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FIND **NEW** ROADS™

CHEVROLET





ON THE COVER

A beautiful, practical, space-saving door that you can make yourself. Photographed by Tom Fenenga

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EGO
POWER BEYOND BELIEF™



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Stuff We Love

Our favorite DIY tools, materials + gear. By Mark Petersen



WORTH THE SPLURGE

Love at first bite

I've been a charcoal snob for most of my life. But a few years ago I decided to buy a gas grill just for those times when I was in a hurry. I did my research, bought a Weber Genesis grill and was instantly impressed by the quality of its construction. It felt super-solid and had an excellent fit and finish, and its three burners delivered even heat and outstanding flavor every time. I gave away my charcoal grill and never looked back.

Now Weber has introduced its Genesis II line, with prices ranging from \$700 to \$2,000. The Genesis II LX E-640, shown above, is the top of the line. You can choose between an LP model and a natural gas model. It features six stainless steel burners, a warming rack, a grill cabinet and side tables, an LED fuel gauge for LP models, lighted control knobs and much more. And it's iGrill 3 ready, which means you can monitor your grilling on your mobile device. Check out all the Genesis II models at weber.com.

— VERN JOHNSON, ART DIRECTOR

GREAT DESIGN

DEEP-CLEANING GRILL BRUSH

Most grill brushes work OK at cleaning the very top side of a grill grate, but the Kona 360° Clean Grill Brush has a three-brush head that's designed to get inside the grate. It has aggressive bristles but still works on all types of grates including porcelain, stainless steel and infrared. It's also easy on the wallet: The Kona 360° Clean Grill Brush costs \$13 at amazon.com.



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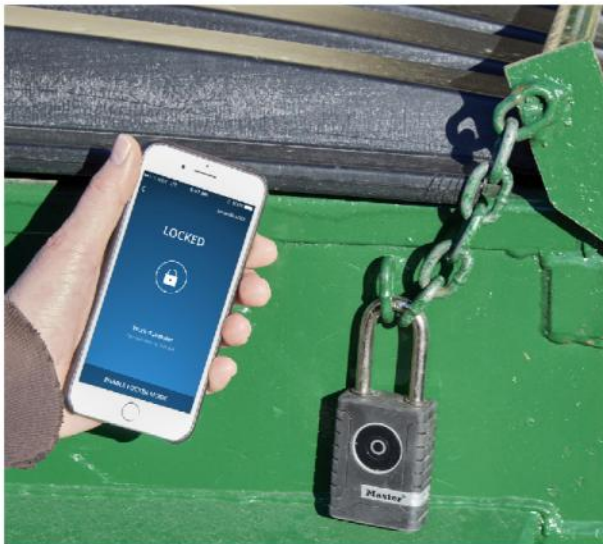
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Socket trays

After decades of digging through my toolbox drawers in search of the right socket, I decided to step up my toolbox organization game and bought a few different sizes of Hansen Socket Trays. Now, not only are my sockets easily accessible but I can actually see which size is which thanks to the large print on the holders. The trays hold shallow and deep well sockets and come in three sizes to fit 1/4-in., 3/8-in. and 1/2-in. drive sizes. They're also available for both metric and SAE sockets. They cost about \$10 each at home centers and online. Find out more at hansenglobalinc.com/our-products/socket-trays. – **JASON WHITE, ASSOCIATE EDITOR**



HIGH-TECH SOLUTION

BLUETOOTH PADLOCK

We had a problem with strangers disposing of their garbage in our dumpster here at work. On a few mornings, it was completely full of construction debris! We could either start locking the dumpster at night or keep paying the \$80 early pickup fees. I bought a Master Lock Bluetooth padlock because I didn't want to carry any more keys in my pockets or try to remember a combination.

The app on my phone lets me open the lock remotely (within Bluetooth range). I can also use the app to set combinations that my coworkers can use. If I give out individual codes, I can track who opened it and when—not that I don't trust my coworkers. I can give out single-use codes as well. I bought the heavy-duty outdoor model No. 4401DLH for less than \$70 online.

– **JOSH RISBERG, LEAD CARPENTER**



IMPRESSIVE IMPROVEMENT

An easy-to-load string trimmer—really!

I've had a love/hate relationship with all three string trimmers I've owned. Every single one was a pain when it came to loading the string—and every one supposedly had an "easy-load" head. Ryobi's new Reel Easy Bump Feed Head is the first one I've come across that can honestly include "Easy" in the name.

Here's how it works: Push the line through one hole until it comes out a hole on the other side, pull the line so there's an even amount on each side (up to 16 ft. total), and attach the Speed Winder crank. Turning the crank will spool the line into the head. Brilliant! The Reel Easy with Speed Winder also fits Homelite and Toro trimmers. It sells for about \$25 at The Home Depot.

– **TRAVIS LARSON, SENIOR EDITOR**

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STUFF WE LOVE



INNOVATIVE

Kind to your back—and your stairs

This UpCart hand-

cart has a clever six-wheel design that keeps the cart frame from dragging on and scraping stair treads. The extra wheels also reduce the distance a load travels up and down, which makes it more stable. This isn't for hauling refrigerators, but it can handle loads up to 100 lbs., perfect for hauling bags of water softener salt or a tub full of books. And the UpCart folds up so small that it can hang near fits in your back pocket. This version costs \$89 online. Check out the cool accessories and find out more about the UpCart at upcart.com.



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STOP ROOF LEAKS

I used to own a small construction company that specialized in roofing, siding and gutter work. Faulty pipe flashing was a common cause of the roof leaks we repaired. The rubber boot on pipe flashing can dry out and crack (sometimes in just a few years), giving water a clear path into the house. Sealing the crack was a temporary solution. More often than not, we replaced the pipe flashing, which was a dicey operation when working with older, brittle shingles.

The Perma-Boot is a permanent solution that doesn't involve the hassle of ripping up shingles. Just slide the boot over the existing pipe, add adhesive and pop on the cap. I wish these guys had been around when I was still crawling around on rooftops. Perma-Boots are available in several sizes and colors. Find them for less than \$20 online and at home centers and hardware stores.

— MARK PETERSEN, ASSOCIATE EDITOR



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Citrus-rind seed starters

Grapefruit, orange and other citrus rinds are just the right size for starting new seedlings. I make a hole in the bottom of each one for drainage and add some damp seed-starting mix and seeds. Then, when it's time to move them outside, I plant the whole works in the ground—peels and all. The citrus rinds make the soil more acidic, however, so I only do this with acid-loving plants like radishes, peppers and the like. — **JUDY WILDER**



NO MORE SMELLY LAWN CLIPPINGS

After mowing, I dump all my lawn clippings into a "green refuse" bin. But after a day or so, the grass clippings turn into a slimy, smelly mess. To combat the stench, I raided my electric paper shredder and threw a few handfuls of shredded paper into the bottom of the barrel. The paper helps absorb the moisture and reduce the smell.

— **EMIL MACHRONE**

EXTENSION CORD TAMER

I was always struggling to keep the extension cord away from the blade of my electric hedge trimmer. So I attached a carabiner clip to a belt loop on the back of my pants and threaded the cord through it, which keeps the cord behind me and out of harm's way.

— **GRAHAM DALY**

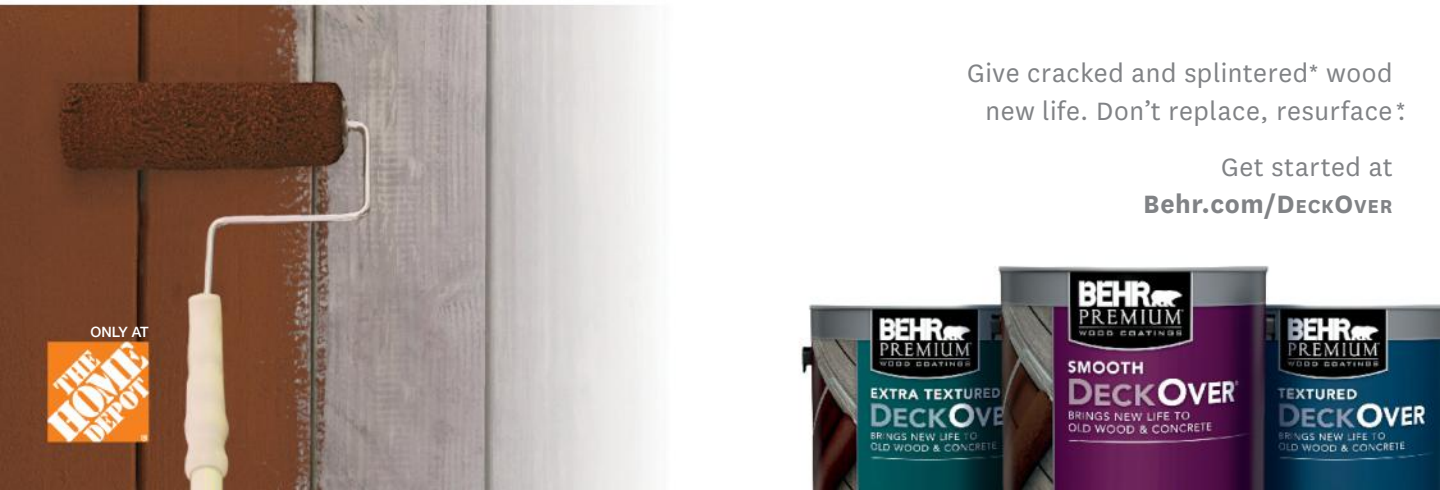


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If you don't like waiting for wood glue to come out after you squeeze the bottle, put the cap on and swing it around a couple of times. Centrifugal force will concentrate the glue at the top of bottle, making it come out of the nozzle faster. — **ALAN PEROUTKY**



Golf tee paint helpers

When you're painting or varnishing small projects, it's best to elevate them for good coverage and to keep your project from sticking to the worktable. I use an old piece of pegboard and some golf tees. The pegboard keeps the tees in place, and I can arrange them as necessary for different size projects. — **TERRY MEINCKE**



RIGHT SIDE UP

A polarized plug has a larger prong on the neutral leg, so it has to be put into an outlet a certain way. As I get older, I find it harder to see whether I'm holding a polarized plug right side up when I'm pushing it in. And it's especially hard to see what I'm doing when there's furniture in the way. That's why I make a dot on the tops of all my plugs. I use a black marker for light-colored plugs and white correction fluid for dark-colored ones. — **NORMAN SCHOCK**



Need More Handy Hints?

Can't wait for the next issue? Head over to: tftmag.com/tooltips

Mud ladle

No sooner did I finish digging footing holes for a new shed than it rained, filling all the holes with water. It looked like mud soup! I had to get rid of it quickly in order to pour concrete, so I fashioned a "mud ladle" out of a section of round ductwork, a piece of 3/4-in. plywood and a solid wood handle. Thanks to my invention, I was able to scoop out all the water in just a few minutes. – **DAVE CHOUDEK**



Silicone Tape

NONSLIP GRAB BAR

Sometimes the grab bars in my shower can get a little slippery. My quick fix was to wrap them with Stretch & Seal silicone tape. It grips well and stays where you put it. Just be sure to stretch it as you wrap it so it sticks to itself. I've also used it to get a better grip on lots of other handles. – **BRUCE KNOTT**



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DIY Essentials

Our best tips for getting your project done right. By Travis Larson

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12 Tips for Spray-Painting

The telltale signs of a bad spray-paint job are easy to spot. Stripes of uneven coverage, paint buildup in the corners, a stray hair in the finish—the list goes on. Worst of all is the dreaded run, an obvious sign that the painter applied too heavy a coat.

Here are a dozen tips to help you get a smooth, consistent finish on your next painting project. For more on this topic, including how to build a spray-paint booth, search for “spray painting” at familyhandyman.com.

Spray-can trivia

Ever wonder what gives spray cans their rattle? It's a glass marble most likely made by Marble King, a company in West Virginia. Marble King makes spray-can marbles and most of the marbles sold in the U.S.A., 1 million a day, 365 days a year.





1. DISASSEMBLE IF YOU CAN

Before you start painting, examine your project. If you can take it apart without too much trouble, do it! You'll have much better luck getting even coverage, seeing what you're doing and avoiding runs. But don't just dismantle the piece willy-nilly. Mark the parts for easy reassembly.



3. ALWAYS CLEAN OUT THE NOZZLE

Even though nozzle-cleaning directions are on every single can of spray paint, it's an easy step to skip. After use, hold the can upside down and press the nozzle until no more pigment shows in the spray, and then wipe the tip with a rag or paper towel. If you skip this step, you could end up with a nozzle completely clogged with dried paint or a partial clog that'll affect the spray pattern next time.



2. APPLY COATS IN DIFFERENT DIRECTIONS

To achieve the most even coverage, it's a good idea to put on subsequent coats in different directions. Changing directions will help you get into all those nooks and crannies and reduce the chance of zebra stripes.



4. DUST: PUBLIC ENEMY NO. 1

For a flawless finish on small parts, paint them inside a cardboard box. If you have larger projects, create a poly booth. In basements, dust will shake down from the floor joists, especially if someone is stomping around upstairs, so staple painter's plastic to the ceiling. Damp-mopping the floor will keep your feet from stirring up dust. Don't use a fan to speed up drying time. Wear clean clothes and a hat to keep hair out of the finish. An hour or so before you paint, shut off furnaces, the A/C and ceiling fans to let the dust settle.

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5. SWAP PLUGGED NOZZLES

Most nozzles have a universal fit. If you end up with a plugged nozzle and have other cans of spray paint with good nozzles, just swap the bad one for a new one. They lift right off and push on. If you don't have any good nozzles, remove the plugged one and soak it in nail polish remover, acetone or even mineral spirits.



6. START WITH A TACK COAT

If you're spraying a vertical surface, it's always smart to apply a "tack" coat before applying the first full coat. A tack coat is a light mist that you allow to set for five minutes. The texture of the tack coat will help hold the paint in place and reduce runs.

7. SPRAY ANYTHING

The Spra-Tool is a simple product—a plastic jar plus an aerosol can. You just pour the liquid into the jar and pull the trigger. We had great results with thin liquids like stain, shellac and household cleaners. With thicker material—polyurethane and latex paint—we had to add thinner to achieve a smooth coat. In some cases, we added more thinner than the paint manufacturer recommended. (Using too much thinner can affect the paint's durability, but we didn't have a problem.) Still, we got smooth, perfect finishes—fast. The Spra-Tool kit (about \$12) is available at some home centers and online.



8. NEED A CUSTOM-COLOR SPRAY PAINT?

If you want to paint radiators, electrical cover plates, a shelf or anything else to match your wall or trim color, go online and search for "custom spray paint." You'll find many companies (myperfectcolor.com is one) that can custom-mix just about any color you want, provided you know the paint manufacturer and color name. If you want a different shade of an existing color, choose one of the other shades from the paint swatch you got at the home center or paint store and have that color custom-mixed.

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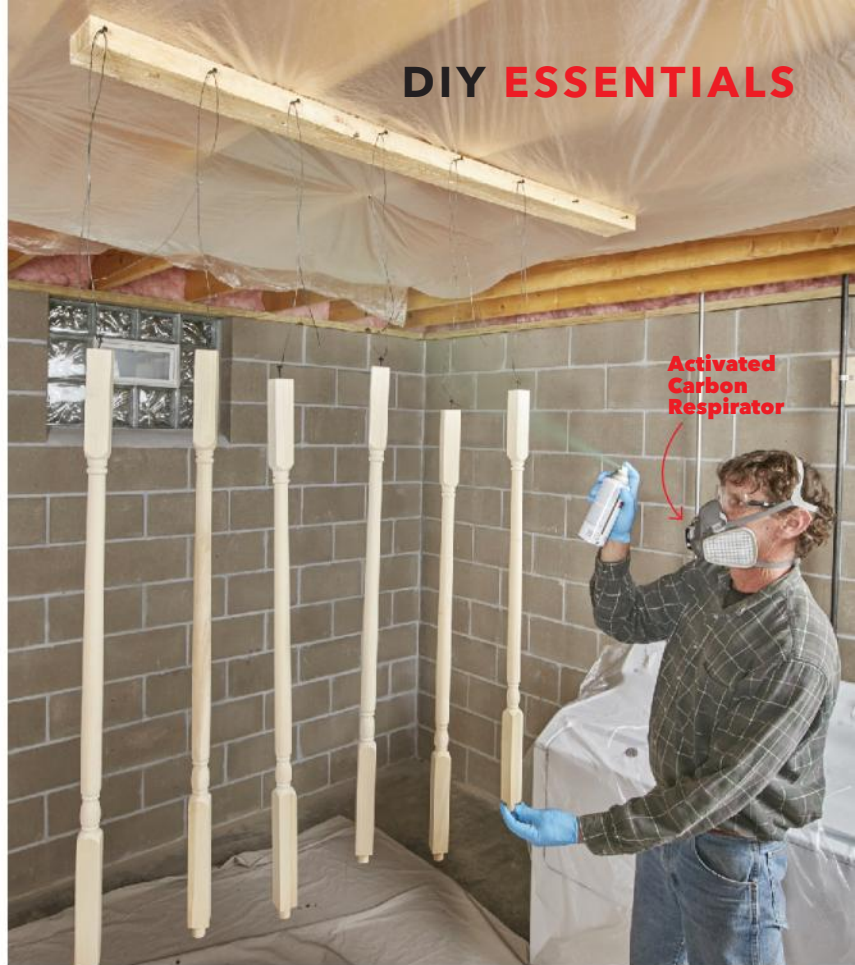
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9. READ THE DIRECTIONS!

This sounds obvious, but few people bother to read the directions on the can. If the manufacturer says to apply a tack coat or start with a primer, there's probably a good reason for it. One of the most important pieces of information is the drying time between coats. Often, you can apply a second coat soon afterward. But if you miss that window, you may have to wait a long time to apply the next coat.



Activated Carbon Respirator

10. HANG 'EM HIGH

If the project parts are small enough, you can suspend them for painting. You'll be able to paint all sides at the same time and have everything at eye level. Use coat hangers, wires, thumb-tacks, screws—whatever you have on hand. Wear an activated carbon respirator when you spray-paint, especially if you're painting indoors.

11. MANY LIGHT COATS

It's common knowledge that you should apply several light coats rather than one or two heavy ones. But few have the discipline to follow this simple advice. When you're spraying, resist the temptation to fill in thinner areas on one pass to completely cover the surface. Or welcome to dealing with runs—yet again.

12. AUTHENTIC-LOOK HARDWARE... FOR LESS!

When I bought my 1923-vintage house, the two exterior doors were original, as were the doorknobs. Unfortunately, the previous owners had installed shiny new brass dead bolts and escutcheon plate—a bad mismatch. Instead of scouring local antiques stores to find replacements, I decided to try painting the brass.

After removing the hardware, I scuffed the brass finish with fine sandpaper. Then I sprayed on a coat of primer and a few coats of Rust-Oleum's hammered-finish spray paint. The hammered finish provided the aged bronze look I was after. I was amazed at how well the repainted hardware matched the old doorknobs, and the paint job has held up, inside and out, for more than 10 years. So here's my advice: Don't replace ugly metal hardware. Save money by refinishing it with a metallic spray paint. — **VERN JOHNSON, ART DIRECTOR**



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Best Pro Tips

Expert advice from the job site. By Mark Petersen

Finishing Trim

A beautiful finish is all about proper preparation, a suitable workspace and the right products. We asked Gary Hakkinen, a painting veteran of 40-plus years, to show us his best practices for perfection. Here are a few of his favorite staining, sanding and finishing tips to help you create rich, silky-smooth trim.



MEET THE EXPERT:

Gary Hakkinen is the sole proprietor of Empire Painting in Lake Elmo, Minnesota. He's been painting, staining and varnishing residential homes and commercial buildings for more than 40 years.



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BEST PRO TIPS



Sand wood for even finishes

The trim you bought may look perfect, but it likely has imperfections from machining that won't show up until you stain it. Sand every contour and flat area in the direction of the grain with a combination of medium-grit sanding sponges and pads. When necessary, fold 120-grit paper to get into tight cracks.



Dry-brush crevices

Stain will pool in cracks. Use a dry paintbrush to remove it from each piece after it's been completely wiped. Wipe the brush on a clean rag or brush it on newspaper to clean off the stain between strokes.



Test stain colors first

Try out the stain on a sample of the same wood you plan to finish. You can create your own custom color by mixing two or three stains (of the same type) together. If you go this route, it's important to mix up a batch big enough to finish all the wood. The odds of achieving identical results on the second batch are slim. Keep a little extra on hand for touch-ups and repairs.



Stain one piece at a time

Saturate the wood with a liberal coat of stain using a natural-bristle brush. Wipe off the stain with clean cotton rags in the same order you put it on. That will enable the stain to soak into all areas of the wood for about the same amount of time. Wipe with light, even pressure. Refold the wiping rags frequently so you have a dry cloth for most of the strokes, and grab a new rag whenever one gets soaked. Work on one piece of trim at a time to keep the stain from drying before wiping.



Apply sanding sealer first

Sanding sealer is the perfect foundation for the clear coat. It's formulated to dry quickly and has more solids than conventional clear coats, making it very easy to sand. And varnish adheres better to a well-sanded, sealed surface. Pick a sealer that's designed for the overlying finish, preferably the same brand. After the sanding sealer dries, sand it with fine-grit sandpaper and sanding sponges. Remove dust with a tack cloth.



Clean the room

If possible, do your sanding and finishing in different rooms. All that sanding dust will affect the clear coats. If you have to sand and finish in the same area, do whatever you can to clean the room before applying the sanding sealer and clear coat. If you're in a garage, open the overhead door and use a leaf blower to blow dust outside. Use a shop vacuum on the floor, and damp-mop it so your feet don't stir up dust.



Long strokes = a smooth finish

If you can, arrange your trim boards in such a way that after you brush on the desired amount of finish, you can make your last couple strokes in one continuous pass. That will ensure no overlap marks. If you do end up with imperfections after the finish dries, sand them out when you sand before the next coat.

MORE PRO TIPS

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BEST PRO TIPS

Don't skimp on the brush

Buy a 2-in. or 2-1/2-in. brush, and don't spend less than \$10. If you take care of it and clean it well, a top-quality brush will last a long time. A cheap brush is more likely to leave brush marks and shed bristles that could get stuck in the finish. China (natural) bristle brushes are the choice for oil-based products; synthetic for water-based.



Oil vs. water-based topcoats

Oil-based finishes are a little more durable than water-based, but the difference isn't nearly as great as it was 10 years ago. Oil will yellow unstained wood more than water-based products will, which can be good or bad depending on the look you're after. Yellowing isn't an issue with stained wood. Water-based products dry faster, which helps keep dust from settling into the finish, but fast drying may be a disadvantage for slower, meticulous workers. Cleanup is easier with water-based products, and the odor isn't nearly as strong.



Dispose of the rags

Rags soaked with oil-based products can spontaneously combust and burn down your house. Spread out stain-soaked rags away from other combustible items, and let them dry before disposing of them.



Polyurethane vs. varnish

What's the difference between polyurethane and varnish? The quick-and-dirty answer: Varnish contains a resin and a solvent (oil or water). Once varnish is applied to wood, the solvent evaporates and the protective resin is left behind. Varnish can contain one of a few different resins, and polyurethane is one of them. Varnish that contains polyurethane just goes by the name polyurethane. The upside to polyurethane is that it's tougher (like a plastic coating) than the other varnishes. The downside is that it can appear cloudy when it's applied too thick, and it's harder to sand between coats.

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Rustic Barn Door

HIGH STYLE WITH LOW-COST LUMBER—AND A FEW TRICKS
BY JEFF GORTON

If you've investigated rustic "barn" doors, you've probably gotten sticker shock. But we can help. In this article we'll show you how to build a simple barn door, including how to distress new pine boards for a weathered look.

WHAT IT TAKES

TIME
3 days

COST
\$350 to \$500

SKILL LEVEL
Intermediate

TOOLS Router, 3/8-in. rabbeting bit, brush knot cup, angle grinder and standard DIY tools



Fooled by a forgery

I've harvested loads of lumber from abandoned farmsteads. But Jeff's fake barn wood fooled me. I really thought it was genuine until I took a close look. Even then, I was impressed with the quality of the counterfeit. And in some ways, fake barn wood is better than the real thing: There are no rotten, splintered boards, lead

paint or musty odors filling the air. In fact, Jeff's forgery made me wonder: Was collecting real barn wood—with all the sweat and splinters—a waste of my time?

To see how Jeff got a great look with standard home-center lumber, check out pp. 36-37.

GARY WENTZ, EDITOR-IN-CHIEF

Three sliding options

Before you start shopping for hardware, take a careful look at the area where you would like to install the door and figure out what door setup works best. If you want to cover the opening with one door, you'll need an area on one side of the opening that's wide enough for the door. Make sure there aren't any obstructions like light switches, sconce lights or heat registers that would be covered by or interfere with the door. If there's not enough wall space on one side of the opening, you can install a pair of doors that slide to opposite sides, or buy special bypass hardware that allows the doors to stack.



SINGLE DOOR

This is the most popular choice, but you'll need enough wall space. Order a track that's at least twice as wide as the door.



DOUBLE DOORS

If you don't have enough wall space on one side of the opening for a single large door, you can use two doors instead. Centering the track on the opening will allow the doors to slide to the sides of the opening.



BYPASS DOORS

If you want to install barn doors on a closet opening, or on an opening that goes wall to wall, you can order bypass hardware that allows you to stack the doors on one side of the opening.



1. Make shiplap boards

Mount a 3/8-in. rabbeting bit in your router and set the cutting depth to 3/8 in. Cut rabbets on two scraps and check the fit. Adjust the depth until the rabbeted joint is flush. Then cut rabbets on the door boards. After rabbeting one edge of a board, remember to flip it over before rabbeting the other edge.



Rabbeting Bit



3. Make wormholes

Create "wormholes" using an awl. To make an oblong hole, tip the awl after punching it in.



2. Distress the boards with a grinder

Mount a knot cup wheel in a grinder. Put on safety gear, including goggles. Nail a board to sawhorses and use the edge of the wire cup to grind out soft wood and create a weathered texture.



Knot Cup Wheel

Time, tools and materials

The 1x6 No. 2 pine boards we used for this door are inexpensive, so be sure to buy several extras so you can experiment with the distressing and staining techniques before you start on the boards you'll use. Preparing the boards is the most time-consuming part of this project. Expect to spend several hours cutting the rabbets on the edges of the 1x6s. We used a router with a rabbeting bit to cut the rabbets; a table saw with a dado blade set would be quicker.

The grinder and knot cup brush we used make quick work of the initial distressing. It took me about 10 minutes per board. If you don't own a grinder, you can buy one for about \$30 to \$150. A cheap one will work fine for this project. You

could also use a knot cup wire brush mounted in a corded drill, but it would take you longer to achieve the same results.

Staining goes quickly, but set aside a day or two to get the parts cut and finished. Barn door hardware ranges in price from about \$250 to \$500 depending on the size and style. Some companies have ready-to-ship options, but you should plan ahead if you need something else since it usually requires longer to get.

Measure the opening

Whether you're building a door or ordering one, here's what you need to know about door size. Sliding doors should extend at least an inch beyond the sides of the opening that don't have trim, or an inch

beyond the moldings of openings with trim. You can add more overlap for extra privacy. To determine the door width, add at least 2 in. to the width of the opening, or to the outside dimensions of the door trim (**Photo 1**).

Choose your hardware before determining the door height. Then check the measuring instructions or ask the manufacturer for help arriving at the door height. In most cases, measuring to the top of an opening with no trim, or to the top of the trim, and subtracting 1/2 in. from your measurement will give you the minimum door height required.

Finally, you have to make sure you allow enough clearance above the opening to lift the door onto the track. This distance varies depending on your hardware, so again, check with the manufacturer.



4. Apply a base coat of stain
Roll or brush an even coat of light-colored stain over each board. Wipe off the excess stain with a rag.



5. Add dark stain
Dab dark stain over the board with a rag in a random pattern. Then spread out the dabs of stain to create dark areas and streaks. Finally, wipe off the excess dark stain with a different rag.



6. Finish with gray stain
Wipe on the topcoat of gray stain with a rag. Apply an uneven coat of stain, letting some of the previous layers show through. Wipe off the excess gray stain with a rag. Let the boards dry overnight.

Three ways to support the track

To support a door, the track needs to be solidly mounted to wall framing. There are three options. First, you could install continuous wood backing between the wall studs at the track height. This allows you the freedom to install track-mounting screws at any location. But this method isn't practical in a room that's finished because you would have to remove the drywall or plaster to install the blocking.

The second option is to mount a header board to the wall surface, making sure it's securely screwed to the

studs, and screw the track to the header board. One manufacturer recommends a maximum door weight of 75 lbs. if you're using this method because the support screws will only be engaged in 3/4-in.-thick wood.

The third option is to bolt the track directly to the studs. You have to do two things if you choose this method. First, make sure to order an undrilled track. You'll need to drill holes yourself at the stud locations. And second, ask the supplier to recommend hardware to avoid crushing the drywall. Most suppliers have crush plates or something similar to solve the problem.



Get the right spacers and floor guides

Included in the track mounting hardware will be some sort of spacers or stand-offs that hold the track away from the wall to allow the door to slide freely. Some companies supply spacers in different lengths, while others supply adjustable-length spacers. The length of the spacers is determined by your track mounting method, whether there is trim around the door or at the floor that you must clear, and the thickness of your door. Be sure to double-check with the supplier before placing your order to make sure you're getting the correct length spacers for your situation.





7. Square the vertical slats

Arrange the slats on 2x4s and space them with pennies. Align the ends and screw wood scraps to the 2x4s to hold the boards in place. Then line up the ends and check the door for square by making sure the diagonal measurements are equal.

You'll also need a guide at the floor to prevent the bottom of the door from swinging. The simplest guide is an L-shaped metal bracket that mounts to the floor and fits into a groove cut in the bottom of the door. If your door doesn't have a groove in it, there are roller guides and adjustable roller guides that will work. Choose the guide that works best for your door.



Make shiplap boards

We used inexpensive 1x6 No. 2 pine boards, cut rabbets on the edges to make shiplap boards, and distressed and stained them to resemble old barn wood. When you choose boards, don't worry about knots, scratches or gouges. But try to pick boards that are straight and not cupped or warped.

We divided the width of the door by the board width to see how many boards we would need. And then we adjusted the board width until they were all equal. When you're doing the math, remember to account for the shiplap edges.

For our 4-ft.-wide door, we cut each board 5 in. wide. Yours may be different. Cut the boards to the right width and cut rabbets on two edges of all but two boards. Cut one rabbet on two boards that will

be used on the outside edges.

Photo 1 shows how we used a 3/8-in. rabbeting bit to cut the rabbets. A table saw with a dado blade will also work.

We also cut the boards to the right length before distressing them so we could make the ends look aged. At the same time, cut the two horizontal rails and the two 3-in.-wide blocks that go under the hangers. Make the horizontal rails 2 in. shorter than your door width.

Check out the video!

To see how to make shiplap boards on a table saw, go to tfh.mag.com/shiplap

Grind, scratch and beat the boards

When all the parts are cut, you're ready for the fun part—distressing



8. Fasten the rails

Measure and mark for the rails. Ours are 8 in. from the top and bottom of the door. Apply construction adhesive to the back of the rails and place them on the door. Attach the rails with nails. We staggered the nails up and down on each board, but you can use any pattern you like.

9. Mark for the hanger holes

Follow the manufacturer's instructions for mounting the hangers. We're using a 2-1/2-in. spacer to ensure the wheel is the correct distance from the top of the door. Mark the hole locations. Then drill holes and mount the hangers on the door.



the boards. **Photo 2** shows how to use a brush knot cup mounted in an angle grinder to abrade the soft wood and expose the grain. This gives the wood a weathered look. Pieces of wire from the cup can break off and cause serious injury if you're not protected, and there's a lot of dust. Make sure to wear safety goggles, hearing protection and a good-quality dust mask.

Start by nailing the board to the sawhorses with finish nails to hold it in place. The nail holes will add to the rustic appearance. Tip the grinder so the wheel is on edge and parallel to the grain to wear away the soft wood. Use the wire wheel on the edges and ends of the board to create an uneven, worn look. You can also hold the wheel flat on the surface and move it in arcs across the wood to

resemble saw marks. Don't worry; you can't go wrong here. Wearing away any amount of wood will look great.

If you want to take your distressing to the next level, use an awl to create "wormholes" (**Photo 3**). You don't have to put holes in every board. Some variety will add authenticity. Drag a screwdriver or other sharp object along the grain to create a fake crack. Use your hammer claw or any other tool or heavy object to create dents and gouges. When you're done distressing the boards, it's time to stain them.

Add layers of stain

To achieve the look you see here, start by applying a base coat of light gold stain to the boards (**Photo 4**). We applied the stain with a mini roller to speed up the

process. Wipe off excess stain with a rag. Then use a rag to apply an uneven coat of dark stain (**Photo 5**). Wipe off the excess to expose some of the base coat color. Finally, apply a thin, uneven layer of gray stain, dabbing and wiping to create an aged look (**Photo 6**). It'll look better if the stain is less consistent. Also, don't worry if the finish is different from one board to another. The variation will add an authentic look when the door is assembled. Don't forget to finish the ends and edges of the boards. Let the stain dry overnight before moving on to the door assembly.

Most stain brands have colors that will work well for aging wood. Here are the colors we used:

Base coat: Varathane Summer Oak

Second coat: Varathane Kona

Third coat: Varathane Weathered Gray

Assemble the door

Start by arranging the vertical boards on a pair of 2x4s placed flat on sawhorses or the floor. Arrange the 2x4s so they're lined up under the locations of the horizontal rails. Space the boards top and bottom with pennies. Screw scraps of wood to the 2x4s on both sides of the door to hold the boards together while you add the horizontal rail. After checking to see that the ends of the boards are still lined up, measure diagonally from opposite corners to make sure the door is square (**Photo 7**). If necessary, adjust the position of the boards until the diagonal measurements are equal.

Next mark the height of the rails on the door and attach them with construction adhesive and nails (**Photo 8**). Since the fasteners show, we decided to use 1-1/2-in. wrought-head nails that we bought at rockler.com. Since the nails protruded slightly from the opposite side, we shortened them a bit by holding them with locking pliers and grinding off the tips on a bench grinder. You could also mount a metal grinding wheel in your angle grinder. Drill pilot holes



10. Mount the track

Measure carefully to determine the track height. Hold the track level and in the correct position and mark the wall at each fastener hole. Drill pilot holes at the marks. Then attach the track to the wall with the fasteners and spacers provided in your hardware kit.



11. Hang the door

Set the door on the track. Carefully roll it to each end to determine where to place the stops. Install the stops, bottom guide and any other hardware to complete the project.

for the nails that are near the ends of the rails to avoid splitting the wood. If you don't mind the appearance of screw heads on the opposite side of the door, you could flip the door over and drive 1-1/4-in. screws through the boards into the rails for a little more strength.

If you prefer, you could brush on a coat of flat polyurethane. Test the finish on a scrap to see if you like it before you apply it to your door. We didn't put a finish on our door.

Install the hangers and mount the track

Follow the instructions included with your door hardware to install the hangers. Our instructions recommended using a 2-1/2-in. spacer between the door and the wheel to hold the hanger in the correct position while marking the bolt locations (**Photo 9**). After

marking the bolt locations, drill holes for the bolts and mount the hangers on the door.

The steps you take to mount the track will depend on your track support. If you've installed continuous backing between the studs or are mounting the track on a header board, then you may be using a predrilled track and can proceed to bolt the track to the wall.

If you're mounting the track over the drywall and bolting it to studs, you'll have to locate and mark the studs, and then transfer the stud locations to the track so you can drill holes for the mounting screws in the right place. The instructions should give you a formula for determining the track height. Double-check your dimensions and math before mounting the track (**Photo 10**). You don't want to have to cut down the door or reposition the track if it's in the wrong spot.

With the track mounted, finish the job by putting the door on the

track (**Photo 11**) and mounting the end stops, bottom guides and any other hardware according to your instructions.

MATERIALS LIST (for a 4-ft.-wide door)

ITEM	QTY.
Barn door hardware kit	1
1x6 x 8' No. 2 pine boards	12
1-1/2" wrought-head nails	40
Knot cup brush for grinder (\$20)	1
Tube of construction adhesive	1
Light gold stain	2 qts.
Dark stain	1 qt.
Gray stain	1 qt.
Polyurethane (optional)	1 qt.
Mini roller and cover	1
Rags	
Brush or roller for poly	

Barn Door Hardware Sources

- artisanhardware.com
- realslidinghardware.com
- barndoorhardware.com
- rusticahardware.com



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UNDER-CABINET DRAWER

Extra storage right where you need it! by Travis Larson

Coffee pods, knives, utensils, spices—there are so many good uses for an extra drawer or two under your upper cabinets. You can put one under almost any upper cabinet as long as there's enough space underneath to fit your countertop appliances. So take a look at what's currently cluttering your countertop and make a nice, neat home for it above!

WHAT IT TAKES

TIME	COST	SKILL LEVEL
1 hour*	\$20*	Beginner

TOOLS Basic hand tools, jigsaw or circular saw, drill, 18-gauge nailer

(A miter saw and a table saw will speed things up and give you better results.)

* Per drawer

Two boards and 1/4-in. plywood

This really is a simple project. For lumber, you'll need 1/4-in. plywood for each drawer bottom (see **Figure A**), 1x3 for the drawer box and 1x4 for the drawer supports, drawer front and trim board. (You'll need two trim boards if the drawer is visible from both sides.) We used poplar for all the parts because the exposed parts will be painted to match the cabinets. But if you have natural wood cabinets, choose your wood and finish to match. Paint or finish the drawer front and trim boards before installing them.

Side-mount drawer slides made easy

Ordinarily, installing drawers with side-mount slides is very challenging. But with this technique (**Photos 4 - 6**), everything is built around the drawer, making it very easy.

Most upper cabinets are 12 in. deep. If that's the case with yours, you'll need a pair of 10-in. side-mount drawer slides (\$15 per pair) for each drawer. You won't find 10-in. slides at home centers; you'll have to search for them online or shop at a wood-working store. If you have unusually deep cabinets, you can create deeper drawers and use 12-in. slides, which are readily available at home centers.

The cavity defines the drawer sizes

Peek under your cabinets and you'll see the cavities (**Photo 1**). You can put several drawers under a row of cabinets if you wish, but each cabinet needs a separate drawer. If you're putting in adjoining drawers, hold off on cutting the drawer fronts until all the drawers are installed so you can cut them to fit with even gaps between them. For single cabinet drawers, go ahead and cut the fronts the same length as the cabinet face. You won't need any drawer pulls. Because the drawer front drops about an inch below the drawer, you'll have a built-in lip on the underside for a finger pull.



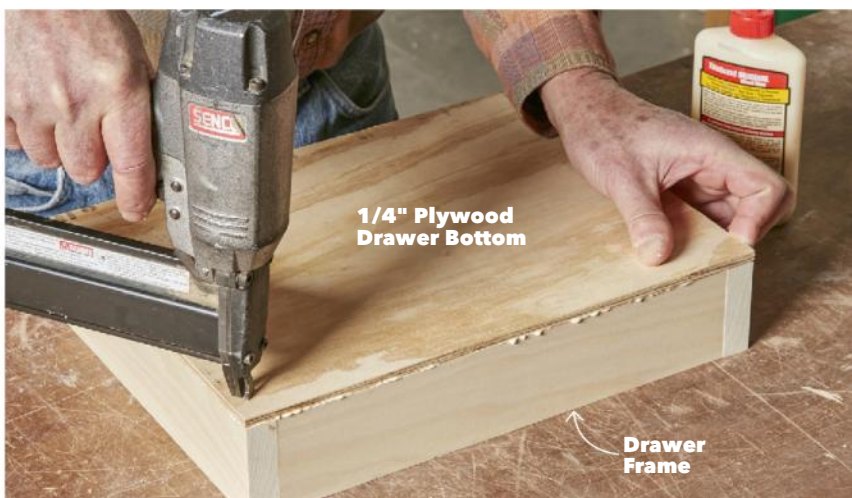
1. SIZE THE DRAWER

Measure the cavity under the cabinet and cut a piece of 1/4-in. plywood 2-1/2 in. narrower and 1/4 in. shallower than those dimensions.



2. BUILD THE DRAWER FRAME

Cut 1x3 frame parts to match the plywood dimensions, then glue and nail them together with 1-1/2-in. 18-gauge brads.



3. ADD THE DRAWER BOTTOM

Glue and nail the plywood to the frame using the plywood to square up the frame as you fasten it.



4. ATTACH THE DRAWER SLIDE

Cut two 1x4s to the same length as the drawer sides, then attach the slides to the drawer supports, holding them flush with the bottom and the end. Use a self-centering drill bit in the round slide mounting holes before sinking the 1/2-in. screws.

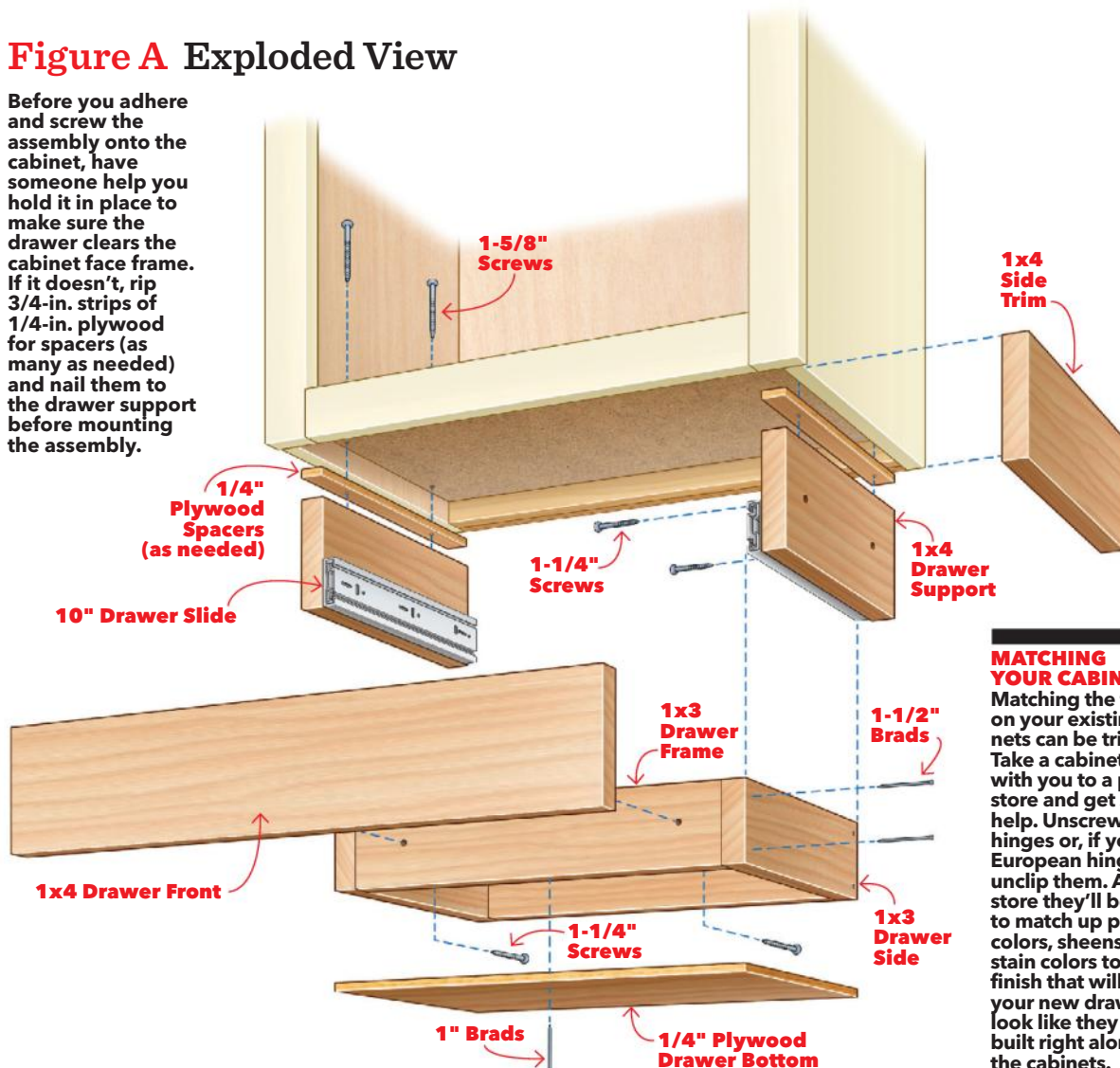


5. JOIN THE SLIDE TO THE DRAWER

Pull out the slide on each drawer support a few inches to expose the mounting holes, then predrill and screw the slides to the drawer sides flush with the front.

Figure A Exploded View

Before you adhere and screw the assembly onto the cabinet, have someone help you hold it in place to make sure the drawer clears the cabinet face frame. If it doesn't, rip 3/4-in. strips of 1/4-in. plywood for spacers (as many as needed) and nail them to the drawer support before mounting the assembly.



MATCHING YOUR CABINETS

Matching the finish on your existing cabinets can be tricky. Take a cabinet door with you to a paint store and get some help. Unscrew the hinges or, if you have European hinges, just unclip them. At the store they'll be able to match up paint colors, sheens and stain colors to get a finish that will make your new drawers look like they were built right along with the cabinets.

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6. FINISH ATTACHING THE DRAWER SLIDE

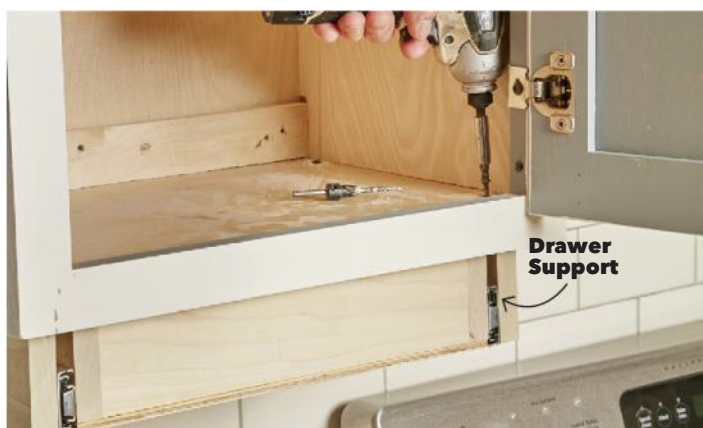
Pull the slide out the rest of the way to mount the slide to the back end of the drawer.



Double-Face Tape

7. STICK THE ASSEMBLY TO THE CABINET

Use double-face tape to temporarily stick the assembly to the underside of the cabinet. (Center it in the opening.)



Drawer Support

8. SCREW THE DRAWER SUPPORTS TO THE CABINET BOTTOM

Drill two 1/8-in. pilot holes through the cabinet bottom, then screw into the drawer supports.

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-CNET 2/14/14



9. STICK ON THE DRAWER FRONT

Cut the 1x4 drawer front exactly the same length as the cabinet face frame. Use two nickels to space it from the cabinet frame while you attach it with double-face tape.



10. ATTACH THE DRAWER FRONT

Drill, then permanently attach the drawer front to the drawer frame from the inside with 1-1/4-in. screws.



11. CLAMP AND SCREW THE SIDE TRIM INTO PLACE

Drill pilot holes above the drawer slide and attach the side trim with 1-1/4-in. screws.

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8 Great Painting Tips

Interior painting must be the No. 1 home improvement activity—everyone has to paint a room sometime! To help you master the process, check out these terrific tips from pros and DIYers alike.

By Jason White

1 Self-cleaning paintbrushes

Just hang your brush in a jar of solvent: water for latex paint, and mineral spirits or paint thinner for oil-based. Using a clamp, suspend the brush in the jar with the bristles fully submerged almost to the ferrule, but not touching the bottom of the jar. Finish will slide off the bristles and settle on the bottom of the jar.

If you're using paint thinner or mineral spirits, set the jar outside to keep fumes out of your house. Be sure it's away from children and pets. After a day or two, remove the brush and give it a thorough rinse in clean solvent.

— PAT GUSTAFSON, READER



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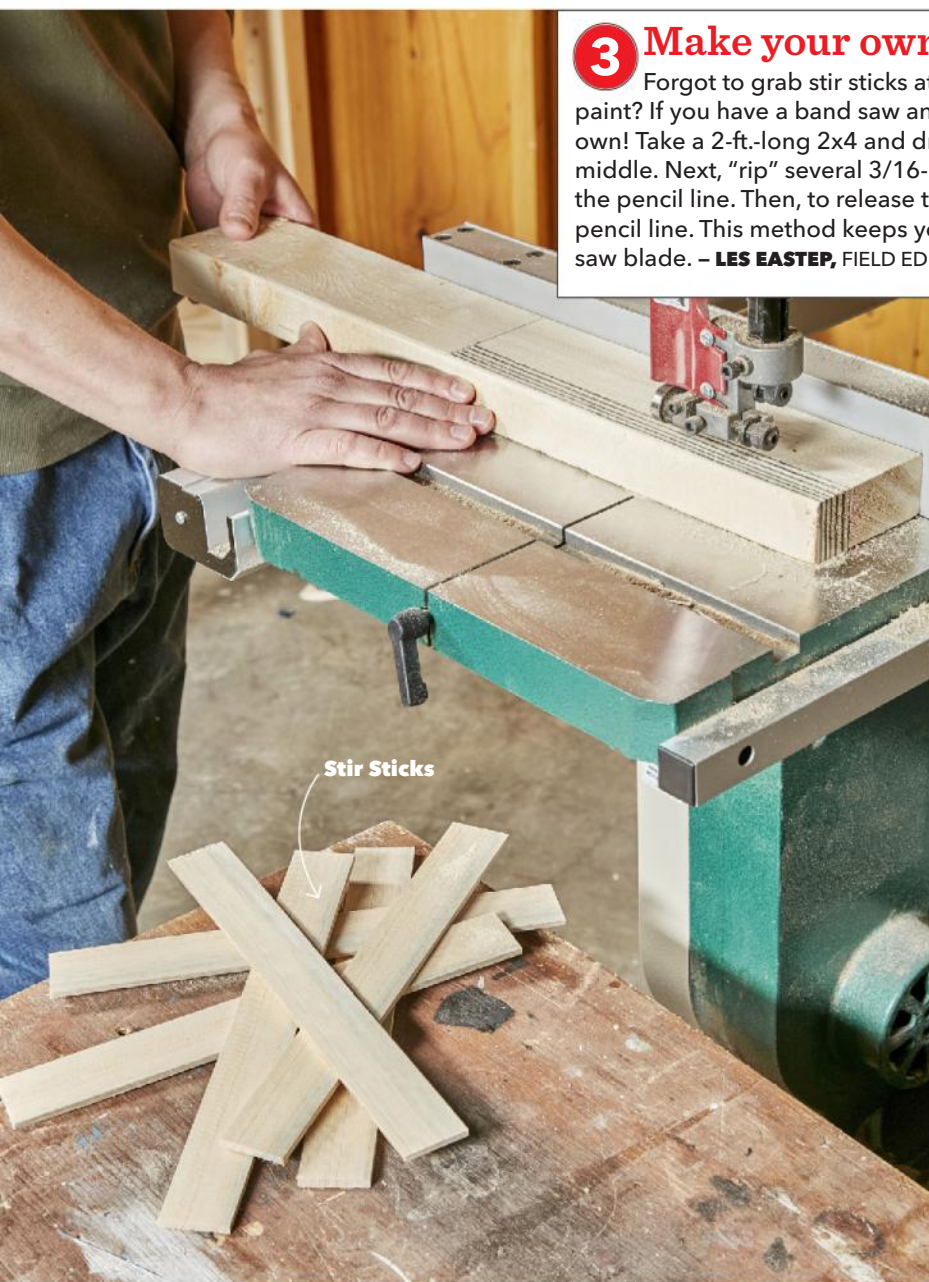
You've done a great job of patching and smoothing over all those pesky cracks, holes and dimples in your walls and ceiling, and you've rolled on the primer. So does that mean you're ready for the topcoat? Not so fast. Take a closer look at the surfaces with a portable work light. Chances are, you still have small imperfections you'll want to touch up with spackling or joint compound. Better to take care of these now because they'll really stand out after the final coat of paint goes on.

— **MATT KARL**, FIELD EDITOR



3 Make your own stir sticks

Forgot to grab stir sticks at the store when you picked up the paint? If you have a band saw and a hunk of 2x4, you can make your own! Take a 2-ft.-long 2x4 and draw a perpendicular line in the middle. Next, "rip" several 3/16-in.-thick strips on the band saw up to the pencil line. Then, to release the stir sticks, chop the 2x4 at the pencil line. This method keeps your fingers a safe distance from the saw blade. — **LES EASTEP**, FIELD EDITOR



4 Baby wipes for small messes

I always have a package of baby wipes handy whenever I paint a room. They're great for wiping up small drips before I accidentally walk through them and track paint all over the house. It beats keeping a bucket of water and rags around any day!

— **CARL EDOUARD DENIS**,
FIELD EDITOR



5 Touch-up paint bottle

When there's only a little bit of latex paint left in the can and I want to save it for touch-ups, I put a half-dozen marbles in an empty water bottle and pour in the leftover paint. When I'm ready to do a touch-up, I shake the bottle and the marbles mix the paint. A roll of tape with a rag draped over it helps hold the bottle steady while I pour the paint into it. Just be sure to use a funnel or you'll have a mess on your hands.

— **RON HAZELTON,**

TV HOME IMPROVEMENT EXPERT,
RONHAZELTON.COM



DIY DEBATE

Paint walls or trim first?

We asked our Facebook followers whether they preferred to paint trim or walls and ceilings first, and boy, are people divided on this! We got more than 300 comments from DIYers and pros, but no clear consensus. However, we did learn some new tricks:

Paul G. paints in this order: "Hands, jeans, cat, kid, then finally the walls and trim."

And our keep-it-simple award goes to Brian G.: "I paint everything the same color, so it doesn't much matter."



6 Shelter baseboards from splatter

When you're rolling paint onto walls or ceilings, a fine mist of paint settles on unprotected trim. For baseboards, forget about covering them completely. Just cover the top of each one with a "shelter" made from painter's tape. A single overhanging strip of 1-1/2-in. or 2-in. tape catches roller splatters just like the roof overhang on a house keeps rain off the siding. Tape doesn't stick to dusty surfaces very well, so be sure to vacuum or wipe down your baseboards before masking. Also press the tape down hard with a putty knife to prevent paint from bleeding underneath. For the best results, use "self-sealing" tape (see p. 53).

— MICHAEL WHITING,
PRO PAINTER



DIY DEBATE

Angled or straight bristles?

We asked our Facebook followers whether they preferred paintbrushes with straight or angled bristles for tasks like cutting in around windows or painting trim. Most said they preferred angled, but we did hear from a handful of straight-bristle brush fans. And lots of people use both. As Lea D. told us, "Angled for corners and cutting in, and flat for all-over coverage."



7 Take photos of paint can lids

Have you ever thrown away a paint can and later wished you hadn't because you couldn't remember the name of the color you painted the bedroom? Paint can lids usually have labels with color information printed on them. Take photos of your paint can lids, print them and tuck them away for future reference.

— GARY WENTZ, EDITOR-IN-CHIEF



Self-Sealing Tape

8 Splurge on self-sealing tape

With regular painter's tape, you run the risk of "paint bleed"—paint creeps underneath the tape, leaving a ragged line where a wall meets trim or another wall or ceiling. We like self-sealing tapes like FrogTape and ScotchBlue Edge-Lock tape because they're specially designed to prevent paint bleed, giving you crisp, straight lines. They cost a lot more than regular masking or painter's tape, but they're worth it.

—TOM DVORAK, FIELD EDITOR



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(Secret hiding places)

Maybe it's jewelry, maybe it's cash, maybe it's just a bag of M&Ms you want to eat all by yourself. But we all have something we want to tuck safely out of sight. We asked our readers to share their best hiding places, and share them they did! Of course, we omitted their names to protect their secrets. So read on, pick your favorites, invent your own—and keep those crooks guessing!

By Mark Petersen



A shelf with a secret

Floating shelves are beautiful and easy to build. With a little extra effort and a few bucks more, you could build yours with a hidden compartment.



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go to [tfhmag.com/
floatingshelves](http://tfhmag.com/floatingshelves)

Slit open a tennis ball

Slice open a tennis ball and you've got yourself a little vault just like those rubber squeeze coin purses from the '70s. Don't store the ball in the garage with the other balls or it could get tossed across the yard for your dog.



Make a treasure map

Having several hiding places makes sense ... unless you forget where they are! Avoid this misfortune by making yourself a map of your various treasure sites. That way you only need to remember one location—the place where you hid the map.

Sneaker subterfuge

Some shoes have a removable sock liner (the foam pad your foot rests on). Pull out the sock liner and slide in some cash. What thief is going to want to dismantle your stinky shoes? This is also a good place to hide emergency cash on your person while you're on vacation. Unless your sneakers are nice enough that someone would want to steal them too.



You can't take it with you

Prepare for the worst, and make sure your goodies are not lost forever by including all your hidey-hole locations in your will.



Family album

Nobody ever looks at those old photo albums, but they never get thrown away either. That's why they're the ideal place to store a little emergency cash.



Key magnet

I always keep a spare key hidden somewhere on my vehicle. I don't use a magnetic key box because it can fall off, and it's not easy to find a place big enough to stick them to mostly plastic modern cars. Instead, I bolted my spare key to a magnet, the kind with metal on one side and a hole in the middle. It fits perfectly in a little nook near my rear bumper, and it's been there for years without falling off.



Who'd suspect an ironing board?

Many ironing boards have tubular legs with plastic caps on them. Pull the cap and you've got yourself a perfect little hidey-hole. I slide in a wad of paper towels first so my secret stays near the opening and doesn't rattle around.



Secret in the ceiling

I like to stash my treasures above the suspended ceiling tiles in my basement. At that height, would-be thieves can't get at them without a ladder. Keep your goodies in a plastic container to protect them from bandits of the rodent variety. And don't stash anything heavy that could cause a ceiling tile to sag.

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**Sprinkler Head
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Hide a key in the keypad

It takes hours, not days, for my younger kids to lose their house keys. My solution was to install a remote keypad for the garage door opener. That worked great until one day we lost power and my 12-year-old son was left out in the cold ... literally. I discovered that my key fit right behind the nine-volt battery inside the keypad. A key in a keypad—now that's ironic.



**Smooth-Edge
Can Opener**



Kitchen cabinet cache

There are tons of ways to hide stuff in a kitchen cabinet. Bury a zipper-top bag full of jewelry at the bottom of a half-full oatmeal box. Open a cereal box at the bottom and shove in some cash. (Pick a healthy cereal that no one will touch.) A "smooth-edge" can opener cuts through the top in such a way that the top often fits snugly back in place.

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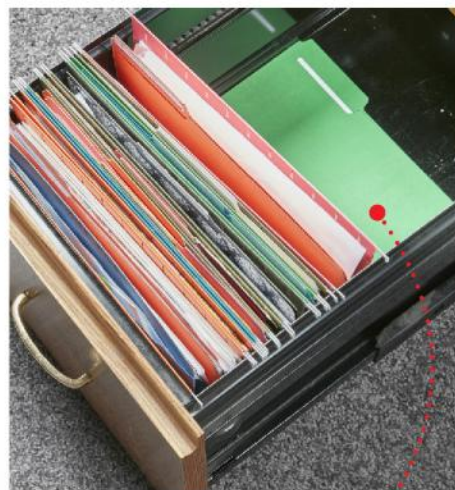
Tissue coverup

Stick a flat box of tissues in a full-size tissue box holder and you've just created a convenient little hiding spot. You could buy a one-size-fits-all box like this, or a regular box holder and set the box of tissues on a couple of blocks. The box shown is made by PandPal and costs \$23 online.



A safe safe

It's a good idea to protect your valuables in a fireproof safe. The problem is that these smaller safes are as easy to grab as a briefcase; some even have a handle on them. I hide my safe in a suitcase.



Password protection

I keep a list of my passwords on a sheet of paper near my computer. I protect my list from bad guys and nosy coworkers by putting it in a file folder. I lay the folder flat on the bottom of a file cabinet drawer under the other hanging folders. For an extra level of security, you could label the file "Proctology Exam Results" or some other title to ward off prying eyes.

Want more ideas?

For more hiding places, go to tfh.mag.com/hidingstuff

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HomeCare+Repair

Fix it, maintain it, improve it. By Jason White

LABOR SAVER

Easier twisting for wire connectors

When you have multiple or heavy-gauge wires to join, twisting on wire connectors by hand can be a real bear, even when they have wings on them. Several manufacturers have tools that make the job easier, but we especially like this one from Ideal Industries.

Ideal creates a recess in the handle of several of its screwdrivers, conduit reamers and other tools. You just insert the wire connector into the star-shaped recess as shown; the recess and the tool's large rubber grip make twisting wires much easier. You can find these tools for about \$6 and up in home centers and online.

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[PROBLEM SOLVER]

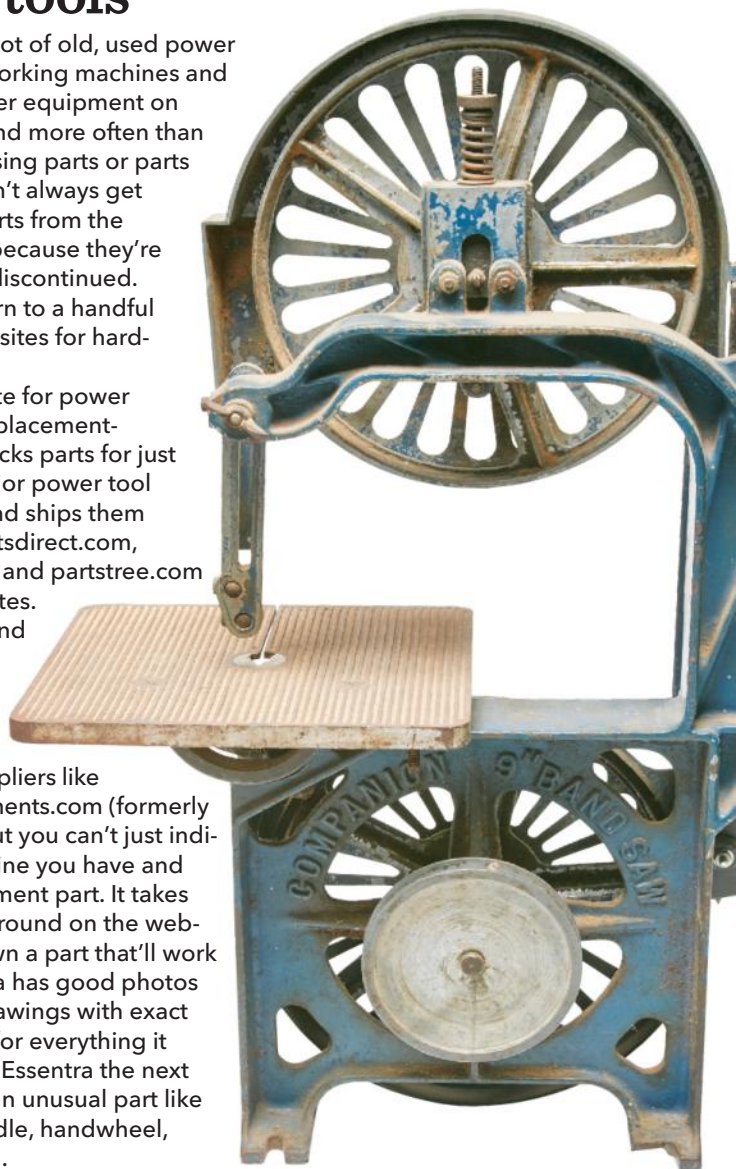
New parts for old tools

I've bought a lot of old, used power tools, woodworking machines and outdoor power equipment on craigslist.org. And more often than not, they're missing parts or parts are broken. I can't always get replacement parts from the manufacturers because they're out of stock or discontinued. That's when I turn to a handful of different websites for hard-to-find parts.

My favorite site for power tool parts is ereplacement-parts.com. It stocks parts for just about every major power tool manufacturer and ships them quickly. Toolpartsdirect.com, mikestools.com and partstree.com are also good sites.

If I still can't find what I need, I turn to industrial machine component suppliers like essentracomponents.com (formerly Reid Supply). But you can't just indicate what machine you have and order a replacement part. It takes some digging around on the website to track down a part that'll work for you. Essentra has good photos and detailed drawings with exact measurements for everything it sells. Check out Essentra the next time you need an unusual part like a clamping handle, handwheel, knob or bearing.

— JASON WHITE,
ASSOCIATE EDITOR



EASY UPGRADE**Replace baseboard heater covers**

Got old, rusty “hydronic” (hot water heat) baseboards? You could replace them in their entirety, but that’s expensive and time consuming. You could also sand and paint them, but that’s a lot of work.

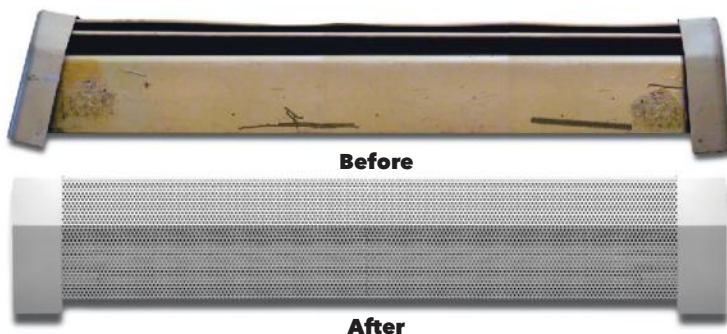
The easiest option is to replace just the front covers and end caps with aftermarket ones made of plastic or metal, which are available at home centers and online. Supplyhouse.com (formerly pexsupply.com) sells several styles of replacement covers, called “baseboarders,” for about \$16 to \$27 per foot. End caps cost about \$16 to \$28 apiece. The company’s website has easy-to-follow installation videos.

SAFETY FIRST!**Chirping smoke detectors**

Ever been driven crazy in the middle of the night by a chirping smoke detector? One of your detectors has a dying battery, but determining which detector is chirping is surprisingly tough.

Instead of trying to figure out which smoke detector has the dying battery, just replace the batteries in all the smoke detectors at the same time to eliminate the guesswork. Also be sure to replace any smoke detectors that are older than 10 years because they’re no longer reliable.

If there’s no manufacture date on any of your smoke detectors, just replace them to be safe. Some newer ones have 10-year batteries in them that you never have to replace; you just replace the smoke detector.



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[KNOWLEDGE IS POWER]

Got wasps?

If you have a nest of yellow jackets or paper wasps near your house and they're not bothering you, just leave them alone and let them eat the caterpillars and spiders in your yard. These types of wasps die off after a couple of hard frosts, anyway.

According to the "bee lab" at the University of Minnesota—beelab.umn.edu—only the new queens survive winter. They hibernate underground and establish new nests in the spring and don't reuse the old nest, whether

it's underground or inside an exterior wall of a house.

If you're really worried about getting stung, and the nest is visible, you can kill the entire nest with an aerosol spray product available at hardware stores and home centers. You just spray the product directly into the nest at sunset or sunrise (follow the directions on the can). Just make sure you're standing far away from the nest while you're spraying in case all the wasps decide to fly out and try to sting you.

[COOL TOOL]

Another way to remove popcorn texture

We ran a story a few months ago on how to remove popcorn texture from ceilings. One of our readers, John McKinney, wrote to us with a tip of his own. "I use a Homax Popcorn Ceiling Scraper," says John. "It's a rectangular scraper that you screw onto a painting pole or broom handle. The rectangular part accepts a plastic grocery bag that catches most of the texture as you scrape it off. You can dump the bag when it gets too heavy or put on a new bag." The Homax popcorn scraper is available at home centers and online for about \$20. Thanks for the tip, John!



MEET THE EXPERT
John McKinney is a retired aerospace engineer and property manager who has scraped many popcorn ceilings in his rental properties.



TOP: SHUTTERSTOCK

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— J. Fitzgerald, VA



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Car + Garage

Expert advice on repair, maintenance and gear. By Rick Muscoplat



Change Your Engine Coolant

Over time, engine coolant loses its anticorrosive properties and lubricating ability. Some carmakers recommend changing the coolant every 30,000 miles. The recommended change intervals vary widely, however, so check the maintenance schedule in your owner's manual.

You can change your coolant yourself in about an hour. You'll need to invest in an air-powered refilling tool to remove air pockets from the cooling system as you fill. You'll save about \$50 on your first coolant change and about \$100 on each one after that.

This procedure works for any cooling system that's not contaminated with rust or oil. I'll show you how to check yours and then how to change the coolant.

Here's what you'll need:

- Coolant (2 gallons; about \$40)
- Air-powered refill tool (\$90)
- Air compressor
- Hose removal tool (\$8 at auto parts store or online)
- Shop manual to locate block drain plugs
- Drain pan and paper towels
- Wrenches and screwdrivers

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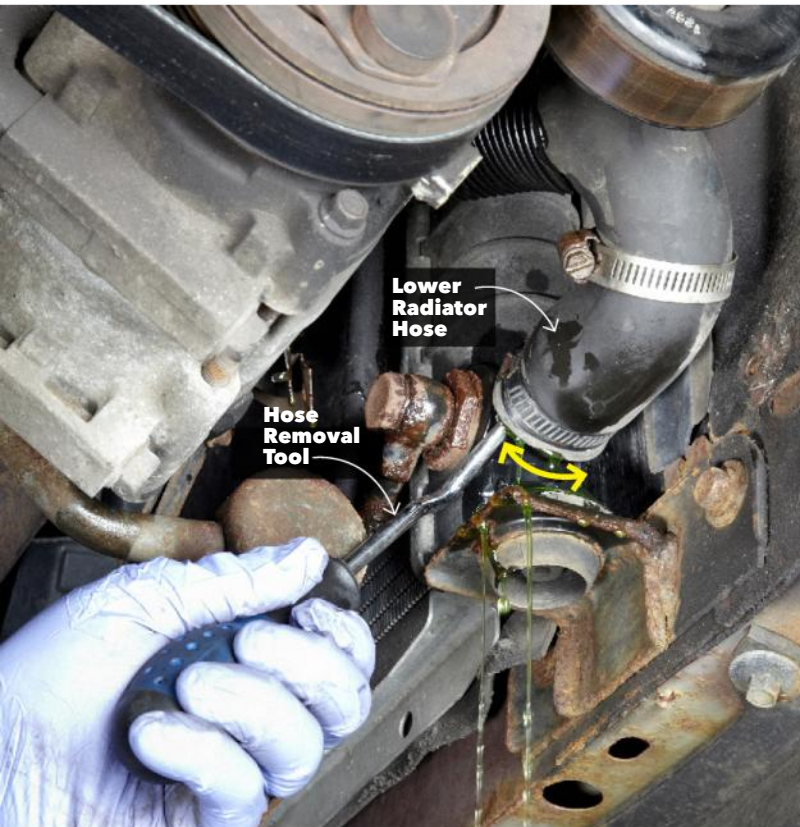
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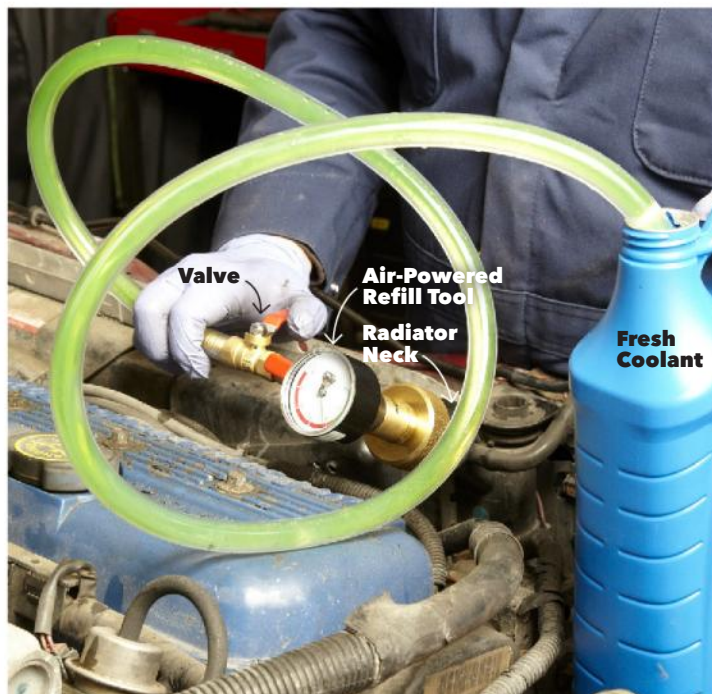
www.startyouenginesus.com





1. Remove the lower hose

Slip the pointed end of the removal tool all the way into the end of the hose. Then pull it around the radiator neck to break the hose loose. Then pull it off quickly and immediately direct the coolant into the drain pan.



2. Vacuum-fill the cooling system

Insert the fill tube into the coolant bottle. Then open the valve and let the vacuum suck fresh coolant into the system. Repeat the procedure until the system is full.

To begin, check the condition of your coolant when the engine is cool. Remove the radiator or coolant reservoir cap and examine the coolant. If it looks rusty (don't confuse orange coolant with rust), has crud or oil floating on the top, or looks like chocolate milk, call it quits and take it to a pro. You have problems that this procedure won't solve.

If the coolant looks clean, start the job by jacking up the vehicle and supporting it with jack stands. Next, place a large drain pan under the radiator. Loosen the lower radiator hose clamp with pliers (spring-type clamp) or a screwdriver (worm-drive clamp) and remove the hose (**Photo 1**). If the hose won't budge, use a hose removal tool (one choice is Tool Aid No. SGT13860; about \$7 online) to break it loose (**Photo 1**). Let the radiator and water pump drain completely. Then reattach the lower radiator hose and clamp.

Next, locate and remove the block drain plugs (they're not in the same spot on every engine, so refer to a repair manual for the location of yours). Reinstall the block drain plugs and move on to the refilling step.

Refill with fresh coolant

Insert the air-powered refilling tool (we used the UView 550500 AirLift II Economy Cooling System Refiller; \$90 online) into the radiator neck or overflow bottle. Connect the exhaust hose and compressed air line and route the open end of the tool's exhaust hose into an empty gallon jug or pail. Then open the valve and let the vacuum rise until the needle reaches the edge of the red zone on the gauge. Then fill with coolant (**Photo 2**). The vacuum sucks out any air pockets as it refills the system. When it's full, just reinstall the radiator or overflow tank caps, remove the jack stands, and go for a spin.

Buying the right coolant

Most DIYers buy coolant at the auto parts store, which carries a product labeled "universal," meaning it works in all cars. The car-makers disagree. Over the past several years, they've issued service bulletins warning that "universal" coolants are often incompatible with the newer metal alloys and gaskets and seals used in their vehicles. The carmakers aren't saying that just to increase sales of their proprietary coolants. They're seeing real (and expensive) damage caused by these coolants.

If you use the wrong coolant, you won't see the damage for a few years. But when you do, it'll cost you a bundle. So heed the manufacturer's warnings and buy coolant right from the dealer. It'll cost about \$6 more per gallon (most vehicles need 2 gallons), but the peace of mind is worth it.



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HomeTech

New solutions for today's home. By Rick Muscoplat

BETTER, BRIGHTER WORKSHOP LIGHTING

The price of LED bulbs has fallen to the point where it finally makes sense to replace the fluorescent bulbs in your workshop and other rooms with LEDs. These bulbs consume about half the energy of old T12 bulbs and about 30 percent less than even the most efficient T8 or T5 bulbs. By switching to LEDs, you'll save money on electricity and

eliminate the hassle of recycling fluorescent bulbs and replacing expensive ballasts.

LED bulbs offer other advantages as well. They last twice as long as fluorescent bulbs. They work in temps down to minus 4 degrees F or even lower. And they focus the light in a 160-degree downward pattern (as opposed to 360 degrees), so you get a brighter work area.

THREE CHOICES

You have three options when it comes to getting on the LED shop light bandwagon. The prices below assume 48-in. bulbs and two-bulb fixtures.

1. Buy replacement "ballast-compatible" bulbs for about \$15 each. Open the fixture and locate the ballast model number. Then search the LED bulb manufacturer's website for compatible bulbs. The downside to this approach is that you're still relying on an old ballast that will eventually fail. And a ballast costs \$15 to \$35 to replace.

2. Buy entirely new replacement LED fixtures. The cheapest LED fixtures cost less than \$40, including bulbs. They're easy to swap in if yours are suspended by chains—not as easy if they're permanently mounted and hardwired. The advantage: You'll never have to replace any ballasts.

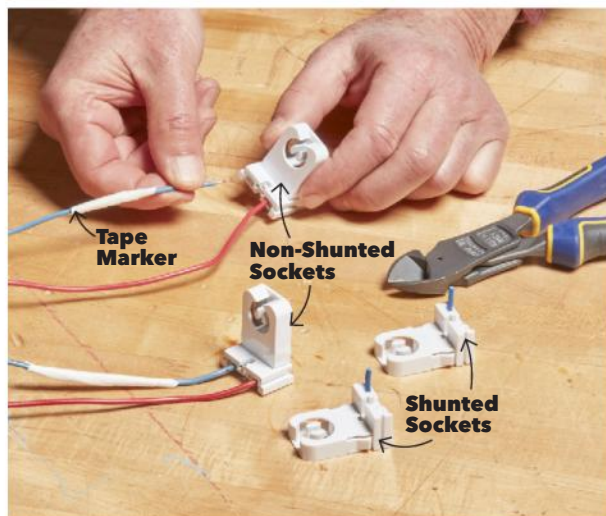
LED Advantages

- Longer life
- Electricity savings
- Great for unheated garages



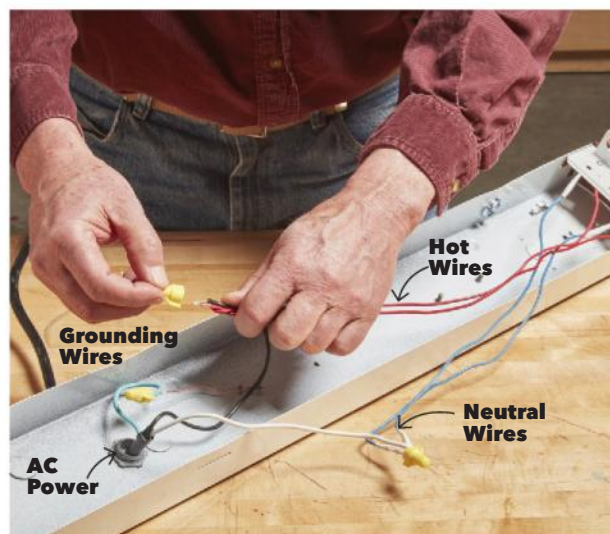
1. REMOVE THE COVER/REFLECTOR

Then remove the end cap housing from one end of the fixture and cut the wires to the sockets. Remove and discard the old sockets.



2. CONNECT THE SOCKETS

Insert a new white and black 18-gauge solid copper wire into each new socket. If you don't have 18-gauge wire on hand, you can repurpose the existing wires from your old ballast. Make sure you label the neutral wire from each socket by wrapping each end with white electrical tape.



3. CONNECT SOCKET WIRES

Using a twist-on connector, connect the neutral wires from each new socket to the white wire from the cord or house wiring. Then connect the hot wires from each new socket to the black wire from the cord or house wiring using another twist-on connector.



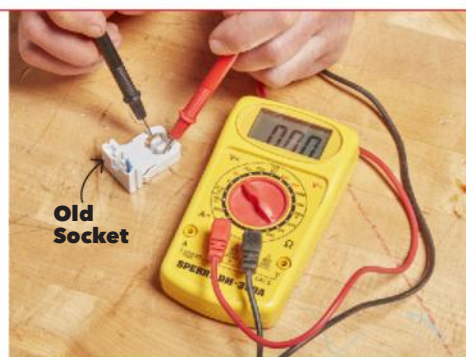
4. REINSTALL THE END CAP AND REFLECTOR/COVER

Label the powered sockets with a marker and install the LED bulbs. Apply the supplied warning label to the fixture so that future users will know the fixture has been converted to use ballast-free/direct wire bulbs. Turn on the power and test the bulbs. Recycle the fluorescent bulbs.

CAN YOU USE YOUR OLD SOCKETS?

The answer is, probably not. Most older fluorescent fixtures have shunted sockets, which means the internal contacts are connected with a copper "shunt" strap. If you connect hot and neutral wires to a shunted socket, you'll create a dead short and possibly damage the new LED bulb.

You can determine what type is in your fixture with a continuity tester. Turn off the power to the fixture and disconnect the wires going to each socket. Probe across the copper contacts in each socket. If you get a continuity reading, the sockets are shunted and must be replaced with non-shunted units.



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HOME TECH

3. If you have lots of fluorescent fixtures or fixtures that are permanently wired, consider converting them to use "ballast-free/direct wire" LED bulbs. They cost about \$15 each. (If you have lots of lights, you can buy in bulk to reduce the price to \$10 per bulb.) These bulbs don't need a ballast because the power wires connect directly to two of the fixture's sockets.

The advantage of this option is that you'll never have to worry about replacing ballasts. You'll reuse your existing fixtures, and the conversion is simple. The steps are shown on p. 73.

SHOP FOR LED_s AND SOCKETS

Before you go online or shop at the home center, make sure you know what kind of bulbs you have (T5, T8 or T12). Buy bulbs that are labeled "ballast-free/direct wire" (see "Before You Buy," below). You may need one new non-shunted socket for each new bulb

(see "Can You Use Your Old Sockets?" on p. 73).

Some LED bulb manufacturers include a socket with each bulb, but since there are nearly 10 socket sizes and styles, the included sockets may not fit your fixture. Since most home centers don't stock all the different types, you can contact the bulb manufacturer or buy the correct one online. Double-check the socket fit before you start the conversion. Never try to modify a socket to fit your fixture!

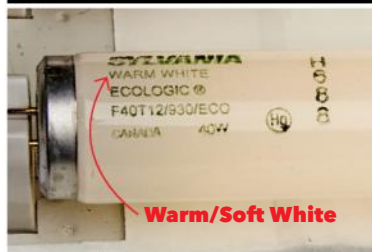
CONVERT YOUR FIXTURE

Ballast-free/direct wire LED bulbs get power from only one end and use the socket on the opposite end only to hold the bulb in place. Start by unplugging the fixture or turning off the circuit breaker if it's hardwired. See **Photos 1 - 4** for the rest of the conversion steps. Leave the old ballast in the fixture or recycle it—don't toss it in the trash.

Before you buy

■ Decide whether you want a clear or diffused lens. Choose a clear lens if the fixture is directly over your work area and a diffused lens for lighting large areas.

CHECK OLD FLUORESCENT BULB FOR COLOR TEMPERATURE



Warm/Soft White



Cool White

■ Check the label info on your current bulbs to find their color temperature. If you're happy with the color, buy it again. If not, choose a color based on the room and task.

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kitchen, bedrooms.

**NEUTRAL/
COOL**
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Best for
workshops.

**DAYLIGHT/
COLD WHITE**
6,000° Kelvin.
Provides the great-
est contrast. Best for
intricate work.

■ Then check the packaging before you buy to make sure the label says the bulbs are "Ballast-Free" or "Direct Wire" to indicate the bulbs are designed to work without a ballast. Finally, check the bulb's brightness level to make sure it provides the same illumination as your fluorescents, if not better. For comparison, fluorescent bulbs typically provide 2,000 to 3,000 lumens.

What's Wrong with this picture?

By Travis Larson

BAD PLANNING

HVAC short circuit

In forced-air heating systems, warm air enters the room via the heat registers and flows through the room to a cold-air return, which carries air back to the furnace. Obviously in this case, the heat isn't spreading through the room, is it?

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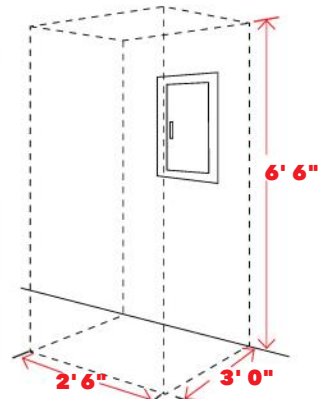
ELECTRICAL MISCONDUCT

NO ACCESS

When a breaker trips or you have an emergency or need to make repairs, you gotta have easy access to the electrical panel. That's why it's required in the electrical code!

The right way

The typical clearance requirements are shown at right. As inspectors say: If you couldn't park a fridge in front of the panel, you don't have adequate access.



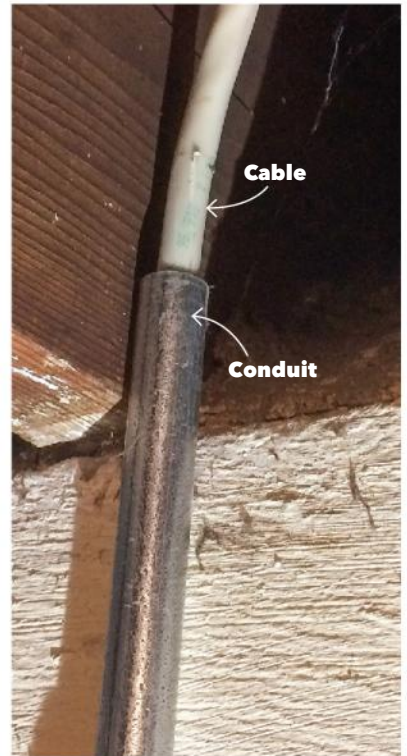
MINIMUM ACCESS CLEARANCE AROUND A SERVICE PANEL

WHAT'S WRONG



How NOT to run new power

You can't run an extension cord through a wall—even if you finish around it nicely with joint compound and paint.



ON THE CUTTING EDGE

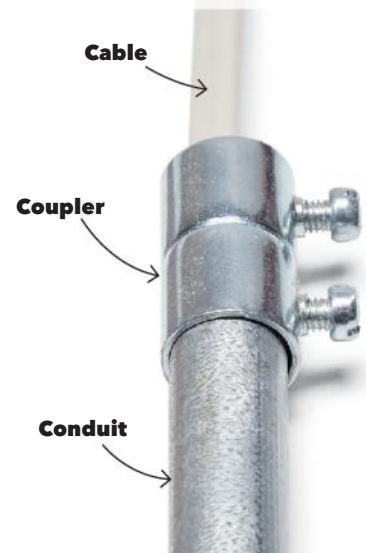
UNSAFE EXIT STRATEGY

Cable should never exit electrical conduit without protection from sharp edges.

Eventually, small movements will scrape away the plastic insulation, resulting in a short or even a house fire.

The right way

The simplest way to protect the cable is to attach any type of coupling or adapter, all of which have smooth edges at the exit point.



DISASTER PREVENTION

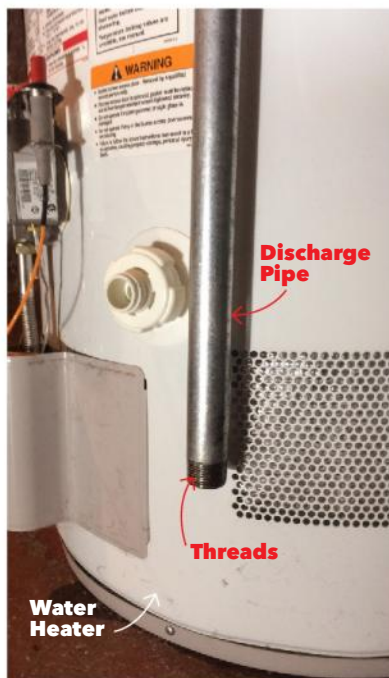
THREADED PIPE BOMB

The discharge pipe on this water heater has threads on the end. That can be dangerous, and it's not allowed by plumbing codes. Here's why:

If the pressure inside a water heater gets too high, a TPR (temperature and pressure relief) valve lets out a little water through the discharge pipe. Anyone seeing that puddle might assume it's a problem and "fix" it by screwing a cap onto the pipe. That blocks the TPR valve, and the pressure that builds up can cause the water heater to explode.

The right way

The plumber should have cut off the threads before installing this pipe.



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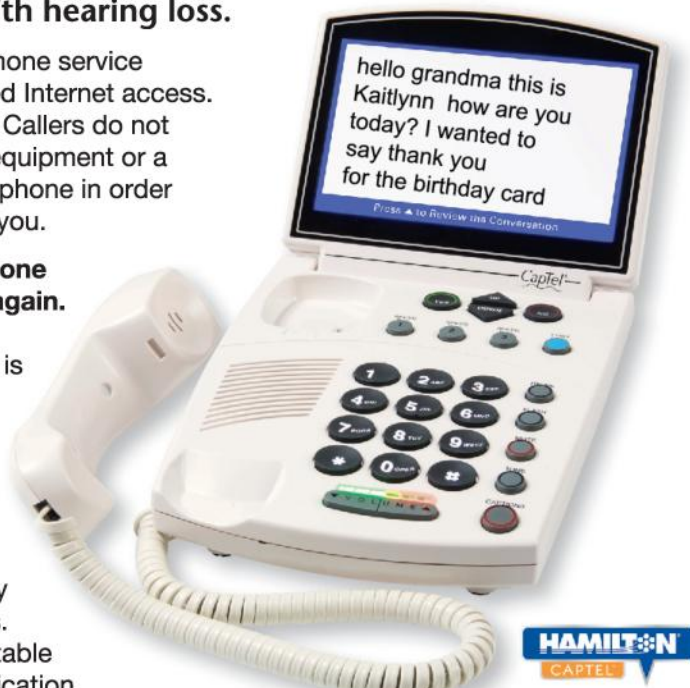
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WHAT'S WRONG

HIDDEN DANGER

Crushed and clogged

Metal “semirigid” duct is a safe option for dryer venting. Building codes and dryer manufacturers typically allow lengths up to 8 ft. But be careful not to crush it. The dent in this duct caused lint buildup and blockage, which led to an expensive dryer breakdown. It could have caused a dryer fire.



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CLOSE CALL

A REAL SCORCHER

This incandescent lightbulb is way too close to a PVC pipe, hence the scorching. The fixture should be moved farther away or the bulb should be swapped out with a much cooler LED or CFL bulb. Incandescent bulbs cause lots of house fires.

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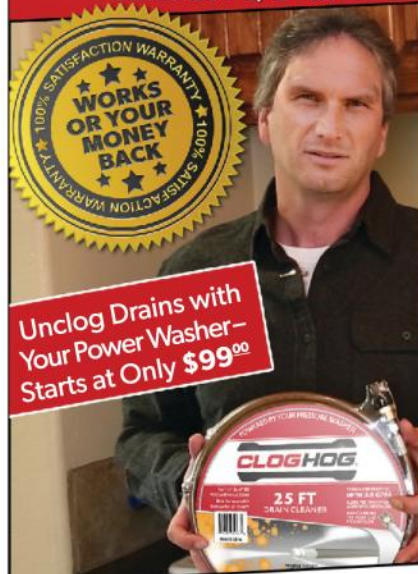


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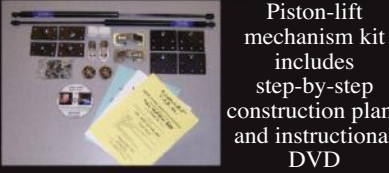
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clarity!

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the first time**



Now you see it...

*Now you
don't*



Perfect Choice HD Ultra™ is NOT a hearing aid. It is a Personal Sound Amplification Product (PSAP). Hearing aids can only be sold by an audiologist or a licensed hearing instrument specialist following hearing tests and fitting appointments. Once the audiologist had you tested and fitted, you would have to pay as much as \$5000 for the product.

The designers of the Perfect Choice HD Ultra™ have moved the tiny but powerful speaker to the end of the hearing tube, so it is closer to the eardrum, giving you more volume and clarity. It features dual microphones that focus on voices for better conversational listening. It also automatically senses noisy or quiet environments and suppresses background noise, so sounds and conversations are easier to hear and understand.

The unit is small and lightweight enough to hide behind your ear...

only you'll know you have it on. It's comfortable and won't make you feel like you have something stuck in your ear.

Try it for yourself with our exclusive home trial. This remarkable product has been designed with the finest micro-digital components on the market today. Thanks to the efforts of a doctor who leads a renowned hearing institute, it's manufactured in an efficient production process that makes it available at an affordable price. Call now, and you'll find out why so many satisfied seniors are now enjoying their Perfect Choice HD Ultra, hearing their grandchildren and what the world has to say. Call today, and be sure to ask about our special discounts for Seniors and Military personnel.

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Perfect Choice HD Ultra is not a hearing aid.
If you believe you need a hearing aid, please
consult a physician.

It's Better

COMFORT	Less than 1 ounce
SOUND QUALITY	Excellent: Optimized for speech
FITTING REQUIRED?	No
ONE-ON-ONE SETUP	Free
SENIOR AND MILITARY DISCOUNTS	Yes

Great Goofs®

Laughs and lessons from our readers



Laundry washout

While folding laundry one rainy Saturday, I noticed water seeping from the sill of a basement window. Figuring the window had not shut properly because of a dirty seal, I got a small rag and started to open the window to wipe it out.

When I turned the latch, a tidal wave washed over the whole laundry room, completely soaking me and everything in it. I hadn't realized that the entire window well was full of water.

I went upstairs to change and told my wife the laundry was still a little damp.

— TERRY JOBKE

SODLY MISTAKEN

I had to replace a worn 4 x 6-ft. section of my lawn with new sod. I was advised to kill off any grass before rolling out the new turf, so I bought some Roundup and meticulously sprayed a perfect rectangle.

A few days later, the area started to turn brown as expected. But I also noticed that a few spots outside the patch were starting to die too. I was irritated that my sprayer had leaked on my otherwise flawless lawn.

As the grass killer continued to work, the mystery spots began to take shape—they were the perfect imprints of my shoes! Evidently I had walked through the freshly sprayed area while heading back to my garage.

— KEN SCHUBA

No free lunch

I decided to save the price of a plumber by replacing my kitchen faucet myself. After installing the new faucet, I treated myself to lunch out with all the money I had saved.

I returned two hours later to about an inch of standing water on the first floor. Apparently, I had neglected to properly tighten a compression fitting on the supply valve under the sink.

After replacing the carpet and having all the wood floors sanded and refinished (ouch!), I now hire a plumber and watch the proceedings while I eat lunch in.

— BRIAN THOMAS



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