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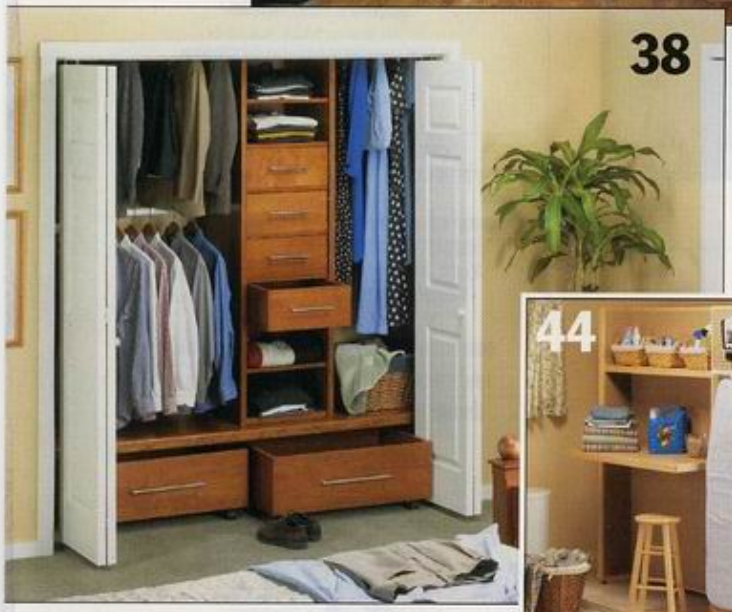

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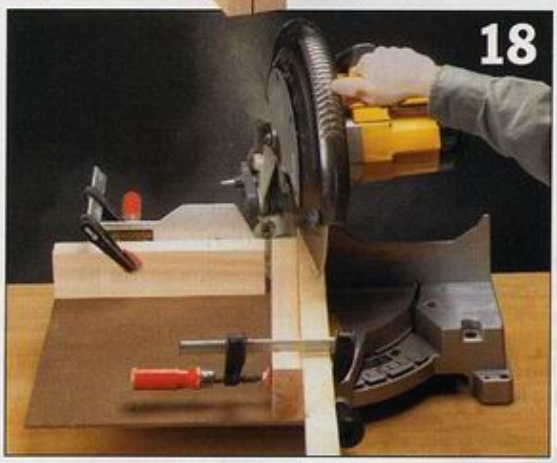


Departments

Questions & Answers

Say Goodbye to Band Saw "Barrel" Cuts

Q *When I use my band saw for resawing, I always end up getting a curved cut. What am I doing wrong?*

Max Ferrill
Cleveland, OH

A What you're describing is a common problem called a "barrel" cut. It's usually the result of a blade that's not supported properly or one that's inadequately tensioned.

There are several things you can do to eliminate barrel cuts, starting with using the correct blade. I've found that a 1/2"-wide blade works well for most resawing jobs.

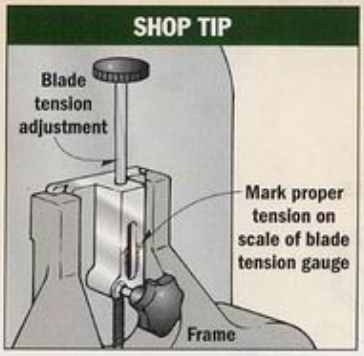
GUIDE ASSEMBLY. Another thing that can cause a barrel cut is not having the upper guide assembly positioned correctly.

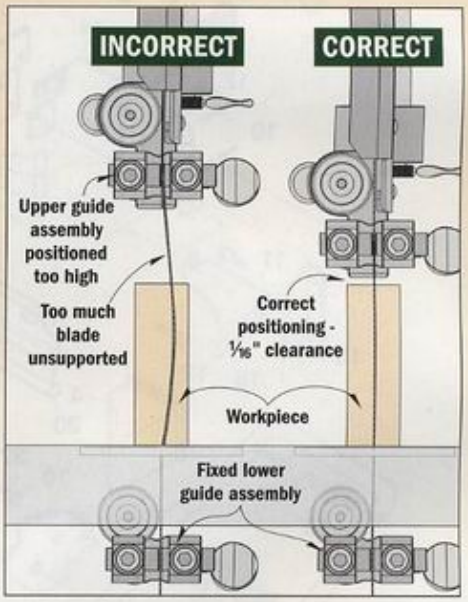
If you look at the *Illustration* labeled "Incorrect", you'll see that if the guide assembly is too high, more of the blade is left unsupported. This allows the blade to flex, creating a bowed cut.

Instead, the guide assembly should be positioned close to the workpiece, as shown in the second drawing labeled "Correct." A good rule of thumb is to allow about a 1/16" clearance.

TENSION. Even with the guide assembly close to the workpiece, the blade has to be properly tensioned to make a straight cut. Most saws have a tension gauge, which indicates an *approximate* setting. But these indicators often aren't very accurate. So I usually apply *more* tension to a blade than the gauge suggests. For example, when I put a 1/2" blade in my saw and tension it, the gauge reads like it would for a 3/4" blade.

To tension the blade, slowly turn the adjustment knob, and "pluck" the blade occasionally. It should ring with a clear tone, not a dull thud. You'll want to make a test cut to check the tension. If the blade cuts straight, mark the setting on the saw so you can quickly retension it after changing blades *(see Shop Tip below left)*.





"Super-Sized" Medium-Density Fiberboard

Q *In the Dec. 2001 issue of Workbench, your cutting diagram for the utility bench specified 49" x 97" sheets of MDF. I can only find 48" x 96" sheets. Can you explain?*

Sean Anderson
Rockford, IL

A Depending on the manufacturer, you'll find sheets of medium-density fiberboard (MDF) sold in two different sizes: 49" x 97" and 48" x 96".

The industry standard for a sheet of MDF is 49" x 97". Sheets of this size are typically sold to professional cabinet shops where they do a lot of production work, using MDF as a substrate for plastic laminate.

Since most sheets of laminate are 48" x 96", the extra inch on the MDF allows a comfortable margin of error when applying the laminate. It's simply glued down without having to worry about aligning it with the edges of the MDF. Then these laminate-covered sheets are cut into smaller pieces for counters and cabinets.

Occasionally, these larger sheets of MDF also make their way into home centers and lumberyards. If there's a choice, I buy the larger sheets. That's because the edges are always getting dented and beat up from moving the heavy sheets around. The extra inch lets me trim off the damaged portion and still have a "full" sheet to work with.

The Intent of Detents: Cutting Crown Molding

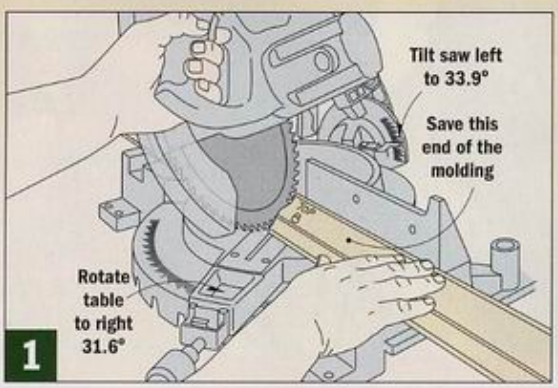
Q All of the compound miter saws I've seen have detents, or positive stops, at 0°, 22.5°, and 45°. I've also noticed that some saws have miter detents at 31.6° and others at 33.9°? What's the deal?

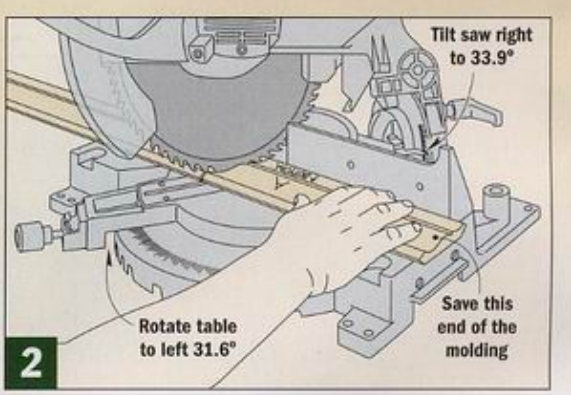
Richard Brenn
Sioux City, IA

A These odd-angled detents, when combined with the proper bevel setting, allow you to cut crown molding while it's lying flat on the saw table *(see Photo at left)*. Here's how it works.

To cut the crown molding, it requires two adjustments: one to *rotate the head of the saw* left or right to set the miter angle, and another to *tilt the saw* left or right for the bevel. A combination of a 31.6° miter setting and a 33.9° bevel setting will allow you to cut crown molding to form a perfect 90° corner *(Figs. 1 and 2)*.

The thing to be aware of is that on some saws, the miter and bevel detents are just the opposite (33.9° miter and 31.6° bevel). Even so, it still provides the right combination of angles to cut the crown molding.

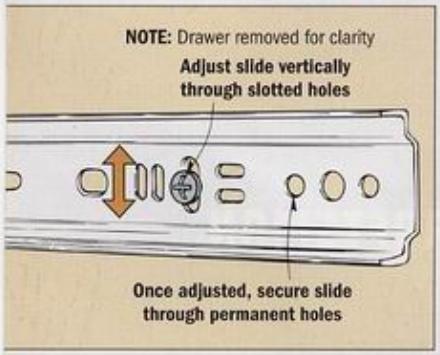




Fast Fix for Sagging Drawers

Q I installed a set of full-extension drawer slides on a project recently and they worked fine for awhile. But now the drawer is sagging. What happened?

Tom Meur
Plano, TX



A Typically the drawer slides are mounted using the vertical adjustment slot, then the fit of the drawers is adjusted. But with frequent use, the slides may have a tendency to slip in the slots, causing the drawer to sag.

The simple remedy is to first adjust the fit, then install screws in the permanent mounting holes *(shown at left)*.

YOU HAVE Questions WE HAVE Answers

Looking for basic helpful hints or some good common-sense solutions to everyday woodworking and home improvement problems? If so, send us your best questions. We're happy to answer your question and share the tips, tricks, and great woodworking ideas we've collected over the years.

HOW TO SEND YOUR QUESTION:

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Forums: www.forum.woodnet.net
U.S. Mail: Workbench Q&A, 2200 Grand Ave., Des Moines, IA 50312

Please include your full name, address, and daytime telephone number. You'll receive one of our handsome and fashionable *Workbench* caps if we publish your letter.

▲ **A solid-wood panel will swell during humid months, causing the tongue to extend past the breadboard end.**

▲ **During dry winter months, a solid-wood panel will shrink, recessing the tongue in the breadboard end.**

Breadboard Ends Leave Room for Growth

Q *I'm building a table that calls for breadboard ends. What exactly are they? And how do they work?*

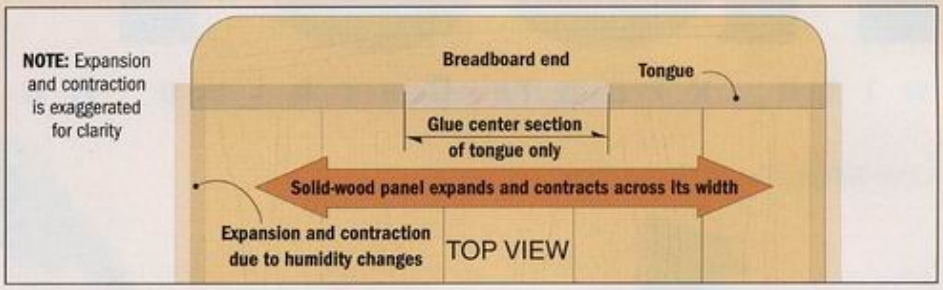
Peter Gannon
San Jose, CA

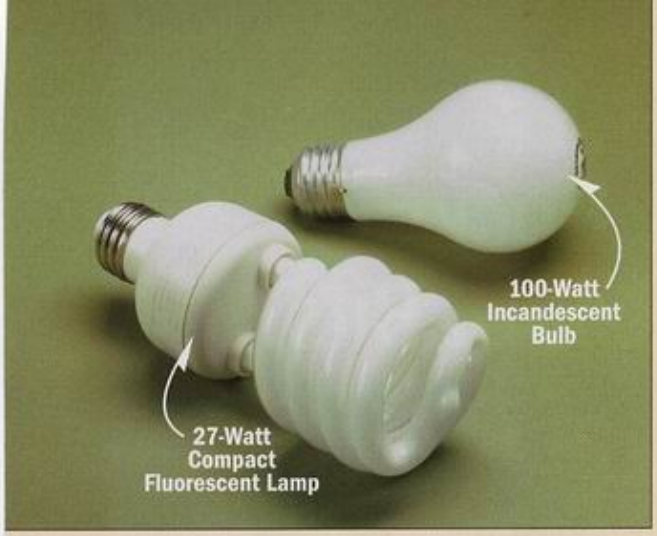
A Breadboard ends are nothing more than wood caps designed to fit over the ends of a solid-wood panel to keep it flat. To accomplish that, the inside edge of the breadboard end is grooved to fit over a tongue that's cut on the end of the panel.

In addition to keeping the panel flat, the breadboard ends also have to allow it to expand and contract with changes in humidity.

A solid-wood panel will shrink or swell *across* its width as the seasons change. So, don't be surprised if the tongue on the panel sticks out past the breadboard ends as much as $^1/_4$" or more during the humid summer months *(Top Photo)*. In the winter, the panel will shrink, so the tongue will actually be recessed a bit *(Bottom Photo)*.

To secure the breadboard end to the panel, yet still allow for this wood movement, you'll want to glue only the center section of the tongue on the panel into the groove. I usually glue the middle 25 percent *(see illustration below)*. This way the center stays fixed, but the solid-wood panel can still expand and contract in both directions.





Compact Fluorescents: A Bright Idea

Q *I've been thinking about replacing my incandescent light bulbs with compact fluorescent lamps, but they're very expensive. Are they worth the extra cost?*

Jane Ferdin
Montgomery, AL

A A compact fluorescent lamp (CFL) costs quite a bit more than an incandescent bulb. Expect to pay about $8 for a 27w CFL, compared to about 50 cents for a comparable 100w incandescent bulb.

But there's more to it than the initial cost. For example, CFLs are more energy efficient than standard incandescent bulbs. In fact, they use less energy (about 75 percent less) to provide the same amount of light.

A compact fluorescent lamp also wastes less energy. A 27w CFL converts about 80 percent of the energy it uses into light — 20 percent is emitted as heat. On the other hand, a 100w incandescent bulb converts only about 10 percent of the energy it uses into light — the other 90 percent is wasted as heat.

Another advantage of CFLs is they don't have to be replaced as often. Under normal use, a CFL will last anywhere from 7-13 times longer than an incandescent bulb. So even though the initial cost of a CFL is much higher, you save money in the long run by not having to buy replacement bulbs.

All of this makes CFLs a better value, especially if you decide to replace several (or all) incandescent bulbs in the house *(see chart at left for example of savings).*

OPERATING COSTS: CFLs vs. INCANDESCENTS
(10 light fixtures for 7 years)

	CFLs	Incandescents
Initial Cost of Bulbs	$80	$5
Energy Cost @ 0.085 (per kWh)	$238	$868
Bulb Replacement Costs	$0	$62*
Total Lifetime Operating Costs	$318	$935

* 123 Replacement bulbs

Source: energystar.com

Tale of Two Nailers

Q *What type of air nailers do you recommend for installing a hardwood floor?*

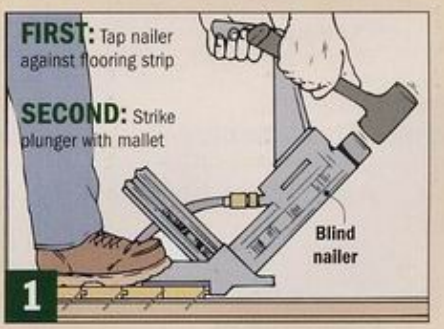
Jason Richardson
Via the Internet

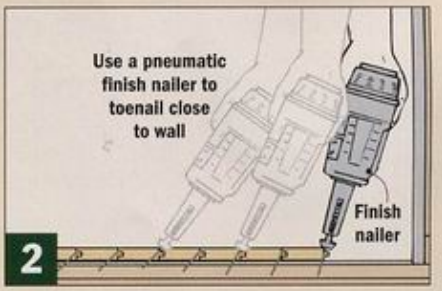
A To install a hardwood floor, you're going to need two different types of air nailers.

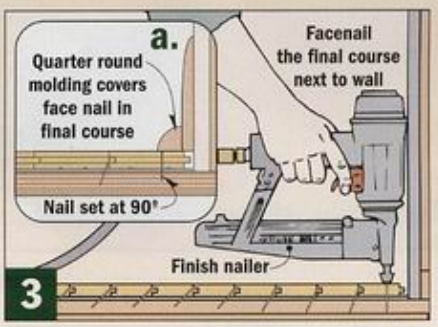
The first one is called a *blind nailer*. It drives nails at a 45° angle through the tongue of each hardwood strip. It works by setting the nailer on the flooring, tapping it into position, and then striking the plunger with a mallet *(Fig. 1)*.

As you approach a wall, however, there's no room to swing the mallet without banging up the wall. So I switch to a pneumatic *finish nailer*, toenailing the flooring *(Fig. 2)*.

The final flooring course is simply face-nailed *(Fig. 3)*. Don't worry about the exposed nail head. The baseboard and quarter round will cover it *(Fig. 3a)*.







No-Crush Method of Installing Deck on Stucco Exterior

Q *I'm attaching a deck to the stucco-exterior of my house. Can I fasten the ledger board right to the stucco, or is there a better way?*

Rick Robirds
Via the Internet

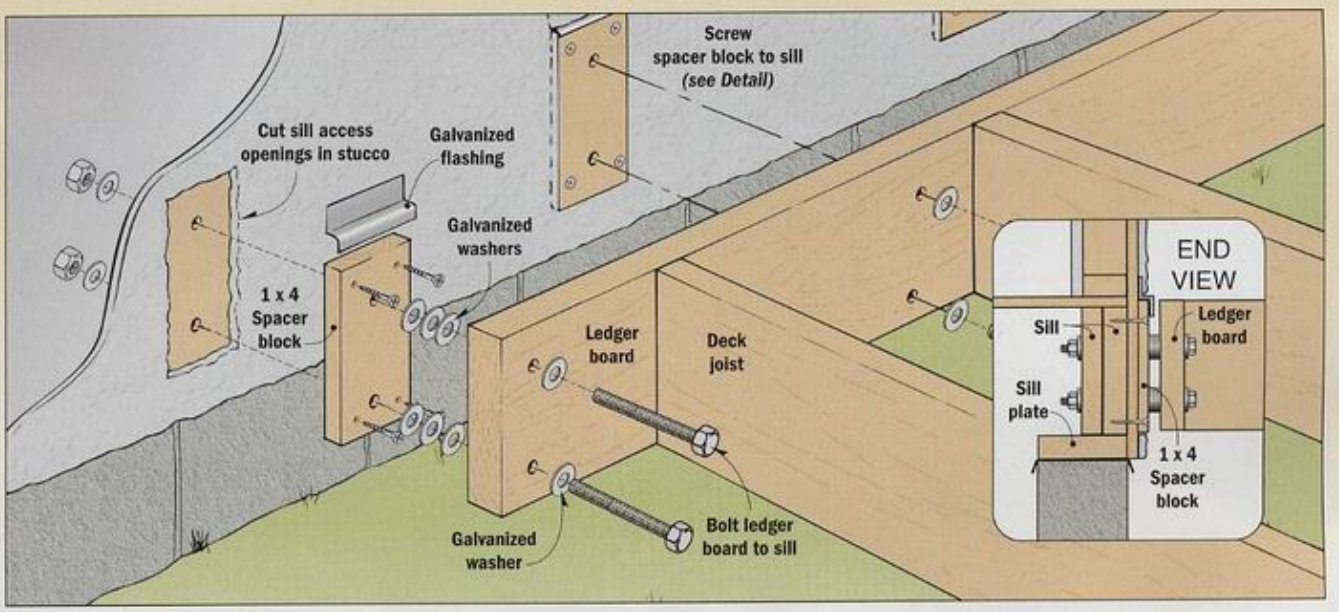
A Stucco isn't designed to carry any type of load, so I wouldn't recommend fastening anything directly to it. Instead, what you want to do is attach the ledger board of the deck to the *sill* of the house, which is more solid *(End View)*. To do that, you first need to create a mounting surface that allows the ledger board to sit out away from the stucco.

To accomplish that, I'd recommend using a number of 1x4 spacer blocks that fit into openings cut into the stucco *(see Illustration below)*. The thickness of these spacer blocks allows them to sit just a bit "proud" of the stucco *(End View)*. This way, when the ledger board is attached, the blocks hold it away from the house so it won't crush the stucco.

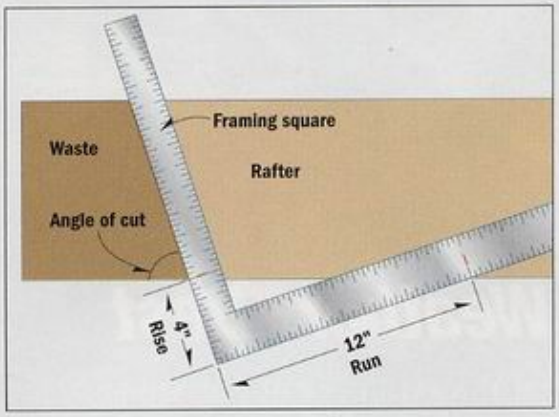
Before installing the spacer blocks, you'll need to determine the location of the ledger board. Mark the top and bottom of the board on the stucco. Then cut the openings for the spacer blocks in the stucco about every 24"-32" apart. A circular saw fitted with an abrasive cutoff wheel works good.

Then before attaching the spacer blocks, slip a short piece of flashing into the opening. Now set the blocks into place, fasten them to the sill with screws, and caulk around the flashing and fasteners.

Once the blocks are installed, you've got a solid mounting surface for the ledger board. It's fastened with bolts that pass through holes in the ledger board, the spacer blocks and the sill *(End View)*. Note: Adding a stack of washers between the ledger board and spacer blocks helps prevent rot by allowing air to circulate.



Tricks of the Trade: Laying Out Angled Cuts on Rafters



Q *I've seen carpenters using a large framing square to lay out the angle cuts on the ends of rafters, but I can't make heads or tails of how they do this. What's the secret?*

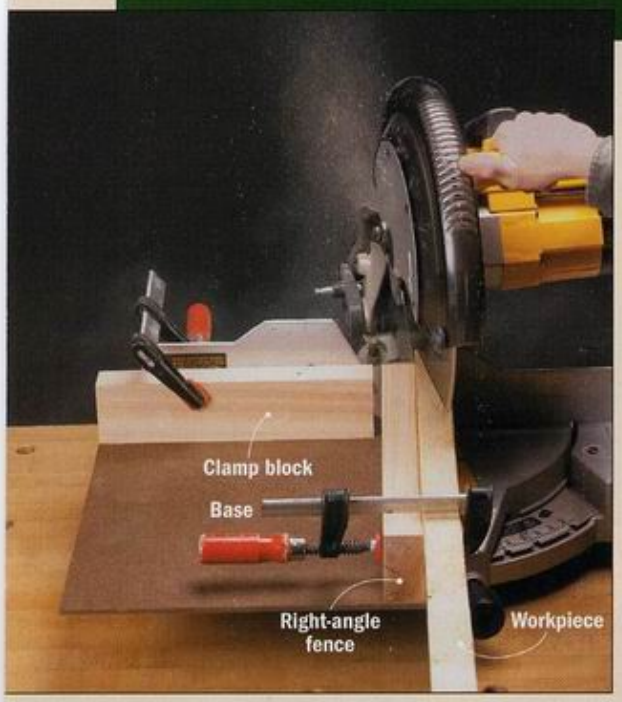
Gary Sternard
Fort Dodge, IA

A The framing square has inch marks engraved on both of its legs. What the carpenter is doing is aligning a point on each of these legs that will reflect the angle the carpenter wants to cut on the ends of the rafters.

The bottom leg of the square always remains the same: 12" (carpenters call this the "run"). What determines the angle of cut is where the other leg is placed on the rafter the "rise". The combination of the run (12") and rise (4") defines the angle of cut the carpenter is after. The *Illustration* at left shows how this works for a roof with a 4/12 pitch (4" of rise every 12" of run).

Tips & Techniques

FEATURED TIP



▲ This jig makes it safe and easy to cut a long, steep angle on the end of a workpiece.

New Angles for Miter Saws

Recently I was building some sawhorses that required making a number of angled cuts on my miter saw that were well *beyond* 45°. The only problem is the saw wouldn't rotate far enough in either direction to make the cuts.

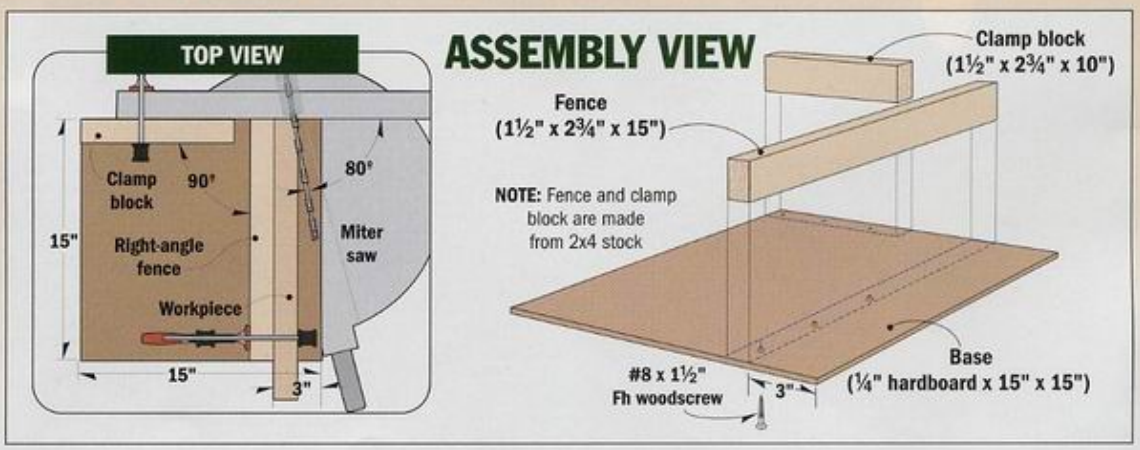
My solution was to build a jig that held the workpiece *perpendicular* to the fence on the miter saw *(see photo at left)*. Then I just rotated the saw a few degrees to make the steeply angled cuts.

The jig consists of a 1/4" hardboard base and two wood blocks fastened to it with screws *(Assembly View)*. The block attached to the back edge is used to clamp the jig to the metal fence on the miter saw. The second block serves as a right-angle fence that's used to position the workpiece and to clamp it in place. Note: Be sure to square the fence to the clamp block *(Top View)*.

Since the fence holds the workpiece at 90°, the cut will be at the *complementary* angle of the setting on the miter saw. For example, if you rotate the saw table 10° to the right, you'll end up making an 80° angled cut.

So with that in mind, set the saw to the proper angle. Then lay out the angled cut line on the workpiece, and clamp the piece to the right-angle fence. Now simply position the jig so the blade aligns with the layout mark, clamp the jig in place, and make the cut.

George Person
Costa Mesa, CA

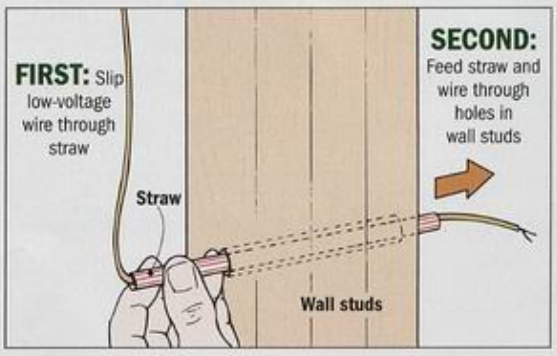


Fishing Low-Voltage Wires

Feeding a low-voltage wire (to install a garage-door opener for example) through several wall studs that are ganged together can be a nuisance. The flexible, small-gauge wire always seems to get hung up inside the holes.

A simple solution is to first slip the wire through a straw and then poke the straw through the holes in the studs. The straw is stiff enough that it won't "catch."

Justin Steele
Kalamazoo, MI



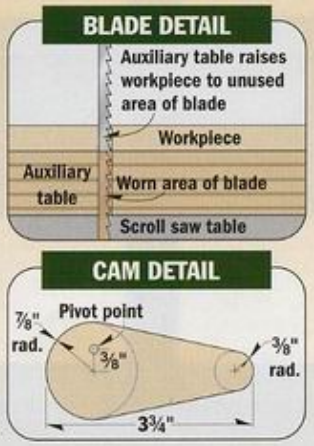
More Mileage from Scroll Saw Blades

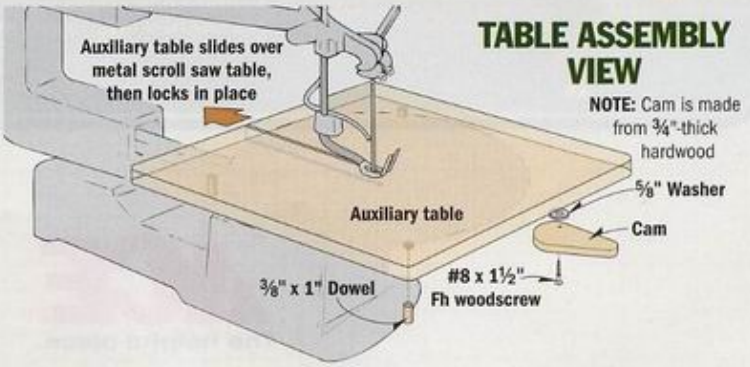
The stroke of the blade on my scroll saw is quite short. As a result, only a small portion of the blade actually does the cutting. When the teeth in that section got dull, I used to throw the blade away. But recently I figured out a way to get more mileage from my dull blade.

My solution is to install an auxiliary table made of $^3/_4$" plywood over the metal saw table *(Table Assembly View)*. The table raises the workpiece $^3/_4$" (the thickness of the plywood), which means that a "fresh" part of the blade is engaged in the cut *(Blade Detail)*.

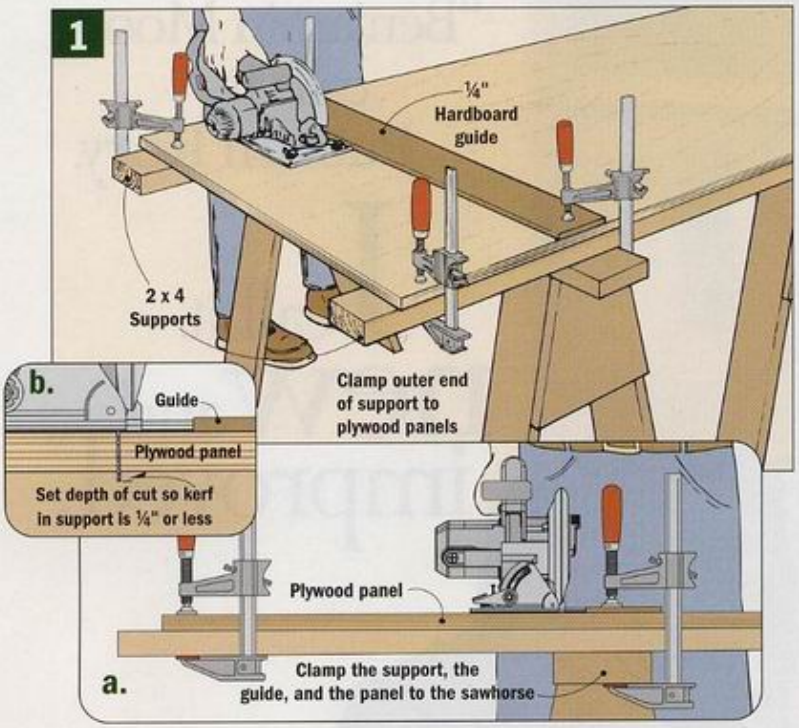
The auxiliary table is $^1/_2$" larger than the metal scroll saw table *(Top View)*. To make it easy to position, I glued three dowels into holes drilled in the bottom of the table. Also, a narrow slot provides clearance for the saw blade when you install the table. To "lock" it in place, you simply rotate a cam so it pinches against the metal saw table *(Cam Detail)*.

Issac Willis
Clarkton, NC





Quality Cuts in Plywood



Crosscutting a large sheet of plywood with a circular saw can be a challenge. First of all, the large size of the plywood panel makes it awkward to handle. To make matters worse, the last inch or so of the cut always seems to splinter right as you complete the pass.

To produce a smooth, clean cut, I clamp a couple of 2x4 supports underneath the long edges of the plywood panel *(Fig. 1)*. The 2x4s provide support for the cutoff piece at the end of the cut, which ensures a clean, chip-free edge.

Of course, the 2x4s are also going to need adequate support. Be sure to clamp the outer end of each board to the panel itself. I also clamp the support to a sawhorse and a piece of $^1/_4$" hardboard that's used to guide the base of the saw *(Fig. 1a)*.

Another thing to keep in mind is the depth of cut. The idea is to adjust the saw so the blade makes a shallow kerf in the supports *(Fig. 1b)*. This way, you won't accidentally cut all the way through the supports.

Robert DeGraw
Kirkland, WA

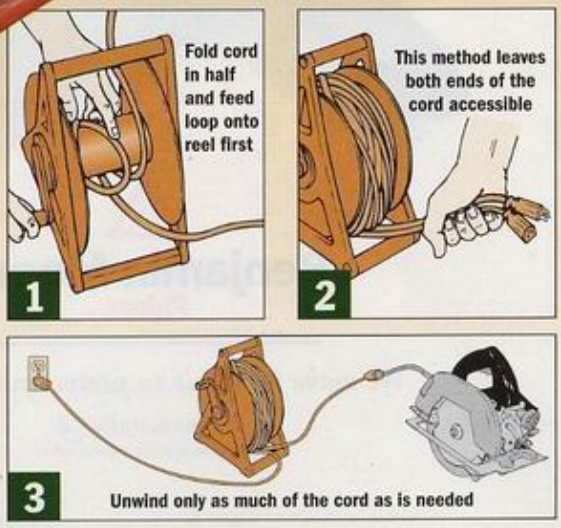
Better Way to Wind a Cord

▲ **Folding a power cord in half before winding it onto a reel puts both plugs front and center.**

A wind-up reel is a handy way to store a power cord. The only problem is you have to unwind the entire reel to get to both ends.

To save time, I fold the cord in half, forming a loop that's fed onto the reel first *(Fig. 1)*. This method provides easy acess to both ends of the cord *(Figs. 2 and 3)*, and it cuts winding time in half.

Howard Sheldon
Yorba Linda, CA



Easy Breaker Identification

When doing electrical repairs, it's a safety must to shut off the circuit breaker that controls power to the outlet you're working on. Unfortunately, the breakers in the panel aren't always labeled correctly (and sometimes not at all). This makes finding the correct breaker a time consuming task.

So once I match an outlet to its breaker, I use a permanent marker to write the number of that breaker inside the cover *(see Photo)*. Now the next time, I know exactly which breaker to shut off.

John Watkins
Ozark, AR

WORKBENCH HOME

KITCHEN MAKEOVER

Yes, you can create your own custom kitchen — just use the ideas in this second part of our kitchen makeover to cook up a plan of your own.

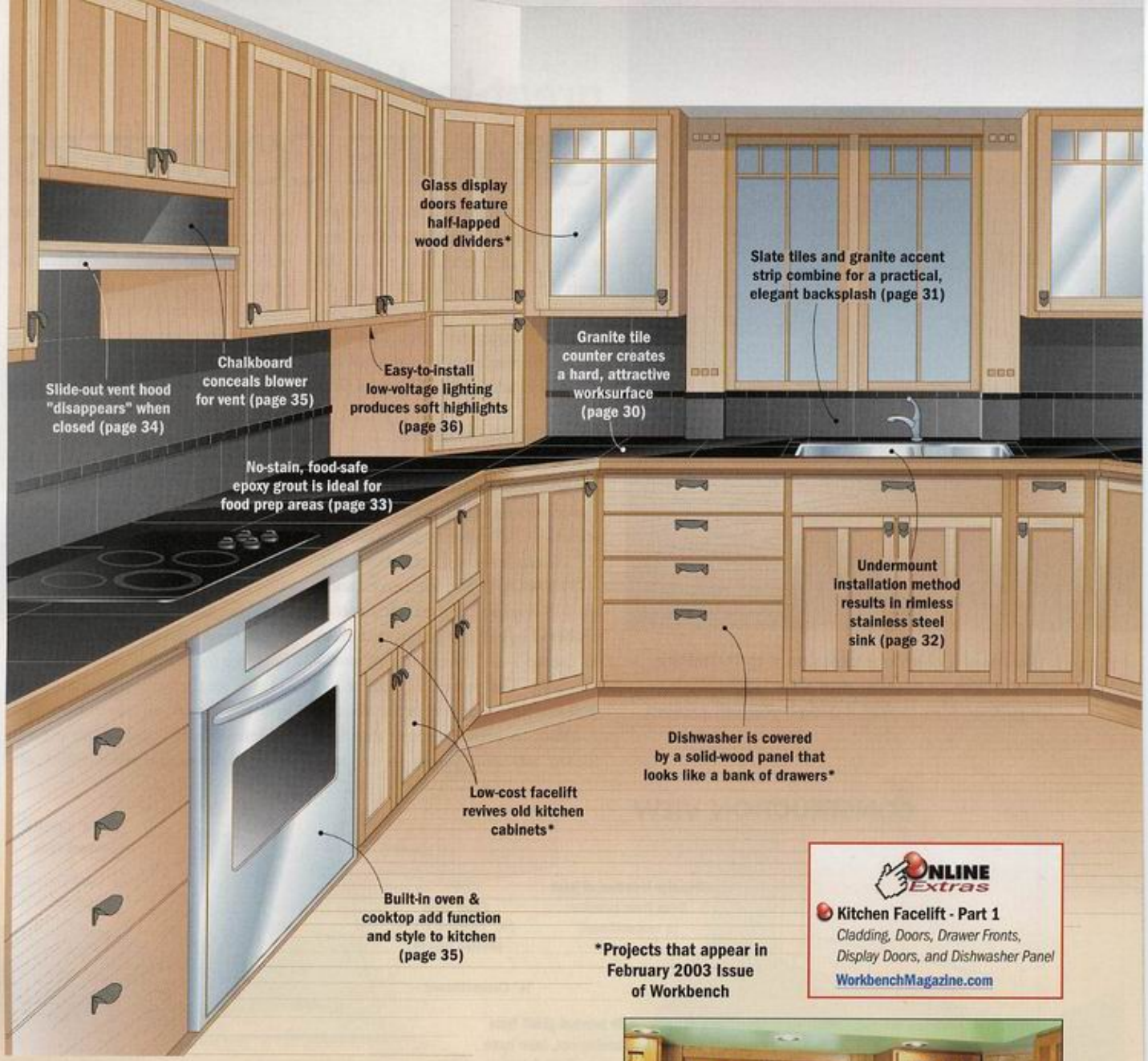
Shortly after we completed this kitchen remodeling project, I asked the homeowners what they liked best about it.

CABINET FACELIFT. At the top of their list were the kitchen cabinets. Instead of buying new cabinets, we *refaced* the existing cabinets by applying thin strips of cherry and then building new doors and drawer fronts. (To learn more about refacing cabinets, refer to the first part of this kitchen makeover in the February 2003 issue of *Workbench*.)

GRANITE COUNTERS. The new counters were high on their list, too. For these, we considered the usual materials — plastic laminate, ceramic tile, and wood. But the homeowners wanted a more durable material. So we decided on an extremely hard material that's virtually impossible to scratch — granite.

Now, I'm not talking about huge slabs of rock. Instead, to simplify the installation, the counters are made up of 12" x 12" granite *tiles*. As you can see in the *Photo* above, we used polished black granite tiles to contrast with the cherry cabinets. A dark-colored grout makes the joint lines virtually disappear. It's a non-porous *epoxy grout* that won't stain or harbor bacteria — just the ticket when you're baking or preparing meals.

SLATE BACKSPLASH. In addition to the granite counter, we installed a backsplash made of slate. Here again, using tiles makes this an easy job. Notice the subtle contrast between these gray slate tiles and the granite counter. Also, a narrow band of black granite tiles creates a decorative accent in the backsplash.



*Projects that appear in February 2003 Issue of Workbench

ONLINE Extras

Kitchen Facelift - Part 1

Cladding, Doors, Drawer Fronts, Display Doors, and Dishwasher Panel

WorkbenchMagazine.com

▲ The first part of our kitchen makeover features plans on how to reface your existing cabinets. *(See Feb. 2003 Workbench or Online Extras above.)*

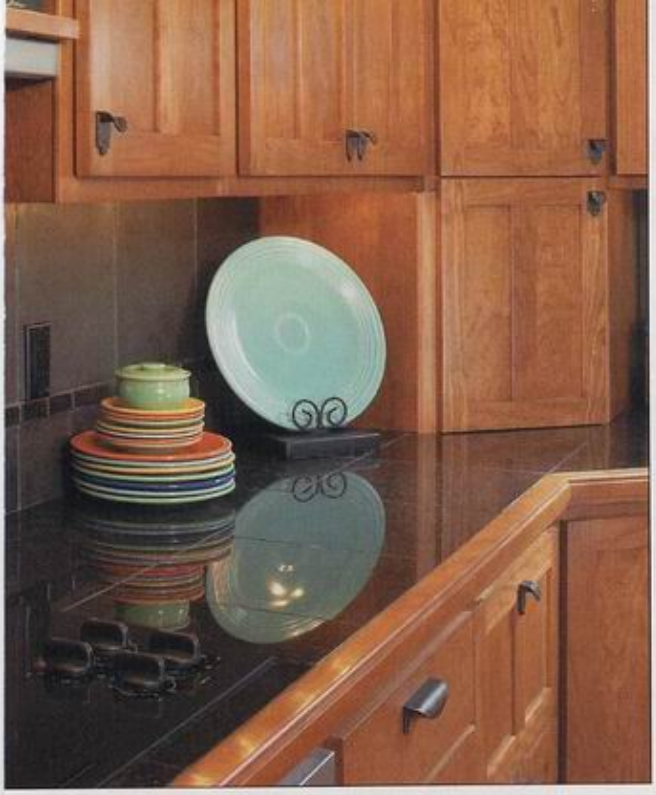
COST. All of this sounds great, but isn't it expensive? For the granite counter, slate backsplash, and all the grout supplies, we paid about $32.50 a linear foot. It's a bit pricey, but the results are definitely worth it.

APPLIANCE UPGRADES. The homeowners also gave a thumbs-up for all the new appliance upgrades. More to the point, it was how they improved both the function *and* style of the kitchen.

Our part in this process was to incorporate these new upgrades into the overall design of the kitchen.

Take the sink for instance. It's a stainless steel sink that's designed to be surface-mounted (with the rim on *top* of the counter). But to create a more streamlined appearance, we came up with a unique *under-counter* method of installing the sink.

In addition, we replaced the old slide-out range with a built-in oven and an in-counter cooktop. Be sure to check out how the vent for the cooktop is disguised with an old-fashioned chalkboard. And there's a low-voltage lighting system that's literally a "snap" to install.



▲ No need to hire a professional to install this upscale granite counter and slate backsplash. Using stone tiles makes it a do-it-yourself project.

great-looking GRANITE COUNTERS

Besides the fact this granite counter provides a hard, durable worksurface, it looks great, too. And since it's made with tiles, it's a very "do-able" project. We used polished black granite tiles for the counter and gray slate tiles for the backsplash. (This type of tile is available at most tile supply stores.)

A Solid Substrate

A long-lasting counter depends on a solid substrate. To accomplish that, I used two layers of material for the substrate: 3/4" exterior plywood and 1/4" cementboard *(Construction View)*.

PLYWOOD. The kitchen cabinets are 24" deep, so I ripped full sheets of plywood in half and positioned them to create a 1/4" overhang *(Counter Assembly)*. This leaves 1/4" gap at the wall, but it's covered by cementboard.

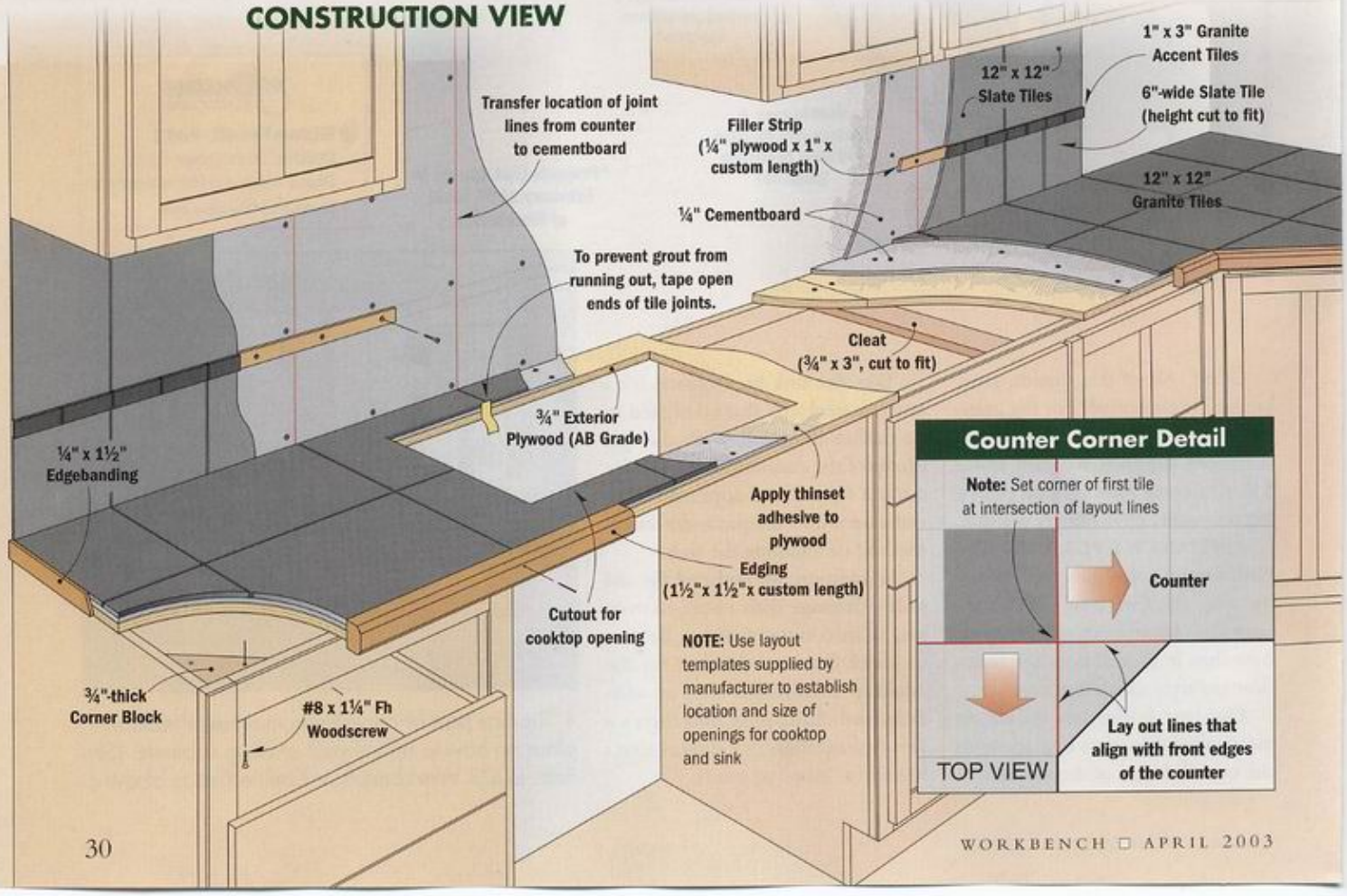
Also, to provide extra rigidity, locate any end joints in an area where there's room for a wood cleat underneath. After attaching the cleats with glue and screws, check that the plywood is level, shimming if necessary. Then fasten it from underneath with screws installed through corner blocks in the cabinets.

With the plywood in place, now is the time to cut the openings for the sink and cooktop.

CEMENTBOARD. To provide a stable base for the tiles, the next step is to add the cementboard. Notice that it's flush with the front edge of the plywood. To add rigidity to the substrate, size the pieces so the joints are offset from the plywood joints.

Here again, you'll need to create openings for the sink and cooktop. To do this, set the cementboard in place and then mark the openings from underneath. If you plan to use our method for an undermount sink, off-

CONSTRUCTION VIEW



set the cementboard from the opening *(see Sink Installation on page 32)*.

To install the cementboard, apply thinset adhesive to the plywood. Then fasten it with cementboard screws, making sure the screw heads are slightly below the surface. Since we installed tile for the backsplash, I covered the wall with cementboard, too.

Note: If you plan to install an undermount sink, do that now, *before* laying the granite tiles *(see page 32)*.

Tips for Tile

Now it's time to install the tiles. The key to success here is a careful layout and a "dry-installation" of all the tiles before spreading any adhesive.

LAYOUT. To establish the location of the first tile, I marked two lines that extended along the front edge of each "leg" of the counter *(Corner Detail)*. Set the first tile in place *without* any adhesive at the intersection of these lines. Then dry-fit the rest of the tiles, working your way out.

The tiles around the openings for the sink and cooktop will need to be cut to fit. A rented "wet" saw makes this an easy job. To produce a symmetrical appearance, I cut the tiles on each side of the opening to the same width *(see page 32)*. I also sanded a bevel on the cut edge to create a finished appearance *(page 80)*.

INSTALL TILES. Once you're satisfied with how the tiles are fitting, the actual installation should go smoothly. They're glued on with a thinset adhesive for natural stone (I used a polyurethane blend). Working a few square feet at a time, apply the adhesive with a notched trowel, and then wiggle the tiles into place.

BACKSPLASH. After the adhesive sets, you can turn your attention to the slate backsplash. It has a narrow band of granite "accent" tiles that are sandwiched between rows of slate tiles. For appearance, the tiles in the lower row are cut into quarters, and we installed full-size tiles above.

Since the accent tiles attract a lot of attention, I wanted to be sure they were perfectly straight. So I screwed a temporary wood support to the wall and used it to align the tiles *(Backsplash Assembly)*. Also, to emphasize the accent tiles, I wanted them to sit "proud" of the surrounding slate tiles. To accomplish that, I screwed a 1/4" plywood filler strip to the wall and then glued the tiles to it.

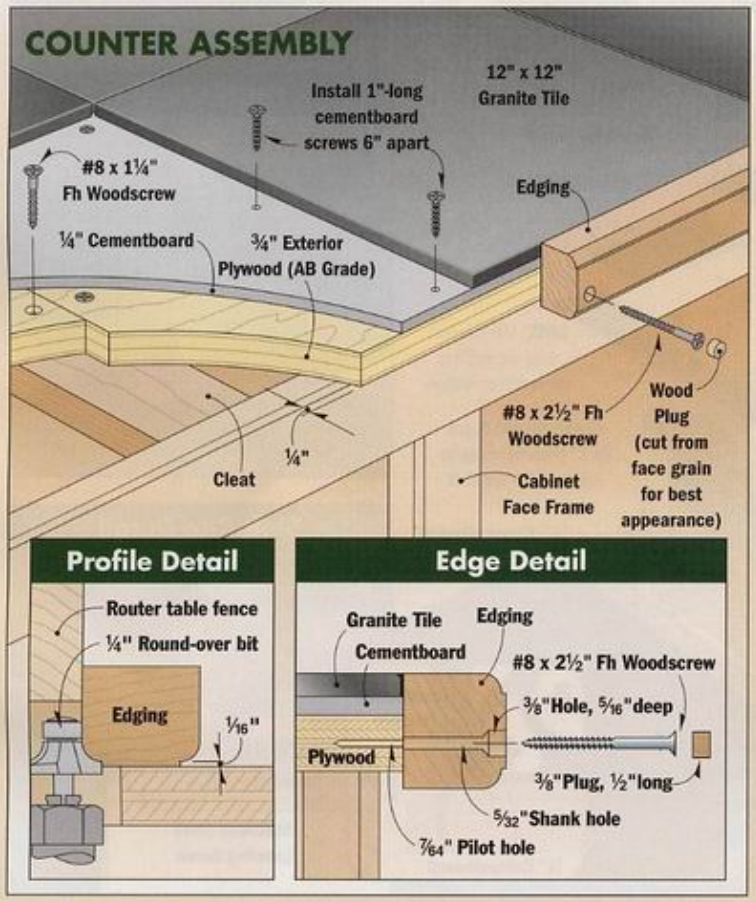
▲ Use a metal straightedge for alignment as you dry assemble the tiles for the backsplash.

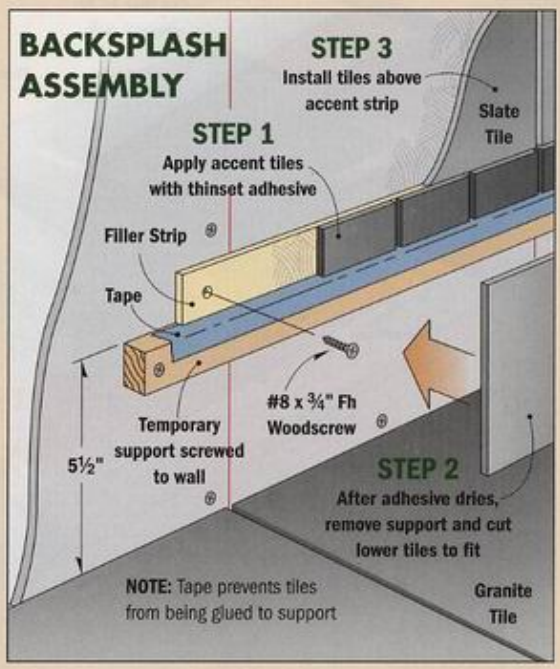
Solid-Wood Edging

After completing the tile installation, and before grouting, I added wood edging to the front of the counter.

The edging is 1 1/2"-thick hardwood (cherry) that's ripped to a width of 1 1/2". To create a decorative profile, I routed the top and bottom edges *(Profile Detail)*. Then I attached the edging with glue, screws, and wood plugs *(Edging Detail)*.

Finally, to provide a durable finish that resists wear and moisture, I brushed on three coats of polyurethane, sanding between each coat.





▲ An undermount stainless steel sink provides an attractive, yet extremely practical, installation.

▲ This waterproof sealant and adhesive is available at many boat stores. Or, order it from West Marine: 800-262-8464

secrets to installing an

UNDERMOUNT SINK

It's easy to overlook the thing that's special about this sink — a unique method of installation that ensures a permanent, watertight seal.

But before I get to that, take a look at the photo at left. As you can see, the stainless steel sink is mounted *underneath* the counter, so the rim of the sink isn't visible. This produces a cleaner appearance than a surface-mounted sink (where the rim sits on *top* of the counter). Plus, it lets water run off the counter into the sink.

Okay, but how do you prevent water from seeping *under* the granite tiles and damaging the counter? That's where our special installation method comes in *(Sink Rim Detail)*.

Notice that the rim of the sink rests on a set of stainless steel leveling screws installed in the lip of the counter. (As you recall, this lip was formed earlier by setting the cementboard in from the sink opening.) A special sealant and adhesive *(shown at left)* totally encases the metal rim of the sink. The result is a permanent, absolutely waterproof installation.

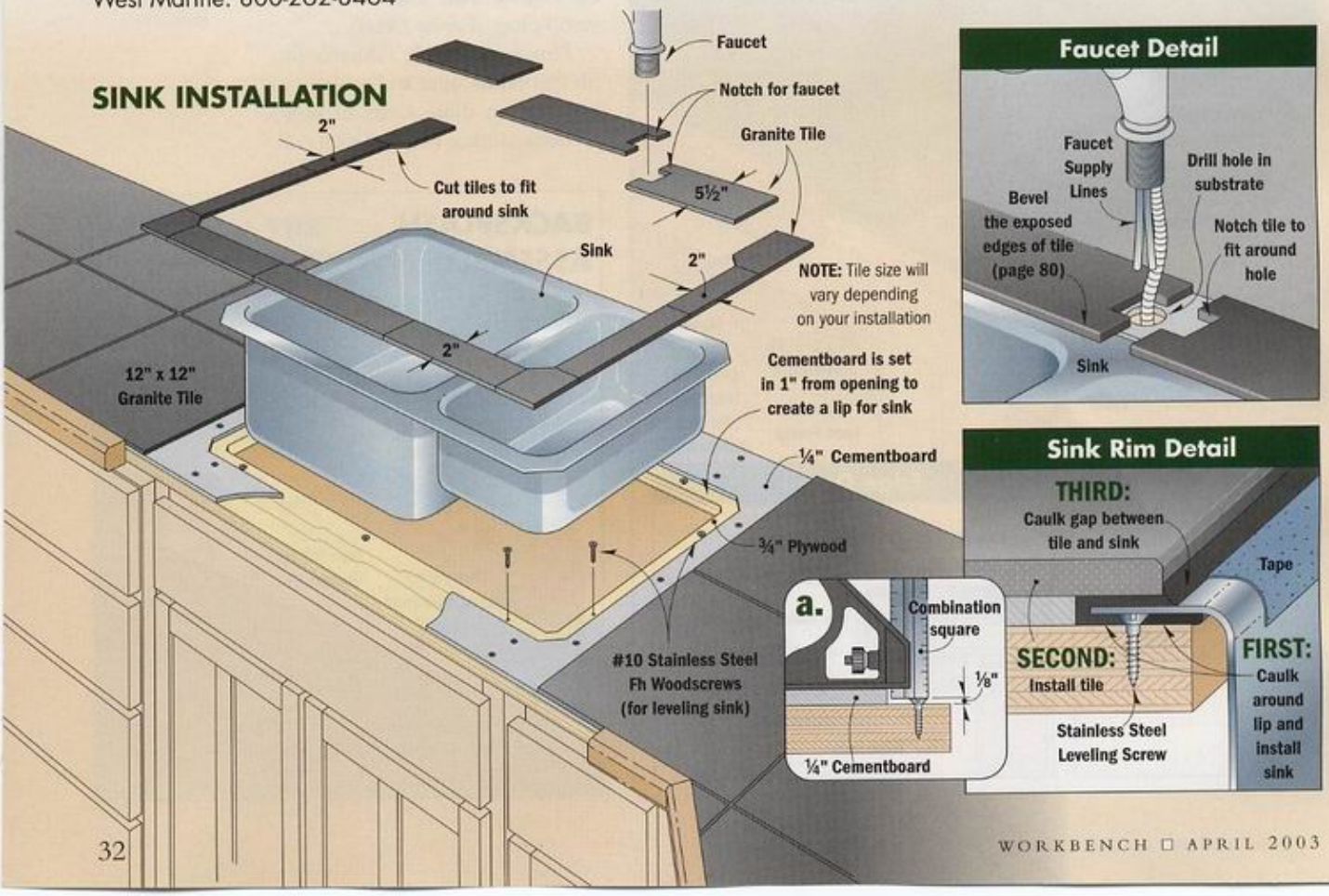
ADD LEVELING SCREWS. The first step is to install 10 leveling screws —two near each corner of the sink opening and a single screw near the front and back edge *(Sink Installation)*. The idea is to adjust the height of the screws so there will be a gap above *and* below the sink rim. By filling these gaps with the sealant, it will ensure a waterproof bond.

To prevent the sink from rocking, it's important that the leveling screws are the same height. An easy way to do that is to use a combination square as a gauge and then "tweak" the screws to the correct height *(Detail a)*.

INSTALL SINK. Now you're ready to install the sink. Since the sealant is kind of messy, start by taping all around the opening, leaving only the lip of the counter exposed.

Next, apply a thick bead of sealant all around the lip and leveling screws. Then lower the sink into the opening so it rests on the screws. Add weight to hold it in place and then clean up any sealant that squeezes out.

After letting the sealant cure at least 24 hours, go ahead and lay tiles around the sink, as shown below. Then caulk the gap between the tile and sink, using the same sealant as before.



the abc's of EPOXY GROUT

We used a special epoxy grout on the granite tile counters in this kitchen. Unlike cement-based grouts, this type of grout won't stain, it's easy to clean, and it doesn't harbor bacteria.

The grout comes in a kit with three packages labeled A, B, and C *(Epoxy Grout Supplies)*. The packages are mixed together to make a syrupy liquid about the consistency of honey.

Because of this, the grout is a bit messy to work with. So be sure to mask the edging on the counter. Cover the sink with cardboard and tape the edges down. I also used tape to make a "dam" across the *open-ended* joints to keep grout from running out, *(see Construction View on page 30)*.

Before you get started, clean the tiles and joint lines. Also, be sure to allow enough time to complete the job (about six hours in my case).

MIXING. Now you're ready to mix the grout. Start by pouring the resin (Package A) and hardener (B) into a plastic bowl. To ensure that the ingredients are thoroughly mixed, use a flat stick to scrape the sides of the bowl. Then add the coloring agent (C), as shown in *Figure 1* below. I used dark gray so the grout lines would be as inconspicuous as possible against the black granite.

As soon as the grout is mixed, pour the entire batch out onto the tile. This will slow down the curing process, providing you more working time.

APPLY GROUT. Next, spread the soupy mix around with a rubber grout float. Hold the float at a shallow angle *(Fig. 2)*, pressing the grout down into the joints. Scrape off the excess grout into a plywood tray, as shown above. You can reuse the grout. Also, set some aside in case some of the joints need a little extra.

WATER CLEAN-UP. After allowing the grout to set up for about 30 minutes, clean the surface of the tiles with water and a nylon pad *(Fig. 3)*. Then remove the excess water *(Fig. 4)*, let the grout set up for at least three hours, and clean the tile lightly with soapy water.

▲ Working diagonally across the joints, hold the float at a 90° angle and scrape off the excess grout.

▲ After mixing parts A & B for two to three minutes, slowly stir in the coloring agent (part C).

▲ Next, pour the grout onto the tile, then use a firm rubber grout float to work it into the joints.

▲ Now flood the tile with water and scrub the grout off the surface with a nylon pad (Inset).

▲ Remove excess water by dragging a towel lightly across the tile. Rinse towel often.

epoxy grout supplies

Epoxy grout comes in a kit that includes the resin (Part A), hardener (Part B), and a coloring agent (Part C). The kit also has rubber gloves and a white nylon cleaning pad.

Clean-up Tip

If the counter has a hazy film the next day, use a citrus-based hand cleaner and a plastic dish pad to polish the tiles to a mirror finish. Follow up with soap and water.

▲ Replacing the range (left) with a built-in oven and a counter cooktop adds function and style to this kitchen.

custom kitchenworks

BUILT-IN APPLIANCES

The homeowners did all the footwork when it came to researching and buying new appliances. Our job was to give them a custom touch *(see Photos at left and on page 35)*.

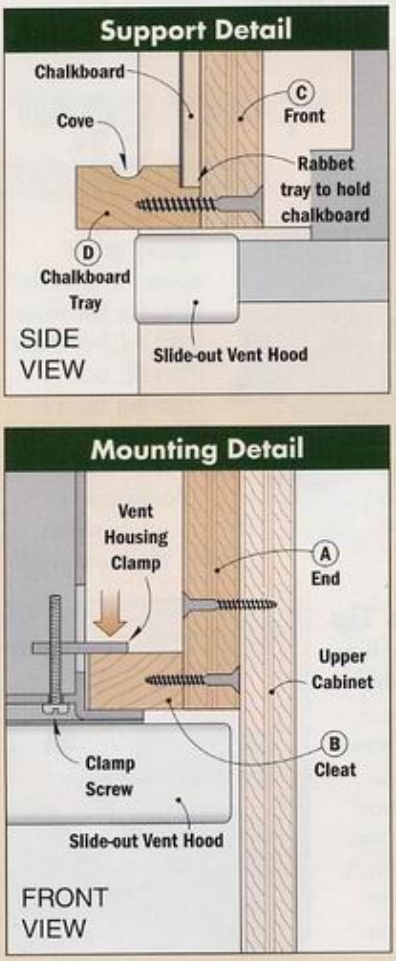
A "Disappearing" Vent

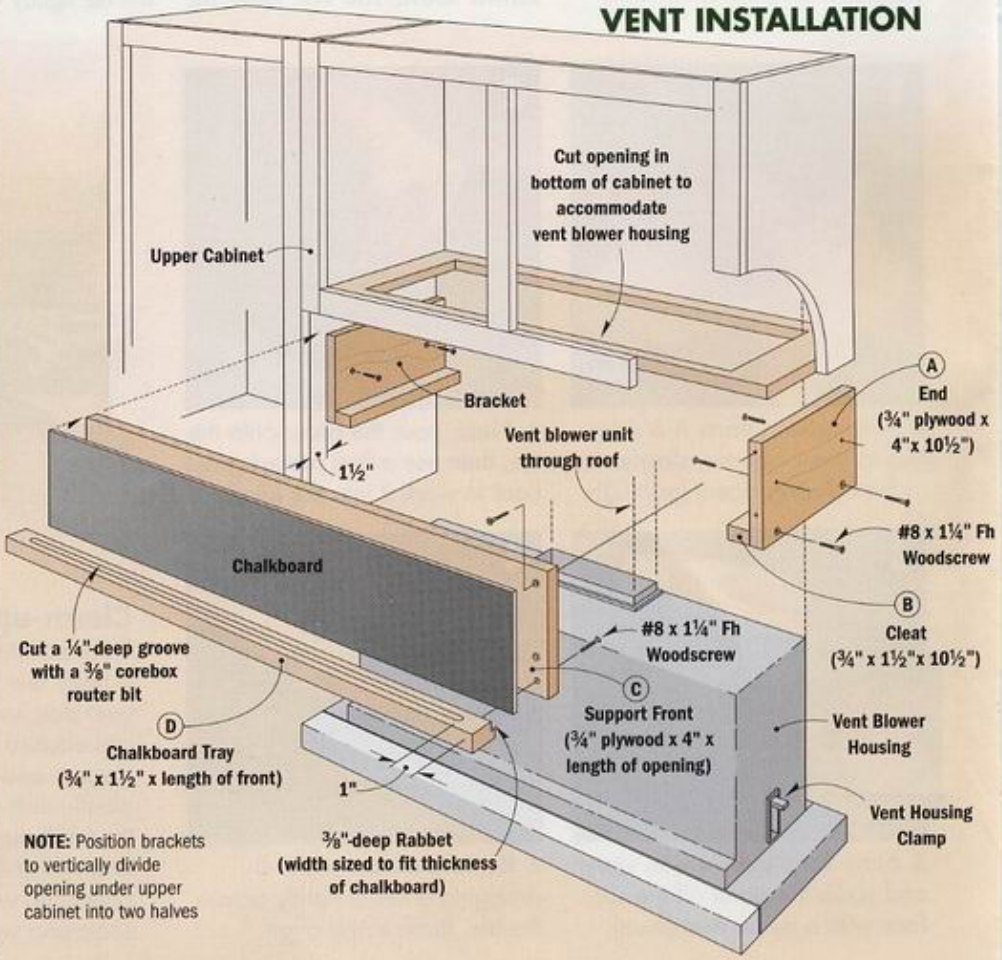
We installed the vent first. This particular unit lets you pull out the vent hood to exhaust steam or cooking odors, then slide it back in when you're done. This disappearing act makes for a clean looking installation. As a side benefit, a light switches on to illuminate the cooktop when you pull out the vent hood.

The blower for the vent fits into an opening cut in the bottom of the upper cabinet. There was just one problem. Our cabinet was only 18" tall — too far above the cooktop for the blower to be effective.

SUPPORT. The solution was to build a simple support for the blower that mounts below the upper cabinet. As you can see in the *Vent Installation Drawing* below, the support consists of a pair of L-shaped brackets and a front piece that spans the opening between the two flanking cabinets. Notice that the front also doubles as a mounting surface for a chalkboard.

Each bracket consists of two pieces: a plywood end (A) that attaches to the cabinet and a hardwood cleat (B) that forms a lip used to secure the blower *(Mounting Detail)*. After gluing and screwing the





brackets together, fasten them to the cabinets with screws. Then cut the front piece (C) to fit the opening and screw it to the brackets.

Note: The blower is installed as shown in the *Mounting Detail* on page 34. But in order to provide access when working on the message center, I did this after it was completed.

Message Center

Before installing the blower, I added the message center. It's made up of two pieces: a chalkboard for jotting notes and a hardwood tray (D) to hold the chalk. I bought an inexpensive chalkboard at a stationery store and cut it to size with a table saw.

As you can see in the *Support Detail* on page 34, the chalkboard fits into a rabbet that's cut in the back edge of the tray. To hold chalk, I also routed a long groove in the tray with a core box bit. The tray is glued and screwed to the front of the support. As for the chalkboard, construction adhesive will hold it securely in place.

Built-In Oven & Cooktop

Installing the built-in oven and cooktop was next on the list. But first, a bit of information about the planning that went on beforehand.

PLANNING. First of all, we didn't want to replace or rebuild the base cabinets, so we chose an oven that fit into the existing 30"-wide space. Also, make sure the cooktop you purchase will fit above the oven.

Finally, a word about electrical power. Our oven required its own circuit breaker, separate from the cooktop. So here again, we had an electrician install a junction box for each appliance.

INSTALL COOKTOP. To install the cooktop, all that's needed is to make the electrical connections, apply silicone sealant under the rim, and tighten the clamps supplied with the unit *(see Cooktop Mounting Detail below)*.

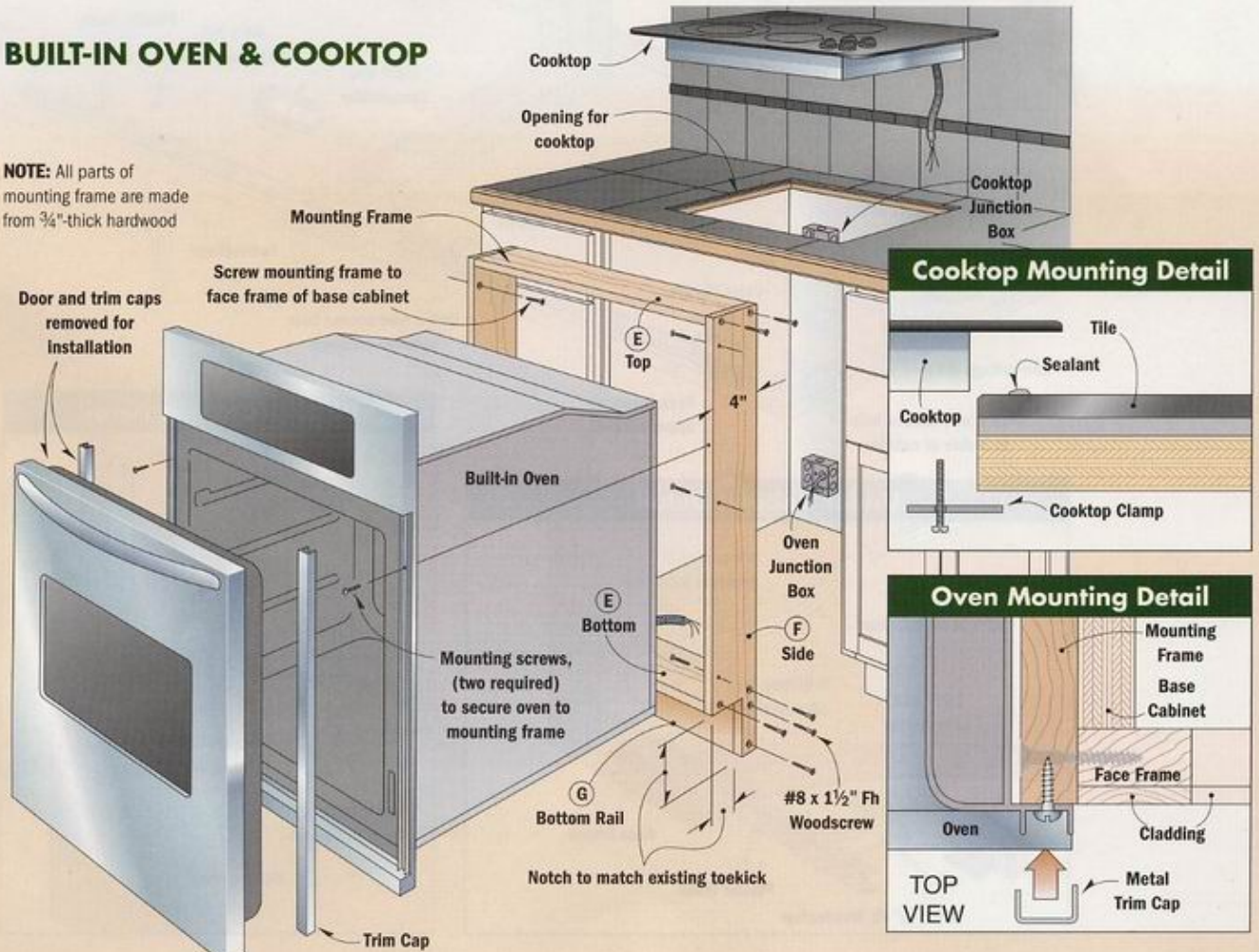
OVEN. The built-in oven is mounted to a hardwood frame that's attached to the base cabinets *(see Illustration below)*. The frame consists of a top and bottom (E) piece that fit between the two sides (F).

Notice that the bottom end of each side is notched to form a toe-kick. Then the frame is glued and screwed together. A rail (G) screwed to the bottom of the frame encloses the opening in the toekick.

Once the frame is done, set it flush with the front of the cabinets and screw it in place *(Oven Mounting Detail)*. The oven is screwed to the mounting frame, and a trim strip (supplied) covers the fasteners.

▲ In the Feb. 2003 issue of *Workbench*, we show you how to make a custom wood panel for the dishwasher.

BUILT-IN OVEN & COOKTOP



▲ Low-voltage lights cast a warm glow across the slate backsplash. A simple snap-in design lets you locate the lights wherever you want.

low-voltage ACCENT LIGHTING

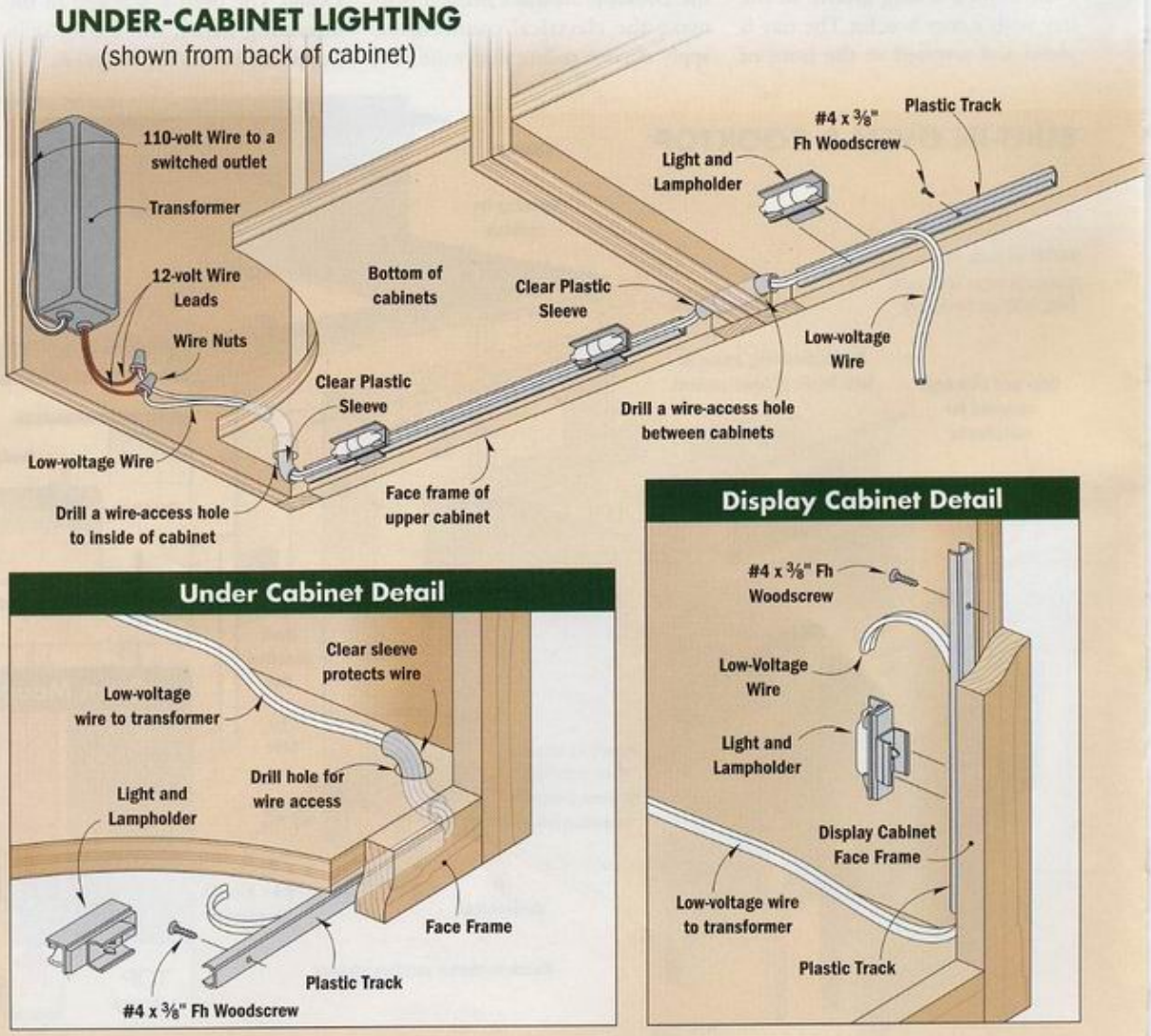
At this point of our project, the kitchen looked terrific. It looked even better though a short time later — right after we'd installed low-voltage lights under the upper cabinets *(Photo at left)*, and also in the display cabinets *(see Photo on page 37)*.

There are a number of low-voltage lighting systems available. The one we installed has nifty snap-in lampholders that make it easy to install a light wherever you want *(see Lighting Components on page 37)*. Not only that, you can quickly relocate a light if a spot is too dimly or brightly lit.

Before you install this low-voltage lighting system, take a minute to study the *Illustration* below to understand how it works.

Notice that there's a transformer that reduces the power from 110 volts to 12 volts. Running from this transformer is a low-voltage wire that's routed through access holes drilled in the cabinets. The wire fits into plastic tracks mounted to the cabinets. To illuminate an area, you simply snap a lampholder into the track and clip in a light.

PLANNING. Once you're familiar with the low-voltage system,



planning the details is quick and easy *(see Planning Guide below)*.

Start by measuring the total length of the "runs" for the plastic track and the low-voltage cable.

Next, you'll need to decide on the total number of lights and their wattage. I used 10-watt lights spaced 6" apart under the upper cabinets. As for the display cabinets, 5-watt lights, spaced the same distance apart, provided plenty of light.

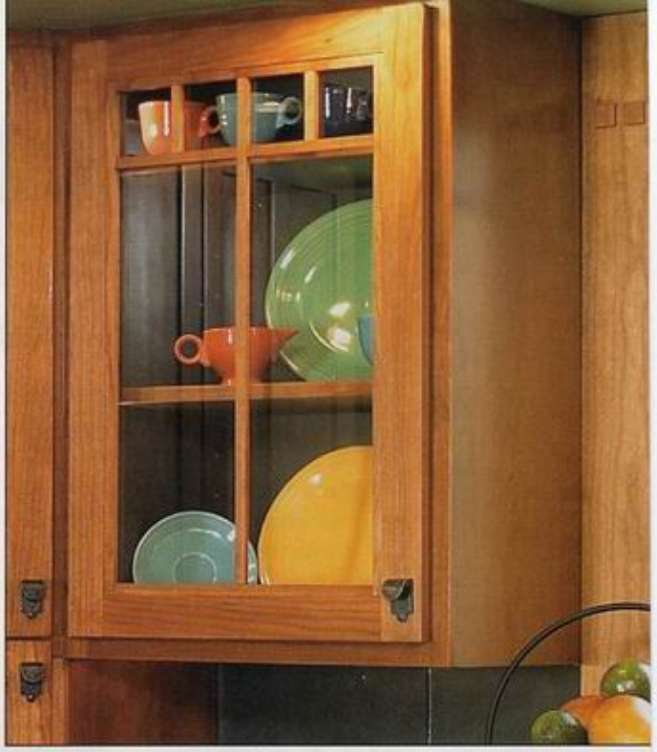
Once you've determined the total number of lights, add up their *combined* wattages (actual wattage consumed). This establishes the number and wattage of the transformer(s) you need. Select a transformer with a wattage that's greater than the total wattage consumed. For example, I used a 300-watt transformer for the 21 under-cabinet, 10-watt lights and a 60-watt transformer for the eight display cabinet lights (5 watts each).

One last note about transformers. There are two types. One plugs into a wall outlet; the other is "hard-wired" into an electrical circuit. To simplify the installation I used the plug-in type for both transformers.

ON/OFF SWITCHES. Of course, having to plug in a transformer every time you want to turn on the lights would be a nuisance. So we had an electrician install a switched outlet. This involved installing an electrical outlet *inside* the cabinet just above an existing wall outlet. Then the wall outlet itself was replaced with a combination switch/outlet that's used to turn the lights on and off.

INSTALL COMPONENTS. With the electrical requirements taken care of, it's time to install the rest of the components. To illuminate the backsplash, we mounted the track, cable, lampholders, and lights on the back of the face frames for the upper cabinets *(Under-Cabinet Lighting)*. Note: Line the access holes with the clear plastic sleeves (supplied) to avoid abrasion to the low-voltage wire.

DISPLAY LIGHTING. To highlight the dinnerware in the glass display cabinets, I mounted two tracks vertically behind the face frames *(Display Cabinet Detail)*. The three lights in each track illuminate the cabinet nicely, even with the solid wood shelves.

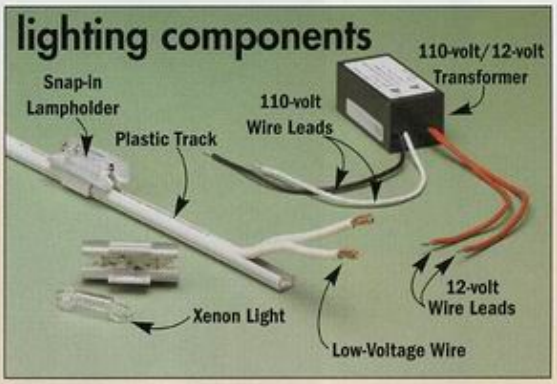


▲ To draw attention to the homeowners' collection of festive-colored dinnerware, we also installed low-voltage lights inside the display cabinet.

low-voltage planning guide

Light Spacing and Wattage		
Application	Lampholder Spacing	Light Wattage
Under Cabinet	6"	10W
Inside Cabinet	6"	5W

Light Performance			
Rated Light Wattage	Actual Wattage Consumed	Rated Light Life	Approx. Lumens per Light
5	4.0	16,000	33
10	8.4	12,000	83



▲ The components of the low-voltage lighting system we used are available from the source listed below. Use the *Guide* (at left) to plan your installation.

buyer's guide

WORKBENCH HOME

Appliances
KitchenAid
Dishwasher (KUDS01FKPA)
Cooktop (KECC508GBT)
Vent (KWVU205YBA)
Oven (KEBC107KSS)
Refrigerator (KTRC22EKSS)
800-422-1230
www.kitchenaid.com

Low-Voltage Lighting
Ambiance Linear
800-347-5483
info@seagulllighting.com

Epoxy Grout
Laticrete
651-264-5150
www.laticrete.com

Sink
Kohler
K-3352 Stainless Sink
800-456-4537
www.us.kohler.com

Faucet
Delta 470-SS Single Handle Pull-out Signature™ Series
www.deltafaucet.com

Closet Organizer

Need more closet space? Don't remodel — reconfigure the existing space instead by building this attractive cherry closet organizer.

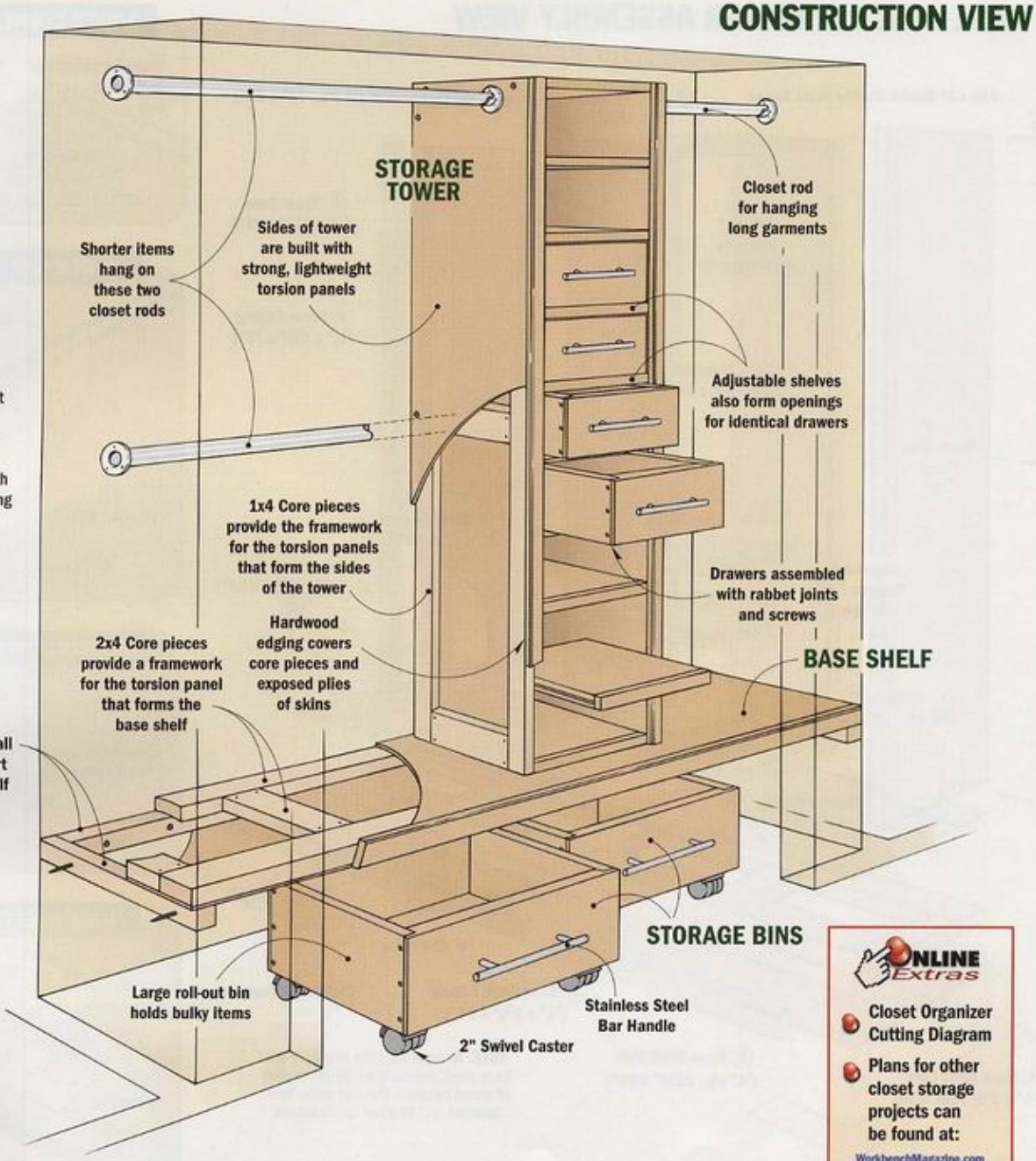
Most closets don't suffer from a *lack* of space, but rather an *inefficient use* of space. That's what makes this closet organizer so intriguing. It's designed to make better use of the *existing* space.

How? First of all, it eliminates the overhead shelf and uses that space at the bottom of the closet for a pair of roll-out storage bins. The additional height that's gained provides room for a tall storage tower supported by a sturdy shelf that spans the length of the closet *(Construction View)*.

To make the storage space in the tower as versatile as possible, it's divided into compartments that can be used either as shelves or to hold drawers. The tower also provides support for three closet rods.

With all the storage it provides, this closet organizer is a fairly large project. Even so, it doesn't require a lot of material or complicated techniques to build. That's because all of the structural parts of the organizer are *torsion panels* — a framework of dimensional lumber covered with thin plywood "skins." (For more about torsion panels, see page 48.)

CONSTRUCTION VIEW



NOTE: This closet organizer is designed to fit inside an 8 ft.-tall closet with a 6 ft.-wide opening

ONLINE Extras

- Closet Organizer Cutting Diagram
- Plans for other closet storage projects can be found at: WorkbenchMagazine.com

MATERIALS LIST

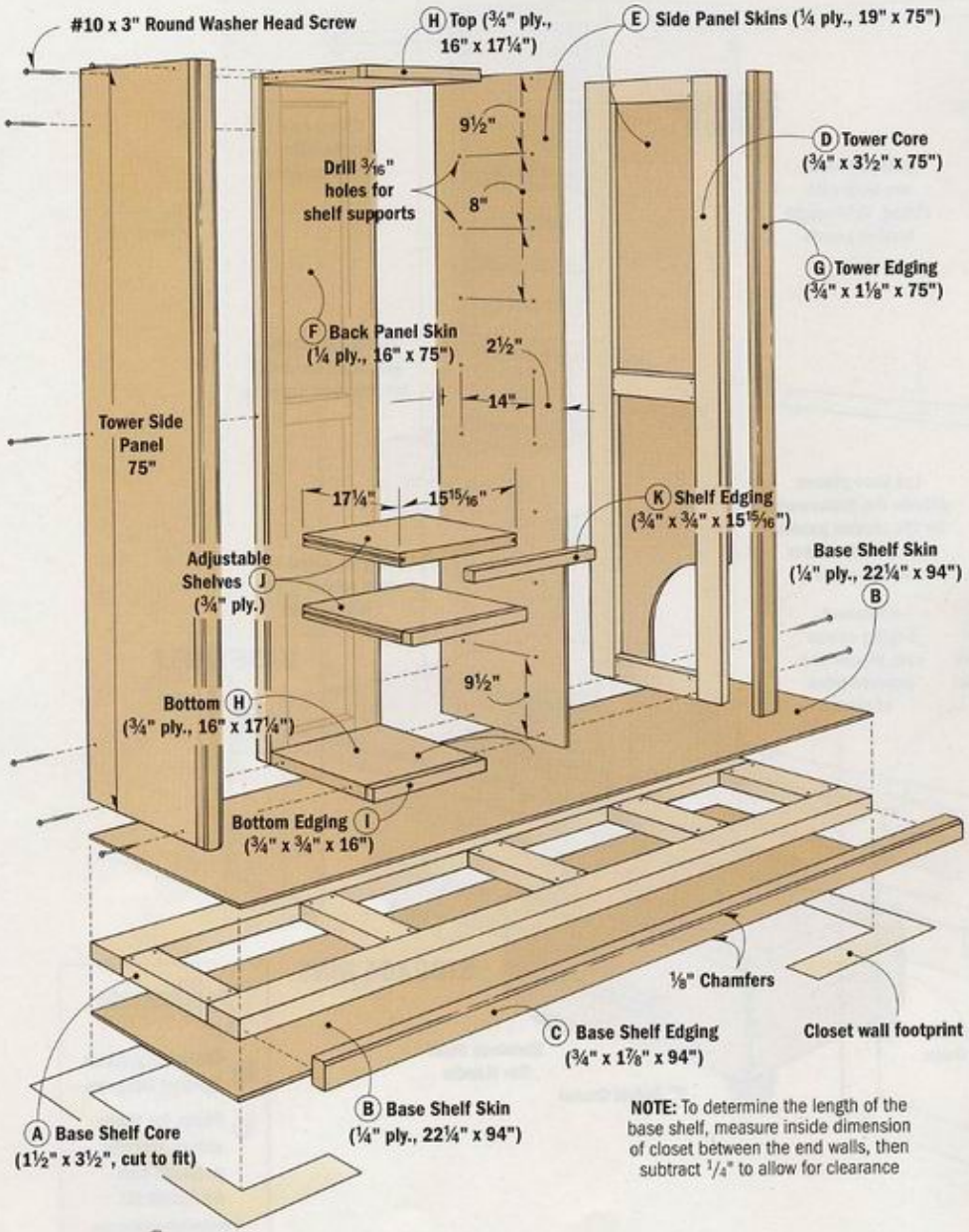
A (7)	Base Shelf Core Pcs. (2x4)	$1\frac{1}{2}$" x $3\frac{1}{2}$" x 23 lin. ft.*
B (2)	Base Shelf Panel Skins (cherry ply.)	$\frac{1}{4}$" x $22\frac{1}{4}$" x 94"
C (1)	Base Shelf Edging (cherry)	$\frac{3}{4}$" x $1\frac{7}{8}$" x 94"
D (15)	Tower Core Pcs. (1x4)	$\frac{3}{4}$" x $3\frac{1}{2}$" x 46 lin. ft.*
E (4)	Tower Side Panel Skins (cherry ply.)	$\frac{1}{4}$" x 19" x 75"
F (1)	Tower Back Panel Skin (cherry ply.)	$\frac{1}{4}$" x 16" x 75"
G (2)	Tower Edging (cherry)	$\frac{3}{4}$" x $1\frac{1}{8}$" x 75"
H (2)	Tower Top & Bottom (cherry ply.)	$\frac{3}{4}$" x 16" x $17\frac{1}{4}$"
I (2)	Top & Bottom Edging (cherry)	$\frac{3}{4}$" x $\frac{3}{4}$" x 16"
J (8)	Adjustable Shelves (cherry ply.)	$\frac{3}{4}$" x $15\frac{15}{16}$" x $17\frac{1}{4}$"
K (8)	Shelf Edging (cherry)	$\frac{3}{4}$" x $\frac{3}{4}$" x $15\frac{15}{16}$"
L (8)	Drawer Fronts & Backs (cherry ply.)	$\frac{3}{4}$" x 7" x $15\frac{3}{4}$"
M (8)	Drawer Sides (cherry ply.)	$\frac{3}{4}$" x 7" x $17\frac{1}{2}$"
N (4)	Bin Fronts & Backs (cherry ply.)	$\frac{3}{4}$" x $9\frac{7}{8}$" x $29\frac{7}{8}$"
O (4)	Bin Sides (cherry ply.)	$\frac{3}{4}$" x $9\frac{7}{8}$" x $19\frac{1}{2}$"
P (72)	Drawer & Bin Edging (cherry)	$\frac{1}{16}$" x $\frac{3}{4}$" x 54 lin. ft.*
Q (4)	Drawer Bottoms (cherry ply.)	$\frac{1}{4}$" x $14\frac{7}{8}$" x 17"
R (2)	Bin Bottoms (cherry ply.)	$\frac{1}{4}$" x 29" x 19"
S (8)	Caster Spacer Blocks (cherry ply.)	$\frac{1}{2}$" x 3" x 3"
T (3)	Cleats (fir)	2" x 2", cut to fit

* Includes extra for waste

HARDWARE

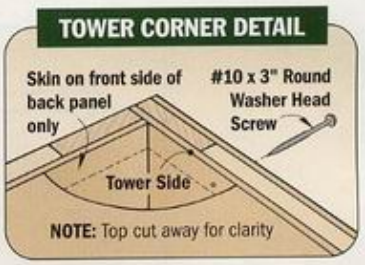
- (31) #10 x 3" Round Washer Head Screws (see page 40)
- (72) #8 x $1\frac{1}{2}$" Fh Woodscrews
- (16) #8 x $\frac{1}{2}$" Sheet Metal Screws
- (4) Stainless Steel Bar Handles ($7\frac{7}{8}$") w/Mounting Bolts (included)
- (2) Stainless Steel Bar Handles ($12\frac{29}{32}$") w/Mounting Bolts (included)
- (32) Low Profile Shelf Supports
- (8) 2" Swivel Casters
- (3) Closet Rods w/Supports and Screws
- 1" Brads

BASE SHELF & TOWER ASSEMBLY VIEW

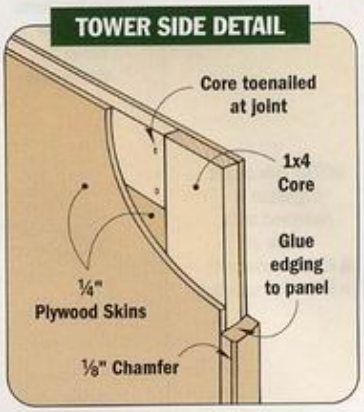


NOTE: To determine the length of the base shelf, measure inside dimension of closet between the end walls, then subtract 1/4" to allow for clearance

TOWER CORNER DETAIL

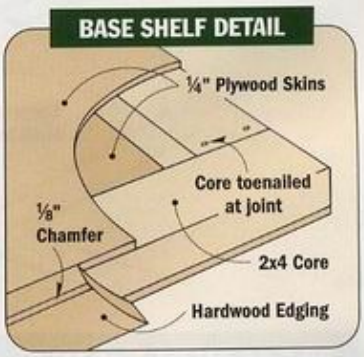


TOWER SIDE DETAIL



ADJUSTABLE SHELF DETAIL

BASE SHELF DETAIL



▲ I used round-head screws with "built-in" washers to assemble the tower. Available from McFeely's at McFeely's.com or 800-443-7937.

DIVIDING THE CLOSET SPACE

The heart of this closet organizer is a wide base shelf and a tall storage tower *(Assembly View)*. To simplify the construction, the base shelf and tower are both built with torsion panels.

BASE SHELF COMES FIRST

The base shelf is the first and largest of the torsion panels that make up this project. In fact, it spans the entire length of the closet. To make it easier to fit the shelf into the closet, it's best to allow for some clearance at each end. I made mine 1/4" shorter than the distance between the end walls of the closet.

The base shelf also supports the weight of the tower. That's why I "beefed up" this torsion panel by using 2x stock for the core pieces (A). (The smaller panels for the tower that come later are made with 1x core pieces.) To complete the panel, 1/4" cherry plywood skins (B) are glued to both sides of the core pieces.

To cover the exposed core pieces (and the edges of the skins), the next step is to apply hardwood edging (C) to the front of the base shelf. After gluing the edging in place, I eased the sharp edges by routing an 1/8" chamfer along the top and bottom edges *(Base Shelf Detail)*.

BUILD A STORAGE TOWER

The storage tower is made up of three torsion panels (two identical side panels and a narrower panel for the back). As I mentioned, these panels

are thinner than the base shelf, which gives the tower a "lighter" look.

To create this slim profile, I used 1x stock for the core pieces (D). As with the base shelf, 1/4" cherry plywood skins cover the core pieces.

One thing to note is the skins (E) cover *both* sides of the side panels. But the back panel is different. Since it sits against the closet wall, I glued a single skin (F) to the *front* only of this panel, leaving the back open.

EDGING. Like the base shelf, I applied edging (G) to the side panels *(Tower Side Detail)*. These hardwood strips are glued to the front edge of the side panels only. There's no need to cover the back edges since they won't be visible. For that same reason, the back panel has no edging at all *(Tower Corner Detail)*.

SHELF SUPPORT HOLES. After gluing the edging in place, I drilled a series of 1/4" holes in the side panels for the shelf supports. Note the locations of these holes in the *Assembly View* on page 40.

Now that all the torsion panels are completed, there's one more thing to do before assembling the tower. That's to make the top and bottom (H). These are pieces of 3/4" plywood with strips of hardwood edging (I) glued to the front.

TOWER ASSEMBLY

Now it's just a matter of assembling the storage tower. It's a large unit, but it should go together easily because it's held together with screws.

Of course, this means that the screw heads will be visible once it's assembled. So for appearance, I used a round-head screw with a "built-in" washer *(see Photo on page 40)*. A special coating on the screws creates a finished look. Also, the deeply-cut threads provide a lot of holding power.

One thing you *won't* have to worry about when assembling the tower is the panels flexing or twisting. (The rigidity of the torsion panels takes care of that.) However, be sure to predrill the holes for the screws. That's because the screw threads will be engaged in *both* parts. By predrilling the holes, it prevents the threads from "catching" in the front part, which would hold the panels apart. With that in mind, go ahead and assemble the tower, using the sequence shown in the *Tower Assembly Illustration* below.

ADD ADJUSTABLE SHELVES

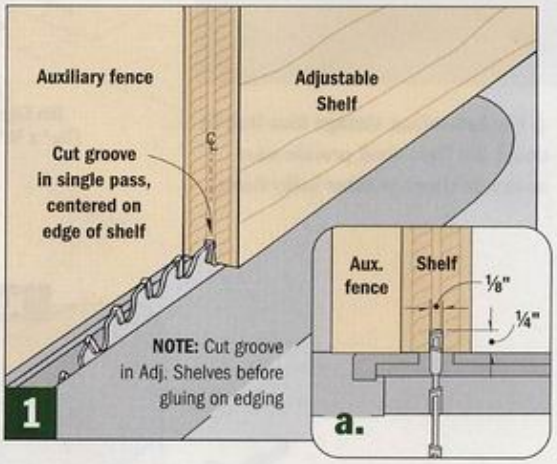
With the tower together, you can shift your focus to the adjustable shelves that fit inside it. In addition to providing storage, these shelves also form the openings for the drawers.

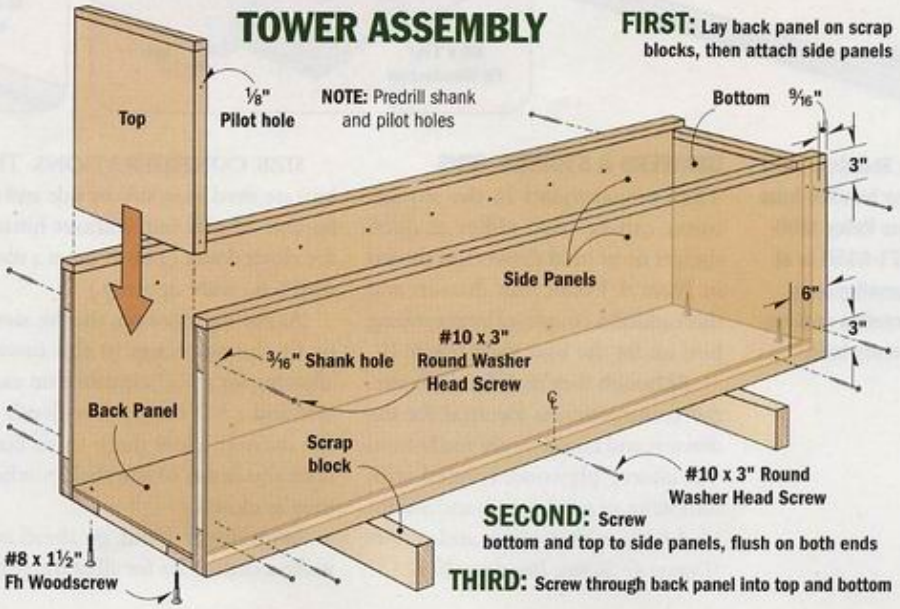
Like the top and bottom, the shelves (J) are made of 3/4" plywood. But there are two differences worth noting. First, they're 1/16" narrower so you can slide them in and out. Second, they have a groove in each side that fits over the low-profile shelf supports I used *(see Photo at right and Adjustable Shelf Detail on page 40)*.

CUT GROOVES. The table saw makes quick work of cutting the grooves in the shelves. As you can see in *Figure 1*, you'll need to stand each shelf on edge as you make the cut. To keep the shelf from tipping, attach a tall auxiliary fence to the rip fence. Then, after setting the rip fence so the blade is centered on the thickness of the shelf, make a single pass to cut each groove *(Figs. 1 and 1a)*.

EDGING. Don't worry about the groove showing. It gets covered up by the hardwood edging (K) that's glued to the fronts of the shelves.

▲ A groove cut in the sides of the adjustable shelves allow them to slide onto low-profile supports *(shown above)*. The supports are available from Rockler (800-279-4441).



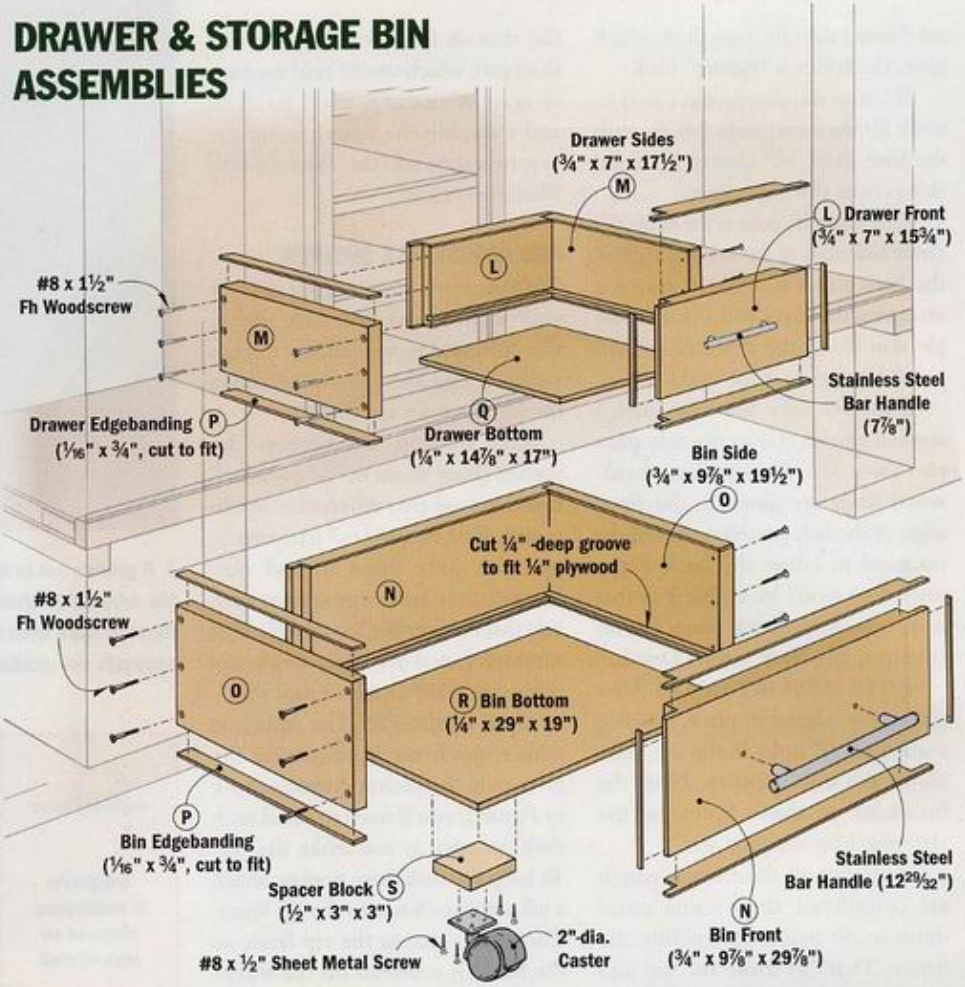


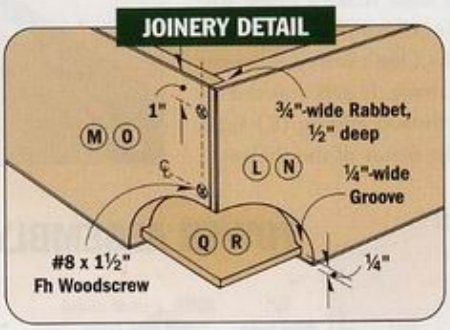
▲ To simplify construction, the drawers slide on the adjustable shelves that form the openings in the tower.

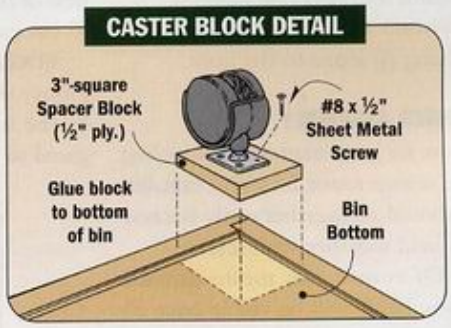
▲ The two rolling storage bins that fit under the base shelf provide easy access to shoes or other bulky items.

▲ Stainless steel bar handles from Lee Valley (800-871-8158 or at leevalley.com) create a contemporary look.

DRAWER & STORAGE BIN ASSEMBLIES







DRAWERS & STORAGE BINS

The compartments in the storage tower can be used either as open shelves or to hold drawers, as shown in *Photo A*. I built four drawers and then added a couple of larger rolling bins under the base shelf *(Photo B)*.

Although they're different in size, the construction is identical for the drawers and bins. They're made from ¾" cherry plywood, banded with thin strips of solid wood, and assembled with rabbet joints and screws *(Drawer & Storage Bin Assemblies)*.

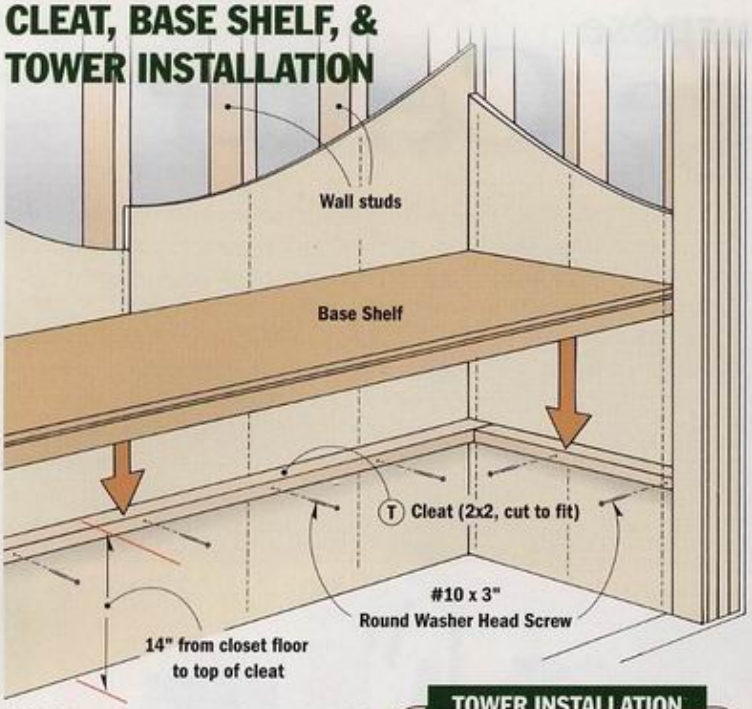
SIZE CONSIDERATIONS. The bins are sized to sit side by side and to be able to pull out without hitting the closet doors. (This assumes a standard 6 ft.-wide opening.)

As for the drawers, they're sized to fit the openings in the tower, allowing for a 1/16" clearance on each side and a 1/4" on top. The depth of the drawers allow them to sit flush with the fronts of the shelves when they're closed.

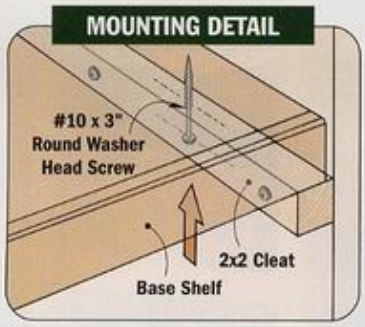
With that in mind, go ahead and make a cutting list for all of the parts. Don't forget to take the 1/2"-deep rabbets into account when sizing the side pieces. The thin strips of edgebanding (mine are 1/16" thick) also play a part in determining the size of the drawer and bin pieces.

To see what I mean, take a look above. Notice the fronts and backs (L, N) are edgebanded on all four edges. For the sides (M, O) though, only the top and bottom edges are covered. (There's no need to band the ends since they fit into the rabbets in the front and back.)

CLEAT, BASE SHELF, & TOWER INSTALLATION



NOTE: Mount cleats to studs, then set base shelf in place and fasten to cleats from underneath



▲ **To install the closet organizer, start by setting the base shelf on 2x2 cleats mounted to the walls. Then fasten the shelf to the cleats by driving in screws from underneath.**

▲ **Thanks to the lightweight torsion panels that make up the storage tower, it's a one-person job to lift it onto the shelf. Use screws (or drywall anchors) to secure it to the wall.**

There's quite a bit of edgebanding (P) to apply. The shortcut shown on page 83 will help speed things along.

Once the edgebanding is sanded smooth, the next step is to cut the rabbets in the front and back pieces to hold the sides *(Joinery Detail)*. Then, after cutting a groove for the bottoms (Q and R), assemble the drawers and bins with glue and screws.

ADDING THE FINAL TOUCHES

At this point, there are only a couple more details to take care of.

I wanted the drawers and bins to have a contemporary look, so I used stainless steel bar handles *(Photos on page 42)*. To ensure the handles align from drawer to drawer, I made a template for drilling the holes *(page 82)*.

A set of swivel casters completes the bins and makes it easy to roll them out from under the base shelf. In order for the casters to swivel, though, you'll need to screw them down to some small plywood spacer blocks (S) first, which are glued to the bottom of the bins *(Caster Block Detail)*.

OUTFITTING THE CLOSET

After giving the entire project a light sanding and appying a finish, it's time to install it in the closet *(see above)*.

Notice the base shelf rests on 2x2 cleats (T) attached to the closet walls *(Top Photo)*. Be sure to allow clearance for the bins to roll under the shelf. I positioned the top of the cleats 14" above the floor and then screwed them to the wall studs. Now fasten the base shelf to the cleats from underneath, as shown in the *Mounting Detail*.

To complete the organizer installation, secure the tower to the back wall, making sure you hit at least one stud *(Tower Installation)*.

Multipurpose Storage Center

Most storage problems come from a lack of space — there's just not enough room for all your stuff. But that doesn't mean that having a lot of space makes storage easy.

Take the laundry/utility room shown here as an example. It's a large room with plenty of storage possibilities. The challenge then becomes making the most of the available space.

This storage center does just that. It stands on its own, with no need to connect it or otherwise build it into the room. With its freestanding design, this unit offers storage in front *and* back, as well as in a tall tower on the end *(see Photos below)*. It also has a large worksurface built right into it that serves as a convenient folding table. It would also make a great light-duty workbench, too.

If there's a catch to all this convenience, it's that this storage center is quite large. This meant we had to build it without making it so heavy it would require a framing crew to assemble.

TORSION PANELS

The answer turned out to be torsion panels — a fancy name for a simple type of construction used to build strong, lightweight panels.

The short explanation of a torsion panel is a wood core that's clad with thin sheets of material, or "skins." The longer version, as well as all the specifics of building panels like these, are explained in the article that begins on page 48.

FIVE PANELS. If you take a look at the *Construction View* below, you'll notice that the structure for this storage center is made up of five large torsion panels. Three of the panels form a U-shaped tower at one end (two sides and a back). This tower is connected to a large center wall that spans the middle of the storage center. The center wall in turn is attached to an end wall to form a T-shaped structure.

All of the panels are made the same way — with 2x stock for the core pieces (A) and either 1/4" pegboard (B, F) or 1/4" hardboard for the skins (C, D, E, and G). Note: To provide hanging storage, I used pegboard on the outer faces of the tower sides and the end wall.

Once the panels are built, it's simply a matter of gluing maple edging (H) to the exposed edges and installing levelling glides *(Levelling Glide Detail)*.

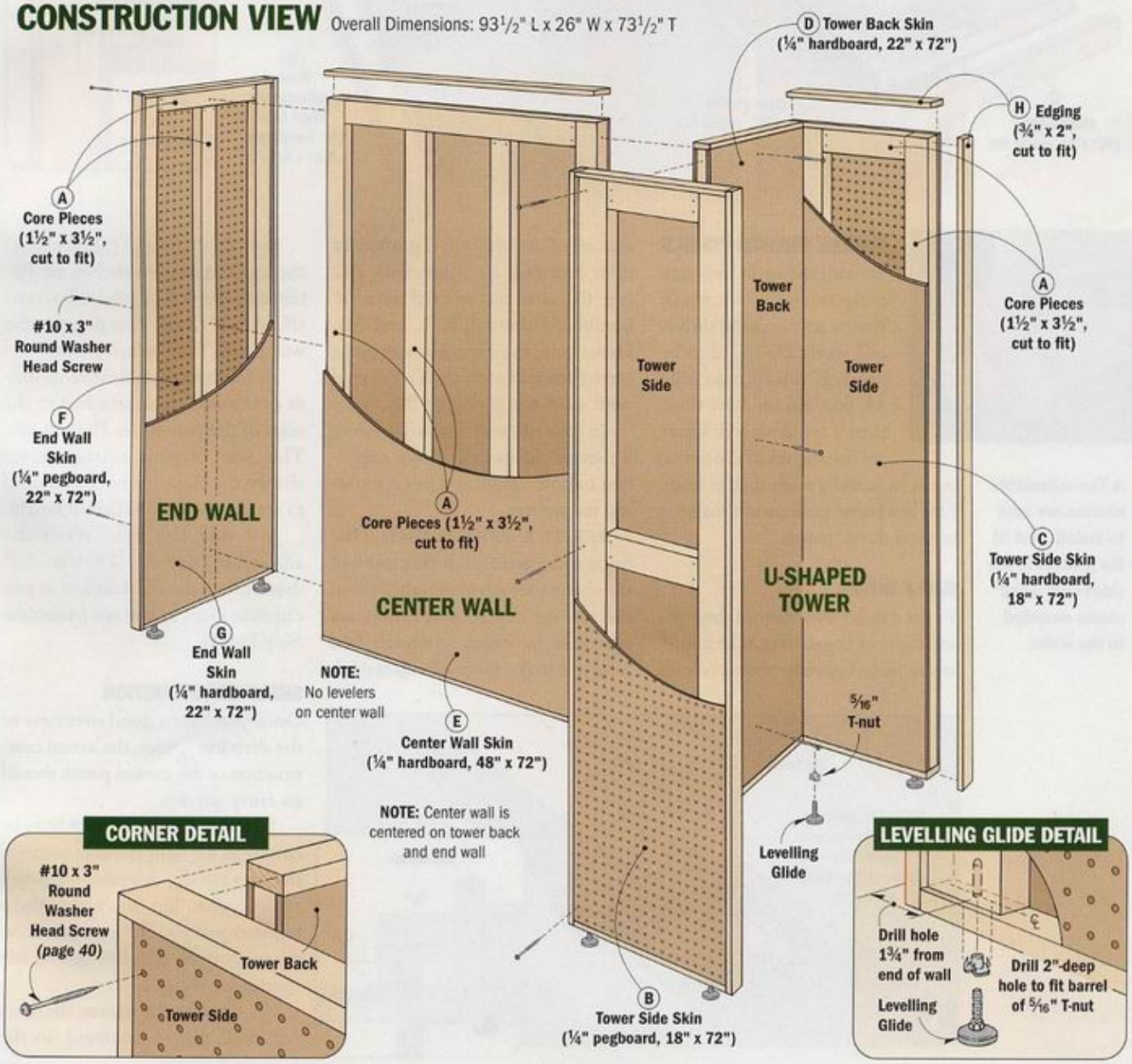
ASSEMBLE THE PANELS. With those things out of the way, you can begin assembling the structure.

Start by building the tower section flat on its back. To connect the panels, I used round washer head screws, as shown in the *Corner Detail*. Then stand the tower up, position it where you want it, and level it. Finally, to complete the assembly, attach the center and end walls, using the same type of screws as before.

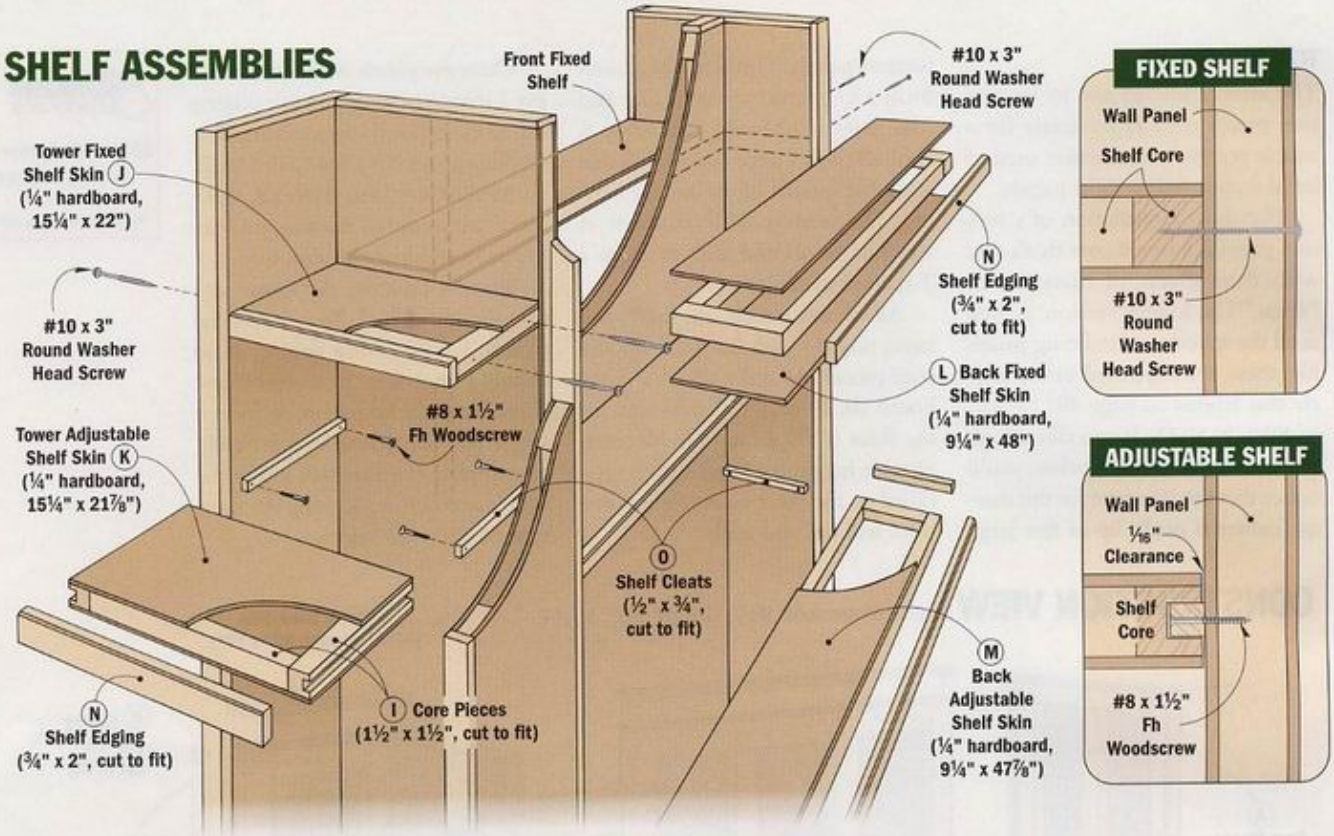
ONLINE Extras
Storage Center Cutting Diagram
WorkbenchMagazine.com

CONSTRUCTION VIEW

Overall Dimensions: 93 1/2" L x 26" W x 73 1/2" T



SHELF ASSEMBLIES



▲ **The adjustable shelves are easy to install. Just fit the grooves in the sides over wood cleats mounted to the walls.**

TWELVE TORSION PANELS

As with the main structure of the storage center, I built torsion panels for the shelves and worktable — 12 to be exact. If you turn to page 44, you can see how these panels are arranged. There are five shelves in the tower, five in back, and a single shelf in front. The worktable underneath makes it an even dozen panels.

SHELF NOTES

To get a quick overview of the construction of the shelves, take a look at the *Shelf Assemblies* above. Notice that *all* of the shelves, regardless of their location, are made with 2x2 core (I) pieces and covered with 1/4" hardboard skins (J, K, L, and M). Here again, the exposed core piece on the front of each shelf is covered with solid-wood edging (N).

In spite of these similarities, there are several differences that are important to note before you begin building the shelves.

FIXED & ADJUSTABLE. One thing to be aware of is that some of the shelves are permanently *fixed* to the storage center, and others are *adjustable*. So which is which? And why not make them all adjustable?

First of all, to add rigidity, *all* of the top and bottom shelves are fastened to the wall panels with screws *(Fixed Shelf Detail)*. This prevents the wall panels from splaying out.

As for the adjustable shelves, they fit over wood cleats attached to the sides of the panels *(see Photo at left)*. This way, if your storage needs change, the cleats can be repositioned to set the shelf at a different height.

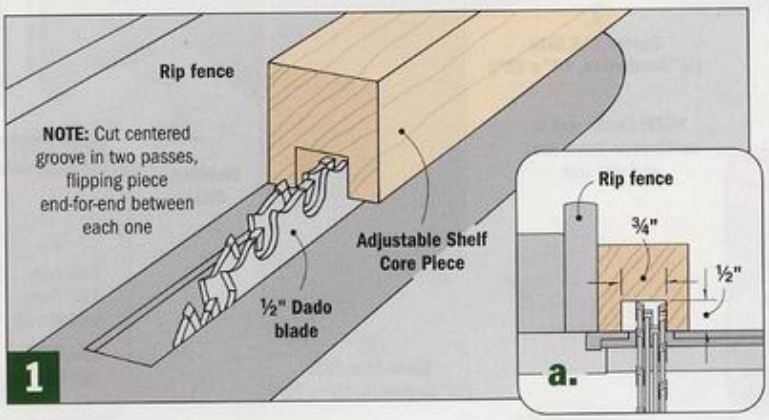
Just one last note about the adjustable shelves. They're 1/8" shorter than the fixed shelves so you can slide them in and out *(Adjustable Shelf Detail)*.

SHELF CONSTRUCTION

Once you have a good overview of the shelving system, the actual construction of the torsion panels should go fairly quickly.

SKINS & CORE PIECES. Start by cutting all the skins and core pieces to size. You can dry-assemble the panels at this point, but don't glue them together just yet. The core pieces on the ends of the *adjustable* shelves still need some work.

To fit over the cleats, there's a 3/4"-wide groove centered on the



outer edge of each of these core pieces. A quick way to cut these grooves is to mount a 1/2" dado blade in the table saw and use a simple two-pass method *(Figs. 1 and 1a)*.

Start by positioning the rip fence so the core piece is *roughly* centered on the blade. Then make two passes, flipping the workpiece end-for-end between each one. If the groove isn't quite 3/4", you'll have to enlarge it a bit. Just nudge the fence away from the blade and make two more passes.

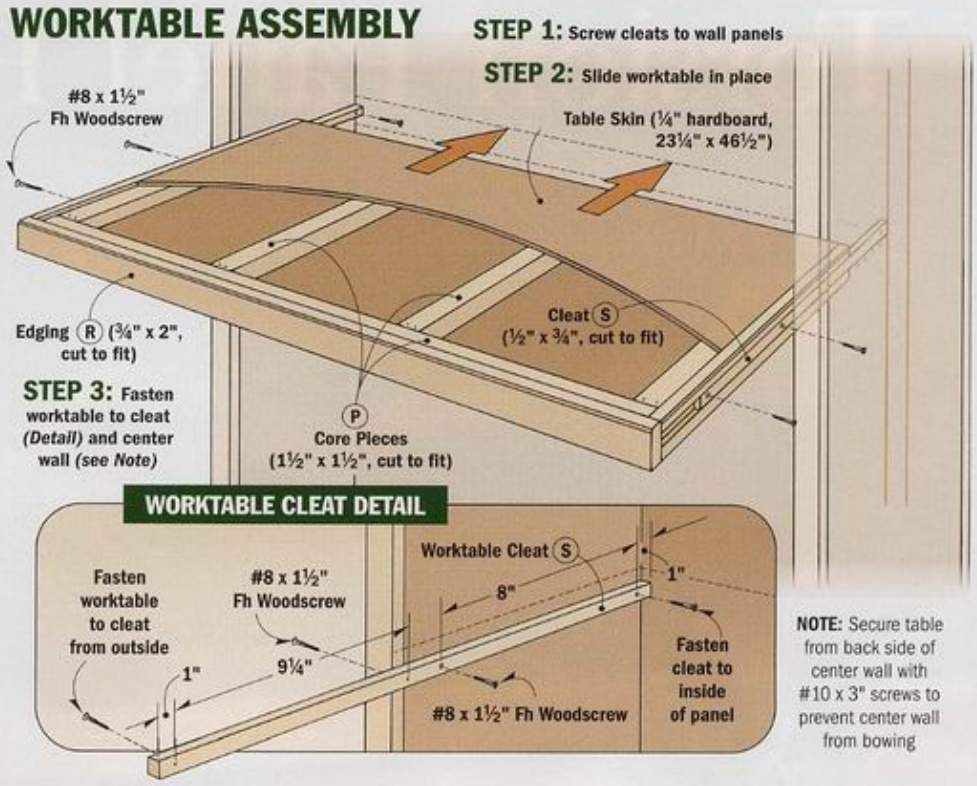
After cutting all the grooves, go ahead and assemble the torsion panels for the shelves. The ends of the grooves in the adjustable shelves will be exposed, at least for now, but gluing on the edging covers them up.

CLEATS. At this point, you're ready to cut the cleats (O) to fit the grooves. The goal is to get the cleat to fit snugly in the groove. If it's too tight, the shelves will bind — too loose and it produces a sloppy fit.

To end up with the right size cleats, I started by ripping 3/4"-thick hardwood into 1/2"-wide strips. Then I used a hand plane to shave just enough off each strip for a perfect fit.

INSTALL SHELVES. Now it's just a matter of installing the shelves. As I mentioned, the fixed shelves are fastened to the walls with the same washer head screws used to assemble the main structure.

To install the adjustable shelves, screw the cleats to the walls first, making sure each pair is aligned. Then slide the shelves into place.



NOTE: Secure table from back side of center wall with #10 x 3" screws to prevent center wall from bowing

A WORKTABLE WRAPS IT UP

Once all the shelving is installed, all that's left is to make the torsion panel for the worktable. By now, this process should be pretty familiar.

Like the shelves, the table is built with 2x2 core pieces (P) and 1/4" hardboard skins (Q), as shown in the *Worktable Assembly* above. As before, solid-wood edging (R) covers the front. But here, since the table extends past the walls of the storage center, I applied edging to both ends of this panel, as well.

Notice that these pieces of edging have a groove that fits over cleats (S) mounted to the walls, the same as the shelves. What's different is the *length* of the cleats. As you can see in the *Worktable Cleat Detail*, they extend past the front of the wall. As you slide the table over the cleats, the part that sticks out "fills" the exposed groove in the edging. To secure the table, simply install a screw in the end of the cleat.

▲ **A large torsion panel makes an ideal folding and sorting table.**

MATERIALS LIST

STORAGE CENTER PANELS

A (26)	Panel Core Pcs. (2x stock)	1½" x 3½" x 120 lin. ft.*
B (2)	Tower Side Skins (pegboard)	¼" x 18" x 72"
C (2)	Tower Side Skins (hardboard)	¼" x 18" x 72"
D (2)	Tower Back Skins (hardboard)	¼" x 22" x 72"
E (2)	Center Wall Skins (hardboard)	¼" x 48" x 72"
F (1)	End Wall Skin (pegboard)	¼" x 22" x 72"
G (1)	End Wall Skin (hardboard)	¼" x 22" x 72"
H (16)	Panel Edging (maple)	¾" x 2" x 63 lin. ft.*

FIXED & ADJUSTABLE SHELVES

I (44)	Shelf Core Pcs. (2x stock)	1½" x 1½" x 168 lin. ft.*
J (4)	Tower Fixed Shelf Skins (hardboard)	¼" x 15¼" x 22"
K (6)	Tower Adj. Shelf Skins (hardboard)	¼" x 15¼" x 21⅞"
L (6)	Back/Front Fixed Shelf Skins (hardboard)	¼" x 9¼" x 48"
M (6)	Back/Front Adj. Shelf Skins (hardboard)	¼" x 9¼" x 47⅞"
N (11)	Shelf Edging (maple)	¾" x 2" x 35 lin. ft.*
O (12)	Shelf Cleats (maple)	½" x ¾", cut to fit

WORKTABLE

P (6)	Worktable Core Pcs. (2x stock)	1½" x 1½" x 15 lin. ft.*
Q (2)	Worktable Skins (hardboard)	¼" x 23¼" x 46½"
R (3)	Worktable Edging (maple)	¾" x 2" x 8 lin. ft.*
S (3)	Worktable Cleats (maple)	½" x ¾", cut to fit

* Includes extra material for trimming to size

HARDWARE

- (36) #10 x 3" Round Washer Head Screws (see page 40)
- (32) #8 x 1½" Fh Woodscrews
- (6) Levelling Glides w/T-nuts (sold as packages of 4, T-nuts included)
- 1" Brads

Torsion Panel Primer

Discover the hidden strength of torsion panels — then use this simple construction method to build an amazing variety of projects.

Chances are, you landed on this page because you saw one, or both of the storage projects in this issue that use torsion panels (*Closet Organizer,* page 38, and *Multipurpose Storage Center,* page 44). And more than likely, you're wondering what a torsion panel is and why we're so intrigued by them.

WHAT'S A TORSION PANEL?

The simple explanation of a torsion panel is that it's a solid-wood frame (core) covered on both sides with a thin sheet of material, or "skin."

In the *Photo* above, one of the torsion panels for the multipurpose storage center is being assembled. Notice how the 1/4" pegboard "skin" is glued to the wood frame, which is made of dimensional lumber. (You can also use many other kinds — and sizes — of material. I'll tell you more about that later.)

STRONG & LIGHTWEIGHT

The biggest advantage of this type of construction is that it makes it easy to build large panels that are incredibly strong and lightweight (relative to their size).

The reason a torsion panel is lightweight is because it's essentially hollow. (Think of a hollow-core door, which is in fact, a torsion panel.) But why it's so strong is harder to explain.

Basically, it comes down to this — once the skin is glued to the frame, you've got a rigid structure that resists movement in every direction. For the panel to bend or twist, the skin and the frame would have to "let go" of each other. As long as the glue joints are sound, that won't happen.

These glue joints make a torsion panel strong the same way an airplane wing is strong. There isn't a lot of material involved, but the way it's put together gives it strength that's much greater than the sum of its parts.

MULTIPLE MATERIALS

As I mentioned, there's a wide range of materials that can be used to assemble a torsion panel.

CORE MATERIALS. Take the core materials for instance. In the torsion panel shown above, we used 2x lumber. This made the panel heavier, but it provided better holding power for the screws used to fasten the storage center together. Lighter weight material like 1x stock

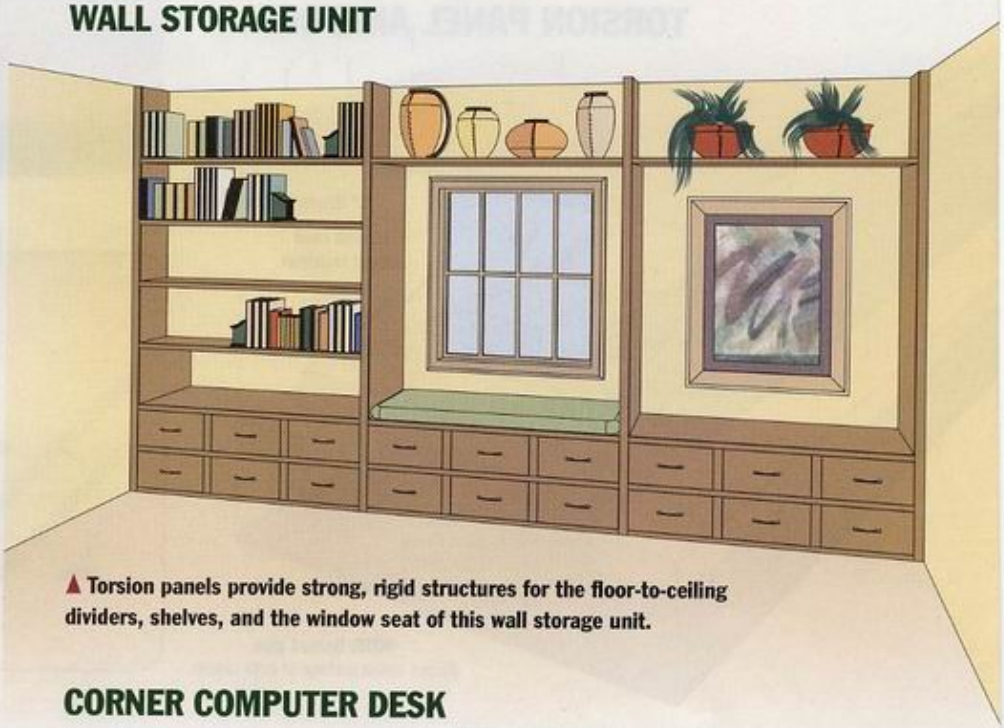
(used in the panels for the tower on the closer organizer), or strips of 1/4", 1/2", or 3/4" plywood are all good options for the core.

SKINS. There are also lots of materials to choose for the *skin* of a torsion panel. For the two projects featured in this issue, we used 1/4"-plywood, pegboard, and hardboard. But for lighter-duty projects, 1/8" sheet material would also work fine. (For more options, turn to page 51.)

PROJECT POSSIBILITIES

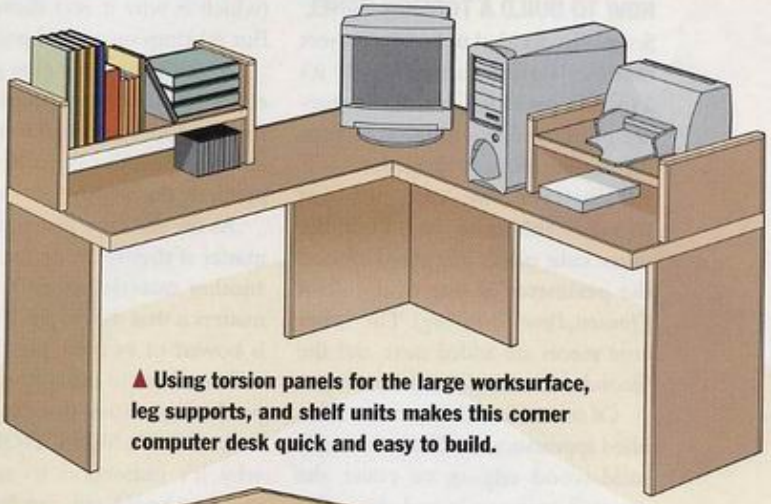
When you combine all the material options with the structural benefits of torsion panels, the project possibilities are endless. We've shown a few at right just to get you started. For tips and techniques on building a torsion panel, turn to page 50.

WALL STORAGE UNIT



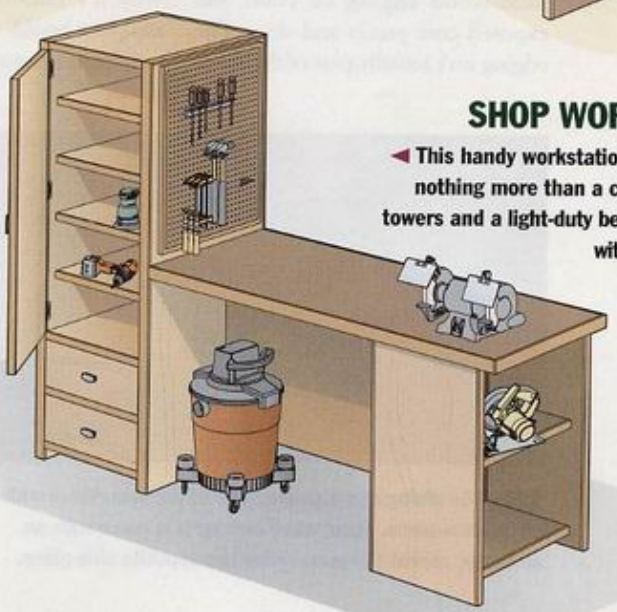
▲ **Torsion panels provide strong, rigid structures for the floor-to-ceiling dividers, shelves, and the window seat of this wall storage unit.**

CORNER COMPUTER DESK

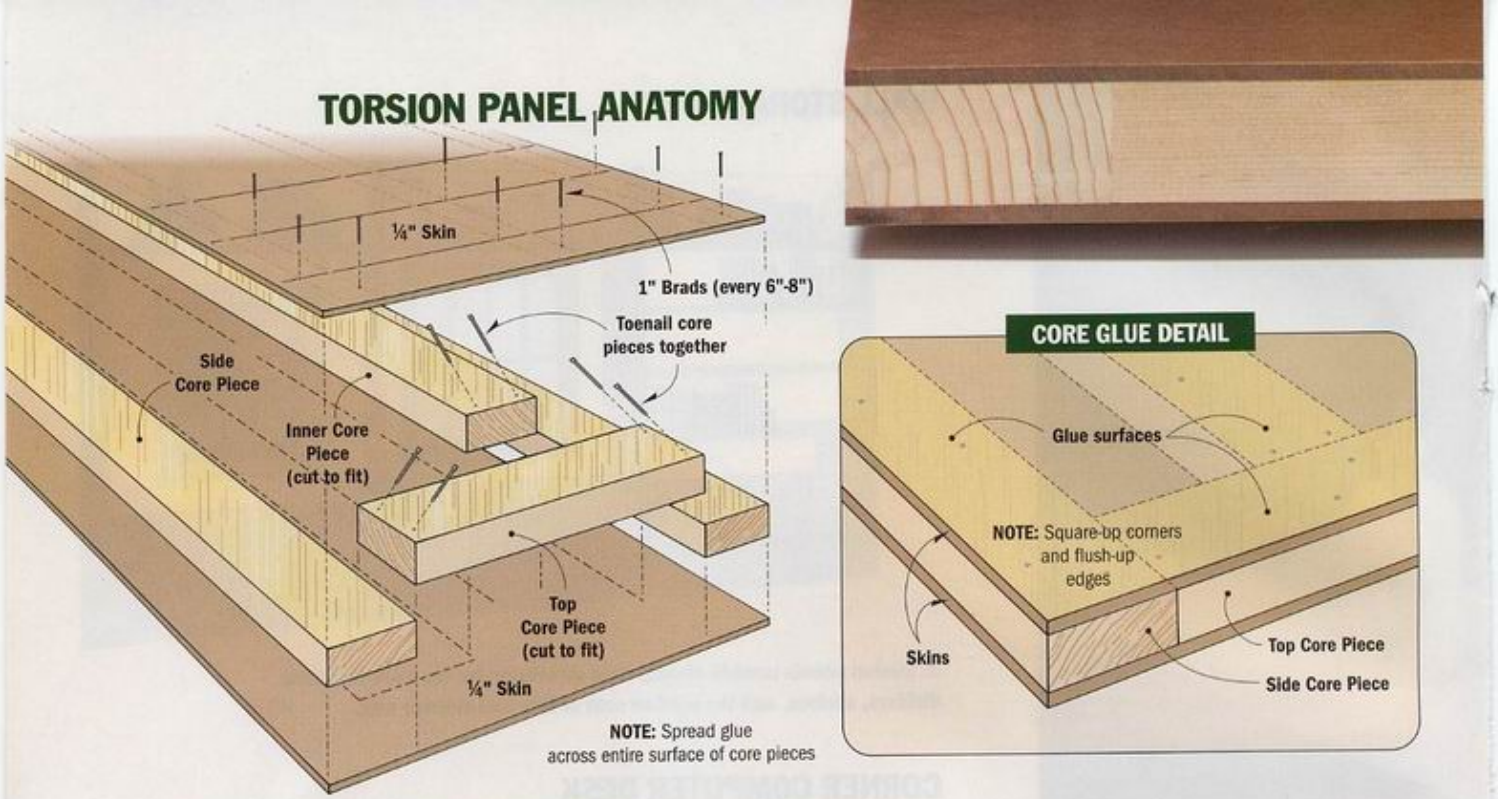


▲ **Using torsion panels for the large worksurface, leg supports, and shelf units makes this corner computer desk quick and easy to build.**

SHOP WORKSTATION



◀ **This handy workstation for the shop is nothing more than a couple of storage towers and a light-duty benchtop, all made with torsion panels.**



HOW TO BUILD A TORSION PANEL

So you've decided to build a project that uses torsion panels. Maybe it's a torsion panel for one of the storage projects in this issue, or perhaps it's another project altogether.

Whatever the case, it's put together the same way. First, the outer core pieces are glued around the perimeter of one of the skins *(Torsion Panel Anatomy)*. The inner core pieces are added next, and the second skin completes the package.

Of course, in order to create a finished appearance, you'll want to apply solid-wood edging to cover the exposed core pieces and skins. The edging isn't actually part of the panel (which is why it isn't shown here). But it brings up a good point.

To create a strong glue joint, the edges of the torsion panel must be straight and smooth, as in the *Photo* above. Plus, the skins have to be perfectly flush with the core pieces.

As for the core pieces, it doesn't matter if they're 1x or 2x stock (or another material altogether). What matters is that they're *flat*. If the stock is bowed or twisted, the thin skins will conform to those irregularities, producing a wavy torsion panel.

LUMBER SELECTION. That's why it's important to select the *straightest* boards you can find for the core pieces. Sometimes the 2x4s and 1x4s at the lumberyard are pretty squirrely. So I buy wider boards (2x8s or 1x8s) and then rip them to width.

Just because the boards are straight to begin with doesn't mean they'll *stay* that way. If they have a high moisture content, they can twist like a pretzel when you bring them into a dry shop. So it's a good idea to let them acclimate for a few days. I set the boards on edge, a couple of inches apart. Note: Use scrap pieces to keep the boards from absorbing moisture from the floor.

STOCK PREPARATION. Once they've seasoned a bit, joint one edge of each board and then rip it to width on the table saw. Then plane all the

▲ **Start by gluing and clamping one of the skins flush with a side core piece. Then, after tacking it in place with an air nailer, repeat the process for the opposite side piece.**

▲ **With the panel flipped over, the top and bottom core pieces can be cut to fit between the sides. Simply glue these pieces to the skin, and toenail them in place.**

boards to a consistent thickness. As for length, don't worry about cutting the core pieces to final length just yet.

SIZE THE SKINS. With the core stock prepared, you can turn your attention to the skins. The skins are sized to match the *finished* size of the torsion panel you're building. So just cut the sheet material for the skins *(sidebar at right)* to width and length.

ASSEMBLING THE PANEL

Okay, so the main ingredients of the torsion panel are ready to go. Now clear a large enough area to assemble the panel. Make sure it's flat. If it's not, you're likely to end up with a bowed panel that's not usable.

The first part of this process is about as simple as it gets — gluing the core pieces around the perimeter of the first skin, one "stick" at a time.

Now, gluing the core pieces on is easy enough. The difficult part is *clamping* them. To get a good glue joint would require a lot of clamps. Even then, they may not have enough reach. An easier way is to "clamp" them together using an air nailer. This will pepper the skin with nail holes, but they're easily filled.

SIDE CORE PIECES. Start by cutting the side core pieces to match the length of the skin. Then lay one of the pieces flat on the bench, apply a thick bead of glue, and spread it evenly across the face of the board. (I use a small paint roller.)

Now set the first skin on top, carefully aligning it with the side core piece at both ends and along the outer edge. Once it's positioned, use a couple of clamps to keep it from shifting. Then tack the skin to the core piece, spacing the nails about 6" to 8" apart to get a strong glue bond *(see Photo 1 on page 50)*.

TOP & BOTTOM. After attaching the second side piece, it's time to add the top and bottom core pieces. You'll need to flip the panel over to do this. Then crosscut the pieces to fit between the sides. Here again, apply glue (to the bottom face this time), align each piece, and toenail it, as shown in *Photo 2*. These nails aren't for strength — they just hold the pieces in place until the glue dries.

INNER CORE PIECES. To provide support for the skins, the next step is to add the inner core pieces. Space these pieces (which can be vertical or horizontal) 12" to 18" apart. If you plan to hang something on the panel, be sure to put in a core piece for a mounting surface. Here again, cut the inner core pieces to fit, apply glue, and toenail them to the adjacent pieces.

SECOND SKIN. At this point, it's just a matter of adding the second skin. This should be familiar territory by now. Spread glue on the top face of the core pieces, align the skin, and tack it in place *(Photo 3)*.

TRIM EDGES. There's one last thing to do to complete the torsion panel. Even though you've carefully aligned all the pieces, chances are they're not perfectly flush at the edges. A little work with a hand plane takes care of that *(Photo 4)*.

SKIN OPTIONS

There are a variety of materials that can be used for the "skins" of a torsion panel. That makes these panels incredibly versatile, as well as strong. By covering the core pieces of the panels with one (or more) of the materials shown here, you can build projects to suit a range of applications.

These materials are all 1/4"-thick sheet stock, which is lightweight, readily available, and inexpensive. But 1/8" material would also be a good choice.

What's more important than the thickness is that it has a "glueable" surface. Remember, it's the glue bond between the skin and the core pieces that gives a torsion panel its strength.

Here's a brief look at the benefits of using each material:

SHOWER BOARD — Slick surface cleans easily; back is glueable; ideal for utility areas or kids' rooms.

PEGBOARD — Great for hanging storage; paintable, readily available in 1/8" and 1/4" thicknesses.

PLYWOOD — Large selection available; easily stained or finished as in our closet organizer.

HARDBOARD — Hard, durable, paintable surface; also available in 1/8" and 1/4" thicknesses.

BEADBOARD — Quick, inexpensive way to make beaded panels for a country- or cottage-style look.

▲ Once all of the inner core pieces are fastened, glue the second skin on top of the panel. Here again, align the edges of the skin flush with the core pieces and tack it in place.

▲ Finally, use a hand plane to trim the edges of the torsion panel. A few quick strokes is all it takes to make the exposed edges of the core pieces flush with the skins.

▲ The saws were rated by the number of 2x4 cuts possible on a single charge.

◀ The drills were tested by drilling and driving until the batteries were totally spent.

18-Volt Tool Test: Cordless Combo Kits

Power is rising and prices are dropping in the cordless tool market. We put 16 tools to the test to find out which combo kits you can count on.

Gone are the days when cordless tools were underpowered and overpriced. Today's stock of cordless tools boast greater power than ever before, have batteries with much longer run times, and are priced to fit any budget.

That said, don't think for a minute that all cordless tools are created equal. A quick comparison of prices and you'll see that, if on no other count, there's a vast disparity among these tools. The goal of this test, then, was to determine *why* the tools cover such a wide-range of price tags.

The most obvious answer is that higher-priced tools are built to meet the demands of professional builders who rely on their tools for their livelihood. The lower-priced tools are aimed more at the occasional user, such as a do-it-yourself homeowner or woodworker.

We grouped the eight manufacturers in this test accordingly, with five of them being compared and evaluated as Pro Grade tools and the

remaining three falling into the Consumer Grade category.

We subjected two 18-volt tools (circular saw and drill) from each manufacturer to a series of trials (described in *How We Tested* at right).

These trials illustrated quite definitively the differences in the two classes of tools. It also revealed some interesting differences among tools within the same category.

In general, we found that you get what you pay for, which isn't to say that you should rush out and buy the most expensive cordless tools you can find. Instead, take a look at the way we tested these tools. Read the descriptions of each manufacturer's product. Then compare that to the way you're going to be using the tools to make the best choice for your particular needs.

If you plan to run them every day all day, pay the higher price for the Pro Grade tools. On the other hand, if you're more of a weekend project builder, you'll find that the best of the Consumer Grade tools will likely meet or exceed your need for power and run time.

APPLES TO APPLES

One important note when comparing the prices of these tools. Each manufacturer packages the tools a little differently. So be sure you know exactly what's included in a kit before comparing it to another. Most of these tools are available in two-piece kits (just the saw and drill) while others are only available in larger kits. So it's important to know exactly which tools you're buying and at what price.

UNCOMMON KITS

As more and more tools are adapted for battery power, manufacturers are packaging them in kits that are more task specific. This allows you to buy specialized tools that are better suited to your particular needs.

A couple of our favorite specialty kits are shown on page 59 along with expanded coverage of the complete kits from Ryobi and Black & Decker that were part of this test.

HOW WE TESTED

▲ To gauge the sustained power of the drills, we bored 1"-dia. holes until the batteries failed.

▲ We compared the clutches on the drills by driving a screw at each setting.

▲ The first step in testing tools is to condition the batteries. This was done by cycling each battery through five charges and five discharges.

▲ The crosscut test was performed twice with each saw to ensure accurate results and allow for differences in stock. A crosscut sled guaranteed uniform cuts.

Cordless Combination Kit Performance Test Results

Manufacturer & Model	Drill		Saw
	Pilot Holes/Screws	1" Auger Holes	2x4 Cutoffs
Milwaukee 0902-28	200/190	43	139
Bosch 93618DC	150/149	37	98
Makita DK1016DL	200/200	38	136
Porter-Cable 9884CS	180/180	33	112
DeWalt DW988KS2	150/142	29	148
Ryobi HP518MK2	130/130	22	72
Black & Decker	10/108	N/A	62
Skil 5884-04	110/109	N/A	38

MILWAUKEE 0902-28 PROFESSIONAL GRADE

At a Glance:

Combo Kit	Price:	$360
	Voltage:	18
	Batteries:	2
	Amp Hours:	2.4
	Charger:	1-hour
	Warranty:	Limited lifetime
Drill	Torque:	495 in. lbs.
	Clutch:	20 positions
	Chuck Capacity:	1/2"
Saw	Blade Diameter:	6 1/2"
	Blade Type:	24T, carbide-tipped
	RPM:	3,200
	Capacity @ 90°:	2 1/8"
	Max. Bevel:	50°

Virtues: Powerful. Long battery life. Comfortable to use.
Vices: Heavy.
Verdict: These tools are superior by nearly every measure.
www.MilwaukeeTools.com
262-781-3600

It would've been an easy choice to name Milwaukee's cordless tools as the best of the Professional Grade kits based purely on the numbers. Take a look at the chart on page 53 and you can see that these tools are near the top of the performance curve in every single test we conducted.

But there's much more to these tools than the cold hard statistics. And it was those characteristics, along with the impressive performance of the tools, that gave Milwaukee top honors.

DRILL/DRIVER

Grabbing hold of the Milwaukee drill for the first time, we immediately noticed two things about this tool. First of all, it's heavier than the other drills in the test. Second, this drill has a noticeably narrower grip that allows you to get your hand firmly around the tool.

Our first thought was that the weight might make the drill tiring to use. But after drilling and driving 200 screws, we felt this was the most comfortable drill to use for an extended period of time.

That has a lot to do with the near-perfect balance of the drill. Plus the narrow grip allows a much more comfortable hold on the tool. We experienced less forearm and wrist strain with this drill than any other we tested.

The best feature of this drill, though, is the chuck. It's an all-steel, single-sleeve ratcheting chuck — which is a wordy way of saying that you can tighten a drill bit securely with just one hand *(Fig. 1)*.

▲ We opted for the canvas contractor's bag with this kit — we'll never go back to plastic cases.

▲ The large chuck and the ratcheting action make for easy bit installation, even with gloves on.

▲ The substantial fence of this edge guide keeps the Milwaukee circular saw on track during long cuts.

CIRCULAR SAW

We found this saw to be finest in terms of overall construction and fit and finish. This was best demonstrated when we tested the metal bases for flexing. The Milwaukee showed almost no give — which goes a long way toward making a clean, straight cut.

And speaking of straight cuts, this saw also had our favorite edge guide *(Fig. 2)*. The wide face of the guide is a sturdy platform that holds the saw true through long rip cuts.

Other highlights for this tool are the magnesium shoe and blade guard, which are beefy, but lightweight, and a trigger/safety switch combination that's easy to operate with one hand, lefty or righty.

Our opinion of this set is that it was built with no compromises. Milwaukee seems intent on living up to their "nothing but heavy-duty" claim without getting caught up in the "lightest and smallest" race. And that's working out just fine, as far as we're concerned.

BOSCH 93618DC — PROFESSIONAL GRADE

At a Glance:

Combo Kit	Price:	$399
	Voltage:	18
	Batteries:	2
	Amp Hours:	2.4
	Charger:	1-hour
	Warranty:	3 Years
Drill	Torque:	500 in. lbs.
	Clutch:	16 positions
	Chuck Capacity:	1/2"
Saw	Blade Diameter:	6 1/2"
	Blade Type:	18T, carbide-tipped
	RPM:	3,600
	Cut Capacity @ 90°:	2 1/8"
	Max. Bevel:	50°

Virtues: Rugged construction. Fast saw speed.
Vices: Awkward spindle lock.
Verdict: Tough tools with admirable performance.

www.BoschTools.com
800-267-2499

We couldn't bring ourselves to drop the Bosch drill from 46 feet in the air (as Bosch does on their web site), but we're still convinced that this may be the toughest drill on the market. That's thanks to a reinforced collar around the chuck and a flexible exterior housing. *(For more on these features, see page 86).*

Of course, you don't buy 'em to drop 'em, so it's the performance that really counts.

DRILL/DRIVER

This drill finished in the middle of the pack in terms of screws driven and holes drilled, but earned its number two spot with solid construction, good ergonomics, and a very effective clutch.

CIRCULAR SAW

The saw came up a bit short in the number of cuts, but with Bosch's rapid charger (one of the fastest going) we don't see it as a real handicap. Plus, we liked the fact that this saw runs at 3,600 rpm, giving it one of the highest blade speeds in the group. That makes for quick, clean cuts. The depth scale on this saw is also the best of the bunch *(see Photo right)*.

One knock against this saw is the spindle lock. It works fine, but its location is awkward.

Overall, these are outstanding tools that will take abuse better than most.

▲ A well-placed, accurate depth scale is a bonus on Bosch's saw.

MAKITA DK1016DL — PROFESSIONAL GRADE

At a Glance:

Combo Kit	Price:	$479
	Voltage:	18
	Batteries:	2
	Amp Hours:	2.6
	Charger:	1-hour
	Warranty:	1 year
Drill	Torque:	404 in. lbs.
	Clutch:	18 positions
	Chuck Capacity:	1/2"
Saw	Blade Diameter:	6 1/2"
	Blade Type:	24T, carbide-tipped
	RPM:	2,600
	Cut Capacity @ 90°:	2 1/8"
	Max. Bevel:	50°

Virtues: Accurate. Compact. Affordable. Excellent controls.
Vices: Mushy depth stop.
Verdict: The right saw in the right size at the right price.

www.Makita.com
800-462-5482

These cordless tools have everything we've come to expect from Makita: they're compact and lightweight, have user-friendly controls, and excellent performance.

Even the battery charger distinguished itself. It's very easy to glance at the Makita charger and know the exact status of the battery *(Photo below)*. Some other chargers require a bit of deciphering.

DRILL/DRIVER

This drill wore us out by driving 200 screws into pre-drilled holes. And the size and shape of the drill proved quite comfortable during the test.

One improvement that would be welcome is a single-sleeve chuck.

CIRCULAR SAW

The circular saw finished an impressive third place in the number of cuts on a single battery charge. But even more impressive was the quality of cuts we got from this powerhouse. The cuts were generally straighter and smoother than those made by most other saws in the test.

We also found the saw to be smooth running and easy to use. The controls are smartly located, and the base proved to be flat with only the slightest amount of flex.

As a whole, these are superior tools that are a pleasure to use.

▲ Makita's charger was the easiest to read and understand.

PORTER CABLE 9884CS — PROFESSIONAL GRADE

▲ Dust-free cutting thanks to PC's nozzle and your vac hose.

Porter-Cable's tools differ from the others in this test in that they use 19.2-volt batteries instead of the 18-volt packs on all the others. That means there is one more 1.2-volt cell in the Porter-Cable batteries. Quite honestly, we didn't see any increase in performance as a result.

DRILL/DRIVER

Porter-Cable's drill put up pretty respectable numbers in all the test categories. Nonetheless, we felt the drill could benefit from a single-sleeve chuck, a thinner handle that allows a better grip on the tool, and a battery that's not so awkward to remove.

CIRCULAR SAW

It was the saw that really made this kit a favorite for us. We were more than satisfied with the number of cuts we were able to get from a single charge. But more than that, we were impressed with some of the details of the saw.

Dust collection, as an example, is outstanding thanks to a nozzle that mounts in the blade guard *(Photo, left)*.

Other notable features include an extended tip on the blade guard that moves the guard even on odd-shaped workpieces and adjustable stops for fine-tuning the shoe to 45° and 90°.

All in all, these are burly tools with average performance numbers and a few nice features.

At a Glance:

Combo Kit	Price:	$340
	Voltage:	19.2
	Batteries:	2
	Amp Hours:	2.0
	Charger:	1-hour
	Warranty:	1 year
Drill	Torque:	390 in. lbs.
	Clutch:	20 positions
	Chuck Capacity:	1/2"
Saw	Blade Diameter:	6"
	Blade Type:	18T, carbide-tipped
	RPM:	2,600
	Cut Capacity @ 90°:	2"
	Bevel:	45°

Virtues: Excellent dust control on saw. Adequate battery life.
Vices: Two-sleeve chuck. Thick handles.
Verdict: A good kit that lacks a few niceties. Pay more for the 9984 kit with the single-sleeve chuck.

www.Porter-Cable.com
800-487-8665

DEWALT DW988KS2 — PROFESSIONAL GRADE

▲ DeWalt's third speed is perfect for hammer-drilling masonry.

DeWalt's cordless drill put up respectable numbers in the tests, and the saw produced the highest number of cuts on a single charge. There were just a couple of quirks that cost this kit a higher position.

DRILL/DRIVER

One real high point for this drill is a three-position gear box. Position 1 is for low-speed, high-torque jobs such as driving large screws. Position 2 is a high-speed, low-torque setting perfect for typical drilling applications. The corker is position 3, which cranks the top speed of the drill up to 2,000 rpm.

This third speed is suited for drilling masonry in the hammer-drill mode *(Photo, below)*.

Where this drill suffered was in the sensitivity of the clutch. In the lower gears, where the clutch is most useful, we were unable to fine-tune the clutch.

CIRCULAR SAW

Based on 2x4 cuts on a single charge, there's no better saw in this group. So if that's your priority, this is your saw.

On the downside, we noticed more flex in the shoe of this saw than on the other Pro Grade tools.

All in all, these are high performance tools with a couple of compromises you may have to consider.

At a Glance:

Combo Kit	Price:	$390
	Voltage:	18
	Batteries:	2
	Amp Hours:	2.4
	Charger:	1-hour
	Warranty:	1 year
Drill	Torque:	450 in. lbs.
	Clutch:	18 positions
	Chuck Capacity:	1/2"
Saw	Blade Diameter:	6 1/2"
	Blade Type:	24T, carbide-tipped
	RPM:	3,700
	Cut Capacity @ 90°:	2 1/4"
	Max. Bevel:	50°

Virtues: Tools are compact. Both tools are high speed.
Vices: Poor clutch control on drill. Moderate flex in saw base.
Verdict: Excellent tools with a couple of minor faults.

www.DeWalt.com
800-433-9258

RYOBI HP518MK2 — CONSUMER GRADE

Ryobi's tools perform very near the levels of the higher-priced Pro Grade tools. In addition, we found some features on the drill that made it all the easier to give this kit our Top Value Award.

At a Glance:

Combo Kit	Price:	$199
	Voltage:	18
	Batteries:	2
	Amp Hours:	1.5
	Charger:	1-hour
	Warranty:	2 years
Drill	Torque:	Not published
	Clutch:	24 positions
	Chuck Capacity:	1/2"
Saw	Blade Diameter:	5 1/2"
	Blade Type:	18T, carbide-tipped
	RPM:	4,200
	Cut Capacity:	1 9/16"
	Max. Bevel:	50°

Virtues: Solid performance in both tools. User-friendly features on drill. High blade speed on saw.
Vices: At this price, none.
Verdict: Performance and features well beyond the price.

www.RyobiTools.com
800-525-2579

DRILL/DRIVER

Drilling and driving 130 screws put this drill nearly on par with the much pricier tools from other manufacturers. Now add to that the two levels (one of which is removable) and the magnetic tray for holding hardware, and this drill becomes an unequalled bargain.

We were also impressed with the quality of the clutch on this drill. Each setting resulted in a different depth of set, allowing for fine-tuning the drill for most applications.

CIRCULAR SAW

The circular saw in this kit speeds along at a blistering 4,200 rpm, the fastest blade speed in this test — the result of which are fast, clean cuts. Surprisingly, the higher speed didn't seem to drain the battery any faster.

Considering that these tools are part of a five-piece kit that sells for half as much as the pro-grade tools, but still delivers pro-like numbers, this is an excellent choice for any do-it-yourselfer. Take a look at page 59 to see the complete kit.

◄A magnetic tray sure beats holding all those screws in your mouth.

◄Vertical or horizontal, levels on the drill keep you pointed true.

BLACK & DECKER — CONSUMER GRADE

At a Glance:

Combo Kit	Price:	$199
	Voltage:	18
	Batteries:	2
	Amp Hours:	1.2
	Charger:	3-hour
	Warranty:	1 year
Drill	Torque:	280 in. lbs.
	Clutch:	Infinite
	Chuck Capacity:	3/8"
Saw	Blade Diameter:	5 3/8"
	Blade Type:	16T, carbide-tipped
	RPM:	2,200
	Cut Capacity:	1 9/16"
	Max. Bevel:	50°

Verdict: A few nice features, but save this kit for light duty.

www.BlackandDecker.com
800-544-6986

Black & Decker's tools impressed us with their features more than their performance. The batteries, for instance, are the easiest to remove from the tools. They literally spring on and off. But each tool had other unique features.

DRILL/DRIVER

The removable chuck on this drill speeds changes between drilling and driving and is quite handy. And the large controls make it easy to operate the drill with gloves on.

CIRCULAR SAW

A sight window on the saw that offers a bird's-eye view of the cut is another feature we really liked.

Performance numbers from these tools were a bit low, even considering the low cost of the kit.

Our big gripe is the charger that takes three to six hours to charge a battery and offers no indicator to tell when the battery is ready.

SKIL 5884-04 — CONSUMER GRADE

►A $7^1/_4$" circular saw makes this a one-of-a-kind combination kit.

Skil was nice enough to let us test a prototype of this kit, which includes the only full-size ($7^1/_4$") cordless circular saw currently available.

The kit should be on store shelves by the time you read this.

DRILL/DRIVER

This drill put up numbers comparable to the other Consumer Grade tools and has a few features, such as a removable level and magnetic tray, that we appreciate. The clutch is a bit limited with only six positions, but functioned well in all six settings.

CIRCULAR SAW

We like the extra capacity the $7^1/_4$" circualr saw offers, but would like to see a bit more run time out of of a single battery charge.

Nonetheless, this is a one-of-a-kind kit at a reasonable price. Just be sure to keep a spare battery charged if you plan to use the saw for very long.

At a Glance:

Combo Kit	Price:	$159
	Voltage:	18
	Batteries:	2
	Amp Hours:	1.4
	Charger:	1-hour
	Warranty:	2 years
Drill	Torque:	300 in. lbs.
	Clutch:	6 positions
	Chuck Capacity:	$^3/_8$"
Saw	Blade Diameter:	$7^1/_4$"
	Blade Type:	18T, carbide-tipped
	RPM:	3,600
	Cut Capacity:	$2^7/_{16}$"
	Max Bevel:	45°

Verdict: A unique kit at a low price. Expect short run time.

www.Skil.com 877-754-5999

FINAL RECOMMENDATIONS

EDITOR'S CHOICE

Milwaukee lives up to their boast of "nothing but heavy-duty" and delivers cordless tools that are ruggedly built and perform as well as any and better than most.

Both the drill and the saw in this kit set standards for power, comfort, and fit and finish. This is the "no-compromise" kit for the demanding user.

Surprisingly, this is also one of the more moderately priced kits, making it a solid investment.

TOP VALUE

Any savvy tool buyer knows that as prices go down, expectations should lower accordingly. But apparently no one mentioned this to Ryobi. Their incredibly affordable cordless kit includes five essential tools. And the two that we tested performed well above their bargain price and delivered results not too much less than tools costing hundreds of dollars more.

This kit is a real boon for the budget-conscious tool buyer.

MILWAUKEE

RYOBI

Combo Kit Report Card	DRILL					SAW									COMBO KIT		
Manufacturer & Model	Performance	Chuck	Clutch	Ergonomics	Battery Charge	Performance	Depth Scale	Bevel Scale	Blade Lock	Alignment Marks	Depth Adjustment	Base Deflection	Fit & Finish	Ergonomics	Battery Changing	Changer	Accessories	GPA
MILWAUKEE 0902-28	A	A+	A+	A+	B	A	A+	A+	A	A+	A+	A	A+	A	B	A	A+	A-
BOSCH 93618DC	B	B	A+	C	B	B-	A	B	B	A-	A+	A	A	B+	B	B	B-	B+
MAKITA DK1016DL	A+	B	A+	A	C	A	n/a	A+	A	A-	A	A-	A+	B	C	A+	B	B+
PORTER-CABLE 9884CS	B+	B	A+	B	B	B	B	B	A	B-	A	B-	B	B+	B	A-	B	B
DeWalt DW988KS2	C+	A	B-	A	B	A+	n/a	A	A	A-	B+	B-	B	B	B	A	B-	B
RYOBI HP518MK2	C	C	A+	B	B	C-	B+	A	A	A-	A	C	B	A-	B	C	B	B
BLACK & DECKER	C-	C	A	B+	A+	D	B	B	n/a	n/a	B	C	C	C	A+	D	C	C
SKIL 5884-04	C-	C	C	C	C	D-	A	C	n/a	A	A	D	C	B-	C	B	D	C

Larger Combo Kits

Super size your combination kit and you'll save even more money. Here's a quick look at a couple of the big kits you might find worthwhile.

▼ The Black & Decker tools we evaluated in this test can be purchased individually, or in the set shown here, which includes the drill and circ saw as well as a flashlight and reciprocating saw. Buying this kit and only paying for two batteries and one charger actually saves you about half of what it would cost to buy the tools individually.

▲ For the most part, Ryobi's cordless tools are available only in kits. The kit we took the tools from for this test includes a reciprocating saw, flashlight, and hand vacuum. The vacuum is a unique part of this kit that comes in real handy around the house for cleaning up after small projects like hanging pictures or installing door hardware.

Specialized Combo Kits

More tools are being adapted to battery power everyday. And with each new tool, manufacturers are finding more useful ways to package them.

▼ The Bosch 93618DJP kit includes an 18-volt drill, jig saw, and planer ($500). This is an excellent combination for door installation and other finish type jobs. We tested these tools the old-fashioned way — we put them to work. The planer surprised us with its quality of cuts and long run time. And when we inadvertently damaged one of the carbide knives, changing it was a snap.

▲ Porter-Cable's 9884RJS drill, router, jig saw package ($600) is a cabinet installer's dream kit. And deck builders will like the convenience these cordless tools offer, as well. Rounding over the edge of a deck board that's been ripped is exactly the type of work this router is suited to. And the jig saw is ideal for cutting boards to fit around a post.

1 FIRST PLACE

3 Award-Winning Decks of Distinction

The winners of the annual redwood deck contest sponsored by Workbench and the California Redwood Association.

Moving to a warm climate to escape cool temperatures was important to the owners of this 1926 San Diego home.

With this major lifestyle change, it became apparent to them that they wanted to create an indoor/outdoor lifestyle that would embrace the warm Southern California environment. Opening up the rear of the house and entertaining family and friends in a relaxed atmosphere were the main design criteria for them.

Rather than adding square footage to the house, they decided that building a redwood deck would be the best way to achieve this goal. The idea is distinctive in this older, established neighborhood that is filled with Craftsman-style homes.

With that in mind, it became readily apparent that remodeling the home and working around existing elements (a palm tree, a derelict hot water heater, gas meter, plumbing, and unusual side yard access) created difficult site conditions. But the architectural firm for the project, MLSDesigns.com, decided to embrace these elements and incorporate them into the design, rather than remove them.

A strong 45-degree plan was conceived to orient the 330-square foot

SAN DIEGO, CA - Barbara Jensen & Michael Scott

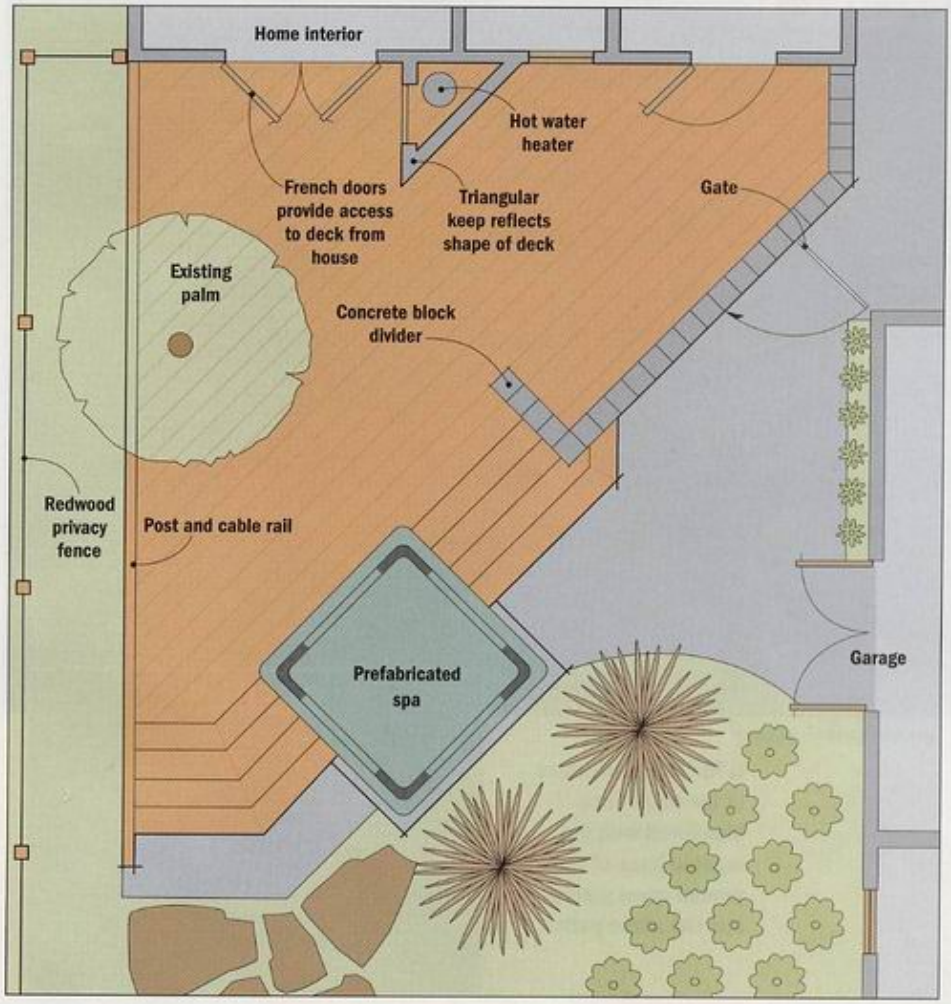
deck toward prime southwest sun exposure. This unique concept created intimate areas for both sunbathing and evening dining. And the angle of the deck provided an invitation to guests who arrived via the yard's side entrance.

The old hot water heater actually provided one of the distinctive elements in the overall design. The appliance was shrouded in a triangular "keep," next to the main entrance, that perfectly reflects the shape of the main deck. Hiding the hot water heater in this fashion avoided the time and expense that would have been involved with moving it inside the house.

To save the palm tree, the deck was built surrounding the tree. Again, this furnishes an attractive design element to the deck.

The spa is surrounded by redwood stairs that gracefully step down into the tropical landscaping in the rear yard *(see Photo A below)*.

The boundaries between deck and yard are marked on one side by a post and cable rail *(Photo B)*, and on the other by a cinder block wall with glass block accents *(Photo C)*.



▲ The elevation of the deck is used to integrate a spa without the need for additional structure.

▲ Cables strung between redwood posts and secured with turnbuckles create a striking border to the deck.

▲ Even a large, unbroken field of deck boards seems inviting thanks to the rich color of redwood. Here the homeowner made use of cinder and glass blocks to define an outdoor dining area. The door in this photo leads directly to the indoor cooking and dining space.

2 SECOND PLACE

NOVATO, CA - Gary Marsh

www.GaryMarshDesign.com

▲ The sculpted edges of the main deck blend well with the organic lines of the ground cover plants and the stone path.

The owners of this circa 1970 home in Novato, California contacted designer Gary Marsh to request that he transform their sterile and visually cold backyard into a welcoming, peaceful setting, using a nearby waterway and established trees as the anchors for design.

The real design challenge was set when the homeowner said he needed the ability to entertain up to 25 guests at a time. Marsh's approach was to create a transition from the interior of the home to the exterior deck without any visual barriers.

The concept of structural, "built-in" planters and the use of curves set the tone for the project. The planters brought landscaping close to the home, and established a visual connection between the deck and surrounding landscaping. The curved redwood benches were positioned to face the entertaining area, while the planters served as backs for the benches *(see Photo A above)*.

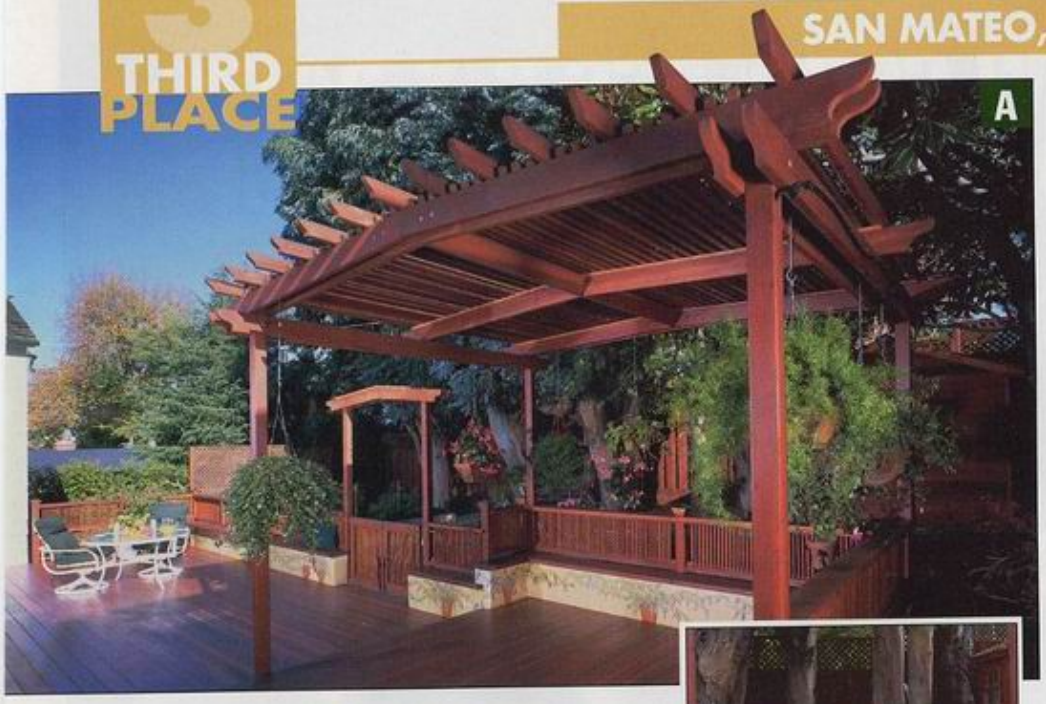
The outer edge of the deck combines a scalloped edge with a sweeping curve *(Photo B)*. Passage along the winding stone path is marked by a redwood burl gate with custom redwood posts *(Photo C)*.

▲ A treatment of gray stain and the free-form lines of the deck help integrate the structure with the natural surroundings. The final transition from deck to waterway is adorned by elaborate, colorful plantings.

▲ This redwood burl gate hangs between custom posts, creating an artistic pause along the garden path.

3 THIRD PLACE

SAN MATEO, CA - Debbie Burns



This expansive redwood deck behind the home of Debby Burns in San Mateo, California, is anchored by an arching pergola *(see Photo A)*. Its slightly peaked roof is a welcome departure from the flat design common to such elements.

In the shade of the pergola is an ample entertaining area, bordered by generous seating in the form of redwood and stucco benches. The deck rails serve as the backs of the benches and are comprised of narrow spindles in long, uninterrupted fields. The horizontal members of the deck span between stout redwood posts topped off with redwood and copper caps *(Photo B)*.

Floral patterns painted on the front of each bench soften the transition from redwood to stucco, and bring a personal touch to the space, as well *(Photo C)*.

The peak of the pergola and the slender spindles of the bench backs are repeated in the design of the gate that opens into the courtyard *(Photos D and E)*. The combination of these elements give the gate a feel more of distinction than division.

► **The narrow spindles, copper caps, redwood posts, and finer details like routed edges give this railing its distinctive appearance.**

◄ **Attractive gates mirror the rail design and invite visitors to explore the garden beyond.**

▲ **Repeating elements, such as the arch of the pergola also being used over the gate, give this large deck a feel of continuity throughout the design.**

▲ **Beyond the gate, a large stone courtyard transitions into narrow paths through the garden. The expansive courtyard allows large gatherings to spill from the deck to the garden without feeling confined.**

Readers' Workshop

Roll-out Router Mat

A router mat is really an "all-purpose" mat. It's great for keeping a workpiece from slipping around when routing or sanding. It also serves as a cushion, protecting projects from nicks and dings as you work.

But if a router mat isn't handy, chances are you won't bother using it. That's what Wayne Horak of Riverside, Iowa, discovered.

So he decided to remedy the situation. He designed a wind-up reel for his workbench that keeps his router mat neatly tucked away, yet right at hand so he can pull it across his bench to work on a project. And when he's done, he just rolls the mat up on the reel.

Wayne's system makes good use of the space underneath the ends of the workbench. It's similar to a paper towel holder — a set of brackets holding a dowel that's used to roll up the mat *(Construction View, Roller End)*. The other end of the mat is sandwiched between a wood cleat and a strip of aluminum bar stock *(Lead End)*. It's temporarily secured to the far end of the workbench with dowels.

The first step is to round up material for the router mat. I found rubber carpet backing makes a great pad. It's sturdy enough to take day-to-day shop use, provides more cushion than typical router mat material, and it can be picked up at any carpeting store for under ten bucks.

SPLITTING THE DOWEL. To build the reel, I started at the roller end of the assembly, cutting a $1\frac{1}{4}$" dowel to length (to match the width of the bench). The dowel has to be

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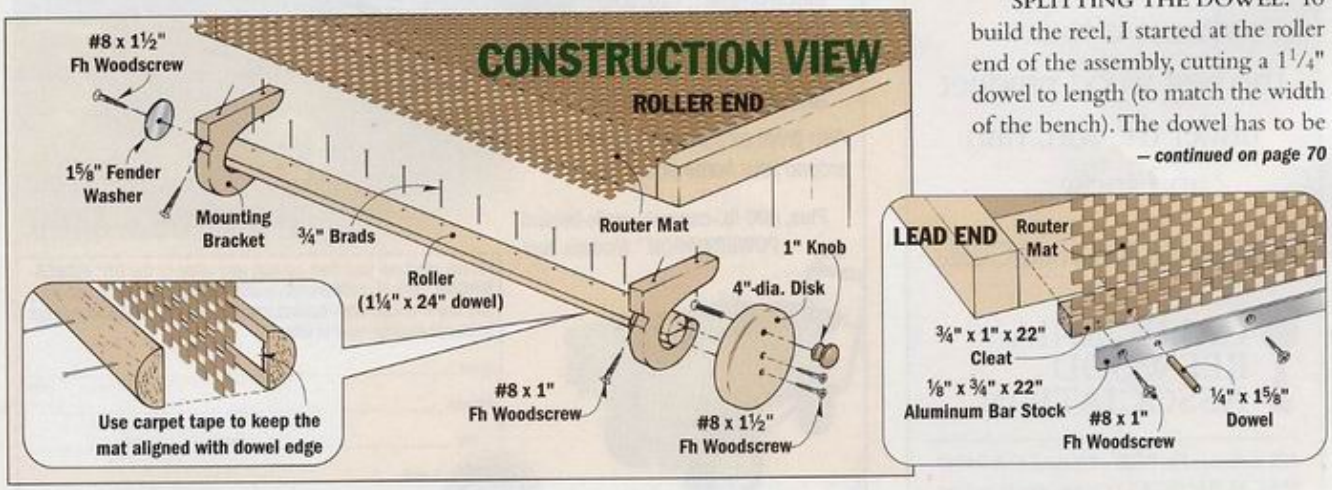

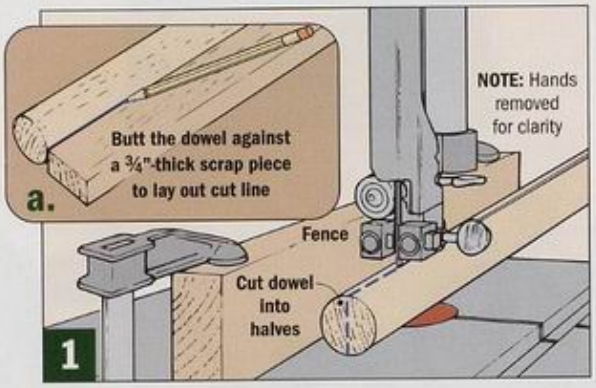

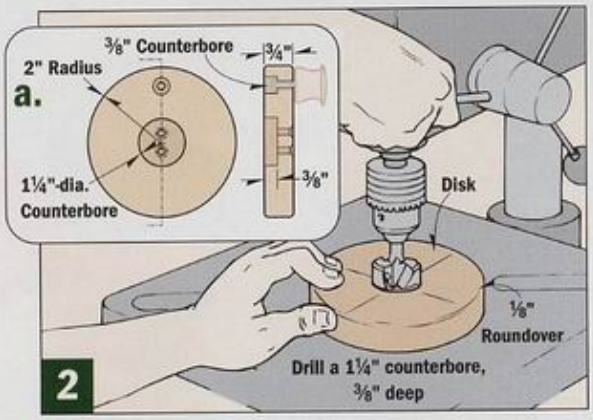

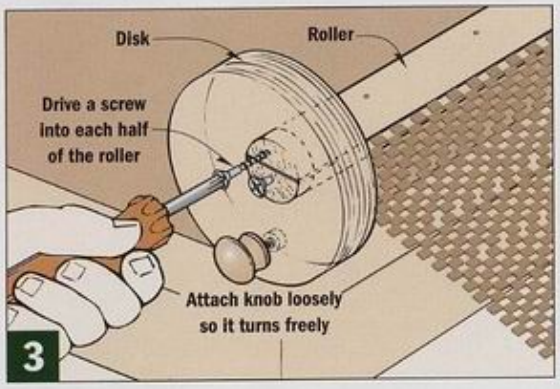

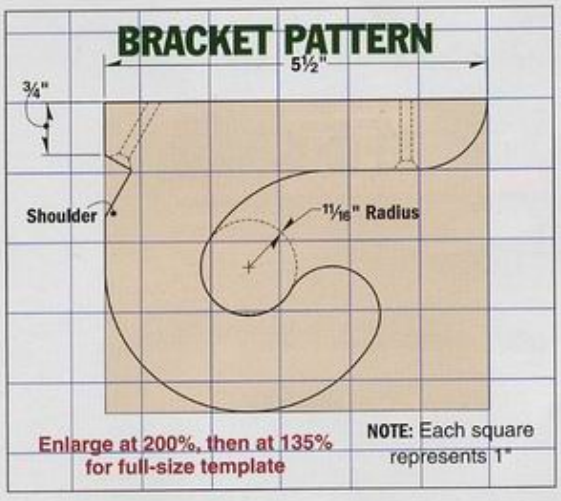

split in half lengthwise to hold the mat. The tricky part is figuring out a way to lay out a straight line on a dowel that wants to roll around. Since half of 1½" is ¾", I set a ¾"-thick scrap piece against the rod, to steady it and to act as a marking guide *(Fig. 1a)*. Then I used a band saw to cut the dowel in half *(Fig. 1)*.

The next step is to sandwich the mat evenly between the two halves — this ensures the mat will roll up evenly after each use. To do this, I used carpet tape to hold the end of the mat squarely in place while I tacked the halves together with brads *(Construction View Detail on page 68)*.

DISK & HANDLE. Now you're ready to make the disk/handle assembly. Start by cutting a 4"-dia. disk out of ¾" plywood on the band saw, and then rout a ⅛" roundover on both sides. To accept the end of the roller, you'll need to drill a large counterbore in the center of the disk *(Fig. 2)*. Then drill countersunk shank holes for the mounting screws *(Fig. 2a)*. Also, drill a smaller counterbore for the screw that's used to attach the knob. When attaching the disk, it's important to drive the screws into *both* halves of the roller *(Fig. 3)*. Otherwise, the dowel could split when you turn the handle. To help prevent the roller assembly from slipping out of the mounting brackets, I attached a large fender washer to the other end of the roller.

BRACKETS. Using the *Bracket Pattern* provided on this page, the brackets themselves are a snap to make. I used ¾" plywood and cut them to shape on the band saw. Then I routed a ⅛" roundover on both sides.

LEAD END. With the roller assembly finished, you can turn your attention to the "lead" end of the mat. Just fit this end of the mat between the wood cleat and the aluminum bar, and screw this assembly together *(see Lead End on page 68)*.

When the mat is in use, the lead end is held in place with two dowels that fit into holes drilled in the end of the bench. The photo below shows an easy way to accurately locate the holes in the bench.

▲ To locate the holes for the dowels, drill the first hole through the aluminum and cleat and into the bench end. Temporarily install a dowel in that hole. Now move to the other end and repeat the procedure.

SEND US YOUR SHOP IDEAS!

You *know* you're always coming up with ways to make working in your shop safer, easier, and more efficient. Now you can reap the benefits of all your hard work! Send us your workshop project idea, and if we publish it here in *Readers' Workshop*, you'll get cold hard cash – ***$350.00!***

Include a rough sketch, a photo and how this helps out in your shop. We'll do the rest. Mail your ideas to Workbench Readers' Workshop, 2200 Grand Ave., Des Moines, IA 50312 or email it to editor@workbenchmagazine.com.

The Cutting Edge

Cordless Saw Blades — Thin Is In!

Ultra-thin blades, laser-cut technology, and super-slick coatings — what does it mean? More cuts for cordless saws.

Cordless circular saws have come a long way in the last few years. That's due in part to higher-voltage batteries. (Many saws now sport 24-volt batteries.) Bigger batteries though are only part of the story.

Equally important is the *blades* themselves. Manufactured specifically for cordless saws, these blades are designed to increase the number of cuts you get on a single battery charge.

THINKING THIN

As soon as you pick up one of these blades, you notice how *thin* it is — thin enough to flex with a moderate amount of hand pressure.

METAL PLATE. The main reason has to do with the metal plate that forms the body of the saw blade *(see Blade Anatomy below)*. This plate is almost *twice* as thin as the plate on a conventional blade *(Thick & Thin)*. A thinner, lighter plate like this requires less power than a thick plate, which conserves battery life.

ULTRA-THIN KERF. In addition to the slim plate, the carbide-tipped teeth of these blades are significantly thinner than those of a conventional blade. As you make a cut, these teeth create an *ultra-thin* kerf, removing considerably less material than a thicker blade.

This allows for a faster, easier feed rate. Plus it reduces waste. More to the point, the motor doesn't have to work as hard, so ultimately, there's less drain on the battery.

RUNNING TRUE

As manufacturers push the edge of this "thin" technology, it brings up an important question. What keeps these super-thin saw blades from twisting as you make a cut.

LASER CUT. For starters, higher quality blades are *laser cut* from hardened steel plates, resulting in an extremely well-balanced blade. (If a blade is stamped out by a press, it deforms the plate slightly, which causes the blade to

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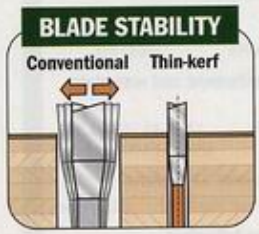
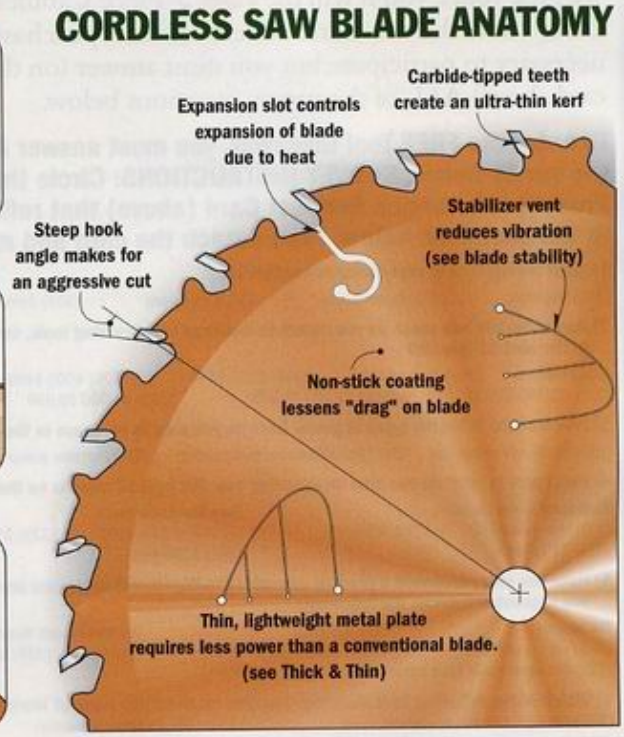




▲ **Do ultra-thin, cordless saw blades deliver on the claims they make (shown below)? Our informal endurance test provides the answer.**

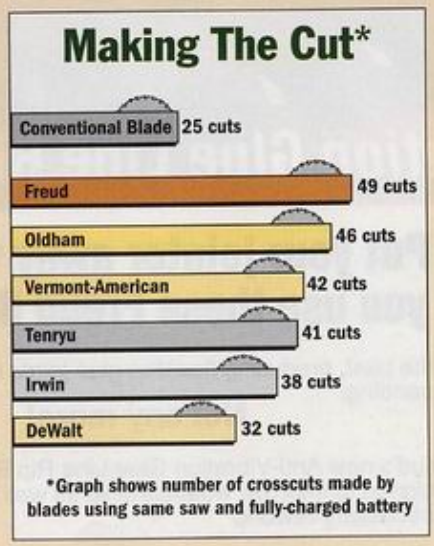
CLAIM CHECK

I was intrigued by the claim that cordless saw blades provide "45 percent more cuts per charge," "energy boost," "less drain," and "extended battery life." Do these claims actually pan out? To find out, I ran a test.

I had two goals. First, to determine how many cuts could be made on a single battery charge. Second, compare that performance to a thicker-kerf blade that would typically be used on a corded saw.

To make the test as fair as possible, I rounded up several framing blades with 18 to 24 teeth. Then, using the same cordless circular saw for each blade, I clipped in a fully-charged battery, and made crosscuts in a 2x12 until the saw ran out of gas.

RESULTS. Once the dust settled, it was clear that most of the claims checked out (chart below). In short, when you compare cordless to conventional blades, "thin" wins.



CORDLESS SAW BLADE SOURCES

Vermont American 800-742-3869 www.vermontamerican.com	Tenryu 800-951-7297 www.tenryu.com
Oldham 800-828-9000 www.oldham-usa.com	Porter-Cable 800-487-8665 www.porter-cable.com
Freud 800-472-7307 www.freudtools.com	DeWalt 800-433-9258 www.dewalt.com

continued from page 74

wobble). On the other hand, the precision machining of a laser-cut blade makes it run truer, so you get more efficient use from the battery.

STABILIZER VENTS. To take this laser-cutting technology a step further, some blades like those manufactured by Freud have *stabilizer vents* cut into the metal plate (*Blade Anatomy, page 74*). Note: Don't confuse these with the slots that control blade expansion due to heat.

Stabilizer vents are designed to reduce the vibration, or *sideways* movement of the cutting edges against the workpiece *(see Blade Stability Illustration on page 74)*. Less side-to-side movement produces smoother cuts, plus it also gives you *more* cuts on a single charge.

NON-STICK COATINGS. Yet another way that battery life is improved is by adding non-stick coatings to the blades. These slick coatings reduce the friction between blade and board. Since there's less "drag" on the blade, less power is consumed as you make a cut.

A more obvious result of a non-stick coating is a cleaner blade. So how does a clean blade contribute to a longer run time? Let me explain.

With reduced friction, the blade doesn't get as hot. It's the heat that melts the resins in the wood, which in turn stick to the blade as they cool. If a blade is covered with gunk, it makes the saw work harder, gobbling up battery life. On the other hand, a clean blade glides through the wood, using up less energy.

HOOK ANGLE. Another thing that affects how quickly a blade — cordless *or* conventional — is "pulled" through a board is the hook angle of the teeth. This is the angle that the tooth "leans" *(see Hook Angle Detail on page 74)*. When cutting dimensional lumber, I'd suggest a fairly steep hook angle (at least 15°) to produce an aggressive cut and minimize battery usage.

SOURCES. You'll find $6\frac{1}{2}$" cordless saw blades (the most common size) at most home centers, or call the sources at left. Blades cost about $10.

Tips From The Workbench Shop

Putting the Finishing Touches on Stone Tile

When we installed the granite tile counter in the kitchen makeover *(page 30)*, we had to cut several tiles to fit around the sink and cooktop. In addition, the tiles that made up the narrow accent strip of the backsplash had to be cut.

Even though granite is extremely hard, the stone tiles can be cut quite easily with a tile saw or "wet" saw. This type of saw is available at many rental businesses. (It should cost about $45 for a day's rental.)

But cutting the tiles is just one part of the process — the *cut* edge of the tile will still need some additional work.

The reason has to do with a small bevel that's machined on the "factory" edges of the tile *(see Inset Photo above)*. If the edge of the tile is exposed, say for example around the sink, this bevel produces a finished appearance *(Fig. 1)*. If the tile is laid next to another tile, the bevels on the adjacent edges provide a recess for the grout *(Fig. 2)*.

The problem is that when you cut a tile, it removes this beveled edge. Fortunately, there's an easy fix.

SAND THE BEVEL. To restore the bevel, all that's needed is to *sand* the edge of the tile using a belt sander. No, it doesn't take long. Yes, it makes lots of dust, so be sure to wear a mask.

Start by mounting an 80-grit sanding belt, then clamp the sander securely in a portable workbench like the Workmate that's shown in *Photo A* below.

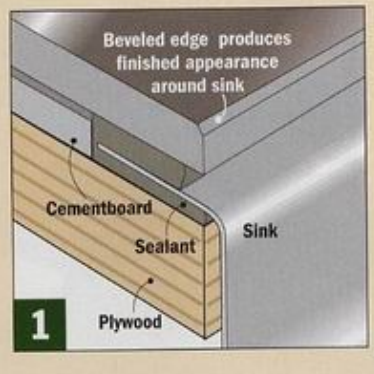
Now turn on the sander, hold the tile at an angle to the belt, and *lightly* sand the edge. I tried to approximate the original 45° bevel as closely as possible, but the exact angle really isn't critical. All that's needed to complete the job is to finish sand the beveled edge with a 120-grit sanding belt.

Note: If you're using *ceramic* tile instead of granite, don't use this sanding technique.

SEAL EXPOSED EDGES. One thing you'll notice after sanding the edge is that the exposed surface will be quite a bit lighter than the face of the tile. This is especially true with the polished black granite tiles we used.

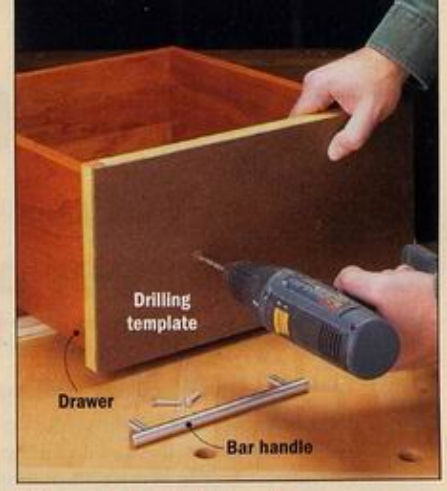
If the tile is going to be installed around the sink, the light color on the exposed edge will be quite noticeable, so you'll want to darken it a bit. An easy way to do that is by rubbing a stone tile sealer (available at tile supply stores) across the cut edge and the sanded bevel *(see Photo B)*.

Having said that though, there is one exception — *don't* seal the beveled edge if it's going to be grouted. The sealer will prevent the grout from adhering to the tile.



► **A belt sander makes quick work of beveling the cut edge of a tile. Hold the tile at an angle to the belt and lightly sand the edge as shown.**

► **If the edge of the tile will be exposed, rub stone sealer (Inset Photo) across it to more closely match the face of the tile.**



Handy Drilling Template

The tall tower on the closet organizer has four identical drawers *(page 42)*. For appearance sake, I wanted the stainless steel bar handles on the drawers to align vertically with each other and to be centered on the drawer fronts. So to locate and drill the mounting holes quickly and accurately, I made the simple drilling template that's shown above.

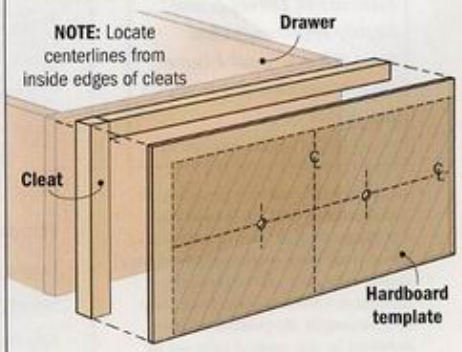
The template is a piece of 1/4" hardboard with two wood cleats attached to the back *(see Assembly View below)*. A pair of holes in the hardboard serve as guides when drilling the mounting holes. By fitting the cleats over the drawer, it registers the template and automatically locates the mounting holes.

One thing to keep in mind is that the cleats affect the size of the template. My cleats were 3/4" x 3/4", so I cut the hardboard 3/4" longer and wider than the drawer front.

After gluing on the cleats, the next step is to mark the centerlines, as shown below. Then lay out and drill the mounting holes for the pulls in the template.

To make sure the holes are located accurately, it's a good idea to temporarily mount the handles in the template. If everything checks out, you can go ahead and drill the holes in the drawer fronts.

ASSEMBLY VIEW



A Quicker Way to Apply Solid-Wood Edgebanding

The exposed edges of the drawers in the closet organizer *(page 42)* are covered with thin strips of solid-wood edgebanding *(see Photo at right)*.

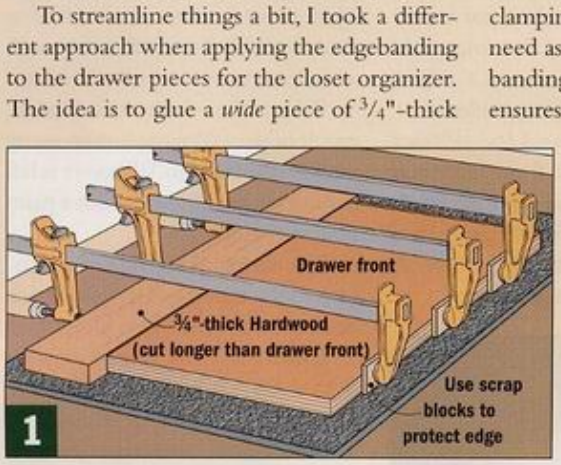
Usually, this requires some fussing around. You need to rip all the strips to a consistent thickness (which isn't as easy as it sounds). Then round up *lots* of clamps. Even then, if the clamping pressure isn't evenly distributed, the edgebanding can end up with a slightly wavy surface.

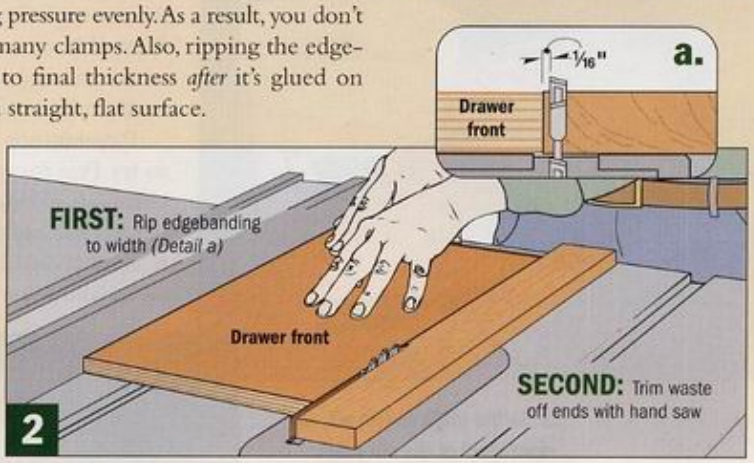
To streamline things a bit, I took a different approach when applying the edgebanding to the drawer pieces for the closet organizer. The idea is to glue a *wide* piece of $^3/_4$"-thick hardwood to the edge of the plywood *(Fig. 1)*. Then rip the edgebanding to final width ($^1/_{16}$"), as shown in *Figs. 2 and 2a*.

As for the cutoff, it's glued to the next piece that needs to be edgebanded and ripped to width as before. Then simply repeat the process as many times as necessary.

One advantage of this technique is the wide board acts as a caul that helps distribute clamping pressure evenly. As a result, you don't need as many clamps. Also, ripping the edgebanding to final thickness *after* it's glued on ensures a straight, flat surface.

▲ **The thin strips of wood covering the exposed plywood edges of the drawers make the joint lines virtually disappear.**





WORKBENCH APPROVED Tools & Products

Peel Away Makes Paint Removal Safe and Easy

▲ As the cloth comes off, so does most of the old paint. Then toss the cloth in the trash.

► A bit of scraping is all that's required to remove several layers of softened paint.

Stripping old paint is not for the faint of heart. The best chemicals for the job are typically caustic and highly flammable, meaning that when and where you undertake such a project needs to be carefully considered.

Recently, however, I had a chance to try Peel Away 7 from DuMond chemicals. DuMond touts the product as a safe *and* effective alternative to conventional, hazardous chemicals — a claim I was eager to test.

Peel Away 7 is a thick paste that can be applied with a brush or roller. Then it gets covered with a fibrous cloth (included with the chemical) and allowed to sit for up to 96 hours.

When the cloth is removed, much of the old paint comes along with it *(Photo at left)*. Whatever is left behind comes off easily with a paint scraper *(Photo)*.

The chemical lived up to the company's lofty claims and is now my first choice for paint removal projects.

DuMond offers several varieties of Peel Away suited to specific tasks. Peel Away 7 sells for around $28 for a gallon, which covers approximately 30 to 40 square feet.

Contact DuMond for more information: www.PeelAway.com or call 212-869-6350.

Convenience and Comfort are Built Into SubFlor

One challenge to finishing a basement is taking the chill off a concrete floor. The quickest way to defeat cold concrete is to put some space between it and you, which is precisely what SubFlor is designed to do.

The SubFlor system consists of 2-ft. x 2-ft. floor panels that interlock to create a smooth solid surface that accepts most finished floor coverings.

The top surface of the panel is oriented strand board (osb) that's impregnated with water-resistant resins and waxes. On the underside is a layer of heavy-duty polyethylene plastic that's covered with "dimples."

The dimples create an air gap above the concrete. This air gap acts as a thermal break between the cold floor and warm socks. The plastic layer also acts as a barrier to any moisture that collects on the floor. As the moisture collects, it can flow freely under the SubFlor to the nearest floor drain. Installation is as easy as butting the pieces together — no fasteners or adhesive required. Panels cost about $6.50 (manufacturer's suggested retail price). Visit www.SubFlor.com or call 866-782-3567 for more information or to find a dealer near you.

◄ The tongue-and-groove panels slide together, dimple side down, to form a fast subfloor.

Bosch Gets the "Drop" on Tool Abuse

▲ **Can your drill do this? Bosch adds a new "twist" to tool body construction.**

Bosch took a chapter from Timex in marketing their new line of Brute Tough cordless drills. Remember the "takes a licking and keeps on ticking" shtick? Well, Bosch has been beating up on their drills in similar fashion — the most extreme example being a 46-ft. drop to a concrete sidewalk — to demonstrate the ruggedness of the new line.

The good news — it's not just hype. These drills really *can* take a beating.

One reason for their durability is the Dura-Shield housing *(Photo at left)*. This flexible housing quite literally bounces back from most drops. (No, I mean that. I've actually seen these tools bounce.)

More important, though, is the steel reinforced collar *(Inset Photo at right)*. This collar protects the chuck from snapping off should the tool be dropped on its nose, so to speak.

Since the chuck is typically the weakest link in any drill, in terms of impact survival, this improvement alone should extend the life of countless drills.

The Brute Tough drills are available in 18-, and 24-volt models. They can be purchased individually or as part of cordless combination kits. (For our in-depth review of these combination kits, see page 52).

▲ **The drill's steel reinforced collar protects the chuck from extreme falls.**

For more information on the Brute Tough line, and to watch a video of the drill surviving a 46-ft. drop, visit www.BoschTools.com. Be sure to check dates and locations of Bosch's Big Blue World Tour, where you can drop the drills for yourself.

Ryobi 12" Compound Miter Saw

Ryobi continues to expand its line of affordable, yet remarkably capable, benchtop tools. Most recently, they've added a 12" compound miter saw to the mix. The new saw features a heavy-duty, 15-amp, ball bearing motor that runs at 5,000 rpm. We found the saw to be well-powered for crosscutting 2x8s as well as bevel and miter cutting pressure treated 4x4s.

We were also surprised by the smoothness of the cuts, considering the saw comes equipped with a 28-tooth carbide-tipped blade (higher tooth counts are generally required for smooth cuts).

The saw is also loaded with features that make it user friendly. In particular, we appreciate the electric brake that stops the blade quickly after a cut. This is a valuable safety feature that is surprisingly absent on some other saws costing hundreds of dollars more.

The scales and adjustment knobs also lend themselves to easy use. The large tightening knob on the back of the saw makes bevel adjustment quick and easy. And a large, easy-to-read bevel scale accommodates precise settings.

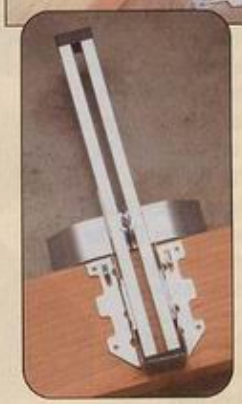
The saw also has a built-in measuring scale on the face of the fence for lining up cuts out to 10 inches.

Longer cuts or repetitive cuts are also a breeze on this saw thanks to the stock supports and a sliding stop block that can be quickly positioned on either side of the saw.

Other standard equipment with this saw is a dust bag, a dust nozzle for vacuum hook-up, and a threaded work clamp to secure stock against either fence.

The miter saw (model TS1550DX) is available at Home Depot for under $200.

For more information on this, or other Ryobi products, visit their web site at www.RyobiTools.com or call 800-525-2579.



▲ Hangers install quickly and precisely.

◄ The JoistMate holds a hanger at the perfect location and at the ideal width to accept joists up to 2x12.

Hanger Positioning is a Snap With JoistMate

JoistMate from Starr Products is a fast, easy way to ensure accurate installation of floor joists. And whether you're building a deck or a room addition, proper joist placement is key to avoiding problems such as squeaky or uneven floors.

To use the JoistMate, set the adjustable cross arm to match the width of an actual joist. Then align the JoistMate on the ledger or rim joist and put a hanger on the vertical arm of the JoistMate. A magnet on each side of the JoistMate will hold the hanger open at exactly $1^{9}/_{16}$", ensuring a snug fit when the joist is installed.

With the hanger held securely by the magnets, you can get your hand out of the way while you drive the hanger nails. Then simply move down to the next hanger location and do it again.

The JoistMate works to positions any 2x size joist hanger.

Each JoistMate sells for about $20. They are available at several hardware stores and home centers.

For additional information, including a demonstration video of the JoistMate and to locate a dealer in your area, visit the Starr Products web site at StarrProducts.com or call 888-378-2777.

▲ **Three profiles of EZ Sand Pro blocks adapt most popular palm sanders to just about any contour you'll encounter.**

EZ Sand Expands the Profile of Popular Palm Sanders

Thanks to EZ Sand Pro from Wizard Industries, your quarter-sheet palm sander can go where it has never gone before — into curves and corners.

The EZ Sand Pro is a set of three foam blocks that are held on a palm sander by a sheet of sand paper.

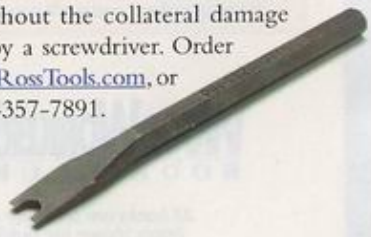
The blocks create different profiles to match a variety of sanding applications. The profiles are a 90-degree angle, 110-degree angle with $\frac{1}{2}$" radius fillet curve, and a $3\frac{3}{8}$" radius curve.

Between the three of them, your palm sander can be adapted to almost any imaginable contour. The EZ Sand Pro works with any orbital or vibrating palm sander.

Look for the EZ Sand Pro in hardware stores or home centers, or order directly from Wizard Industries online at www.EZSand.com. To reach the company by phone, call 888-346-3826.

Pin-Eez Hinge Puller

Turns out there really is a "right" tool for every job. Take the Pin-Eez ($13) from Ross Tools as an example. The one and only purpose of this tool is to remove hinge pins without the collateral damage caused by a screwdriver. Order yours at RossTools.com, or call 626-357-7891.



▲ **Setting the router up with one contoured grip and one palm grip gives it the same control and feel as a D-handle router.**

New Milwaukee Fixed-Base Router

There's little question that Milwaukee's new fixed-base router, with a 3½ hp electronic variable-speed motor, is intended for heavy routing jobs. Yet, this new powerhouse has several features that make it well-suited for finer, more delicate operations, as well.

First of all are the handles. Milwaukee provides you with a couple choices here. The router comes out of the box with large contoured handles that provide a firm grip on the full-size router. (With that many horses, good reins are essential!) But as an option, either one or both of the contoured handles can be removed and replaced with a palm-grip handle. The *Photo* at left shows the router in action with one palm-grip and one contoured handle, which essentially turns the router into a D-handle tool. This is the configuration I became most comfortable with when using the router on a variety of projects. Having the low hold offered by the palm-grip made it much more comfortable to control the large router.

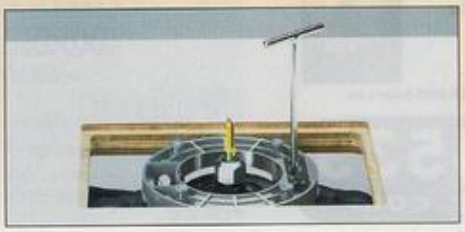
Another "fine" feature of this router is the depth setting system. When using the router handheld, gross adjustments are made by loosening the base and sliding the motor up or down. Fine adjustments, to within 1/64", are made by turning a knob on top of the router.

Once mounted in a router table, a T-handle wrench allows for above-the-table height adjustments *(see Photo below left)*.

Standard equipment for the Milwaukee 5625-20 router includes a ½" and ¼" collet, T-handle height adjustment wrench, two sub-bases (with 13/16" and 2½" bit openings), and the palm-grip handles.

The router is available at home centers and tool retailers or can be purchased online. Expect to pay about $350.

You can visit Milwaukee's Website at MilwaukeeTools.com or call 262-781-3600 to locate a dealer in your area.



► **Milwaukee's 5625 fixed-base router is designed to make above-the-table height adjustments easy with a T-handle wrench.**

A Feast for the Eyes

The annual "Design in Wood" competition at San Diego's Del Mar Fair showcases the best woodworking talent.

A picture is worth a thousand words, especially when it comes to the winning entries in the "Design in Wood" competition at San Diego's Del Mar Fair. And looking at these beautiful examples of handcrafted furniture is the next best thing to being there.

The annual competition showcases some of the best woodworking talent from around the world. Hundreds of amateurs and professionals alike compete in a wide range of categories, including contemporary and traditional furniture, wood carving, wood turning, marquetry, and scroll sawn fretwork. There are even classes for musical instruments, scale models, and clocks.

Among last year's winners was John DeGirolamo, who captured the "Excellence in Design" award sponsored by *Workbench (see below)*. His entry table, titled "BoLowe," was named for the "bowed" legs and the "Lowe" family who commissioned the orginal.

Along with John's winning entry, several others caught our eye, including the clock and the wine cabinet shown here.

With so many fine examples of woodworking and craftsmanship, though, we wanted to share as many as possible. So we've included several more of the winning entries from San Diego's Del Mar Fair on our website. You can check them out by visiting Workbench Magazine.com.

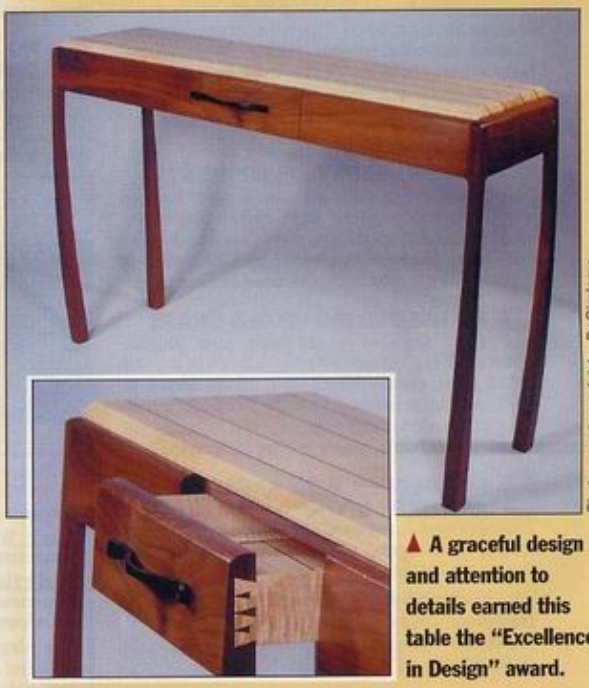
While you're enjoying the work from last year's exhibitors, be sure to look into the upcoming 2003 "Design in Wood" exhibition.

Photos courtesy of SDFWA (Lynn Rybarczyk & Anderew Patterson)

▲ **W. Patrick Edwards used figured veneers, green tinted bone, and mother of pearl to craft this stunning "Marquetry Tallcase Clock."**

▲ **Tambour doors and a bowed front draw attention to this walnut and ebony wine cabinet ("4 Wine") by William Bardick.**

WINNER: "EXCELLENCE IN DESIGN"



Photos courtesy of John DeGirolamo

▲ **A graceful design and attention to details earned this table the "Excellence in Design" award.**

The gracefully curved legs of this entry table support a top made up of highly figured maple, alternating with thin strips of walnut. Notice the very fine hand-cut dovetails, too. An ebony handle, handmade to resemble a ribbon, provides the finishing touch.