This requires nothing more than brushing on one or two coats, depending on how porous your tile is and what the manufacturer recommends.

After allowing the sealer to cure, you're ready to get creative and display those wine bottles, special dishes, or



Porous tile and the wet conditions in the kitchen mean a couple coats of tile sealer are in order.

whatever else you can find that makes a statement about your kitchen. 

—Written by Bill Link, project designed by James R. Downing, illustrated by Matt Scott



2] To lay out the corner cut, first mark a tile to match the space between the bottom of the window and the plate rail.



3] Now mark the tile to match the remaining space between the adjacent tile and the edge of the window trim.



4] After marking the width of the cut, you'll need to extend this line to meet the other cut line.



6] The tile saw won't be able to cut a perfectly clean corner, so you'll need to square up the corner with hand nippers.



7] Use a notched trowel ($\frac{1}{4}$ " or $\frac{3}{8}$ " should be fine) to spread an even bed of tile adhesive along the walls.



8] After the tile adhesive has dried, miter the cap pieces and nail them in place over the top of the tile.



Garage Door Makeover

Does your garage door look like every other garage door on the street? Turn it into a door of distinction by installing these simple windows made from PVC "lumber."



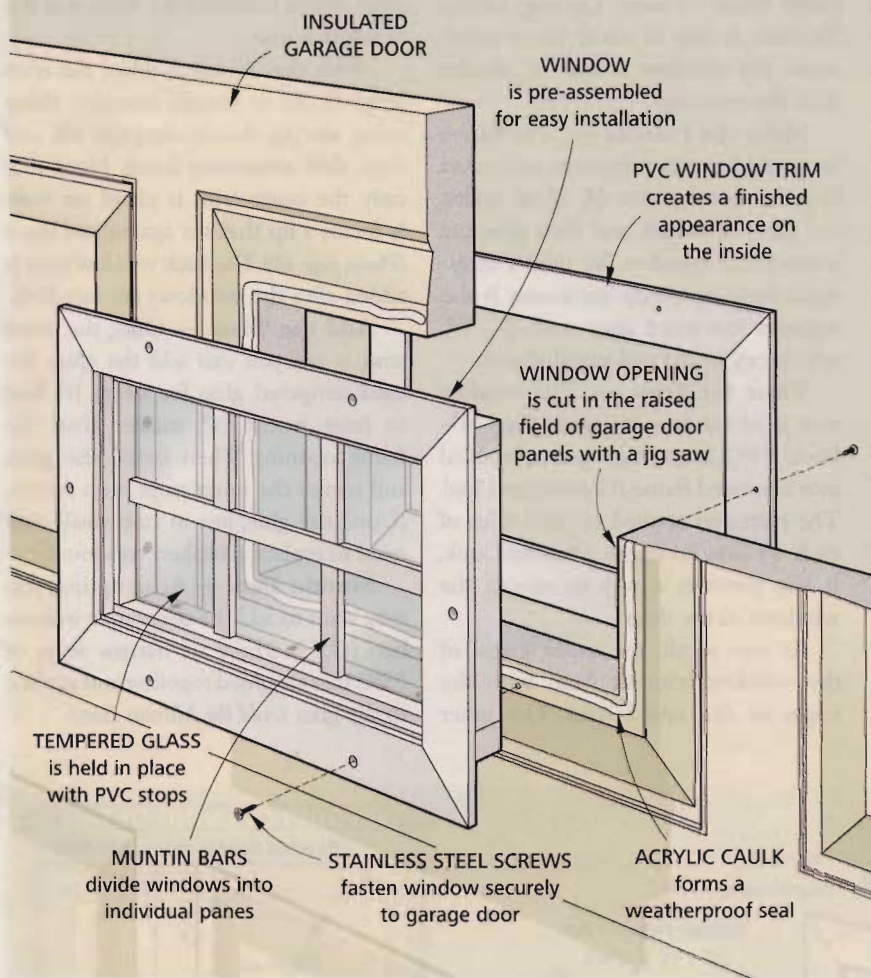
BEFORE

This nondescript, steel-clad garage door (*left*) was a perfect candidate for a facelift. To create a custom look, we cut openings in the door (*above*) and then installed a row of shop-made PVC windows (*right*).

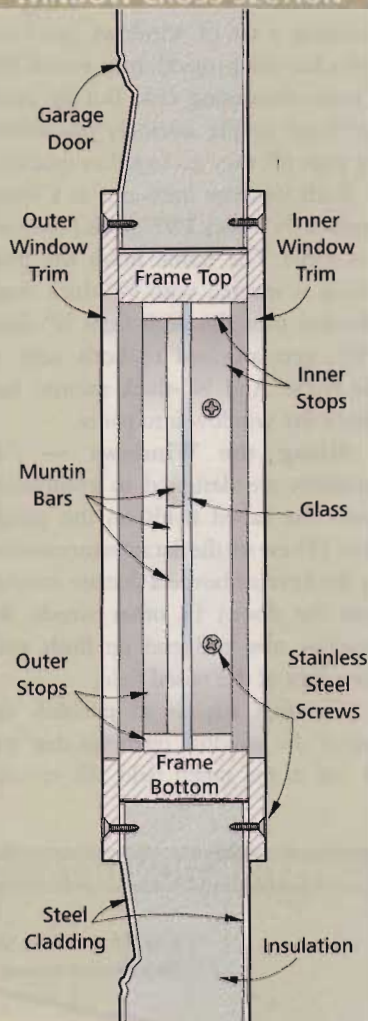


AFTER

CONSTRUCTION DETAILS



WINDOW CROSS-SECTION



Garage doors just seem to get better all the time. They're more lightweight, energy-efficient, and affordable than ever. Even so, some of these newer garage doors could still use a good facelift.

It's not that your standard garage door with its rows of "raised" panels looks bad (*"Before" Photo, page 60*). It's just that, except for color, one door is almost always identical to the next. Needless to say, that doesn't do much to enhance the curb appeal of a home.

Fortunately, there's an easy way to transform a "cookie-cutter" garage door into a one-of-a-kind showpiece. You simply cut a series of openings in the door and install a row of shop-made windows (*"After" Photo*). The windows look terrific. And they let in some welcome natural light.

Now I know, the thought of cutting holes in your garage door may seem a bit intimidating (not to mention building your own windows). But it's actually a very manageable project. A jig saw equipped with a metal-cutting blade makes quick work of cutting the openings. And with the help of three simple assembly jigs, you can build the windows one day and then install them the next.

The PVC Advantage — Aside from their good looks, another benefit of these windows is they don't require any upkeep. That's because they're made of PVC "lumber." This material, which is similar to PVC plumbing pipe, won't rot. And unlike some plastics, it won't "yellow" when exposed to sun.

You'll find that PVC lumber is extremely easy to work with. Simply

cut the pieces to length (no special tools needed), and then glue them together with PVC pipe cement. (See page 66 for more information about working with PVC lumber.)

Low Cost — One last benefit of using PVC lumber for this project is that it's very affordable. All the materials and supplies (including the glass), only cost about \$150.

PROJECT AT A GLANCE

TOOLS REQUIRED:

Table Saw, Jig Saw, Drill, File, Caulk Gun, Screwdriver

COST:

\$150 (for eight windows)

TIME COMMITMENT:

2 Days (1 for assembly;
1 for installation)

BUILDING PVC WINDOWS

Building a set of windows (we built eight for this project), may sound like a time-consuming task. But by using the three simple assembly jigs shown on page 63, they go together quickly.

Each window starts out as a frame made of $\frac{3}{4}$ "-thick PVC stock (*Construction View*). The frame holds the glass, which is secured with $\frac{1}{4}$ "-thick stops. Window trim, also made from $\frac{1}{4}$ "-thick PVC, gets attached to both sides of the frame. And $\frac{1}{4}$ "-thick muntin bars divide the window into panes.

Sizing the Windows — The windows are designed to completely cover the raised fields on the garage door. (These are the flat areas surrounded by the beveled borders that are molded into the door.) In other words, the window *trim* will end up flush with the edges of the raised field.

The first step is to establish the size of the window openings that will be cut in the raised field. We cut our

openings $\frac{3}{4}$ " in from the edges of the raised fields (*Window Opening Detail*). To make it easy to install the window, make the window frames $\frac{1}{8}$ " smaller than the openings.

Make the Frames — The frames are assembled with butt joints and screws. Rip the frame pieces (A, B) to width, cut them to length, and then glue and screw them together. We used a shop-made jig to square up the frames. It also registers the inner glass stops (C, D), which can be cut and installed now.

Time for Trim — The window trim is added next. It's made from 1/4"-thick PVC lattice that gets assembled into a mitered frame (*Construction View*). The trim gets applied to both sides of each window to create a finished look. It also provides a way to mount the windows to the door.

As you recall, the outer edges of the window trim sit flush with the edges of the raised field. The inner

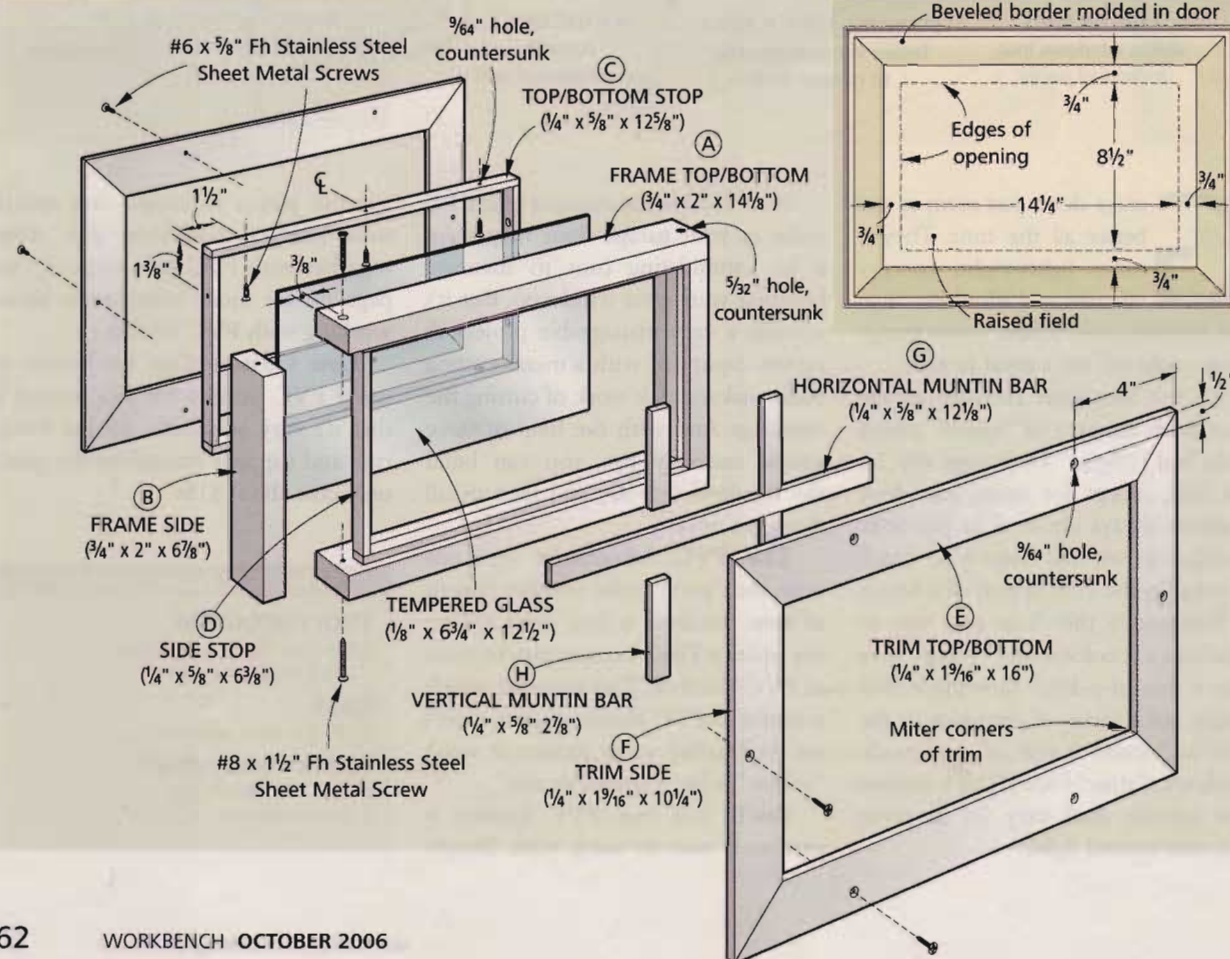
edges are set back 1/8", which creates a small reveal between the trim and the window frame.

With that in mind, miter the trim strips (E, F) to length, assemble them using the jig shown on page 63, and then drill mounting holes. Note that only the outer trim is glued on now. It forms a lip that sits against the door (*Photo, page 60*). The back window trim is added after the windows are installed.

Add the Glass — Once the outer trim is on, you can add the glass. We used tempered glass for safety. It's best to have it cut $\frac{1}{8}$ " smaller than the frame opening. Then install the glass, and secure the inner stops with screws. (Don't use glue, just in case you'd ever need to replace a broken window.)

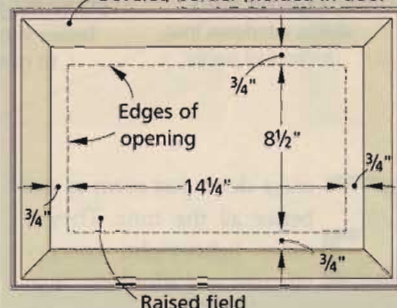
Muntin Bars — As an option, you may want to add the decorative muntin bars (G, H). These are narrow strips of PVC that are glued together and applied to the glass (*Add the Muntin Bars*).

CONSTRUCTION DETAILS



WINDOW OPENING DETAIL

Beveled border molded in door



G

HORIZONTAL MUNTIN BAR
($\frac{1}{4}$ " x $\frac{5}{8}$ " x $12\frac{1}{8}$ ")

TRIM TOP/BOTTOM
(1/4" x 19/16" x 16")

Miter corner
of trim

ASSEMBLE FRAMES & GLASS STOPS >

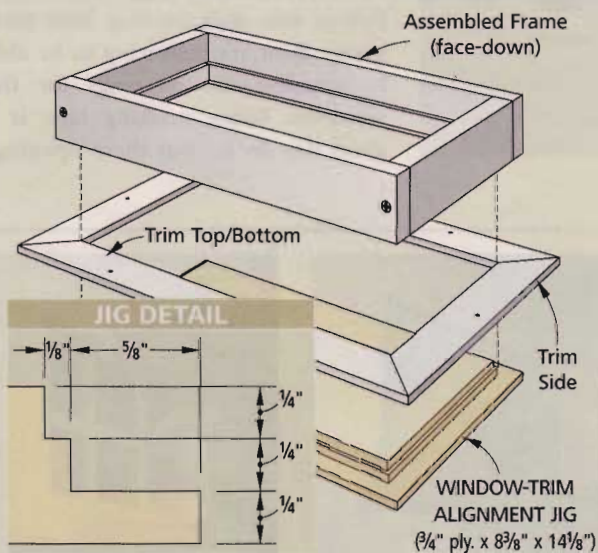
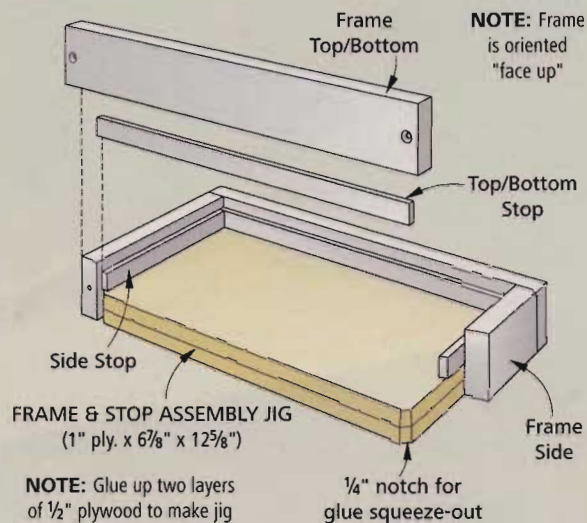
This assembly jig is just a 1"-thick block of plywood (right), but it has two key jobs. First, it squares up the window frames (Fig. 1). And second, it automatically positions the glass stops at the correct height (1"), as shown in Fig. 2. Note: Glue on the outer stops only now. Inner stops are added after you install the glass.



1] Glue and screw the frame pieces around the jig.



2] Set the glass stops on the jig, and glue them in place.



< ATTACH THE WINDOW TRIM

We used a second jig to align the outer trim on the frame. (Here again, the inner trim goes on after you install the windows). This jig is a piece of $\frac{3}{4}$ " plywood with two rabbets cut in each edge (illustrations, left). After gluing up the window trim (Fig. 3), fit it down onto the wide rabbet (Fig. 4). Then fit the frame around the narrow rabbet as you glue it in place.



3] Glue and tape the miter joints on the trim pieces.



4] Set the trim in the jig, and then glue on the frame.

ADD THE MUNTIN BARS >

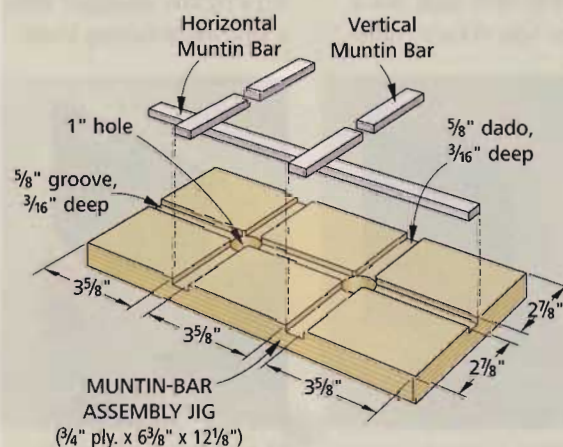
To create a uniform appearance from one window to the next, the spacing of the muntin bars has to be identical. This jig makes that a snap. It's a piece of $\frac{3}{4}$ " plywood with intersecting dadoes and grooves that are cut to fit the muntin bars. After gluing the muntin bars together, remove them from the jig (Fig. 5). Then attach the muntin bars to the glass (Fig. 6).



5] Use the holes to pop the muntin bars out of the jig.



6] Attach the muntin bars to the glass with silicone.





INSTALLATION

The last part of this project is sure to bring out a crowd of neighbors. And chances are, they'll want to know two things: why you're cutting into a perfectly good garage door, and, once the windows are installed, how to go about dressing up their own garage doors the same way.

Essentially, there are two phases to this part of the project. First, you'll be working on the outside of the door as you cut the openings and then insert the windows. After that, a few finishing details on the inside will wrap up the installation.

FROM THE OUTSIDE

Before you start cutting into your garage door, it's reassuring to be able to visualize the openings for the windows. Using masking tape is a good way to lay out these openings

INSTALLING THE WINDOWS



1] After laying out window openings with tape, drill a starter hole in each corner.



2] Now cut the opening using a jig saw equipped with a long metal-cutting blade.



3] File any ragged edges smooth, so the window will sit flat against the door.



4] After inserting the window, lay out the locations of the pilot holes on the door.



5] Drill pilot holes for screws that will be used to fasten the window to the door.



6] Apply a bead of caulk around the opening to form a weatherproof seal.



7] Set the window into the opening, and then press it firmly into place.



8] Secure the window with stainless steel screws. Avoid overtightening them.

(Fig. 1, page 64), which, as you recall, are set in $\frac{3}{4}$ " from the edges of the raised panels. The masking tape makes it easy to see if your openings are level with each other across the top. It also gives you a chance to double-check the size of the openings against the window frames before you commit to cutting them out. (The frames should be slightly smaller, to fit into the opening easily.)

To form the openings, you'll need a jig saw equipped with a metal-cutting blade to cut the steel "skin" of the door. If your garage door has foam insulation and an inner skin, the blade also has to be long enough to cut through that extra thickness.

The first step is to drill a starter hole for the jig saw in each corner of the opening with a $\frac{3}{8}$ " twist bit (Fig. 1). Then insert the saw blade in one hole, and cut to the next, using the tape as a guide (Fig. 2). The blade will leave the edges a little ragged, which could prevent the window from sitting perfectly flat against the door. A bit of work with a file is all it takes to smooth the rough edges (Fig. 3).

After cutting all of the openings, test-fit the windows and make any necessary adjustments. Then transfer the location of the mounting holes in the window trim to the door (Fig. 4).

With the windows in place, it's a good idea to label each one, as well as its respective opening. This way, you'll be able to return each one to its proper opening. Now you can remove the windows, and drill pilot holes in the door (Fig. 5).

Before mounting the windows, there's one more thing to do. To seal out moisture, apply a bead of latex caulk around the opening (Fig. 6) and then press the window into place (Fig. 7). After that it's just a matter of installing the mounting screws (Fig. 8). Use stainless steel screws that won't rust. And just tighten the screws until they're snug — it's easy for them to strip out in the thin steel skin.

THE INSIDE JOB

At this point, there's still a little work to do on the inside of the garage door. As you can see in Figure 9, there are small gaps between the window frame and the garage door. That's where the inner window trim comes in. It covers these gaps and creates a finished appearance.

A handy way to install the inner window trim is to use the same jig you used earlier to align the outer trim. Just as before, set the trim in the jig, and then fit the jig into the window frame like a plug (Fig. 10). Finally, drill pilot holes and screw the trim in place. (There's no need to caulk this trim.)

Final Details — At this point, you can leave the window just as it is. The white pre-painted primer on the PVC looks fine. (You may want to dab some white paint on the screw heads though.)

Or, if you want to add a little texture to match your garage door, just brush on a light coat of paint.

— Written by Kate Busenbarrick, project designed by James R. Downing, illustrated by Matt Scott

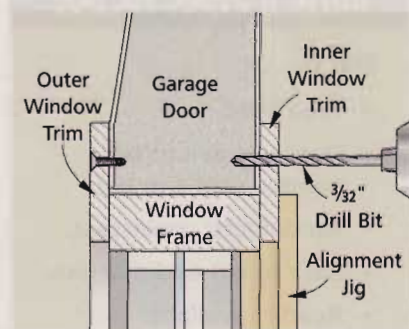
INSIDE FRAMES



9] On the inside of the garage door, the gaps between the window frame and the door get covered by the inner trim.



10] Position the inner window trim with the jig. Then use the mounting holes as a guide when drilling the pilot holes.



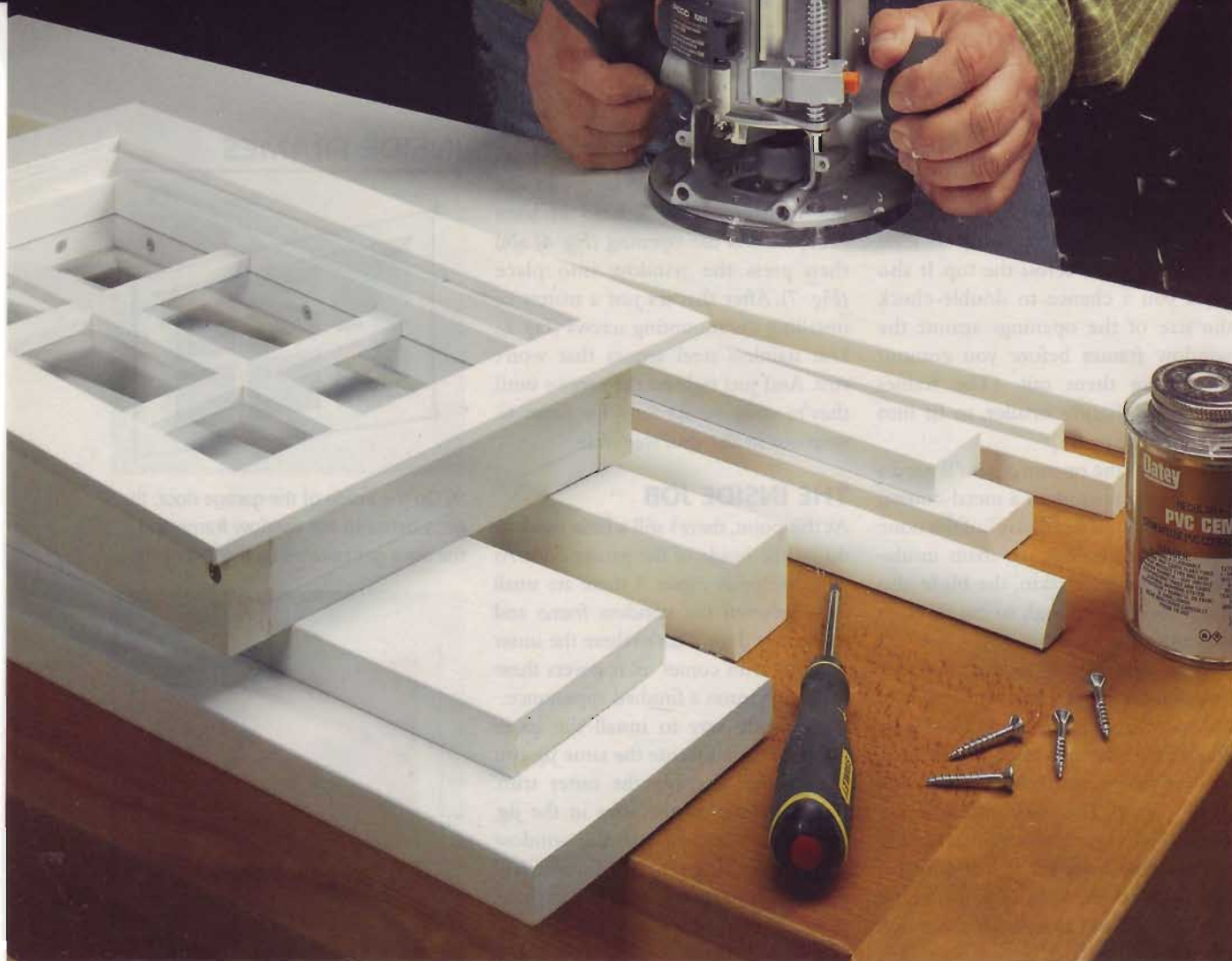
MATERIAL LIST

Part	Qty	Size	Material
A FRAME TOP/BOTTOM	2	$\frac{3}{4}$ " x 2" x 14 $\frac{1}{8}$ "	PVC
B FRAME SIDES	2	$\frac{3}{4}$ " x 2" x 6 $\frac{7}{8}$ "	PVC
C TOP/BOTTOM STOPS	4	$\frac{1}{4}$ " x $\frac{5}{8}$ " x 12 $\frac{5}{8}$ "	PVC
D SIDE STOPS	4	$\frac{1}{4}$ " x $\frac{5}{8}$ " x 6 $\frac{3}{8}$ "	PVC
E TRIM TOPS/BOTTOMS	4	$\frac{1}{4}$ " x 1 $\frac{1}{16}$ " x 16"	PVC
F TRIM SIDES	4	$\frac{1}{4}$ " x $\frac{9}{16}$ " x 10 $\frac{1}{4}$ "	PVC
G MUNTIN BAR (HORIZ.)	1	$\frac{1}{4}$ " x $\frac{5}{8}$ " x 12 $\frac{5}{8}$ "	PVC
H MUNTIN BARS (VERT.)	4	$\frac{1}{4}$ " x $\frac{5}{8}$ " x 2 $\frac{7}{8}$ "	PVC

HARDWARE:

- (22) #6 x $\frac{5}{8}$ " Stainless Steel Sheet Metal Screws
- (4) #8 x 1 $\frac{1}{2}$ " Stainless Steel Sheet Metal Screws
- (1) $\frac{1}{8}$ " x 6 $\frac{3}{4}$ " x 12 $\frac{1}{2}$ " Tempered Glass

NOTE: Material and hardware quantities shown here are for one window



PROS & CONS OF PVC

PROS

- Won't rot.
- Doesn't have to be painted (but can be).
- No defects; consistent.
- Easy to cut and machine.
- Readily available.

CONS

- Not designed for structural use.
- "Plastic" appearance if left unpainted.
- Machined edges require priming and painting.

PVC "Lumber"

Create long-lasting outdoor projects with a material that's as easy to work with as wood, but won't rot like it.

You expect to find PVC (polyvinyl chloride) in the plumbing department. But you may be surprised to learn that PVC is becoming commonplace in the lumber department, as well.

There, you'll find a wide array of exterior moldings, from brickmold to door frames, made from PVC. You'll also see PVC "lumber" in standard dimensional sizes that are commonly used as exterior trim (*Photo, above*).

The promise of PVC products is impressive (*left*). They'll outlast wood, and they're maintenance-free. They resist seasonal movement. And the

pre-primed surfaces won't discolor from exposure to sunlight. That means you can use PVC to build outdoor projects that will look good for years to come. And that's exactly why we chose PVC to build the windows in our garage-door makeover on page 60.

If you've worked with PVC pipe, you know it's brittle and tough to cut cleanly. But PVC lumber is made with "cellular" PVC that has millions of tiny, uniform air bubbles. They make the material more pliable and give it excellent working properties. You'll get excellent results using standard woodworking tools and techniques.

CUTTING PVC

For a woodworker, PVC lumber's easy workability has to rank as one of its top attributes. In fact, it's easier to machine than wood in some ways, thanks to its consistency and lack of defects.

On the Table Saw — Cutting PVC lumber on the table saw is a straightforward process. The "boards" have predictably straight edges that yield accurate rips and crosscuts.

Because PVC lumber is flexible, though, you do need to ensure that you have adequate stock support when working with long pieces (*Photo, right*). As you cut, make sure that you use a steady feed rate, and keep the workpiece moving to avoid gouges or burns on the cut edge.

This flexibility is especially a factor when cutting thin PVC stock. The impact of the blade can cause the workpiece to "chatter," so use a wide push block to keep thin stock pressed against the saw table (*Photo, right*).

An Easy Rout — At first, I was skeptical that PVC lumber could be routed successfully. I figured it would be too soft to hold a crisp profile, or the spinning bit would simply melt the material. But I quickly discovered that PVC doesn't melt and, in fact, routs very well for two reasons.

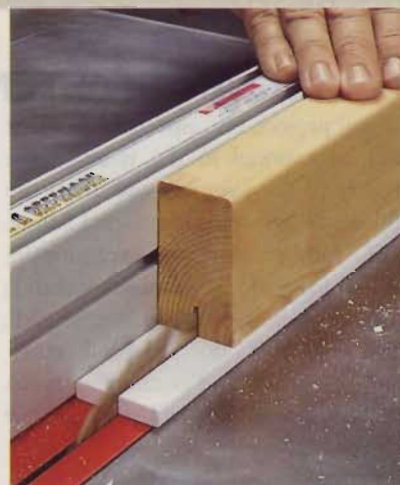
First, PVC has no grain structure like wood, so it routs the same whether routing across or along the length of



PVC lumber cuts easily because it's so "soft." But that softness also makes the material flexible, especially when working with long or thin pieces. Be sure to use outfeed supports to hold long stock flat as you cut (*above*) and wide push blocks to hold thin stock against the saw table (*below*).

a workpiece. Tearout is almost nonexistent. Second, PVC holds crisp edges and profiles amazingly well, and most of them can be routed in just one pass.

To get the best results, feed the workpiece steadily at a moderate rate. Router speed has little effect on cut quality, but routing at full speed produces a lot of dust. If you have a variable-speed router, setting it to about 15,000 rpm produces fine shavings that are much easier to collect. Dust collection is a must, too, because the static-charged shavings will cling to everything.



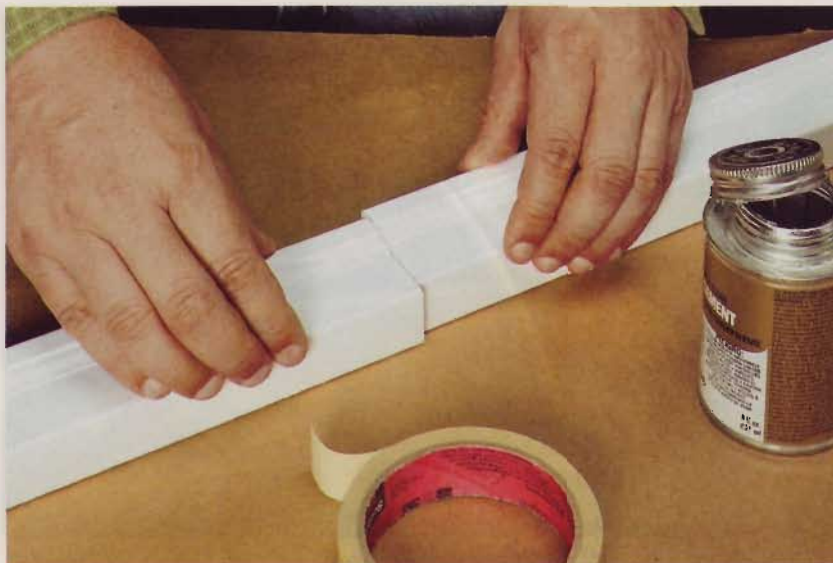
Profiles that might have to be routed in two passes in wood often take only one pass in cellular PVC.

PVC MOLDING: EXPLORING THE OPTIONS

Though PVC can be cut and shaped using woodworking tools, chances are that you won't even need them in order to trim out the exterior (or interior) of your home. That's because PVC molding is available in dozens of profiles. A few examples are shown at right. That makes it easy to get the look you're after, or to match existing wood moldings on your home.

And unlike intricate wood moldings, which are more prone to rot because of their complex shapes, PVC moldings are as maintenance-free as any other PVC product.





For many PVC lumber glue-ups, clamps aren't necessary. Just spread cement on one piece, rub the two together, and then hold them together with firm pressure for about 15 seconds. The bond is strong right away.

GLUING AND FASTENING PVC

In any project, but especially one that will be exposed to the weather, the quality of the assembly can mean the difference between success and failure. PVC lumber glues up exceptionally well; it has good screw-holding ability; and it can be nailed in place, as well. And since PVC doesn't absorb moisture or expand and contract as much as wood, assemblies will stay together for the long haul.

Good Glue-Ups — When you're ready to glue up assemblies made of PVC, standard PVC pipe cement is the adhesive to use. It's available in the plumbing department.

If you've glued up PVC pipe before, you know how the adhesive works. It effectively "welds" the mating pieces together as the adhesive melts into the joint. And, just as when assembling pipe joints, no clamping is required. Simply rub the two pieces together, hold them for a few seconds, and you're done. The joint holds together almost instantly.

This "friction welding" technique also works very well with PVC lumber.

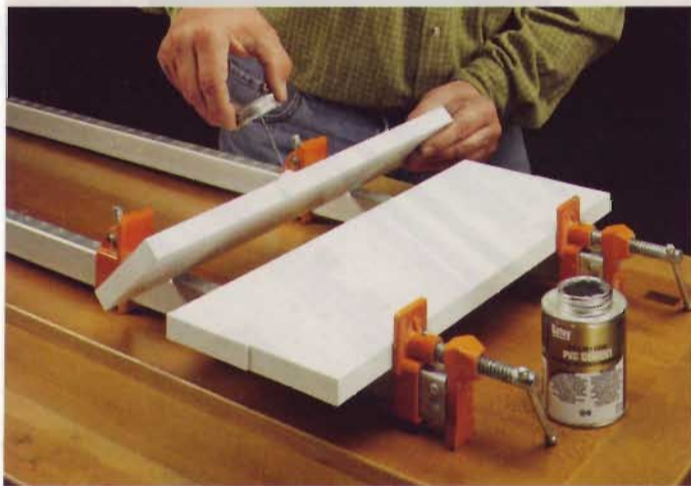
And you can even make strong end-to-end joints that wouldn't hold together at all when gluing wood (*Photo, left*).

Of course, you can clamp up PVC assemblies, too, like the glued-up panel in the *Photo*, below. But there are two things you need to keep in mind. First, the "open time," or the amount of time you have to get the joint assembled, is less than a minute with PVC cement, so a dry-assembly is a must. The good news is if the cement hardens before you can get the joint together, all you have to do is brush on a new coat of cement and then reassemble the joint.

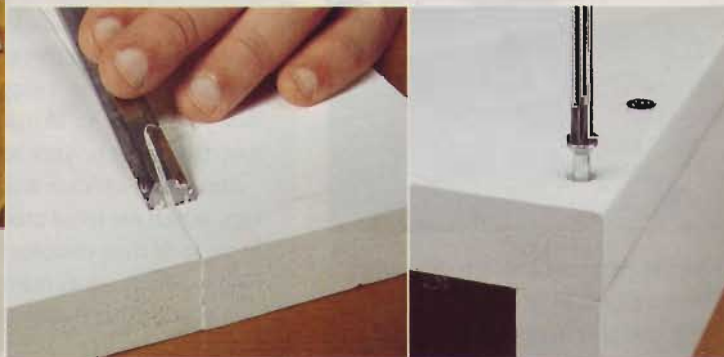
The second consideration is to use much lighter clamping pressure than you would when gluing wood. The cement melts the PVC, meaning too much clamp pressure can actually deform the mating edges. So tighten the clamps only enough to draw the joint closed.

As a rule, you'll want to apply a pretty thick coat of cement. That will result in some squeeze-out, but it can be pared away with a chisel once the glue hardens, usually a few hours after assembly (*Middle Photo, below*).

Success with Screws — Another time when PVC lumber's lack of grain structure pays benefits is when joining pieces with screws. The material offers plenty of holding power no matter what direction you drive the screws in. As usual, you'll need to drill shank holes in the "front" piece, but pilot holes in the mating piece aren't necessary. Countersinks should be shallower than normal, as the screw head will pull into the material as it's tightened (*Right Photo, below*). When you drive in the screws, do it by hand to prevent them from stripping out.



Whether joining PVC lumber with glue (*above*) or screws (*far right*), it goes together easily and holds well. Excess glue is easy to remove (*near right*).



COLOR AND PAINT

The one complaint I've heard about PVC lumber and molding is the way it looks in its raw form. With its lack of grain structure and its uniform texture, PVC definitely has a "plastic" look when you examine it closely that makes it clear it's not wood.

But the solution for giving PVC a more traditional appearance is easy — paint it. And once it's painted, you'll be hard-pressed to tell that the material isn't real wood.

Of course, if you want to leave PVC lumber raw, that's just fine. It comes with a factory-applied coat of white paint that can be left exposed or used as a primer under either oil-based or latex paint. And a few manufacturers offer brickmold and door jambs in tones that match popular window colors (*Photo, right*).

Even if you plan to leave the PVC raw, though, you'll have to prime any edges that have been cut or machined, as well as any areas where you have sanded through the factory-applied paint coat. This is necessary to protect it against exposure to UV light. It also seals the open "pores" to prevent dirt from accumulating in them. Standard white primer matches the factory color well.

Get Your Fill — Before you can paint, though, you'll probably have nail or screw holes to fill, along with any nicks that can't be sanded out. Standard wood fillers, as well as vinyl spackle or painter's putty, can be used with good results (*Photo, above*).



A brushed paint finish makes PVC look like painted wood (*left*). Spray paint gives a glossy appearance (*right*).



Holes and gouges in PVC lumber are easy to fill using either plastic wood filler or vinyl spackling. Overfill the hole, let the filler harden, and then sand it flush with the surrounding surface. Finish up by applying a coat of primer.

Brush or Spray — When it comes time to paint, you can either brush or spray it on, depending on the appearance that you're after. When brushed, PVC lumber looks just like painted wood (*Photo, bottom left*). If you want a super-smooth finish, you can spray on the paint. Again, the uniform texture means you'll get a glassy surface without much sanding or other prep work (*Photo, bottom right*).

Whether you brush or spray, the paint goes on easily. Thanks to the factory base coat, you'll get good coverage with just one or two coats of paint.

Lighter is Better — When looking at information on PVC lumber, I did see one common caution when it comes to painting. Most manufacturers recommend against painting the material with dark colors. Dark colors absorb more heat, which can cause the PVC to expand more than it normally



PVC door jambs and brickmold are offered in a few colors that match common window colors.

would. That could push joints apart or cause adjoining pieces to bind. So remember that you'll want to keep the colors light when choosing your paint scheme. 

— Written by David Stone

FOR MORE INFORMATION

To learn more about PVC molding, see available profiles, or get project ideas, check out the product information in home centers, or contact the following manufacturers:

- Royal Mouldings: 800-368-3117; RoyalMouldings.com
- Azek Trimboards: 877-275-2935; Azek.com



CIRCULAR SAW BUYER'S GUIDE

There's more to circular saws than meets the eye. Use this guide to choose yours carefully, and then learn a few tips for using it to its full potential.

Circular saws get no respect. For some reason, they've been denied the "hero" status of other tools, like routers. Perhaps that's because we tend to think of circular saws as being only for rough cuts and construction work. But in truth, a circular saw can be a precise, versatile tool that can quickly earn its keep in a wide variety of home improvement jobs.

Of course, as with any tool, success hinges on choosing the best model for your purposes, having the right accessories to complement the saw, and having a few tips up your sleeve to really make your saw go the extra mile. We'll cover all of that over the next several pages, beginning with an explanation of why the cost of circular saws varies so widely. Then, we'll offer some guidance on which saws you should be considering for your next purchase.

Price Structure — The circular saws being sold in home centers range in price from \$30 to about \$180. Clearly, these saws are not created equal. Despite being designed for the same basic purpose — cutting lumber — they are really quite different. We've used these differences to group the saws into three categories: consumer saws, pro/advanced DIY saws, and professional saws.

Consumer saws are the most affordable models and are perfect if you only use your saw three or four times a year. On the other hand, if your saw sees action three or four times a month, whether in your DIY projects or at your job, the pro/advanced DIY saws are a better choice. And for the professional carpenters, who use their saws all day every day, the professional saws are up to the task (*Table, next page*).

External Details — The differences on the outside of these saws are hardly "skin deep." In fact, by comparing



CONSUMER

Typical Qualities

Spur gearing, 12- to 13-amp motor, stamped aluminum components, plastic cord, high-speed steel blade, costs \$50 or less.

Best Fit

Occasional user who builds small projects or makes small repairs around the house.

PRO/ADVANCED DIY

Typical Qualities

Helical gearing, 15-amp motors, magnesium and composite components, carbide-tipped blade, costs \$80 to \$120.

Best Fit

Professional tradespeople and frequent DIY users with large projects.

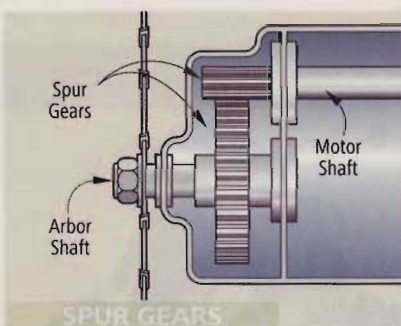
PROFESSIONAL

Typical Qualities

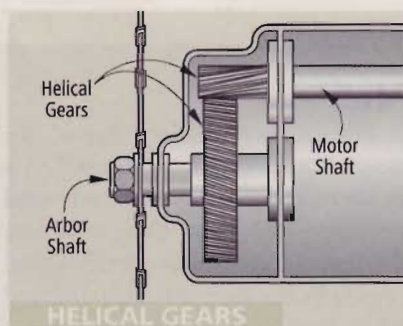
Worm gearing, 15-amp motors, magnesium and composite components, carbide-tipped blade, costs as much as \$180.

Best Fit

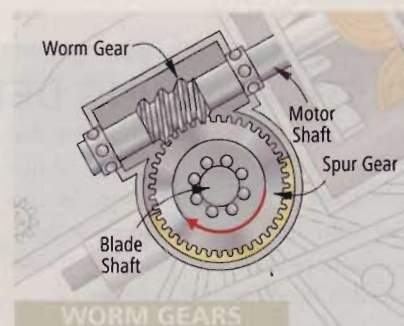
Professional carpenter or other tradesperson who uses their saw all day long for heavy cutting.



SPUR GEARS



HELICAL GEARS



WORM GEARS

their external details, you can largely predict which saws will be the most durable, cut the smoothest, and be the most comfortable to use for long periods of time.

For example, the magnesium shoe and blade guards on a premium saw would be unfazed by a fall that would bend or twist the aluminum parts of a consumer saw. And magnesium weighs a lot less than aluminum, which helps keep the tool weight down. That's a big plus for carpenters who lift and carry their saws all day long.

Blades are another key difference. Generally speaking, the more you pay for a saw, the more likely you are to get a blade with carbide teeth. This means you'll get cleaner cuts and longer blade life, all while putting less strain on the motor.

Handles and cords are two more distinguishing characteristics. Premium-priced saws are more likely to have a

soft overmold built into the handle to prevent blisters and soreness for someone who uses their saw repeatedly.

As for the power cords, the longer, more-flexible rubber cords that are typical on high-end saws are valuable on jobsites where power outlets are scarce and cold temperatures can stiffen the plastic cords of consumer saws.

Internal Differences — Internally, these saws are just as different as they are externally. These differences can be found in the power output of the motor and the quality of the bearings, as well as the gearing (or drive system), that links motor to blade.

In terms of power, most consumer saws draw 12 or 13 amps. This makes them powerful enough to cut 2x4s, plywood, and most other lumber you'll use in projects around your house. Where these saws may falter a bit is when faced with wide, wet boards like pressure-treated 2x10s that you might use in



A right-blade circular saw offers a poor view but excellent tool support throughout the cut. The sightline on a left-blade saw is better, but when the waste falls away, so does the saw.



a deck project. The 15-amp motors of premium saws are much better suited to this type of work.

And even if a consumer saw can power through the occasional cut of a soaking-wet pressure-treated board, the sleeve bearings inside of the tool won't hold up to that kind of abuse day in and day out. Which is why premium saws use needle or ball bearings. These bearings are much better suited to withstand the heat that comes from working a saw to its limits. Additionally, needle bearings and ball bearings are fit to much tighter tolerances, so the more expensive saws are less likely to develop blade wobble or "runout," even after years of use.

Finally, we come to the drive systems. This is perhaps the most meaningful difference among these models, and the one that really defines the three levels.

At the top of the circular saw food chain is the worm drive. This system puts the motor parallel to the blade and uses a deep-mesh worm gear to transfer power from the motor to the blade. This system turns out higher torque but

lower blade speed than "sidewinder" type saws, which makes them perfect for constant, heavy cutting.

"Sidewinder" saws, or saws where the motor is perpendicular to the blade, use either helical or spur gears. The more expensive sidewinders use helical gears, which are more durable, more efficient, and quieter than spur gears.

Blade Left/Blade Right — One final difference to point out about these saws is where the blade sits in relation to the motor. Worm-drive saws are always "blade-left," which means the blade is on the left side of the motor. Sidewinders, on the other hand, are typically "blade-right."

The one exception to this is the Porter-Cable Mag Saw, which is available in both a blade-left and blade-right model (*Photos, left*). There are advantages and disadvantages to both configurations, and choosing one or the other is really a matter of personal preferences and what you're accustomed to using.

Which Saw Suits You? — Bigger motors, stronger gears, and better

DISTINGUISHING DETAILS >>>

Apart from the common qualities that define the three categories of circular saws, there are a handful of unique features that make these saws easier to repair, more accurate, cleaner, and ultimately better suited to their intended audience.



Rather than a built-in cord, Bosch's circular saws have a receptacle that works with any extension cord.

For professional users, there's the Bosch "Quick Connect" feature. This is an alternative to the typical hard-wired power cord on a saw. These saws have a socket that accepts an extension cord (*Fig. A*). Bosch reasoned that a damaged power cord is the most common maintenance issue with circular saws, and this feature makes repairs much easier — simply plug in a new extension cord. This can save a lot of downtime compared to sending the saw out for repair or waiting for a replacement cord to arrive in the mail.

These same Bosch saws also feature a "sky hook." This is a hook built into the top of the saw that flips up so you can hang the saw from a board (*Fig. B*). This was specifically designed for carpenters to hang their saws from rafters.

Consumers will appreciate a couple of unique cutting aids that Skil has added to some of their circular saws.



The "sky hook" on Bosch's saw is the perfect size to hang over a 2x4, so you can keep the saw close.

First is an alignment guide called AccuSight (*Fig. C*). This is a clear plastic lens with two cursors imprinted on it. It extends out from the front of the saw shoe, so you can place the appropriate cursor (one cursor is for square cuts, the other is for beveled

blades: We should all run out and buy the most expensive circular saw we can afford, right? Wrong. The urge to buy more tool than you really need is one that you should resist.

For most DIYers, a \$40 or \$50 saw is the right choice for the occasional small-to medium-size project. And if you use the money you save to buy better blades and a few cutting guides, any of the saws from Skil, Ryobi, or Black & Decker will serve you well. And it's worth noting that these saws often have features that are quite helpful to novice saw users (*Distinguishing Details*, below).

On the other hand, if you're gearing up for major home improvement work that will include a litany of projects where your saw will see action (framing a basement, a room addition, several outdoor projects), then you should consider the \$80 to \$120 models from Bosch, Makita, Porter-Cable, and other premium brands.

As for the very expensive worm-drive saws, these are probably best left to professionals. The only exception might be if you're about to undertake

large outdoor projects and need to cut a lot of pressure-treated lumber. In that case, models from Skil, Ridgid, or Bosch, just to name a few, might be worth the investment.

BLADES

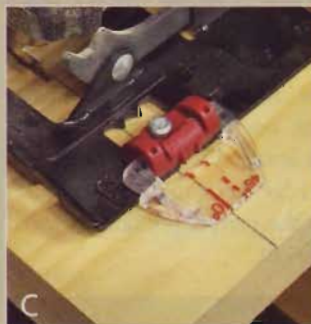
Of course, no matter how much you pay for a circular saw, you can always improve on the saw's "stock" performance by teaming it with some choice accessories. And the most important accessories you can invest in are good blades. You see, most circular saws come standard with one "general purpose" or "combination" blade.

These one-size-fits-all blades may or may not have carbide teeth. But what they all have in common is just enough teeth to make moderately smooth crosscuts, but not so many teeth that you have to slow way down when making a rip cut. You can get by with these blades for cutting 2x material for

framing or other rough work, but for more finished results, such as cutting sheet goods, more specialized blades are worth the cost.

For plywood or OSB, which tend to chip easily when you cut them, a blade like the thin-kerf, 140-tooth model, above right, is a good choice.

To avoid damaging thin veneers or laminate faces, a 60-tooth, carbide-tipped blade like the Ultra-Finishing model, above left, is just the ticket.



Skil offers a couple of alignment guides on various models of their circular saws, including a flip-out, see-through guide and dual-laser cutline indicator.



Wrenchless blade change (above) and a dust port (below) give Porter-Cable's Mag Saw unique value.



cuts) directly on a cutline drawn on the workpiece.

Available on some other Skil models is a dual-laser cutline indicator (Fig. D). This simplifies alignment by allowing you to position the desired cutline between the two lasers.

Finally are the Mag Saws from Porter-Cable. These saws have two features that address the biggest circular saw frustrations faced by DIYers and professionals alike.

First is the wrenchless blade change (Fig. E). This uses a fold-out lever on the blade retaining nut to allow the user to tighten and loosen the nut without the use of a wrench. This means there's no wrench to lose, and it encourages changing blades to match the work.

The Mag Saws also have a built-in dust port on top of the blade housing (Fig. F). This works very well to collect dust when connected to a standard shop-vacuum hose.

CUTTING GUIDES

Cutting a straight line is the most basic, yet somehow most challenging, operation in all of construction. Just consider that on any given jobsite, the guy who demonstrates the ability to make straight cuts with a circular saw is very likely to become the dedicated "cut-man" for his crew. He will take up his post near a set of sawhorses and perform countless cuts to the exact dimensions shouted to him by coworkers.

For the rest of us, who have neither a dedicated cut-man nor the freakish ability to make one dead-on cut after another, there are cutting guides.

The simplest example of a cutting guide is a 12" speed square, which you can pick up for about \$8 at any hardware store or home center (*Photo, above*). By simply holding this square against the edge of a board, the saw shoe now has a straightedge to keep it tracking true.



The end of the auxiliary fence on this ChopShot guide makes aligning the blade with the cutline simple.



The Clamp 'n' Tool Guide is a solid straightedge that sets up easily and adjusts to various sizes.



A common speed square can serve as a quick and effective cutting guide when working with lumber as wide as 6". You can simply hold it with your free hand or clamp it for a more secure guide.

A more sophisticated take on this theory is Lee Valley's ChopShot Saw Guide (*Photo, left*). One unique feature of this guide is the sacrificial wood fence that you attach to it. Your first cut will crop the fence to the perfect length. After that, you can use the fence to align the guide to the desired cutline. Lee Valley offers this in their catalog and online for about \$13 (LeeValley.com or 800-871-8158; item #09A01.01).

Of course, a speed square or a ChopShot are only good for short cuts. For longer cuts, such as ripping dimensional lumber, the old standby edge guide, like the one shown in the *Photo, below*, is still a great solution. Some saws include these edge guides, but for others you'll have to buy them as an optional accessory. They're usually on display near the circular saws and cost less than \$10.

Using an edge guide couldn't be much simpler. It attaches to the saw shoe

with set screws and slides in and out to adjust the width of cut. Then it simply rides along the edge of the workpiece to guide the saw in a straight line.

When working with larger workpieces, like sheet goods, you'll need a bit more reach than these cutting guides can offer. One of the best choices for these times is a Clamp 'n' Tool Guide from Tru-Grip (*Photo, below left*). A 50" version of this guide (which is perfect for cutting across the width of sheet goods) costs about \$40. Shorter versions (36" and 24") are also available (visit TruGrip.com for more information).

To set this guide up quickly, make a hardboard template that matches the distance between the blade and the edge of the saw shoe. Then, to position the guide, align one edge of this template on the cut line, and butt the guide up to the other edge. Lock the guide in place, and it's in the perfect position to make an accurate cut.

Once a standard feature with almost all circular saws, this simple edge guide is now optional. But for the extra control they offer, they're worth the additional expense.



SPECIALTY BLADES

Circular saws are designed for wood cutting, but they can do a lot more when you outfit them with specialty blades.

Metal Cutting — Whether by choice or simply bad luck, if you're a homeowner there's a good chance that one day you'll find yourself needing to cut something metal. It might be aluminum bar stock, or maybe an old wrought-iron railing. Either way, there are blades that can make your circular saw capable of the cut.

The most affordable blade for metal cutting is an abrasive blade. You can pick one of these up for about \$2. But be forewarned: They cut slowly, and they generate a lot of sparks. A better choice would be a steel-bodied blade that's intended for cutting either ferrous metals (the wrought-iron rail) or nonferrous metals (the aluminum bar stock). Blades of this type will cost closer to \$20, but they'll cut quicker, with less strain on you and the saw, and with fewer sparks.

Fiber-Cement Blades — With the growing popularity of fiber-cement siding and fiber-cement backer boards, blade manufacturers have had to develop blades that can cut these materials (*Photo, below left*).

These blades, which can cost as much as \$50, typically have only six carbide teeth with very large gullets. This odd configuration is designed to cut the material quickly while generating as little dust as possible.



Limited cutting of ferrous and nonferrous metals is possible by teaming a powerful circular saw with a special blade.

Masonry Blades — One final operation for which your circular saw can serve limited use is cutting masonry, such as stones or bricks.

Just as with metal-cutting blades, you can choose from a very inexpensive abrasive blade (about \$2) or a more costly diamond-rimmed blade (\$50).

Both of these blades require a measure of patience, though the diamond-rimmed blade cuts much faster and smoother, so it's probably worth the extra cost if you need to make more than one or two cuts.

Lubricate These Blades — One way to get the most out of your expensive, steel-bodied specialty blades is to use a blade lubricant to minimize friction and heat build-up (*Photo, right*).



Use the blade lubricant like a crayon, and "color" the entire blade to help it cut more efficiently.



The right blade and a saw with dust extraction reduce the mess of cutting fiber cement.



An abrasive or diamond-rimmed blade can turn your circ. saw into a masonry-cutting machine.

Super Saws

The best circular saw money can buy, with every specialty blade available and a full complement of accessories, still has its limitations. Most notably, each time you want to cut a different material, you'll have to change the blade. And the limited depth-of-cut means you won't even be able to cut a 4x4 in a single pass.

But we did find three products that defy those limitations.

Evolution Rage — This saw powered through wood, aluminum, and steel with ridiculous ease. Perhaps most remarkable, though, is that the saw creates almost no sparks, even when cutting steel. And the parts are cool to the touch immediately after they are cut.

It was enough to turn our skepticism to curiosity. It clearly works, but how?

Well, according to Michael Fangmann, president of Evolution Power Tools, the blade deserves most of the credit. He explained that a proprietary brazing material and high-quality carbide give the blade its remarkable cutting power. He also pointed to the unique geometry of the teeth. They have anti-kickback limiters that regu-



Born in the steel-cutting industry, the technology that makes the Evolution Rage circular saw so versatile rests largely in the unique construction and design of its proprietary blade.

late how large of a "chip" the blade removes with each tooth.

But don't think you can just mount one of these blades on any saw and get the same results. The Rage blade is limited to 3,500 RPM, which is quite a bit slower than most circular saws run.

The only thing you give up with this saw is the ability to make very fine cuts in wood. And, at just \$160 for the saw with the blade and \$25 for replacement blades, this is an excellent choice for an all-purpose saw if your projects sometimes include demanding materials. Visit EvolutionRage.com or call 866-386-8665 for more information.

Beam Cutters — A circular saw's limited depth of cut (just under 3") becomes a real liability when working on landscaping or fencing projects where cutting 4x4s or 6x6s is a must.

A couple of manufacturers offer solutions that allow you to turn ordinary saws into beam-cutting machines.

First is the Prazi Beam Cutter (Photo, left). This replaces the standard blade with a chainsaw arm and blade. The

kit sells for about \$150, is easy to install, and offers 12" of cutting capacity. Visit PraziUSA.com or call 800-262-0211.

A different take on beam cutting is the Big Foot Saw Adapter kit (\$270). This replaces the standard 7¼" blade with a 10" version. Unlike the Prazi Beam Cutter, the Big Foot kit is a permanent change since you have to alter the saw housing to make it fit. Visit BigFootSaws.com or call 702-565-9954 for more information.

— Written by Bill Link



Despite its intimidating appearance, the Prazi Beam Cutter cuts smoothly and with little user effort.



The Big Foot kit was invented by a carpenter who wanted a saw capable of cutting two 2x4s at one time. It's also great for 4" posts.



5 STEPS TO GETTING LUMBER FLAT, STRAIGHT, & SQUARE

All it takes to turn unruly boards into perfect stock for your next project is three shop tools and a few machining techniques. We'll show you how.

Anyone who buys wood knows that boards are often far from perfect when you pull them off the rack. Even if they've been surfaced, boards are often cupped, twisted, bowed, or simply beat-up looking.

So before you can turn these boards into great-looking projects, you'll need to remove the imperfections and get the faces flat, the edges straight, and all the corners square.

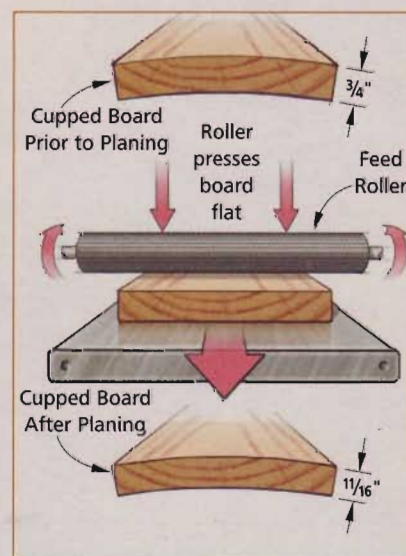
This process is easy, and it works well with dimensional stock (*page 81*) or fine hardwoods. You simply "dress" the faces, edges, and ends to reveal the "good" lumber within (*Photo, below*).

Tools for the Task — Turning raw boards into perfect stock usually requires three tools: a jointer to flatten the first face of the board and straighten one edge, a thickness planer to trim the second face straight and parallel, and a table saw to rip the final edge straight

and crosscut the ends square. The table saw and planer are indispensable, but I'll share a few tricks that will let you get by without a jointer.

The Planer Truth — But before we get started, I want to dispel the myth that you can flatten twisted or cupped boards with a thickness planer. The planer's feed rollers press on the board with enough force to temporarily flatten it. But the board will spring back to its imperfect shape once it exits the planer (*Illustration, below*).

A Breakdown — Before you can dress your boards, you need to cut them into smaller pieces based on your project cutting diagram (*Top Photo, page 79*). They're easier to handle, and don't require as much trimming to make them flat and straight. (To learn more about breaking down boards, download our free article at WorkbenchMagazine.com.)



IMPERFECT IN, IMPERFECT OUT

Feed rollers in a planer push the board flat as it passes through, so any defect like cupping is still there after planing.

STRAIGHT & SQUARE STEP-BY-STEP

After you rough-cut your workpieces, the first step in dressing them is to flatten one face. This step is critical, as this face becomes the "reference" surface for flattening and squaring all the others. This is normally done using a jointer (Fig. 1).

A jointer has rotating knives that sit between two horizontal tables. When you lay a warped or cupped board on the infeed table, only portions of the face touch the table. As you pass the board over the knives, they remove a thin layer of wood from just those portions of the board. The outfeed table supports these newly flattened portions as you complete the pass. By making multiple passes, you can flatten the entire face.

Note: If you don't have a jointer, you can flatten this first face with a planer and a special sled (see page 80).

Plane It Parallel — After flattening the first face, the next step is to make the other face flat and parallel to it. This is done by passing the board through a planer with the face you just jointed against the planer's infeed table (Fig. 2).

Like the jointer, the planer has horizontal knives, but they're suspended above and parallel to the planer table. Each pass through the planer removes just the high spots on the exposed face. Make multiple passes no more than $\frac{1}{32}$ " to $\frac{1}{16}$ " deep until this face is flat.

Establish an Edge — Now that both faces are flat, move back to the jointer to dress one edge of the workpiece (Fig. 3). Hold one face of the workpiece firmly against the jointer fence and make multiple passes to straighten the edge and make it square to the faces.



BOARD BREAKDOWN Imperfect boards can be tough to cut on the table saw, so use a jig saw and circular saw to break them down into oversize workpieces.

Straight Edge, Square Ends — To finish up, rip the last edge parallel to the first using a table saw (Fig. 4). That done, you should have a flat, straight, and square board. All you have to do now is crosscut the ends (Fig. 5).



1] Joint the first face by making multiple shallow passes (removing no more than $\frac{1}{32}$ " per pass) until the face is flat.



2] Place the jointed face against the planer table, and plane until the second face is flat and parallel with the first.



3] Use the jointer to straighten one edge of the workpiece. Press one face against the fence to ensure a square corner.



4] Place the jointed edge against the table saw rip fence, and then rip the final edge parallel to the first.



5] To finish dressing your workpiece, crosscut the ends square. Now it's ready to be made into a project part.

NO JOINTER? NO PROBLEM

If you read through the sequence for dressing boards on page 79, it may appear that you must have a jointer in order to make boards flat, straight, and square. The jointer is used in two of the five steps: flattening the first face and straightening the first edge.

But if you don't have a jointer, there are a couple of tricks that will allow you to perform these two steps using a planer and a table saw.

A PLANE SIMPLE SLED

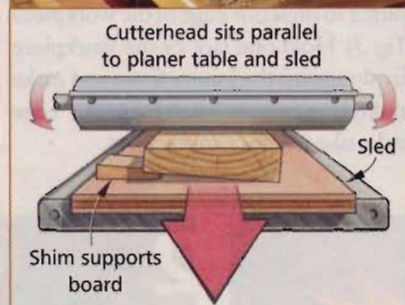
We already know that a thickness planer can press a board against the planer table, temporarily flattening out warped or cupped areas. To prevent this, you need a way to support the board so that the rollers can't push it down.

The way to do that is to place the board on a flat sled, and then "prop up" the high spots, so the rollers can't force the board down as you plane it (Photo, right). That way, the knives will only trim off the high spots on the exposed face of the board (Illustration, right).

Start by cutting a flat piece of $\frac{3}{4}$ "-thick plywood to size for the sled. It should be just a bit narrower than the maximum-width capacity of your planer, and about a foot longer than the longest board you'll need to plane.



1] Rock the board on the sled until you determine where to place the shims, and then slide them in from the ends.



FLATTENING WITH A PLANER

To flatten a warped board with a planer, temporarily attach the board to a sled using shims and hot glue.

What makes the sled work are inexpensive wood shims that are normally used for positioning windows and doors in their openings. You'll also need a hot-glue gun to temporarily adhere the shims to the sled and the board.

Shim It & Stick It — To use the sled, first lay it on your benchtop and then place the board you need to flatten on top of the sled. Now slip shims under the ends to prevent the board from rocking (Fig. 1). As you

insert the shims, get the exposed face of the board as close to parallel with the sled as possible. That way, you'll remove the least amount of wood as you plane the board.

Next, take a look along the edges of the board. If either edge is raised off the sled, you'll need to slip in a shim there, as well (Fig. 2). You don't need to fill the entire raised area with shims. Just add one or two wherever the board needs support.



2] Wherever the edges are raised, slip a shim in place. Make sure the shims don't extend past the edges of the sled.



3] Use hot glue to hold the shims to the sled, and then stick the board to the shims the same way.

Before you can plane the board, you need to secure it and the shims to the sled. If you don't, the force of the feed rollers and the rotating knives can push the board out of position. That's where it's hard to beat a hot-glue gun. The glue sets fast and holds tight but can be easily removed with a chisel or scraper.

To tack the board down, first lift it carefully off the sled, so you don't move the shims. Then tip each shim, place a small drop of hot glue (about the size of a dime) under it, and stick each shim to the sled. Apply hot glue on top of each shim, and press the board down onto it (*Fig. 3, page 80*). It only takes a few seconds for the glue to set.

A Plane & Easy Process — That done, you can set the planer's cutterhead height for the first pass. Note that you'll need to set the cutterhead high enough to accommodate the highest portion of the workpiece plus the thickness of the sled.

When planing, you'll again want to make light cuts — no more than $\frac{1}{32}$ " to $\frac{1}{16}$ " per pass. If the board is really bowed or warped, the feed rollers may lose their grip on it during the first few passes, causing the sled to stop moving. If this happens, gently push the sled forward until the feed rollers grab onto the board again.

Once you've flattened this first face, pop the board off the sled, and pare off any hot glue sticking to it.

From here, it's easy to plane the second face flat and parallel. Just set the planed face against the infeed table (no sled this time), and plane it normally by making multiple shallow passes until the face is flat.

SAW SLED FOR EDGES

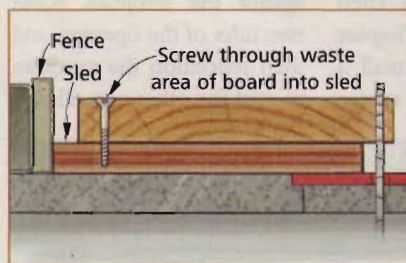
The second sled, which is used on the table saw, is even easier to make. It's just a piece of $\frac{3}{4}$ " plywood about 10" wide and longer than the longest board you'll need to trim.

To use the sled, set your planed board on it, so the board overhangs one edge (*Illustration, below*). Then secure the board by driving screws through waste areas at the ends of the workpiece.

Now butt the sled against the table saw rip fence, and then trim the edge straight. For an exceptionally smooth edge, reposition the fence, and make another pass, shaving $\frac{1}{16}$ " or so off the board (*Photo, below*). Then remove the board from the sled.

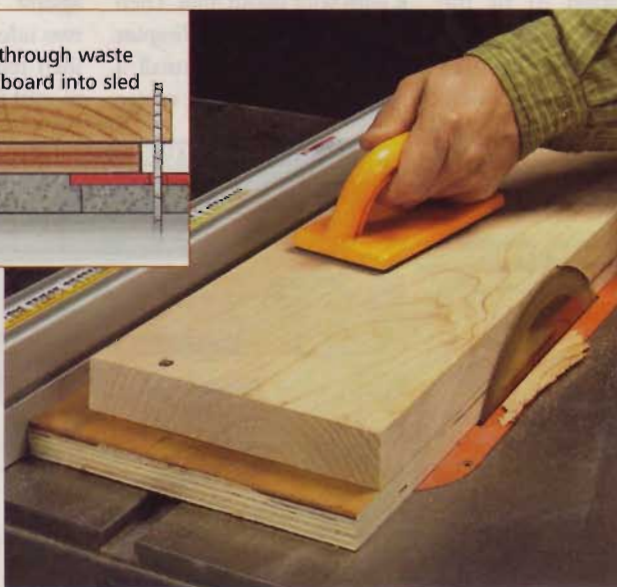
To finish up, place the edge you just cut against the fence, adjust the fence, and rip the final edge parallel. ▀

— Written by David Stone, illustrated by John Hartman



EDGE RIPPING

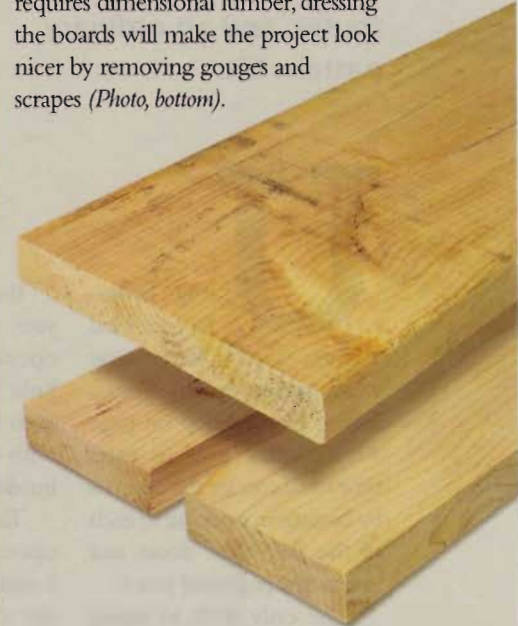
Attaching a board with uneven edges to this ripping sled gives you a straight surface to guide against the fence as you trim one edge straight.



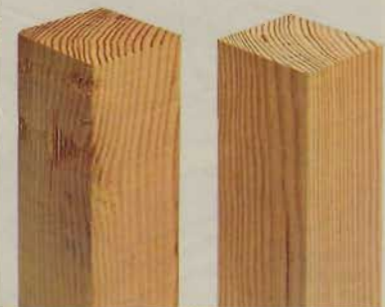
GOOD WOOD WITHIN

You may think dimensional lumber, such as 2x4 stock, is suitable only for construction projects. But if you know how to dress lumber, you can turn those everyday boards into great-looking project stock. It's a great way to get good wood at a bargain price, and it allows you to custom-cut the boards you need from wider stock (*Photo, below*).

And if a project, such as a deck, requires dimensional lumber, dressing the boards will make the project look nicer by removing gouges and scrapes (*Photo, bottom*).



Dimensional lumber is rarely pretty when you buy it, but you can cut bigger boards down to get the stock you need (*above*). Or trim off the chewed-up surfaces to improve the looks of any project that's built with dimensional lumber (*below*).



HOW TO CUSTOMIZE

Cabinet Doors

Turn ordinary slab cabinet doors into paneled doors. All it takes is a jig saw, a router, and an ordinary pattern bit.



Using manufactured cabinets saved a lot of time when setting up the Space-Saving Home Shop on page 40. And that gave us extra time to customize the cabinets by cutting an opening in each of the flat “slab” doors and inserting a pegboard panel.

The only trick to doing this is getting the sides of the opening square and straight. Using a router and a template makes it easy (Photo above).

Before routing, though, you need to lay out the opening. Next, drill a starter hole at each corner, and then cut the rough opening with a jig saw, staying $\frac{1}{8}$ " inside the lines (Photo, right).

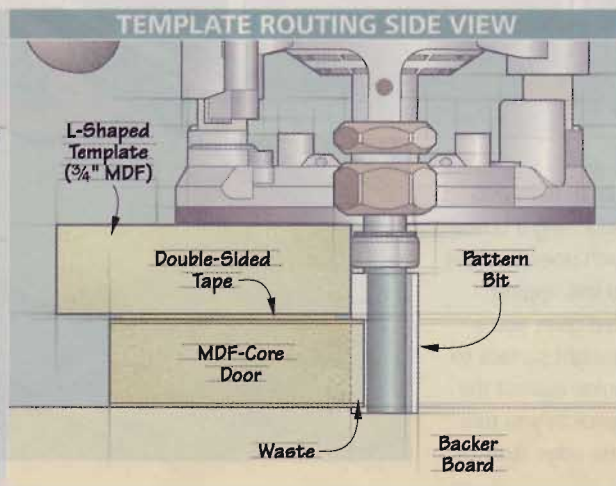
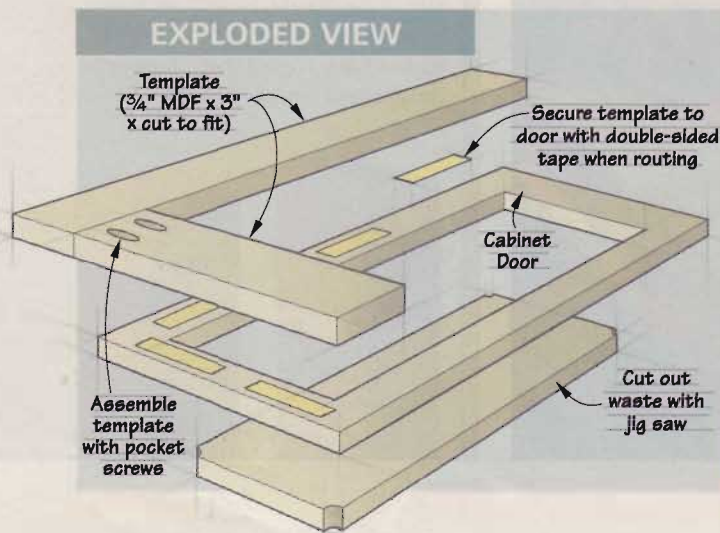
To trim the sides of the opening straight, we used an L-shaped template to guide the router. Made from scrap MDF, it's sized to fit the largest door (Exploded View). That means it can be used on the smaller doors, as well.

Use a jig saw to rough-cut an opening (right), and then rout it to final shape by guiding a pattern bit along an L-shaped template (above).



To use the template, align it with your layout lines. Then tape it to the door (Template Routing Side View). Install a pattern bit in your router,

and set it so the bearing rides against the template. Rout two sides of the opening, and then reposition the template to rout the other two sides.



ROUTER JOINERY BASICS

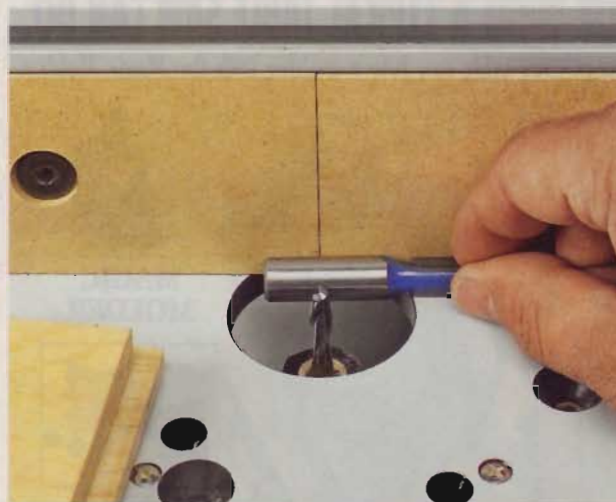
Tongue & Groove

A router table makes it easy to cut the tongue-and-groove joints that secure the solid-wood pieces onto plywood panels in several parts of our Space-Saving Home Shop (page 40). And you can cut both parts of the joint with a $\frac{1}{4}$ " straight bit and just two setups, which saves a lot of time when building multiple panels.

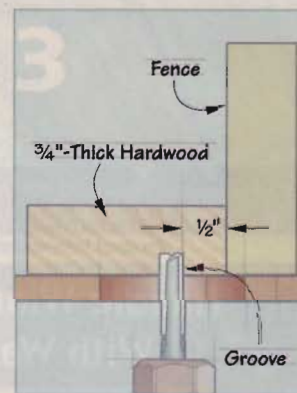
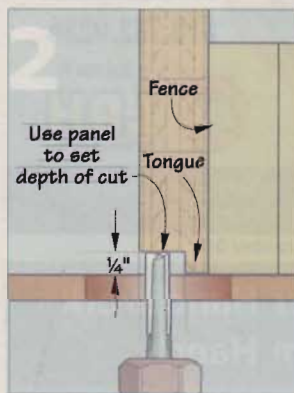
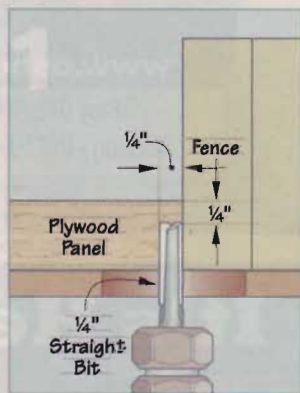
The first step is to rout the tongues. To do that, set the router-table fence snugly against the bit. This establishes the $\frac{1}{4}$ " tongue length (Fig. 1). Now raise the bit above the table to set tongue thickness ($\frac{1}{4}$ "). Then make a pass along the edges of each panel. To set up for the grooves that get cut in

the wood pieces, move the fence $\frac{1}{2}$ " from the bit. A router bit makes a great setup gauge (Photo, right). Then use the panel to set the groove depth (Fig. 2).

Now you can accurately rout the grooves by making a single pass in each piece (Fig. 3).



Sometimes it's tough to get an accurate measurement between a router bit and the fence. Try a gauge that you know is the right size, such as this $\frac{1}{2}$ "-shank router bit.



To install a threaded insert, drill an oversize hole. Add epoxy to secure the insert. Tape keeps epoxy out of the inside threads. A fender washer seats against the surface around the hole to press the insert straight in as you tighten it.

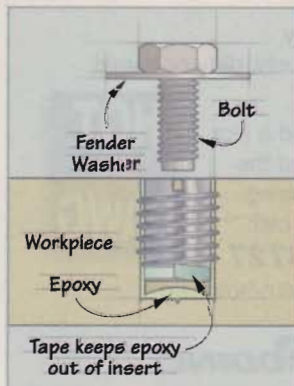
NO-FAIL INSTALL FOR Threaded Inserts

Threaded inserts provide the perfect mounting system for the miter saw fences in the Space-Saving Shop. But installing inserts in MDF can

be challenging. First, they're tough to get in straight. And the outer threads on the insert can split the MDF, causing the material to "mushroom up" around the hole.

To prevent this, drill the hole for the insert slightly oversize, so the threads barely bite into the MDF (Illustration). A bit of epoxy secures the insert.

To make the insert go in straight, drive it in with a short bolt, and use a fender washer to seat the insert flush with the surface. Once the epoxy sets, remove the bolt.





A GUIDE TO CHOOSING & BUYING

Twist Bits

There are a lot of twist bits to choose from. Let's decipher the differences to decide which ones you really need.



A twist bit can handle many specialized drilling jobs in the shop that other drill bits can't. Drilling a hole in acrylic is just one example.

Buying a twist bit for a woodworking or home improvement project used to be easy. All you had to know was the size of the bit you needed, and then you could head to the store and pick it up.

Now things aren't quite so simple. Recent breakthroughs in the types of metals used in twist bits, special coatings, tip design, and even in the flutes and shanks of these bits have made the decision a bit more complicated.

That aside, these advances mean you can drill holes faster and better in a wider range of materials. And in many cases, you can drill more holes without dulling the bits. Of course, all this comes at a cost: You can expect to pay more for specialized bits.

What type of twist bit should you buy? That depends on the task at hand. And it's that task, of course, that dictates which bit you should buy. We'll walk you through all the differences and help you determine which bit is best over the next couple of pages.



High-Speed Steel



Black Oxide



Titanium



Cobalt

Metal Makes a Difference

One big difference between twist bits is the metal they're made of (*Photos, left*).

High-Speed Steel—The mainstay for general-purpose drilling is a high-speed steel twist bit. High-speed steel is extremely hard, so these bits work fine for drilling holes in wood, plastic, or metal. As your drilling demands increase, though, you'll go through a lot of bits because they will dull fairly quickly.

Black Oxide—One way manufacturers keep high-speed steel bits from dulling so quickly is to coat them with black oxide. This coating reduces friction, which means they'll stay sharper longer. All things being equal, a black-oxide bit will drill more holes than a high-speed steel bit.

Titanium—Like black oxide, titanium bits are high-speed steel with a coating. But titanium provides a more dramatic reduction in heat and friction. These bits often last six times longer than black oxide. If you drill a lot of holes in steel, consider upgrading to titanium.

Cobalt—At the high end of the drill bit scale is cobalt, which is the choice for professionals who drill holes in steel on a daily basis. Cobalt bits aren't coated—the cobalt is blended into the steel. This allows them to withstand high heat and stay sharper longer.

Price—Each of these materials increases the bit's durability, but it also increases the price. So don't buy a higher-quality bit than your needs require.

Pick the Right Point

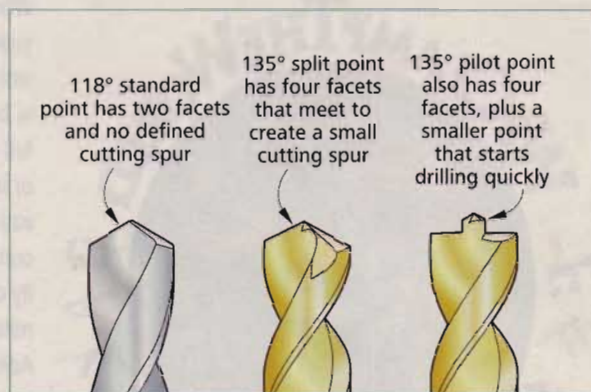
Another important difference between twist bits is right at the tip of the bit (*Illustrations, right*).

The most common type of bit has a 118° chisel point. This simply means that the two cutting edges form a 118° angle at the point, and have a small flat area (the chisel) in between. As this type of bit enters the workpiece, the chisel simply grinds into the material until the edges begin to cut.

In hard materials, the chisel has a frustrating tendency to “skate” off the centerpoint as you begin drilling. To prevent this skating, bit manufacturers devised the 135° “split point” bit. It has

two additional facets ground on the point to form a sharp center spur (instead of a chisel) that makes a piercing cut. In addition, the shallower point angle means the two edges of the bit begin cutting sooner.

Another bit, known as a “pilot point,” takes the split-point bit a step further. This point is smaller than the overall diameter of the bit and has the same 135° split point. Because



the point is so small, it bores quickly and easily in metal and other hard materials without skating. This makes pilot-point bits particularly effective when used in handheld drills.



Tightly fluted bits drill quickly in wood (*left*), but they “grab” in metal, so use standard-flute bits instead (*right*).

“Tune In” to Flutes

Another advance in twist bit design is in the spiral flutes that wrap around the body of the bit.

Some bits have what manufacturers call a *speed helix*, which is where the flutes form a much tighter spiral than on a conventional bit.

The flutes still perform the same function, which is to clear chips from the hole. But they do it much *faster* than the flutes on a standard bit. Faster chip ejection allows the bit to cut quicker, and you’ll find you don’t have to bear down as much on the drill. The result,

is less heat build-up, which extends the life of the bit. If you’re using a cordless drill, it also means you’ll be able to drill more holes on a battery charge.

Bits with a speed helix are ideal for drilling holes in wood (*Photo, far left*). But they’re not as well-suited for metal. The aggressive cutting action can cause the bit to “grab” when it enters or exits the workpiece. This puts strain on your wrist. And you can end up with chipout around the rim of the hole. So for drilling holes in metal, stick with standard-flute bits (*Photo, left*).

Select No-Slip Shanks

One final thing to consider when selecting twist bits is the shank. To avoid damaging the bit, you want to get one that won’t slip in the chuck. This is especially true with large bits (that exceed the $\frac{3}{8}$ ” chuck capacity that’s typical with most consumer-grade drills).

For these large bits, the shank is machined to a diameter of $\frac{3}{8}$ ” to match the capacity of the chuck. But even with a “stepped-down” shank (*Photo, near right*), the jaws of the chuck have a difficult job. Consider that there’s a single point of contact between each

jaw of the chuck and the round shank. As a result, the jaws don’t always grip tightly enough, and the bit breaks free. The bit gets stuck in the workpiece and the chuck continues to spin, damaging the shank of the bit (*Photo, middle right*) and sometimes the chuck itself.

To prevent that, some twist bits have a “no-spin” shank. These bits have three facets that are ground into the shank (*Photo, far right*). These facets align with corresponding “flats” on the jaws of the chuck, which grip the shank of the bit like a vise.

Round-shank bits (*left*) can get damaged (*center*) if a chuck slips. A “no-spin” shank (*right*) produces a tighter grip.





MULTIPURPOSE

Sharpening Stone Holder

Simplify sharpening with a holder that "locks" your stone in place, protects it from damage, and lets you hone a keen edge.

The last thing you want to deal with when sharpening a tool is having the sharpening stone slide around. To make his stone stay put, John Thoraldson of Burnsville, Minnesota, built this simple holder (Photo, above).

The holder is just a box with a lid (Construction View, below). The stone fits snugly in the box, which has a cleat on the bottom that gets

tightened in a vise. This creates a rock-solid sharpening platform. The lid, which protects the stone in storage, also has a piece of leather attached to it. This way, once you're done sharpening, you can hone the edge of the tool on the leather.

The box and lid are identical. Each part has two sides and two ends that are rabbeted to hold a plywood top and bottom. Notice, too, that rabbets in the ends



Tighten this holder in a vise, and you won't have to worry about your bench stone sliding around as you sharpen. A leather-topped lid lets you hone the blade after sharpening.

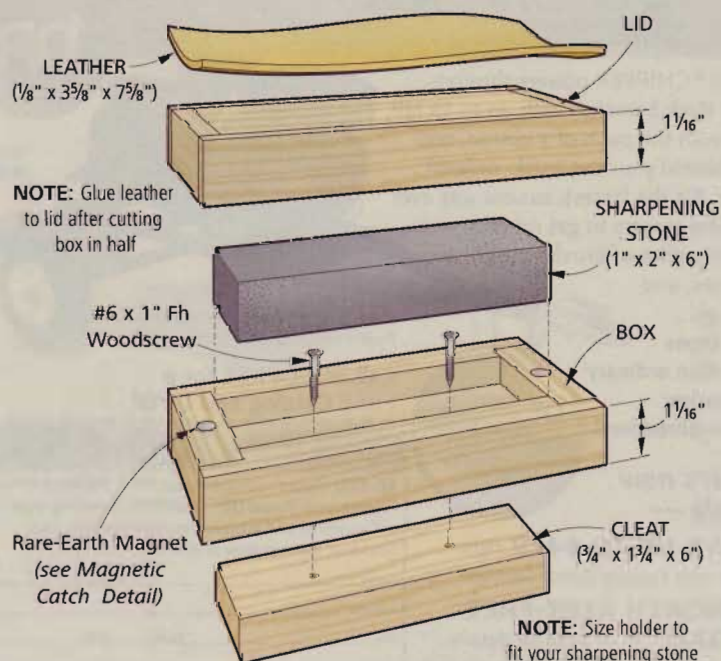
of the sides accept the end pieces of the box and lid.

The tricky part in building this stone holder is to make the box and lid the exact same size. But that's easy if, instead of building

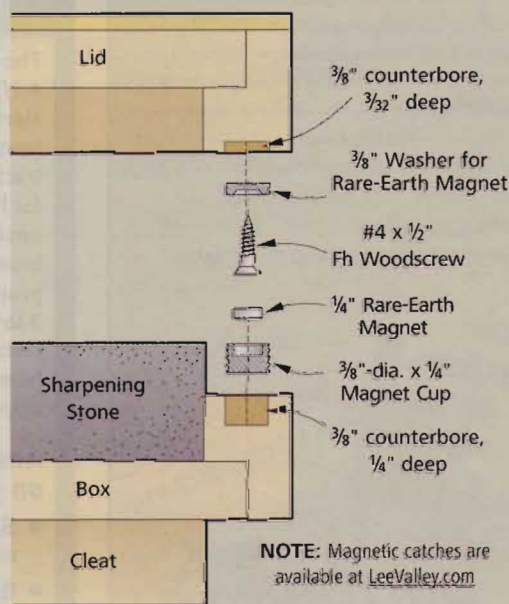
them separately, you first build a large, hollow box, and then slice it in half. (This is explained on page 91).

To do that, start with an extra-wide blank of $\frac{3}{4}$ "-thick stock that's long

CONSTRUCTION VIEW



MAGNETIC CATCH DETAIL



enough to make both sides and the ends of the box (24" long should be fine).

As for the width of this blank, measure the thickness of your sharpening stone, and then add 1 1/4". That accounts for the 1/2"-thick top and bottom, an 1/8" saw kerf for when you cut the box apart, plus 1/8" clearance so the stone won't keep the lid from fitting tight.

Now you can rabbet the edges of the blank to accept the top and bottom (*Constructing the Box*). Then cut the box ends to length to match the width of your stone plus 7/8". (That will leave 1/8" of extra width inside the box.)

Finishing up the box sides takes two steps. First

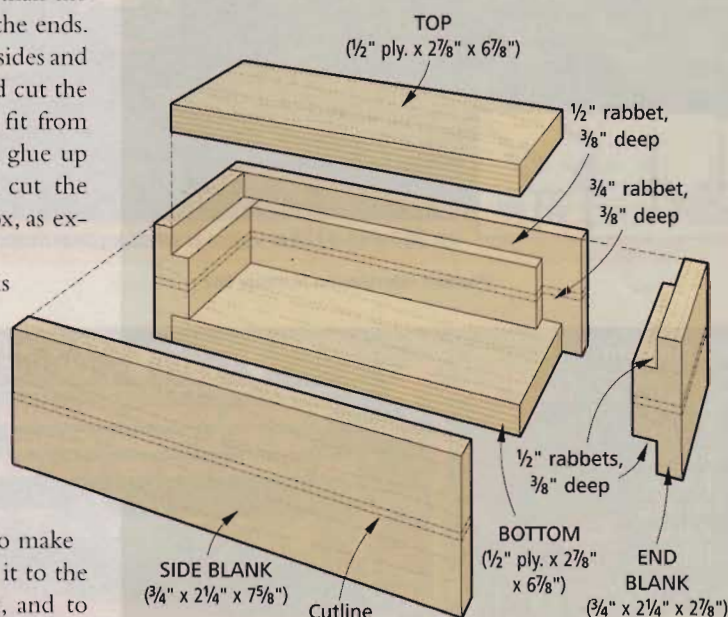
you need to cut them to length, 1 5/8" longer than the stone. Then rabbet the ends.

Now dry-fit the sides and ends of the box, and cut the top and bottom to fit from 1/2" plywood. Next, glue up the box, and then cut the lid free from the box, as explained below.

The next step is to install magnetic catches to hold the lid on. They fit into counterbores, as shown in the *Magnetic Catch Detail* on page 90.

All that's left is to make the cleat and screw it to the bottom of the box, and to attach the leather to the lid with hide glue.

CONSTRUCTING THE BOX



Cut the Lid Free

There's nothing complicated about cutting the lid free from the box on the table saw. The trick is holding the box steady and square during each cut.

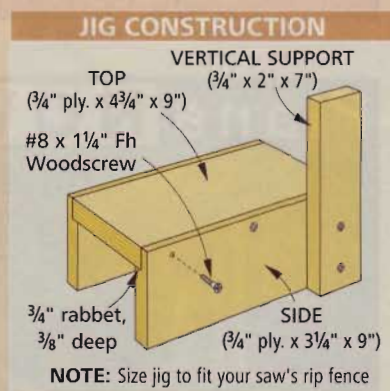
A simple saddle that slips over the rip fence does just that (*Illustration, below*). A vertical support screwed to the side of the saddle holds the box square to the saw table as you push it past the blade (*Fig. 1*). Be sure to locate the screws out of the way of the blade.

Table Saw Setup — To set up the table saw, raise the blade so it will just

barely cut through the box thickness. Then set the rip fence the desired distance from the blade. Keep in mind that the jig will throw off the scale on your fence rail. So to position the fence, hold the box against the jig while you align a layout mark on the box with the saw blade.

Cut the Ends First — The ends of the box get cut first. To do that, stand the box on end and hold it firmly against the saddle and vertical support (*Fig. 1*). Now push the box and jig over the blade. After making the first pass, flip the box end for end and make a second cut. Just be sure to keep the same face against the saddle for both cuts.

Now the Sides — For the sides, the technique is similar. That is, cut one side, flip the box, and cut the other side. It's this last pass, though, that needs special attention. As the lid gets cut free, it could bind against the blade and kick back. To prevent that, insert 1/8"-thick shims in the saw kerfs before making that final pass (*Fig. 2*).



1] Hold the box firmly against the jig as you cut the ends. Keep the same face against the jig for both cuts.



2] Shims taped into the saw kerfs prevent the box parts from binding against the blade on the final pass.



HTC PORT-A-MATE PM7000 PROVIDES

Workcenter Versatility

HTC took this proven miter saw stand design and added even greater functionality and value with a blend of unique features and accessories.

Perhaps HTC shouldn't refer to their new Port-A-Mate PM7000 as a "Miter Saw WorkCenter." That description just doesn't give this tool stand its due.

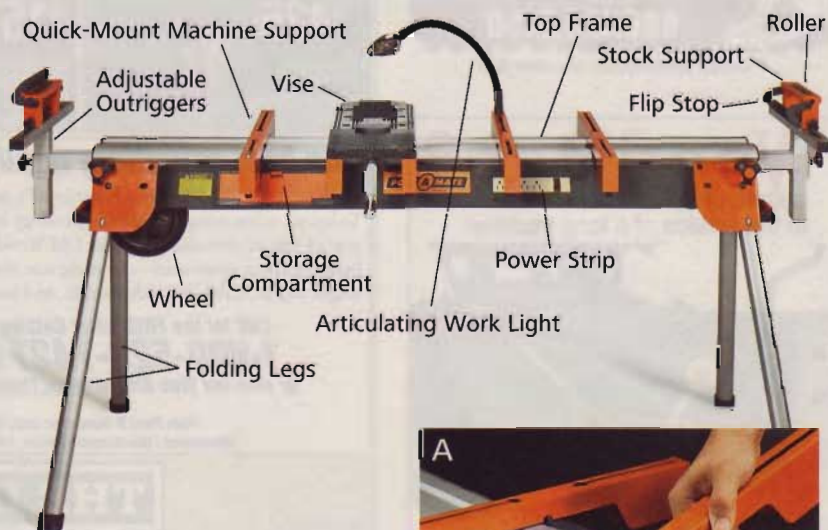
The PM7000 (\$220) certainly performs admirably as a miter saw stand, but so do several other similar and competitive models. The PM7000, however, picks up where the others leave off, making it one of the best choices for anyone who needs portable, versatile tool support for a miter saw or just about any other benchtop power tool (Photo, right).

Shared Qualities — At first glance, the Port-A-Mate PM7000 looks much like workcenter models from so many other brands. And it shares all the functionality that has made this type of tool stand popular among builders, remodelers, and DIYers.

The familiar elements of the PM7000 include a long top frame that accepts quick-mount machine supports (Fig. A). These supports can



The stock support extends for long workpieces and can be adjusted to match various tool heights.



be positioned and repositioned quickly along the full length of the frame.

Next are the stock supports (Fig. B). These mount to adjustable outriggers that extend out from the frame to offer nearly 10 feet of support between them.

Finally, collapsing legs let you fold the entire workcenter down into a much more manageable package to move from one place to another.

Distinguishing Characteristics — If the notable elements of the PM7000 stopped there, we'd simply file it under "another workcenter." But, as we said, HTC went the extra mile with this new model. For instance, the stock supports, which we've already touched on, also have a built-in roller and flip stop.

The flip stop makes precise repetitive cuts with a miter saw almost automatic (Fig. C). And the rollers are perfect infeed and outfeed supports for a thickness planer (Fig. D).

A couple of our favorite features are the articulating worklight and the work vise. These came standard with our PM7000, but according to the HTC website, this is a limited-time offer.



Quick-mount machine supports can accommodate a wide range of benchtop tools.

The worklight can be attached to any of the machine supports and has a flexible shaft, so you can shine the light wherever you need it. And the heavy-duty, cast-aluminum vise makes this workcenter perform more like a workbench than just another tool stand (Fig. E).

It's also worth noting that the PM7000 has a built-in, four-outlet power strip. So just run a single extension cord to the workcenter, and you'll have enough outlets for all of your power tools.

We Want More — The PM7000 has a lot going for it. But there are a couple of improvements we'd like to suggest, nonetheless.

First, this workcenter could really benefit from a second wheel, or maybe just a wider wheel than it currently has. As it is, rolling this thing around on that one skinny wheel feels like something of a circus act. It's almost impossible to keep it from tipping to one side.

And we'd appreciate it if buying extra machine supports was a little easier. They weren't available at the retail store where we bought our workcenter and at the time of this writing, they weren't available online. An HTC customer service person, however, said they would be available on the website soon.

Finally, we hope the vise and light will become standard features rather than "limited-time offers." These two additions really set the center apart from competitive models.

For more information on the PM7000 Miter Saw WorkCenter, or to locate a dealer in your area, visit HTCProductsInc.com or call 800-624-2027.



Breaking down long workpieces is much simpler with the expandable stock supports and built-in flip stop.



Rollers on the stock supports make them perfect for infeed and outfeed support for a thickness planer.



The heavy-duty vise offers serious holding power to help you manage large workpieces.



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MAKING WOODWORKING FUN WITH

Fanciful Furniture

See how one Canadian craftsman builds furniture that's designed to be both fun *and* functional.

Ask Judson Beaumont to list his furniture-making influences, and you won't hear the usual names like James Krenov or Sam Maloof. Sure, he's studied all the top builders and designers, but many of Judson's projects are inspired by the likes of Dr. Seuss, Daffy Duck, and Pee-Wee Herman.

Take one look at Judson's whimsical furniture, and this comes as no surprise. Despite the name of his shop, Straight Line Designs, his furniture

is filled with curves and unusual shapes that give it an unmistakably unique look.

"Some people think I build children's furniture, but that's not the case," Judson says. "I build furniture that appeals to the kid in all of us. I want to get a reaction and make people look at furniture with a different frame of mind."

Ask Questions — To do that, he asks himself (and sometimes his kids) what might happen if a chest of drawers got crushed (*above right*), if a piece of furniture could expand like an accordion (*left*), or how a coffee table might act if it misbehaved (*below*). In other words, he's not bound by conventional thinking about how furniture should be designed and built.

Much of that comes from his background. While studying at an art college, Judson discovered the wood-working shop. Then he used those tools and skills to craft a series of cube sculptures. During an exhibit of the cubes, one man offered Judson \$300 for one of his "coffee tables," and the seeds of a furniture business were sown.

After a stint building sets and props for movies and television shows, Judson rented a studio space in the then-rundown warehouse district of Vancouver and began building furniture full-time. He's been at it in the same location ever since.

Inside-Out Design — To design his furniture, Judson always starts with a sketch. Then, no matter how unusual



Called "Cracked," this chest shows what might happen if a piece of furniture got crushed. Amazingly, all the drawers still open.



Like all the furniture Judson makes, this chest of drawers is fully functional and totally whimsical.



We've all built projects that didn't turn out as planned, but this coffee table built by Judson Beaumont redefines what it means to say that a project turned out "bad."

the design, he figures out a way to build it. And that's no small feat, considering that his pieces often include curves and irregular angles. Plus, he needs the furniture to be sturdy but still lightweight enough to be shipped to clients all over Canada and the United States.

The cabinet above serves as a good example. The case sides aren't laminated or steam-bent. They're made with a core of plywood ribs that are first cut to the curved shape, and then skinned with $\frac{1}{8}$ " plywood. Applying veneer over this skeleton gives the appearance of solid wood.

To see more of Judson Beaumont's furniture, you can check out his equally interesting website: StraightLineDesigns.com.