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**HOW TO
PROTECT
& RENEW
CONCRETE**

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**INTERNET
SECURITY**
A SIMPLE WAY
TO GUARD YOUR
PRIVACY

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LUSH LAWN
PRO TIPS
FOR A SHARP
LAWN MOWER
BLADE

SEPTEMBER 2020
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What do you think is the best starter tool for kids? Shoot me a note at editors@familyhandyman.com



Jason Magalen's daughters share his good taste in reading material.

BUILDING LIFELONG DIY SKILLS

Playtime with a payoff

One of the best parts of my job is connecting with readers and, in a way, feeling welcomed into your homes and lives each month. Often, readers build on that goodwill by sending us stories and photos.

Here's my favorite recent example: Back in the spring, when schools closed because of the pandemic, Jason Magalen worked with his daughters, ages 6 and 10, to build a playhouse. The project kept the girls entertained and challenged, amused and enthused, for days.

The girls got the playhouse they had wanted. And much more: They built basic skills like planning and measuring. Even better, they built DIY confidence. (For all of us, an I-can-do-this attitude is half the battle!) Practical skills and confidence will benefit those girls forever.

GARY WENTZ
EDITOR-IN-CHIEF



Jason (aka "Dad") has a few tips for helping kids get started in DIY

- First, and most important, let the kids do as much of the work as possible. Intervene when safety is an issue, but otherwise, let them experience their own mistakes and triumphs. That's what builds skills, confidence and pride.
- Twelve-volt cordless tools, especially drills, are great starter tools for kids. They're built for adults but suit smaller hands and are less powerful.
- A jigsaw is a kid-friendly cutting tool. It can handle a variety of jobs and is much safer than other power saws. That said, a jigsaw can injure—supervision is essential!



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Modular Storage Wall

Conquer garage clutter and turn the space into an organized mudroom.

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Wash your dog at this convenient station—and keep the mud out of the house!

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Sharpen Your Mower Blade

You'll mow faster and have healthier grass! All it takes is a few minutes and a little know-how.



The risk information provided here is not comprehensive. To learn more, talk about IMBRUVICA® with your healthcare provider or pharmacist. For more information, call 1-877-877-3536 or go to www.imbruvica.com.

What is IMBRUVICA®?

IMBRUVICA® is a prescription medicine used to treat adults with:

- Mantle cell lymphoma (MCL) who have received at least one prior treatment
- Chronic lymphocytic leukemia (CLL)/Small lymphocytic lymphoma (SLL)
- Chronic lymphocytic leukemia (CLL)/Small lymphocytic lymphoma (SLL) with 17p deletion
- Waldenström's macroglobulinemia (WM)
- Marginal zone lymphoma (MZL) who require a medicine by mouth or injection (systemic therapy) and have received a certain type of prior treatment
- Chronic graft versus host disease (cGVHD) after failure of 1 or more lines of systemic therapy

It is not known if IMBRUVICA® is safe and effective in children.

What should I tell my doctor before taking IMBRUVICA®?

Before taking IMBRUVICA®, tell your healthcare provider about all of your medical conditions, including if you:

- have had recent surgery or plan to have surgery. Your healthcare provider may stop IMBRUVICA® for any planned medical, surgical, or dental procedure.
- have bleeding problems
- have or had heart rhythm problems, smoke, or have a medical condition that increases your risk of heart disease, such as high blood pressure, high cholesterol, or diabetes
- have an infection
- have liver problems
- are pregnant or plan to become pregnant. IMBRUVICA® can harm your unborn baby. If you are able to become pregnant, your healthcare provider will do a pregnancy test before starting treatment with IMBRUVICA®. Tell your healthcare provider if you are pregnant or think you may be pregnant during treatment with IMBRUVICA®.
 - **Females** who are able to become pregnant should use effective birth control (contraception) during treatment with IMBRUVICA® and for 1 month after the last dose.
 - **Males** with female partners who are able to become pregnant should use effective birth control, such as condoms, during treatment with IMBRUVICA® and for 1 month after the last dose.
- are breastfeeding or plan to breastfeed. Do not breastfeed during treatment with IMBRUVICA® and for 1 week after the last dose.

Tell your healthcare provider about all the medicines you take, including prescription and over-the-counter medicines, vitamins, and herbal supplements. Taking IMBRUVICA® with certain other medicines may affect how IMBRUVICA® works and can cause side effects.

What should I avoid while taking IMBRUVICA®?

Do not drink grapefruit juice, eat grapefruit, or eat Seville oranges (often used in marmalades) during treatment with IMBRUVICA®. These products may increase the amount of IMBRUVICA® in your blood.

What are the possible side effects of IMBRUVICA®?

IMBRUVICA® may cause serious side effects, including:

- **Bleeding problems (hemorrhage) are common** during treatment with IMBRUVICA®, and can also be serious and may lead to death. Your risk of bleeding may increase if you are also taking a blood thinner medicine. Tell your healthcare provider if you have any signs of bleeding, including:
 - blood in your stools or black stools (looks like tar)
 - pink or brown urine
 - unexpected bleeding, or bleeding that is severe or that you cannot control
 - vomit blood or vomit looks like coffee grounds
 - cough up blood or blood clots
 - increased bruising
 - dizziness
 - weakness
 - confusion
 - change in your speech
 - headache that lasts a long time or severe headache
- **Infections** can happen during treatment with IMBRUVICA®. These infections can be serious and may lead to death. Tell your healthcare provider right away if you have fever, chills, weakness, confusion, or other signs or symptoms of an infection during treatment with IMBRUVICA®.

- **Decrease in blood cell counts.** Decreased blood counts (white blood cells, platelets, and red blood cells) are common with IMBRUVICA®, but can also be severe. Your healthcare provider should do monthly blood tests to check your blood counts.
- **Heart rhythm problems (ventricular arrhythmias, atrial fibrillation and atrial flutter).** Serious heart rhythm problems and death have happened in people treated with IMBRUVICA®, especially in people who have an increased risk for heart disease, have an infection, or who have had heart rhythm problems in the past. Tell your healthcare provider if you get any symptoms of heart rhythm problems, such as feeling as if your heart is beating fast and irregular, lightheadedness, dizziness, shortness of breath, chest discomfort, or you faint. If you develop any of these symptoms, your healthcare provider may do a test to check your heart (ECG) and may change your IMBRUVICA® dose.
- **High blood pressure (hypertension).** New or worsening high blood pressure has happened in people treated with IMBRUVICA®. Your healthcare provider may start you on blood pressure medicine or change current medicines to treat your blood pressure.
- **Second primary cancers.** New cancers have happened during treatment with IMBRUVICA®, including cancers of the skin or other organs.
- **Tumor lysis syndrome (TLS).** TLS is caused by the fast breakdown of cancer cells. TLS can cause kidney failure and the need for dialysis treatment, abnormal heart rhythm, seizure, and sometimes death. Your healthcare provider may do blood tests to check you for TLS.

The most common side effects of IMBRUVICA® in adults with B-cell malignancies (MCL, CLL/SLL, WM and MZL) include:

- diarrhea
- tiredness
- muscle and bone pain
- rash
- bruising

The most common side effects of IMBRUVICA® in adults with cGVHD include:

- tiredness
- mouth sores (stomatitis)
- pneumonia
- bruising
- muscle spasms
- diarrhea
- nausea

Diarrhea is a common side effect in people who take IMBRUVICA®. Drink plenty of fluids during treatment with IMBRUVICA® to help reduce your risk of losing too much fluid (dehydration) due to diarrhea. Tell your healthcare provider if you have diarrhea that does not go away.

These are not all the possible side effects of IMBRUVICA®.

Call your doctor for medical advice about side effects. You may report side effects to FDA at 1-800-FDA-1088.

What are the ingredients in IMBRUVICA®?

Active ingredient: ibrutinib

Inactive ingredients:

IMBRUVICA® capsules: croscarmellose sodium, magnesium stearate, microcrystalline cellulose, and sodium lauryl sulfate. The 70 mg capsule shell contains gelatin, titanium dioxide, yellow iron oxide, and black ink. The 140 mg capsule shell contains gelatin, titanium dioxide, and black ink.

IMBRUVICA® tablets: colloidal silicon dioxide, croscarmellose sodium, lactose monohydrate, magnesium stearate, microcrystalline cellulose, povidone, and sodium lauryl sulfate. The film coating for each tablet contains ferrousferic oxide (140 mg, 280 mg, and 420 mg tablets), polyvinyl alcohol, polyethylene glycol, red iron oxide (280 mg and 560 mg tablets), talc, titanium dioxide, and yellow iron oxide (140 mg, 420 mg, and 560 mg tablets).

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DEPARTMENTS

9 Stuff We Love

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14 Handy Hints®

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20 homeLAB

We test garage parking guides and a simple, easy-to-use cyber security device.

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80 Great Goofs®

Shocking cake batter, a trick shot with a hammer, and paint cans that yearn to be free.



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GARAGE PROJECTS

Looking for more ways to improve your garage? Hover your camera below to get more organizing tips, clever storage ideas and cleaning projects to help you create a garage space so enjoyable, you could live in it.

You'll also find videos showing you exactly how the top projects featured in this issue were made.



SMALL-SPACE SOLUTIONS

What are the best ways to maximize a small apartment or dorm room? How do you fix problems like that hole in the wall from the doorknob? These are just two of the topics we'll cover in our Small Spaces digital collection.



EXPERT PET ADVICE

How do I build a dog kennel or cat tree? What are the best products for cleaning up pet messes? What carpet and furniture materials resist pet hair? Get the answers to these questions and more at this digital destination.



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Stuff We Love

Our favorite DIY tools, materials + gear



Instant blade changes

With the Bosch X-Lock angle grinder, you don't need to fuss with a spanner tool. To attach a disc or blade, just snap it on. To remove it, simply lift the lever and it pops right off. Bosch and other manufacturers offer a ton of accessories compatible with the X-Lock system, from diamond blades to wire cups. But there are a couple downsides: X-Lock accessories cost slightly more and aren't as widely available in stores. The X-Lock comes on an entire line of grinders, including corded to cordless, starting at about \$100.

BILL BERGMANN, ASSOCIATE EDITOR





Garage door control—from anywhere

Chamberlain's myQ Hub lets you control your garage door with your phone. So, for example, you can let your neighbor in while you're on vacation. Or you can deputize the Hub to do things for you: It can close the door when you forget or automatically open as you drive up—no need to fumble with your remote. The Hub also works with Amazon Key so packages can be left safely inside your garage. The myQ Hub works with most openers and costs about \$40 in stores and online.

NICK GRZECZOWIAK
CHIEF CONTENT OFFICER



HOVER YOUR CAMERA HERE
To see how to install the myQ Hub, scan this code with your smartphone.



QUICK-DRAW SAWHORSE

Heavy duty and speed usually don't go hand in hand. But Bora Tool built speed into a heavy-duty sawhorse and named it Speedhorse. I've been using a pair for a few months, and they've been a real time-saver. To deploy the legs, you just pull a trigger and the legs flip out. No more tipping the horses over to figure out which leg comes out first or how they lock into place; it all happens at once.

When you're ready to pack up, pull the levers on each end and fold the legs away; it doesn't matter which leg you put in first. And these sawhorses are seriously beefy; they can support up to 1,500 lbs. each. They also feature slots that lets you span two sawhorses with vertical 2x4s. The slot is 2 in. deep, so combined with a sacrificial top, all surfaces are flush. Pick up a pair of Speedhorses for \$160 at a home center or online.

JOSH RISBERG, LEAD CARPENTER

A BRIGHTER GARAGE

If your garage is lit by a single bulb, you need a "deformable" light. They screw in just like a standard lightbulb but shine much brighter. This 100-watt model (\$35) blasts out 12,000 lumens—about eight times more than a 100-watt bulb. You'll find lots of options online costing \$30 to \$100.

MIKE BERNER, ASSOCIATE EDITOR

ONE-HANDED PEX PINCHER

I love PEX. But I don't love the oversize tool I've been using on clamp connections. It ties up both hands and doesn't fit into tight spots. The Ryobi Cordless PEX Tubing Clamp Tool is infinitely better. Just shy of 2-1/2 in. wide at the front end, it fits into tight spaces and leaves one hand free to hold onto the ladder. The built-in work lights are a big plus in dark spaces. Ryobi claims you can make up to 400 connections in a single charge, but I was having so much fun with this slick tool that I lost count. Pick one up for about \$120 (tool only) at home centers.

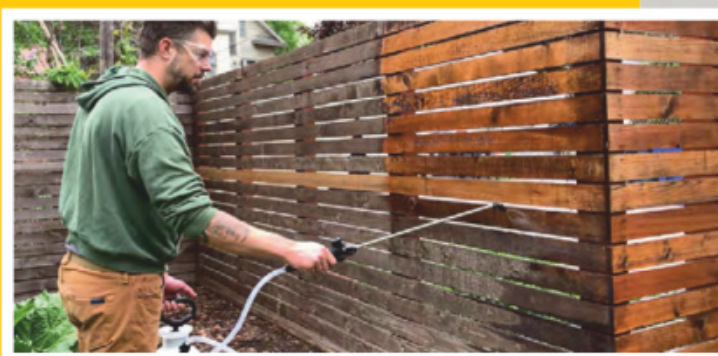
GARY WENTZ, EDITOR-IN-CHIEF

SPEEDY OUTDOOR CLEANING

If you're into fast results, check out 30 Seconds Outdoor Cleaner. I started spraying my old gray cedar fence at the top, and by the time I had finished spraying three rows, the top row was already bright and restored!

It works on many exterior surfaces, including siding, decks, gutters, asphalt shingles and concrete. Just hose it on and rinse it off. I bought the concentrate and used a pump sprayer. It's also available in an easy-to-use jug with hose adapter (shown) for \$14 at home centers.

VERN JOHNSON, CREATIVE DIRECTOR



See inside anything

There are lots of endoscopes and borescopes out there, but the low price on this endoscope caught my attention. Bottom line: I was impressed. It's a great tool for vehicle diagnosis and seeing what's going on inside plumbing and walls. The camera, with adjustable LED lights, is less than 1/4 in. in diameter and easily fits inside plumbing pipes. (I got it to bend through the first turn in a P-trap, but not the second.)

This unit also comes with a few useful attachments: a hook, a strong magnet and a 90-degree mirror. The camera image is streamed to your smartphone wirelessly, allowing you to record images and video as you are inspecting. Find the NIDAGE endoscope online in 11.5-ft. (\$36) or 33-ft. lengths (\$40).

JAY CORK, ASSOCIATE EDITOR





The Phyn Plus Smart Water Assistant + Shutoff is available online for \$700.



Detect leaks, prevent damage

Smart water shutoff valves can be a home-saver. They learn your household's water usage habits and can distinguish between water that's filling your tub and water spewing from a burst pipe.

Once a leak is detected, the valve will automatically shut off and send an alert to your smartphone. A Phyn Plus model is shown, but several manufacturers offer smart valves, priced from \$400 to \$700. Beyond protecting your home from a potential water damage catastrophe, these smart valves provide useful consumption data to help you minimize your water bill. Water is a precious commodity; now you can preserve it and your home at the same time.

BILL BERGMANN, ASSOCIATE EDITOR

SMALL BUT POWERFUL

This M18 FUEL compact router by Milwaukee has a lot more power than its size would suggest. Its brushless motor puts out 1-1/4 hp with a 5-amp-hour battery and really plows through cuts that bog down other trim routers. It has a variable-speed dial, a micro adjustment knob to set the depth of cut and a simple tool-free spindle lock to make bit changes quick and easy.

This is a tool-only kit that comes with a dust port attachment, two base plates and an edge guide. It sells for \$180 online and at home centers.

BILL BERGMANN
ASSOCIATE
EDITOR



Wrought Iron 2124-10 and Million Dollar Red 2003-10, Benjamin Moore Chalkboard Paint

CHALKBOARD IN ANY COLOR

Chalkboard paint has several advantages over a traditional chalkboard: It can be tinted to any color, applied over almost any hard surface and cover any size area. It's easy to renew with a fresh coat of chalkboard paint or easy to eliminate; just paint over it. Most paint brands offer tintable chalkboard paint, for \$15 to \$25 per quart.

JENNY MAHONEY, ART DIRECTOR



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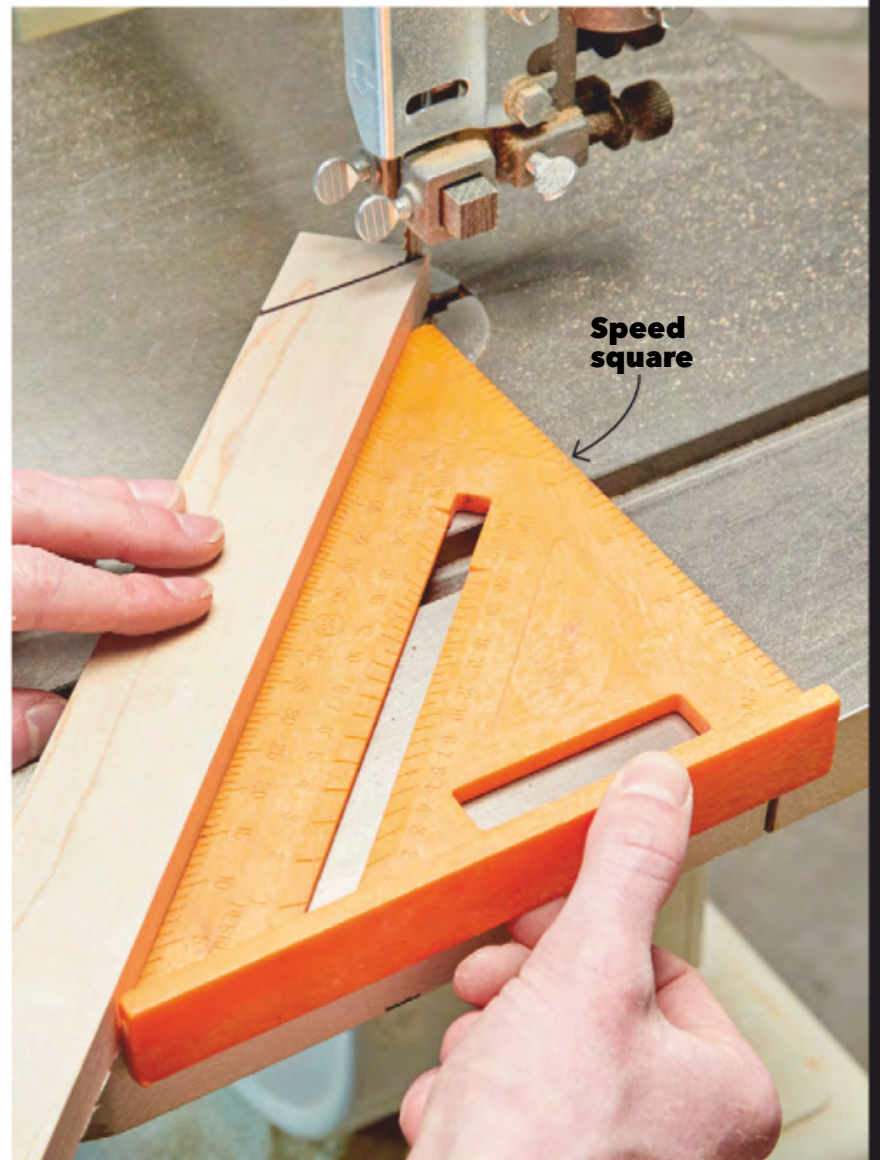
NEW LIFE FOR OLD GLOVES

Typically, not all the fingers on a pair of gloves wear out at the same time. So after a couple fingers get holes, snip off the remaining good ones. Now, when a finger starts to wear out on a newer pair of gloves, just slip a spare inside.

D. TYNJALA



Drinking
straw



Speed
square

EASY ANGLE CUTS

Here's a quick and reliable way to cut 45-degree angles on a band saw. Just use the lip on a Speed square as a guide against your saw table's edge. No setting up a miter gauge!

PHIL VANCE

Long-reach nozzle

When you need to caulk a hard-to-reach area, like the base of a vessel sink, for example, try this: Cut the end of a drinking straw at an angle and duct tape the other end to the nozzle of the caulk tube.

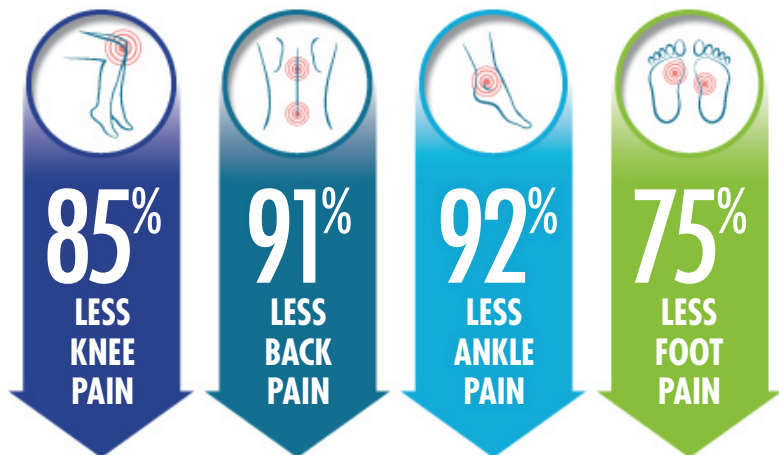
TERRY THORKELSON

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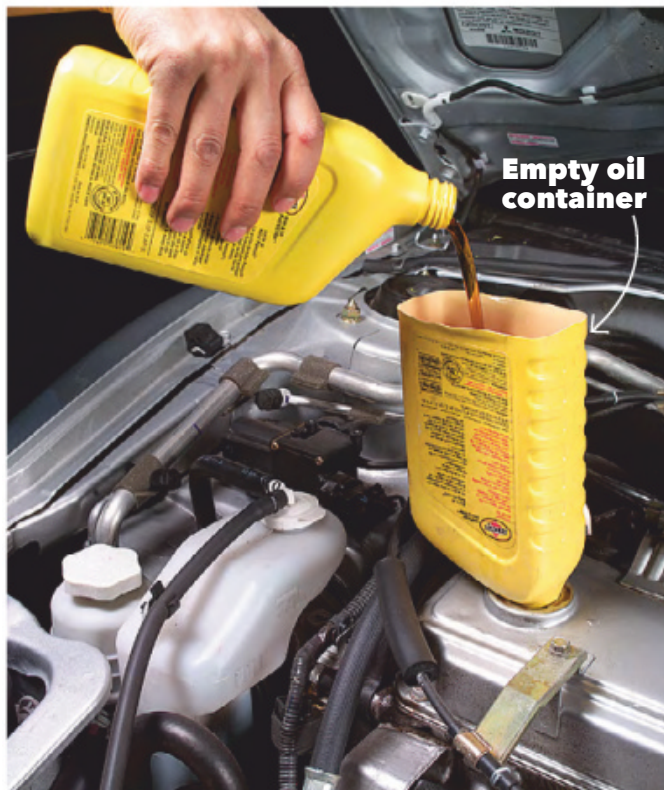
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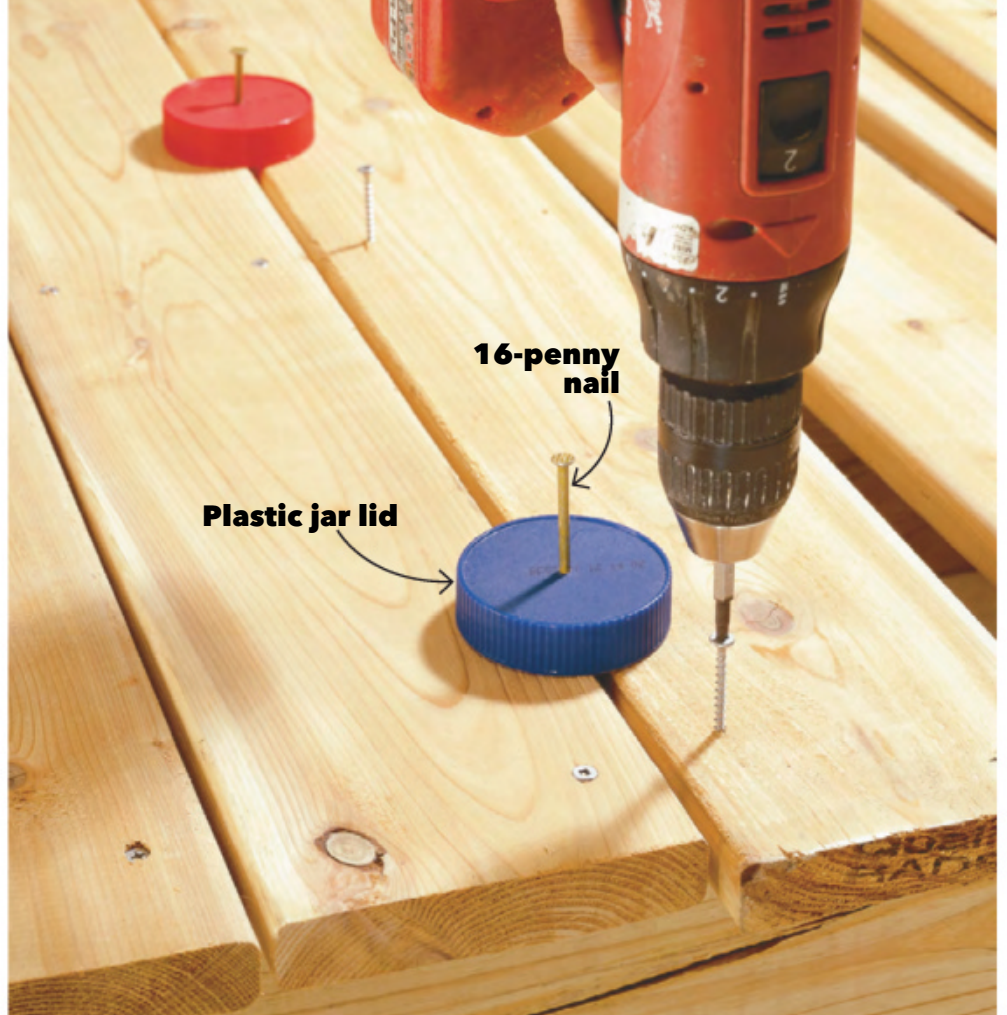
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INSTANT OIL FUNNEL

Don't have a funnel handy? An empty plastic oil container will do the job. Cut the bottom out of the empty container with a utility knife. This funnel can hold an oil container snugly, so you don't have to stand around waiting for the last drop to drain.

FATHER CHRYSANTHOS



SPACERS THAT STAY PUT

Sixteen-penny nails (also known as 16d nails) make perfect spacers when you're installing deck boards, but they often fall through the cracks. Keep the nails in place by pounding them through plastic jar covers. They're easier to move and won't slip between the boards and disappear.

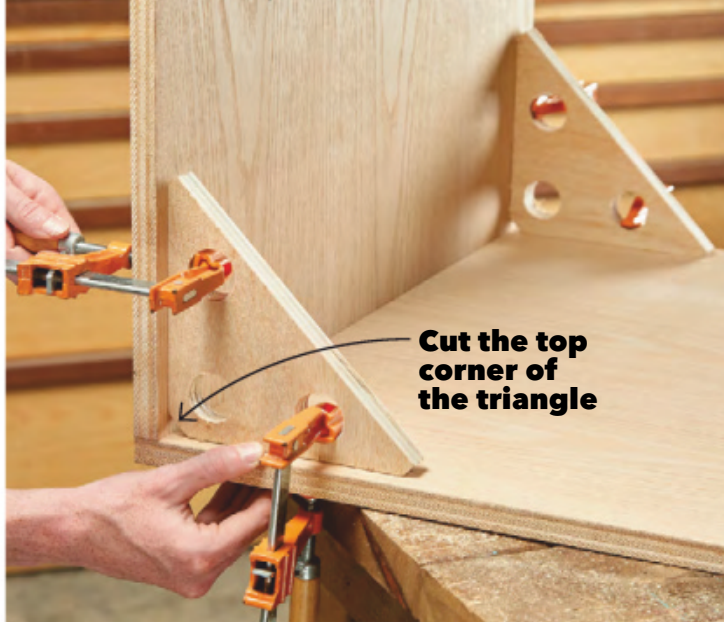
DAVID R. KIMBLE



Super-comfy hammer grip

If you need to replace a worn-out grip on an old hammer or add a grip to a hammer without one, here's a frugal solution. Buy a multi-pack of tennis racquet grips and you'll have a life-time supply. You can get a five-pack for as little as \$8. Racquet grips are adhesive-backed and easy to apply. Most grips are also padded, adding to their comfort and reducing the shock of repeated pounding.

LEON GARDAS



PERFECTLY SQUARE, HANDS-FREE!

Holding parts square while clamping and fastening can be tricky. These plywood triangles make it easy. Using a miter saw or table saw, cut the triangles, taking care that your setup is perfectly square. Drill a hole at each corner, large enough for your clamp heads. Be sure to cut off the triangle's top corner, so it doesn't get glued to your workpiece.

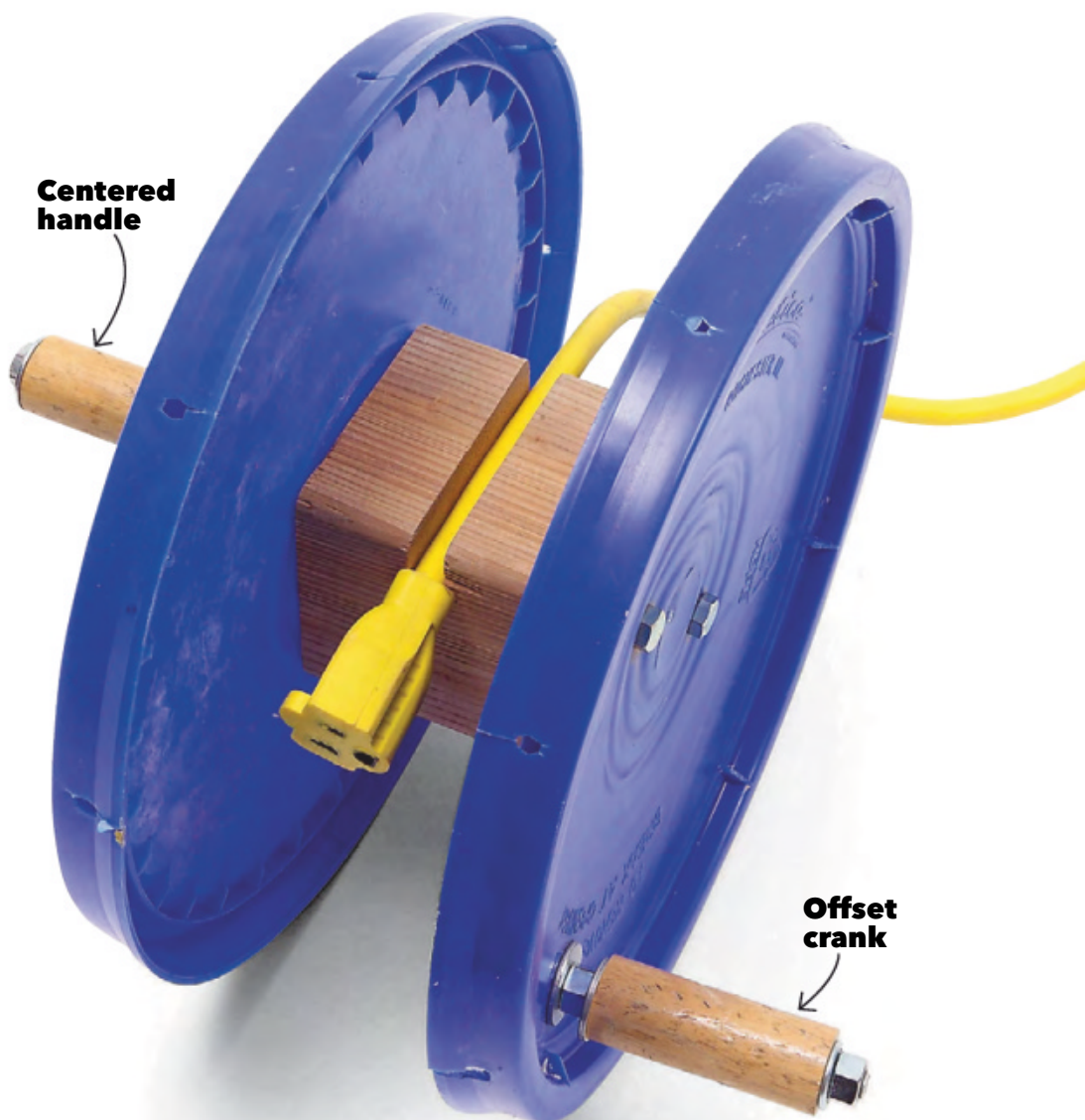
JOE SKIBA



BETTER BLADES IN MINUTES

Pitch buildup on saw blades causes friction, burning and premature blade dulling. You can buy special cleaners to remove the pitch, but this easy fix uses stuff you already have around the house. Heat a pan of water to boiling, drop in the saw blade, and then pour baking soda on the blade. Leave the blade in the boiling water for five minutes or so, then carefully remove it and wipe it dry.

EVAN GAFKJEN



Bucket-lid cord reel

Make this handy cord reel using extra bucket lids from dry-wall mud pails or other 5-gallon buckets. Cut a 5-in. length of 4x4 and then cut a groove in the side just wide enough to fit your cord. Fasten the lids to the 4x4 with 1/4 x 2-in. lag screws. Make handles from an old 1-1/8-in.-diameter broom handle and drill a 1/2-in. hole through the centers. Fasten the crank to the lid with bolts, nuts and washers, and apply Loctite sealant to the end nut. Fasten the handle to the 4x4 through the lid with a 6-1/2-in. lag screw. Then just insert your cord and reel it in.

DOUG KOENIG



FRESH, CLEAN CUTTING BOARD

Here's an easy and effective way to get stains out of your cutting boards. Sprinkle coarse salt over the surface and scrub with half a lemon. Then just rinse and dry.

KERRY BROWN



Quick roller tray liner

Put a layer of aluminum foil in your paint tray before you pour in the paint. This makes cleanup and color changes fast and easy.

ZOE WALKER



SHOP VACUUM ORGANIZER

A PVC tee makes the perfect holder for shop vacuum attachments. Take one of your attachments to the home center and find a PVC tee that fits it. Drill a hole in the tee to fit a screwdriver, put a plywood spacer behind it and screw it to the wall.

VERN JOHNSON



SIMPLE PESTICIDE

Make a solution of bleach-free dish soap and water and spray it on your plants to kill insects like aphids, mites, thrips and whiteflies.

JEFF RANALLO



homeLAB

A TESTING ZONE FOR *INNOVATIONS*

GARAGE PARKING GUIDES: *DO THESE INNOVATIONS BEAT THE TENNIS BALL?*

BY JASON INGOLFSLAND

Like many homeowners, I hang a tennis ball in my garage to help me stop before I bump into the wall. But I wondered if there was a better way. So I did some research and discovered everything from lasers to sensors to bumpers, proving that many companies have been thinking about this problem. But does any of it beat the tennis ball? To find out, I bought one of each type and put them to the test.





GoodChief Universal Laser Parking Assist (\$28)

With this system, you position lasers that tell you when to stop and also help you center the vehicle. The lasers are powered by your garage door opener, so they're not constantly on. Setting it up took longer than with the other options (about 30 minutes), but in my opinion, this system is better than the tennis ball—not having a ball hanging in my workspace is nice. There are other laser parking devices available for roughly \$20 to \$35.



Laser on dash indicates stopping point



Light flashes green, yellow then red

Sensor measures the distance to your vehicle

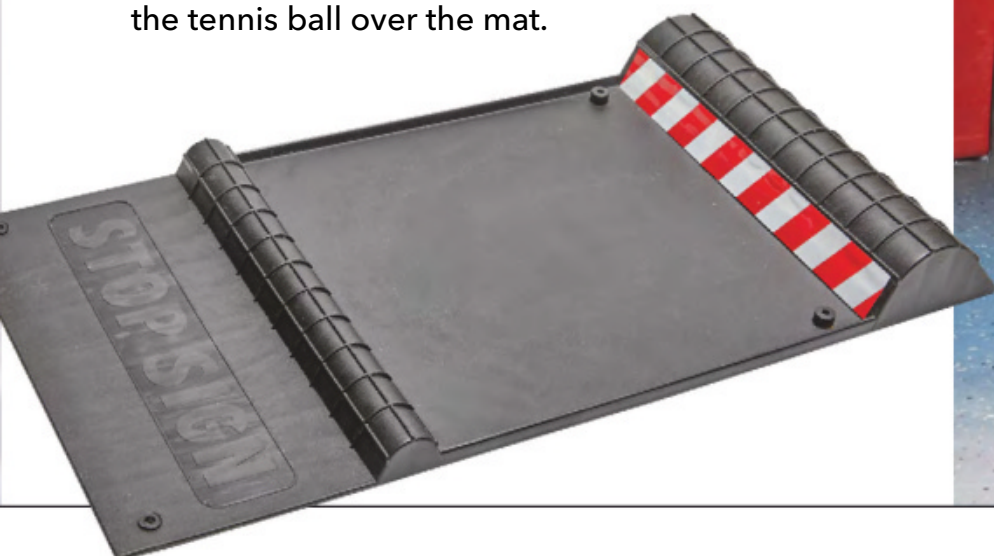


STKR Parking Sensor (\$28)

This device is similar to what you might find at a car wash. It detects your car's position and flashes green, yellow and then, when it's time to stop, red. Installation is fast and easy; you just use adhesive tape or screws. It runs on four "AA" batteries or an optional USB cable. Overall, it's my favorite alternative to the tennis ball.

Maxsa Park Right Mat (\$20)

With this simple mat, you stop your vehicle when your front tire is between the two ridges. But sometimes, the anti-skid tape on the back wasn't enough to keep it in place. It has optional anchoring holes, but I wasn't willing to drill into the floor and fasten it; my garage is also my shop, so I didn't want a permanent obstacle on the floor. In this case, I'd choose the tennis ball over the mat.



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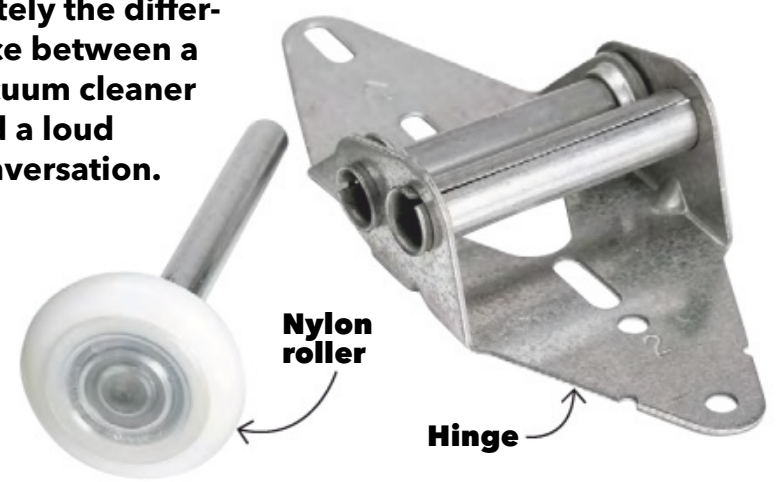
homeLAB



A quieter garage door

Everyone agrees that nylon garage door rollers are quieter than steel rollers. But what does that mean? A little quieter? A lot? To find out, I first measured the noise of steel rollers using a decibel meter at a distance of 8 ft. Then I took 20 minutes to install nylon rollers and measured again.

Nylon rollers reduced the noise by about 40 percent! As a rough comparison, that's approximately the difference between a vacuum cleaner and a loud conversation.



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SIMPLE CYBER SECURITY THAT REALLY WORKS

Smart home devices make our lives better, but they also leave gaping security holes for hackers to exploit. Devices like robotic vacuums, smart outlets and baby monitor cameras have all been used to hack into home networks. Security solutions are confusing, so I went on a quest for simplicity, which led me to Firewalla. There are similar devices, but Firewalla looked to be the most affordable and easiest to use. So, I tested it out. Here's what I found.

How it works

Firewalla acts as a gatekeeper between your router and your devices. All activity running from your router to your devices is first processed through Firewalla, its cloud and its smartphone app. It also monitors all the devices connected to your network.

What it does

I was amazed at all the things Firewalla could do. It automatically detects and blocks malicious or abnormal activity, plugs open ports in your network, blocks ads and inappropriate content, and even provides a free virtual private

network (VPN) that you can access when you're working away from home. For such a small device, it gives you enormous control.

Easy to install

What I really love about Firewalla is how easy it is to install. You just plug it into an outlet and then plug it into your home router (the ethernet cable comes with Firewalla). Download the Firewalla app on your smartphone, open it, and then scan the QR code underneath the Firewalla device to connect it. Firewalla takes it from there. The company provides online resources to help you if you get lost.

User-friendly app

Everything is laid out on the app in a simple, easy to understand way.

None of the features are hard to find. From ad block to family protect, many of the options are clear and quick to set up. Each feature also has a brief explanation of what it does and a link to more information about the feature.

Devices can be hard to identify

Identifying devices on the network isn't always simple. Main devices, like smartphones and laptops, are clearly labeled and easy to find. Other devices often have unrecognizable titles and numbers. This requires some detective work. One way to identify each device is to turn it off and then back on. Firewalla will tell you a new device has come on to the network, letting you locate the device. You can then label it accordingly.

Excellent protection for your network

After using Firewalla, I'm a fan. It detected open ports and abnormal activity that I was then able to block. It's affordable and easy to use and gives me extra peace of mind as I use my smart home devices. It's available online from \$109 to \$179.



EASY-CHANGE STORAGE SYSTEM

A customizable clutter buster that turns your garage into a mudroom

BY MIKE BERNER

Garage or mudroom organizers all have a similar design: tall, narrow cubbies, hooks on the wall, maybe a built-in bench. In my home, this arrangement ends up looking like a pile of jackets and bags hung on top of one another. Another problem is that people's storage needs change over time. But most organizers don't.

I wanted to break the mold and create a more versatile and less cluttered solution. What I came up with was inspired by the versatility of pegboard. The 1-in. pegs support a ton of weight, and making a new shelf or moving a crowded peg is simple. You don't need to know how to build cabinets to build this stunning storage wall. But you will have to drill lots of holes—288 per sheet! Luckily I figured out a trick to make positioning all those holes fast and accurate.



MEET THE BUILDER

Mike Berner is an associate editor at *Family Handyman*, a former shop teacher and a father of three. In other words, he's someone who's in constant search of ways to declutter his house and his shop!



BUILD BOXES TO SUIT YOUR STUFF

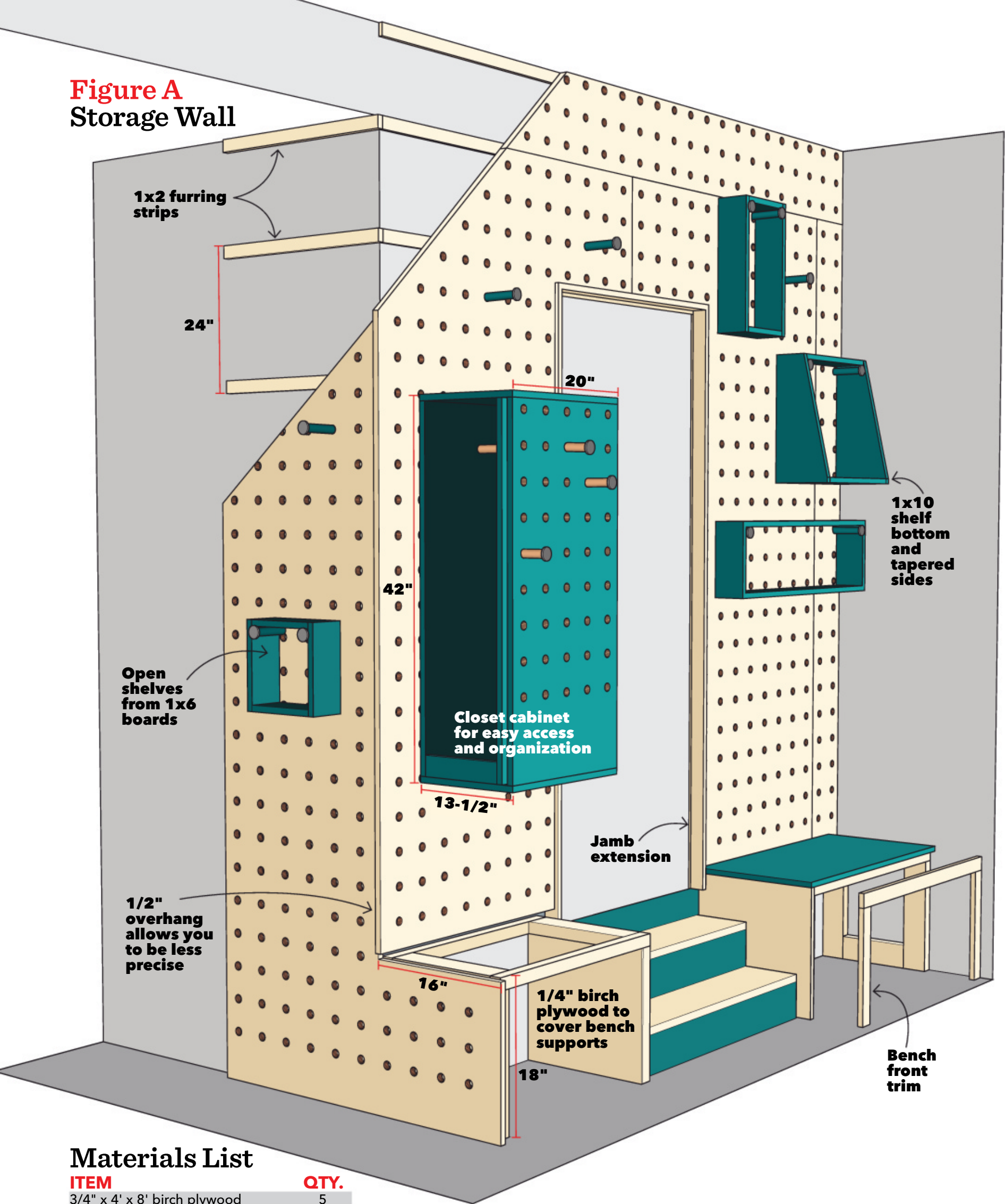
Boxes hanging on pegs are the key to this flexible system. In an hour or two, you can build boxes of any size and shape, just right for the items you want to store.



REARRANGE IT IN MINUTES

This system is easy to reconfigure as your needs change—so easy that you could rearrange every season. All you have to do is pull out pegs and insert them elsewhere. You can move a shelf in seconds, make a new one in minutes or create an entirely new arrangement in less than an hour.

Figure A
Storage Wall

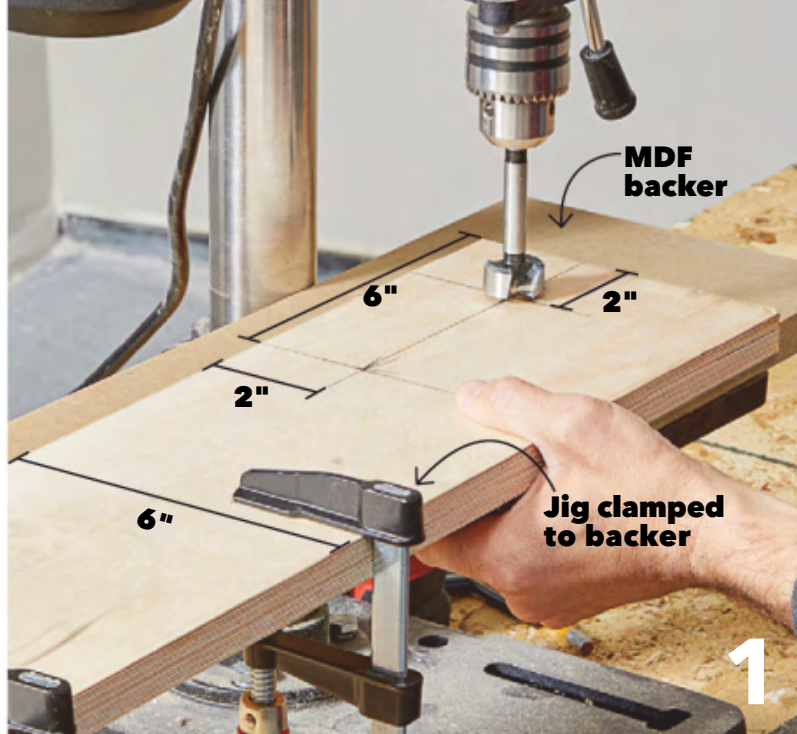


Materials List

ITEM	QTY.
3/4" x 4' x 8' birch plywood	5
1/4" x 2' x 4' birch plywood	2
2x4 x 8'	6
2x2 x 8'	4
1x2 x 8' furring strips	10
1x6 x 8' boards	8
1" dowel rods	5
3" construction screws	
3" trim-head screws	
15-gauge finish nails	
1-1/4" washers	
1" No. 6 wood screws	
Composite shims	

WHAT IT TAKES

TIME 1 weekend	COST \$300 to \$500	SKILL LEVEL Beginner
TOOLS Drill press, drill, 1" Forstner bit, circular saw, framing square, level, clamps		



1 MAKE A DRILLING JIG

Save yourself hours of measuring with this drilling guide: Cut an 8-ft. length of plywood to 6 in. wide. Then make a pair of marks 2 in. from the long edge: one at 2 in. from the end and the other 6 in. from the end. Clamp a backer (I used MDF) to the plywood and bore a hole at the first mark with a 1-in. Forstner bit through the jig and the backer.

2 BORE CONSISTENT HOLES

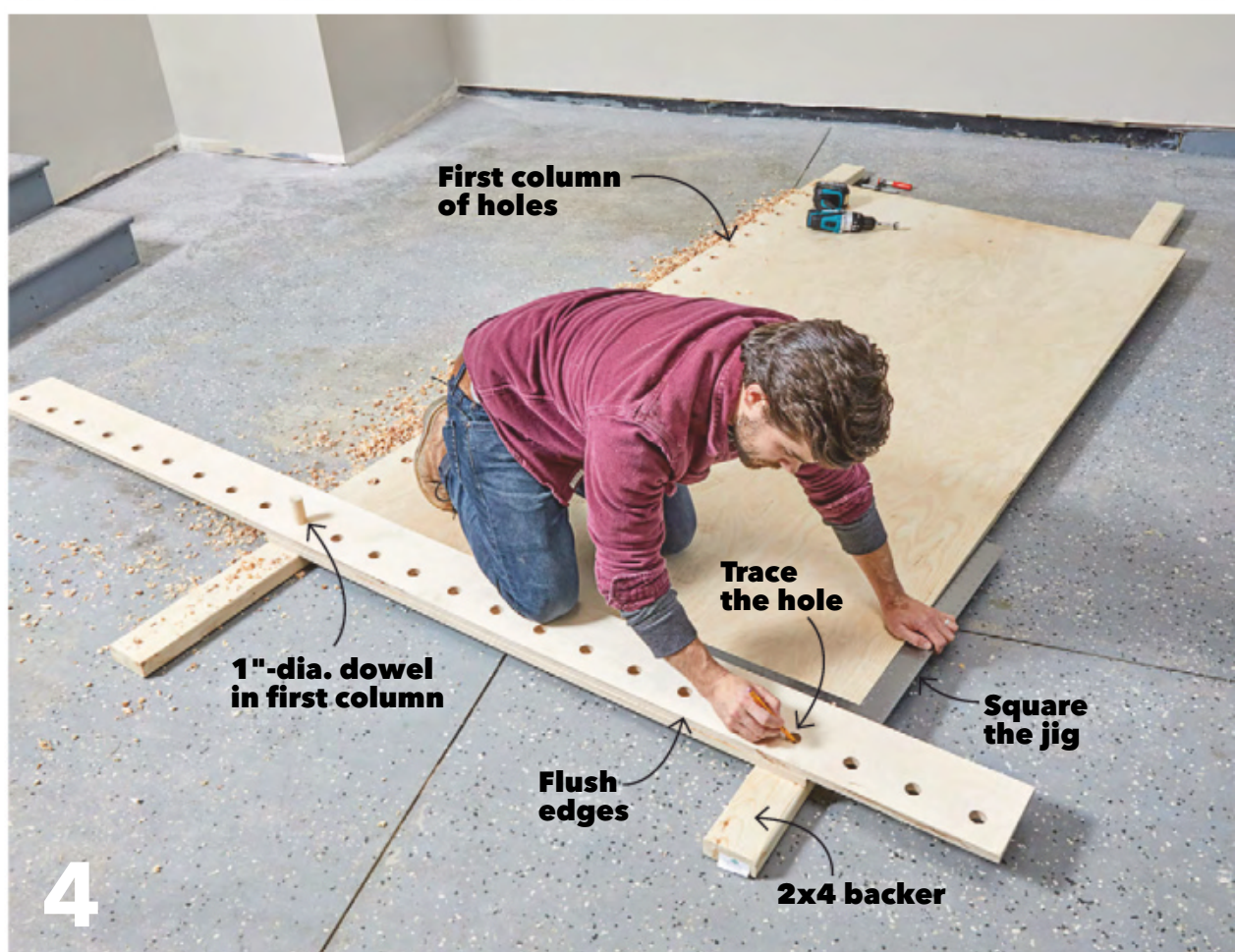
Place 1-in.-dia. dowel in the hole to keep the jig and backer together. Line up the bit with the second mark, clamp the backer to the table and then bore a second hole. Without moving the parts, keep the backer clamped to the table and fasten a fence along the edge of the jig. Slide the jig down and place the dowel through the new hole. Bore the rest of the holes this way.

3 BORE THE HOLES IN FIRST COLUMN

Lay a sheet of plywood on 2x4s, and flush the edges of the jig and the plywood. Clamp it in place, then use the jig to bore the first column of holes.

4 TRACE CORNER HOLES

Position the jig sideways along the top of the plywood and hold it in place with a dowel in the top hole. Square the jig with the edge of the plywood and trace a hole at the opposite edge of the plywood. Do the same at the bottom to locate the hole in the opposite corner.



TIP: To avoid major chip-out, put an extra 2x4 beneath the plywood for the bit to plunge into.



5 BORE HOLES IN FAR COLUMN

Line up the jig with the traced holes, clamp the jig into place and bore each hole. Place a dowel in the first hole to keep the jig secure, then place one every few holes as you go, to help hold the jig in place.



6 DRILL THE ROWS

Rotate the jig horizontally and hold it in place with dowels in each column. Bore the holes in the row, then move the jig down to the next row. Repeat the process until all 288 holes are drilled.

7 USE FIRST SHEET AS A TEMPLATE

Now that you have a complete sheet drilled, you have a perfect template for making more. Place the template on top of a new sheet, line up all the edges, and bore more holes.



8 BUILD THE BENCHES

Assemble the bench from 2x4s and 2x2s. Position the bench, then screw it to studs in the wall and shim the legs to level the top.

9 ATTACH THE FURRING STRIPS

Fasten a furring strip along the length of the wall just above the bench, then level and fasten furring strips every 2 ft. until you reach the ceiling. Screw the strips into the wall studs. To avoid blocking entire rows of holes with the strips, use the jig as a guide.

10 FASTEN THE PLYWOOD

Cut the plywood to fit around doors and corners. Tip up each sheet and attach them with trim-head screws into each row of furring strips every 16 in.



DEALING WITH DOORS AND WINDOWS

I had to work around a door that was smack dab in the middle of the wall. Because the wall was being built out, I needed to extend the jamb of the door. I extended the jamb beyond the plywood by 1/2 in. to create a simple, modern look.





11 MAKE THE PEGS

Cut 1-in.-diameter dowels to 7-in. lengths to make pegs to hold the 1x6 shelves. Drill a pilot hole centered on the end of the peg and attach a washer with a 1-in. wood screw.

12 BUILD A CLOSET CABINET

Stack the wall closet panels and line up their edges. The panel with peg holes will be on top. Use one of the center holes toward the top as a guide to bore through the other two panels to fit a clothes hanger rod. Then nail furring strips between the two front panels, avoiding the rows of peg holes.

13 MOUNT THE CABINET

Screw the top and bottom of the closet box to the panels and attach the sides. To help position it on the wall, place a pair of pegs under the closet cabinet. They can help hold it up while you fasten it to the wall.

COLORFUL STAIN

I loved the look of the natural wood but also wanted a dash of color. To get both, I chose Minwax Solid Color Stain, which can be tinted to more than 200 colors! The color used here is Bay Blue.



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DOG SPA

Make bath time more comfortable and convenient for you both—and keep the mess out of your house

BY BRAD HOLDEN



HOVER YOUR CAMERA HERE
Scan this code with your smartphone to see how the dog spa comes together and watch the stairs in action!

WHAT IT TAKES

TIME	COST	SKILL LEVEL
3 days	\$500–\$1,200	Intermediate

TOOLS Table saw, or circular saw and cutting guide; miter saw; tiling tools; drill/driver; finish nailer; jigsaw; router; plumbing tools

Our dog frequently returns from her outdoor romps with a big helping of dirt. Sure, I could haul her to the bathtub, getting my clothes and the floor filthy. But now that I've built a dog wash station in the garage, the mess never has to come inside. A pull-out staircase makes it easy for my dog to step up to a comfortable working height, so I don't have to stoop to wash those dirty paws. And all my cleaning supplies store neatly inside the steps!

User-friendly features:

- 1 HANDHELD SHOWERHEAD**
Reach all the dirt for a thorough cleaning.
- 2 WAIST-HIGH SHOWER PAN**
No more aching back or knees from crouching by the tub.
- 3 STAIRCASE**
No lifting your dirty dog. They can walk right up on their own!
- 4 NONSLIP GRIP**
Stair tread grip tape lets your dog use the steps with confidence.
- 5 TIE STRAP**
Leave both your hands free for washing.
- 6 SPLASH GUARD**
Keep the spray in the shower, where it belongs.
- 7 DRAWER STORAGE**
Store all your cleaning supplies, treats, collars, leashes, poop bags and more.
- 8 CABINET STORAGE**
Keep food bags and other large items out of sight.
- 9 HOSE HOOKUP**
Water at-the-ready for filling buckets or water dishes.
- 10 SHOWER ROD STORAGE**
Keep the supplies you need right at your fingertips.



MEET THE BUILDER
Brad Holden is a senior editor at *Family Handyman* who has built cabinets and furniture for more than 30 years.

GETTING STARTED

Every house's plumbing is different. To see the basic plumbing, check out Figure B on p. 36. Aside from that, this is a pretty straightforward project: standard wall framing and some tiling. I eliminated the hard part of tiling by using a preformed shower pan. The stairs require precise measuring and cutting, but I'll walk you through the details.

The size of the dog shower depends on the shower pan you

buy, which depends on the size of your dog. So, before cutting any parts, buy a shower pan that'll comfortably hold your dog. Next, determine the shower pan height. For your comfort working, it should be about the height of your wrists when your hands are at your sides.

To find the height of the walls, measure to your dog's shoulder and add 3 to 6 in. to that. That total gives you the height of the

walls above the pan. Keep in mind that design changes might be needed to accommodate the specific shower pan you buy.

I used high-end materials on this project, so don't let the price tag scare you. You can substantially trim the cost by using home center plywood, inexpensive fixtures and tile (or plastic wall panels). You could also skip the stairs, which would save you a bundle on drawer slides.



Build the structure

With the dimensions and design finalized, build and assemble the walls and deck frame (A - F). Support the deck at the desired height while attaching it using temporary blocks on the wall framing (**Photo 1**). Screw on the deck platform (G), and then cut the drain hole. Size the hole generously so you have extra room if you ever need to work on the drain.

Set the pan

Install the drain in the shower pan (\$250 at home centers), then apply construction adhesive to the decking and set the shower pan in place (**Photo 2**). Typically, a shower pan is set in mortar, but this pan won't have to support a person, so I skipped the mortar. Screw through the pan's flange into the wall framing to fully secure it.

Plumb for the fixtures

Attach the shower valve and wand plumbing to a plywood backer fastened between the studs (**Photo 3**). The valve's depth and the thickness of the substrate, tile and mortar determine how deep into the wall to mount the valve. Mount the valve in the first stud cavity so it's easy to reach. The plumbing supplies you'll need depend on what's included with your shower. My shower (Ravinte Rain Shower, \$160 online) had an overhead component, which I just capped off. I also connected a tee at the cold water stub-out and ran pipe over to the outside wall and plumbed in a hose bib. Handy for filling buckets! To learn more, search for "how to install a shower faucet" at familyhandyman.com.



1 BUILD THE FRAME

The basic structure is super simple: Assemble the walls using 2x4s 16 in. on center. Screw temporary blocks to support the deck while you attach it so it will be at a comfortable working height.



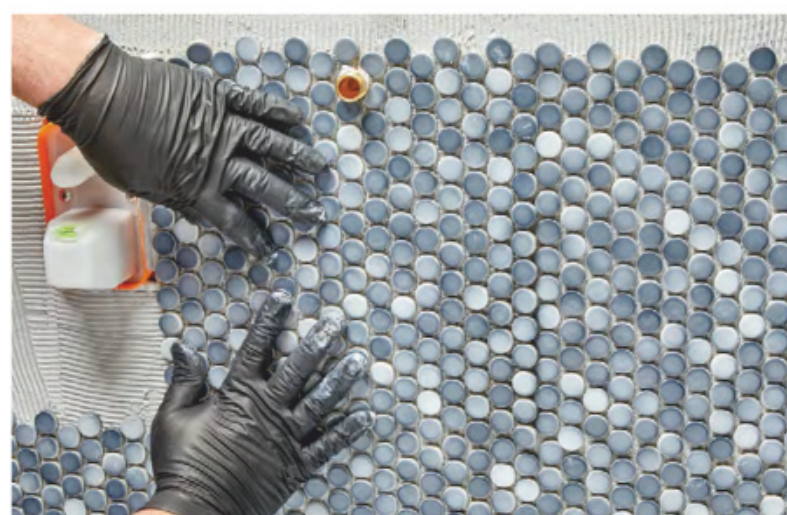
2 SET THE PAN

A standard fiberglass shower pan forms the dog wash basin. Screw plywood to the deck framing, cut the hole for the drain and then set the pan into thick beads of construction adhesive. Screw the flange to studs for extra stability.



3 INSTALL THE PLUMBING

Attach the shower valve and plumb for the wand. Shower hardware differs by brand, so you'll need to adapt the plumbing fittings to the needs of your fixture.



4 TILE THE WALLS

Apply backer board to the framing, cutting holes for the fixtures. Spread mortar using the proper size notching trowel for your tile, then set the tile.

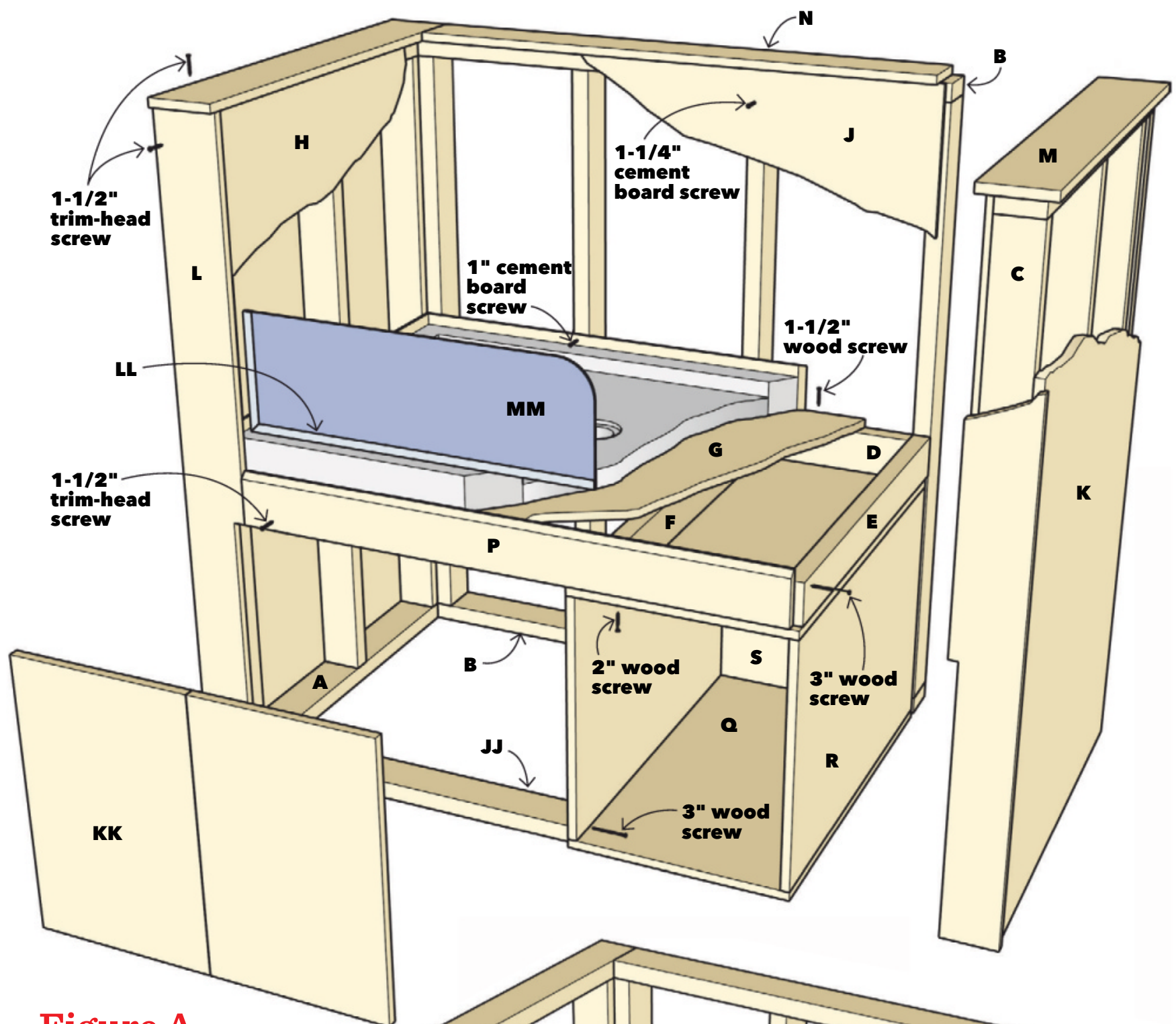
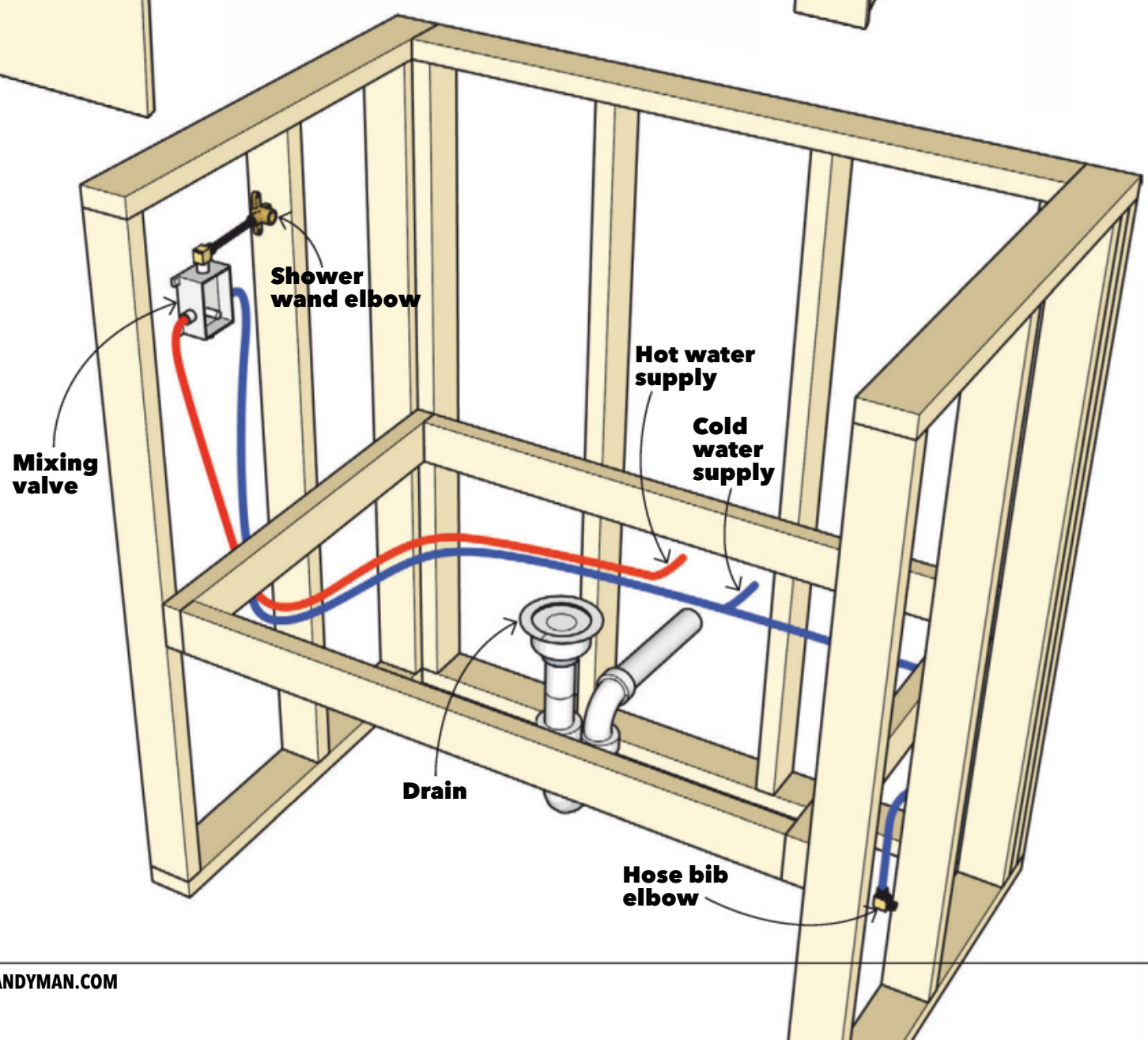


Figure A
Dog Wash
Structure

Overall Dimensions:
56-3/4" H x 56-7/8" W
x 36-5/8" D

Figure B
Plumbing





5 ADD THE WALL TRIM

Fasten all the wall caps and the front rail using 1-1/2-in. trim-head screws. Bevel the front rail to shed water and caulk it to the shower pan.

Tile the walls

Cut holes for the fixtures in the tile substrate, then fasten the substrate (H - J) to the framing using cement board screws. For the substrate, I used GoBoard backer board, which has a foam core, so it's lightweight, easy to cut and less messy than cement board. GoBoard is available at most home centers. Seal all the seams and cover the screw heads with a polyurethane sealant.

Apply mortar, using the proper notching trowel for your tile. Install the tile and let it set up for 24 hours (**Photo 4**). After the mortar has set, the tile is ready for grout, but apply the plywood wall caps first. The overhanging edges of the wall caps serve as a "form" for the grout. For more information, search for "how to tile a shower" at familyhandyman.com.

Finish the walls

Attach outer panels (K), then the front wall end caps (L) and the top caps (M and N). Since the caps overhang the wall faces by 1/4 in., determine their width by measuring the finished wall thickness, including tile, and adding 1/2 in.

Next, bevel the top edge of the front rail (P)—so it sheds water—and attach it with its bottom edge flush with the bottom of the deck frame (**Photo 5**). Caulk the top edge of the rail to the shower pan. Once all the wall caps are attached, grout the tile.

For plywood cutting diagrams, email us at feedback@familyhandyman.com.

Create the staircase

The staircase is a bit like a set of Russian dolls. There are three subassemblies—the stair box, the steps and the drawers—and six pairs of drawer slides. Each step rides on a pair of slides, and each drawer rides on a pair of slides inside a step. Steel catches and rare earth magnets on the backs of the steps let them slide in and out in sequence simply by pulling out the bottom step.



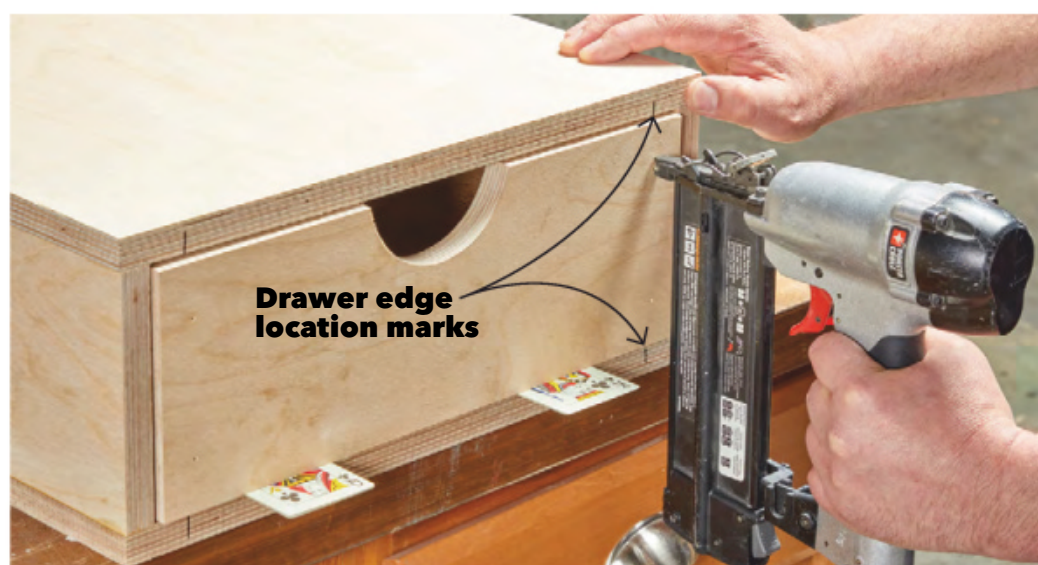
6 BUILD THE STEPS

Assemble the top and middle steps. Before assembling the bottom step, rout a finger groove in the underside of the top. Add the drawer slides now too. The bottom step is too deep to add them after assembly.



7 INSTALL THE DRAWERS

Assemble the drawers and attach their slides. Leaving the fronts off for now, slide each drawer into its step.



8 ATTACH THE FRONTS

Apply glue to the front edges of the drawer, then center the drawer front in the opening using spacers and nail it to the drawer. Drawer edge location marks on the stair edges help position the nails.

Figure C Staircase

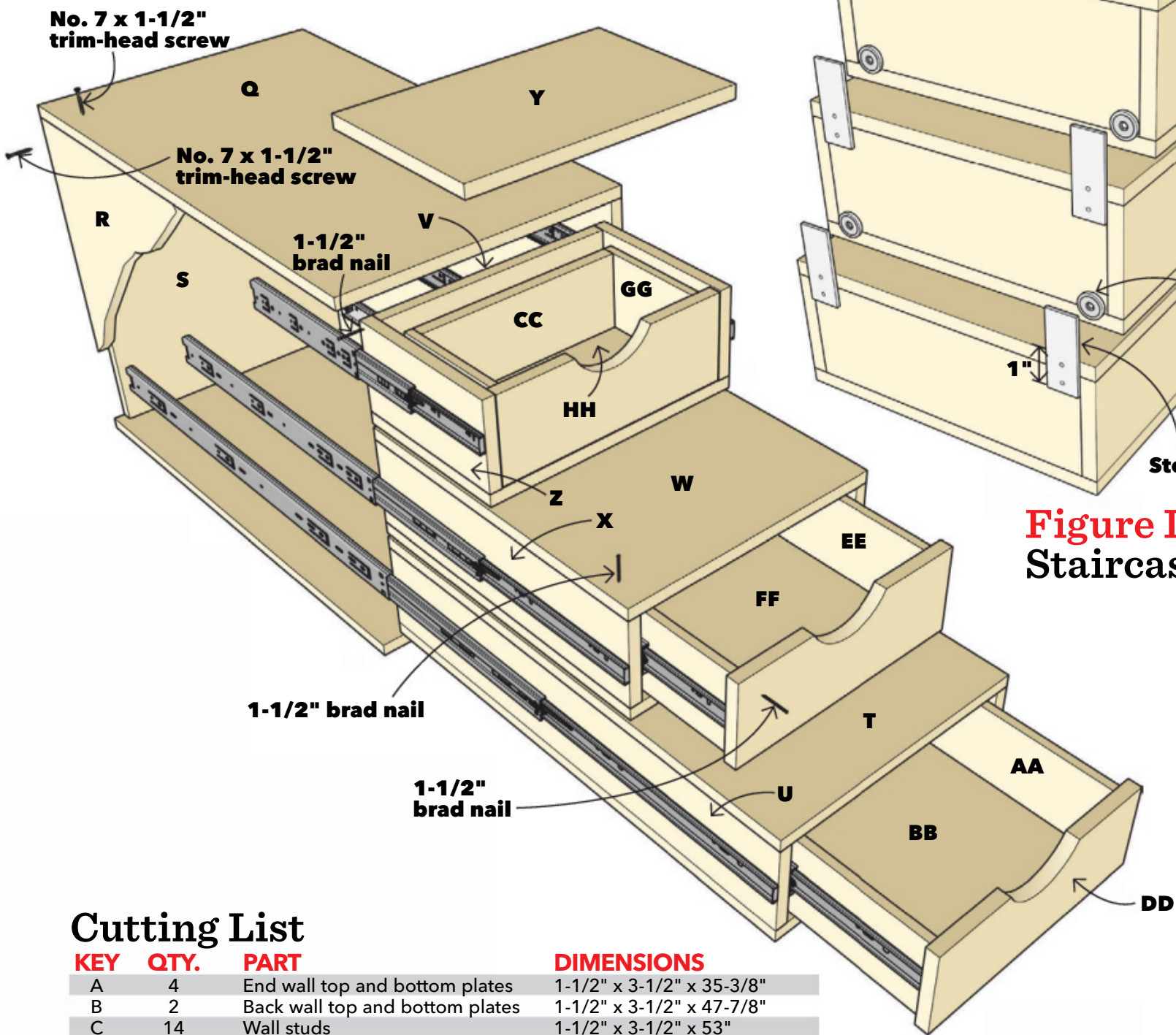
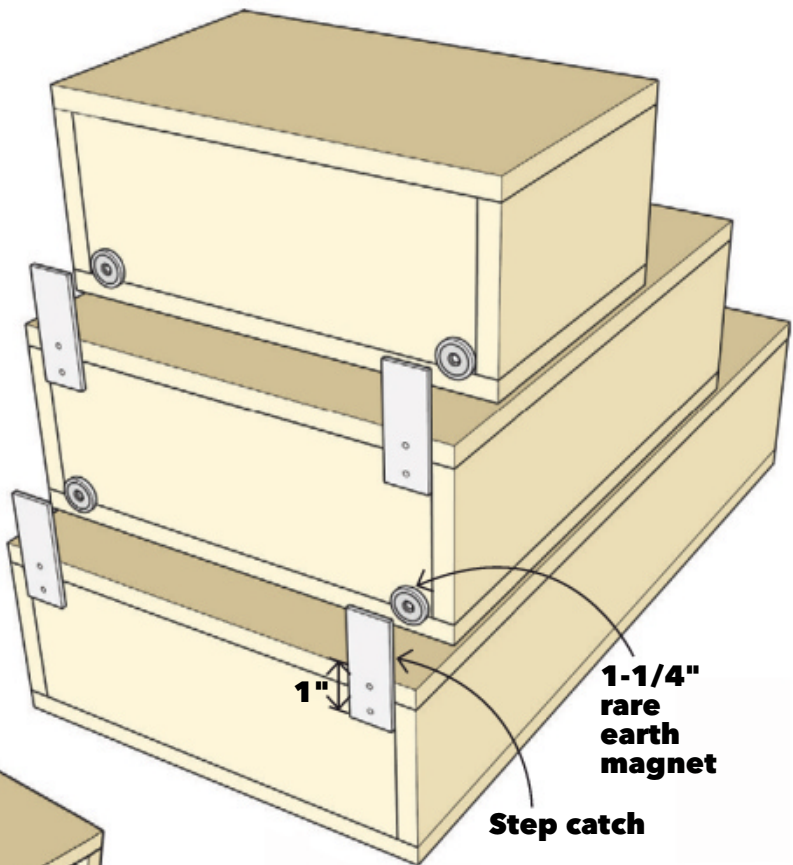


Figure D Staircase Back



Cutting List

KEY	QTY.	PART	DIMENSIONS
A	4	End wall top and bottom plates	1-1/2" x 3-1/2" x 35-3/8"
B	2	Back wall top and bottom plates	1-1/2" x 3-1/2" x 47-7/8"
C	14	Wall studs	1-1/2" x 3-1/2" x 53"
D	2	Deck frame front and back	1-1/2" x 3-1/2" x 44-7/8"
E	2	Deck frame ends	1-1/2" x 3-1/2" x 31-7/8"
F	2	Deck joists	1-1/2" x 3-1/2" x 28-7/8"
G	1	Deck platform	3/4" x 31-7/8" x 47-7/8"
H	2	Wall end backers (GoBoard)	1/2" x 26" x 31-7/8"
J	1	Back wall backer (GoBoard)	1/2" x 26" x 46-7/8"
K	2	Wall outer panels	3/4" x 35-3/8" x 56"
L	2	Wall front caps	3/4" x 5-1/2" x 56"
M	2	End wall top caps	3/4" x 5-1/2" x 36-5/8"
N	1	Back wall top cap	3/4" x 4-1/2" x 45-7/8"
P	1	Front rail	3/4" x 4-1/2" x 45-7/8"
Q	2	Stair box top and bottom	3/4" x 18-1/2" x 31-7/8"
R	2	Stair box sides	3/4" x 21-5/8" x 31-7/8"
S	1	Stair box back	3/4" x 17" x 21-5/8"
T	2	Bottom step top and bottom	3/4" x 16" x 30"
U	2	Bottom step sides	3/4" x 5-3/8" x 30"
V	3	Step backs	3/4" x 5-3/8" x 15"
W	2	Middle step top and bottom	3/4" x 16" x 20"
X	2	Middle step sides	3/4" x 5-3/8" x 20"
Y	2	Top step top and bottom	3/4" x 16" x 10"
Z	2	Top step sides	3/4" x 5-3/8" x 10"
AA	2	Bottom drawer sides	1/2" x 5" x 28"
BB	1	Bottom drawer bottom	1/2" x 12-1/2" x 28"
CC	3	Drawer backs	3/4" x 4-1/2" x 12-1/2"
DD	3	Drawer fronts	3/4" x 5-1/4" x 14-3/8"
EE	2	Middle drawer sides	1/2" x 5" x 18"
FF	1	Middle drawer bottom	1/2" x 12-1/2" x 18"
GG	2	Top drawer sides	1/2" x 5" x 7 1/4"
HH	1	Top drawer bottom	1/2" x 12-1/2" x 7-1/4"
JJ	1	Spacer	1-1/2" x 3-1/2" x 29-3/8"
KK	2	Doors	3/4" x 13-3/4" x 22-5/8"
LL	1	Aluminum channel	Cut to fit
MM	1	Splash guard	1/4" x 12" x 30"

Materials List

ITEM	QTY.
3/4" x 4' x 8' Baltic birch plywood	4
1/2" x 4' x 4' Baltic birch plywood	1
1/2" x 3' x 5' GoBoard	2
32" x 48" shower pan	1
2x4 x 8'	6
2x4 x 10'	7
Shower fixture	1
Tile	24 sq. ft.
Mortar	
Grout	
Wood glue	
Polyurethane caulk/sealant	
3" exterior screws	
2" trim-head screws	
1-1/2" trim head screws	
1-1/2" brad nails	
1/2" PEX pipe	
30" drawer slide	1 pair
28" drawer slide	1 pair
20" drawer slide	1 pair
18" drawer slide	1 pair
10" drawer slide	1 pair
8" drawer slide	1 pair
1/8" x 1-1/2" flat steel (for step catches)	16"
1-1/4" magnets	4
1/4" aluminum channel	4'
1/4" x 12" x 30" plexiglass	1
Miscellaneous plumbing fittings and pipe	



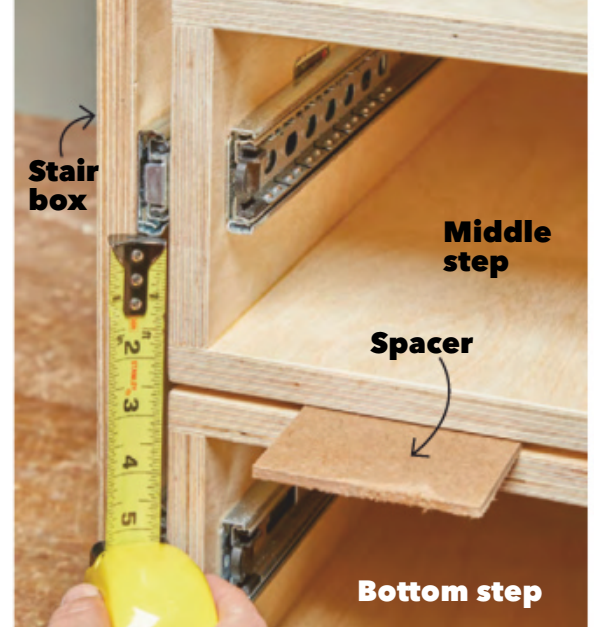
9 POSITION THE BOTTOM STEP

Assemble both drawer slide members on one side of the bottom step. Set the step on 1/4-in. spacers, then measure from the bottom of the slide to the floor of the stair box.



10 HANG THE BOTTOM STEP

Cut a mounting guide the width of the measurement from Photo 9. Set the drawer slides on the guide and screw them to the box sides.



11 POSITION THE NEXT STEP

Set the middle step on top of the bottom step with an assembled slide attached to the step. Measure from the slide to the top of the bottom drawer and cut a mounting guide to that width.

Start with the stair box

My stair box (Q - S) is 18-1/2 in. wide, giving the steps ample width. To determine the height, measure the space underneath the deck frame. The stair box should be a snug fit under the deck when assembled. Build the stair box but don't install it yet. It's easier to add the slides with the box sitting on your workbench.

Build the steps

To determine the step heights, measure the inside height of the stair box. Subtract 1 in. and then divide by three. This allows for a 1/4-in. gap above and below each step. For the step width, measure the width of the box and subtract 1 in. Cut all the parts (T - Z) and assemble the top and middle steps. Before assembling the bottom step, first rout or chisel the finger grip (see **Photo 6**) into the underside of its top. Because of the bottom step's length, it's nearly impossible to install interior drawer slides after assembly. So, attach those slides (**Photo 6**), then finish assembling the step.

Build the drawers

Cut the drawer parts (AA - HH) and make a hand-grip cutout in each drawer front with a jigsaw. Build the drawers, leaving the fronts off for now. Attach the drawer slides using spacers to center the slides on the drawers and inside the steps.

Slide each drawer into its step and apply wood glue to the drawer's front edges (**Photo 7**). Using playing cards as shims, set the fronts in place, with the drawer edge locations marked on the



12 HANG THE REMAINING STEPS

Set the guide on top of the bottom step. Set the slide on the guide and attach it to the stair box. Repeat the process to hang the top step.



13 ADD THE STEP CATCHES

Cut the flat steel for the step catches and fasten them to the backs of the bottom and middle steps. Attach corresponding magnets to the middle and top steps.



14 INSTALL THE STAIR BOX

Slide the stair box into position and screw it to the framing. Add the spacer (JJ) to ensure that the opening to the left of the box is square for the doors.



15 ADD THE SPLASH GUARD

Adhere the aluminum channel to the shower pan and wall using silicone caulk. Cut the plexiglass splash guard, file the edges and caulk it into the channel.

step edges as a reference for nailing. Adjust the fronts side to side until the gap is even all the way around, then pop in a few brad nails (**Photo 8**). If you're not in a hurry, skip the nails and just let the glue dry.

Install the steps

Installing drawer slides perfectly is tricky. I cut mounting guides to make the procedure foolproof. Separate the two components of each slide. Attach the drawer components of the slides centered on the outside of each step, and then slide the cabinet components onto the drawer components. Set 1/4-in. spacers on the stair box's bottom, then set the bottom step on the spacers. Measure from the bottom of the drawer slide to the box bottom (**Photo 9**) and cut a mounting guide to that width. Set the drawer slide cabinet components on the guide and attach them to the stair box (**Photo 10**).

Leaving the bottom step in place, repeat the process with the middle step (**Photo 11**), setting the 1/4-in. spacers on top of the bottom step (**Photo 12**) instead of the box's bottom. Repeat with the top step, then remove all the steps.

Cut the step catches and drill two screw holes in each one. Mount two catches to the backs of the bottom and middle stairs. Attach the magnets to the backs of the top and middle stairs, aligned with each step catch (**Photo 13**).

Slide the box into place and screw it to the framing (**Photo 14**), then reinstall the steps, starting with the bottom step. Measure the opening to the left of the stair box and cut and install the spacer (JJ) to keep the opening square.

Finish up

Cut aluminum channel (LL) for the splash guard (MM) and attach it to the shower pan and the tiled wall with silicone. Once the silicone is dry, caulk the channel into place so that it sheds water. Cut the splash guard to size and radius the outer corner. Break all the sharp edges with a fine-tooth file. Set the splash guard into the channel (**Photo 15**) and caulk it into place.

Fill the screw holes, sand the plywood parts up to 180 grit, and then apply two or three coats of polyurethane. Finally, hang the doors (KK), add the door hardware and install the shower controls and hose bib. Optional accessories include tie rings, hooks and a shower caddy.

What is the most important information I should know about ELIQUIS (apixaban)?

For people taking ELIQUIS for atrial fibrillation: Do not stop taking ELIQUIS without talking to the doctor who prescribes it for you. Stopping ELIQUIS increases your risk of having a stroke. ELIQUIS may need to be stopped prior to surgery or a medical or dental procedure. Your doctor will tell you when you should stop taking ELIQUIS and when you may start taking it again. If you have to stop taking ELIQUIS, your doctor may prescribe another medicine to help prevent a blood clot from forming.

ELIQUIS can cause bleeding which can be serious and rarely may lead to death. This is because ELIQUIS is a blood thinner medicine that reduces blood clotting.

You may have a higher risk of bleeding if you take ELIQUIS and take other medicines that increase your risk of bleeding, such as aspirin, nonsteroidal anti-inflammatory drugs (called NSAIDs), warfarin (COUMADIN®), heparin, selective serotonin reuptake inhibitors (SSRIs) or serotonin norepinephrine reuptake inhibitors (SNRIs), and other medicines to help prevent or treat blood clots.

Tell your doctor if you take any of these medicines. Ask your doctor or pharmacist if you are not sure if your medicine is one listed above.

While taking ELIQUIS:

- you may bruise more easily
- it may take longer than usual for any bleeding to stop

Call your doctor or get medical help right away if you have any of these signs or symptoms of bleeding when taking ELIQUIS:

- unexpected bleeding, or bleeding that lasts a long time, such as:
 - unusual bleeding from the gums
 - nosebleeds that happen often
 - menstrual bleeding or vaginal bleeding that is heavier than normal
- bleeding that is severe or you cannot control
- red, pink, or brown urine
- red or black stools (looks like tar)
- cough up blood or blood clots
- vomit blood or your vomit looks like coffee grounds
- unexpected pain, swelling, or joint pain
- headaches, feeling dizzy or weak

ELIQUIS is not for patients with artificial heart valves.

Spinal or epidural blood clots (hematoma). People who take a blood thinner medicine (anticoagulant) like ELIQUIS, and have medicine injected into their spinal and epidural area, or have a spinal puncture have a risk of forming a blood clot that can cause long-term or permanent loss of the ability to move (paralysis).

Your risk of developing a spinal or epidural blood clot is higher if:

- a thin tube called an epidural catheter is placed in your back to give you certain medicine
- you take NSAIDs or a medicine to prevent blood from clotting
- you have a history of difficult or repeated epidural or spinal punctures
- you have a history of problems with your spine or have had surgery on your spine

If you take ELIQUIS (apixaban) and receive spinal anesthesia or have a spinal puncture, your doctor should watch you closely for symptoms of spinal or epidural blood clots or bleeding. Tell your doctor right away if you have tingling, numbness, or muscle weakness, especially in your legs and feet.

ELIQUIS is not for use in people with antiphospholipid syndrome (APS), especially with positive triple antibody testing, who have a history of blood clots.

What is ELIQUIS?

ELIQUIS is a prescription medicine used to:

- reduce the risk of stroke and blood clots in people who have atrial fibrillation.
- reduce the risk of forming a blood clot in the legs and lungs of people who have just had hip or knee replacement surgery.
- treat blood clots in the veins of your legs (deep vein thrombosis) or lungs (pulmonary embolism), and reduce the risk of them occurring again.

It is not known if ELIQUIS is safe and effective in children.

Who should not take ELIQUIS?

Do not take ELIQUIS if you:

- currently have certain types of abnormal bleeding.
- have had a serious allergic reaction to ELIQUIS. Ask your doctor if you are not sure.

What should I tell my doctor before taking ELIQUIS?

Before you take ELIQUIS, tell your doctor if you:

- have kidney or liver problems
- have antiphospholipid syndrome
- have any other medical condition
- have ever had bleeding problems
- are pregnant or plan to become pregnant. It is not known if ELIQUIS will harm your unborn baby.
- are breastfeeding or plan to breastfeed. It is not known if ELIQUIS passes into your breast milk. You and your doctor should decide if you will take ELIQUIS or breastfeed. You should not do both.

Tell all of your doctors and dentists that you are taking ELIQUIS (apixaban). They should talk to the doctor who prescribed ELIQUIS for you, before you have **any** surgery, medical or dental procedure. **Tell your doctor about all the medicines you take, including** prescription and over-the-counter medicines, vitamins, and herbal supplements. Some of your other medicines may affect the way ELIQUIS works. Certain medicines may increase your risk of bleeding or stroke when taken with ELIQUIS.

How should I take ELIQUIS?

Take ELIQUIS exactly as prescribed by your doctor. Take ELIQUIS twice every day with or without food, and do not change your dose or stop taking it unless your doctor tells you to. If you miss a dose of ELIQUIS, take it as soon as you remember, and do not take more than one dose at the same time. If you have difficulty swallowing the tablet whole, talk to your doctor about other ways to take ELIQUIS. **Do not run out of ELIQUIS. Refill your prescription before you run out.** When leaving the hospital following hip or knee replacement, be sure that you will have ELIQUIS available to avoid missing any doses. **If you are taking ELIQUIS for atrial fibrillation, stopping ELIQUIS may increase your risk of having a stroke.**

What are the possible side effects of ELIQUIS?

- See “**What is the most important information I should know about ELIQUIS?**”
- ELIQUIS can cause a skin rash or severe allergic reaction. Call your doctor or get medical help right away if you have any of the following symptoms:
 - chest pain or tightness
 - swelling of your face or tongue
 - trouble breathing or wheezing
 - feeling dizzy or faint

Tell your doctor if you have any side effect that bothers you or that does not go away.

These are not all of the possible side effects of ELIQUIS. For more information, ask your doctor or pharmacist. Call your doctor for medical advice about side effects. You may report side effects to FDA at 1-800-FDA-1088.

This is a brief summary of the most important information about ELIQUIS. For more information, talk with your doctor or pharmacist, call 1-855-ELIQUIS (1-855-354-7847), or go to www.ELIQUIS.com.

You are encouraged to report negative side effects of prescription drugs to the FDA. Visit www.fda.gov/medwatch, or call 1-800-FDA-1088.

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SUPER STORAGE LIFT

A high shelf that automatically lowers with the push of a button

BY JAY CORK

Lots of garages, including mine, are crammed full of stuff—every inch of storage space within arm's reach is used up. But chances are, they have plenty of empty space near the ceiling. High shelving is a great option for taking advantage of that space, but I wanted something convenient to access. I didn't want to be lugging heavy bins up a ladder.

I set out to design a contraption that would do that work for me. For lifting power, I chose a "linear actuator." Since I'd never used one before, I built a prototype to see whether my idea would work. I pushed the button on the remote. Success! This shelf glides down for easy loading, and pushing the other button lifts the shelf up and out of the way.



OUT-OF-THE-WAY STORAGE
This shelf easily lifts 450 lbs. of stuff up and out of your way, leaving space below for storage or parking.

MEET THE BUILDER

Jay Cork is an associate editor at *Family Handyman* who loves inventing things from scratch.

Pro Tip: I assembled my project with glue, brad nails and pocket hole screws to maximize its strength. Even if you don't have a pocket hole jig, I suggest a using a combination of glue and screws; this shelf needs to be strong.

What are linear actuators?

A linear actuator is basically a small but powerful motor that moves a rod in and out. They come in various sizes and cost anywhere from \$30 to thousands of dollars. The model I chose has 40 in. of travel, or "stroke," is rated to lift 450 lbs. and costs about \$240.

EASY TO INSTALL

Linear actuators are low-tech devices. If you can wire a light switch, you can wire an actuator. Most run on 12 volts, so you don't have to worry about shocking yourself. In addition to the actuator, you'll need a power supply and a controller. I chose a wireless control module and a 20-amp power supply. The power supply and wireless controller added about \$200 to my cost.

1

1 ASSEMBLING THE SHELF & CABINET

I cut and labeled all the parts and then assembled the shelf (Figure A). The cabinet (Figure C) doesn't get completely assembled yet; the bulkhead (M) is added in Photo 9, and the back (A) is the last part to be attached, in Photo 10.

2



2 MAKE SUPER-SLIPPERY GUIDES

I made L-shaped guide strips from a low-friction material called UHMW (ultra high molecular weight) plastic. They allow the shelf to slide easily as it travels up and down and also prevent racking from an unbalanced load. To start, I made the rabbet cut on a table saw and then predrilled the screw holes.



3 POSITIONING THE GUIDE STRIPS

To get the guides positioned just right, I placed the shelf face down on the floor and centered the cabinet on top of it. Slipping the guide strips under each side of the cabinet puts them exactly where they need to be; I just needed to make sure everything was square before screwing them down.

3

Wireless controller

Linear actuator

20-amp power supply



Trial & error: On my first try, I put the wheel brackets the same distance from the bottom as they were from the top. Big mistake. The lower wheels came out of the track when the shelf was in its lowest position. Oops!



4 WHEEL BRACKETS ARE NEXT

On the back of the shelf, I marked a line 2 in. from the edge, top to bottom. Then, I marked a line 2 in. from the top and 4 in. from the bottom. With the wheels inserted, align the corners of the wheel brackets with these lines and attach them to the shelf with 3/4-in. screws.

5 SIMPLE SPACER FOR THE WHEEL TRACKS

With the curved side of the wheel track facing the front of the cabinet, I slid the track over the wheels. To make sure it ran parallel to the front of the cabinet, I used a strip of 3/4-in. plywood as a spacer. Then I put one 3/4-in. screw near the top, one in the middle and one near the bottom of the track. More will go in, but only after it's hung on the wall.



6 STRENGTHEN THE SHELF

First, I centered one mounting block (N) exactly 2-1/2 in. from the top of the shelf and attached it with wood glue and 1-1/4-in. screws. I used the same method to stack the second mounting block on top of the first.

7 DRILL BOLT HOLES IN THE SHELF

With the shelf and cabinet still face down and the actuator positioned so the carriage sat centered on the spacer block, I used the brackets of the carriage itself as a guide to drill 3/8-in. holes through the spacer block into the shelf.



Figure A
Electric Shelf

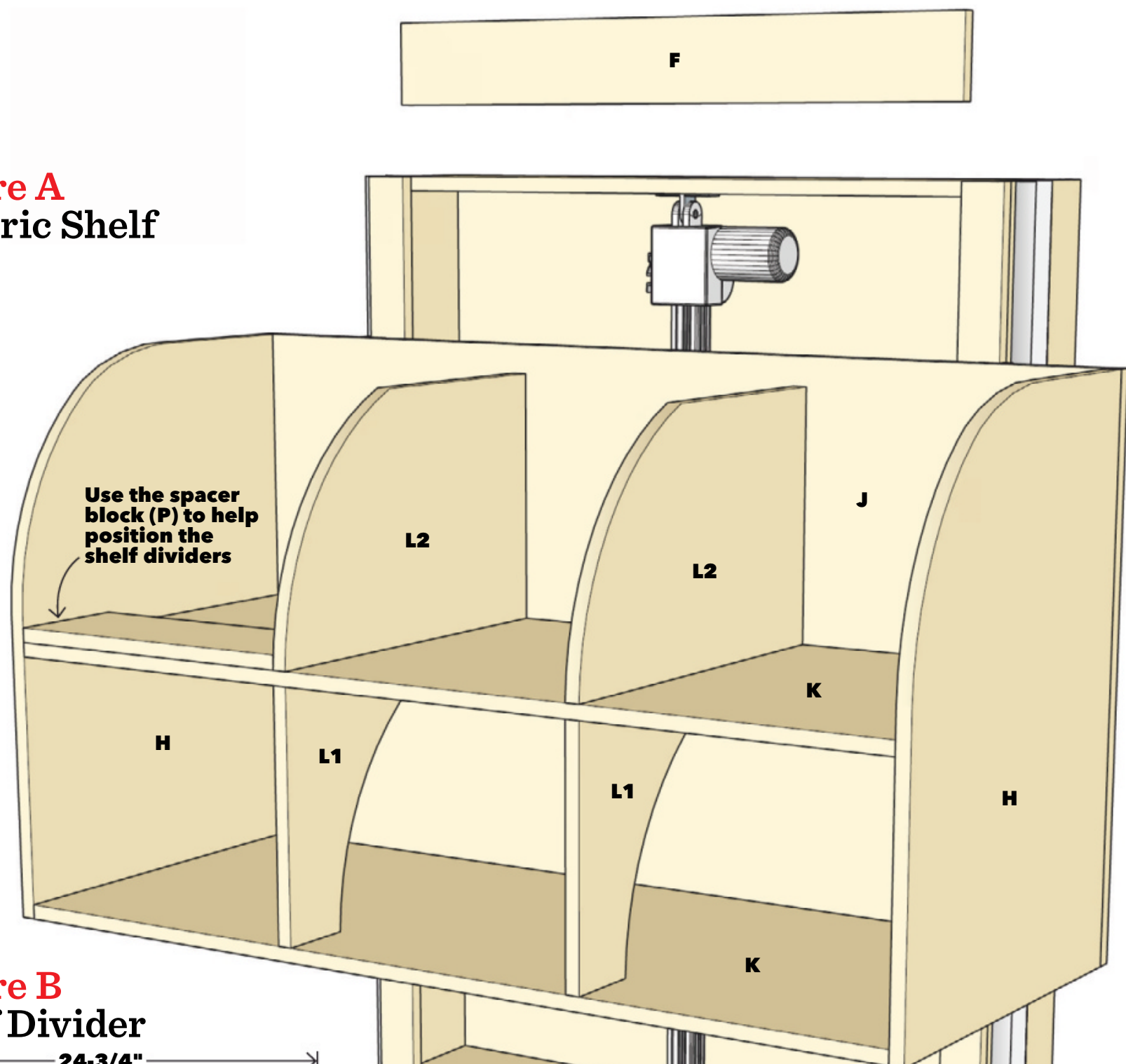
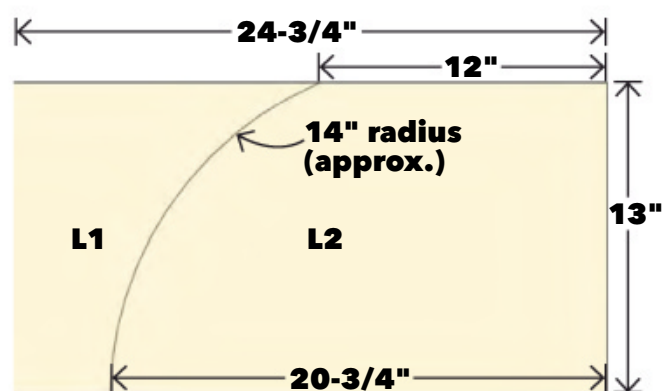
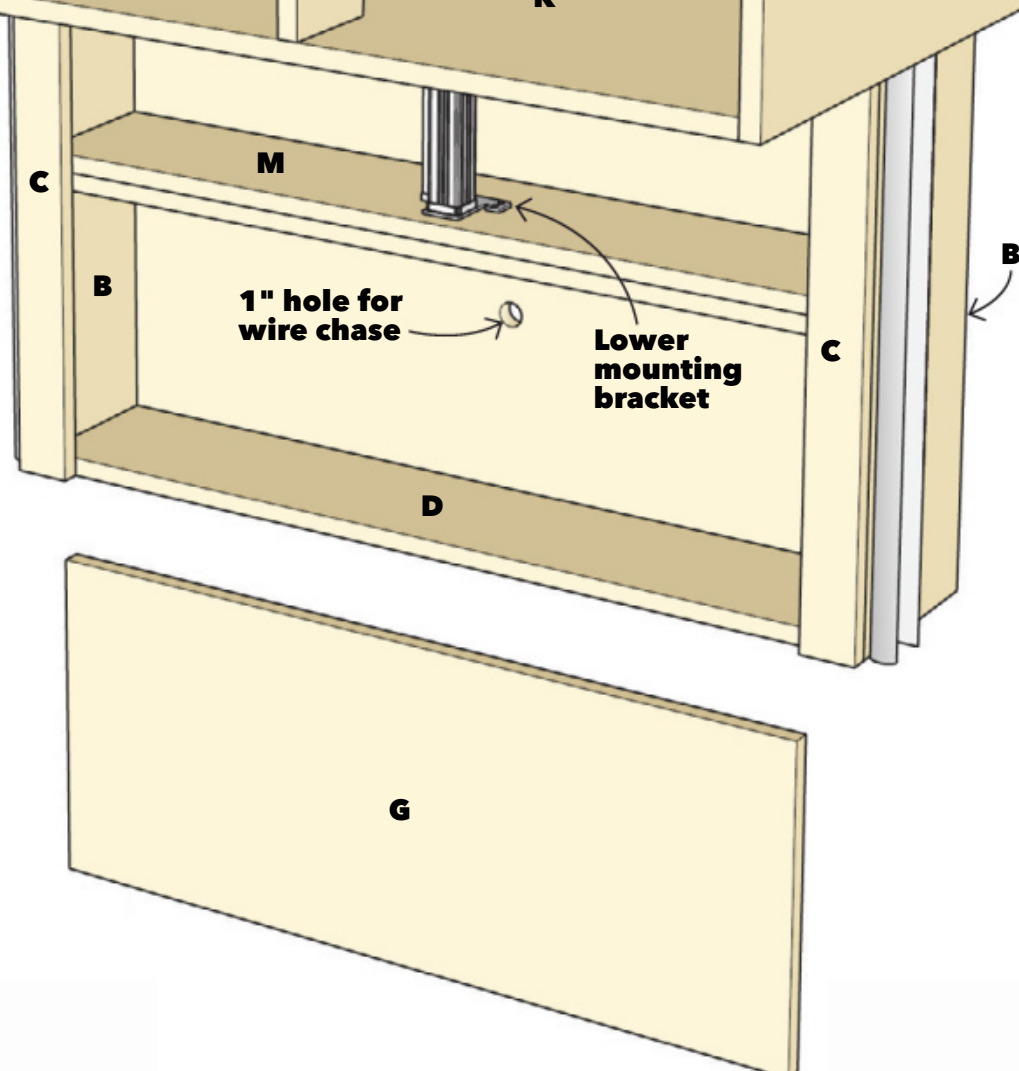


Figure B
Shelf Divider



The upper and lower shelf dividers are cut from one piece (L)



WHAT IT TAKES

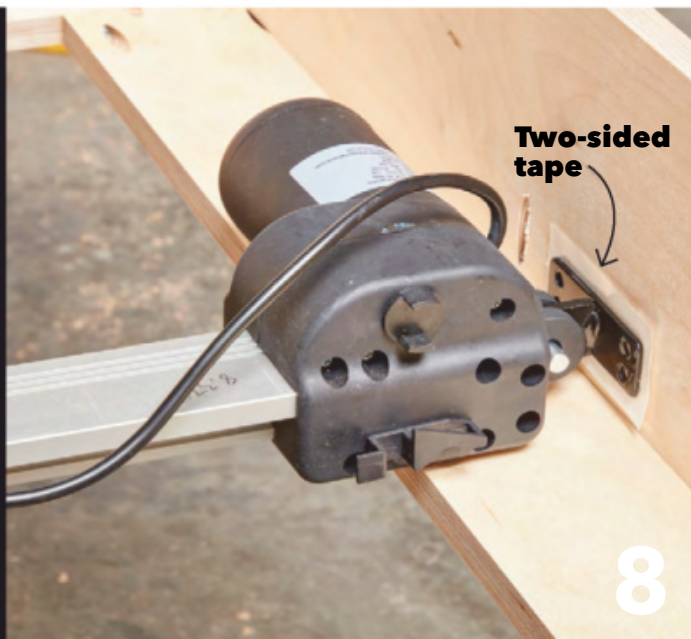
TIME	COST	SKILL LEVEL
2 days	\$500 to \$750	Intermediate

TOOLS Basic hand tools, table saw, miter saw, drill/driver, brad nailer



HOVER YOUR CAMERA HERE
Scan this code with your smartphone to watch a video of this shelf in action!

Caution: The actuator can still move around a bit after being bolted to the shelf; I learned this the hard way. I assumed it was straight when it wasn't and had to repeat the process. Next time, I leveled the actuator to the shelf using a combination square, and I used a measuring tape to make sure it was parallel to the sides.



8 USE TAPE TO HOLD THE BRACKET

With the actuator bolted to the shelf, I slid the shelf and cabinet together so the included T-bracket would touch the cabinet top. The double-sided tape on the T-bracket kept it perfectly positioned while I removed the clevis pin and got the actuator out of the way. I used 3/4-in. screws to finish the job.

9 INSTALL THE BULKHEAD

Once the T-bracket was screwed on, I reattached the actuator, put the bulkhead (M) in place and hit it with a hammer. This pressed the screw heads of the lower mounting bracket into the plywood so the bulkhead could sit flush with it.



10 INSTALL THE BACK LAST

I used the same spacer blocks (P) that spaced the dividers in the shelf. This time I used them along the inside of the cabinet to keep the back from sagging while I screwed it in.



11 SWAP POLARITY

Since I chose to mount the actuator upside down, I had to swap the lead wires so the carriage would run the correct way when the up or down button was pushed on the remote. All I needed to do was cut and swap the white and blue wires coming from the control box.

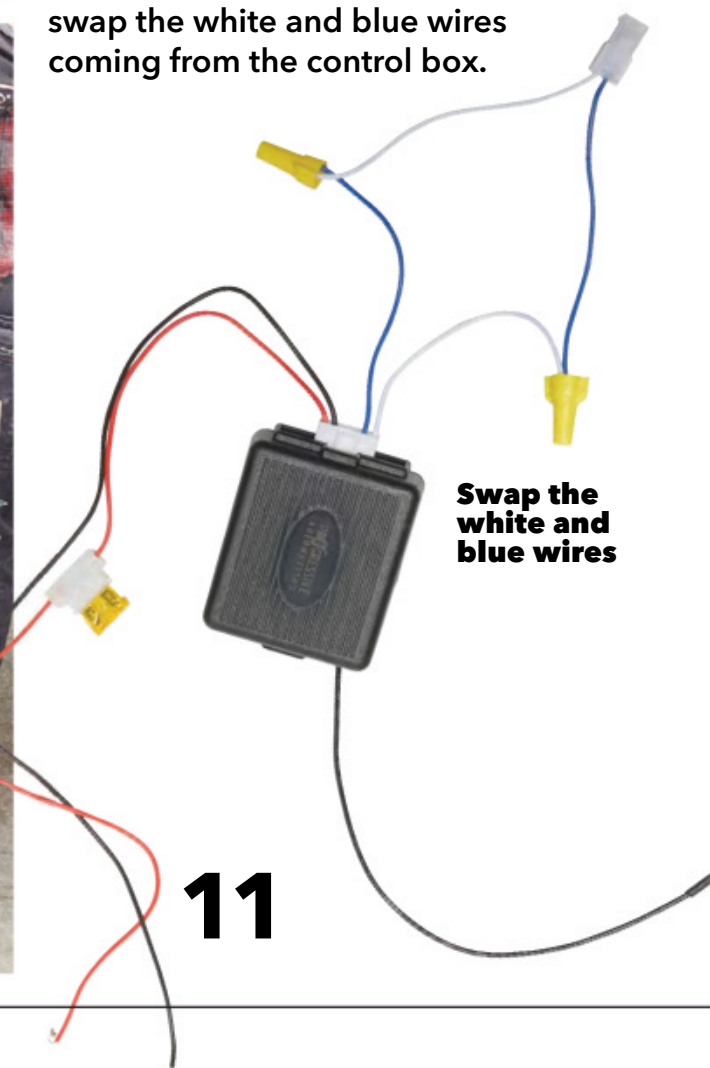
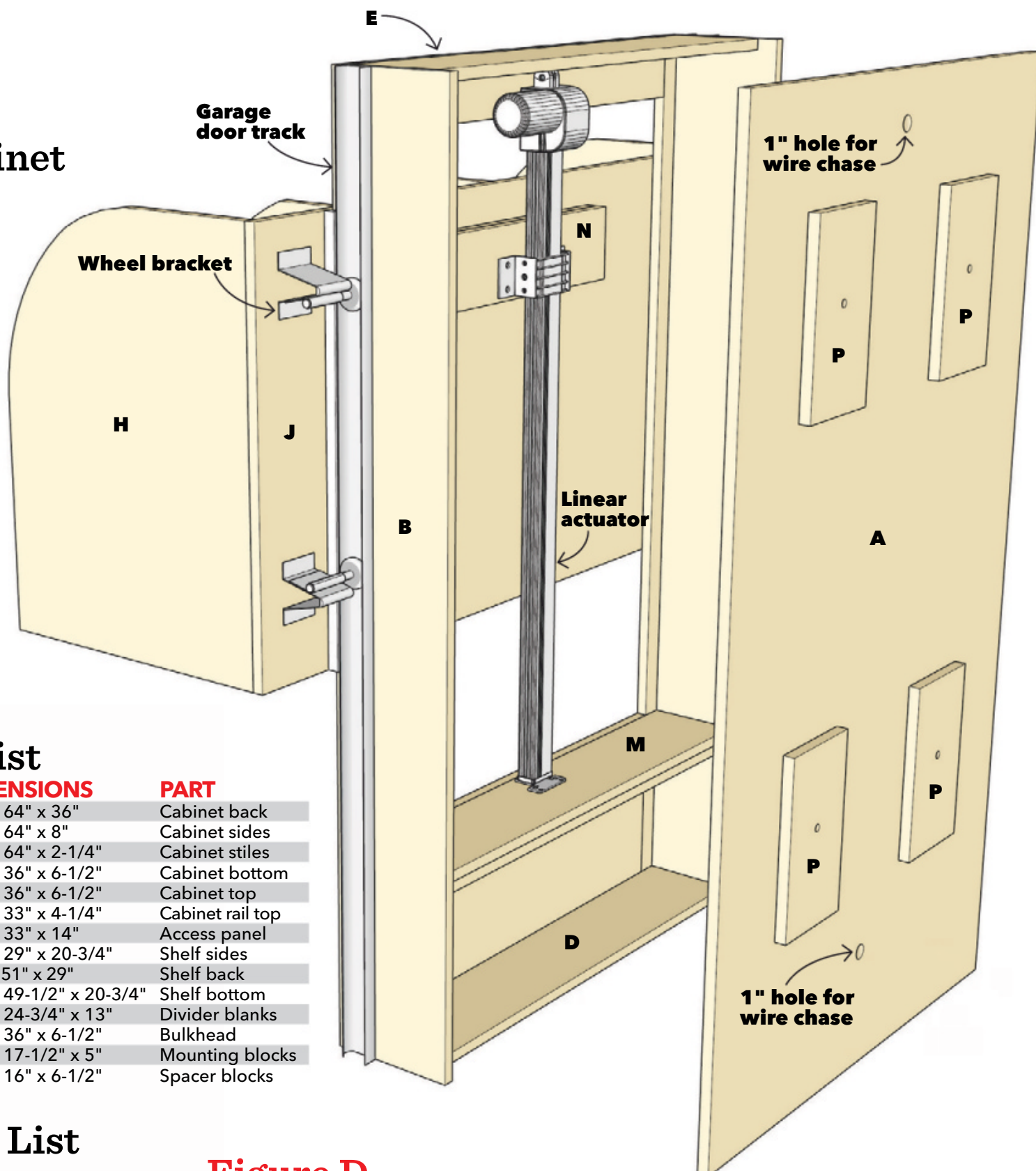


Figure C Shelf Cabinet



Cutting List

KEY	QTY.	DIMENSIONS	PART
A	1	3/4" x 64" x 36"	Cabinet back
B	2	3/4" x 64" x 8"	Cabinet sides
C	2	3/4" x 64" x 2-1/4"	Cabinet stiles
D	1	3/4" x 36" x 6-1/2"	Cabinet bottom
E	1	3/4" x 36" x 6-1/2"	Cabinet top
F	1	3/4" x 33" x 4-1/4"	Cabinet rail top
G	1	3/4" x 33" x 14"	Access panel
H	2	3/4" x 29" x 20-3/4"	Shelf sides
J	1	3/4" x 51" x 29"	Shelf back
K	2	3/4" x 49-1/2" x 20-3/4"	Shelf bottom
L	2	3/4" x 24-3/4" x 13"	Divider blanks
M	2	3/4" x 36" x 6-1/2"	Bulkhead
N	2	3/4" x 17-1/2" x 5"	Mounting blocks
P	4	3/4" x 16" x 6-1/2"	Spacer blocks

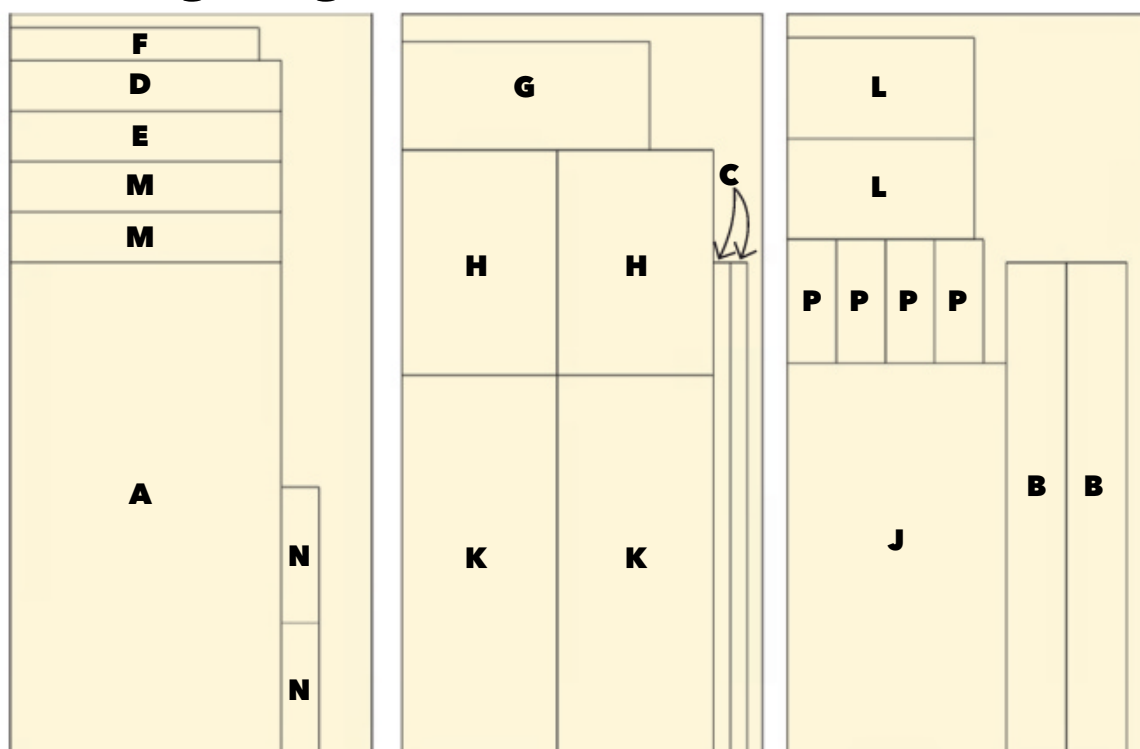
Materials List

ITEM QTY.

40" linear track actuator	1
12V power supply and controller	1
Actuator control module	1
4' x 8' sheets of plywood	3
3/4" x 36" UHMW plastic	1
6' garage door tracks	2
Garage door wheels w/ bearings	4
3/4" wood screws	1 box
1-1/4" wood screws	1 box
1-1/4" brass trim-head screws	4 ea.
3/8-16 x 3" lag bolts and locknuts	4 ea.

Figure D

Cutting Diagrams



SHOPPING FOR MATERIALS

Most of the materials for this project are available at home centers, but some things are easier to find online. I ordered the garage door tracks and wheels from americandoorsupply.com and the linear actuator kit from progressiveautomations.com. I found the UHMW plastic at a local Woodcraft store.



12

12 ANCHOR INTO STUDS

Using a support stand I made from scrap wood, I positioned the cabinet against the wall and drove one lag screw in. While my helper checked for plumb, I drove the other three lag bolts in. After securing the cabinet to the wall, I removed the middle and lower screws from the wheel rails.

13 MOUNT THE SHELF TO THE CARRIAGE

A lesson I learned from making the prototype was that the shelf can't slide straight up into position; the mounting blocks on the back of the shelf won't clear the bottom of the cabinet. With my helper on the other side, we swung the rails out just enough to guide the wheels into them. Once the shelf was lifted high enough, we swung it back in, and while my helper kept it steady, I lined up the bolt holes to the actuator carriage.

14 ADJUST THE ROLLERS

With the shelf installed, I plugged in the electronics and tested the movement of the shelf. Looking at the guide strips as it moved, I noticed a gap near the top. To close it, I adjusted the upper wheels a little tighter to the shelf.

15 FIT THE ACCESS PANEL

The power supply and the receiver were installed in the lower section of the cabinet. I used brass trim-head screws to attach the access panel (G). I had to cut the panel down to fit, so don't be surprised if you need to do some final fitting.

Make sure it's secure: This shelf is heavy! So, to make sure I anchored into studs, I predrilled two holes in the cabinet back near the top and two near the bottom, horizontally spaced 24 in. on center. The final task for the spacer blocks (P): I fastened them over the holes on the back of the cabinet using glue and 1-1/4-in. screws.

Temporary stand made from 2x4s



13



14

Snug the wheel to the track and tighten the bolt



Trim to fit if needed

15

KINDA SLOW, BUT IT BEATS THE ALTERNATIVE

This was a fun project to design and build. The best moment was the first time I pushed the button on the wireless controller and watched the shelf automatically rise. Like magic!

I'll admit, its speed was a bit disappointing; the shelf takes a full 90 seconds to rise. Then again, that's faster than getting a ladder, setting it up and lifting bins up or down. A lot safer, too!

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Pictured: Leather chair chestnut color. Chestnut color also available in Duralux fabric

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YARD PESTS?

16 proven solutions from a pro

BY JASON INGOLFSLAND

There are hundreds of ways to deal with yard pests. But what works and what doesn't? For expert guidance, we talked with Derrick Benz, who battles pests every day, all day (and wins!). He told us that few solutions work every time.

Sometimes, small deterrents are enough. If you just make food or shelter a little harder to find, critters will often move to friendlier areas. But if animals are especially hungry or stubborn, you may have to try several solutions. Here are some of the strategies that have worked the best for Derrick.

1 Lock down your trash

Raccoons are especially good at opening trash cans, but a bungee cord is usually enough to foil them. Also deal with trash odor. Garbage may smell bad to you, but to many pests it smells like dinner. Put trash in plastic bags and seal them. If your trash can is dirty, wash it out with soap and water.



PHOTO: JOHANNES KROEMER/GETTY IMAGES



MEET THE EXPERT

Derrick Benz is a wildlife supervisor at Plunkett's Pest Control. His latest adversary is a fox who's even slyer than most.



② Pick up nuts and fruit

Lots of animals love nuts and fruit. Removing these treats while they're on the tree usually isn't practical. But gathering fallen apples or raking up nuts is an effective way to send critters elsewhere for dinner.



③ Eliminate hiding places

Small animals seek out hiding places—in open spaces, they feel exposed to predators. So trim the shrubs around your foundation. Also check around your property for any other hiding spots, like wood piles, and move them away from your house.



④ Let your dogs out

Animals are less likely to come near your yard if they know a potential predator is around. Your dog may show you where the invaders are hiding out—and leave scents that ward off unwanted visitors.

5 Kill off clover

Clover isn't the worst weed in most lawns, but Derrick says it's one of the most attractive to rabbits and deer. There are a few ways to eliminate clover, but the best defense is healthy grass.



6 Cut the grass

Tall grass in a neglected lawn isn't just an eyesore; it makes an attractive haven for insects and rodents. Even if those grass dwellers don't bother you outdoors, some will find their way into your house. They'll also attract predators that you may not want in your yard.



7 Contain compost

Uncovered grass or leaves are fine, but any compost that contains food scraps needs a pest-proof container or cover. Otherwise, you're inviting animals to a feast.



8 Install plastic predators

Plastic owls often scare off rodents. The key is to mount them up high, usually on the roof or in a tree—that's where animals expect to see predatory birds. You can get a plastic owl for \$20 or less online.



9 Remove squirrel nests

Squirrels can be a yard nuisance, but it gets worse: Eventually, they'll look for ways to get into your house, seeking nesting sites in your attic or eaves. To make them feel unwelcome, it's best to knock down their nests. Sometimes, you can do that with a long pole. In other situations, it's easier to cut off a tree branch to bring down the nest. Either way, removing squirrel homes is a great incentive to make them seek friendlier yards.



10 Wipe out grubs

Grubs living in soil are yummy to some rodents. Little cone-shaped holes in your yard are usually evidence that raccoons or skunks are digging for grubs. Moles and voles also go where the grubs are. Eliminate your grub problem with grub killer, available at home centers for \$15 to \$25.

Loves grubs!



11 Scare them with scents

Derrick says a few drops of coyote, fox or wolf urine is a good deterrent. He recommends a light application, just around the perimeter of your yard and garden. You won't notice it, but animals will smell it from a distance and go elsewhere. You'll find predator urine at home centers and online for \$25.

12 Fence out rabbits

Keeping rabbits out of gardens with chicken wire is an old idea, but Derrick says patience is the key to their departure. It may take months for the bunnies to give up and move to other feeding grounds.

13 Close the backyard buffet

Pests are like people: If you're serving up their favorite meal, they'll keep on coming back. Knowing what attracts pests is often the first step toward keeping them away. Want to discourage a particular type of pest? Check this list to see if there are food sources you're willing and able to remove.

PEST	COMMON FOODS THEY EAT
SQUIRRELS	Walnuts, acorns
COYOTES	Mice, squirrels
DEER	Hostas, leafy shrubs and bushes
MOLES	Grubs
RABBITS	Clover, berry bushes, berry trees
RACCOONS	Grubs, trash
SKUNKS	Grubs
TURKEY	Grass, insects, berries



15 Catch and release—far away

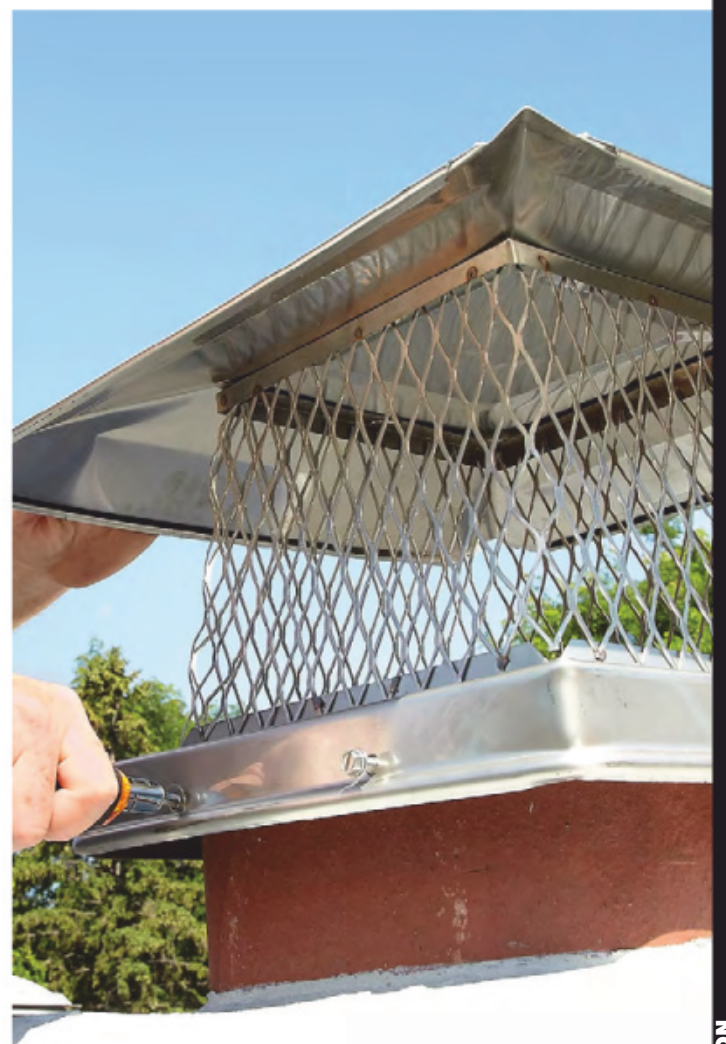
Derrick is a believer in live trapping but says homeowners often make mistakes. Here are a few tips for success:

- When handling the trap with an animal inside, wear Kevlar gloves.
- Choose a trap with a metal plate under the handle to protect your hand from teeth and claws.
- Call a wildlife preserve to see if you can release the animal there.
- Release animals at least 10 miles from your home; their ability to find their way back is incredible.
- When finished, clean the trap with a bleach solution to eliminate scents that may scare off the next critter you want to trap.



14 Spray them away

Motion-activated sprinklers often discourage deer, rabbits and raccoons, according to Derrick. Just keep in mind that animals may get used to the sound and spray and eventually ignore them. Motion-activated sprinklers are available at home centers and online for about \$45.



16 Install a chimney cap

Various animals will occasionally find their way down a chimney, but Derrick says raccoons especially like chimneys as nesting sites. Chimney caps cost as little as \$20 at home centers and online.

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Sharpen your **MOWER BLADE**

You'll be able to mow faster, and you'll have a healthier lawn too

BY JASON KEIPPELA

One of the best ways to encourage a greener, fuller and healthier lawn is to sharpen your lawn mower blade.

A dull blade rips and pulls the grass blades, leaving ragged tears that weaken the plant and promote fungal growth and other grass diseases. A sharp blade, on the other hand, cuts cleanly, allowing the plant to recover quickly. Sharp blades also let you complete your lawn-cutting chore faster and with less stress on the mower.

Sharpening is a simple task, even for a novice. It'll take a few sharpenings to master the technique. After that, the task will take less than 10 minutes. Plan to do it twice every mowing season. We show here the steps that will work for just about any walk-behind mower. Riding mowers require different blade removal techniques, which we won't show here.

Play it safe when removing the blade

Always remove the spark plug wire before you touch the blade (**Photo 1**). The blade shaft is directly connected to the motor, and turning the blade by hand could cause the motor to fire.

Then look for the carburetor and air filter. The carburetor is usually easy to recognize because it has throttle cables running to it. If you keep this side up when you tip your mower over to access the blade (**Photo 2**), you won't get a smoke cloud from leaking oil the next time you start it. Some mowers have gas caps with air holes that could leak a little gas onto your garage floor, so work outside or keep a rag handy to clean up drips. Once the blade is off, set the mower back on its wheels until you're ready to reinstall your blade.

You'll usually find a single bolt or nut holding the blade on. It's typically very tight and you'll need to clamp the blade to loosen it. The 2x4 method we show (**Photo 3**) is simple, quick and safe. Don't use your foot! A good tool to keep handy for loosening the bolt is a 10-in. breaker bar with a socket to match the bolt. It'll give you plenty of leverage to loosen extremely tight bolts, and you can keep your knuckles well away from the blade when bearing down. Use a squirt of penetrating oil on really rusted, stuck bolts. Wait 10 minutes to give it time to work.

Sharpen it with a file

Once you remove the blade, examine it to decide whether to sharpen it or replace it. (See "Do You Need a New Blade?" on p. 59.) Mower blades are made from fairly soft steel, so a hand file can sharpen it (**Photo 4**). You can sharpen most with fewer than 50 strokes of a clean, sharp "mill bastard" file that's at least 10 in. long. Grinders also work, and much more quickly. (Pros use them.) But they're more difficult to control and can over-heat and ruin the blade.



1 PREVENT ACCIDENTAL START-UP

Pull the spark plug wire from the spark plug to prevent the motor from accidentally starting. Tape or tie it back so it doesn't flop back into contact with the plug.



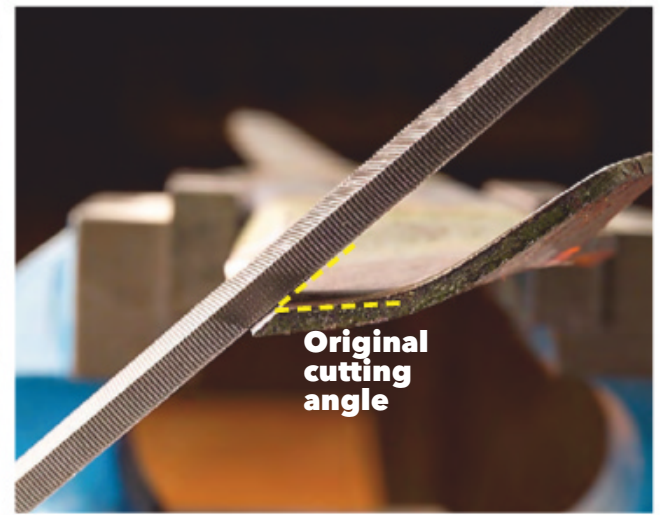
2 KEEP GAS OUT OF THE AIR FILTER

Turn the mower onto its side with the air filter and carburetor side up. This keeps oil and gas from dripping into the air filter.



3 REMOVE THE BLADE

Wedge a short 2x4 between the blade and the deck to clamp the blade. Loosen the bolt (or nut) with a long-handled wrench. Turn counterclockwise. Remove the bolt and blade.



4 SHARPEN THE BLADE

Clamp the blade in a vise and sharpen the cutting edge with a mill bastard file, holding it at the same cutting angle as before. File until the blade is "butter knife" sharp.



5 BALANCE THE BLADE

Hang the blade on a nail to check the balance. If one side dips, file a bit more off that side until the blade remains horizontal.



6 REINSTALL THE BLADE

Position the blade and screw in the bolt. Then wedge the 2x4 back in and tighten the bolt firmly with your socket and breaker bar.

Always sharpen from the top side of the cutting edge; this will give you the longest-lasting edge. The file cuts on the push stroke only; you'll feel it bite into the blade. If you don't feel that cutting action, your file is probably dull or you're not pressing hard enough. Don't try to make your blade razor sharp; it'll dull more quickly. "Butter knife" sharp will do.

Sharpening mulching blades is sometimes more difficult. (See "Buying a New Blade," p. 59.) Mulching blades may have longer or curved cutting edges, and you may need several types of files to sharpen them. In some cases, you may have to resort to an angle grinder. If your blade is too difficult to sharpen, take it to a blade sharpening service (about \$10).

Balance it before reinstalling

Before you reinstall the blade, be sure to balance it. An unbalanced blade will cause vibration and possibly ruin the blade shaft or bearings. To check the balance, simply hang the blade on a nail (**Photo 5**). If one side falls, it's heavier, and you have to file more metal off it. Keep filing until the blade stays level.

Reinstall the blade and hand-tighten the bolt. Insert the 2x4 in the reverse direction so you can bear down on the breaker bar to tighten the bolt. It's difficult to overtighten the bolt. Mower sharpening pros say that the second most common mistake they see is undertightening the bolt. A loose blade throws off the engine timing and sometimes makes the mower hard to start.



No excuses!

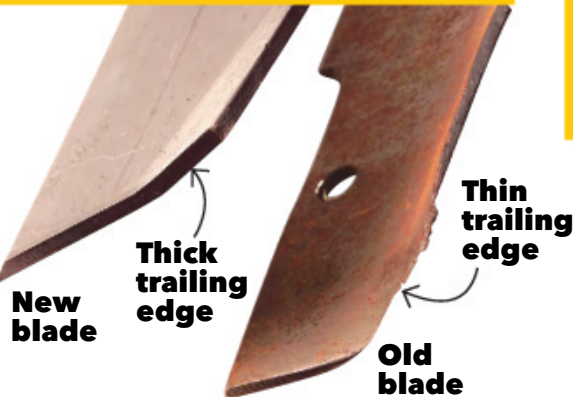
To get in the habit of keeping your blade sharp, dedicate a set of tools for sharpening only. Hang them nearby so they're ready to go. And keep a second, sharp blade handy too. You can slip it on and sharpen the dull one later.

DO YOU NEED A NEW BLADE?

Examine your blade when you remove it and look for the problems shown. If you're unsure of the condition of the blade, take it to a hardware store or home center and compare it with a new one.

WORN TRAILING EDGE

The trailing edge, or fin, is the edge opposite the cutting edge. This fin is often slanted upward, which creates an updraft to lift the grass and grass clippings. Dust and sand will wear this fin down. When it's thin, replace the blade.



BENT BLADE

Set your old blade on your workbench and check for bends. If you're unsure, compare it with a new blade.



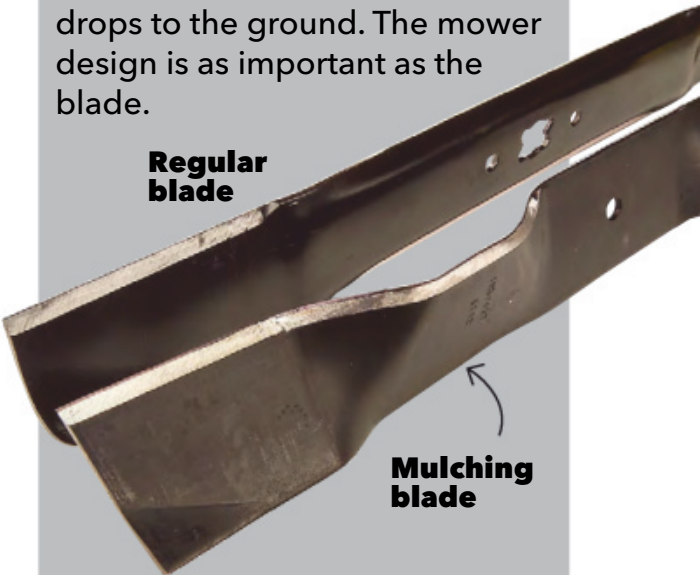
DENTS IN CUTTING EDGE

Replace blades that have deep dents that you can't file out and erosion from wear and sharpening. Also replace any blade that has cracked.



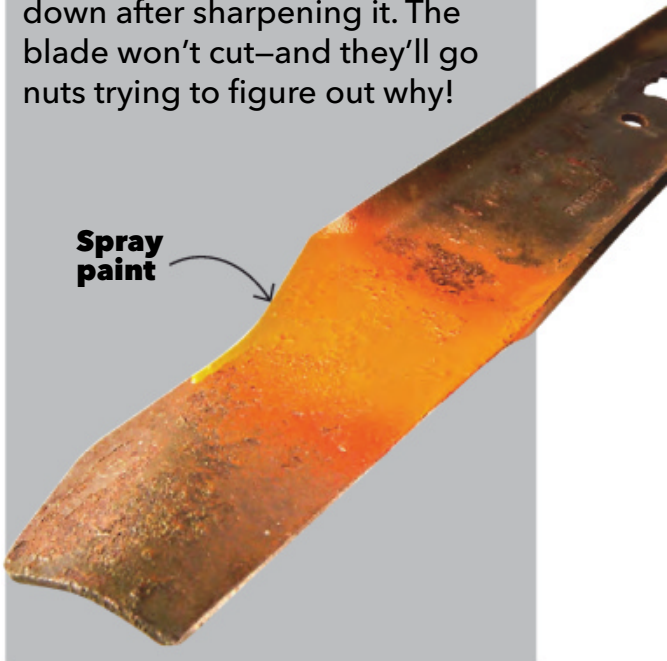
Buying a new blade

Always replace your blade with an identical blade, or the blade recommended in your owner's manual. Resist the temptation to convert your regular straight-blade mower to a fancier mulching mower by simply changing the type of blade. Your mower probably won't work any differently than before, and it may not work as well. The mower deck on a straight-blade mower is shallow and has a side discharge to eject the grass clippings quickly. A mulching mower has a deeper deck without a side discharge; the grass is chopped three or four times before it drops to the ground. The mower design is as important as the blade.



Mark your new blade

Mark your blade with spray paint before you remove it so you know which way to reinstall it. Mower repair pros say that the biggest mistake homeowners make is installing a blade upside down after sharpening it. The blade won't cut—and they'll go nuts trying to figure out why!



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Best ProTips

Expert advice from the job site. By Jay Cork

GET A GLASS-SMOOTH FINISH

My early wood-finishing results weren't pretty: I refinished musical instruments I had no business even touching and ruined some valuable furniture. I've learned a lot since then, working with some of this country's top experts in wood finishing. Now I'd like to share some of that knowledge with you.

If there's one thing I've learned about wood finishing, it's that patience is always rewarded; there are very few shortcuts to achieving great results. But that's not a bad thing. In fact, I find that it's really enjoyable to slow down and pace myself. When I get in a hurry and cut corners, I always regret it.

LINT-FREE APPLICATOR

Terry-cloth staining pads work great for gel finishes too.



MEET THE EXPERT

Jay Cork is an associate editor at *Family Handyman*. He began his wood-finishing career as a teenager.

Jay's Finishing Kit

Technique is important for achieving consistent results, but quality tools and materials play a major role too. Here are some I've come to rely on:

SANDING BLOCKS

I love this sanding block! It's \$12 at woodcraft.com. The block uses the same 5-in. discs as my sander, and it's form-fit for my hand.

COLORLED PENCILS/MARKERS

Use colored pencils or markers to create grain lines on a repair.

MAGNIFYING GLASS/LIGHT

A magnifying glass with a light helps me spot blemishes.

TACK CLOTH

Tack cloths are meant to clean the surface between coats. I've never liked the store-bought ones, but a microfiber cloth dampened with solvent has never failed me.

SPATULA KNIVES

With some types of grain, the color difference requires two or more tones of filler. I use small art knives to achieve that detail.

RUBBER SQUEEGEE

For larger areas, a rubber squeegee will help spread the filler into the grain. This grout tool that I found at a hardware store does the same job.

VERSATILE WOOD DYE

TransTint wood dye (\$22 at Rockler) is soluble in both alcohol and water. I use it to tint shellac or a water-based finish. Go easy—a little goes a long way!

FESTOOL SANDPAPER

Festool "Granat" is hands-down the best sandpaper I've ever used. It's more expensive, but you'll save money using it.

STEEL WOOL

Used between coats, Briwax "0000" oil-free steel wool (\$13 at Woodcraft) won't contaminate the finish. I never use steel wool on bare wood; the iron can cause little black stains that will never come out.



PAINTING PYRAMIDS

Painting pyramids keep your project elevated and stable—but be careful! I once sanded a piece while it was still on the pyramids and the points dug in on the back side! Oooops!



NITRILE GLOVES

In the past I've used blue latex gloves. But I discovered these ultra-durable Venom Steel nitrile gloves (\$10 for 50 at Menards). I'll be using these from now on.



TWEEZERS

Dust, hair, brush bristles and even insects can all ruin your finish. If you catch the culprit quickly with a pair of tweezers, the finish should level back out.

CHISEL

A sharp chisel is for more than just wood! I use one to shave off drips and runs after the finish has dried.



PREVAL SPRAYER

When topcoating with epoxy, I like to have a Preval sprayer (\$5 at Menards) filled with denatured alcohol. A little spritz will help settle bubbles and other surface imperfections.



MINERAL SPIRITS AND DENATURED ALCOHOL

Certain finishes require specific solvents. I use denatured alcohol for thinning shellac and epoxy. Mineral spirits can be used for thinning oil-based finishes and for cleaning.



TIMBERMATE WOOD FILLER

Timbermate (\$9 at Woodcraft) is a water-based wood filler made from wood flour. It can be thinned out with water for use as a grain filler, and it shrinks less than any other filler I've used.

BRUSHES

I find that a very stiff, natural-bristle brush gives me greater control for brushing polyurethane.



BLOXYGEN

Bloxygen (\$13 at Rockler) displaces oxygen with an inert gas. Spraying it into a can of finish as you put the lid back on keeps the finish from going bad.





Jay's tips for a fantastic finish

■ START WITH GLOSS

A satin finish is simply a gloss finish with tiny particles in it. Those "flatteners" make the finish less shiny. But, too many layers of satin can obscure the grain, causing the finish to appear dull. To avoid this, I start with at least two coats of gloss then apply one last coat using satin. That gives me the depth and luster I love to see in a finish.

■ SAND BETWEEN COATS

Modern polyurethanes don't require sanding between coats for adhesion, but I still recommend it. Dust nibs need to be removed before the next coat. It might be tempting to use a random orbital sander. Don't! Block-sanding by hand with 320 grit is the way to go.

■ NEVER USE COMPRESSED AIR TO REMOVE DUST

Compressed air is very good at blasting away dust after sanding, but it's a really bad idea. Here's why: Compressors often contain moisture, oil and small particles of rust. All it takes is a microscopic drop of oil to produce "fish eye" in a finish. Instead, use a lint-free rag with mineral spirits.



DE-WHISKER BEFORE WATER-BASED STAIN

Water-based stains and finishes can cause the grain to rise like whiskers. To avoid this, "de-whisker" the wood before staining. Mist it with water, but avoid oversaturation; just spray and wipe with a towel. After it dries completely, sand with 220 grit and it will be ready to finish.



SHAVE AWAY RUNS

When you see a run, your first instinct may be to grab a piece of sandpaper. Don't! Sandpaper can damage the area around a run and make things worse. I prefer using a very sharp chisel to remove drips or runs in finish. If you spot a run as the finish is drying, wait! Let the finish dry first.



HIDE A REPAIR WITH FAKE GRAIN

Sometimes repairs don't blend in because the grain lines have been interrupted. I use colored pencils and markers to make fake grain to disguise the repair. This skill takes time to master, so my advice is to practice! It's a really fun challenge. Buy many brown shades, not just a couple, and don't forget red and yellow. Most important, start with lighter colors. You can always go darker, but not the other way around!



SET UP LOW-ANGLE LIGHT

In the shop, proper lighting for finishing is one of the hardest things to get right. It might be perfect from one perspective but useless from another. I've used floor lamps or utility lights as a source of reflected light, but the reflection was too small. Then I had a better idea—I attached a 4-ft. LED light fixture vertically to a stand. It stands opposite me as I work, always giving me a long, solid line of reflected light in the finish.



MY FAVORITE FINISHES

When finishing a tabletop, I prefer oil-based polyurethane. I just love the classic amber hue that oil provides. Another advantage: Oil-based finishes can be thinned much more than water-based poly. I find thinning the final coat 50/50 really helps level it out. For highly figured wood, rubbing in a few coats of boiled linseed oil (and letting it dry completely) before the polyurethane topcoat can give the figure even more depth.

I use shellac on virtually every finishing project. Zinsser SealCoat is a wax-free clear shellac that works very well as a sanding sealer or prestain conditioner. I love General Finishes Arm-R-Seal because I can apply it with a brush, wipe it on or even spray it. General Finishes Gel Topcoat in satin gives an attractive, hand-rubbed sheen.

RUB OUT WITH STEEL WOOL

Gently rubbing out the final coat of satin finish with "0000" steel wool and a little soapy water will produce the silkiest, smoothest finish you've ever felt.



SEE WITH YOUR FINGERS

The most important lesson I learned when cutting my teeth refinishing cars, furniture and musical instruments was to not trust my eyes. Our fingers are far more capable of sensing minute details. Even before the finishing process begins, my fingers will tell me very quickly if my joints are all glued evenly, or if there are any rough spots that need to be addressed.



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BEST PRO TIPS

Grain filling: What, why and how?

Red oak, hickory and ash are the most common species with “open grain.” While beautiful in their own right, they don’t take a finish evenly. No matter how much you sand, that bumpy texture will show in the finish. That texture can be attractive, but if you want a perfectly smooth finish, you’ll have to fill the grain. I usually fill the grain on tabletops and musical instruments.

MY FAVORITE FILLER

I’ve tried many grain filler products, but the only product I use now isn’t even a grain filler; it’s marketed as a water-based wood putty. Timbermate is made from wood flour and available in many species. It’ll accept stains, dyes and finishes just like the wood around it. It ages the same as wood, which makes me confident that my project will look good the day I complete it as well as years down the line.

1 MIX IT BY HAND

I start with two big scoops of Timbermate wood putty in a plastic food container. Wearing nitrile gloves, I slowly add water and mix it with my fingers. This takes time; mix until those last little clumps are dissolved.

2 SPREAD IT OUT!

When the slurry is the consistency of yogurt, I scoop it up with my hands and spread it on the wood. Just like I do when I stain, I’ll rub in circles and across the grain, working the filler into the pores of the wood.

3 GET THE SPOTS YOU MISSED WITH A SECOND COAT

Applying a second coat produces the best results; it covers little spots that were missed. I’ll even start the second coat before the first one is completely dry so the slurry remaining in my container doesn’t dry out.

4 SAND LIGHTLY!

I like to wait a day before sanding so the moisture has a chance to evaporate. I’ve achieved the best results using a random orbital sander that has effective dust collection, and variable speed so I can slow it down. I start with 80-grit paper and stop at 220.

TIP: I use only Festool sanders because they have the best dust collection of any random orbital sander on the market. More important, the complete absence of vibration means my hand and wrist won’t hurt after hours of use.

5 SEAL WITH SHELLAC

Shellac is very versatile! Because it’s compatible with all finishes, it can be used as a barrier between water- and oil-based stains and topcoats. I use thinned shellac as a pre-stain conditioner. I’ll also use it after grain filling to even out the absorption rate of the filler and wood, so the stain or topcoat lies down evenly. In addition, shellac can be used alone as a stunning topcoat, but that’s for another article (or three).



Home Care

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PROTECT & RENEW STAMPED CONCRETE

Stamped concrete should be sealed every two to three years to protect it from the elements, make it last longer and keep it looking new. My stamped sidewalk was looking dull and faded with a whitish film on it, so it was time to reseal.

Sealers are either water- or solvent-based, and it's best to use what was previously used on your patio. If you apply solvent-based over water-based, you'll likely end up with an uneven, blotchy finish. That's because solvent-based sealer will darken areas where the old sealer has worn off, but not areas where it's still visible. If you put water-based sealer over solvent-based, you're likely to get a poor bond.

I didn't know what the existing sealer was, so I did this quick test. I poured some xylene—a readily available solvent—on a small area that still had old sealer. After a minute or so, it felt tacky, so I knew it was a solvent-based sealer. Water-based sealer gums up with this test. Switching to water-based sealer would have meant completely stripping the old sealer, which is a pain. So I stayed with solvent-based.

1 WASH THE SURFACE

I started by pressure washing using a surface cleaning attachment. The attachment has a spinning head, ensuring that I wouldn't get lines in my concrete from a standard pressure tip. This step removes dirt, mold, mildew and old, flaking sealer. Some of the old sealer remained, but that's fine. Think of it like scraping and repainting. You don't have to scrape off all the paint, just the loose stuff. After the surface cleaner, I used a fan tip to rinse the dirt away.

I let the patio dry thoroughly, no less than 24 hours. If there's moisture underneath the new sealer, it won't bond well.

2 BLOW OFF THE DIRT

After drying and before applying sealer, I blew off any debris with a leaf blower. Sealing when the temperature is in the 60s or 70s degrees F is ideal. If the temp's too high, the sealer might dry too fast and blister.

3 BRUSH THE TIGHT SPOTS

To apply sealer, I first brush areas that would be hard to reach with a roller, such as steps or where the concrete meets the house. Before applying the sealer, I mixed in an anti-slip agent called SHARKGRIP.

4 ROLL ON THE REST

I finished with a 3/8-in. nap roller, applying two thin coats. A thin coat of solvent-based sealer is ready for recoating in 20 to 30 minutes. You could apply sealer with a pump sprayer and then back-roll afterward, but you'd need a sprayer with hoses and seals that were made to stand up to solvent.





In-use covers are safer for you—and your walls

If you keep anything plugged into an outdoor outlet during wet weather—a pond pump, holiday lights, a low-voltage lighting transformer—the plug is bound to get wet and pose a potentially dangerous shock hazard. The solution is an in-use outlet cover, which keeps the outlet sheltered and dry even while a cord is plugged in. That reduces the risk of shocks and keeps GFCI outlets from getting wet and shutting off power. In-use covers help to protect your walls, too. When a standard outlet cover is held open by a cord, it can let water into your walls—not much water, but enough to encourage wood rot and peeling paint.

Home centers and hardware stores carry in-use covers to accommodate horizontal, vertical, rectangular and duplex outlets. A tough metal cover like the one shown above costs about \$15. The gasket that comes with the cover forms a watertight seal over smooth surfaces, but seal around the cover with caulk if you have rough brick or stucco siding.

Correction: Tool Cabinet

There is a mistake in our Cutting List for the “Grab & Go Garden Tool Cabinet” (July/Aug. ’20, p. 57). We apologize for the error. Here is the correct information for Part S:

Key	Qty.	Size
S	6	3/4" x 3-1/2" x 16-7/8"



Does your hot water stink?

The smell is caused by hydrogen sulfide gas. This gas is produced in a couple ways. First, your water heater is a nice, warm place for sulfur bacteria to thrive. Second, your water heater is an ideal host for a reaction between sulfate in the water and the water heater anode. If your hot water smells like rotten eggs, you don’t have to live with it. Replacing your water heater’s standard anode rod with a powered anode (\$132 online) should stop that sulfur odor.

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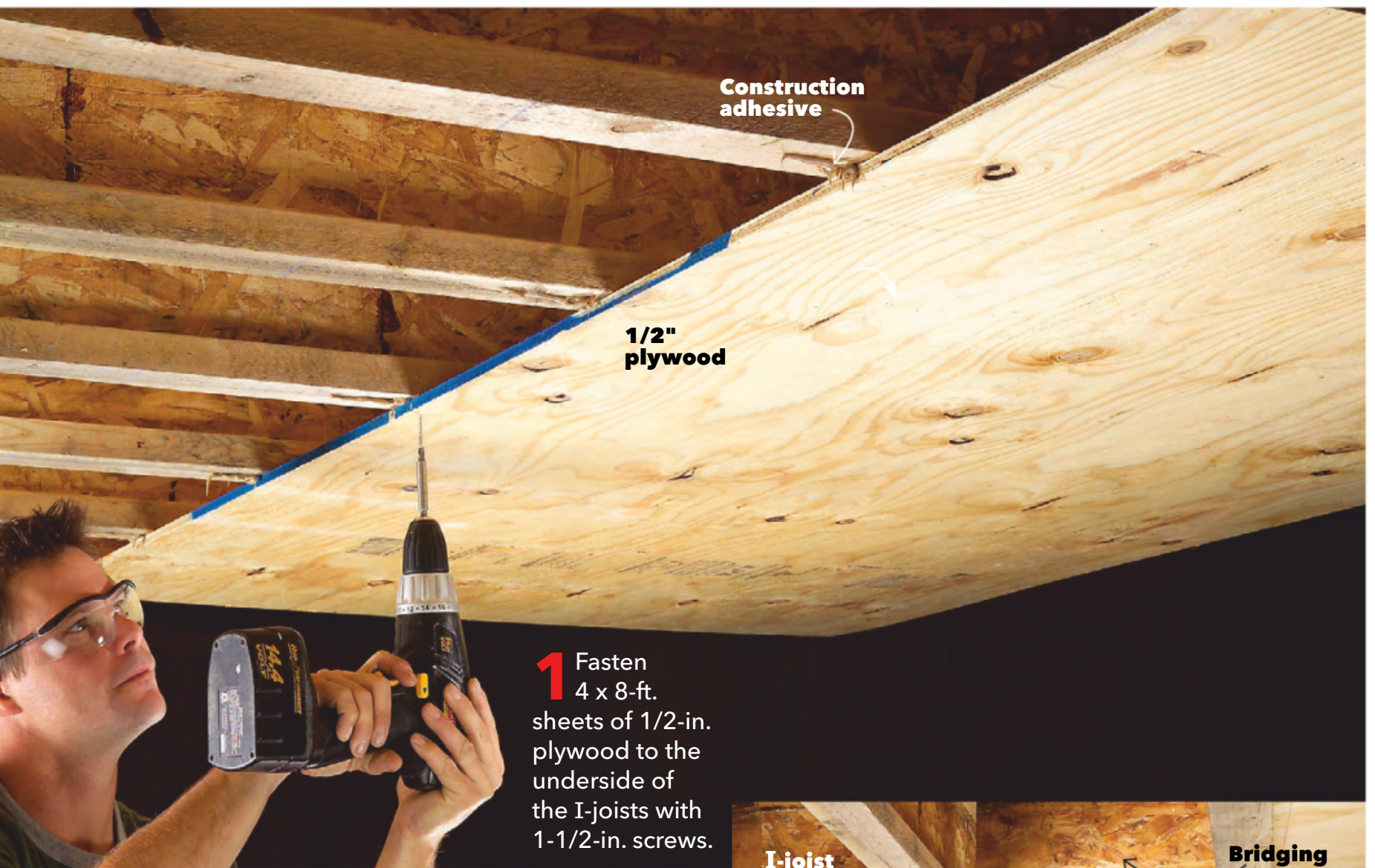
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1 Fasten 4 x 8-ft. sheets of 1/2-in. plywood to the underside of the I-joists with 1-1/2-in. screws.

Two Solutions for a Bouncy Floor

If your floor has engineered I-joists and feels a bit “springy” when you walk on it, the fix is relatively easy if you have access to the underside of the joists. You can install either bridging or a layer of plywood. Try bridging first. Just nail short I-joist sections between your existing joists (**Photo 2**). To prevent squeaks, apply construction adhesive to the top side of the bridging where it contacts your floor. If the joist span is shorter than 14 ft.,

2 Toenail a line of I-joist blocks between the joists across the full length of the room.



install one row of bridging at the midpoint. If the span is longer than 14 ft., install two rows of bridging, dividing the span into thirds.

If the floor is still bouncy, glue and screw 1/2-in. plywood to the bottom of the joists (**Photo 1**). Start the first row at a corner, then stagger subsequent rows so the seams

don’t fall on the same joists. The drawback to this method is that you have to leave ceiling access to plumbing and gas valves, electrical boxes and other fixtures. Of course, the surest method is to install a beam and posts near the mid-span, but they’ll be obstacles in the room below.



Negative terminal: First off, last on, always!

Correction: Car Battery Safety

In our June '20 issue (p. 44), I recommended disconnecting the positive terminal first when servicing a car battery. That was incorrect. The negative is always first off, and always last back on. If you remove the positive first and your tool accidentally touches the chassis, sparks will fly and you could get burned.

JAY CORK, ASSOCIATE EDITOR

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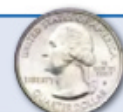
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"...this product is just as effective (if not more) than traditional overly-priced hearing aids. I will be recommending MDHearingAid to my hearing-impaired patients." – **Dr. Chang**

Excellent Quality-to-Price Ratio ★★★★★

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The new rechargeable VOLT incorporates advanced digital technology at an outstanding price.

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Did you know most people who use one hearing aid really need two?

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Laughs and lessons from our readers

SUNROOF DISASTER

I finally got around to replacing the flashing on one of our dormers. My extension ladder was too short to let me work comfortably at the peak of the dormer, so I drove my pickup into the front yard and placed the ladder in the bed, propping the bottom against the tailgate. It worked perfectly, giving me the extra height I needed.

I climbed up the ladder and went to work. No sooner had I gotten down to business than the hammer slipped out of my hand, ricocheted off the ladder rungs and smashed through the sunroof of my truck. A one in a million shot. To look on the bright side, at least it didn't go through my windshield. But from now on, I'll use scaffolding to tackle the high points of my house.

RON BENDER



MAGIC CABINET MYSTERY SOLVED

The metal cabinet where I store my cans of spray paint used to drive me crazy. Every time I opened the door, a can would fall out and land on my foot. I'd pick up the can and put it back on the shelf. This happened at least a dozen times.

For the life of me, I couldn't figure out why a can would fall out every time I opened the cabinet. Finally, I saw it: A magnet was stuck to the inside of the door and had been pulling out the cans.

MARK YAX

ELECTRIC CAKE BATTER

When I was a teenager, I came home from school one day to find my mother making a cake. She was using her favorite electric mixer. The double-ended electric cord was plugged into the mixer at one end and into the wall outlet at the other. As she happily mixed away, she inadvertently knocked the cord out of the mixer, and it fell into the cake batter. So she fished it out and, not thinking, licked the batter off. The live cord shocked her tongue, making her jump about 3 ft. in the air. After the shock wore off, she was fine, and now we laugh about it.

MARY-KAY RENO



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