

Best-Ever Home Shop Ideas

2009

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**Projects
and Tips
for Setting
Up Shop**

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**Ways to
Save BIG
on Tools**

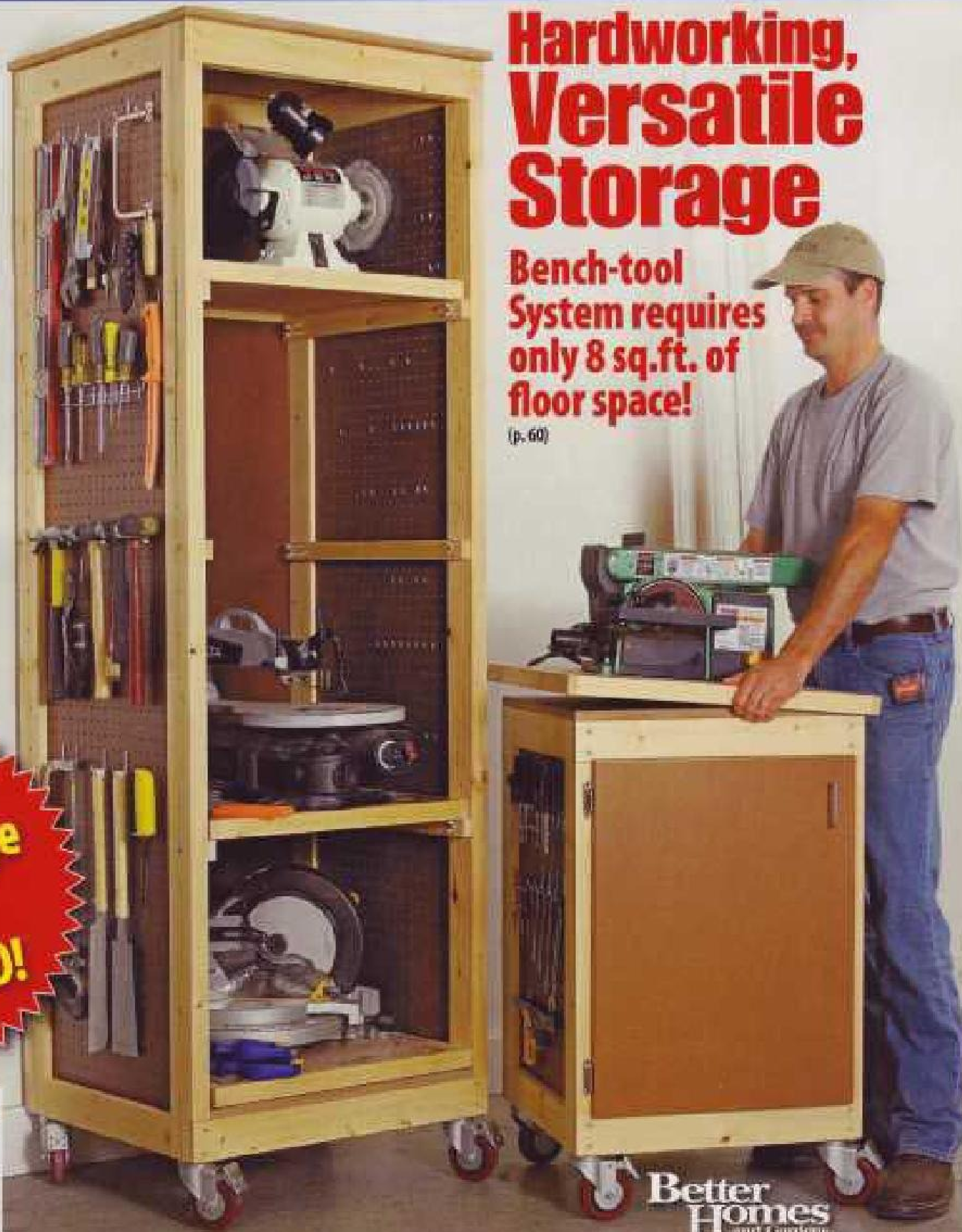
**Unstuff
Your Garage
THIS
WEEKEND!**

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Hardworking, Versatile Storage

**Bench-tool
System requires
only 8 sq.ft. of
floor space!**

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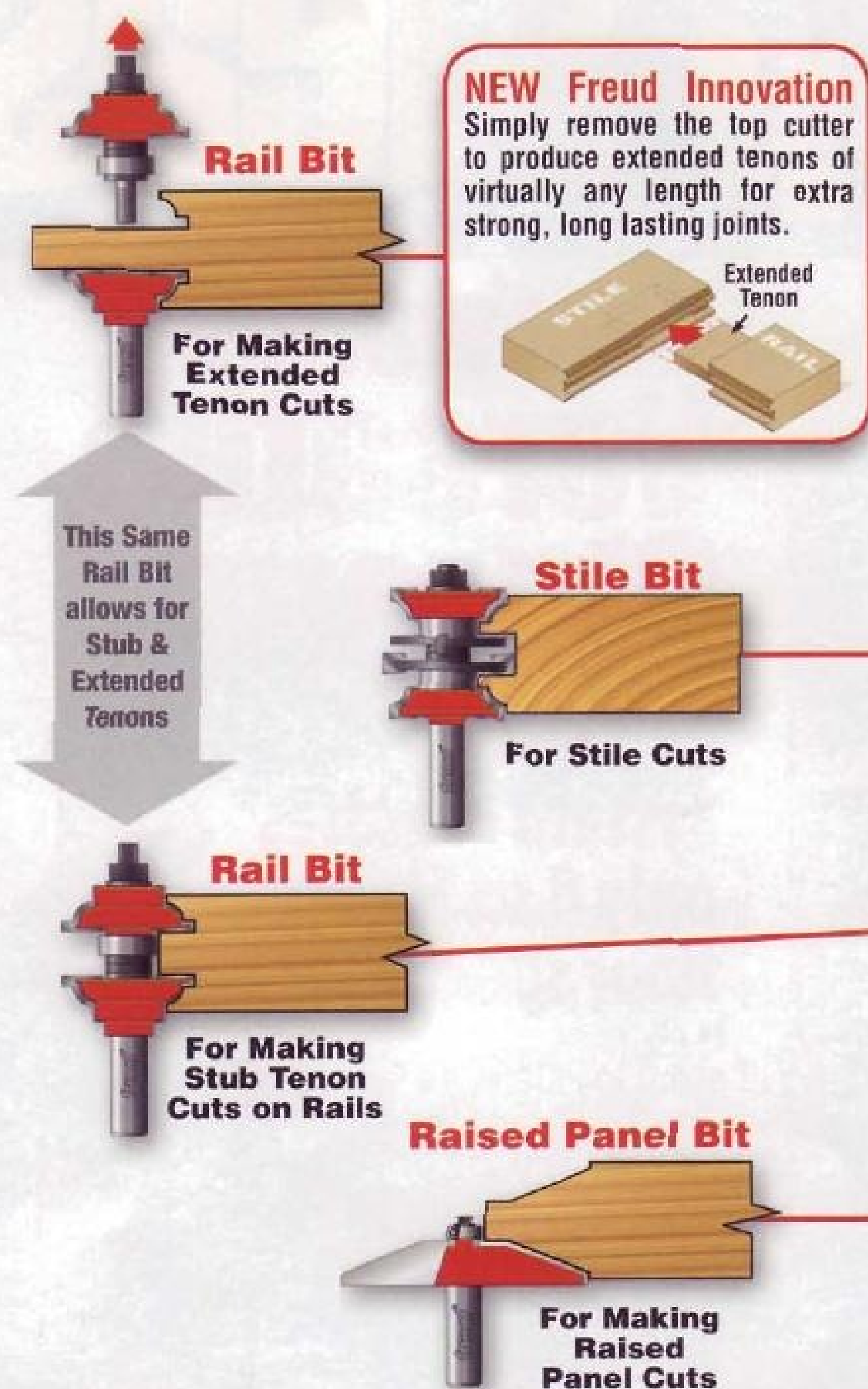


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Editor's Letter



After moving cars outside, this homeowner rolls out cabinets to form a work surface in his garage. To learn more, see *page 22*.

From 'okay' to 'wow!'

A few months ago, I spent a good portion of a week watching the transformation of a ho-hum 2½-car garage into an incredible car buff's backyard escape. (For a closer look at the shop, see *page 36*.)

What a difference five days made. And believe me, the "wow" factor doesn't fade: A revisit months later still took away my breath when the garage door rolled up. But who wouldn't be green with envy gazing at a sparkling epoxy floor? No oil stains would dare linger!

That garage is a multitask space designed and organized as many of us imagine our shops. Car-care products, previously shuffled around in cardboard boxes, are now neatly organized behind a pair of doors. The adjoining cabinet holds a season's worth of yard and garden remedies. Paintbrushes and hand tools, neatly lined up like soldiers, beg to be picked up from smooth-rolling drawers.

The recent visit to the shop gave me pause. No more excuses: I got the jolt to jump-start and overhaul my own shop. I referred to the planning articles in this issue to lead me every step along the way.

How 'bout you? Just picking up this magazine affirms that there's a garage or shop redo on the horizon at your home. So get going! Break the work into bite-size tasks, and you'll be there quicker than you think.

Marlen Kemmet

Marlen Kemmet
WOOD® Magazine Managing Editor

Better Homes and Gardens®

Best-Ever Home Shop Ideas 2009

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In Memoriam — **E.T. Meredith III (1933-2003)**

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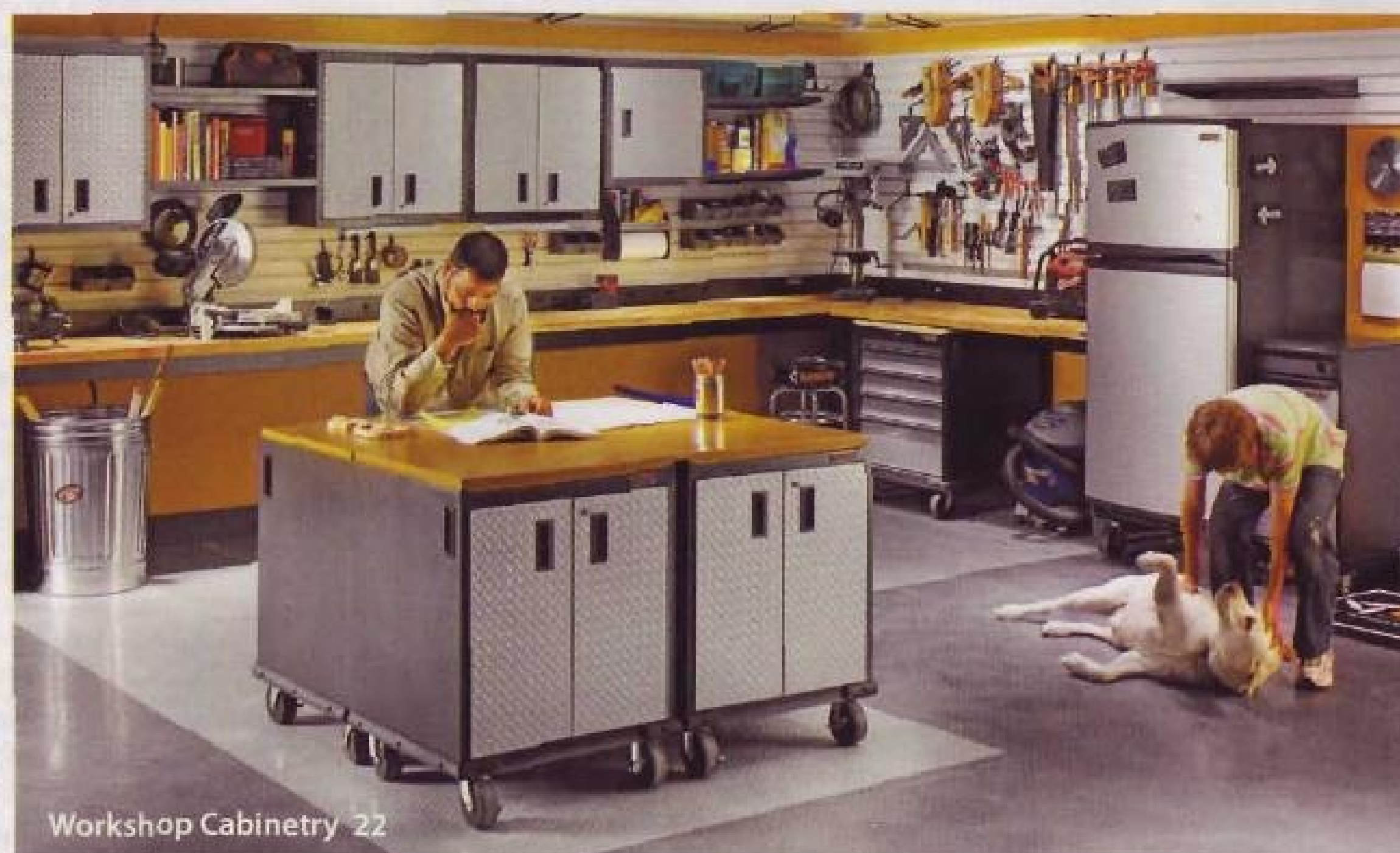
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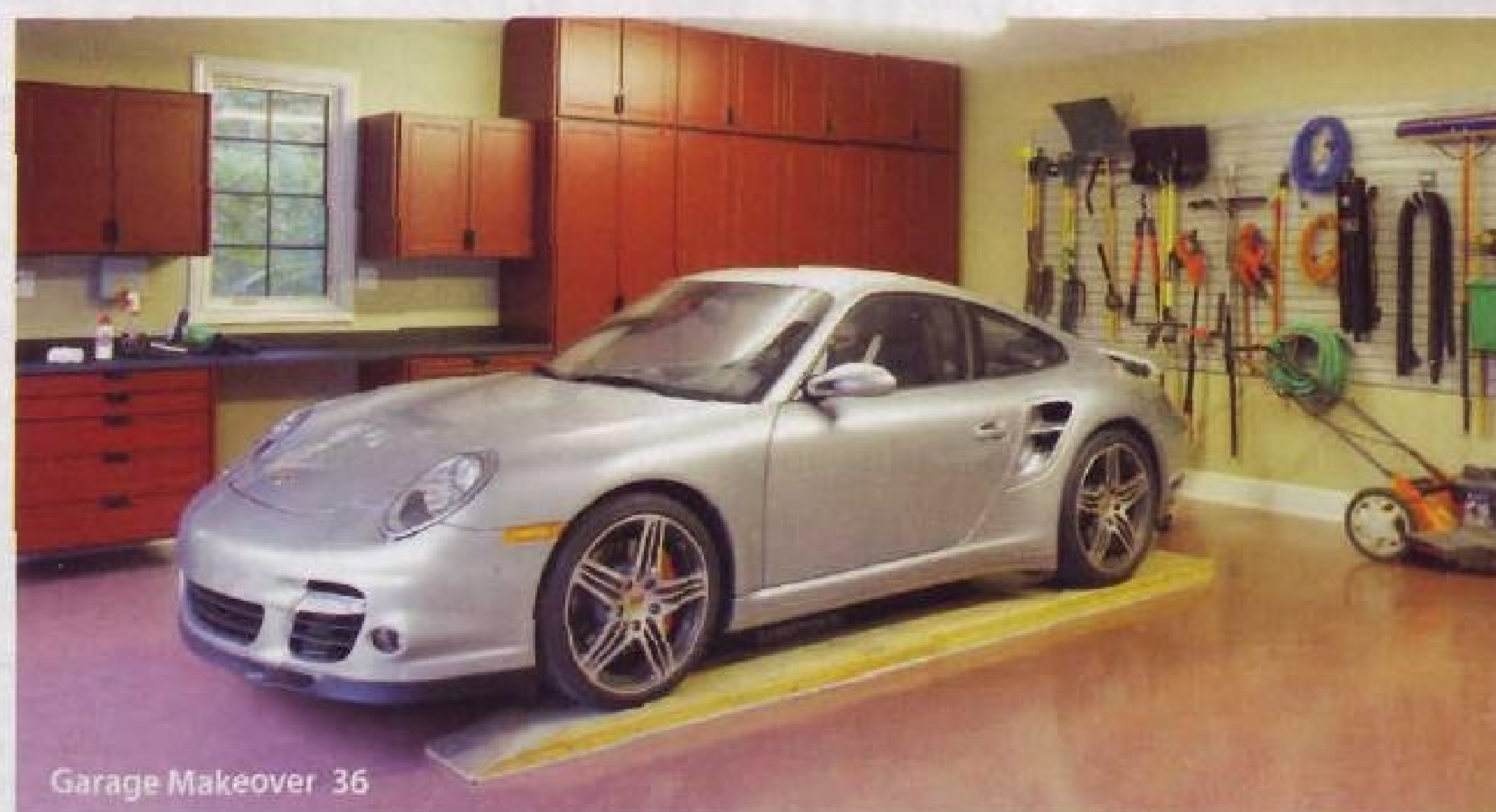
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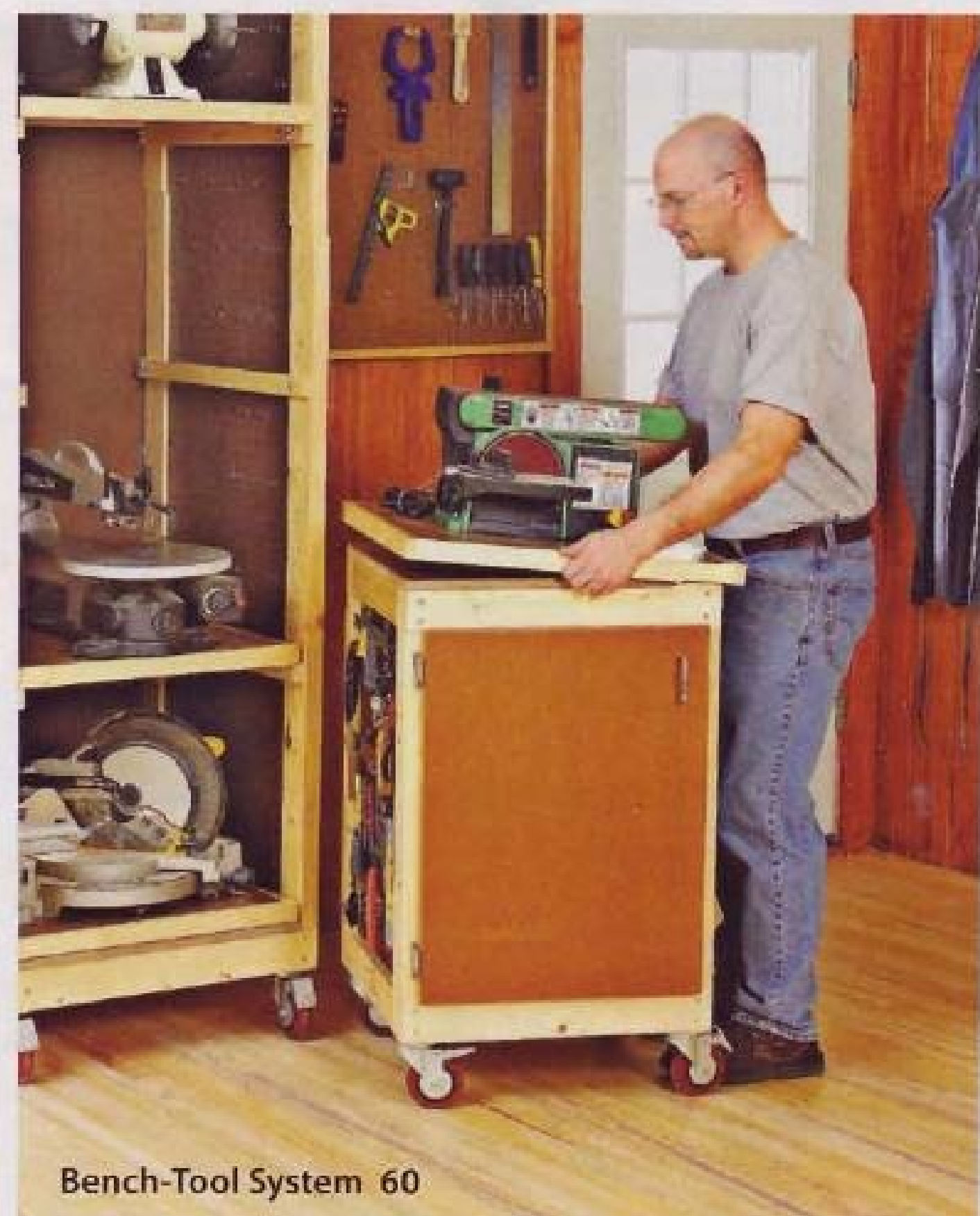
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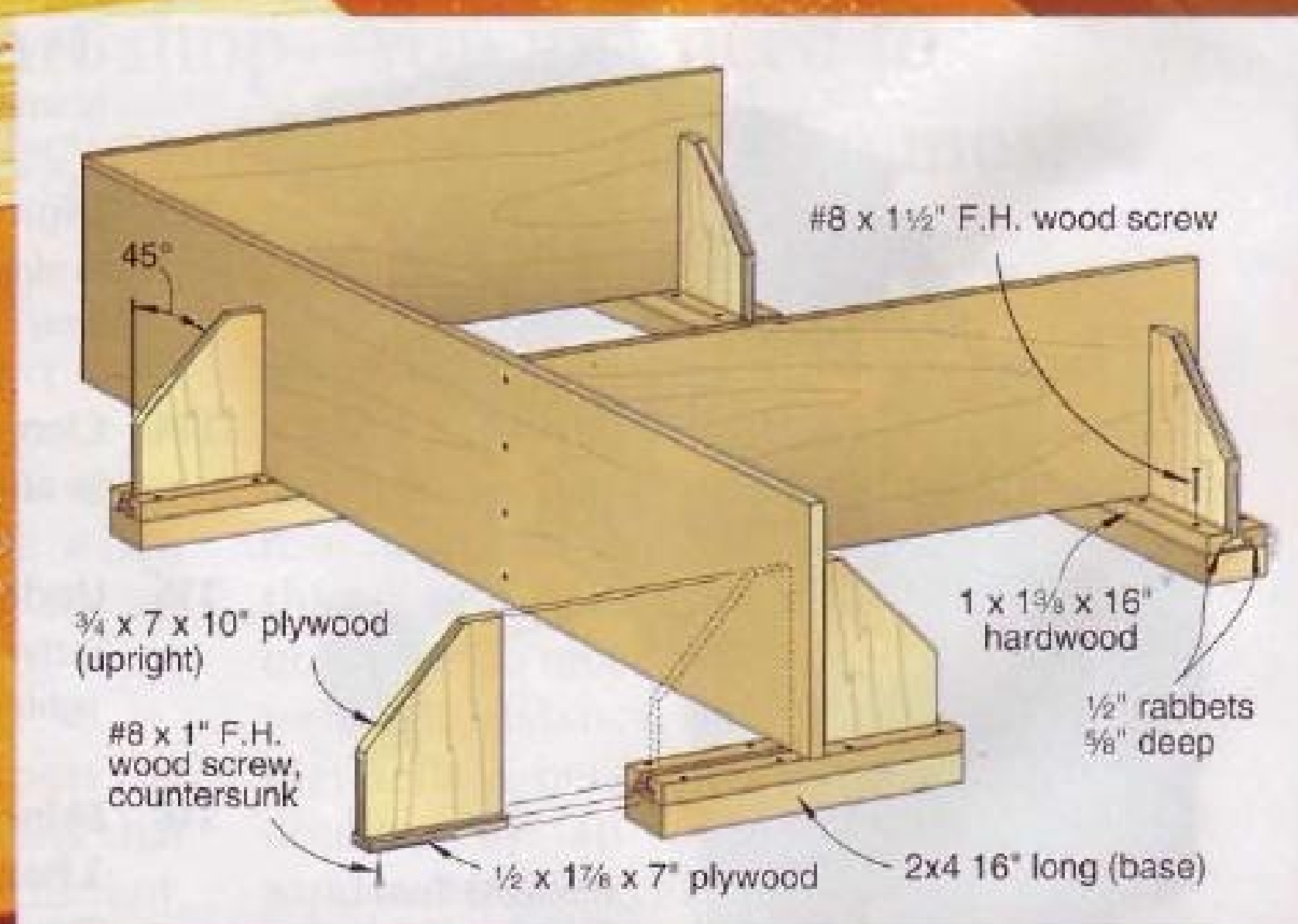
Bench-Tool System 60

No Helper? No Problem.

You can fly solo with proper
planning and the right tools.



When assembling projects, work holders, like the adjustable supports *above*, are as handy as having an extra set of hands in the shop.





A Black & Decker Workmate manages clamping tasks (*above*) and proves equally handy as a workpiece support (*right*).



Individual abilities come into sharp focus in your home workshop, where you'll probably spend most of your time alone. One constant challenge will be inventing ways of accomplishing things by yourself. Whether your main interest is mechanics, radio-controlled boats, or woodworking, you'll often need to maneuver items that are heavy, bulky, or simply require three (or more) helping hands.

Work-holding strategies

Every workshop worthy of the name has a solid workbench with a sturdy vise or two to secure a workpiece. A vise frees up both of your hands so that you can measure, mark, and cut without chasing your stock all over the shop.

In addition, you'll want plenty of clamps to supplement your bench's holding powers and for assembling projects. See *page 114* for the basic lineup of clamp types as well as additional information about bench vises.

Sawhorses, whether purchased or shop-made, are a great idea in any home shop. They hold plywood sheets for cutting or serve as temporary assembly tables. Folding sawhorses, like the ones shown at *right*, require minimal storage space.

Another feature to consider is height adjustability. As you'll discover, tailoring the horse to your stature and the

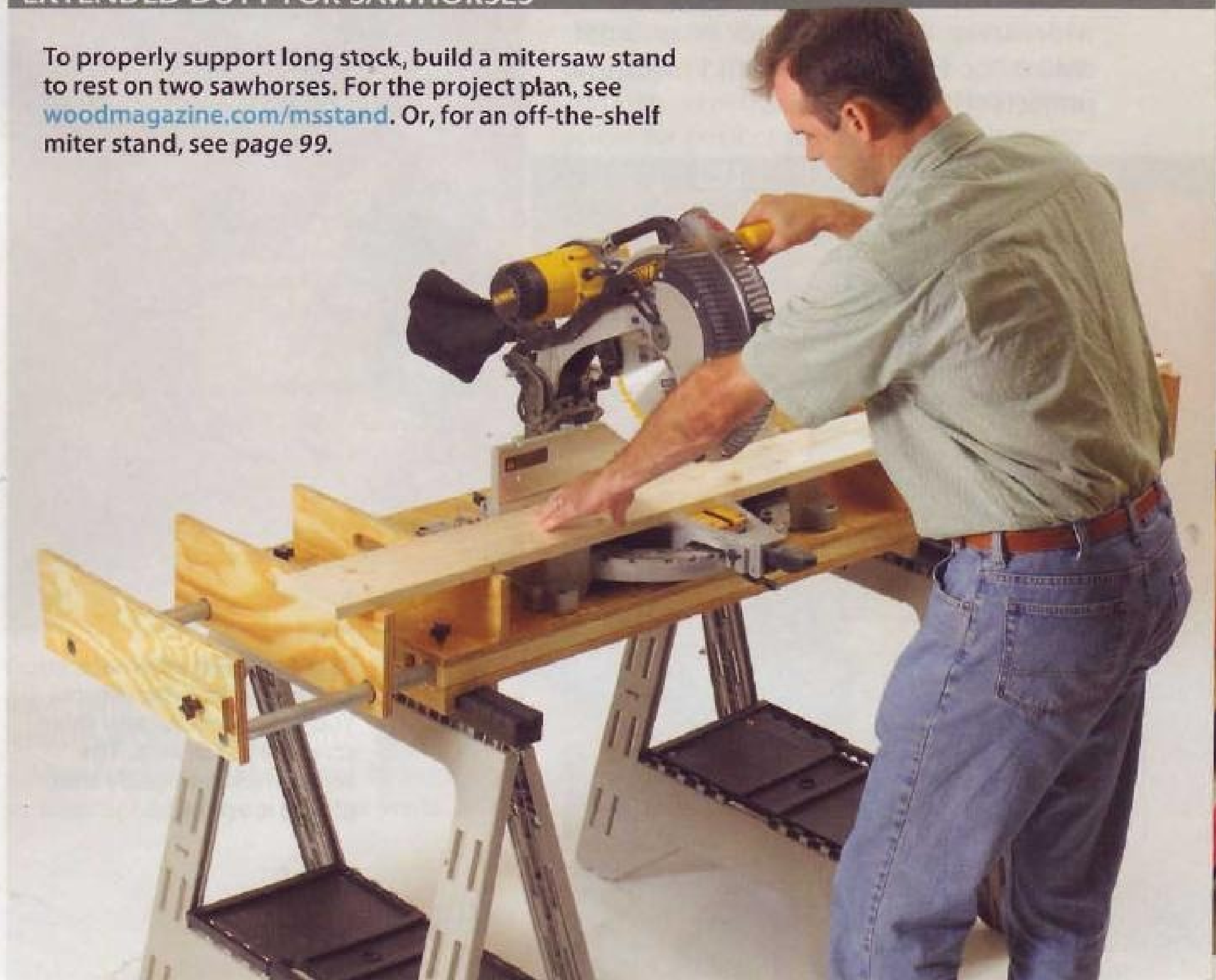
task is a real back-saver. Many homeowners get a grip on DIY projects with portable clamping workstations, such as Black & Decker's Workmate *above*. You'll find an amazing variety of models, even those that incorporate a two-wheel dolly for hauling tools and materials to the job site.

Tips for going solo on assemblies

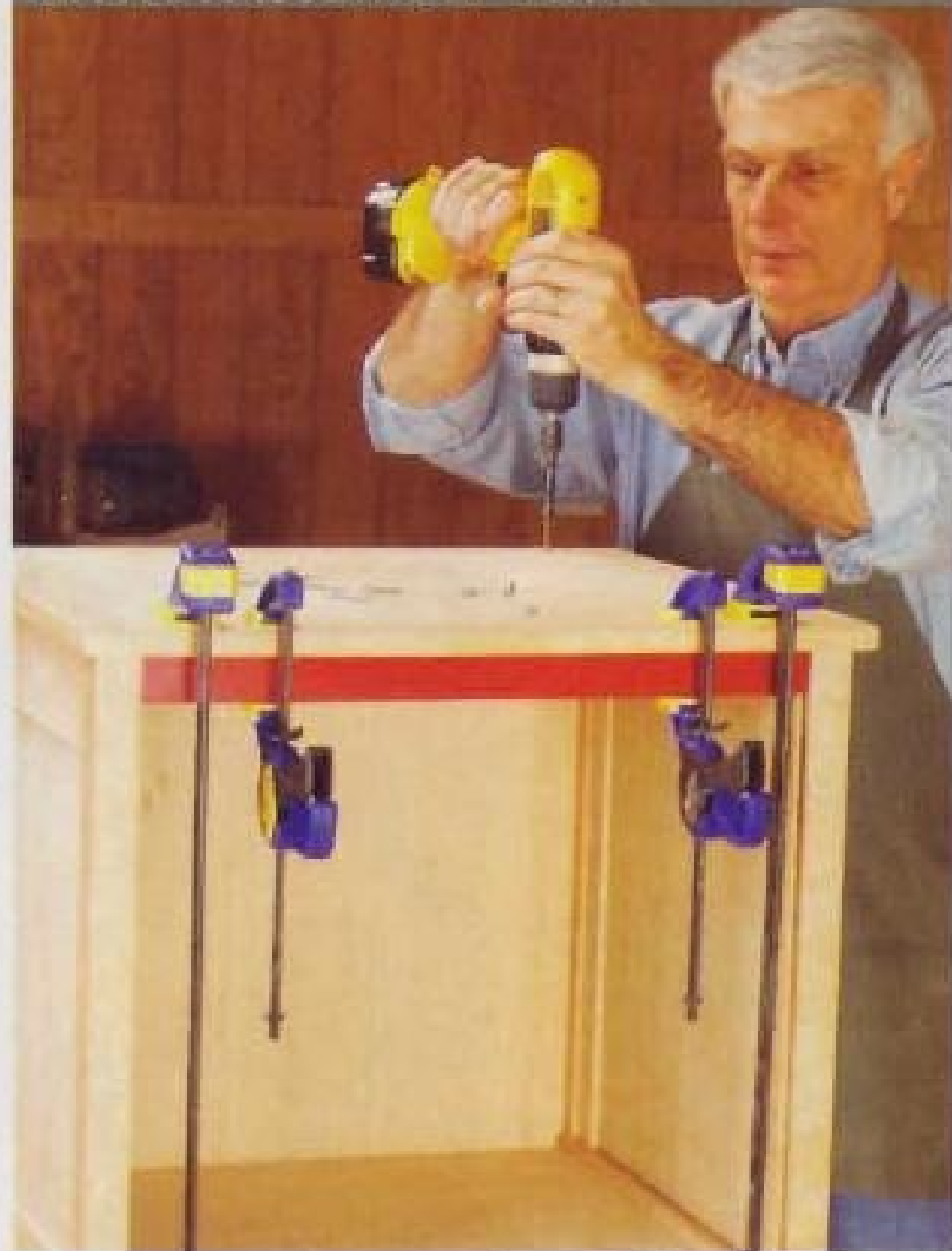
Clamping woodworking projects can be an exasperating experience, even if you do have a helper. That's because you're constantly fighting the clock, trying to get everything aligned and locked down before the glue grabs. Buy yourself some

EXTENDED DUTY FOR SAWHORSES

To properly support long stock, build a miter saw stand to rest on two sawhorses. For the project plan, see woodmagazine.com/msstand. Or, for an off-the-shelf miter stand, see *page 99*.



EXTRA ASSEMBLY TIME



When you switch to a glue with longer open time, you'll gain clamp and assembly time.

extra assembly time by choosing a glue that doesn't grab as fast as ordinary yellow carpenter's glue. Franklin makes a version called Extend Titebond II with a slower set time, making it ideal for complex assemblies or when you don't have an assistant.

Another one-person strategy is use pocket-screw joinery. As shown *below*, the jig guides your bit to bore an angled hole in one workpiece, and you then clamp the pieces to another, drill a matching hole, and secure a strong joint with screws (no glue required). If you make a mistake, simply back out the screws and try again. You can craft a wide array of joints, and even build entire face-frame cabinets and furniture projects with this system.

SWITCH TO POCKET HOLES

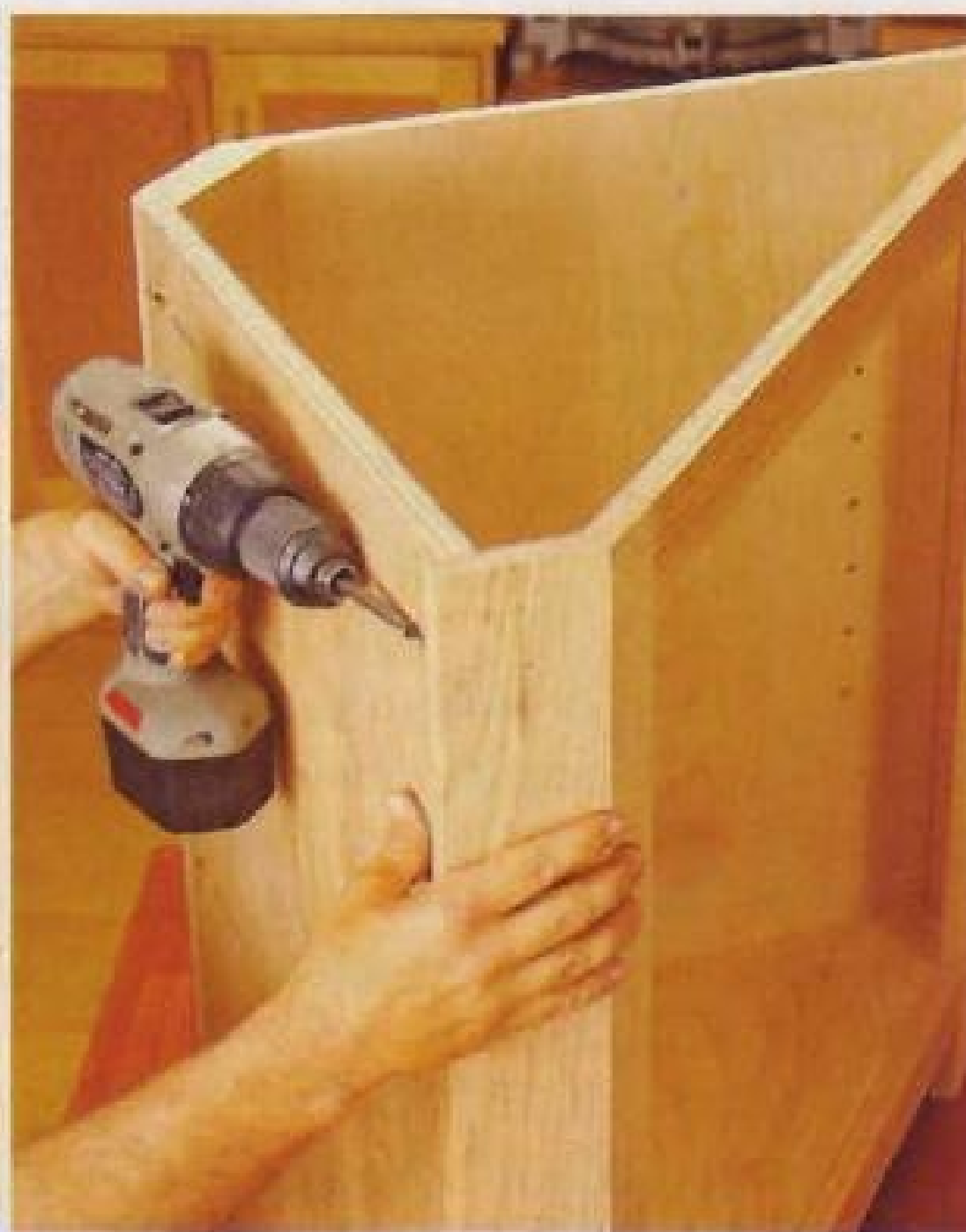


Dollies provide moving experiences

Moving dollies are helpful additions to any shop for a wide range of tasks, whether you're wheeling a new tool into your shop, shuffling supplies, or rolling out a finished project. Two-wheel dollies are good choices when you're moving a stack of boxes or a similar load that's taller than it is wide or deep. But reach for a four-wheel flat dolly for cumbersome loads or when you want to keep a piece mobile for an extended period of time without lifting it repeatedly. But why choose? Some dollies, such as one manufactured by FastCap at *right* (see McFeely's at mcfeelys.com), morph between the two configurations simply by moving a handle. This particular model won't negotiate stairs like a standard two-wheeler, but it does simplify many moving tasks in your shop and home.

Gain some leverage for heavy lifting

Woodworking and carpentry involve a lot of material-handling challenges. Full sheets of plywood and other panels can be tough to lift, and even more unwieldy when you try to maneuver them at a tablesaw. But here are a few ideas that can help.



Pocket screws eliminate complex clamping setups. You simply clamp and drive screws at each step. The screws hold so tightly that gluing is optional.



FASTCAP SPEED DOLLIE

When moving cabinets around the shop or house, it's hard to beat the convenience of a dolly. This FastCap Speed Dollie supports up to 250 pounds.

Before you go to the lumberyard, develop a cutting plan for each sheet that will reduce the panel to several manageable pieces. Some lumberyards and big-box stores will make several plywood cuts at no charge, then tack on only a nominal per-cut fee after that.

A caution: The purpose of the lumberyard cuts is simply to make handling easier, not to obtain final sizes.

Trying to control a long piece of lumber or plywood at the tablesaw can be dangerous. An outfeed support is an inexpensive purchase that keeps lumber from taking a dive. The outfeed support can also serve you well at the drill press and other tools in your shop.

A panel lifter is a big help in moving plywood, drywall, and other sheet goods. Most lifters fit under the panel, and you simply center the carrier in the length of the sheet, as shown *opposite*.

A quick tip: Keep your arm straight to avoid fatigue. Another style of panel lifter squeezes the top of the sheet, and you hold your hand at shoulder level. This design frees up your other hand and also provides better visibility while you're walking.

Helping hands

Whether you're installing crown molding or a bank of wall cabinets, one tough part of the job is holding the long and bulky item in position while you drive fasteners. A strong and patient assistant isn't always available, so tool up for installation chores with a couple of mechanical helpers.



CARRY SHEET GOODS

This panel lifter from Stanley does a great job of helping you carry sheet goods such as plywood and drywall.

For installing cabinets and other heavy chores, consider the Craftsman Cabinet Support from Sears (*above center*). It quickly adjusts from 50" to 85", and holds up to 400 pounds. Plastic support pads at both ends help protect the floor and the item being installed. There's also a "shorty" version that works in the 17" to 25" range; it's ideal for installing wall cabinets after the base units are in place.

The Third Hand Tool, *top right*, manufactured by FastCap, excels at lightweight holding tasks (up to 70 pounds), such as holding crown or cove molding at the ceiling line. Each pole has a series of ball detents (stops), allowing for fast adjustments in a range



SUPPORT A CABINET

The Craftsman Cabinet Support allows you to use both hands to level and secure a cabinet to the wall.

from 5' to 12'. Once you get close, squeeze the handgrip to advance a ½" steel rod topped with 3×3" swiveling pad. The base also has a textured rubber pad to resist slipping. For extra stability, upgrade to a 6×6" foot. See McFeely's (mcfeelys.com) for one source.

Keep small tools and parts within reach

People constantly invent new ways to make good use of magnetism. One clever idea is the magnetic wristband that grabs onto nails, screws, and even small tools and keeps them—quite literally—close at hand. A variation straps around your bicep, and is appropriately named the Tool Band-it (toolbandit.com). With a



THE THIRD HAND TOOL

The Third Hand Tool (about \$45) solves the problem of needing three hands and two ladders to install molding.

magnetic field strong enough to grip a carpenter's hammer, the bicep model enables you to shed your tool belt when working in confined areas such as a crawl space. Either version works when you're scooting under a vehicle.

A mechanic's magnetic bowl provides another great way of keeping ferrous fasteners in an easily accessible location. If you're the truly frugal type, you can make your own container from a small steel kitchen mixing bowl, and a magnet salvaged from a stereo speaker. 🌱

Written by: **Robert J. Settich**

CUT SHEET GOODS INTO MANAGEABLE SIZES



Toss a sheet of expanded polystyrene insulation onto the floor, and you bypass the need to lift plywood onto sawhorses. Cut notches into the foam to accommodate clamps for the cutting guide.

woodmagazine.com

KEEP HARDWARE NEARBY



Keep fasteners as well as tools close at hand with a magnetic band. It's especially handy when you're working alone beneath a vehicle or on a ladder.



To Buy or Not to Buy? That is the Question.

A trencher takes a lot of the hard work out of many digging jobs such as installing a lawn sprinkler system.

You probably have a friend who will seize even the flimsiest excuse as a justification for buying a new tool. But sometimes, even the most hard-bitten tool junkie will flinch when faced with purchasing an expensive, specialized product that will see limited use. At these times, it pays to take a serious look at renting.

Two top reasons to consider tool rental are limited necessity and storage issues. For example, you may use a stump grinder to pulverize an annoying stump, but then not need the tool for another decade or two. And a concrete mixer may be useful 1 percent of the time, but during the remaining 99 percent of its life, it merely eats up floor space in your garage or shed.

When buying makes sense

Let's look at another rent vs. buy scenario: You're laying down a prefinished hardwood floor, and you have all of the tools except a special flooring nailer and an air compressor. If you're doing only one room, buying the nailer probably doesn't make much sense. But perhaps buying the compressor does because it can help you with many other home and shop chores.

(For more about compressors and air-powered tools, see *page 108*).

There are no absolute rules on the rent vs. buy calculus, but the 50-percent rule is a good guideline: If the rental fee is likely to be 50 percent or more of the purchase price, buying makes sense.

Check around for advice and prices

When you have a rental need on the horizon, check at several stores to compare prices as well as the quality of the equipment. If you see off-brand tools or poorly maintained equipment, go to another rental center. Most of the time, prices among the various companies will be similar, but you'll sometimes find a real bargain.

Also ask about the rental periods available. There's often a minimum rental period—two hours, for example—that is

the base fee, even if you return the tool sooner. For longer rentals, you'll find weekly and even monthly rates. Sometimes, the day of the week or time of day makes a difference in the rental rate. Again, asking questions may land you a discount.

If you can visit the rental store at a slow time, the employees may be willing to discuss your project with you and offer advice that could save you a lot of time, money, and work. For example, you may walk in thinking you need to rent a sandblaster, but a quality pressure washer could be an even better tool for the job.

Popular rental tools

Most rental stores do a brisk business in carpet-cleaning machines, and it's no surprise that there's a seasonal nature to the demand. For example, some families want to freshen their house before the

GO BIG AND GET IT DONE



Industrial-strength rental equipment cuts big jobs down to size, saving you time and effort.

Thanksgiving and Christmas seasons, so don't wait until the last minute and risk a lack of availability.

Even sewer snakes have seasonal natures. In this case, though, homeowners often discover that they need them after the big holiday gatherings

as a result of overloading the garbage disposal, pouring grease down the drain, and having a house full of people.

Other tools commonly rented include a pressure washer for cleaning decking and siding, airless paint sprayer, hardwood-floor sander, pavement breaker, post-hole auger, and garden equipment such as a tiller and aerator.

Planning requirements

The old phrase about the equation of time and money takes on a sharp reality when you're renting tools and other equipment. The clock ticks away relentlessly, and your money will disappear quickly if you aren't organized and prepared.

For starters, make sure you have all of your supplies and auxiliary tools on hand before picking up your rental gear. If you're renting a verti-cut lawn seeder (cuts parallel grooves in the soil), for example, buy your seed several days before renting, and make sure you have spare gasoline so you don't need to stop in the middle of your project.

Unloading and loading the equipment can also be a real time-waster if you're not organized. Get ramps for your pickup truck, if necessary, or arrange for several beefy buddies to help you hoist the equipment.

Efficiently organizing your work is another way to save time. Let's say you're tiling a dining room and need a tile saw to accurately cut the border pieces.

Continued on page 10

DIAMOND-BLADED WET SAW



A tile wet saw is a must for smooth cuts in stone, porcelain, and many floor tiles.



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Standards come in 7 lengths
KV0087 pg. 354



KV82/182
Black or white



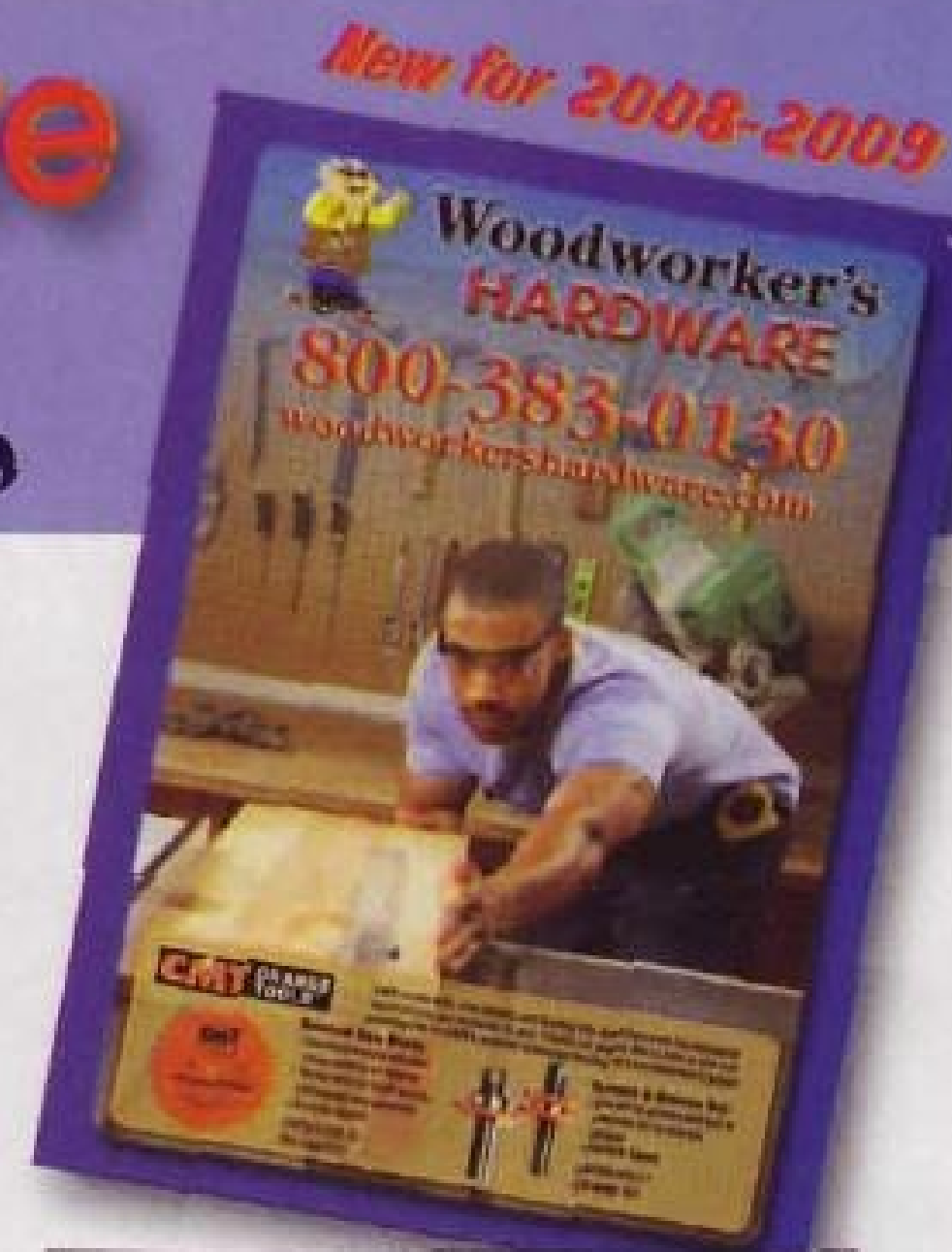
12" bracket rated for 300 lbs.
Brackets come in 8 lengths

Standards come in 7 lengths
KV0082 pg. 355

For Your Shop:



FastCap Chop Saw Hood
Keeps your work area clean and more productive.
Portable and easy to set up.
FCSAWHOOD page 519



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BREAK PAVEMENT, NOT YOUR BACK



A couple of hours with a pavement breaker can demolish a weekend's worth of whaling away with a sledgehammer.

Continued from page 9

Instead of renting the equipment for the entire duration of the job, lay all the full tiles you can in the room, and let the mortar set. Next, mark all the tiles that need to be cut. Finally, rent the tile saw, and do all of your cutting at once.

Do you need a permit?

Don't make the costly mistake of renting equipment and then learning that a permit is required. Digging equipment demands advance preparation so you don't accidentally chew up buried utilities. Years ago, you had to contact each utility company separately and wait for its worker to mark the location of lines on your property. But many areas now simplify this procedure with a one-call service (call811.com). A contractor comes to your property and locates the lines for all the utility companies with color-coded spray paint. The service is often free, but be sure to allow adequate lead time—48 hours in some locations.

Local building inspectors are generally a helpful and friendly group—unless you try to build without a permit. And then, faster than you can say “Stop Work Order,” your project screeches to a halt. And human nature being human, these usually cooperative folks will find a dozen other things more pressing than getting your project restarted.

Know what you're doing

Before you leave the rental store, be sure that you understand how to start, stop,

and operate a piece of equipment. Ask about any adjustments you may need to make such as setting the depth of cut. Some stores include a printed “tip sheet” with frequently rented tools.

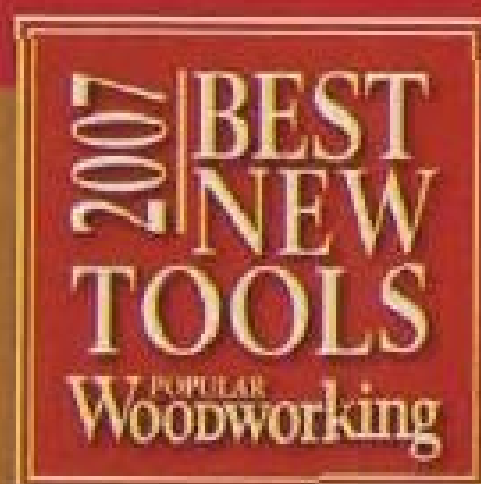
There are many potential hazards when you're operating unfamiliar equipment, so make sure you understand each safety rule for its operation. Also inquire about recommended safety gear. Most rental operations sell dust masks, hearing protection, and safety glasses.

Some rental companies offer a damage waiver for additional charge at the time you rent. This means you won't be responsible for equipment save for damage, abuse, or theft. Your credit-card company may offer some protection when you use its card for the rental, but getting authoritative advice on the coverage may be challenging. Best tip: Check your homeowner's insurance policy. That may cover rental equipment, but it's best to call your agent before renting to understand limitations and deductibles.

One final word of advice: Clean the tool before returning it. This isn't merely a matter of courtesy—most shops will tack on a stiff penalty if you bring back dirty equipment. 🌱

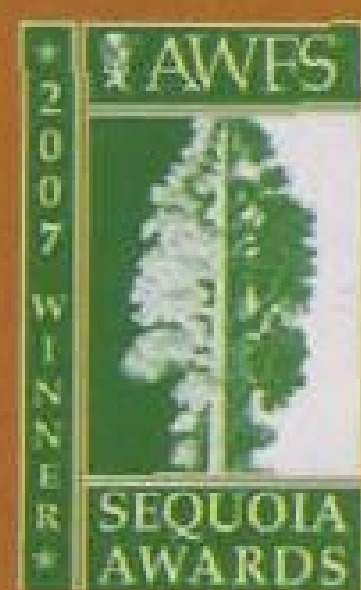
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Popular Woodworking -2007 Best New Tools



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A7500QT Atomizer Quick-Release Cup Gun with an Apollo HVLP Green Machine Turbine



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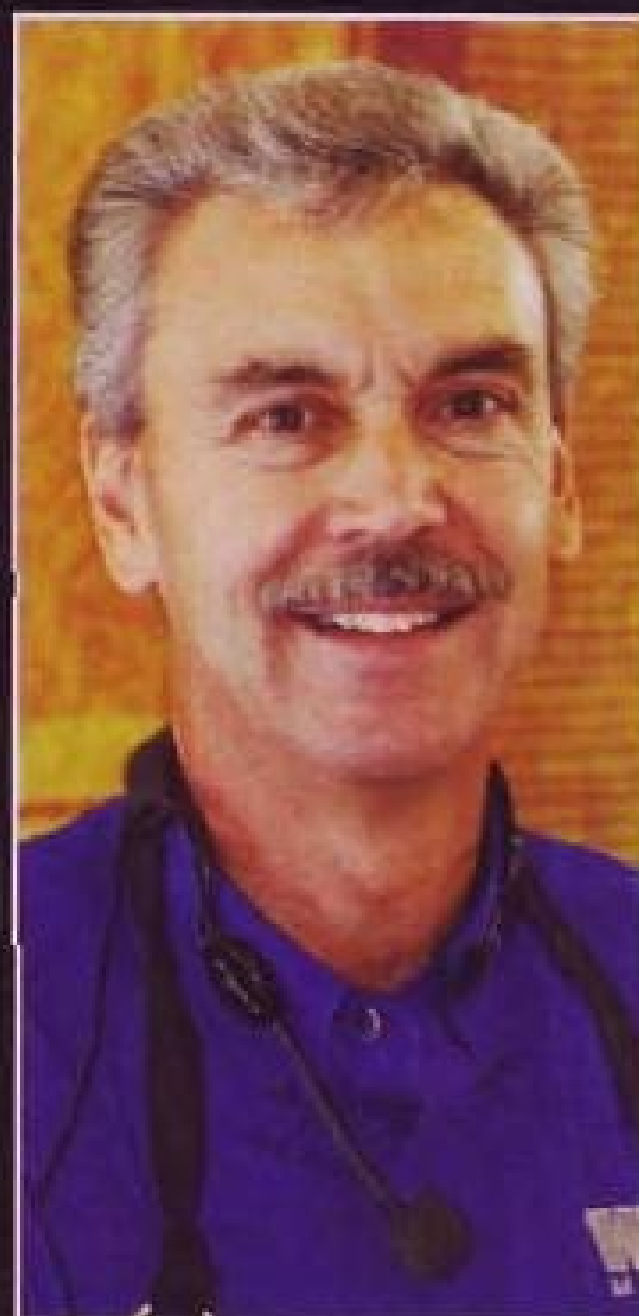
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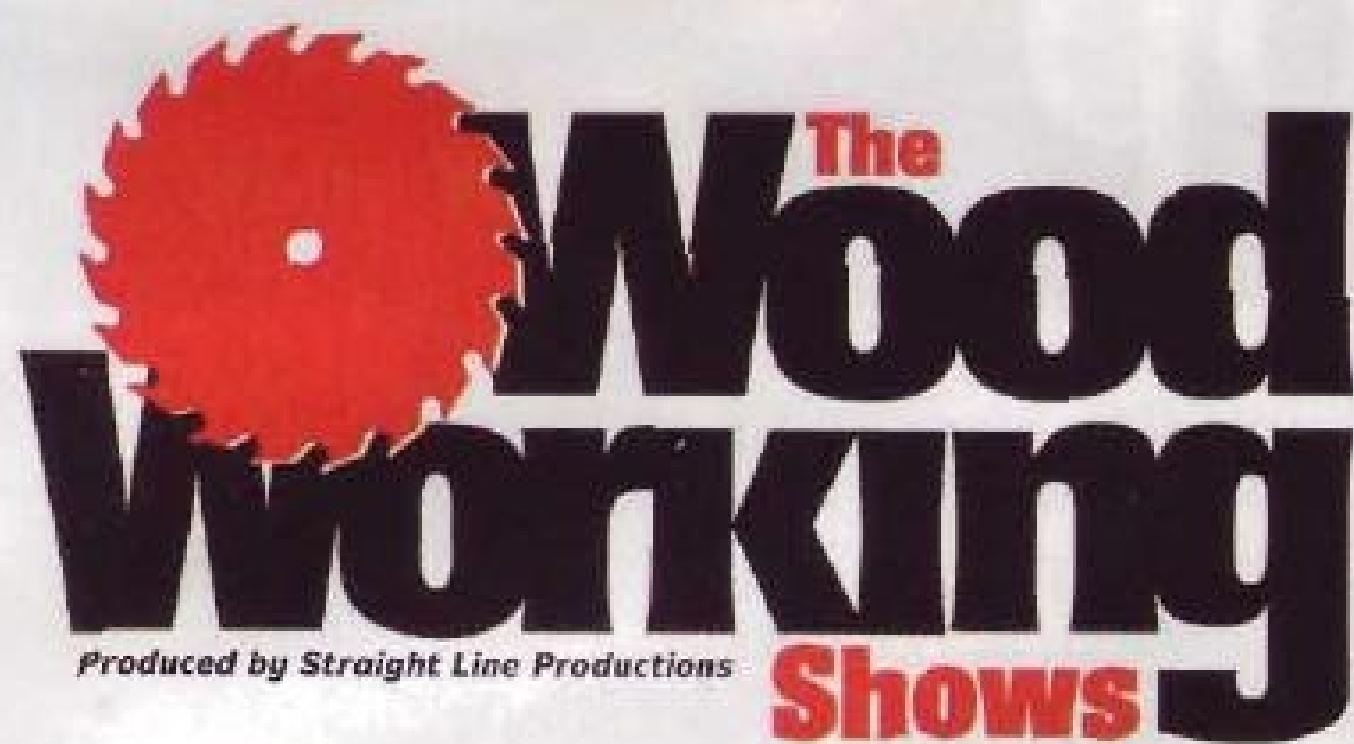
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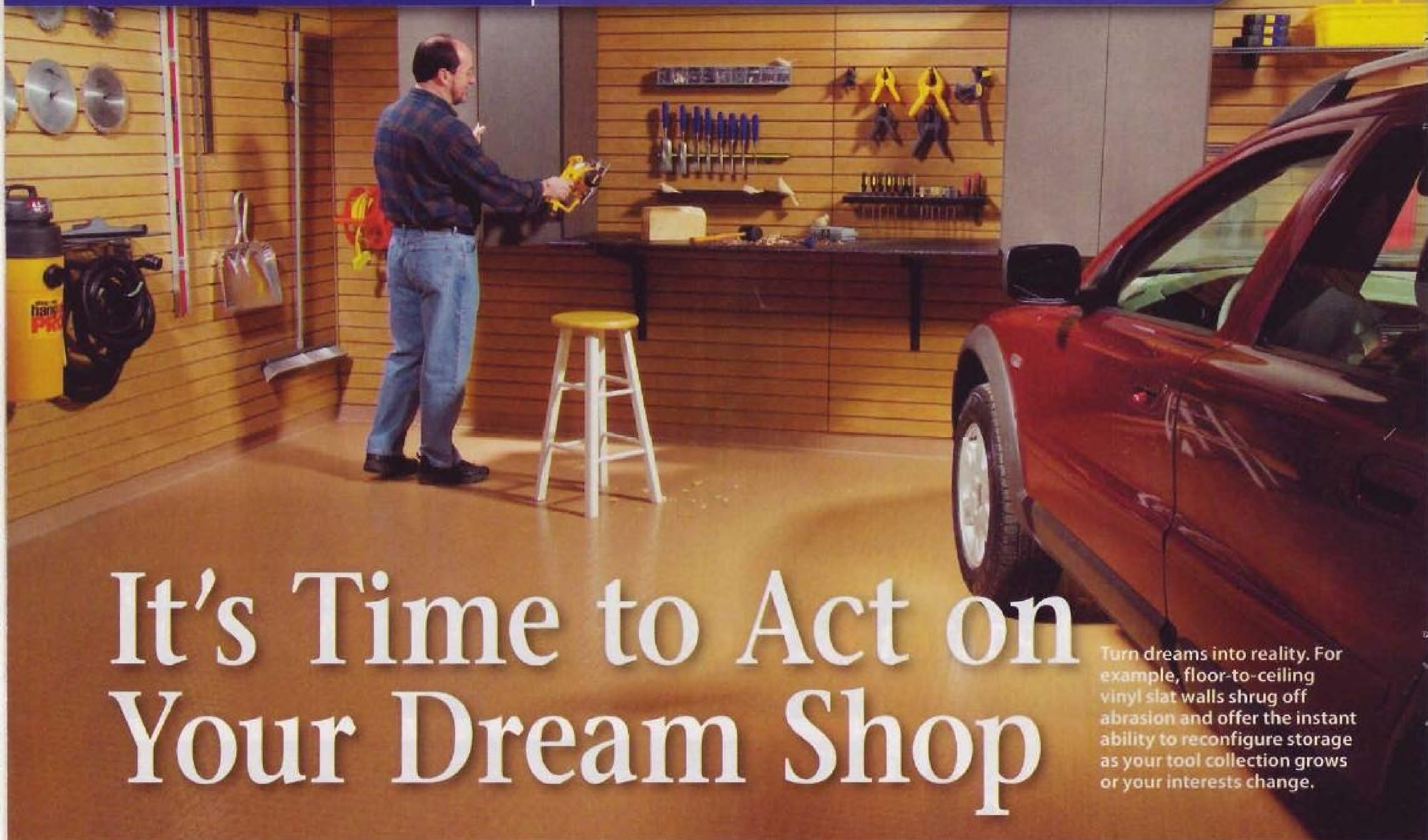
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Plan Your Shop

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It's Time to Act on Your Dream Shop

Turn dreams into reality. For example, floor-to-ceiling vinyl slat walls shrug off abrasion and offer the instant ability to reconfigure storage as your tool collection grows or your interests change.

When it comes to location, there are three basic choices for your shop, and each one has virtues and vices.

A **freestanding outbuilding** can be as small as a garden shed or as large as a barn. This opportunity is limited for city dwellers and most suburbanites, but could be an appealing possibility if you own a rural acreage. However, construction costs can be substantial, and you'll need to carefully consider whether you'll recover the investment when you sell your property. In addition, monthly operating expenses can be a genuine concern, especially if your part of the country requires a heating system for comfortable use during winter months.

A **basement** is often a great shop location, especially if it has a large ground-level entry. This permits you to easily move in tools and materials and just as easily get finished projects out of

your workspace. Shops accessible only via a flight of stairs are slightly less attractive, but still may be your best option. Some basements have minimal lighting and poor air circulation, but these are fixable inconveniences, not deal-breakers. The proximity of electrical service and other utilities means that powering up your shop and getting it comfortable is usually quite affordable. (See the article "Energy Efficiency for Your Shop" on page 32.)

A **garage** shop is often a good choice because of excellent accessibility and sturdy concrete floors to support heavy equipment. As a bonus, many garages have a high ceiling. This makes it easy to handle sheets of plywood or long pieces of lumber. Two potential drawbacks involve existing clutter and vehicles. Clutter-busting solutions including getting rid of unused items and renting a self-storage unit. The storage-unit option

involves an ongoing expense, but it is sometimes the only real alternative for an unrepentant pack rat. The vehicle situation is potentially a more serious issue, especially if your family includes people who are under the delusion that a three-car garage should hold at least one vehicle. If your shop needs to coexist with a car, you'll need to employ a range of space-saving strategies, such as flip-up work surfaces and mobile tool bases to exploit every cubic foot of storage space.

It begins with a plan

But even before we get to the plan, let's debunk the myth of the "Ideal Shop." Like the Easter Bunny and one-size-fits-all clothing, it simply does not exist. The truth is that your shop will be a unique creation because its purpose satisfies the needs of one person: you. In addition, recognize the fact that your



A well-organized shed can hold enough tools to tackle an ambitious range of projects. For large-scale work, you may need to roll some equipment outdoors. The photo *above right* shows a simple but sturdy workbench with plenty of storage space below it.



Don't toss the plan after you've moved into your shop. You'll no doubt refer to the drawing again to experiment with new arrangements without getting into any heavy lifting of machinery.

However you complete your plan, don't scrimp on storage areas. Empty spaces fill up quickly with lumber and tool accessories.

shop will need to grow and adapt to meet your evolving needs. You may need to sharpen a mower blade on Saturday morning and build a shelf in the afternoon.

Begin with a list that includes the size of your workbench and storage units, as well as the primary power tools, such as tablesaw, drill press, air compressor, and so on. To help ensure that your shop will be large enough, make a list all of the major tools you're planning to buy in the foreseeable future—not just the ones you currently own.

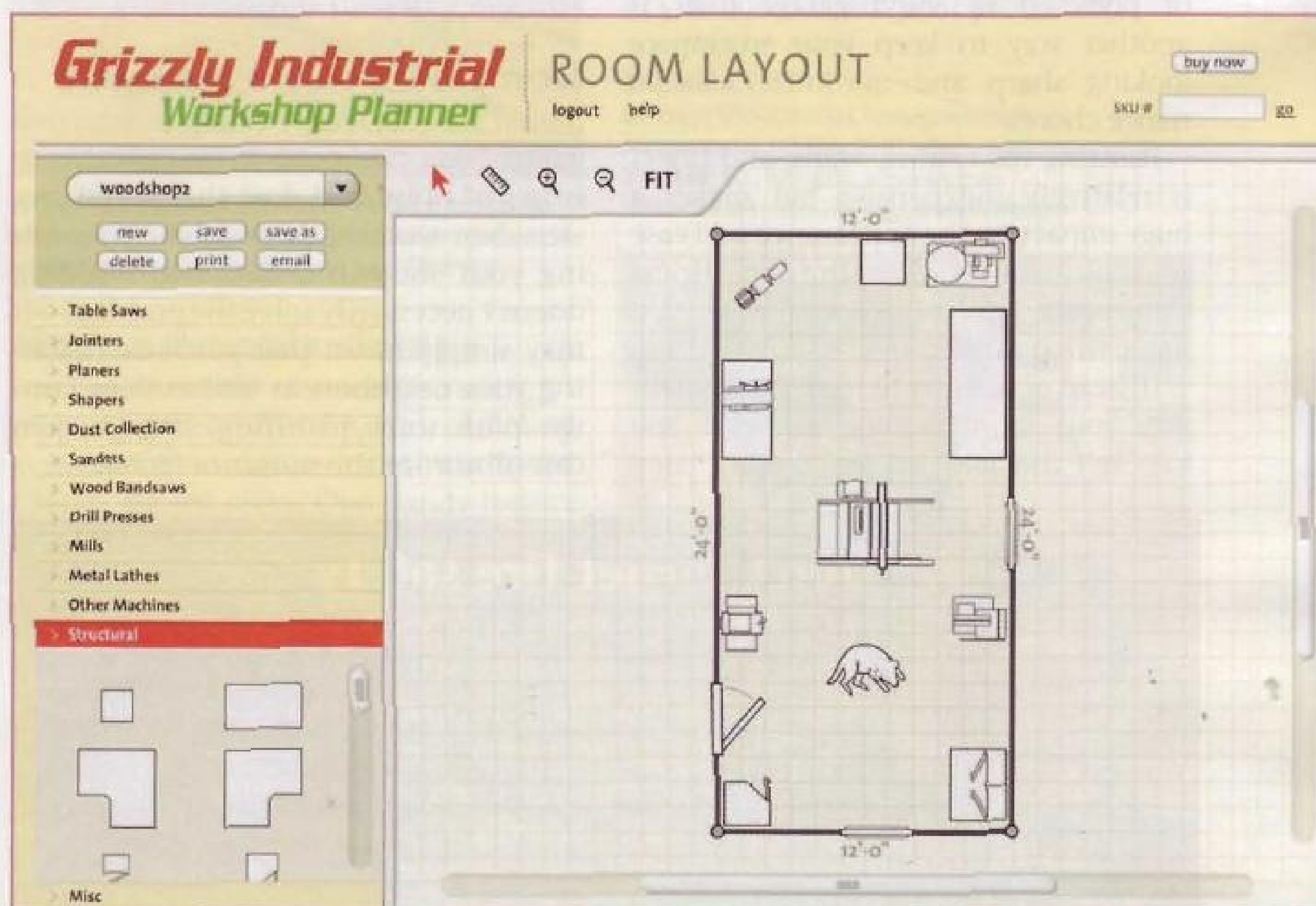
Next, draw a scale floor plan of your space, and create top views of the tools on little pieces of paper so that you can move them about to test various locations. To help with the planning, you can download a free planning article at woodmagazine.com/shoplayout.

A more high-tech approach is designing your shop layout on your computer. The Grizzly Industrial Web site, for example, allows you to quickly create a floor plan, add doors and windows, and then drag in a wide variety of elements. These include countertops, wall cabinets, and tables. You can size each one of them in 1" increments. Now you can select from virtually all of the major tools in the company's catalog, dragging, drop-

ping, and rotating them anywhere you want. You can even stack elements: putting a benchtop drill press onto a counter, for example. To access this free planning tool, go to grizzly.com and click on "Interactive Workshop Planner."

Solve infrastructure issues first

Whenever possible, move everything out of your shop area so you can easily deal with infrastructure upgrades such as wiring, lighting, insulation, heating, and so on.



A virtual shop layout on your computer allows you to drag and drop equipment with a mouse instead of straining your back. When you create your plan, allow adequate paths so that you don't need to bob and weave between the tools. Mobile bases help you stow idle tools.



Good planning made the best of this shop space. Windows and banks of fluorescent lights improved illumination. Mobile bases are a must for a maximum versatility of space, and the most-used tools conveniently hang above the generous expanse of countertop.



A mobile cabinet delivers tools and supplies right where you need them—for auto detailing for example. Simply close the doors at the end of the project, and roll the cabinet against the wall, where it's neatly tucked out of the way.

If you don't have enough covered area to accommodate your shop's contents during construction, consider renting a storage trailer that a rental company can deliver to your driveway. Some building centers act as agents for portable storage containers as well, so that's another option for temporary storage.

If you're finishing the walls, use fire-rated drywall if your local building codes require it, or consider a special grade of impact-resistant drywall. A wainscot of plywood or vinyl garage liner is another way to keep your workspace looking sharp and minimize maintenance chores.

Painting the ceiling, walls, and floors is relatively inexpensive but makes a huge impact on the appearance and ease of maintenance. Renting an airless sprayer for the ceiling and walls can make this a quick job.

Instead of rushing to move equipment into your shop, exercise patience. You may tell yourself that you'll paint later,

but the truth is that it would probably never happen because this task generally involves too much tool shuffling. This is especially true of prepping and painting a floor or installing another type of floor system. Doing this job when the shop is empty adds only a couple of days to your construction schedule, but it makes a huge difference in the appearance of your shop. For more information, see "Flooring Options," page 20.

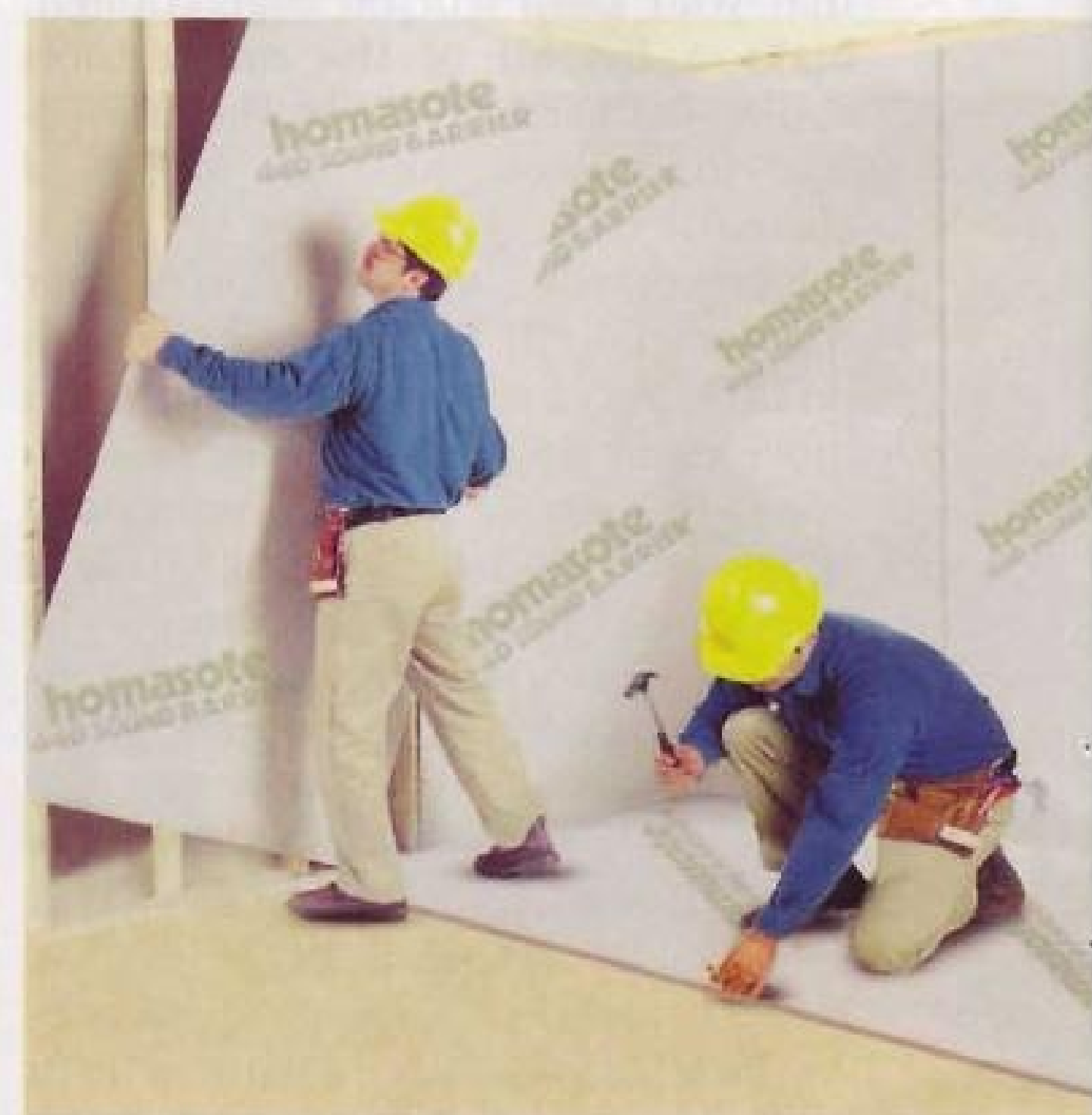
Using light tones also improves the efficiency of your shop's lighting.

Don't be a noise nuisance

If your shop is in a basement or attached garage, you also need to be sensitive to issues of noise and dust that you'll create when working in your shop. Locating your shop in a detached building doesn't necessarily solve the problem—it may simply mean that you'll be irritating your neighbors as well as your family. With some planning, though, you can minimize the nuisance factor.

There are a number of ways to minimize sound transmission. Sound-attenuating fire blankets (SAFBs) install quickly into stud bays and between joists, providing better sound control than fiberglass insulation. You can also consider a sound-reduction board as the first layer that is then covered with drywall. Homasote 440 Sound Barrier Panel (homasote.com) shown below is one brand.

Or, gain further improvement in noise insulation by adding a second layer of drywall. For general information on insulation, see page 32. 🌱



Sound-reduction products, such as the Homasote panels shown here, can provide an effective barrier to noise transmission.



Don't forget fire safety

Buy a fire extinguisher for your shop, and check it regularly so that it will be ready when you need it. A 10-pound ABC extinguisher will handle fires of rubbish, liquids, and electrical. You can purchase an inexpensive fire extinguisher at the home center, but this type often cannot be refilled and has a plastic valve that could break. At a safety specialty store you can get a refillable extinguisher with metal valve that is more durable. Plus, the unit can be serviced, making it less expensive in the long run.



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Pack More Workshop

If clutter and cramped floor space describe your workshop, fight back and win with these space-saving ideas.

Nobody plans to mess up the shop; it gets messy for lack of a plan. If you're toiling in an unworkable workshop, devise an organization strategy, and take action.

Every woodworker's clutter cure is unique, so pick and choose the ideas shown here that suit your situation. Whichever solutions you go with, you'll first need to do three things:

- **Define the boundaries of your shop** to determine how much space you actually have. Remember to also think vertically—not just within your shop's width and length.

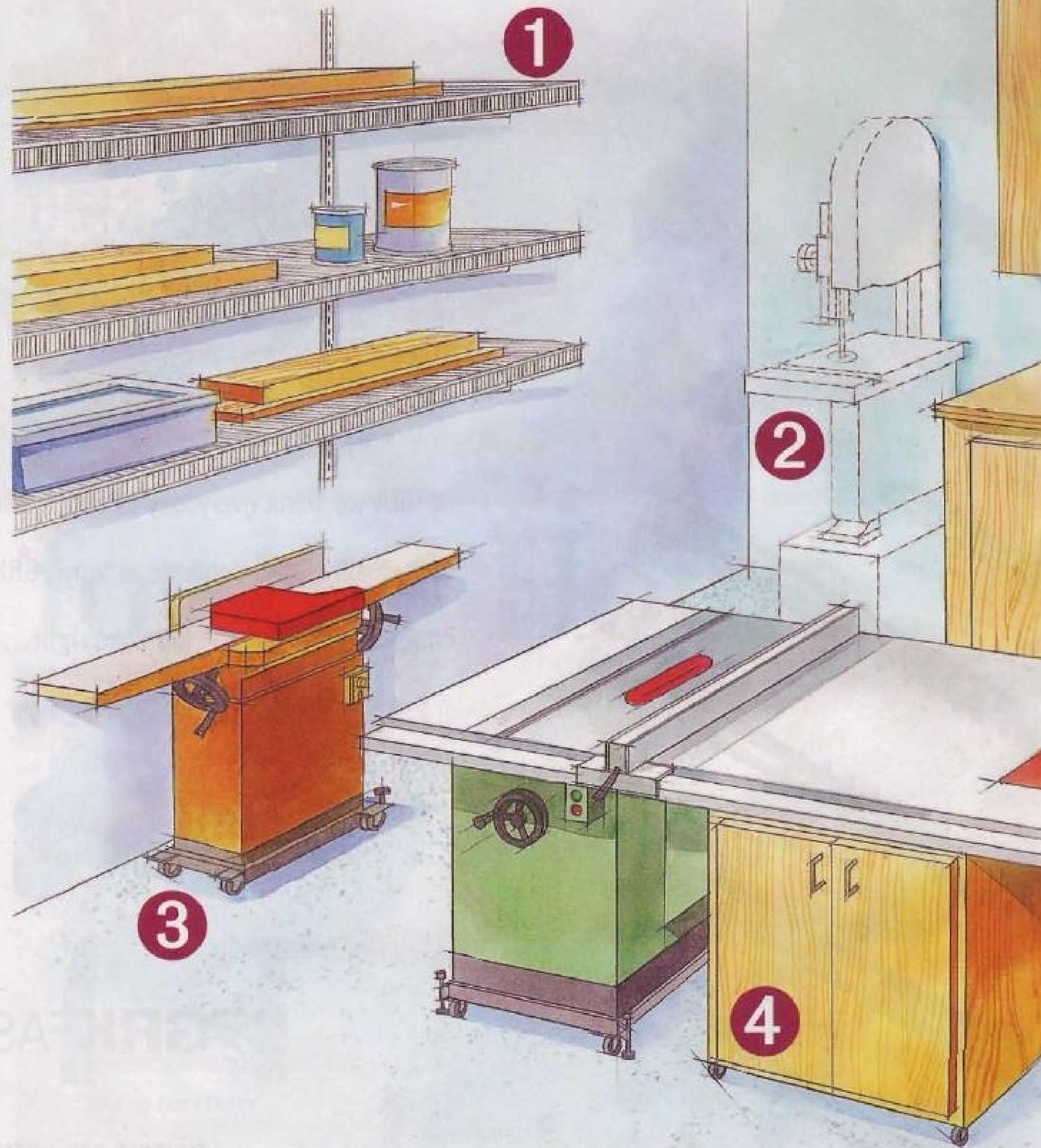
- **Decide what needs to be kept within the shop** and what could be moved elsewhere. Then, list the tools you currently own, and envision locations for tools you'll own eventually.

- **Make the same space hold more** or serve multiple purposes. Search out areas with untapped storage potential.

Bust up the clutter

You can't organize your shop until you get rid of needless stuff, so play "moving day." What would you keep or toss if you had to pack everything and move next week? Send everything that's not a keeper to the trash or to the secondhand store. Turn unused tools and loose hardware into someone else's clutter by boxing them up for the next garage sale. Then, take nearly empty cans of paint in forgotten colors to your local hazardous-waste-disposal site.

As you sort, distinguish between tools and supplies for home repairs and those for woodworking. Box up plumbing and electrical specialty tools and fixtures you'll seldom use. Then, store them on high shelves or outside the shop.

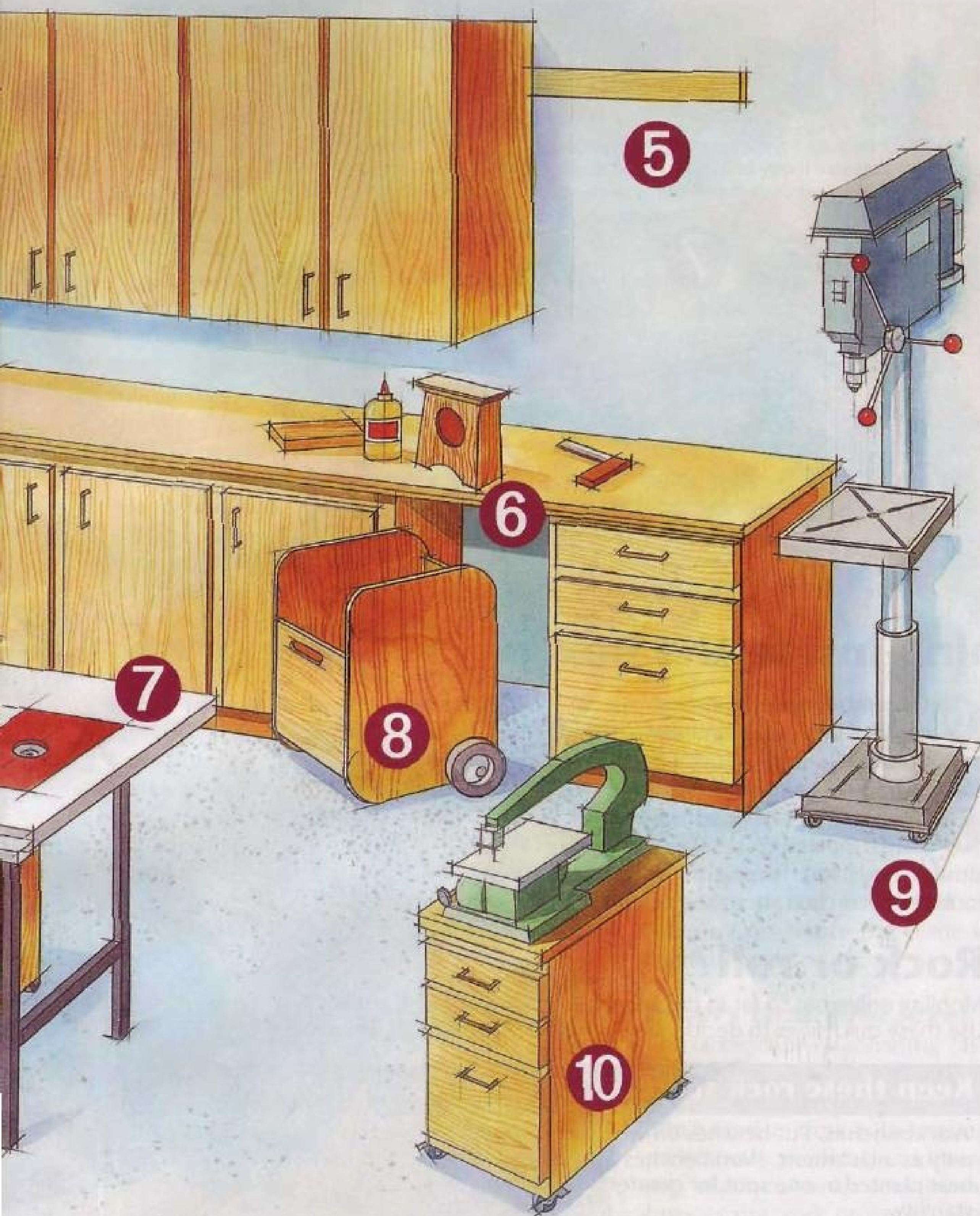


Lay out space for flexibility

When reorganizing your workshop, plan for changing equipment or different woodworking interests such as woodturning. A single area within your shop can serve existing and future uses, but only if you design it with that flexibility. Here are 10 ways to make smarter use of the space you have:

- 1 Adjustable shelving adapts to change better than fixed shelving**, especially for storing lumber. The wire-mesh shelves used here provide ventilation for dimensional lumber and are readily available at most home centers. Run shelves all the way to the ceiling to use every cubic foot of space.

into Less Space



4 Look for neglected spaces to add storage. A cabinet on wheels can be stored beneath a tablesaw extension and rolled out to double as an assembly table. Also, store loose parts in stacking bins beneath jointer tables, between the legs of a lathe, or below a drill-press table.

5 Add wall cleats for a more flexible layout. Wall cleats give you the freedom to add or rearrange wall cabinets as your needs change. They also make it easier to build or buy additional cabinets gradually instead of all at once. In addition to cabinets, cleats can hold specialized storage such as clamp racks and tool boards.

6 Create space where you can sit and work. Between cabinets under a countertop, leave a knee space wide and deep enough to store a mobile storage cabinet or scrap bin. If your countertop stands higher than your tablesaw top, build a rolling storage cabinet short enough to fit easily into the knee space but tall enough to double as an outfeed support for the saw or other major tools around the shop.

7 Double-duty design uses half the space. Instead of a separate router table that takes up floor space, drop a router table insert plate into the tablesaw extension. This arrangement lets you use the same fence for two tools.

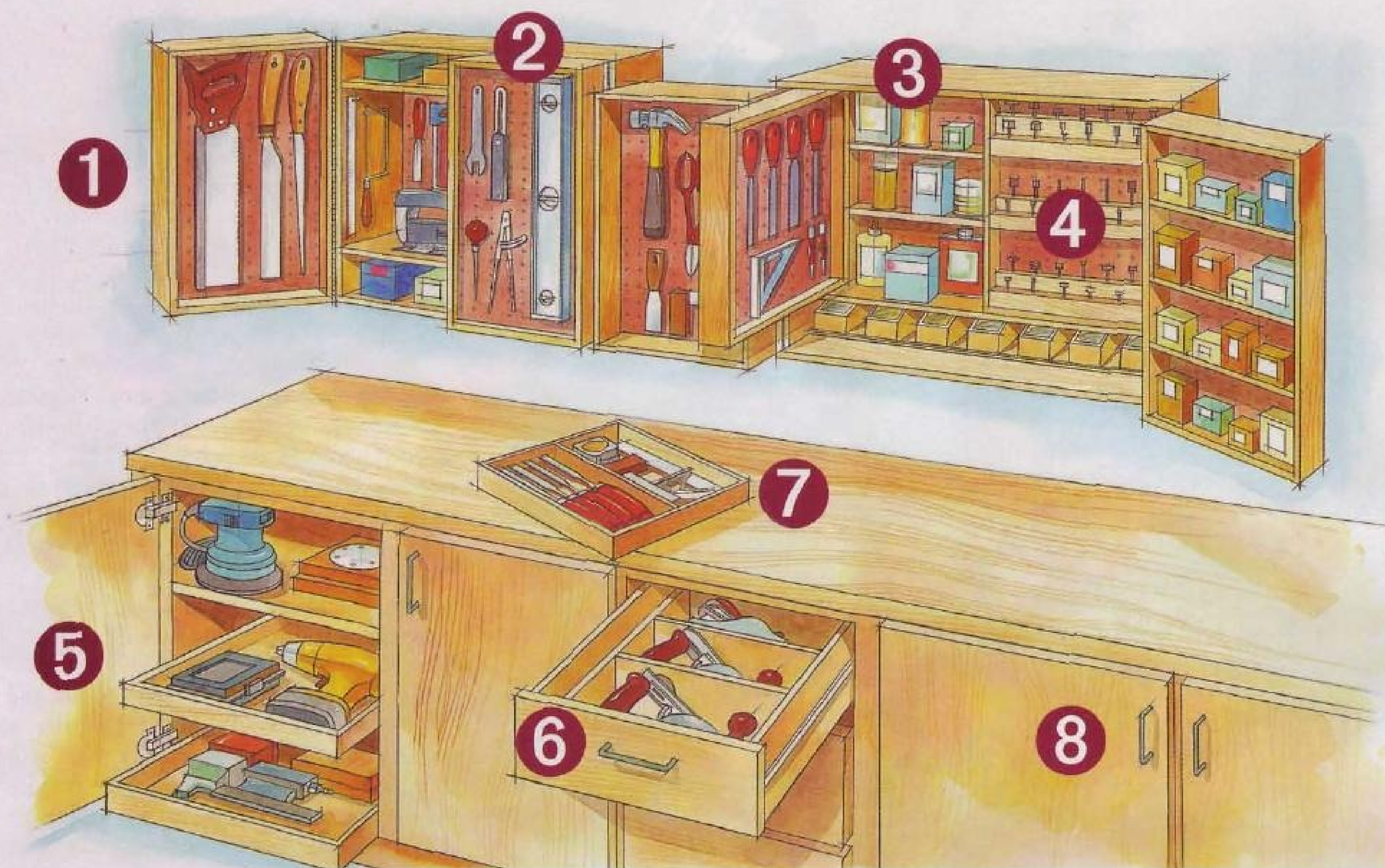
8 Make a place for wood scraps. For pieces too large for the trash but too small to store with your lumber, build a mobile scrap bin. That way, you create a source for small project parts, scraps for testing blade or bit settings, or just material for building jigs.

9 Fit tall tools into corners. Use gaps between benches or cabinets and walls to store tall, narrow tools such as a drill press. Mobile bases make it easy to move tools into these tight spaces.

10 Replace steel leg stands with mobile cabinets. This keeps accessories close to the tools that use them, creates a heftier tool base for greater stability, and relieves some of the storage burden on your other cabinets and drawers.

2 Plan for equipment you expect to add along with what you already own. That could mean leaving a corner empty until you can afford that bandsaw you've been eyeing. If you're creating a new shop, add 220-volt outlets to power step-up machinery without the hassle of extension cords or rewiring.

3 Mobility = flexibility. Even if you don't have to accommodate vehicle parking in a garage shop, place tools and cabinets on casters and mobile bases. That lets you use the same floor space for more than one task, speeds cleanup, and makes it easier to accommodate new equipment as your shop expands.



Custom cabinets: Think inside the box

1 Bump up wall-cabinet capacity by fitting them with clamshell doors. Use the inside cavity to hang tools, or fit it with adjustable shelves to organize fasteners and loose hardware. Then, customize the outside of the door for hanging storage.

2 Add dimension to storage space. Perforated hardboard provides easy-to-install storage, but alternative methods use space more efficiently. Instead, buy or build cabinets that hold more tools in less wall space.

3 Add cabinets that create storage within storage to hang hand tools and organize accessories. The accordion cabinet (*page 70*) uses two interior doors with perforated hardboard for layers of hanging storage.

4 Replace space-eating drill and router bit packages with a storage cabinet that holds everything you need, including wrenches, collets, and accessories.

5 Use slide-out trays in base cabinets to provide access to the contents with less bending or kneeling (and quicker tool retrieval). For a simpler alternative, fit cabinets with adjustable shelves to keep tools and supplies from being heaped onto each other.

6 Customize drawer storage specifically for items such as planes, chisels, and saw blades. Allow space at the top of the drawer to hold a removable tray.

7 Make tool- or task-specific trays such as this portable chisel tray. Create similar trays for turning or measuring tools that you can take to the machine.

8 Use cabinets instead of open shelves to keep dust off tools and clutter out of sight. If a cabinet-and-countertop arrangement doesn't fit your workshop plans, add storage cabinets beneath your workbench for increased weight and stability, and to keep tools close to where you'll use them.

Rock or roll?

Mobility only goes so far in the shop; some items are best left with a solid foundation. Use these guidelines to decide what needs to be rock solid or ready to roll.

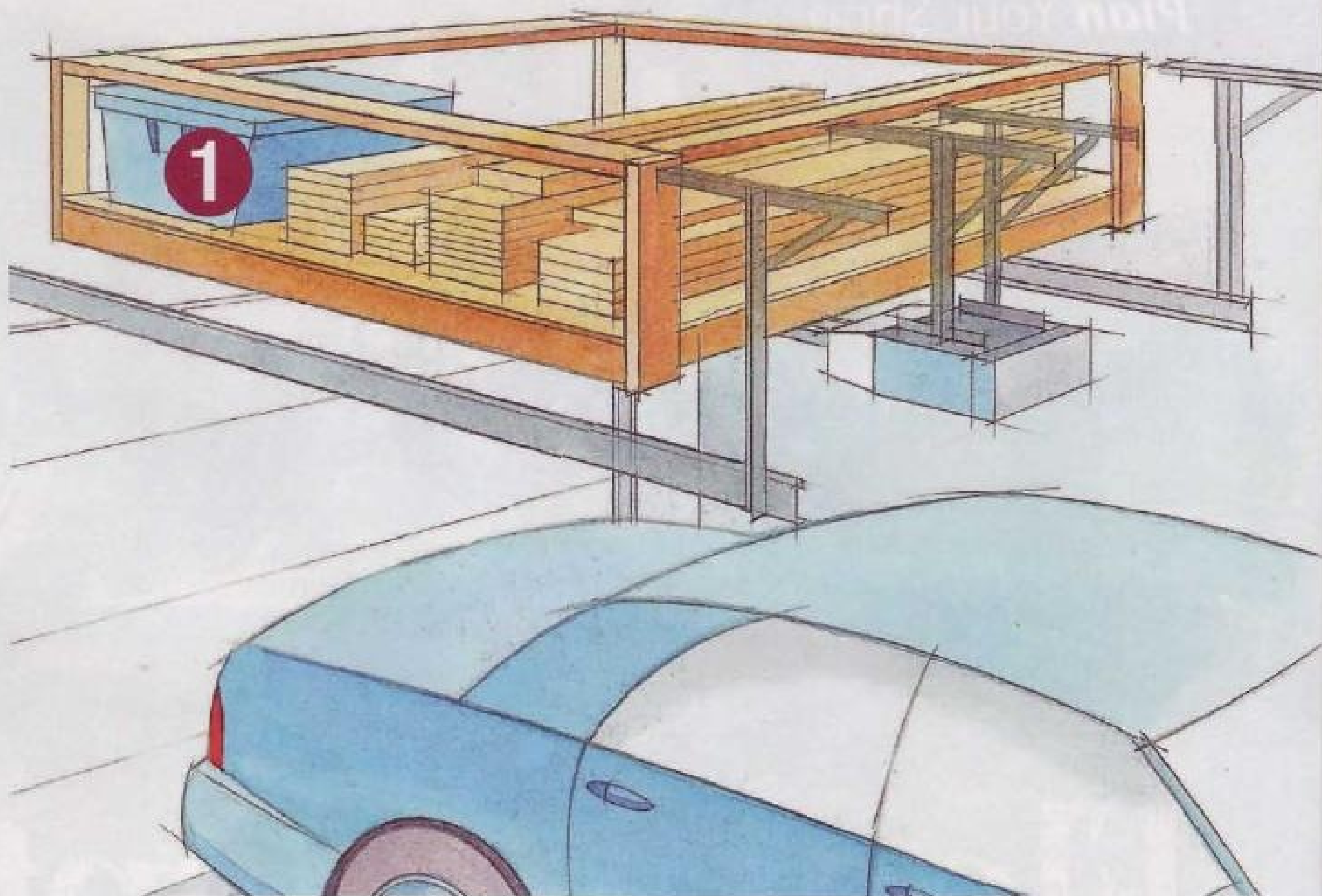
Keep these rock solid	Make these mobile
Workbenches. Put benches on wheels only as a last resort. Workbenches are best planted in one spot for greater stability.	Saws. On a mobile base, a tablesaw can be swiveled or repositioned to rip large panels and tucked out of the way when not in use.
Lathes. The vibration of a lathe makes it a poor candidate for mobile bases and casters. If you need mobility, use wheels that retract completely or low, removable rolling dollies.	Drill press. A mobile base allows you to wheel this tool into a corner of the shop when not in use.
	Router tables. Shaping long stock is as easy as wheeling your router table into a wide-open work area.
	Jointers/planers. Jointers can be mounted on bases with retractable wheels. Planers can be attached to cabinets with locking casters.

Space-stretching tips just for garage shops

1 No space goes to waste. Put that area above your garage door to work by suspending a platform beneath the ceiling. It's a handy spot for lumber, tool cases, and household items you moved aside to make room for your shop. Just make certain you've firmly connected the framework to the ceiling joists.

Need temporary storage for a couple of long pieces of lumber? Rest them on the garage floor centered between the wheels of your car. Raise the boards off the floor using scrapwood supports, and cover them to guard against vehicle leaks.

2 Up against the wall. Sheet goods leaning against a wall waste space and tend to warp. Solve both problems with a simple bungee cord. Mount eye hooks into the wall studs more than 8' apart, center the panels between the hooks, and pull them tightly against the wall with a pair of bungee cords hooked at the middle. Most panels are 4' wide or less, leaving plenty of room for shelves above your sheet goods.



3 Put high walls to work. Not all storage needs to be within easy reach. Use the high walls in your garage to add one additional layer of storage for items you'll use infrequently. Mount cabinets in the space above your car hood. You'll add storage without sacrificing parking space. 🌿

Written by **Robert Wilson**
Illustrations: **Brian Jensen**

Use every cubic foot of your shop

Even little changes can add up to big space savings. Here are five more ways to stretch your shop:

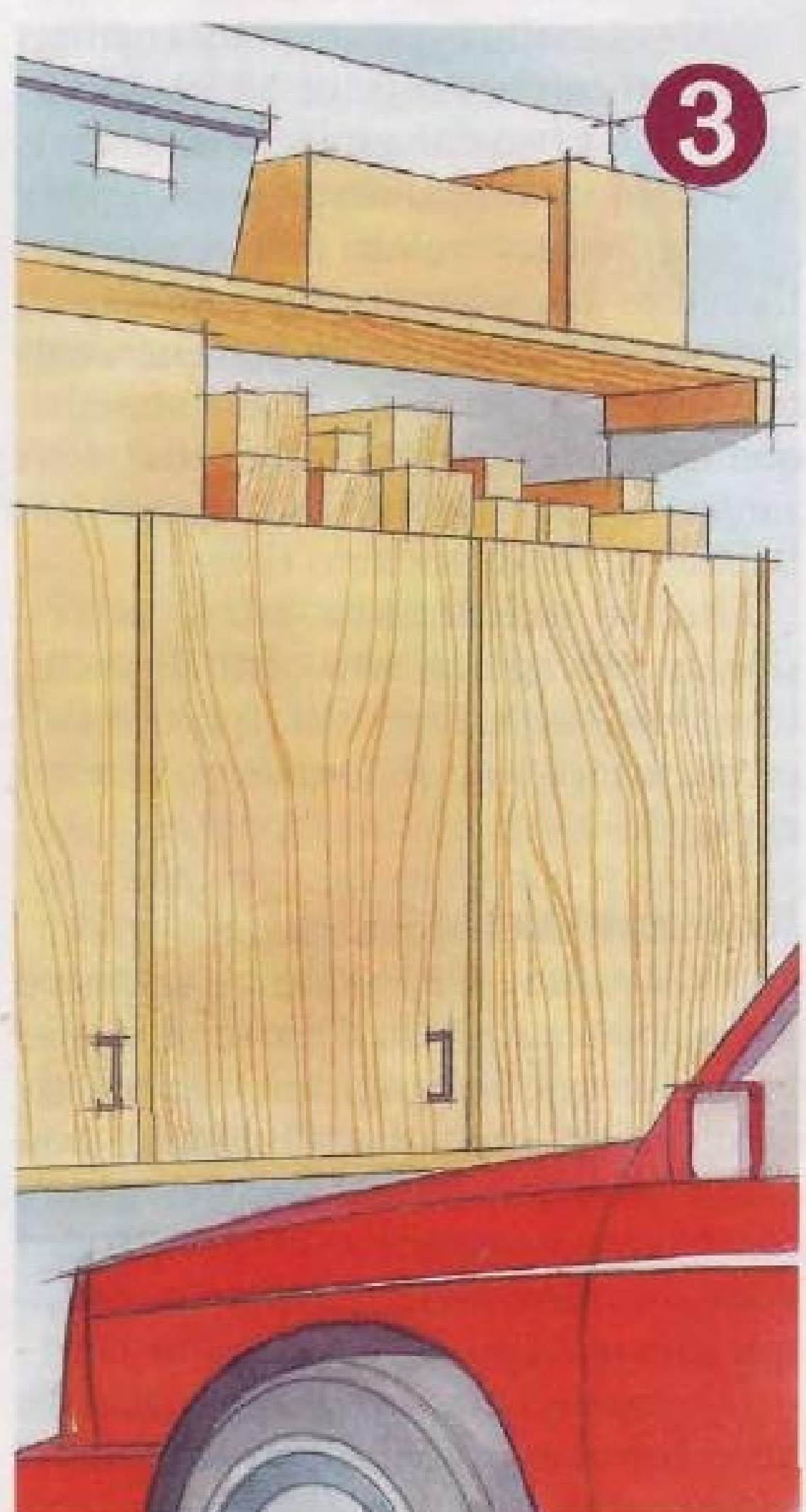
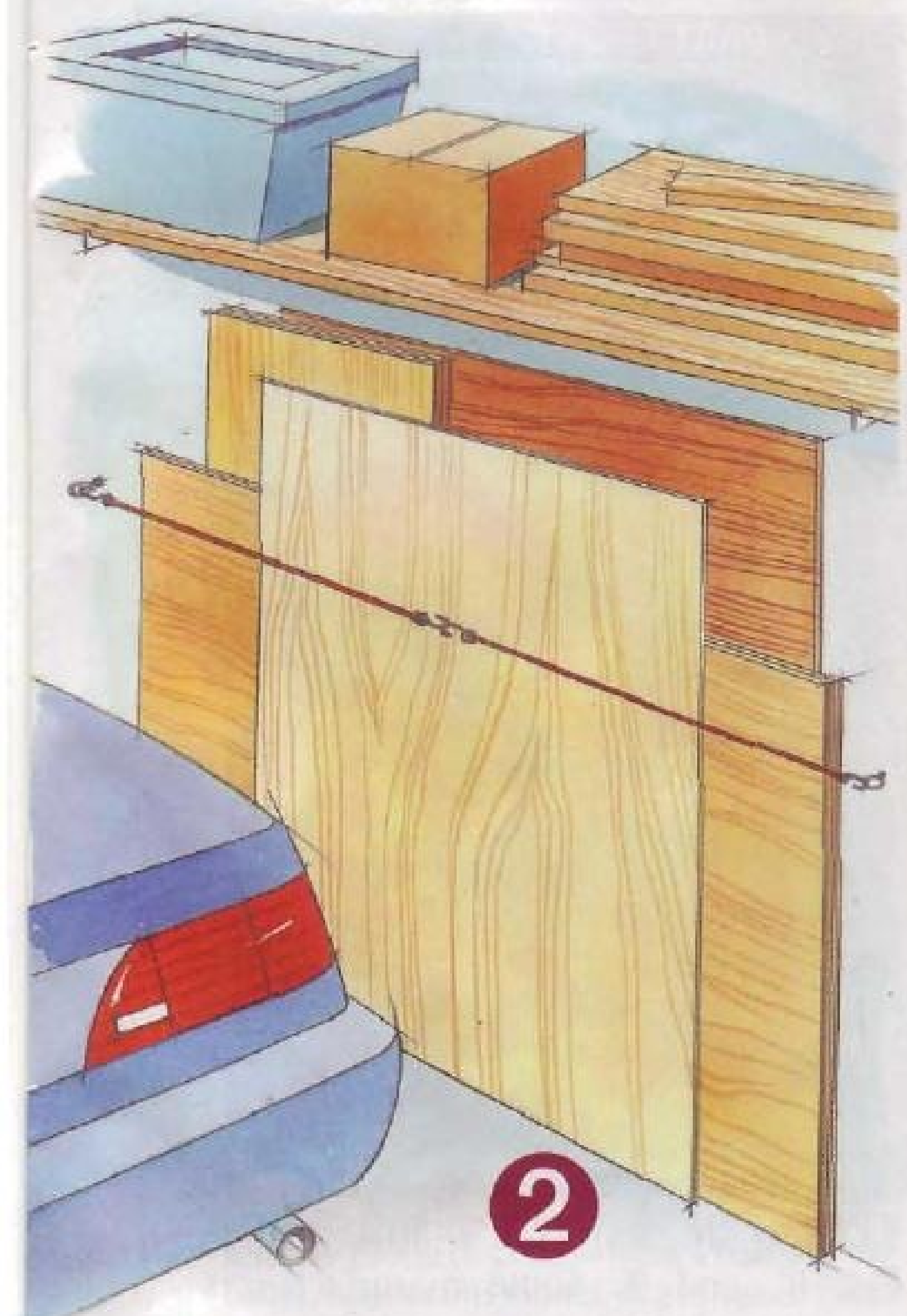
■ In basement shops, drive nails or pegs into the overhead joists to hang clamps conveniently close to your workbench.

■ If you can't foresee when you'll have time to build shop cabinets, don't wait. Get started with inexpensive, ready-to-assemble cabinets from a local home center. Then, customize these basic boxes with add-ons such as router-bit holders, tool racks, and additional adjustable shelves.

■ Handle every incoming item only once. For example, don't leave that new box of screws you just bought resting on your workbench simply because you're in a hurry. Take the extra 15 seconds to store it now, and you'll save yourself 15 minutes of clearing accumulated clutter later.

■ Don't stop with your shop. Add or improve storage throughout your house to create places for items that don't belong in the workshop.

■ Create a "limbo" box for all those interesting doodads you toss into your shop when you think they're too handy to pitch but haven't earned a permanent home. When the box fills up, it's judgment day: Time to sort the trash from the treasures.





Flooring Options

Many garage renovations begin with a primary goal to improve the bare concrete floor. Fortunately, there are several solutions available in a wide price range.

Paint and epoxy

Paint provides the fastest and easiest floor upgrade for your garage. Latex concrete paint—often called “porch-and-floor paint”—offers a quick, inexpensive, and colorful solution. As long as you don’t plan to share your garage shop with a car (hot tires can damage the surface) or otherwise abuse it, concrete paint may be right for you. Depending on brand, a gallon sells for about \$20.

Epoxy-based coatings, extremely hard when cured, are among the most durable options. A one-part epoxy can be applied straight from the can, while two-part epoxies (resin and hardener) must be mixed thoroughly before use. A two-car garage kit (500 sq. ft.) that includes floor cleaner and two-part epoxy and sells for about \$120.

Whether you apply paint or epoxy, the floor must be clean, dry, and free of grease and oils, or you may find the coating will peel up with the first change in weather or humidity. Proper adhesion of most epoxy products also requires a thorough process to provide “tooth” for the epoxy to bond to the concrete. A chemical etching is the most common DIY approach.

Professionally applied epoxy coatings may cost in the range of \$3.50–\$5.00/sq. ft. for a two-car garage. The price is higher because industrial-grade epoxy is 100 percent solids (no fillers and therefore no odor during application) compared with about 20 percent solids for the DIY product. The industrial-quality epoxy wears longer and isn’t subject to hot spots (DIY epoxy can bubble up) from hot auto tires.

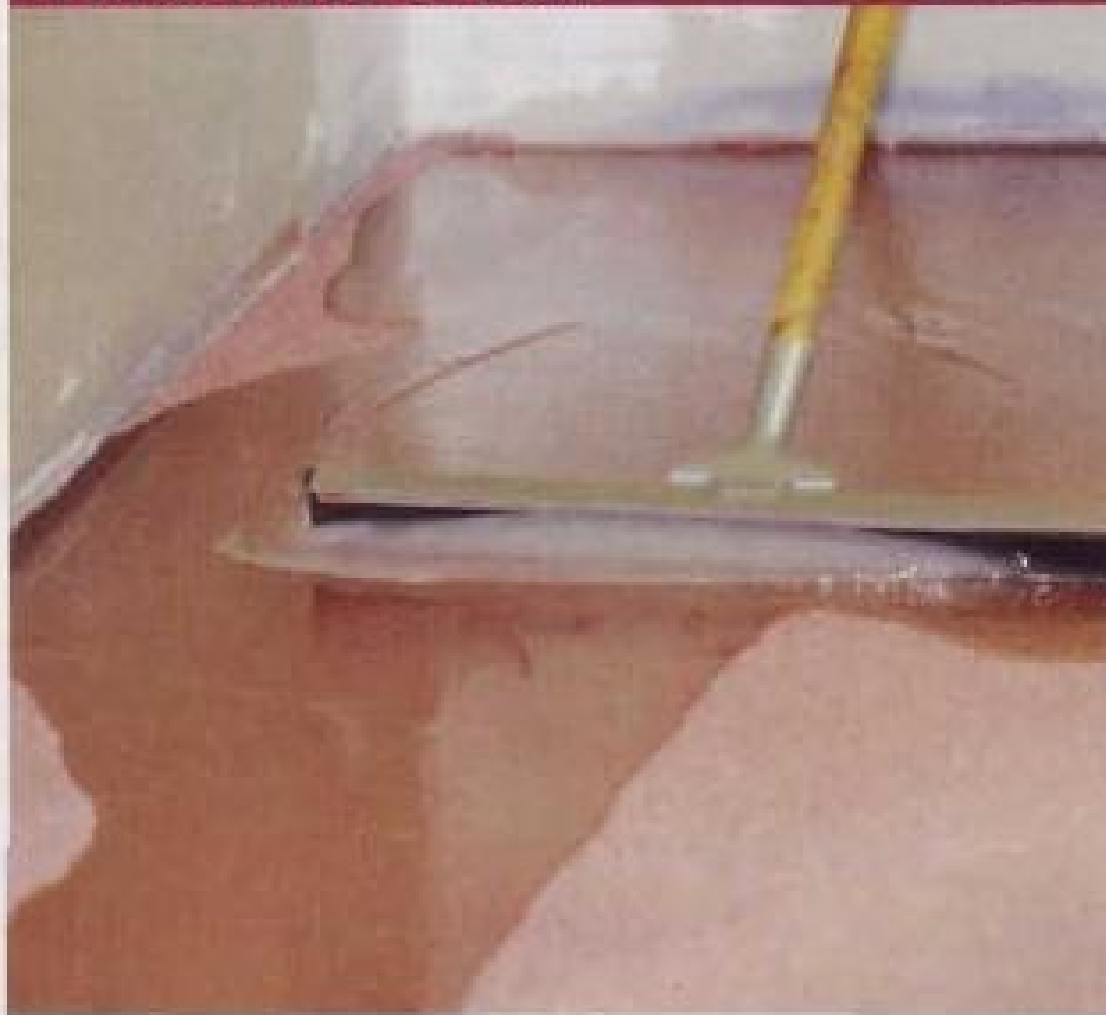
After a thorough cleaning, professionals will roll on two or three coats, compared with one coat for the DIY products. See *page 38* for tips on a better epoxy floor.

Roll material

Rolled coverings for the garage, as shown in the *top* photo, install the same way as indoor vinyl flooring. But because its own weight anchors it in place, you aren’t required to adhere the garage vinyl with an adhesive or tape. Rolled material offers some welcome cushioning atop unforgiving concrete floors.

In a perfectly rectangular garage with no obstructions, installation doesn’t take much longer than the time it takes

TWO-PART EPOXY



A 30"-wide squeegee helps spread an even coat of two-part epoxy across the floor.

to roll it out and join seams (an optional step). For a garage with permanent obstacles, like a water heater, floor drain, or preexisting built-in cabinetry, you’ll need to trim it to fit. Most homeowners will have the skills to install.

Priced according to thickness, pattern, and size, roll coverings average \$1.50–\$3.50/sq. ft. Standard widths include 7½', 8', and 9'. Some manufacturers recommend overlapping seams.

Interlocking tiles

Offering good cushioning, a variety of styles and surfaces, and a large selection of colors and patterns, these tiles (*right*) provide the most pattern options.

The tiles come in different types, including solid, perforated, and even drain tiles, and have embossed surface patterns for good traction and durability. The most common tiles measure 12×12" and 24×24", with intermediate sizes also available. So you may need to trim tiles around obstacles. Most systems include beveled attachable outside pieces to improve the transition between tiled and non-tiled areas.

One benefit of tiles that paints and roll materials don't have is breathability. The seam around each tile allows a bit of air circulation, and perforated tiles offer even more air movement—a boon to garage floors prone to dampness.

Because they simply snap together, homeowners can design a three-color pattern and install the tiles with no experience. (Race Deck shows several options at racedeck.com.) When there are a lot of cracks in a concrete floor—too many for epoxy or paint to hide—tiles make great alternatives.

Tiles offer one additional benefit: Should you move to a new home, or simply want to try a new color pattern or tile arrangement, they can be unsnapped and rearranged, or easily removed altogether for installation elsewhere. Expect to pay \$2.25–\$5.50/sq. ft. for tile materials.

Air-gap tiles

Although not pretty, air-gap wooden tiles (*above right*) offer extreme breathability for concrete floors prone to dampness. The oriented strand board (OSB) tiles, measuring 24×24", have patterned plastic undersides that actually lift the tiles off the floor. Not only does the created space allow the most air movement of any flooring option, but minimal amounts of running water can freely flow underneath. This solution is best for a basement shop or garage that doesn't share space with an auto.

You may have to cut tiles to clear obstacles, but the tongue-and-groove edges make for fast installation. If you'll be rolling heavy equipment around, you may want to add some of the edge tiles to the floor to prevent shifting. Shims are available that fit the patterned plastic on the under-side to level the tiles on uneven floors. The tiles are nearly

INTERLOCKING TILES



By alternating tile patterns, as in this DiamondTrax floor, you can create an unlimited variety of floor designs.

1" thick so transition and reducing strips (available at home centers) are required on exposed edges.

The tiles come only one way—bare wood—but can be painted if desired. Or, you may choose to use the tiles as a subfloor for another flooring material

AIR-GAP TILE



The air-gap engineered into DRlcore tiles lifts the wooden portion off the concrete, which creates an insulating layer.

to be laid on top. You can find the tiles at many national home centers (one brand name is DRlcore; information at dricore.com), where they sell for about \$5 each, or about \$1.25/sq. ft. Only paint is less expensive. 🌳

Written by A.J. Hamler

Floor Type	Pros	Cons
Latex paint	• Least expensive • Wide variety of colors • Makes cleaning shop easier • No seam	• Dry concrete a must • No cushioning • Requires cleaning of concrete, removal of old paint • Doesn't hide cracks, other blemishes • Least durable
Epoxy paint	• High durability • Wide variety of colors • Makes cleaning shop easier • No seams	• Dry concrete a must • No cushioning • Two-part versions can be tricky to mix and apply • Requires extensive cleaning and etching of concrete before application • Doesn't hide large cracks, other blemishes • Short "open" (application) time
Roll material	• Good cushioning • Good traction • Hides cracks, other blemishes • Variety of colors • Removable	• Large rolls can be unwieldy • Cutting necessary for perfect fit • Some colors may require special order
Interlocking tiles	• Good cushioning • Wide variety of colors • Good traction • Breathable • Hides cracks, other blemishes • Easy to remove	• Cutting may be necessary for perfect fit • Desired materials/colors may require special order • Seams easy to spot • Dust, dirt get trapped in open-pattern tiles
Air-gap tiles	• Good cushioning • Good traction • Breathable • Hides cracks, other blemishes • Easy to remove • Water barrier • Inexpensive	• Cutting may be necessary for perfect fit • No color options • Lots of joints • Can't tolerate the weight of a car or truck



After backing the car out of the garage, this homeowner rolled out four Gladiator mobile base units to form a sizable work area.

Ample, accessible storage is the key Workshop Cabinetry

For a lot of us, the family garage is the most available space to create a workshop. Unfortunately, it's also the most available space for storing yard gear and other household items—and, occasionally, a car—creating a mass of clutter not conducive to setting up a shop.

Basic shelving can get stuff up and off the floor, but offers few options for increased workspace, and plain shelves in an unimproved garage are really just vertical clutter on a dirty concrete floor. The perfect solution would be a system of manageable storage cabinets, a way to hang all of your home, shop, and yard tools, as well as a more comfortable and attractive floor to stand on and keep clean. Let's

first look at cabinet solutions. (See *page 20* for floor upgrades and *page 26* for wall storage systems.)



With appropriately designed cabinets, like these steel base and wall units from Baldhead, cars and tools can coexist in a garage workshop.

What cabinets work best in a garage workshop? Well, consider for a moment the other most work-intensive area in the average home: the kitchen. It's a place with ample storage for tools and supplies, an interconnected system of expansive worksurfaces, doors, and shelves to keep everything contained (and hidden) when not in use. Add to that the fact that it's also a place where creativity is important, and it's no surprise that manufacturers have taken their cues from the kitchen to introduce cabinetry designed and styled with the workshop in mind.

As in the kitchen, garage cabinetry comes in a huge range of sizes and styles to suit any need, with some manu-

facturers offering custom design services. This isn't your grandma's kitchen you remember growing up, though. Surfaces are sturdy steel, stain-fighting laminates, and heavy-duty resin or plastic. Most garage cabinets sold today come in base and wall units that you can arrange to fit any size garage, with individual components geared to your storage and project needs.

Base units

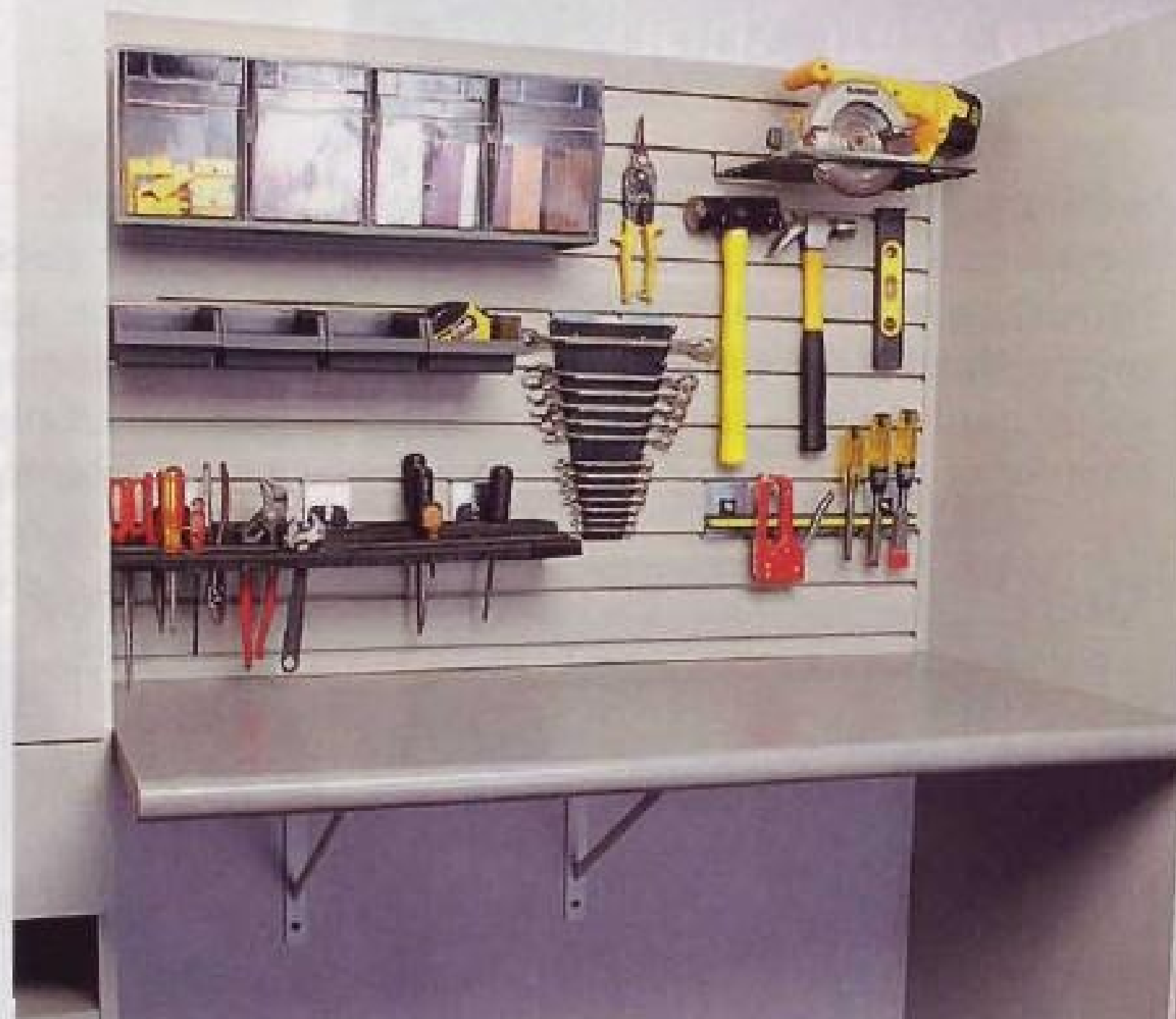
Base units can be simple or elaborate. Some are basic, small cubes with a set of drawers or doors. Others can be quite large and fully tricked out with doors and shelves, and available in several lengths and styles. Some manufacturers, especially those on the low end of the price scale, offer just a few options; on the upper end, some carry hundreds of configurations.

As in the kitchen, many base units can be connected, while others are placed side-by-side as needed. Most rest on the floor, but some manufacturers design their base cabinets to attach to wall brackets. These hanging base units leave open space underneath, an important factor in garages and basements prone to damp floors.

Cabinets made from heavy-gauge steel are extremely durable and sturdy—unless they have wheels, they're meant to stay in one spot. (Wheeled base cabinets are a good idea for infrequently used tools such as miter saws or drill presses; the entire unit can be rolled out of the way when not in use.) For versatility, simple cabinets of molded resin or plastic panels are incredibly light and can be rearranged any time you want. They're also easy to stack to create taller units. Between those two extremes are cabinets more similar to typical kitchen setups made of particleboard, MDF, or plywood. A laminate surface improves both durability and appearance, as shown *below left*.

Wall units

Base units for garage systems can be complemented with wall units hung above them. Wall units can have doors or shelves, or a combination of both.

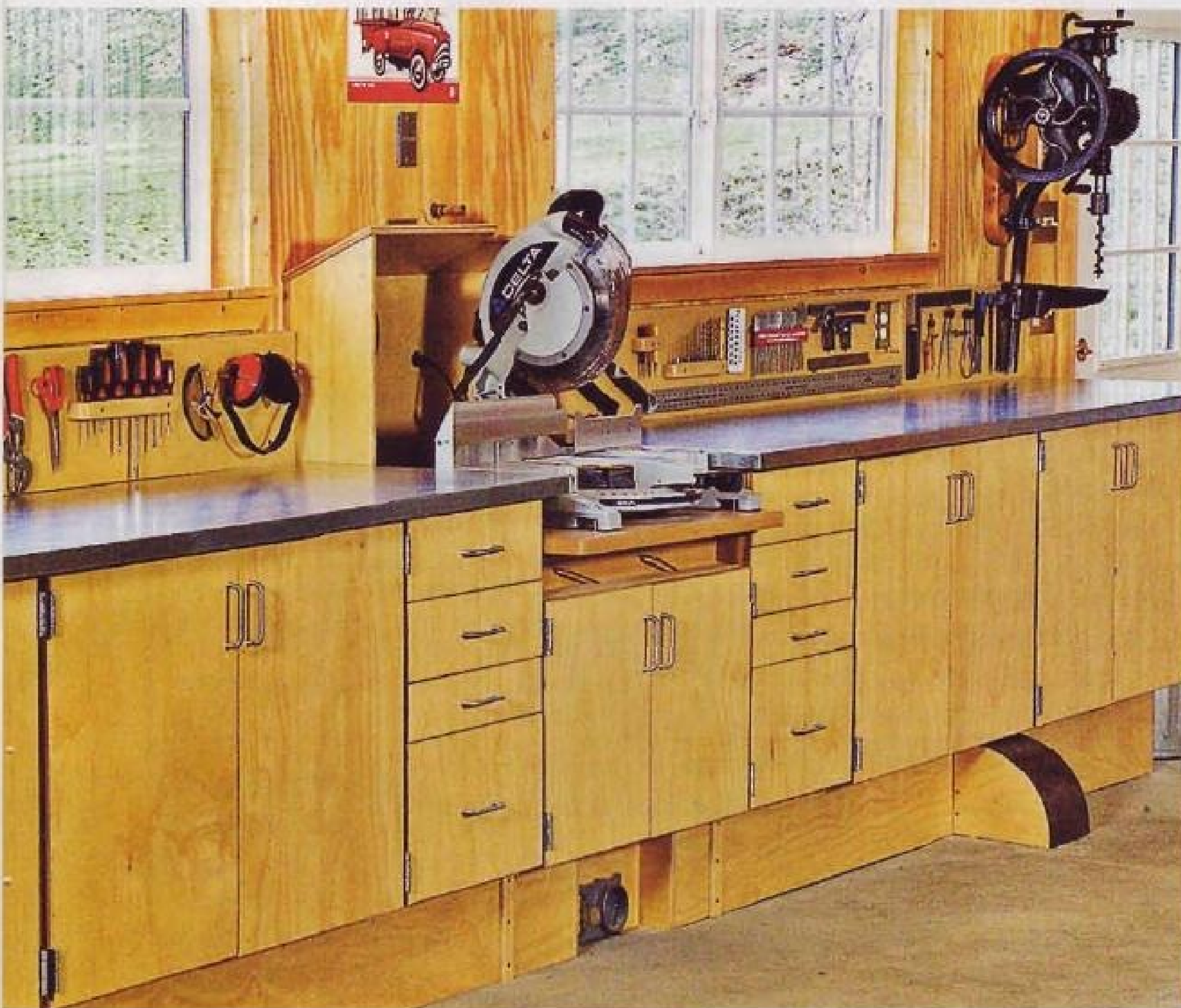


Through careful attention to layout, wall storage and cabinetry can be integrated for an attractive and efficient workshop solution.

Most are sized to match the base units below, and some can actually be attached to base units and arranged in modular groupings. Materials and construction from each manufacturer tend to match those of the base units.

Worksurfaces

Many base-unit worksurfaces are made of the same material as the rest of the cabinet, and may be unsuitable for tool use. Others have wood or MDF surfaces that stand up to some abuse.



This 20"×20' workstation includes a backsplash for hanging frequently used tools. The table of the compound miter saw is set flush with the work surface, fully supporting long boards. This setup makes it easy to control long boards and cut accurately.



Whatever cabinets you choose, you'll need a strong, reliable worksurface. Depending on the manufacturer, the options may include solid wood (as shown on the cabinets above), steel, MDF, particleboard, rubber, steel, pliable polyurethane, plywood, or molded plastic.

For more durability, choose base units from a manufacturer that offers optional benchtops (or be prepared to make your own). Wood is a traditional favorite, but many homeowners prefer the low maintenance of aluminum or plastic surfaces.

Cost

Generally speaking, heavier cabinets are more expensive. Simple molded resin cabinets generally cost \$110 or less. Laminated plywood, MDF, and particle-board cabinets range from \$80 to \$250

for off-the-shelf units, with custom units pricier. Steel cabinets list from \$100 to \$450, with premium units going into the thousands. High-end, custom-designed cabinets may require professional assembly and installation, which costs more.

Guide to Base and Wall Units for Your Garage

Product	Door material	Carcass material	Worksurface material	Full-extension ball-bearing slides (Yes/No)	Finish	Pricing	Comments	For more information, or to locate a dealer:
Baldhead	ST	ST	ST	Yes	Powdercoat in six colors; custom colors available	\$2,000–\$9,000 for typical cabinets and installation	Combined sets available; optional work tops of 1½" maple or 12-ga. steel available	877-966-2253 baldheadcabinets.com
BH North America MAXimum Garage	MDF	LPB	MDF	Yes*	Textured PVC laminate	\$59–\$149 per component	All edges radiused; optional 1¼" MDF benchtops available; wheeled base unit available	866-325-2339 bhnorthamerica.com/ulti-mate
BH North America Ulti-MATE Garage	MDF	LPB	MDF	Yes	Polyurethane-coated doors; textured PVC laminate elsewhere	\$79–\$249 per component	All edges radiused; optional 1¼" MDF benchtops available; wheeled base unit available	866-325-2339 bhnorthamerica.com/ulti-mate
BH North America Ulti-MATE Pro	MDF	LPB	MDF	Yes	Polyurethane-coated doors; textured PVC laminate elsewhere	\$99–\$399 per component	Shelves are 1"; all edges radiused; optional 1¼" MDF benchtops available; wheeled base unit available	866-325-2339 bhnorthamerica.com/ulti-mate
California Closets	LPB	MPB	V	Yes	Melamine; 10 colors available	\$800–\$1,500 for system	All custom components	800-274-6754 calclosets.com
Coleman TD2	LPB	LPB	R	No	Plastic laminate	\$70–\$198 per component	Perforated hardboard hutch available; no workbench available; metal edging on top and drawer sides for strength; metal drawer sides	800-523-3987 colemansstorage.com
Cooper Cabinet Systems	MDF	MPB	MPB	Yes	Plastic laminate	\$1,500–\$2,000 for typical cabinets and installation	Formerly Mitchell Cabinets; cabinets hang on steel-rail support system; slatwall tool organizer over worksurface	866-321-2525 coopercabinetsystems.com
Garage Storage Cabinets (GSC)	MDF	LPB	MPB	No	Melamine in three colors	Complete systems from \$675–\$1,800	DIY installation, but professional installation available; various cabinet depths available	866-414-4844 garagestoragecabinets.com
GarageTek Plastic	PL	PL	W	No	PVC plastic	\$8,000 for typical cabinets and installation	Dealer-installed only; modular components attach to specialized wall-plank system	866-664-2724 garagetek.com
Garage Tek Signature Line	ST	ST	W	Yes	Powdercoat available in four colors	\$10,000 installed for average garage	Dealer-installed only; modular components attach to specialized wall-plank system; worksurfaces 1¼"-thick wood; steel shelves	866-664-2724 garagetek.com

Most available cabinets are strictly do-it-yourself, however, requiring little more than a basic knowledge of hanging cabinets. Further, if your needs change, the entire arrangement can often be altered or added to with more cabinetry.

When it comes to keeping costs down, there's one more option. Since garage cabinet design is based on the kitchen, don't overlook that source. Kitchen liquidators often discontinue cabinet lines and mark them down considerably. Also,

check with local kitchen contractors—after a new installation, many offer the old cabinets they've removed for a song. A light sanding or coat of paint may be all they need to be transformed into a low-cost storage solution. 🌱

Written by **A.J. Hamler**

Product	Door material	Carcass material	Worksurface material	Full-extension ball-bearing slides (Yes/No)	Finish	Pricing	Comments	For more information, or to locate a dealer:
Gladiator	ST	ST	MDF	Yes**	Powdercoat	Welded: \$150–\$450 per unit. Unassembled: \$98–\$398 per unit	Combined sets available; optional 1" solid-maple worksurface available	866-342-4089 gladiatorgarageworks.com
Lista	ST	ST	W	Yes	Powdercoat	\$739–\$2,466	Workbench available; several wheeled cabinets available	888-897-9050 listacabinets.com
Premier	MPB	MPB	MDF	Yes	Plastic laminate	About \$150 per linear foot	Cabinets raised to minimize cleaning and reduce potential for water damage; various cabinet depths available	866-483-4272 premiergarage.com
Redline Garage Gear	MDF	MDF	W or PP	Yes	Powdercoat	\$5,500 for typical cabinets and installation	250 cabinet styles/sizes available; all cabinets are wall-hung; professional installation only; optional worktops of 1½" maple or 1" pliable polyurethane	877-624-2332 redlinegaragegear.com
Sears	ST	ST	MDF	Yes	Baked enamel	\$119–\$379 per component	Combined sets available	sears.com; click on tools, then garage & tool storage
Slide-Lok	MDF	PLY	LPB	No	Plastic laminate available in five colors	\$999 and up for average installs	DIY installation, but professional installation available; various cabinet depths available	800-835-1759 slide-lok.com
Stack-On Products	ST	ST	MDF	Yes	Baked epoxy	\$100–\$250	Workbench and wheeled cabinet available	800-323-9601 stack-on.com
Stanley	AL	AL & PL	PL	Yes	Molded aluminum and polypropylene	\$80–\$190	Wall-mount base units; plastic sides; various cabinet depths available	800-782-6539 stanleyworks.com; search garage cabinets
Suncast	PL	PL	PL	No	Plastic resin	\$50–\$110 per component	No benchtop available; removable drawers slide into molded slots	800-444-3310 suncast.com

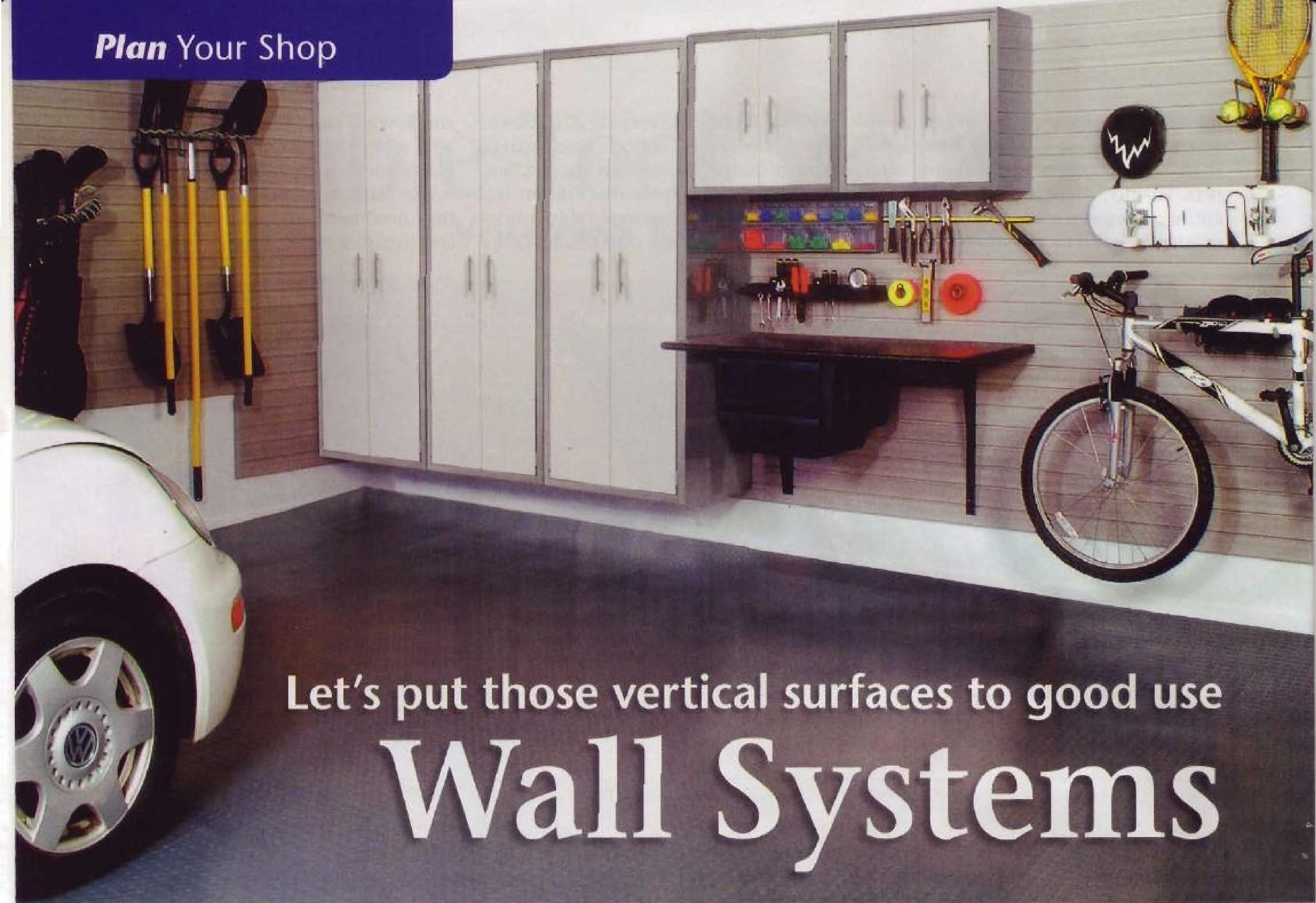
MATERIAL KEY:

(AL) Aluminum
(LPB) Laminated particleboard
(MDF) Medium-density fiberboard

(MPB) Melamine-coated particleboard
(PL) Molded plastic
(PLY) Plywood
(PP) Pliable polyurethane

(R) Rubber mat
(ST) Steel
(V) Variety of options include wood and LPB
(W) Solid wood

(*) Ball-bearing, but ¾-extension
(**) Not full-extension on ready-to-assemble steel drawers



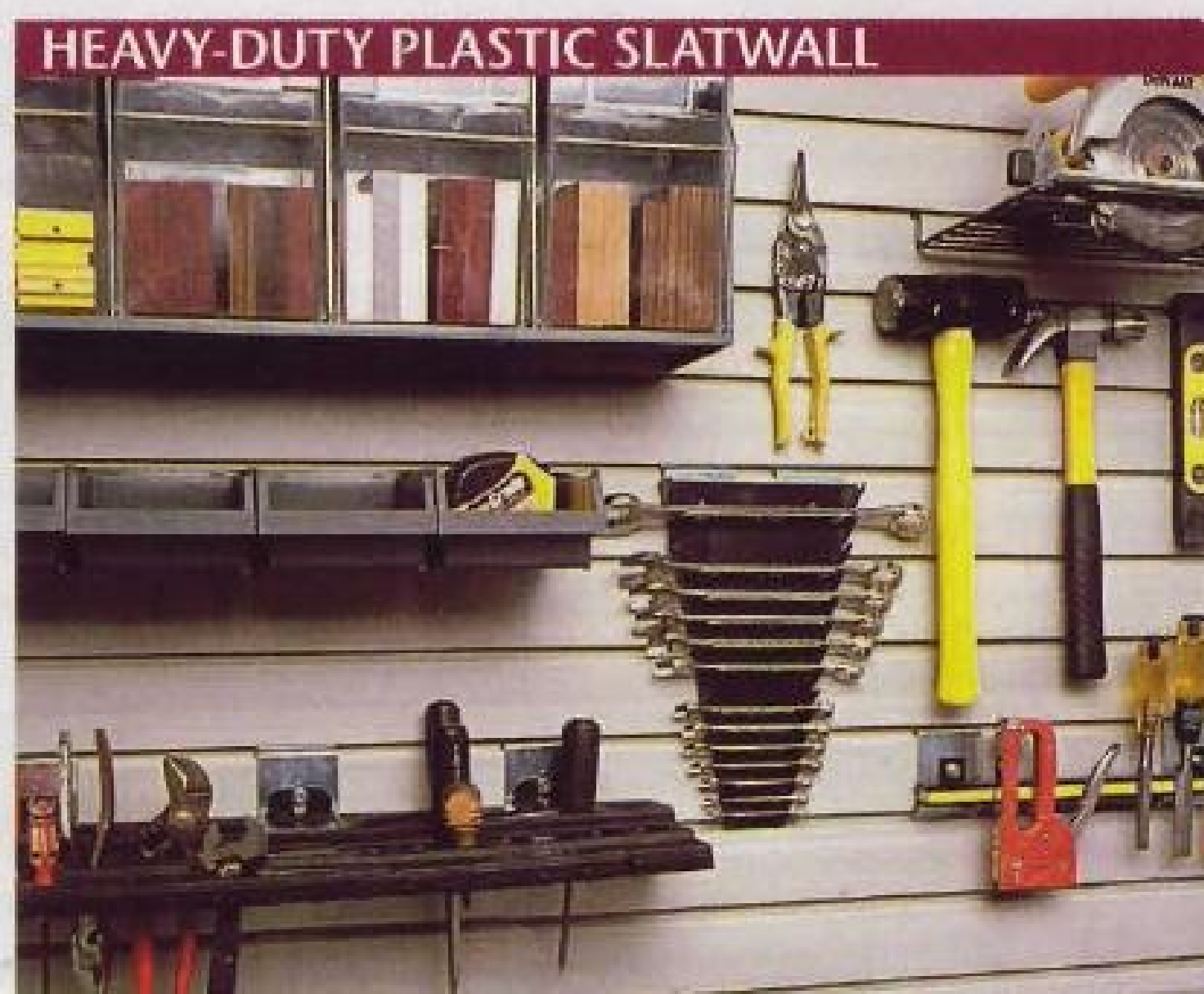
Let's put those vertical surfaces to good use

Wall Systems

With cabinets and worksurfaces in place, a lot of tools and shop paraphernalia now have homes. But a lot of typical garage “stuff” is too big or awkward to store in cabinets. Unfortunately, things like recreational gear, yard equipment, and garden tools end up leaning against the wall or in corners, consuming valuable floor space. The trick here is to keep that stuff easily at hand, but up and out of the way.

Bare drywall—or, in some cases, open framing—requires that anything hung there be anchored to a stud. However, the typical 16" spacing of studs gives only a limited number of vertical locations (and few, if any, horizontally) for mounting hooks and hangers.

A number of wall solutions are available. Perforated hardboard (commonly called Peg-Board, a trademarked name) is a favorite for hanging hand tools. However, this doesn't provide a worthy solution for heavier tools stored in most of today's garages.



HEAVY-DUTY PLASTIC SLATWALL
Brackets and hooks can be mounted anywhere on a slatwall system, as in this example from storeWALL. Gravity holds the brackets in place, so they can easily be rearranged at any time according to changing needs.

Plywood

A quick-and-easy upgrade is to attach ½" plywood to the walls, anchoring the plywood solidly to the garage's existing framework. After fastening the plywood,

screw mounting hooks and brackets, or hang shelves wherever you like. As you update your tool inventory, alterations are just as easy: Just unscrew mountings and move them to new positions.

Bare plywood doesn't look that appealing, and changing the tool layout later leaves unsightly screw holes. Plywood is difficult to clean and is vulnerable to moisture from wet yard tools and dripping hoses. A couple of coats of paint helps, but that's more work. On the plus side, all the materials you need are

inexpensive and right around the corner at your hardware store or home center. Better yet, construction is simple. If your budget is limited, and you don't mind a bit of maintenance, this may be your best ticket.

Slatwall

At many of your favorite retail stores, you've undoubtedly seen wall panels using modified T-slots that accept angled brackets. The brackets, which slip into the slots anywhere along their length and are held in place by their own weight, can be attached to a wide range of specialized hangers—they include simple hooks, hangers, and brackets designed for specific tools and yard implements; hook-on baskets and shelves; and light fixtures. Most, but not all, manufacturers produce interchangeable hangers.

Slatwall has become the most popular upgrade for today's garages, and is generally available in panels in many colors. Composition is of melamine-coated MDF or rugged heavy-duty plastic. Panels range from large 4×8' sheets to individual strips from 6–15" wide. The panels cut easily with a circular saw. Two 8'-long panels are ideal across the front of most two-car garages.

METAL GRIDWORK



A grid system, like these examples from Schulte, supports heavy tools and shelves and is easy to adjust to meet changing needs. The grid panels are secured to wall studs.

Depending on the material and finish, slatted panels aren't cheap (about \$6 per square foot), whether sold individually or in packages. Hanger and accessory prices vary widely, depending on size and use. A package of six simple hooks goes for less than \$5, while a rack for 12 garden tools retails for about \$25.

Metal gridwork

Metal grids are similar to slatted panels in the way they are anchored to wall studs, but offer attachment points over the entire wall surface covered by the grid. Hooks, hangers, shelves, and other accessories snap onto the gridwork, and are held in place by gravity.

Grid panels come in several sizes (2×4', at about \$12–\$14 is the most popular), but colors are currently limited to white, black, and silver or chrome. Hangers are priced similar to slatwall hangers.

Steel panels

A third type of panel system consists of rigid steel with regularly spaced slots or a combination of slots and

holes similar to perforated hardboard. Plain panels come in brushed aluminum or galvanized steel. You'll find steel panels in a range of power-coated colors. Panels sized at 8×32" or 16×32" can be hung singly or combined to form larger arrays, and mounting holes are set at standard 16" intervals. Prices range from about \$13 to \$23.

Accessories that hang in the slots include a variety of hooks, brackets, and shelves, plus larger pieces designed for specific uses such as tool holders, parts bins, even fluorescent-light mounts. Smaller accessories, such as hooks, sell in multipacks starting at about \$4; larger accessories sell for \$7 to \$24.

Rail systems

A different type of wall storage uses rails rather than panels, but shares traits of the other panel types. This system uses a vertical rail mounted securely into wall studs, from which vertical slotted metal strips can be hung anywhere along the rail length.

RIGID STEEL PANELS



These steel panels from Wall Control are solid, colorful alternatives to perforated hardboard. Although the company offers a wide variety of hooks and accessories, the panels allow the use of any third-party magnet hooks or hangers.

Shelves, baskets, small cabinets, and a variety of hangers and hooks snap into the vertical strips.

Rails, slotted strips, brackets, and hooks range from \$2.50 to \$12. Depending on size, cabinets and shelving units matched to the rails range from \$60 to \$150. 🌳

Written by **A.J. Hamler**

Sources

FreedomRail: 800-669-3225, schultestorage.com

Gridwall: 800-862-0899, gridwall.com

Schulte Wall Grid: 800-829-4752, 800-669-3225, schultestorage.com

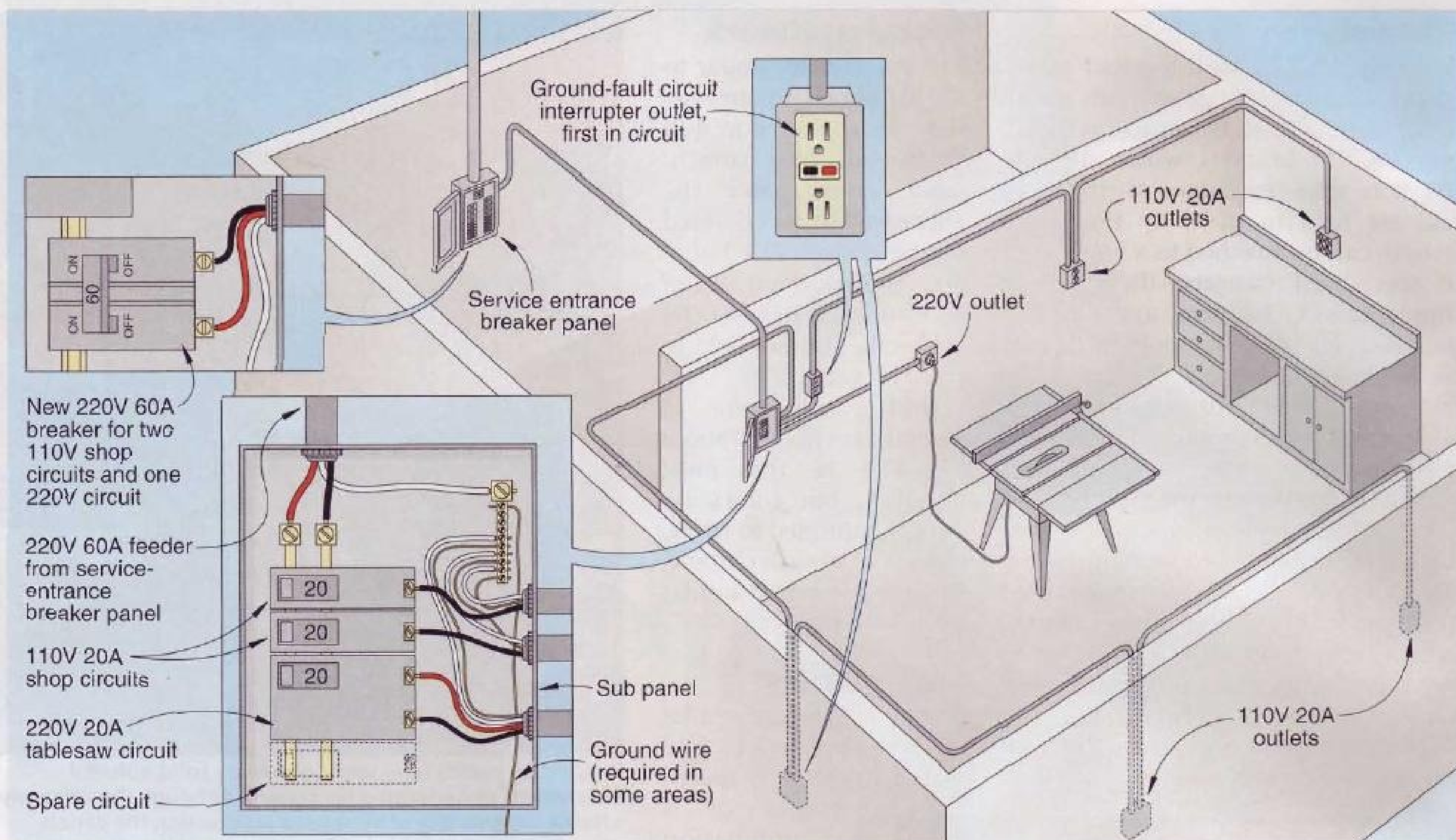
StoreWALL: 866-889-2502, storewall.com

Wall Control: 770-723-1251, wallcontrol.com

RAIL SYSTEM



A rail system, like this example from Freedom Rail, offers shelves, cabinets, and hangers supported on heavy-duty vertical metal strips secured to the wall studs.



Get Wired

Don't take your power needs for granted, or you may starve your tools

Shop wiring requirements can vary widely, depending on the type of projects you tackle. If your hobby is building radio-controlled airplanes, you may need a single convenience outlet for a soldering iron. But if you're into woodworking, you'll need some serious amperage to simultaneously run a table saw and dust-collection system. And if cars are your passion, you may have a large air compressor and welding rig that demand wiring on nearly an industrial scale.

But no matter your requirements, one thing's for certain: You can't starve a power tool and expect it to last. When you don't provide a motor with enough power, it runs inefficiently, tempting you to push it harder to get the job done. That further overheats the motor, and you're quickly way beyond the tool's designed operating range.

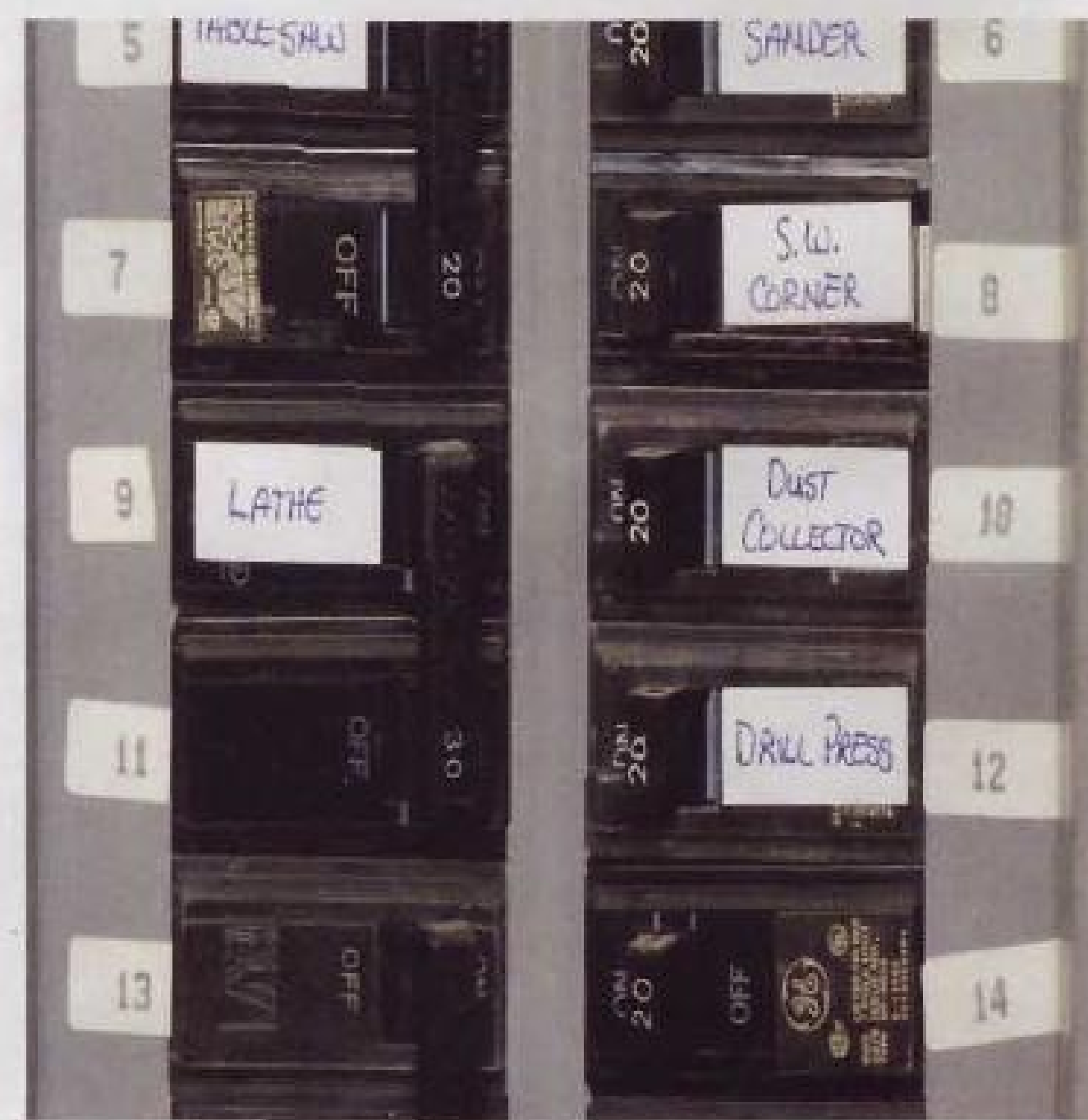
At that point, several things can happen, and none of them are good. If you blow a circuit breaker, that's a dead giveaway that the circuit is trying to deliver more amperage than it can handle. By resetting the breaker, you continue

torturing the tool for a while, but it doesn't solve the problem. In severe overheating conditions, you may burn the insulation off the motor's windings or fry another component. Either way, you'll have a dead tool. If things really go wrong, you could start a fire.

Figure your power needs

The unit of electrical power is called the ampere, usually shortened to amp. To figure the size required for a tool circuit, start by looking at the motor nameplate of your most power-hungry tool. For discussion purposes, let's say it's a table saw with a 14.2-amp motor (at 110/120 volts). Tools often draw a surge of power at startup, so we'll figure a 25 percent allowance for this by multiplying 14.2 times 1.25. The result is 17.75, so a 20-amp circuit is a good choice for this one tool.

The math remains easy even if you'll run more than one tool simultaneously on a circuit—say a router and dust collector. Look up the nameplate amperage for each tool, figure its surge allowance,



This electrical sub panel for a home wood shop identifies each tool's circuit. There's also room to add more circuits later.

then add the requirements of the two tools. If the total exceeds 20 amps, though, you'll usually find that the most practical solution is to run each tool on a separate circuit.

Some large motors have dual-voltage capability: They can be wired to run on a 110/120-volt circuit or on a 220/240

circuit. You or the motor won't notice a particular advantage either way. That's because doubling the voltage cuts the amperage in half. In the example of the tablesaw motor requiring 14.2 amps at 110 volts, wiring it for 220 power drops the amperage needed to 7.1.

Other power requirements in your shop may be relatively minor, such as a radio or fan, but adding an appliance, like as a refrigerator or space heater, can create a serious demand on a circuit.

The circuit for the lighting should always be separate from the power receptacles. Otherwise, if a tool trips a circuit breaker, you'll be in the dark.

For more details about shop wiring, see woodmagazine.com/shopwiring.

DIY or hire an electrician?

If you're confident in your ability to plan and install circuits, you may want to take on the actual wiring yourself. But check first with the local governmental agency that issues permits and conducts inspections. Many locations allow the homeowner to complete wiring chores; some require that you prove your knowledge by first passing a test. Others absolutely prohibit the homeowner from doing wiring unless it's completed by a licensed electrician.

In almost all cases, electrical work requires that you obtain a permit and have the work inspected by a building official. If you proceed without a permit, you could have problems with your homeowner's insurance in the event that you need to submit a claim.

If you have doubts about your wiring skills, hire an electrician. Skilled tradesmen don't work cheaply, but the peace of mind that comes from having a pro handle the job is worth it.

Ground-fault protection

Electrical codes may require that your shop's outlets have protection called GFCI (ground-fault circuit interrupter), particularly for installations in a basement or garage. GFCI is designed to sense dangerous conditions and shut off the power. This could prevent a serious or even fatal electrical shock.

You can achieve GFCI protection with specially designed receptacles or breakers. Either way, carefully follow the manufacturer's installation instructions to ensure protection. Check the breaker or receptacle monthly by pushing the test button.

Extension cord cautions

Short and fat may not describe the ideal body type, but it's a good rule of thumb for choosing an extension cord. "Short" means picking a cord that's no longer than necessary because long cords can cause a loss of voltage. "Fat" means wires with a large cross section, enabling the conductor to carry more power. The gauge numbering system for electrical wires is counterintuitive: the smaller the number, the larger the wire. For example, 10-gauge wire is substantially larger than 14-gauge.

If you're doing projects outdoors, make certain that you plug your extension cord into an outlet with GFCI protection. Some outdoor cords include GFCI protection plus a multiple outlet block that allows you to have several tools connected at once.

See the extension cord chart *below* or refer to your tool's owner's manual for selection advice. Here are other cautions about extension cords:

- Never walk on a cord or roll wheeled objects over it. That can stress or break the insulation or even the wire itself.
- Never use an extension cord that's tightly coiled on a storage reel because that can create an undesired electrical field. (Think of the motor you made in school by winding copper wire around a nail.) Instead, fully unwind the cord before use. 🌱

PROTECT WITH GFCI OUTLETS



A ground-fault circuit interrupter (GFCI) duplex outlet can provide valuable protection against electrical shock.

BUY QUALITY EXTENSION CORDS



Buy high-quality extension cords, and protect them from abrasion to keep your tools running strong. This pigtail model includes a GFCI.

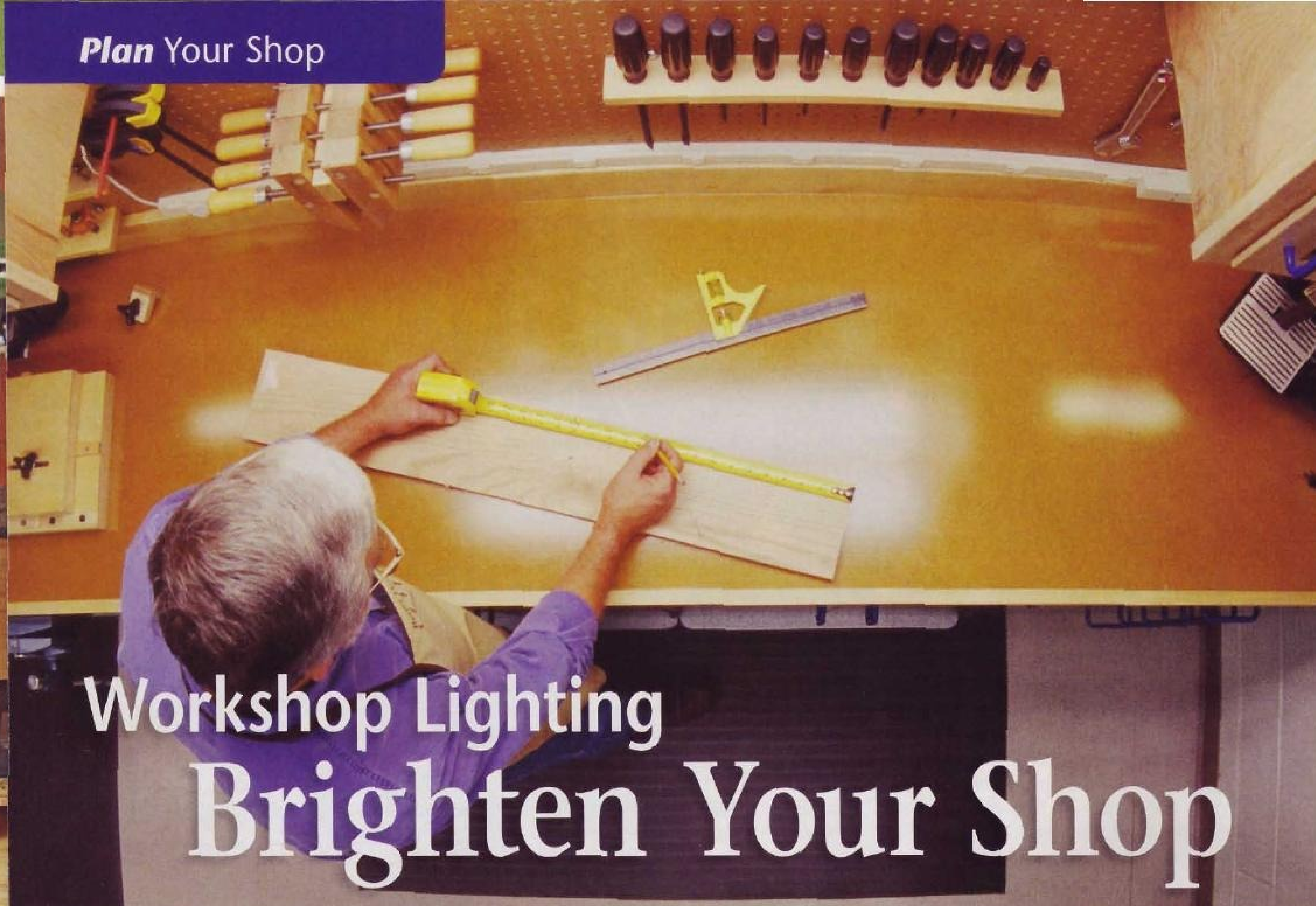
Extension Cord Recommendations

Amp rating of tool at 110 volts	Up to 25 feet	Up to 50 feet	Up to 100 feet
Up to 3	18 gauge	18 gauge	16 gauge
3-4	18 gauge	18 gauge	16 gauge
4-5	18 gauge	18 gauge	14 gauge
5-6	18 gauge	16 gauge	14 gauge
6-8	18 gauge	16 gauge	12 gauge
8-10	18 gauge	14 gauge	12 gauge
10-12	16 gauge	14 gauge	10 gauge
12-14	14 gauge	12 gauge	10 gauge
14-16	14 gauge	12 gauge	10 gauge

ELIMINATE CLUTTER



A fluorescent light on a retractable reel gives your home shop a professional look and eliminates tangled extension cords.



Workshop Lighting Brighten Your Shop

When it comes to energy-efficient lighting, it's tough to beat natural daylight. Of course, you may need to make an investment or two to get it into your shop, but after that, it's virtually all benefit.

If you have a garage workshop, for example, adding a window or two—or even more—will make a dramatic difference. If the walls in your garage have exposed framing, putting in the headers and framing the openings for new windows is a straightforward task, whether you tackle it yourself or delegate it to a contractor.

If your garage is detached from the house, you needn't be finicky about matching its style of windows to your house. That opens up the choices to include less-expensive stock windows from a home center.

Or, if you're not in a big hurry to get your windows, contact the big-box stores and other window suppliers in your area, asking them to let you know when they have bargains available. These can include closeouts, "scratch-and-dent"

items, or custom orders where the specifications got garbled. Retailers often slash prices dramatically on these items, and you pocket the savings.

Task lighting is essential

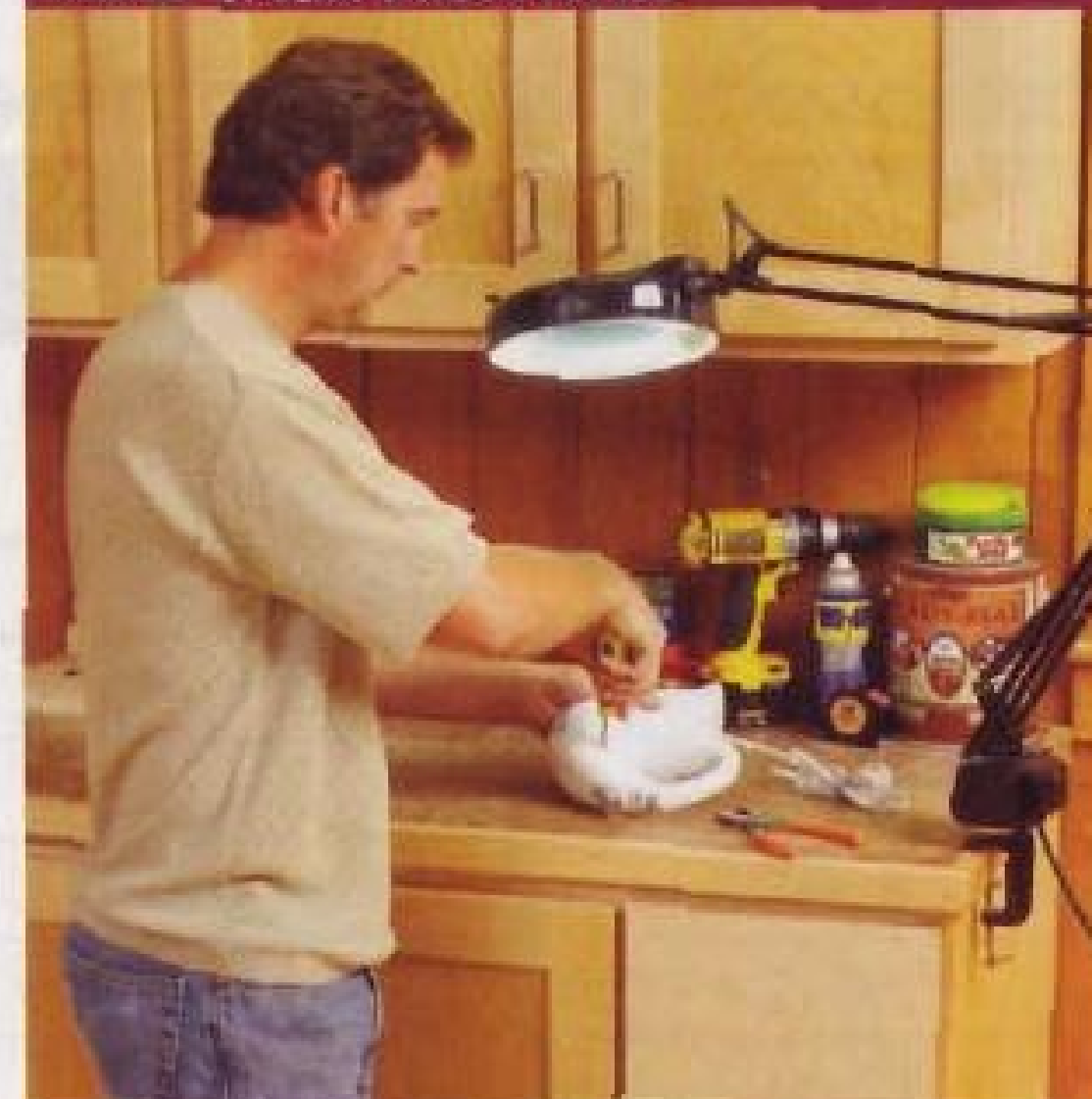
The level of overall illumination in a shop is called "*ambient lighting*," and it must provide sufficient brightness to enable you to move about safely and perform a range of tasks.

But when it comes to close work—tight-tolerance measuring and marking, for example—you need to pump up the amount of light to give yourself a better view. This type of lighting is called "task lighting." You'll want to permanently install task lights at some locations and also have portable sources, both for shop and on-location use.

A workbench is one logical location for fixed task lighting. You can position a fluorescent or halogen-strip fixture above your bench for illuminating the entire area. Or install a canister fixture at a critical location: above a frequently used bench vise, for example. Track

lights give you flexibility to tailor illumination almost instantly to the chore at hand—an excellent choice if your shop handles a wide range of repair and construction chores. You'll want to position the track lights high enough so they aren't in the way, yet low enough to permit easy adjustment.

ADD TASK LIGHTING



An articulated-arm lamp is an inexpensive and handy task-lighting source for your shop.

VERSATILE HALOGEN LAMPS



Halogen work lamps on stands are versatile in your shop as well as remodeling sites.

Dedicated and movable task-lighting choices

Some workshop tools tend to block ambient light that provides a clear view of your work. So it makes sense to purchase accessory lighting fixtures and install them at the machine. A drill press and bandsaw are two popular tools that fit into this category. A grinder and scrollsaw also would benefit from this special treatment.

Movable task lighting offers another solution. This can include a goosenecked desk lamp (from office-supply stores) that you can mount on your bench to drench sharpening chores with light or as "raking" light (grazing a project at a low angle) to inspect the surface while you apply a finish.

Another useful movable lighting choice is an articulated-arm fixture (*opposite*; think drafting-table lamp). This type, also readily available at office-supply stores, usually includes a clamp-on base. However, by drilling mounting holes in work surfaces throughout your shop, you make it easy to move the lamp wherever needed. Many of these fixtures use standard-base lightbulbs, making it simple to switch to a CFL (compact fluorescent lamps) and enjoy energy savings.

Some articulated lamps instead utilize circular fluorescent lamps and incorporate magnifying lenses that improve your view of tiny assemblies. If you're into detailed work, you'll find this combination a convenience.

Halogen lamps solve bigger problems

Halogen lamps provide powerful lighting within your shop as well as throughout your home during remodeling projects. You can purchase an individual lamp with an integral stand, or buy one or more lamps mounted on stands, as shown *left*. (Many include adjustable tripod bases.) Some lamps have dual-level lighting: Click once for 500 watts of power, and click again to boost to 1,000 watts.

Paint makes a difference

Dark colors on walls, ceilings, and other surfaces can seem to suck all of the light from your shop. You'll make your work area brighter—and even seem larger—by choosing white or other light-reflective tones whenever possible. It's best to avoid glossy finishes, though, because the glare can be distracting and cause eyestrain.

Brightening your floor with a durable coating is another way to maximize the light in your shop, provided that you stay with the lighter tones. See *page 20* for more information about choosing and applying a floor finish.

Energy-efficient lamps

Incandescent lamps have changed little in the past 100 years, but the system is not efficient. (A considerable amount of energy is wasted as heat.) Fluorescent lamps utilize more energy-efficient

ENERGY-EFFICIENT LIGHTING



Compact fluorescent lamps (CFLs) save money in a variety of fixture types.

technology. As a result, the lamps stay cooler and consume only about one-fourth the energy of incandescents of the same light level. As an added benefit, the lamps last about 10 times longer, slashing replacement expense as well as the annoyance of changing them.

The new T8 style of fluorescent tube has a smaller diameter than the T12, which will be phased out of production. The T8 fixture is also more energy efficient, so choose this style if you're in the market for new tubular fluorescents.

CFLs, in the curlicue configuration or another shape, allow you to re-lamp existing fixtures and enjoy considerable energy and cost savings. If you have recessed ceiling canisters in your shop, look for CFLs in a style that closely resembles standard reflector lamps. 🌱

MOTION-SENSOR SWITCH

When your hands are full, groping for a light switch with your elbow is a definite nuisance. That's where a motion-sensor light switch helps: It "sees" your motion and turns on the lights for you. Even better, when the sensor fails to detect motion for a time, it turns off the power. (You set the length of the time delay by adjusting a screw hidden under a panel on the switch.)

This type of switch isn't recommended as a control for the main lighting in your shop because it would be inconvenient and dangerous for the lights to go out while power tools are whirring. But it's perfect for steps and hallways leading to your shop, as well as storage closets.

Read the specifications of the switch carefully before you buy it. Many will handle both fluorescent and incandescent lamps but not compact fluorescents.



A motion switch turns out the lights automatically, a useful feature when your hands are full.



**Your retreat
needs more than heat**

Energy Efficiency for Your Shop

When installed over a concrete floor, a modular air-gap system creates a vapor barrier and insulating air gap. The 2×2' DRICore panels slide together. The inset image *above* shows the air gaps.

Making a shop warm is a relatively straightforward task, and you have bushels of choices: from portable electric heaters to stoves that burn wood, biomass pellets, or even corn. (No, it doesn't pop.)

But making a shop into the comfortable and inviting retreat that you want requires more than raw Btus. To make your energy dollars more efficient, you'll want to make sure that your shop has well-insulated sidewalls. And if your shop is in a garage or freestanding building, be certain that the attic space above it has adequate insulation. In addition, you'll also need to plan for air movement within your shop.

Transform concrete into a warm and resilient surface

If standing on a cold concrete slab keeps you out of your shop or garage, a modular air-gap system, such as DRI-Core, *above*, quickly and easily creates a

vapor barrier and insulating air gap above the concrete surface. As an added bonus, the new resilient floor reduces leg fatigue. As a result, you'll discover that your shop time is far less tiring.

The 2×2' tongue-and-groove panels are easy to transport and simple to install. You can cut and drill the panels with power and hand tools. Place ¼" spacers along the perimeter of the room and around fixed obstructions, then tap the panel edges together using a hammer and block of wood. For maximum strength, stagger the joints between rows in a brick-bond pattern. At low spots, use the company's plastic shims to level an uneven shop floor.

For shop use, you can leave the oriented-strand-board (OSB) surface as is, or apply a stain, sealer, or paint. If you ever convert the space into a living area, the system serves as an excellent subfloor for carpet, or "floating" installations such as laminate or engineered wood flooring.

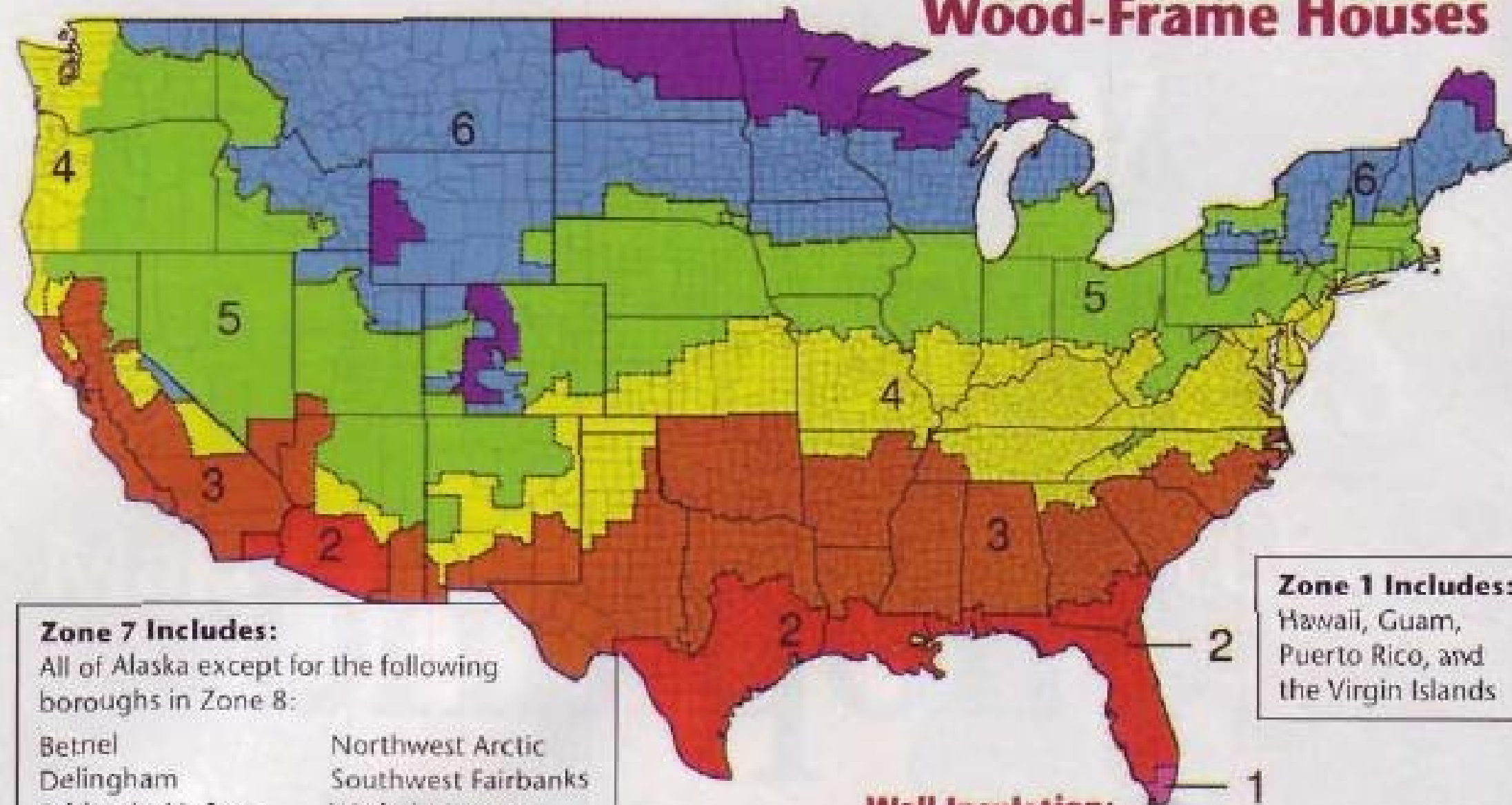
The panels have an impressive load rating of 5,000 pounds per square foot, and have a low retail price of about \$1.50 per square foot. For more details about air-gap flooring, see *page 20*.

Choose the right type and amount of insulation

Whether you're building from scratch or want to upgrade the energy efficiency of your existing shop, you need to know the recommended levels of insulation for your part of the country. Energy Star is a joint program of the United States Environmental Protection Agency and the Department of Energy. The program goal is to help people save money and protect the environment through energy-efficient practices and products.

Energy Star estimates that a knowledgeable homeowner or contractor can save up to 20% on annual heating and cooling costs while enjoying additional comfort as well as the savings. For more

Insulation Recommendations for Existing Wood-Frame Houses



Zone 7 Includes:

All of Alaska except for the following boroughs in Zone 8:

Betnel Northwest Arctic
Delingham Southwest Fairbanks
Fairbanks N. Star Wado Lampoon
Nome Yukon-Koyukuk
North Slope

Zone 1 Includes:

Hawaii, Guam,
Puerto Rico, and
the Virgin Islands

Wall Insulation:

Whenever exterior siding is removed on an uninsulated wood-frame wall:

- Drill holes in the sheathing and blow insulation into the empty wall cavity before installing the new siding.
- Zones 3–4: Add R5 insulative wall sheathing beneath the new siding.
- Zones 5–8: Add R5 to R6 insulative wall sheathing beneath the new siding.

Insulated wood-frame wall:

- For Zones 4–8: Add R5 insulative wall sheathing beneath the new siding.

Add Insulation to Attic

Zone	Uninsulated Attic	Existing 3–4 inches of insulation	Floor
1	R30 to R49	R25 to R30	R13
2	R30 to R60	R25 to R38	R13 to R19
3	R30 to R60	R25 to R38	R19 to R25
4	R38 to R60	R38	R25 to R30
5 to 8	R49 to R60	R38 to R49	R25 to R30

details, visit the Energy Star Web site (energystar.gov).

Insulation amounts are specified by R-value, which is a measure of the insulation's ability to resist the movement of heat traveling through it. The larger the R-value, the greater the insulating ability of the material. Refer to the USA map and chart above for recommended R-values in your climate region of the country.

Start by sealing air leaks

Most air leaks are easy to find because you'll feel them as cold drafts in the wintertime. A stick of incense is another way to help you find an air leak. You'll see the gentle smoke trail deflected by even the tiniest air leak. Likely locations to begin your investigation include windows and outside doors, as well as electrical switchplates and sockets.

Seal leaks around electrical devices with inexpensive closed-cell foam sealers. (Shop in the weather-stripping aisle of your hardware store or home center.)

Around doors, examine weather-stripping at the top and sides of the door. Don't neglect the seal and sweep at the bottom of the door.

For tight spaces, aerosol foam sealant performs well. (Great Stuff and DAP products are distributed nationwide.) Use the ordinary variety for general-

purpose sealing, but purchase the low-expansion formulation for improvements around the frames of doors and windows. That's because the standard formulation can expand too aggressively in these applications, and could even bow the jambs, making it difficult to operate your windows and doors.

Duct sealing is another important step. If your home's ductwork is accessible (in an attic, basement, or crawl space, for example), seal the joints with a special duct sealer (also called duct mastic) to help eliminate the loss of heated or cooled air. Don't rely on ordinary duct tape because it simply doesn't have the sealing ability to deliver the energy-saving results you want.

Fiberglass and other insulating choices

Fiberglass offers an affordable and widely available form of insulation. You'll find it in 16" or 24" widths suitable for studs or joists that are spaced on center. Some batts come factory-cut for standard stud-bay lengths so that you don't need to trim each batt; other fiberglass products come as a continuous roll.

As a final consideration, choose whether you want the fiberglass to have a kraft paper facing. In most areas of the United States, the paper faces the living space. However, in some humid locations

(such as the Gulf Coast), the paper faces outdoors. Check with your building-regulation official for which orientation is appropriate for your location.

You'll also find expanded polystyrene (Styrofoam is one brand) in sheet thicknesses at your local home center. The material easily cuts with a handsaw. If you need to glue these panels in place, select an adhesive specifically approved for the application.

You'll be a fan of this idea

Unless your shop has an air-circulation system, the area will probably suffer from hot and cold spots, air that settles into temperature layers, and moisture-laden air that collects in corners and other dead areas. Stale air can produce a musty smell or even bloom into a serious mold infestation. Moving the air helps solve those problems, and it can also relieve a claustrophobic feeling in small shops.

If your shop has a high ceiling, consider a ceiling fan. Manufacturers' Web sites will help match your shop's volume with the recommended number of fans, their blade diameters, and mounting heights. In warm weather, you run the fan so that it blows downward on you, creating a cooling evaporative "wind chill" effect. Reverse the fan's rotation in cold weather to harvest warm air from the top of the room and guide it down the walls without creating a draft. Both ways, you'll be more comfortable. 🌿

ADD A CEILING FAN



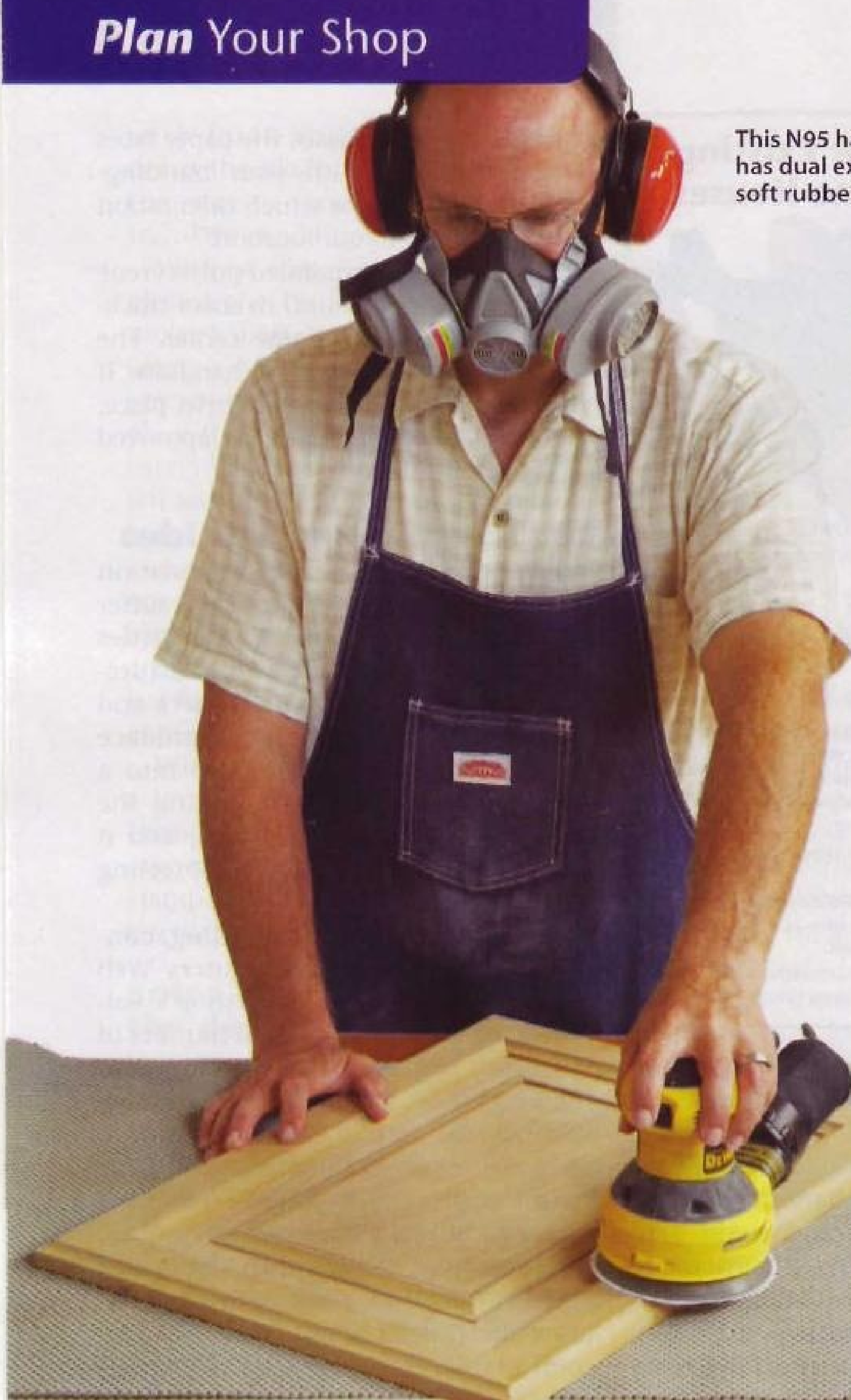
This Hunter fan, designed to hang from a ceiling joist, circulates the air in your shop without subtracting floor space.

Sources

DRICore: dricore.com; 866-976-6374

Energy Star: energystar.gov

Hunter: hunterfan.com; 888-830-1326



This N95 half mask respirator by AO Safety weighs less than 5 ounces, has dual exhalation valves, and uses replaceable filter elements. The soft rubber body seals well without chafing.

Air You Breathe Keep Your Shop and Lungs Clean

You probably already know that dust control is an important health issue: Inhaling extremely fine particles can lead to respiratory problems.

Your dust-control strategy should ideally consist of several elements: a central or portable dust collector, a portable shop vacuum or dust extractor, an exhaust fan, a ceiling-mounted air-filtration unit, and a respirator. When you look at the price tags on dust-control equipment, you may be tempted to avoid these purchases and simply let the chips fall where they may. Don't be penny-wise and pound-foolish: You can't buy much health care for the price of effective dust control.

Small dust particles carry more potential danger than large chunks. For example, some dust collectors capture particles down to 30 microns in size. This sounds fairly impressive because a micron is one-millionth of a meter. But larger particles simply drop harmlessly to the floor, so the real health risks start at the 30-micron and smaller size.

The front line of dust defense

The best starting place for dust collection is at the source: at your tablesaw, router, sander, or other tool. Many of these already have dust ports, simplifying the connection to a dust collector or shop vacuum.

Installing a central dust-collection system can be an excellent strategy that's convenient to use. But properly designing and sizing your system involves a host of variables: the range of tools you own, your shop's size and layout, and even the types of hoses and ductwork you'll use.

We can't cover that breadth in a couple of pages, but we can guide you to an excellent resource. Visit the *WOOD*® magazine online searchable index (woodmagazine.com/index), and enter the words "dust collection." You'll find a

A dust collector may use a cloth bag or canister filter. Many have heavy plastic bags for chip collection, simplifying disposal.



listing of articles that walk you through the design process, provide product reviews of dust collectors, and open up additional resources. If you don't have a back-issue collection, you can easily download many of the articles for a nominal fee.



Clean air in the shop isn't a matter of being finicky—it's vital to good health. A ceiling-mounted cleaner, like this JDS model, can deliver excellent results.

Dispose of airborne dust

In addition to a dust-collection system, invest in an air-filtration system that continually pulls those floating dust particles out of the air before they reach your lungs. A ceiling-mounted unit is a great solution if your shop has adequate headroom. The one pictured *above* has multiple filtration stages to remove 99% of dust particles down to 5 microns in size, and even 91% of particles down to 1 micron.

A number of manufacturers produce these air-filtrations systems in a range of sizes to suit your shop's needs. One multi-tasking model from Delta incorporates a work light into the bottom of the unit. Hanging it above a tablesaw, which is usually in the middle of a shop, enhances both sight and breathing.

Instead of scrubbing and recirculating the air within your shop, you may want to simply export the problem outdoors by opening your garage doors or adding an exhaust fan. (Forget about the kind of fan that's usually installed in bathrooms—it simply won't move enough air to be effective.)

EXHAUST DUST OUTDOORS



Pop rivets secure a fan framework made from standard aluminum extrusions available at most hardware stores.

For a simple, low-tech solution, secure a window or box-type fan in an open window in your shop. (To purchase plans for the setup shown *below left*, see woodmagazine.com/fan.)

If possible, choose a totally enclosed motor because it will survive well in a dusty location. An even better alternative—though substantially more expensive—is a motor that carries an explosion-proof rating. This type helps provide valuable insurance against accidental ignition due to dust and solvents.

A portable dust extractor tames dust-collection problems in your shop as well as at job sites throughout your home.



Portable shop vacuum vs. dust extractor

Hooking up a tool to an ordinary shop vacuum helps prevent a cloud of dust from filling up your shop. But attaching that same tool to a dust extractor can make a healthy difference. For example, the HEPA-rated dust extractor *above* traps particles down to 0.3 microns. (HEPA means High Efficiency Particle Attenuation.) An extractor generally has a smaller footprint than a shop vacuum.

Of course, performance like that carries a price tag (about \$350 retail) substantially higher than ordinary shop vacuums (about \$125). If you're not quite ready to invest in a dust extractor, at least search out a more effective aftermarket filter for your shop vacuum than the one shipped as standard equipment.

The respirator: Your last line of defense

Some woodworking operations generate so much fine dust—machining medium-density fiberboard (MDF) or sanding on the lathe, for example—that it's nearly impossible to capture enough of it through standard collection methods. In those cases, wear a respirator over your nose and mouth.

CHOOSE A DUST MASK WISELY

Choose a disposable respirator with the N95 designation for good protection against airborne wood dust.



A single-strap nuisance mask provides little protection from airborne dust.



If you want a disposable respirator, look for one that meets the NIOSH 95 standard (often abbreviated as N95), for particles down to 0.3 microns. (See photo *top*.) Most of these respirators have the shell style similar to a "nuisance dust mask," *above*, but the N95 is far more effective than the one-strap model. A respirator with an exhalation valve makes it easier to breathe. You'll also find a pleated design that claims even easier breathing and improved visibility.

A half-mask single- or dual-cartridge respirator (shown *opposite*) offers even more protection. A dual-cartridge model protects your lungs from the solvents and particles of sprayed finishes. Choose the proper pre-filters and cartridge elements to match the material you're using.

Sources

AO Safety: aearo.com
Fein: 800-441-9878, feinus.com
JDS: 800-480-7269, jdstools.com
Jet: 800-274-6848, jettools.com

The hazards of metalworking

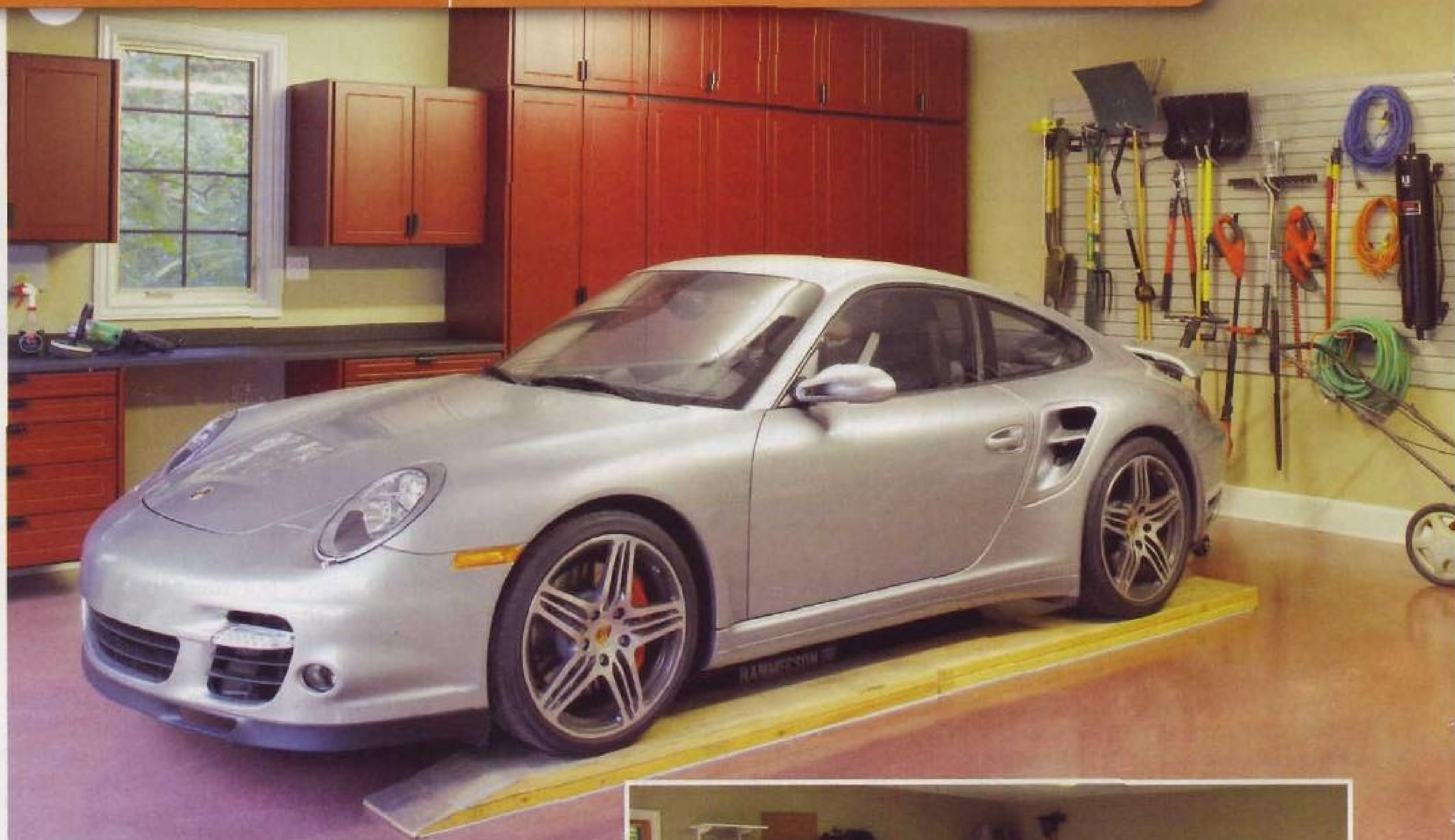
If metalworking is part of your shop, you need to protect yourself from fine particles generated by sawing, grinding, and other operations. The fumes produced by welding add another level of concerns. Check with mail-order sources or a local safety supplier to ensure that your defensive strategies are appropriate for the metals you work and the procedures you use.

Prepare Your Shop

36 Garage Makeover

38 Tips & Tools for Applying an Epoxy Floor

42 How to Unstuff a Garage in Two Days



AFTER

Garage Makeover

Burgundy cabinets and organized walls transform an ordinary garage into an extension of a car guy's home.

The epoxy floor was peeling up in flakes, open shelves were a distracting clutter, and garden tools were chained to the wall to prevent another one falling onto the hood of a car. But that's all in the past after this homeowner upgraded his garage. Does every tool have its place? You bet!



BEFORE

There are garages and then there are garages. If you baby everything from your car or pickup truck to your favorite 2½"-wide Purdy paintbrush, there's good reason to invest in a garage upgrade. In fact, organizing a garage may be the last frontier in home-improvement projects for many households.

If you can see it, you can find it

Don't you hate it when you can't find a shovel among your jumble of garden tools? Or when that darned string trimmer falls off the wall and smashes onto your car hood?

If that sounds like your garage, it's time to restore order with a wall system. (For a more complete look at wall systems, see page 26.)

One inexpensive option is a single strip of hooks and hangers that fits many garden tools. Although inexpensive, this solution doesn't make the best use of space.

Wall systems, like the storeWALL units shown at right, allow more flexibility than a traditional linear strip of hangers provides. Most manufacturers offer just about any hook under the sun for odd-shaped equipment, including leaf blowers, string trimmers, wheelbarrows, and garden hose.

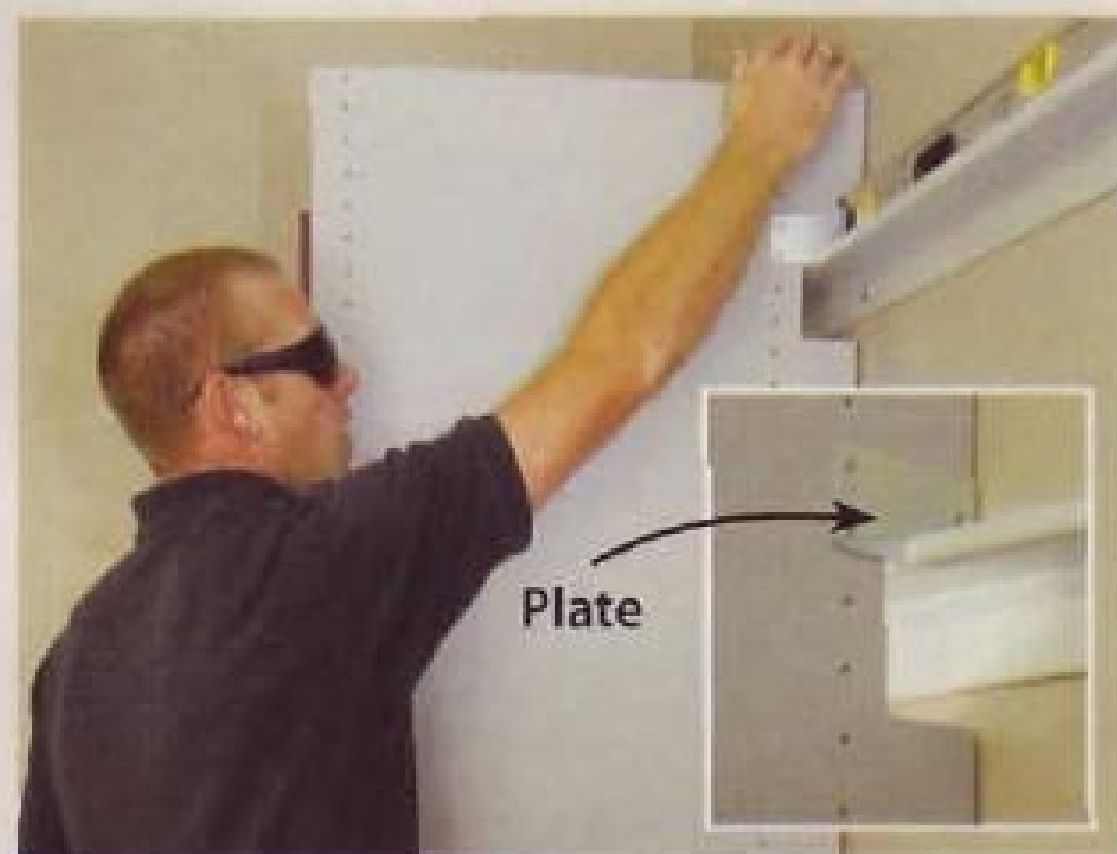
These wall systems have also become popular with sports-minded families desperate for a solution to a mountain of golf bags, tennis racquets, basketballs, and whatever else gets piled up in an active family's garage.

Before you begin hanging *anything* on the wall, Todd Walker, owner of a garage and storage store, suggests removing *everything* from the garage and assessing what you really value. He provides a 24' trailer for customers to temporarily store garage contents while the garage floor is being prepared. This usually means calling a family summit to claim all the tools and sports equipment worth keeping. What doesn't find a home in the "new" garage should be donated to charity or hauled away.

Written by **Carl Voss**



Eight-foot long sections of an interlocking track system (above) by storeWALL attach quickly to line one wall of the garage.



After securing and leveling the top and bottom 2"-wide steel rails, Joe McGuire fits the notched cabinet end piece against the wall (left). Once all the frames are assembled, Jake Berhow begins hanging the doors (center). Double ball-bearing drawer slides screw into factory-drilled holes (right).



Cabinets: What you need to stash away

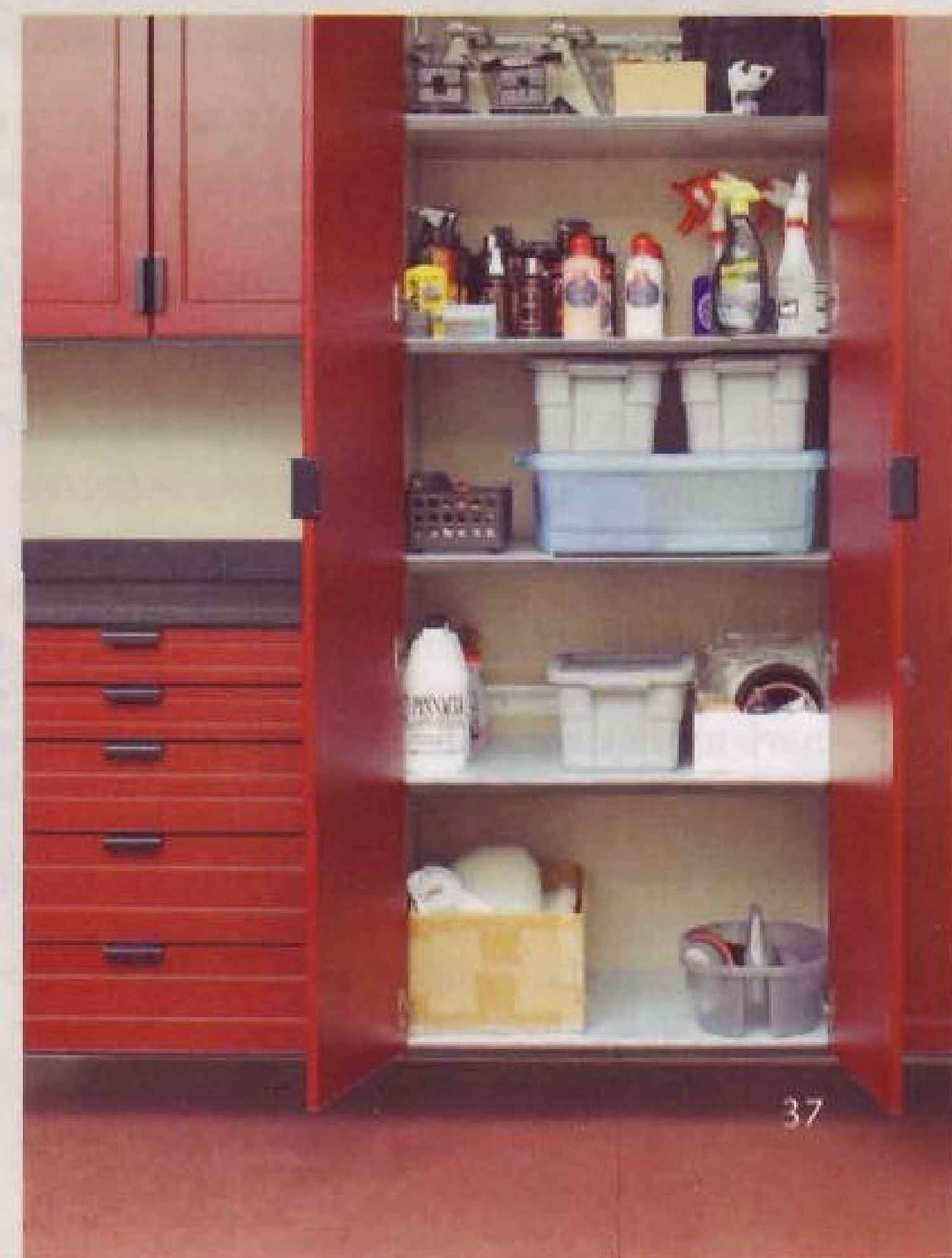
It's ideal to place yard and garden tools on hooks across the front or along the side of a garage. However, lots of other garage items belong behind doors or in drawers. In this homeowner's case, he selected burgundy cabinets for his car-care products (below right), garden sprays, and do-it-yourself supplies. A two-man crew installed 16 lineal feet of cabinets and drawers in five hours.

The Redline Garage Gear cabinets (redlinegaragegear.com) are powder-coated MDF and should provide years of service. Because the base cabinets are mounted on the wall and not resting on the floor, homeowners can hose down the garage floor and not worry about damaging the cabinetry or contents. (Many of the companies listed on pages 24-25 also offer wall-hanging cabinets.)

A new 6'-long workbench beneath a garage window provides the homeowner with the space he needs to spread out his projects. He chose a bench surface coated with black urethane (the same tough material as a spray-on truck-bed liner) that should withstand even the most powerful solvent in his cleaning arsenal.

The homeowner loaded most of his auto-mechanic's tools into a mobile tool chest (see other examples on page 106) and found a home for home improvement tools in his new drawers beneath the workbench.

The dovetailed drawers in this system are constructed from 9-ply hardwood plywood, and travel smoothly on double ball-bearing full-extension drawer slides. 🌿



Tips & Tools for Applying an Epoxy Floor

Learn from these professional applicators as they share their secrets for putting down a high-quality epoxy floor.

Stirring up a batch of two-part epoxy is the easy part of applying a new garage-floor covering. The hard part is avoiding the temptation to take shortcuts in the recommended preparation steps. Here are tips from professionals that will keep your floor looking as good two decades from now as it does on Day One.

According to Todd Walker, owner of Absolute Garage in Des Moines, Iowa, about 50 percent of his business is applying epoxy floors to home garages. "Concrete wasn't made to be coated," Todd explains. "So to get it right, you have to trick the concrete." That means properly preparing the concrete to bond with the epoxy. In the case of this car buff's garage, his builder passed along incorrect advice about new concrete not needing preparation before the first coat of epoxy. The homeowner's attempt to fix the first application with two additional coats of epoxy compounded the problem; the epoxy began peeling off in chunks. That's when the homeowner threw in the towel and called in the pros. Removing the old epoxy proved to be a 32-man-hour job. The new floor? Just 10 man-hours.



PEEL OFF EXISTING EPOXY

No shortcuts

A long-lasting epoxy floor requires proper preparation of the concrete surface. First, remove every bit of the three layers of epoxy previously applied by the homeowner. A power scraper *above* (available from rental stores at about \$60 a day), peels up the layers of epoxy.

OPEN CONCRETE PORES



Bonding with your floor

Establishing a good bond between the epoxy and concrete requires opening the pores of the concrete. This holds true even with new concrete (a step overlooked by some homeowners). Etching with muriatic acid is an option with new concrete. In this case, an 8"-diameter grinder (available at rental stores) removes any stubborn epoxy and prepares the concrete for proper adhesion. The shot blaster, a specialty machine, *above*, pounds the surface with tiny pellets. The photos *right* show two stages of the shot-blasted floor preparation and the finished surface.

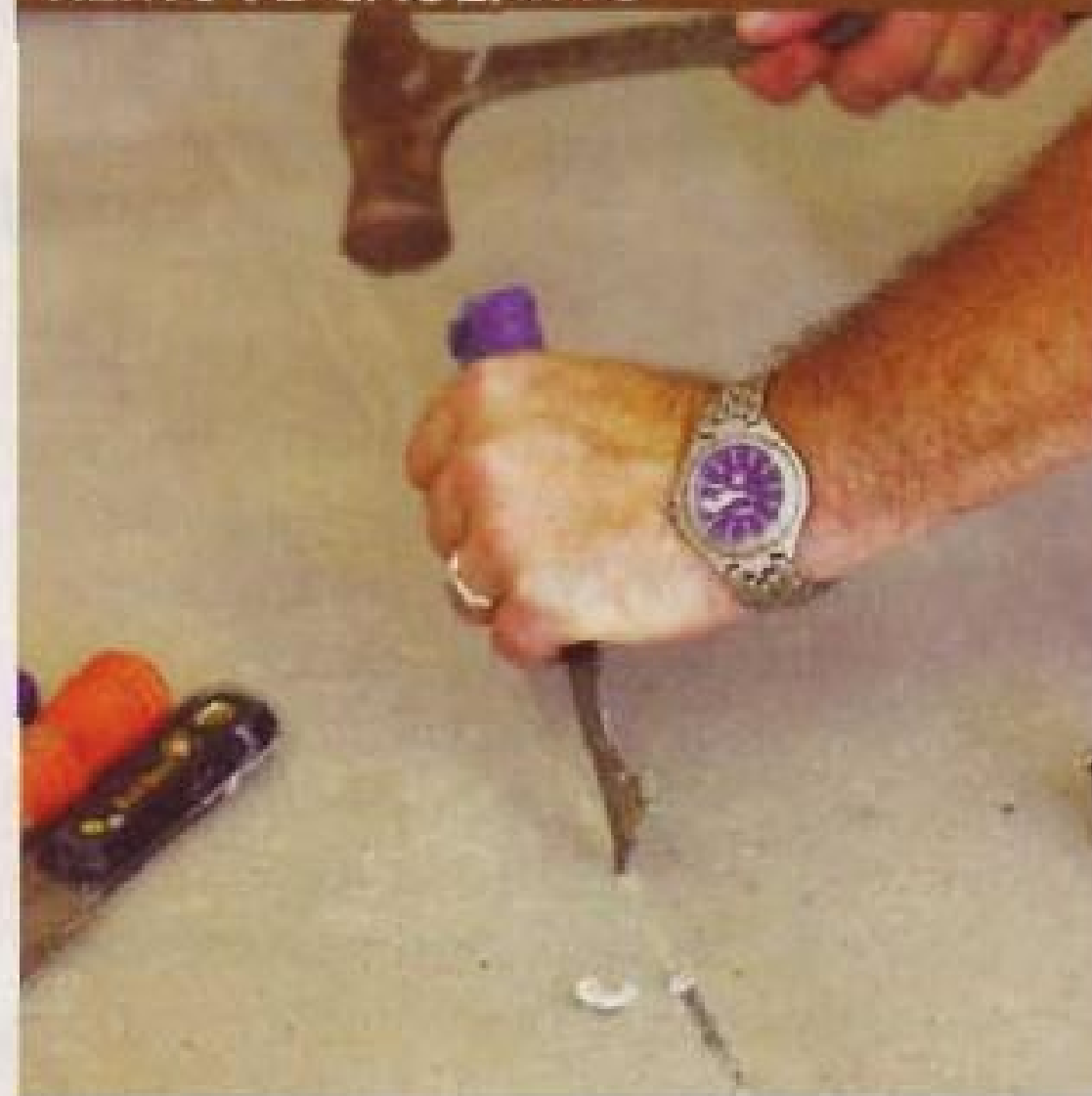
BEFORE

AFTER

FINISHED SURFACE



REMOVE CAULKING



A hammer and chisel remove the top layer of caulk. A right-angle grinder removes the caulk down to about 1/2". (Grinder guard removed for clarity.)

Preparation pays

A well-prepared epoxy garage floor is a sight to behold. Unfortunately, some homeowners who apply epoxy themselves either receive incomplete advice or rush through the steps that will ensure a long-lasting floor.

If an epoxy floor seems right for you, keep in mind that there are several grades of epoxy. (For more details, see *page 20*.) Top epoxy grades contain more solids—the good stuff you want on your floor. Todd, the applicator from Des Moines, uses industrial-quality products whether he's working on a two-car garage or a sprawling airplane hangar. The top products are kinder to the nose during curing, too.

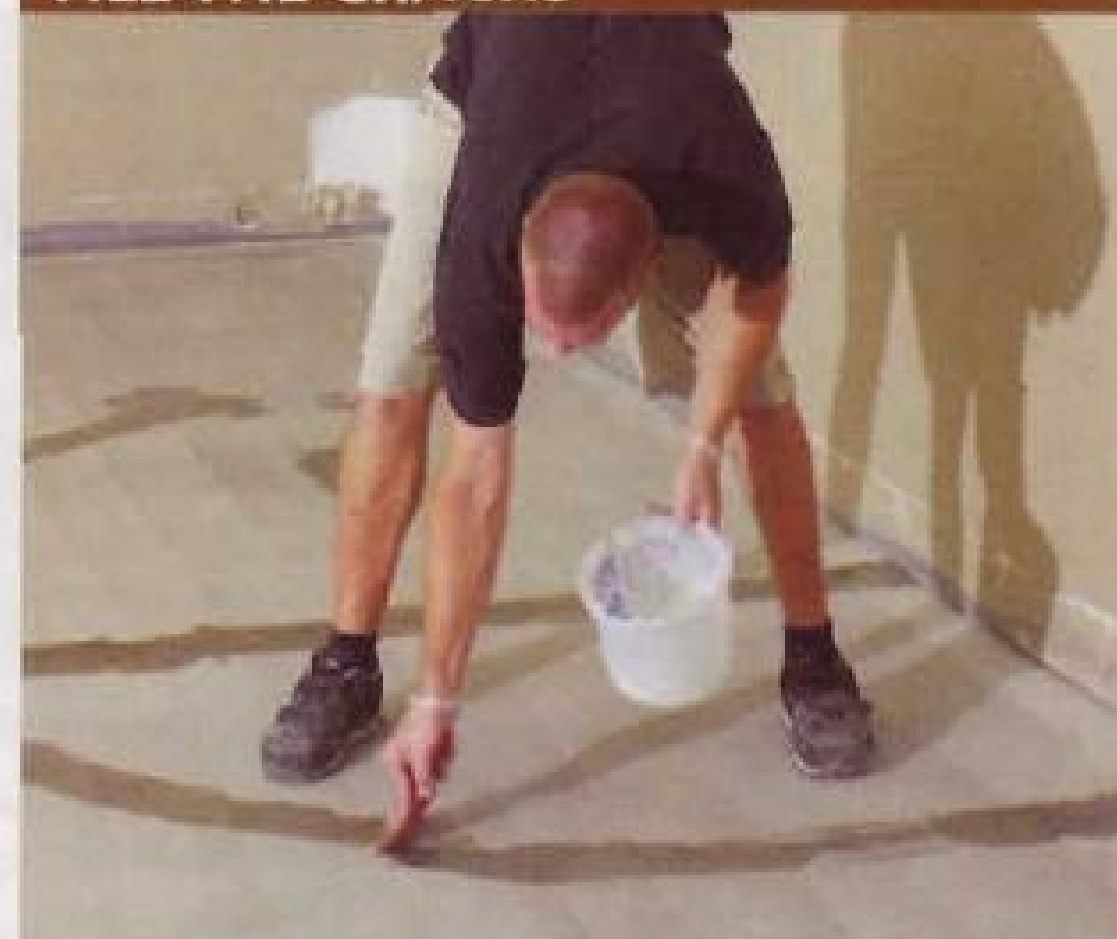
Regardless of your epoxy budget, make the most of your investment by following recommended preparation steps. A good tooth (bond)—opening up the concrete pores so the epoxy has something to grab on to—is what drives thorough preparation. Without a good tooth, you are apt to see the coating bubble up. This is especially evident if you drive a car with hot tires onto a poorly prepped floor.

The most common preparation is with muriatic acid (available at home centers and paint stores) or Quikrete Cleaner. You'll see the acid bubbling away on the concrete and smell the effects of something similar to rotten eggs. Be sure to ventilate your basement or garage properly, and thoroughly water-rinse the acid. Wait at least 24 hours before applying epoxy to be sure the concrete is completely dry.

If you must remove old paint or epoxy before applying a new coat, follow the tips described on these pages. If you're doing this yourself, plan for two days of preparation for a two-car garage.

Your floor will have a smoother appearance if you take time to fill cracks and the concrete saw cuts, as shown at *right*. Although some homeowners are satisfied with premium-quality caulking, Todd prefers a slurry of patching epoxy compound. "The problem with caulk is that eventually it will crack during expansion and contraction. Then your eyes go right to the crack! If the garage is on stable ground, I've found that epoxy is less prone to cracking. Just take your time, and do a good job."

FILL THE CRACKS



A slurry of patching epoxy compound replaces caulk and holds up well to seasonal expansion and contraction of the floor.

To establish a crisp edge of epoxy at the garage door, Todd rolls out 2"-wide painter's tape directly below the garage door. Then a second layer of tape goes on top of the first. To make sure the tape is sealed well, Todd suggests running a putty knife or drywall tool over the tape; this will prevent the epoxy from creeping beneath the tape.

To stand up against wear from at the garage door, Todd creates extra-deep trough of epoxy using a right-angle grinder and a diamond wheel, as shown at *right*.

With the floor back to Square One, the fun begins. And what could be more fun than a rose-colored floor?

Cut in the edges of the floor with a brush (*page 38*), then roll on the epoxy with a $\frac{3}{8}$ " nap cover. Professionals use an 18"-wide roller (twice the width of the standard roller). Most epoxy applications require two coats to cover.

While the first coat of 2-part epoxy is still wet, Todd and his crew sprinkle a custom rose-colored quartz (sand) over the entire 500-square-foot floor to provide additional traction. (What quartz doesn't stick gets swept up and sprinkled later over the second coat of wet epoxy.) After the final epoxy coat cures, a coat of satin polyurethane tops off the project. 🌳

Written by **Carl Voss**

GET A GOOD EDGE AT THE DOOR



To create additional depth for the epoxy coat beneath the overhead door, remove about $\frac{1}{16}$ " of concrete with a right-angle grinder and a diamond wheel. Two layers of 2"-wide blue painter's tape create a crisp edge to the epoxy.

SQUEEGEE AND ROLL



Joe spreads the first coat of red epoxy with a 24"-wide squeegee. While the epoxy is still wet, he uses an 18"-wide roller (twice the standard width) to even the coat. Strap-on cleats (similar to a golf shoe pattern) make walking easier on the wet epoxy.

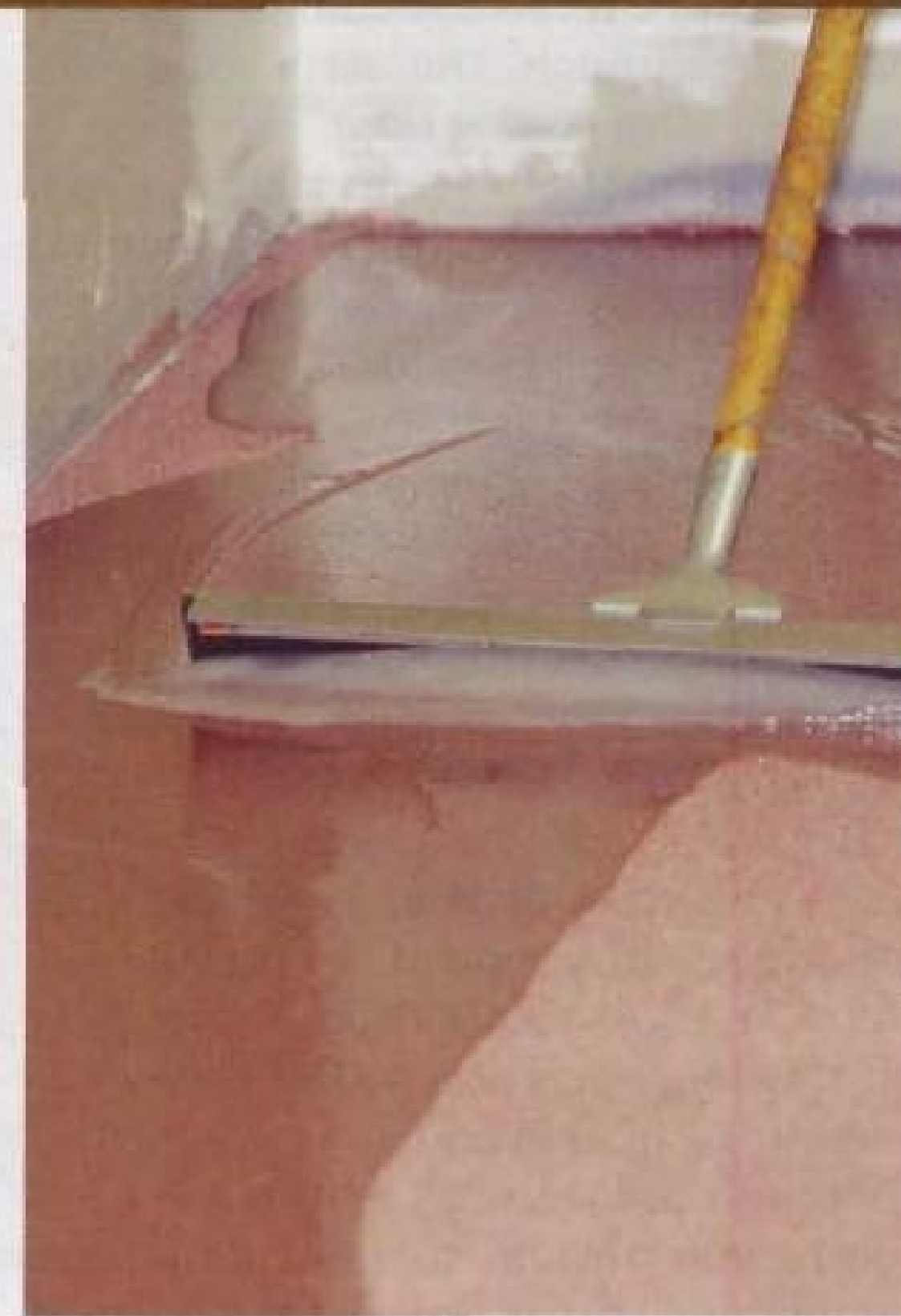
A SPRINKLE OF QUARTZ, THEN A COAT OF SATIN POLYURETHANE



While the first coat of epoxy is still wet, Joe McGuire dusts the entire garage floor with rose-colored quartz.



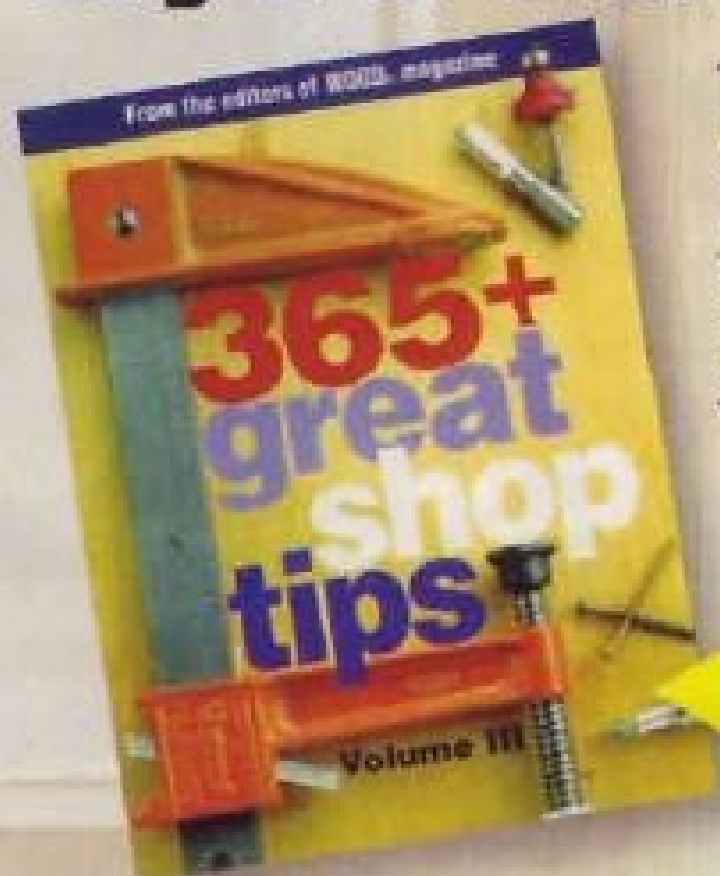
After the first coat cures overnight, Todd Walker sweeps up the loose rose-colored quartz that wasn't embedded in the epoxy.



Finally, Joe spreads a thin coat of clear polyurethane over the second coat of cured epoxy. The polyurethane adds luster.

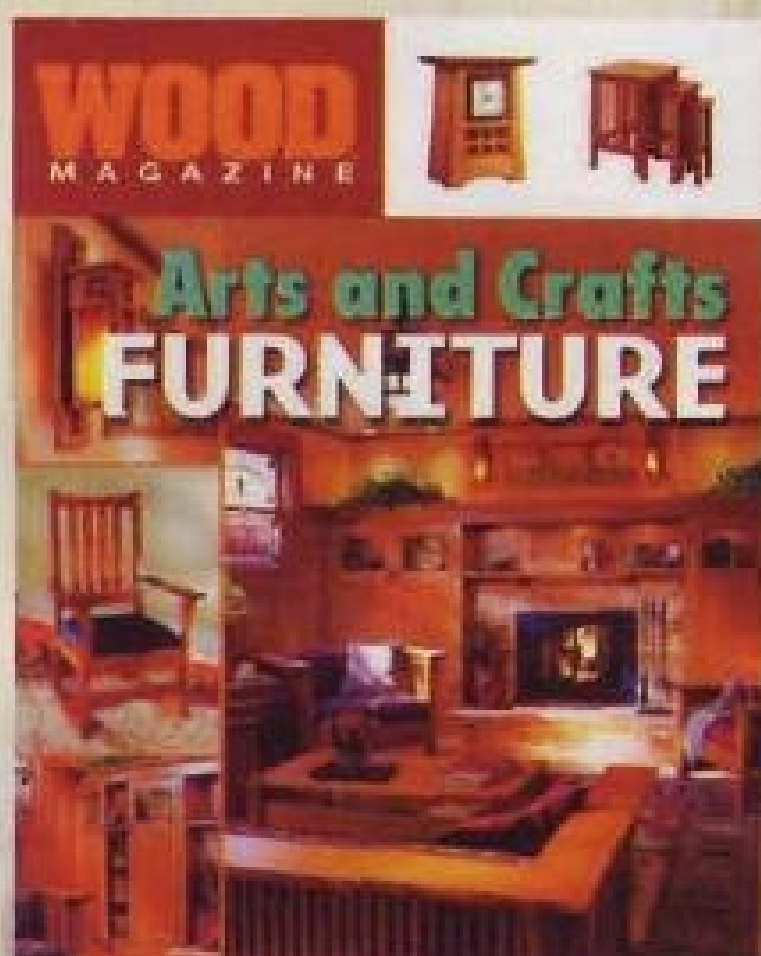
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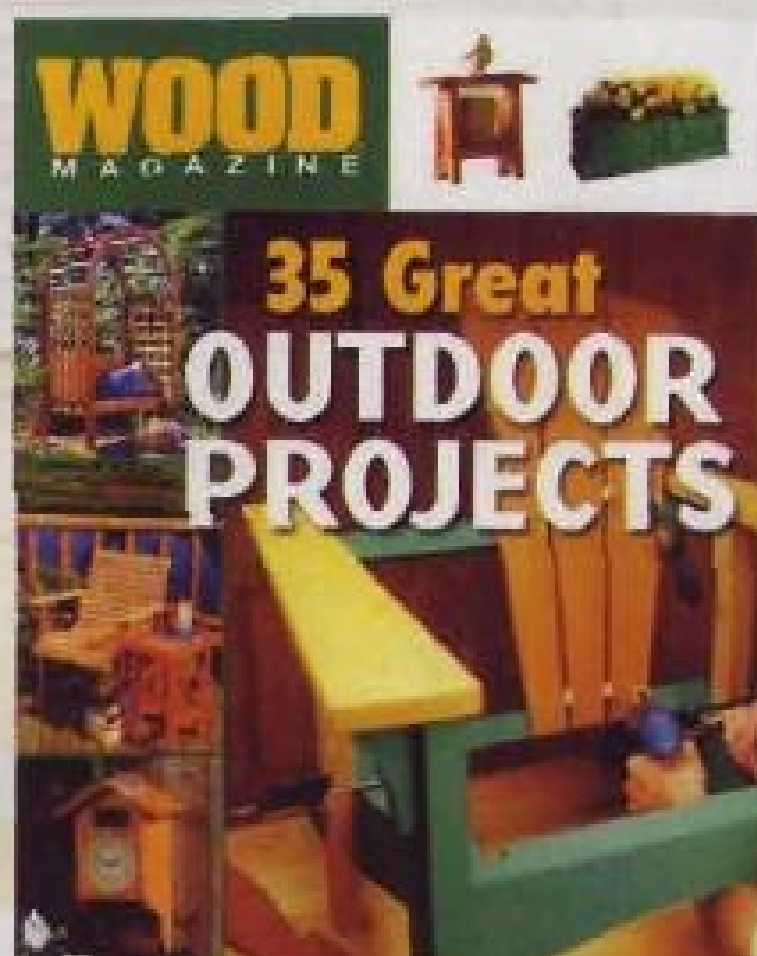


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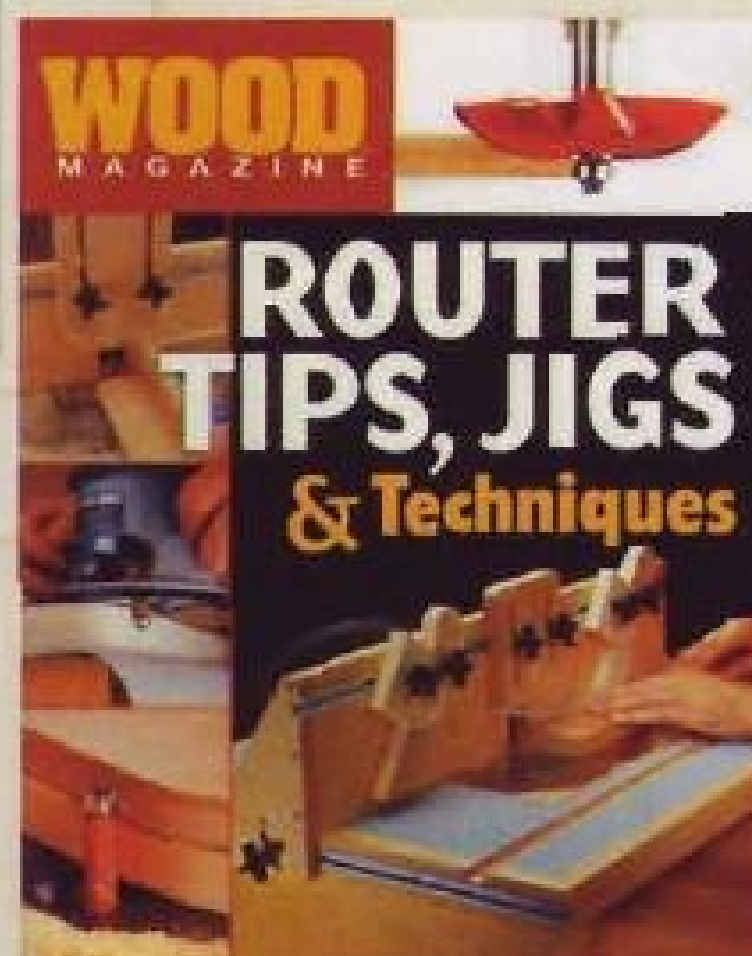
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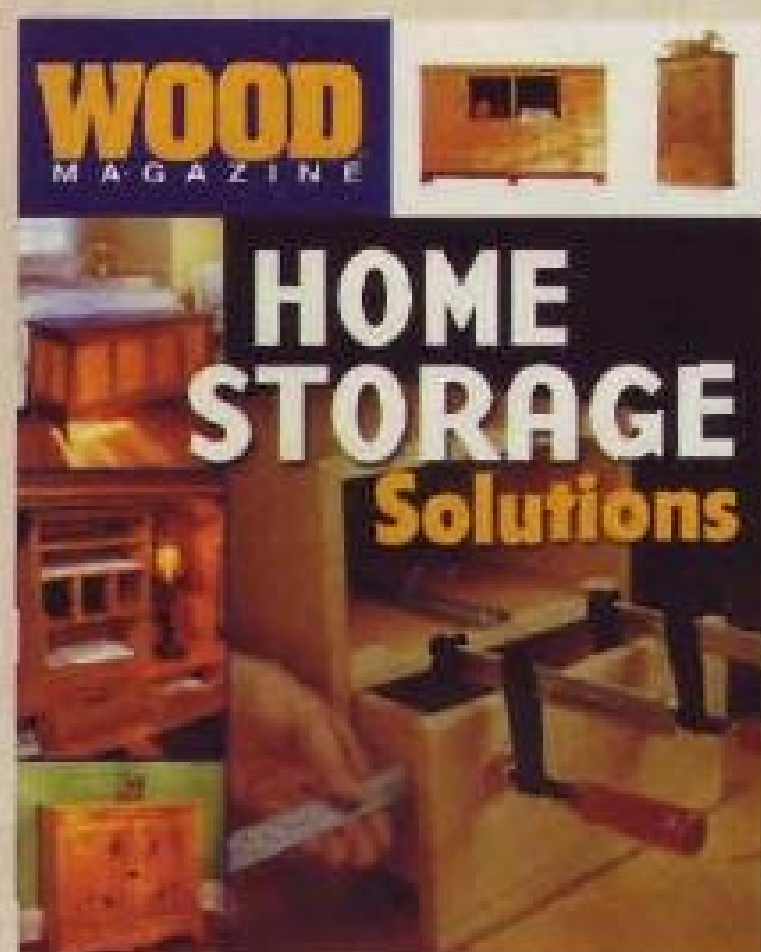
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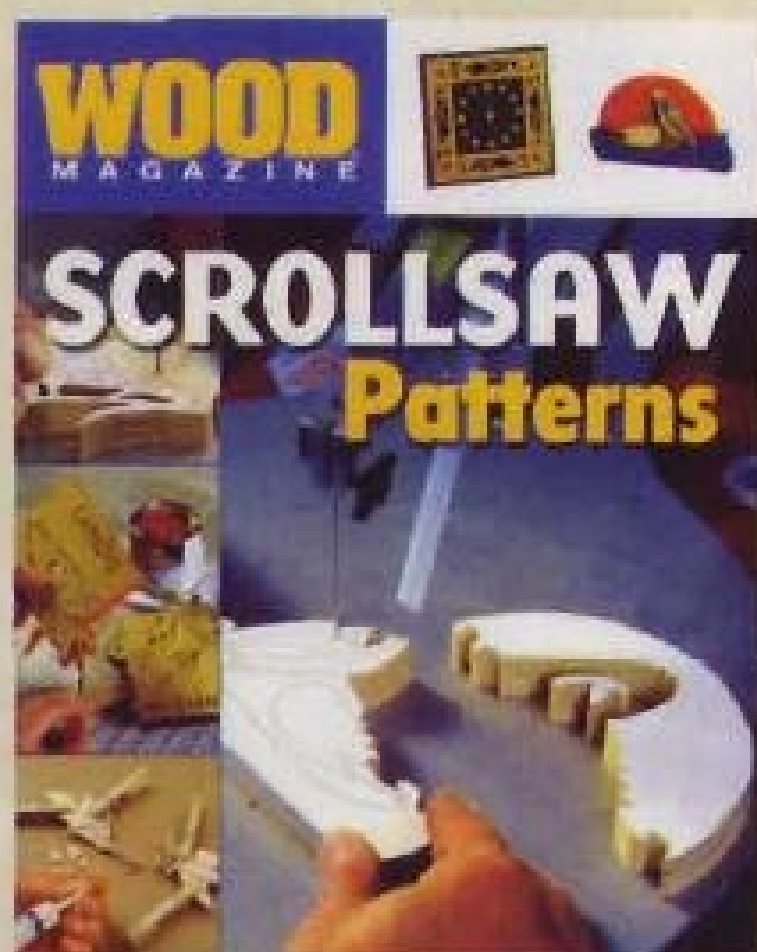
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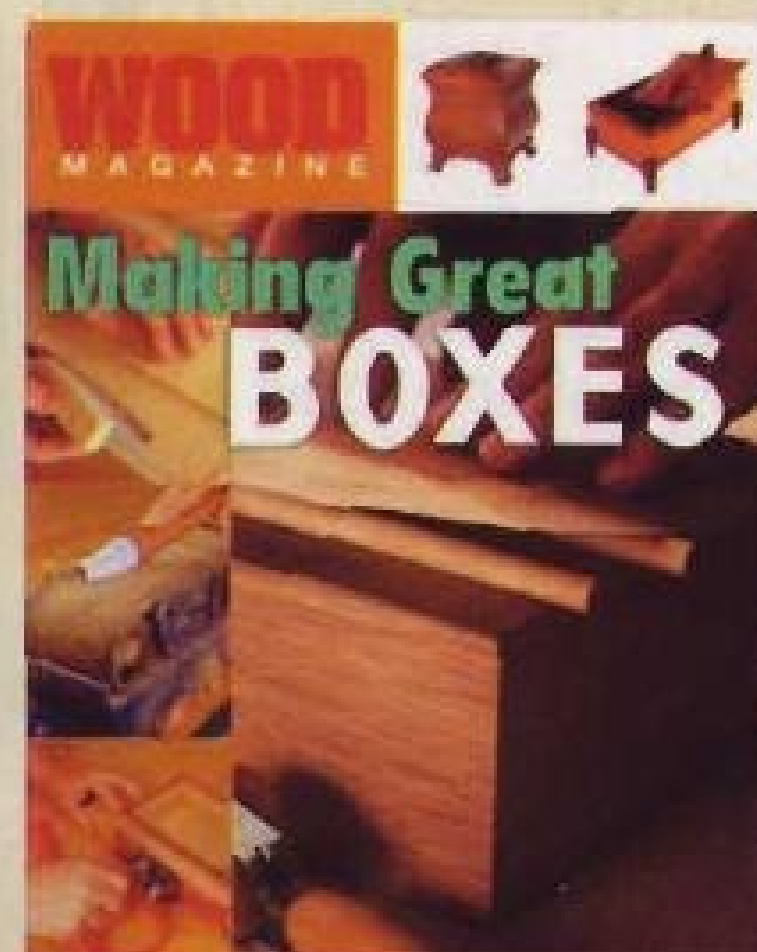
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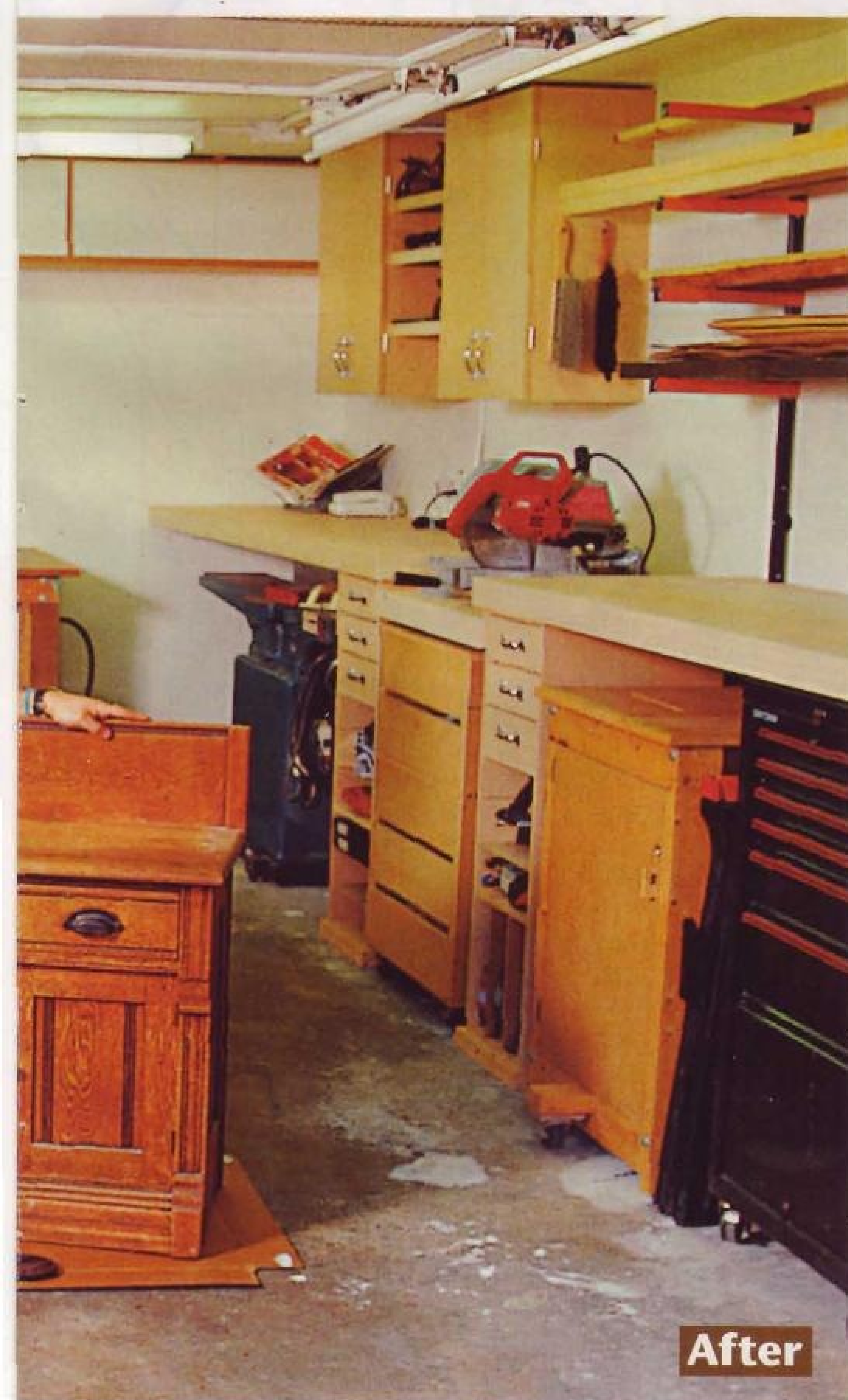
How to Unstuff a Garage in 2 Days



From a shambles to shipshape—we used a modest budget and a boatload of great ideas to restore order to a reader's disastrously unorganized garage shop. Adapt these same ideas in your shop to create an orderly space with ample room to move around.

The mission: Demonstrate that your dream workshop may be closer, and more affordable, than you think. To prove it's possible, we visited the shop of *WOOD*® magazine reader and Seattle woodworker Mark Lea. Upon first inspection, his one-car garage shop looked more like a storage locker (see the photo *above right*) than a functioning workshop. But after a single weekend, and for less than \$1,000, we transformed Mark's shop into a model of efficiency that even he barely recognized. To accomplish this feat, the five basic organizational principles (*opposite page*) were used to put things in order. Now, equipped with the ideas found here, you can do the same.





5 basic principles of workshop organization

Mobility—This makes a small shop work like a large one. To create mobility, mobile bases were added to Mark's tablesaw, 8" jointer, and 14" bandsaw. (The router, belt/disc sander, and planer already had wheels.) When the countertops and mitersaw station along one wall were added, resulting recesses served to house Mark's large jointer and roll-around cabinets. After two days, his shop had only three wheelless tools (the workbench, mitersaw station, and drill press).

Flexibility—Needs change from project to project and with each new tool purchase. The "Versa-cab" (see page 46) offers the maximum in flexibility. Shelves and drawers can be quickly relocated to meet changing storage needs. The Triton lumber-rack system (page 45) has movable arms. The large tool recess in the corner accommodates either Mark's mobile jointer or his mobile tablesaw.

Accessibility—Organization means little if you can't get to things easily. To create accessibility, we opened up Mark's floor space by creating sensible homes for all the large tools. (See the shop floor plan on page 44.) The open floor space dramatically improves workflow, providing obstruction-free access to all parts of Mark's shop.

Durability—There's no point to doing the work if it's not going to last. For the shop's worksurfaces, birch plywood was used with hardwood edge strips; for the cabinetry, $\frac{3}{4}$ " MDF with heavy-duty hardware. Mobile bases, made of welded steel for maximum strength and durability, made moving large, heavy tools easy. For protection of the bare wood surfaces of Mark's countertops and cabinets, he'll need to apply at least two coats of oil-based polyurethane to ensure lasting material stability.

Affordability—In addition to making sure that the shop components last, purchasing them at a low or reasonable price also proved important. (See "Where the money went" on page 49.) In Mark's shop, all the materials for the cabinetry and countertop cost less than \$440 for five cabinets, multiple drawers and shelving, and more than 32 square feet of countertop. Less than \$40 was spent on the plywood holder.



For a grid and tool templates to begin planning your shop, see woodmagazine.com/shoplout.

Prepare Your Shop

First, an overview of the shop overhaul

To best show you the improvements to Mark's shop, here's a diagram of the floor plan, plus photos that say it all. Use the project drawings shown throughout this article to build the key components.



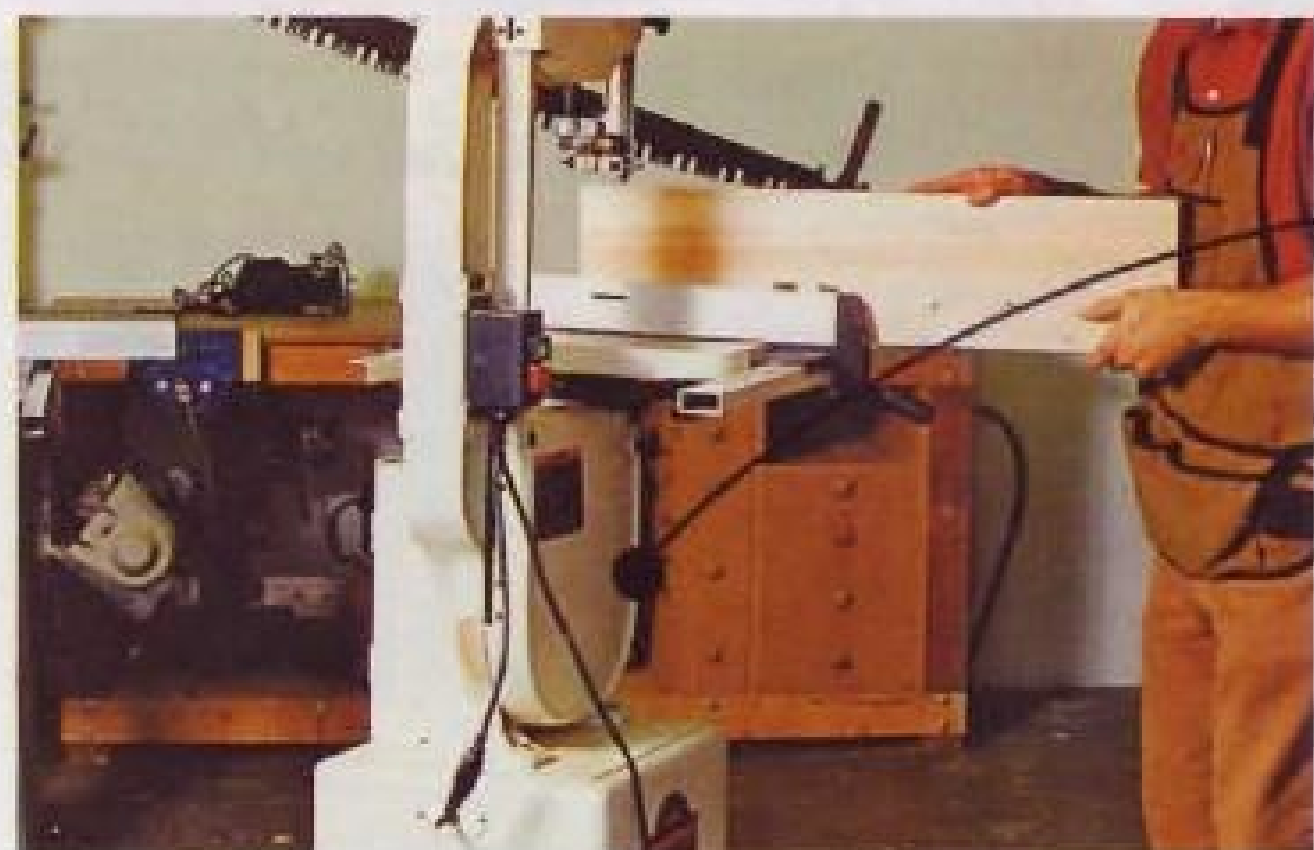
Project 1: VERSA-CAB SYSTEM

This customizable cabinet system, dubbed the "Versa-cab" (see page 46 for the plan), works as a wall or base cabinet. The cabinet's 15 $\frac{3}{4}$ "-deep top serves as a shelf for tool cases.



Project 3: SHEET-GOODS RACK

A long but shallow rack allows Mark to store full-size and partial sheet goods in spite of the shop's limited ceiling height of 7' 9". (See page 48 for the plan.) It includes a hinged containment stretcher for easy material removal. We even threw in extra storage for dowel rods that come in the form of two spaced sections of heavy-duty carpet tubing.

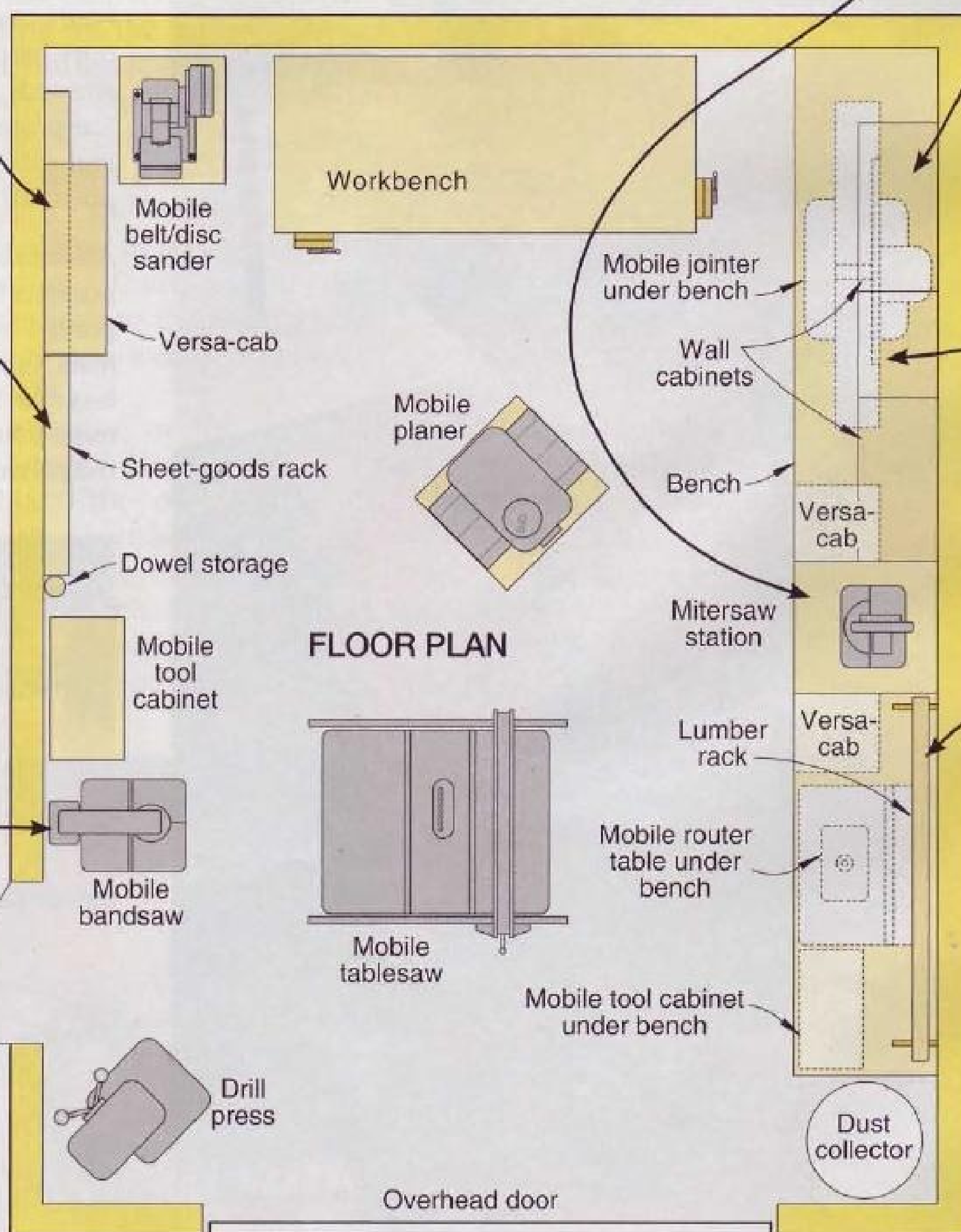


MOBILE BASES Three HTC mobile bases added to the larger power tools significantly improved Mark's workshop mobility. (chwilke.com or call 717-764-5000)



Project 2: MITERSAW WORKSTATION

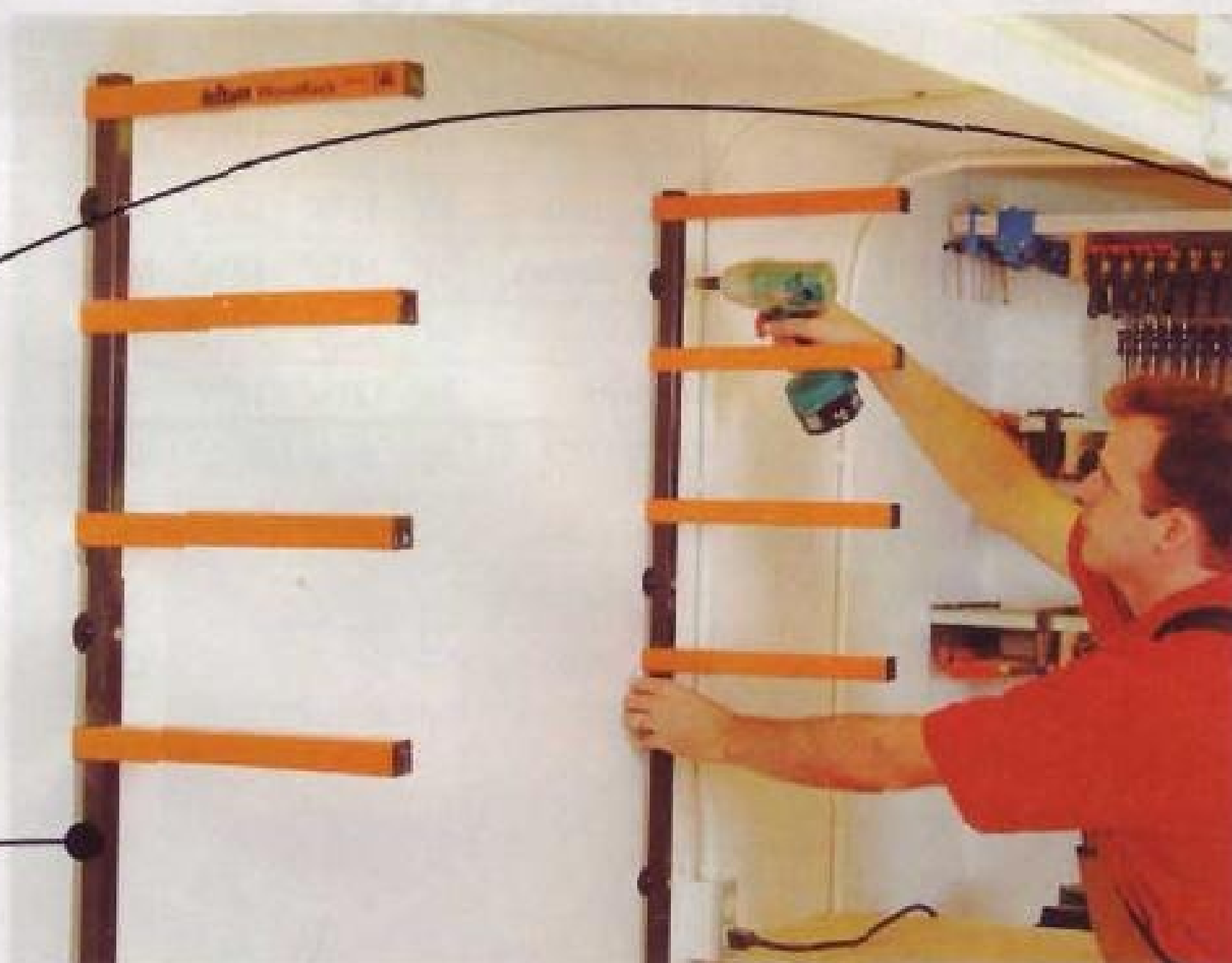
More than 32 square feet of countertop, not including the miter saw platform, were added to Mark's shop. As you can see from the photos, none of the space, either above or below the countertop, is wasted. Most miter saws benefit when they have permanent homes with plenty of work support on either side. Our miter saw platform, supported by neighboring "Versa-cab" base cabinets, is deceptively simple to build, and effective in function. (See page 47 for the plan.)





Project 4: WALL CABINET/OPEN SHELVES

Two simple wall cabinets perched above the countertops make a huge difference in the small shop's available storage space. Because surface-mounted conduit prevented us from mounting the cabinets together, we used the opportunity to add adjustable shelving between the two. As a final touch, shop brushes (not seen in this photo) find a handy home on the cabinet side. (See page 49 for construction details.)



LUMBER RACK Triton's sturdy lumber rack, mounted above the countertop, leaves Mark plenty of room for "current project" material, and those special boards set aside for an heirloom to come. (Visit rockler.com or call 800-279-4441.)



LARGE POWER-TOOL RECESS Leaving space underneath the countertops allowed us to store and protect Mark's 8" jointer. The space is large enough to alternate as a temporary home for the tablesaw as well.

Get Organized, Keep it That Way

Of all the features shown here, Mark Lea was most appreciative of his new bench that incorporated a mitersaw station. "It was really nice to have a full-length bench along the wall. But overall, I can't tell you how it meant

to me to have an organized shop. And I've kept it that way!"

Mark's shop also includes a 2-stage Delta dust collector on wheels that he moves from machine to machine. Mark also has a pancake compressor to run a variety of nailers.

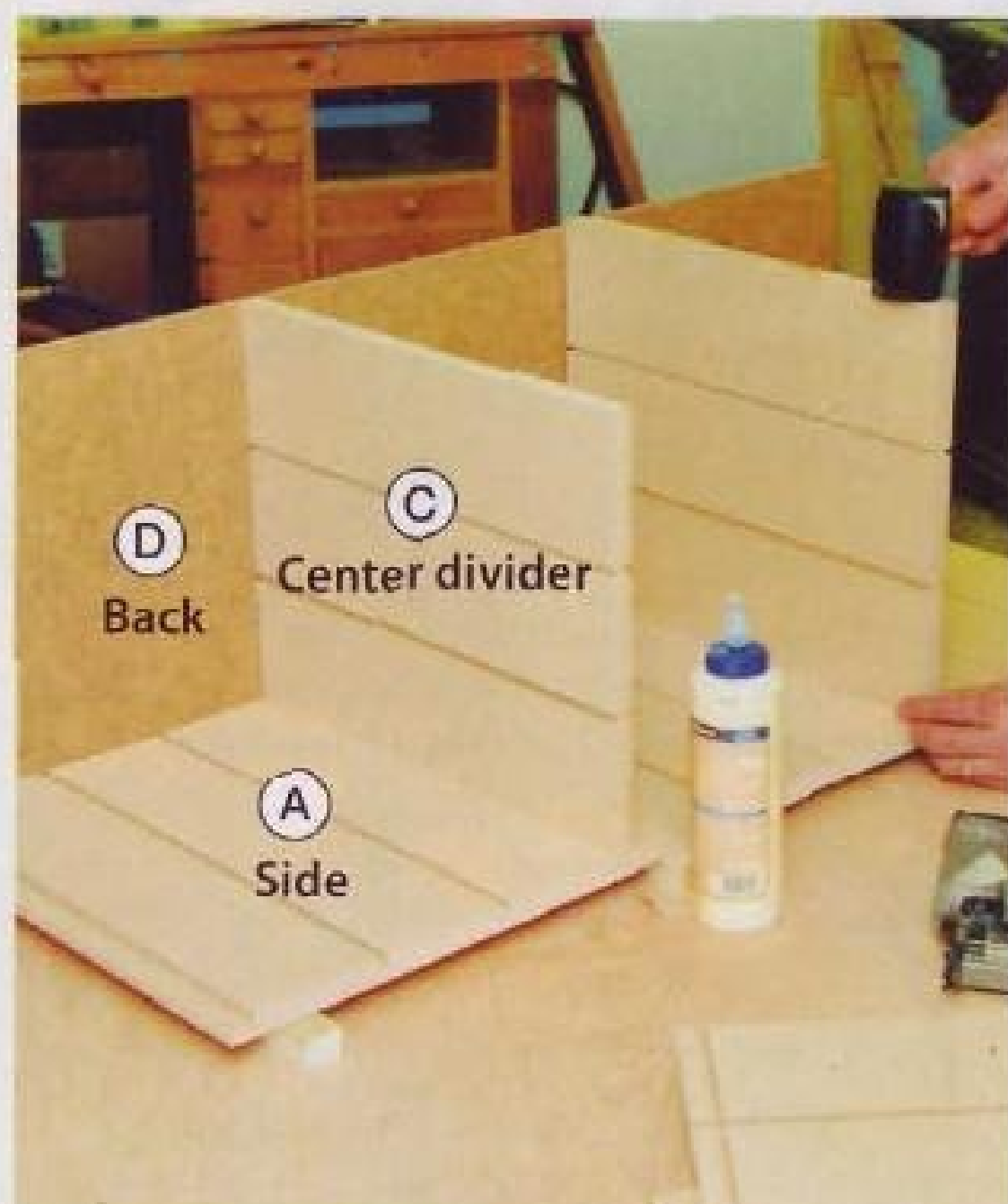
Mark recently moved into a new home, with a 2½-car detached garage that serves as his shop. All of the benches and fixtures shown on these pages moved to Mark's new space. The only major upgrade in his new shop is a gleaming epoxy floor.



Project 1: "VERSA-CAB" TOOL-CABINET SYSTEM

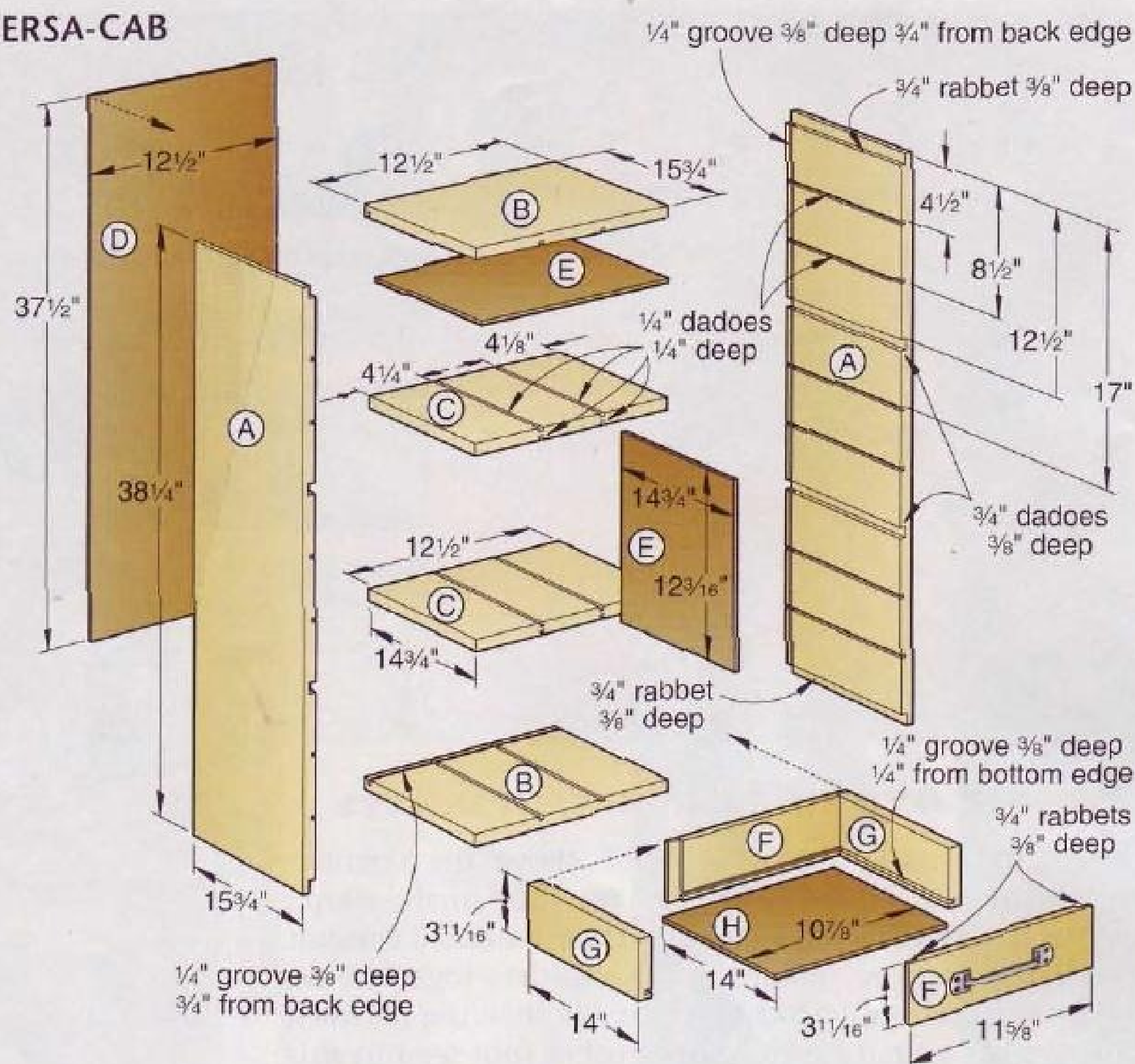
This simple cabinet design (**Drawing 1**) offers the ultimate in versatility; hence the name. It accommodates multiple drawers, shelves, or vertical dividers—or a mix of all three. Place it vertically as a base cabinet on the floor, or mount it vertically or horizontally on the wall. Because the dividers lay loosely in their slots, the layout of each cabinet can be quickly reconfigured to meet changing needs. The cabinet size makes optimum use of a sheet of medium-density fiberboard (MDF). The spacing between the dividers proves ideal for medium-size drawers and many smaller tools, tool cases, and other items.

Overall, the cabinet measures (when vertical) 15 $\frac{3}{4}$ " deep, 13 $\frac{3}{4}$ " wide, and 38 $\frac{1}{4}$ " high. At its most basic, it has three equal compartments of 11 $\frac{3}{4}$ "x11 $\frac{3}{4}$ "x14 $\frac{3}{4}$ ". The individual spaces, with dividers installed, are 3 $\frac{3}{4}$ " wide. When routing the $\frac{1}{4}$ " wide, $\frac{3}{8}$ " deep



Assemble the Versa-cab by gluing and fitting the center dividers (C) and the cabinet back (D) into the sides (A). Glue and nail the dividers and cabinet ends, square the cabinet, and then nail through the back into the dividers to stiffen the cabinet.

1 VERSA-CAB



grooves for the cabinet backs and drawer bottoms, make certain the $\frac{1}{4}$ " hardboard fits somewhat loosely into the grooves. If the fit is too tight, the remaining lip may split away from the MDF. As you assemble the cabinet carcass and the drawer boxes, glue the $\frac{1}{4}$ " hardboard into the grooves to provide extra strength.

We found that once all the parts are cut and routed, and assuming you have a finish nailer, each cabinet, including three drawer boxes, can be assembled in about an hour.

Materials List

Versa-cab		FINISHED SIZE			Matl.	Qty.
		T	W	L		
A	sides	$\frac{3}{4}$ "	15 $\frac{3}{4}$ "	38 $\frac{1}{4}$ "	MDF	2
B	top and bottom	$\frac{3}{4}$ "	15 $\frac{3}{4}$ "	12 $\frac{1}{2}$ "	MDF	2
C	center dividers	$\frac{3}{4}$ "	14 $\frac{3}{4}$ "	12 $\frac{1}{2}$ "	MDF	2
D	back	$\frac{1}{4}$ "	12 $\frac{1}{2}$ "	37 $\frac{1}{2}$ "	HB	1
E	partitions	$\frac{1}{4}$ "	12 $\frac{3}{16}$ "	14 $\frac{3}{4}$ "	HB	6
F*	drawer front and back	$\frac{3}{4}$ "	3 $\frac{11}{16}$ "	11 $\frac{5}{8}$ "	MDF	2
G*	drawer sides	$\frac{3}{4}$ "	3 $\frac{11}{16}$ "	14"	MDF	2
H*	drawer bottoms	$\frac{1}{4}$ "	10 $\frac{7}{8}$ "	14"	HB	1

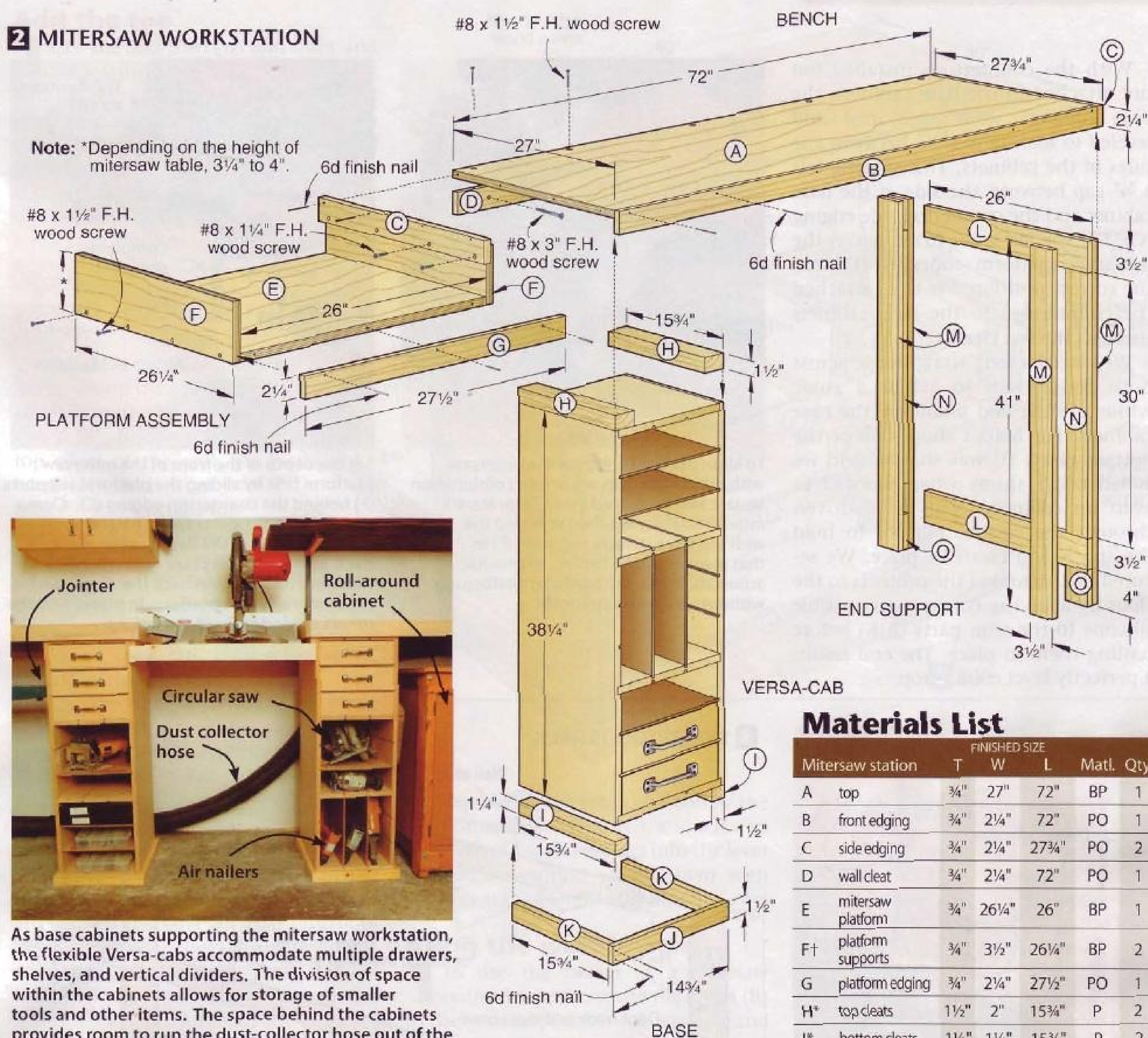
* Quantity for one drawer.

Materials key: MDF—medium-density fiberboard, HB—hardboard.



For wall installation, add a horizontal cleat inside the cabinet and to its back, securing it to the sides. Then drive screws through the cleat and back and into the wall studs. To increase the versatility of the partitions, add a dowel for storing circular-saw blades of 10" or less.

2 MITERSAW WORKSTATION



As base cabinets supporting the miter saw workstation, the flexible Versa-cabs accommodate multiple drawers, shelves, and vertical dividers. The division of space within the cabinets allows for storage of smaller tools and other items. The space behind the cabinets provides room to run the dust-collector hose out of the way and to the jointer.

Project 2: MITERSAW WORKSTATION

As with most workshops, the miter saw serves as one of the busiest tools in Mark's shop, and it needed a permanent home. Mark needed additional work surface and storage capacity. These needs were met by installing a miter saw workstation along the 18' right-hand wall (looking in from the garage doorway). The miter saw workstation was centered on the wall to allow maximum cutting length to the left or right.

Two Versa-cabs (**Drawing 1**) installed as base cabinets support the countertops on either side of the miter saw. Wall cleats (D) were screwed into studs

to support the outside end of the left countertop and the countertop back. If you don't carry the countertop all the way to the corner, build the end support (**Drawing 2**). Either solution will provide firm support.

Mark's shop had an uneven and sloped concrete floor that required a little extra effort when setting the base cabinets. To solve the problem, the position of the base cabinets was located, and then measured up from the highest spot on the floor. The top of the wall cleat was positioned 41" from this high spot to allow the Versa-cab base cabinets to fit

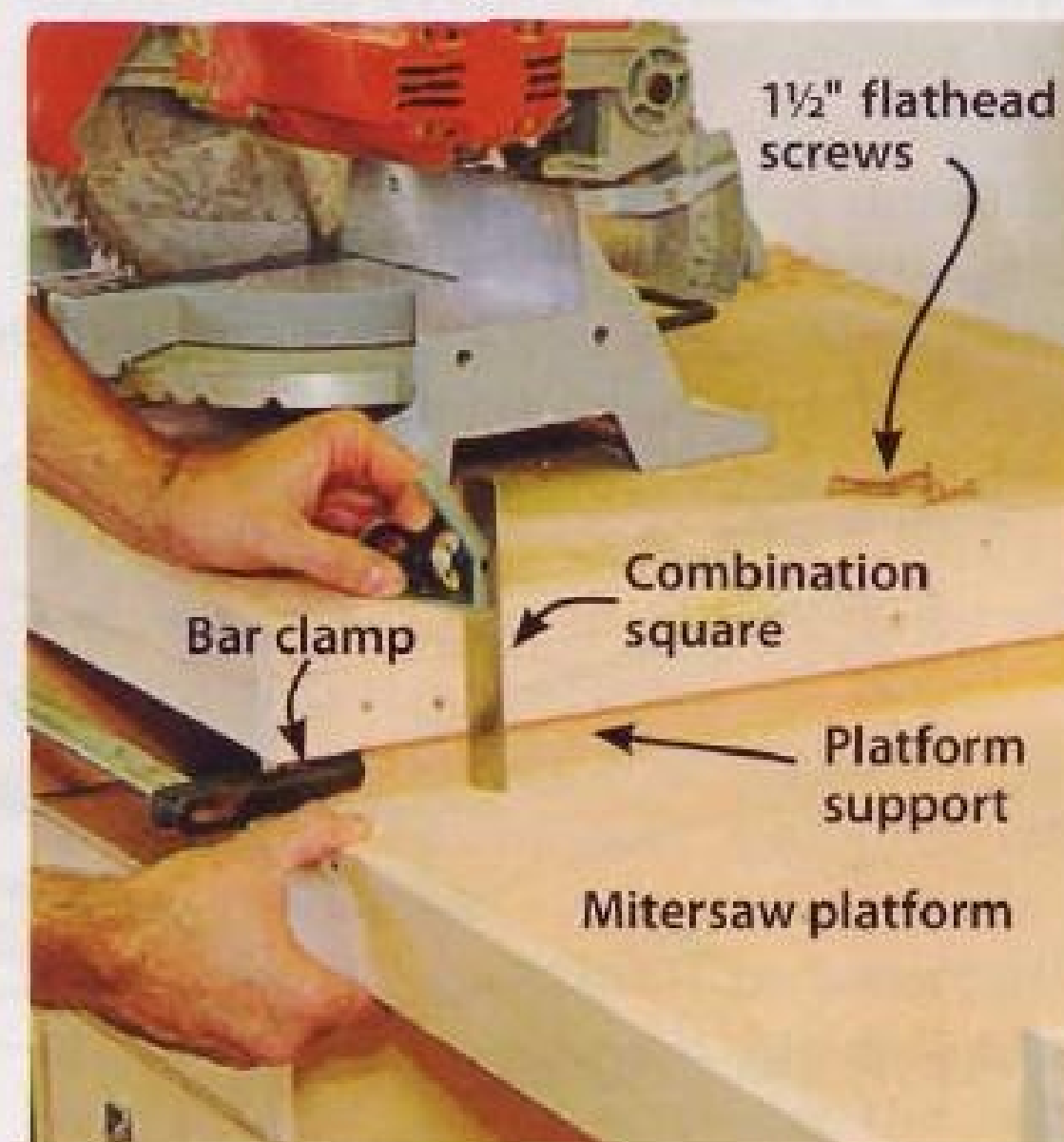
underneath the countertop (**Drawing 2**). Next, a 48"-long level line was drawn from this mark. We lengthened the level line across the entire wall with a chalk line, and used the mark to install the wall cleats. Because of this floor variation, the height of the end supports was adjusted until level with the line.

With the countertops installed but not attached to the base cabinets, the base cabinets were positioned and leveled to maintain 27½" between the sides of the cabinets. This spacing left a ¾" gap between the side of the base cabinet and the countertop side edging (C). The gap left space to maneuver the mitersaw platform supports (F) into the correct position. We then attached the countertops to the base cabinets through the top cleats (H).

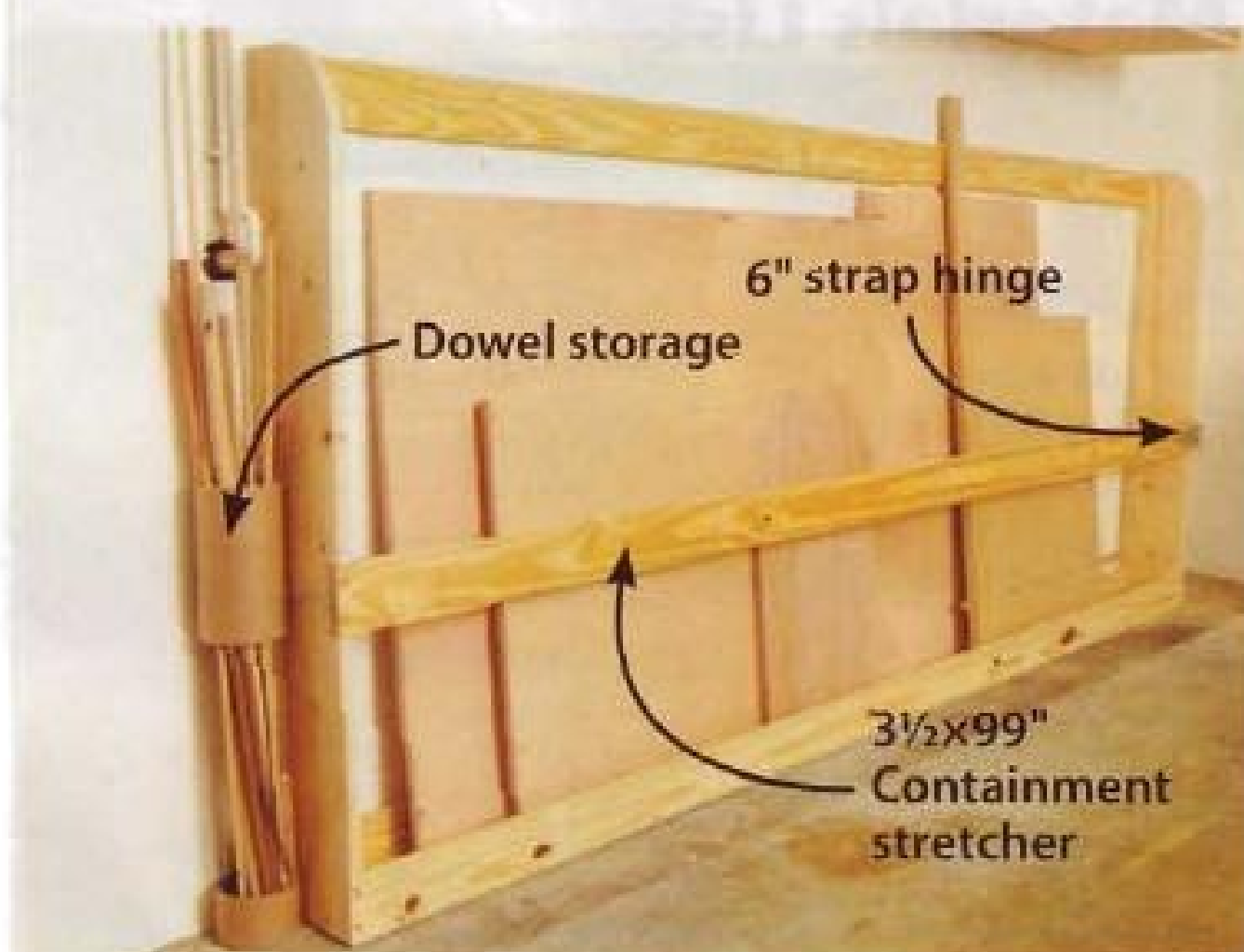
We placed a long straightedge across both countertops to act as a guide while leveling and plumbing the base cabinets. For Mark's shop, one of the bottom cleats (I) was shaved, and we added cedar shims where needed to even up cabinets. Nails were driven through the cabinet bottom to hold the shims and cleats in place. We secured the bottom of the cabinets to the floor by applying concrete-compatible silicone to the trim parts (J, K) before nailing them in place. The end result: a perfectly level countertop.



To align the top surface of the mitersaw with the countertop, we used a combination square and measured down from Mark's mitersaw table. We then trimmed the width of the platform supports (F) to that measurement, less ¼", to provide adjustability for the platform positioning without sacrificing strength.



Set the depth of the front of the mitersaw platform first by sliding the platform supports (F) behind the countertop edging (C). Clamp the platform supports to the neighboring cabinet sides. Set the depth of the platform's back, and screw it in place at that location. Return to the front, recheck the depth, and finish screwing the platform in place. Add the mitersaw, and recheck the height.



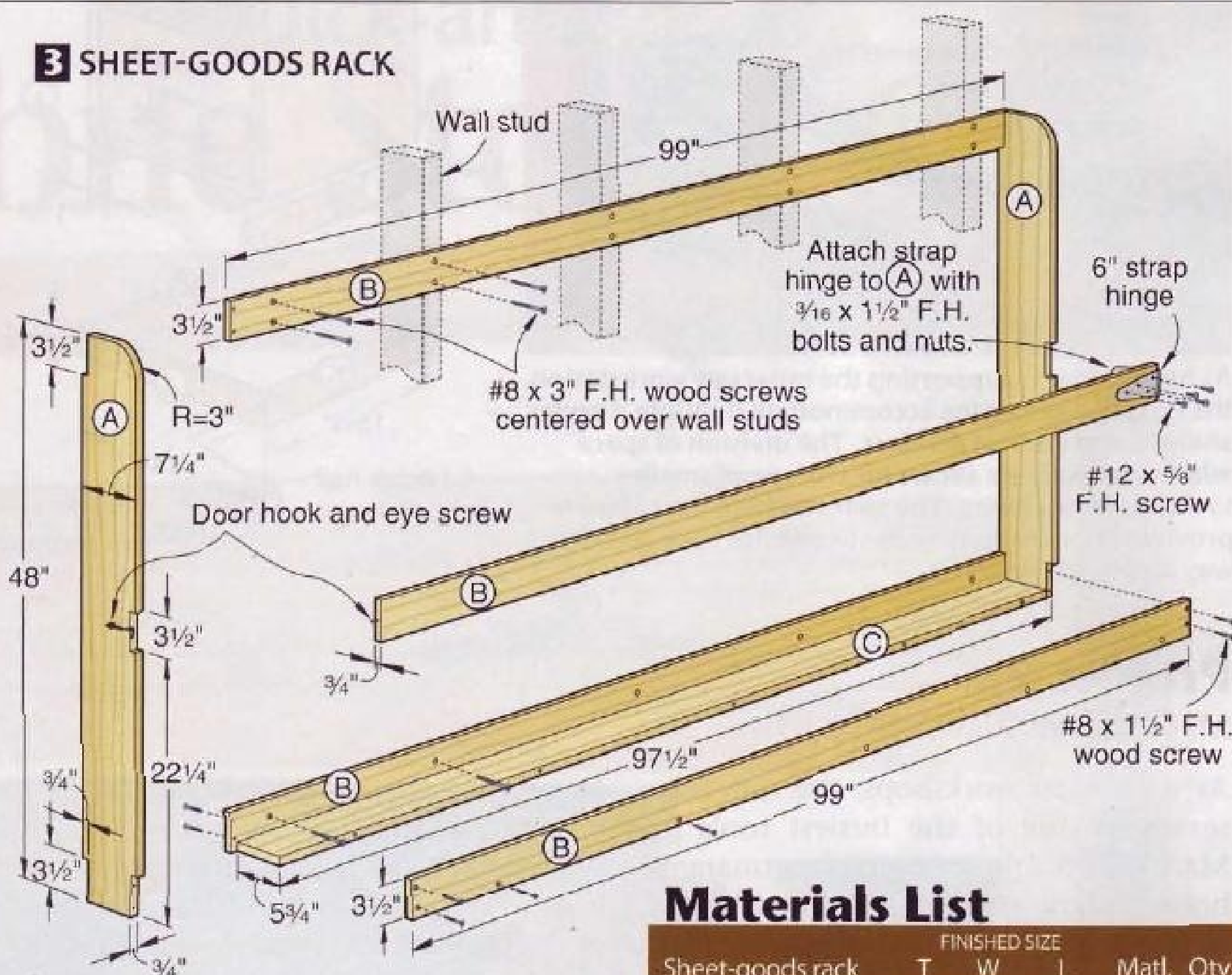
The lower (containment) stretcher (B) of the sheet-goods rack is held in place by a 6" strap hinge bolted to the rack's side and a hook and eye at the other end.

Project 3: SHEET-GOODS RACK

Every shop needs a place to store sheet goods, including sheet-good scraps. Mark's shop is no exception. However, the limited ceiling height (7' 9") of Mark's garage shop required some special considerations. To meet that need, we built a rack for horizontal storage with enough space inside for 97"-long sheets of MDF (**Drawing 3**).

Because the wall-mounted Versa-Cab above the rack prevents placing full sheets in the holder by lifting them over the lower containment stretcher,

3 SHEET-GOODS RACK



we designed a "swing-out" containment stretcher (B) that improves the accessibility of the rack.

The trough at the bottom of the rack contains the materials in a defined and generous space. The rear stretcher at the top allows you to firmly mount the rack to wall studs. For added versatility, we also mounted two short

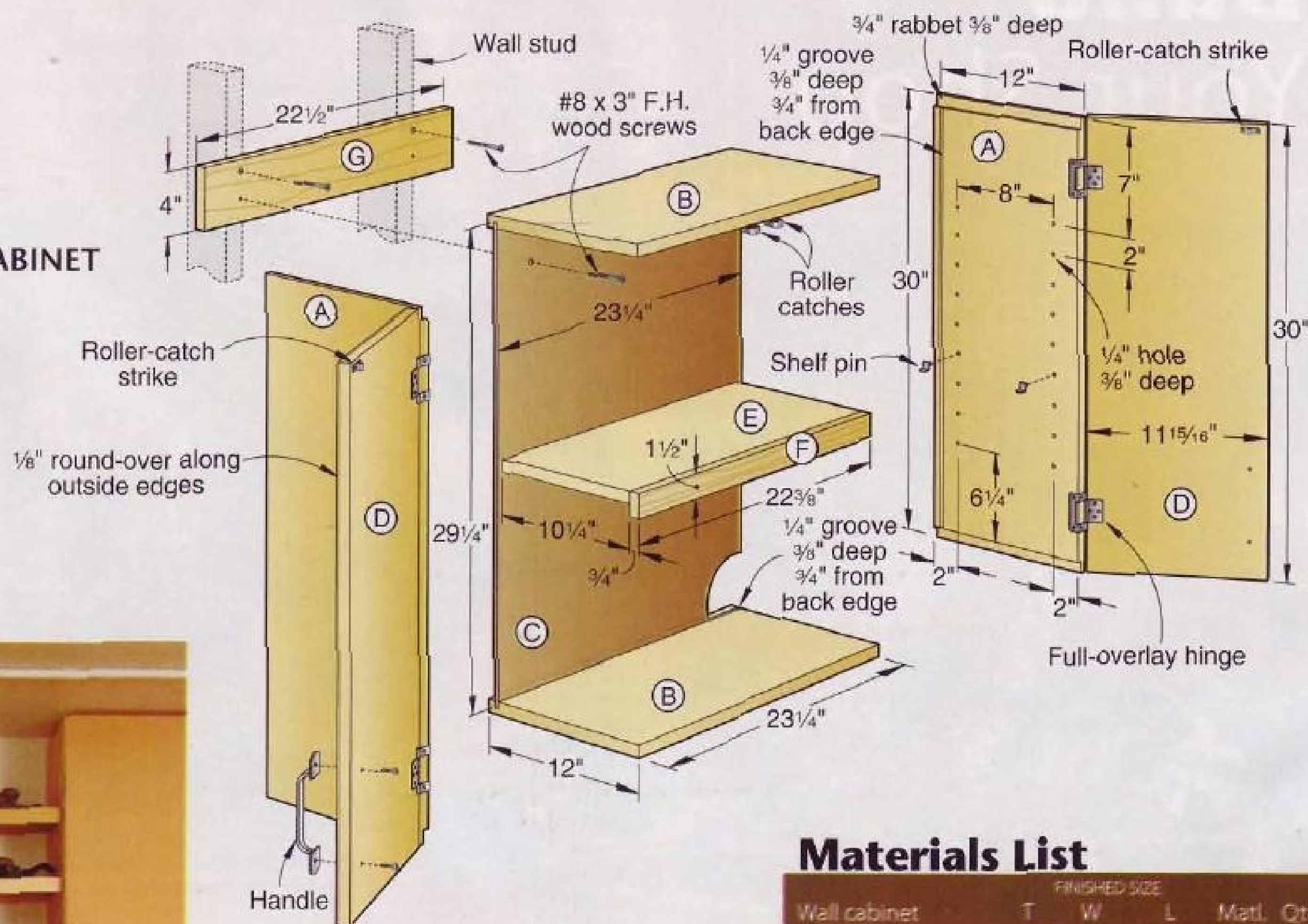
Materials List

Sheet-goods rack		FINISHED SIZE			Matl.	Qty.
		T	W	L		
A	sides	¾"	7¼"	48"	P	2
B	stretchers	¾"	3½"	99"	P	4
C	bottom	¾"	5¾"	97½"	P	1

Material key: P-pine.

sections of heavy-duty cardboard carpet tubing (shown in the photo on page 44 and at left) to the side for containing dowels and other thin-strip material.

4 WALL CABINET



Materials List

Wall cabinet	FINISHED SIZE			Mater.	Qty.
	T	W	L		
A sides	3/4"	12"	30"	MDF	2
B top and bottom	3/4"	12"	23 1/4"	MDF	2
C back	1/4"	23 1/4"	29 1/4"	HB	1
D doors	3/4"	11 5/16"	30"	MDF	2
E* shelves	3/4"	10 1/4"	22 3/8"	MDF	2
F* shelf edging	3/4"	1 1/2"	22 3/8"	PO	2
G wall cleat	3/4"	4"	22 1/2"	PO	1

* Optional shelf and shelf edging quantity, depending on need.

Materials key: MDF—medium-density fiberboard, HB—hardboard, PO—poplar.

Project 4: WALL CABINET

Most shops require at least some degree of protected storage where dust can't enter. This wall cabinet meets that need simply, affordably, and quickly.

Cut the parts shown in **Drawing 4** to size. If you're making a pair of cabinets that support shelving in between, first determine which cabinet sides will support the shelving. On these sides, drill the holes for the shelf pins all the way through, where shown. This

way, the holes can house a shelf pin on either side. Next, drill 1/4" holes 3/8" deep on the interior faces of the opposing cabinet sides.

Assemble the cabinet carcass and dry-fit the 1/4" back in place to ensure that it's not so tight as to risk splitting off the lip behind. Then, glue the 1/4" backing into the 1/4" grooves, and glue and nail the sides, top, and bottom together. To ease assembly and hanging, align and predrill the hinge holes for the doors, but don't mount the doors until after hanging the cabinet. Install the cleat on the cabinet by using glue and nailing into the ends of the cleat and into the cabinet sides.

Using 3" deck screws, we installed the cabinets to wall studs, where shown, checking for level. 🌳

Written by **Mike Satterwhite**
Project designs: **Kevin Boyle**
Illustrations: **Roxanne LeMoine; Lorna Johnson**
Photographs: **Richard McNamee**

Where the money went

All in all, the workover at Mark's workshop was limited to a budget of \$1,000, making the changes affordable. There was even cash left over. Here's what had to be purchased to put things in order:

Bandsaw mobile base	\$106
Jointer mobile base	106
Tablesaw mobile base	80
3/4" medium-density fiberboard (MDF) (5 sheets)	142
1/4" hardboard (4 sheets)	47
3/4" birch plywood (3 sheets)	108
3/4" poplar and pine	76
Triton lumber rack	82
Assorted hardware	84
TOTAL	\$831

Build Your Shop

50 One-Day Workbench
56 Tool Carousel
60 Bench-Tool System
65 Rolling Workshop Storage
66 Shop Cart
70 Tool Cabinet

75 Stool & Tool-Tote Combo
76 Tablesaw Workbench
82 Mobile Storage
84 Mobile Tool Cabinet
90 Orbital-Sander Rest
91 Sheets Goods Mover/ Lifter



One-Day Workbench

cheap as dirt, solid as a rock



Corner or straight bench: it's your choice

This article shows you how to make the corner bench shown *opposite*. If you prefer a straight bench (shown at *left*), follow the same instructions, but make two right bases (A), two ends (C), and the long top (D). Omit the biscuit slots in (D). Use the cutouts from the right bases (A) to make two long base shelves (F). Fit your straight bench with optional shelves at each end by making the long and short cleats (H, I) and the long and short shelves (J, K) from the extra particleboard.

For the items needed to build this project, see the Materials List and Cutting Diagram on *page 55*.

Cut out the bench parts

1 Temporarily fasten 4'-long 2×4 extensions to a pair of sawhorses, and lay a sheet of $\frac{3}{4}$ " particleboard across them. The extensions will support both the workbench parts and the cutoffs as you work. Referring to the **Materials List**, mark the width of the right base (A) on the sheet.

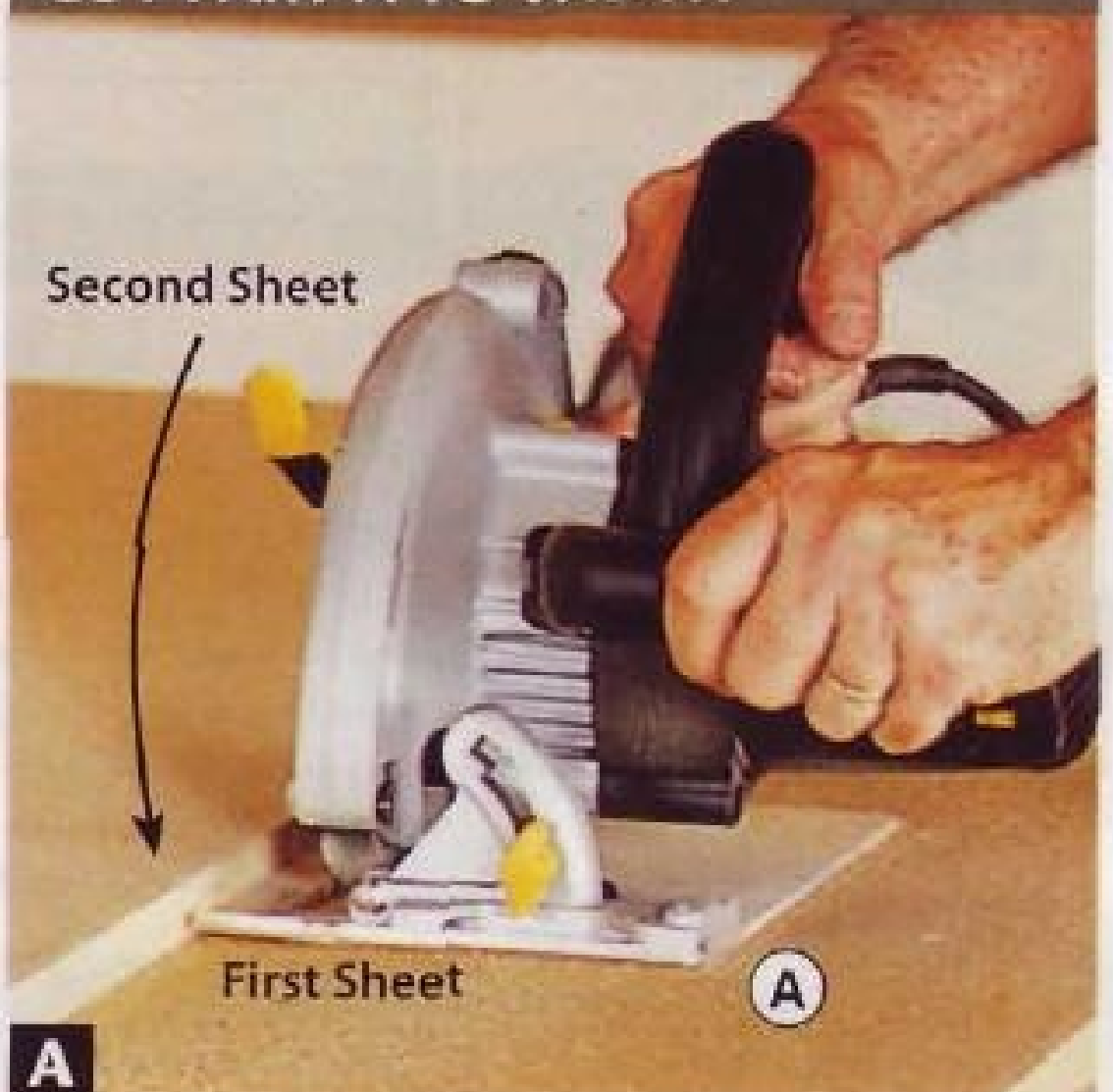
2 Measure the distance from the right edge of your circular saw's shoe to the right side of the blade. Lay a second sheet of particleboard onto the first, offsetting it from the A marked width on Part A by the distance you measured on your circular saw. Clamp the second sheet to the first, and cut part A to width.

3 Using the cutoff from the first part A as a straightedge, clamp it to the other sheets (**Photo A**), offsetting it your measured distance from the parts' dimensions. Cut the rest of the parts A, B, C, D, and E to size.

4 Lay out the end and center cutouts on the right bases (A) and left bases (B) (**Drawing 1**). Drill blade-start holes and jigsaw the cutouts, or see the **Shop Tip** on *page 55* for making inside cuts with your circular saw.

5 True up one edge of the four base center cutouts. Cut the upper and lower long base shelves (F) out of the cutouts from the right bases (A), and the upper and lower short base shelves (G) out of the cutouts from the left bases (B) (**Drawing 1**).

CUT PART A TO WIDTH



Using the edge of a second sheet to guide your saw, cut the first part A to width. Save the cutoff as a straightedge for cutting the other parts.

ROUT THE SLOT



With the slot template (painted green for clarity in this photo) guiding the flush-trim bit's pilot bearing, rout the slot in the end (C).

Form interlocking slots

1 Make the slot template (**Drawing 1**) from leftover particleboard. To cut the slot as accurately as possible, use a jigsaw and straightedge. Mark the outside corner, where shown.

2 Retrieve one of the ends (C), and clamp the template to it, aligning the template's marked corner with one of the part's corners. Chuck a $\frac{1}{2}$ " flush-trim bit into your handheld router, and rout the $\frac{13}{16}$ "-wide slot (**Photo B**). In the same manner, rout the other three slots (**Drawing 1**), flipping the template as needed.

3 Using the slotted end (C) as a template, clamp it in turn to the other part C and the two left bases (B), and rout the slots into those parts, where dimensioned (**Drawing 1**).

Rout, drill, slot, finish, and assemble

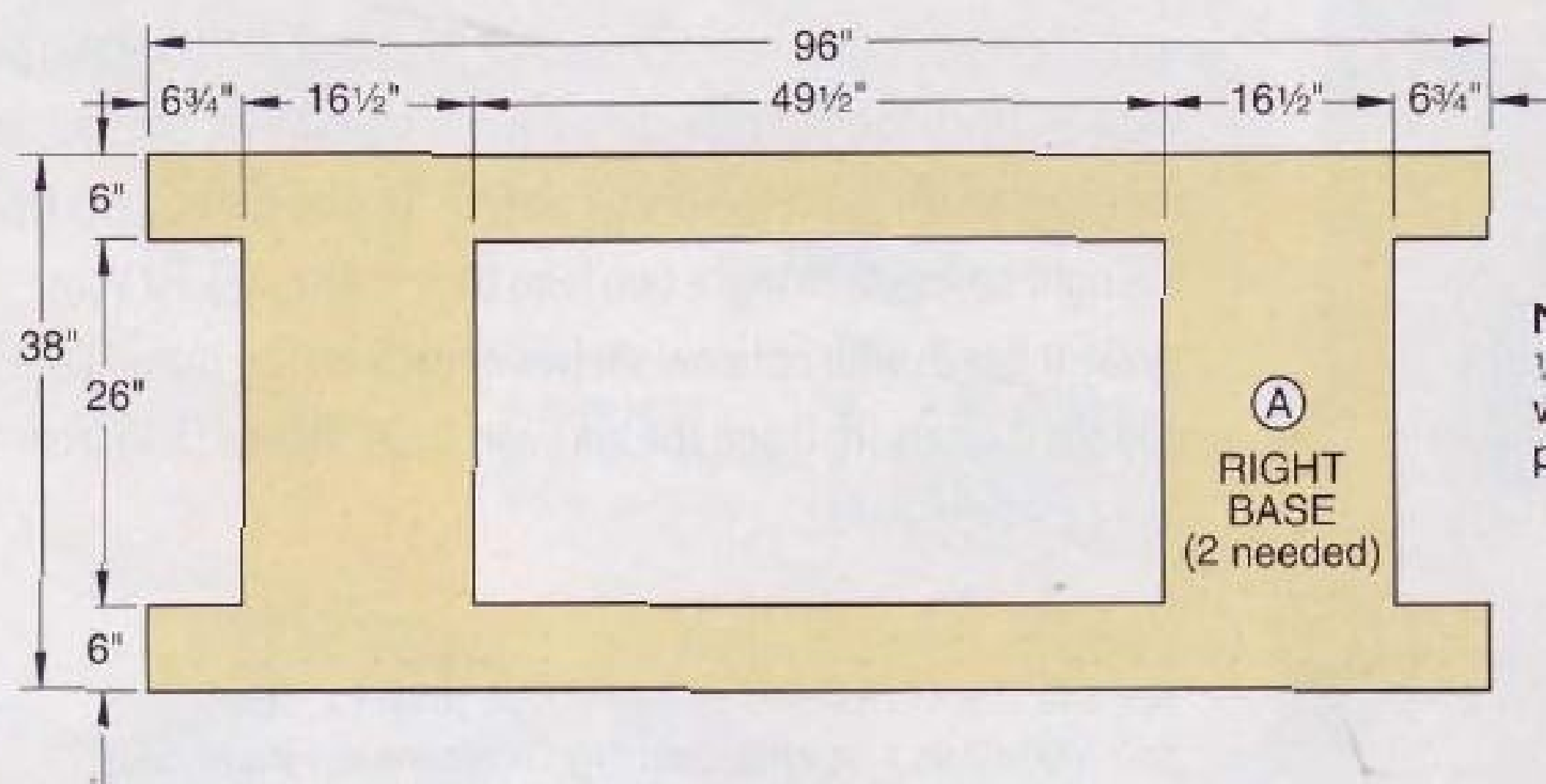
1 Chuck a $\frac{1}{8}$ " round-over bit into your handheld router, and rout all edges of parts A, B, C, F, and G. On the long top (D) and short top (E), rout all the edges except where the two tops butt together, where indicated (**Drawings 1 and 2**).

2 Drill $\frac{5}{32}$ " countersunk shank holes into parts D, E, F, and G (**Drawing 1**).

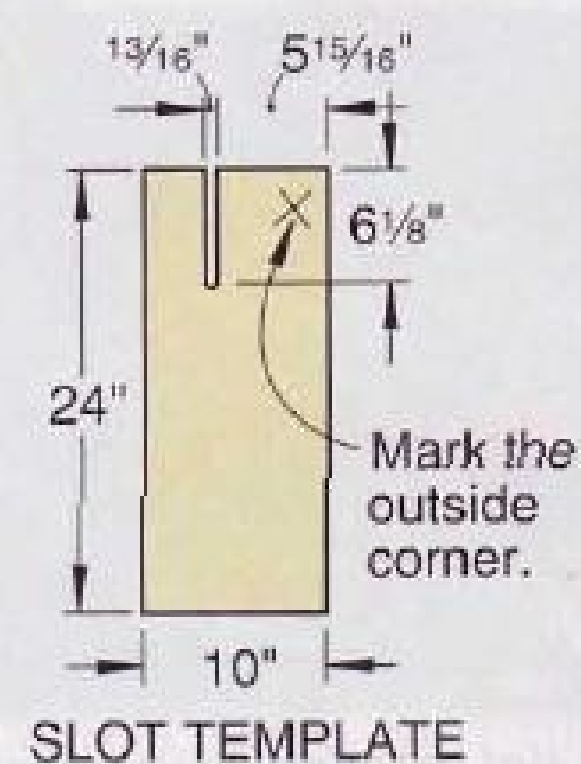
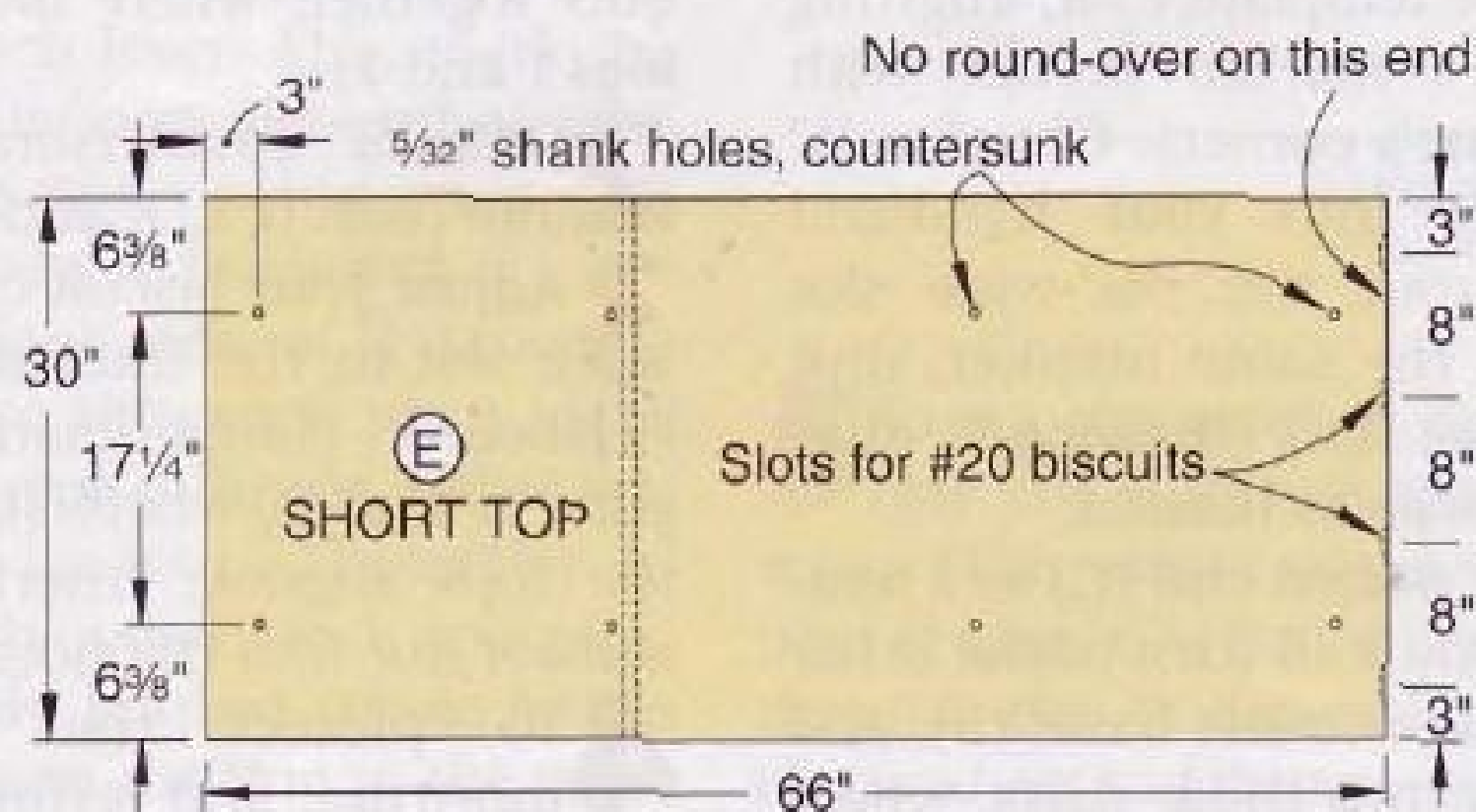
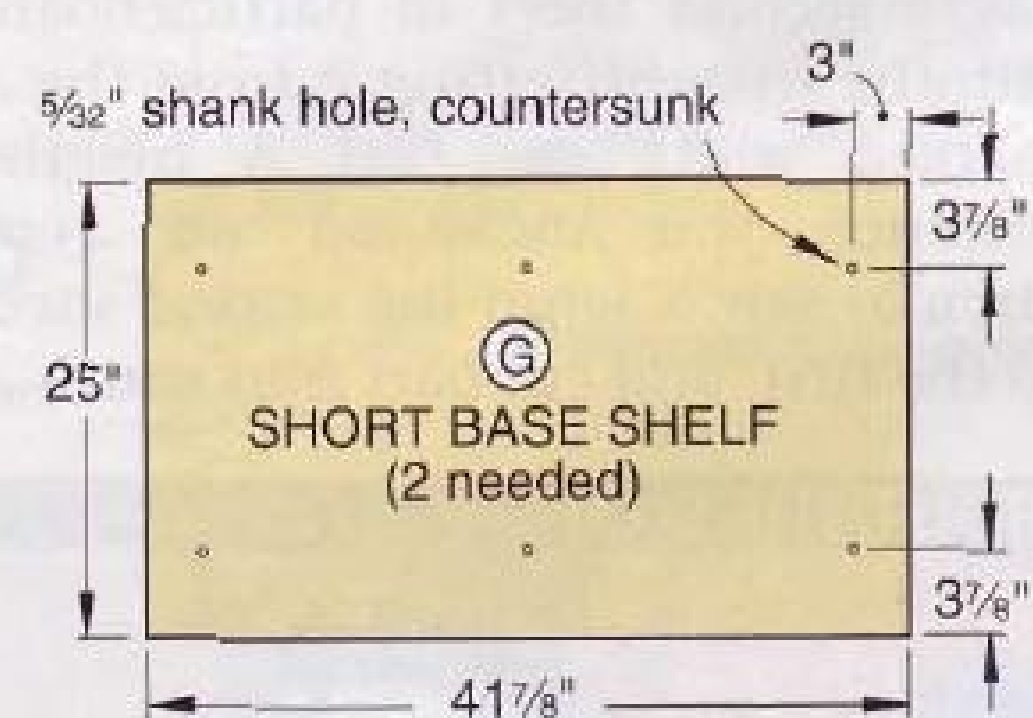
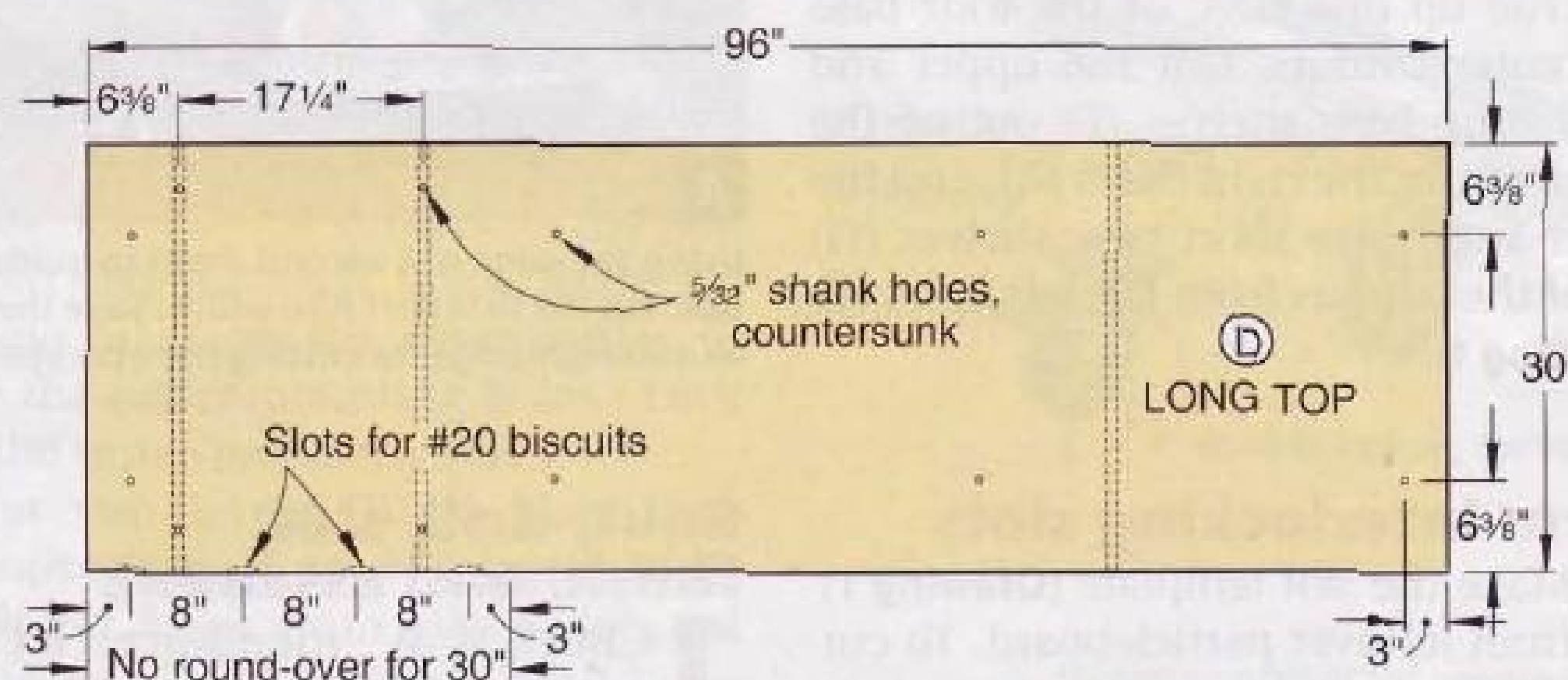
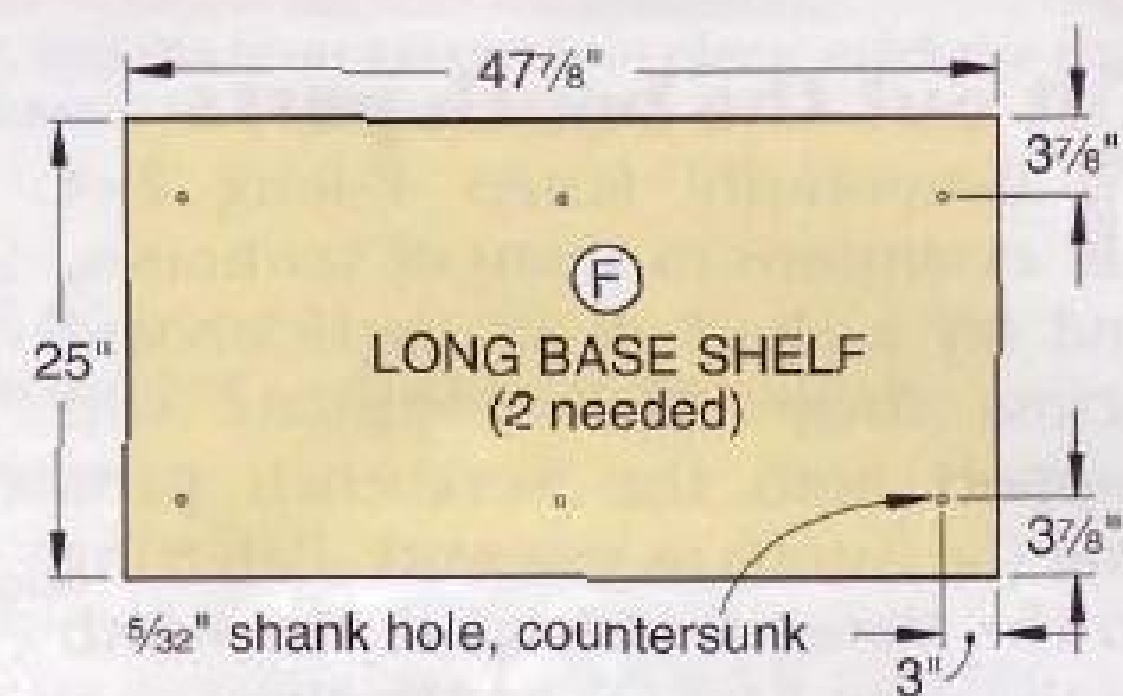
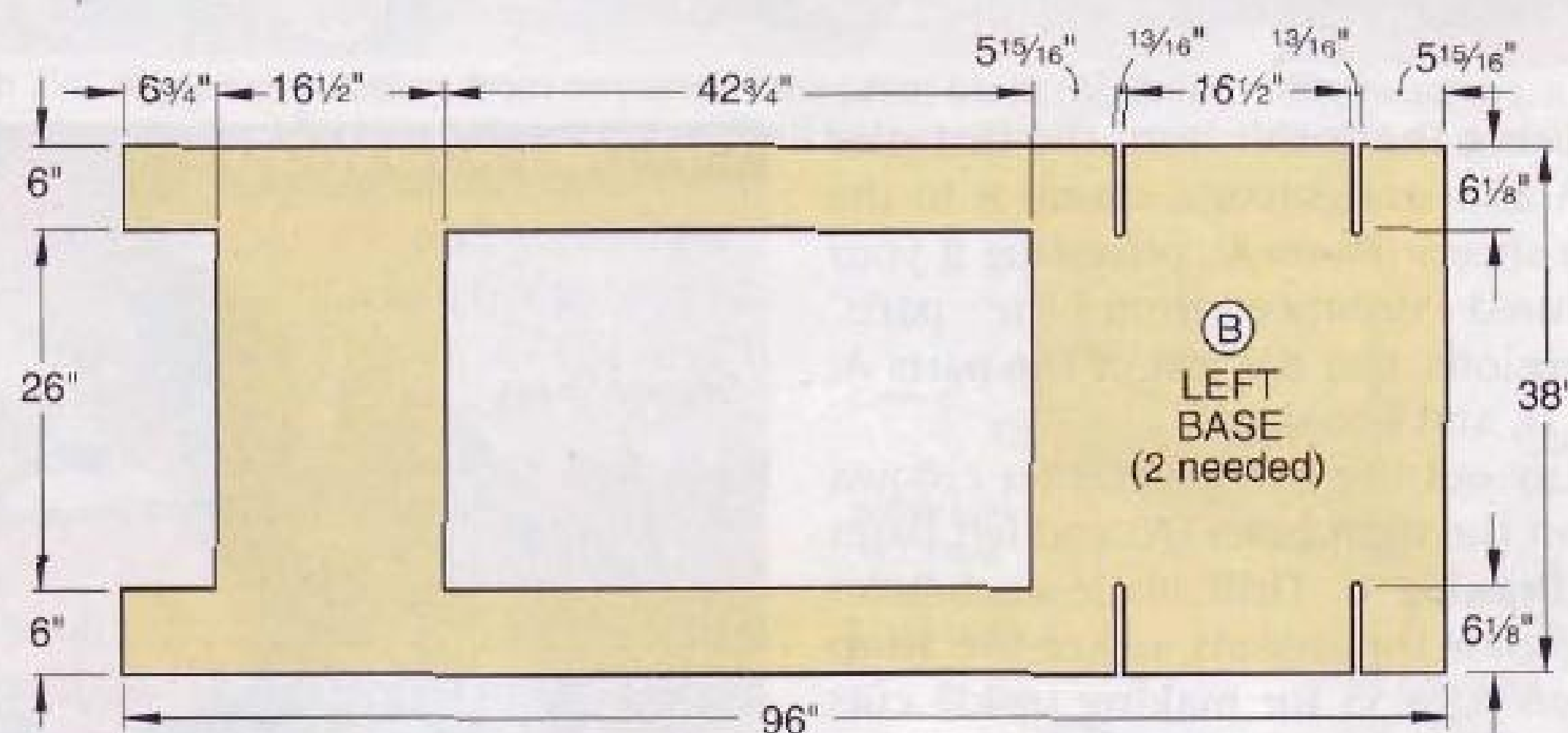
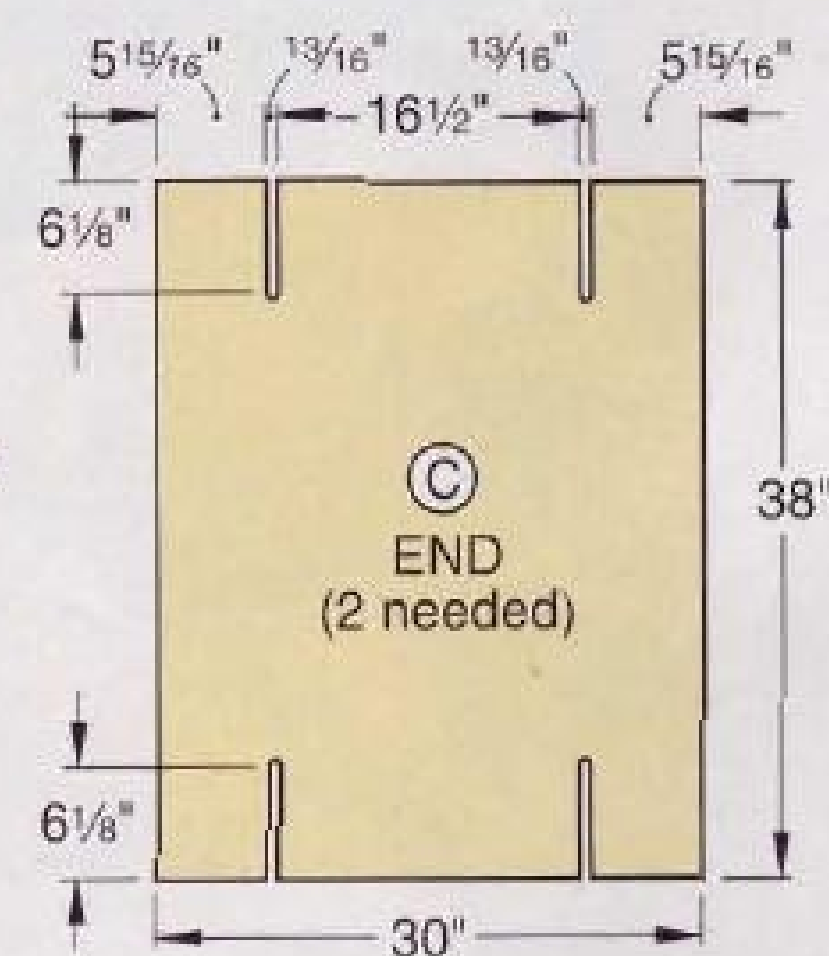
3 Adjust your biscuit cutter to center a slot in the thickness of the particleboard. Plunge mating slots into parts D and E, where shown. To keep the tops aligned, insert #20 biscuits *without glue* into the slots.

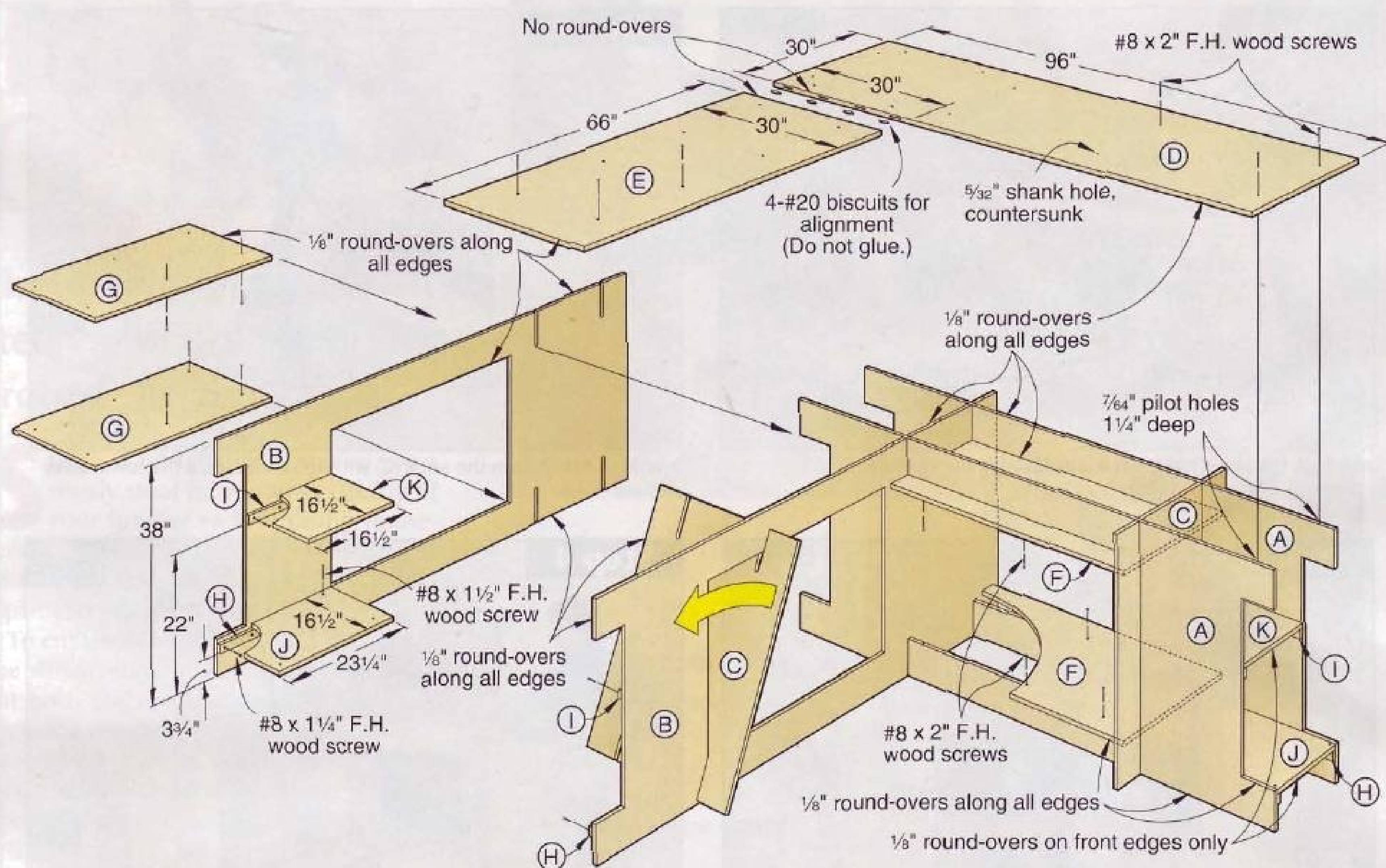
4 To protect the bench from moisture and grime, apply two coats of finish to all the parts before assembly. Apply a third coat to the top

1 PARTS VIEW



Note: All edges have $\frac{1}{8}$ " round-overs, except where indicated on parts **D** and **E**.





after assembly. To keep the cost down, you can use any house paint or finish. (We used satin polyurethane.)

5 With the finish dry, enlist a helper and assemble the bench (**Drawing 2**) and in the four photos on **page 54**. Take care in handling the bases (A, B). The 6"-wide "rails" are somewhat fragile until the bases are interlocked and supported by the ends (C) and shelves (F, G). Using the previously drilled shank holes in parts D, E, F, and G as guides, drill pilot holes into their mating parts, and drive in the screws.

Add the optional shelves

1 To add shelves to the ends of your workbench (**Drawing 2** and **Photo C**), cut the long and short cleats (H, I) and shelves (J, K) to size.

2 Rout $\frac{1}{8}$ " round-overs onto the front edges of the shelves. Drill $\frac{5}{32}$ " countersunk shank holes through the cleats. Locate the holes 1" in from both ends of each cleat, then evenly space two more holes between those. Apply two coats of finish to the shelves and cleats.

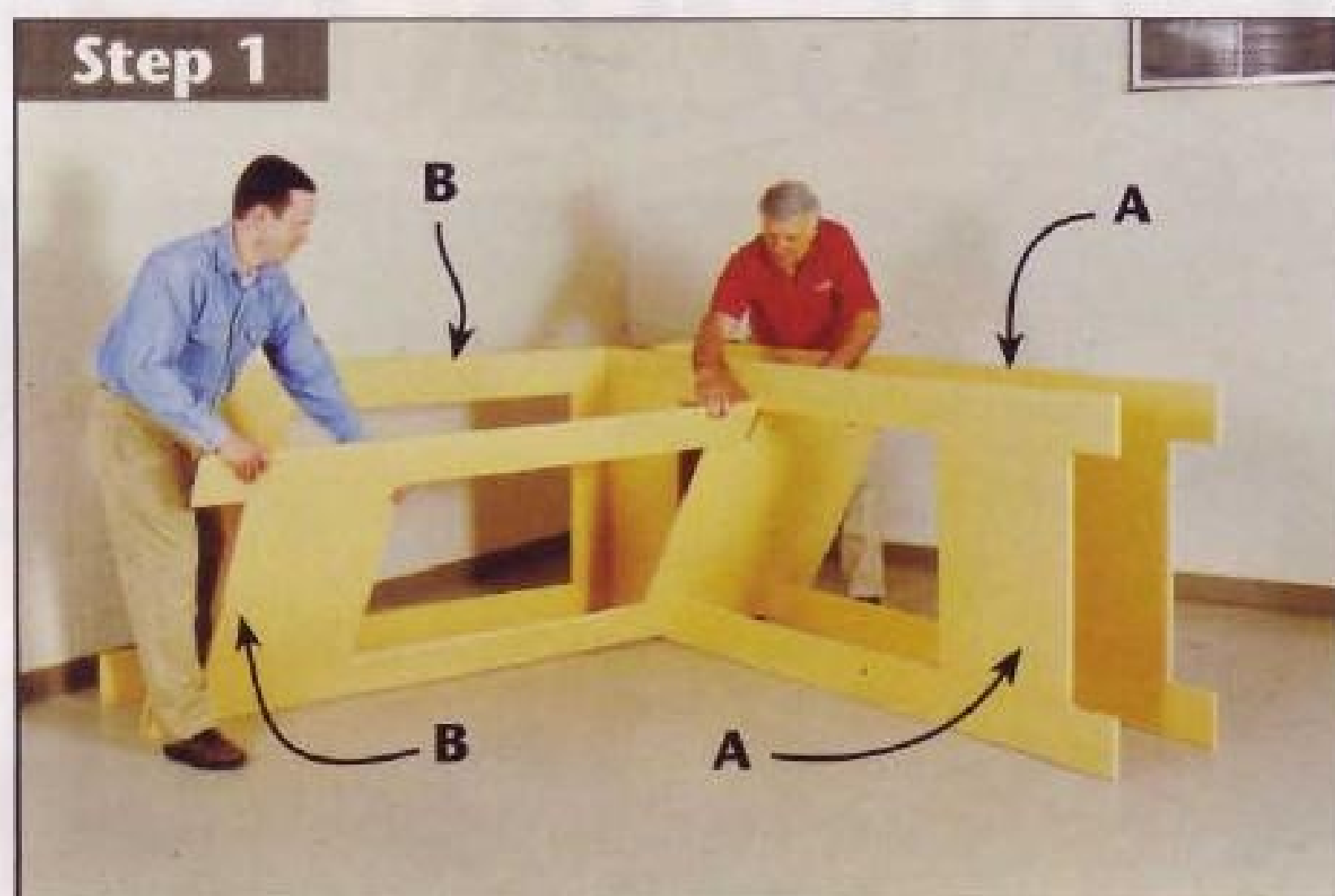
3 Using the shank holes in the cleats as guides, drill pilot holes into the bases (A, B), and screw the cleats in place. Position the long cleats so the long shelves are flush with the bottom of the bases' end cutouts. Position the short cleats to accommodate the height of the items you plan to store. You may want to make more than one short shelf for each end. Lay the long shelves onto the long cleats. Drill pilot and countersunk shank holes, and screw the long shelves to their cleats. Lay the short shelves into place. 🌲

ADD OPTIONAL SHELVES



C After assembly, install optional shelves to further expand storage space.

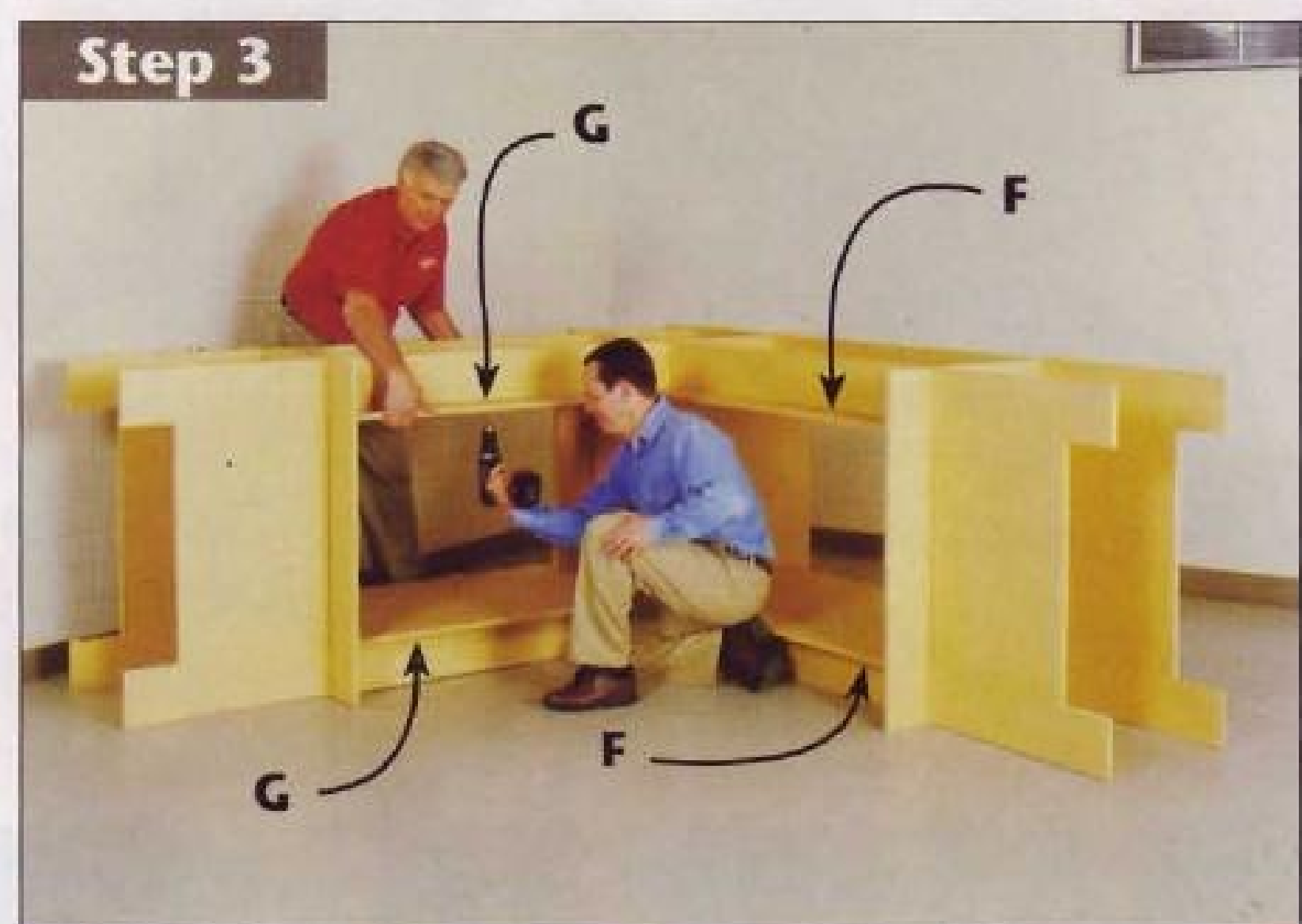
With a helper, assembly is a snap.



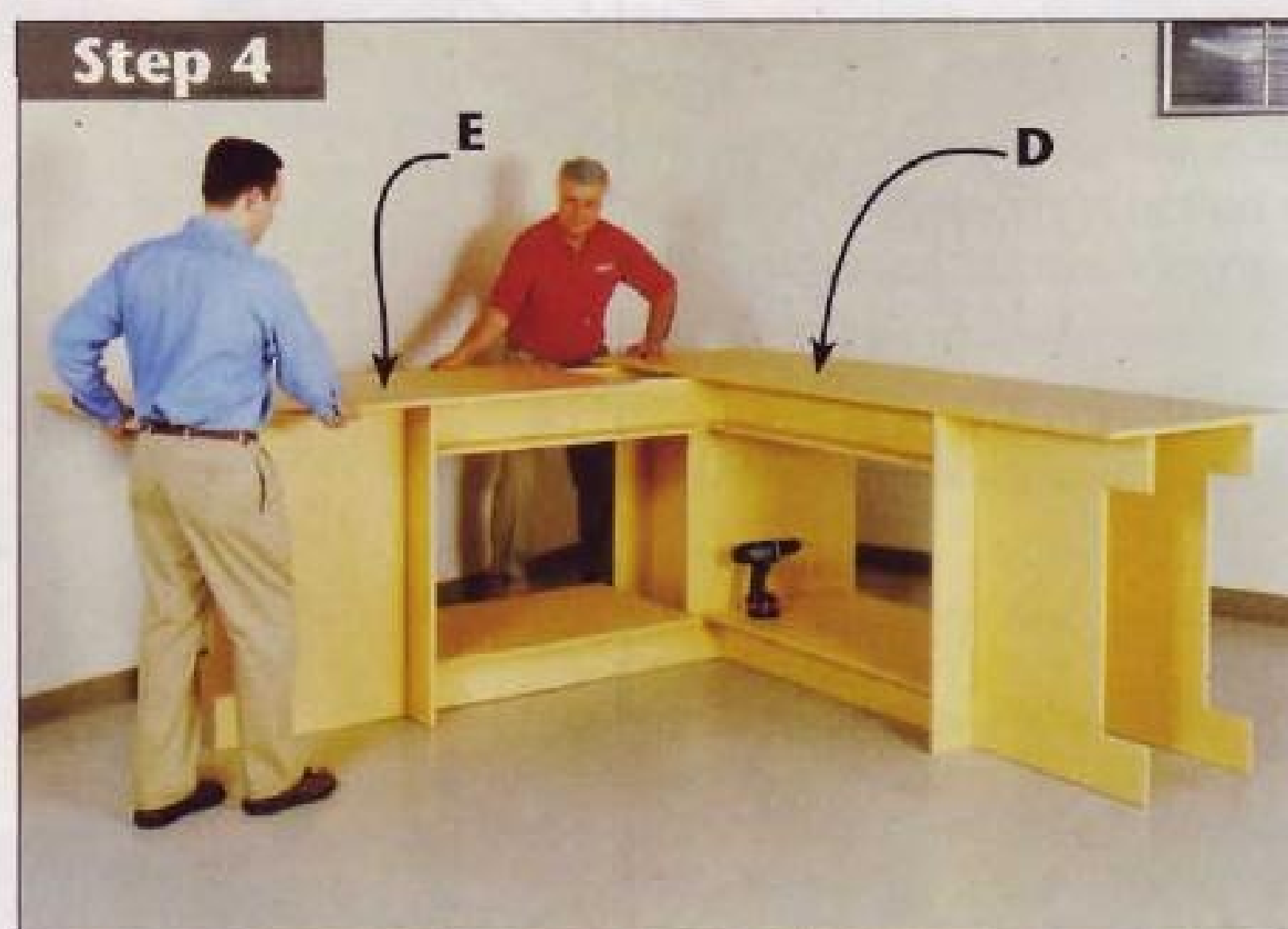
Interlock the slots in the left bases (B) with the right bases (A).



Interlock the slots in the ends (C) with the bases. Add the lower base shelves (F, G).



Drill pilot holes, and screw the upper base shelves (F, G) in place.



Position the long and short tops (D, E). Drill pilot holes, and screw them in place.



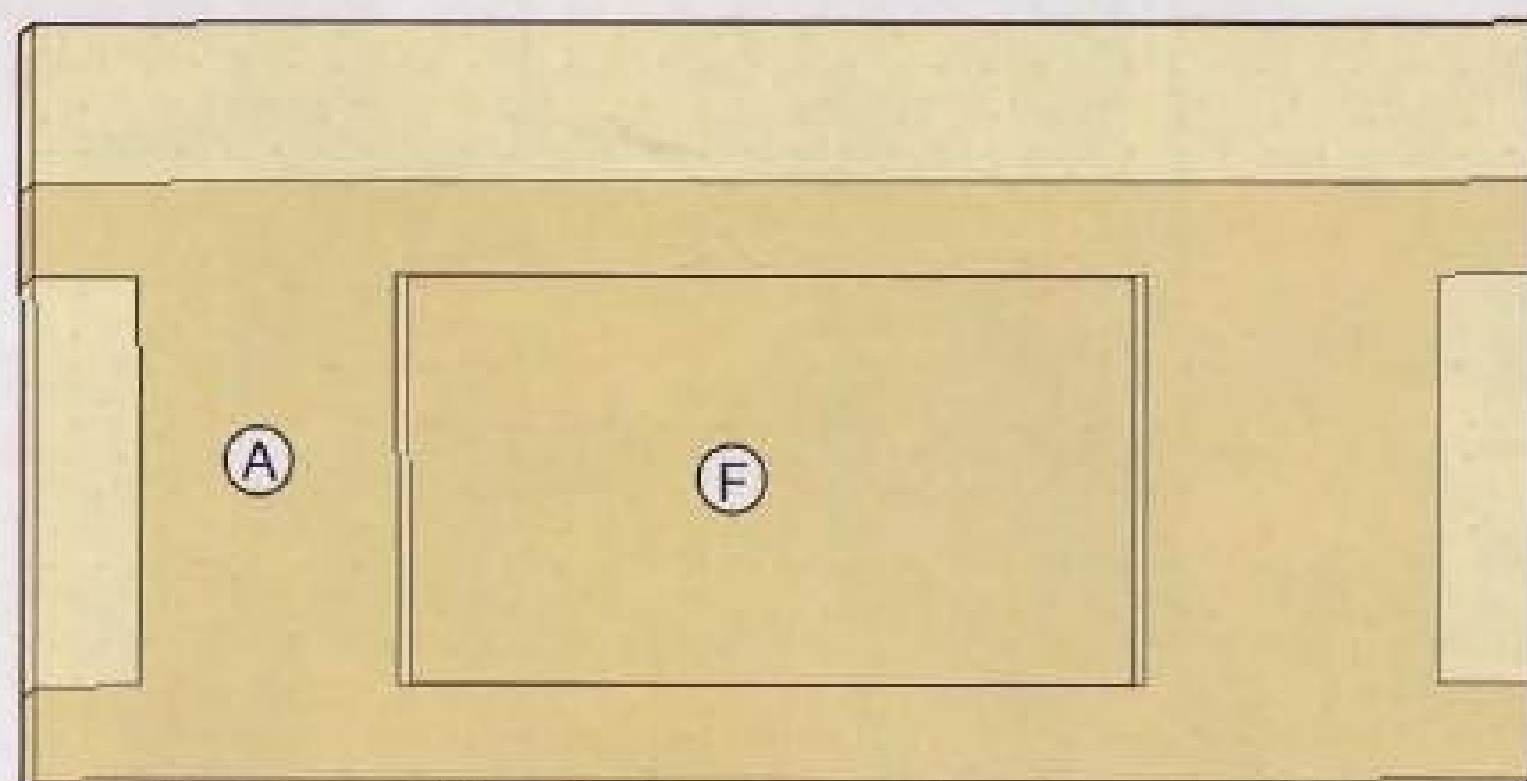
Meet the designers

Chad Veach, far left, a professional engineer, and Cameron Campbell, an architect teaching at Iowa State University, collaborated on this entry for Best Original Workbench Design in *WOOD*® magazine's Great American Workshops Contest.

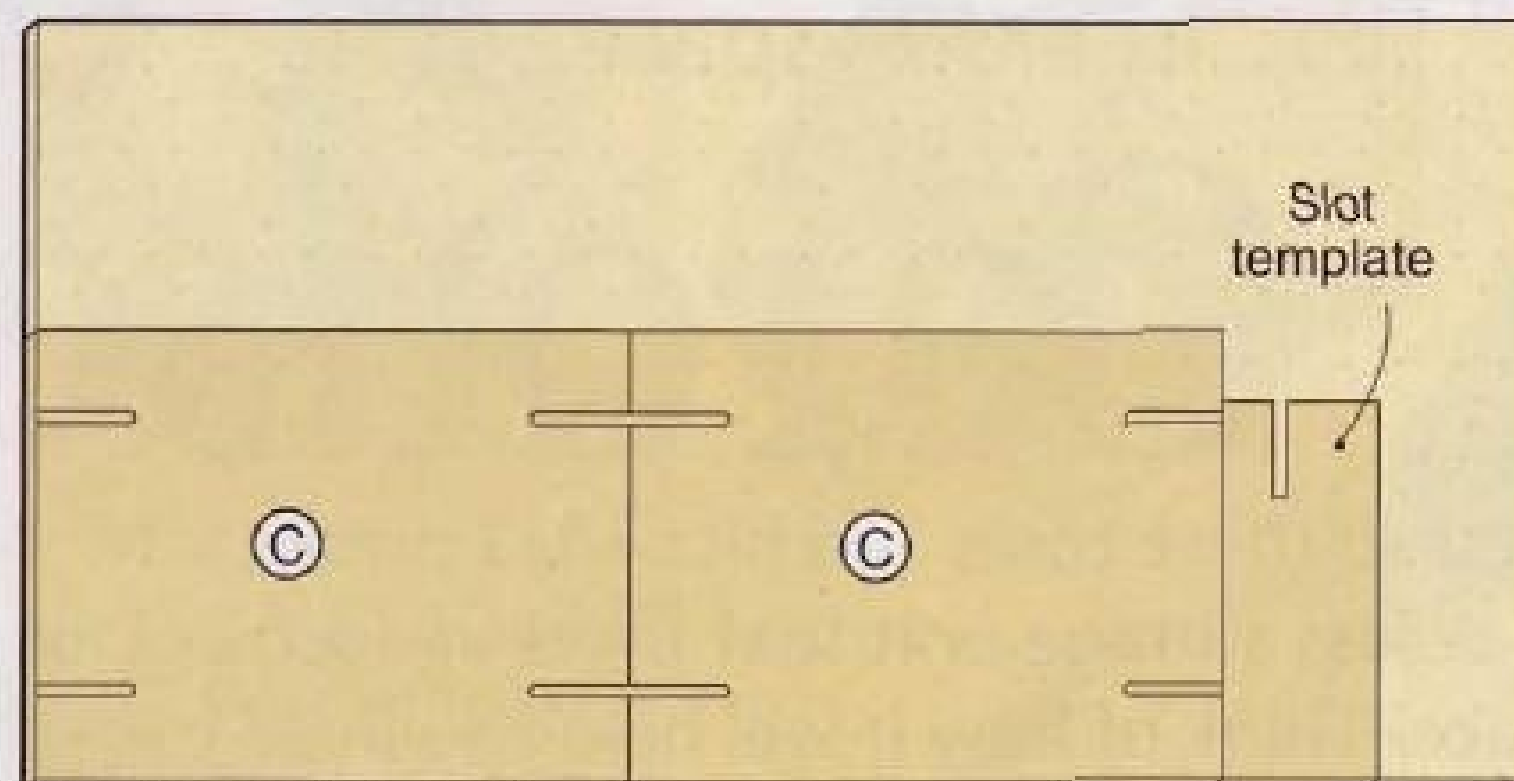
By replacing legs with interlocking panels, their design eliminated the problem of making rigid connections between the benchtop and legs. In the corner configuration, each section reinforces the other, which increases workbench stability. Chad and Cameron also included a continuous overhanging edge for clamping and shelves deep enough to store large tools or shop materials.

Using only a circular saw, drill, and jigsaw (alternative to a router), they built the original bench in half a day.

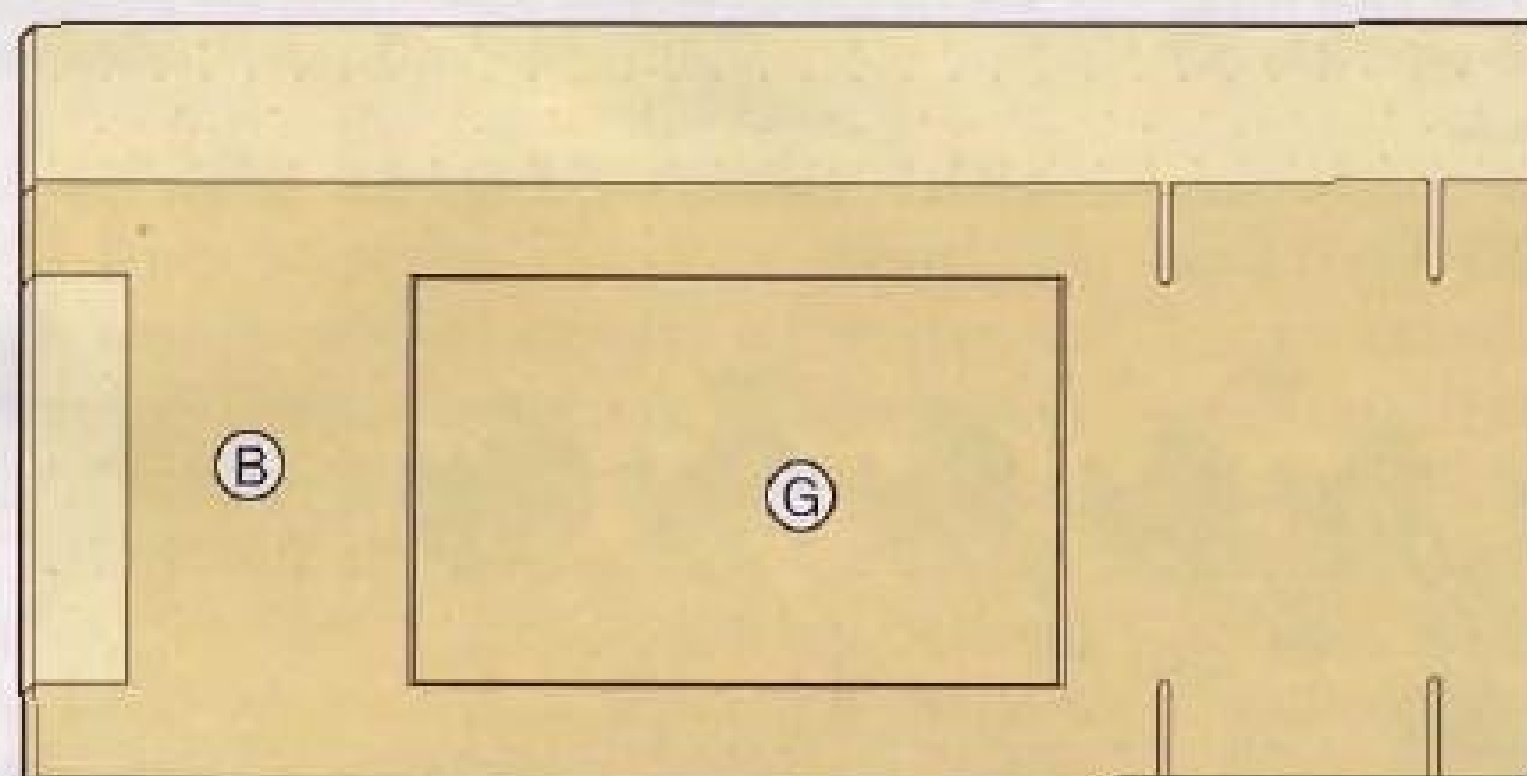
Cutting Diagram



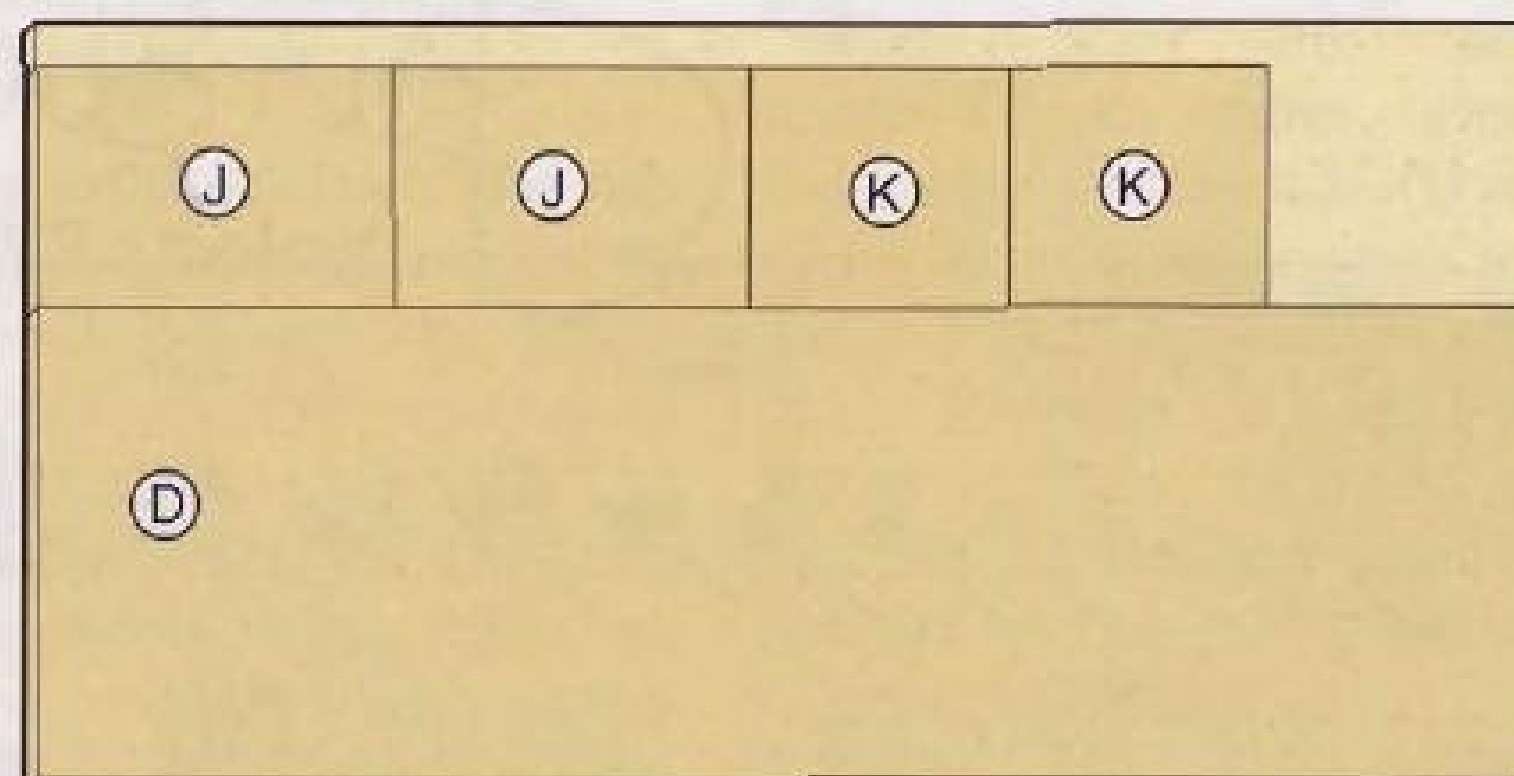
$\frac{3}{4}$ x 48 x 96" Particleboard (2 needed)



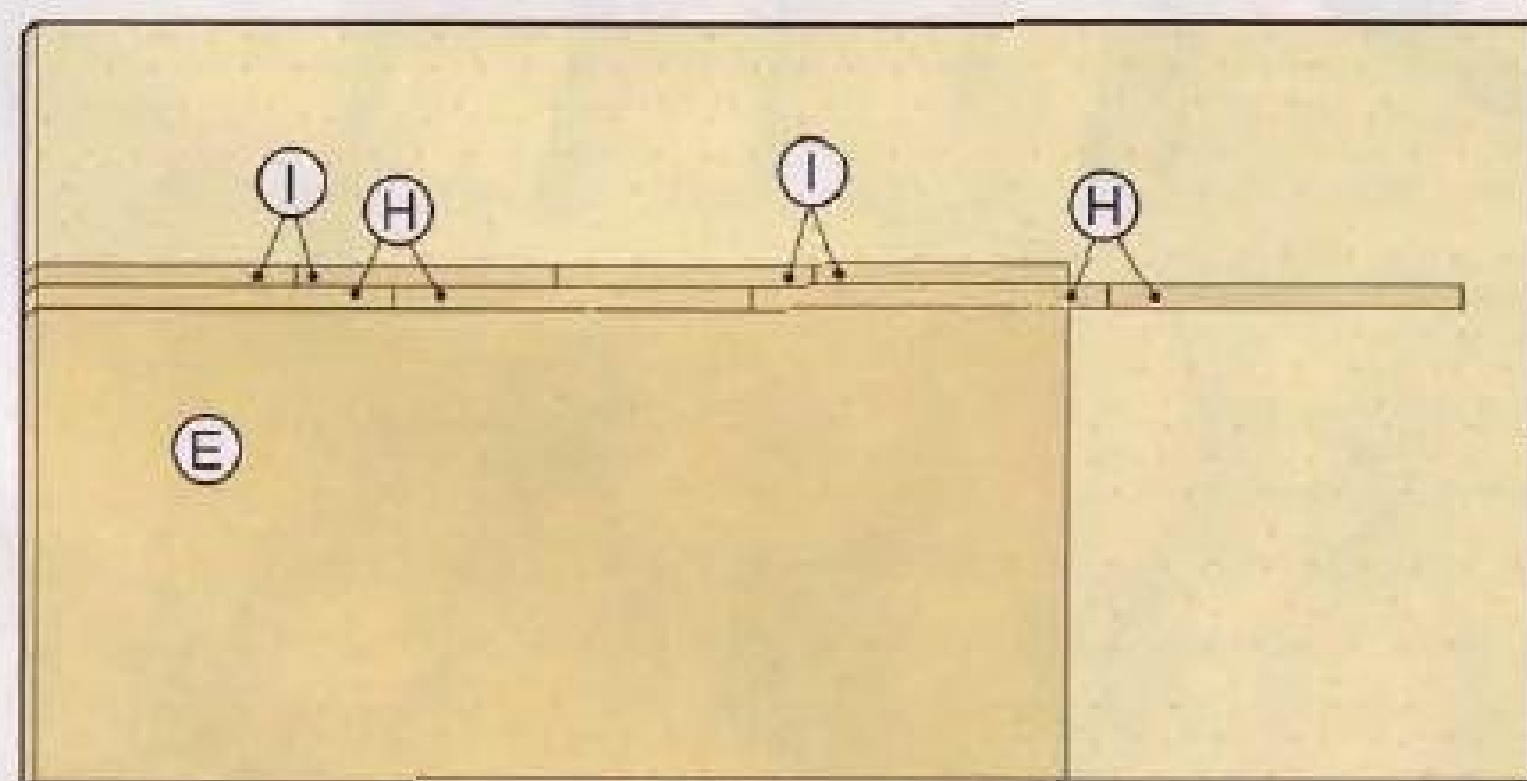
$\frac{3}{4}$ x 48 x 96" Particleboard



$\frac{3}{4}$ x 48 x 96" Particleboard (2 needed)



$\frac{3}{4}$ x 48 x 96" Particleboard



$\frac{3}{4}$ x 48 x 96" Particleboard

SHOP TIP

Making inside cuts with a circular saw

To get arrow-straight edges when making inside cuts, like the ones needed to remove the cutouts in the workbench bases, use your circular saw, a straightedge, and a technique called plunge-cutting. Here's how.

Measure the offset from the edge of your circular saw's shoe to the side of the blade. Clamp a straightedge to the part, offsetting it that distance from the cutout's layout line. With the saw's depth adjustment loose, raise the blade above the part's surface. Starting at one inside corner, hold the shoe against the straightedge, and swivel the blade guard out of the way. Switch on the



saw, and lower the blade through the part, as shown in the photo above.

Keeping the saw's shoe against the straightedge, continue your cut, stopping at the next corner's intersecting layout line. Repeat with the other three sides of the cutout. Finish the cuts at the corners with a handsaw.

Materials List

Part	FINISHED SIZE			Matl.	Qty.
	T	W	L		
A right bases	$\frac{3}{4}$ "	38"	96"	P	2
B left bases	$\frac{3}{4}$ "	38"	96"	P	2
C ends	$\frac{3}{4}$ "	30"	38"	P	2
D long top	$\frac{3}{4}$ "	30"	96"	P	1
E short top	$\frac{3}{4}$ "	30"	66"	P	1
F long base shelves	$\frac{3}{4}$ "	25"	47 $\frac{7}{8}$ "	P	2
G short base shelves	$\frac{3}{4}$ "	25"	41 $\frac{7}{8}$ "	P	2
H long cleats	$\frac{3}{4}$ "	1 $\frac{1}{2}$ "	23 $\frac{1}{4}$ "	P	4
I short cleats	$\frac{3}{4}$ "	1 $\frac{1}{2}$ "	16 $\frac{1}{2}$ "	P	4
J long shelves	$\frac{3}{4}$ "	16 $\frac{1}{2}$ "	23 $\frac{1}{4}$ "	P	2
K short shelves	$\frac{3}{4}$ "	16 $\frac{1}{2}$ "	16 $\frac{1}{2}$ "	P	2

Material key: P—particleboard.

Supplies: #8x1 $\frac{1}{4}$ " flathead wood screws, #8x1 $\frac{1}{2}$ " flathead wood screws, #8x2" flathead wood screws, #20 biscuits.

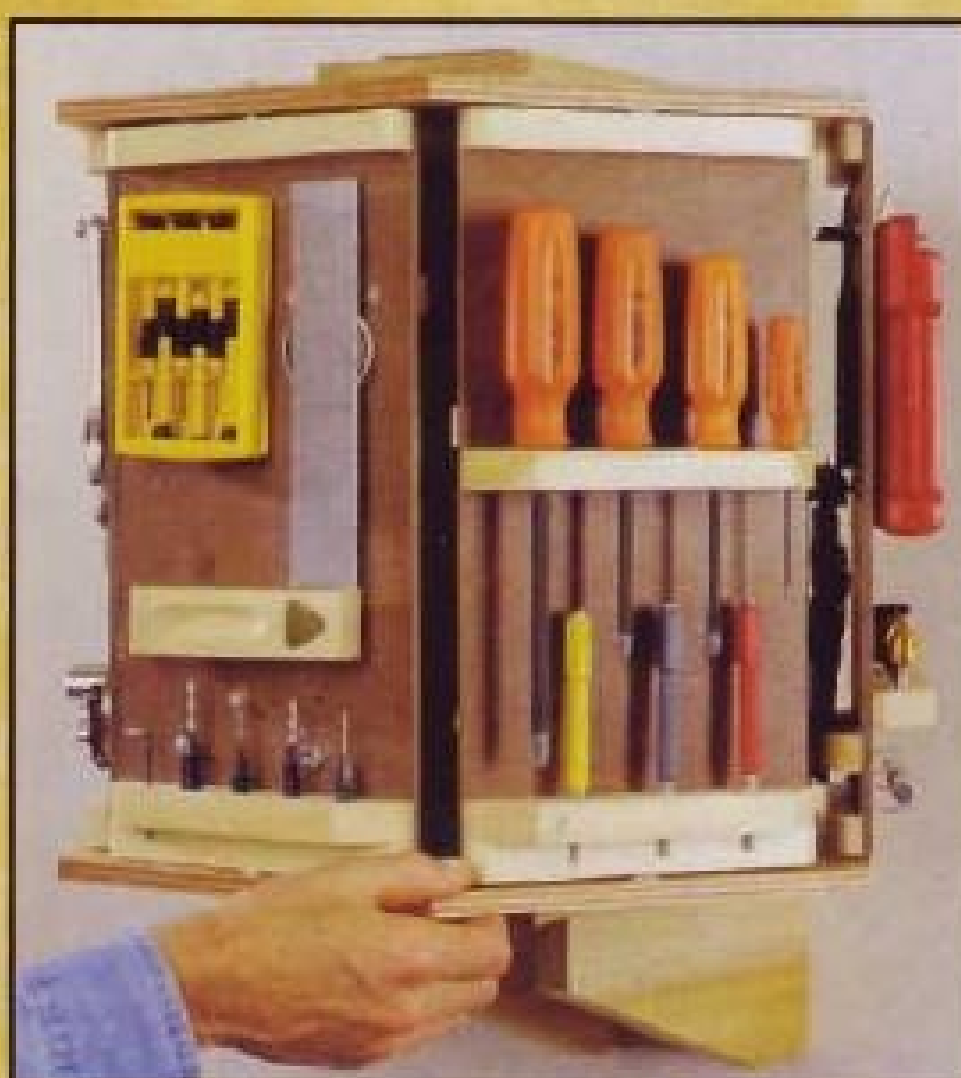
Bits: $\frac{1}{2}$ " flush-trim, $\frac{1}{8}$ " round-over router bits.

A ton of storage
in a tidy space

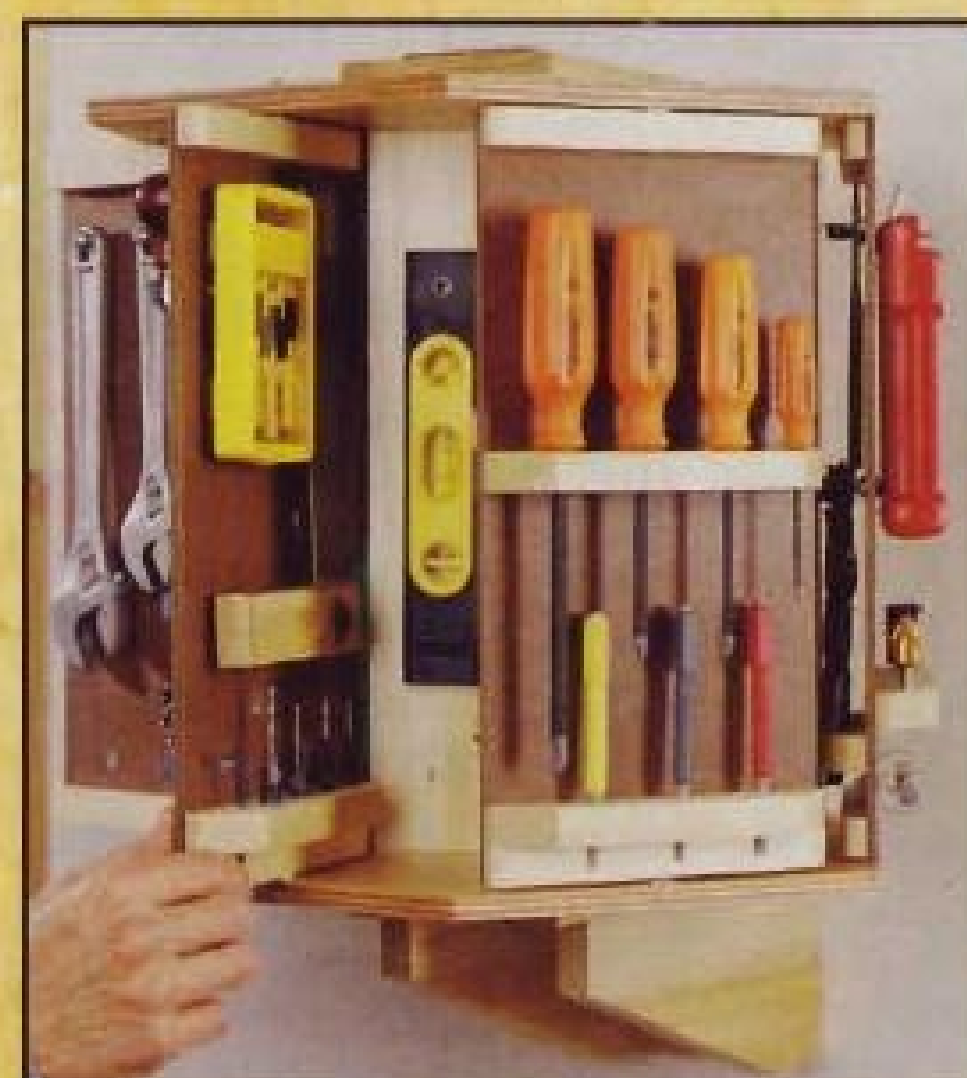
Tool Carousel

We packed all these tools and bits—135 pieces total—into an instant-access storage unit that takes up just 2×2' of wall space. Think of how it will help organize your shop!

Jan Svec
Projects Editor

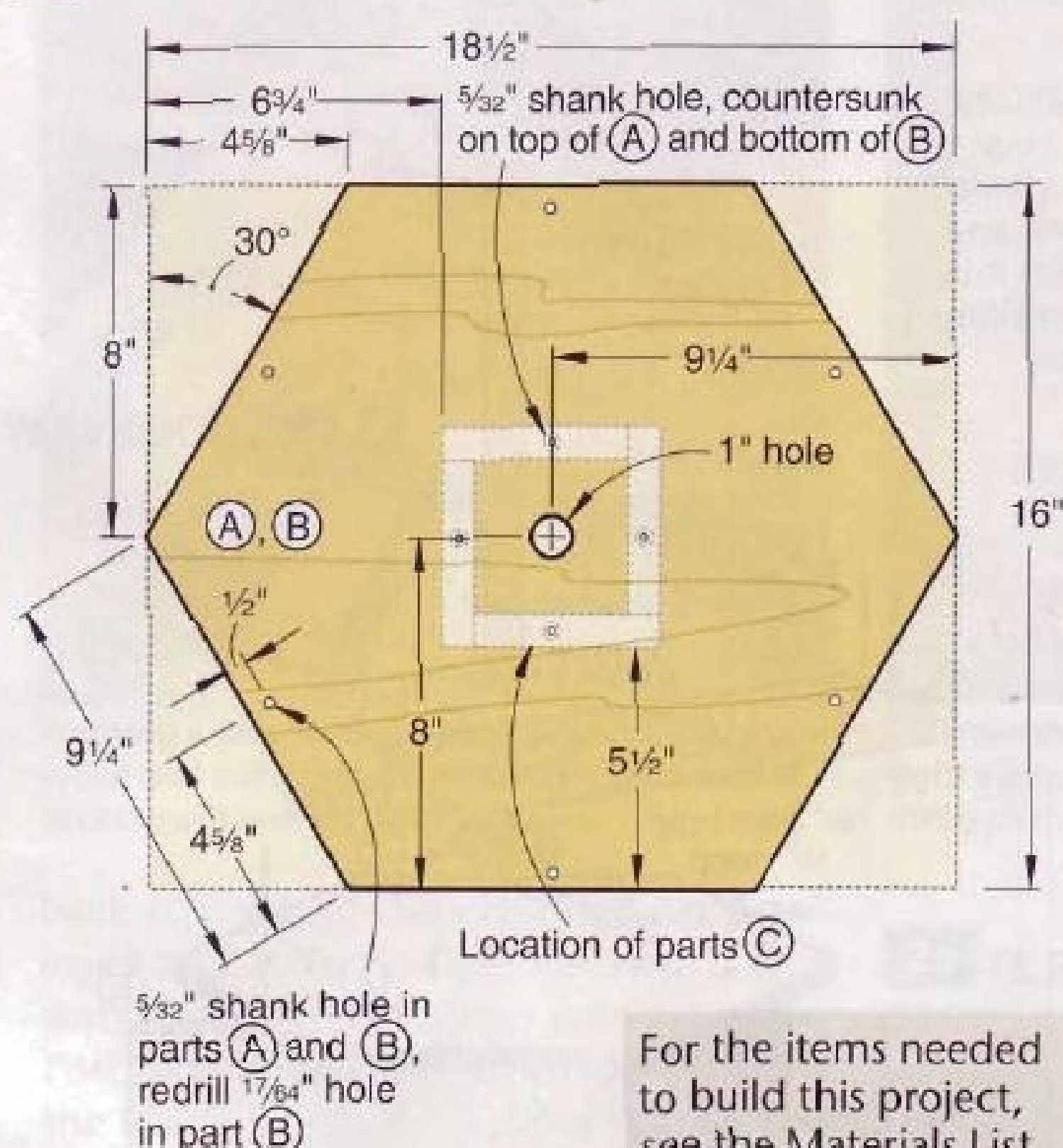


Spin the entire carousel to access each of its six tool-holding wings ...



... and rotate each wing to access both of its sides and the center column.

1 TOP AND BOTTOM



For the items needed to build this project, see the Materials List and Cutting Diagram on *pages 58 and 59*.

This handy shop helper is the brainchild of reader Jim Maw of Kleinburg, Ontario. His ingenious design earned the prize for WOOD® magazine's "Best Storage Solution or Organizer for Power Tool Accessories" in our Great American Workshops Contest. We liked Jim's organizer so much that we obtained the design rights from him, then built one ourselves so we can present the plans here.

Start with the carousel

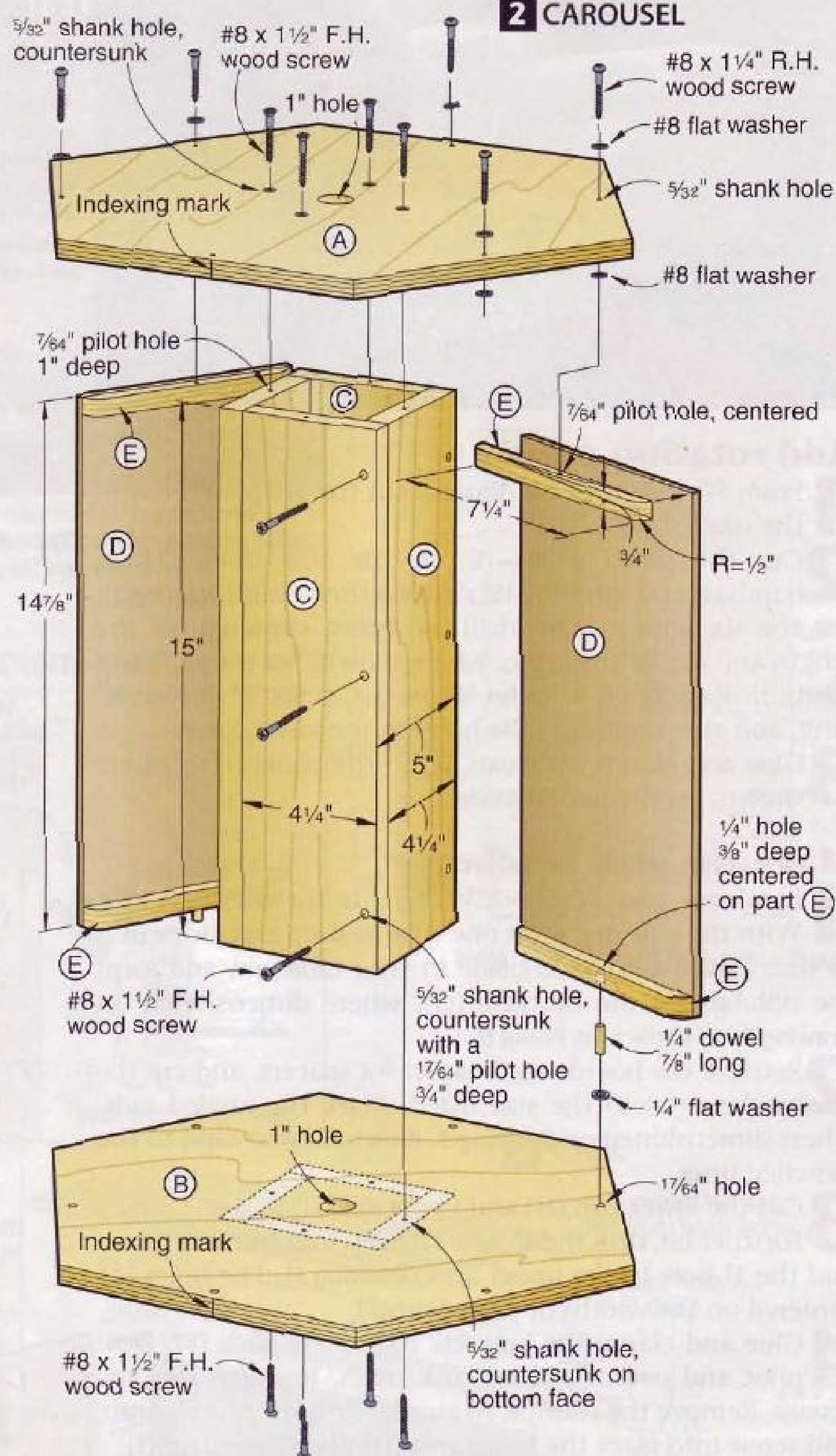
1 To make the top (A) and bottom (B), stick together two $\frac{1}{2} \times 16 \times 18\frac{1}{2}$ " pieces of plywood with double-faced tape. Mark the top one "A" and the bottom one "B." Referring to **Drawing 1**, lay out the hexagonal shape and location of the holes on the top (A). Bandsaw close to the line, then sand the top and bottom to shape.

2 Drill the six $\frac{5}{32}$ " holes around the perimeter, and the four $\frac{5}{32}$ " holes around the center through both parts. Countersink the center holes on the top surface of part A and the bottom surface of part B. Drill the 1" hole at the center. Make indexing marks across one edge of the joined parts for later reference. Separate the parts. Enlarge the perimeter holes in the bottom (B) to $\frac{17}{64}$ ".

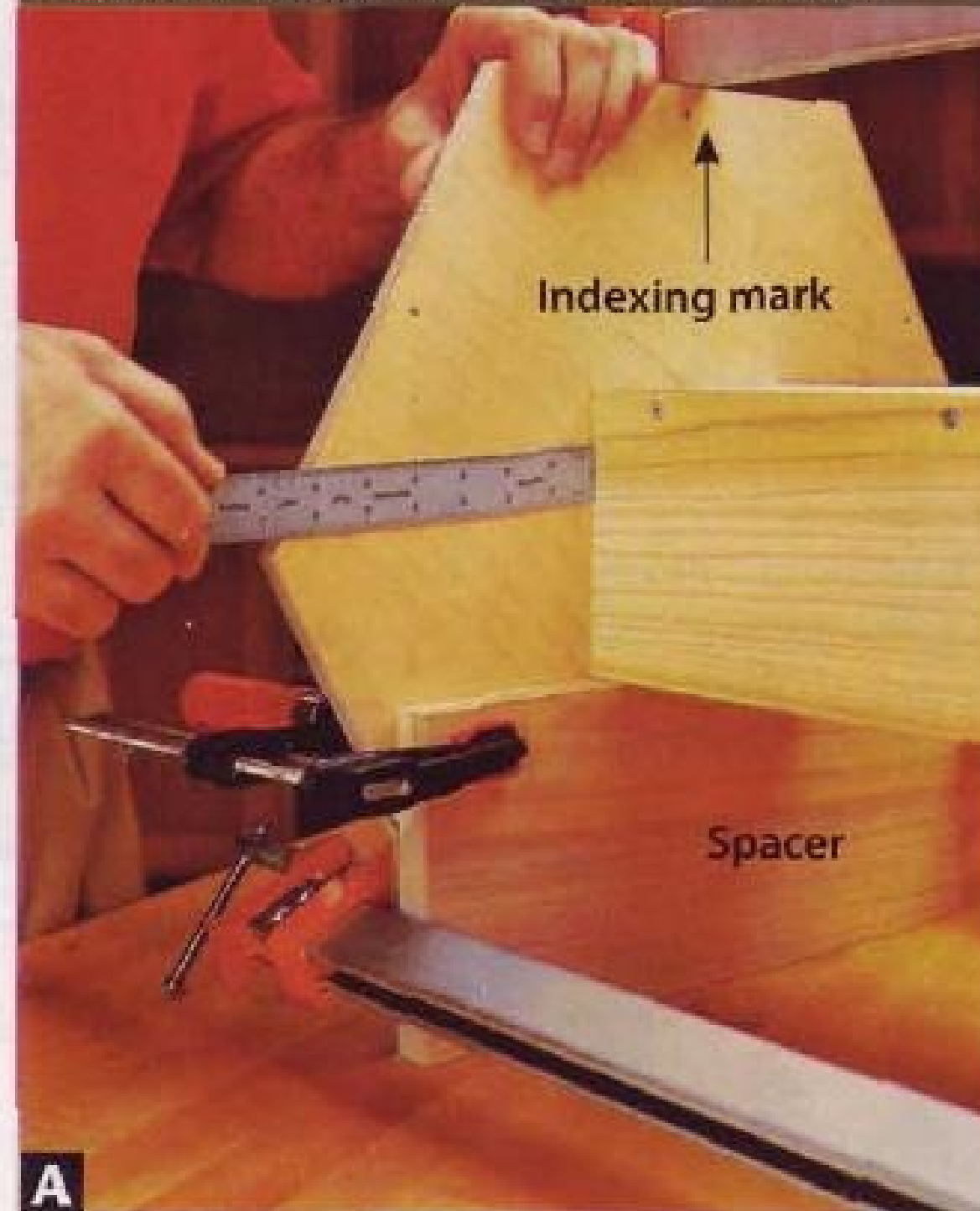
3 Cut the core sides (C) to the size given on the **Materials List**. Glue and clamp the core together in the configuration shown on **Drawing 2**. Make sure the ends are flush. Drill pilot and countersunk shank holes where shown, and drive in the screws. Remove the clamps.

4 To position the core between the top (A) and bottom (B), cut two $\frac{3}{4} \times 5\frac{1}{2} \times 13\frac{1}{2}$ " spacers. Make the spacers from poplar. [You can rip them later to 5" wide for the brackets (G).] Clamp the core between the top and bottom (**Photo A**). Using the countersunk shank holes in the top and bottom as guides, drill pilot holes into the ends of the core, and drive in the screws.

2 CAROUSEL



USE SPACERS TO POSITION CORE



With the indexing marks on the top (A) and bottom (B) facing upward, use spacers to position the core parallel to two sides. Measure in from the points, centering the core.



Add rotating panels

1 From $\frac{1}{4}$ " tempered hardboard, cut the six panels (D) to the size listed.

2 Cut the panel cleats (E) to the size listed. Mark, bandsaw, and sand the $\frac{1}{2}$ " radii on their ends (**Drawing 2**). For the six upper cleats, drill $\frac{7}{64}$ " holes, centered on the length and the $\frac{1}{2}$ " thickness, where shown. For the six lower cleats, drill centered $\frac{1}{4}$ " holes $\frac{3}{8}$ " deep. Cut six $\frac{1}{4}$ " dowels $\frac{7}{8}$ " long, and glue them into the holes in the lower cleats.

3 Glue and clamp the cleats (E) to the panels (D), where shown. Set the panels aside.

Make the wall bracket

1 Laminate two $\frac{3}{4} \times 5\frac{1}{4} \times 22\frac{1}{2}$ " boards for the back (F). With the glue dry, joint one edge and rip and crosscut it to size. Install a $\frac{3}{4}$ " dado blade in your tablesaw, and form the notches for the brackets (G), where dimensioned on **Drawing 3**, as shown in **Photo B**.

2 Retrieve the boards used earlier for spacers, and cut the brackets (G) to the size listed. Mark the angled cuts, where dimensioned on **Drawing 3**. Bandsaw, and sand to the penciled lines.

3 Cut the lower arm (H) and upper arm (I) to size. Using a Forstner bit, drill the 1" hole $\frac{1}{2}$ " deep into the lower arm, and the 1" hole in the upper arm (**Drawing 3**). The holes are centered on the widths of parts H and I.

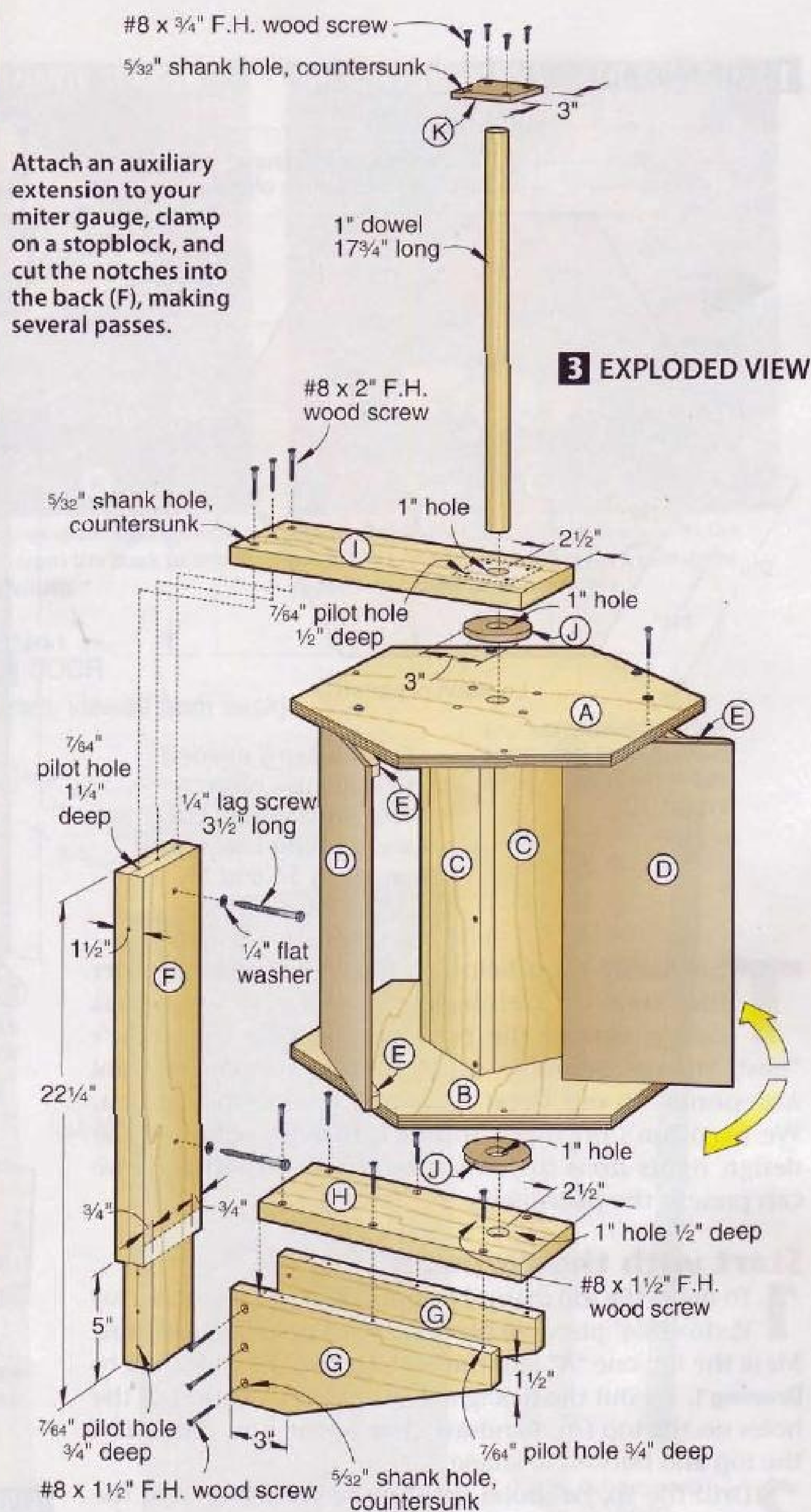
4 Glue and clamp the brackets (G) to the back (F). Drill pilot and countersunk shank holes, and drive in the screws. Remove the clamps. In similar fashion, glue, clamp, and screw into place the lower arm (H) and upper arm (I).

Finish and mount the carousel

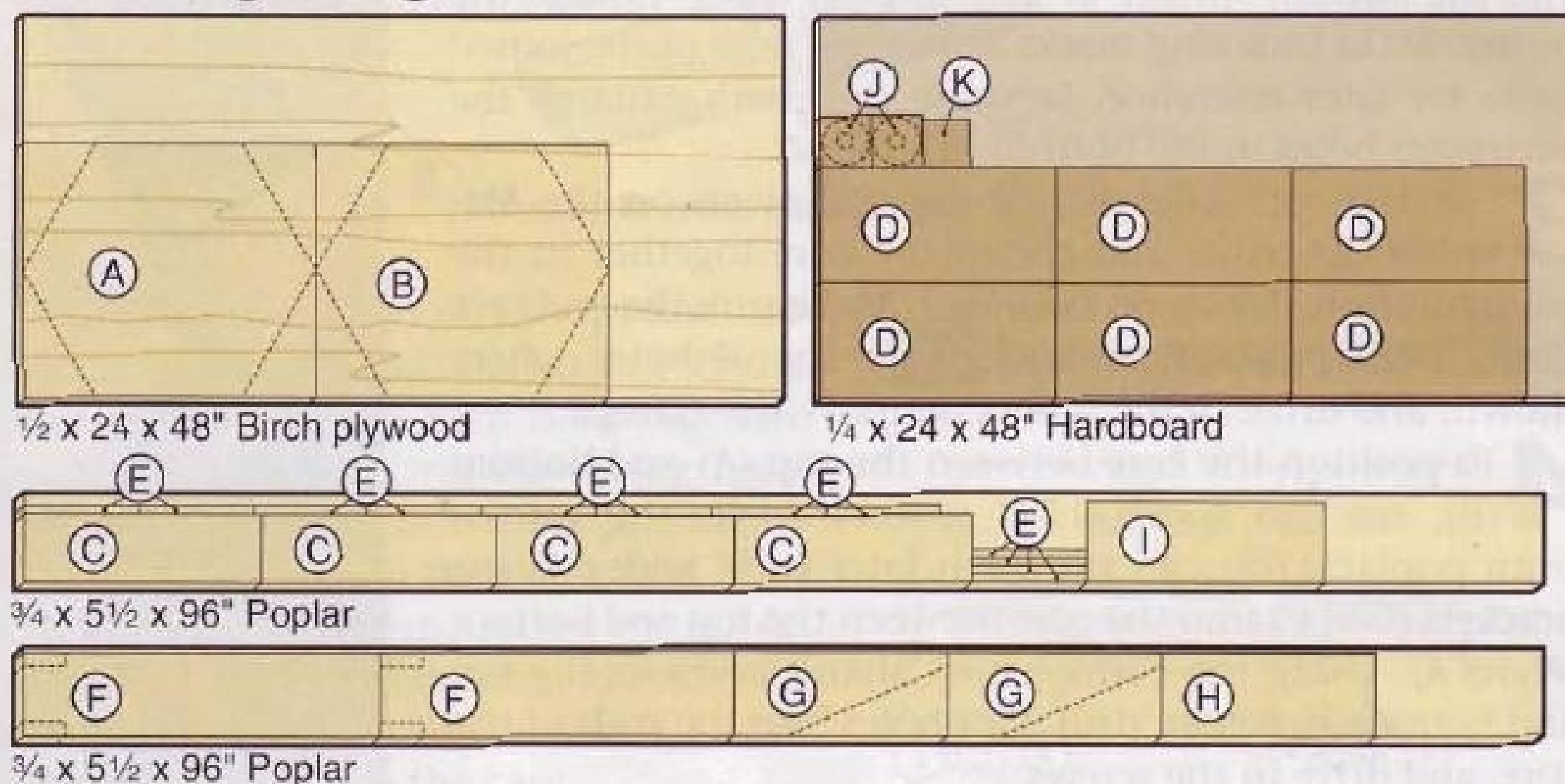
1 Sand all the parts to 220 grit, easing the edges with a sanding block. Apply the finish of your choice. We brushed on two coats of satin polyurethane, sanding lightly with 220-grit sandpaper between coats. You can also prime and paint to match existing cabinetry.

2 Cut two $\frac{1}{4} \times 3\frac{1}{4} \times 3\frac{1}{4}$ " hardboard blanks for the washers (J). Mark their centers, and draw 3"-diameter circles. Drill centered 1" holes, and bandsaw the washers to shape.

3 Cut the cover plate (K) to size. Drill countersunk shank holes at the four corners (**Drawing 3**).



Cutting Diagram



4 With the finish dry, drill $\frac{1}{4}$ " holes through the wall-bracket back (F). Transfer these locations to the wall at a stud location. Drill pilot holes into the stud. Now, fasten the wall bracket with $\frac{1}{4}$ " lag screws $3\frac{1}{2}$ " long.

5 Cut a $17\frac{3}{4}$ "-long piece of 1" dowel. Place the carousel between the upper and lower arms. Slide the washers (J) into place between the carousel and the arms. Drop the dowel in from the top, seating it into the hole in the lower arm (H). Center the cover plate (K) over the upper arm's dowel hole. Using the shank holes in the cover plate as guides, drill pilot holes, and drive in the screws.

6 Arrange your tools on the panels, and make the holders. For the mounting methods we used, see the sidebar, right.

7 With the holders now attached to the panels, slip washers over the bottom cleats' $\frac{1}{4}$ " dowels, and tip the panels into place, seating the bottom cleat dowels into the holes in the carousel's bottom (B). Slide a #8 flat washer between the top cleat and the carousel top (A), where shown on **Drawing 2**. Secure the panels to the top (A) with flat washers and roundhead screws. Attach the tools and bits. 🌱

Written by **Jan Svec** with **Chuck Hedlund**
Project design: **Jim Maw**; **Kevin Boyle**
Illustrations: **Roxanne LeMoine**; **Lorna Johnson**

Materials List

Part	FINISHED SIZE			Matl.	Qty.
	T	W	L		
A top	$\frac{1}{2}$ "	16"	$18\frac{1}{2}$ "	BP	1
B bottom	$\frac{1}{2}$ "	16"	$18\frac{1}{2}$ "	BP	1
C core sides	$\frac{3}{4}$ "	$4\frac{1}{4}$ "	15"	P	4
D panels	$\frac{1}{4}$ "	$7\frac{1}{4}$ "	$14\frac{7}{8}$ "	H	6
E panel cleats	$\frac{1}{2}$ "	$\frac{3}{4}$ "	$7\frac{1}{4}$ "	P	12
F* back	$1\frac{1}{2}$ "	5"	$22\frac{1}{4}$ "	LP	1
G brackets	$\frac{3}{4}$ "	5"	$13\frac{1}{2}$ "	P	2
H lower arm	$\frac{3}{4}$ "	5"	$13\frac{1}{2}$ "	P	1
I upper arm	$\frac{3}{4}$ "	5"	15"	P	1
J* washers	$\frac{1}{4}$ "	3" diam.		H	2
K cover plate	$\frac{1}{4}$ "	3"	3"	H	1

*Parts initially cut oversize. See the instructions.

Materials key: BP—birch plywood, P—poplar, H—tempered hardboard, LP—laminated poplar.

Supplies: #8 $\times\frac{3}{4}$ " flathead wood screws (4), #8 $\times\frac{1}{2}$ " flathead wood screws (32), #8 $\times\frac{1}{4}$ " flathead wood screws (3), #8 $\times\frac{1}{4}$ " roundhead wood screws (6), #8 flat washers (12), $\frac{1}{4}$ " flat washers (6), $\frac{1}{4}$ " lag screws $3\frac{1}{2}$ " long (2), $\frac{1}{4}$ " dowel, 1" dowel.

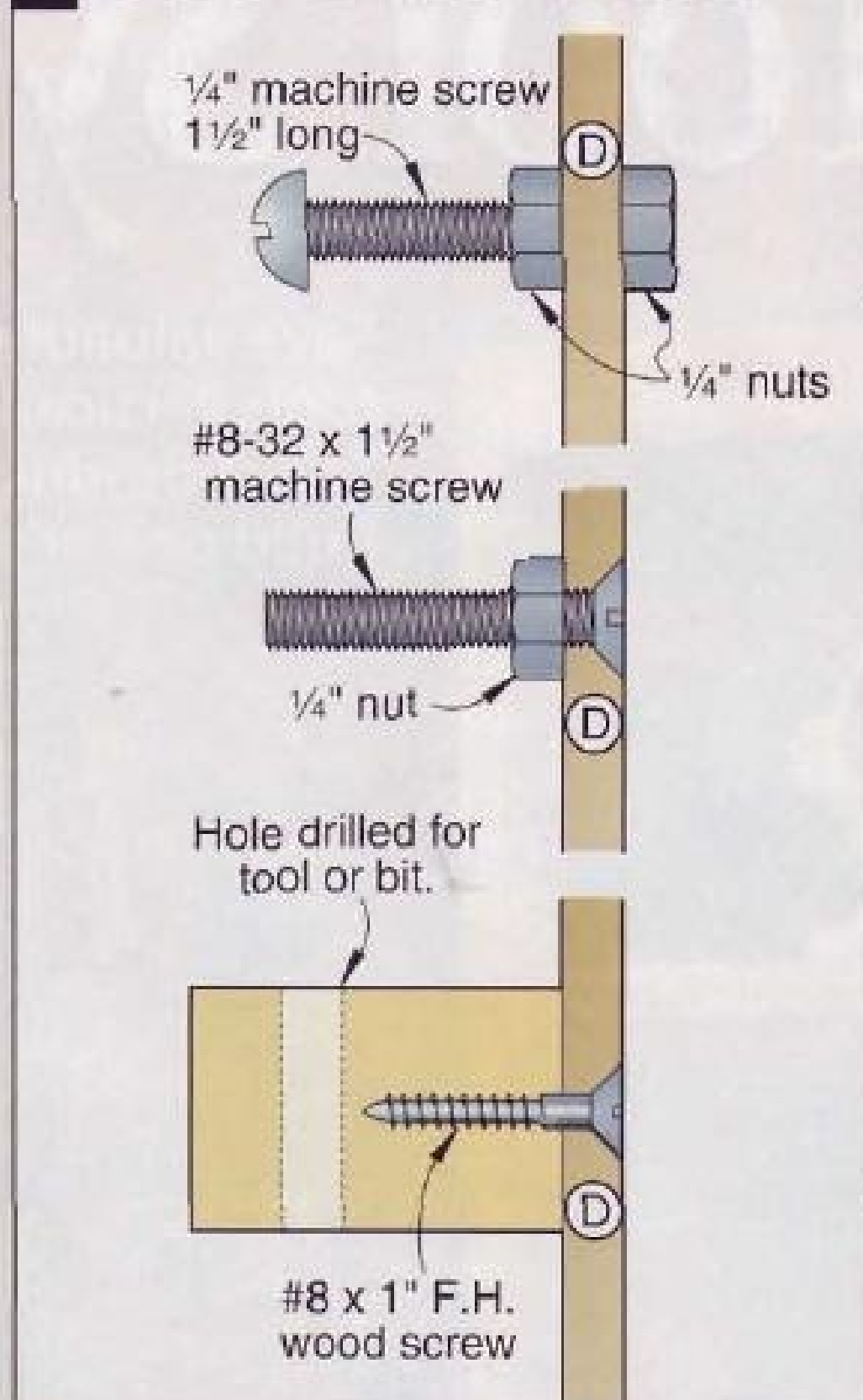
Blades and bits: Stack dado set, 1" Forstner bit.

Source

Tool Holders: Look for spring-clip tool holders and magnetic tool holders at your local hardware store, home center, or woodworking specialty store.

Adding your tools and bits

4 TOOL MOUNTING OPTIONS



How many of the hundred-plus small items that clog the drawers in your shop can you fit onto your carousel? To plan the arrangement of your tools and bits, place the panels (D/E) on your workbench, and position the items, as shown in **Photo C**. You can store items on both sides of each panel, and also on the core.

Note: For the panels to rotate, there must be clearance between each panel and the core. No bit, tool, or tool holder may protrude beyond an imaginary 8"-diameter cylinder, centered on the panel. Items stored on the core must not interfere with the panels' rotation.

For tools that can hang from pegs, mark the locations, and drill holes through the panels. Insert machine screws, and thread on nuts, as shown on **Drawing 4**.

For drill bits and other tools that fit into round holes, measure the bit or tool center-to-center distances, and transfer these dimensions to blocks of wood. Drill holes slightly larger than the bit-shank or tool diameters. Clamp the holders to the panels. Drill pilot and countersunk shank holes from the opposite side, and drive in screws. (We didn't glue the holders in place, just in case we ever need to rearrange our panel layout.)

ARRANGE THE BITS OR TOOLS



Arrange on the panels the bits or tools you wish to store in the carousel. Leave enough clearance between items to allow for easy handling.

SPRING-CLIP TOOL HOLDERS



After fastening spring-clip tool holders to the panel with machine screws and nuts, snap the tools into place.

MAGNETIC TOOL HOLDER

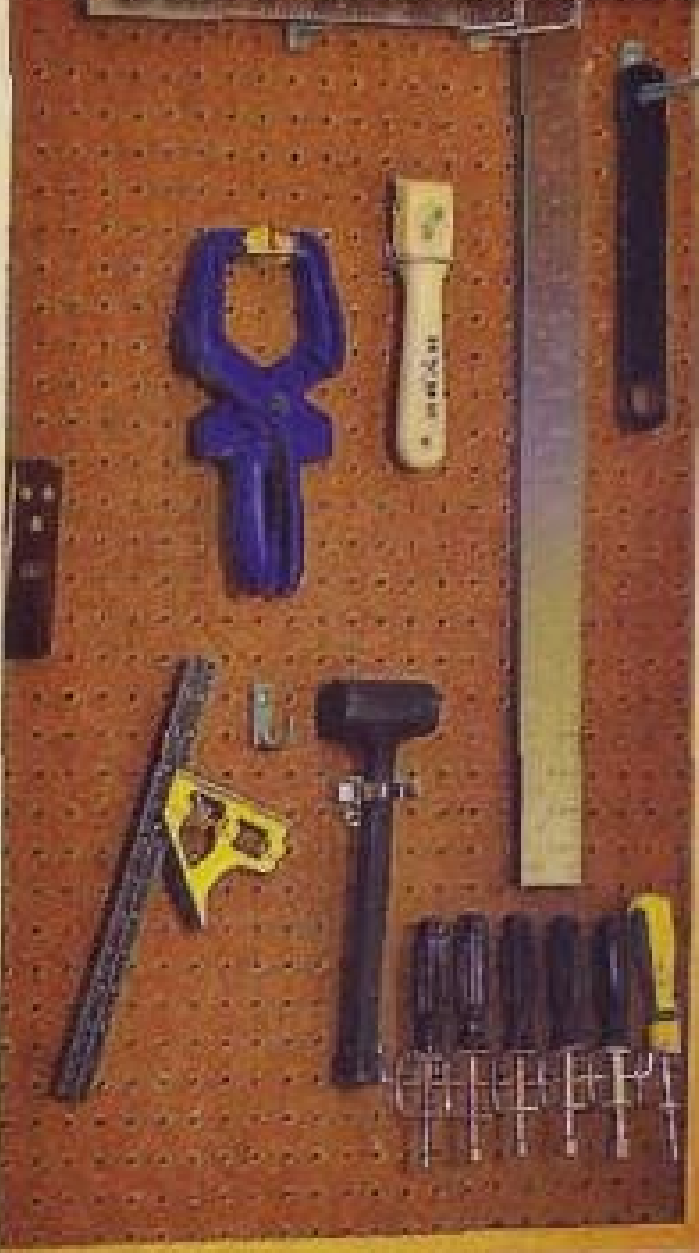
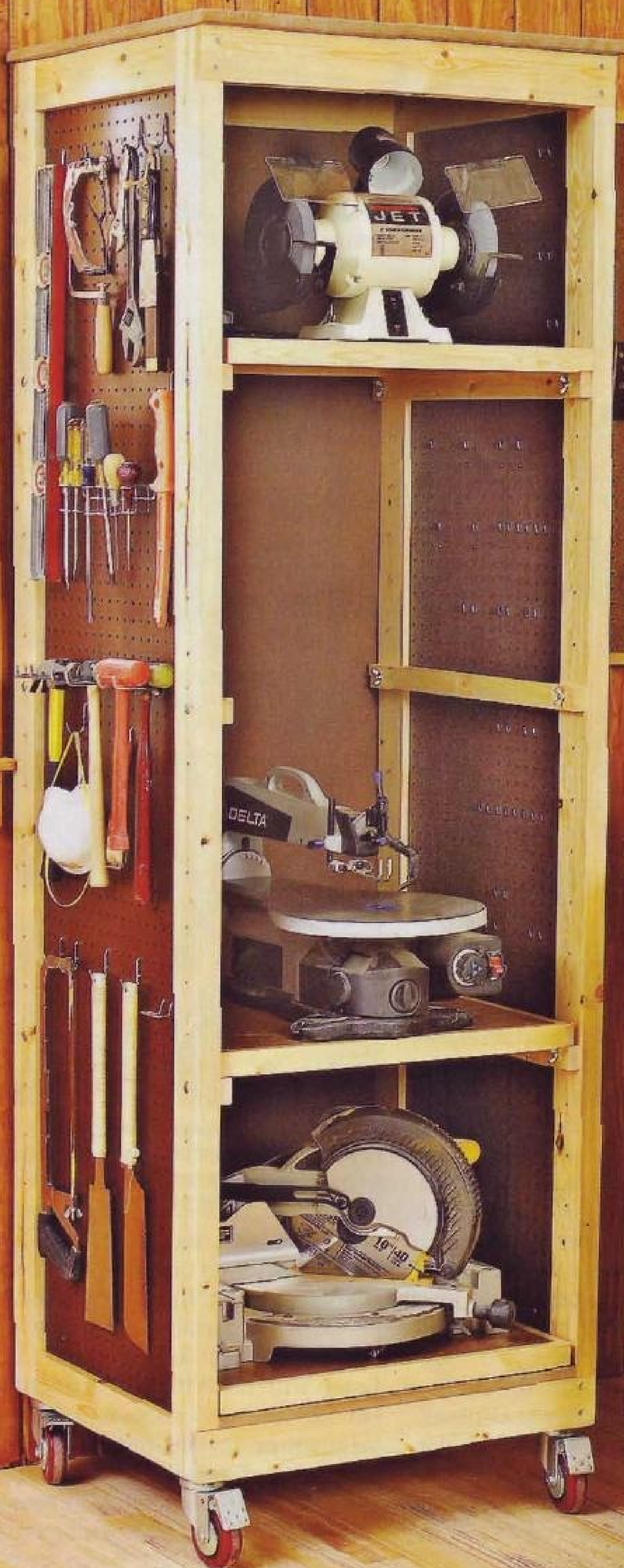


To avoid having to make intricate holders for small or odd-shaped parts, mount a magnetic tool holder with a machine screw and nut.

If some of your tools have their own small cases or holders, you may wish to mount them to panels. To permanently attach the case, drill holes through it and the panel, and fasten with machine screws and nuts. For removable attachment, adhere Velcro tape to the case and panel. Other easy mounting methods are to use spring clips, as shown in **Photo D**, and magnetic tool holders, as shown in **Photo E**. 🌱

Super-organized, space-saving Bench-Tool System

Save valuable space by storing your benchtop tools vertically on trays in a roll-around cabinet. The slide-out trays mount atop a mobile tool base. Build one or more of each.



PROJECT HIGHLIGHTS

- Overall dimensions:
Tool cabinet, 27 $\frac{3}{4}$ " wide x 25 $\frac{3}{16}$ " deep x 85 $\frac{7}{8}$ " high.
Tool base, 21 $\frac{7}{8}$ " wide x 22 $\frac{3}{16}$ " deep x 36 $\frac{7}{8}$ " high.
- Inexpensive materials are easy on the wallet. One-stop shopping for most parts and simple construction make this a great weekend project.
- Benchtop tools bolt to trays that fit over the top of the tool base. For storage, lift the tool and tray off the base, and slide them into the cabinet.
- Roll the cabinets out to work, away for storage. Dual-locking casters provide both mobility and stability. See **Source** on page 64.

Skill Builder

- Make a simple jig to cut rabbets for half-lap joints in multiple oversize parts at once.

Make the case sides

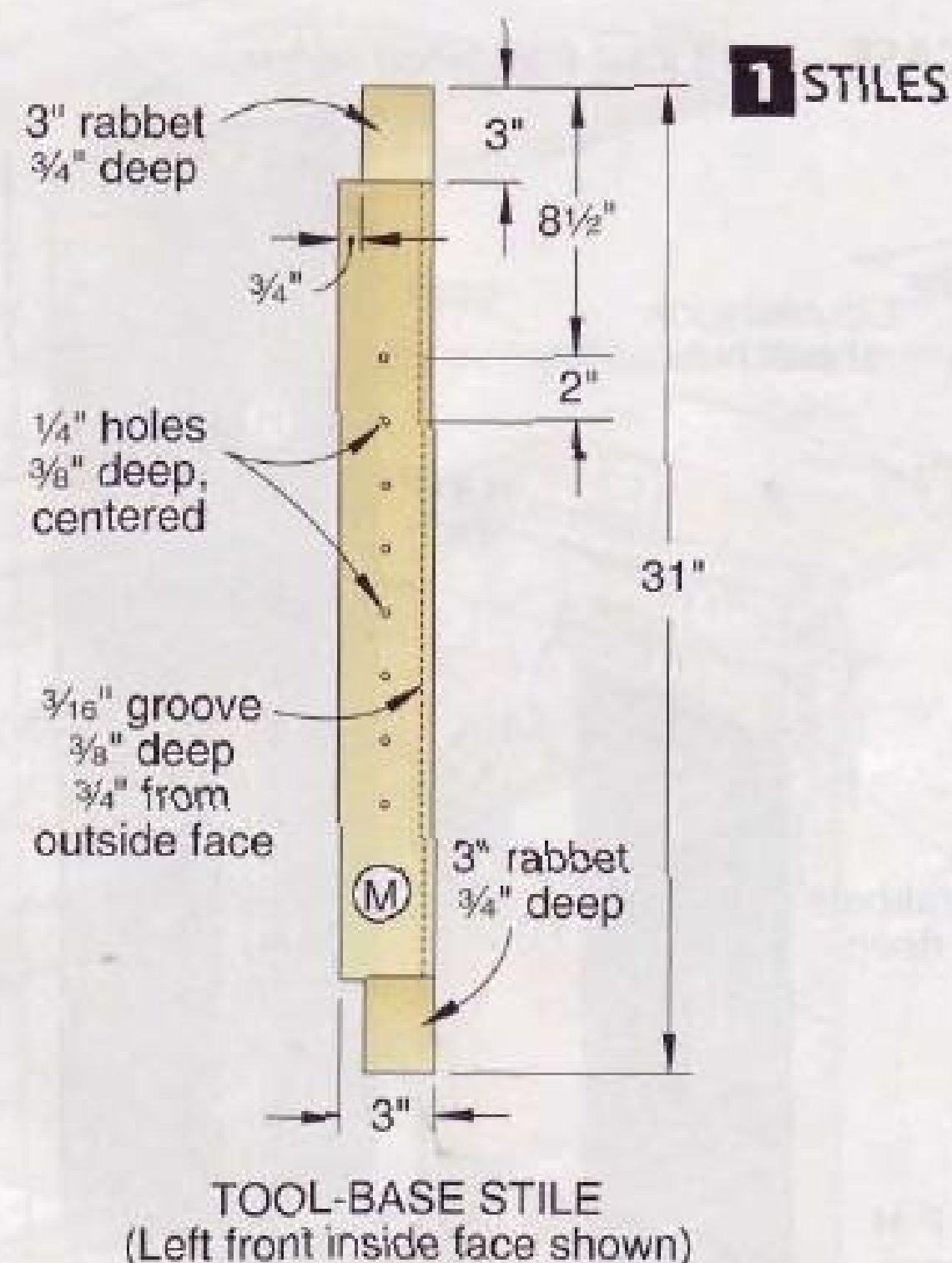
1 Select straight 2x4s with as few knots as possible for the tool-cabinet stiles (A), rails (B), and stretchers (C), and the tool-base stiles (M), rails (N), and stretchers (O). Clean up the 2x4 faces with a random-orbit sander. Then, rip and joint both edges to the 3" finished width. Now, cut the parts to the finished lengths (**Materials List**, page 64).

2 Lay out the stiles (A, M), rails (B, N), and stretchers (C, O) in the arrangements shown (**Drawings 2 and 3**). Then mark the locations of the rabbets, notches, and grooves (**Drawings 1, 2, 2a, and 3**). Cut the rabbets and notches. Set the stretchers aside. Now, making two passes over the tablesaw blade, cut $\frac{3}{16}$ " grooves $\frac{3}{8}$ " deep in the stiles and rails for the panels (D, P).

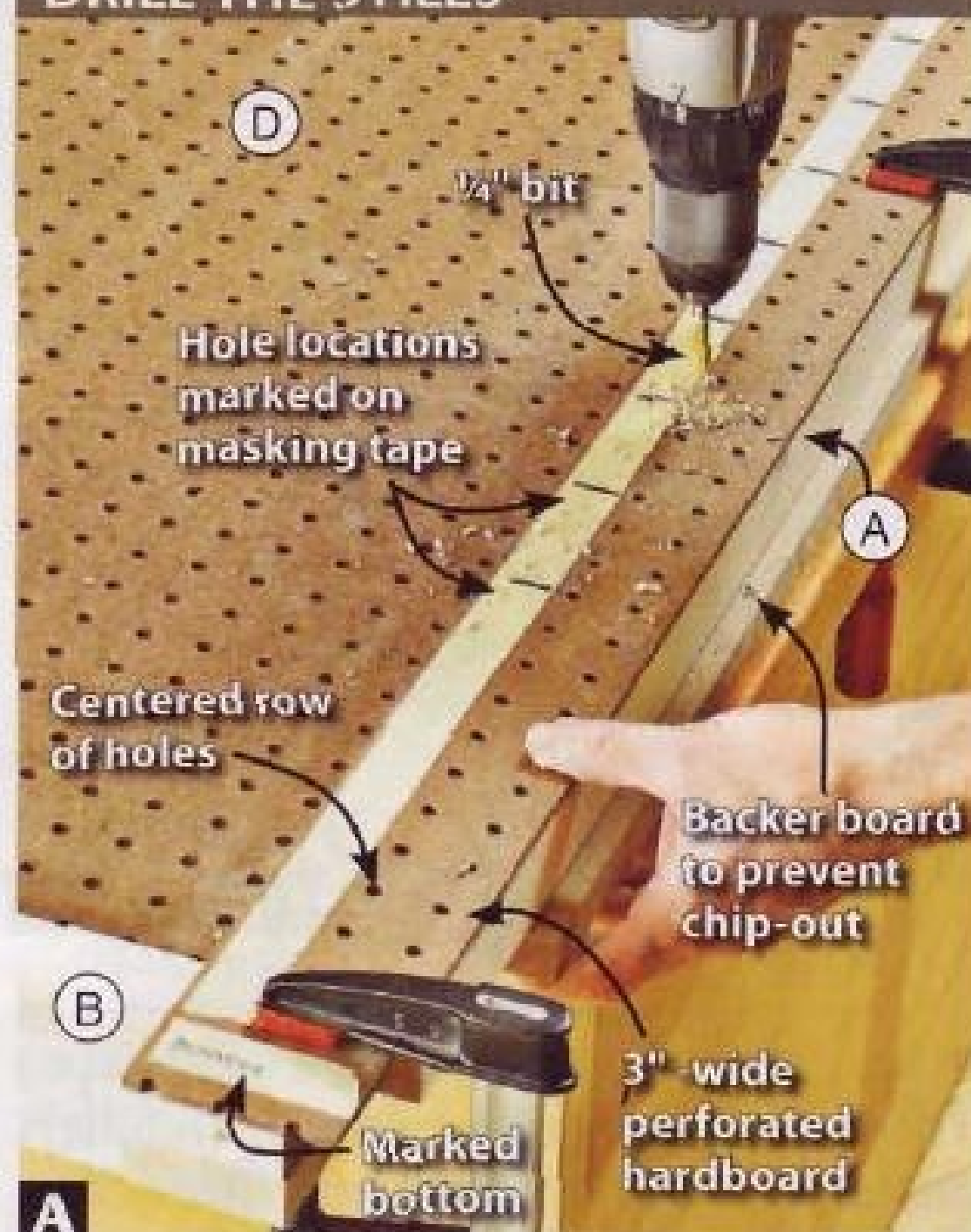
Note: We used $\frac{3}{16}$ " perforated hardboard for the panels (D, P). For $\frac{1}{4}$ " perforated hardboard, cut the grooves in one pass with a dado blade.

3 Cut the panels (D, P) to size. Dry-assemble the sides (A/B/D and M/N/P) to check the fit. Make any necessary adjustments. Then, glue and clamp the sides with the smooth face of the panels facing out. Check the sides for square. To speed the side glue-up process, see the **Shop Tip** at right.

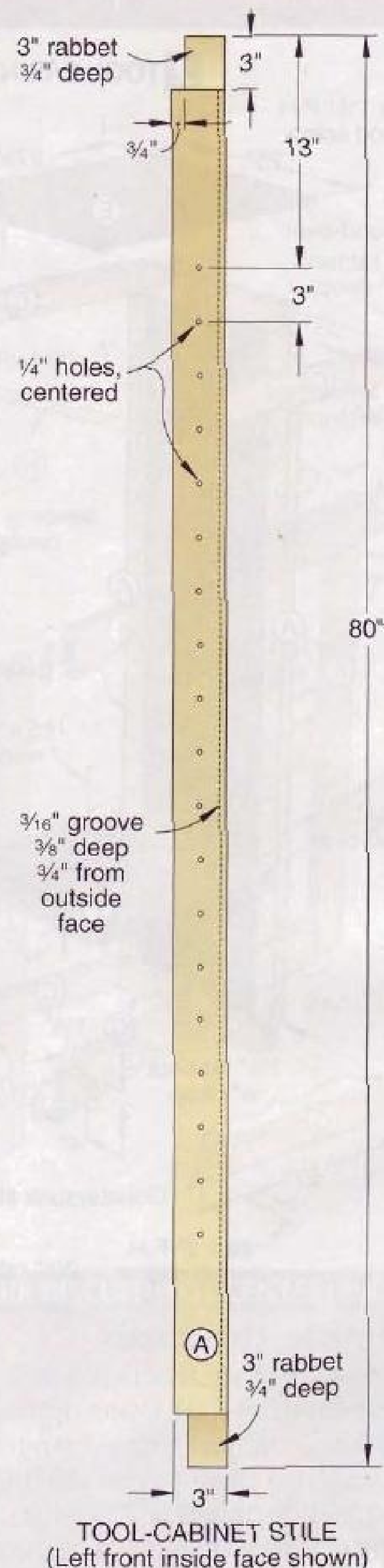
4 With the sides assembled, drill $\frac{1}{4}$ " holes through the tool-cabinet stiles (A), and $\frac{1}{4}$ " holes $\frac{3}{8}$ " deep in the inside faces of the tool-base stiles (M) (**Drawings 1, 2, and 3, Photo A**). The photo shows drilling the holes into the tool-cabinet stiles.



DRILL THE STILES



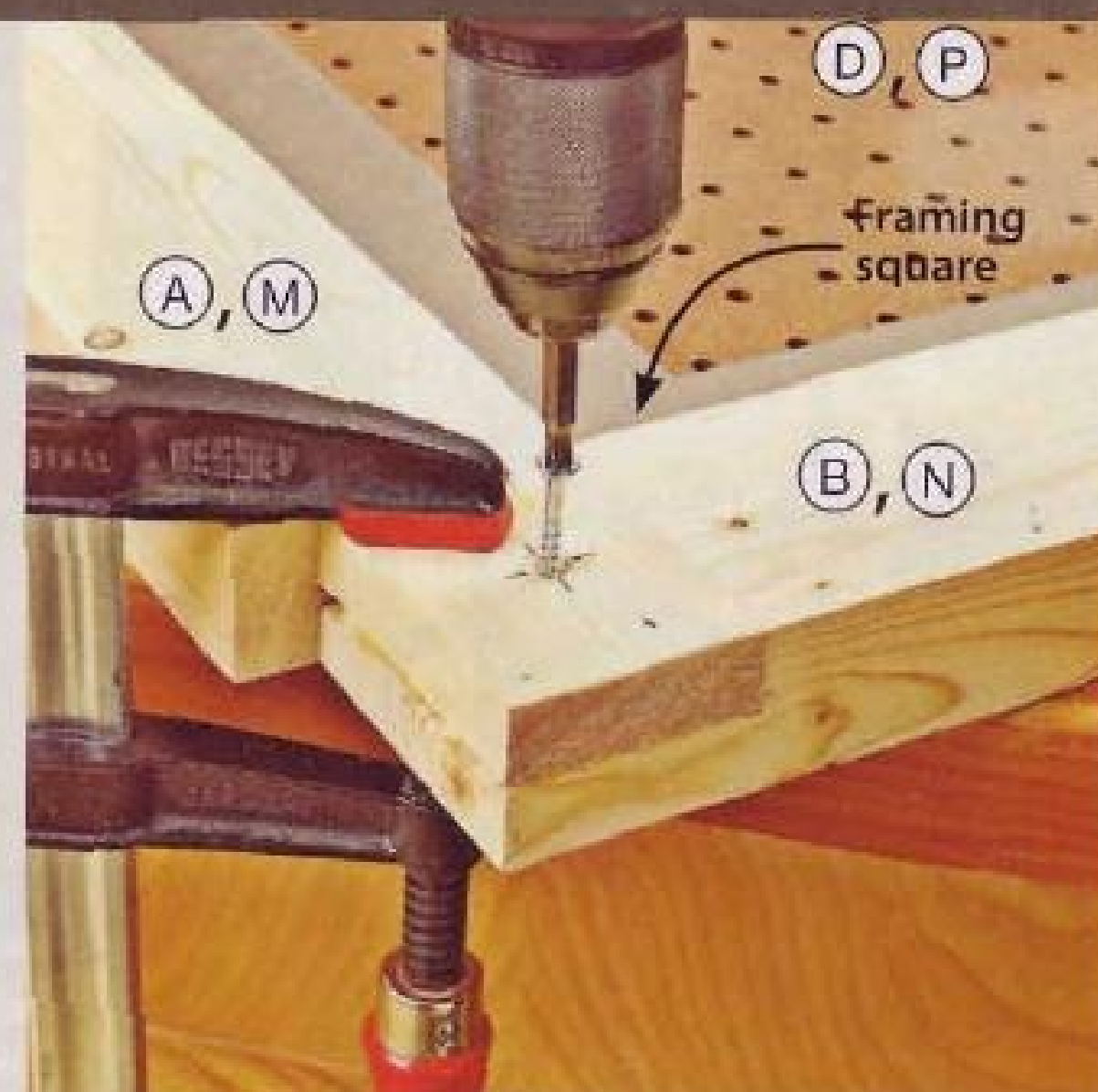
A Mark hole locations on masking tape applied to a perforated hardboard strip. Using the strip as a guide, drill the holes into the stiles (A).



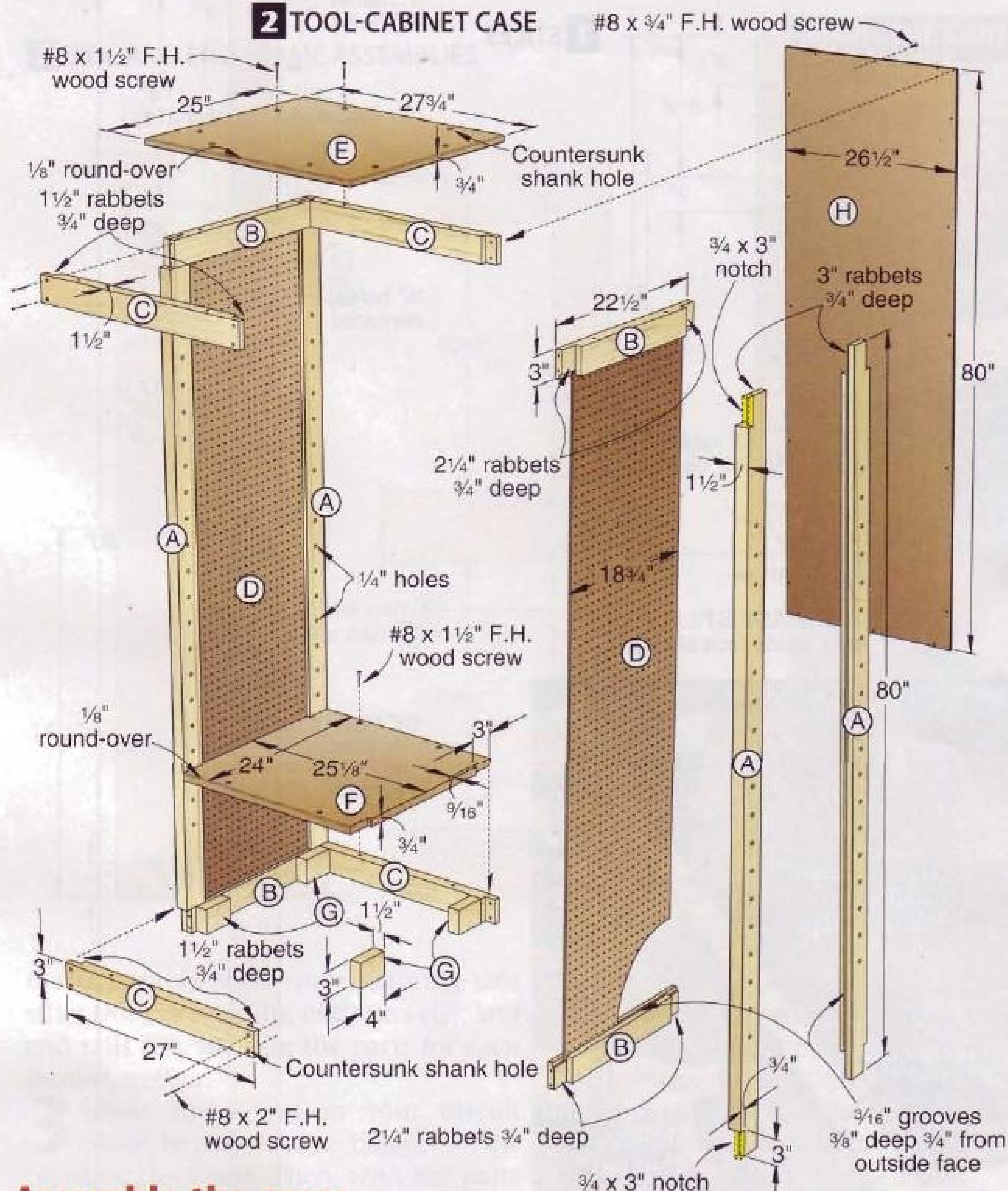
SHOP TIP

Let wood screws do the clamping

Here's a way to cut down on the clamping time and number of clamps needed to glue up the sides (A/B/D and M/N/P). After clamping up the first side and checking for square, drill a screw hole centered in each half-lap joint. Then, drive screws, as shown at right, remove the clamps, and set the assembly aside. Now, your clamps and bench space are free for assembling the next side.



2 TOOL-CABINET CASE

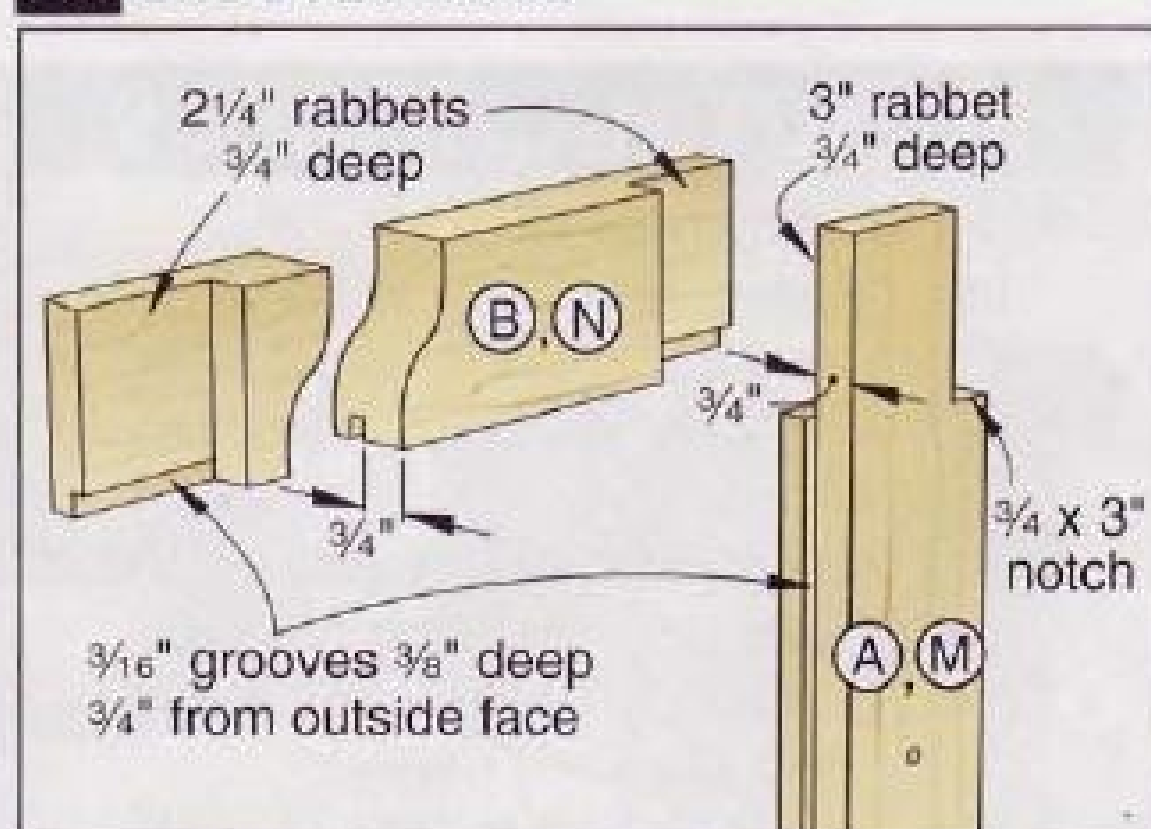


Assemble the cases

1 Retrieve the stretchers (C) and tool-base stretchers (O). Using right-angle braces to align the stretchers, glue and screw them to one side (A/B/D and M/N/P) (Drawings 2 and 3). (To download a free plan for a right-angle

brace, see woodmagazine.com/brace.) Then with the four cabinet stretchers attached to the first side, add the second side (Photo B), and glue and screw it in place. The photo shows adding the second side to the tool cabinet.

2a GROOVE DETAIL



2 Cut the tops (E, Q) to size, and rout 1/8" round-overs along the edges (Drawings 2 and 3). Then, clamp the tops to the cases, drill screw holes, and drive the screws. Align the tool-cabinet top (E) flush with the back stretcher (C), centered side-to-side and overhanging the front stretcher. Align the tool-base top (Q) flush with the case all around.

3 Cut the bottoms (F, R) to size. [Make the necessary adjustment for 1/4" perforated hardboard panels (D, P).] Draw the corner notches (Drawings 2 and 3), and cut them out (Photos C and D). Rout round-overs, where shown. Apply glue to the top edges of the lower stretchers (C, O), and clamp the bottoms in place. Drill screw holes, and drive the screws.

4 Lay the cases facedown. Cut the caster blocks (G, S) to size, and glue and clamp them in place (Drawings 2 and 3).

5 Cut the backs (H, T) to size. Center the backs side-to-side on the cases, and clamp them in place. Then, drill screw holes and drive the screws.

Add trays, shelf, and door

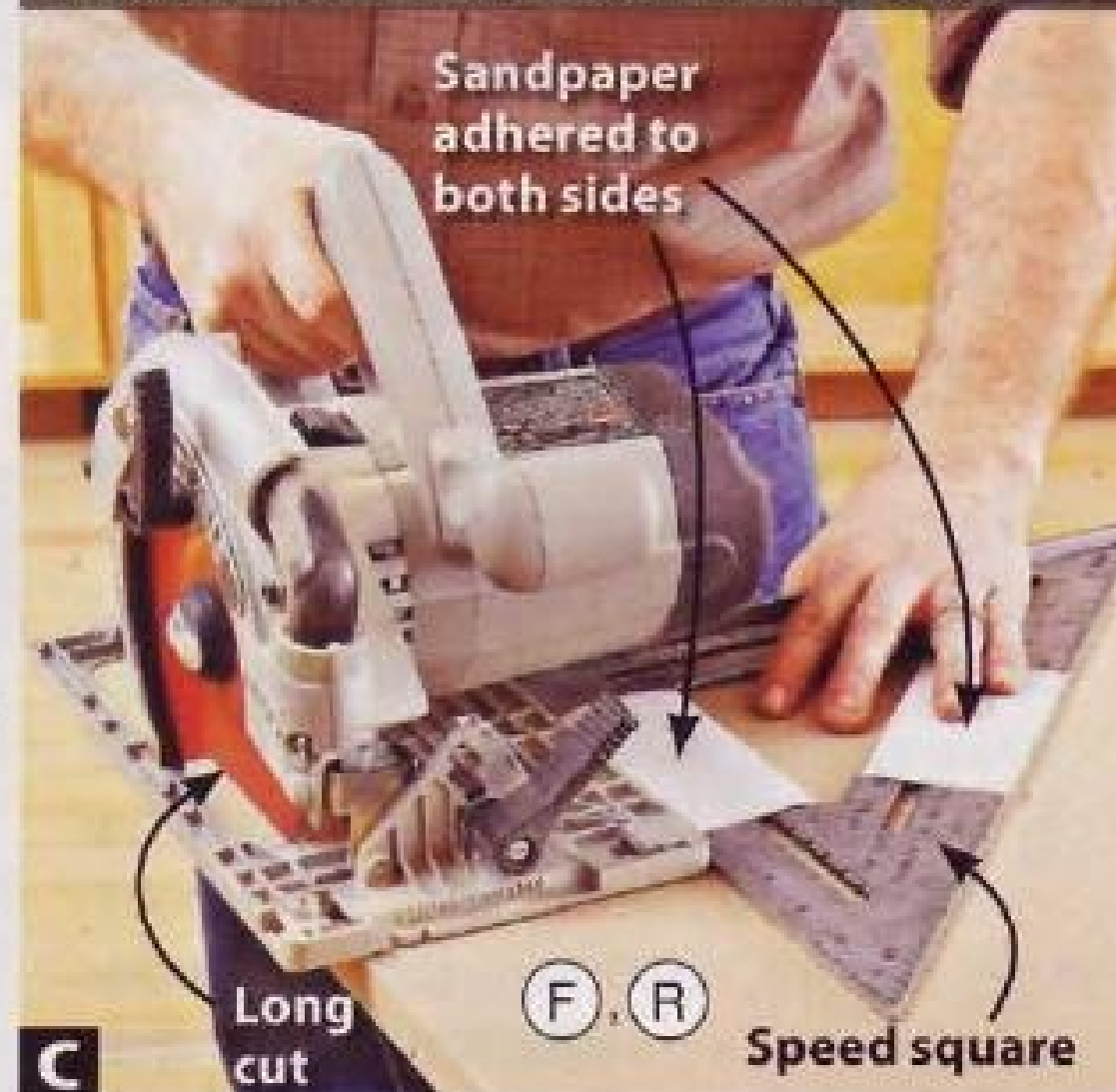
1 For the tool cabinet, cut the tray panels (I) to size, and for the tool base, cut the shelf panel (U) to size. Then, cut the short edging (J), long edging (K),

BEGIN THE CASE ASSEMBLY

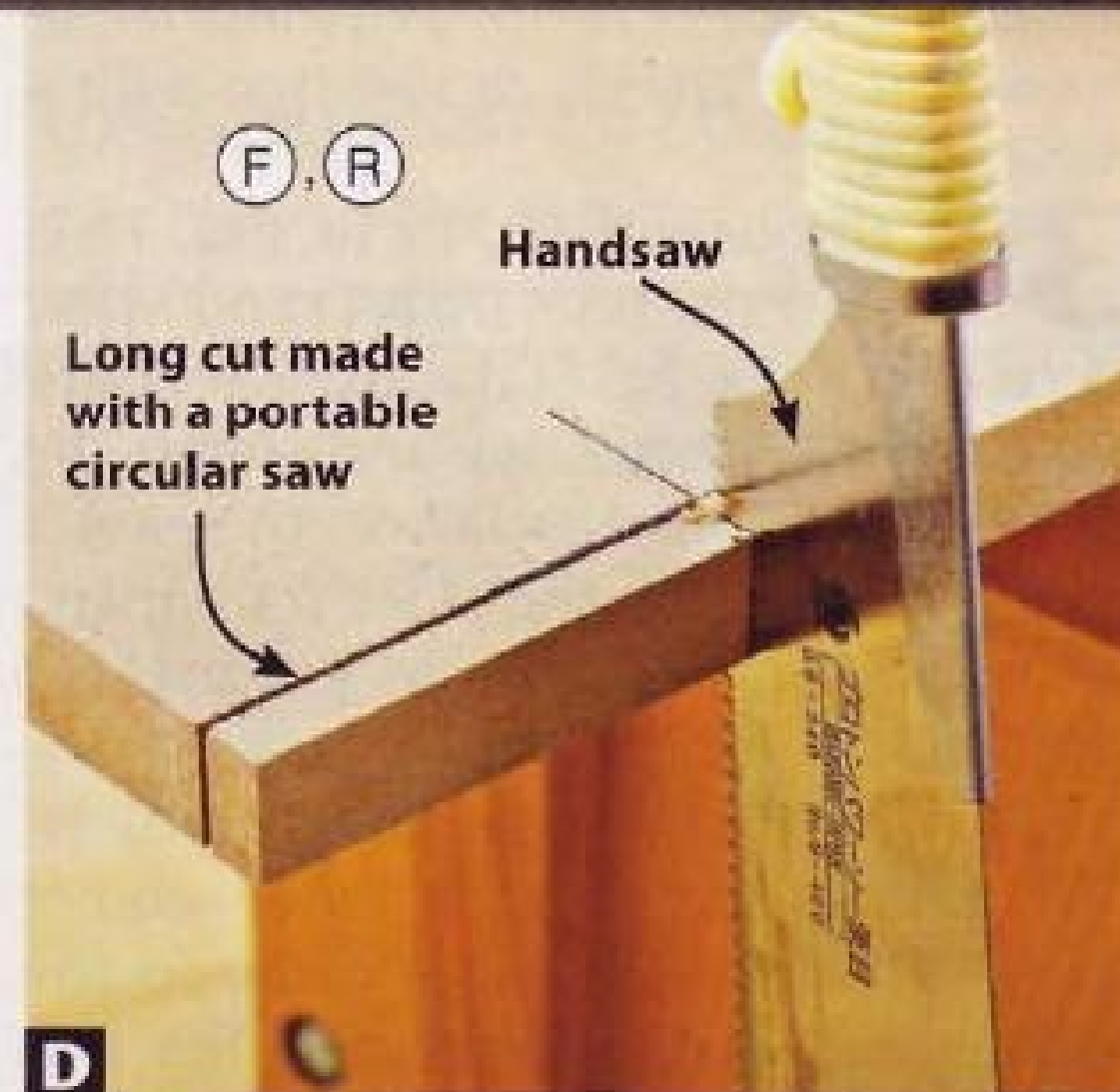


With the stretchers (C) attached to the first side (A/B/D), apply glue to the stretcher rabbets, and position the second side.

FORM THE BOTTOM NOTCHES

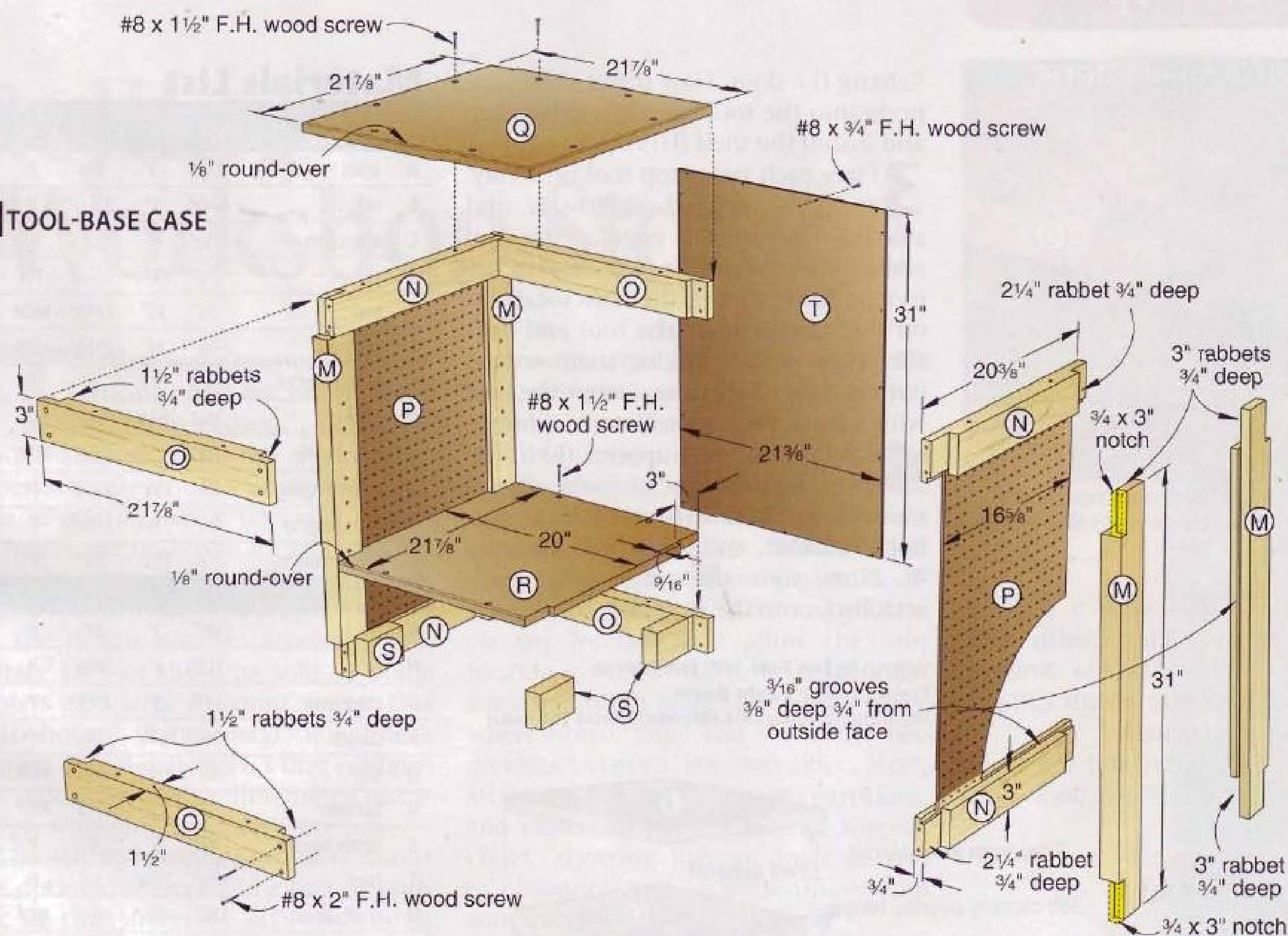


To make the long cuts, adhere sandpaper to a speed square to keep it from slipping. Then use it to guide your portable circular saw.

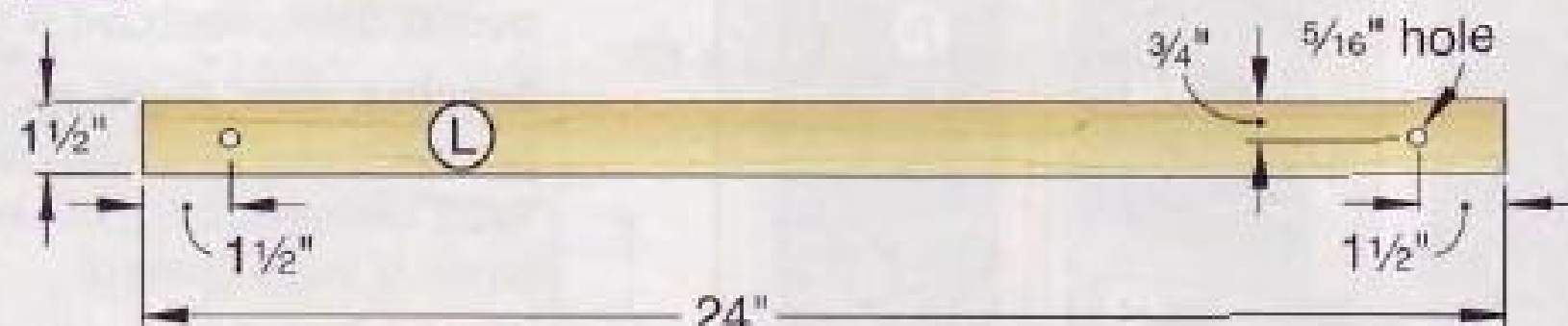


After making the long cuts with a portable circular saw, finish cutting the notches with a fine-tooth handsaw.

3 TOOL-BASE CASE



4a TRAY SUPPORTS



4 TOOL CABINET ASSEMBLY

and shelf edging (V) to size. (We ripped these parts from the edge of 2× stock. You also can cut them from 3/4\"-thick stock.) First, glue and clamp the short edging to the trays, flush at the top and ends, and then add the long edging [Drawing 4]. Now, glue and clamp the shelf edging to the shelf panel (Drawing 5). Rout 1/8\" round-overs along the top edges of the trays and shelf, and finish-sand them.

2 Rip 3/4\"-wide strips from a 2×4, and cut the tray supports (L) to size. Then, drill a 5/16\" hole at each end (Drawing 4a). Finish-sand the supports.

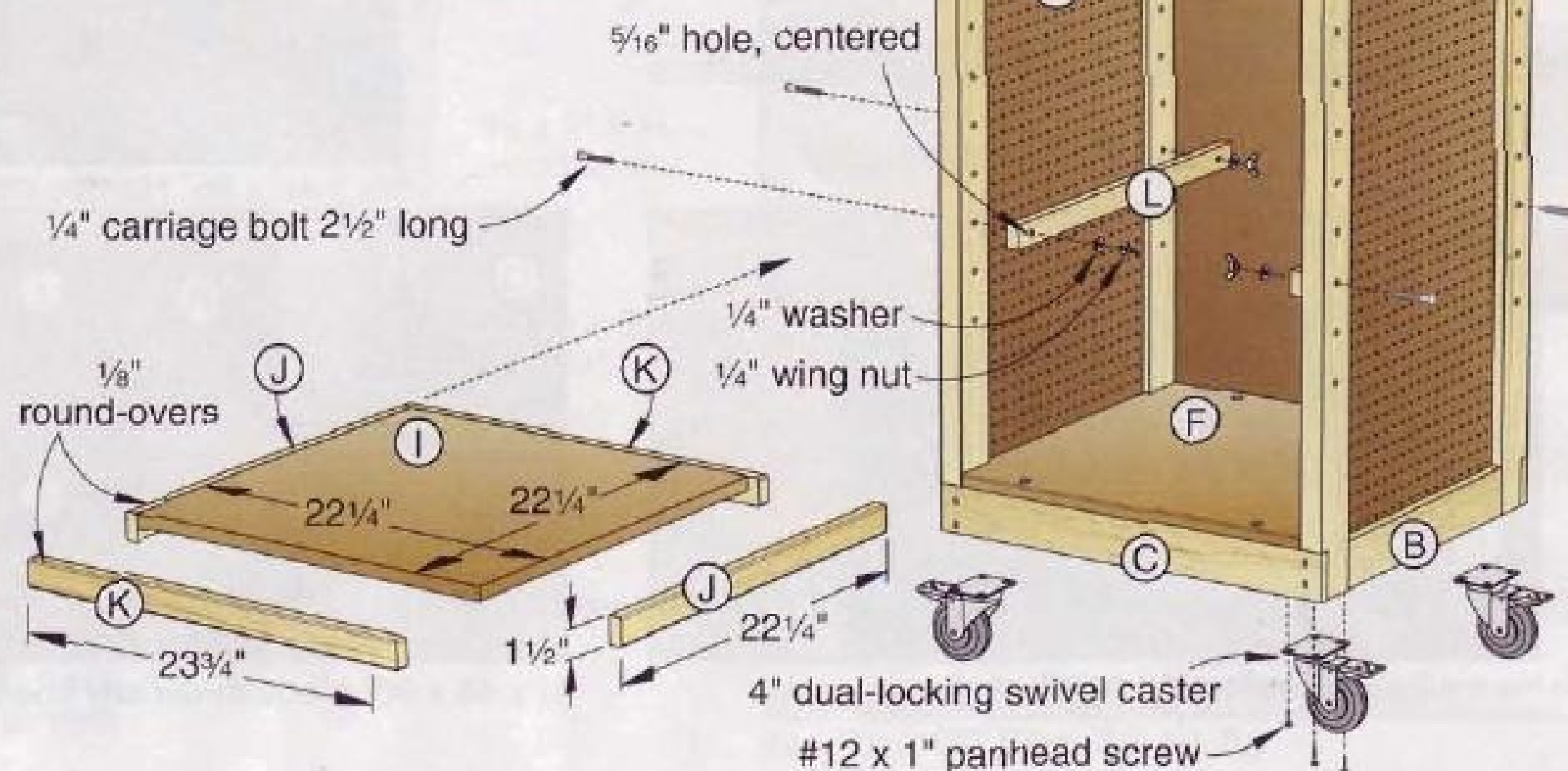
3 Lay the tool-cabinet and tool-base cases on their backs. Then, position the caster plates 1/4\" from the case edges, and using the holes in the plates as guides, drill screw holes. Now, screw the casters in place.

4 Cut the tool base door (W) to size, and rout 1/8\" round-overs along the front edges. Then, drill holes and attach

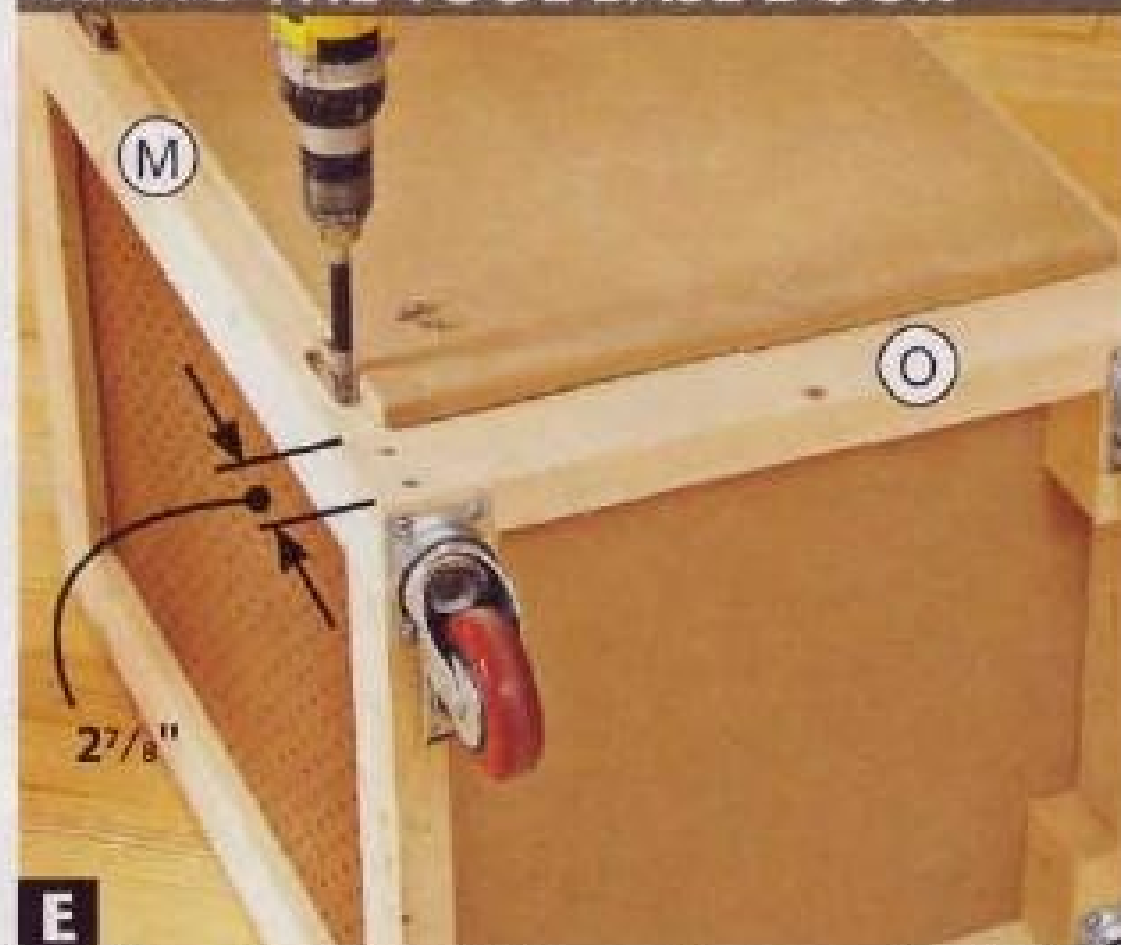
the hinges and handle (Drawing 5). Now, lay the tool base on its back, and fasten the door to the case (Photo E).

Apply finish and assemble

1 Remove the door from the tool base, and the hinges and handle from the door. Remove the casters from both cases. Examine all the parts and assemblies, and finish-sand where needed. Then,



HANG THE TOOL BASE DOOR

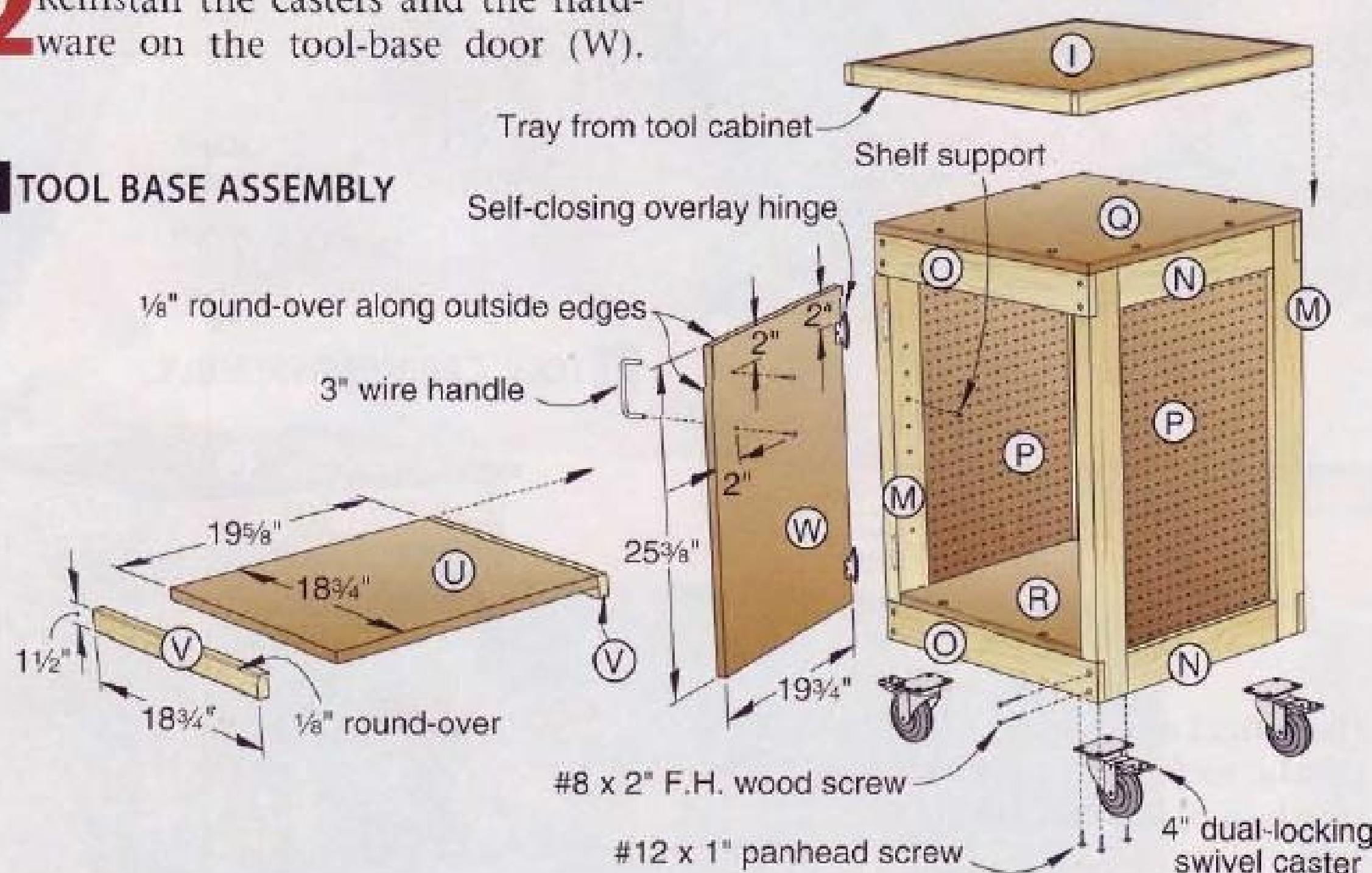


E Position the door 2 7/8" from the stretcher (O) bottom edge and centered side-to-side. Screw the hinges to the stile (M).

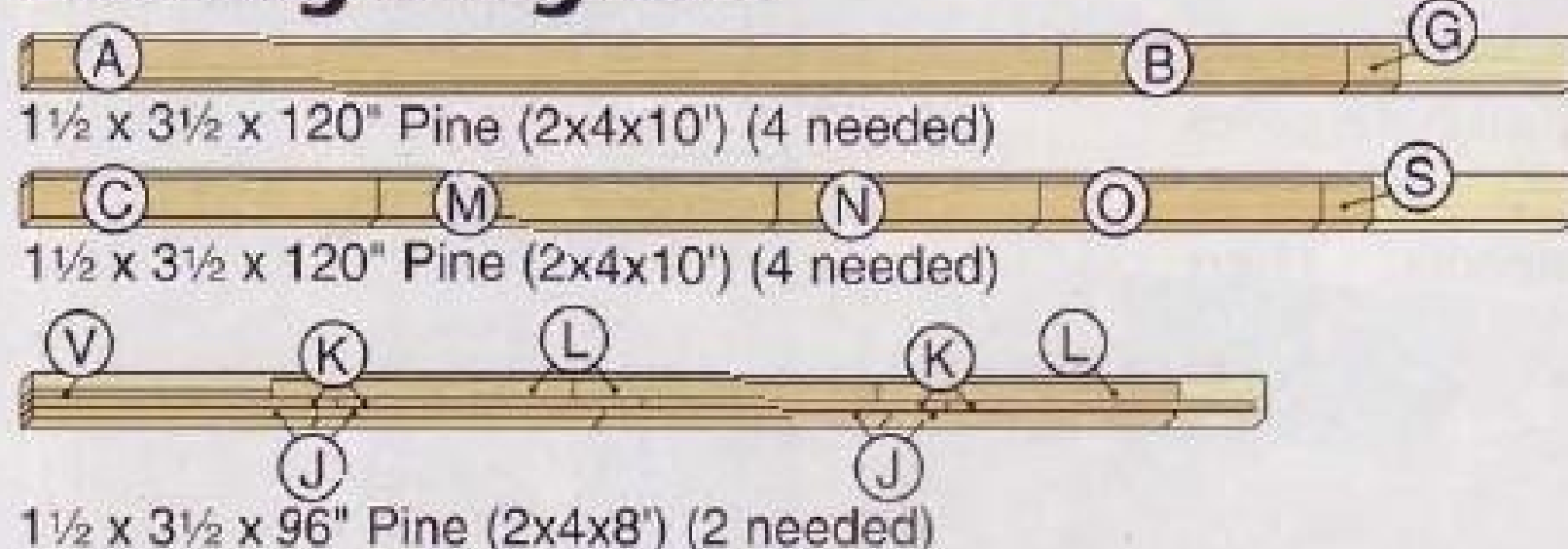
ease any sharp edges with a sanding block. Now apply a clear finish. (We applied two coats of Minwax Antique Oil Finish, sanding lightly with 220-grit sandpaper between coats.)

2 Reinstall the casters and the hardware on the tool-base door (W).

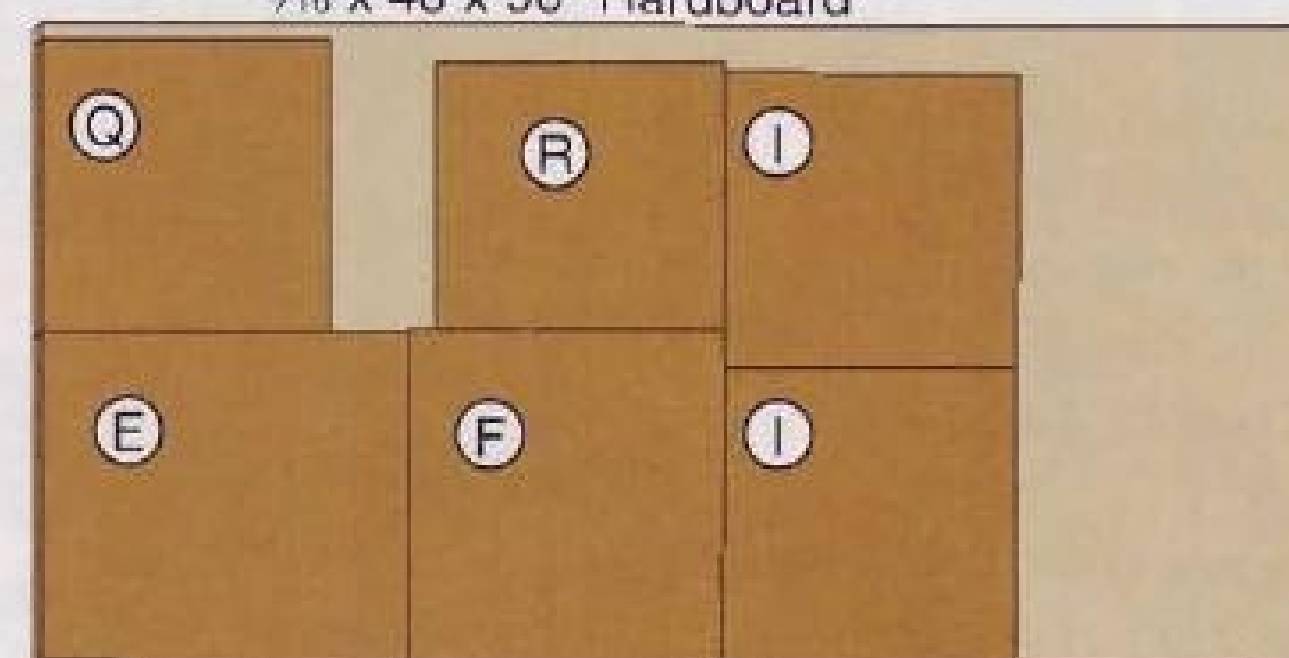
5 TOOL BASE ASSEMBLY



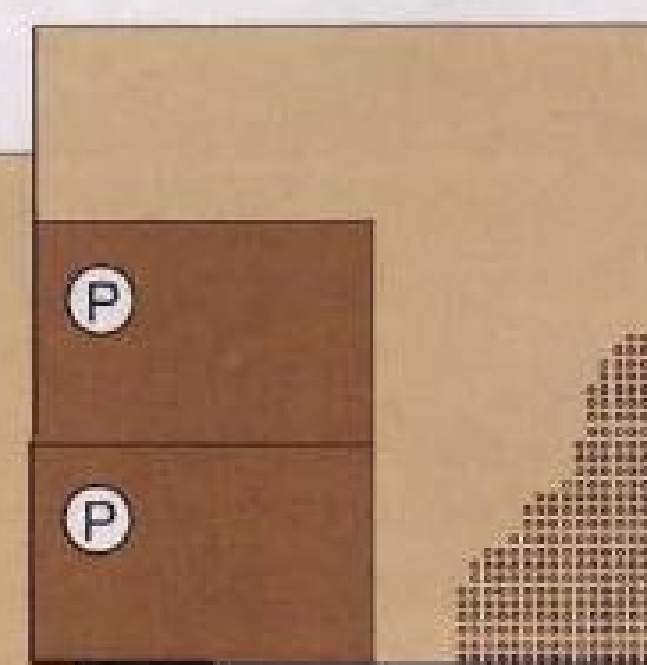
Cutting Diagram



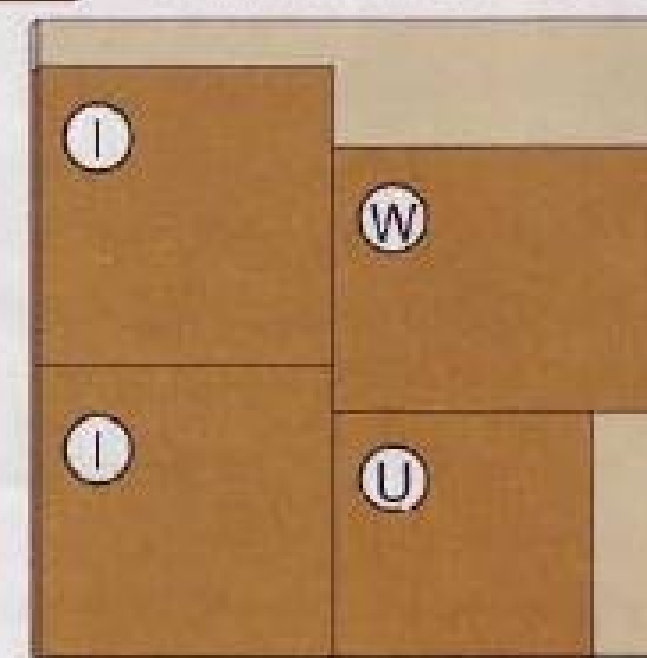
3/16 x 48 x 96" Perforated hardboard



3/4 x 48 x 96" Medium-density fiberboard



3/16 x 48 x 48" Perforated hardboard



3/4 x 48 x 48" Medium-density fiberboard

Rehang the door. Now insert shelf supports into the tool-base-stile (M) holes, and install the shelf (U/V).

3 Place each benchtop tool on a tray, generally centered side-to-side, and as close to the front edge as the tool allows. Then, using the bolt holes in the tool as guides, mark the hole locations on the tray. Remove the tool and drill the holes, countersinking them on the bottom face of the tray. Fasten the tool with flathead bolts, washers, and nuts.

4 Position the tray supports (L) in the tool cabinet, spaced vertically as needed, and fasten them with carriage bolts, washers, and wing nuts (Drawing 4). Now, slide the trays, with tools attached, onto the supports.

Written by **Jan Svec** with **Jeff Mertz**
Project design: **Kevin Boyle**
Illustrations: **Roxanne LeMoine; Lorna Johnson**

Materials List

Tool cabinet	FINISHED SIZE			Matl.	Qty.
	T	W	L		
A stiles	1 1/2"	3"	80"	P	4
B rails	1 1/2"	3"	22 1/2"	P	4
C stretchers	1 1/2"	3"	27"	P	4
D panels	3/16"	18 3/4"	74 3/4"	PH	2
E top	3/4"	25"	27 3/4"	MDF	1
F bottom	3/4"	24"	25 1/8"	MDF	1
G caster blocks	1 1/2"	3"	4"	P	4
H back	3/16"	26 1/2"	80"	H	1
I tray panels	3/4"	22 1/4"	22 1/4"	MDF	4
J short edging	3/4"	1 1/2"	22 1/4"	P	8
K long edging	3/4"	1 1/2"	23 3/4"	P	8
L tray supports	3/4"	1 1/2"	24"	P	6
Tool base					
M stiles	1 1/2"	3"	31"	P	4
N rails	1 1/2"	3"	20 3/8"	P	4
O stretchers	1 1/2"	3"	21 7/8"	P	4
P panels	3/16"	16 5/8"	25 3/4"	PH	2
Q top	3/4"	21 7/8"	21 7/8"	MDF	1
R bottom	3/4"	20"	21 7/8"	MDF	1
S caster blocks	1 1/2"	3"	4"	P	4
T back	3/16"	21 3/8"	31"	H	1
U shelf panel	3/4"	18 3/4"	19 5/8"	MDF	1
V shelf edging	3/4"	1 1/2"	18 3/4"	P	2
W door	3/4"	19 3/4"	25 5/8"	MDF	1

Materials key: P-pine, PH-perforated hardboard, MDF-medium-density fiberboard, H-tempered hardboard.

Supplies: #8x3/4", #8x1 1/2", #8x2" flathead wood screws; #12x1" panhead screws (32); 1/4" wing nuts (12); 1/4" flat washers (12); 1/4x2 1/2" carriage bolts (12); self-closing overlay hinges (2); 3" wire handle; 1/4" shelf supports (4).

Bits: 1/8" round-over router bit, 1/4" and 5/16" drill bits.

Source

Castors: 4" dual-locking swivel plate casters no. 36992, \$10.49 ea. Hartville Tool. Call 800-345-2396, or go to hartvilletool.com.

Rolling Workshop Storage

"This unit was designed and built to bring order out of the chaos in my workshop," explained reader Bernard Monneau of Calgary, Alberta, in his letter to us. We liked his idea of mixing plastic tubs and shelves so much, we built one for the *WOOD*® magazine shop, and invite you to construct one for your work area as well.

The design revolves around plastic storage tubs of the type sold in home centers and large discount stores. Our unit houses Rubbermaid Roughneck Storage Tote 3-gallon/11.3-liter containers. Adjust the project dimensions accordingly if you use a different-size tub.

The entire workshop project, minus the optional shelves and cleats, is built out of two sheets of MDF ($\frac{3}{4}$ " birch

plywood would also work well). See the **Cutting Diagram** below right for optimal sheet-goods usage.

To build the project, cut the parts to the sizes noted in the drawing below. Rout a $\frac{1}{8}$ " round-over along the one exposed edge of each $1\frac{1}{2} \times 1\frac{1}{2}$ " cleat and along the top edge of each $\frac{3}{4} \times \frac{3}{4}$ " cleat, where shown. (The round-overs on the interior cleat allow the tubs to slide easier.) Then, drill the counter-sunk mounting holes through all parts, where noted. Glue and screw the two dividers between the two sides. Next, attach the top, bottom, center partitions, and cleats. Mount the interior support cleats, allowing just an inch or two of clearance, top to bottom, between containers. Attach the casters.



As an option, use $10\frac{1}{2} \times 16$ " shelves in place of some or all of the tubs.



Cutting Diagram

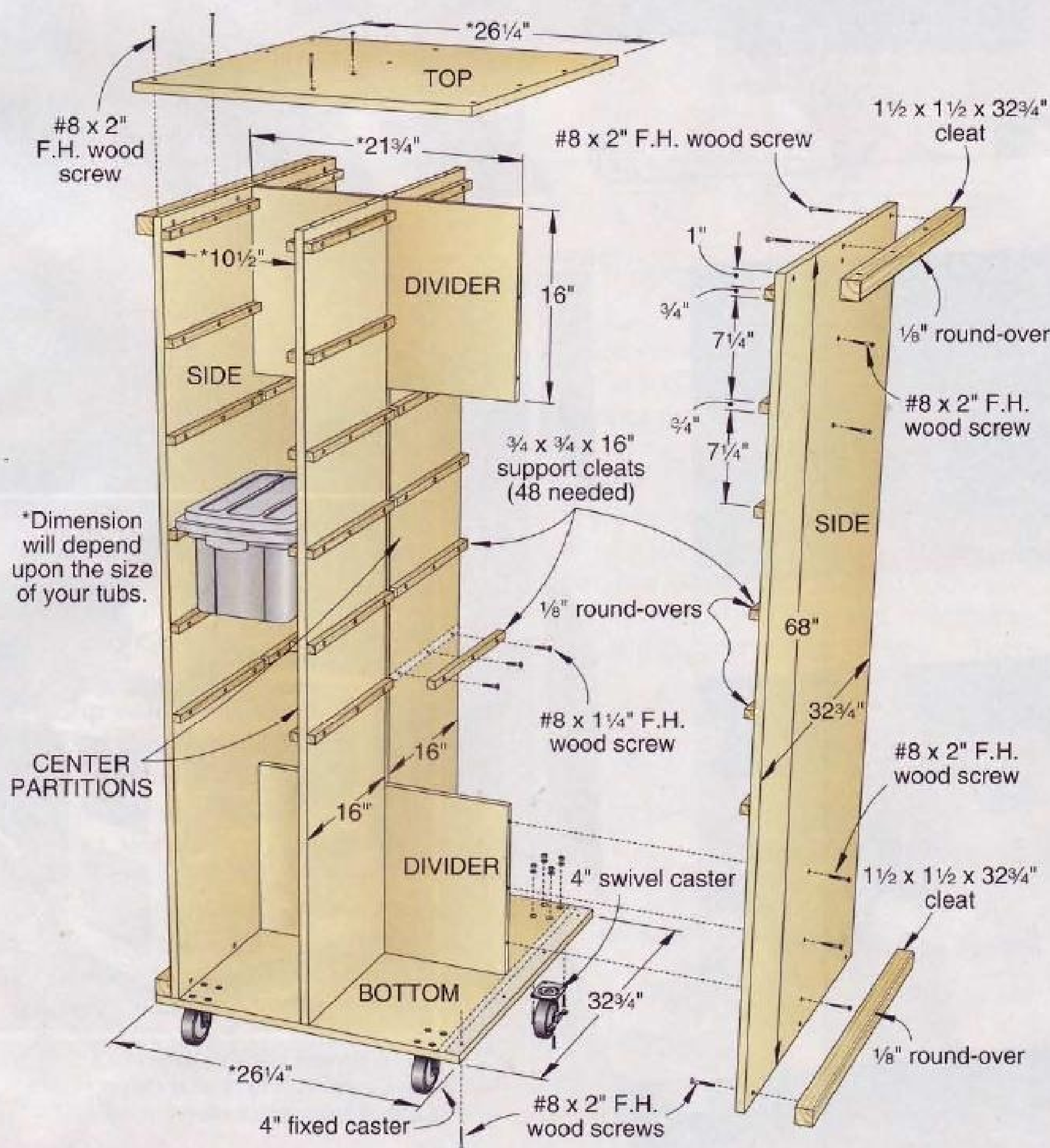
Center partition	Divider
Side	Top/bottom

$\frac{3}{4}$ x 49 x 97" Medium-density fiberboard (MDF) (2 needed)

Outside cleats
 $1\frac{1}{2}$ x $\frac{3}{2}$ x 72" Pine (4 bd. ft.)

Inside cleats
 $\frac{3}{4}$ x $5\frac{1}{2}$ x 96" Pine (4 bd. ft.)

Inside cleats
 $\frac{3}{4}$ x $3\frac{1}{2}$ x 96" Pine (2.7 bd. ft.)



Get'r-done Shop Cart

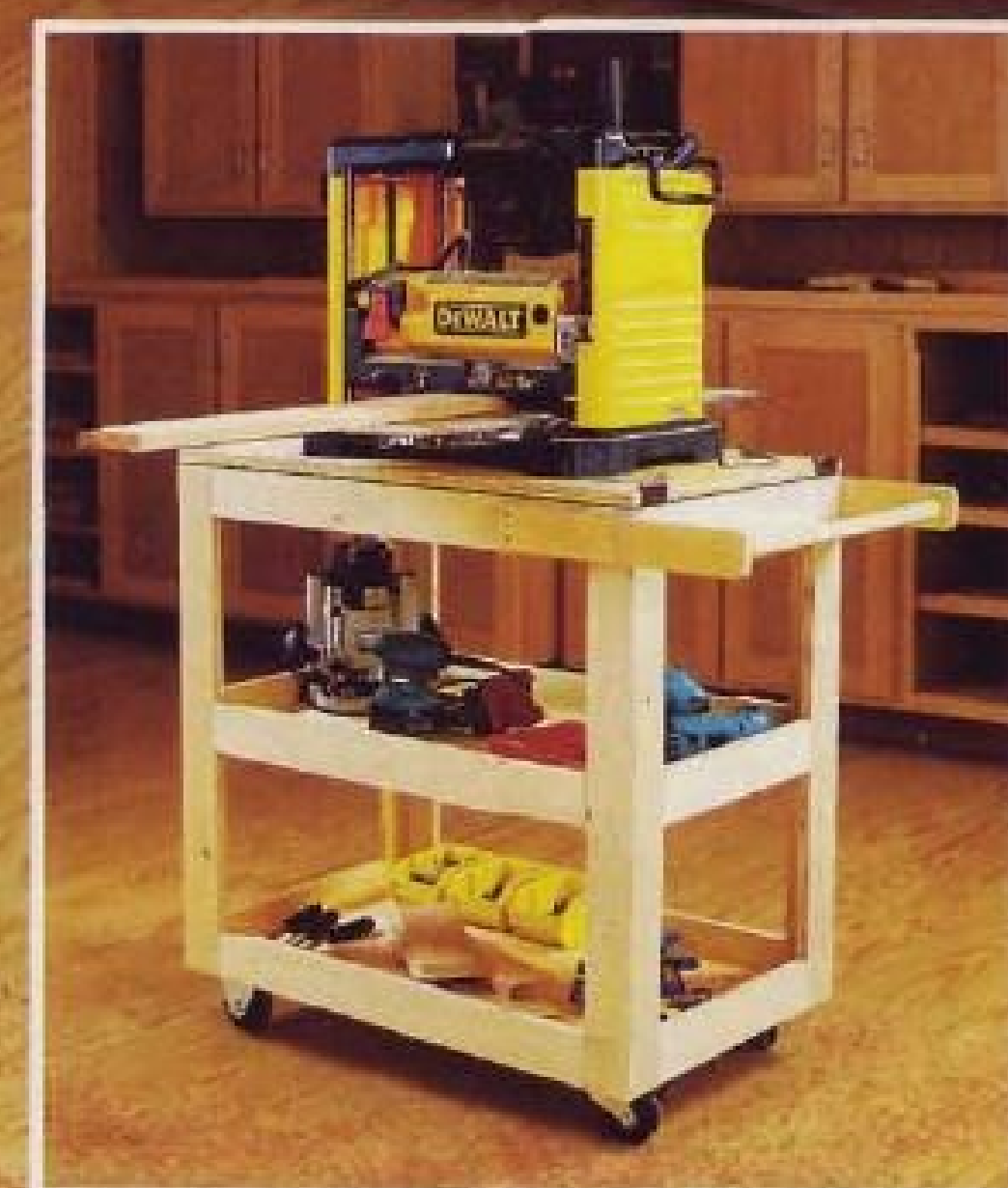
Lid conveniently swings open 270° against end of cart thanks to overlay hinges.

Keep your tools, supplies, and workpieces within easy reach, and enjoy an additional worksurface with this handy mobile helper.

Compartment under this lid provides storage for small items.

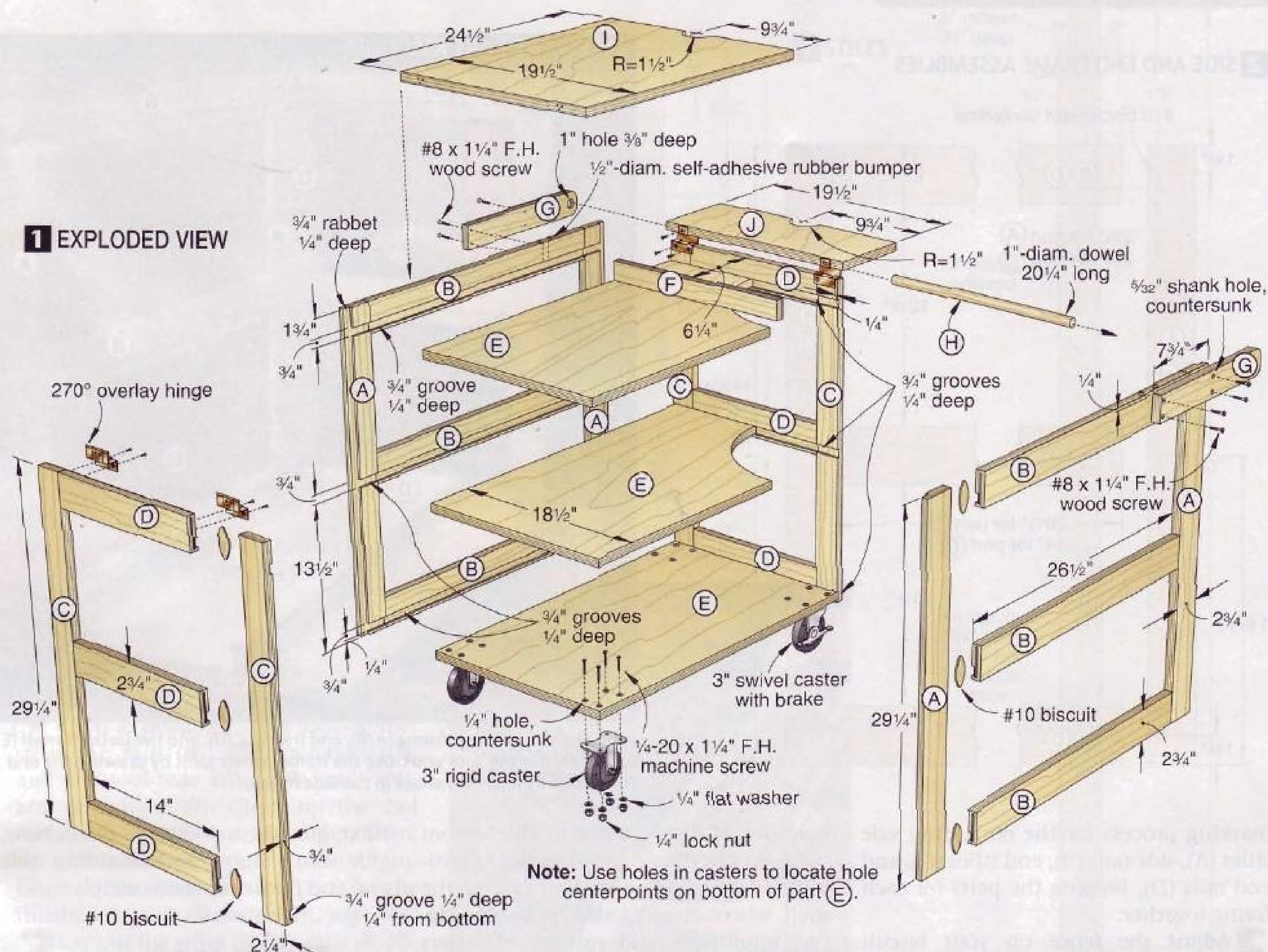
All frame members are biscuit-joined for quick and easy assembly.

Swivel casters with brakes securely park the cart in place.



When closed, the lids provide a sturdy worksurface that can support a benchtop power tool.

1 EXPLODED VIEW



AT A GLANCE

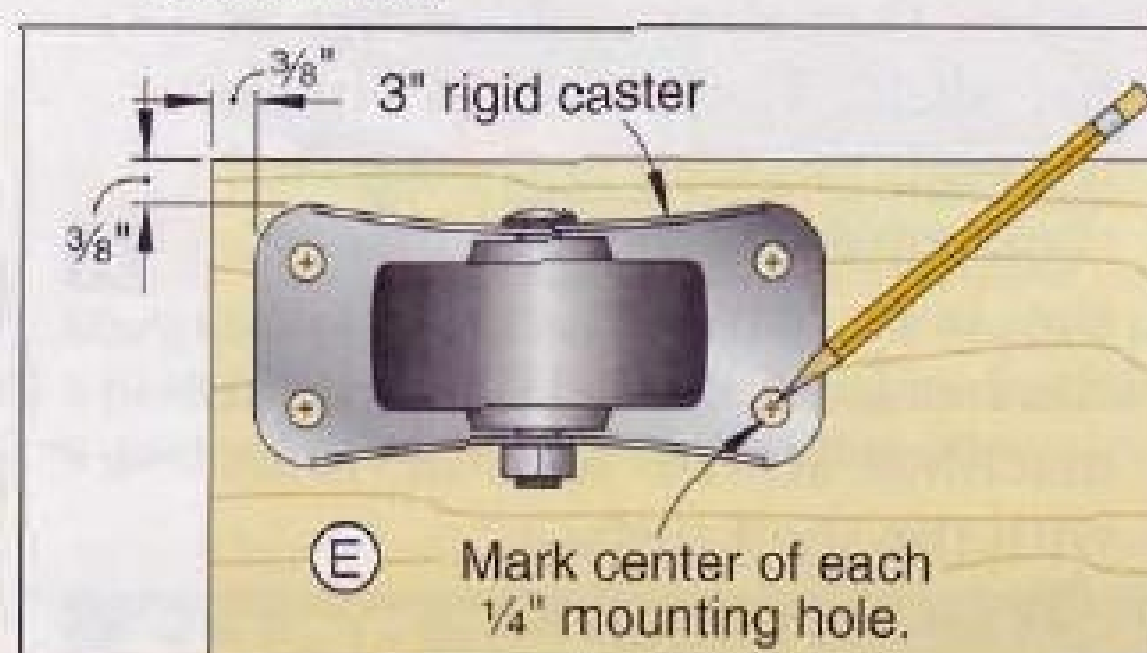
- Overall dimensions: 21" wide x 38 3/4" long x 33 1/4" high.
- For the items needed to build this project, see page 69.

For about \$85 and from just one 4x8' sheet of 3/4" plywood, you can build this sturdy shop accessory. With biscuit-joined side and end frames and simple rabbet-and-groove joinery, you can easily complete it in a weekend. We used birch plywood that cost less than \$40 a sheet at a local home center. Surprisingly, that plywood came close to the quality of pricier Baltic birch plywood, having the same number of plies (13) and few voids for smooth, finished edges. As a cost-saving option, you can make the cart from medium-density fiberboard (MDF), which runs about \$20 a sheet.

Start with the side and end frames

1 From 3/4" plywood or MDF, cut the side stiles (A), side rails (B), end stiles

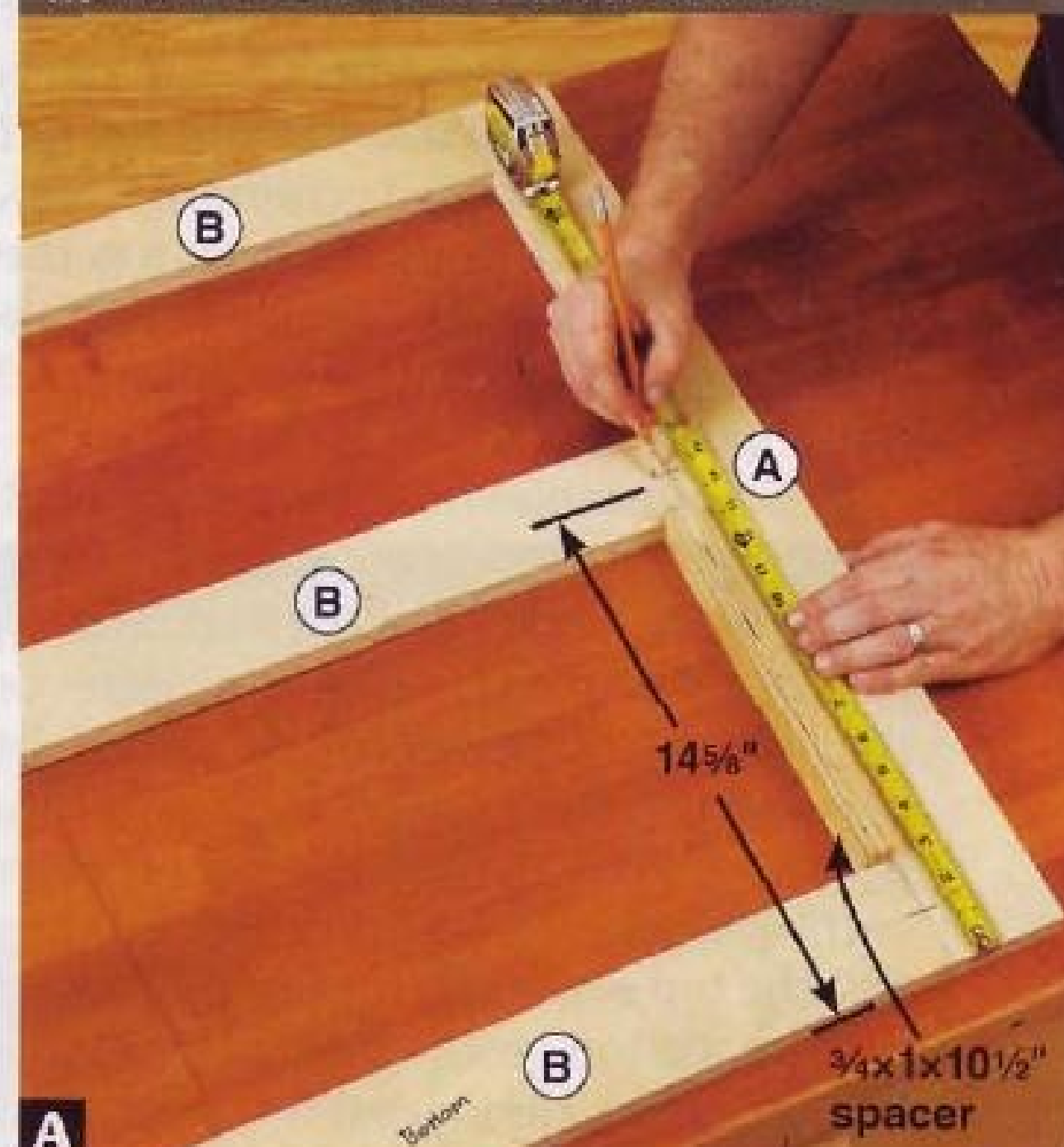
1a CASTER LOCATION DETAIL (Bottom view)



(C), and end rails (D) for the frame assemblies, shown on **Drawing 1**, to the sizes listed in the **Materials List**. To ensure you'll get all of the cart parts from one 4x8' sheet, refer to the **Cutting Diagram**, page 69.

2 To mark centerlines for #10 biscuit slots on the stiles and rails, where dimensioned on **Drawing 2**, page 68, lay out on a flat surface two side stiles (A) and three side rails (B) in the arrangement shown. To position the center side rail in the frame where dimensioned, cut two 1x10 1/2" spacers from 3/4" scrap. Place the spacers between the bottom and center side rails, as shown in **Photo A**.

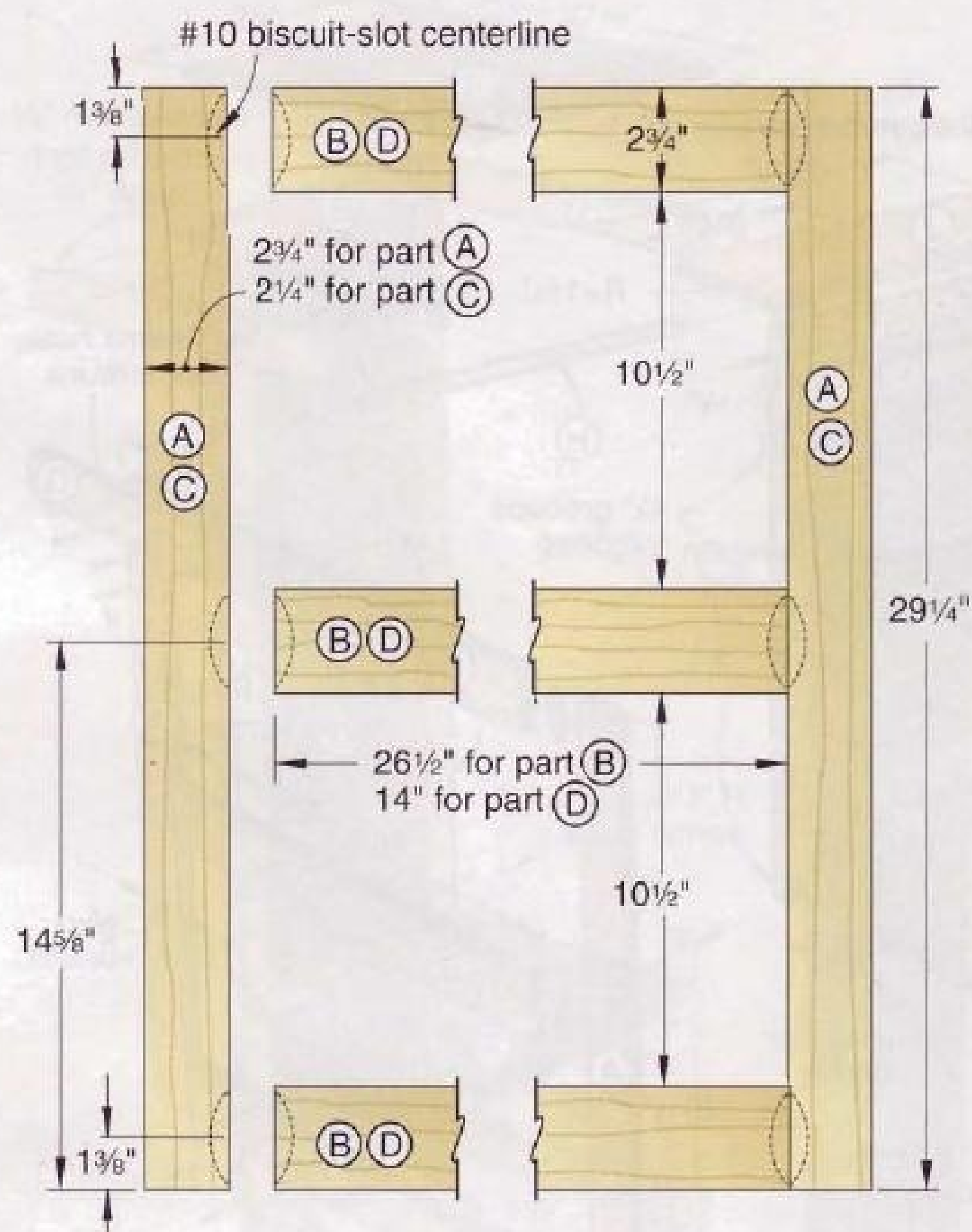
MARK BISCUIT-SLOT CENTERLINES



With the center side rail (B) positioned in the frame with spacers, mark the centerlines for biscuit slots on the side stiles (A) and rails.

Mark the biscuit-slot centerlines across the stile/rail joints, as shown. Also, identify the bottom rail to ensure correct frame orientation later. Now, repeat the

2 SIDE AND END FRAME ASSEMBLIES



marking process for the remaining side stiles (A), side rails (B), end stiles (C), and end rails (D), keeping the parts for each frame together.

3 Adjust the fence on your biscuit joiner to center the blade on the plywood thickness. Then, with the parts clamped to your workbench for safety, plunge slots for #10 biscuits into the rails and stiles at the marked centerlines. Now, glue, biscuit, and clamp the parts together to form the frames, again using the spacers to position the center rail in each frame assembly.

4 Fit your tablesaw with a dado blade that matches your material thickness. Then, cut 1/4"-deep grooves along the length of the side and end frames on the *inside* face, where dimensioned on **Drawing 1**. Keep the bottom edges of the frames firmly against the fence when cutting the bottom and center grooves, and the top edges against the fence when cutting the top groove.

5 Attach an auxiliary fence to your rip fence. Then, cut a 3/4" rabbet 1/4" deep along the outside edge of the side stiles (A) on the *inside* face, where shown.

Add the shelves and assemble the cart

1 Cut the three shelves (E) to 18 1/2 x 31". To locate and drill the mounting

holes for 3" casters through the bottom shelf, where shown on **Drawing 1**, position a caster on the bottom face of the shelf, where dimensioned on **Drawing 1a**. (We found the rigid and swivel casters with brakes at a local home center.) Mark the centers of the mounting holes. Repeat at each corner of the shelf. Then, drill 1/4" holes through the shelf at the marked centerpoints, and countersink the holes on the *top* face so the heads of 1/4-20 x 1 1/4" flathead machine screws will sit flush with the shelf surface.

2 Sand the side frames (A/B), end frames (C/D), and shelves (E) to 150 grit. Then, to assemble the cart, glue and clamp a side frame, end frame, and the bottom shelf together, as shown in **Photo B**. (To minimize the number of clamps needed, we assembled the cart in four stages.) When the glue dries, glue and clamp the center shelf in position.

BEGIN THE CART ASSEMBLY

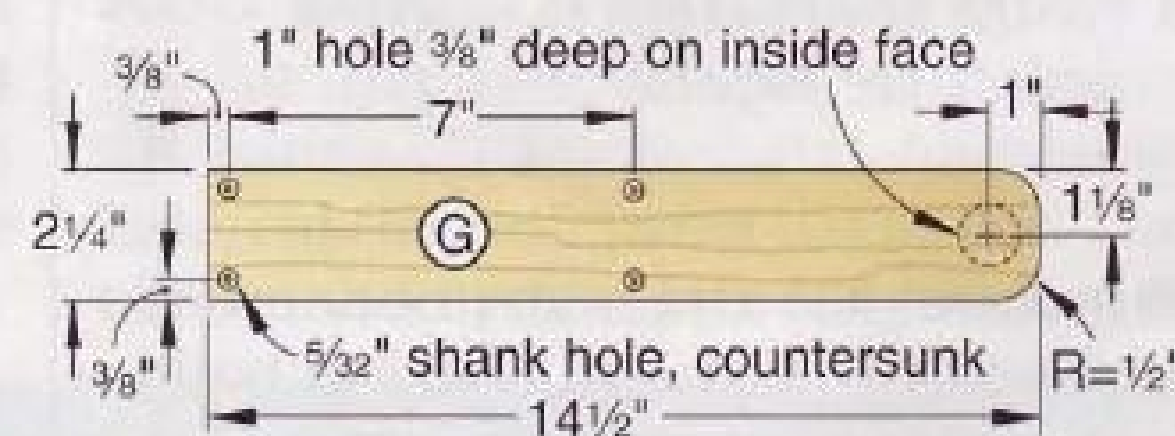


B Glue and clamp a side frame (A/B), end frame (C/D), and the bottom shelf (E) together, making sure you close the frame corner joint by drawing the end frame tightly into the rabbet in the side frame.

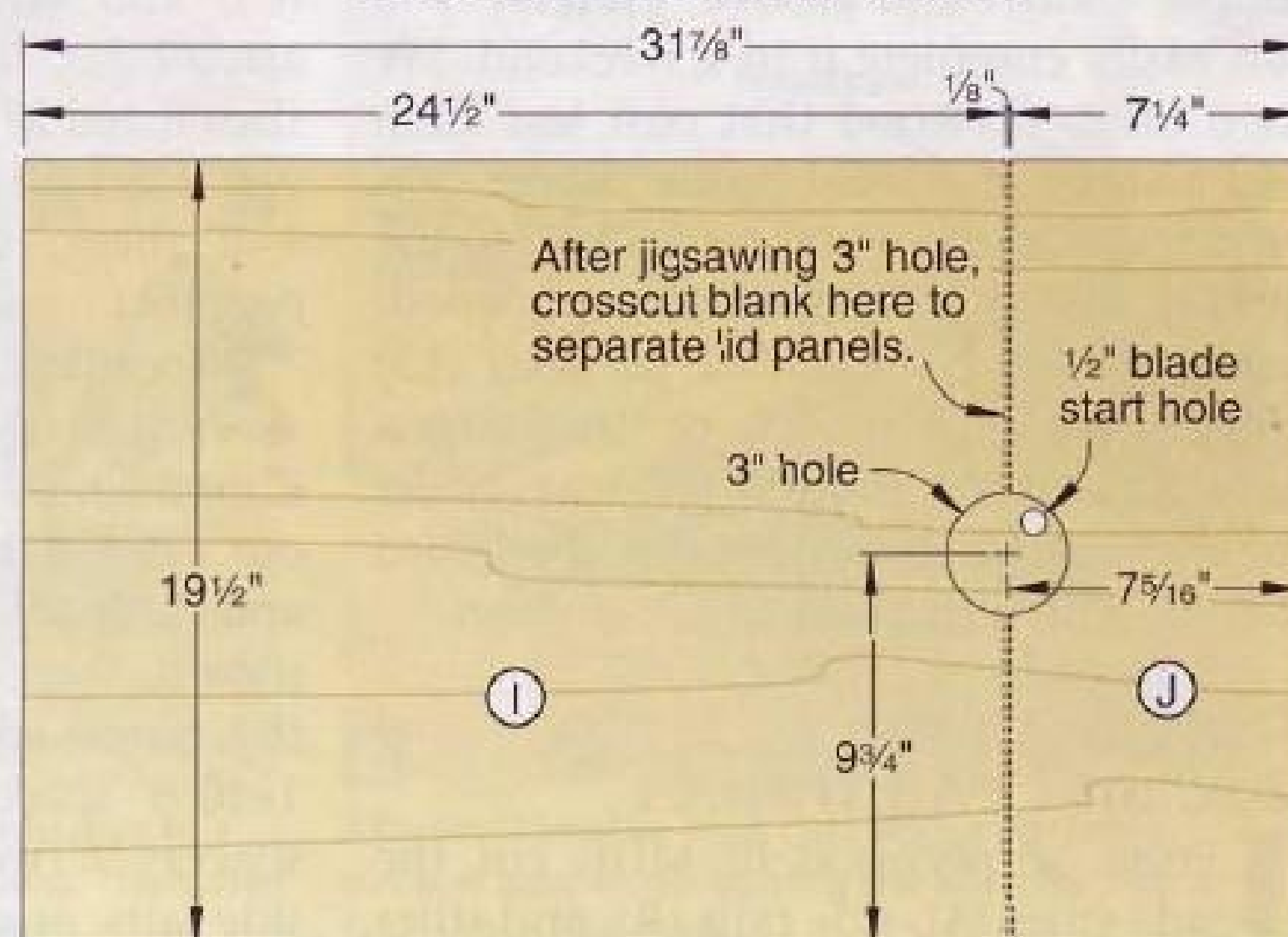
Next, glue the top shelf in place. Now, glue and clamp the remaining side and end frames to the assembly.

3 PARTS VIEW

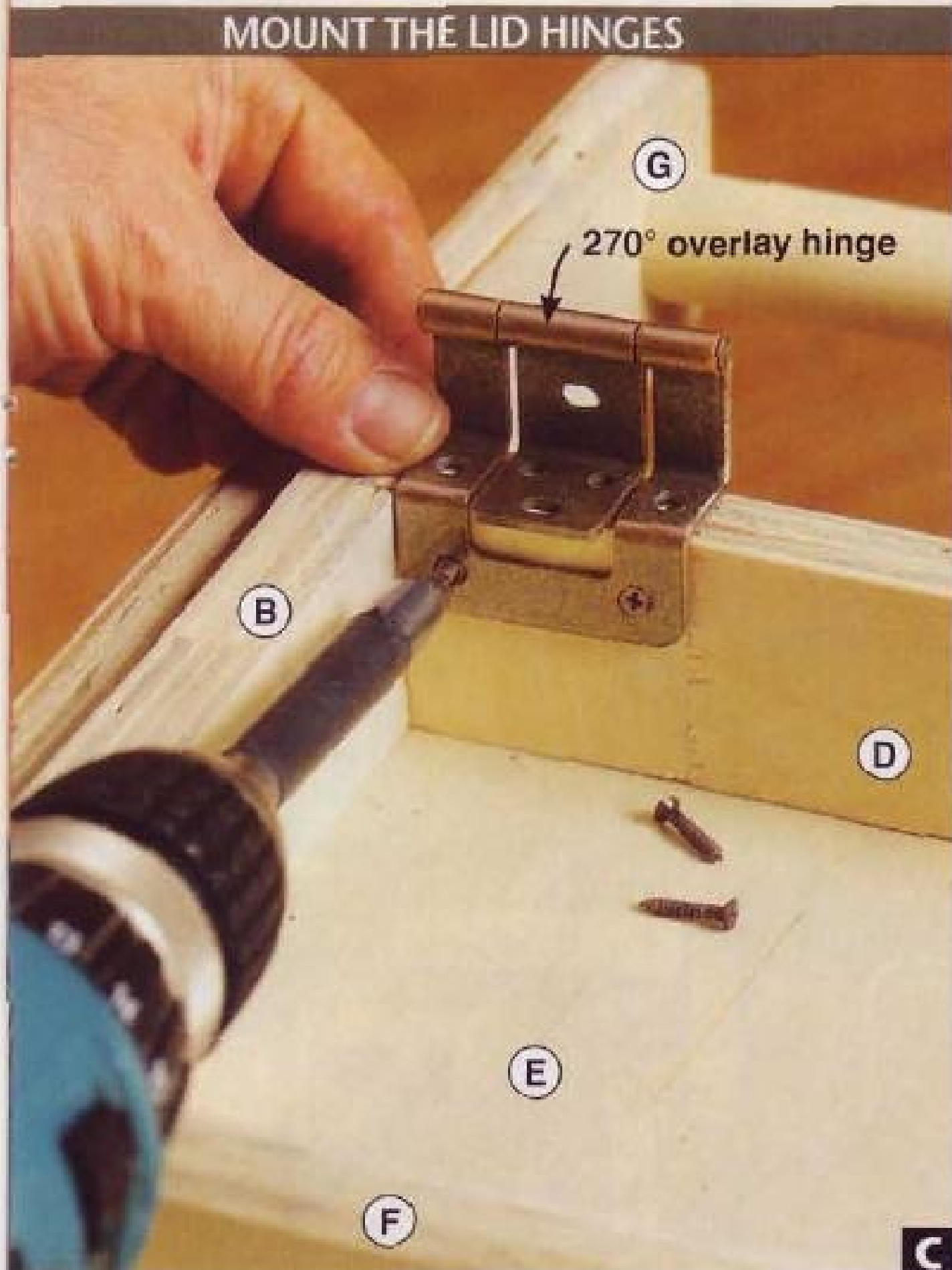
HANDLE SUPPORT (Outside face shown)



LONG AND SHORT LID PANELS



MOUNT THE LID HINGES



With a 270° overlay hinge positioned on a top end rail (D), tightly against a side rail (B), drill the mounting holes, and drive the screws.

Mount the casters, and complete the cart

1 To mount two 3" rigid casters and two 3" swivel casters with brakes to the bottom shelf (E), where shown on **Drawing 1**, position the cart with an end frame on the floor. Now, attach the casters using $\frac{1}{4}$ -20 $\times$ 1 $\frac{1}{4}$ " flathead machine screws, $\frac{1}{4}$ " flat washers, and $\frac{1}{4}$ " lock nuts. Set the cart on the casters.

2 Cut the top-shelf divider (F) to the size listed. Then, glue and clamp the divider to the top shelf (E), where dimensioned.

3 Cut the handle supports (G) to size. On the *outside* face of the supports, mark centerpoints for four countersunk shank holes, where dimensioned on **Drawing 3**. Also, mark $\frac{1}{2}$ " radii, where shown. Next, on the *inside* face of the supports, mark a centerpoint for a 1" hole, where dimensioned. Drill the countersunk shank holes. Then, using a Forstner bit in your drill press, bore the 1" hole $\frac{3}{8}$ " deep. Now, bandsaw and sand the radii to shape.

4 From a 1"-diameter birch dowel 36" long, cut a 20 $\frac{1}{4}$ "-long piece for the handle (H).

5 To mount the handle supports (G), draw alignment lines on the top side rails (B) $\frac{1}{4}$ " from the top edge and extending 7 $\frac{3}{4}$ " from the ends, where

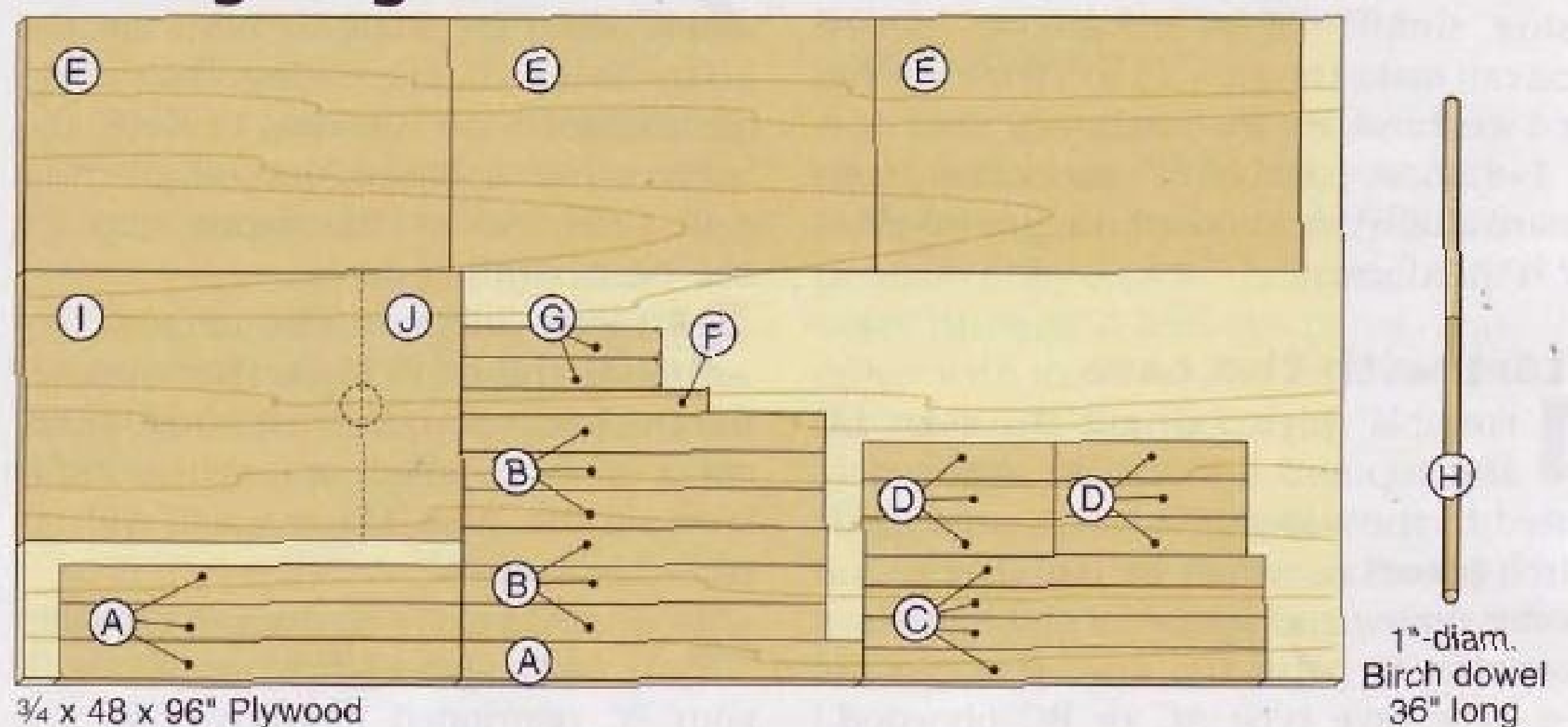
dimensioned on **Drawing 1**. Then, glue and clamp a handle support to a top rail, aligning the support with the marked line. Drive the screws. Repeat to mount the remaining support, making sure you capture the handle (H) between the supports in the 1" counterbores.

6 Cut a 19 $\frac{1}{2}$ $\times$ 31 $\frac{7}{8}$ " plywood blank to form the long and short lid panels (I, J). Draw a circle for a 3" hole (for finger access) on the blank, where dimensioned on **Drawing 3**. Drill a $\frac{1}{2}$ " blade start hole just inside the circle. Then, jigsaw the 3" hole to shape and sand smooth. Next, position your tablesaw fence 7 $\frac{1}{4}$ " from the inside face of a $\frac{1}{8}$ "-kerf blade. Now crosscut the blank through the center, of the hole to separate the lid panels.

7 To mount four 270° overlay hinges for the lids, where shown on **Drawing 1**, position a hinge on a top end rail (D), tight against a side rail (B), as shown in **Photo C**. Mark the mounting holes on the inside face and top edge of the end rail. Using a 3" bit extender or magnetic drive guide for chuck clearance, drill the holes. Then, drive the screws supplied with the hinges. Repeat to mount the remaining hinges.

8 Position the long and short lid panels (I, J) on the cart with the finger-access hole straddling the top-shelf divider (F). With the panels tight against the hinges and the edges flush with the outside faces of the side rails (B), drill mounting holes centered in the slots of each hinge into the edges of the lids. (Note that the hinges offset each panel $\frac{1}{8}$ " toward the center, leaving a $\frac{1}{8}$ " gap between the panels.) Drive the screws. Then, open the lids and drill mounting holes centered in the hinge holes and slots into the bottom faces of the lids. Drive the remaining screws.

Cutting Diagram



Finish up and get ready to roll

1 Remove the casters, long and short lid panels (I, J), and hinges. Sand any areas of the cart that need it to 150 grit, and remove the dust.

2 Apply two coats of a clear finish. (We used Varathane Diamond Water-Based Polyurethane, sanding to 220-grit smoothness between coats.)

3 Finally, remount the casters and lid panels. Open the lid panels and install a pair of $\frac{1}{2}$ "-diameter self-adhesive rubber bumpers on each top side rail (B), where shown on **Drawing 1**. Now, clear off your workbench, load the cart with your tools and supplies, and start motoring around the shop. 🌳

Written by **Owen Duvall**

Project design: **Jeff Mertz**

Illustrations: **Roxanne LeMoine; Lorna Johnson**

Materials List

Part	FINISHED SIZE			Matl.	Qty.
	T	W	L		
A side stiles	$\frac{3}{4}$ "	2 $\frac{3}{4}$ "	29 $\frac{1}{4}$ "	P	4
B side rails	$\frac{3}{4}$ "	2 $\frac{3}{4}$ "	26 $\frac{1}{2}$ "	P	6
C end stiles	$\frac{3}{4}$ "	2 $\frac{1}{4}$ "	29 $\frac{1}{4}$ "	P	4
D end rails	$\frac{3}{4}$ "	2 $\frac{3}{4}$ "	14"	P	6
E shelves	$\frac{3}{4}$ "	18 $\frac{1}{2}$ "	31"	P	3
F top-shelf divider	$\frac{3}{4}$ "	1 $\frac{3}{4}$ "	18"	P	1
G handle supports	$\frac{3}{4}$ "	2 $\frac{1}{4}$ "	14 $\frac{1}{2}$ "	P	2
H handle	1" diam.		20 $\frac{1}{4}$ "	B	1
I* long lid panel	$\frac{3}{4}$ "	19 $\frac{1}{2}$ "	24 $\frac{1}{2}$ "	P	1
J* short lid panel	$\frac{3}{4}$ "	19 $\frac{1}{2}$ "	7 $\frac{1}{4}$ "	P	1

*Parts initially cut oversize. See the instructions.

Materials key: P-plywood, B-birch dowel.

Supplies: #10 biscuits (24), 3" rigid casters (2), 3" swivel casters with brakes (2), $\frac{1}{4}$ -20 $\times$ 1 $\frac{1}{4}$ " flathead machine screws (16), $\frac{1}{4}$ " flat washers (16), $\frac{1}{4}$ " lock nuts (16), #8 $\times$ 1 $\frac{1}{4}$ " flathead wood screws (8), $\frac{1}{2}$ "-diameter self-adhesive rubber bumpers (4).

Blade and bits: Dado-blade set, 1" Forstner bit, 3" bit extender or magnetic drive guide.

Source

Hinges: 270° overlay hinges no. 15455, \$8.29 pr. (2 pr.). Call or click Rockler, 800-279-4441; rockler.com.

Shop-in-a-box Tool Cabinet



Keep tools, hardware, and supplies organized in this space-saving 4-door cabinet. Though it occupies little more than 7 square feet of wall area, it offers a full 26 square feet of storage on the perforated-hardboard panels alone!

Looking for an easy-to-build project that makes a really big impact on reducing shop clutter and improving work efficiency? Here it is. With identical case and door construction using simple rabbet-and-groove joinery, you can make this cabinet in a few evenings or a weekend. For materials, you need only a 4x8 sheet each of $\frac{1}{4}$ " perforated hardboard and $\frac{3}{4}$ " plywood, plus a quarter-sheet of $\frac{1}{4}$ " hardboard.

Start with the case

1 From $\frac{3}{4}$ " plywood, cut the sides (A) and top and bottom (B) to the sizes listed in the **Materials List**. (We used Baltic birch plywood, which we found at a local home center, and applied a clear finish. If you plan to paint the unit, you can use less-expensive type AC or BC plywood.)

Because the thickness of plywood varies, you may need to slightly adjust the sizes of some parts and the mating dadoes and rabbets.

2 Mark centerpoints for $\frac{1}{4}$ " holes $\frac{3}{8}$ " deep for shelf supports on the *inside* faces of the sides (A), where dimensioned on **Drawing 1**. Drill the holes using a brad-point bit in your drill press. Adjust the depth stop for consistent drilling depth.

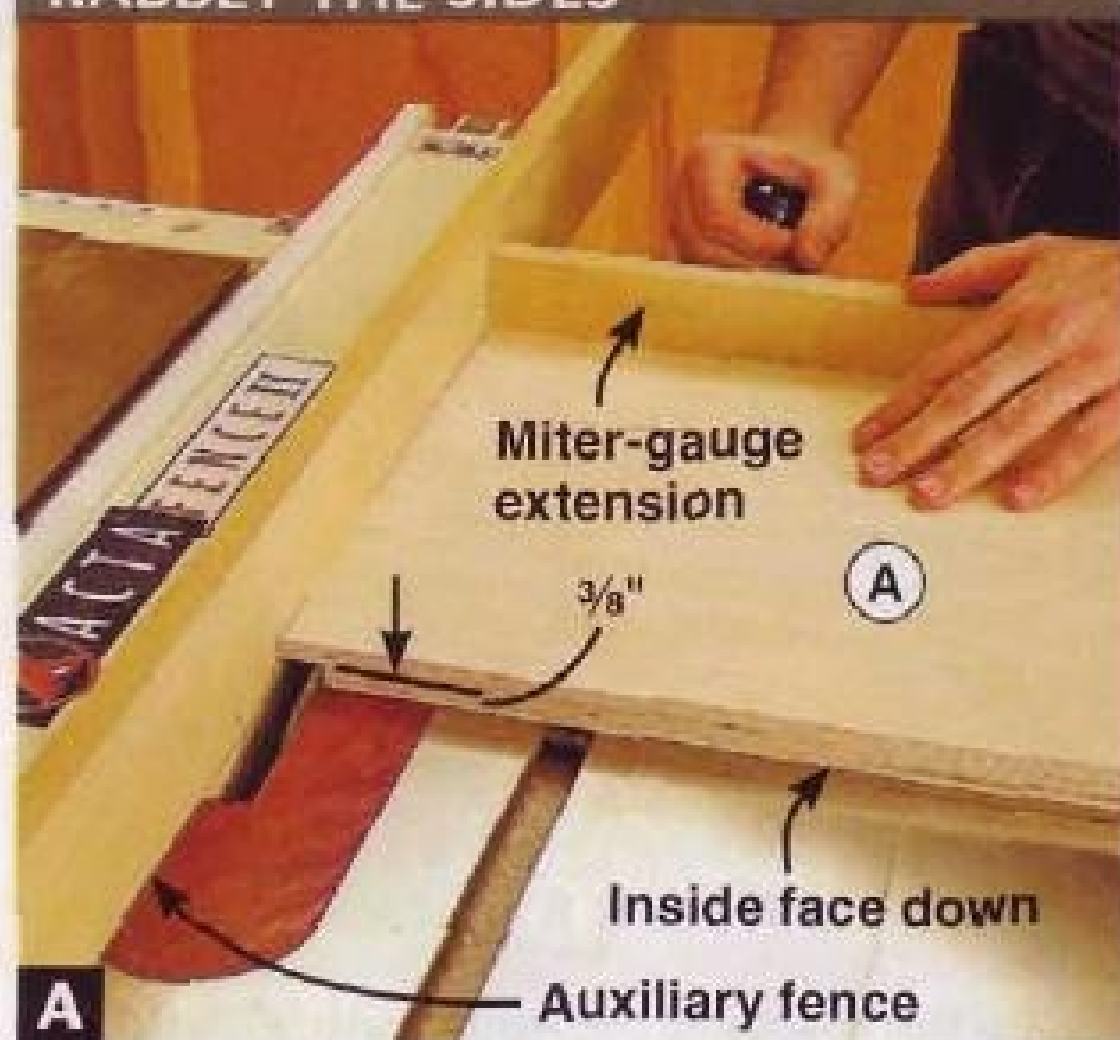
3 Fit your tablesaw with an auxiliary fence and dado blade that matches the thickness of your $\frac{3}{4}$ " plywood. Then, cut a $\frac{3}{8}$ "-deep rabbet across the *inside* faces of the sides (A) at each end, as shown in **Photo A**.

4 Cut a $\frac{1}{4}$ " groove $\frac{3}{8}$ " deep in the sides (A) and top and bottom (B) to fit your $\frac{1}{4}$ " perforated hardboard for the



Though the case measures just $12\frac{5}{8}$ " deep, it houses all four doors when closed.

RABBIT THE SIDES



Keeping a side (A) tight against an auxiliary fence and miter-gauge extension, cut a rabbet across each end on the *inside* face.

back (C), where dimensioned on **Drawings 1** and **2**. To do this, first switch to a standard $\frac{1}{8}$ "-kerf blade in your tablesaw. Position the fence $\frac{3}{4}$ " from the *inside* of the blade. Then, cut a groove along the back edges of the sides, top, and bottom on the *inside* faces. Now, reposition the fence, as needed, and cut the grooves to final width to snugly fit the hardboard. Sand the parts smooth to 180 grit.

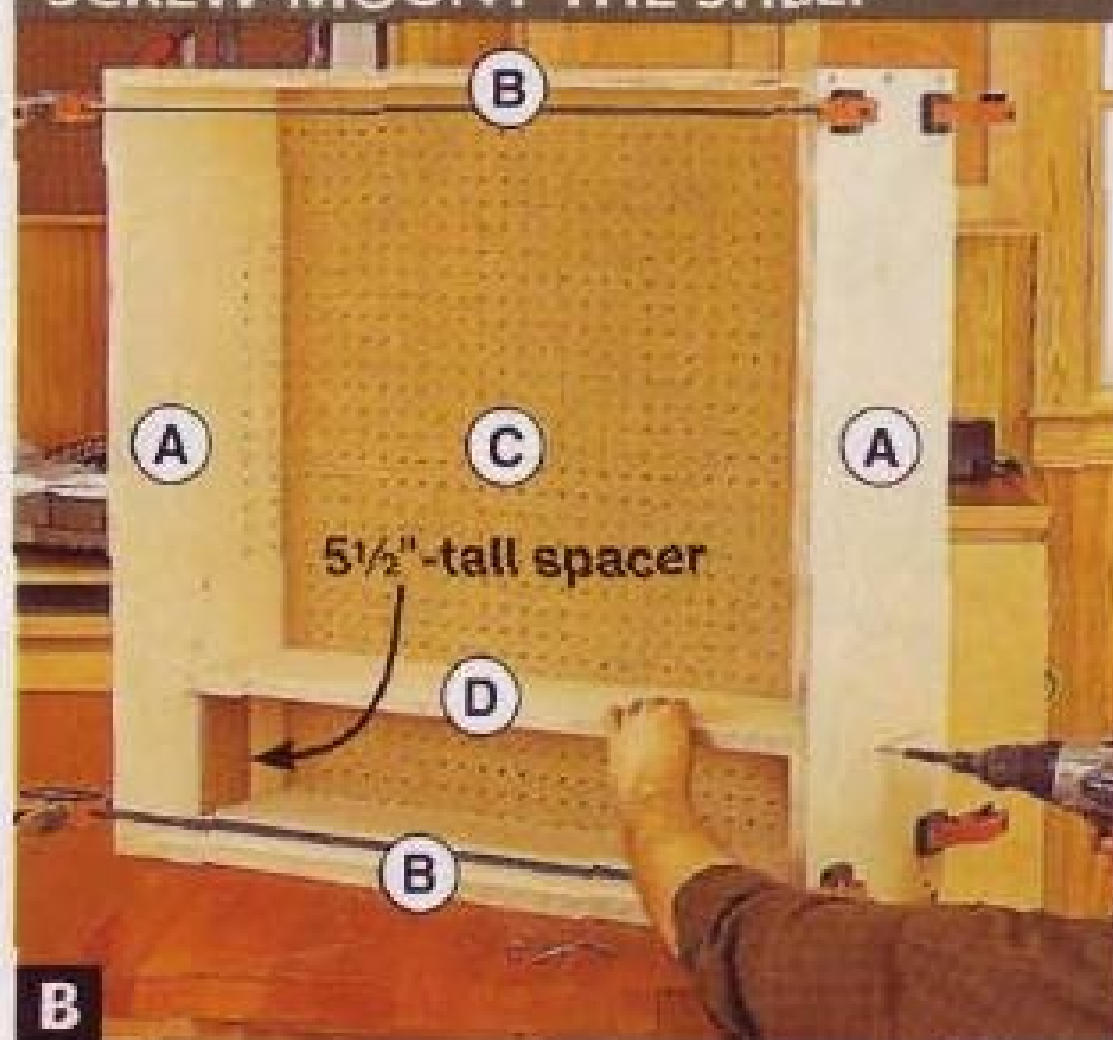
5 From $\frac{1}{4}$ " perforated hardboard, cut a $31\frac{3}{4}$ "-square piece for the back (C). Then, dry-assemble the sides (A), top and bottom (B), and back, and check that the parts fit together correctly. Make any needed adjustments. Now, glue and clamp the case together, measuring for equal diagonals to verify square. Drill mounting holes through the sides and into the top and bottom, where shown on **Drawing 2**, and drive the screws.

6 From $\frac{3}{4}$ " birch plywood, cut the shelf (D) to size. Then, from your $\frac{1}{4}$ " perforated-hardboard cutoffs, cut two $4 \times 5\frac{1}{2}$ " spacers. Position the shelf in the case on the $5\frac{1}{2}$ "-tall spacers, as shown in **Photo B**. Drill the mounting holes, where dimensioned on **Drawing 1**, and drive the screws.

7 From $\frac{3}{4}$ " plywood, cut the mounting cleats (E) and spacer (F) to $1\frac{1}{2} \times 31$ ". Bevel-rip one edge of each cleat at 45° , leaving a $\frac{1}{8}$ " flat, where shown on **Drawing 2a**.

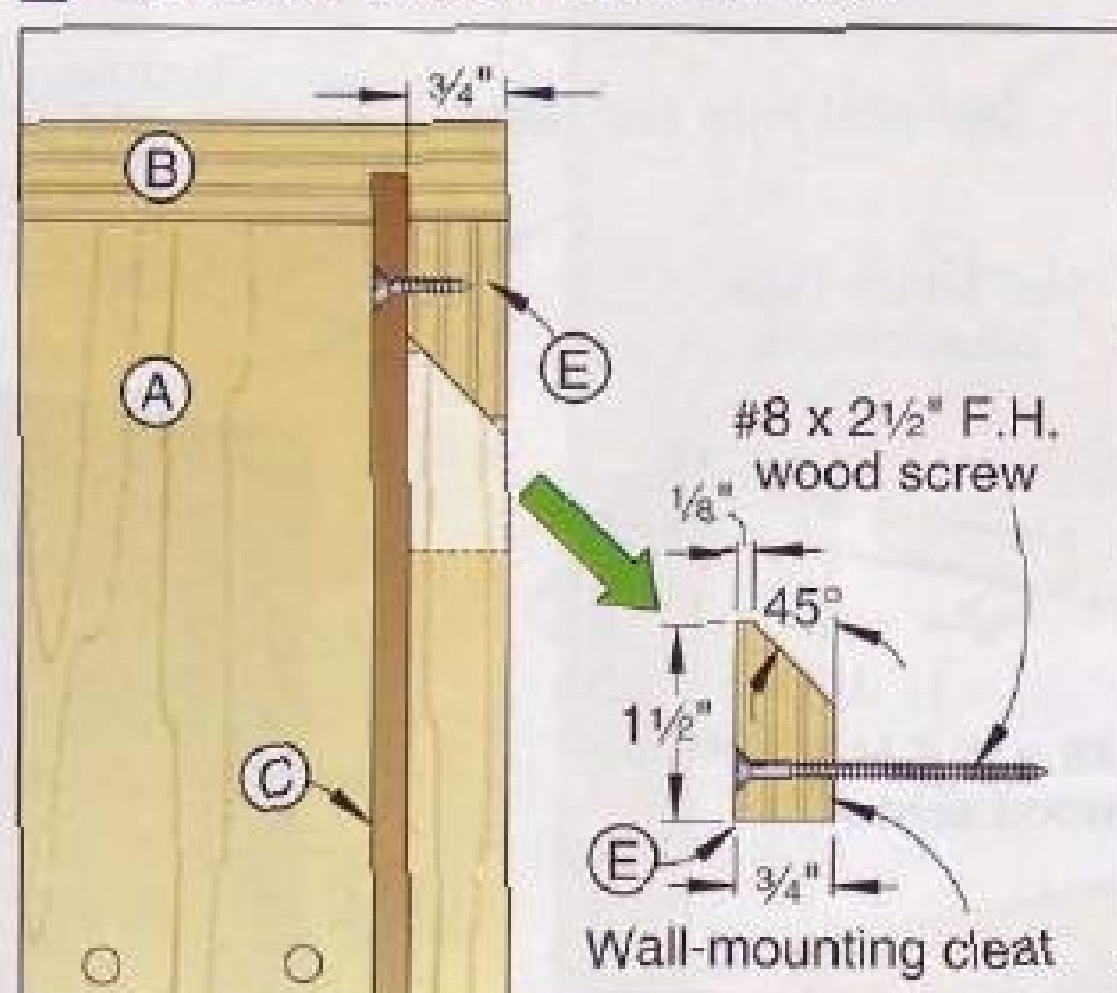
8 Position the case on your workbench with the back (C) up. Then, glue and clamp a mounting cleat (E) in place on the back, tight against the top (B), in the orientation shown on **Drawing 2a**. From inside the case, drill holes (centered in the holes in the perforated-hardboard back, into the mounting cleat, where shown on **Drawing 2**, and drive the #8 $\times$ 3/4" flathead wood screws to

SCREW-MOUNT THE SHELF

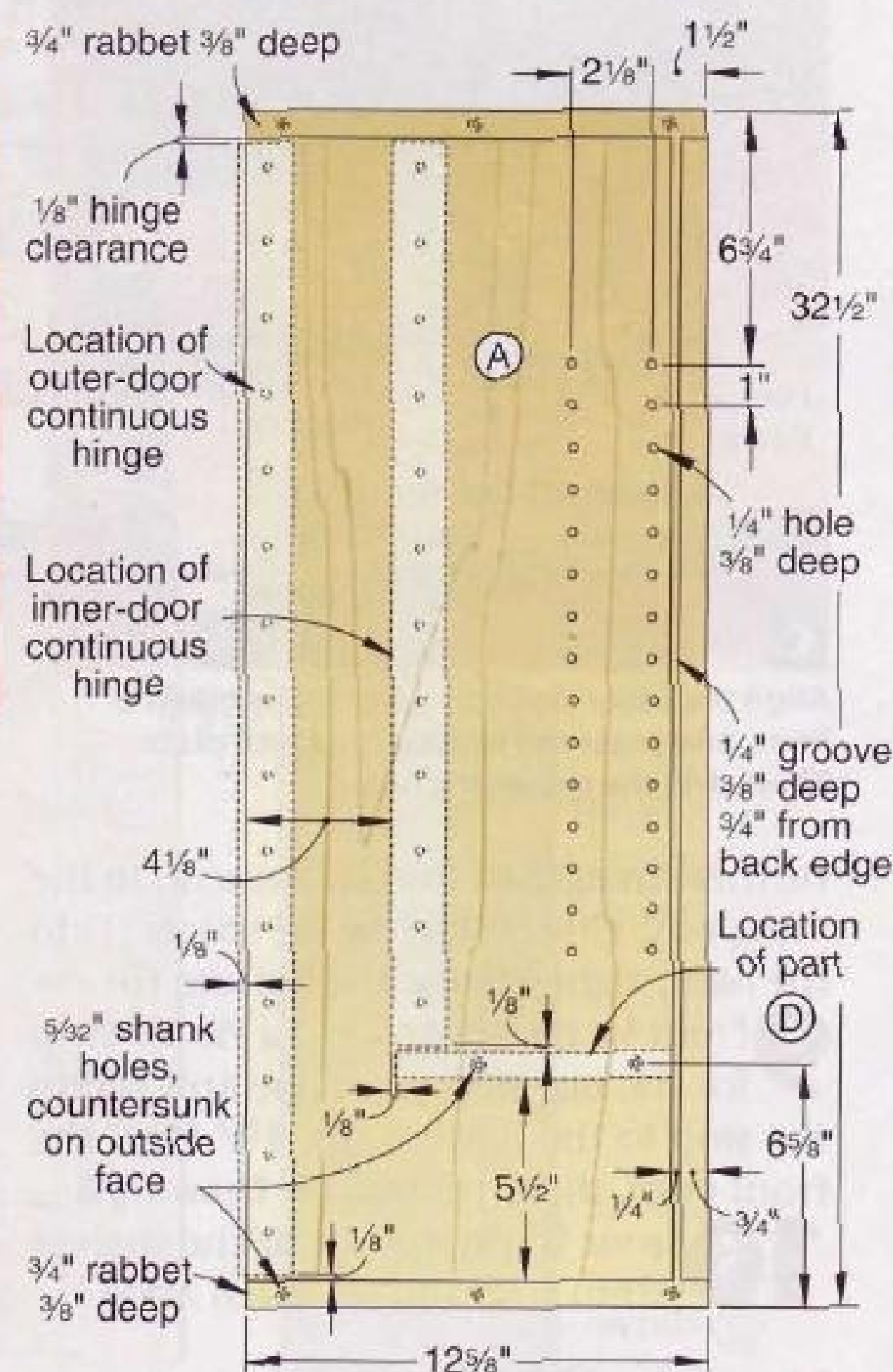


With the shelf (D) on 5½"-tall spacers and tight against the back (C), drill mounting holes through the sides (A) into the shelf.

2a CLEAT MOUNTING DETAIL

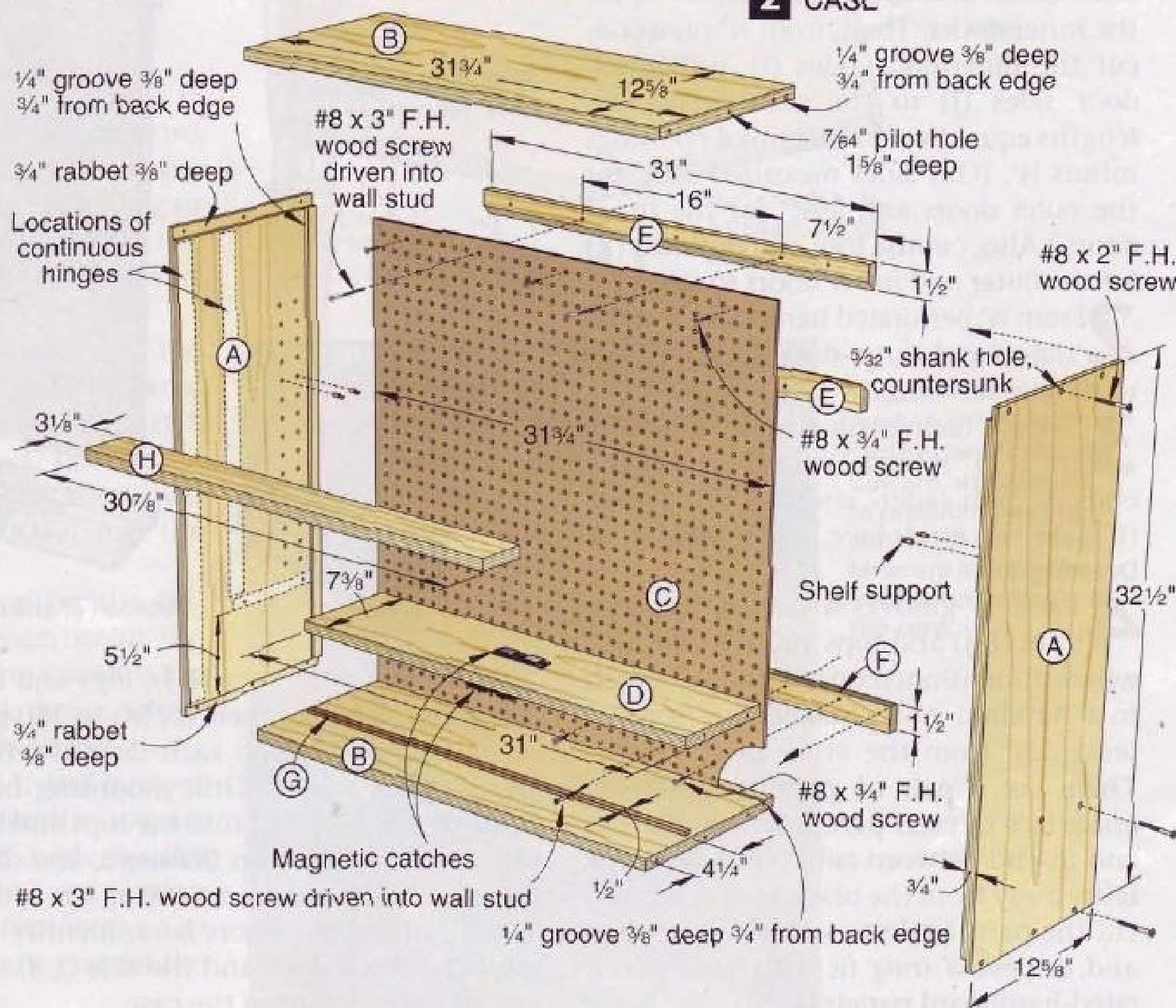


1 CASE SIDE
(Inside face of left side shown)

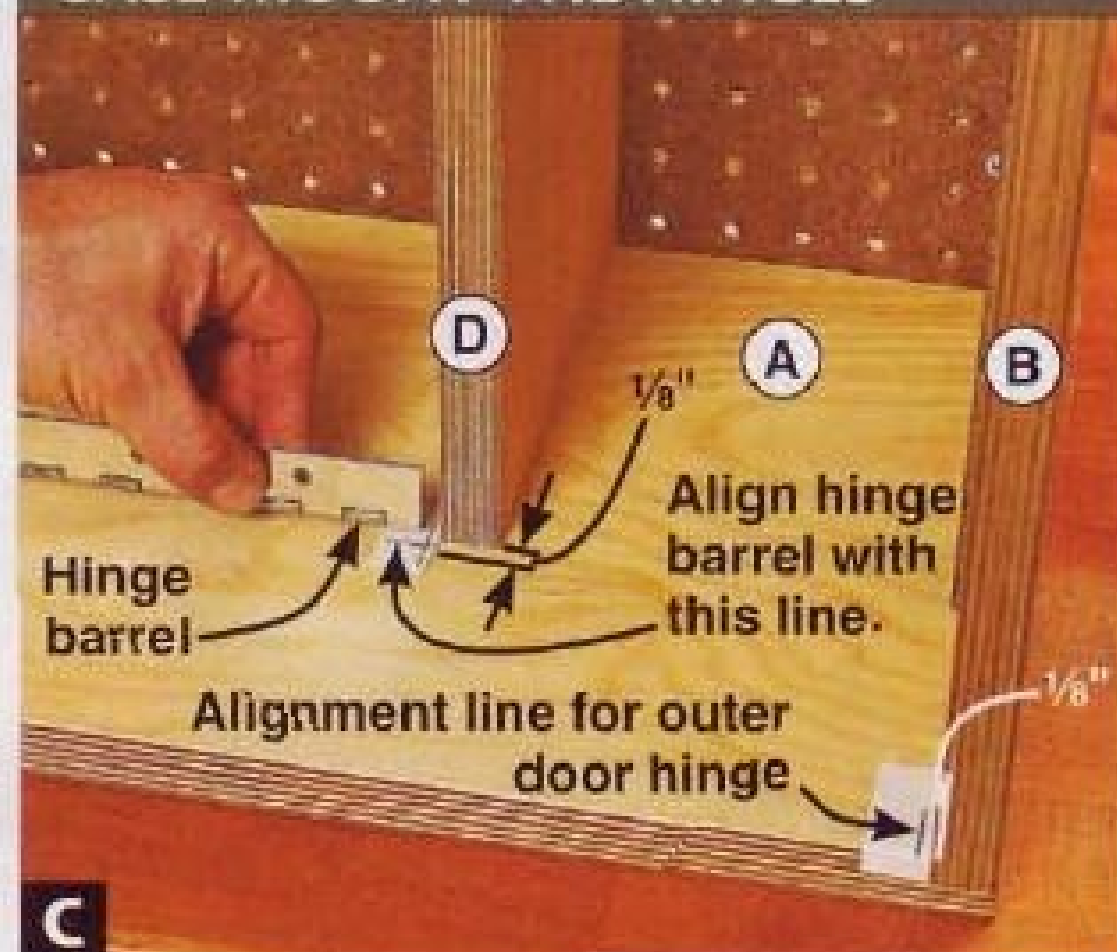


Note: Right side (A) is a mirror image.

2 CASE



CASE-MOUNT THE HINGES



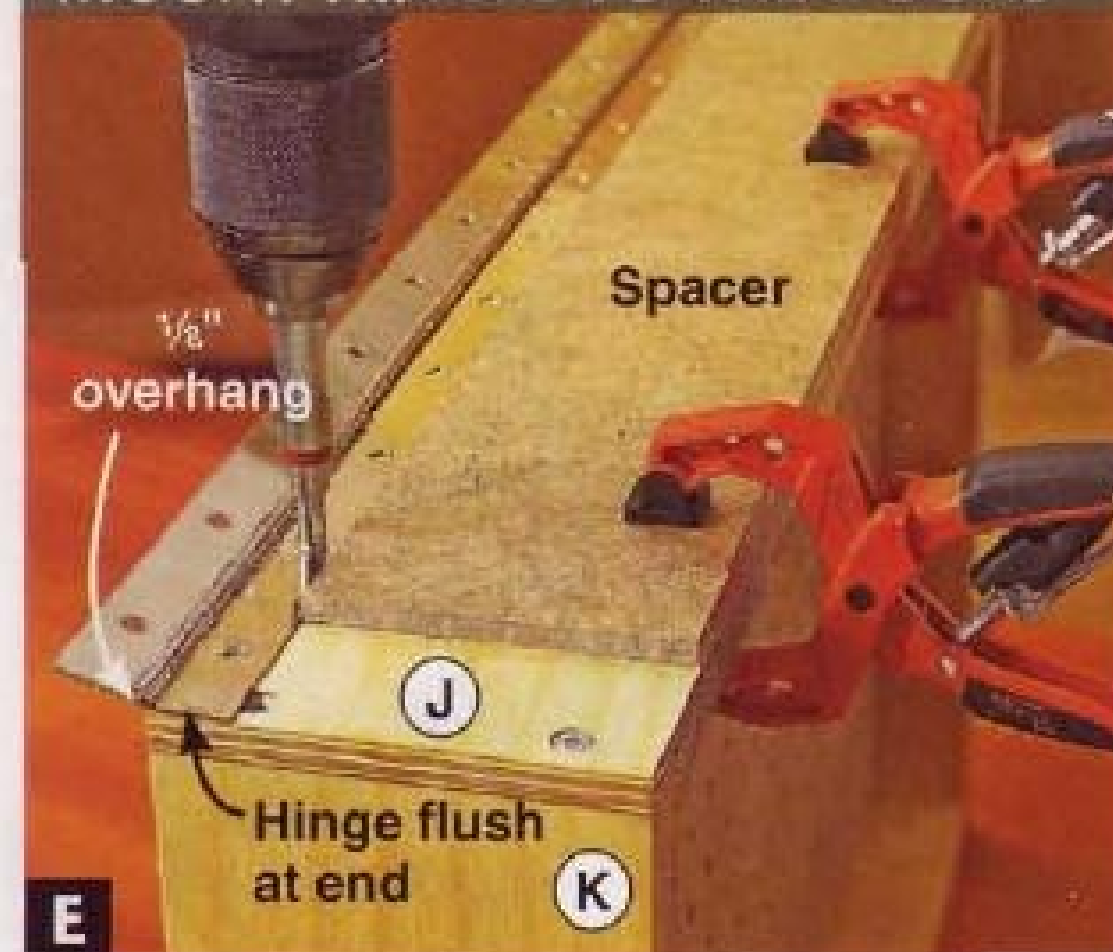
Align the inner-door hinge with the marked lines, and press the taped hinge into place. Then, drill the mounting holes.

MEASURE FOR A HINGE SPACER



Position a hinge on an inner-door side (J), with a $\frac{1}{8}$ " overhang. Measure from the back to the hinge to find the spacer width.

MOUNT HINGES TO THE DOORS



Clamp the spacer to the door, flush with the back edge. With the hinge tight against the spacer, drill the mounting holes.

further strengthen the attachment. In the same way, glue and screw the spacer (F) to the back, tight against the bottom (B).

9 From $\frac{1}{4}$ " hardboard, cut a $\frac{1}{2} \times 31$ " strip for the bin stop (G). Glue and clamp the stop to the bottom (B), $4\frac{1}{4}$ " from the front edge, dimensioned on **Drawing 2**.

10 From $\frac{3}{4}$ " plywood, cut the shelves (H) to size, and set them aside.

Now, build the doors

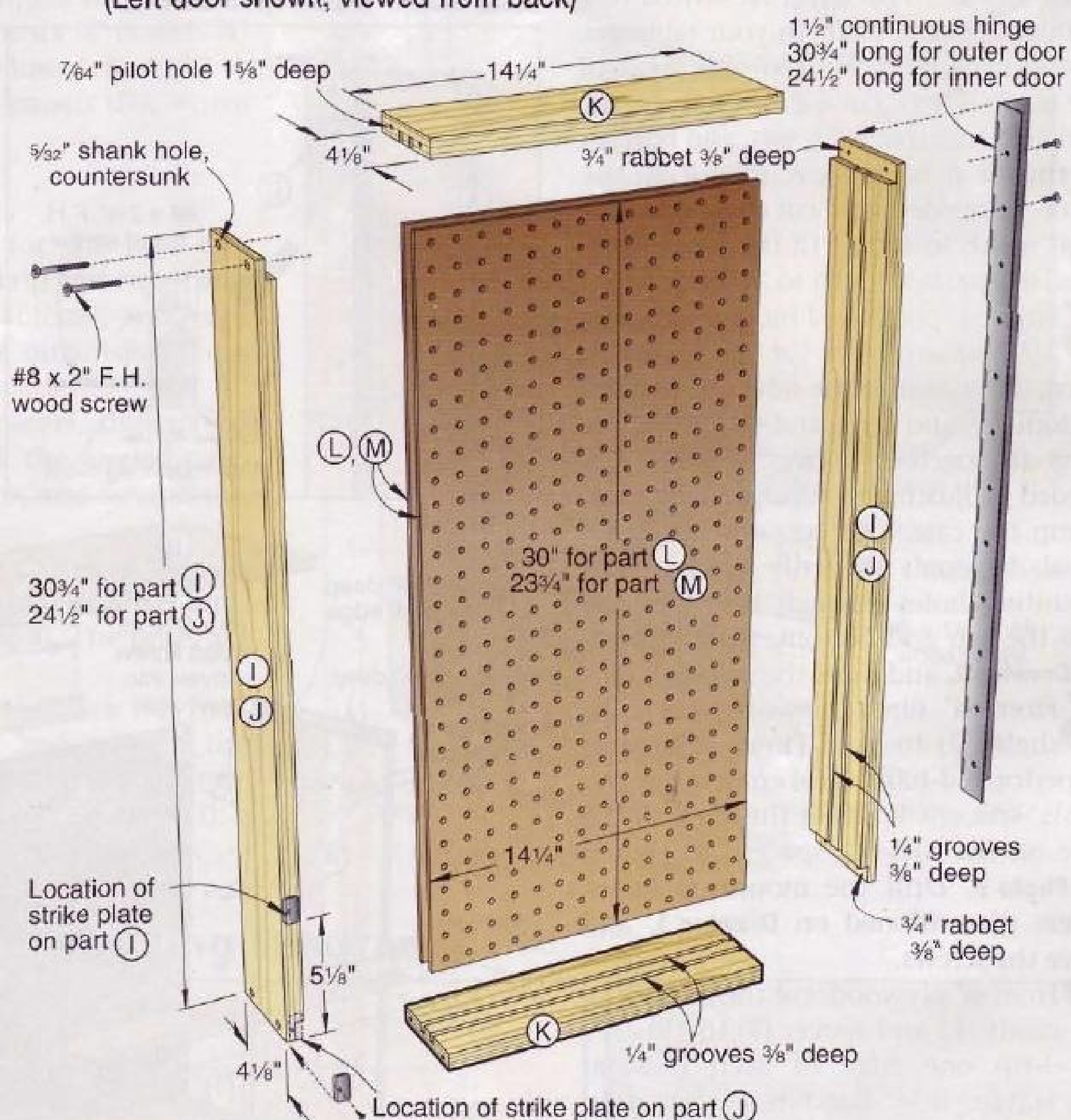
1 To ensure that the outer and inner doors fit into the case with $\frac{1}{8}$ " clearance at the top and bottom, where shown on **Drawing 1**, measure the openings between the top and bottom (B) for the outer doors and the top and shelf (D) for the inner doors. Then, from $\frac{3}{4}$ " plywood, cut the outer-door sides (I) and inner-door sides (J) to the sizes listed and lengths equal to your measured openings minus $\frac{1}{4}$ ". (Our sides measured $30\frac{3}{4}$ " for the outer doors and $24\frac{1}{2}$ " for the inner doors.) Also, cut the tops and bottoms (K) for the outer and inner doors to size.

2 From $\frac{1}{4}$ " perforated hardboard, cut the outer- and inner-door panels (L, M) to the sizes listed.

3 Using a dado blade in your tablesaw, cut a $\frac{3}{4}$ " rabbet $\frac{3}{8}$ " deep across the ends of each outer- and inner-door side (I, J) on the *inside* face, where shown on **Drawing 3**.

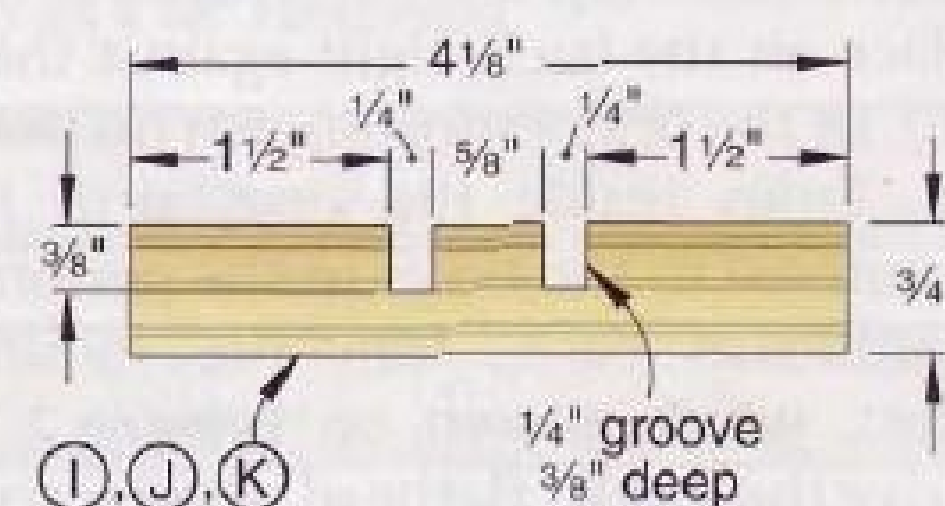
4 To cut $\frac{1}{4}$ " grooves $\frac{3}{8}$ " deep in the door sides (I, J) and tops and bottoms (K), where dimensioned on **Drawing 3a**, switch to a standard $\frac{1}{8}$ "-kerf blade. Position the fence $1\frac{1}{2}$ " from the *inside* of the blade. Then, cut a pair of grooves along the *inside* face of each part, rotating the part end-to-end between cuts. Now, move the fence away from the blade as needed, and cut the parts again to widen the grooves and achieve a snug fit with your perforated-hardboard panels (L, M).

3 DOOR (Left door shown, viewed from back)



5 Sand the door sides (I, J), tops and bottoms (K), and panels (L, M) to 180 grit. Then, glue and clamp each door together, checking for square. Drill mounting holes through the sides and into the tops and bottoms, where shown on **Drawing 3**, and drive the screws. For ease in mounting the hinges and installing the doors later, identify the top (K) of each door and the side (I, J) that you'll hinge-mount to the case.

3a DOOR GROOVE DETAIL



MOUNT THE DOORS

Right inner door

F

Add the easy-to-make bins

2 Lay out the angled edge on a side (P), where dimensioned on **Drawing**

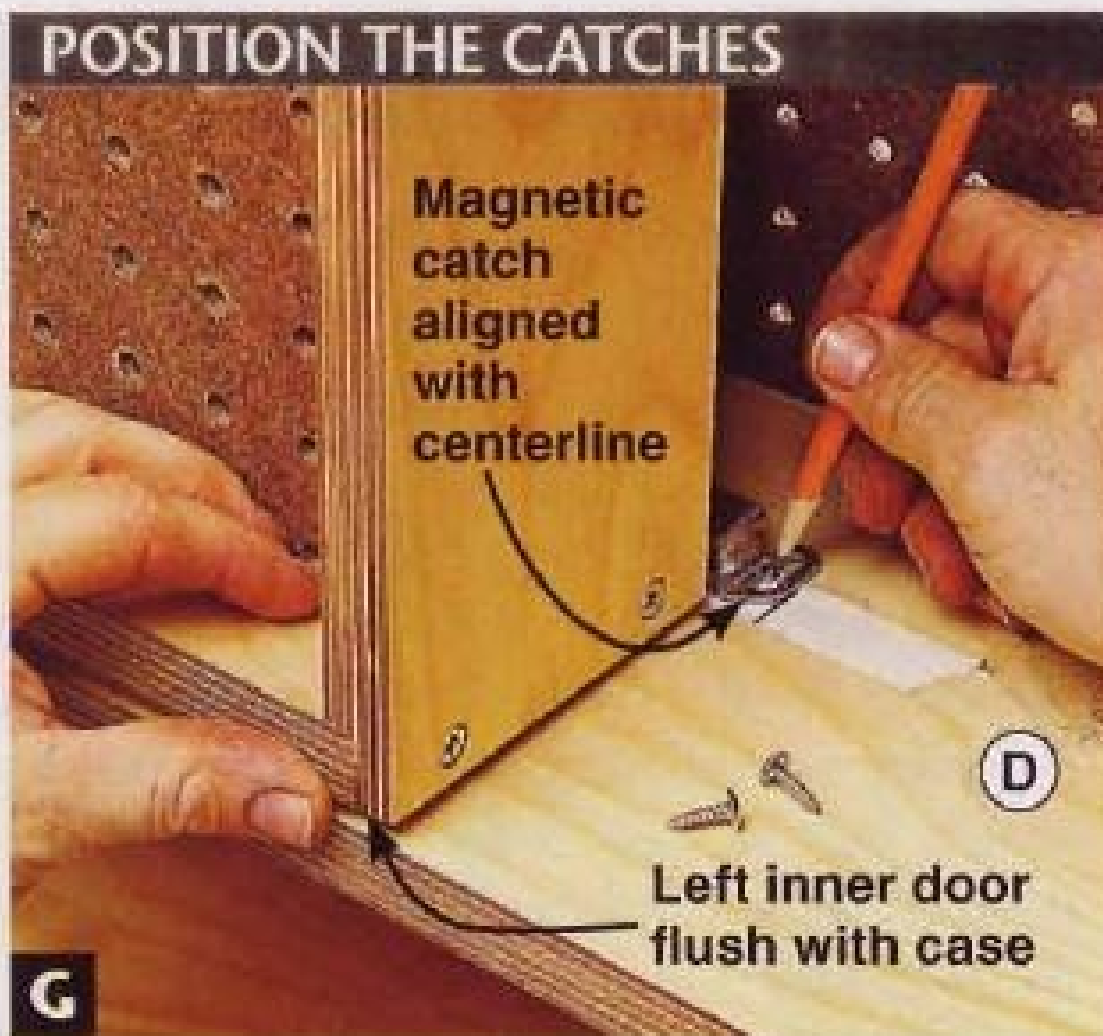
4. Bandsaw or scrollsaw to the marked line, and sand smooth. Using this piece as a template, mark the angle on the remaining side pieces, and cut and sand them to shape.

Sand, then apply the finish

2 Apply two coats of a clear finish, sanding between coats. (We applied Varathane Diamond Water-Based Polyurethane, satin finish, sanding to 320 grit between coats.)

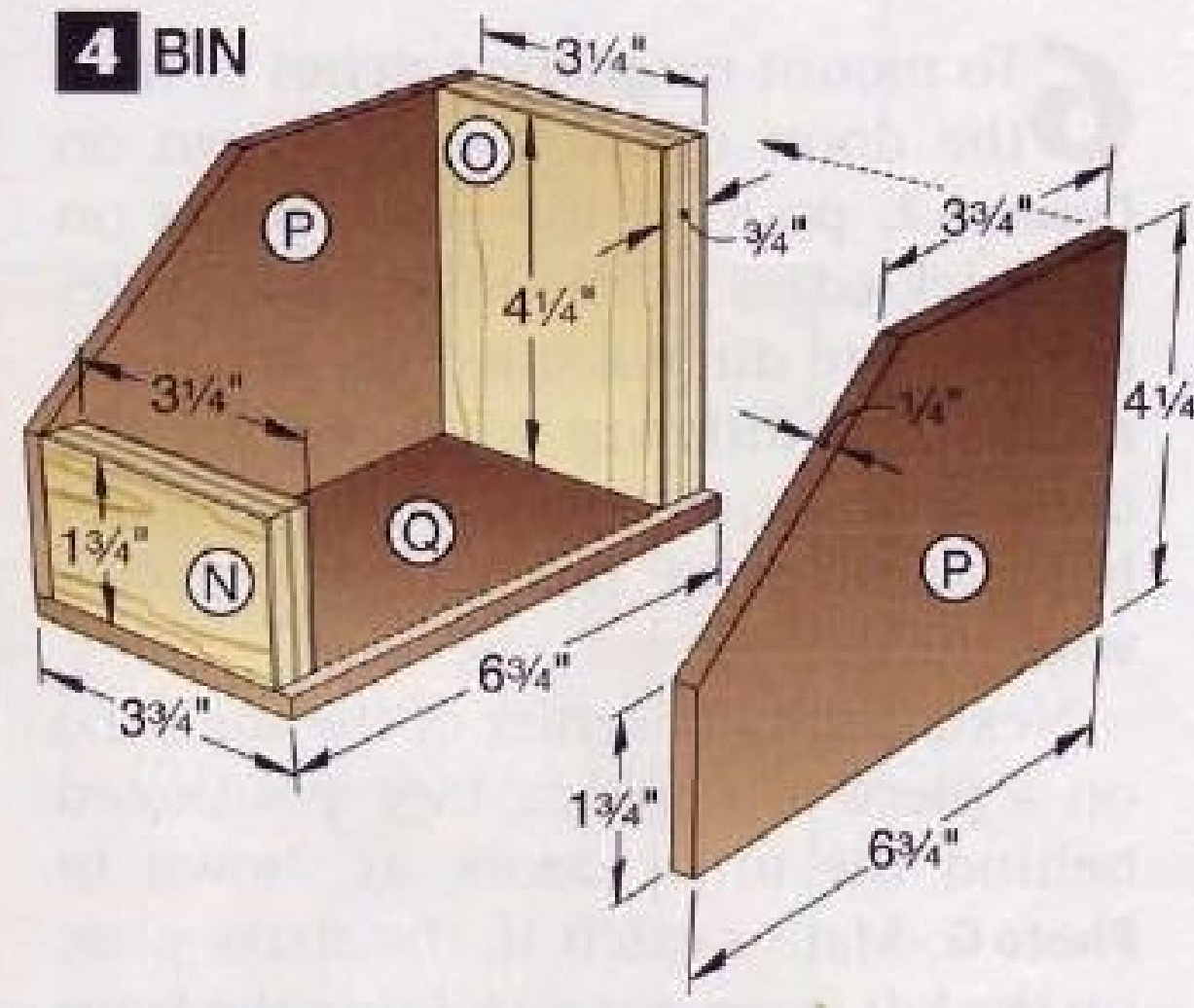
Complete the assembly

2 To position the hinges on the case sides (A), where dimensioned on **Drawing 1**, place the case on the left side. Draw alignment lines on masking tape $\frac{1}{8}$ " from the top and bottom (B) for the



outer-door hinge and $\frac{1}{8}$ " from the top and shelf (D) for the inner-door hinge to center the hinges top-to-bottom. Then, position the barrel of the inner-door hinge $\frac{1}{8}$ " from the front of the shelf so the door closes flush with the shelf. To do this, adjust a combination square to the distance from the front edge of the side to the shelf, less $\frac{1}{8}$ ". (We set our square to $4\frac{1}{8}$ ".) Now, mark intersecting lines using the square.

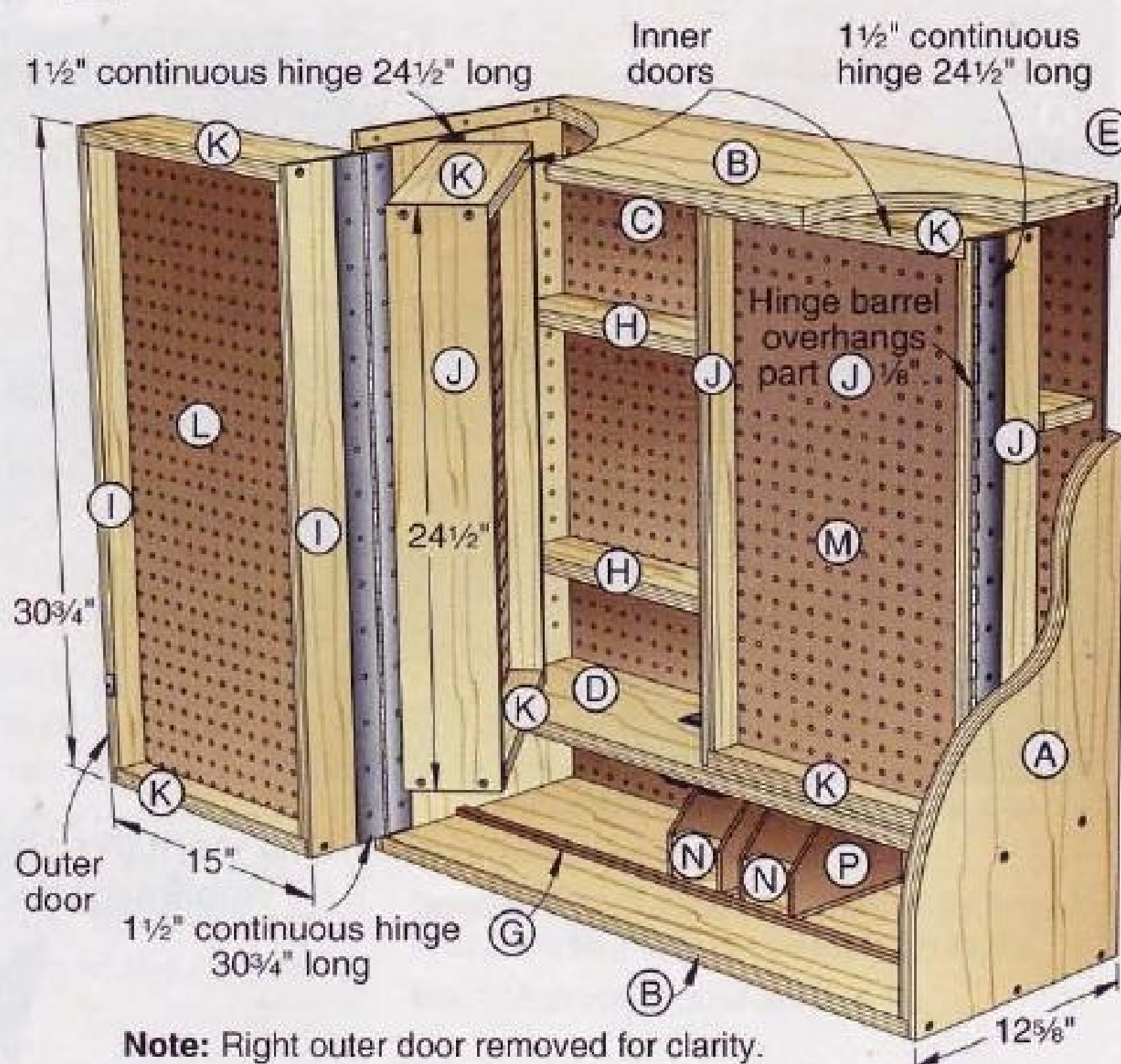
In the same way, mount the outer-door hinge, except position it so that the barrel overhangs the front edge of the case by $\frac{1}{8}$ ". Use a combination square or a $\frac{3}{4}$ "-wide strip of $\frac{1}{8}$ " hardboard as an alignment aid to set the hinge overhang. Now, reposition the case on the right side (A), and repeat the hinge-marking and mounting process.



Measure from the back of the door to the hinge for a spacer, as shown in **Photo D**. (We measured 3¾".) Then, from ¼" hardboard, cut a 20"-long piece to your measured width. Now, clamp the spacer to the door, and mount the hinge, as shown in **Photo E**, driving all of the screws. Repeat for the other doors.

5 Position the case on the right side (A), and screw-mount the right inner door, as shown in **Photo F**. Raise the door to the closed position. Then, mount the right outer door. Using a helper, reposition the case on the left side. Mount the remaining doors.

5 CABINET



Note: Right outer door removed for clarity.

6 To mount magnetic catches to hold the doors closed, where shown on **Drawing 2**, position the strike plates on the back edges of the inside door sides (I, J), where dimensioned on **Drawing 3**, noting the different locations for the outer and inner doors. Drill the pilot holes, and drive the screws supplied with the catches.

Next, mark the center of the shelf (D) on a piece of masking tape positioned behind the inner doors, as shown in **Photo G**. Mate a catch to the strike plate on the left inner door. Holding the front of the door and shelf flush, align the catch with the centerline, as shown. Mark the centers of the mounting slots. Drill the holes, remove the tape, and screw-mount the catch. In the same way, mount the catch for the right inner door, tight against the left-door catch. Then, mark the center of the shelf (D) on the *bottom* face at the front edge. Now, mount the catches for the outer doors, aligning the catches with the centerline.

7 To mount the unit, hold the remaining mounting cleat (E) level on your wall, with the beveled edge positioned where shown on **Drawings 2** and **2a**. Drill countersunk mounting holes through

SHOP TIP

Lock hooks to perforated hardboard in a snap

Here's a simple and inexpensive way to secure standard, nonlocking hooks to perforated hardboard so they won't come out. Strap them in place with M-style hook holders. Just center a holder over the hook shank, and press the barbed ends into an adjacent pair of holes, as shown. You easily can release the holders to reposition the hooks. The holders fit standard 9-gauge and heavy-duty 5-gauge hooks used in $\frac{1}{8}$ " and $\frac{1}{4}$ " hardboard with $\frac{3}{16}$ " or $\frac{5}{32}$ " holes spaced 1" apart. A bag of 50 clips, no. 1169A85, costs \$11.89 from McMaster-Carr, 404-346-7000, mcmaster.com.



the cleat into the wall studs, and fasten with #8x2½" flathead wood screws. Using a helper, hang the unit. Then, from inside the cabinet, drill mounting holes, centered in holes in the back (C), through the case mounting cleat (E) and spacer (F) into the studs to anchor the assembly to the wall.

8 Finally, install the shelves (H) where you wish, using ¼" shelf supports. Place the bins in the cabinet behind the bin stop (G), where shown on **Drawing 5**. Tidy up your shop by filling the cabinet with tools, hardware, and supplies.

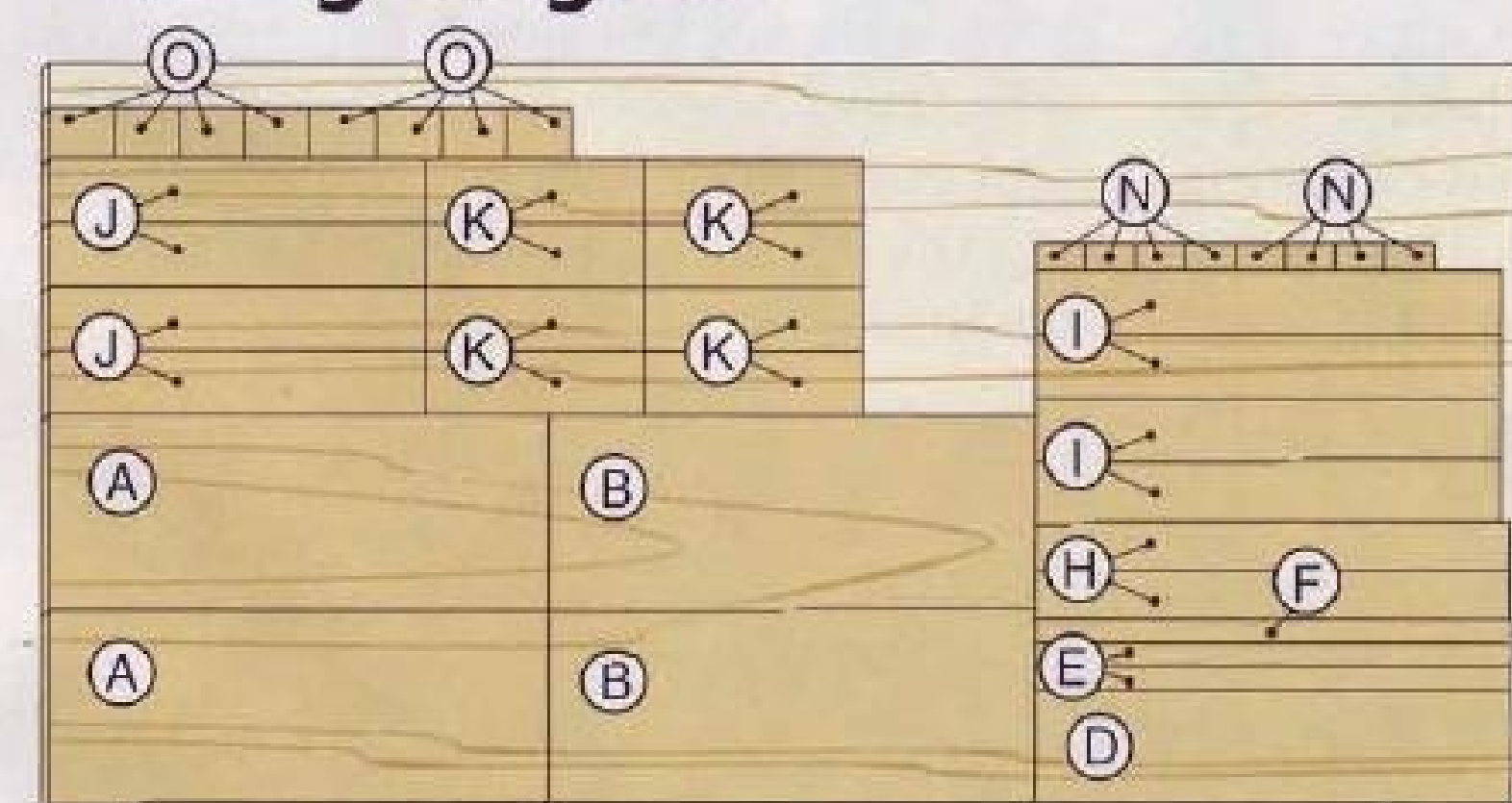
Hang shop items on the perforated-hardboard panels using suitable ¼" metal hooks, available at your local home center or hardware store. For a simple way to keep hooks securely in place, see the **Shop Tip**, above.

Written by **Owen Duvall**

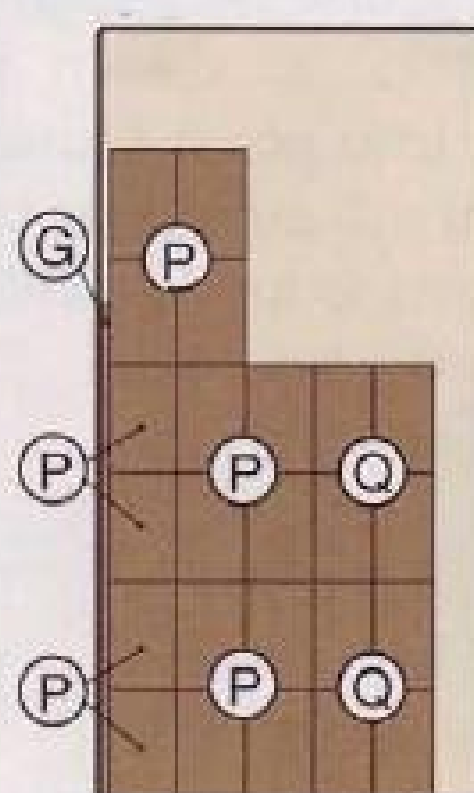
Project design: **Jeff Mertz**

Illustrations: **Roxanne LeMoine; Lorna Johnson**

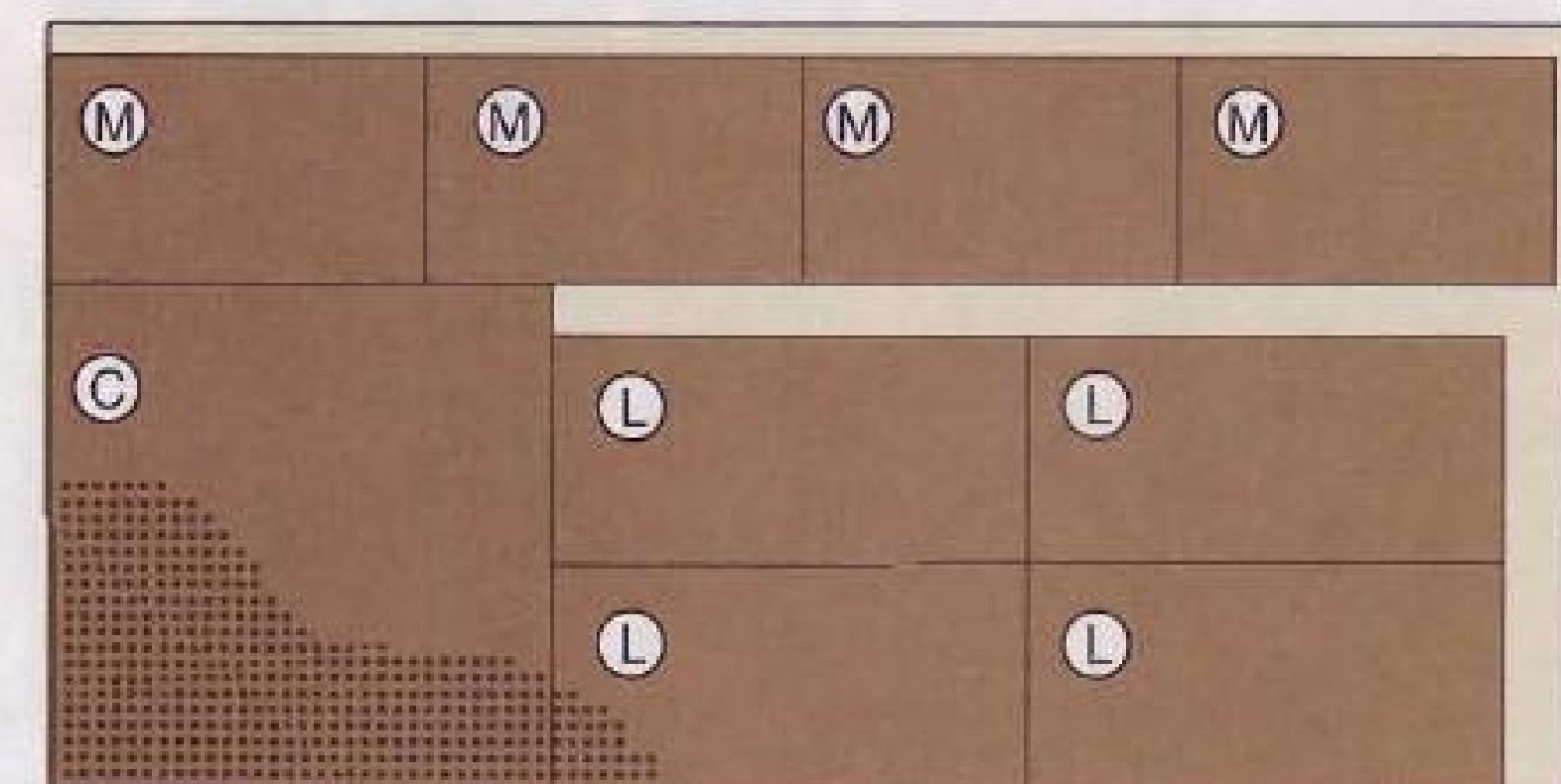
Cutting Diagram



¾ x 48 x 96" Baltic birch plywood



¼ x 24 x 48" Hardboard



¼ x 48 x 96" Perforated hardboard

Materials List

Case	FINISHED SIZE			Matl.	Qty.
	T	W	L		
A sides	¾"	12 5/8"	32 1/2"	BP	2
B top and bottom	¾"	12 5/8"	31 3/4"	BP	2
C back	¼"	31 3/4"	31 3/4"	PH	1
D shelf	¾"	7 3/8"	31"	BP	1
E mounting cleats	¾"	1 1/2"	31"	BP	2
F spacer	¾"	1 1/2"	31"	BP	1
G bin stop	¼"	1/2"	31"	H	1
H shelves	¾"	3 1/8"	30 7/8"	BP	2
Doors (2 outer and 2 inner needed)					
I outer-door sides	¾"	4 1/8"	30 3/4"	BP	4
J inner-door sides	¾"	4 1/8"	24 1/2"	BP	4
K tops and bottoms	¾"	4 1/8"	14 1/4"	BP	8
L outer-door panels	¼"	14 1/4"	30"	PH	4
M inner-door panels	¼"	14 1/4"	23 3/4"	PH	4
Bins (8 needed)					
N fronts	¾"	1 3/4"	3 1/4"	BP	8
O backs	¾"	3 1/4"	4 1/4"	BP	8
P sides	¼"	4 1/4"	6 3/4"	H	16
Q bottoms	¼"	3 3/4"	6 3/4"	H	8

Materials key: BP-Baltic birch plywood, PH-perforated hardboard, H-hardboard.

Supplies: #8x¾" flathead wood screws (6); #8x2" flathead wood screws (48); #8x2½" flathead wood screws (2); #8x3" flathead wood screws (4); cloth-backed double-faced tape; 1½x48" continuous hinges (2) and 1½x30" continuous hinges (2); paintable wood putty; magnetic catches (4); ¼" shelf supports (8); ¼" perforated-hardboard hooks.

Blade and bit: Dado-blade set, ¼" brad-point bit.

Find more free shop project plans at:
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Stool & Tool-Tote Combo

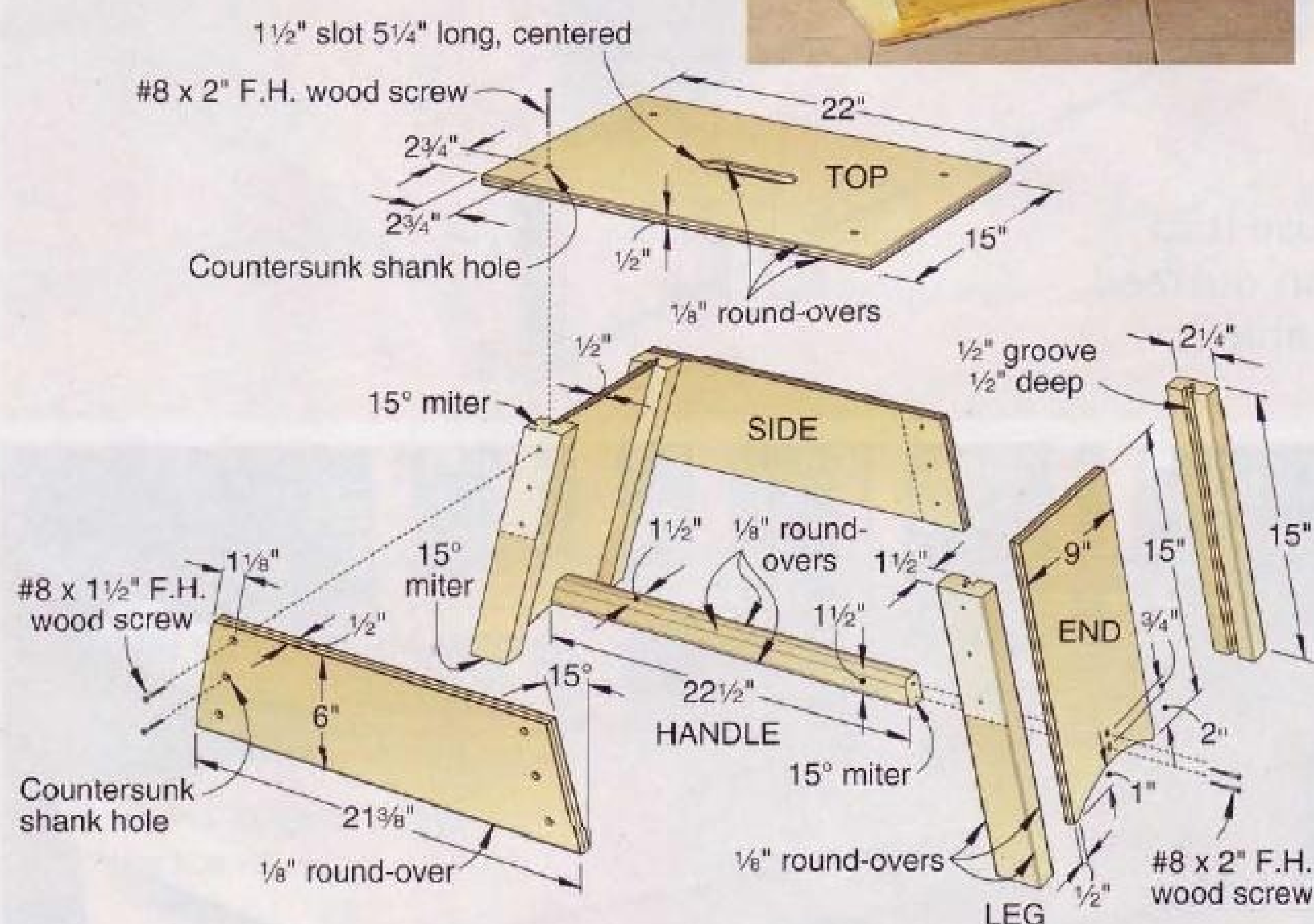
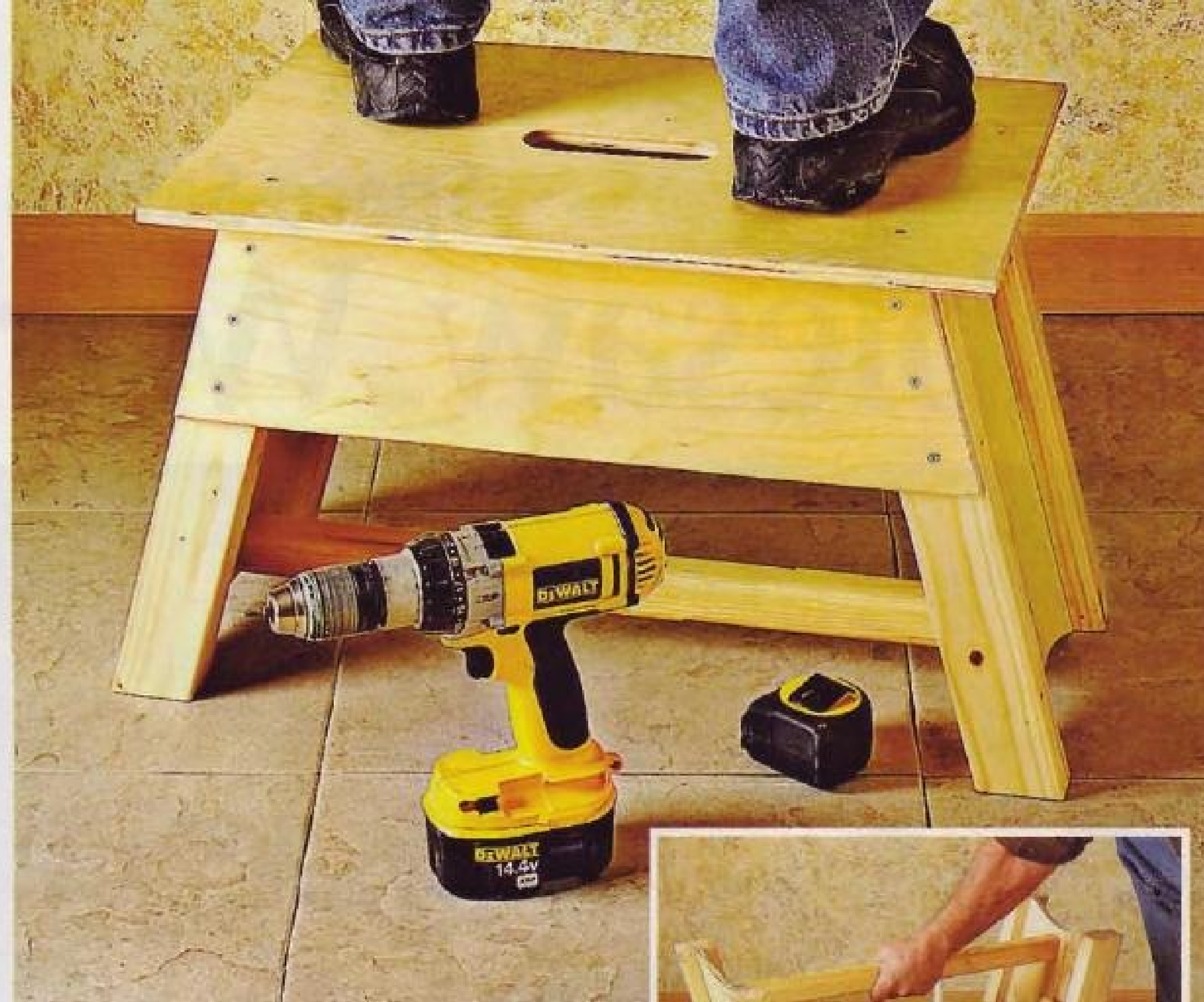
This simple carrier is a step up for odd jobs around the home.

Stand it upright, and you've got a sturdy stool for reaching the top of your lumber rack or doing household chores. Flip the stool over, fill it with tools, and you're ready to tackle a repair anywhere on your property.

To cut the pieces to size and shape, use the dimensions on the drawing. Miter-cut both ends of the legs at 15°. Use ½" plywood for the top, sides, and ends. For the legs and handle, cut 2×4 stock to size. Cut a ½" groove ½" deep, centered along the *inside* face of each leg. Mark the slot, drill a blade-start hole, and cut the handle opening in the top to shape. Cut the arcs in the ends. Rout ⅛" round-overs along the handle opening and on the remaining parts, where shown at *right*. Glue, clamp, and screw the project together in the configuration shown. Sand smooth, and add a finish. 🌲

Project design: **Lynn Lawrenz, Algoma, Wis.**

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woodmagazine.com/freeplans



Try a "green" version of the stool

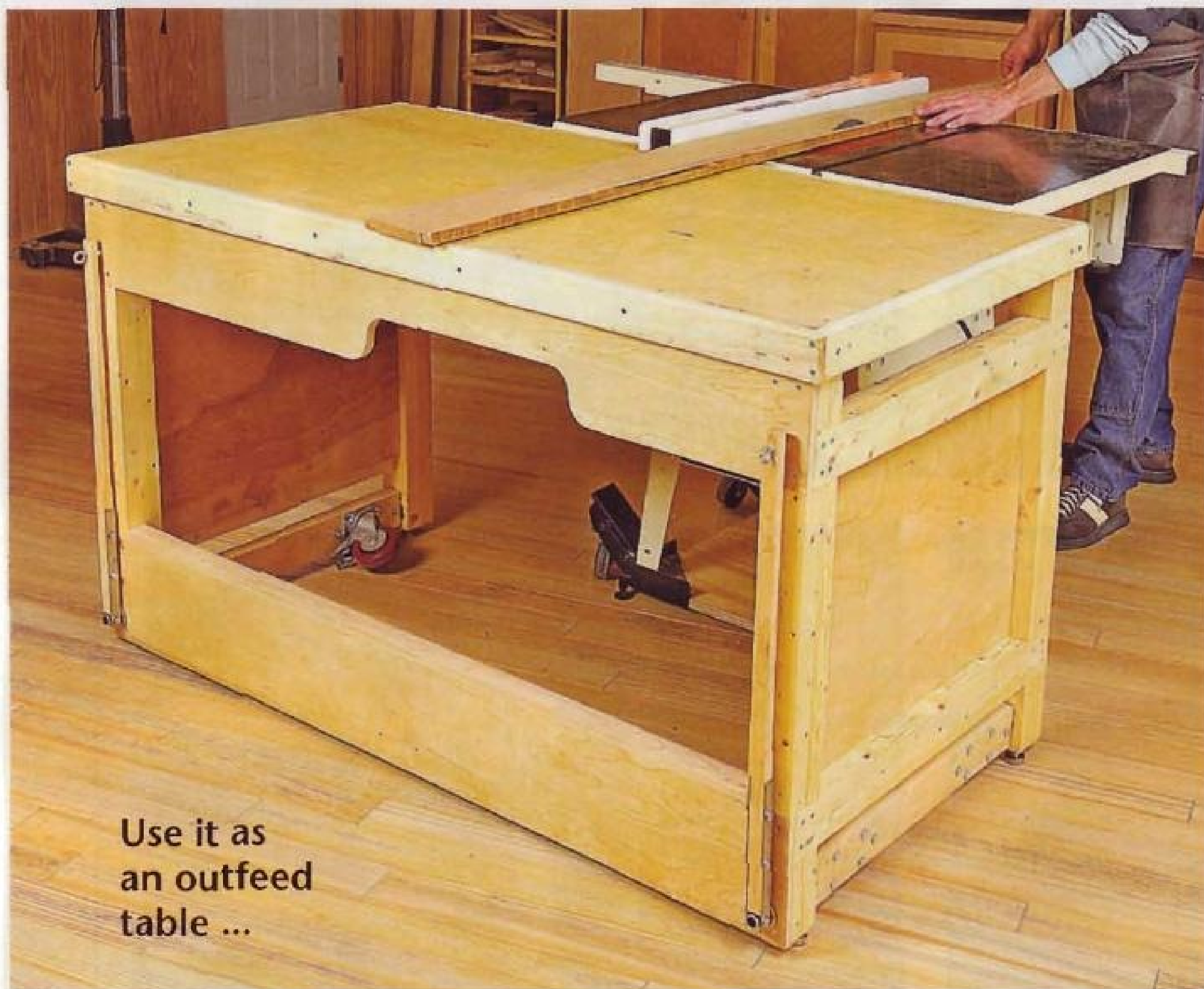
We designed this stool and tool-tote combo so you can build it from commonly available materials. If you have access to construction debris, repurpose that waste by building the project from it. That's how the stool's designer, Lynn Lawrenz, constructs them. "The raw materials are headed for the landfill, until I snag them for stools," says Lawrenz. "I've given away dozens of them, always in pairs, because

people like to set a plank on top of the stools when spread apart for painting and other chores."

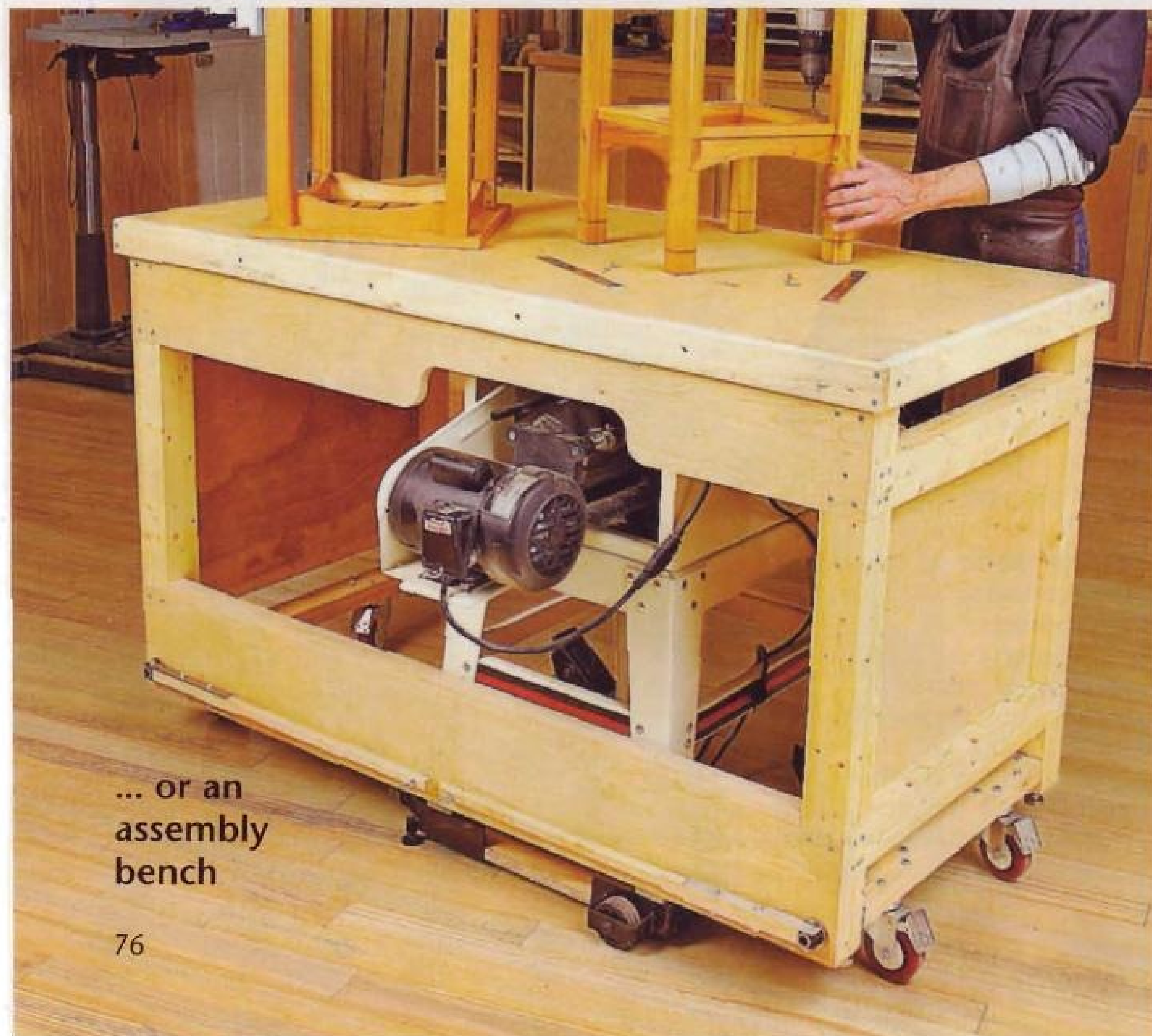
In his version (see photo *right*), the end panels/legs are scraps of 12" engineered I-joists, the cross brace/handle joining them is a 2x2" cutoff, the top is discarded roof sheathing (typically oriented-strand board), and the side panels are cut to shape from spare ½" cabinet plywood.



Space-Saving Double-Duty Tablesaw Workbench



Use it as
an outfeed
table ...



... or an
assembly
bench

Attention, small-shop and garage-shop woodworkers: Here's a project designed with you in mind. It's a combination workbench and outfeed table. Plus, for the space-starved shop, it stores in the same footprint as your tablesaw.



Watch a FREE two-minute video of the Tablesaw Workbench in action at:
woodmagazine.com/videos

PROJECT HIGHLIGHTS

- Overall dimensions: 61½" wide x 32½" deep x 39¾" high (casters in the down position).
- You can customize the workbench to fit any type of tablesaw. The workbench shown at left fits a contractor's model with a 30" fence.
- Levelers let you adjust the bench to match your tablesaw height for use as an outfeed table.
- To renew the worksurface, simply flip or replace the ¾" plywood top panel.
- For the items needed to build this project, see opposite page. You'll find the **Supplies** at home centers. For the casters, see **Source**.

Skill Builder

- Learn how to form large dadoes and rabbets using your tablesaw fence as a workpiece stop.

Note: To position the workbench over your tablesaw, remove the blade guard, rip fence, and miter gauge. The bench dimensions allow 1" clearance at the top of the tablesaw and 1" clearance at each side. There is no front-to-back clearance. With the workbench positioned over the tablesaw, the back-fence rail touches the inside of the upper-back rail (F) [Drawing 4], and the back of the front-fence rail rests against the front legs (C).

Measure your tablesaw

No matter the type of tablesaw you own, or how it's accessorized, you can customize this project to fit your needs.

1 Measure your tablesaw [], and enter the dimensions in the empty brackets. (Our sample tablesaw dimensions are shown in parentheses.) If by chance your saw dimensions match those of the sample tablesaw, stop here. Simply use the part dimensions for the sample tablesaw shown on the **Materials List** at *bottom*.

2 For dimensions in brackets larger or smaller than the ones in parentheses (**Drawing 1**), here's how to size the workbench to your tablesaw. (Don't let the following lengthy explanation scare you off. The process is really quite simple.)

■ Subtract the smaller *length* dimension from the larger one. Enter the difference in the **L** column under the **CALCULATE** heading on the **Materials List** for parts A, D, E, H, J, and K, and in the **W** column for part N. Precede with a plus symbol (+) for a length in brackets larger than the one in parentheses, and a minus symbol (-) for a length in brackets smaller than the one in parentheses.

■ Subtract the smaller *height* dimension from the larger one. First, enter the difference in the **L** column under the **CALCULATE** heading for part C, and in the **W** column for part E. Precede with a plus symbol for a height in brackets larger than the one in parentheses, and a minus symbol for a height in brackets smaller than the one in parentheses.

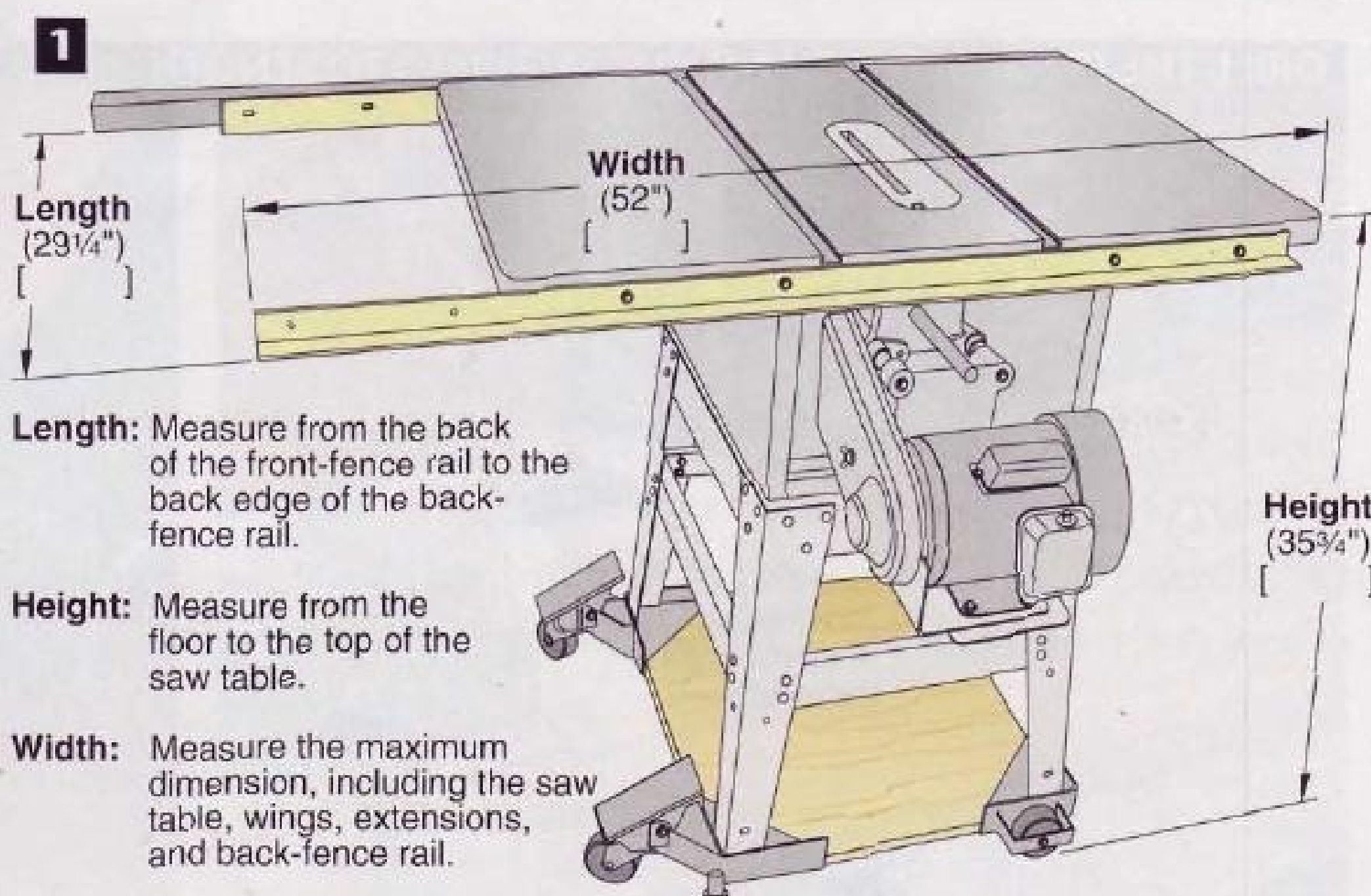
■ Subtract the smaller *width* dimension from the larger one. Enter the difference in the **L** column under the **CALCULATE** heading for parts F, G, I, and N. Precede with a plus symbol for a width in brackets larger than the one in parentheses, and a minus symbol for a width in brackets smaller than the one in parentheses.

■ Divide the width dimension difference (determined in the previous step) by 4. Record the dividend in the **L** column under the **CALCULATE** heading for parts L and M. Precede with a plus or minus symbol, as directed *above*.

■ For a *width* dimension in brackets smaller than the one in parentheses, divide the dimension difference by 2. Enter the dividend in the **L** column under the **CALCULATE** heading for part B. Preceded with a minus symbol. (Do not make part B longer than the length listed for the sample tablesaw.)

■ Now add the numbers in the **W** and **L** columns under the **CALCULATE** heading to, or subtract them from, the **W** and **L** dimensions under the **SAMPLE TABLESAW** heading. Enter the new dimensions in the **W** and **L** columns under the **YOUR TABLESAW** heading. Then, to avoid confusion, cross out the obsolete **SAMPLE TABLESAW** dimensions.

Now, for example, let's say your tablesaw measures 30½" long, and you've entered this number on **Drawing 1** in the brackets under **Length**. In this case, complete the row in the **Materials List** as shown (**Example, right center**).



Length: Measure from the back of the front-fence rail to the back edge of the back-fence rail.

Height: Measure from the floor to the top of the saw table.

Width: Measure the maximum dimension, including the saw table, wings, extensions, and back-fence rail.

Note: Our tablesaw dimensions are shown in parentheses.

EXAMPLE:

Step 1

$$30\frac{1}{2}" - 29\frac{1}{4}" = 1\frac{1}{4}"$$

Materials List

FINISHED SIZE:		SAMPLE TABLESAW			CALCULATE		YOUR TABLESAW		Matl.	Qty.
Base		T	W	L	W	L	W	L		
A	pivot blocks	1½"	3"	23¾"		+1¼"		25"	LM	2

Step 4
Cross out the obsolete dimension.

Step 2
The length in brackets is larger than the length in parentheses.

Step 3
 $23\frac{3}{4}" + 1\frac{1}{4}" = 25"$

Materials List

FINISHED SIZE:		SAMPLE TABLESAW			CALCULATE		YOUR TABLESAW		Matl.	Qty.
Base		T	W	L	W	L	W	L		
A	pivot blocks	1½"	3"	23¾"					LM	2
B	levers	¾"	7/8"	27½"					M	2
C*	legs	3"	3"	34½"					LP	4
D	end rails	1½"	3"	29¼"					P	4
E	end panels	¾"	23"	24"					BP	2
F	back rails	¾"	8"	60"					BP	2
G	rail stiffener	¾"	1½"	54"					M	1
Top										
H	end trim	¾"	2½"	30"					M	2
I	front/back trim	¾"	2½"	61½"					M	2
J	top supports	¾"	1¾"	29¼"					M	3
K	end cleats	¾"	1¾"	24"					M	2
L	outer cleats	¾"	1¾"	117/16"					M	2
M	inner cleats	¾"	1¾"	147/16"					M	2
N	top panel	¾"	30"	60"					BP	1

*Parts initially cut oversize. See the instructions.

Materials key: LM—laminated maple, M—maple, LP—laminated pine, P—pine, BP—birch plywood.

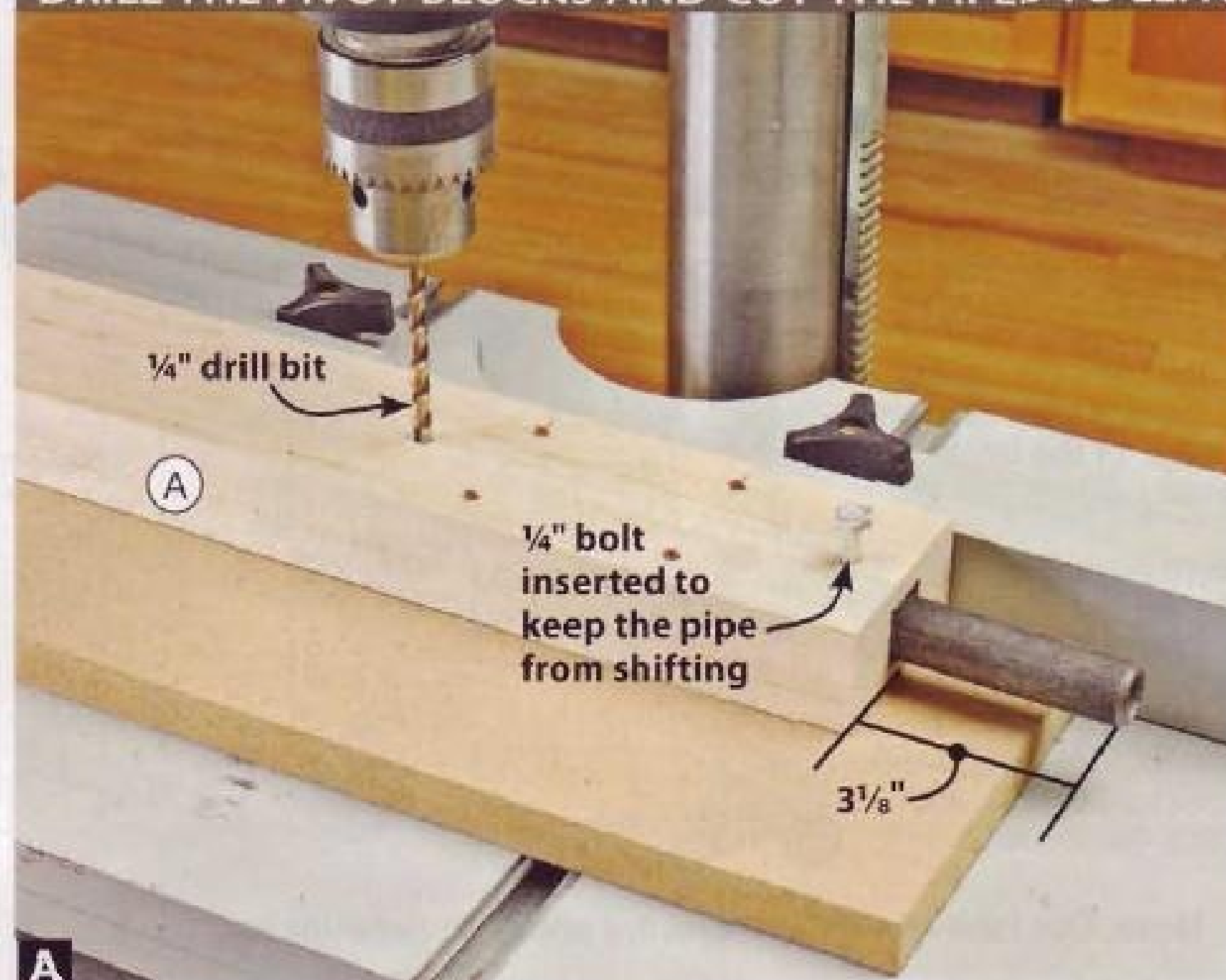
Supplies: #8x1¼", #8x1½", #8x2", #8x2½" flathead wood screws; ¾" levelers with T-nuts (4); ¼x1½" hexhead bolts (6); ¼x2" hexhead bolts (24); ¼" washers (52); ¼" lock nuts (32); ¼x2" eyebolts (2); 7/8" washers (6); ½x¾x36" steel bar; ½x36" schedule 40 steel pipe (2).

Blades and bits: Stack dado set; ¼" round-over and 45° chamfer router bits.

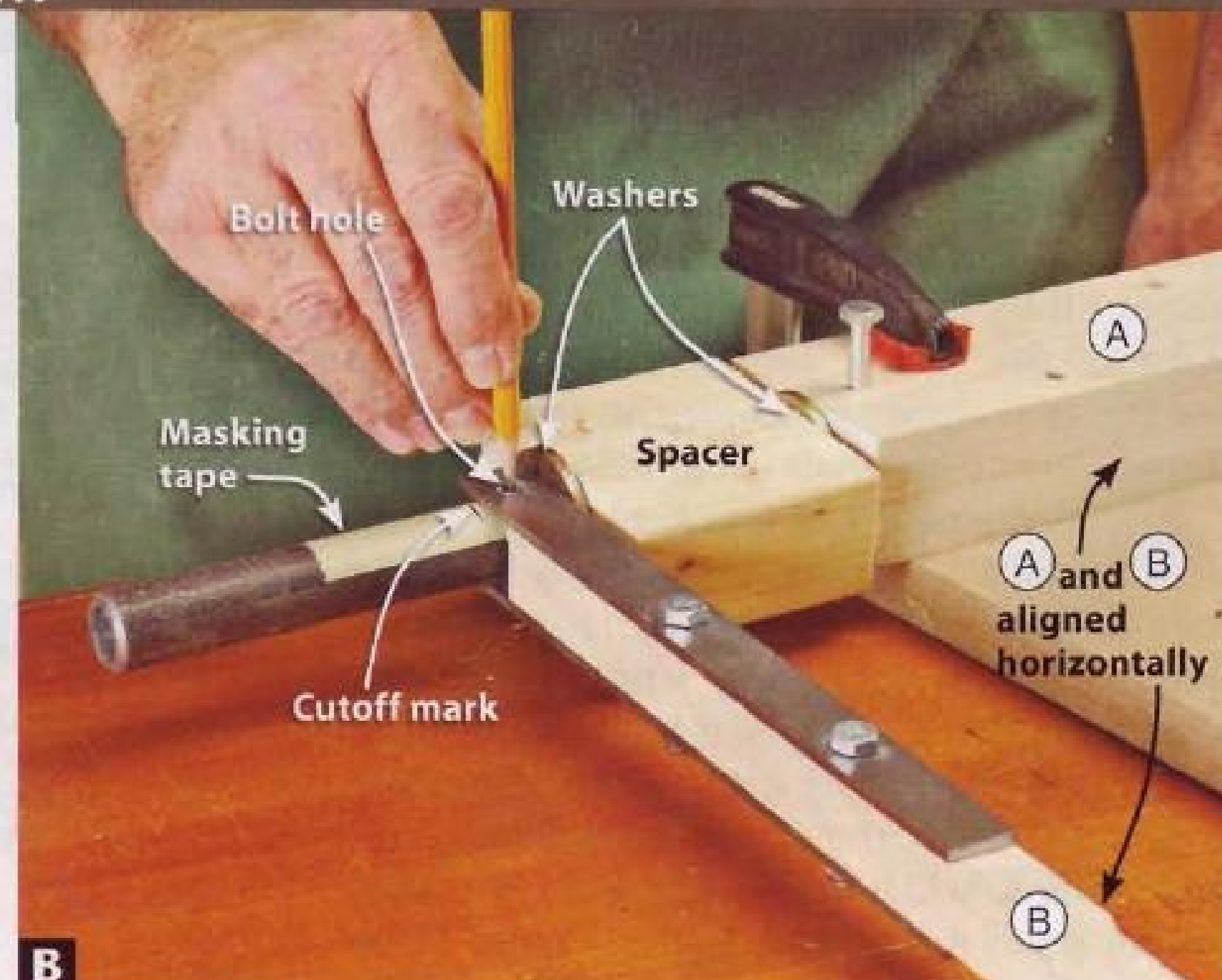
Source

Casters: 4" swivel caster with brake no. 36992, \$10.49 ea. (4). Call Hartville Tool, 800-345-2396, or go to hartvilletool.com.

DRILL THE PIVOT BLOCKS AND CUT THE PIPES TO LENGTH



A With 3 1/8" of pipe protruding from one end of the pivot block (A), drill holes through the block and pipe at the marked hole centers.



B With washers, a spacer, and the lever assembly in place, mark the pipe length and lever attachment bolt-hole location.

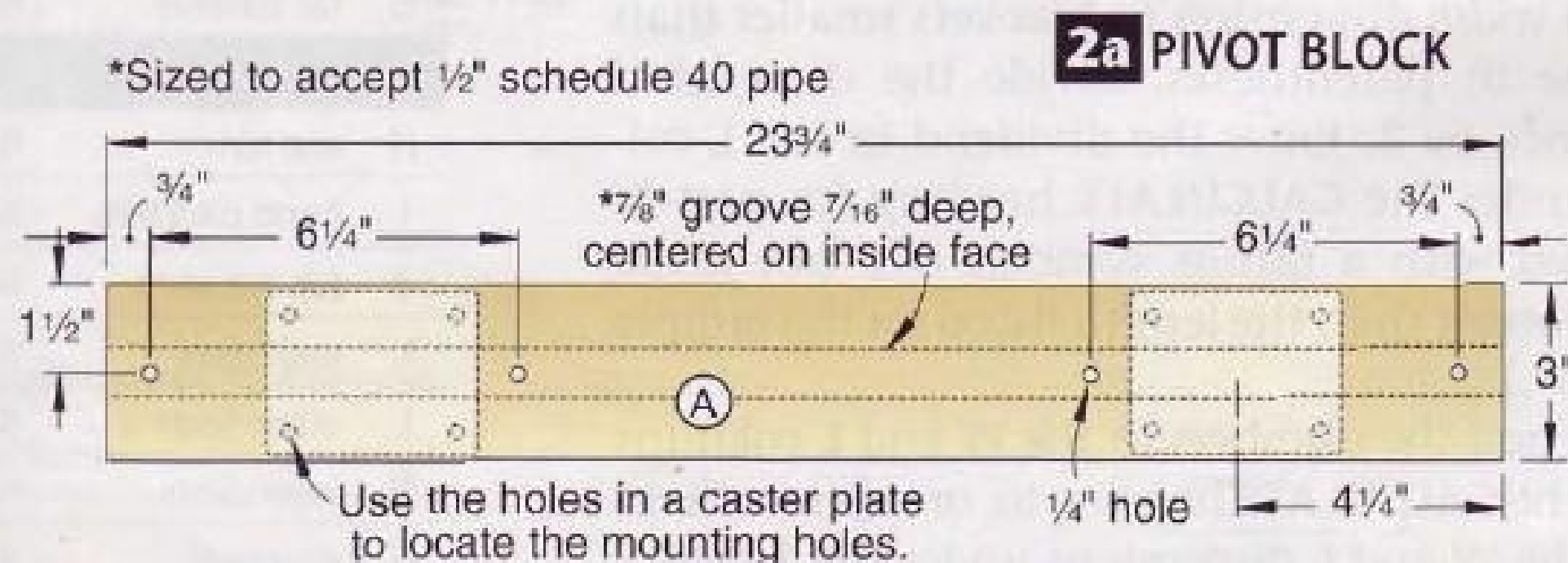
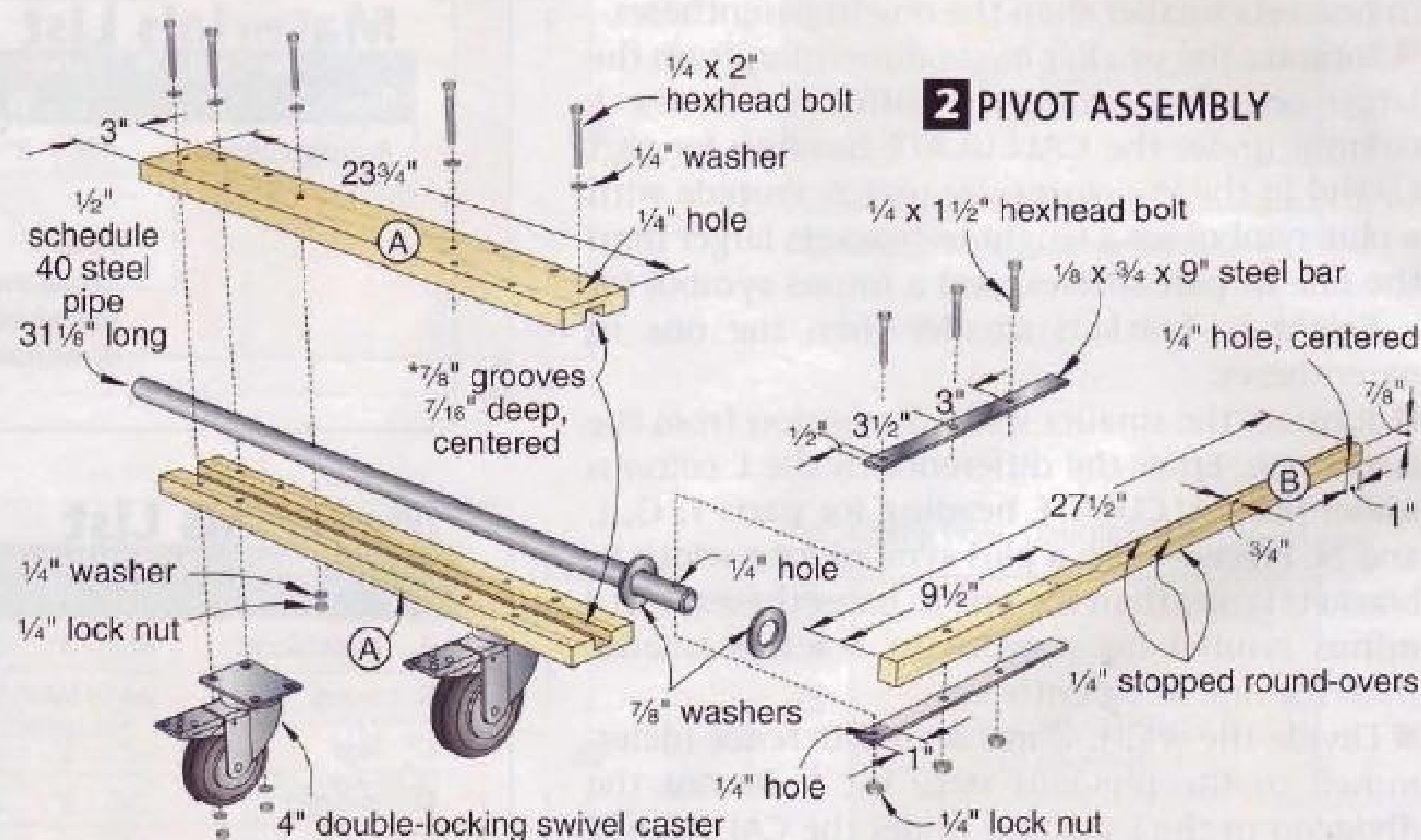
Build the pivot assemblies

1 For the pivot blocks (A), cut four 3/4"-thick pieces of stock to the width and length listed. (We used maple. If you've adjusted the length of part A, be sure to use the new length.) Then, making two passes with a dado blade, cut centered grooves in each piece (Drawings 2 and 2a). Clamp the pieces together in the arrangement shown, and verify that 1/2" schedule 40 steel pipe slips through the square hole. Now, glue and clamp the pieces, keeping the ends and edges flush.

2 Lay out the hole centers on the bottom face of each pivot block (A) (Drawing 2a). (Use the caster plates to locate the caster-mounting holes.) Drill only the caster-mounting holes.

3 Cut two levers (B) to size. Rout stopped round-overs along the edges (Drawing 2). Then, from a 1/8 x 3/4 x 36" steel bar, cut four 9"-long pieces. Drill holes where shown. Now, position a bar on each lever, with the bar protruding 1" beyond the end of the lever. Using the holes in the bar as guides, mark hole positions on each lever. Also, mark the hole center at the opposite end of each lever. Drill the holes using your drill press. Bolt the bars to the levers.

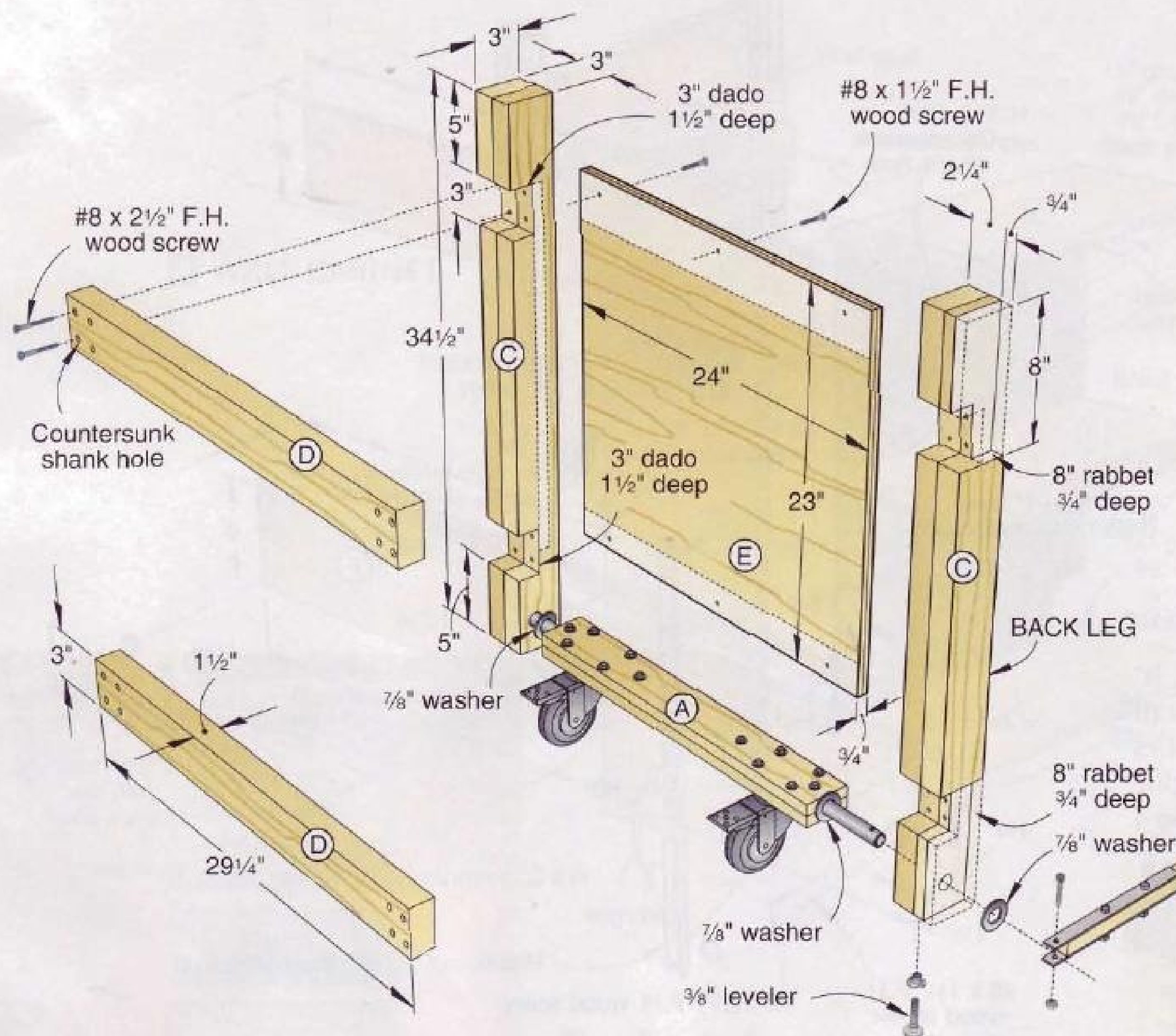
4 Slide a 36"-long piece of 1/2" schedule 40 steel pipe into each pivot block (A), letting the pipe protrude 3 1/8" at one end. Then, drill the four 1/4" holes that go through both the pivot block and pipe, where previously marked (Photo A). To keep the pipe from shifting in the pivot block, insert bolts into the holes as you drill them.



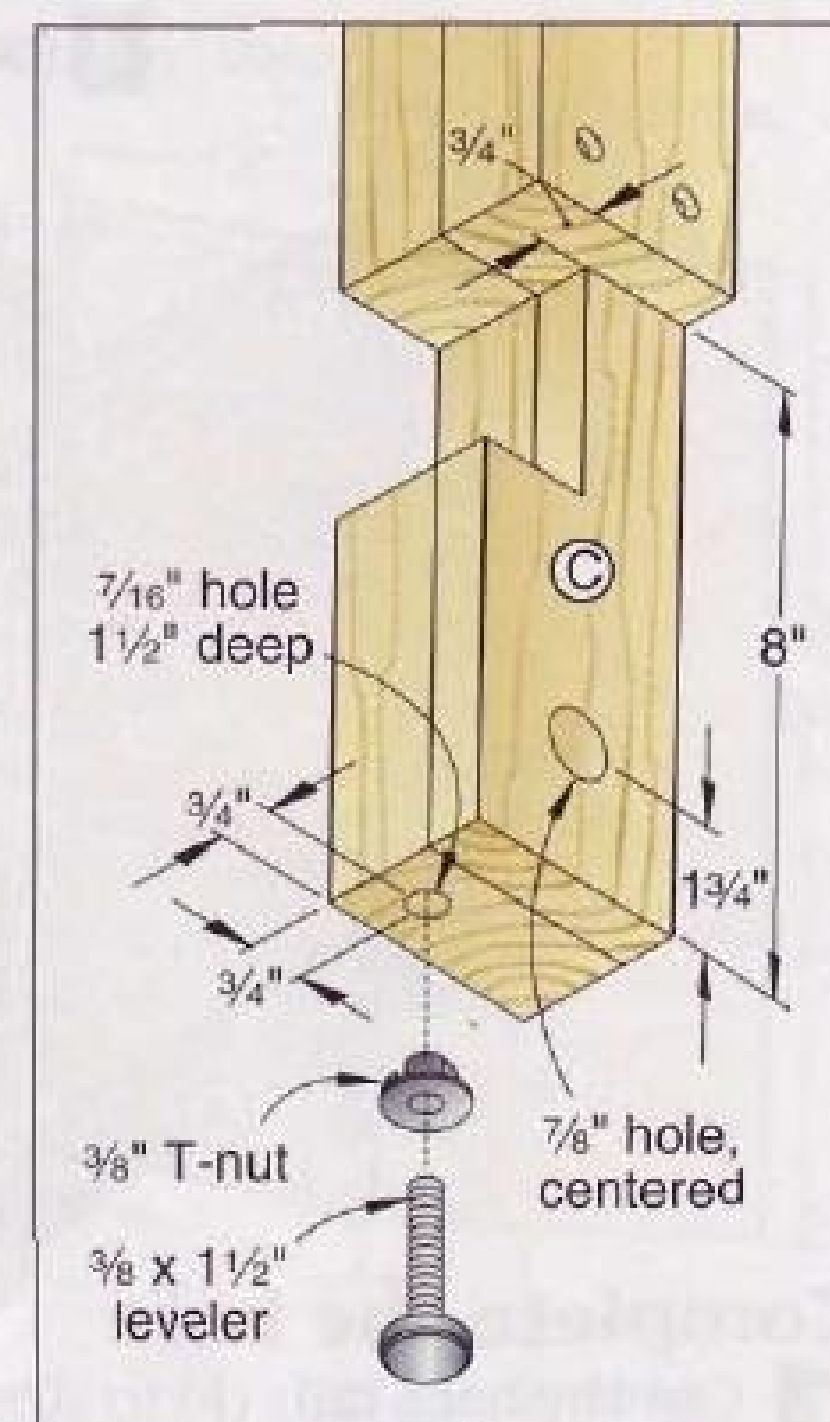
5 To cut the pipes to finished length, first cut a 3"-long spacer from 2x4 scrap. [The spacer represents the thickness of a leg (C).] Drill a centered 7/8" hole through the 3" dimension. Then, slide two washers and the spacer onto the long protruding pipe end of one pivot block (A) assembly. Apply masking tape to the

pipe. With the lever (B) and pivot block aligned horizontally, mark the finished length and the bolt-hole location (Photo B). Repeat with the other assembly. Now, mark the pipes and pivot blocks for reassembly, remove the pipes, and cut them to length. Using a V-block on your drill press, drill the bolt holes.

3 END ASSEMBLY



3a LEVELER DETAIL (BACK LEG SHOWN)



Assemble the ends

1 For the legs (C), cut eight 2×4 pieces ½" longer than listed. Laminate them in pairs to form four 3×3½" blanks. Then, joint one edge smooth, rip the opposite edge to width, and crosscut the legs to length. To avoid problems when building projects from construction lumber, see the **Shop Tip**, below.

2 To form 3"-wide dados in the inside faces of the legs (C) (**Drawing 3**), install a $\frac{3}{4}$ " dado blade in your tablesaw,

and adjust it to cut 1½" deep. To establish one edge of the dados, position the fence 5" from the *right* side of the blade, and attach an extension to the miter gauge to back the cuts. Then, using the fence as a stop, cut a dado at both ends on the inside face of each leg. Next, to establish the other edge of the dados, reposition the fence 8" from the *left* side of the blade. Again using the fence as a stop, cut a second dado at each end of all

SHOP TIP

How to keep construction lumber straight

Construction lumber (2x4s, 2x6s, etc.) has a high moisture content. When brought into a shop, the lumber dries out, causing it to shrink and often twist. Of course, your project will go together easier with straight lumber. Here's a simple solution.

First, select lumber that does not include the center (pith) of the tree. Cut the parts to rough length as soon as you bring the lumber home. Then, place the parts in a trash bag, as shown at *right*, and close it with a twist tie. Remove the parts for machining, and



return them to the bag until you are ready to assemble them. After building the project, the wood dries, but now twisting of any one part is restrained by the other parts.

four legs. Now, make repeat cuts to remove the waste.

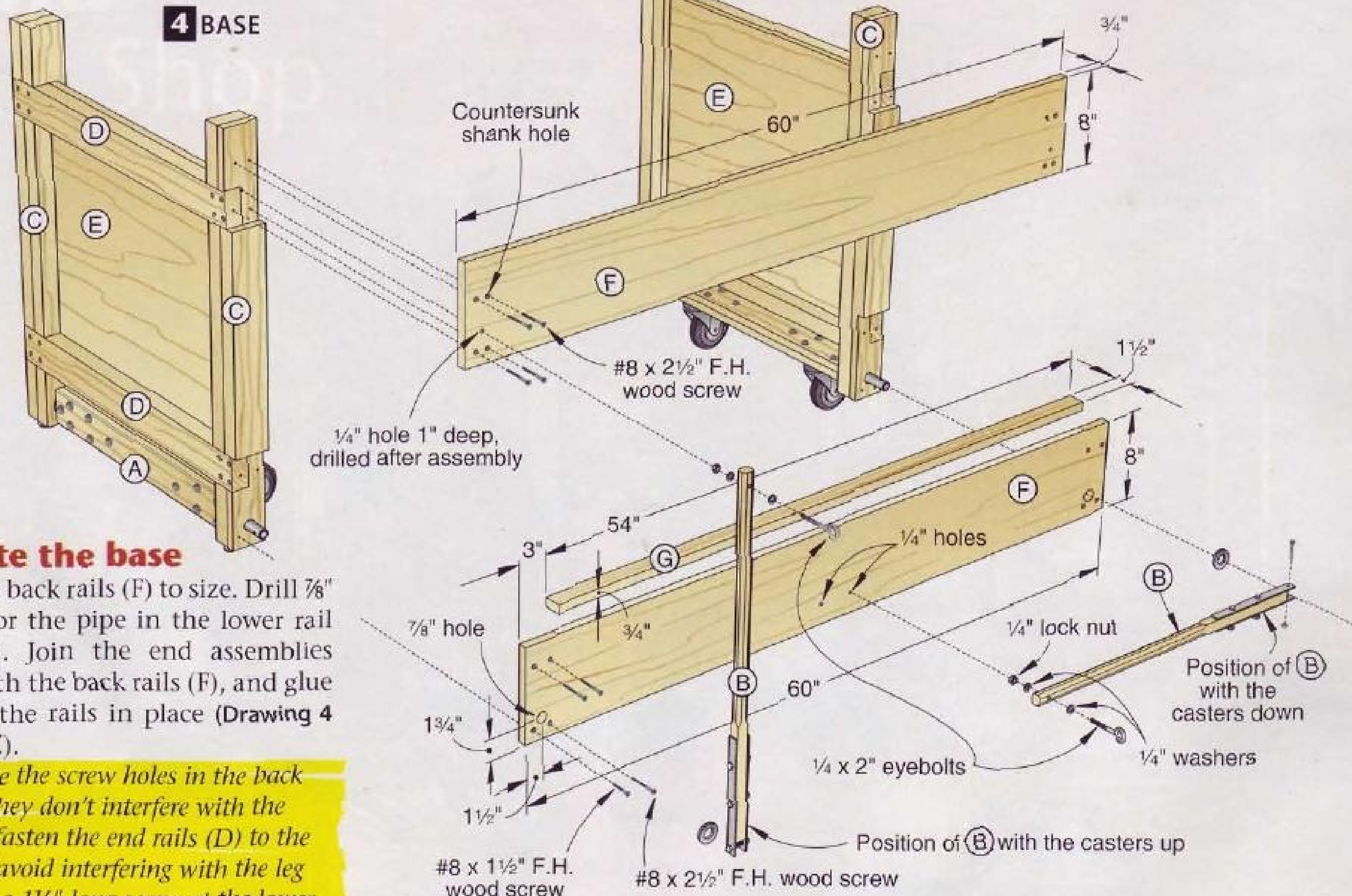
3 To form the 8"-wide rabbets at the top and bottom of the back legs (C) (**Drawings 3 and 3a**), leave the tablesaw set up as in the previous step, but lower the blade to cut $\frac{3}{4}$ " deep. Then, making sure you will have mirror-image parts, cut dados at both ends of the back face of the back legs. Now, make repeat cuts to remove the waste from the dados to the ends of the legs.

4 Drill $\frac{7}{8}$ holes for the pivot assembly pipes at the bottom of each leg (**Drawing 3a**). Then, drill a hole for the leveler T-nut.

5 Cut the end rails (D) to size. Glue and clamp them into the leg (C) dadoes, with the rail ends flush with the front surface of the front legs and the rabbeted surface of the back legs (**Drawing 3**). Check the assemblies for square. Then, drill holes, and drive the screws. (For #8 screws in softwood, drill $\frac{5}{32}$ " shank holes and $\frac{3}{32}$ " pilot holes.)

6 Cut the end panels (E) to size. Glue and clamp the panels to the end rails (D), a with the top of each panel flush with the top of the upper rail. Drill screw holes, and drive the screws.

4 BASE



Complete the base

1 Cut the back rails (F) to size. Drill 7/8" holes for the pipe in the lower rail (Drawing 4). Join the end assemblies (C/D/E) with the back rails (F), and glue and screw the rails in place (Drawing 4 and Photo C).

Note: Locate the screw holes in the back rails (F) so they don't interfere with the screws that fasten the end rails (D) to the legs (C). To avoid interfering with the leg levelers, use a 1 1/2"-long screw at the lower outside corners of the bottom back rail.

2 Apply a finish to the pivot blocks (A) and levers (B). (For an easy-to-apply and easy-to-repair finish, we applied two coats of Minwax Antique Oil Finish.) Attach the casters to the pivot blocks (Drawing 2).

3 Place the base upside down on the floor, and slide the pipes through the legs (C), washers, pivot-block (A) assemblies, and lower back rail (F) (Drawing 3). Align the pivot-block holes with

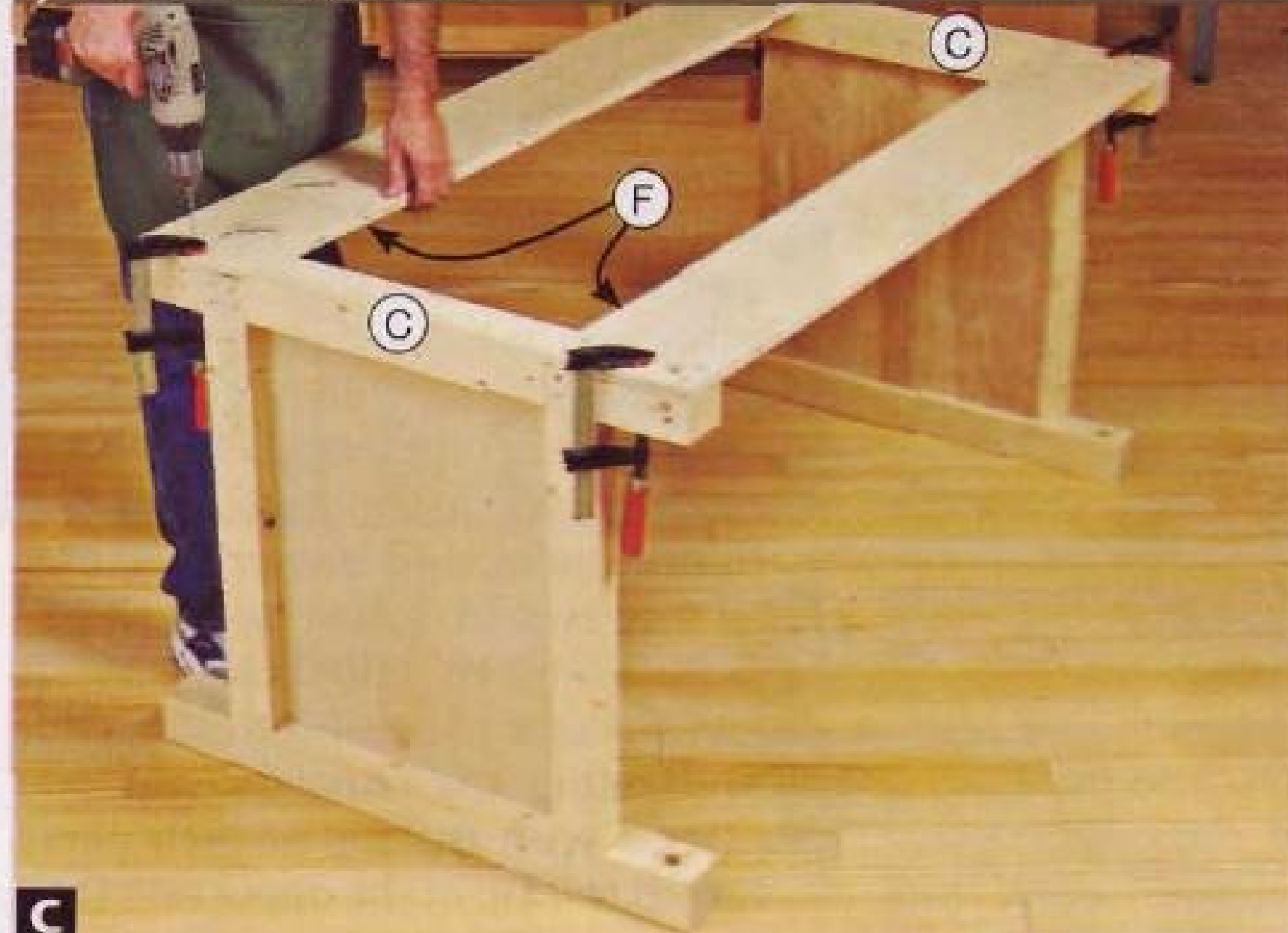
the pipe holes, and bolt the pipes in place (Drawing 2). Now, slip a washer and a lever (B) assembly onto each pipe, and bolt the levers in place (Drawing 4).

4 Adhere masking tape to the lower back rail (F) at the location of the lever (B) ends when the casters are in the down position. Draw a line on the tape 1 3/4" from the bottom edge of the rail. Drill holes in the rail for the eyebolt lever pins (Drawing 4, Photo D). Apply

tape to the upper back rail at the locations of the lever ends when the casters are in the up position. Mark lines on the tape 1 1/2" from the ends of the rail. Rotate the levers so the casters are in the up position, and drill 1"-deep holes through the rail and into the legs (C).

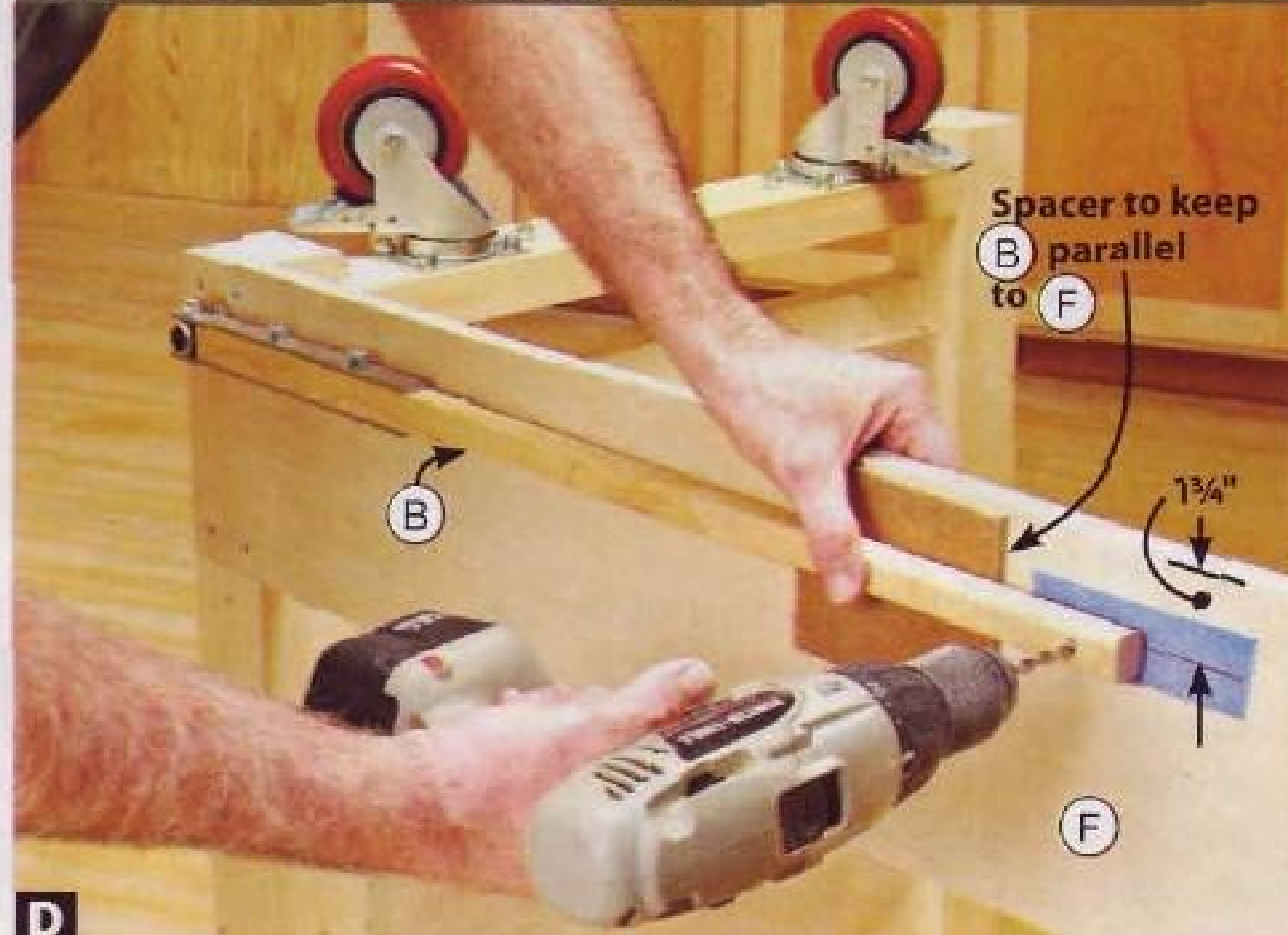
5 Turn the base right side up. Cut the rail stiffener (G) to size, and glue and clamp it to the top edge of the lower back rail (F) (Drawing 4).

JOIN THE BASE ENDS



C Glue and clamp the back rails (F) into the end assembly leg (C) rabbets. Check for square, drill screw holes, and drive the screws.

DRILL THE LEVER-PIN HOLES



D Using the hole in the lever (B) as a guide, align the drill bit with the marked line, and drill a lever-pin hole through the rail (F).

Add the top

1 Cut the end trim (H) and front and back trim (I) to size. Set the back trim aside. Clamp the end trim and front trim to the legs (C), with the top edge of the trim protruding $\frac{3}{4}$ " beyond the tops of the legs (Drawing 5). (Use a scrap of $\frac{3}{4}$ " plywood for a gauge.) Drill screw holes and drive the screws. (For #8 screws in hardwood, drill $\frac{5}{32}$ " shank holes and $\frac{7}{64}$ " pilot holes.)

2 Cut the top supports (J), end cleats (K), outer cleats (L), and inner cleats (M) to size. Then, clamp the parts in place, with the top edges $\frac{3}{4}$ " below the top edges of the end trim (H) and front trim (I), and with the top edges of the top supports flush with the top edge of the upper back rail (F) (Drawing 5). Now drill screw holes and drive the screws. Retrieve the back trim, and clamp it to the upper back rail. Drill screw holes, and drive the screws.

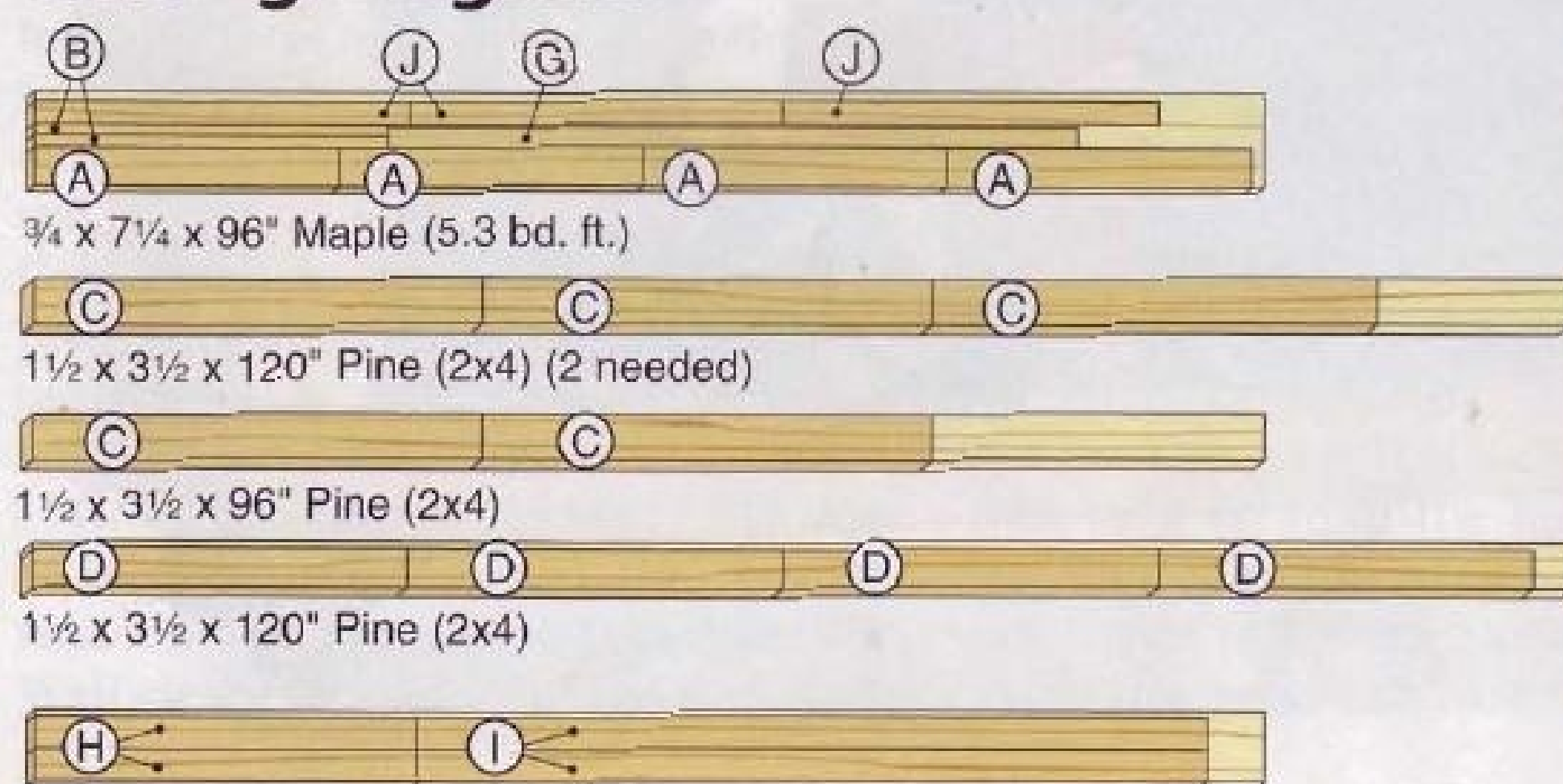
3 Cut the top (N) to size. Clamp it in place, resting on the upper back rail (F), top supports (J), and cleats (K, L, M). Drill screw holes, and drive the screws. Rout a $\frac{3}{16}$ " chamfer along the outer edges of the trim (H, I).

4 Position the workbench over your tablesaw. On the inside face of the upper back rail (F), mark the location of any part of the tablesaw that protrudes beyond the back-fence rail and interferes with the upper back rail. Then, transfer the marks to the outside face of the upper back rail. Now, lay out a notch, adding 1" of clearance all around the obstruction. Jigsaw and sand the notch.

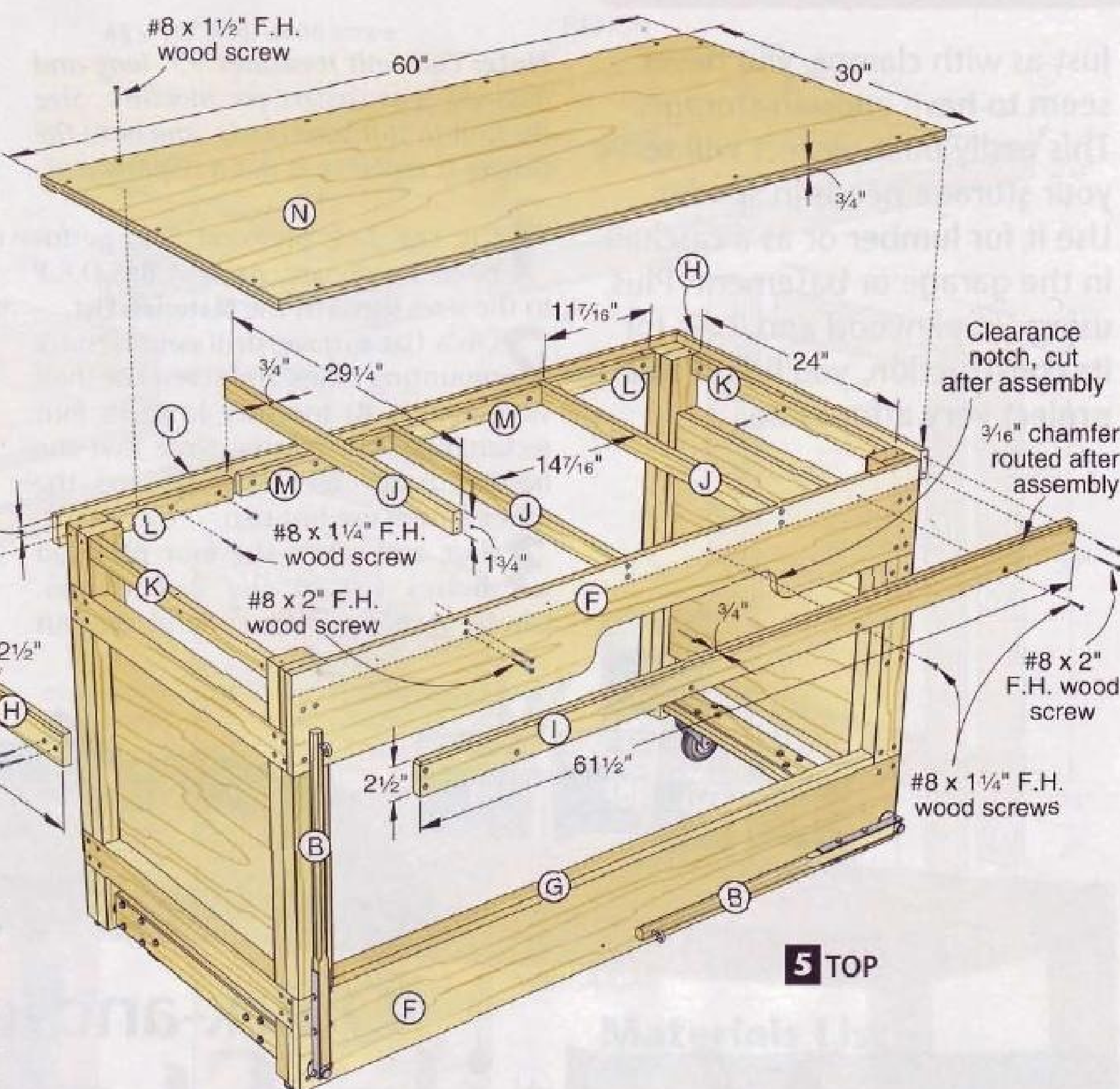
Apply finish and hardware

1 Inspect the bench, and finish-sand, where needed. Ease any sharp edges with a sanding block. Apply the finish.

Cutting Diagram



woodmagazine.com



2 Tap the T-nuts into the holes in the bottoms of the legs (C), and screw in the levelers. Insert eyebolts into the lever (B) end holes, and secure them with washers and lock nuts (Drawing 4).

Using the workbench

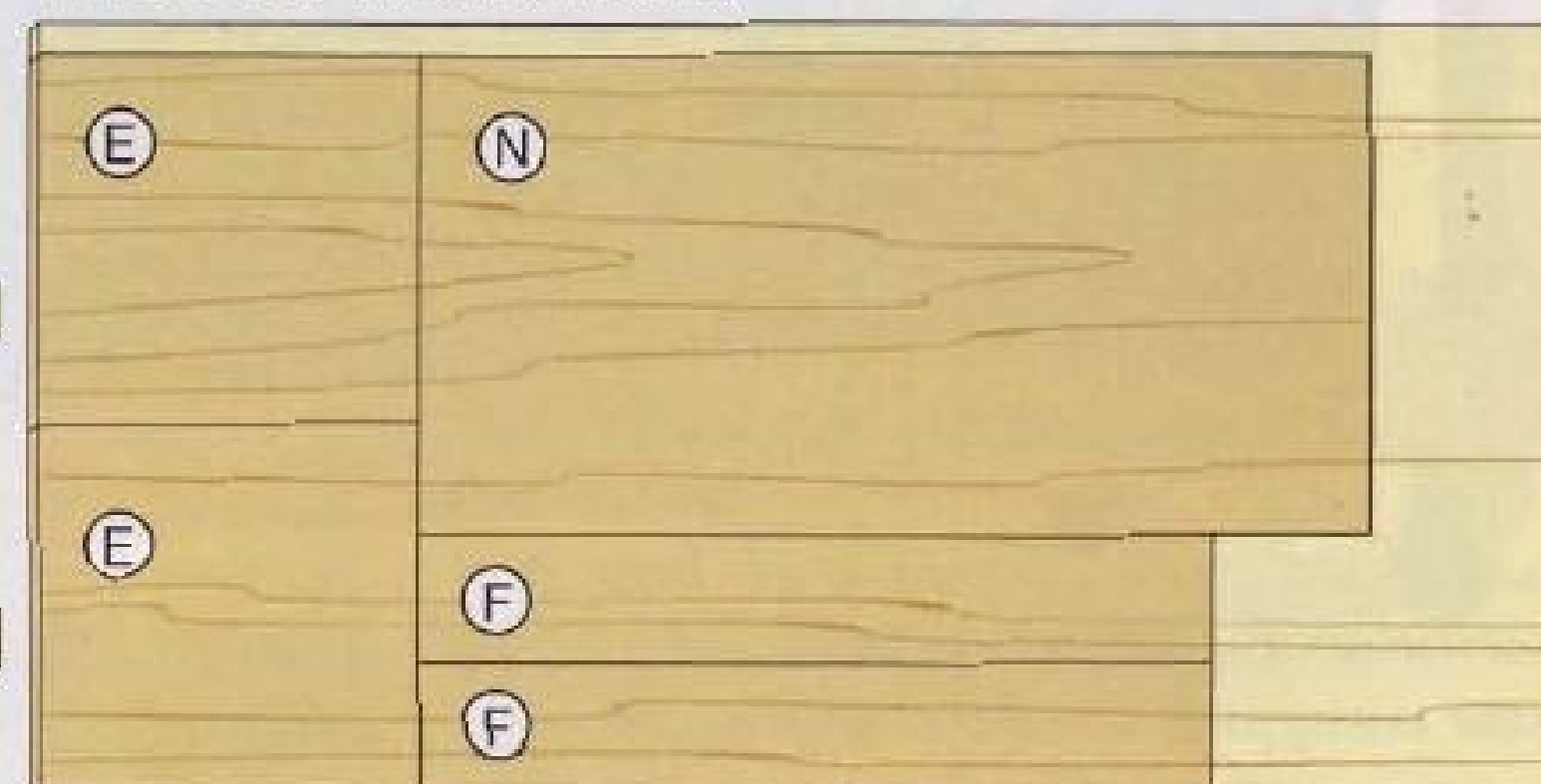
1 To use the bench as a tablesaw outfeed support, rotate the levers (B) to the vertical position (casters up), and insert the protruding ends of the eyebolts into the holes in the upper back rail (F). Adjust the levelers so the bench height matches your tablesaw height.

2 To position the bench over your tablesaw, first remove the blade guard, miter gauge, and rip fence from the tablesaw. Then, withdraw the eyebolts from the holes in the upper back rail (F). Rotate the levers (B) to the horizontal position (casters down), and insert the eyebolts into the holes in the lower back rail (F). Now, roll the bench into place, and depress the caster locks with your foot.

Written by **Jan Svec** with **Chuck Hedlund**
Project design: **Jeff Norris**, Delta, B.C.
Illustrations: **Roxanne LeMoine**; **Lorna Johnson**

$\frac{3}{4}$ x $5\frac{1}{2}$ x 96" Maple (4 bd. ft.)

$\frac{3}{4}$ x $5\frac{1}{2}$ x 96" Maple (4 bd. ft.)



$\frac{3}{4}$ x 48 x 96" Birch plywood

Just as with clamps, you never seem to have enough storage. This easily built project will serve your storage needs in spades. Use it for lumber or as a catchall in the garage or basement. Plus, using $\frac{1}{2}$ " plywood and 2x4s for its construction, you'll find this project very affordable.

Note: Our unit measures 99" long and rests on four casters for mobility. Size the unit to suit your needs, and omit the casters if mobility is not a requirement.

1 Cut the 2x4, plywood, and perforated hardboard parts A,B,C,D,E,F to the sizes listed in the **Materials List**.

2 On a flat surface, drill countersunk mounting holes, and screw the shelf supports (A, B) together to form four rectangular 2x4 frames. Note that the bottom frame uses four Bs, and the other frames use just two.

3 Glue and screw the four plywood shelves (C) to the 2x4 frames. Check each for square. Sand or rout

slight round-overs to break the sharp edges along the top edges of the $\frac{1}{2}$ " plywood shelves.

4 Glue and screw the four uprights (D) to what will be the bottom shelf assembly (A, B, C). Use a framing square to ensure squareness and plumb of the uprights to the shelf assembly.

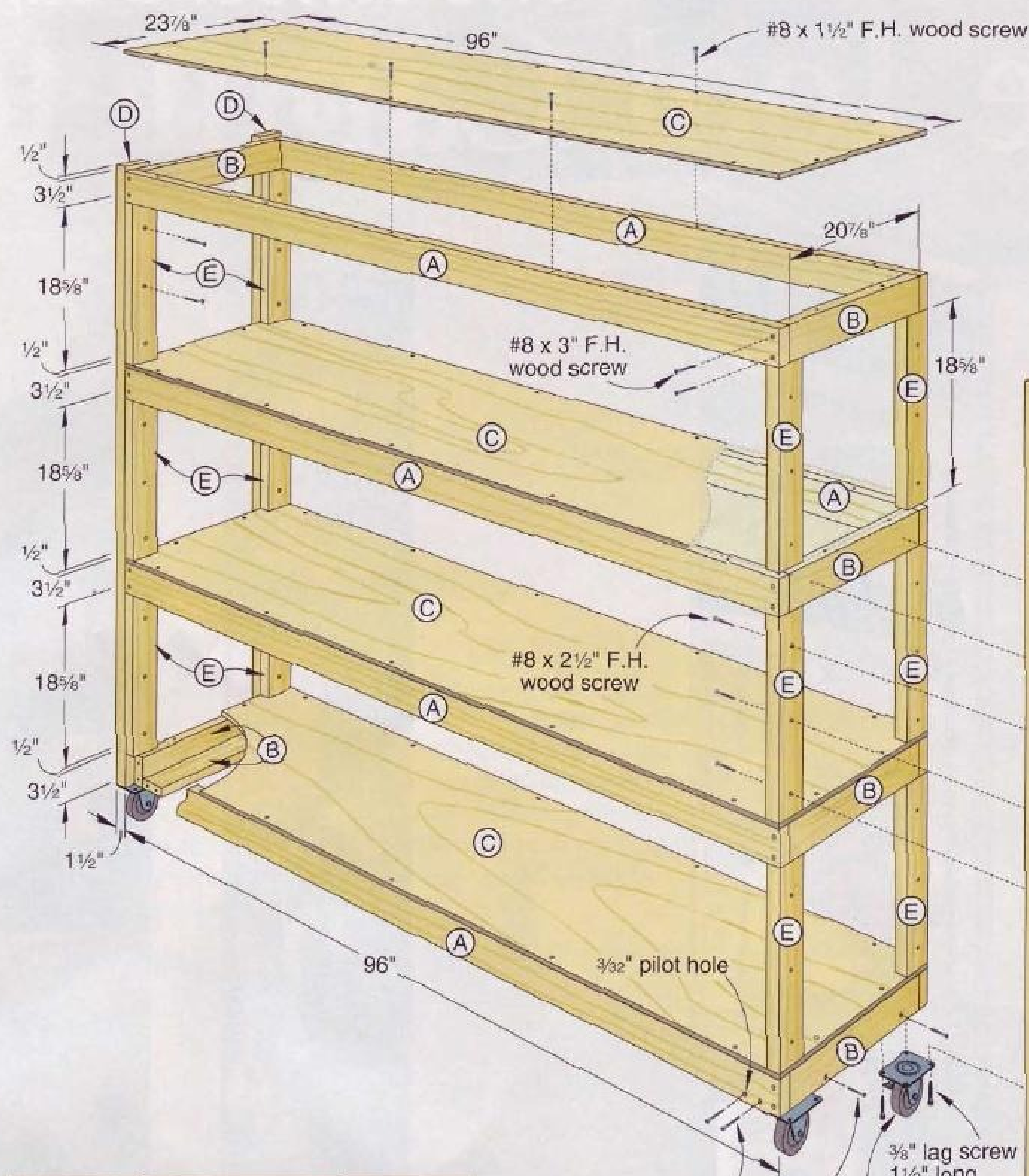
5 Screw the bottom four vertical supports (E) to the inside faces of the uprights (D).

6 Position the next shelf assembly on top of the vertical supports, as shown in **Photo A**.

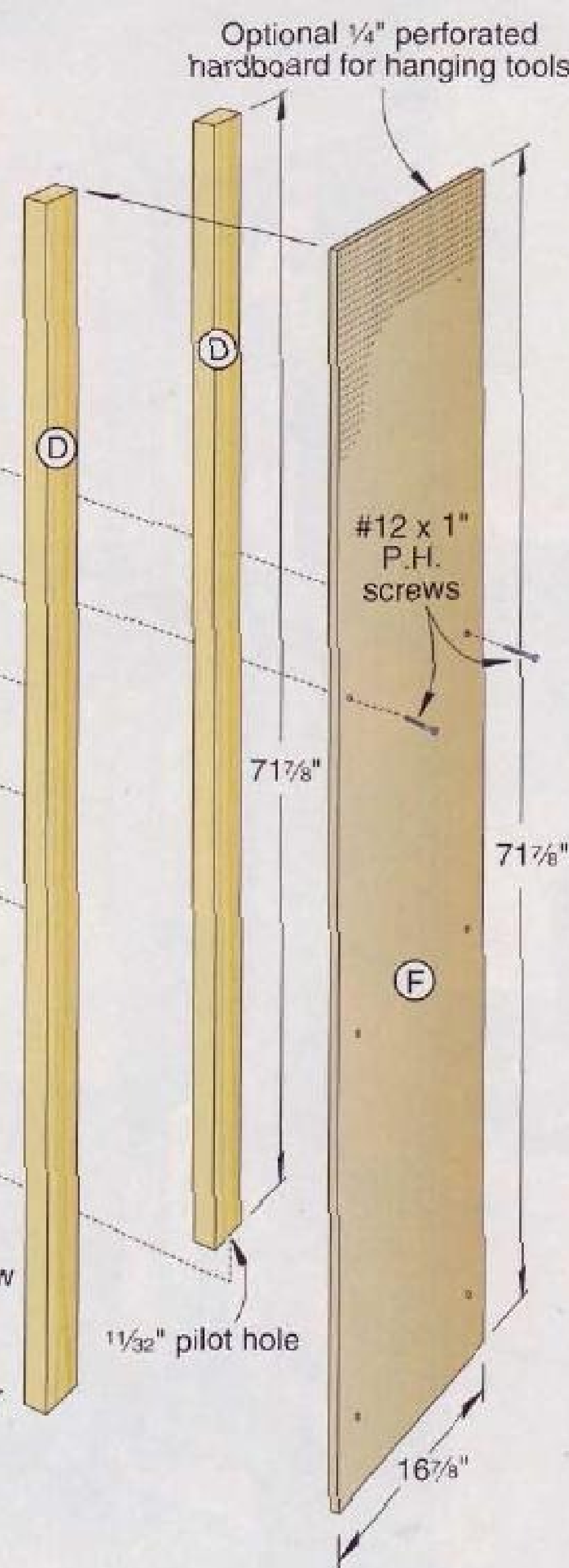
7 Repeat Steps 5 and 6 to secure all the supports and shelf assemblies to the uprights. Before screwing the top



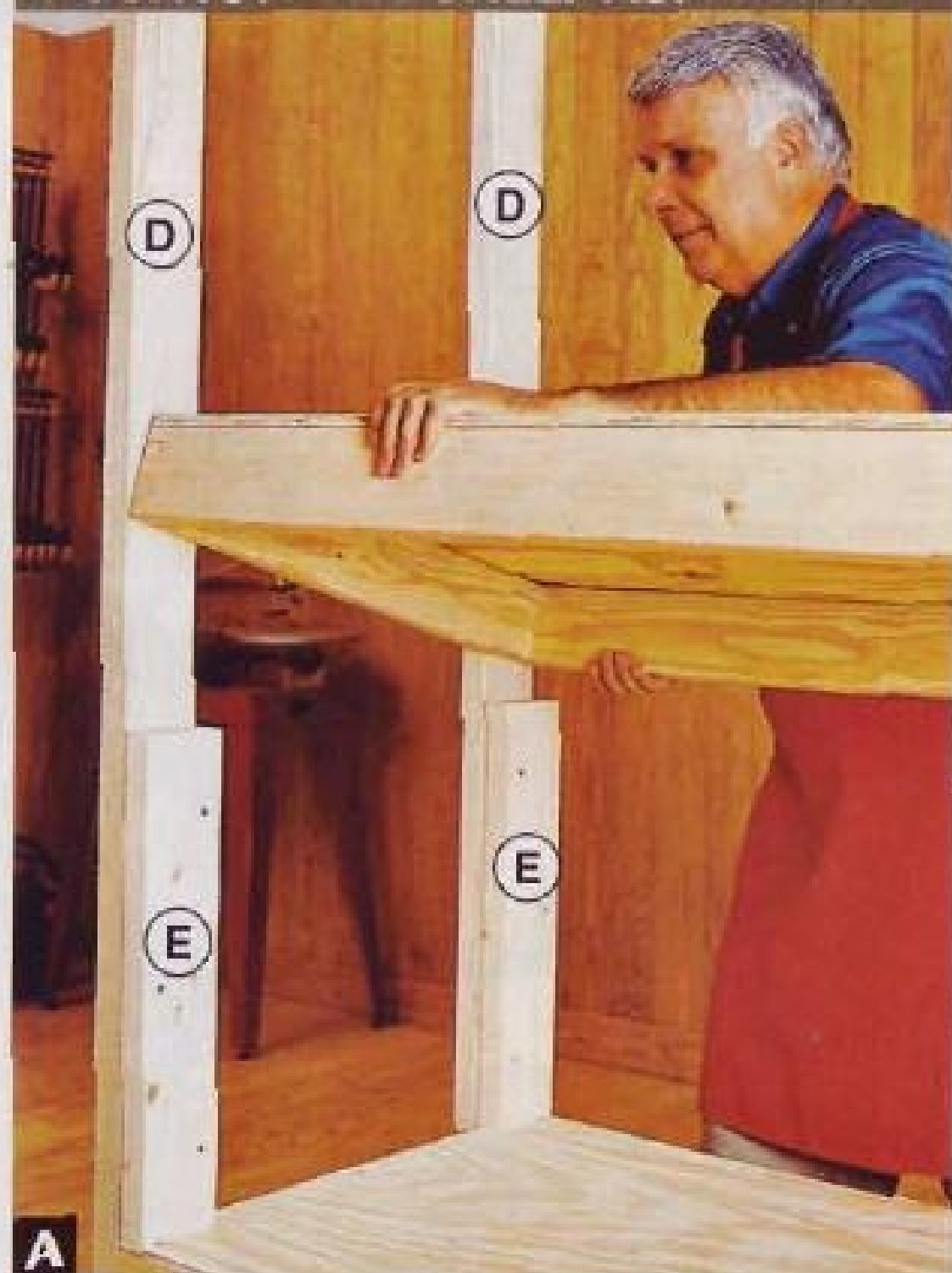
Quick-and-easy Mobile Storage



Note: Attach (E) to end supports (B) with #12 x 1" panhead screws.



POSITION THE SHELF ASSEMBLY



One level at a time, glue and screw the 2x4 vertical supports (E) into position, and add a shelf assembly. Continue the process to the top of the project.

#8 x 3" F.H. wood screw
#8 x 2 1/2" F.H. wood screw
3/8" lag screw 1 1/2" long
4" heavy-duty swivel-lock caster

four supports (E) in place, make sure the top of the top shelf sits flush with the top ends of the uprights (D). If necessary, trim the top four vertical supports.

8 Cut the perforated hardboard end panel (F) to fit between two uprights (D) for additional storage on one or both ends of the unit. Add hooks for hanging tools, accessories, or supplies.

9 Lay the unit on its side and attach 4" heavy-duty swivel-lock casters to the bottom, if desired. Paint the completed project, if desired.

Project design: **Chuck Hedlund**
Illustration: **Roxanne LeMoine; Lorna Johnson**

Materials List

Part	FINISHED SIZE			Mati.	Qty.
	T	W	L		
A horiz. front & back supports	1 1/2"	3 1/2"	96"	C	8
B end supports	1 1/2"	3 1/2"	20 7/8"	C	10
C shelves	1/2"	23 7/8"	96"	PL	4
D uprights	1 1/2"	3 1/2"	71 7/8"	C	4
E vertical supports	1 1/2"	3 1/2"	18 5/8"	C	12
F end panel	1/4"	16 7/8"	71 7/8"	PH	1

Materials key: C—choice of pine or fir 2x4, PL—plywood, PH—perforated hardboard.

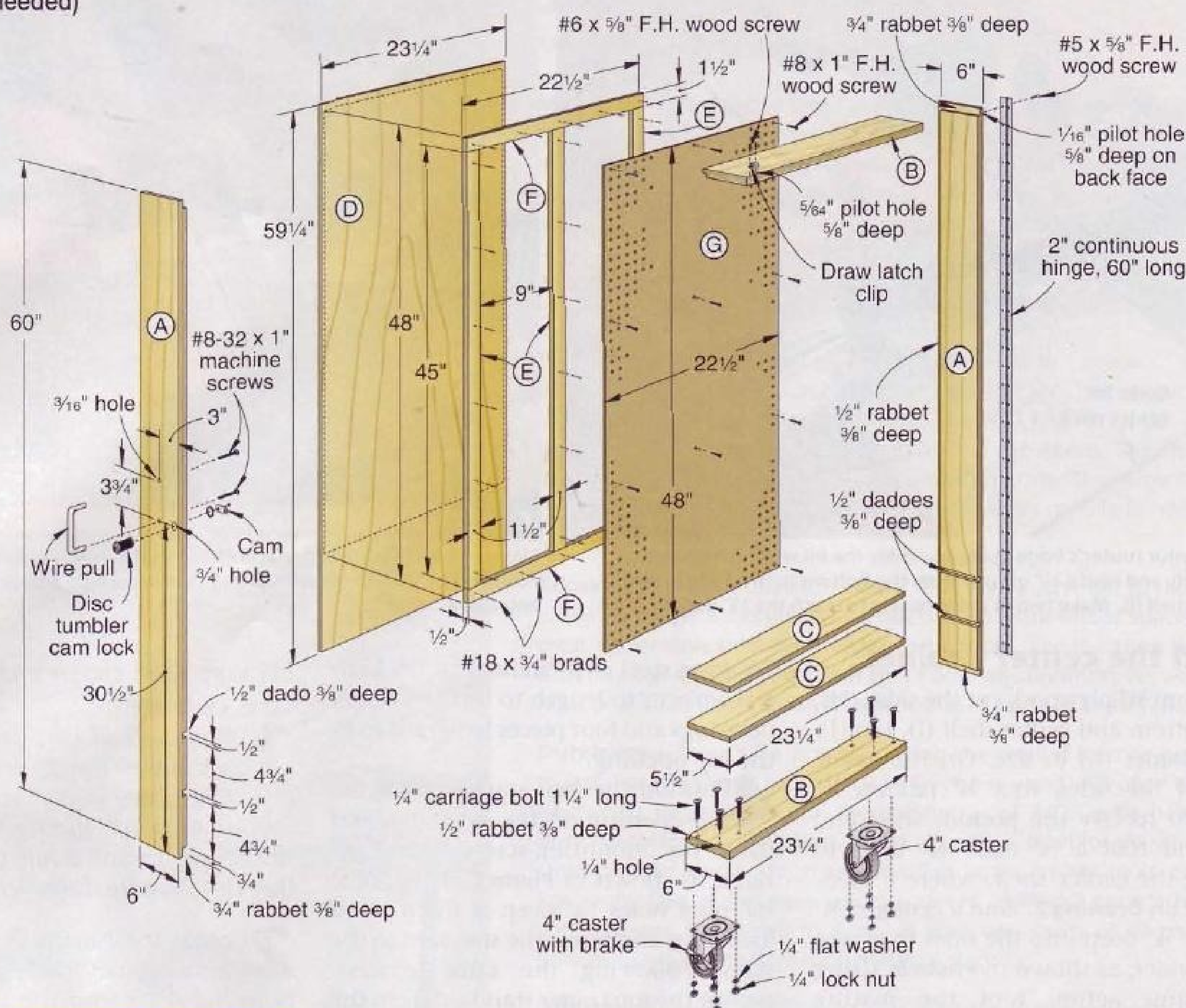
Supplies: 3/8" lag screws 1 1/2" long (16), 4" heavy-duty swivel-lock casters (4), #12x1" panhead screws, #8x3" flathead wood screws, #8x2 1/2" flathead wood screws, #8x1 1/2" flathead wood screws.

Mobile Tool Cabinet



Put your tools within easy reach by rolling this sturdy cabinet right up to your work area. When you're through, simply close and lock the doors. Then, return the cabinet to its storage spot — it occupies only 2x2' of floor space.

1 DOOR EXPLODED VIEW (2 doors needed)



Note: For a natural-wood look and void-free edges, we used Baltic birch plywood for our cabinet, and applied a clear finish. But, as a less expensive alternative, you also can use type AC or BC plywood, particularly if you plan to paint the cabinet.

Start with the doors

1 From $\frac{3}{4}$ " plywood, cut the door sides (A) and tops and bottoms (B) to the sizes listed in the **Materials List**. From $\frac{1}{2}$ " plywood, cut the shelves (C) to size.

2 On the inside face of the side pieces, rout $\frac{1}{2}$ " dados $\frac{3}{8}$ " deep to receive the shelves, where dimensioned on **Drawing 1**. Then, rout $\frac{3}{4}$ " rabbets $\frac{3}{8}$ " deep across the ends of the sides to accept the tops and bottoms. Now, rout a $\frac{1}{2}$ " rabbit $\frac{3}{8}$ " deep along the back edge of the sides, tops, and bottoms to receive the back (D).

Note: To rout the $\frac{1}{2}$ " and $\frac{3}{4}$ " rabbets and dados in this project, we used $\frac{3}{8}$ " and $\frac{1}{2}$ " straight bits, respectively, making two passes to size the joints exactly to fit the mating plywood parts.

3 Glue and assemble a door's sides, top, bottom, and shelves, as shown in **Photo A**, using squaring braces to keep the assembly square. With the glue dry, sand the door frame's surfaces and edges to 220 grit. Repeat to assemble the other door frame.

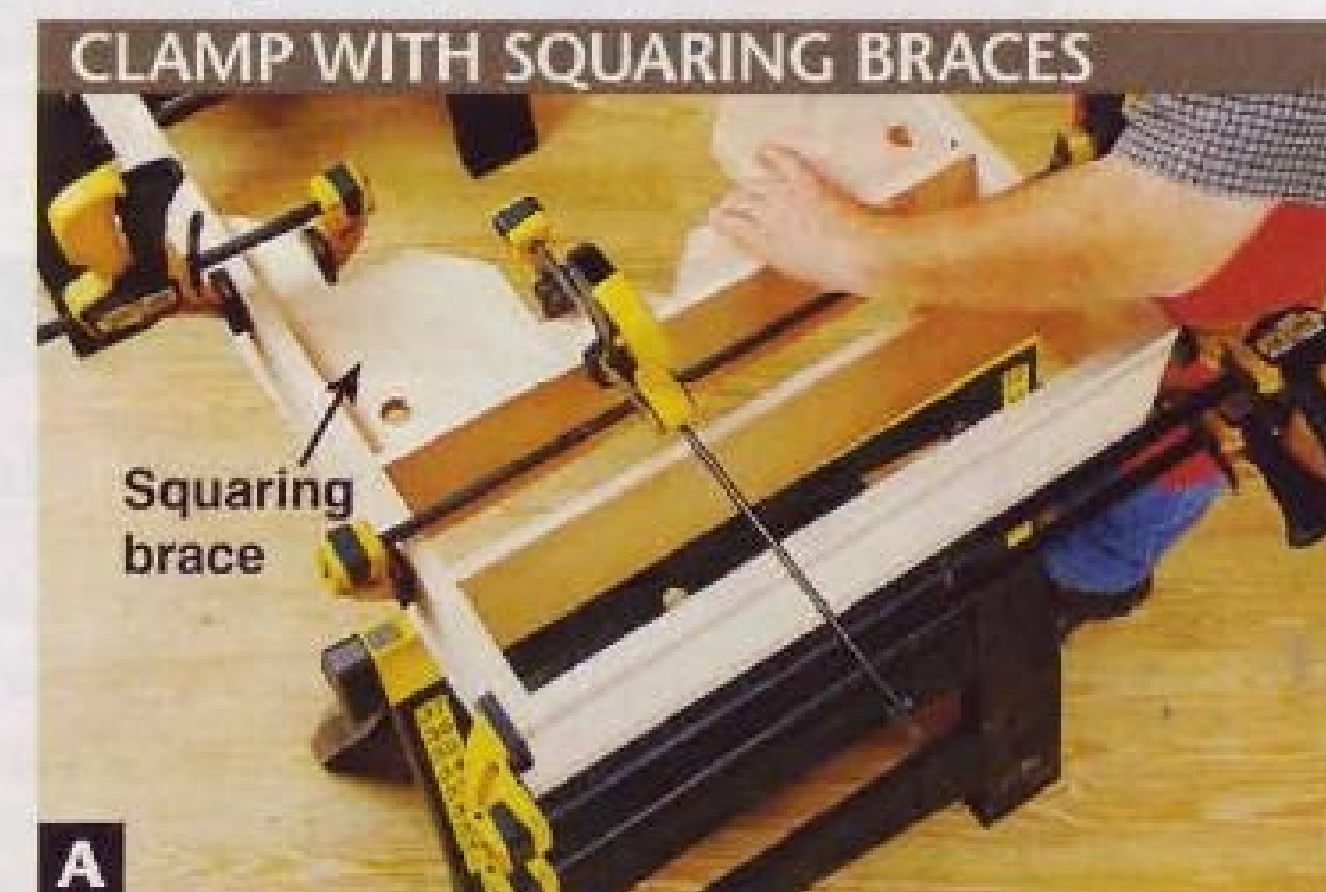
4 From $\frac{1}{2}$ " plywood, cut the backs (D) to size. Sand them to 220 grit, and remove the dust. Glue a back in the rabbeted opening in each door frame, and clamp it securely all around the frame.

5 From $\frac{1}{2}$ " plywood, cut the vertical spacers (E) and horizontal spacers (F) to size. Then, glue and nail the spacers inside each door to the back (D), where shown on **Drawing 1**.

Note: Because actual plywood thicknesses vary from their nominal dimensions, measure all inside dimensions of the tool cabinet. Cut the spacers, and later the upper and lower shelves (L, M) and shelf edging (N), to the necessary length for the best fit.

6 Brush or spray the inside and outside of the doors with a finish of your choice. (We brushed on three coats of Minwax satin polyurethane, sanding to 220 grit between coats.)

7 Cut the perforated hardboard panels (G) to size. Screw them to each door's spacers, where shown.



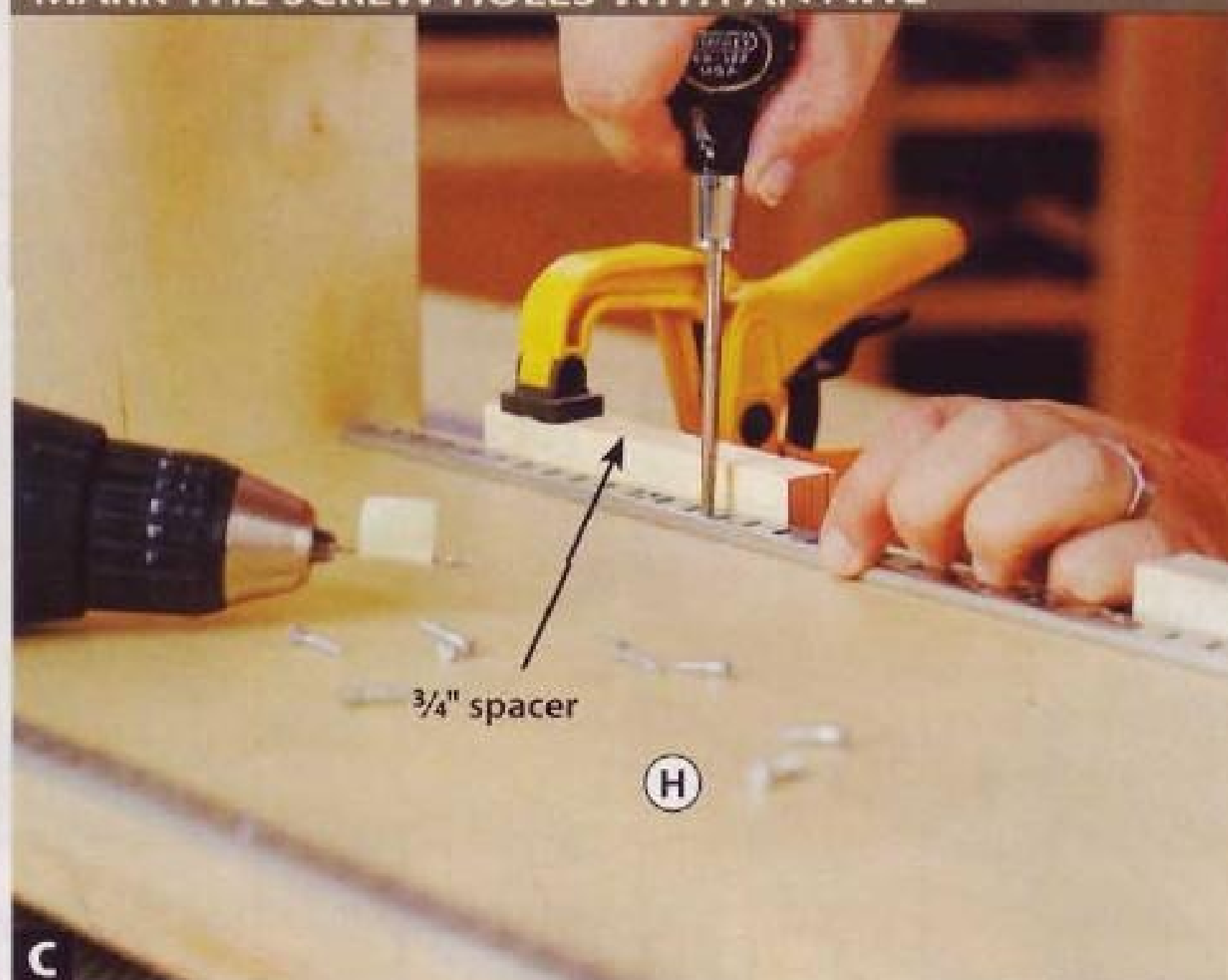
With the edges of the door-frame members flush, clamp the assembly together with squaring braces. You can make simple braces from scrap $\frac{3}{4}$ " plywood.

ROUT A GROOVE TO THE DADO



B Adjust your router's edge guide to center the bit within the width of a side (H), and rout a $\frac{3}{4}$ " groove from the bottom to the dado for the center shelf (I). Make two or more passes to reach the $\frac{3}{8}$ " depth.

MARK THE SCREW HOLES WITH AN AWL



C Clamp scrap $\frac{3}{4}$ " plywood spacers flush to the edges of each side (H). Position the shelf standard against the spacers, and mark the screw holes with an awl.

Build the center cabinet

1 From $\frac{3}{4}$ " plywood, cut the sides (H), bottom and center shelf (I), top (J), and divider (K) to size. On the inside face of the sides, rout $\frac{3}{4}$ " rabbets $\frac{3}{8}$ " deep to receive the bottom shelf and top and rout a $\frac{3}{4}$ " dado $\frac{3}{8}$ " deep to accept the center shelf, where dimensioned on **Drawing 2**. Rout a centered $\frac{3}{4}$ " groove $\frac{3}{8}$ " deep into the sides to accept the divider, as shown in **Photo B**. Using the same setup, rout the mating grooves for the divider in the bottom and center shelf.

2 Sand the parts to 220 grit, dry-assemble them, and verify they fit correctly. Then, glue and clamp the parts together, again using squaring braces to keep the assembly square. When the glue dries, apply the finish.

3 Measure the openings between the bottom and center shelf (I) and between the center shelf and top (J). (Our openings measured $28\frac{1}{2}$ " for the bottom and $29\frac{1}{4}$ " for the top.) From

30"-long steel shelf standards, hacksaw eight pieces to length to fit the bottom openings and four pieces to length to fit the top opening.

4 Position the four standards for the top opening on the sides (H), and mark the mounting-screw hole locations, as shown in **Photo C**. Then, drill $\frac{1}{16}$ " pilot holes $\frac{7}{16}$ " deep at the marked locations, and screw the standard to the sides. Following the same process, mount the four outer standards into the bottom openings. Then, mount the four inner standards to the sides, using the $\frac{3}{4}$ " spacers to position them parallel to the divider (K).

5 Position 4" casters on the bottoms (B, I), where dimensioned on **Drawing 3**. Mark the centers of the casters' mounting-bolt holes, and drill $\frac{1}{4}$ " holes through the bottoms at the marked locations. Bolt the casters to the bottoms, as shown, making sure to locate the casters with brakes where shown.

Hinge the doors to the cabinet

1 Using a hacksaw, cut two 2×72 " continuous hinges to a length of 60". Align the doors and the center cabinet on a flat surface with the back side facing up, and clamp them together. (See the **Shop Tip**, below left.)

2 Center the hinges along the door/center-cabinet joints. Drill $\frac{1}{16}$ " pilot holes $\frac{5}{8}$ " deep into the centers of the hinge screw holes, and drive the screws. Now, set the tool cabinet upright on the casters.

Add the shelves

1 From $\frac{3}{4}$ " plywood, cut the upper shelves (L), lower shelves (M), and edging (N) to size. (Again, it's a good idea to measure the inside width of the cabinet, both between the sides (H) for the edging and the shelf standards for the shelving, and cut the parts to the exact length for a snug fit.)

2 Glue and clamp the edging to the upper and lower shelves, where shown on **Drawings 2** and **4**. Center the edging so it overhangs the shelves by $\frac{1}{8}$ " at each end. When the glue has dried, sand the shelves to 220 grit, trim to length, and apply the finish. With the finish dry, clip the shelf supports in the standards at the desired locations, and install the shelves on the supports.

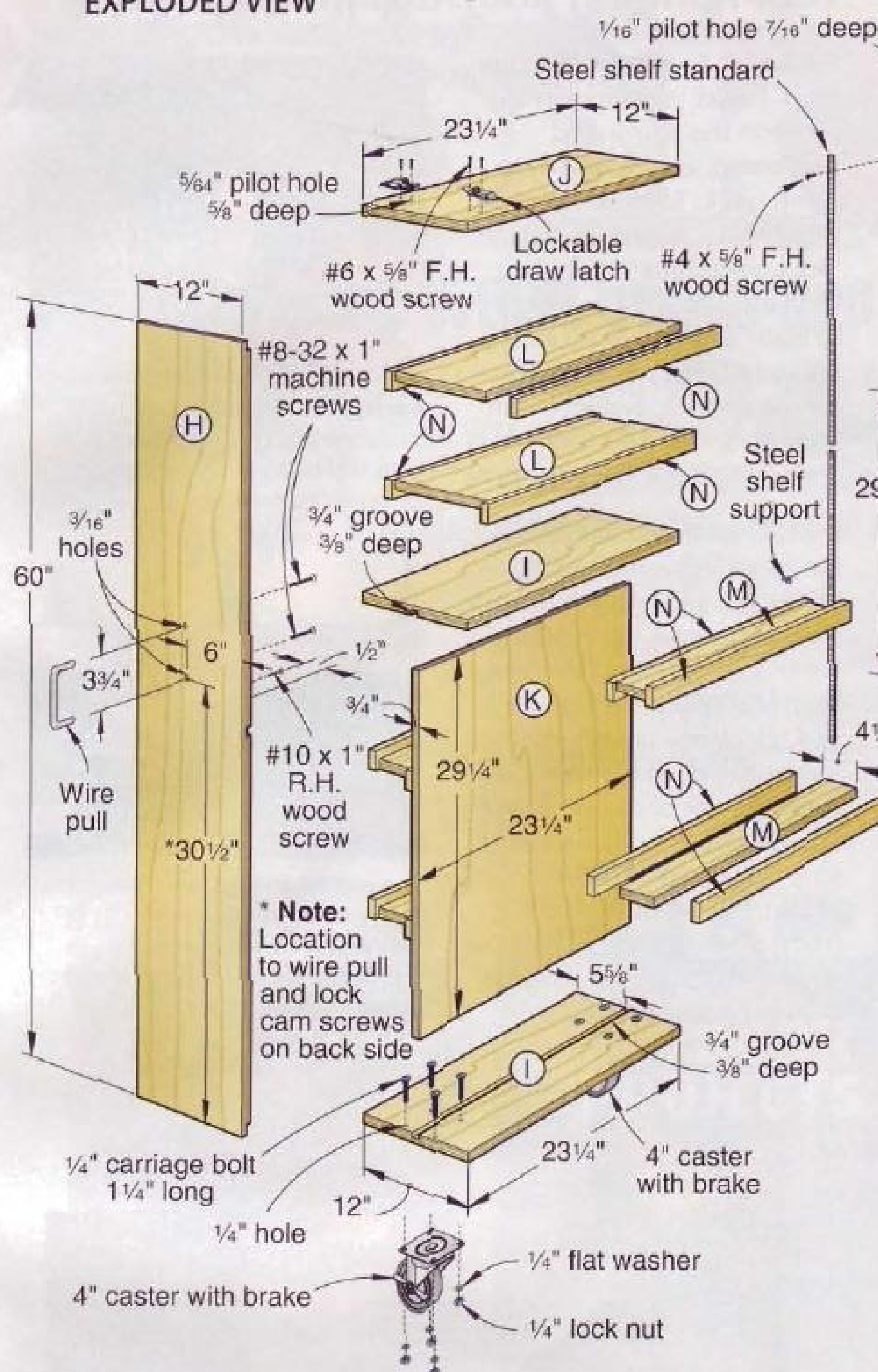
SHOP TIP

How to install continuous hinges

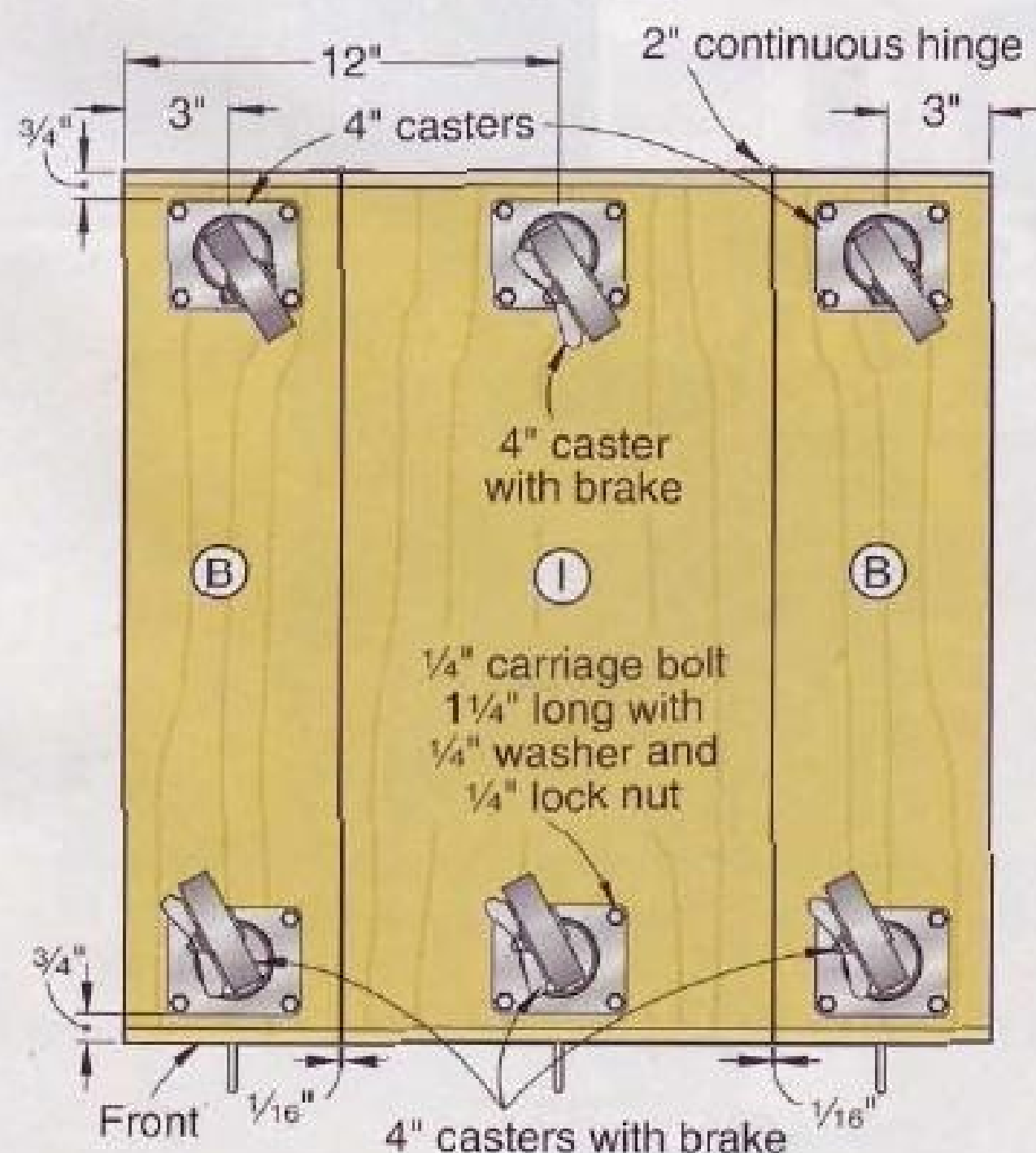
When attaching doors with continuous hinges, such as for the tool cabinet, leave a $\frac{1}{16}$ " gap between the members to be hinged. The gap will prevent potential hinge binding due to wood movement, which could keep the parts from closing together tightly. To establish the gap, place $\frac{1}{16}$ "-thick wood spacers between the parts as needed, and then clamp the parts together.



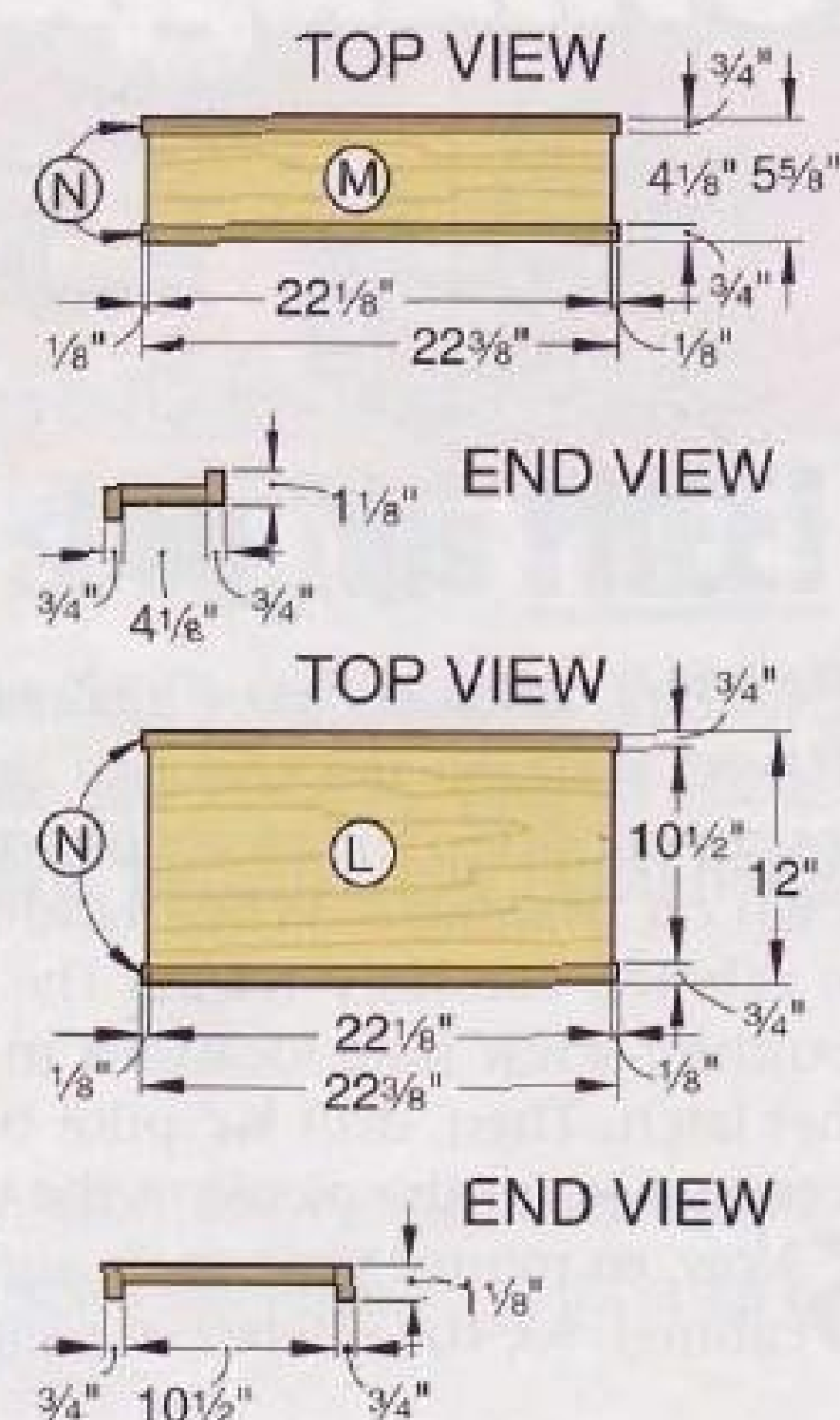
2 CENTER CABINET EXPLODED VIEW



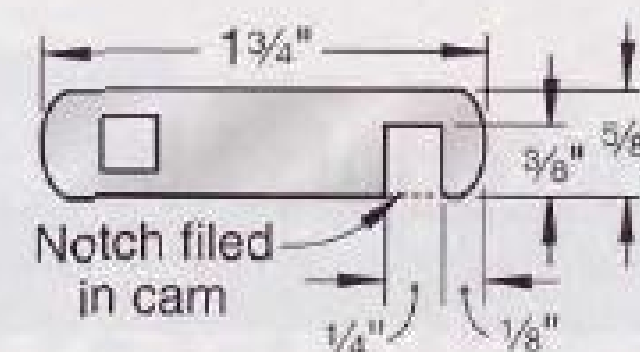
3 CASTER PLACEMENT (Viewed from the bottom)



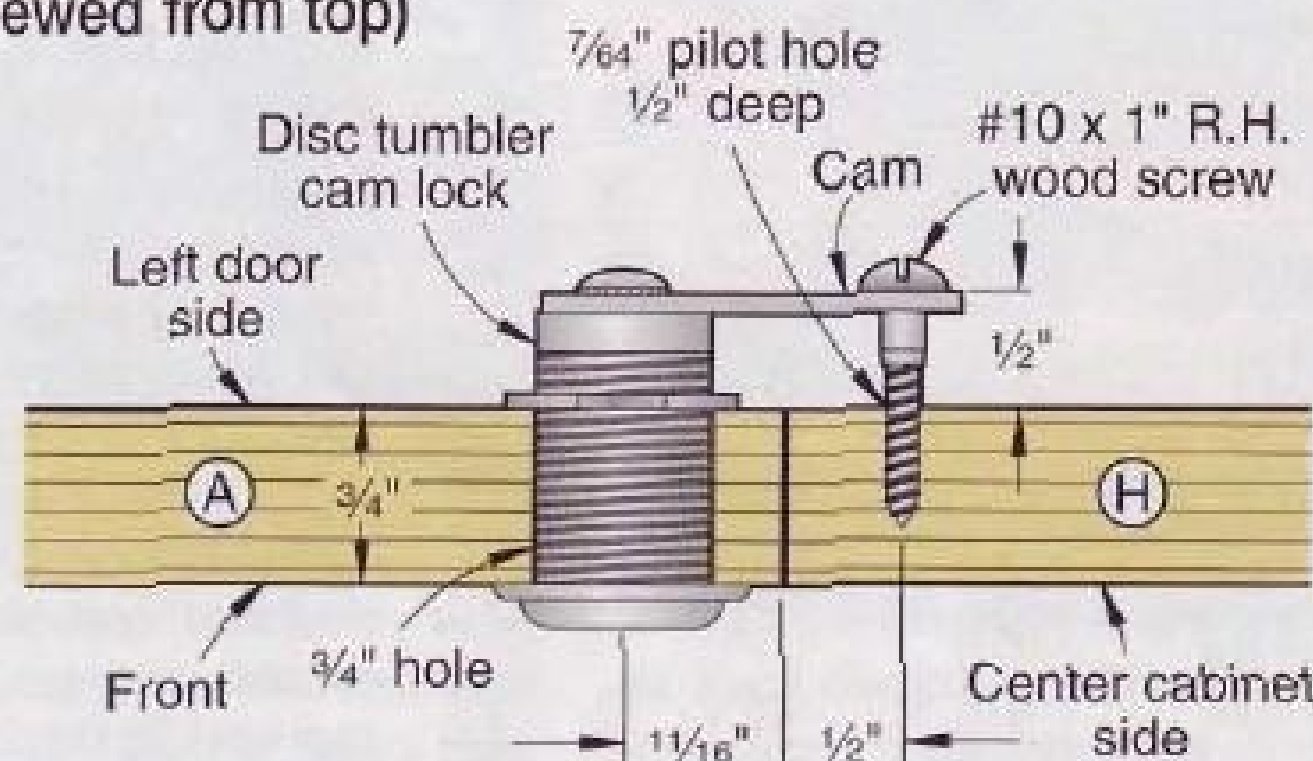
4 SHELVING DETAIL



5a CAM DETAIL



5 LOCK INSTALLATION (Viewed from top)



Install the locks and handles

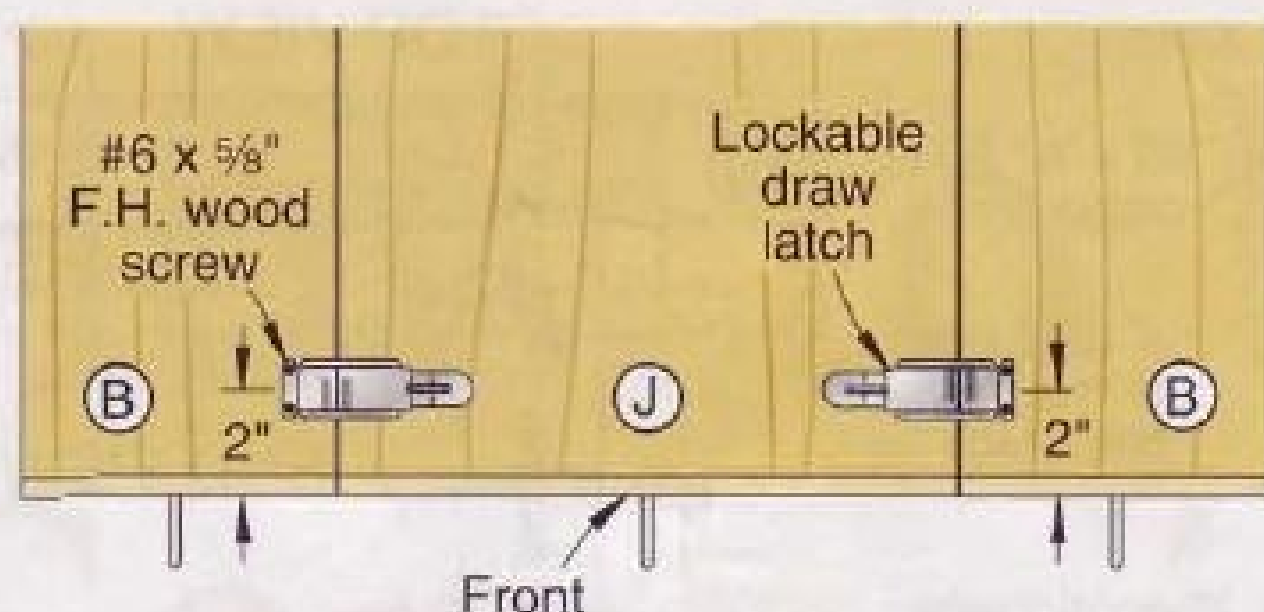
1 On the front of each door, mark the centerpoint for a 3/4" hole to receive a disc tumbler cam lock, where dimensioned on **Drawings 1 and 5**. (Note that the two lock installations are mirror images of one another.)

2 Using a 3/4" Forstner bit, and a backer board to prevent tear-out, drill the lock holes through the doors. Remove the screw attaching the cam to the back of each lock, and then remove the cam. Install the locks in the holes as directed in the manufacturer's instructions. File a notch in each cam where dimensioned on **Drawing 5a**. Then, screw the cams to the locks.

3 On the back of the center cabinet's front side (H), mark the centerpoints for #10x1" roundhead wood screws that engage with the locks' cams, where dimensioned on **Drawings 2 and 5**. Drill 7/64" pilot holes 1/2" deep at the centerpoints. Then, drive in the #10x1" roundhead wood screws to the depth shown.

4 On the front of the doors and center cabinet, mark the screw-hole locations for attaching the wire pulls, where shown on **Drawings 1 and 2**. Drill 3/16" holes at the marked locations, and mount the pulls using the supplied screws.

6 DRAW LATCH INSTALLATION



5 Clamp the doors snug against the center cabinet at the front. Engage the lockable draw latches in the mating clips, and position the pieces on top of the tool cabinet, where shown on **Drawing 6**. While holding a latch and clip against the cabinet, carefully release the latch lever, and mark the mounting-screw hole locations in each piece. Repeat for the other latch. Then, drill $\frac{5}{64}$ " pilot holes $\frac{5}{8}$ " deep at the marked spots, and screw the pieces to the top.

6 Now, to mount your tools and organize hardware in the cabinet, see the sidebar, at *right*, for ideas. 🌳

Written by **Owen Duvall**
Project design: **Burdette Heikens**,
Carefree, Arizona, with **Jeff Mertz**
Illustrations: **Lorna Johnson**

Materials List

FINISHED SIZE					
Doors	T	WL	Matl.	Qty.	
A sides	$\frac{3}{4}$ "	6"60"	BB	4	
B tops and bottoms	$\frac{3}{4}$ "	6"23 $\frac{1}{4}$ "	BB	4	
C shelves	$\frac{1}{2}$ "	5 $\frac{1}{2}$ "	23 $\frac{1}{4}$ "	BB	4
D backs	$\frac{1}{2}$ "	23 $\frac{1}{4}$ "	59 $\frac{1}{4}$ "	BB	2
E vertical spacers	$\frac{1}{2}$ "	1 $\frac{1}{2}$ "	45"	BB	6
F horizontal spacers	$\frac{1}{2}$ "	1 $\frac{1}{2}$ "	22 $\frac{1}{2}$ "	BB	4
G perforated panels	$\frac{1}{4}$ "	22 $\frac{1}{2}$ "	48"	PH	2
Center cabinet					
H sides	$\frac{3}{4}$ "	12"	60"	BB	2
I bottom and center shelf	$\frac{3}{4}$ "	12"	23 $\frac{1}{4}$ "	BB	2
J top	$\frac{3}{4}$ "	12"	23 $\frac{1}{4}$ "	BB	1
K divider	$\frac{3}{4}$ "	23 $\frac{1}{4}$ "	29 $\frac{1}{4}$ "	BB	1
L upper shelves	$\frac{3}{4}$ "	10 $\frac{1}{2}$ "	22 $\frac{1}{4}$ "	BB	2
M lower shelves	$\frac{3}{4}$ "	4 $\frac{1}{8}$ "	22 $\frac{1}{4}$ "	BB	4
N edging	$\frac{3}{4}$ "	1 $\frac{1}{8}$ "	22 $\frac{3}{8}$ "	BB	12

Materials key: BB—Baltic birch plywood, PH—perforated hardboard.

Supplies: #18x $\frac{3}{4}$ " brads; #4x $\frac{3}{8}$ ", #5x $\frac{5}{8}$ ", and #8x1" flathead wood screws; $\frac{1}{4}$ " carriage bolts 1 $\frac{1}{4}$ " long (24); $\frac{1}{4}$ " flat washers (24); $\frac{1}{4}$ " lock nuts (24); 4" casters with brake (4); 4" casters without brakes (2); steel shelf standards 30" long (12); steel shelf supports (24); 2x72" continuous hinges (2); disc tumbler cam locks (2); #10x1" roundhead wood screws (2); 3 $\frac{3}{4}$ " (96mm) wire pulls with #8-32x1" machine screws (3); lockable draw latches (2) with #6x $\frac{5}{8}$ " flathead wood screws.

Blades and bits: $\frac{1}{4}$ " and $\frac{1}{2}$ " straight router bits, $\frac{3}{4}$ " Forstner bit.

Tool-hanging and storage-bin options

■ **Hooks.** To ensure that your tools' hooks stay securely in place on the perforated hardboard, use locking-type nylon hooks for rock-solid attachment, as shown at *right*. The hooks come in a variety of shapes, so you can mount virtually any tool or accessory. We used Talon perfboard hooks for our project, available from McFeely's. Call 800-443-7937, or go to mcfeelys.com.

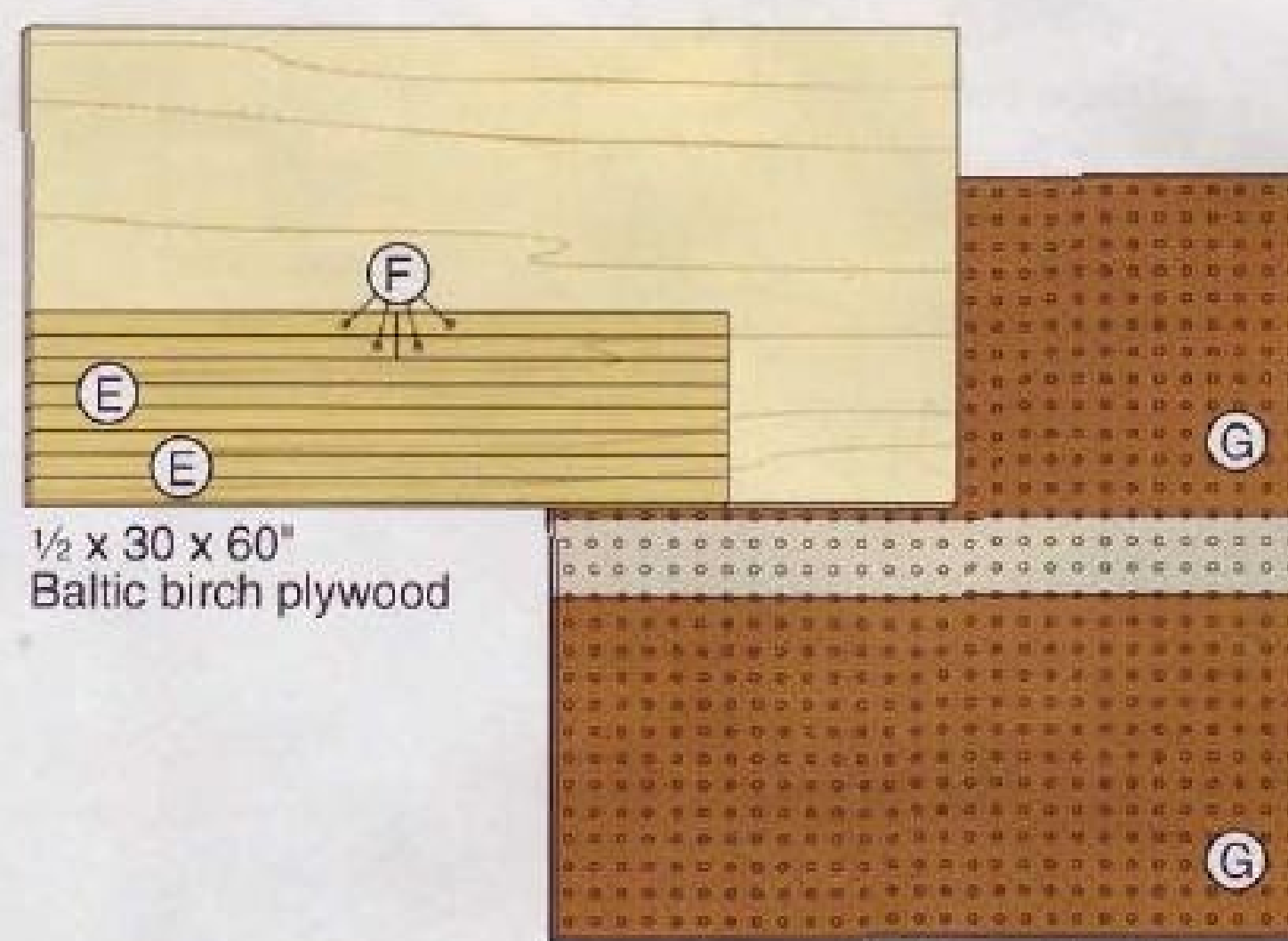
■ **Storage Bins.** To keep bulk hardware items organized, identified, and easily accessible, it's hard to beat storage bins. We placed bins, also available from McFeely's (Web address and telephone *above*), on the lower shelves of the doors, as shown in the photo on *page 84*. The bins hook onto a support strip, as shown at *right*. Packs of six bins, no. BINS-6000R (red), BINS-6000Y (yellow), or BINS-6000G (green), include the support strip.



Each locking hook has a dual-purpose pin that you push in to lock the hook in place and unscrew to remove it.



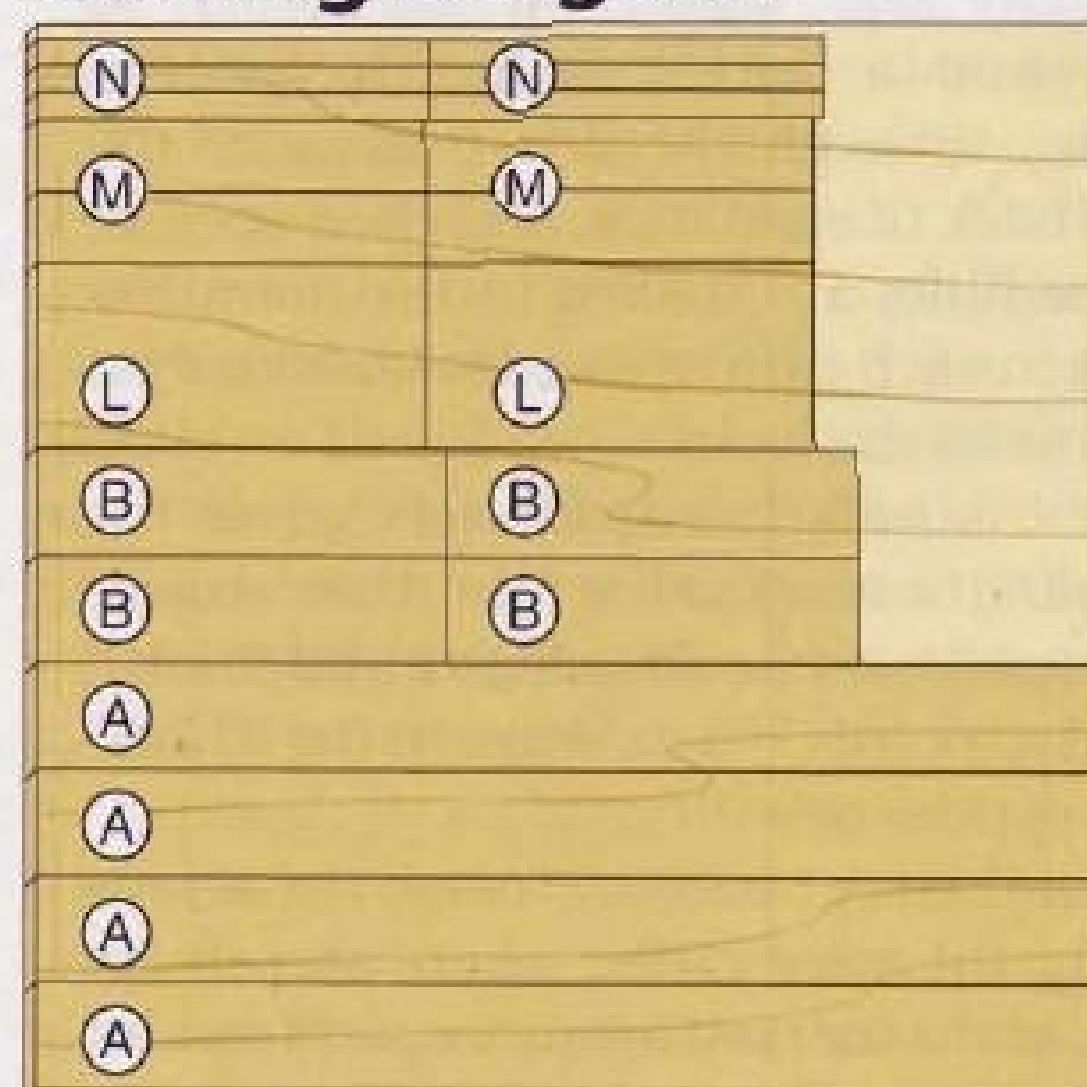
The support strip, which mounts to the cabinet back with #8x $\frac{3}{8}$ " panhead screws, keeps the bins from sliding around when moving the cabinet.



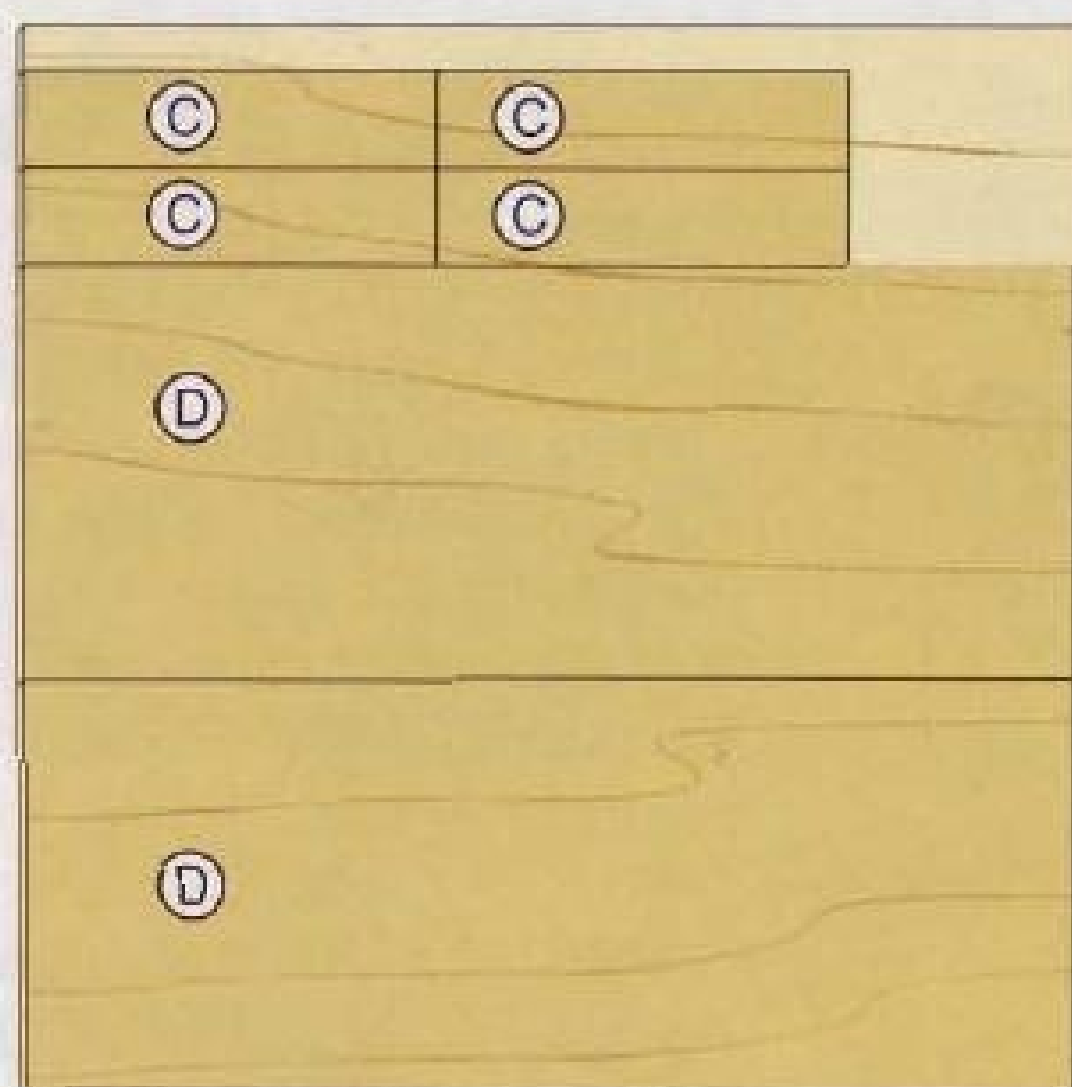
$\frac{1}{2}$ x 30 x 60" Baltic birch plywood

$\frac{1}{4}$ x 48 x 48" Perforated hardboard

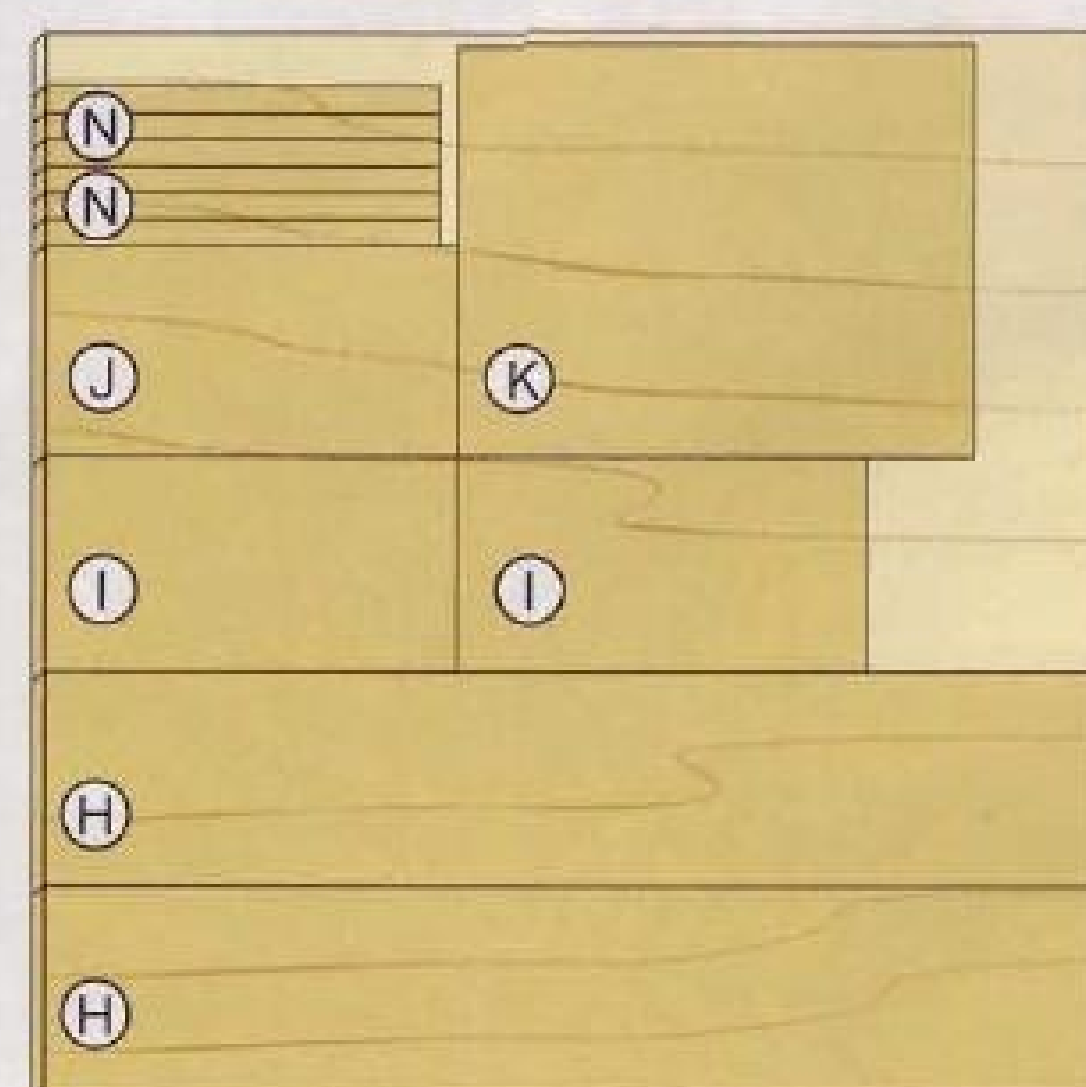
Cutting Diagram



$\frac{3}{4}$ x 60 x 60" Baltic birch plywood



$\frac{1}{2}$ x 60 x 60" Baltic birch plywood



$\frac{3}{4}$ x 60 x 60" Baltic birch plywood

Best-Ever Plans for Workshop Tools & Accessories

from the editors of **WOOD**® magazine

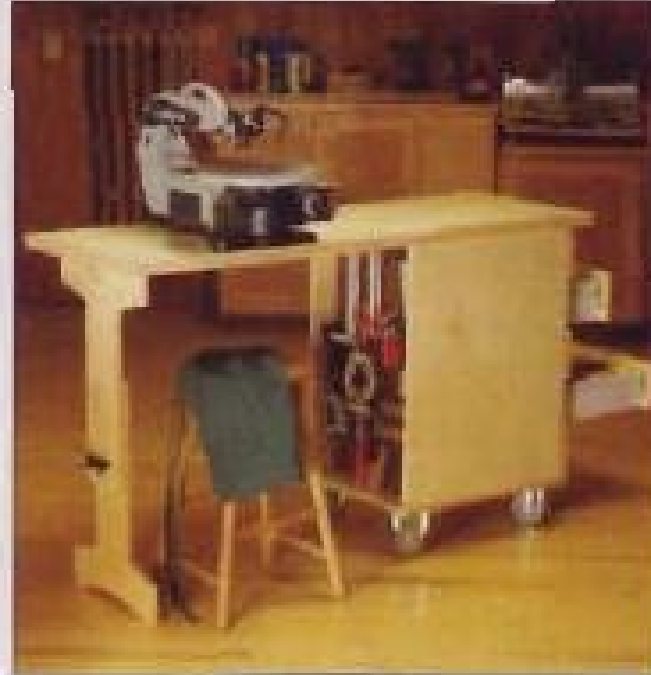
1,000+
woodworking plans at
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Benchtop Router Table
Plan DP-00151 \$7.95



Go-Anywhere Tool Caddy
Plan DP-00426 \$6.95



Shop Cart/Workbench
Plan DP-00592a \$4.95



Traditional Workbench
Plan DP-00482 \$7.95



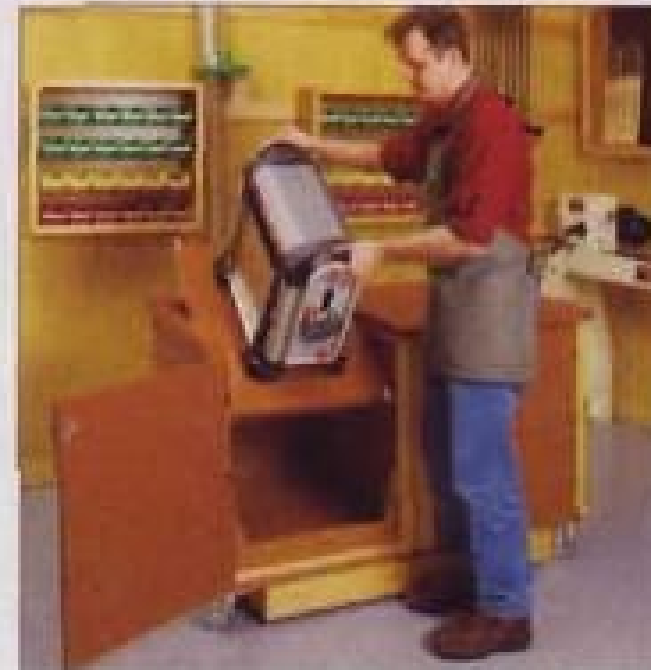
Drill-Press Table
Plan DP-00056 \$6.95



Roll-Around Tool Base
Plan DP-00061 \$6.95



Rolling Workshop Storage
Plan DP-00488a \$2.95



Flip-Top Work Center
Plan DP-00239 \$5.95



Mobile Miter Saw Center
Plan DP-00098 \$7.95



Full-Service Workbench
Plan, Part 1, DP-00058 \$8.95



Five Great Clamp Organizers
Plan DP-00230 \$6.95



Basic Workbench and 6 Ways to Beef it Up
Plan DP-00456 \$7.95



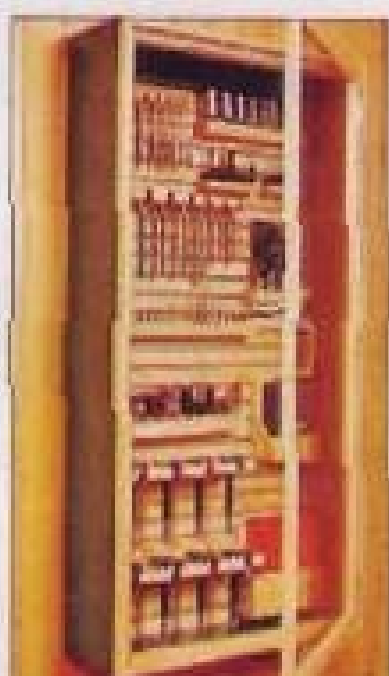
Simple 'N' Sturdy Tool Stand
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Plan DP-00271 \$8.95



Full-Service Workbench Lift-Up Router & Tool Table
Plan, Part 2, DP-00059 \$8.95



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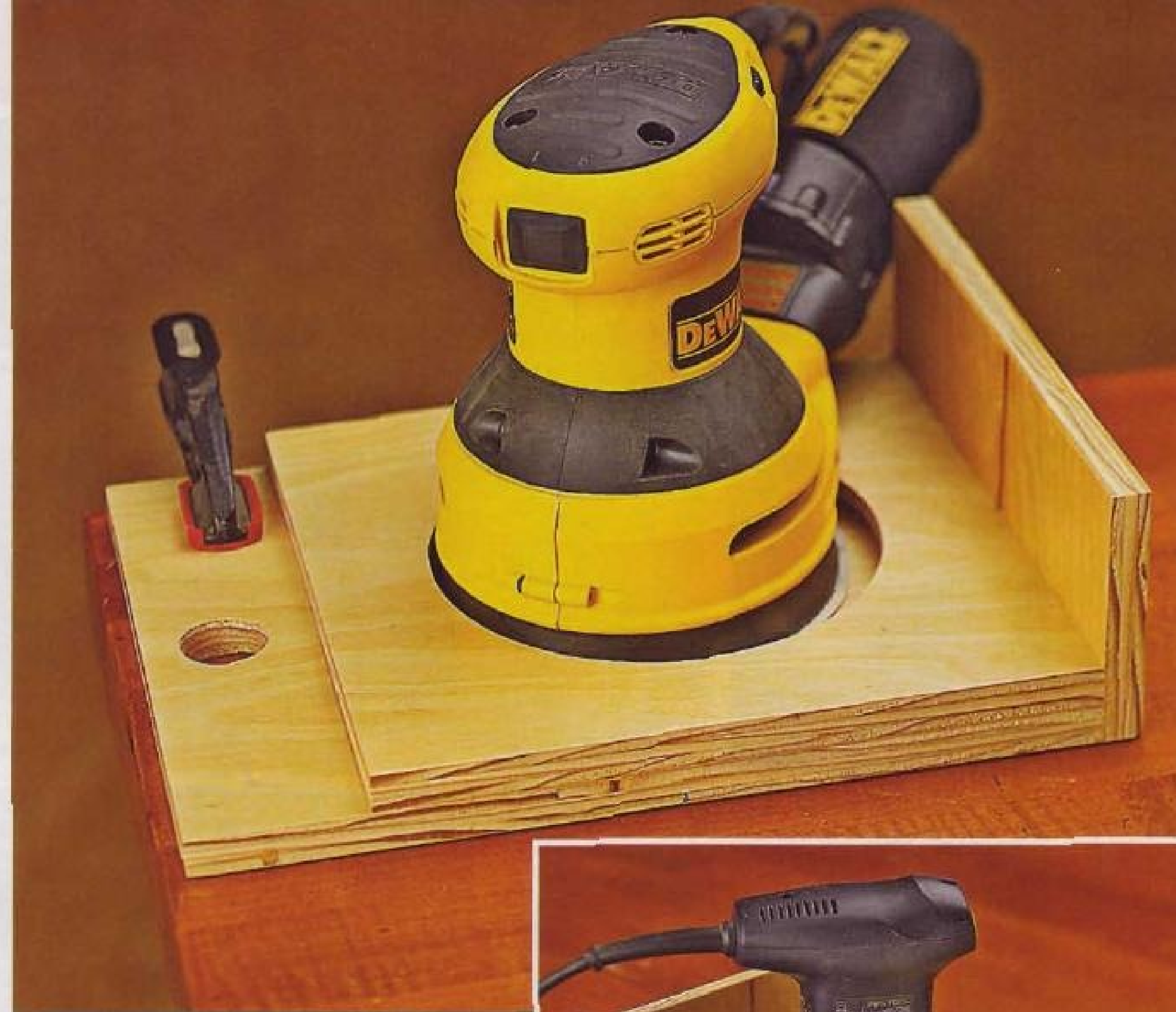
Orbital-Sander Rest

Customize the basic design to support your sander.

For Chuck Hedlund, *WOOD*® magazine's Master Craftsman, time is always of the essence. Even the precious few seconds he wastes holding a 5" random-orbital sander until its pad quits spinning add up. And even if you're not in a rush, isn't it a pain waiting for that pad to stop twirling around?

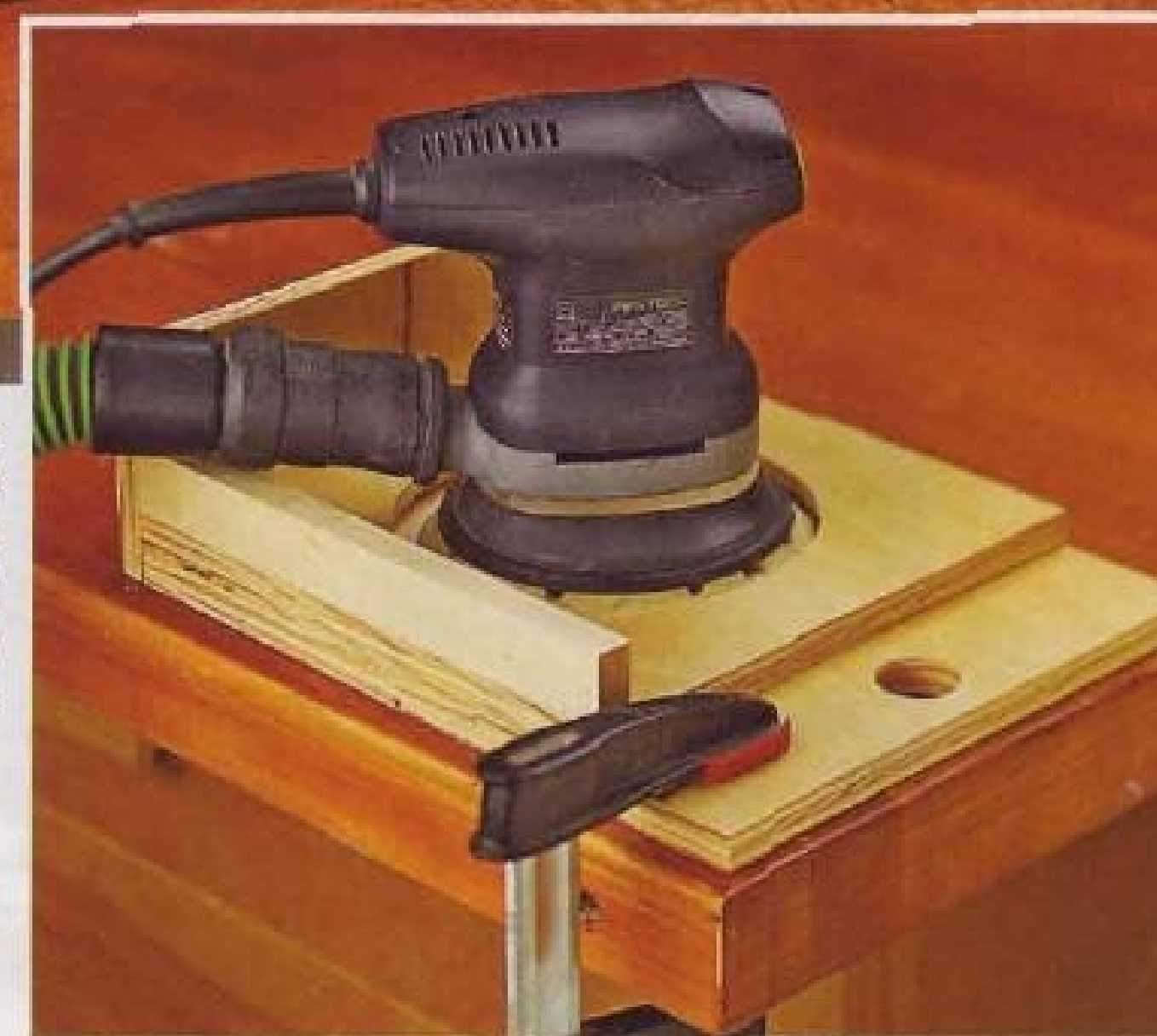
To remedy this situation, Chuck designed and built this benchtop sander rest. After turning off his sander, he immediately places it in the rest. After much testing in the *WOOD* magazine shop, Chuck chamfered the bottom edge of the hole in the top to trap the sander in the opening. Then, he added an upright to catch the sander's dust port and keep the sander from spinning. For sanders with a vacuum attachment (see smaller photo), add the optional support. This holds up the vacuum hose while keeping the sander from tipping over. Use the 1" hole in the base to hang the rest when not in use. 🌲

Project design: **Chuck Hedlund**
Illustration: **Roxanne LeMoine**

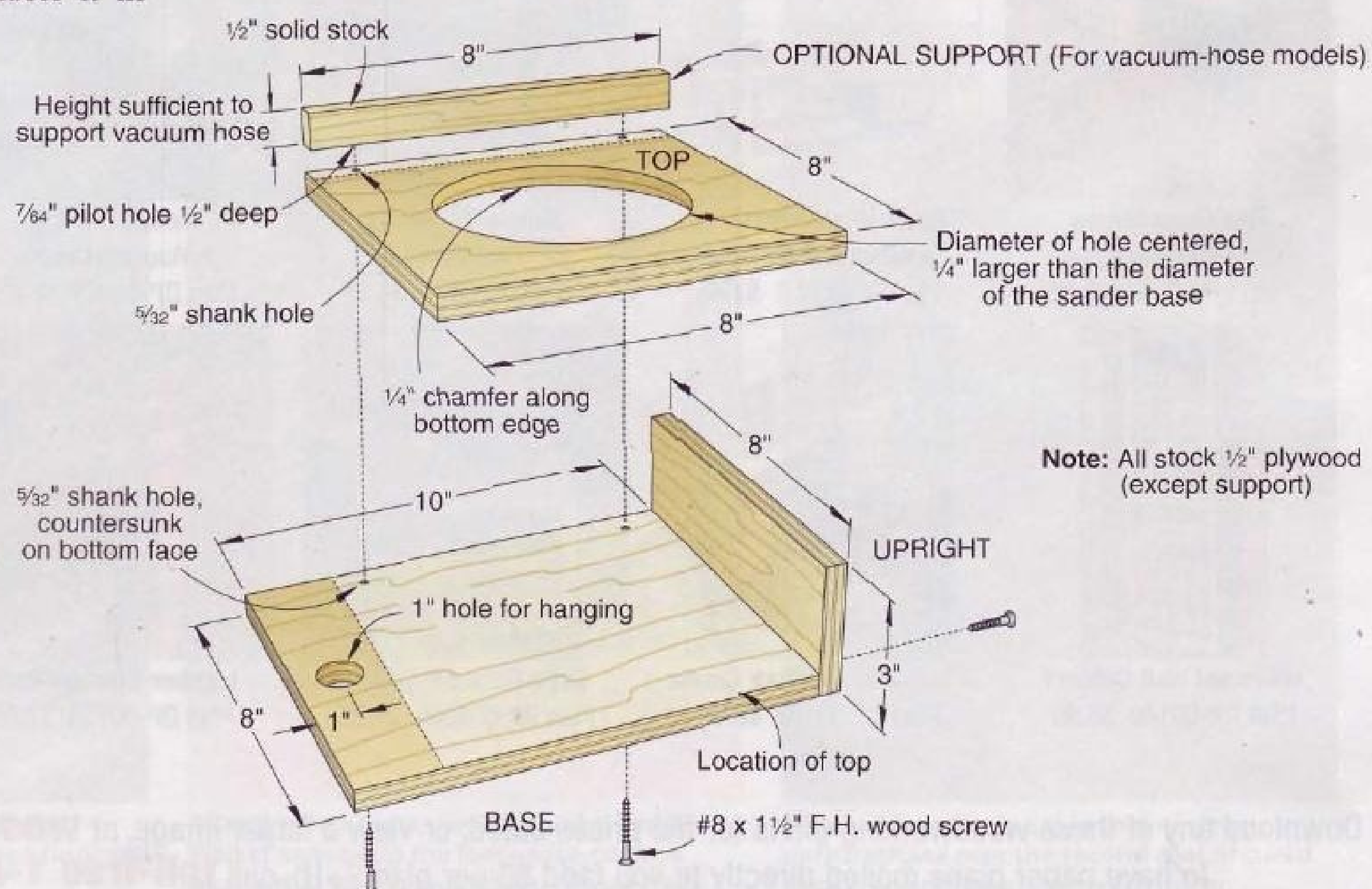


FOR SANDER WITH DUST BAG

The optional support at right works well for the vacuum hose to rest on, preventing the sander from tipping over.



FOR SANDER WITH VACUUM HOSE



Easy-Does-It Sheet Goods Mover/Lifter

Few shop chores rival the awkwardness of moving large sheet goods by yourself. And it's nigh impossible to get them up onto sawhorses without help (or the horses skittering across the floor). You'll never again have to cajole reluctant family members into helping if you use this system, designed by *WOOD*® magazine reader Jim Forney.

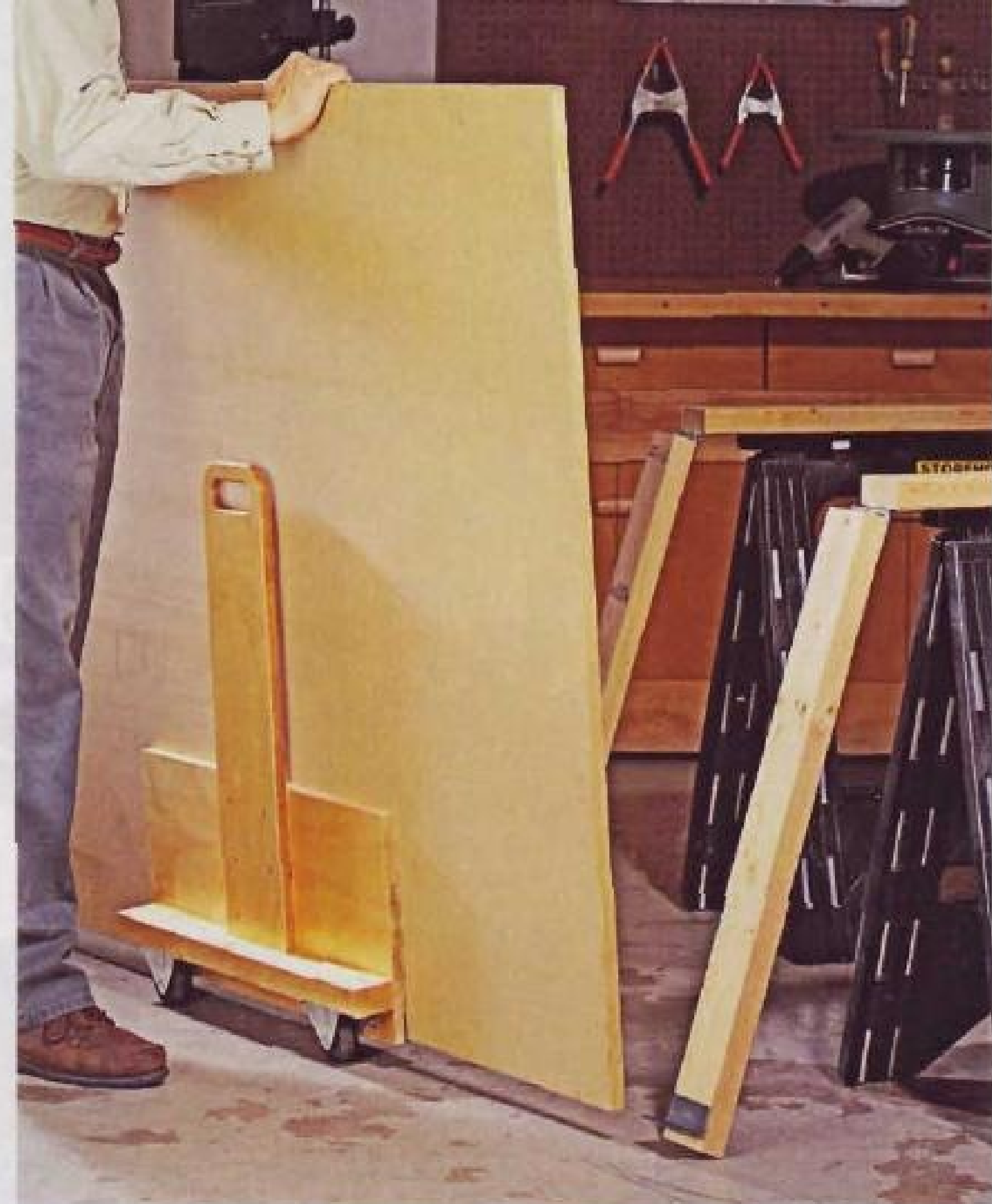
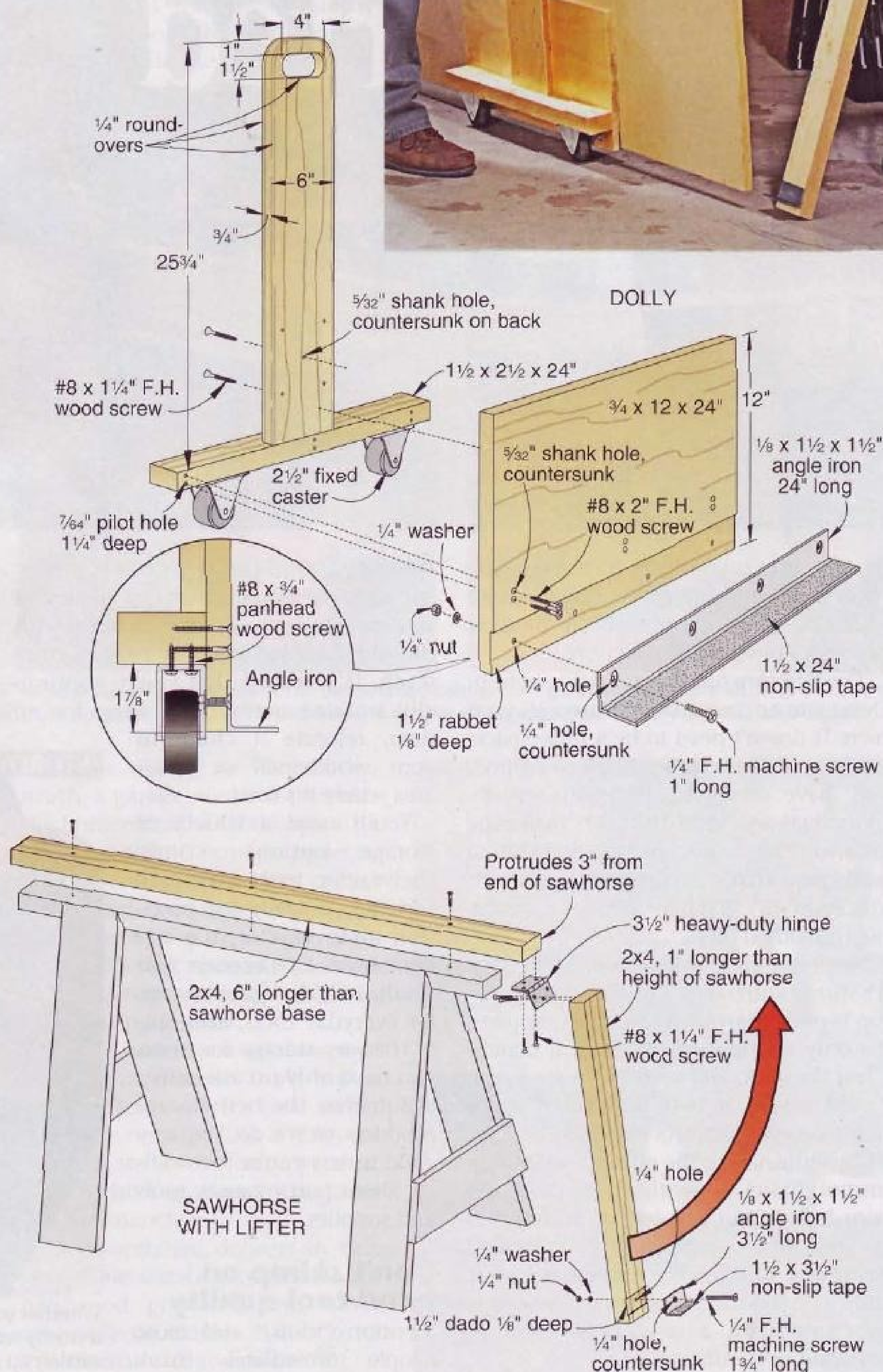
Build the dolly from $\frac{3}{4}$ " plywood or medium-density fiberboard (MDF), and solid stock, as shown in the drawings at right. Carefully position the casters so they run parallel to one another—otherwise, the dolly can shimmy like a bad shopping cart.

Each sheet lifter consists of a pair of hinged 2x4s. One attaches temporarily to the top of your sawhorse; the other guides the stock from vertical to horizontal.

To work the system, slide the angle-iron of the dolly under the edge of the sheet you want to move. (It works best if you store your sheet goods standing on their long edge, raised up on 2x stickers.) Grab the top of the sheet, and tip it toward you. This lifts the material off the stickers, and shifts its weight to the dolly. Now, wheel the sheet to your work area, steering it by tilting and pivoting the dolly on one caster.

To lay the sheet on sawhorses, roll it into position over the angle iron of the lifters, and tip the sheet toward the sawhorses to free the dolly. (The sheet should be resting only on the lifters.) Pull the dolly away, and set it aside. Finally, raise the material by tilting the top toward the sawhorses—the lifters will drop down to the floor once the weight of the sheet has transferred to the horses. 🌲

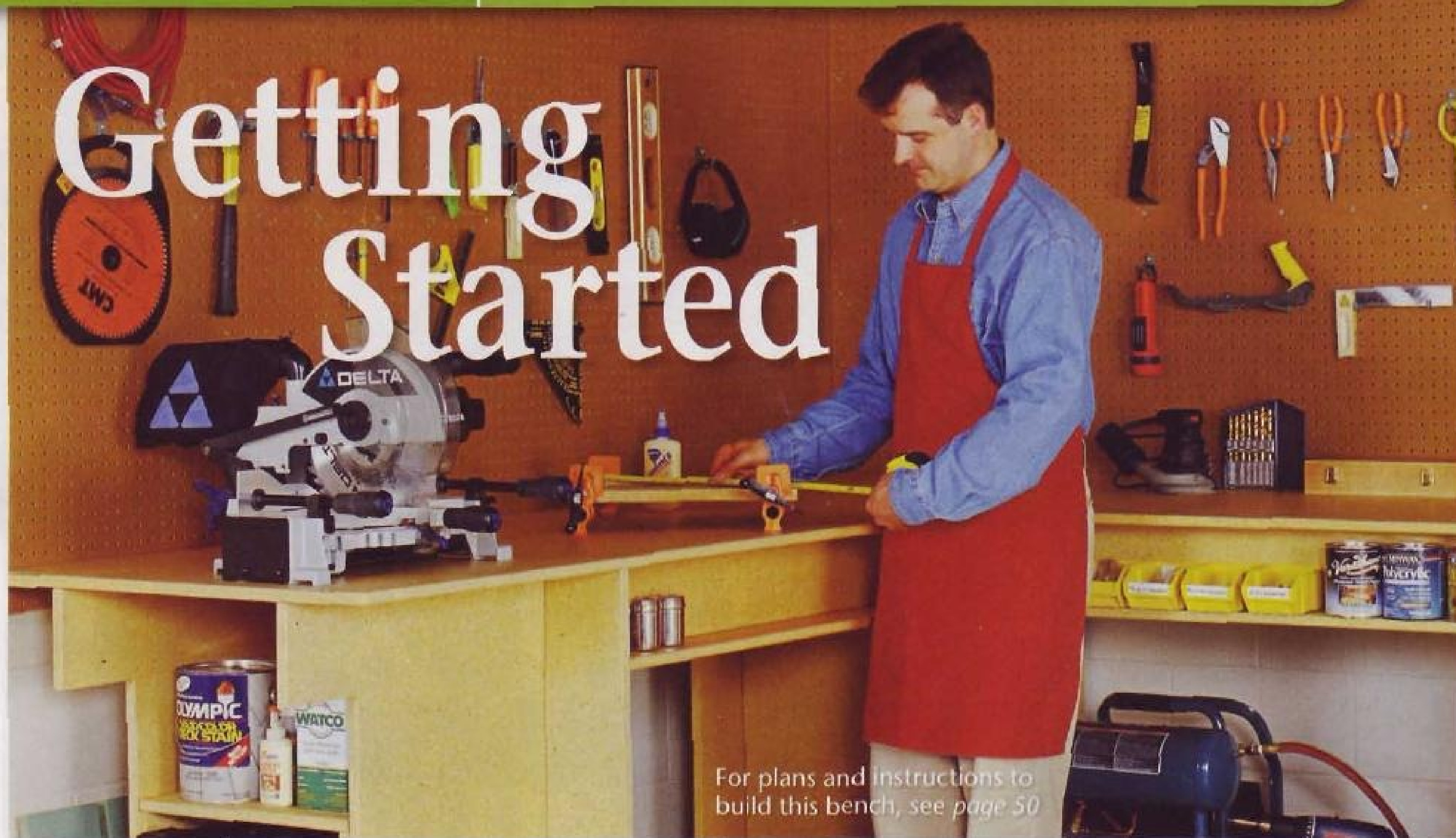
Project design: **Jim Forney**
Illustration: **Roxanne LeMoine**



Equip Your Shop

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Getting Started



For plans and instructions to build this bench, see page 50

When you have a hardworking and organized shop, routine repairs and special projects become a pleasure, not a chore.

The first step toward equipping a shop: Designate an area that you can call your own. It doesn't need to be a huge space, but it should be comfortable, well-lighted, and have adequate electrical service. Individual articles within this magazine give you the details on how to create a workspace that's inviting and efficient. You'll also find valuable advice on choosing individual tools.

Next, set up a workbench. Make sure it's sturdy and free of clutter. If the benchtop is piled high with tools and supplies, it's only acting as a shelf, not a bench. Clear the deck, and keep it clean.

Add a vise or two, and you'll make many of your projects considerably easier by eliminating the effort of manually immobilizing a workpiece. Work *on* your bench, but not *into* it. Stray holes in your workbench, as well as spilled paint and oil, quickly downgrade your shop's appearance. Protect or renew your benchtop with a replaceable layer of plywood or hardboard.

Make storage a priority

An efficient home shop has plenty of storage area for tools and supplies, with the most-needed items always at arm's reach. If you find that you're continually walking across your shop for an item, relocate it closer to your workbench or other area where it's used.

You'll need a variety of storage options: sturdy shelves for tools and bulk supplies, drawers for precision tools, bins or snap-top containers for fasteners and small tools, hanging storage for everyday tools, and out-of-the-way storage for items you need only occasionally.

But even the best storage products won't do you any good unless you're methodical about putting away tools and supplies.

Don't skimp on hand-tool quality

Mention "tools," and most people immediately think

of power tools—the type that requires an electric cord. But every well-equipped shop also has plenty of hand tools. These basic implements include wrenches, saws, files, chisels, striking tools, and measuring and marking tools.

STURDY WORKBENCH IS A MUST



Whether you build it yourself or buy and assemble, a sturdy workbench is one of the top necessities for setting up your home shop.

QUALITY IS EVERYTHING



Invest in high-quality hand tools, and they will last a lifetime. You'll use them on many projects as well as for machinery adjustments.

As you begin to build your tool collection, beware of bargain bins. These tools often provide attractive price tags but little in the way of quality. In fact, you may discover that poorly designed or poorly made (or both) tools will frustrate your best efforts. High-quality products usually aren't cheap, but having good tools removes a significant barrier in your quest to produce first-rate results.

Several brands of hand tools offer lifetime guarantees, such as Craftsman (Sears), Husky (The Home Depot), and Kobalt (Lowe's). The initial investment may be higher than brands that don't offer liberal replacement policies, but an active do-it-yourselfer will enjoy the

WORK ACCURATELY



Precision layout tools enable you to work accurately, so don't shortchange your results by buying cheap rules and squares.

benefit of never struggling with a damaged tool. The warranty covers a wide spectrum of hand tools, such as pliers, wrenches and screwdrivers, but excludes power tools.

Don't spend more than you have to

Retailers often provide generous discounts on lawn and garden gear in the spring, and even more dramatic mark-downs at the end of the summer, when the equipment will otherwise be returned to the warehouse. Other outdoor tools follow similar cycles: for example, you'll usually get the best deal on a snowblower when the weather begins to warm. The stores will also have sales dur-

ROUTERS ADD VERSATILITY



A router is a versatile addition to your shop that can cut cabinet joinery as well as shape decorative edges on a wide range of products.

ing the year when you'll enjoy substantial discounts—even 50 percent off—on selected hand or power tools. You can build or upgrade your tool collection more quickly when you watch for these deep discounts.

Closeouts and reconditioned items are other money-saving opportunities, and these tools often carry full warranty protection. Stores with rental operations often offer low prices on used tools that are top-quality and professional grade. In this case, though, you'll probably buy the tool "as is," without any warranty. It may work for 10 minutes or 10 years, but it's yours either way.

Another opportunity is the "brown-bag sale" that retailers sometimes

SHOP TIP — PRIORITIZE YOUR TOOL PURCHASES

Unless you've recently won a lottery or a big poker tournament, you probably aren't going to buy a shop full of tools on a single visit to the home center. The following categories represent a starting list of basic shop tools to tackle a wide range of home repair and improvement projects. They don't include all the tools required of trades such as painting, drywall, electrical, and so on.

Primary shop

16-ounce claw hammer, a pair of 12" one-handed bar clamps, a 10" pair of locking-grip pliers, 6" and 10" adjustable wrenches, sawhorses, battery-powered drill-driver, a set of drill bits, shop fire extinguisher, safety glasses, hearing protection, respirator, drive-bit set (which can also be used with a magnetic-tip screwdriver), flexible and stiff 1/4"

putty knives, a set of wood chisels, chalk line, line level, ball of nylon mason's line, utility knife and spare blades, slip-joint pliers, tape measure, torpedo and 2' levels, combination square, framing square, caulk gun, handsaw, sandpaper in a variety of grits, small pry bar, 6' stepladder, compass, variety of tapes (masking, duct, electrical), nail sets, scratch awl.

Secondary shop

Corded electric drill, set of spade-type drill bits, 25' extension cord (14-gauge is adequate; 12-gauge preferred), tool belt, hacksaw with spare blades, plumb bob, bevel gauge, coping saw, circular saw, jigsaw, set of Allen wrenches (hex keys), socket-wrench set in both SAE and metric sizes, mitersaw, sander, sharpening stones and honing guide, block plane, crowbar, strap wrench, tongue-and-groove pliers (Channellock is one brand), stapler,

3-pound drilling hammer, 8-pound sledgehammer, wood rasps, grinder, dead-blow mallet, 4' level, needle-nose pliers, wire stripper and cutter, center punch, neon electrical tester, electrical continuity tester, cat's-paw nail puller, pipe wrenches.

Advanced shop

Shop vacuum, construction calculator, laser level, dial calipers, micrometer, full-face shield, precision screwdriver set, router, high-speed rotary tool (RotoZip type), reciprocating saw, propane torch, air compressor and pneumatic tools, tablesaw, welding rig, tap-and-die set, bandsaw, soldering iron, cold chisels, drill press, tin snips, electrical multimeter (AC and DC volts, ammeter, ohms), heat gun, metal-cutting chop saw, impact driver, central dust collector, overhead air-filtration system.

LEVEL OUT YOUR TOOL BOX



A 2' level, along with a torpedo level, is part of your basic tool kit. A 4-footer provides even better accuracy for big projects.

conduct, offering a percentage discount on all the items you can stuff into a brown paper (grocery) bag. This can be a good way to save on some hand tools, such as measuring and marking equipment, that are often not discounted.

Make a list, and check it twice

The sidebar on *page 93* lists primary, secondary, and advanced homeowner tools can serve as a general guideline to prioritize your wish lists. But bear in mind, however, that building a workshop is a long-term project, not a one-time event.

It's easy to get carried away when buying tools, so set a budget to keep things under control. That way, you can add to your shop every month without undue strain on the finances. In general, you'll buy power tools as your projects justify them, but you'll probably be pleasantly surprised how quickly they pay for themselves when compared with the fees charged by a contractor. For example, the installation price that you'd pay for an entry door will go a long way toward buying the miter saw you'll need for the trimwork.

Stockpile supplies

When you get into your projects around the home, you'll save time and trips to the hardware store by stockpiling nonperishable supplies such as wire nuts, sandpaper, fasteners, and other products. But be cautious about buying giant bottles of glue and other products that have limited shelf lives.

It's also wise to keep volatile liquids (fuels and solvents, for example) in limited quantities. Whenever possible, store combustible liquids in a shed or garage that's detached from your home.

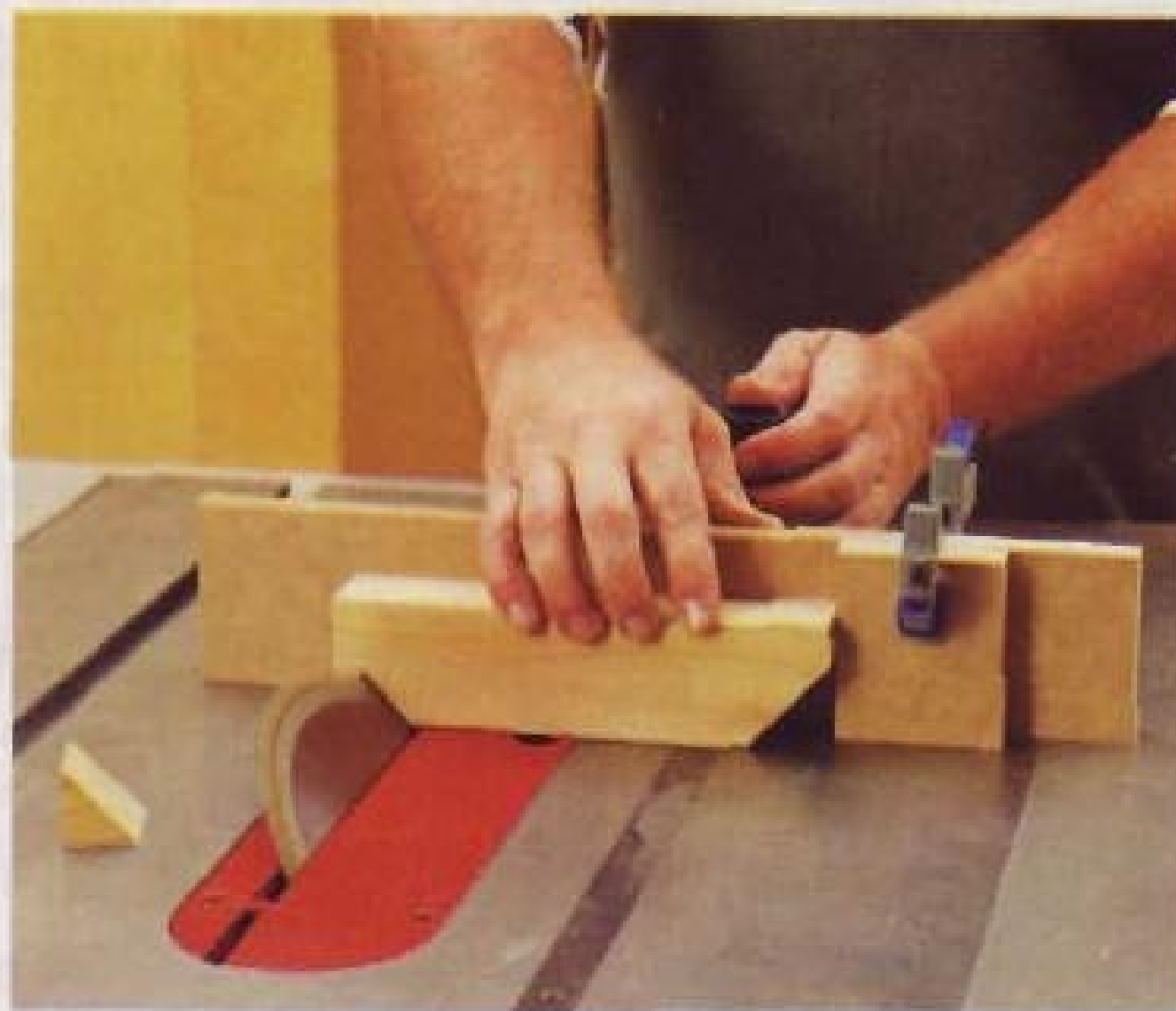
Of course, having supplies on hand is only part of the challenge—finding them when needed is the real key. Organize your fasteners in neatly labeled standardized transparent containers. (See *page 105* for one option.)

Maintain your tools

When you spend your hard-earned money for tools, you'll be motivated to take care of them. Scrape soil off gardening tools before storage (see more details in the sidebar at *right*), and buy canvas tool rolls so that your woodworking chisels don't bang each other on the cutting edges.

Learn how to sharpen basic edges, such as plane irons and chisels, or send your tools to a sharpening service to keep them in prime condition. 🌱

Equipment articles written by **Robert J. Settich**



Buying a table saw is your passport to the world of precision woodworking. You'll build great projects for inside your home and outdoors.

Protect Your Tool Investment

Buying new tools for your shop can be an enjoyable experience. But replacing stolen or neglected equipment can be both painful and expensive. With a bit of care, though, you can minimize your risk.

For starters, conduct an inventory of your shop. This will be helpful if you ever need to file an insurance claim because your tools were stolen or sucked up into a tornado's funnel cloud. Record the tools' makes, models, serial numbers, dates of acquisition, and purchase prices. Shooting photos or video is a quick way to prove ownership of small tools that would be too tedious to list individually. Store the inventory in your safe-deposit box or at another off-site location.

Next, contact your insurance agent to discuss whether items of substantial value should be specifically mentioned in your coverage. You'll also want to find out whether your policy provides full replacement value or would pay only on a depreciated basis. Coverage at the depreciated amount is less expensive, but it may also provide only a small fraction of the tab for retooling your shop. The difference would come out of your pocket. Ask for a quote on switching to full replacement coverage, and you may find that it's quite affordable compared with bearing the risk yourself.

It's also a good idea to keep valuable tools under lock and key. Make sure that your shop has a sturdy door with dead-bolt, and even lock tools up again in a wall cabinet or mobile storage unit. (See "Ready, Set, Roll" on *page 106*.)

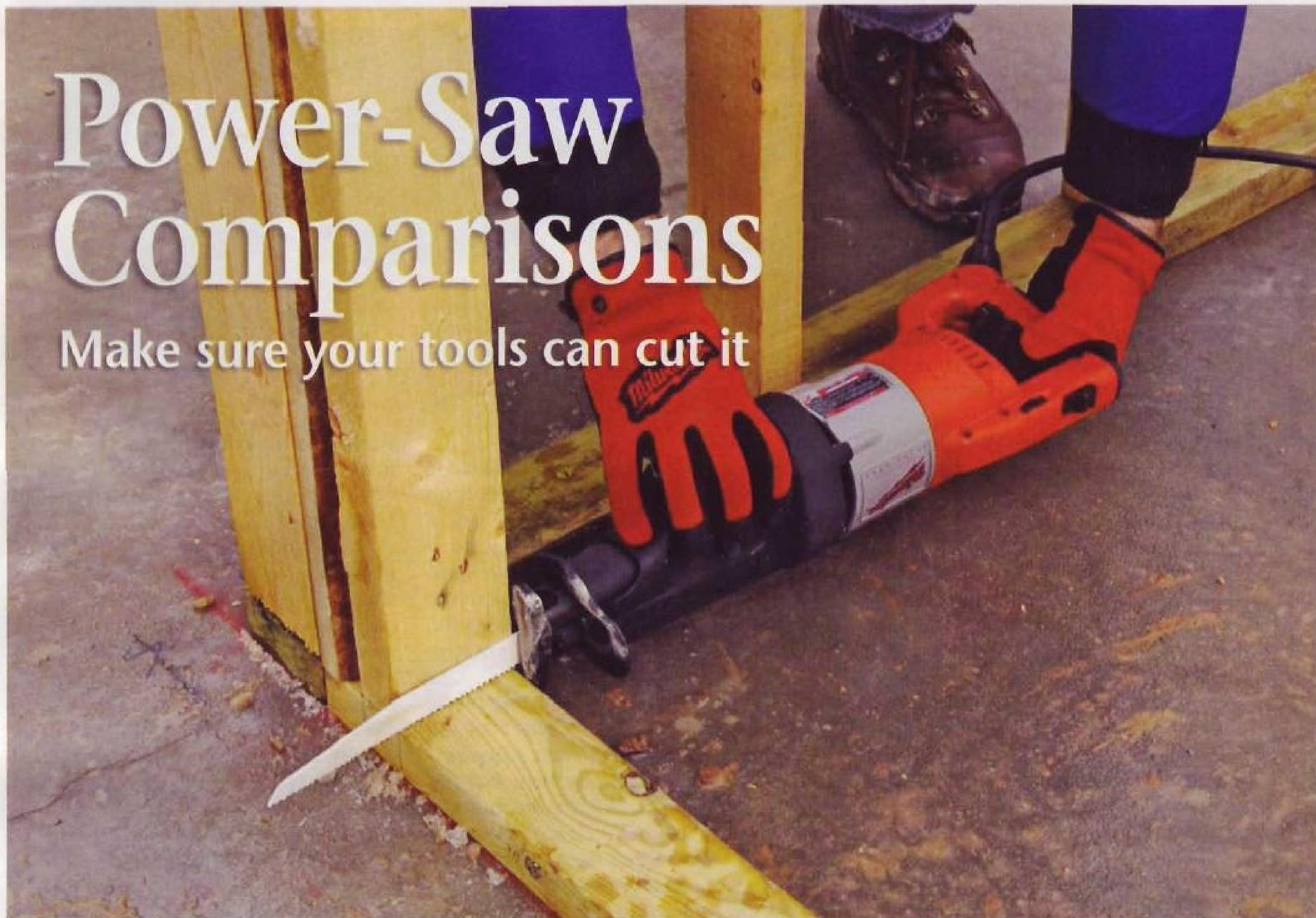
Security is a special issue if your shop is in an attached garage. Professional burglars often approach targets virtually empty-handed, relying on a quick kick to a weak door to get into the garage. From there, they often use the homeowner's own tools to gain entry to the house.

Keep your tools clean and dry

Theft is a quick way of losing tools. Rust and corrosion work more slowly, but can make your tools just as useless. Scrape loose soil from garden tools to keep rust and corrosion at bay. For off-season storage, blast the tools clean with a garden hose, air-dry, and then give each one a spritz of oil. If you have a table saw or other equipment with cast-iron tops, protect them with coats of automotive paste wax. Catalogs for wood- and metalworkers also offer sprays and wipe-on finishes that banish rust and corrosion from small tools. (Boeshield T-9 is one product.) You can also invest in dehumidification blocks that keep the air dry inside a tool box.

Power-Saw Comparisons

Make sure your tools can cut it



It's a simple enough question: "What saws do I need for my shop?" But as with many simple questions, there's no easy answer. In fact, some of the replies sound like trick questions in their own right. For example, a jigsaw uses a straight blade, but it's hard to cut a straight line with it. A circular saw has a round blade, but it won't cut curves.

Choosing a saw type doesn't have to be a riddle; it's simply a matter of matching a tool's strong points to the project you want to tackle. In this article, we'll take a quick look at the circular saw, reciprocating saw, jigsaw, tablesaw, bandsaw, and scrollsaw. You'll also want to refer to the companion article on mitersaws beginning on *page 98*.

Circular saw: the portable powerhouse

A circular saw allows you to take serious cutting power to the job, and there are plenty of tasks it can handle: crosscutting studs for a room addition, cutting deck boards to length, notching timbers for a backyard play set, cutting 4x8' sheet goods to size, and much more. Install an abrasive masonry wheel, and you can score concrete blocks or paving stones for your patio (You'll need a cold chisel to finish the job.) Substitute a metal-cutting wheel, and you'll power through conduit.

You'll find a wide range of choices within the circular-saw category, but most of the tools fit into two basic designs: the sidewinder and the worm drive. Each saw style defines itself by the position of the motor relative to the blade.

The worm-drive design places the long axis of the motor parallel to the saw blade, as shown at *right*. The motor transfers the power to the blade through a series of pinions and gears. A worm-gear assembly that gives the design its name turns the rotary motion 90° at the saw arbor.



A corded circular saw, such as this SkilSaw model above, provides steady power for even your most ambitious construction projects. The Skil 77 worm drive has exceptional power and a narrow profile.

This setup gives the saw a narrow profile side to side, but stretches the body of the worm-drive saw, adding reach that's often handy on long saw cuts. However, the real benefit of the worm-drive design is exceptional torque (rotational power). That means you will

rarely find a situation where you'll bog down the blade. On the negative side, the gearing and powerful motor translate to additional weight.

With a sidewinder saw, you mount the blade directly to the motor's shaft. With some saws, the blade is on the right (judged from your operating position), but others place it on the left. Some manufacturers produce both models: blade-left and blade-right. In theory, a right-hander should find a blade-left saw more convenient because you don't need to look over the saw to see the blade. But if you're a righty already accustomed to a blade-right saw, switching to a blade-left can be a disorienting experience.

With a little practice, you can follow a line freehand to make cuts straight enough for most projects. For more accuracy, use a purchased or shop-made clamp-on straightedge guide with your circular saw.

Enter a recip saw into the demolition derby

If you do occasional home repairs, you probably own a tool belt. If you're a serious remodeler, you'll definitely own a reciprocating saw. Fans of this tool nickname it the recip saw, and after the first time you use one, you'll be a fan, too. With a recip saw, many operators actually look forward to the demolition phase of each project instead of dreading it.

The saw gets its name from the back-and-forth action of the blade. You rest the foot plate of the saw on the piece you're cutting, and squeeze a variable-speed trigger with one hand while your other hand steadies the body of the saw. It's a tool built for speed and power, not pretty cuts.

Cutting through old decking, lumber, and plywood is no problem, even if it's riddled with nails and screws. Need to slice through rebar or old pipes? No sweat—simply pop in a metal-cutting blade. The recip saw with a coarse blade lets you cut up downed tree limbs with nearly the speed of a chain saw, but with a lot less noise and zero fumes.

Most corded recip saws have plenty of power to cut big jobs down to size. But if you're willing to sacrifice power for the advantage of going cordless, you'll find battery-powered saws that won't tether you to electrical outlets.



Next to a friendly banker with a low interest rate, a reciprocating saw is the remodeler's best friend. This model uses an 18V rechargeable battery.

Jigsaw: Cutting corners accurately

While a reciprocating saw moves a blade forward and back, a jigsaw moves it up and down. And unlike a recip saw, a jigsaw is capable of accurate and intricate cuts. You can craft holiday yard decorations from plywood, cut through a laminate countertop to install a sink, or shape smooth curves in decorative deck brackets.

Choose the right metal-cutting blade, and you'll zip through sheet metal, steel, and copper pipe. With a fine plywood blade, you'll negotiate hairpin turns in $\frac{1}{4}$ " stock. With a medium- to coarse-wood blade, you'll sculpt smooth curves in outdoor projects such as $\frac{3}{4}$ "-thick fence pickets or $1\frac{1}{2}$ "-thick cedar or redwood beams.

You'll find that most jigsaws offer variable-speed control, where your finger pressure on the switch has the same effect as your foot on your car's accelerator pedal. Many saws also allow you to control the orbiting action of the saw—a motion that powers the blade forward and back while it's also traveling up and down. The greater the orbit, the more

aggressive the cut, which also means a rougher-cut edge. Dial down the orbital action, and you'll get improved control and a smoother (but slower) cut.

When shopping for a jigsaw, you'll notice that most have horizontal grips that parallel the motor housing. Others may have you grabbing the housing itself, a position that could uncomfortably warm your hand during an extended cutting session. Check how the saw fits your hand, and whether the grip is comfortable or seems strained when you pull the trigger.

Tablesaw: First choice for straight cutting

With the saws we've discussed so far, the lumber is stationary and you move the tool to make the cut. A tablesaw reverses the dynamics: It sits still while you advance the material past the blade. When you're working on pieces smaller than full sheet goods, you'll find that this makes it easy to achieve accurate results. In addition, the blade-tilt feature enables you to cut bevels with or across the grain. The miter gauge and rip fence make it easy to crank out a stack of identical parts within minutes. If you'll cut only a few long boards, you may need to recruit a helper to assist you in balancing the lumber. But an outfeed stand is an inexpensive alternative that doesn't get impatient.

Even with a helper and an outfeed stand or two, you'll find that manhandling a full sheet of plywood over a tablesaw can quickly turn into a wrestling match. Whenever possible, use a circular saw to break the sheet into manageable pieces before going to the tablesaw. How big a piece fits the definition of "manageable" depends somewhat on you and the size of your saw.



A jigsaw cuts smooth curves in a wide range of materials, from thin plywood to dimensional lumber.



A tablesaw can easily trump the accuracy of all the other hand-guided saws in your arsenal of power tools.

The smallest—and therefore most portable—tablesaws are often labeled as benchtop tools, though many have optional legs set to improve their versatility. Low price is the prime motivator behind these saw designs, so you'll typically find a stamped-steel tabletop, and a universal motor that directly drives the blade. Follow the setup instructions carefully, and you'll get decent results from this type of saw, but don't expect glass-smooth cuts or extreme precision.

The next step up is a jobsite saw, which usually includes a folding stand that doubles as a dolly for easy portability. You'll see a significant boost in the price tag, but you'll receive substantial upgrades in the quality of materials as well as improved precision and power.

The next level is called a contractor-style saw, but you'll see far more of these in home workshops than on construction sites. The contractor-style saw has a cast-iron top that's machined flat, and an induction motor rated about 1.5 horsepower. A V-belt connects the motor to the saw's arbor. This category represents such a large share of the tablesaw market that there's an abundance of aftermarket accessories. So you can bolt on upgrades for accuracy and convenience. For example, you'll find beefed-up rip fences, superaccurate miter gauges, and a host of jigs. A carefully tuned saw is typically more than capable of furniture-quality cuts.

Take one more step upward, and you're looking at a cabinet-style saw, a true industrial machine with a 3-(or

more) horsepower, 220-volt motor. It's all about cast iron, with heavy-duty everything, including the price tag.

Bandsaw: Cuts curves and thick stock easily

Add a bandsaw to your shop, and you'll open new possibilities that are difficult to achieve with any other tool. You can make straight or curved cuts in thick wood with accuracy. Compound cuts—where you slice through two adjacent faces of the stock—are not merely possible but downright fun to do.

This tool also excels at resawing lumber, which means slicing it on-edge. This allows you to open up a piece of wood to create a book-matched panel for a stunning cabinet door. Even benchtop bandsaws offer decent resawing capability, and a mid-priced saw with a riser block can resaw through 12" slabs of hardwood.



A bandsaw is simple enough for the beginner but capable enough for the advanced woodworker.

The defining dimension of bandsaw capacity is the distance from the blade to the column. Some benchtop units utilize a third wheel to improve the capacity of the saw without upscaling the major components. However, most saws feature a two-wheel design.

Although the vast majority of bandsaws are intended for cutting wood, you can also purchase models that cut metal. In this case, though, the pulleys are sized to slow down the cutting speed to a rate that's more appropriate for metal-cutting blades.



A scroll saw handles a wide range of precision and creative cutting tasks in wood and metal.

Scrollsaw: the one-tool habit-forming hobby

Scrollsaws should have some sort of warning label attached, because using one can definitely become an addictive experience. Some users start out innocently enough, crafting nameplates and simple plaques. But then, they find themselves hooked on complex designs and other advanced techniques.

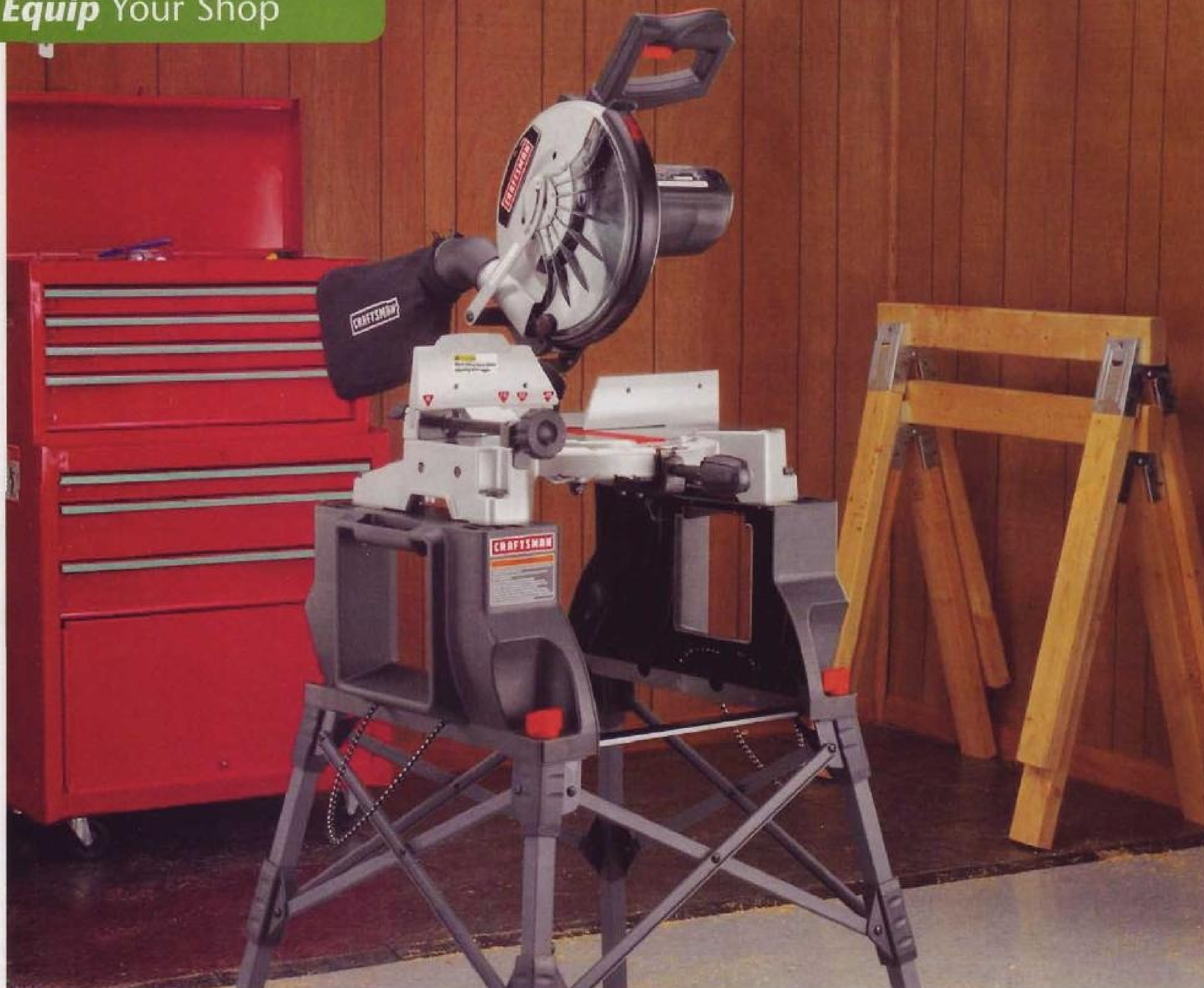
Most scrollsaws have variable-speed controls that allow you to tailor the cutting approach to the material you're crafting, whether it's wood or metal. Equipped with the appropriate jeweler's blade, the scrollsaw can craft exquisite detail in a variety of metals.

The up-and-down motion of a scrollsaw reminds some woodworkers of a sewing machine.

One key tip: change to a new scrollsaw blade whenever you notice the cutting action slowing. A new blade helps you finish sooner, and increases the life of the saw by reducing strain on the motor. 🌲

Sources

Bosch: 877-267-2499, boschtools.com
Craftsman: 800-549-4505, craftsman.com
DeWalt: 800-433-9258, dewalt.com
Hitachi: 800-829-4752, hitachi.com/powertools
Jet: 800-274-6848, jettools.com
Milwaukee: 262-781-3600, milwaukeeetool.com
Skil: 877-754-5999, skil.com



Success With MiterSaws & Accessories

Whether you need to chop a 4×4 deck post or slice a delicate molding for a jewelry box, a miter saw is the tool of choice. To get the most from this tool, though, think about the scale of work and the material you're cutting. These considerations will help you choose both the saw and the blades for the job. If installing molding is your first goal, you'll need a way to measure and cut miter angles, too.

Most miter saws on the market today are the compound style, which means the blade can bevel and miter simultaneously. This enables you to cut crown molding flat on the saw's deck. Most compound miter saws bevel in only one direction, but a few can bevel both ways—a feature that's occasionally handy but not necessary for most DIY jobs.

In today's market, saws have either a 10" or 12" blade, though you'll find a few saws that use smaller or larger blades. A larger blade

diameter, of course, translates into greater cutting capacity. A sliding mechanism is another way to boost the tool's effective cutting range. Saw manufacturers generally list the maximum thickness and width of cut at two positions: the zero-degree cross-cut and at a 45° miter.

Make sure that the saw you choose will handle the largest stock you need to cut. There's always the initial burning temptation to buy the biggest saw in the store, but looking at the price tag often cools that passion.

Chose your blade

Matching the blade to the job is a critical part of cutting success. For decking and other framing chores, a 10" blade with 24 carbide teeth will produce fast cuts and eject chips efficiently. For smooth cuts in moldings, choose a quality blade with 60 or more carbide teeth. If you'll cut plastic molding, you'll need to search out a company that makes specialty blades which minimize melting. (Forrest Manufacturing is one source.)

Working all the angles

One of the key steps toward virtually seamless molding joints is knowing the precise angle you need to cut. You'll get the best results by using a protractor with legs long enough to span the humps typical of outside drywall corners. An 18" plastic protractor from Quint Industries is an affordable and accurate tool. If you don't mind parting with more money, you'll find digital protractors that will calculate the bevel and miter angles for you, as shown below.



A digital angle finder eliminates guesswork when you're installing crown molding.

Capture the crown

Wrapping a room with crown molding motivates many people to purchase a compound miter saw, but the instructions included with the saw often fall short of even basic training. For more help, consult a book such as *Crown Molding and Trim: Install It Like a Pro* from Quint Industries. The book is available at many home centers, or you can order online (compoundmiter.com). For a handy video of cutting molding, see woodmagazine.com/moldingvideo.

It's time to take a stand

A miter saw can be extremely handy in the shop, but making the tool easily portable multiplies its usefulness. That way, you can take it to the backyard to



When choosing a stand, look for stability as well as the ability to support long workpieces. This dolly-type stand from Hitachi lets you transport the saw and its support system in a single trip.

install a new deck rail or near the living room to install crown molding, a chair rail, or both.

You can put the saw onto a piece of plywood between sawhorses, or set up a portable workstation such as Black & Decker's Workmate. If you choose either of these alternatives, it's a great idea to clamp the saw firmly to the stand so it won't slide when you're making the cut.

For real convenience, though, take a look at a dedicated miter saw stand. (Some can even double as a platform for a planer or other tool.) You'll find a variety of designs among manufacturers. There are two categories: a stand that travels independently of the saw and a stand with wheels (above), serving as a dolly to transport itself and the saw at the same time.

The independent stand is the more plentiful and generally the lower-priced of the two types. On the downside, though, you'll always make at least two trips with this variety: one for the stand and another for the saw.

The dolly-type stand is a sweetheart because it cuts your commute in half, and it also eliminates the strain of carrying the saw. Typically, the stand even includes a gas-charged cylinder that helps you overcome gravity during setup. If you'll move the saw up and down stairs, look for large-diameter wheels. If you'll travel over soft ground, wide wheels will keep you on a roll. Some stands require the saw to be bolted on, while others have a quick-release mechanism. Detaching the tool is a plus if you need to load the stand and saw into a truck. Most dolly stands store on end, reducing their footprint.

Both types of stands usually incorporate outrigger work supports that help

hold long pieces of lumber or molding. Typically, you use a built-in screw clamp to match the support's height to the saw's deck. Some supports even include a provision for a stopblock setup, a real plus when you need to cut a batch of parts to identical length. 🌲

The metal-cutting alternative

If metalworking is a part of your shop activities, you'll appreciate a big-capacity chop saw. Despite their size, these saws are surprisingly affordable and can cut a wide variety of ferrous and nonferrous materials. By using a special carbide blade, the model pictured below can cut significantly faster than either a miter saw with an abrasive wheel or a portable bandsaw. The blade produces virtually burr-free cuts, reducing the need for grinding. A quick-acting vise holds the material firmly, and a 45° fence positions stock for accurate and repeatable results.



There's plenty to like in a metal-cutting saw: huge capacity, high power, and uncomplicated operation.

Shock stopper

Ground fault circuit interrupter (GFCI) protection is a must if you use the saw outdoors or in a shop that's located in a garage or basement. Make certain that you plug the power cord into a properly installed GFCI outlet or circuit.

Sources

Bosch: 877-267-2499, boschtools.com

Craftsman: 800-549-4505, craftsman.com

DeWalt: 800-433-9258, dewalt.com

Forrest: 800-733-7111, forrestblades.com

Hitachi: 800-829-4752, hitachi.com

Quint Industries: 866-544-2016, compoundmiter.com

Drills: Compared and Contrasted



Pick a drill without going in circles

You have three potential power sources for a drill: battery pack, electrical cord, and compressed air. Batteries give your drill the most portability, an advantage that's important when your potential household work sites range from the roof to a cramped crawl space. Dragging along a cord adds a degree of difficulty to many of these jobs, and it seems that the plug always pops loose just when you're ready to pull the trigger.

But corded drills definitely have their advantages. When you're faced with heavy-duty tasks—drilling large-diameter holes in wood, for example, or simply boring a lot of holes—you'll benefit from the dependable power that flows through the cord. You can work all day without the bother of swapping power packs or waiting for a recharge.

If your shop has a compressor rated at more than 4 SCFM, consider a pneumatic (air-powered) drill. It's not a good choice as your only drill, of course, because you're tethered by an air hose. But the simple no-motor construction of an air tool gives it light weight, excellent dependability, and low maintenance. Many pneumatic drills lack the refinements of corded and battery drill-drivers: no clutch settings and no variable speeds. Some units even lack reversing features. (For more about air tools, see page 108.)



An angle drill performs well in tight spaces. A corded version lets you quickly drill holes through studs to run wiring or plumbing.

Cordless drill-drivers

Battery power gives your drill-driver a highly portable and dependable power source. No wonder it's one of the most popular of home-shop tools.

A drill-driver with a power source of 10.8 to 14.4 volts is usually plenty for routine drilling of pilot holes and driving screws. But if you need additional power for more demanding tasks, such as spinning spade bits, look for more voltage. However, the high-voltage batteries also impose substantial penalties in both price and weight.

When you're shopping for a drill, don't merely look at price tags. Instead, check the tool's balance (with the battery in place, of course). Also, learn whether you can easily reach and operate all of the switches—such as the reversing control—without straining or fumbling.

To understand more about batteries and chargers—including the new lithium-ion technology—check out page 116.



Several manufacturers offer 14.4-volt drill-drivers (shown with a rechargeable light).

The drill press

The operational principle of a drill press is extremely simple: The tool that bores truly vertical holes to a precise depth—something that's difficult to do with a handheld drill. For precision work in both metal and wood, a drill press rates as a virtual necessity for your shop.

The size rating of a drill press can be confusing because it represents the maximum diameter of a workpiece in which you can drill a center. For example, you could drill the axle hole in a 16½"-diameter wood wheel with a 16½" drill press. Manufacturers like using this size system because it makes the tool seem twice as big as describing its chuck-centerpoint-to-post dimension as 8¼".

The other size consideration in drill presses is whether you prefer a floor model or can utilize a benchtop unit. In terms of precision, you can get excellent

results at either end of the size spectrum. Most drill presses have slower speeds that match up well for drilling metal.



The drill press, like this benchtop model, is a must-have tool for precision work. It can also spin a wire wheel for removing rust, or a buff for polishing both wood and metal.

The hammer drill and rotary hammer

The hammer drill combines rotation with a forward-and-back hammer action that the drill generates mechanically. The combination of these two forces—when teamed with specially hardened drill bits—quickly pulverizes concrete, brick, and stone. In addition to RPM (revolutions per minute) ratings, hammer drills also have BPM (beats per minute) specifications.

A similar tool, the rotary hammer, derives its percussive power with an on-board hydraulic mechanism. This system delivers more energy to the bit than a rotary drill. It's just the kind of tool you need if you're drilling a lot of holes in concrete; for anchors or a termite treatment, for example. But it's also quite pricey, so you may want to consider renting instead of buying if your need is short term. (See the article on buying vs. renting on page 8.)

Hammer drills and rotary hammers usually let you select among three modes: rotation only, hammer only, or hammer plus rotation.



A rotary hammer will save you a lot of time and effort when drilling holes in concrete or stone.

The impact driver

Impact drivers have long been common pneumatic tools: You've heard their distinctive wails in pit rows and the neighborhood tire shop. Corded impact drivers have also been relatively common. Until recently, though, impact drivers were virtually unknown in a battery-powered format.

But several manufacturers now produce compact versions of the impact driver. They are promoting the tool as a real problem-solver for tough construction and renovation tasks around your home. If you're finishing a basement, for example, you can use an impact driver to drill holes in concrete and then drive Tapcon™ or similar fasteners. If you're building a deck, an impact driver will drill pilot holes and then spin in lag screws with a powerful hammering action.



A new generation of battery-powered impact drivers provides the muscle that takes the hard work out of tough fastening jobs.

Size, clutches, gears, and other features

The size of a drill is usually rated by the maximum diameter of bit shank that will fit into its chuck. The most common size for both corded and battery drills is ⅜". Heavy-duty drills feature ½" chucks.

A clutch is a handy feature on a drill-driver because it allows you to set the maximum torque you want to apply to a fastener. This helps prevent overdriving screws or stripping their heads.

Some drill-drivers have dual speed range switches that help you tailor the tool to the task. In the low range, the bit spins more slowly, but you have additional torque and control. In the high range, you trade torque for greater rotational speed—great for fast drilling results.

Sources

Bosch: 877-267-2499, boschtools.com
Delta: 800-438-2486, deltaportercable.com
DeWalt: 800-433-9258, dewalt.com
Grizzly: 800-523-4777, grizzly.com
Porter-Cable: 800-487-8665, deltaportercable.com
Ryobi: 800-525-2579, ryobitools.com

Random-Orbit Sanders

Choose, use a sander without going around

Everyone enjoys the feel and appearance of a silky-smooth surface, but nobody wants to spend hours sanding to get that smoothness. A random-orbit sander minimizes that chore, making it a valuable addition to your shop.

Pick and choose the best sanding moves

A random-orbit sander combines the rotary motion of a disk sander with the orbital action of a finishing sander. As a result, it cuts quickly, like a belt or disk sander, but with the control and cross-grain capability of a finishing sander. This means that you can move the tool in many different directions—even at right angles to the grain direction—without producing an objectionable scratch pattern.

As a result, you can quickly level slightly misaligned woodworking joints. Cabinet face frames and rail-and-frame doors are two examples where the

random-orbit sander excels. It's also a good choice for general finish preparation (sanding a bookshelf, for example).

You want to pull the dust away from the surface so that you're constantly cutting fresh wood, not merely rearranging the dust on the board. Most random-orbit sanders have on-board dust collection or the even better alternative of easy attachment to a shop vacuum. The accessory shown *above right* provides an easy way to turn on the shop vacuum and sander simultaneously.

Hole-y sandpaper!

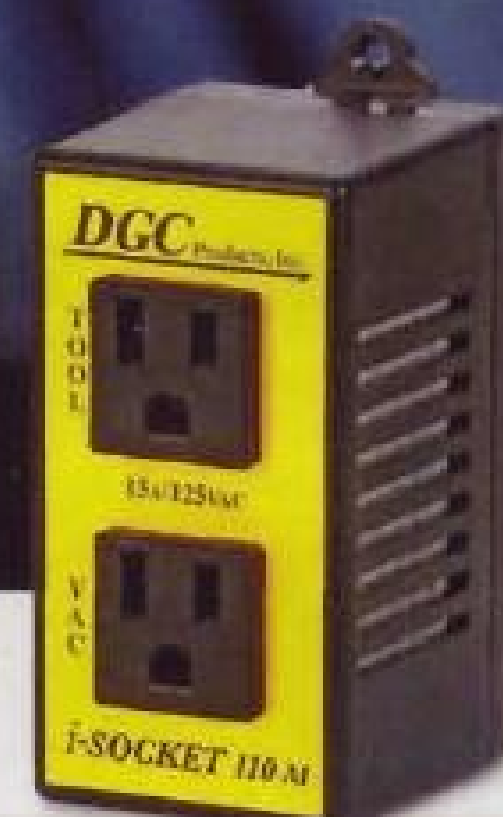
Some sanders have five dust-collection holes in the pad while others have eight. Although it may initially seem strange to pay good money for sandpaper that looks like Swiss cheese, it makes a great sense from a dust-collection standpoint. Some five-hole pads also incorporate slots extending from each hole, as shown *opposite*. This clever arrangement allows

you to use either five- or eight-hole disks on the pad. Some people may say that it's not the ideal situation, but it works.

One- and two-hand versions

If you typically use a random-orbit sander for extended periods of time, you'll probably find the two-hand-grip version less fatiguing because you're splitting the effort among more muscle groups. For access into tight areas or for working on small pieces, though, you may find a single-hand model easier to maneuver across projects.

Whichever type you choose, resists the urge to press down on the sander to speed



An inexpensive accessory like this (\$20 or less) activates your shop vacuum when you switch on your sander. Turn off the sander, and the vacuum runs for three more seconds to clear out the hose.

ONE- AND TWO-HAND MODELS



The Bosch sander (left) requires a two-handed grip, while the Porter-Cable (right) leaves one hand free to reposition the stock as you work. Both sanders have variable speeds.

the smoothing process. In fact, it usually has the opposite effect; plus, you make the job much harder on yourself.

Keep sandpaper attached

H&L is shorthand for hook-and-loop, the generic term for the temporary fastening system known by the brand name Velcro. PSA stands for pressure-sensitive adhesive, another way to hold abrasive disks to a random-orbit sander.

Most woodworkers prefer the hook-and-loop system because it provides a fast and easy way to swap grits, even before the disc is worn out. By contrast,

they find that PSA starts to lose its grip after a few times on and off the sander.

If you have a pneumatic random-orbit sander—it's often called "dual-action" when powered by air—you may find that PSA is your best choice. That's because these sanders often operate at very high rotational speeds: 10,000 RPM is common. Friction at that speed can melt the plastics used in the hook-and-loop system, so it's not a practical choice.

A quick course in sanding

Here are the basics on how to get sanding over as quickly as possible. The grits recommended are a suggestion that you'll need to adapt, depending on the aggressiveness of your sander and personal preferences in surface quality. Another variable is the smoothness of your project before you begin sanding. For example, furniture-quality hardwood plywood arrives in the lumber racks already sanded to 180 grit or finer.

Begin sanding dimensional hardwood with a coarse abrasive (80 grit). After sanding, inspect the surface to make sure that you've removed all the stock needed. From that point forward, it then becomes simply a matter of each successively finer grit removing the scratches of the one before it.

Use a vacuum, cloth, or bench-dusting brush to remove the 80-grit particles and dust, and move to 100, 120, and 150 grit. Between each grit, brush or wipe to ensure that you're starting with a clean surface. With wood, sanding much beyond 150 grit usually isn't necessary, and it can even cause problems, especially if you're applying a stain. That's because finer grits can burnish the wood's surface, preventing it from absorbing stain.

Don't skip grits—leapfrogging consumes more time *and* leave scratches.

How to get a grip on your sanding choices

As with many tools, you'll find that random-orbit sanders cover a wide price spectrum, with the more expensive models (\$165) easily costing twice as much as low-price leaders (\$70). So what do you get as you invest more of your hard-earned dollars?

Sanders that are more expensive usually have more robust internal components, such as metal instead of plastic gears, improved bearings and electronic refinements, including dustproof switches and speed controls. The way the sander fits in your hand is another consideration. Test-grip a number of sanders at the home center or hardware store before making your final choice. 🌲

Sources

Bosch: 877-267-2499, boschtools.com

Porter Cable: 800-487-8665, deltaportercable.com

Sander Sitter and switched outlet available in many woodworking catalogs such as Rockler.com and LeeValley.com.

FIVE- AND EIGHT-HOLE OPTIONS



When the sander base has slots (left), you can use either five- or eight-hole paper.

PARK YOUR SANDER



The Sander Sitter eliminates the nuisance of waiting for the sander to coast to a full stop before you can set it on your workbench.

Other sander options

A **belt sander** aggressively removes stock, but its linear scratch pattern means you can only use it with the grain of wood. Cross-grain scratches (at mitered or butt corners, for example) are as visible as beacons and difficult to remove.

A **finish sander** overcomes this problem by moving a pad in a tight circular motion so you can sand with or across the grain. The small scratches usually aren't conspicuous, and the sander is easy to control. On the downside, though, it's a slow worker. Most finish sanders have square pads that use quarter sheets of sandpaper, but you'll also find rectangular half-sheet versions. You may see these sanders categorized with orbital models, but a square or rectangular pad means that it's not random orbit. Pneumatic (air-powered) sanders with orbital motion are often called "jitterbugs."

Disk sanders have big appetites, and they aren't picky eaters. In the blink of an eye, the rim of the spinning disk can easily take a nasty bite out of your project. And unfortunately, it's difficult to teach good table manners to a disk sander.

Of course, many of these sanders spray dust everywhere, making the sanding chore more unpleasant and even hazardous to your health. (See "Keep Your Shop and Lungs Clean" on page 34.)

Portable Tool Storage

You *can* take it with you



Maybe installing a new dimmer switch in the dining room isn't exactly like an astronaut's repair of a solar panel on the International Space Station. But in both cases, the repairman needs a way to get tools and supplies to the worksite. Fortunately, you can get all the tools you need to the site of your earthbound chores with readily available portable tool storage that falls into five general categories:

Toolboxes: These can range from palm-sized soft-sided bags to metal monsters big enough to dislocate your shoulder even before you load any tools.

Mobile storage: Essentially, toolboxes with wheels, though some of these units pack multiple functions.

Wearable storage: This includes aprons, tool belts, and related accessories. Your tools and supplies go wherever you do.

Organizers: These storage units keep fasteners, drill bits, and other small parts neatly corralled.

On-site storage: This burgeoning category includes a wide range—from plastic file crates to toolboxes for your pickup truck.

Buckets and boxes full of tools

Sure, you can still find rectangular metal toolboxes, but they are only the start of your portable storage options. You'll also find cloth and plastic carriers, and each material has its advantages and drawbacks.

Plastic boxes generally cost less than metal carriers, are lightweight, and dent-resistant, but scuff easily and may become brittle and crack in cold weather.

Metal does a great job of shielding valuable tools and has traditional appeal. Aluminum boxes weigh less than steel and don't rust. On the downside, they dent more readily. Newer surfaces, such as diamond treadplate, give a modern look.

Put your MP3 player in the zippered compartment, then plug the Craftsman Tunes and Tools Bag into any outlet at your jobsite. The built-in amplifier and speakers let you do more than whistle while you work. Almost forgot—it also carries tools.



One of the advantages of a 5-gallon bucket-storage system is you can quickly locate the tool you need—no need to rattle around in the bottom of a bulky box. This version is from Custom LeatherCraft. You can organize another bucket with drop-in plastic compartments for bulk fasteners.



This 14"-fabric bag from Husky opens wide for easy access to tools.

Fabric bags are tough and versatile carriers

You'll find several designs for cloth carrying bags, with battery-powered combo kits and individual tools such as circular saws. You can also purchase bags to serve as totes for specific tools or as a general carrier (*above*). The tough fabric can't dent, of course, and you can squish the bag to reduce its volume. That feat is impossible with rigid materials such as metal and plastic.

A number of manufacturers produce cloth organizers for 5-gallon buckets (*opposite*). Pockets both inside and out provide high-visibility storage that makes it easy to find and grab the tool you need. Snap straps lasso rolls of tape, and you can use the volume inside the bucket to transport supplies to the jobsite. To avoid the hassle of continually putting away tools, simply place the loaded organizer right on your bench. That way, you can grab and go on a moment's notice.



This mobile work station from Stanley features 7" wheels for easy rolling, even over uneven ground. The cavernous lower bin holds large tools, and parts bins organize fasteners and tool accessories. A generous toolbox at top holds even more tools.

Make storage a moving experience

Putting wheels under a toolbox is a great idea, especially if you need to transport items that are heavy, bulky, or both. When you're shopping for one of these units, make sure that it will accommodate the stuff you need to move. If you'll be hauling large tools,

for example, measure carefully to ensure that they will fit. Another consideration is ease of retrieval. A big bin may offer generous volume, but if you fill it with small items, you may need to completely unpack it to find the one tool you need.

Also consider whether a mobile toolbox includes storage for fasteners and other small items that you'll need at the worksite, like the model *below*. Of course, you can always opt for separate small-item storage, but that means one more thing to carry. Look for a telescoping handle that stores out of the way but extends to give you a leverage advantage when you're on a roll. Large wheels are better than small ones on uneven terrain; wide wheels help resist sinking into soft surfaces.

The walking workshop

A well-stocked tool belt surrounds you with your most-needed tools and supplies, while a shop apron trades away most of the tool-toting ability to keep you clean. The general guideline is that an apron is for shop use, but you wear a tool belt on the jobsite.

There are two general approaches toward tool belts. The first is purchasing a one-piece rig that has a hammer loop, a series of pockets, a tape-measure well, and assorted tool slots (*above right*). It's a good solution for carpentry and general-purpose tasks, but some models have drawbacks. A left-hander will immediately notice that the hammer hook is usually located opposite his dominant hand, requiring double-handling each time the hammer's drawn or returned. In addition, there will be times where a job requires only a few tools instead of the full capacity of the tool belt. That's why many people prefer the modular approach: a leather or web belt to which you can easily add or subtract accessories such as a fastener pouch, drill holster, utility-knife sheath, and so on. That way, you can customize your tool rig to the job.

You'll find modular and one-piece tool belts in both leather and fabric. But no matter which approach you take, carefully examine each item before you buy it to ensure that it meets your needs. For example, an open tape measure well might do okay most of the time, but look for a strap to secure it if your work

involves maneuvering around in a crawl space. Also check that the fastener pouch doesn't have exposed rivets with edges that can dive under your fingernail as you reach for a fastener.



A traditional tool belt (this model is from Duluth Trading) is set up for general carpentry.

Everything in its place

Every hardware store and big-box home center will offer a good selection of small-part organizers. But don't stop there. Also look at tackle organizers at the sporting-goods store as well as storage accessories at the local crafts store.

Most organizers include dividers that let you split up the space to suit your needs. Some include a set of modular insert cups so you remove the fasteners you need and snap the lid on the rest, as shown *below*.

If you have a significant volume of fasteners or supplies, look at the compartmented plastic storage units that stack inside a 5-gallon bucket. Adding a padded lid to the bucket helps prevent spills and also gives you a place to sit. 🌲



Lay this Stanley organizer flat, open the lid, and lift out one of the storage cups—there are three different sizes—for easy access to the fasteners or parts you need. The extra-wide handle opening provides a sure grip, even if you're wearing bulky gloves. They stack on the shelf, too.

Sources

Craftsman: 800-549-4505, craftsman.com
Custom LeatherCraft: clccustomleathercraft.com
Duluth Trading: duluthtrading.com
Husky: homedepot.com
Stanley: stanleytools.com

Mobile Cabinets & Carts

Ready, Set, Roll

There are two types of home-shop enthusiasts: those who already own a mobile tool cabinet and those who want one. Even if you're part of the first group, read on because you'll discover useful accessories that boost the storage capacity of your cabinet, both inside and out. You'll also learn about a smart way to create custom drawer labels so you can instantly put your hand on the right tool.

In addition, you'll see how a mobile shop cart can help you get the most enjoyment and productivity from your time in the shop.

Think inside the drawer

When you start looking at mobile tool cabinets, you'll see an incredible variety of drawer configurations: shallow or deep, narrow or wide, and even doors on some units. The setup that will work best for you depends on the type of work you do because that in turn determines the size of your tools. If you're a machinist, for example, you'll probably want a chest that has mostly shallow drawers to organize drills, taps, and cutters. If you thrive on engine work, you'll need shallow drawers for wrenches and screwdrivers, but also some deeper drawers for larger tools and accessories.

Doors open wide to accommodate bulky items. But if a shelf is near the floor, you may need to get down onto your knees to retrieve tools and supplies. You'll make the space more accessible by installing a pull-out shelf. You can make one yourself or find one in the kitchen-organization section of your local home center.

Try before you buy

Even with your eyes closed, you'd be able to distinguish between a homeowner-grade cabinet and a professional model. The entry-level version won't have individual drawer latches, and you'll feel and hear metal-to-metal contact as the drawer scrapes—rather than slides—open. When you close the drawer, you'll need to make certain that it doesn't bounce back or stop short.

As you move up the price ladder, you'll find doors with individual lift latches. This is a great feature because it ensures positive closing and also keeps the drawers from sailing open when you move your cabinet. With non-locking drawers, you'll need to put the entire cabinet in lock-down mode before moving it.

Better chests also use ball-bearing drawer slides. These operate smoothly and quietly, and also help boost the

DRAWER INSERTS ORGANIZE TOOLS



Divide and conquer was a winning strategy for Roman legions, and it's a good way to organize your tool cabinet, too. Dividers and trays (these are from Waterloo Industries) are a good start, but you'll also want to recruit specialized organizers for sockets and other tools.

drawer's weight rating. Inexpensive slides can complain loudly as you load the drawer, but ball-bearing slides seem to thrive on the work by operating more smoothly under an increased load.



Having a great tool collection doesn't do you much good if you can't find the one you need. This cabinet from Kobalt features a flip-top lid and an add-on shelf.

CRAFTSMAN AXS SYSTEM



With the introduction of the Craftsman AXS system, Sears launched mobile tool storage into the electronics age. Some people may consider a few features gimmicky, but this cabinet will still be the coolest place you ever parked a wrench.

Casters, locks, and cables

Casters put the motion into your mobile tool cabinet, so they deserve some attention. The usual setup features two casters that swivel and two with fixed axles—similar to the setup your automobile. As a result, positioning a cabinet against a wall is similar to parallel parking, requiring additional space at each end to permit maneuvering. If you want to push a cabinet straight back into a fitted space, four swivel casters are a better option.

Although casters are a real blessing in moving a fully loaded cabinet, they also enable thieves to make your cabinet disappear. To help keep your tool collection secure, invest in a heavy-duty security cable that tethers your cabinet to an anchor point solidly imbedded in the floor or wall.

For the locks on the cabinet itself, look for pick-resistant tubular keys. If the cabinet you buy doesn't have this type, simply remove the stock lock and take it to a local locksmith. The shop will be able to provide a more secure replacement at a price lower than replacing even one quality tool. A locksmith can also help you if your upper and lower cabinets are keyed differently.

Plug into your tool chest

A power strip on your tool chest can be something that you pop on with a few minutes' work or a factory-supplied accessory. Either way, it will add convenience and reduce your dependence on long extension cords.

You can buy an intermediate chest (sits atop the rolling cabinet) from Sears. It's wired as a charging station for your battery-operated tools as well as personal devices such as your mobile phone and MP3 player.

The Craftsman AXS system from Sears takes electronic convenience (and a few gadgets) to the next level. Your tool chest can have under-frame downlighting, two slide-out LED task lights, backlit nameplates, a 12-volt power outlet (automotive style), six-outlet power strip, and even a USB port. A built-in message center delivers data on day, date, time, indoor and outside temperature (via remote sensor), timer, and alarm functions. The matching portable tool box (see page 104) includes a dock for your MP3 player, and amplified speakers.

Go ahead: Pick a color, any color (almost)

Years ago, a brown-wrinkle finish was virtually the only color choice for tool chests, and some old-school machinists still adhere to that tradition. But now, you have a wide palette of color choices, and can even order drawer fronts emblazoned with bright graphics in themes ranging from NASCAR to NFL to patriotic. At least one maker produces cabinets in a forest camouflage pattern that pleases some people but leaves others scratching their heads.

You can also buy a cabinet in stainless steel, and it can look very sharp if you're willing to invest the time in polishing it and avoiding fingerprints. Also be aware that stainless is softer than regular steel, so it could dent more easily if the manufacturer doesn't compensate by using a thicker gauge.

Label the contents

Some manufacturers produce drawer labels so you don't have to remember whether the crow's-foot wrenches are in the fourth or fifth drawer. But the printed labels (some are magnetized sets) can't anticipate all of your needs, so you may need to resort to hand-scrawling on masking tape.

Avoid both those alternatives with a hand-held labeling machine. Most

CRAFTSMAN MAGNETIZED LABELS



Craftsman magnetized labels make it easy to find your tools.

models let you choose from several type styles and sizes. Unlike the old-fashioned embossing machines, these new models produce crisp type.

Put a shop cart into your shopping cart

Once you start using a shop cart, you'll wonder how you survived without it. Many models have generous drawer volume to keep your most-used tools instantly available. Use the top to stack parts as you move them among various workstations or to hold supplies. 🌲



Solve the problem of a cluttered workbench by purchasing a rolling tool cart and offloading the basic necessities into the drawers. The top of this Grizzly cart provides a surface on which to place components of a work in progress.

Sources

Craftsman: 800-549-4505; craftsman.com
Grizzly: 800-829-4752; grizzly.com
Kobalt Tools: 262-781-3600; lowes.com
Waterloo Industries: 714-522-8088; waterlooindustries.com

Air tools and compressor systems Breeze Through Tough Jobs



This compact compressor has impressive specs: 200 PSI maximum and 5.4 SCFM at 100 PSI. Pull on the handle to convert the unit to a dolly for easy rolling or compact vertical storage.

Choosing an air compressor starts as a relatively straightforward proposition. First, you select the most air-hungry tool that you own—or want to run in the future—and look up its air requirement. (This specification is expressed as the number of cubic feet of air needed per minute, or SCFM). Then, you simply buy a compressor with an output rating that—at the very least—meets that need. Exceeding that minimum requirement by 50 percent is even better, because you'll strain the compressor less, extending its life.

Know your tools' air requirements

Some tools, such as finish nailers, use only small amounts of air in brief bursts. In comparison to water, this would be like squirting a toy water pistol. But other tools, such as a sandblaster or straight-line sander, use large amounts of air for an extended time. Continuing the water analogy, this is like turning on a 4"-diameter fire hose.

To give you a frame of reference, the chart *opposite* provides a quick rundown of the air requirements of some typical air tools.

Do you want large, medium, or small?

After you look up the air requirements of the tools you own or want to acquire, you'd expect that choosing the compressor would be relatively easy. And as long as the machine is strictly a shop compressor, it is: Buy the most powerful and biggest unit you can afford.

But if you want portability, things start to get a little complicated. That's especially true if the portable unit will also serve as your in-shop compressor. You want the compressor big enough to feed your most air-hungry shop tools

but small enough to move without undue strain.

To familiarize you with the features of compressors, let's first look at new technologies for getting air power to the job. Then, we'll discuss portable compressors that will handle a wide range of jobs in your shop and around the house. Finally, we'll cover the advantages offered by large units.

New alternatives

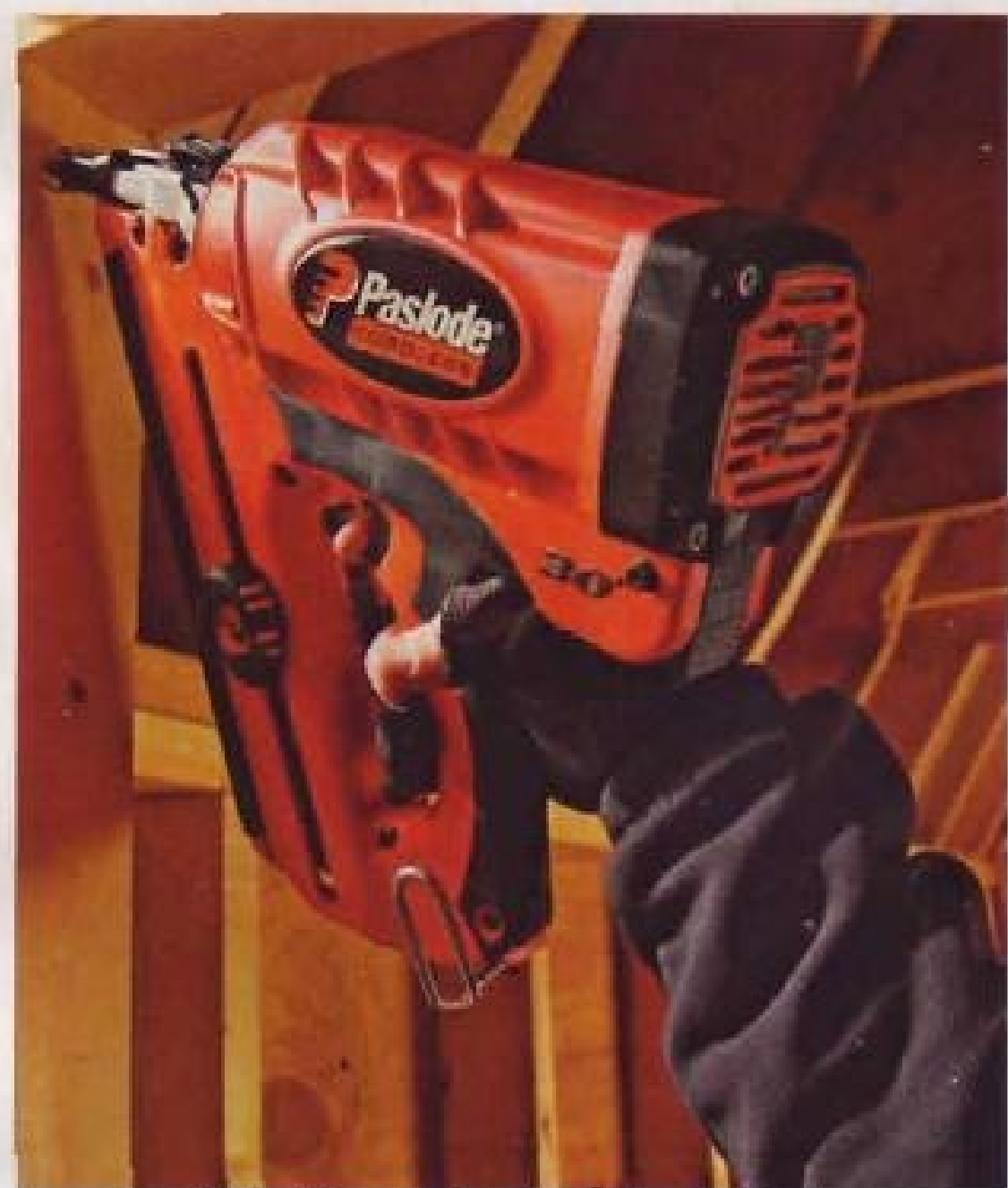
There are several strategies to eliminate a compressor (or at least leave it in your shop) while you handle jobsite chores.



Don't let the small size of the JacPac refillable carbon dioxide cylinder fool you. It has power to shoot 500 fasteners. Including the regulator, it weighs about five pounds.

One simple method involves adding an air regulator to a portable tank. Simply fill the tank with air at a gas station, then use that compressed air. It's a good alternative to lugging a portable compressor up to a second-floor room to install a few pieces of baseboard.

One recent innovation in the air-powered arena is a high-pressure carbon-dioxide cylinder teamed with a regulator. The combination mounts on your belt, and therefore needs only a short hose to connect the tool, as shown *above*. The carbon dioxide is stored in a liquid state, but quickly converts to a gas when it passes through the regulator. The cylinder maintains pressure as you use up the carbon dioxide, so you get full power down to the last fastener. You can have a cylinder recharged at any paintball supply company for about \$5, and that should be enough to shoot about 500 fasteners. You can also do a cylinder exchange at stores that sell the system.



Cordless (and hose-free) nailers reduce setup time for projects. Choose from a framing nailer, such as this model, or a range of finish nailers and drivers for brads and staples.

You'll also find nailers that get their power by igniting gas from an onboard fuel cell. This system eliminates the necessity of a compressor and air hoses, as shown *bottom left*.

Big jobs for stationary compressors

From the standpoints of dependability and performance, bigger really is better when it comes to air compressors. For starters, a large motor (sometimes requiring 240-volt power for the serious DIYer or auto mechanic) squeezes the air to a higher pressure. A two-stage compressor, for example, typically achieves a maximum pressure of 175 PSI compared with 125 PSI for a small compressor. That's significant, because it means that a comparably-sized tank holds 40 percent more air at 175 PSI than at 125 PSI. A 30-gallon tank, for example, acts as if it had a 42-gallon capacity.

A large tank helps ensure that you'll never deplete the pressure below the tool's working requirement, even when you run it wide open for an extended period. Second, a big tank means that your compressor will power on less often, extending the life of the motor and the compressor's components. Virtually all compressors are rated at a maximum service rate of 50 percent, which means that the motor should run no more frequently than half the time.

Small compressors are hard workers

Mid- to small-size compressors with 4- to 6-gallon tanks lack some of the meatier specifications of their big brothers, but they make up for it by being tough competitors. If you match the compressor to the tool, you'll never outwork it. Many of the contractor-style compressors have twin quick-connect hose outlets because they have enough muscle to keep two workers busy. Even a small compressor, such as a 150-PSI unit with a 5-gallon pancake-shaped tank, has enough capability to keep a carpenter with nail guns working hard.

To achieve big performance in a small and portable package, manufacturers

have developed some ingenious solutions. For example, product engineers shed the weight of a cast-iron compressor block, and substitute steel sleeves inside an aluminum block. Many also abandon the oil-filled crankcase and substitute Teflon piston rings and a cooling fan. In fact, an oil-free compressor requires less maintenance than the oil version.

Choose from a wide range of air tools

You'll use a compressor for much more than simply filling tires and inflating pool toys. An impact wrench (what auto shops use to remove lug nuts) takes the hard work out of many vehicle maintenance chores. A word of caution: Be sure to invest in a set of impact sockets. An ordinary socket could shatter when subjected to an impact tool. But impact-rated sockets (usually black in color) have beefier walls to stand up to the strain. You can use standard sockets, though, with an air ratchet.

For wood construction, you can drive a range of air-powered fasteners, from framing nails to finishing nails, brads, and staples. 🌲



This 28-gallon compressor delivers the power to run a wide range of pneumatic tools for jobs in woodworking, metalworking, and auto mechanics.

Air requirements

SCFM (Standard Cubic Feet per Minute) required at 90 PSI*

Finish nailer, brad nailer	3 SCFM
Stapler	3 SCFM
Air ratchet	4 SCFM
Drill (small)	4 SCFM
Air hammer	6 SCFM
Impact wrench (1/2")	8 SCFM
Straight-line sander	9 SCFM
Sandblaster (medium)	10 SCFM

*Many of these tools don't actually require an operating pressure that high, but tool manufacturers convert to that pressure to make comparisons easy. Values listed are representative of the category and may vary among manufacturers.

Sources

Campbell-Hausfeld: 800-543-6400, chpower.com

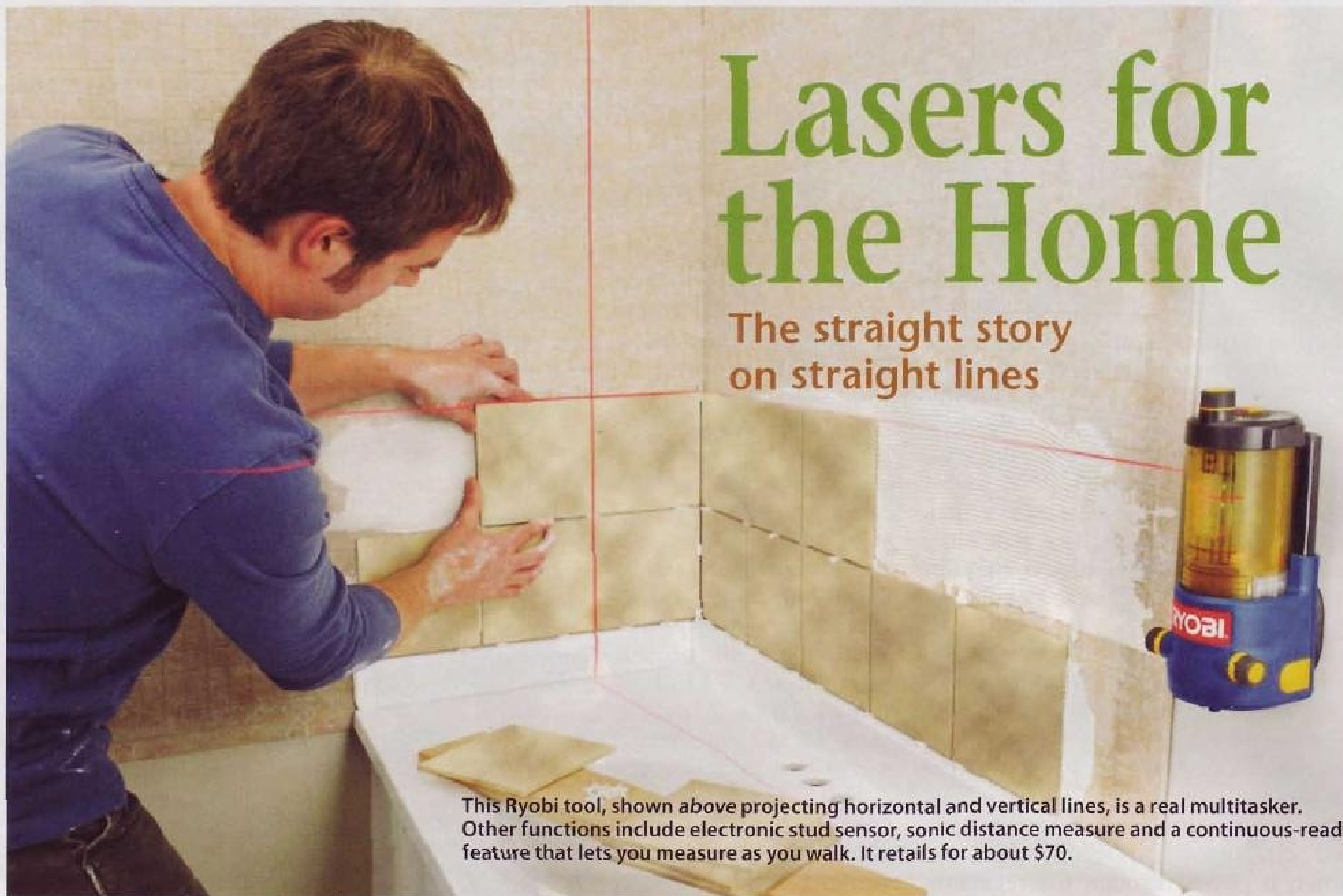
DeWalt: 800-433-9258, dewalt.com

JacPac: 800-567-0864, supplierpipeline.com

Paslode: 847-634-7048, paslode.com

Lasers for the Home

The straight story on straight lines



This Ryobi tool, shown above projecting horizontal and vertical lines, is a real multitasker. Other functions include electronic stud sensor, sonic distance measure and a continuous-read feature that lets you measure as you walk. It retails for about \$70.

The first time many of us saw the power of a laser was when arch-villain Auric Goldfinger advanced the high-energy beam toward a captive James Bond. When that film debuted in 1964, few people could have imagined that lasers would eventually become practical tools in home workshops.

There are three main uses for laser products that you'll find helpful:

- a beam indicates layout lines for a project (tile installation, for example),
- a laser shows the spot or line where a tool will cut (a drill press is one use), and
- a laser serves as a reference point to show where a measuring function is occurring (as with an ultrasonic measuring tool).

Lasers that point

Some ultrasonic measuring tools display distance with just the push of a button. A model from Calculated Industries, *right*, projects a laser beam to indicate the target, eliminating guesswork. It claims a 99 percent accuracy rating over

its 2- to 50-foot range, and is useful in calculating materials for a number of projects throughout your home.

People who do appraisals or other real estate work find a laser/ultrasonic tool especially handy. More-expensive measuring devices have built-in calculators. The devices usually toggle easily between the inch/foot system and metric.

Stanley has a line of Tru-Laser tools that utilize the laser beam itself for linear measurement, a technology that the company says offers superior accuracy compared with ultrasonic.



This laser from Calculated Industries reads distances.

Linear measurements are easy, of course, but team laser devices with an inch-foot calculator (see *page 112* for the Construction Master 5) and you can quickly estimate areas for flooring, drywall, paint, wallpaper, and more. These two tools also speedily figure perimeters, as when you're buying crown molding or other millwork. Or, calculate the volume of rooms, a key piece of information when you're

sizing the capacity of an air-conditioner or humidifier.

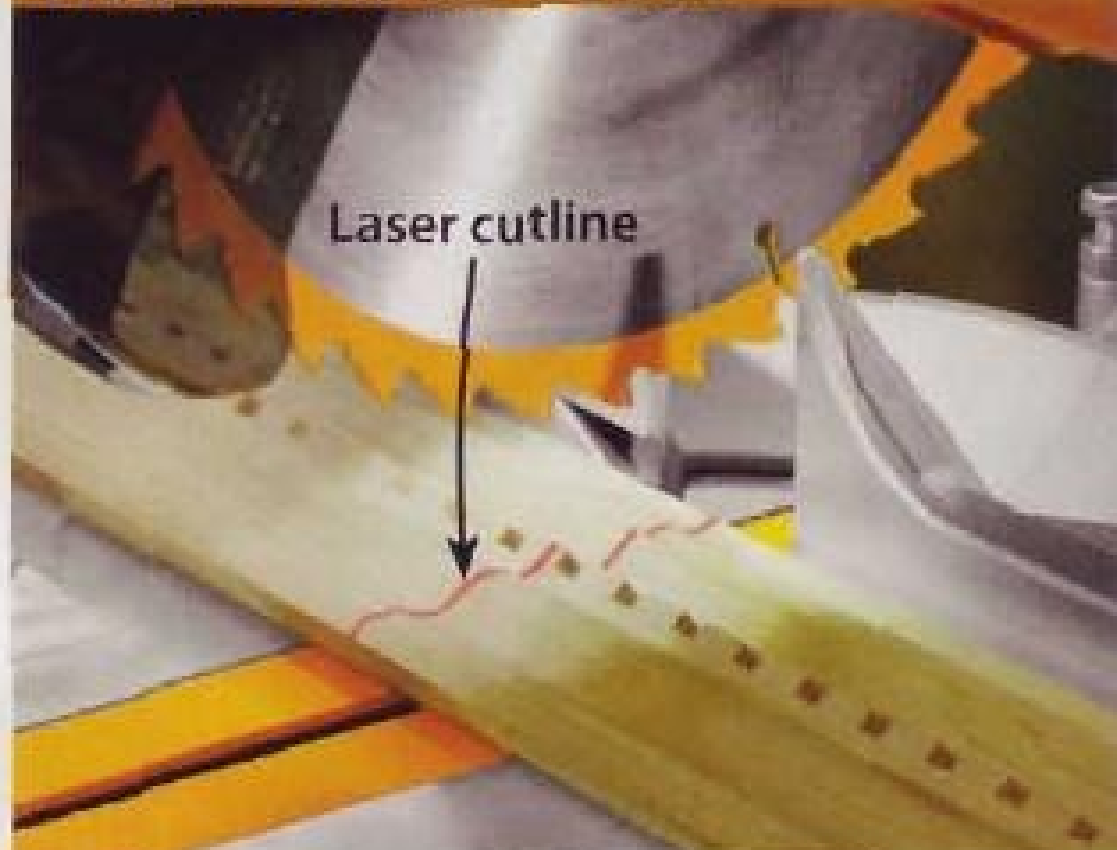
Another example in this category is a no-contact infrared thermometer that includes a laser for targeting of surfaces that can be out of reach or dangerously hot. You can use an infrared thermometer to find hot spots in electrical panels, moving parts, or in automotive applications.

Lasers that show the path

Tool companies often refer to this category as "laser-guided" tools, although the laser doesn't actually take over the steering or positioning of the tool. It's more correct to say that these are tools with laser guides, showing you where the blade will cut or the hole will be drilled. These guides can slash tedious setup time, promote better work habits, and provide more-accurate results.

One example is the drill press *opposite* that utilizes twin criss-crossing laser beams to pinpoint exactly where the bit will enter your stock. You find this feature on some new drill presses. Or, retrofit your existing tool—benchtop or floor model—with an easy-to-install aftermarket unit. For the best results, be patient when you adjust the aim of the

LASER-GUIDED TOOLS



One great advantage of this DeWalt laser system is that you can switch on the laser while the blade is stationary. This simplifies setups and produces more-accurate results.

ADD A LASER TO YOUR MITERSAW



Equip your miter saw with an aftermarket laser from Irwin, and you'll increase your accuracy. The beam switches on when the blade spins.

LAY THE LASER ON YOUR CUT LINE



Some circular saws have a laser (this model has two) that projects a beam onto your workpiece. Match the light to the marked cutline for results that are right on the beam.

beams so that the cross mark exactly matches the drill's centerpoint. It's also a good idea to periodically verify the setup, especially if your drill is on a mobile base, because the vibration and shocks of repeated moving may compromise accuracy.

You also can equip your miter saw with a laser to indicate exactly where the blade will cut, as shown *above*. There are two basic ways of doing this. Some saws have factory-installed systems that indicate the cutlines, and the beam can be switched on even with the blade stationary. The other technology involves a

laser-equipped saw-blade washer that replaced the factory-supplied washer, as shown *above*. When you switch on the blade, the centrifugal force caused by the rotation closes the electrical contacts inside the housing, turning on the laser. This affordable retrofit adapts to a wide range of saw makes and models. Bear in mind though that both of these systems usually show only one side of a saw's kerf, so you'll need to consistently position your stock so that the waste side of the line is to your right (as you face the saw).

You'll also find circular saws that project a laser line ahead of the blade like the model *above right*. Simply match the laser projection with your marked cutline and keep them aligned while you cut. This also trains you to aim the saw by looking at where it will go instead of focusing on where the blade is currently cutting.

Lasers that find level

Lasers excel at establishing layout lines because the line is dependably straight and you don't need to fuss with erasing preliminary marks. In addition, you won't cover up your layout lines as the work progresses. For example, the old-fashioned way of marking out a start line for a ceramic flooring installation has you place the marks directly on the backer board, where they're quickly lost under the first application of thinset mortar. With a laser layout though, you simply turn on the beam whenever you want to inspect your progress, as shown *opposite*.

Secure mounting is one of the keys for success in using a laser. With lightweight units, use special adhesive strips to temporarily secure it to the wall or floor and then remove the device without leaving any residue. Larger units offer different mounting options such as a tripod, as shown *below*, or a special base that permits temporary attachment to a stud or that even clips on to a suspended ceiling grid.

In addition to the ceramic floors and suspended ceiling projects already mentioned, you can use a laser for layout lines for a wide range of other projects. These include hardwood and laminate floors, vinyl floor tiles, ceramic tile on walls, wallpaper, embossed ceiling panels, hanging pictures, installing shelves, nailing on outlet and switch boxes, installing cabinets or a chair rail, and many more projects around the home.

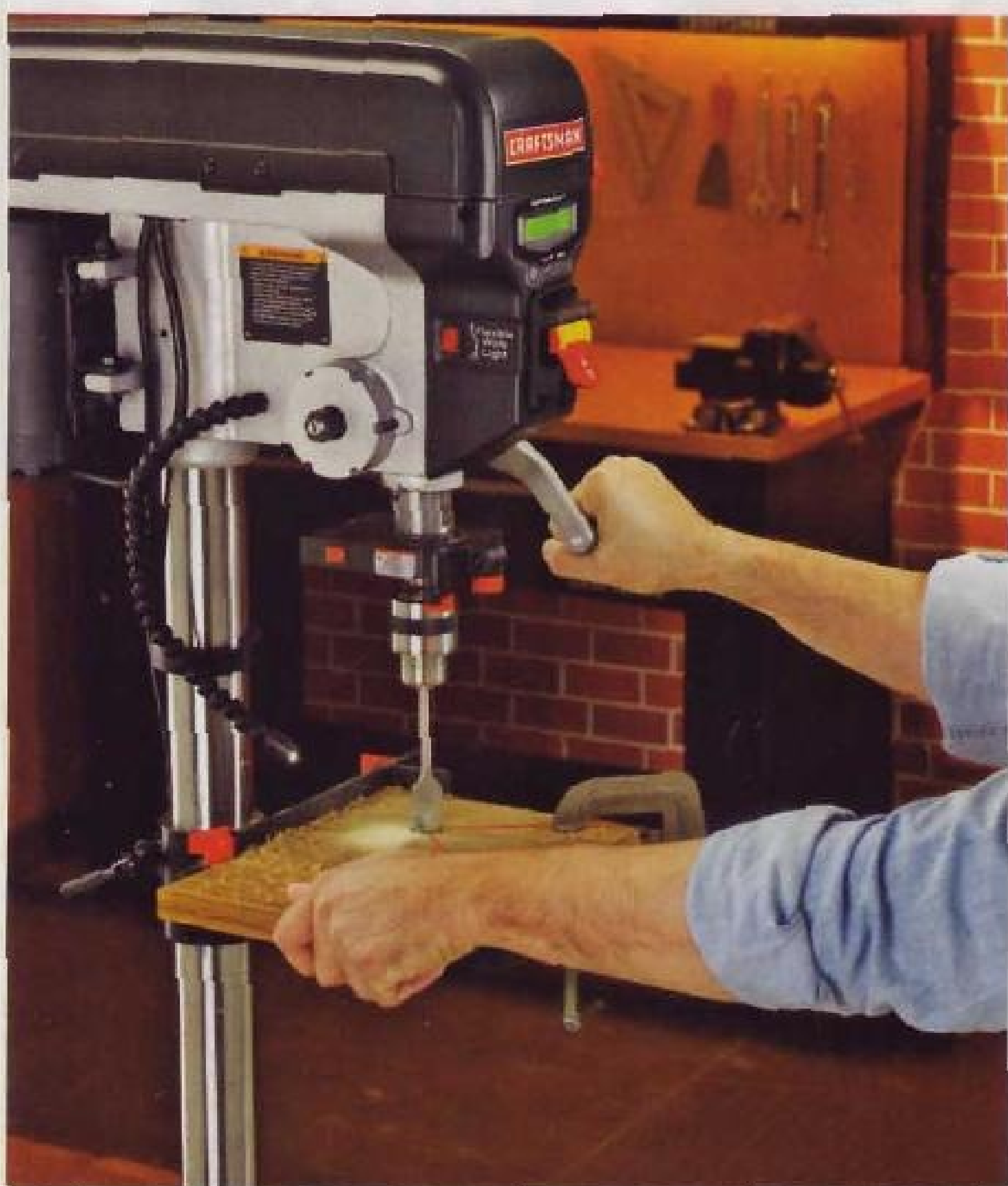
ESTABLISH LAYOUT LINES



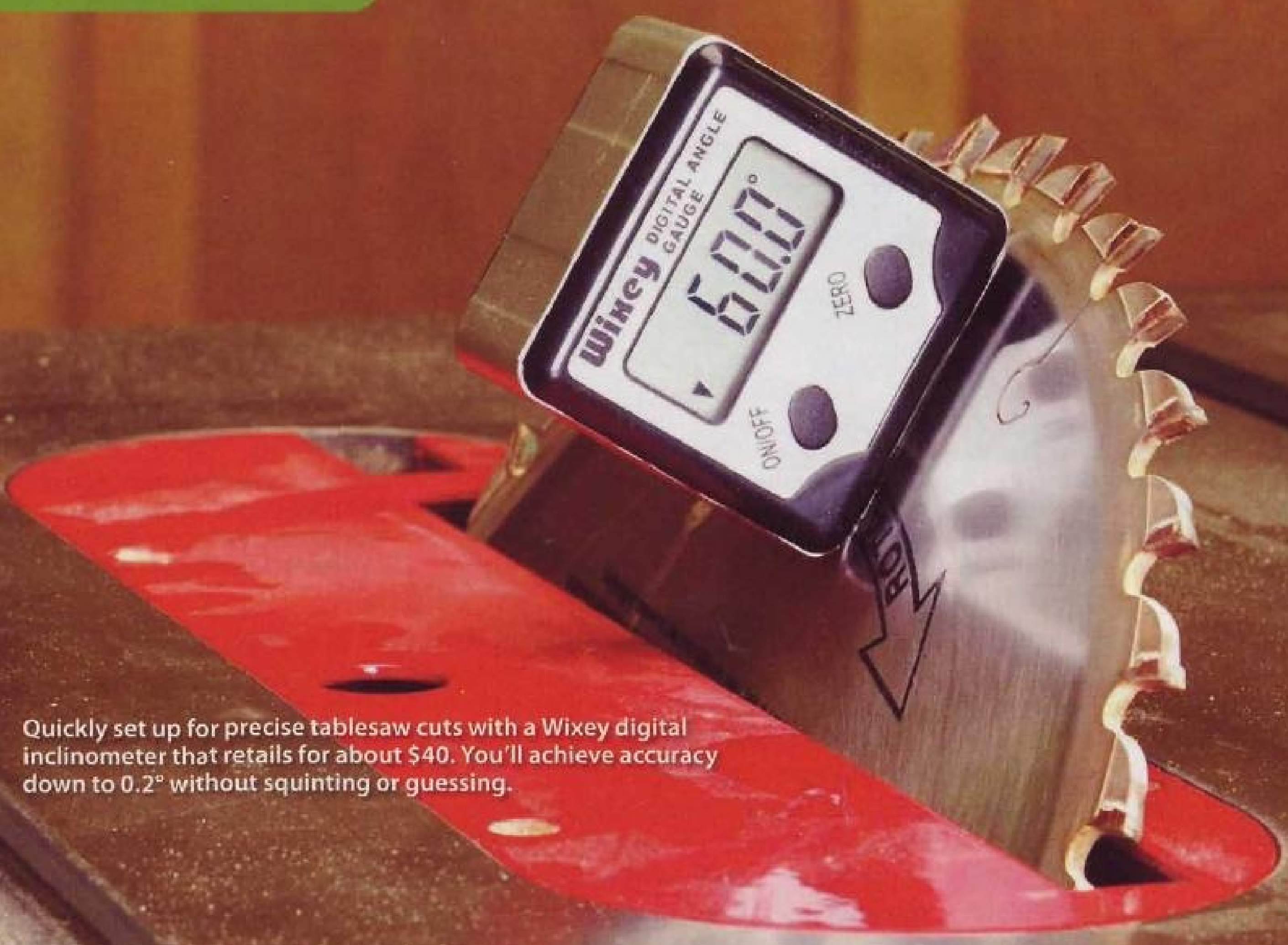
Acculine's manual rotary-head laser (less than \$100) quickly finds horizontal and vertical planes—ideal for tasks from building walls and installing cabinets to hanging wallpaper.

Sources

Acculine: 262-242-1161; acculinepro.com
Calculated Industries: 800-854-8075; calculated.com
Craftsman: 800-549-4505; craftsman.com
DeWalt: 800-433-9258; dewalt.com
Irwin: irwin.com
Skil: skil.com
Ryobi: 800-525-2579; ryobitools.com



Twin lasers generate a crosshair target that shows the center of your bit, promoting faster and more-accurate results. Newer drill presses build in this technology, but it's also available as an add-on for some older models.



Quickly set up for precise tablesaw cuts with a Wixey digital inclinometer that retails for about \$40. You'll achieve accuracy down to 0.2° without squinting or guessing.

Digital Tools Under \$100

Value-packed devices deliver accuracy

Digital technology touches nearly every aspect of modern life: telephones, TVs, and computers, of course. But digital is also steadily becoming a part of home workshops. Some shop tools, such as tablesaws and drill presses, are beginning to sprout digital readouts. But in this article we're focusing on tools under \$100.

The digital inclinometer two-step

The built-in blade-bevel scale of a table-saw will usually get you into the general neighborhood of an angle. But to bring real accuracy home, try a digital inclinometer (or tilt box)—a clever little tool that quickly compares the angular difference between two surfaces (*above*, the saw table and the blade).

To calibrate the tool, first stick it onto your table-saw's top with the rare-earth

magnets built into the bottom of the case. Push a button to zero out the setting. Next, use the magnets on the side of the case to adhere it onto the saw blade. (It works with saws that tilt the blade either right or left.) Now you can crank the blade to the exact angle you need. The digital readout displays in increments of 0.05 degrees, but the stated accuracy is 0.2 degrees.

A calculated way to improve accuracy

Most fifth-graders are proficient at working with fractions. But it's often tough to find a fifth-grader when you're in the middle of a project. In that case, you'll find it helpful to buy a calculator that works in feet, inches, and fractions.

The Construction Master 5 Calculator, shown at *right*, can easily add,



If you want to quickly breeze through estimating and project-planning chores, get yourself a math wizard such as the Construction Master 5 from Calculated Industries.

subtract, multiply, and divide all of those dimensions and metric values, too. You can easily toggle between English metric systems or even include both systems within a string of calculations. But those capabilities merely hint at the full power of this handheld math whiz. You can calculate square yards of carpet, cubic feet of room volume for sizing a dehumidifier, cubic yards of concrete for a driveway repair, figure rafter lengths for a new shed or riser and tread sizes for a set of deck stairs, evenly space balusters on a balcony or pictures along a wall, and much more.

The calculator is intuitive to use: You merely push the keys in the same sequence as speaking the math operation. But don't worry if you get into a tough situation such as figuring the length of edging for a circular planting bed around a tree. The calculator includes onboard storage for its pocket reference guide, so you can quickly look up the exact procedure you need.

Doing your level best

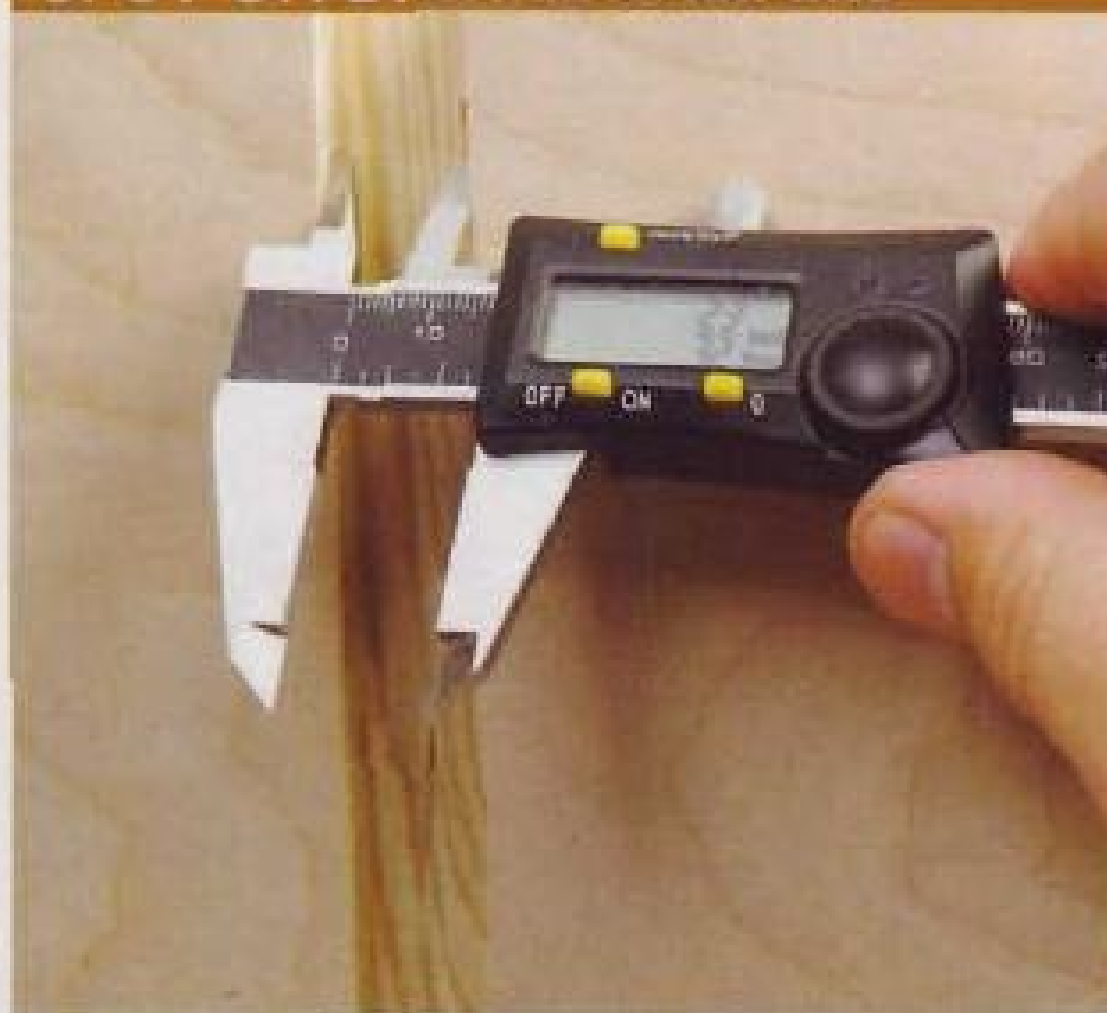
Reading the vials of an standard level can be a dispiriting task. The result depends on how you hold your head, and getting any accuracy at all in cramped or dimly lit areas is a tough assignment. But the technology built into digital levels removes any uncertainty. The bright display is easy to read (left), but there's also an audible beep at 0, 45, and 90 degrees, so you could even operate the tool with your eyes closed. If the surface you're measuring isn't perfectly level or plumb, you can read the angle to an accuracy of an amazing one-tenth of a degree.

The inclinometer function can also switch to read a slope percentage or a pitch. This is useful for surfaces that require an elevation change to drain properly. You'll find it handy when you're building a deck, installing gutters, or setting up forms to pour a patio or sidewalk.

This Craftsman 24" digital level includes a laser reference beam. You'll also find this tool in a torpedo version that easily fits into your toolbox, or in a 48" size.



SPOT-ON DIGITAL CALIPERS



Digital calipers (about \$40) remove uncertainty from precision measuring chores. If you're a left-hander, look for a model with a reversed configuration.

Measuring without the French accent

Calipers and many other measuring instruments have long had a supplemental scale that was developed by Pierre Vernier in 1631. (Interestingly, Vernier's name wasn't widely associated with the scale until the early 19th century.) The Vernier scale is easy to understand and use, but it involves the ability to clearly see small markings.

Digital calipers overcome that shortcoming with a bold readout (above) that can display in fractions, decimal inches, or the metric system. A 6" measuring range should handle most home-shop chores. Calipers have the ability to take inside and outside measurements as well as depth and step measurements. You can combine inside and outside measurement capabilities to directly read the difference between two components such as a shaft and a hole. If your calipers' manual doesn't cover all of these procedures, spend a few minutes on the Internet, and you'll discover plenty of helpful advice.

And although the tool is easy to use, it's not idiotproof. So it's worth developing good work habits such as holding it square to the object you're measuring. Even a slight angle defeats the accuracy built into the tool. Be sure to return the calipers to

their rigid storage case after use to avoid damage from abrasion and impact.

Laser and digital tape measurements

Some tools work hard, but others are multitasking overachievers. The Bulls-Eye laser level (bottom) from Black & Decker combines an auto-leveling laser (with three lines) and a digital tape measure. The self-leveling feature is a real timesaver because you don't need to fiddle with tedious alignment adjustments.

New devices, such as the Scale Master from Calculated Industries at right speeds the translation of plans and maps drawn to scale. 🌲

The Scale Master from Calculated Industries measures scales in drawings and maps.



Sources

Black & Decker:
800-733-7111,
blackanddecker.com

Calculated Industries:

800-854-8075; calculated.com

Craftsman: 800-549-4505,
craftsman.com

Grizzly: 800-523-4777, grizzly.com
Wixey: wixey.com

DIGITAL TAPE MEASURE AND LEVEL



A digital tape measure in Black & Decker's BullsEye laser level brings your DIY projects into the 21st century. The built-in auto-leveling laser projects vertical and horizontal lines, so you finish projects faster and more accurately.



Clamps for the Home

Get a grip on your work and budget

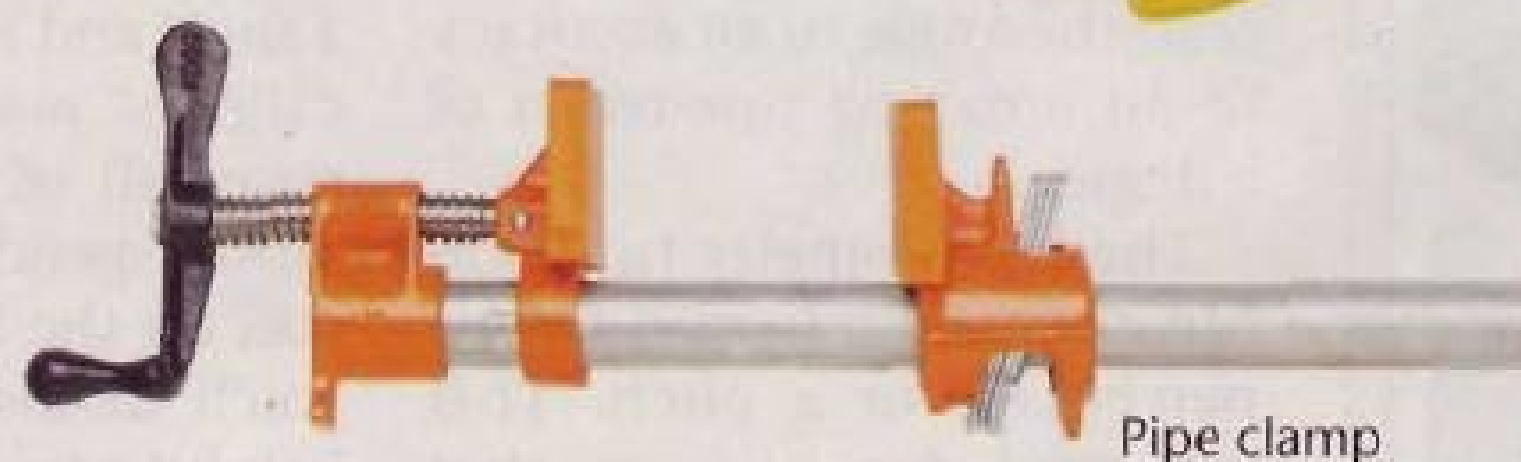
There's an old saying that you can't have too many clamps. And while that's accurate, it's only half the truth, because it's not simply the number of clamps; you also must have the right type.

We'll take a quick look at a wide range of clamps that will make your time in the shop easier, safer, and more productive.

Work-holding clamps

At the drill press, you can use ordinary C-clamps to attach a plywood base that keeps you from drilling into the metal table and prevents chipout when the bit breaks through the wood. A fence—also held in place with a C-clamp—helps immobilize the edge of your stock so that the bit can't grab and spin it. (This is a common source of shop injuries.) Alternatively, you can use a drill-press hold-down that fits into one of the slots milled through the drill-press table.

Five Favorite Clamps for DIYers



NEW-STYLE SPRING CLAMP



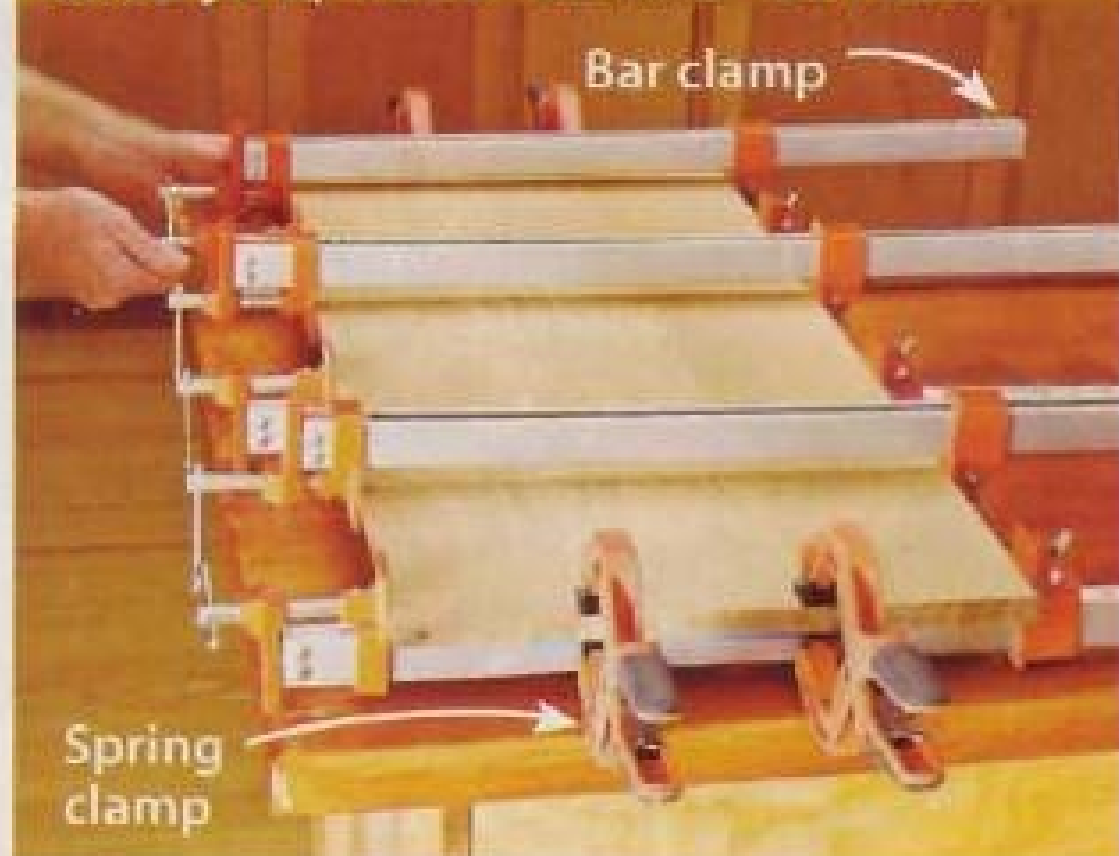
This VarioClippix by Bessey is a clever variation on the standard spring clamp with infinitely adjustable jaws up to 4".

Assembly and disassembly clamps

There's a wide arsenal of clamp types that can help when you're assembling projects. Spring clamps are among the least expensive and easiest to use, but each size has a fairly limited clamping range and only a single pressure setting. And when you use them to hold glued parts, they sometimes make the parts slide out of position. A new style of ratcheting spring clamp (the Bessey VarioClippix, *above*, is one example) overcomes many of these shortcomings by allowing you to adjust the opening, the clamping angle, and the amount of clamp force.

If you get into repairing and reassembling furniture, you'll need some large-scale clamps. Pipe clamps are one of the least expensive alternatives and also one of the most versatile. The length of clamp you can make is limited only by the length of pipe you have. If all of your pipe sections are threaded at both ends, you can expand clamping capacity by joining them with pipe couplers. By the way, we recommend the fixtures that use $\frac{3}{4}$ " pipe because the $\frac{1}{2}$ " version doesn't have enough muscle for big jobs.

ONE JOB, TWO CLAMP STYLES



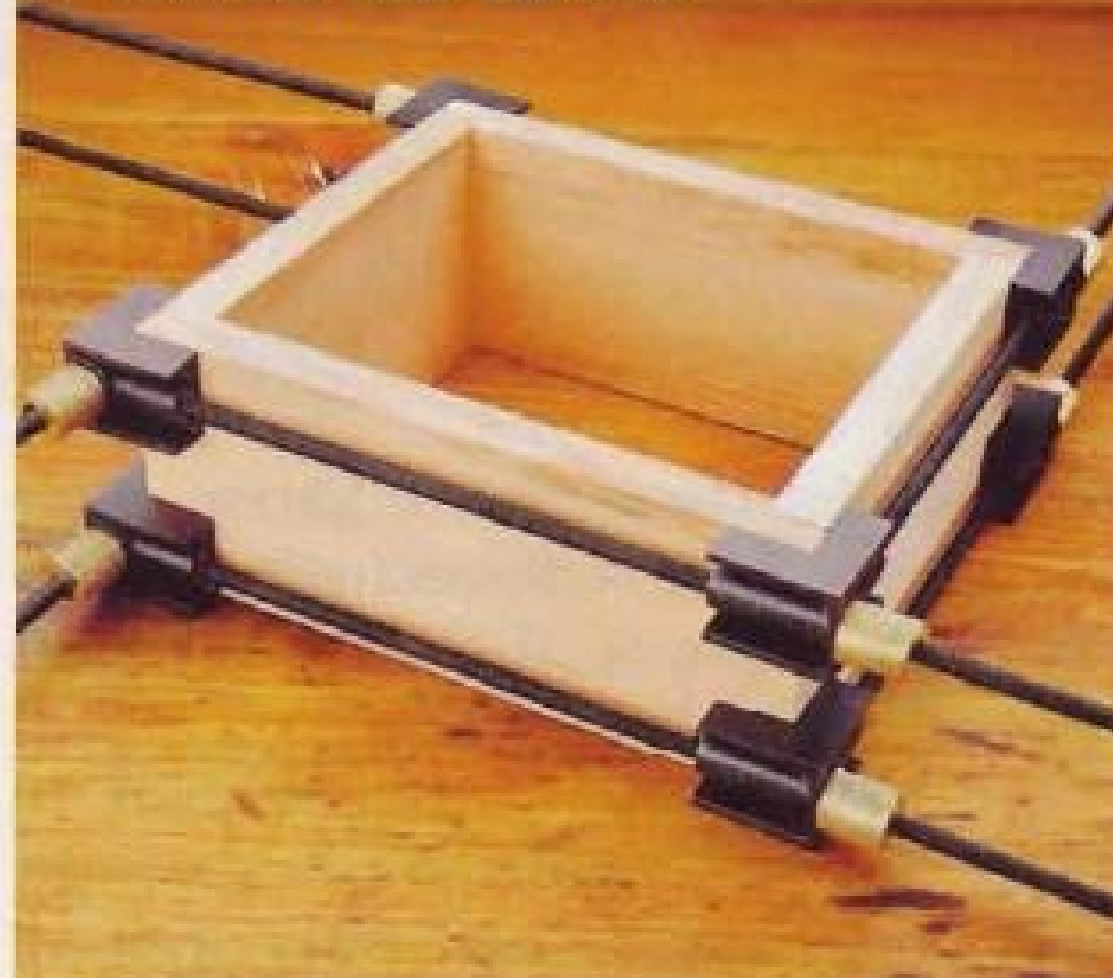
Bar clamps pull the boards together edge to edge while the springs clamp keep the board faces flush. To balance clamping pressure, Alternate bar clamps over and under a panel.

Another type of bar clamp uses fixed lengths of steel, aluminum, or composite material. In similar lengths, these types generally weigh less than a pipe clamp. However, you can't combine two clamps to make one that's longer.

Sliding-bar clamps are a long-time favorite in the shop. The one-handed bar clamp has become popular in recent years because it's fast and easy to use, and keeps one hand free to adjust project parts (not an easy task using sliding-bar clamps). As an added feature for one-handed clamps, you can reverse the jaws to use it as spreader. This is handy in disassembly operations (taking apart a chair, for example) or in cases where you need to apply outward pressure.

At the top end of the bar clamp category are those with large parallel jaws and impressive clamping force. Although a number of manufacturers now produce a similar design, the Bessey K-Body and Jet clamps are often considered the premier examples of this type.

4-WAY SPEED CLAMP



A four-way clamp provides steady pressure and corners that help square the project. It's ideal for assembling boxes and frames.

More assembly clamps

For smaller-scale assemblies such as picture frames and boxes, try a clamping system such as the Veritas 4-Way Speed Clamp, shown *above*. One handy feature is the quick-release nut that can slide along the threaded rod until it's nearly in position. You then engage it on the rod and tighten.

Another handy assembly clamp securely holds corners or T-assemblies square to each other, even when their thicknesses are different. This clamp considerably simplifies and speeds the construction process, whether you're assembling drawers or a large cabinet. The Jorgensen "Pony" 90°-angle clamp, *top right*, is one example.

90°-ANGLE CLAMP



With this clamp and one hand, you can snug up miters, butt joints, and even T-joints. The clamp self-adjusts to pieces of different widths.

Clamps for round and irregular shapes

When you need to apply pressure all around a circular form, a nylon band clamp may be just the solution you need. To use it, lasso the parts you're joining, pull the clamp snug, then tighten the ratchet mechanism with a wrench. The small version of this clamp is 15' long and usually includes four metal corner brackets so that you can conveniently use it when assembling picture frames.

In a pinch, you can also use a ratcheting tie-down strap as a band clamp. You'll find that these are quite inexpensive at hardware stores and the home centers.

If you get into a really big project, make a supersized band clamp using a trucker's tie-down strap. Don't get too carried away with the pressure, though, or you could crush your project. 🌳

Sources

Bessey: 800-828-1004, besseytools.com

Jorgensen: 312-666-0640, adjustableclamp.com

Veritas: 800-871-8158, leevalley.com

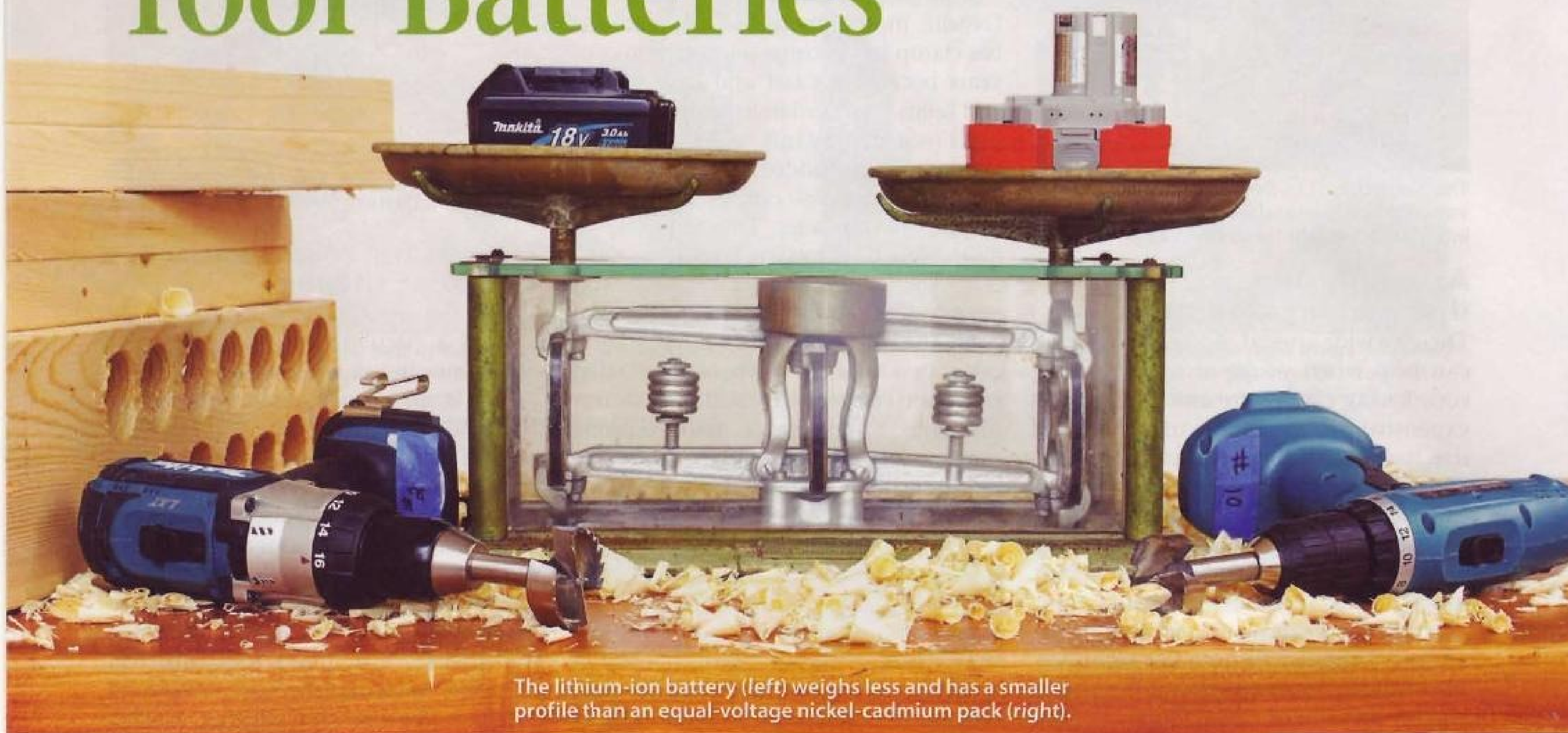
Woodcraft: 800-225-1153, woodcraft.com

BAND CLAMP



A band clamp works great on rectangular projects, but really shows its value on odd jobs: multi-sided, circular, and other toughies. The large trigger on this model from Woodcraft tightens the strap like a one-handed bar clamp.

Understanding Tool Batteries



The lithium-ion battery (left) weighs less and has a smaller profile than an equal-voltage nickel-cadmium pack (right).

When woodworkers talked about battery-powered tools a few years ago, the discussion was almost always about drills. But tool-makers have now hitched batteries to a wide array of power tools, including reciprocating saws, impact drivers, flashlights, angle grinders, sanders, jigsaws, staplers, hedge trimmers, jobsite radios with amplified speakers for your MP3 player, and many more. A number of tool manufacturers bundle several of the most popular tools along with a charger and two batteries to keep you working strong all day.

The battles of battery technology

A battery-powered tool will likely have one of three battery chemical systems: nickel-cadmium (NiCd), lithium-ion (Li-ion), or nickel-metal-hydride (NiMH). At present, Li-ion grabs most of the headlines because it's the relative newcomer. But just because Li-ion has a better press agent doesn't mean that the other technologies are going to quickly or quietly disappear. After all, millions of home shops have tools with NiCd and NiMH

batteries and chargers. In addition, these two technologies have been around longer than Li-ion, so their characteristics are well established.

NiCd batteries, which debuted in 1946, charge rapidly and efficiently, and don't require critical control of charging conditions. (That means they're more tolerant of heat and cold than other chemistries.) They produce a steady voltage when discharging (while powering your tools), and the system has lower internal resistance than NiMH. This means the NiCd batteries achieve a higher maximum discharge rate. On the negative side, NiCd batteries are the heaviest of the three systems, a disadvantage if you're using the tool for long periods, or overhead. And, cadmium is a heavy metal, which is dangerous to discard.

NiMH batteries store more charge (think of them as larger fuel tanks), and that translates into longer run times than NiCd. The unit that describes the amount of stored charge is the amp-hour (abbreviated Ah). NiCd batteries offer a maximum of 2.4 Ah, but NiMH maxes out at 3.5 Ah. As another plus, NiMH

chemistry uses no heavy metal, unlike NiCd. Two drawbacks: NiMH batteries cost 35% to 40% more than NiCd, and they typically exhibit drops in voltage as the battery discharges. You'll often notice this as a distinct loss of power while you're using the tool.

NiMH: LONGER RUN TIMES



It takes 15 cells, each rated at 1.2 volts, to produce the long run times of this 18-volt nickel-metal-hydride battery pack.

Enter Lithium-ion

Although some accounts would have you believe that Li-ion is a brand-new technology, it's really only new to power tools. Li-ion is the battery chemistry found in portable electronic devices such as cell phones, personal digital assistants, and laptop computers. It's also the technology that makes cardiac pacemakers possible, and it remains the power source of choice for implantable medical devices. To understand why Li-ion batteries are causing such a stir, you need to know a little about the internal construction of a tool's battery pack. If you took the housing off a pack, you'd discover that it's composed of a series of individual cells, as shown *previous page bottom*. With NiCd and NiMH chemistry, each cell produces 1.2 volts. The manufacturer then wires a number of cells together in series to produce the desired voltage. (By connecting 10 cells, the manufacturer produces a 12-volt battery.) So it's easy to see how increasing a battery pack's voltage quickly makes it larger and heavier.

On the other hand, each Li-ion cell produces 3.6 volts, so it requires only three cells to make 10.8 volts. The effect on tool size is dramatic: Bosch's 10.8-volt Lithion drill-driver weighs only 4 ounces more than just the battery from a competitor's 12-volt NiMH drill. If you're lugging around a drill all day, the weight savings makes a big difference.

NO-FADE POWER



Li-ion power doesn't fade, so there's no warning of a low charge. Most Li-ion tools have fuel gauges on the tool or battery.

Another advantage of Li-ion is that it holds its charge better than NiCd in storage: a distinct advantage to people who enjoy working with tools but don't do it every day, or even every week (for example, DIYers).

Of course, tool manufacturers are utilizing Li-ion technology to produce batteries comparable in size and weight to the traditional units, but with voltages higher than practical only a few years ago. So, there's a growing number of 24- and even 36-volt tools on the market. With these muscular battery packs, a whole new range of tools has become practical. Now, you can have a rotary hammer with legitimate power. And a circular saw with a 36-volt battery pack is an unmistakably serious tool.

USE A SMART CHARGER



A charger with a built-in fan, like this Ridgid model, cools the battery before and during charging, which prolongs battery life.

Batteries and chargers are getting smarter

Old-style chargers reenergized depleted batteries, but they sometimes also helped the battery to an early grave. That's because they couldn't recognize conditions that produced problems during the charging process. If you put an overheated battery onto the charger, for example, the unit would try to force the battery to take a charge that it was in no condition to accept. Some chargers now include refinements such as built-in fans to dissipate damaging heat. (See photo *top right*.)

Now, an intelligent battery pack (commonly available on Li-ion units) includes a computer chip that helps regulate the incoming charging current as well as the work-producing output. The chip tracks charge and discharge patterns, and records the first date of use for warranty purposes. Some battery packs even have easy-to-read "fuel gauges" that tell you how much of the charge remains in reserve. (See photo *top left*.)

Sources

Ryobi: 800-525-2579, ryobitools.com

Ridgid: homedepot.com

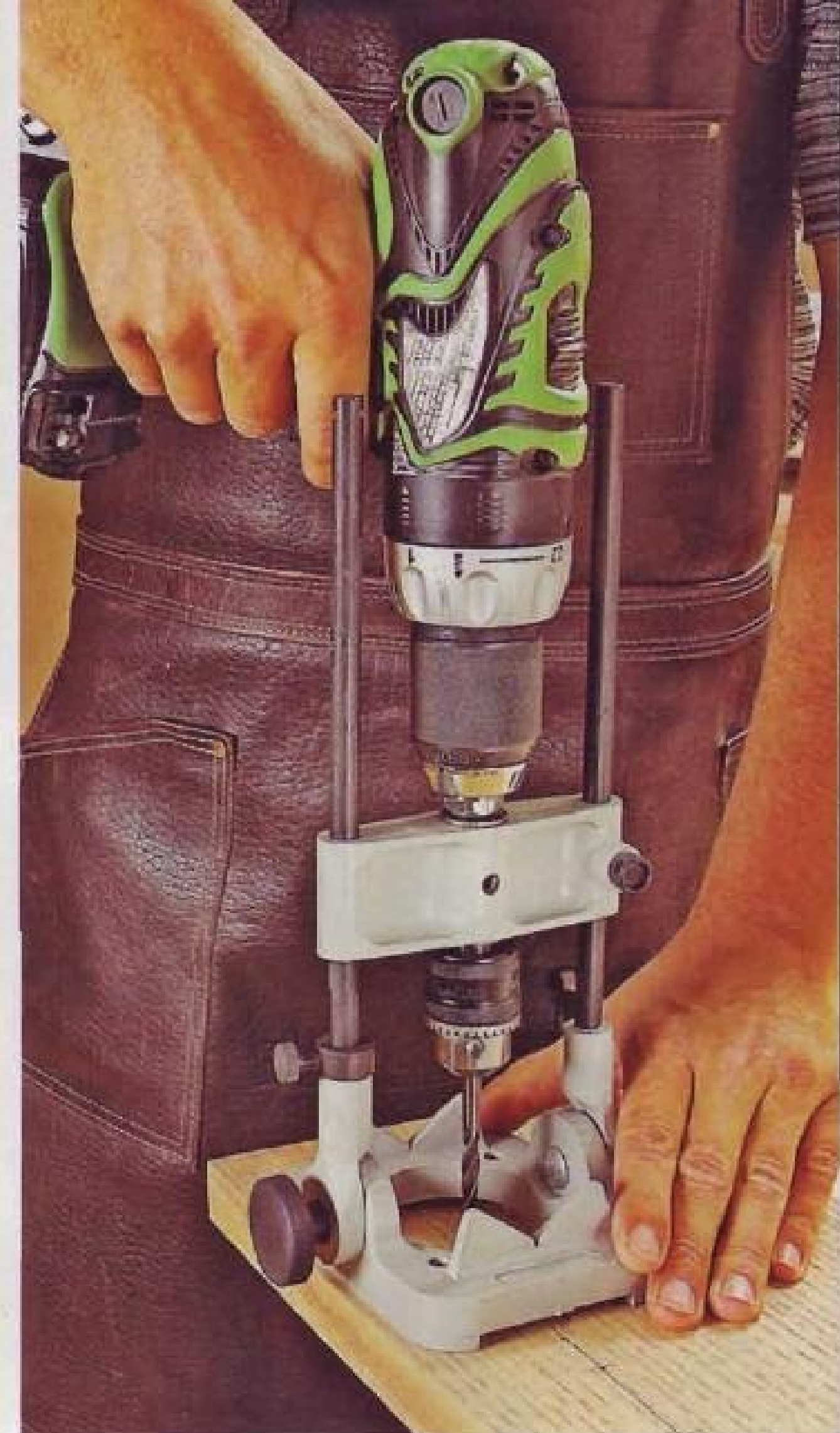
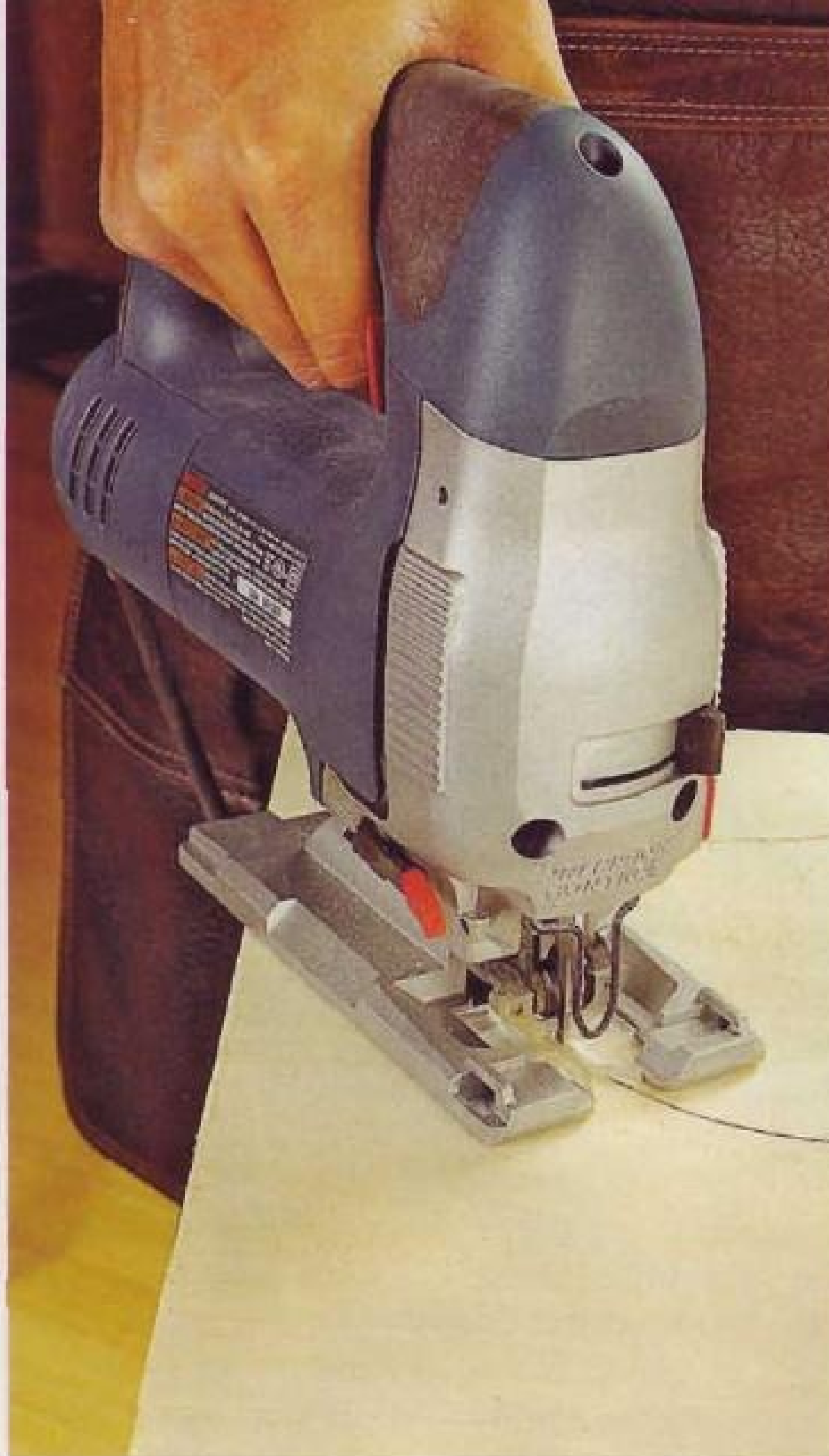
Milwaukee: 262-781-3600, milwaukeetool.com

Recycle used batteries

Even the best rechargeable battery has a limited lifespan, and after a while will refuse to accept a workable charge. Instead of trashing your old battery, take it to a retailer that serves as a collection point for the Rechargeable Battery Recycling Corporation (RBRC). Some of the better-known retailers include The Home Depot, Best Buy, Target, Circuit City, and others. To find the drop-off location nearest to you, contact RBRC by calling 800-822-8837 or visiting its Web site: RBRC.org.



Some manufacturers now sell tools, batteries, and chargers à la carte. You can add to the system later—and save money—by purchasing additional tools without a battery or charger.



Eking Precision from 3 Portable Power Tools

Many seasoned woodworkers see the tools *above* as the rough-work trio, not to be mentioned in the same breath with the word “precision.” Typically, woodworkers rough-size wood materials with a circ saw and finish-cut them on a tablesaw; or they rely on their bandsaw to cut curved parts, fearing they’d hack up workpieces with a jigsaw; or they view their cordless drill as a convenience—not nearly as precise as a drill press.

Discover shop-proven strategies to elevate your circ saw, jigsaw, and portable drill to the stratosphere of performance.

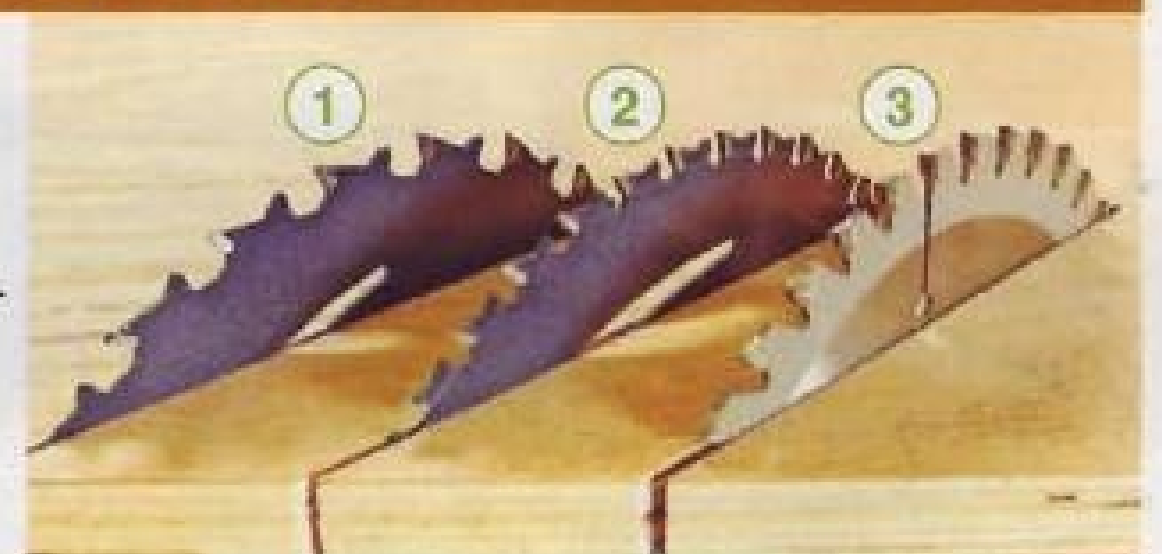
But what if you don’t own a tablesaw, bandsaw, or drill press? What if you don’t have the extra jack to buy these stationary power tools? Can you perform high-quality woodworking with the much-maligned trio? The answer: Absolutely! With the right accessories, bits, blades, and a shop-made helper or two, improved—if not flawless—precision is well within your grasp. Here’s how to turn these “go-away” tools into “go-to” superstars.

Get clean, straight cuts with your circ saw

Crosscutting, ripcutting, and bevel-cutting along a straight line sum up the circ saw’s role. To ensure success, equip the tool with a quality blade, matching it with the material and type of cut (see *right*), and adjusting the blade depth $\frac{1}{8}$ " below the work.

Carbide saw-blade savvy

① If you’re cutting softwood, softwood plywood, and MDF or ripcutting hardwood, a standard or thin-kerf 24-tooth, $7\frac{1}{4}$ " combination blade will deliver a respectable cut. It has an aggressive 20° tooth hook and costs about \$15. ② For a fine-finishing blade to cut hardwood and hardwood veneer plywood, pay a few bucks more for a 40-tooth, hard-body thin-kerf blade. Costing around \$30, its 12° tooth angle cuts less aggressively, leaving few splinters. ③ A standard-kerf 40-tooth blade, with its 20° tooth hook, delivers the cleanest cut, only at a slower rate. Price: about \$45.



Troubleshooting problems

Alignment woes. Do a two-step to tune up your saw for spot-on accuracy. First, square the saw's baseplate to the blade. With the tool upside down (and unplugged), loosen the blade-depth lock. Lower the blade, and lock it into place. Then, retract the blade guard. Fit a square snugly against the blade body and baseplate sole (**Photo A**). Adjust and lock the baseplate to square.

Also, using an adjustable square, check whether the baseplate edge is parallel to the blade (**Photo B**). If you detect a difference from the front to back, adjust the baseplate. If you can't adjust the baseplate, add a shop-made zero-clearance subbase discussed under **Splintering and tear-out** below.

Finally, using a drafting triangle, check the calibrations on the blade-angle scale at 30° and 45°. If your scale is off, incise these intersections with a sharp blade or nail for speedy reference later.

Kickback and wavering cuts. It's scary when a circ saw jumps back during a cut. You fear injury and chewing up the workpiece. Many factors lead to kickback: a lack of stock support, which causes the material surrounding the saw to bind the blade; a forced feed rate; or a hung-up cord. As shown (**Photo C**), it pays to equally support material on both sides of the cutline and—if needed—clamp the workpiece down to prevent it from moving when sawing. Using sawhorses and sacrificial 2x2s under the workpiece provide a cheap solution. Also, don't force the saw; you'll know when the motor slows. Drape the cord over your shoulder so it doesn't catch and yank the saw off course.

To correct wavering or binding freehand cuts, make a straightedge guide customized to your saw, like the one at *right*. Another option: Buy a clamp-on tool guide with a circ saw subbase, as shown *previous page, top left*. Such systems prevent the tool from straying from the cutline. (See other helpful shop guides from **WOOD**® magazine at woodmagazine.com/toolguides.)

Splintering and tear-out. Unlike a tablesaw blade, the teeth of a circ-saw blade cut from the bottom up, so it's the top face of a workpiece where splintering typically occurs. For this reason, place the good face of your workpiece down. Tear-out occurs when the blade exits the edge of the workpiece, creating large splinters. Several strategies can eliminate these problems (**Photo D**). Beyond adding a sharp blade, they include pressing masking tape over the cutline; securing a scrap backer block where the saw blade exits the work; and attaching a zero-clearance, ¼"-thick hardboard subbase to the saw's sole, ensuring that the subbase edges parallel the blade.

When sizing the subbase, make it the same length as your tool's sole, but make the width between the blade and subbase edge a whole number, such as 6", and you'll save time setting up for a cut by not having to deal with fractions. Once you've cut the subbase, secure it with countersunk screws, washers, and nuts, or cloth-backed double-faced tape. Another strategy: Score the cutline with a knife (**Photo E**).

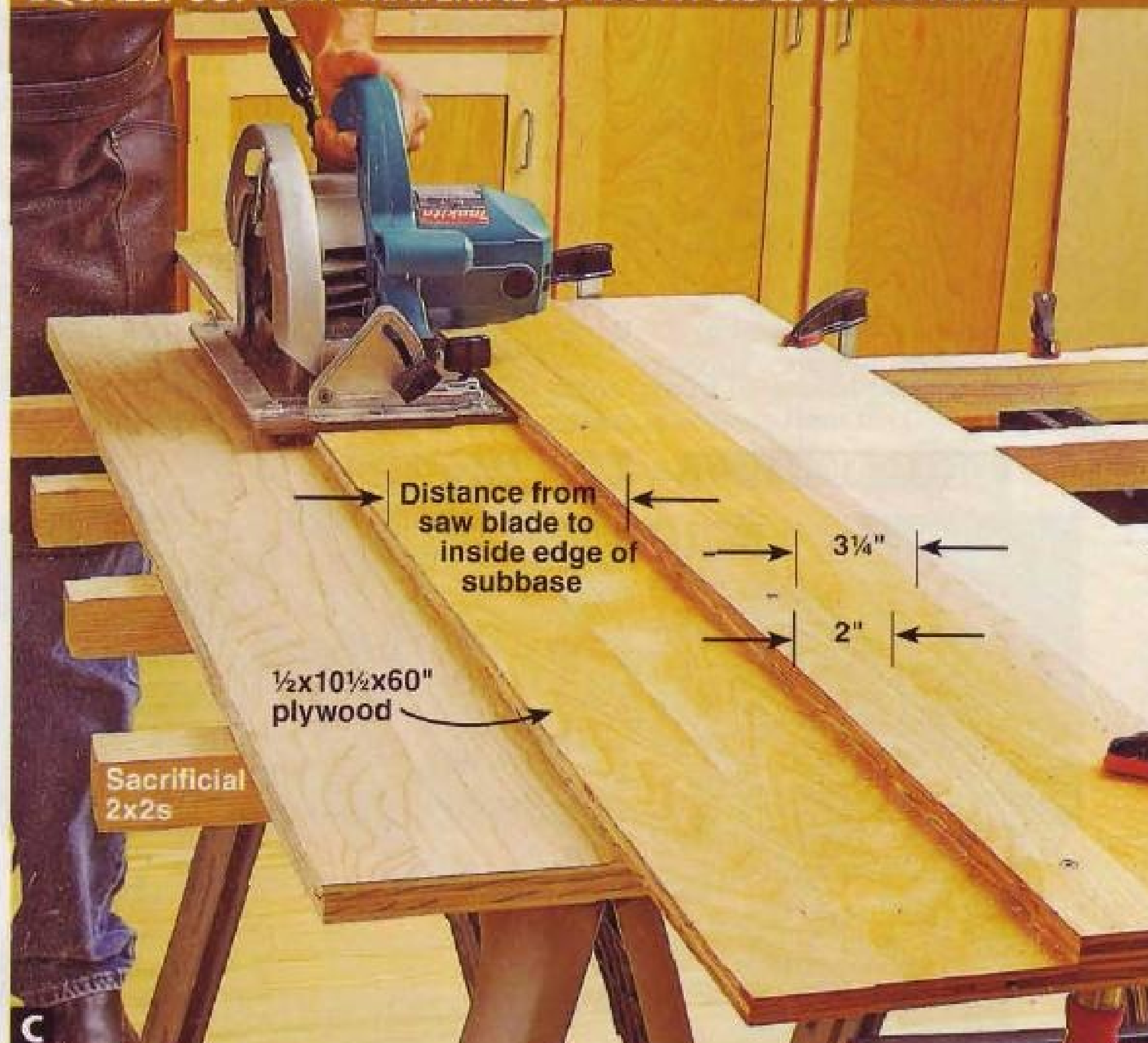
SQUARE THE BASEPLATE



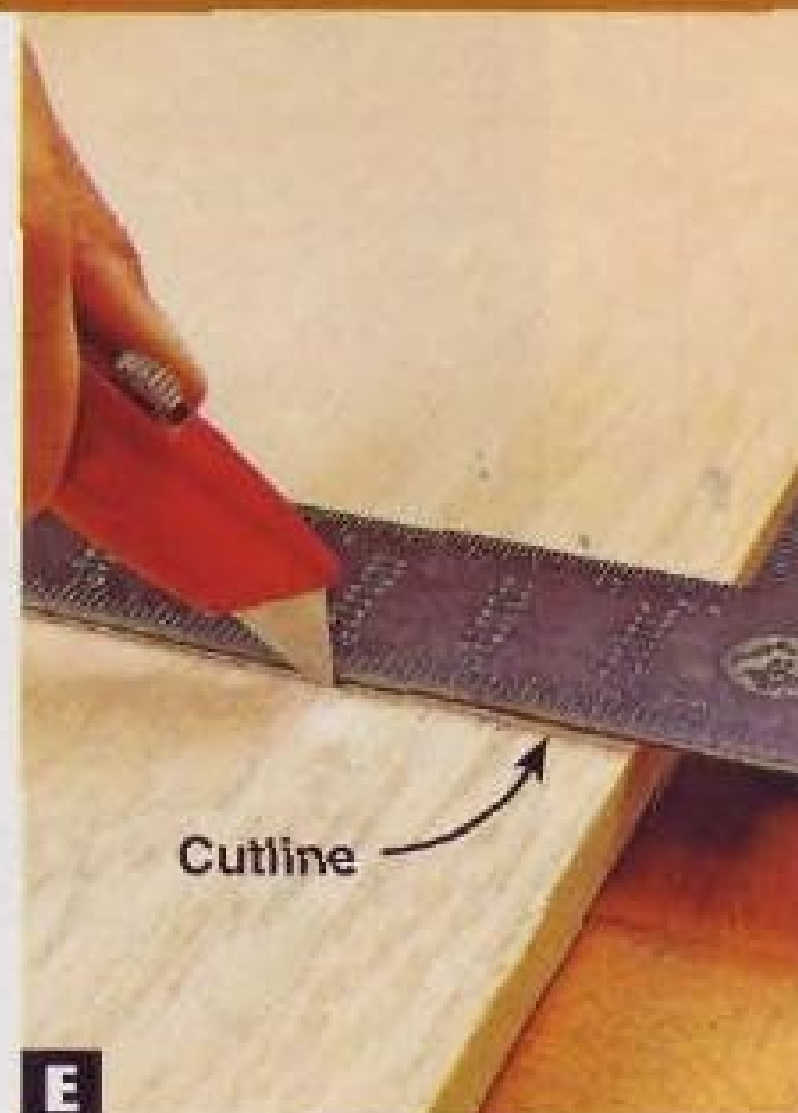
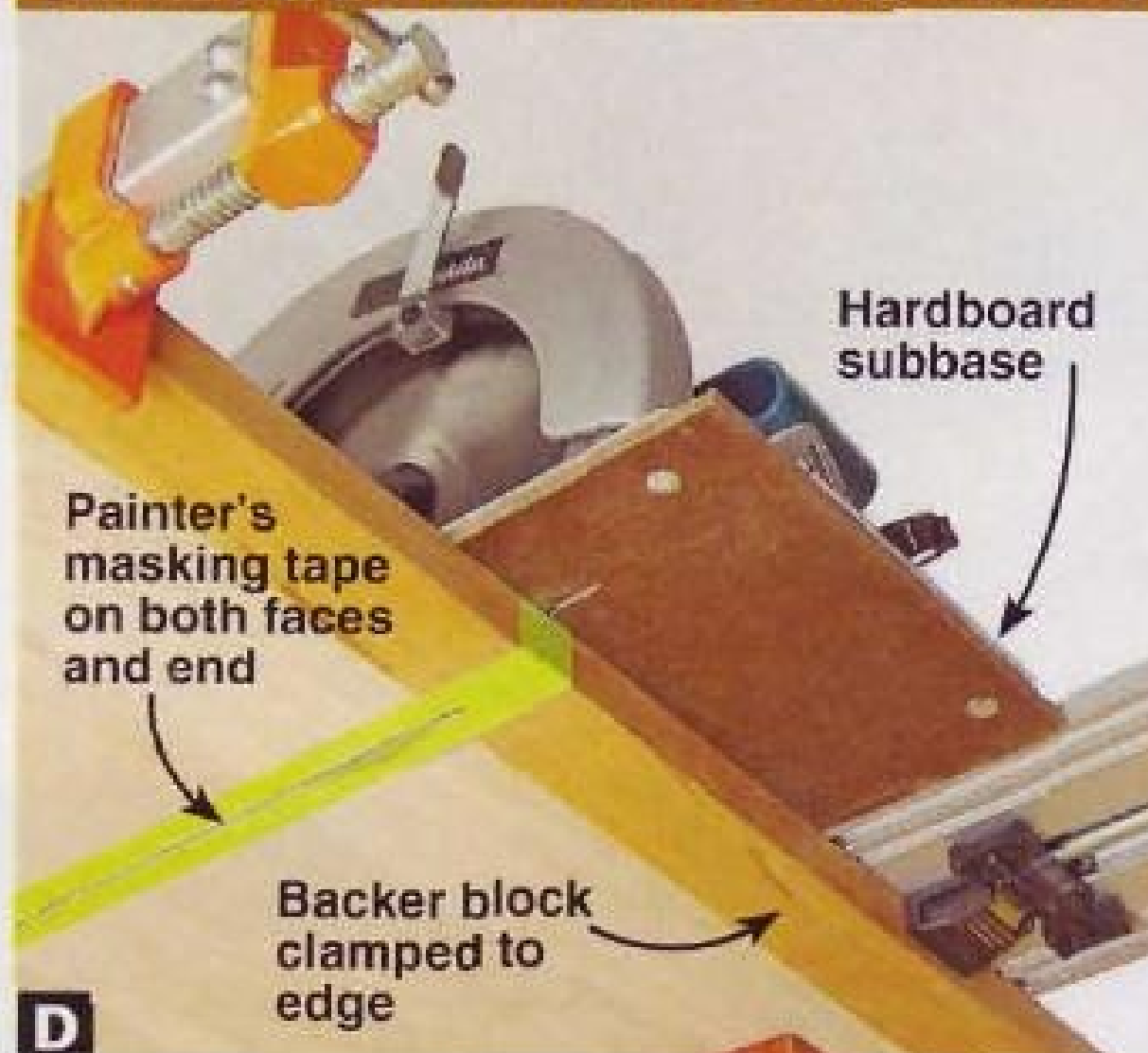
CHECK BLADE ALIGNMENT



EQUALLY SUPPORT MATERIAL ON BOTH SIDES OF CUTLINE



ELIMINATE SPLINTERING AND TEAR-OUT



Make your jigsaw a curve-cutting specialist

Guide roller
Anti-splinter insert
Control guide

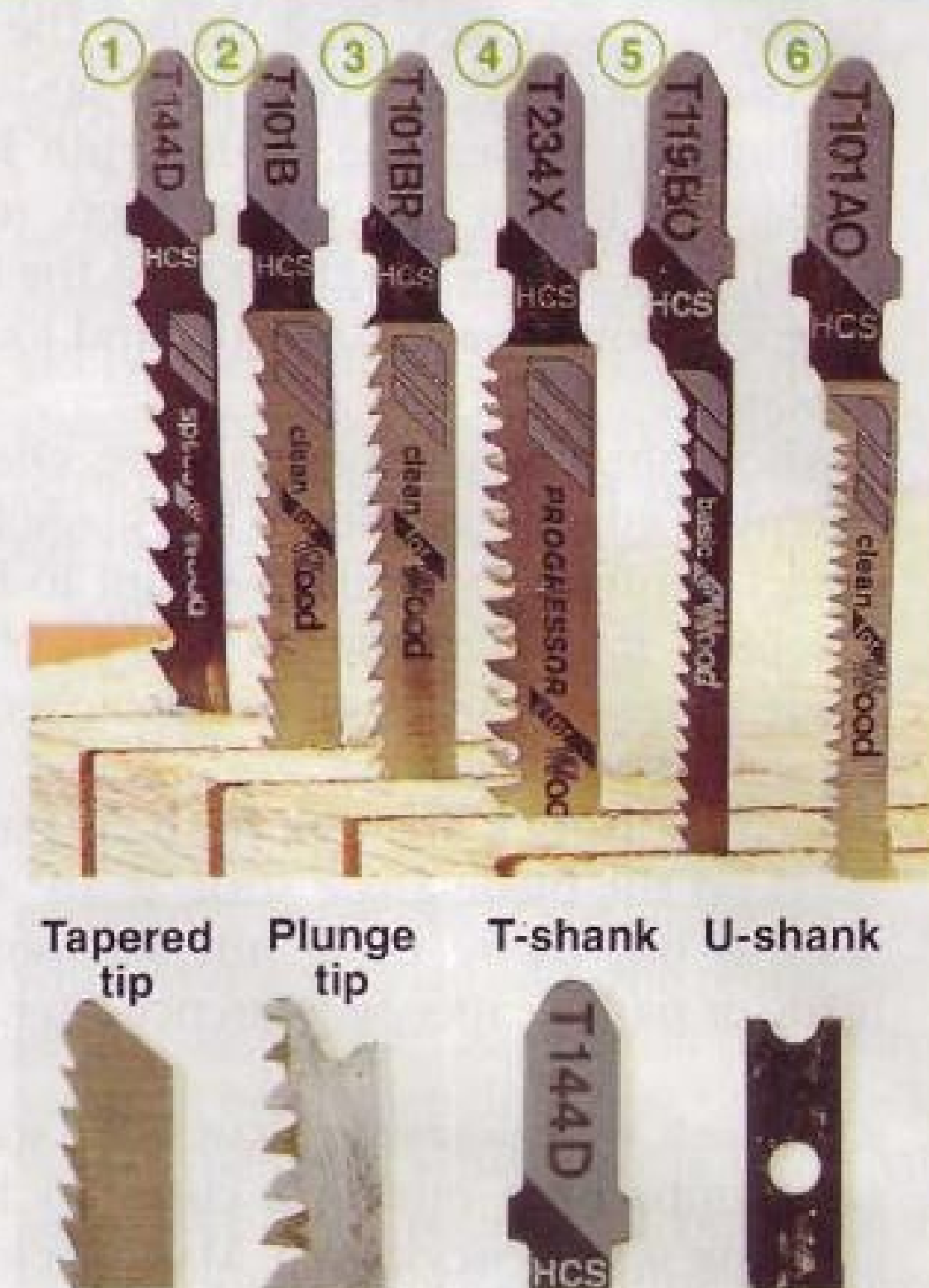
You can't make a good cut with a cheap, down-and-dirty jigsaw, regardless of blade style or quality. A good tool features guide rollers behind the blade to provide support and keep it from deflecting. Some Bosch jigsaws (see *above*) also include precision control guides that contain the blade along both sides. A lock-on button, sawdust blower, variable speed, and straight/orbital cutting options also help deliver a quality cut when matched with the workpiece thickness and material. (The less orbital cutting action, the cleaner the cut.) Still one more feature is an anti-splinter insert in the baseplate, serving as a zero-clearance subbase.

When selecting blades, choose one based on the material you intend to cut, its thickness, and the type of cut. The teeth per inch (tpi) of a wood or plywood jigsaw blade ranges from 6 tpi (coarse) to 20 tpi (fine), with 6-tpi blades being fast and aggressive. Ground, close-set teeth yield clean, precision cuts, while narrow blades excel at turning sharp corners. As the name implies, rely on plunge-tip (and not tapered-tip blades) for plunge cuts.

Also, expect to find two styles of upper-blade ends: T-shank and U-shank. This describes the part that inserts into the tool. Of these, the T-shank blades hold more securely in jigsaws that accept them.

Best blade choices

- ① 6 tpi for fast, coarse cuts; ② 10 tpi for straight, fine cuts; ③ 10 tpi reverse-tooth for straight, splinter-free cuts on the surface where the blade exits the workpiece; ④ progressive-tooth with graduating tpi for fast, clean cuts in thick and thin material; ⑤ 12 tpi for narrow, curved cuts in woods; ⑥ 20 tpi for fine, narrow curved cuts in woods and plastics.



DEFLECTION



ROUGH FIELD CUTS



DRILL BLADE-START HOLES, THEN ADD STRAIGHTEDGE



Troubleshooting problems

Blade deflection and saw marks. Deflection occurs when the blade bends to the right or left of the cutline [Photo A], leaving an unsquare edge and, in severe cases, ruining the workpiece. Saw marks leave rough edges. Choosing the right tool and blade are part of the solution, as well as using a straightedge to guide the saw along for straight cuts. When cutting curves, stay $\frac{1}{16}$ " outside the cutline. Clean up curved cuts with a drill-press-mounted sanding drum (concave cuts) or with a disc sander (convex cuts). Or, make a hardboard template of the cut edge and use it, along with a router and flush-trim bit, to true the edge.

Splintering and tear-out. Cure these with the same techniques described on the *previous page* used to reduce splintering and tear-out with a circ saw. Score and/or tape cutlines, employ backing materials, and use a zero-clearance subbase or anti-splinter insert.

Kickback. Culprits here: binding due to a lack of stock support, wrong blade speed and feed rate, a bent blade, or a hung-up cord. Make practice cuts in scrap to determine the ideal blade speed and feed rate. Then, use the circ saw tips on the *previous page*.

Rough field cuts. Simple solutions apply when you cut out an opening in the middle of a workpiece. For fast plunge cuts, insert a plunge-tip blade into the jigsaw, turn on the tool, and slowly tilt the blade into the waste side of the workpiece (Photo B). For more precision, drill blade-start holes at the opening corners to accommodate the jigsaw blade. Next, clamp a straightedge into place, insert the blade into a hole, and begin cutting (Photo C).

Bore splinter-free precision holes with your portable drill

For project building, a lightweight, cordless 12- or 14.4-volt variable-speed drill with a keyless chuck provides all the torque and freedom you'll need. Having two is better, allowing you to drill pilot holes with one and drive screws with the other without the fuss of changing bits.

Although twist bits win the popularity contest in most shops, you can achieve splinter-free results, greater accuracy, and more versatility with the four choices shown at right. Note, too, that to maximize control, the larger the bit, the slower the speed.



Four precision bits: ① Single-flute countersink (no. 145636, set of 4 for #4-#10 screws, about \$40, Woodcraft, 800-225-1153 or woodcraft.com); ② brad-point; ③ Forstner for holes up to 1½"; and ④ Vix for self-centered holes in hinge-mounting holes (no. and price vary, McFeely's, 800-443-7937, or mcfelys.com).

Troubleshooting problems

Unintentionally angled holes. To err is human, and nothing proves the point more than when trying to drill a hole at a right angle into a workpiece with a handheld drill. You can, however, reach perfection with a handheld drill using these two strategies. The simple shop-made jig (**Photo A**) offers a clear view of the hole location while guiding the bit through the vertical hole in the jig's center. (You may need a drill press to drill the 90° guide hole through the jig.) Or, buy an inexpensive adjustable drill guide (**Photo B**) (no. DG-3637, about \$53 at McFeely's). Attached to the chuck, it lets you drill 90° or angled holes and, stopped holes, as well as centered holes in dowels and board edges (**Photos B and C**). Just be sure to have a firm grip on the guide's handle before aligning the bit and drilling holes.

Break-out. There's not a single good thing you can say about splinters. They're a thorn in a woodworker's...let's not go there. Speaking of backsides, backing a planned drill hole proves an effective deterrent here. To stop break-out both where the bit enters and exits, make a sandwich using scrap (**Photo D**).

Inconsistent hole depths. Many people use masking tape to achieve repeatable-depth holes in wood. And although this puts you in the ballpark, it doesn't knock it out of the park if your goal is dead-on accuracy. Unfortunately, masking tape slips. Your best bet: no-mar stop collars (**Photo E**). (Order 908-298, set of 6, ⅛"-½", about \$27, Woodworker's Supply, 800-645-9292, or woodworker.com.) These accessories secure to the bit using an Allen wrench. A polymer boot at the base of the stainless-steel collar prevents burning or burnishing the wood.

Bit clogging. Drilling deep holes often causes sawdust to jam the channels in a brad-point or twist bit. Carefully dig the dust jam out with a nail tip to avoid burning and polishing the hole sides, which makes them less than ideal for gluing plugs or dowels. 🌲

JIG WITH A VIEW



DRILL GUIDE FOR DOWELS



DRILL GUIDE TO CENTER HOLES



BACKING SANDWICH

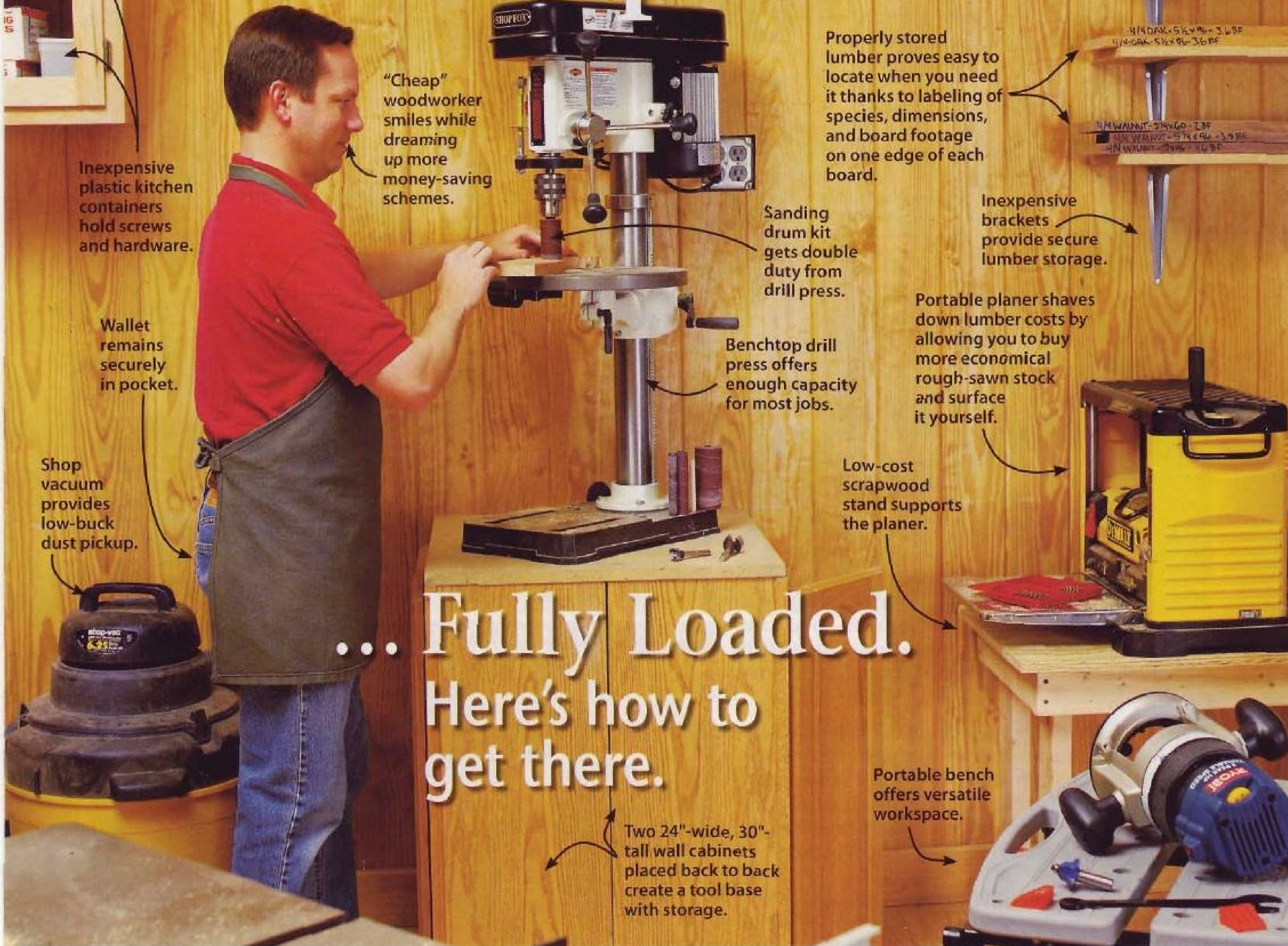


NO-MAR STOP COLLARS



Written by **Jim Harrold** with **Kevin Boyle** and **Jeff Mertz**

The Ultimate Cheap Guy's Workshop...



Inexpensive plastic kitchen containers hold screws and hardware.

Wallet remains securely in pocket.

Shop vacuum provides low-buck dust pickup.

"Cheap" woodworker smiles while dreaming up more money-saving schemes.

Sanding drum kit gets double duty from drill press.

Benchtop drill press offers enough capacity for most jobs.

Properly stored lumber proves easy to locate when you need it thanks to labeling of species, dimensions, and board footage on one edge of each board.

Inexpensive brackets provide secure lumber storage.

Portable planer shaves down lumber costs by allowing you to buy more economical rough-sawn stock and surface it yourself.

Low-cost scrapwood stand supports the planer.

Portable bench offers versatile workspace.

Two 24"-wide, 30"-tall wall cabinets placed back to back create a tool base with storage.

... Fully Loaded. Here's how to get there.

Convinced that you have to spend big bucks on industrial-quality gadgets and shop furnishings to get great results? Think again. When you make smart choices, you really can outfit your shop on a shoestring budget. The secret: Buy what you need, when you need it, and don't spend money on unnecessary luxuries. Take a look at a pro's woodworking shop if you want proof. There, every tool has to earn its keep. Read on to see how you can make yours do the same, and how to squeeze the most from every cent without scrimping on quality.

Start with the essentials

Woodworkers often debate which tools to buy when setting up shop. Here's our take on prioritizing your purchases. The list includes stationary machines, portable tools, and other essentials. (We'll assume you already have common tools such as a cordless drill, a jigsaw, and a shop vacuum.)

✓ **Anchor your shop with a tablesaw.** This versatile tool sits at the heart of most shops. It rips and crosscuts, dados, rabbets, cuts tenons, and does much more. Because this is your core tool,

invest a few bucks. Stay away from ultra-low-end benchtop saws (priced from about \$100 to \$200). They offer little power or precision.

At minimum, buy a basic contractor-style saw or a high-end benchtop model for \$400 to \$700. They offer reasonable power and accuracy, and accept accessories.

Up the ante to around \$1,000, and you're in cabinet-saw country, *opposite top*. Or, for that same money, get a contractor's saw equipped with a 1.5-hp, 120/240-volt motor, and a 36" fence. A saw in either of these categories may be the only one you'll ever buy.



Tablesaw bargains abound at several price levels. As an example, less than \$1,000 buys this Grizzly G1023SL, a saw we've tested and admire. It has a 240-volt, 3-hp motor, an accurate fence, and cast-iron wings.

An accurate rip fence is worth its weight in gold, so make sure you get a good one.

When you set your saw budget, allow at least \$50 for a high-quality 40- to 60-tooth combination blade. Doing this means you won't sacrifice wood to chip-out and burns.

After you get that saw, sink a router-table insert into its extension table. By doing this, you eliminate the cost of a separate stand, and save floor space. You can even get double duty from your tablesaw rip fence by building a slip-on router-table fence.

✓ Multi-base routers play many roles.

The router is one of the most versatile shop tools. And today, you get more router for your money than ever, as shown *below*.

A router is useless alone, of course, but you can buy bits in batches to save money. If you use a bargain-price bit enough to wear it out, replace it with a higher-dollar version that will yield longer service.

✓ Pay out for layout tools.

You can only cut as accurately as you mark, so devote a few dollars to good-



\$175 to \$250 buys a full-featured router with multiple bases (fixed, plunge, and, in some kits, a D-handle base). Table-mount one base, and use the others for freehand work. Add a bargain bit set—this 66-piece pack costs less than \$200—and you're ready to rout.



You can tackle most layout chores with a tape measure, combination square, 6" steel rule, compass, and a mechanical pencil. To handle tougher tasks, add a sliding bevel gauge, caliper, protractor, and a 45° triangle.

quality measuring and marking tools. Many elaborate gadgets exist, but skip them. The few basics, *above*, will suffice.

✓ Work out a workspace.

Now that you can transform lumber into project parts, you need a place to work with them. A full-blown cabinet-maker's bench would be ideal, but you can do a lot with a folding work station; a solid-core door thrown on sawhorses; or a simple shop-built bench, such as the one shown *below*.



A workbench must be flat, sturdy, and stable. To make yours more useful, incorporate a vise and bench-dog holes that ease holding chores. Purchase plans for this easy-to-build bench at woodmagazine.com/workbench.

✓ Get a grip on good clamps.

A woodworker can never have enough clamps, but just a few will get you started. Bar or pipe clamps still rule for versatility, and are the favorite for gluing panels. Build an inexpensive but expandable set by getting a half dozen pipe-clamp heads, plus some 24" sections of pipe and pipe couplers. That way, you can arrange the clamps' lengths to suit your needs.

One-handed clamps are handy, too, so augment your collection with a few

of these in the 12"-24" range. As your budget allows, pick up more clamps to fill your set.

✓ Sail into smooth sanding.

If you can only have one sander in your shop, make it a random-orbit model, *right*. Fit it with coarse paper to remove stock aggressively, and with fine-grit paper to leave smooth, scratch-free finishes. You can pick one up for as little as \$35.

The pad on a random-orbit sander rotates and moves in an orbital motion to blend the scratches into a hard-to-see pattern.



✓ A drill press comes next.

Modern hand drills are wonders of power and versatility, but for ultimate accuracy and control, you need a drill press. For 90 percent of projects, a bench-top model will do, which can save \$100 or more over buying a floor model.

Devote those savings to a set of twist bits, imported Forstner-style bits, and a sanding drum kit. You can even get a mortising attachment that bolts on when you need it.

✓ Next pointer, get a jointer.

You may think you need a jointer, *below*, only if you purchase rough stock. Or you might be tempted to buy one of those gadgets that's supposed to joint edges using your router. But a jointer is no luxury item. With one you can remove saw-blade burn marks, dress edges for perfect glue-ups, and, on many models, cut rabbets. Most important, though, a jointer is the *only* tool that can reliably flatten the face of a board.

Even if you don't take full advantage of a jointer's abilities, you'll appreciate how quickly it prepares boards for perfect ripping and gap-free glue-ups.



Still ready to spend? Now consider these contenders

With the tools on the previous pages, plus your jigsaw and drill, you have all you need to build most projects. Eventually, though, you'll want two additional power tools.

✓ Plan for a planer.

A planer, *below*, saves money on lumber because you can buy rough-sawn boards, then mill them to finished dimension. Plus, owning one allows you to work with lumber thicknesses unavailable at your home center.

Be aware that a planer will create a huge mess of flying chips. Some newer models offer built-in chip collectors that will save you the expense of investing in a dust collector until your shop budget allows for it.



A portable planer offers ample power and enough width capacity (usually 12-13") to handle all of your lumber-surfacing needs. This model collects its own chips in a bag.

✓ Now, bring on a bandsaw.

Not all woodworking involves making straight cuts. A handheld jigsaw can negotiate many curves, but, eventually, you'll want a bandsaw, *below*. In our opinion, a 14" model offers the most bang for your buck to handle home-shop needs.



A bandsaw shines at cutting curves, and can also rip, resaw, cut circles, and even mill short, small-diameter logs into lumber.

With all of these tools and machines on hand, you'll be set for most tasks. Now, you can add specialized tools as your budget permits and projects require. Read "The next wave," *right*, to see what you may want to purchase next.

Time to get Organized

Getting the most from any workshop requires keeping it clean by creating places to stash all your stuff. But don't assume that storage has to be fancy or costly to be effective. Try these pointers.

✓ Scrounge up some cabinets.

You can create great storage without spending a dime if you keep your eyes open for discarded kitchen cabinets. Neighbors, friends, and contractors working on a remodeling project are often happy to get rid of them.

Once you get the cabinets in the shop, use them creatively. The drill press in the photo on *page 122*, for example, sits on two wall cabinets. They position the drill press at working height and provide about 8 cubic feet of enclosed, dust-free storage. Kitchen base cabinets serve well as workbench bases in the shop.

Make the cabinets more functional for shop use by building in cubbies or extra shelving, or adding perforated hardboard to the insides of the doors. Throw on a coat of gloss paint to lend a finished appearance to tattered or mismatched cabinets.

✓ Keep your lumber in line.

Lumber leaned against walls or stacked underfoot quickly becomes disorganized or falls victim to damage. Store those boards right by mounting simple metal shelf brackets, as shown on *page 122*. (We purchased ours at a hardware store for a meager 75 cents each.) Each shelf will easily support six to eight boards. Use four or five metal brackets—screwed into the wall studs—for each shelf, and space the shelves about 8" apart. Finally, lay particleboard over the brackets.

The next wave

Obviously, many more tools and accessories exist to make your woodworking easier, faster, and more refined. After securing the tools covered in this article, buy these next:

Hand tools:

Bench chisels
Block plane
Dead-blow mallet
Japanese-style handsaw
Cabinet scraper

Stationary tools:

Dust collector and air filter
Compound mitersaw
Belt/disc sander
Oscillating spindle sander
Scrollsaw
Lathe

Portable power tools:

Biscuit joiner
Belt sander
Handheld circular saw
Second router

Accessories:

Mobile tool bases
Roller stand/outfeed support
Pocket-hole jig
Dovetail jig
Marking gauge

These short stacks prove easy to sort through when you need a board, especially if you mark the stacks (*page 122*).

More ways to squeeze the most from your budget

✓ Save some coin on clamps.

Want to reduce your need for clamps? Try securing glued-up assemblies with a few air-nailed brads, *below*.

You can get a compressor and brad nailer kit for under \$200, the price of just a few decent-quality bar clamps. If you already have a compressor, the investment for a nailer may be as little as \$40.



A pneumatic air nailer drives a brad into joints without splitting the wood, and holds the assembly while the glue sets.

✓ Add lumber purchasing power.

Buying lumber doesn't qualify, strictly speaking, as part of shop setup. But building anything in a shop proves pretty tough without boards. Why not make them less expensive by purchasing in lots of 100, 250, or even 500 board feet? Pros do it, and so can you, by getting a group of friends or club members together. You may be able to mix species and still earn discounts. 🌲

Written by **David Stone**

Best-Ever Plans for Your Home

View over
1,000+
more plans at
woodmagazine.com/plans

from the editors of **WOOD**® magazine



**Entry-Area
Bench & Shelf**
Plan DP-00509 \$5.95



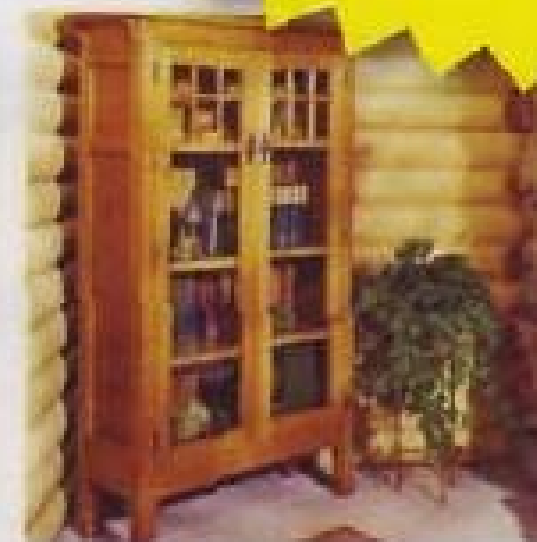
**Home/Shop
Storage Cart**
Plan DP-00561a \$6.95



Mission Bookcase
Plan DP-00563 \$8.95



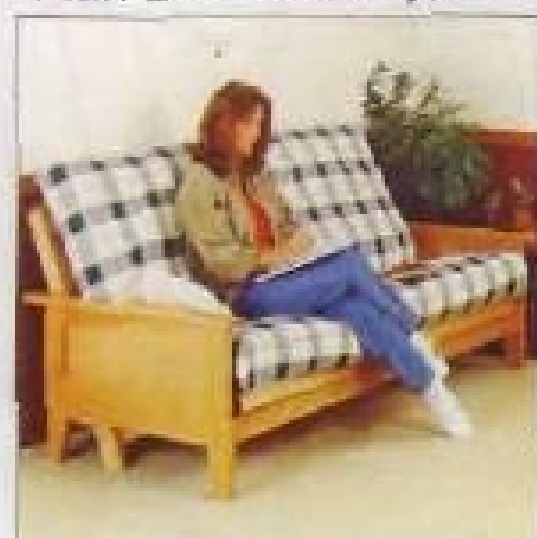
Entertainment Center
Plan DP-00092 \$9.95



Arts & Crafts Bookcase
Plan DP-00080 \$10.95



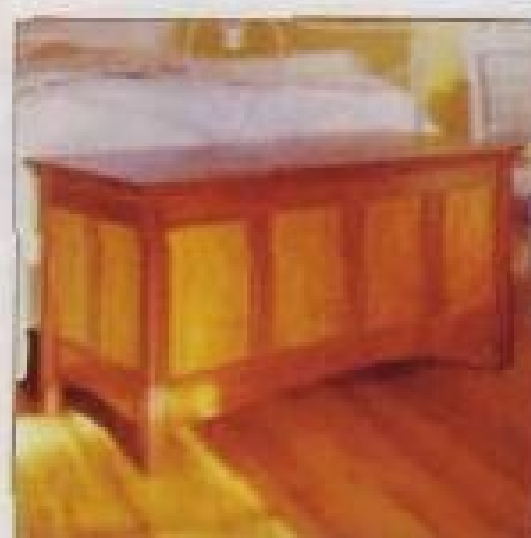
**All-in-order
Storage Bins**
Plan DP-00558a \$5.95



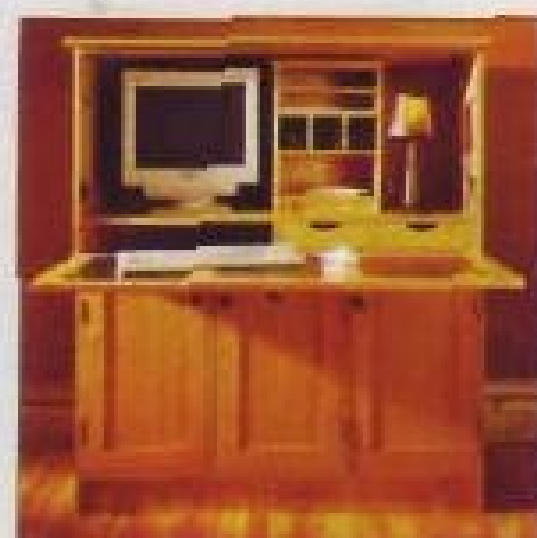
Fantastic Futon Bed
Plan DP-00025 \$8.95



Futon Table
Plan DP-00026 \$8.95



Heirloom Hope Chest
Plan DP-00190 \$7.95



**Hideaway
Computer Desk**
Plan DP-00192 \$9.95



**Compact
Entertainment Center**
Plan DP-00474 \$9.95



**Towering Tomes
Bookcase**
Plan DP-00108 \$8.95



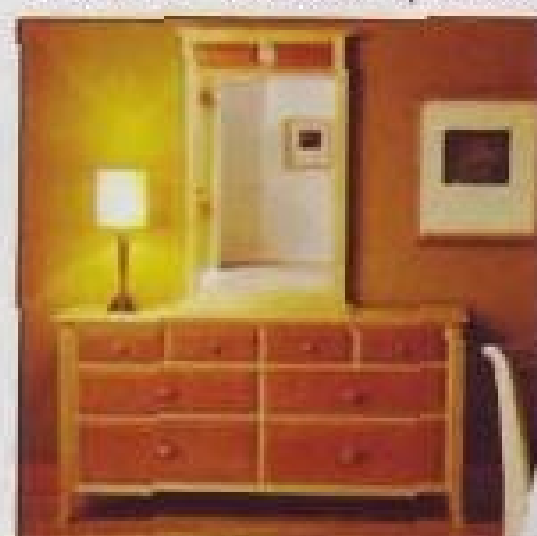
Country-fresh Bed
Plan DP-00081 \$8.95



Country-fresh Dresser
Plan DP-00008 \$8.95



Five-Drawer Chest
Plan DP-00010 \$8.95



Eight-Drawer Dresser
Plan DP-00172 \$9.95



**Armoire/TV
Entertainment Center**
Plan DP-00171 \$9.95



Stackable Bins
Plan DP-00547a \$3.25



Mission Bed
Plan DP-00424 \$9.95



Mission Dresser
Plan DP-00440 \$9.95



Mission Blanket Chest
Plan DP-00446 \$8.95



Mission Nightstand
Plan DP-00433 \$7.95



**Cedar-lined
Blanket Chest**
Plan DP-00534 \$7.95



**Heirloom Corner
Cabinet**
Plan DP-00527 \$9.95



3-in-1 Bed for All Ages
Plan DP-00524 \$9.95



Wine Cabinet
Plan DP-00517 \$5.95



Heirloom Bookcase
Plan DP-00513 \$11.95



China Cabinet
Plan DP-00502 \$12.95



Shelves for Show
Plan DP-00540 \$8.95



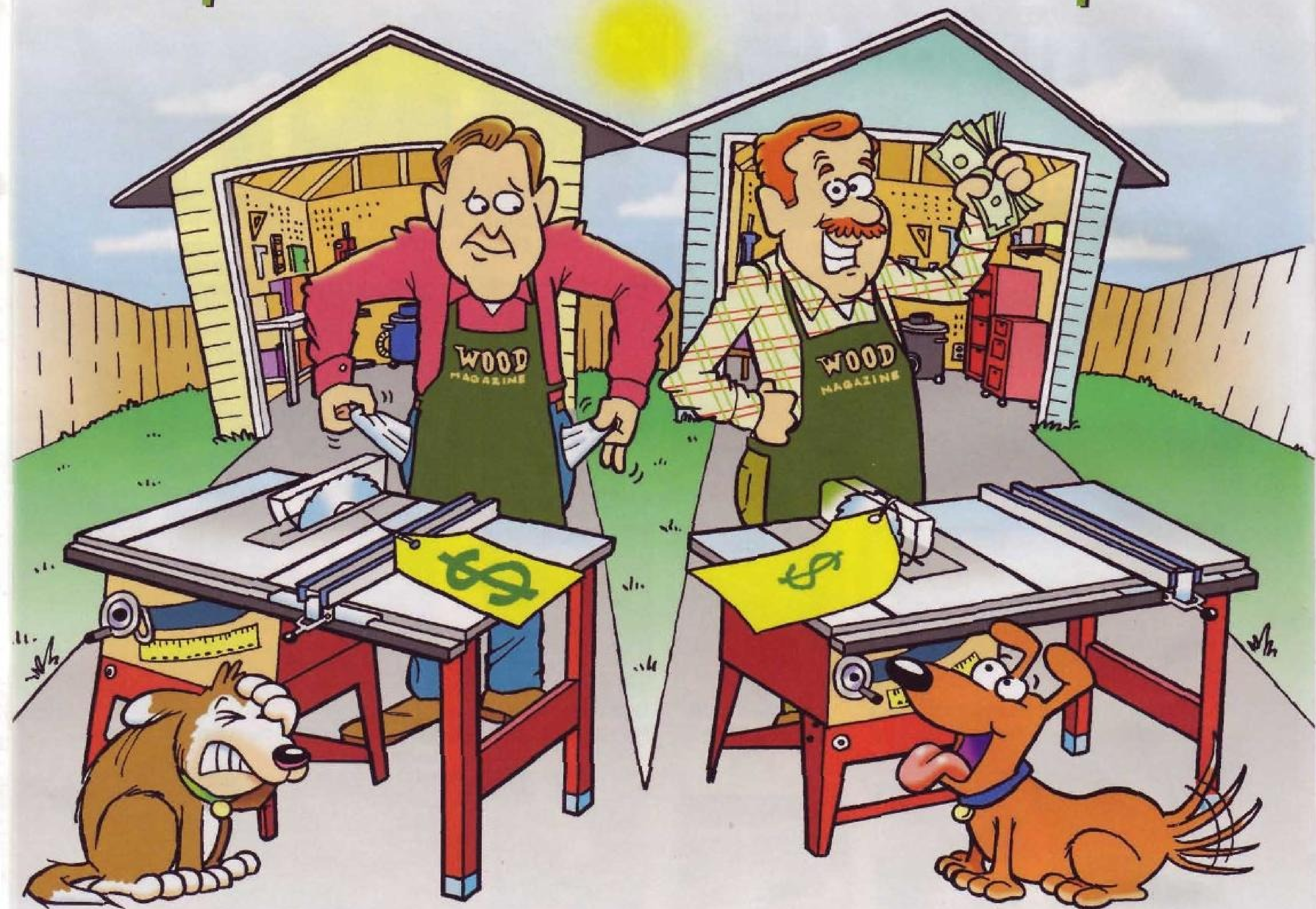
Chimney Cupboard
Plan DP-00494 \$7.95

Download any of these woodworking plans for the prices listed, or view a larger image, at woodmagazine.com/plans

To have paper plans mailed directly to you (add \$3 per plan S+H), call **toll-free 1-888-636-4478**.

Please have your credit card available.

BIG Bucks Save on Tools



You don't need to be rich to outfit a smart shop—you just need to shop smart. Here are 14 money-saving strategies to help you get the most bang (and whirr, and hummm, and buzzz) for your tool-buying buck.

Recognize good deals

1 Do your research before you buy. Watch Sunday newspaper ads, study tool catalogs, and make mental notes as you peruse tool stores and home centers so you can identify a real bargain when it comes along. Don't be fooled by comparisons to "list prices," which are sometimes as much as twice the normal selling price. And have patience: Today's gotta-have gadget

may be a why-bother tool next year. You also may find that the price of a newly introduced tool drops after the newness has worn off or when the manufacturer replaces it with an updated model.

2 Opt for multifunction tools or bonus accessories. A drill press that comes with a mortising attachment, for example, will save you from buying a dedicated mortiser, at least for a

while; likewise, a tablesaw that comes with a high-quality blade. A hammer drill can be used for ordinary drilling, too, and doesn't cost much more than a non-hammer drill. Some wise-buy tools do more than one job equally well. For instance, Shop Fox (shopfox.biz) sells a benchtop drill press that doubles as an oscillating spindle sander; Ridgid's (ridgid.com) edge-belt/spindle sander works equally well on both flat and curved edges.



3 Check mail-order sources. Because they lack a distributor network, manufacturers that sell directly to consumers usually can offer tools at lower prices. But make sure you're dealing with a reputable firm. Some companies, such as Grizzly (grizzly.com), will provide you with customer references upon request.

4 Buy the best you can afford, and the cheapest you can find. You'll only cry once when you buy a top-grade tool. On the other hand, a cheaply built tool may not cut or hold its accuracy well, and your joy over the initial savings may give way to tears of frustration each time you use it.

But be realistic—you don't always need to buy the best. If you think a pneumatic brad nailer will come in handy, purchase a \$20 model, and use it up. Even if it lasts for only a handful of projects, you can buy five inexpensive brad nailers before you outspend a \$100 nailer.

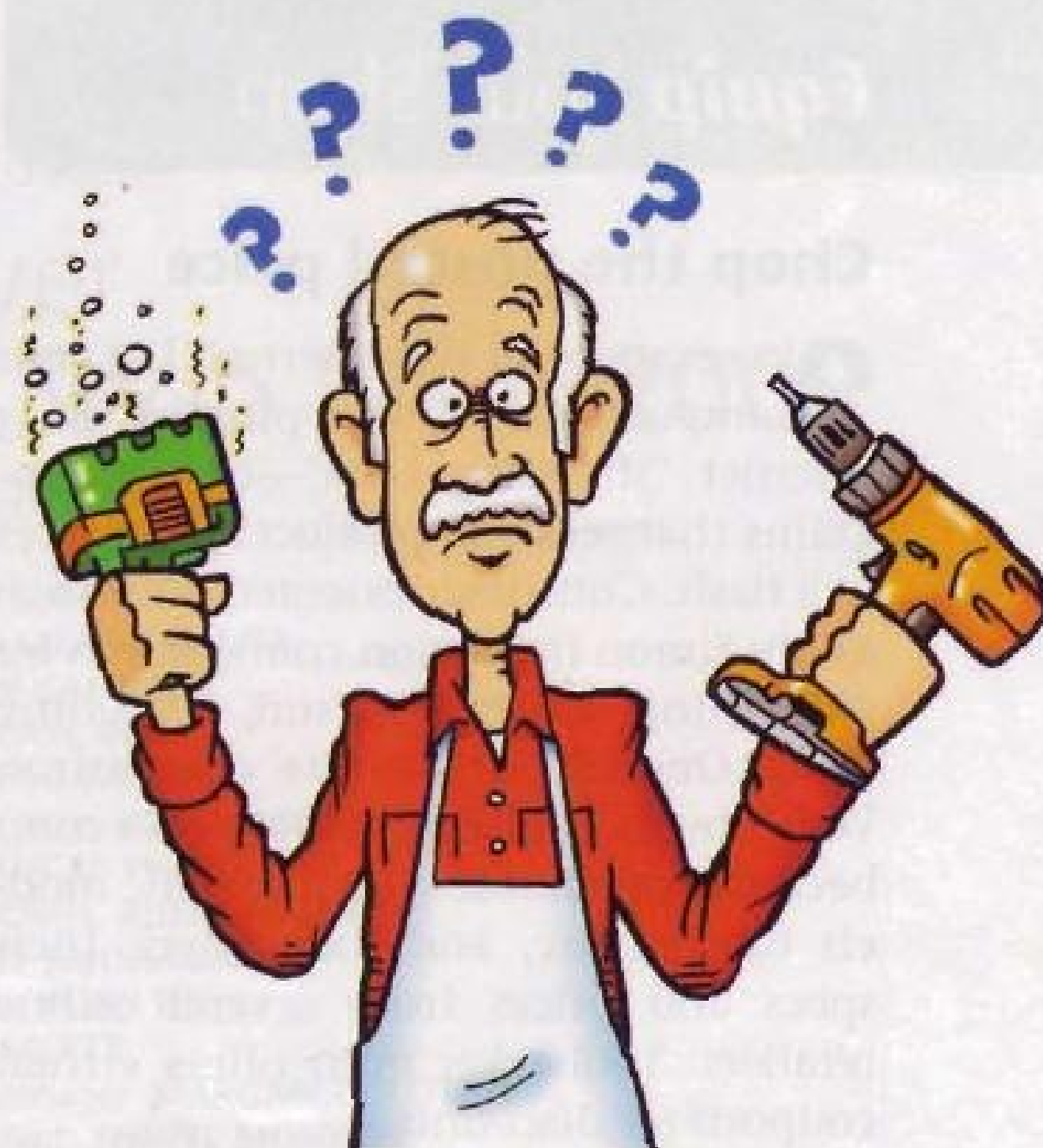
Must you buy new?

6 Buy reconditioned tools with a full warranty. Manufacturers can't sell returned tools as new, even if they're unused but lacking their original packaging. So, if necessary, they replace any bad or broken parts with new ones, repackage the tool, and then resell it as "reconditioned." You risk little because manufacturers typically honor the full factory warranty on these tools, and unlike new-in-the-box tools, recons get a complete and thorough test at the service center before they're repackaged and resold.

7 Find a demo. An exhibitor at a woodworking show will sometimes sell a stationary tool off the show floor, rather than pay to ship it back. Ask whether you can take it off his or her hands for a discounted price when the show is over. You may get a good deal on a tool that's already assembled, and save shipping costs. Also, watch for special scratch-and-dent and tent sales from some manufacturers. In many cases, the damage is cosmetic, and you can pick up a perfectly functioning tool at a deep discount.



8 Buy from a private owner. Your local newspaper classified advertising section is a good source for used tools. Besides scanning the "Tools" classification, pore over the garage sales and auction notices. Often, sellers don't know (or don't care) what they have and underestimate its value. Beware of buying used power tools from pawn



5 Replace the tool, not just the battery. The first thing to fail on most cordless tools is the battery, but a pair of new batteries can set you back almost as much as a new tool. And that new model may have more features or higher voltage, so it's like a low-cost upgrade.

That strategy doesn't apply to cordless kits with several tools sharing one or two battery packs; but you can economize here as well. Before you buy such a kit, consider the voltage and style that fits all the cordless tools you may eventually want to buy.

Editor's Letter



After moving cars outside, this homeowner rolls out cabinets to form a work surface in his garage. To learn more, see *page 22*.

From 'okay' to 'wow!'

A few months ago, I spent a good portion of a week watching the transformation of a ho-hum 2½-car garage into an incredible car buff's backyard escape. (For a closer look at the shop, see *page 36*.)

What a difference five days made. And believe me, the "wow" factor doesn't fade: A revisit months later still took away my breath when the garage door rolled up. But who wouldn't be green with envy gazing at a sparkling epoxy floor? No oil stains would dare linger!

That garage is a multitask space designed and organized as many of us imagine our shops. Car-care products, previously shuffled around in cardboard boxes, are now neatly organized behind a pair of doors. The adjoining cabinet holds a season's worth of yard and garden remedies. Paintbrushes and hand tools, neatly lined up like soldiers, beg to be picked up from smooth-rolling drawers.

The recent visit to the shop gave me pause. No more excuses: I got the jolt to jump-start and overhaul my own shop. I referred to the planning articles in this issue to lead me every step along the way.

How 'bout you? Just picking up this magazine affirms that there's a garage or shop redo on the horizon at your home. So get going! Break the work into bite-size tasks, and you'll be there quicker than you think.

Marlen Kemmet

Marlen Kemmet
WOOD® Magazine Managing Editor

Better Homes and Gardens®

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Show Us Your Shop



In 2007, we published the first issue of *Home Shop Ideas*, and from your letters and e-mails, it appears you loved it. You're holding issue 2.

Now, we'd like to know how you used our ideas, or your own, to create or upgrade your own home shop. We're on the lookout for all types of shops: basements, garages, outbuildings, small spaces, and even garden-shed shops.

Besides searching for great-looking shops, we're also looking for projects, organizers, storage cabinets, or workbenches you've created for your shop.

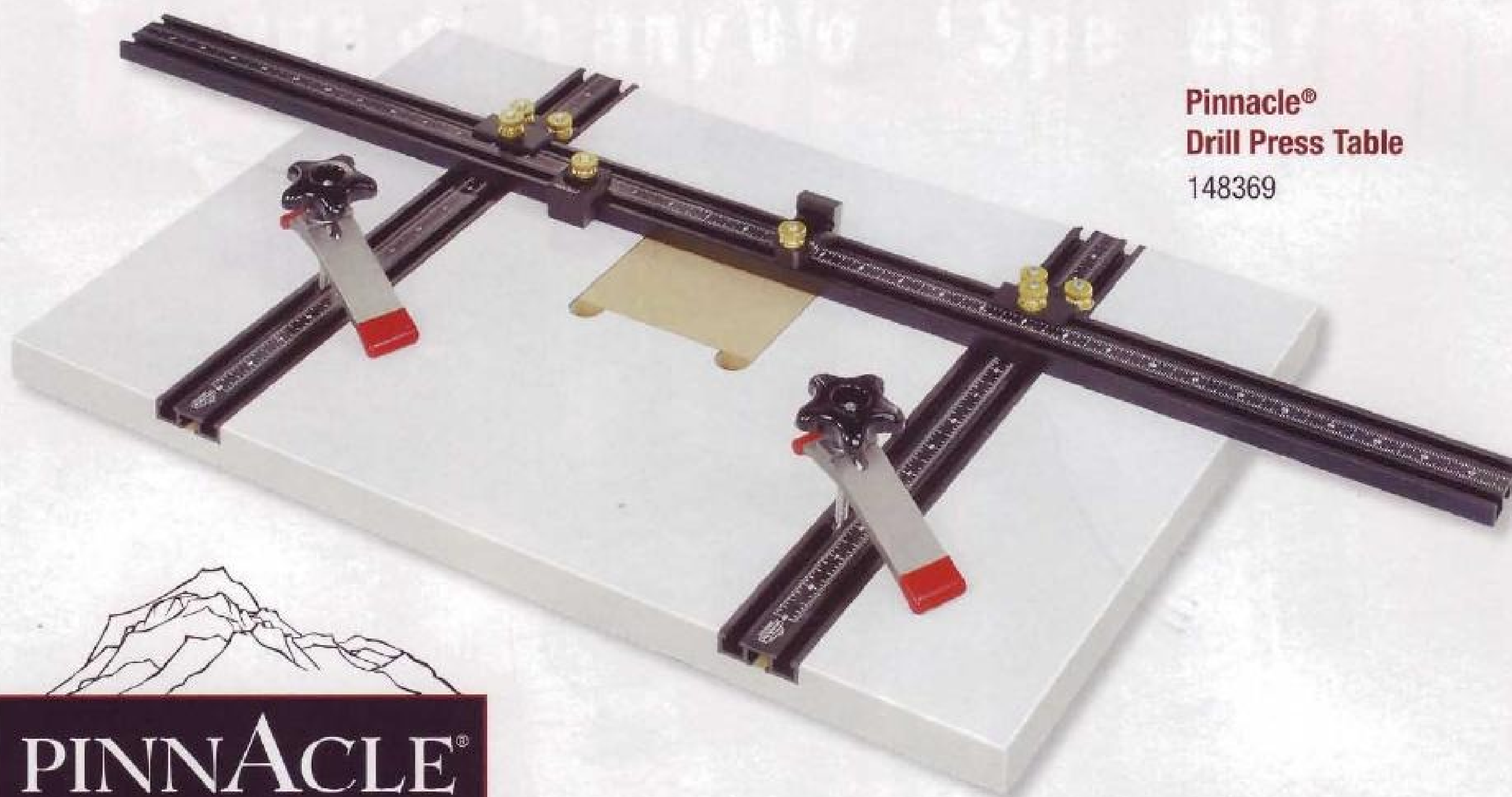
If you'd like your shop, or a friend's, to be considered for national exposure in one of our magazines, send us some photos and a short write-up of what you did to make your shop look better and work harder. If you've got some "before" and "after" photos, those would be excellent, too!

Send your submissions to:
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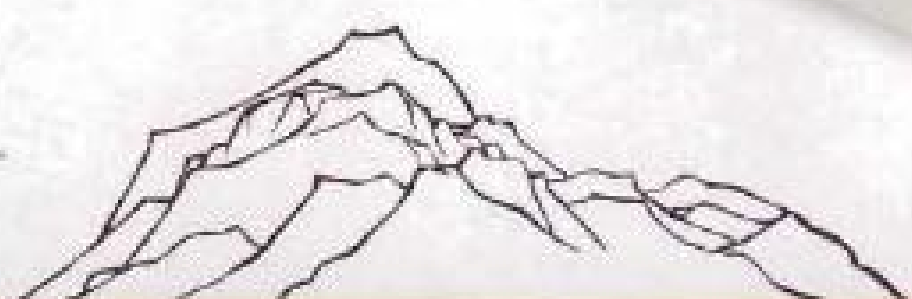


Or e-mail your submissions to homeworkshops@meredith.com. The deadline is June 1, 2009. Submissions cannot be returned. Please include your daytime telephone number, mailing address, and e-mail address, if you have one.



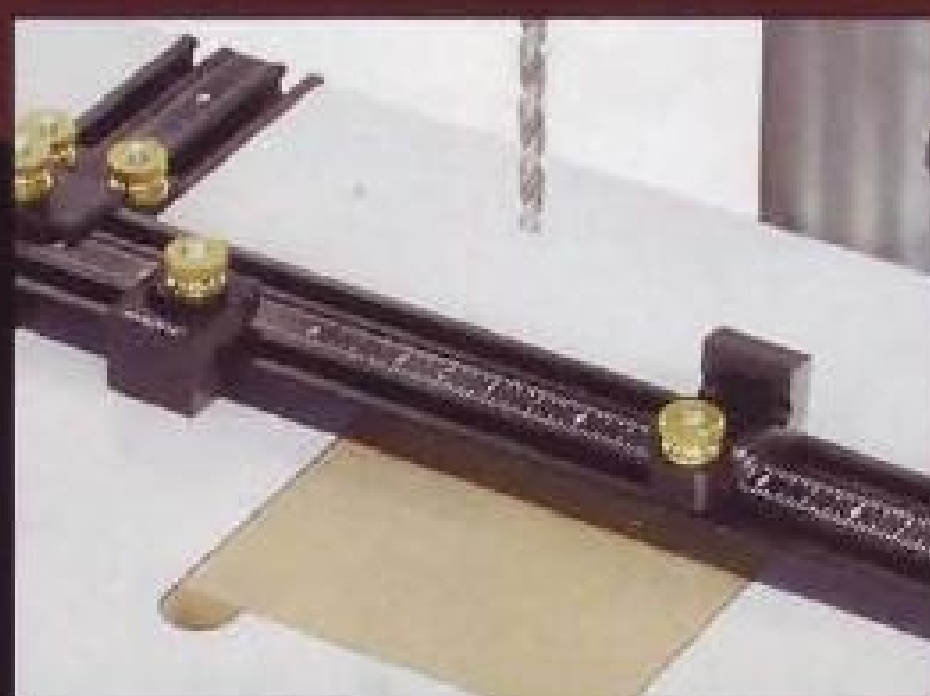


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