WORKSHOP STORAGE SOLUTIONS

16 Storage Projects to Shape Up Your Shop

BONUS!

3 Shop Fixture Projects:

- Table Saw Outfeed Table
- Sawbench
- Shop Stool

POPULAR WOODWORKING MAGAZINE

$30 Lumber Rack

It doesn't take a lot of time or money to build a flexible and sturdy rack for your rough lumber and offcuts.

Clamp all your pieces together when laying out the holes. This is faster and more accurate.

In my family, we still remember the day my old lumber rack collapsed. I was upstairs with the kids when there was a sudden and horrible crash. The two cats ran in four directions; the baby started to wail. It was that loud.

When I went down the steps to the shop it looked like a giant box of toothpicks had spilled everywhere. It seems the metal brackets I had bolted to the walls had reached their limit. One of the brackets gave way and everything came tumbling down.

So when I went to rebuild, I wanted something stout, simple and cheap. I pored over books and magazines for ideas, borrowed a few and made some changes. Here's what I came up with:

Pipe and 2 x 4s

Essentially, the backbones of this rack are 2 x 4s bolted on edge to the double top plate and the bottom plate of my shop wall. The bottom edges of your 2 x 4s should rest on something solid. In most shops, that means running them to the floor. In my shop, the lower half of my wall is cinder block, so I set the 2 x 4s on those. To hold the lumber, I drilled ⅞"-diameter holes through the 2 x 4s at 4" intervals and at a 5° angle. Then I inserted 12" lengths of ½" galvanized pipe in the holes. The ½" pipe, available in the plumbing section, actually has an exterior diameter of just under ⅞", so it fits nicely.

Before you get started, there are a couple things to consider when building this rack for your shop. First, I used 12" lengths of pipe because I rarely have anything in my rack wider than 8". Wider lumber needs longer pipes. Plus, this rack is right over my jointer, so I didn't want the pipes to stick out any more than necessary.

Prep Your Lumber

I bought a single Southern yellow pine 2 x 8 that was 8' long for this project. By ripping it down the middle and crosscutting it into 4' lengths, I got four 4'-

by Christopher Schwarz

Comments or questions? Contact Chris at 513-531-2690 ext. 407 or chris.schwarz@fwpubs.com.

Photo by Al Parrish.

Because the table is at a 5° angle, it's easier to align your holes using the rim of the Forstner bit instead of the center spur.

long 2 x 4s. If you don't have Southern yellow pine in your area, try vertical-grade fir or any other tough construction timber.

I ran the parts over my jointer and through my thickness planer to get them straight and true. They finished out at 1⅜" thick and 3" wide.

Clearance Holes

The first thing to do is taper the ends of the boards and drill the clearance holes to bolt them to your wall. I used 4½"-long lag screws and 1⅜"-diameter washers. You want the holes in your boards to be clearance holes — that is, you want the threads on the lag bolt biting only into the wood in the wall.

Examine the diagrams and you'll see that the easiest way to accomplish this is to taper the ends as shown. I used a band saw to cut the taper and cleaned up the cut with a hand plane.

The holes for the lag screws should be located so the screws enter into the top plate and bottom plate of your stud wall. The location of the hole in the diagram is for a stud wall with a double top plate. Your wall may be different.

Now drill a 1⅜"-diameter recess for the washer — it only needs to be deep enough to seat the washer. Then drill a ½"-diameter hole in the middle of the recess. Repeat this process on the other end of the board and on the other boards.

Even More Drill Press Work

Now, drill the holes for the galvanized pipe. Chuck a ⅞" Forstner bit in your drill press and set the table at a 5° angle. This slight angle will use gravity to keep your lumber in the rack.

Clamp all the pieces of wood together with the ends aligned and make a mark every 4" across all four boards.

Now drill the holes through the boards. Because the table is at 5°, it's difficult to get the center of the bit to hit your line. So don't. Instead, align your holes so the edge of the Forstner bit touches the line instead of the center. It's much easier.

Pipes and Installation

I bought galvanized pipe and cut it to length using a hack saw. Dress the ends using a grinder or file to remove the rough spots. Now get ready to install your rack.

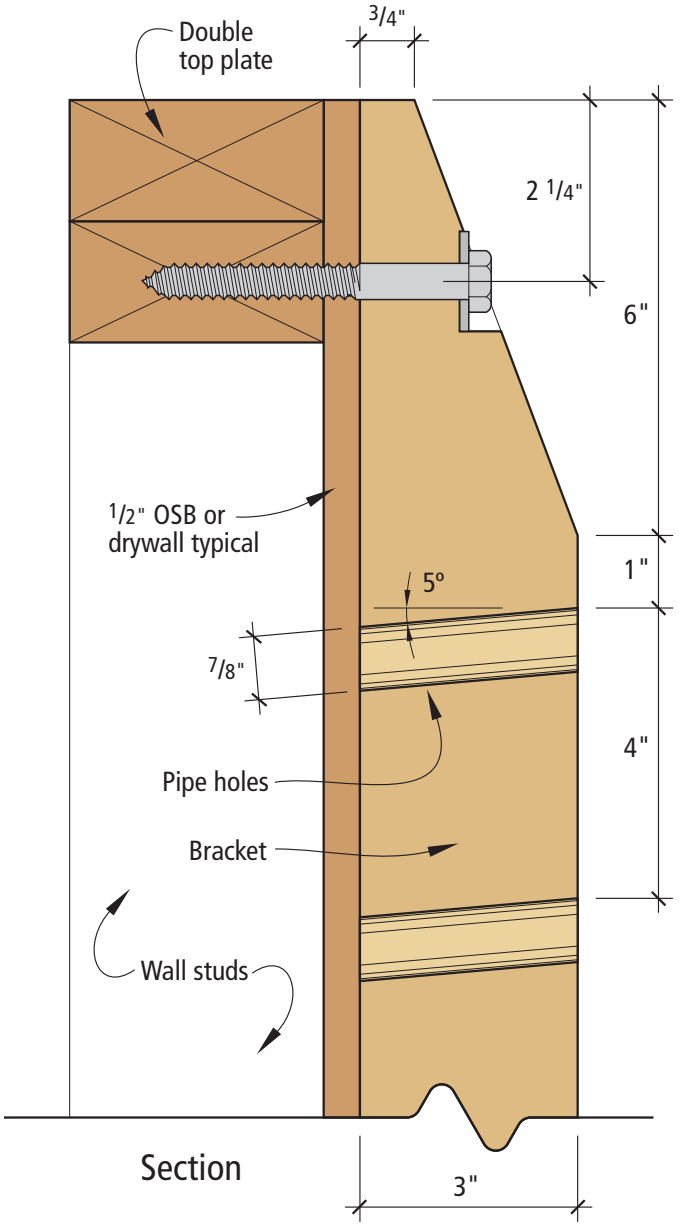
Use a level to ensure your layout lines are plumb and parallel. Mark where the bolts will go and drill pilot holes for the lag screws. Fasten the lag screws to the wall using a ratchet.

I think you'll see quickly how nice it is to have a flexible rack like this. You can reserve a couple pipes for short scraps, and add more pipes or braces as your lumber pile expands. **PW**

$30 LUMBER RACK

	NO.	ITEM	DIMENSIONS (INCHES) T	W	L	NOTES
❑	4	Vertical braces	1⅜	3	48	Yellow pine
❑	16	Pipes	½ID		12	Galvanized pipe
❑	8	Lag screws			4½	
❑	8	Washers	1⅜ dia.			

ID=interior diameter; the exterior diameter of this pipe is just under ⅞".



10-Drawer Tool Chest

Store your smaller tools in style with a tool chest that's surprisingly simple to build.

Most woodworkers have dozens of tools that are small, such as screwdrivers, files, chisels, pliers, dividers and compasses. All these can be stored in shallow drawers, which is where this chest comes into the picture.

The design for the chest came from two inspirations. One was a Craftsman-style bookcase plan. The sides and top are shaped like the bookcase, and the chest is made of quartersawn white oak. The other inspiration came from multi-drawer chests that were made years ago to store sheet music.

This chest was assembled with butt joints and screws. I countersunk the screws and plugged the holes with 3/8" redheart plugs. The drawer pulls also are redheart, which I cut using a 1/2" plug cutter.

by Jim Stack

Step photos by the author

1 The first step is to cut the sides 3/8" narrower than the finished dimension. Then cut the 1/4" x 1/4" dados for the drawers. Glue a 3/8" x 3/4" strip to the back of each side. This strip covers where the dados exit the sides, creating a stopped dado.

2 Now draw the top arc on each of the sides. Trammel points mounted on a stick are great for drawing arcs. A little trial and error is involved here unless you can figure the radius using math. I try connecting the dots, moving the pencil up or down the stick until I find the radius that works. If you don't have trammel points, drive a nail through a stick at one end. This is your fixed point. Use a small clamp or rubber band to hold a pencil anywhere you need along the length of the stick to draw your arc.

Photo by Al Parrish

3 Now you need to draw the arc at the bottom of each side. When laying out the radii at the bottom of the sides, use a small, round object to draw the small radius that defines each foot.

4 Connect these two small radii with an arc that is 1" high from the bottom of the side.

5 Drill holes with the same radius as the small arcs and connect them by cutting the larger arc with a jigsaw or band saw.

6 Smooth and shape the arcs with a rat-tail file or curved rasp.

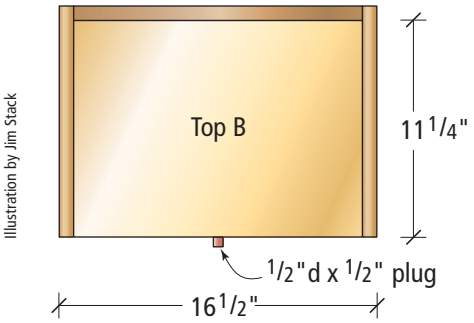
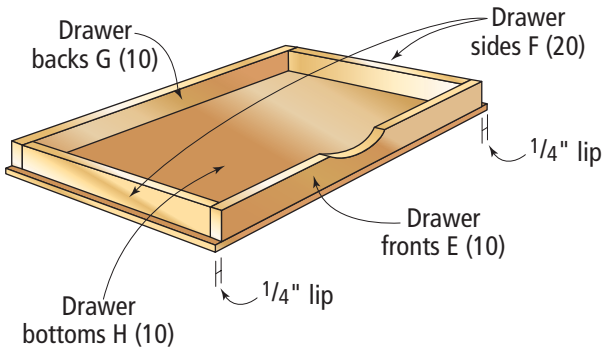
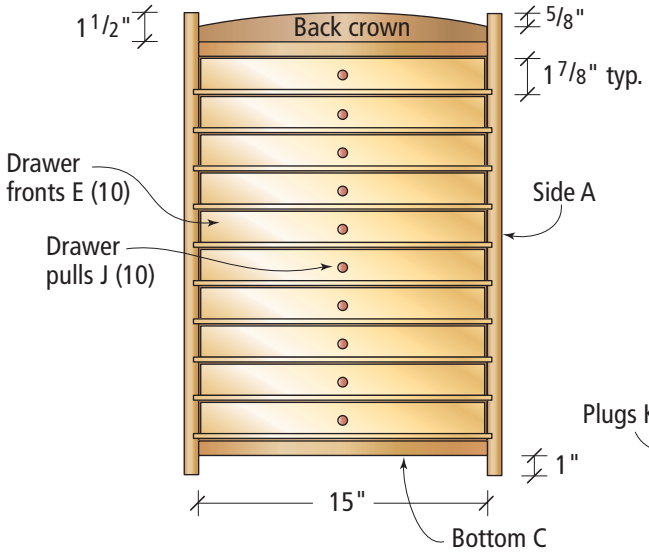


Illustration by Jim Stack

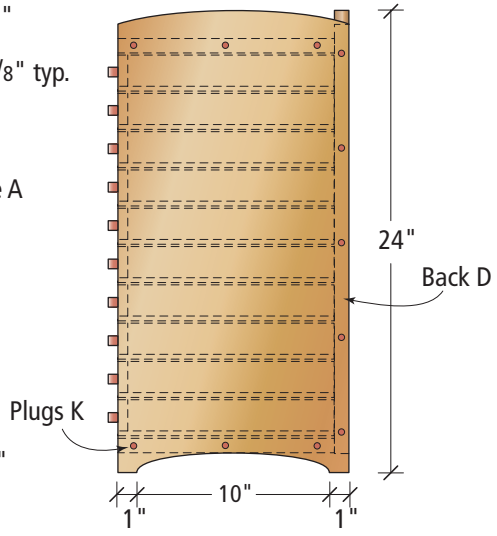
Plan



Drawer assembly



Elevation



Profile

10-DRAWER TOOL CHEST

	NO.	LET.	ITEM	DIMENSIONS (INCHES) T	W	L	MATERIAL	COMMENTS
❑	2	A	Sides	3/4	12*	24	White oak	Width includes 3/8" edging
❑	1	B	Top	3/4	11 1/4	15	White oak	
❑	1	C	Bottom	3/4	11 1/4*	15	Plywood	Width includes 3/8" edging
❑	1	D	Back	3/4	15	23*	Ply/oak	Top crown is 2 1/4" wide, glued to ply
❑	10	E	Drawer fronts	1/2	1 5/8	14 15/16	White oak	
❑	20	F	Drawer sides	1/2	1 5/8	10 1/4	Poplar	
❑	10	G	Drawer backs	1/2	1 5/8	14 15/16	Poplar	
❑	10	H	Drawer bottoms	1/4	11 1/4	15 1/2	Plywood	Trim sides to fit after drawers are assembled
❑	10	J	Drawer pulls	1/2-dia.		1/2	Redheart	Cut with 1/2" plug cutter
❑	22	K	Plugs	3/8-dia.		1/4+/-	Redheart	Cut with 3/8" plug cutter
❑	2		Side strips	3/8	3/4	24	White oak	Glued to back edge of sides
❑	1		Bottom strip	3/8	3/4	15	White oak	Glued to front edge of bottom
❑	1		Back crown	3/4	2 1/4	15	White oak	Glued to top edge of back
❑	10		Dowel rods	1/8-dia.		3/4	Hardwood	

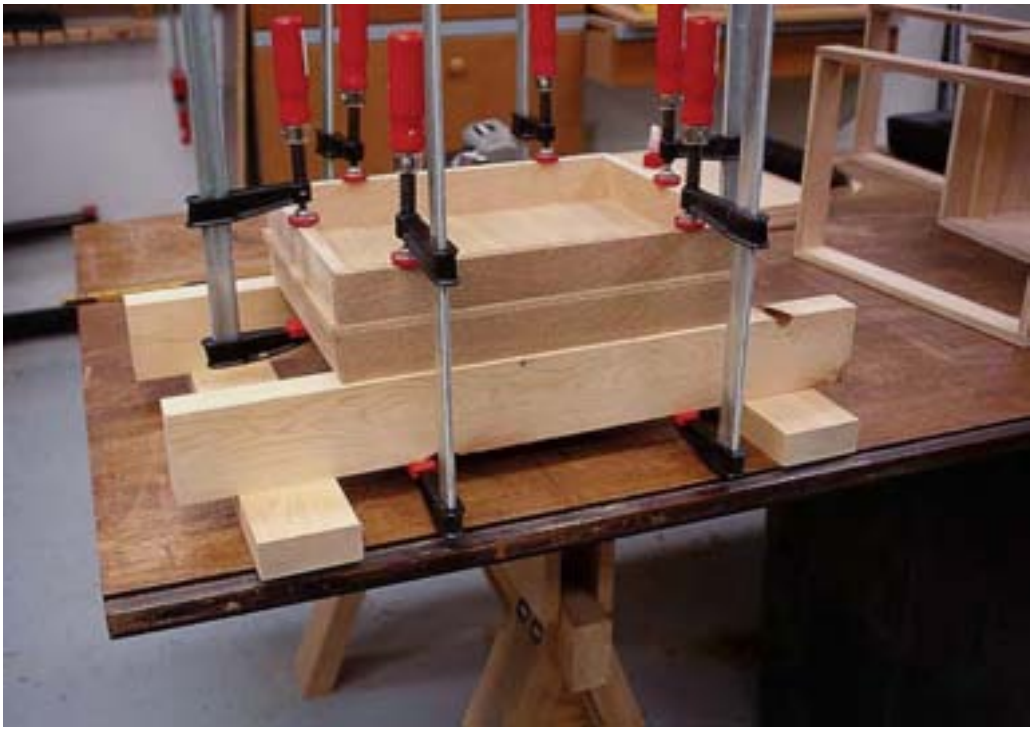
*Measurement is finished dimension and includes solid-wood edging

7 Glue the back crown on top of the plywood back panel. Make the arc on the crown as you did for the sides. Cut the top and bottom panels to size, then glue a $\frac{3}{8}$" x $\frac{3}{4}$" strip on the front of the bottom panel. Assemble the chest using 2" screws. Cut the plugs and glue them in place to cover the screw heads.

8 Here you can see how the two arcs meet nicely at the back corner of the case. These little details will make the sides and back flow together nicely.

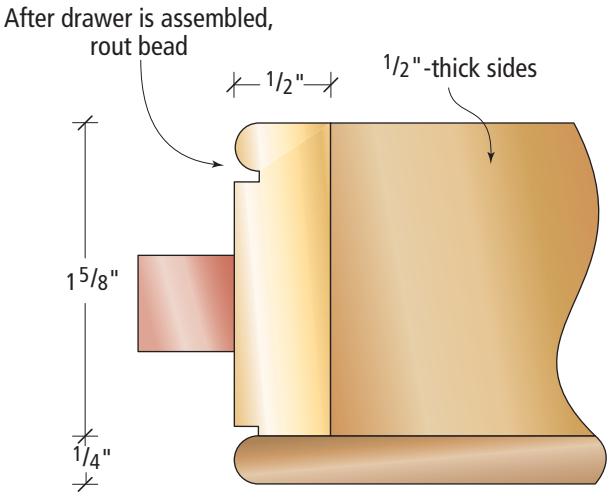
9 Cut all the drawer parts to size. The sides are captured between the front and back parts, so glue-up can be done with two clamps. I just used glue on these butt joints. I know what you're thinking: Why would he use just glue and no fasteners or other joinery to strengthen this joint? Well, after the plywood bottoms are glued in place, the drawers are quite strong. (If you would like to use fasteners, please do so. Screws or dowels would work well.)

10 I use bench horses all the time to hold parts for gluing. Several drawers can be glued at one time. After applying glue to the bottoms, hold them in place with a few small brads or nails. Then stack up a few drawers and clamp them while the glue dries. This also helps keep the drawers flat.



11 When the glue has dried on the drawers, rout the 1/4" bead on the top and bottom of the drawer fronts. The drawer bottoms are the perfect thickness to accept the radius of the bead. (See below.)

12 If necessary, fit the drawers by planing or sanding the sides of the bottoms that fit into the grooves to ensure the drawers slide smoothly. Then cut the plugs for the drawer pulls. I attached the pulls with an 1/8" dowel rod. Drill a hole in the center of the plug, and a matching hole in the drawer front. Glue the pulls in place, then sand and finish the chest and drawers. **PW**



Drawer profile detail

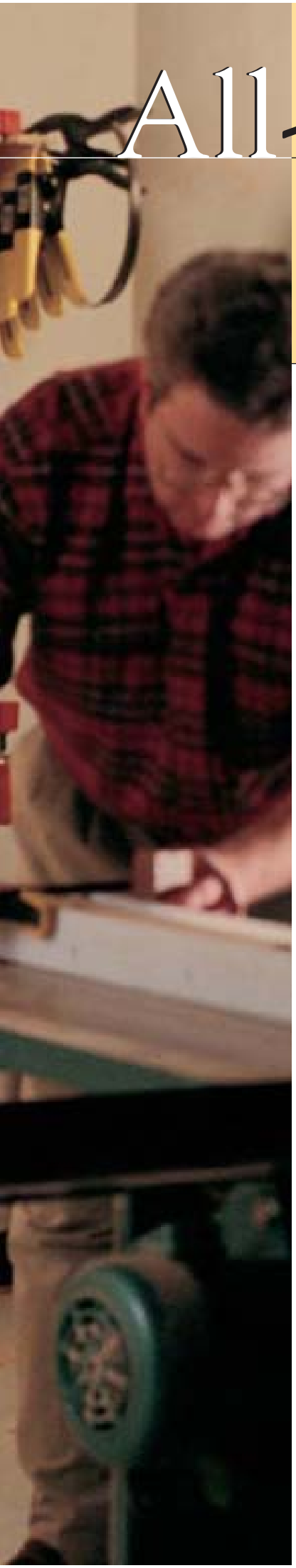


Photo by Al Parrish

All-in-one Cabinet

FOR THE SMALL SHOP

This shop cabinet squeezes 13 cubic feet of tool storage into less than 3 square feet of floor space.

If you're like most woodworkers, your shop is packed to the gills with tools, tooling and accessories. Storing power tools on open shelves is no good; dust will get into the windings and shorten the life of your motors. You need an enclosed cabinet, and you need one that takes up less floor space than a band saw. This cabinet has a place to store routers, all the bits a woodworker could need and other accessories such as edge guides, bases and template guides. There's also room for other tools such as jigsaws, sanders, biscuit joiners and even a portable planer.

Build the Case

Here's the simple jig to rout the dadoes. It uses a bearing-on-top straight bit to guide against the edges of the jig. Clamp the jig right on the marked lines and rout the dado.

Before cutting the plywood, check out the optimization diagram on our web site (www.popwood.com), which shows you how to lay out the parts on two sheets of plywood. After the parts are cut to size, cut ½" x ¾" rabbets on the ends of the sides to hold the top and bottom pieces. Unless your shop has high ceilings, you'll need to cut the rabbets with a plunge router, straight bit and an edge guide. First set the router for the finished depth using your turret depth stop. Now raise the bit halfway and make a pass that defines the shoulder of the rabbet. Now climb cut (which is basically routing in reverse, moving the router backwards) the waste out to the edge of the board. Finally, plunge to the full depth of your rabbet and repeat the above procedure.

The next step is to cut the ¼" x ¾" dadoes in the sides. Mark the location of the dado and make a simple jig to rout it. The jig uses a bearing-on-top straight bit to guide against the edges of the jig. To make the jig, take the fixed shelf and place two strips of plywood against it on a flat surface. Place all this on top of two cross pieces on either end of the strips and glue and nail them in place. Leave a little room (about ½") across the length of the dado cut to adjust the jig. Clamp the jig on the marked lines and rout the dado in two passes. Finish machining the sides by cutting the ½" x ¼" rabbet for the back on the back edge of both sides, top and bottom. (If the cabinet won't be attached to the wall, use a thicker back for stability.) Check the top, bottom and fixed shelf for a good fit, then glue and nail or screw the cabinet together. Fit the back and set it aside. Place the case on a flat work surface and add iron-on edging. Finish the case by gluing and nailing the hanging rail into the top of the case, flush with the rabbet in the back.

by Jim Stuard

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Build the Base

Now comes the adjustable base. When I made custom cabinetry, we often added an adjustable-height base to cabinets so we could compensate for uneven floors or walls. The base is a simple plywood rectangle. You attach the adjustable feet to the inside corners and drill holes in the case above the feet. This allows you to adjust the base with a screwdriver while the cabinet is in place.

The base itself is a simple mitered frame, with biscuits added at the miters. Cut the miters, then glue and clamp the base together. Make sure the base is square by measuring across the corners.

While the glue dries, cut out the blocks that hold the adjustable feet. They're just 1½" x 1½" x 3¼" blocks. Drill a centered, 7/16" hole through the length of the block for a T-nut. Drill holes at right angles to one another in the block that will be used to screw the blocks to the base. Hammer in the T-nuts. With the feet threaded into the blocks, the entire assembly is about 4" long. It should flush up with the top and bottom of the base frame.

Now it's time to attach the base. Cut out four ¾" x ¾" cleats that fit between the levelers and drill mounting holes in the cleats for attaching the case bottom. Screw them in place about 1/32" down from the top edge of the base. Make sure to Position the base on the bottom. Temporarily screw the base in place with four 1¼" screws.

Use screws and glue to attach the levelers to the inside corners of the base frame. The top of the block (the end opposite the foot) should be flush with the top edge of the base frame.

With the case on its back, take two hand screws and attach them to the back lip of the case, ¼" in from the back. This provides a little offset for the moulding on our walls. If you have larger base moulding where you are, make the base a little taller or less deep to accommodate the larger moulding. Place the base up against the case bottom. Center it on the bottom and temporarily screw it into place with four 1¼" screws.

Take out all the feet and use a pencil to mark the location of the top of the leveler hole. Drill the holes using a piece of scrap to back up the hole or you'll tear out the veneer on the inside of the case bottom. When you re-attach the base, you'll be able to adjust the levelers using a straight-bladed screwdriver.

Build the Doors

The doors are plywood slabs with a mitered moulding nailed to the edges. The moulding is a 3/16" x 13/16" solid wood edge with a bullnose routed on the front (see diagram). The bullnose is referred to as a cockbead, which is a common detail on period furniture from the 18th and 19th centuries. It's an easy way to dress up a door or drawer front.

After the edging's been applied, it's impossible to sand into the corners, so begin making the doors by finish sanding the fronts of the doors and drawer fronts. Next, attach the moulding. First apply two opposite pieces, then fit and attach the last two pieces.

Use a sharp pencil to mark the location of the miter cuts. Place the piece on the miter saw and cut to the line. You don't always get the cut right the first time. Make your cut a little long and nibble away at the miter until you get a snug fit, then glue and nail the edges in place. We use Accuset's micropinner to attach the mouldings. The 23-gauge pins don't split the edge, and they leave a hole about the size of a period on this page. Putty the holes if you like. Rout off any overhang on the back side with a router and straight bit. Finish sand the backs.

After making the stock according to the diagram, take a piece and cut a miter on one end. Be sure to make the first cut with the bullnose up. This isn't important for the first two edges, but it's very important for the last two. Use a piece of scrap with a miter cut on both ends to test the fit of the miters.

When fitting the second set of edges, start by cutting the miter on one end. Flip the edge over and place what will be the bottom edge of the miter into the miter on the right. Gently press the flat edge up against the other miter. Mark the location of the miter and make the cut.

Drill the holes for the hinge cups on your drill press. Always make a test piece with a hinge and mounting plate to test your setup.

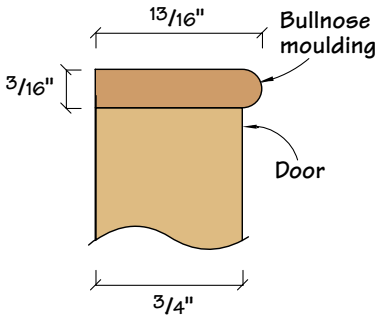
Take out all the feet and use a pencil to mark the location of the top of the leveler hole. Remove the base and drill ½" holes into the case bottom.

SUPPLIES

Lee Valley Tools
800-871-8158 • www.leevalley.com
4-107° Full overlay hinges, 00B10.01
1-14" Full ext. drawer slides, 02K10.14
4-4" Swivel leveler, 01S06.04
4-⅜"-16 T-nuts (10 pc.), 00N22.24
5-4" Wire pulls, 01W78.04
1-Coat hook, 00W80.01
24-Shelf pins (50pc.), 94Z03.02
1-25' Maple edge banding, 41A05.01
2-25mm x 15mm hinges, 00D30.08
8-#1 x ⅜" screws (10pc.), 91Z01.02

This is offered by Lee Valley as a package priced at $72. Ask for item #05D1510

Note: The screws supplied with the hinges use a #1 (square) drive. You'll need a small #1 square drive bit.



Bullnose Moulding

Lay the plate on the marks and drill pilot holes into the cabinet.

You're ready to hang the doors. The cups for European cabinet hinges are usually 35mm or really close to 1 3/8".

Using the instructions supplied with the hinges, derive a drilling location for the hinge cup. I've always drilled hinge cups about 3" or 4" in from the top and bottom of the door. This leaves enough room to adjust the hinge when mounted. The first thing is to drill the hinge cup holes. Set your drill press to drill the holes a little deeper than the cup.

Now transfer the layout holes to the door on the cabinet. Attach the mounting plate and screw the hinges in place. European hinges can be adjusted in three dimensions: in-out, up-down and left-right. When the cabinet is level and plumb, adjust the hinges to make the doors even.

Drill the 1/2" and 1/4" holes. Nail in a couple of rails on the inside of the drawer and simply drop the panels in place. The panel for 1/2"-shank bits is drilled all the way through and the panel for 1/4"-shank bits is drilled down 5/8".

Build the Router Bit Drawer

After attaching the slide to the drawer, mark the location of the cabinet part of the slide on the cabinet side. Use a framing square to run a line back from this mark and mount the slide 1/16" back from the front of the cabinet.

The drawer uses standard construction. Cut 1/4" x 1/2" rabbets on the ends of the sides. Cut a 1/4" x 1/4" groove in the bottom inside edges of all the parts to hold the bottom. Glue and nail the drawer together with the bottom set into the groove.

After the glue is dry, take apart the commercial drawer slides, scribe a line on the sides and attach the small part of the slide to the drawer box. Make sure it's flush to the front of the drawer box. Measure from the mounting line and add 3/4" to that for the lid, hinges and gap. Measure that distance down from the inside, underneath the fixed shelf. Mark the location and mount the slide. The slides have two different mounting holes. The drawer has slots that allow up and down adjustment, and the cabinet parts have slots that allow forward/backward adjustment. Insert the drawer into the slides on the cabinet.

Before mounting the front on the drawer box, nail two finish nails through the front of the drawer box until they just protrude from the outside. Place the front against the drawer box and space it so the gaps on the top and bottom are equal. Push the front against the nails in the drawer box and gently push the drawer out. Drill some clearance holes and attach the front.

Now nail on the drawer lid's back rail and attach the lid with two hinges. Drill a 1" hole in the lid so you can lift it easily. Cut out, drill and attach the two router storage inserts.

Position the drawer front and place a couple of clamps on the drawer box to hold it in place. Drill countersunk clearance holes into the drawer box and attach the front with 1" screws.

Finish up the project by drilling a series of 7mm holes for the shelf pins. Make a template from scrap for this. Lee Valley sells metal sleeves for the shelf pins, but I deemed them unnecessary. You could probably get away with using a 1/4" bit to make these holes, but it makes the pins fit a little sloppy. Attach the back with #6 x 1/2" flathead screws. Check the fit of all the doors, drawer and shelves, then disassemble all the loose parts for sanding. Apply three coats of clear finish and reassemble all the parts. **PW**

Use a stop collar on your drill bit when drilling holes for the shelf pins. I made this drilling jig from shop scrap.

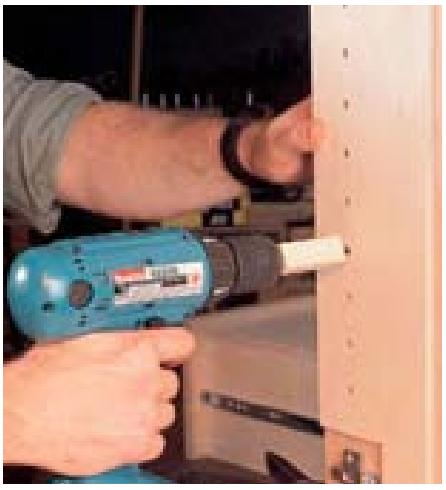


Photo by Al Parrish

Arts & Crafts

TOOL CABINET

The goal: The maximum tools in the minimum space.

Sometime while sawing the 60th dovetail for a drawer side, when my patience was as thin as the veneer facing on cheap plywood, a familiar feeling crept into my body. I began to experience an understandable lust for my biscuit joiner.

It sat patiently on a shelf, and I knew that its chattering, rattling teeth would make everything about this tool cabinet go much faster. But I resisted, because I had the words of a Victorian social reformer, art critic and part-time madman ringing in my head.

The writings of Englishman John Ruskin (1819-1900) were a cornerstone of the American Arts & Crafts movement. Ruskin decried the worst parts of 19th century industrialism. He promoted craft, pensions and public education when there was little of those things for the poor.

And in his book the "Seven Lamps of Architecture, The Lamp of Memory," which was published in 1849, he wrote a passage that all woodworkers should read. It's a bit long and a bit dramatic, but it has stuck with me just the same.

"When we build, let us think that we build forever. Let it not be for present delight nor for present use alone. Let it be such work as our descendants will thank us for; and let us think, as we lay stone on stone, that a time is to come when those stones will be held sacred because our hands have touched them, and that men will say, as they look upon the labor and wrought substance on them, 'See! This our father did for us.'"

The biscuit joiner stayed on the shelf. I continued to saw, chop, pare and fit for another four or five hours. Ruskin, I hoped, would have approved.

From the Book of Tolpin

While Ruskin kept me going through this long and difficult project, I really have a 20th century craftsman and author to thank (or blame) for my obsession with building a fine tool cabinet. Since it was first published in 1995, "The Toolbox Book" (Taunton Press) by Jim Tolpin has become the most-thumbed book in my library. I've studied every page, toolbox and drawing between its maroon cover boards (the dust jacket is long gone).

Years ago, I resolved to build myself a cabinet that might rival some of the examples in "The Toolbox Book." This year, I gave it my best shot. Since early 2004 I've spent many spare moments doodling on graph paper and on my computer to come up with a design that satisfied the three things I wanted from a cabinet: It had to hold a lot of tools, look good and be built to last. After studying my work habits, measuring all my tools and paging through thousands of examples of Arts & Crafts casework, this is what I came up with.

It's small but spacious. Have you ever ridden in an old Volkswagen Beetle? They are surprisingly roomy, and especially generous with the headroom. Somehow, the Beetle violates the laws of space and physics, and it is roomy but can also be parked between two oversized Hummers. This cabinet

continued on page 70

by Christopher Schwarz

Comments or questions? Contact Chris at 513-531-2690 ext. 1407 or chris.schwarz@fwpubs.com.

6 STORAGE SOLUTIONS

Tools need to be protected, organized and easily retrieved. That's a tall order.

Here are some of the problems I've run into over the years: Hanging tools on a wall keeps them organized and close at hand, but unprotected. Keeping them in a traditional sliding tool till in a chest keeps them protected and organized, but you dig around for them endlessly. Drawers under a bench keep them protected and close at hand, but most drawers end up a jumbled mess.

Here's my solution, and so far it works well. The cubbyholes are sized exactly to hold a full complement of hand planes. Finding the right plane and getting it down for use has never been easier.

The chisel rack puts my most-used sizes out where I can get them. And the rack is designed to hold the tools even when the door is accidentally slammed.

The saw till on the right door is the same way. These two saws do 80 percent of my work and they're always handy.

The real feature is the drawers. The smaller drawers hold tools for a specific operation. In the larger drawers, the interchangeable trays stack inside the drawers and also hold tools for a specific operation. Whenever I dovetail, I grab the top right drawer. No more making mounds of tools on the bench.

Chisel Rack

This simple L-shaped bracket holds the five chisels I use most, plus my drawbore pins. Don't use a magnetic strip; it will magnetize your tools, which makes them difficult to sharpen.

Tool Trays, Lower Drawer

The bottom of the drawer is for the tools I rarely need. The tray at left holds files and rasps (I'm going to subdivide this tray as soon as some more rasps arrive in the mail). The tray at right holds specialty chisels and screwdrivers.

Top Shelf Plane Cubby

This area isn't just what's left over from the remainder of the cabinet. It is carefully sized at 22½" wide x 5¾" high to hold a No. 7 jointer plane (a constant companion in my shop), plus a jack plane, panel plane and scraper plane.

Small Plane Cubbies

The cubbyholes are a magic size: 6¼" high, about 3 5/16" wide and 10½" deep. This size holds all my joinery planes, my scrub plane, smoothing planes and miter plane.

Saw Till

My saw till holds the two most useful joinery saws – a dovetail saw and a carcase saw. My full-size saws reside on pegs below the cabinet.

Four Upper Drawers

Each of the four drawers holds all the tools for a common operation: one is for dovetailing, the second is for trimming and squaring assemblies, the third is for marking and measuring, and the fourth is for nailing and screwing.

Tool Tray, Middle Drawer

The lower section of the drawer holds waterstones and honing guides (make sure the stones are bone dry before putting them back in the drawer). The tray shown above holds my four spokeshaves and some specialty sharpening equipment.

continued from page 67

is designed to function the same way. The interior is a mere 11¼"-deep, 22½" wide and 31½" tall. Yet, thanks to good planning, it holds every hand tool I need.

The cubbyholes and shelf for hand planes are carefully sized for all the planes needed in a modern shop. The drawers are loaded with trays of tools. Each tray contains all the tools for a routine function, such as dovetailing, sharpening or shaping curved surfaces.

The cabinet looks pretty good. I spent months thumbing through old Art & Crafts furniture catalogs and contemporary hardware catalogs for inspiration. This cabinet and its lines are a little bit Gustav Stickley, a little Harvey Ellis and a little of myself.

The cabinet will endure. No compromises were made in selecting the joints. Every major component (with the exception of the changeable, nailed-together trays) are built to withstand heavy use. Of course, when you discuss durable joints, you are usually talking dovetails, which is where we'll begin construction.

A Case that Takes a Beating

When this cabinet is fully loaded, my best guess is that it weighs more than any single member of our staff at the magazine (modesty prevents me from revealing what that upper limit might be). To ensure the bottom and top pieces can withstand this weight, I joined them to the side pieces with through-dovetails.

One interesting variation worth noting here is that instead of using one solid top piece, I substituted two 3"-wide rails and dovetailed them into the sides to save a little weight. Because I cut these dovetails by hand, it was simple to lay out this unusual arrangement. If you plan to use a dovetail jig, you will save yourself a headache by forgetting the rails and making your top one solid piece instead.

If you're cutting the dovetails by hand, it's faster and more accurate to clamp your two sides together and saw the tails on the side pieces simultaneously. For years I resisted this technique because it seemed more difficult, but now I know better.

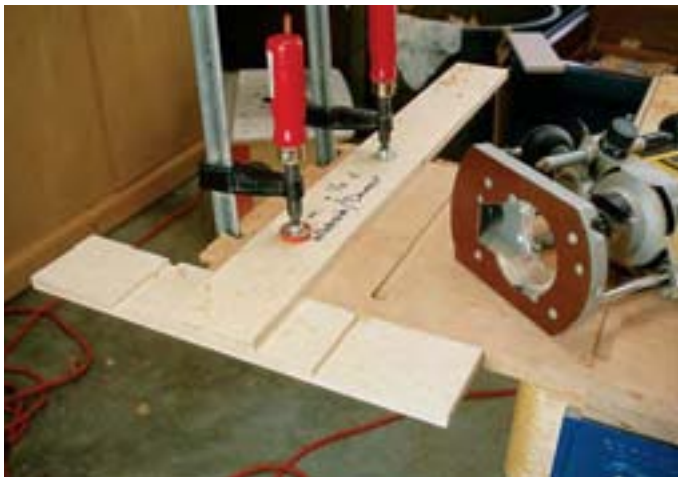
A second feature of the case to note is that the rabbet for the back is a hefty 1" wide. This allows room for the ½"-thick shiplapped back, plus a ½"-thick French cleat that will park the cabinet on the wall and keep it there.

And then there are the stopped dados. These ¼"-deep joints in the side pieces hold all the dividers. Cutting these joints is simple work with three tools: a plunge router, a bearing-guided straight

When sawing the tails, clamp the two sides together and cut them at the same time. This saves time and effort and prevents layout errors.

If your rabbets for the back are perfectly square, your case is much more likely to end up square, too. Clean up any imperfections with a rabbeting plane, such as this bullnose rabbet plane.

The shop-made T-square jig and a plunge router make quick work of the dados.



Here you can see how you use the dado cut into the jig to line up the jig with your layout lines. Using a router with a flat side on its base is more accurate than using a router with a round base.

bit and a shop-made T-square jig that guides the whole shebang. Lay out all the locations of your dados on the sides. Park the jig so it lines up with your layout lines. Cut the dados in two passes.

Fitting all the horizontal dividers to fit the dados is easy. The 1/2"-thick dividers simply need a small notch at the front to fit over the rounded end of the dado created by the round straight bit. A sharp backsaw is just the tool here.

The 3/4"-thick horizontal divider needs a bit more work to fit in the 1/2"-wide dado. A 1/4" x 1/4" end-rabbet is the answer.

The through-dados that hold the vertical dividers use the same router jig, but with the plunge router set to make only an 1/8"-deep cut. Laying out the locations of these parts for the hand plane cubbyholes might seem daunting. If you want the openings evenly spaced, they should each be 3.333" wide. I don't have any infinite numbers on my ruler. But it's actually child's play to lay out the cubbyholes with a pair of dividers (they look like a school compass but with two pointy tips – no pencil). You can tweak these tools until they step off the cubbyholes as precisely as you please. Dividers are one of my secret weapons.

With all these parts cut and fit, make the back of the case. I used ambrosia maple. It's cheap and looks a bit like the spalted maple I used in the doors and drawers. The back boards are joined by a 1/4"-deep x 3/8"-wide shiplap on each long edge.

The top cap is easy. Cut the wide chamfer on the underside using your table saw. Clean up the cut with a block plane. Attach the top to the rails with screws.

You are now at a critical juncture. You can go ahead and get some quick gratification and assemble the whole case. But good luck when you go to finish it. Getting those cubbyholes finished right will be murder. The better solution is to glue up only the sides, bottom and top rails. Tape off the exposed joints and finish all the case parts (I used two coats of a satin spray lacquer). Then assemble the case. I know it sounds like a pain (it is). But the end result is worth it.

Finish the back pieces and top cap while you're at it. Now you can screw the back in place and the top cap. You are ready for the doors and drawers.

Easier than They Look

The doors aren't too bad. The mullions and muntins that form the four lights in each door appear difficult, but thanks to a little legerdemain, it's no problem.

Fitting the dividers is easy with a hand plane. I merely make sure the dividers are surfaced a few thousandths of an inch thicker than where I want them to be. Then I thin them down with a smoothing plane until they slide in with just a little persuasion.

After gluing the sides to the bottom and top rails, trim the dovetails flush with a block plane. Soak the end grain with a little bit of mineral spirits to make it easier to cut. Here you can also see how I supported the case as I worked on it. The big slab holding up the side is an offcut from an old door that's clamped to my bench.

Cut the rabbet on the backside of the door using a rabbeting bit in your router table. With a large tabletop such as this, it's simple work.

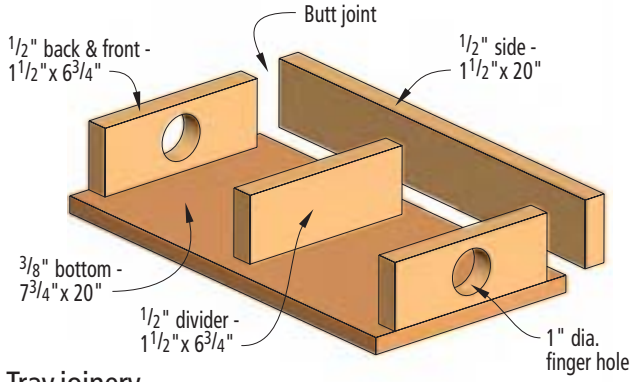
Glue one backing strip into the rabbet in the door on edge. Then flip the door over and glue a mullion onto the backing strip. Then use spring clamps to hold everything while the glue dries.

Install the horizontal muntins the same way. First glue a backing strip into the rabbet on the backside of the door. Then flip the door over and glue the muntin to that.

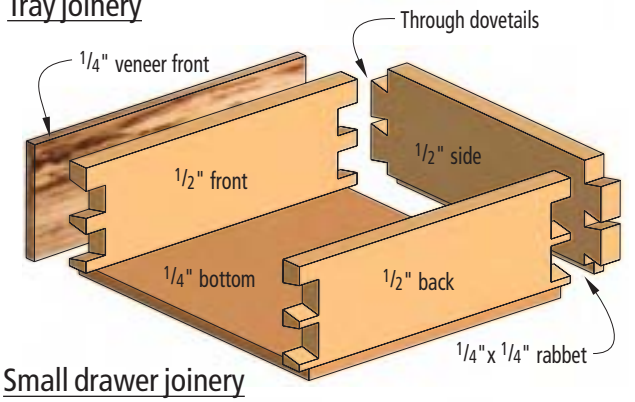
But before getting mired in those details, you need to assemble the doors. Here's how they work: The stiles and rails are joined using mortise-and-tenon joints. For mid-size doors such as these, I use 3/8"-thick x 1"-long tenons.

Cut your tenons and your mortises, then mill a 1/4"-wide x 3/8"-deep groove in the rails and stiles to hold the door panel. I generally make this groove on the router table using a straight bit and featherboards. It's the easiest way to make the groove start and stop in the right place in the stiles.

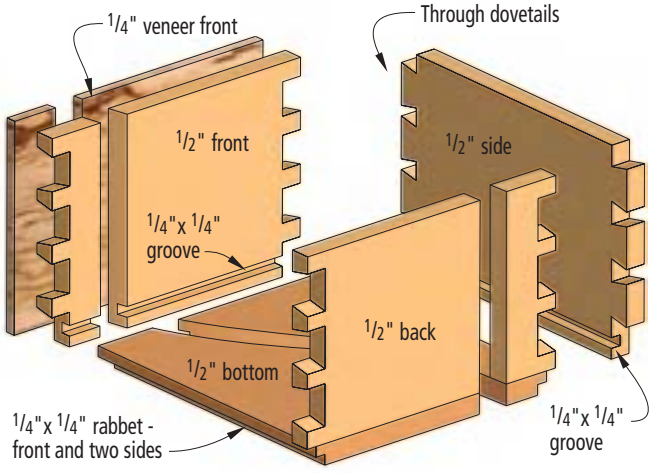
The door panel needs a rabbet on its back to fit in the groove. But before you mill the panel, you should know a bit about spalted maple. Its black spidery lines are caused by the spalt fungus, which attacks the tree after it's been felled. In short, it's partly rotted.



Tray joinery



Small drawer joinery



Large drawer joinery

It's always best to wear a respirator when dealing with spalted wood. There are numerous accounts of people who have had respiratory problems after breathing in the dust.

Once you fit the panel, assemble the doors – the mullions and muntins are added after assembly. Once the glue cures, cut a 1/4"-wide x 1/2"-deep rabbet on the backside of the opening for the glass. This rabbet will hold the narrow backing strips that are built up into the mullions and muntins.

This technique was explained fully by Glen Huey in our August 2002 issue ("Simple Divided-light Glass Doors"). But the photos at left explain it better than words can. Essentially, you create the T-shaped moulding that makes the mullions and muntins by gluing together 1/4"-thick x 1/2"-wide strips of wood. It's simple work.

What's not so simple is mounting the doors with the strap hinges. These hinges are inexpensive, beautiful and handmade. As a result, they need a bit of tweaking and bending and hammering and cursing to get them just right to hang a door.

Here's my best tip: Screw the hinges in place with the cabinet on its back. Then stand it up, loosen the hinge screws and make your final adjustments. I used a block plane to make some adjustments, and a mallet for others. Let your frustration level be your guide.

Getting a Handle on Drawers

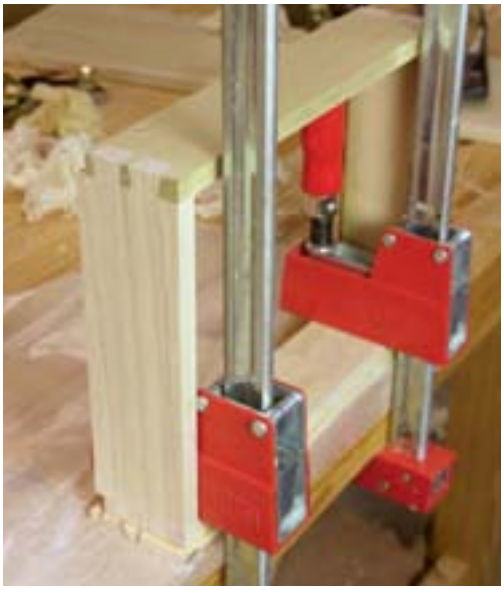
The drawers are a long slog. Even though I'm a fair dovetailer, it took me three solid days of work to get the drawers assembled and fit. But before you start listening to that lock-miter router bit whispering in your ear, remember this: The drawers are going to hold a tremendous amount of steel. And when you open the drawers during a future project, you'll never be disappointed to see dovetails.

To make things a tad easier, I built all the drawers using through-dovetails and 1/2"-thick material for the front, sides and back. Then, with the drawer glued up, I glued on a 1/4"-thick piece of spalted maple to the front piece. This trick also allowed me to stretch my supply of spalted maple.

The four small drawers are built a little differently than the two larger ones. Because the small drawers are shallow, I wanted to use every bit of space. So the bottom is 1/4"-thick plywood that's nailed into a 1/4" x 1/4" rabbet on the drawer's underside.

The larger drawers are more conventional. Plow a 1/4" x 1/4" groove in the sides and front pieces to hold a 1/2"-thick bottom, which is rabbeted to fit in the groove.

Build all the drawers to fit their openings exactly, then use a jack plane to shave the sides until the drawer slides like a piston. Finish the doors and drawers, then it's



Build the drawers with through-dovetails. Then glue a piece of 1/4"-thick veneer to the front.

Here you can see the two different ways of installing the drawer bottoms. The bottom in the top drawer rests in a rabbet in the sides. The drawer bottom for the larger drawers slides into a groove.

Install the dividers in the drawers so they can be easily removed in the future. A 23-gauge pinner is an excellent tool for this job.

Once everything is finished, install the glass using small strips of cherry (1/8" and 1/4" thick). A few dabs of clear silicone and a couple small pins do the trick.

time for the fun part: dividing up the drawers, building trays for the tools and tweaking the hardware so everything works just right.

As you divide up the drawers and trays, one word of advice: Don't fasten any of the dividers permanently. Your tool set will change, and you want to be able to easily alter the dividers. I fit mine in place with friction and a couple 23-gauge headless pins. The dividers can be wrenched free when I need room for a new tool.

When you hang the cabinet, use wide cleats – mine were each 5" wide. This allows you to get more screws into the cabinet and into the studs. Also, for extra insurance, I rested the bottom of the cabinet on a 2"-wide ledger that also was screwed into the studs.

With the project complete, the voice of Ruskin was finally silenced for a short time as I assessed my work. (I for one was happy for the silence; Ruskin vacillated between madness and lucidity during the last years of his life.) I scolded myself for a few things: the reveals around the drawers on the left edge of the cabinet are a tad wider than the reveals on the right side. And in a couple of the dovetails at the rear of the drawers, there are a couple small gaps. It's not perfect.

But before I got too down on myself, I remembered one more quote from Ruskin that relates to handwork and the pursuit of perfection. This one deserves as much ink as the first.

"No good work whatever can be perfect," he writes, "and the demand for perfection is always a sign of a misunderstanding of the ends of art." **PW**

ARTS & CRAFTS TOOL CABINET

	NO.	ITEM	DIMENSIONS (INCHES) T	W	L	MATERIAL	COMMENTS
Carcase							
❑	2	Sides	3/4	12 1/4	33	Cherry	3/8"-deep x 1"-wide rabbet at back
❑	2	Top rails	3/4	3	24	Cherry	Dovetailed into sides
❑	1	Bottom	3/4	11 1/4	24	Cherry	Dovetailed into sides
❑	1	Top cap	1	17	32	Cherry	1/2"-deep x 3"-wide bevel
❑		Shiplapped back	1/2	23 1/4	33	Maple	1/4" x 1/4" shiplaps
❑	1	Major horizontal divider	3/4	10 1/2	23	Cherry	In 1/4"-deep x 1/2"-wide dados
❑	1	Thin horizontal divider	1/2	10 1/2	23	Cherry	In 1/4"-deep x 1/2"-wide dados
❑	3	Thin horizontal dividers	1/2	9 1/4	23	Cherry	In 1/4"-deep x 1/2"-wide dados
❑	5	Vertical dividers	1/2	10	6 1/2	Cherry	In 1/8"-deep x 1/2"-wide dados
❑	2	Small vertical dividers	1/2	9 1/4	2 3/4	Cherry	In 1/8"-deep x 1/2"-wide dados
Doors							
❑	2	Large stiles	3/4	2 3/4	33	Cherry	
❑	2	Small stiles	3/4	1 1/4	33	Cherry	
❑	2	Top rails	3/4	2 3/4	10	Cherry	1" TBE
❑	2	Intermediate rails	3/4	2 1/4	10	Cherry	1" TBE
❑	2	Lower rails	3/4	3 3/4	10	Cherry	1" TBE
❑	2	Panels	1/2	8 1/2	16 3/4	Maple	In 1/4"-wide x 3/8"-deep groove
❑	2	Vertical muntins	1/4	1/2	8	Cherry	
❑	4	Horizontal muntins	1/4	1/2	3 3/4	Cherry	
❑	2	Backing strips	1/4	1/2	8 1/2	Cherry	In 1/4"-wide x 1/2"-deep rabbet, glued to vertical muntin
❑	4	Small backing strips	1/4	1/2	4 1/8	Cherry	Glued to horizontal muntin
Drawers							
❑	4	Small drawer fronts	3/4*	2 1/2	11	Maple	1/4"-deep x 1/2" rabbet on bottom edge
❑	8	Small drawer sides	1/2	2 1/2	9	Poplar	1/4"-deep x 1/4" rabbet on bottom edge
❑	4	Small drawer backs	1/2	2 1/4	11	Poplar	
❑	4	Small drawer bottoms	1/4	10 1/2	9	Plywood	Screwed to drawer box
❑	1	Medium drawer front	3/4*	5	22 1/2	Maple	1/4"-deep x 1/4"-wide groove for bottom
❑	2	Medium drawer sides	1/2	5	9	Poplar	1/4"-deep x 1/4"-wide groove for bottom
❑	1	Medium drawer back	1/2	4 1/2	22 1/2	Poplar	
❑	1	Medium drawer bottom	1/2	8 3/4	22	Plywood	1/4"-deep x 1/2" rabbet on bottom edge
❑	1	Large drawer front	3/4*	6 3/4	22 1/2	Maple	1/4"-deep x 1/4"-wide groove for bottom
❑	2	Large drawer sides	1/2	6 3/4	9	Poplar	1/4"-deep x 1/4"-wide groove for bottom
❑	1	Large drawer back	1/2	6 1/2	22 1/2	Poplar	
❑	1	Large drawer bottom	1/2	8 3/4	22	Plywood	1/4"-deep x 1/2" rabbet on bottom edge

* Finished dimension, laminated from two pieces of wood; TBE= tenon, both ends

Photo by Al Parrish

Portable CHISEL RACK

Keep your tools right where you need them.

I've seen, used and built a number of chisel racks, but none has ever seemed to suit me. Most of them are just a bit awkward.

And don't even get me started on the alternatives to a chisel rack: Chisel boxes and rolls take up too much valuable space on your bench, and keeping the chisels in the bench's tool tray just adds to the clutter that collects there.

What most woodworkers need is a rack that holds all their chisels upright where they can grab

by Christopher Schwarz

Comments or questions? Contact Chris at 513-531-2690 ext. 1407 or chris.schwarz@fwpubs.com.

them. They need a rack that protects the sharp tips. And they need to be able to move the rack off the bench when they're assembling big projects there.

After months of sketches, we're sure we've got the perfect rack. It does everything we want it to do and it can be hung anywhere in the shop (on a bench, a wall or even a cabinet side) thanks to a clever cleat.

And best of all, it's easy and fast to build with shop scraps.

How Does Your Steel Measure Up?

The first thing to do is to measure a few dimensions on your chisels with a ruler and a dial caliper.

Find the thickest part of your thickest blade. Add 1/32" to that measurement and that will be the thickness of all the spacers between the chisels.

Next measure the length of all of your chisels' blades and find the longest one. That length is the width of all of your spacers. (Yes, I do mean width. You want the grain of the spacers to run in the same direction as the front and back pieces.)

Then measure the width of each chisel (don't assume that what is marked on the tool is correct). Add 1/16" to each measurement and that will determine the distance between each spacer. Take these measurements to the saw and rip a small piece of scrap to each of these widths. Mark them with their width. These scraps will help you place your spacers during assembly.

The spacers between each tool are 2 3/8" long. This might seem like a lot, but it allows you to grab any chisel without rapping your knuckles against its neighbor. Most chisel racks I've seen place the tools' handles too close together so you're always fishing out the specimen you need.

A Chisel Lasagna

This rack is essentially four layers of wood sandwiched together. You glue the spacers between the front and back pieces, then you screw a cleat to the back of the rack to hang it.

The stop piece, which is located below the spacers, accomplishes two things: First, it keeps all the chisels at the same height. Second, it prevents you from destroying your rack.

Let's say you built the rack without the stop. Someday, you're going to accidentally drop something on one of your chisels in the rack. The chisel's socket will then wedge into the rack, splitting apart all your work. So spend the extra five minutes to cut and install the stop.

Now that you know the size of the spacers, the space that needs to go between them and the lengths of the blades, you can calculate the dimensions of your front and back pieces (don't forget to add some width for the stop piece). You are ready to begin milling your wood.

Plane down all the pieces you'll need for the rack, then rip and crosscut all your pieces to size. The first step is to attach the stop piece to the back. But before you attach the stop, cut a 45° chamfer on one long edge that measures 3/8" x 3/8". The chamfer makes it easier for dust that gets into the rack to fall out. Then glue the stop in place on the back.

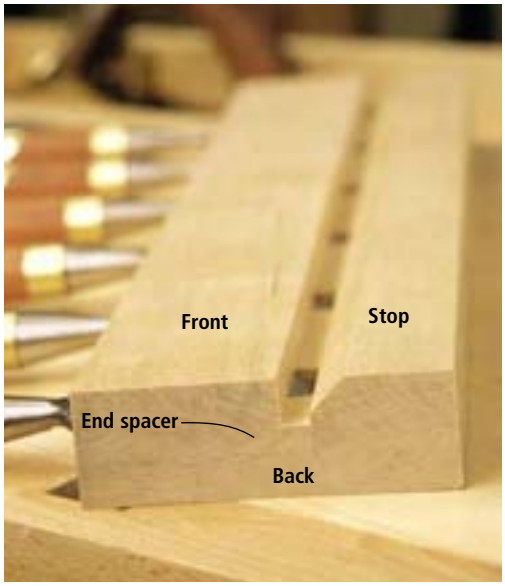
Now nail one of the end spacers in place. Remember those scraps you ripped to width after you measured the width of your chisels? Get them. Place them between your spacers and make sure everything fits to your satisfaction. Now glue and nail the spacers (but not the scraps) in place using 1/2"-long brads.

When that's complete, glue the front piece to the spacers. You're almost done. Clean up all

A dial caliper is handy for checking your chisels' dimensions. Measure the width of each blade, add 1/16" to each measurement, then rip a scrap piece to that width, which will come in handy during assembly.

Use those scrap pieces to lay out the location of the spacers on your back piece. When everything fits, glue and nail the spacers in place.

The chamfer on the stop piece and the slightly narrow front piece allow dust to escape the rack easily.



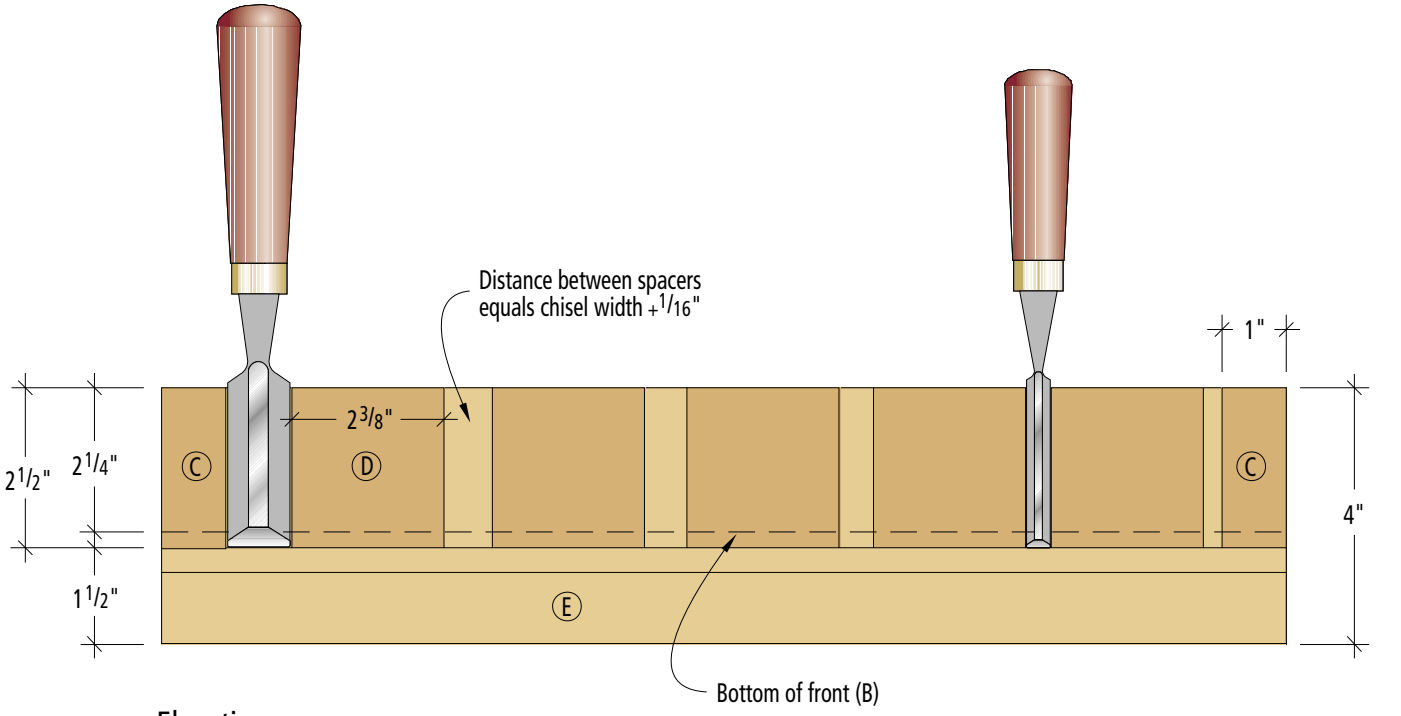
four edges of the assembled rack. Run the bottom edge over your jointer (or clean it up with a hand plane), then rip the rack to width on your table saw to clean up the top edge. Finally, crosscut the ends to tidy things up.

A Clever Cleat

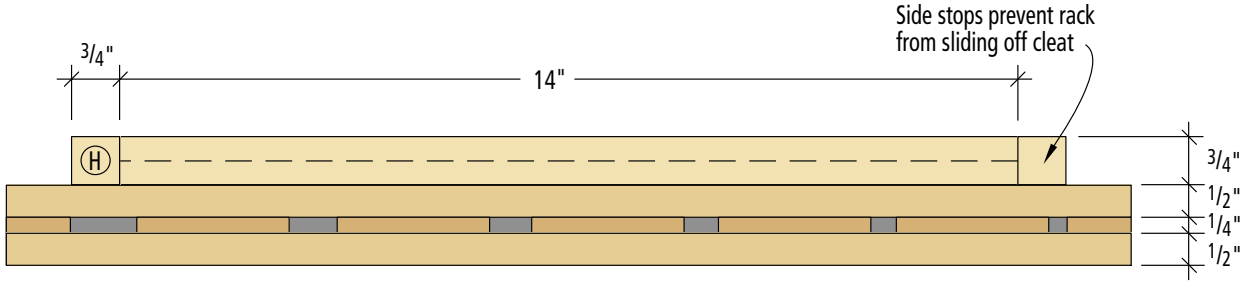
This rack hangs anywhere using two cleats that interlock thanks to a 3/8"-deep x 1"-wide rabbet on each part. You want the fit between the two cleats to be firm. Here's how to do it right: Cut the rabbet on one long edge of each cleat so it's just a touch shy of 3/8" deep, maybe by a few thousandths.

Screw one of the cleats to your bench, shop wall or cabinet. With the other cleat, plane or sand the rabbet at the ends so that the surface is a very gentle and subtle curve. Break the sharp corners of the joint using a block plane or sandpaper, which will make nesting the two cleats easier.

Now screw (but don't glue) this cleat to your rack and give it a try. If the fit is too tight, remove the cleat and thin down the rabbet a bit more. If the fit is too loose, remove the cleat and make a few passes with a plane on the area where the cleat attaches to the rack. This will tighten up the fit.



Elevation



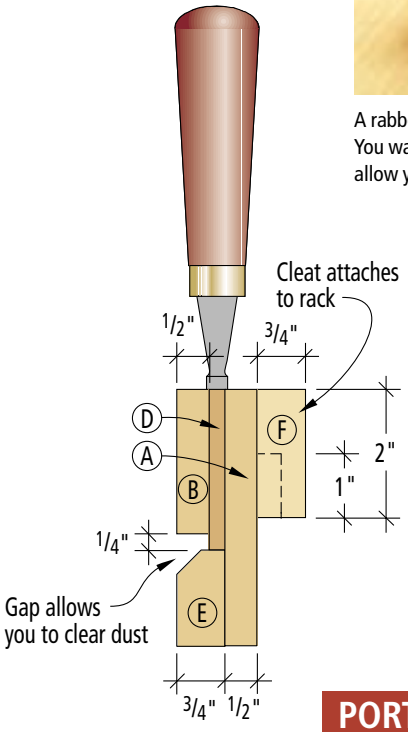
Plan

Once you're satisfied, glue and nail the two side stops on either end of the cleat that's attached to the rack. The side stops will prevent you from pushing the rack off its cleat.

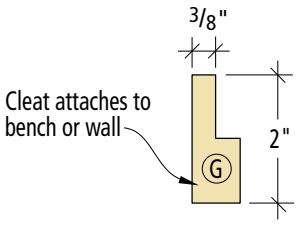
Sand, plane or scrape the surfaces of the rack and add a clear finish. Finish your rack with whatever you used on your workbench. For me it's a wiping varnish comprised of three parts varnish and one part paint thinner.

Since I've installed this rack I've been astonished at how many trips it has saved me to hunt down the chisel I'm looking for. This rack's a keeper. **PW**

A rabbet plane or shoulder plane makes quick work of fitting the cleats together. You want the cleat to fit tightly in the middle and a bit looser on the ends. This will allow you to pivot the chisel rack on and off its mating cleat.



Profile



Profile, cleat for wall

PORTABLE CHISEL RACK

	NO.	LET.	ITEM	DIMENSIONS (INCHES) T	W	L	MATERIAL
❑	1	A	Back	1/2	4	17 3/4*	Birch
❑	1	B	Front	1/2	2 1/4	17 3/4*	Birch
❑	2	C	End spacers	1/4	2 1/2†	1	Birch
❑	5**	D	Spacers	1/4	2 1/2†	2 3/8	Birch
❑	1	E	Stop	3/4	1 1/2	17 3/4*	Birch
❑	1	F	Cleat for rack	3/4	2	14*	Birch
❑	1	G	Cleat for wall or bench	3/4	2	13 1/2*	Birch
❑	2	H	Side stops	3/4	3/4	2	Birch

KEY: * Actual measurement depends on how many tools go in the rack.
** Number of spacers depends on the number of tools.
† Thickness of spacers depends on thickness of tools.

CHOOSING GOOD CHISELS

The chisels shown here are the new American-pattern Ashley Iles chisels available from Tools for Working Wood (toolsforworkingwood.com or 800-426-4613; $100.82 for a set of six). The steel in these chisels did really well during a test performed by the magazine editors in our February 2001 issue. If you're in the market for chisels, here are the other brands that fared well:

• Marples Blue Chips
These are good all-around chisels. They're inexpensive and hold their edge pretty well. Available at any woodworking specialty store or catalog. A set of five costs about $45.

• Craftsman #36859
While these might have the oddest-looking handle on the market, the steel is surprisingly good. Craftsman.com or 800-377-7414. A set of five costs $29.99.

• E.C.E.
German chisels with a horn-beam handle. Refinish the handle and you have a top-notch tool. Ecemmerich.com or 800-724-7758. A set of six costs $108.

• Two Cherries/Hirsch
Excellent steel and decent handles are the good points. Price and the amount of lapping these tools require are the bad points. Highlandhardware.com or 800-241-6748. A set of four costs $79.99.

• Woodworker's Supply German Bevel-edge Chisels
Once you refinish the hornbeam handles on these bargain tools, you'll have a fine and durable set of chisels. Woodworker.com or 800-645-9292. A set of four costs $27.99.

Drawer Primer: Sliding-lid Box

We discovered that our drawer-building technique is an ideal method to make sturdy storage boxes.

This simple box uses the same saw setups and rabbeting techniques for building the drawer shown on page 24, and it's good practice for building the "Simple Shaker End Table" on page 16.

However, there are a couple of differences. Unlike a drawer, this box has a sliding lid that's cut using the same joinery we used to make the bottom. We also added a notched piece of wood inside to organize the box's contents (for us, it's chisels). And there is a small amount of detailing anyone can try: The lid's bevel and thumb pull are made with a chisel, rasp and small gouge.

To make the box, first choose wood with straight grain for the sides, front and back, and wood with nice figure for the lid. We built ours from a hybrid called Lyptus (see page 32). Dress (joint and plane) your lumber, then cut the parts to finished size, except for the tool holder.

Cut the rabbets on your side pieces next, then cut all the grooves. These grooves capture the box's bottom and guide the sliding lid. Finally, cut the rabbets on your bottom and lid.

Lay out the 11/16"-wide x 1/4"-deep bevel on the lid and shape it using a rasp. Once you get close to your layout lines, finish the job with a block plane or #120-grit sandpaper and a sanding block.

Lay out the location of the thumb pull on the lid. Define all the edges using a straight chisel and a gouge for the curved area. Chop out the straight section with a chisel and use the gouge to remove the waste. Hand plane or sand all the parts. If you wish to make a tool holder, do so now. To make the slots for our chisels, we drilled five evenly spaced 1/2" holes, then cut out the remaining material with a hand saw or a band saw.

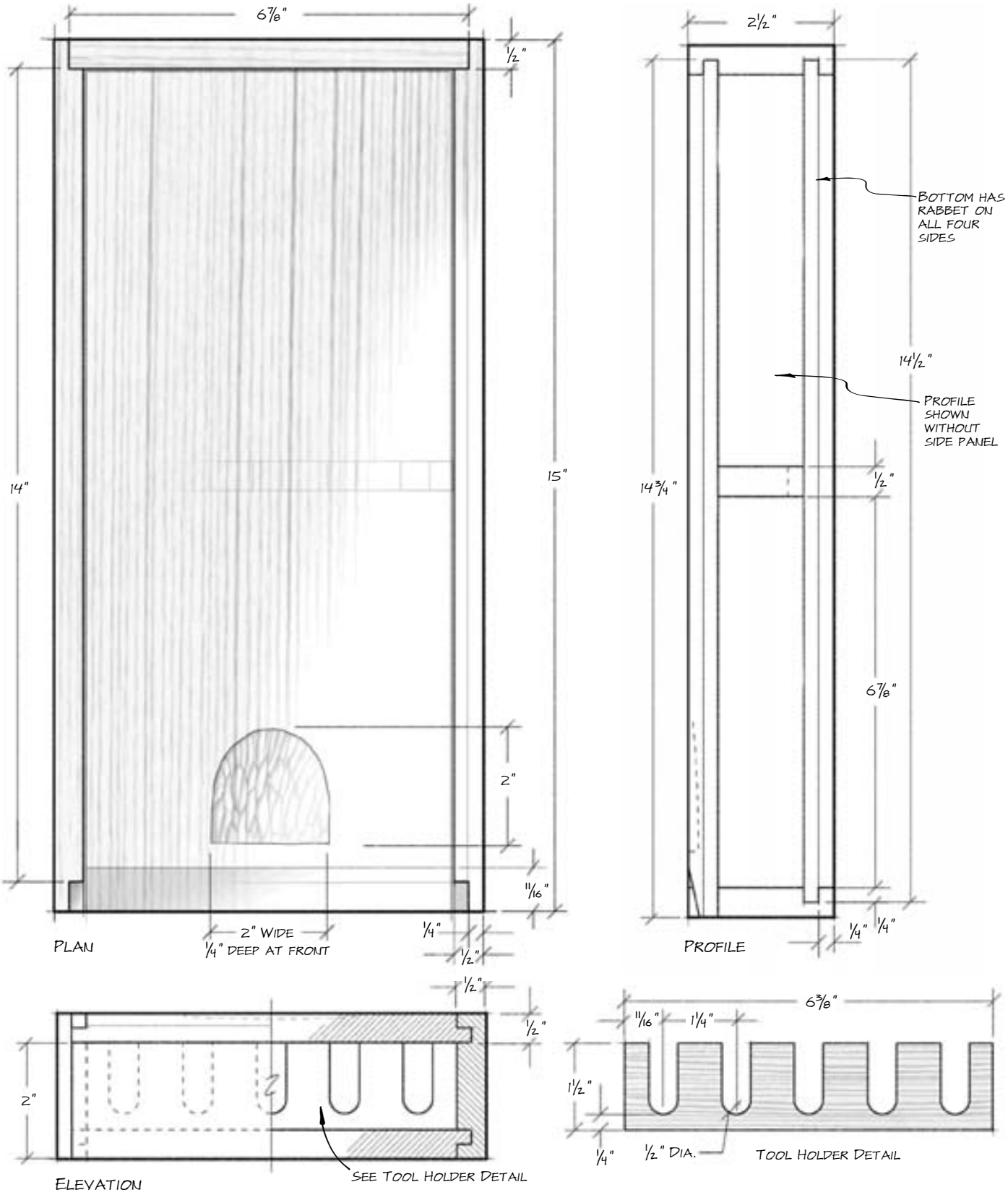
Dry assemble the box. Once satisfied, glue the sides to the front and back. The bottom floats in its groove and the lid (obviously) slides. Reinforce each joint with 5/8" brad nails. We finished our box with garnet shellac. WM

— Christopher Schwarz and Kara Gebhart

PHOTO BY AL PARRISH

Sliding-lid Box

	NO.	PART	SIZES (INCHES) T	W	L	NOTES
❑	1	Front	1/2	2	6 7/8	1/4" x 1/4" groove on bottom
❑	1	Back	1/2	2 1/2	6 7/8	1/4" x 1/4" groove on top and bottom
❑	2	Sides	1/2	2 1/2	15	1/2"-wide x 1/4"-deep rabbet on ends; 1/4" x 1/4" groove on top and bottom
❑	1	Bottom	1/2	6 7/8	14 1/2	1/4" x 1/4" rabbet on all sides
❑	1	Lid	1/2	6 7/8	14 3/4	1/4" x 1/4" rabbet on sides and back
❑	1	Tool holder	1/2	1 1/2	6 3/8	Varies depending on your usage



SLIDING-LID BOX

German Work Box

A fold-out, carry-anything tool chest on wheels.

During a recent trip to Germany, our publisher, Steve Shanesy, snapped some pictures of a utilitarian, but also clever, rolling tool cart used in one of the woodworking shops he visited.

The cart was designed to hold your tools so your bench or assembly platform remained tidy. It had doors and drawers on the lower section, plus wings that opened on top to reveal three tool wells that kept things orderly and prevented items from falling onto the floor. When not in use, the cart closed to a nice size and could even be locked.

The staff agreed that the idea was a good one, but we decided to put a *Popular Woodworking* spin on it. We divided and detailed the lower drawer space some more and added a tool till inside the center well with magnetic tool holders.

Plus we made sure the construction was simple. Mechanical fasteners do all the hard work. You could easily build this cart with a circular saw, a drill and a router, making it a great project for beginners or even a professional cabinetmaker in a production shop.

Affordable Space

While we didn't start out worrying about price, the finished bill is worth talking about. Using two sheets of good-quality ¾" shop-grade plywood and one sheet of ½" Baltic birch ply for the drawers, wood costs came in at about $125. The necessary hardware (there's a lot more than you might think imagine) comes in at less than $150 if you build it exactly as we have. So

By David Thiel & Michael A. Rabkin

Comments or questions? Contact David at 513-531-2690 ext. 1255 or david.thiel@fwpubs.com. Contact Michael at 513-531-2690 ext. 1327 or michael.rabkin@fwpubs.com

Photos by Al Parrish


BOSCH

SOURCES

Lee Valley Tools
800-871-8158 or
leevalley.com

1 set • 2" metal drawers (5)
#05K98.25, $23.50

1 set • 1" metal drawers (5)
#05K98.10, $19.95

2 • gripper mats
#88K18.05, $5.95 ea.

3 • 12" magnetic bars
#93K75.12, $7.95 ea.

Woodworker's Hardware
800-383-0130 or
wwhardware.com

3 • 1½" x 48" nickel piano hinges
#LA11248 14A, $8.98 ea.

2 • 2½" swivel casters
#JH25 S, $4.16 ea.

2 • 2½" swivel casters w/brake
#JH25 SB, $4.81 ea.

1 • lid stay
#KV0472 R ANO, $2.67

2 • 4" chrome pull
#UFWP4 SS, $2,60 ea.

4 • 1" pull screws
#SC832 1SS, $.23 ea.

2 • roller catches
#A09714 A2G, $.96 ea.

1 • 18" 100# full extension slide
#KV8417 B18, $11.45 pr.

Woodcraft
800-535-4482 or
woodcraft.com

2 • Miller Dowel 1X walnut packs (25)
#144735, $6.99 ea.

1 • stepped dowel kit 1X
#144570, $27.99

Woodworker's Supply
800-645-9292 or
woodworker.com

1 • 13/16"x 50' PSA birch edge tape
#934-960, $13.95

Prices as of publication deadline.

for $275, you're still getting a lot of storage for the price and the space is arranged to be exactly what you need, unlike a store-bought toolbox.

The Basics

While this is a utilitarian work cart for the shop, we expended a little extra effort (veneer tape on the plywood edges and no exposed screw heads) to make it a more finished-looking project while maintaining the solid, simple construction details.

The cart joinery is a collection of butt joints. We used a new product on the market, Miller Dowels, to assemble all the butt joints. This is a stepped wood dowel that replaces the screws and plugs the holes left by the drill bit at the same time.

The back is ¾" plywood (plywood offers great gluing strength on edge because of the long grain part of the plywood core). This size back offers excellent stability and the opportunity to square-up the case without worrying about wood expansion because of changes in humidity.

On the interior plywood drawers we used simple rabbet joints to add some extra strength. The bottoms of three of the drawers are screwed to the drawer boxes and stick out past the drawer sides to serve as effective drawer guides, emulating the metal drawers used on the right side of the case.

Begin with the Big Box

First cut the plywood panels to size according to the cutting list below. We've posted an optimization chart at popwood.com (click on "Magazine Extras") to help you get all the pieces from your plywood sheets.

To allow the three smaller drawers to slide in and out of the case, you need to cut ½"-wide x ⅜"-deep dados in the left side of the case and in the left side of the center divider. Lay out the dado locations – according to the illustrations – then cut them using either a dado stack in your saw, repeated cuts with a circular saw, or with a straight bit, using two passes to achieve the full depth. There is ½" of space between each of the drawers and we worked from the bottom up, leaving a larger gap above the top drawer to allow clearance for the door catches.

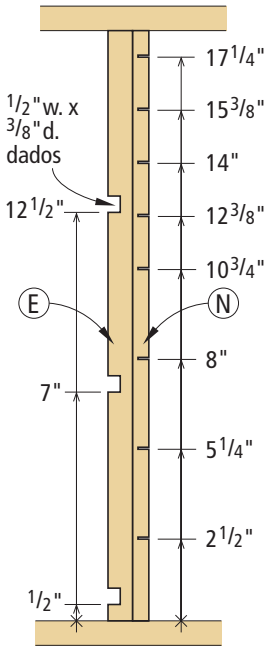
Dowels and Glue

As mentioned, we used veneer tape to dress up the edges of the plywood. We had been using iron-on veneer tape for years, but recently discovered a self-adhesive

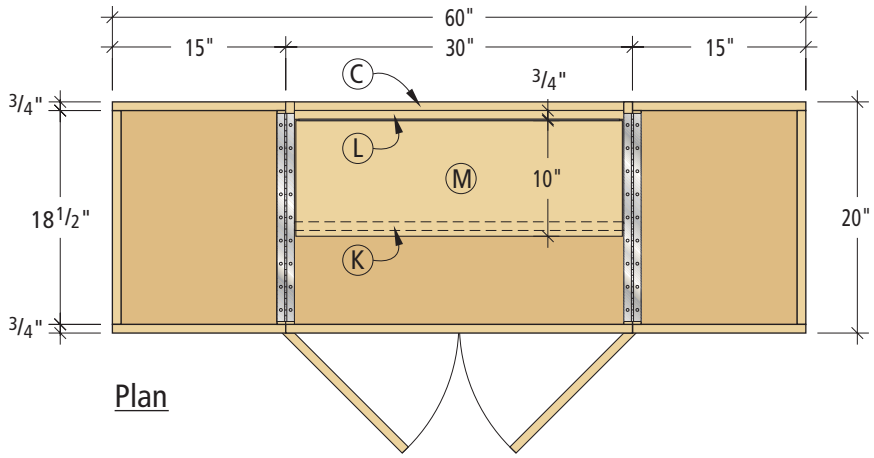
GERMAN WORK BOX

	NO.	LET.	ITEM	DIMENSIONS (INCHES) T	W	L	MATERIAL
Case							
❑	2	A	Sides	¾	19¼	32	Shop plywood
❑	3	B	Shelves and bottom	¾	18½	28½	Shop plywood
❑	1	C	Back	¾	28½	32	Shop plywood
❑	1	D	Front	¾	6⅞	30	Shop plywood
❑	1	E	Divider	¾	18	18	Shop plywood
❑	2	F	Doors	¾	14 15/16	25	Shop plywood
❑	4	G	Wing front and back	¾	6 15/16	15	Shop plywood
❑	2	H	Wing sides	¾	6 15/16	18½	Shop plywood
❑	2	I	Wing sides	¾	6¾	18½	Shop plywood
❑	2	J	Wing panels	¾	13½	18½	Shop plywood
❑	1	K	Till support	¾	5½	28½	Shop plywood
❑	1	L	Till lid spacer	¾	¾	28¼	Maple
❑	1	M	Till lid	¾	10	28¼	Shop plywood
❑	2	N	Drawer section sides	½	12	18	Shop plywood
Drawers							
❑	2	O	Drawer front and back	½	4	15¾	Baltic birch
❑	2	P	Drawer sides	½	4	17½	Baltic birch
❑	2	Q	Drawer front and back	½	4½	15¾	Baltic birch
❑	2	R	Drawer sides	½	4½	17½	Baltic birch
❑	2	S	Drawer front and back	½	5	27½	Baltic birch
❑	2	T	Drawer sides	½	5	17½	Baltic birch
❑	2	U	Drawer front and back	½	5½	15¾	Baltic birch
❑	2	V	Drawer sides	½	5½	17½	Baltic birch
❑	3	W	Drawer bottoms	½	16¾	18	Baltic birch
❑	1	X	Drawer bottom	½	17½	27	Baltic birch

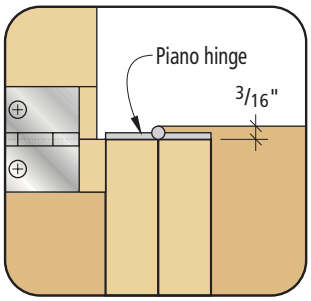
Cut the drawer dados in the case sides prior to assembly. We used a router to make the dados and a store-bought guide that clamps across the plywood to guide the router. You could just as easily clamp a straight board to the side to serve as a guide. Use two passes on each dado to achieve the full depth. This puts less strain on the router and the bit.



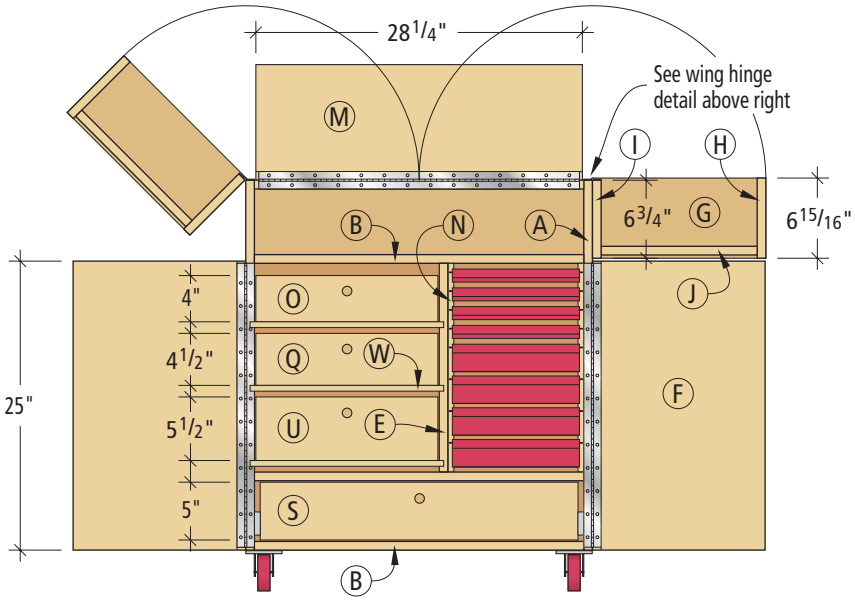
Drawer dado layout



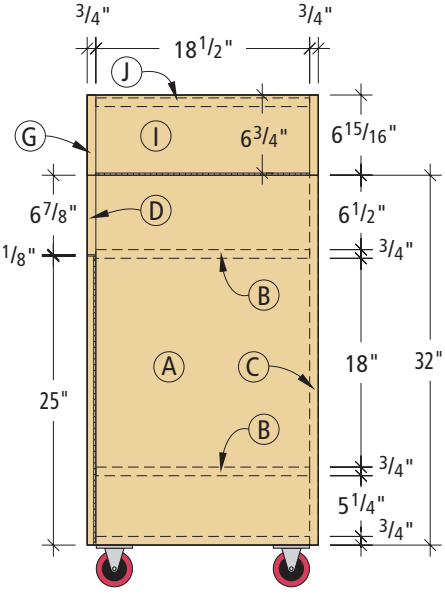
Plan



Wing hinge detail



Elevation



Profile

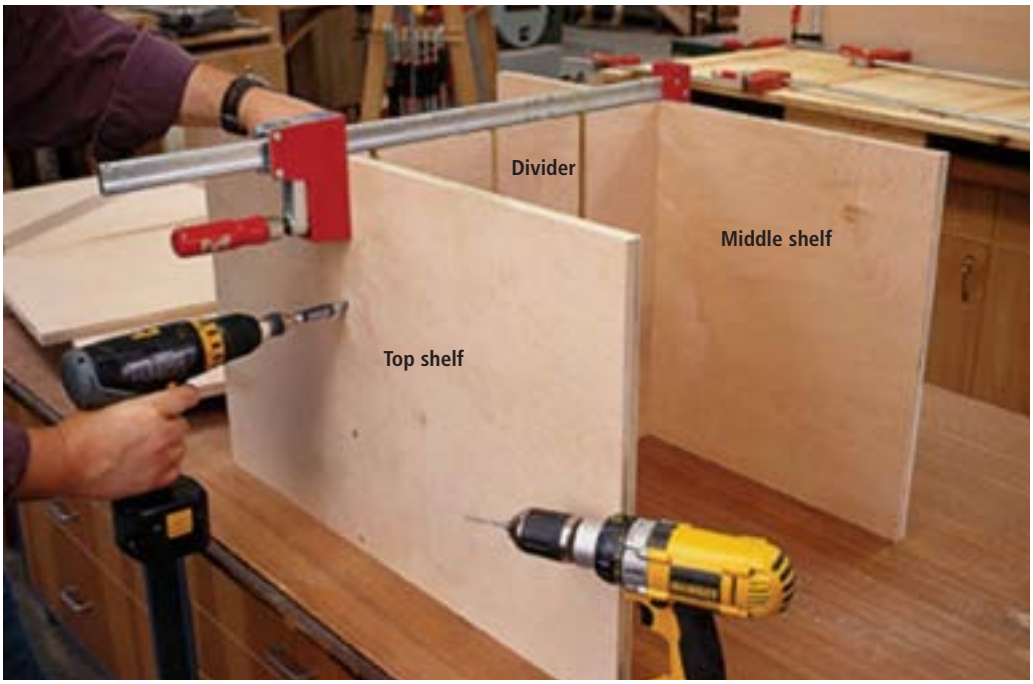
The veneer edge tape is easy to use and quickly adds a finished appearance to the cabinet. Even though we ended up painting the exterior, the paint still applied better to the veneer tape than on a bare plywood edge. You'll need to notch the tape with a file at the dado locations in the left case side.

veneer tape that is much simpler to use, takes the concern out of the glue melting evenly and sticks very well to the work.

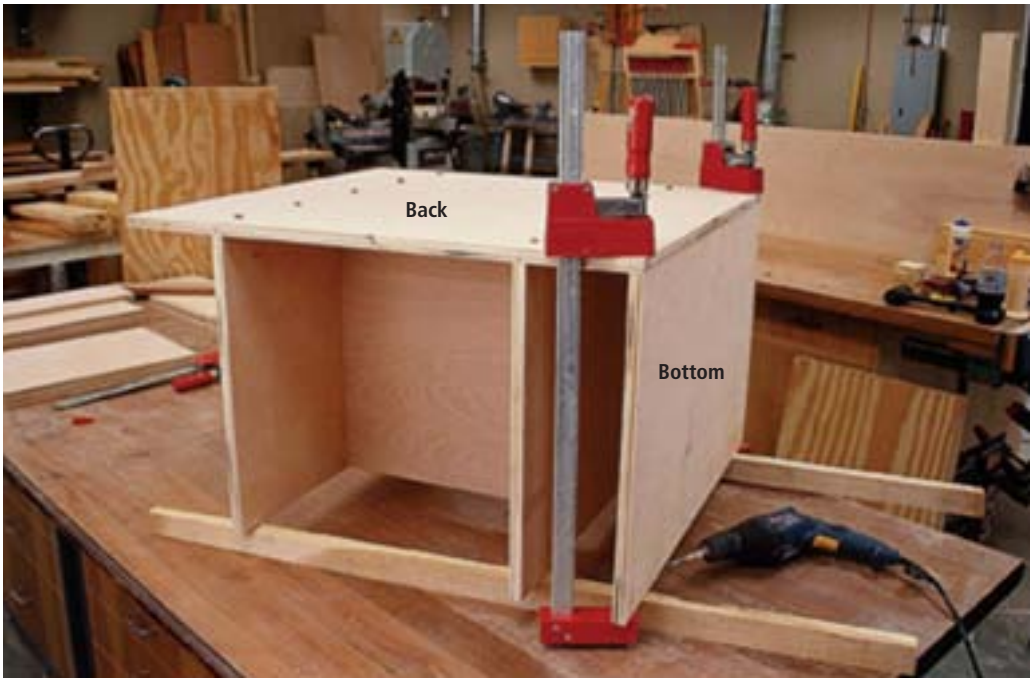
After veneering all the exposed edges, sand the interior surfaces through #150 grit. Now you're ready to assemble the case.

Start by clamping the divider between the upper and middle shelves, holding the front edges flush. We used regular #8 x 1¼" screws here because they would be hidden inside the case. Drill and countersink 3/16"-diameter clearance holes through the shelves and drill 3/32"-diameter pilot holes in the divider. Add glue and screw the assembly together.

Next use either screws or Miller Dowels to attach the back to the center assembly. Check the spaces to ensure they are square, then add the bottom shelf to the back,



Screw the divider between the top and middle shelves by first drilling a pilot hole for the screws and countersinking the flathead screws to the shelf surfaces.



Attach the back to the center assembly using the Miller Dowels. Put glue on the back edges of the center pieces, then position the back and clamp it in place. After using the proprietary stepped drill bit to make the holes, add glue to the dowel and then tap it into place in the hole. Lastly, attach the bottom to the back with stepped dowels.

holding the back flush to the bottom side of the shelf.

Clamp your center assembly between the two sides, drill the appropriate holes, add glue and assemble the rest of the case. It's a good idea to trim the dowels flush to the case side before flipping the case onto that face: It's more stable and there's less chance of messing something up.

Add the front piece to the front edges of the sides, holding it flush to the top edge. The front will overlap the top shelf, leaving ¼" of the shelf edge exposed. This allows room to attach the front to the shelf with brad nails. The exposed edge will act as a door stop once hinges are installed.

The wings go together like simple versions of the case. The side closest to the cabinet on each wing is 3/16" narrower than the other. This creates a recess to house the hinge to mount the wings to the cabinet.

We recessed the captured panels ¼" in from the outside edges to avoid any alignment problems. Using the stepped dowels, attach the wing sides to the wing panels. Attach the fronts and backs to complete the assembly.

Storage Details

Start by adding the till lid to the back with a length of continuous (or piano) hinge. Because of the way the hinge needs to mount inside the cabinet (so the wings can close) we added a ¾" x ¾" maple strip to the back ⅛" down from the top edge. This allows the till lid to open to about 110°. Mount the lid to the strip with a length of piano hinge. Carefully check it for clearance between the two sides as it closes.

Next, attach the till support to the top shelf by screwing into the support through the shelf. The support is set back ½" from the front edge of the till lid to allow you to get your fingers under it to lift the lid. Add some glue and a couple of stepped dowels through the sides to hold everything in place.

Now you need to attach the two wings to the case with more piano hinge. Clamp the wings to the case in the open position (flush to the front) while attaching the hinges to ensure even and well-supported wings.

Lastly, attach the doors to the case (use a piano hinge again).

Before attaching the second side, it makes sense to cut the dowels on the first side flush to the surface. I used a Japanese flush-cutting pull saw that has teeth with very little set to them, reducing the chance of scratching the cabinet side. By applying pressure on the blade to keep it flat to the cabinet surface, I further reduced the chance of scratches. Do a little sanding, then flip the cabinet over and attach the second side, then the front.

The next step is to attach the first side (which side doesn't really matter). Carry your location lines from the back around to the side and use them to lay out the dowel locations. Add glue, clamp, drill and dowel the joint.

After attaching the till lid, the wings are ready. The wings are held flush to the front and are tight against the cabinet side. The recessed wing side is the attachment point for the piano hinge, allowing the lid to close flush against the top of the cabinet.

To get the doors to seat flush against the cabinet front, cut a shallow rabbet (3/16" deep, the thickness of the hinge) the width of the closed hinge on the back of the door on the hinge side. This cut can be done with your router or table saw.

When attaching the doors, pay careful attention to the height. Preferably they will be about 1/8" below the wings when open to keep things from bumping.

You'll also notice that the left-hand door's hinge covers the dados for the drawers. Rather than place the hinge on the outside of the cabinet (making it too visible), we opted to simply file out the hinge to match the dado locations, as shown below.

Drawer Space

Ultimately you'll decide how the interior space in your cart is used. We've used drawers because our experience has shown that low shelving just collects junk at the back of the case that you can never see or reach easily.

We've used a selection of drawer types for this project, both shop-made and purchased. You can follow our lead or choose whatever style you prefer.

The lower shop-made drawer is simply a Baltic birch box drawer mounted on full-extension, 100-lb. drawer slides. This is a fine heavy-duty drawer joined at the corners with simple rabbet joints. We used a 1/2" bottom fit into a rabbet in the sides. While we usually would have recommended a 1/4" bottom, we had the 1/2" material and didn't feel like by buying a whole sheet of 1/4" for just one drawer.

The store-bought drawers are metal, lighter-duty drawers of 1" and 2" depths and have metal flanges that ride on dados cut into the sides of the case. With these, the front of the drawer overlaps the case sides to both hide the dados and serve as a drawer stop. As this would interfere with the door hinge, we added two drawer section sides made of 1/2" Baltic birch and set them back 1" from the front of the case. This also made it possible to cut the dados in the section sides after the case was assembled.

The three drawers to the left use the best of both worlds, finishing off some of the wood at hand and avoiding the cost of more drawer slides by using the "lip and groove" concept of the metal drawers. On all the wood drawers, a simple 1" hole drilled in the front serves as an adequate drawer pull.

Finishing Touches

The last steps are adding a finish (we opted for two coats of dark green latex paint on the outside; the inside was left as-is) and then some sturdy 2 1/2" casters to the case and placing and organizing your tools. The photos will show you a couple of storage tricks and items available for sale to help keep things neat and tidy. **PW**

MILLER DOWELS

Miller Dowels are a clever concept that can make some types of assembly faster and easier. Essentially, the stepped-dowel idea offers the strength of a standard dowel with the ease of a tapered dowel. Alignment and splitting difficulties often associated with standard dowels are reduced, while the strength offered is actually better than with a standard dowel thanks to the ribbed design (increasing glue coverage).

These stepped dowels can be used in place of screws (as we've shown in this project) – think of them as self-plugging screws.

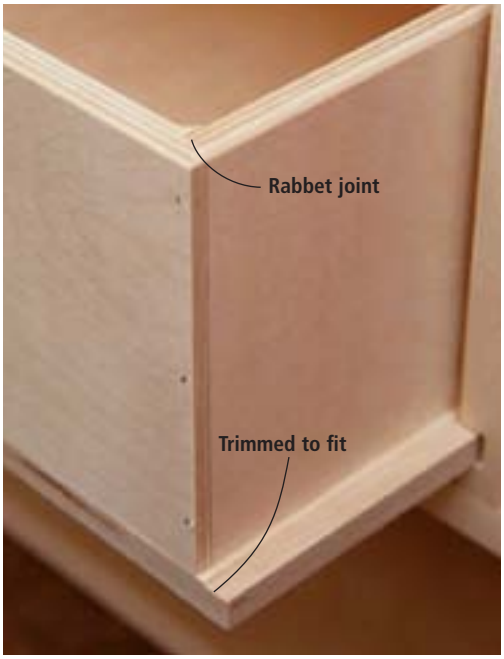
We're going to stop short of advocating Miller Dowels as a replacement for all screws, though. While the strength is good, they still won't pull up an ill-fitting joint, and if the glue is not allowed to cure before removing the clamps, there is the potential for the joint opening slightly after removing the clamps. So proper clamping and glue-curing time is still essential.

Then there is the economic consideration. A pack of 50 dowels (2 3/4" or 3 1/2" long) and the necessary bit cost about $30. Packs of 25 dowels cost about $7. That's about 28 cents per dowel versus 4 cents per #20 biscuit or about 8 cents per premium screw.

All things considered, we like the idea of an all-wood, strong and simple joint – but we'd recommend choosing your application carefully.

The dowels are available in birch, red oak, cherry and black walnut, and more weather-resistant species are on the drawing board. For details, contact Miller Dowel at 866-WOODPEG (866-966-3734) or millerdowel.com.

You can see the two sets of dados for the drawers with a few drawers removed. Also, notice the notched piano hinge to allow the drawers to slide in and out.



This shot of one of the drawers shows the rabbet joinery used. Also note that the bottom was trimmed slightly in width to allow the drawer to move more smoothly in the dados.

Pads line the bottoms of the wing and till sections to keep tools from rolling and to help trap dust. Dividers in the till section can be customized to fit the tools you need. The magnetic bars on the till lid provide secure storage for small ferrous tools. Small-parts storage is easily accomplished with a couple of plastic storage bins held in place in one of the metal drawers with some hook-and-loop fasteners.

Hand Plane Cabinet

Hard-working tools deserve a decent place to rest.

On certain holidays, such as New Year's Day, craftsmen in Japan clean their tools, put them on a shrine and offer them gifts such as sake and rice cakes. It is their way of thanking the tools for the service they have provided and will provide in future days.

As my own collection of hand planes grew from a few rusty specimens handed down from my great-grandfather to a small arsenal of new high-quality instruments, this Japanese tradition began to weigh heavily on my mind. My planes generally squatted on my workbench when not in use, and I had to constantly move them around to avoid knocking them to the floor as I worked.

After some thought, I decided that a cabinet dedicated to my planes was the best way to protect them from dings and to thank them for the service they provide almost every day of the year.

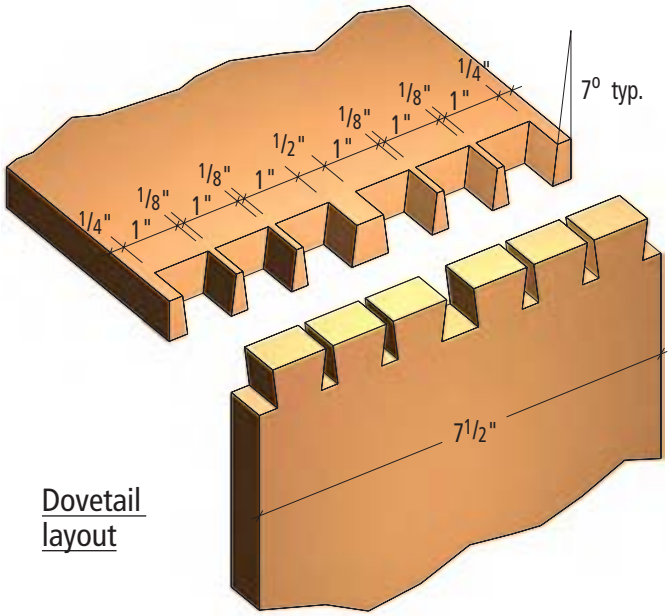
This piece is designed to be used either as a traditional tool chest that sits on a bench or as a cabinet that hangs on the wall on a tough French cleat. Because planes are heavy tools, the case is joined using through-dovetails. The lid is a flat-panel door assembled using mortise-and-tenon construction. And the dividers inside the cabinet are screwed together so the configuration can be rearranged easily as my collection (or needs) change.

As you design your own version of this cabinet, you should measure your planes to ensure there's enough space for everything you own, or plan to own. This cabinet should provide plenty of room for all but the largest collections.

by Christopher Schwarz

Comments or questions? Contact Christopher at 513-531-2690 ext. 1407 or chris.schwarz@fwpubs.com.

Photos by Al Parrish



Dovetail layout

Dovetails with the Pins First

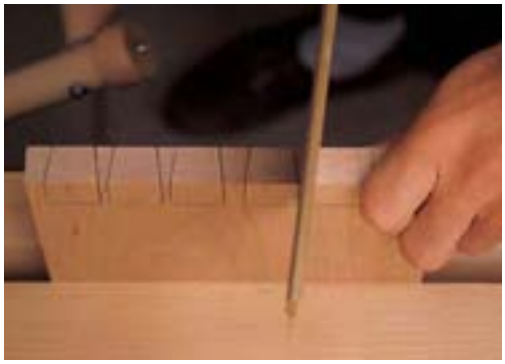
Because of all the cast iron and steel in hand planes, the cabinet's carcase needs to be as stout as possible to resist the stress that all this weight will put on the corners. In my opinion, the through-dovetail is the only joint for this job.

Whether you choose to cut pins or tails first (or use a dovetail jig and a router) is up to you. Usually I cut the tails first, but I try to keep an open mind about different techniques. So for a year I built as many things as I could by cutting the pins first – this is one of those projects.

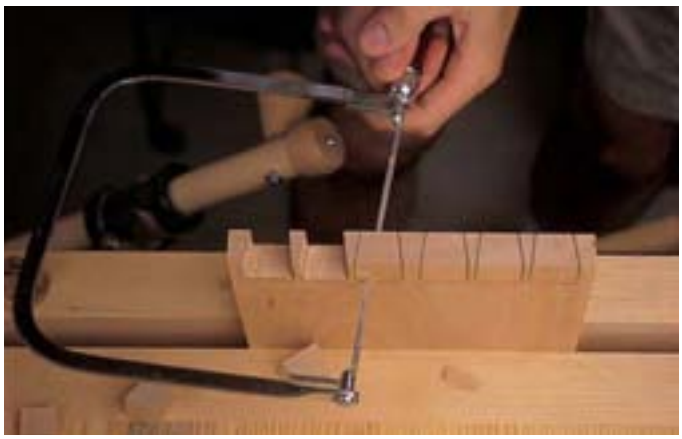
Lay out the joints using the illustration at left, a marking gauge, a square and a sliding bevel square set for 7°. I strike the lines with a marking knife and color them in a bit with a mechanical pencil. The pencil marks help me see the line and the knife lines keep me accurate. In fact, once you get some practice sawing, you should be able to easily remove the pencil marks from only one side of your knife lines. It sounds crazy, but it's actually not that hard.

There are many ways to remove the waste from between your saw's kerf lines. Some just chop it away

Mark the length of your pins and tails. There's a debate as to whether you should mark exactly how long you want them, a little less or a little more. I prefer to mark them 1/32" longer so the ends are proud when assembled. Then I plane them flush after gluing.



Once the cut is started, hold the saw like you would hold a small bird that you're trying to prevent from flying away. Don't clench the handle; just keep enough pressure to avoid losing control. And never apply much downward pressure as you saw – this will cause your blade to drift.



With the pins defined, get out a coping saw with a fine-tooth blade and remove as much waste as you can. The closer you get to the scribed line at the bottom of the joint, the less cleanup you'll have with a chisel. But if you overshoot your line, you're cooked.

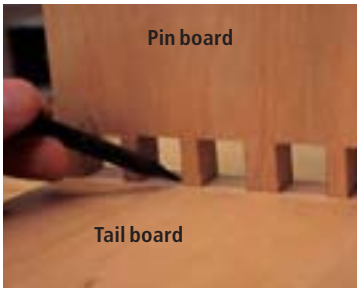
Clamp your pin board to a piece of scrap and remove the rest of the waste using a sharp chisel and a mallet. I sneak up on the line on one side, then on the other, then clean up any junk in the middle. Clean out the corners of the pins using a sharp knife.

directly with a chisel and a sharp blow from a mallet. I find that I'm sharpening my chisels less if I saw out most of the waste and chop out the little bit that's left. A coping saw with a fine-tooth blade works well, as does a jeweler's fret saw.

When you chop out the waste, be sure to stand so you can see the profile of your chisel – it must be perpendicular to the work. I use a standard bevel-edge chisel for this operation. Just make sure that if you do the same that your chisel can be struck by a mallet without splitting the handle.

Next you need to mark out the mating part of the joint by using the first half of the joint as a template. Here's the main difficulty you'll encounter by cutting the pins first: You have to balance the pin board on edge to mark out the tail portion of the joint. With a small case it's manageable. But with a dresser it can be tricky.

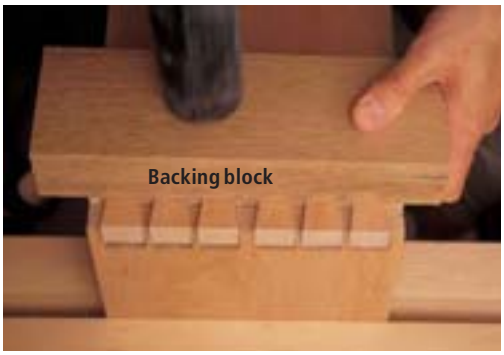
Mark the joints with a sharp knife followed by a pencil. Then cut the tails. For this project I tried a technique you might want to take for a spin: As you can see from the photo above right, I skewed the tail board in my vise so I was



Put your tail board on the bench with its inside face pointing up. Position its mate on top of it and mark the locations of the tails using a knife, followed by a mechanical pencil. Be careful not to shift either board during this step. If you do, erase your lines and start anew.

Transfer the lines on your tail board across the end using a square. Clamp the tail board in a vise. You can see how I skewed the board in my vise so I'm actually cutting straight down. Angle the board one direction and make half of the tail cuts, then reverse the angle for the other cuts. Remember to cut ever-so-slightly outside of the lines.

Remove the waste from the outside face of the board first, then remove the rest from the inside face. This will result in a neater joint if the grain buckles while you are chopping it. Again, clean up your corners with a knife.



Now it's time for a test fit. Assemble the joint using a deadblow mallet and a backing block to distribute your blows across the entire joint. You should be able to push the mating pieces together most of the way using only hand pressure, plus a few taps to seat it in place.

PLANES AT REST: ON THEIR SOLES OR ON THEIR SIDES?

One of the big debates among plane users is whether to place the tools on their soles or their sides when they are not in use. Traditional carpenters place the tools on their sides to protect the iron from getting dinged. Many woodworkers have picked up this tradition and it's frequently passed on from teacher to student (as it was to me).

But it might not be necessary.

A couple of years ago I was convinced by a fellow craftsman that it's better to place planes on their soles when you are working at your bench. Here's the rationale. The old carpenter's rule applied to work on the job site, where you could never be certain about where you were setting your plane (this was back when you might actually see planes on a job site). So placing the plane on its side protected the iron from grit and gravel that

could cover any flat surface in a newly built home. Also, carpenters say that putting planes on their sides prevents the iron from being pushed back into the plane's body, which is what could happen when a plane is rested on its sole.

Woodworkers, however, work on a wooden bench – far away from mortar dust and gravel. So they say it's best to place an unused plane on its sole to prevent the iron from getting dinged by another tool on the bench. What about the iron getting pushed up into the plane's body? If you think about this statement for a moment, you'll see how ridiculous it is. The plane's iron is secured tightly enough in the plane's body to withstand enormous pressure as the plane is pushed through the work. It should be child's play for the iron to stay in one place with only the weight of the plane pushing it down.

Other woodworkers have come up with other solutions that work, too, including placing the planes sole-down over the tool well of their bench. Or they rest the sole on a thin wooden strip that holds the iron slightly above the bench. But I don't mess with that. After unlearning years of training, I now put my planes sole-down on the bench. — *CS*

You can see the pencil lines on the tails and how the ends of the pins and tails stick up a bit on the completed joint. This makes it easier to trim them flush, but more difficult to clamp during glue-up.

Cut the groove for the 1/2"-thick bottom in two passes using a plunge router outfitted with a straight bit and an edge guide. On the pin boards, you can cut the groove through the ends because it won't show.

On the tail boards, you need to stop the groove in one of the tails as shown. The dovetail layout shown in the illustration allows you to put the groove solidly into a tail.

sawing straight down instead of at a 7° angle. I think this is a good trick for beginners as it makes it easier to track your lines. However, you have to shift the board 7° the other way for the other half of your cuts, so it's a bit more work.

At this point you have to pay close attention to your lines or your joint will have a sloppy fit. Saw on the waste side of the line, leaving the pencil line intact. This makes the joint just a little tight – something you can tweak by paring with a chisel.

Use a coping saw to remove most of the waste between the tails and chop the rest of the waste away with a chisel. Now you're ready for a dry run. Ease the inside edges of the tails just a bit with a knife. If the joint is too tight, try shaving off a bit on the inside faces of the pins – parts that won't show in the completed joint.

Bottom and Assembly

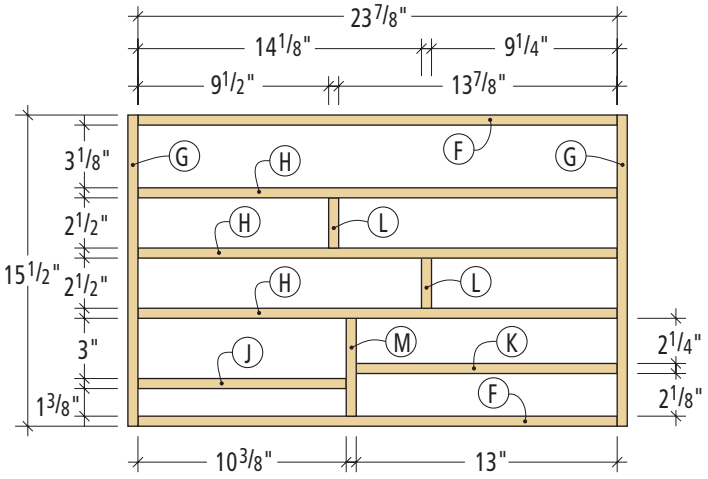
Cut the remainder of your dovetails and mill the 1/4"-deep x 1/2" groove for the plywood back/bottom. I milled this groove using a plunge router, a straight bit and an edge guide. Make sure you put the groove 1/2" in from the bottom edge of the sides to make room for the French cleat that attaches the cabinet to the wall (if you're hanging this cabinet on a wall).

Before you assemble the case with glue, use a smoothing plane to prepare all the inside surfaces of the carcase for finishing – including the bottom piece. I sharpen a gentle camber on the cutting edge of the blade (about .002") and set the plane to take a very fine shaving, about .001" thick. This creates a surface that generally needs little or no sanding, especially with wood that has mild, easy-to-plane grain.

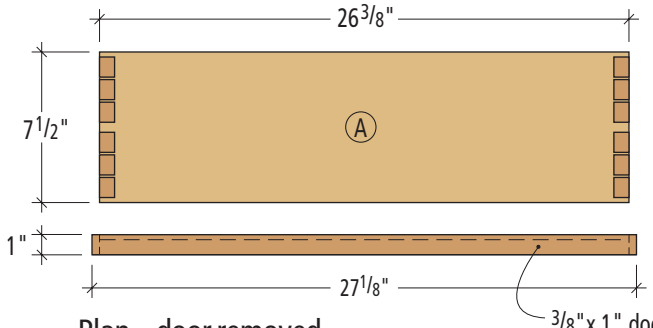
Once you glue up the case, trim the dovetail joints flush to the outside and use a smoothing plane to prepare the exterior of the case for finishing.

HAND PLANE CABINET

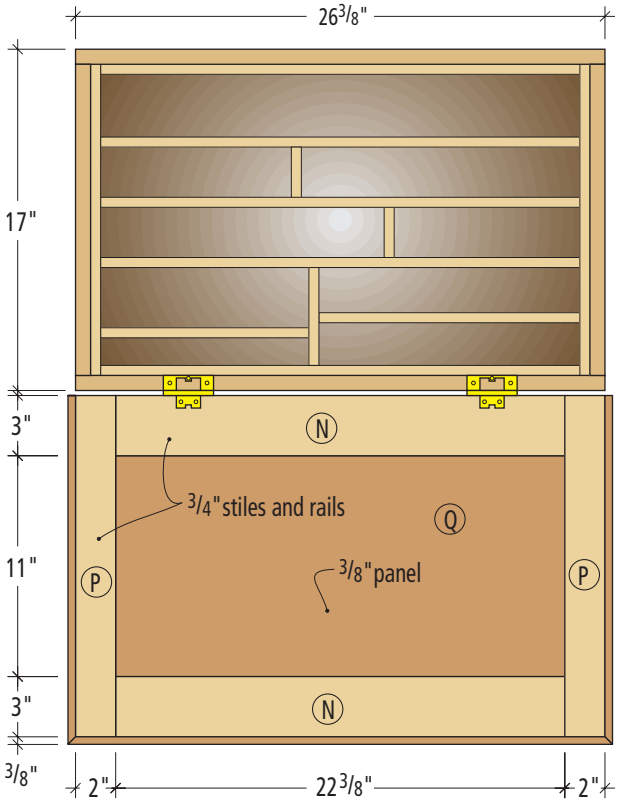
	NO.	LET.	ITEM	DIMENSIONS (INCHES) T	W	L	MATERIAL	COMMENTS
Carcase								
❑	2	A	Top, bottom	3/4	7 1/2	26 3/8	Cherry	Cut 1/16" long
❑	2	B	Sides	3/4	7 1/2	17	Cherry	Cut 1/16" long
❑	1	C	Back/bottom	1/2	16	25 3/8	Plywood	In 1/4"-deep groove
❑	1	D	French cleat for case	1/2	2 1/2	24 7/8	Maple	45° bevel on one edge
❑	1	E	French cleat for wall	1/2	2 1/2	22 7/8	Maple	45° bevel on one edge
Dividers								
❑	2	F	Top, bottom	1/2	2 1/2	23 7/8	Maple	
❑	2	G	Sides	1/2	2 1/2	15 1/2	Maple	
❑	3	H	Horizontal dividers	1/2	2 1/2	23 7/8	Maple	
❑	1	J	Horizontal divider	1/2	2 1/2	10 3/8	Maple	
❑	1	K	Horizontal divider	1/2	2 1/2	13	Maple	
❑	2	L	Vertical dividers	1/2	2 1/2	2 1/2	Maple	
❑	1	M	Vertical divider	1/2	2 1/2	4 7/8	Maple	
Door								
❑	2	N	Rails	3/4	3	24 3/8	Cherry	Cut long to fit cabinet
❑	2	P	Stiles	3/4	2	17	Cherry	Cut long to fit cabinet
❑	1	Q	Panel	3/8	12	23 3/8	Poplar	In 3/8" x 1/2" groove
❑			Moulding	3/8	1	65	Cherry	1/4" roundover on one edge



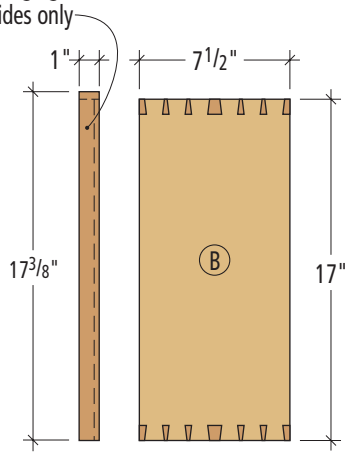
Elevation – internal dividers



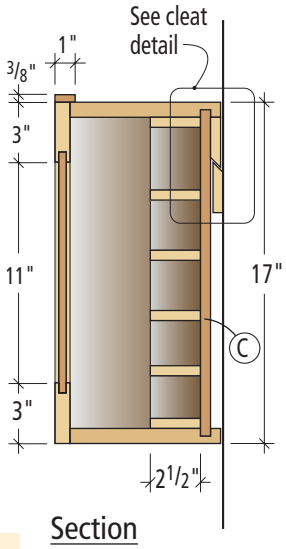
Plan – door removed



Elevation



Profile – door removed



Section

SLICK SOLE FOR SMOOTHING

When using a smoothing plane to prepare wood for finishing, you'll get better results if the plane's sole is waxed. The wax lubricates the sole and allows the plane to skim over the work. You'll use less effort and the end result looks better because you're less likely to stall during the cut. I use inexpensive canning wax found at any grocery store that costs a few dollars for a box. Apply the wax in the pattern shown below (keep it off the iron; that will change how the plane cuts). Then start working until you feel the plane becoming harder to move. Just reapply the wax and get back to work. — *CS*

SUPPLIES

Lee Valley Tools
800-871-8158 or leevalley.com

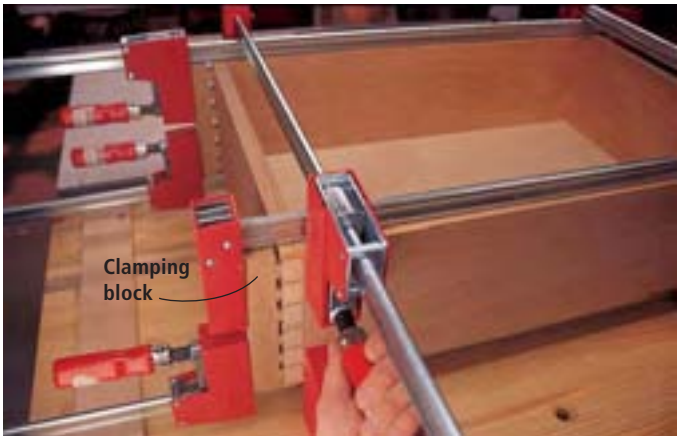
- 2 • Forged flush rings, 1½" x 2" #00L02.02, $13.60 ea.
- 2 • Colonial chest handles #06W02.01, $14.50/pair
- 2 • 2½" non-mortise hinges #00H51.13, $1.20 ea.

Local home-supply store

- 2 • Magnetic catches

Prices as of publication deadline

I don't like to clamp carcase pieces between dogs unless I have to – the clamp pressure can bow the pieces as I'm working them. I prefer a stop on my bench, as shown. After planing the case pieces, I'll hit them with some #220-grit sandpaper to remove any ridges left by the plane.



I use simple clamping blocks to clamp the tail boards firmly against the pin boards. These are easy to make using a hand saw or band saw. Apply a consistent but thin layer of glue to the tails and knock the case together with the bottom in its groove. Clamp up the case using the clamping blocks and let it sit for at least 30 minutes.

Build the Door

With the glue dry and the case complete, measure its width and length to determine exactly how big your door should be. You want the door to overhang the case by 1/16" on either end and 1/16" on the front, so size your door's rails and stiles accordingly.

As much as I enjoy handwork, I decided to cut the mortise-and-tenon joints for the frame-and-panel door using my "tailed apprentices" (my power tools). I begin making this classic housed joint by cutting a sample mortise with my mortising machine. Then I cut all the tenons using a dado stack installed in my table saw.

The rule of thumb is that your tenons' thickness should be one-half the thickness of your stock. The doors are 3/4" thick, so the tenons are 3/8" thick with 3/16" shoulders on the face cheeks.

Now install a dado stack in your table saw. These tenons are 1" long, so I like to put in enough chippers to make a 5/8"-wide cut in one pass. Set the height of the dado stack to 3/16" and set the fence so it's 1" away from the left-most tooth of your dado stack. Make several passes over the blade to remove the waste from the face cheeks, then remove the waste from the edge cheeks and test the fit in your sample mortise.

Raise the dado stack to 3/8" and remove the remainder of the waste on the edge cheeks. The bigger edge shoulders ensure that you won't blow out the ends of your mortises at glue-up.

Mark the location of your mortises using your tenons as a guide, as shown in the photo above right. Cut the 3/8"-wide x 1 1/16"-deep mortises in the stiles using a hollow-chisel mortiser.

Next cut the 3/8"-wide x 1/2"-deep groove on the door parts that will hold the panel. I use a rip blade in my table saw. Don't worry about stopping the groove in the stiles; the hole won't show on the front because it will be covered by moulding. On the back you'll almost never see it because that is where the hinges go. If the hole offends you, by all means patch it with a scrap.

Assemble the door and make sure it fits on the case. When all is well, plane or sand the panel for the door and glue up the door – making sure not to put glue in the panel's groove.

With the door complete, mill the moulding that surrounds the door on three edges. Miter, glue and nail it in place. Then install

A dado stack makes quick work of tenons for the door. The table saw's miter gauge guides the rails over the dado blades to cut the face and edge cheeks.

Test the fit of your tenon in a test mortise. When you're satisfied with the fit, cut the tenons on all the rails this way, being sure to check the fit after cutting each one.

the hardware: the butt hinges, catches, pulls and handles.

Divide and Organize

Finally it's time to make the dividers for the planes. This is the easy part. I fastened the dividers using screws to make sure I could change the configuration in case my plane collection ever changed. The first step when building the dividers is to screw the four outermost pieces together and plane them down so they fit snugly inside the case.

Then divide up the rest of your space and screw everything in place. Secure the assembled divider in the case with a couple of 1"-long screws. As this is shop furniture, I didn't choose a fancy finish. A few coats of clear lacquer is enough protection.

I hung my cabinet on the wall using a French cleat system, shown at right. When installing the cleats, be sure to use 3"-long screws to fasten the cleat to the studs in the wall. This cabinet, when full, is quite weighty.

With this project complete and hung on my shop wall, I loaded the tools into their slots and thought for a moment about offering my planes some sake in the Japanese tradition. But then, coming to my senses, I offered myself a cold beer instead. **PW**

Use the tenons to mark where the mortises should go on the stiles. I like this method because there is less measuring and therefore less room for error.

When cutting the mortise, cut one hole, skip a space, then cut the next one. Then come back and clean up the area in between. If you cut all your holes in a row, the mortiser's chisel can bend or snap because it wants to follow the path of least resistance.

The 3/8" x 1" moulding creates a dust seal around the edge of your cabinet and gives the piece a nice finished look. I cut a 1/4" roundover on the inside edge of the moulding. Miter the ends, then glue and nail the moulding to the door's edges.

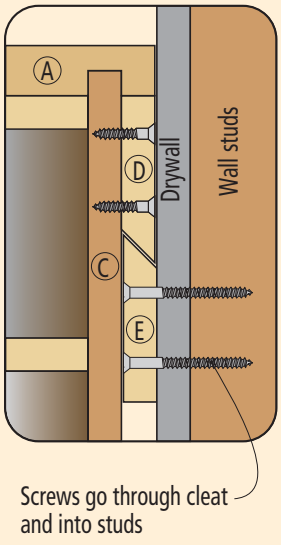
As you install the interior dividers, it's a good idea to double-check your initial measurements against the real thing. I had a rude shock when my No. 4 plane was wider than I had anticipated. When everything looks good, screw all the parts together using #8 x 1" screws. Then screw the whole thing into the cabinet. I ran the screws in from the backside of the cabinet.

THE GENIUS OF FRENCH CLEATS

When you hang a cabinet that will be loaded with heavy objects, I recommend a French cleat to fasten it to the wall. These cleats take a little more work than metal cabinet hangers, but they are well worth it because the cabinet will be more secure and it will be easy to put on the wall and remove.

To make a French cleat, take some of the 1/2" stock left over from building the dividers for the interior of your cabinet. You'll need one piece that's 24 7/8" long, which you'll attach to the backside of the cabinet. And you'll need a second piece that's a couple of inches shorter than the first. Set your table saw to cut a 45° bevel and rip one long edge of each piece at 45°.

Glue and screw the long cleat to the top edge of the backside of the cabinet with the bevel facing in. Now screw the second cleat to the wall where your cabinet will go – with the bevel facing the wall. Be sure to use big screws (I used #12 x 3") and anchor the screws in the studs in your wall. — *CS*



Hanging Tool Cabinet

A cabinet full of tools is physical evidence of a deep, ever-growing investment. If it's not the first project you build, it should come soon after.

This project is based on the "Shaker Hanging Cabinet" (page 16) minus the doors, the solid-wood back (this one is Baltic birch plywood, which doesn't expand with changes in humidity), the curved top and a shelf.

Before you start working with wood, you need to first work with cardboard. To decide how to best arrange your tools, draw a 19"-high x 16½"-wide rectangle on a piece of cardboard and arrange your tools until you find a good fit (Check out "Storing Your Tools" on page 28 for some ideas).

Choose wood for the sides, tops and bottoms that's no less than 9" wide and has straight grain.

Next, joint and plane your boards. We chose maple, but yellow birch works, too. Cut all your parts to size, except the back and stiles.

Now cut a ¾"-wide x ¼"-deep rabbet on the inside top and bottom of each side piece. Next, cut a ½"-wide x ¼"-deep rabbet on the long back edge of each side piece. Then cut a ½"-wide x ¼"-deep dado on each side piece for the shelf, located 6½" from the bottom.

Next, drill the tool holes in the shelf. For my chisels, I made a mark 9/32" in from the front edge of the shelf and, using a drill press and fence, bored six ⅝" holes with a Forstner bit. These holes allow my chisels to hang on the shelf's front lip without falling. You also can drill a matrix of holes two rows deep to hold hand tools if you like.

Sand the inside faces of your pieces and test the fit. Once you're happy, glue it up. Check for squareness before tightening the clamps. Once the glue has cured, add nails for extra strength.

Attach the face-frame stiles and rout the cove detail on the three edges of the outside top and bottom pieces. Glue and nail these pieces on.

Measure the opening for the plywood back, cut it to size and screw it in place with #8 x 1"-long screws. Don't use nails – with screws you can remove the back for finishing.

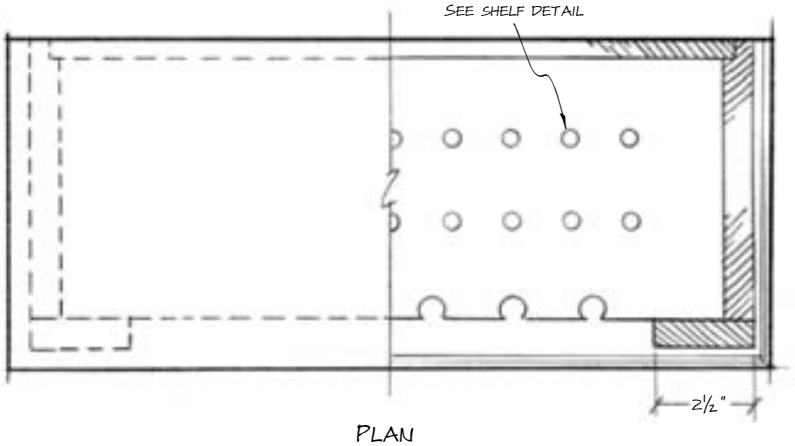
Read "Wipe-on Finishes" on page 30 for detailed instructions on finishing. Sand, scrape or plane everything before applying your finish. Once the finish has dried, attach a magnetic strip or blocks of wood to hold your tools.

For information on hanging this cabinet, read "Smart Ways to Hang Cabinets" on page 24. WM

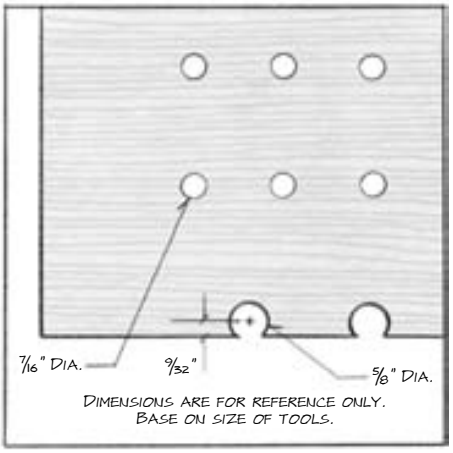
Story and project by Kara Gebhart, associate editor

Hanging Tool Cabinet

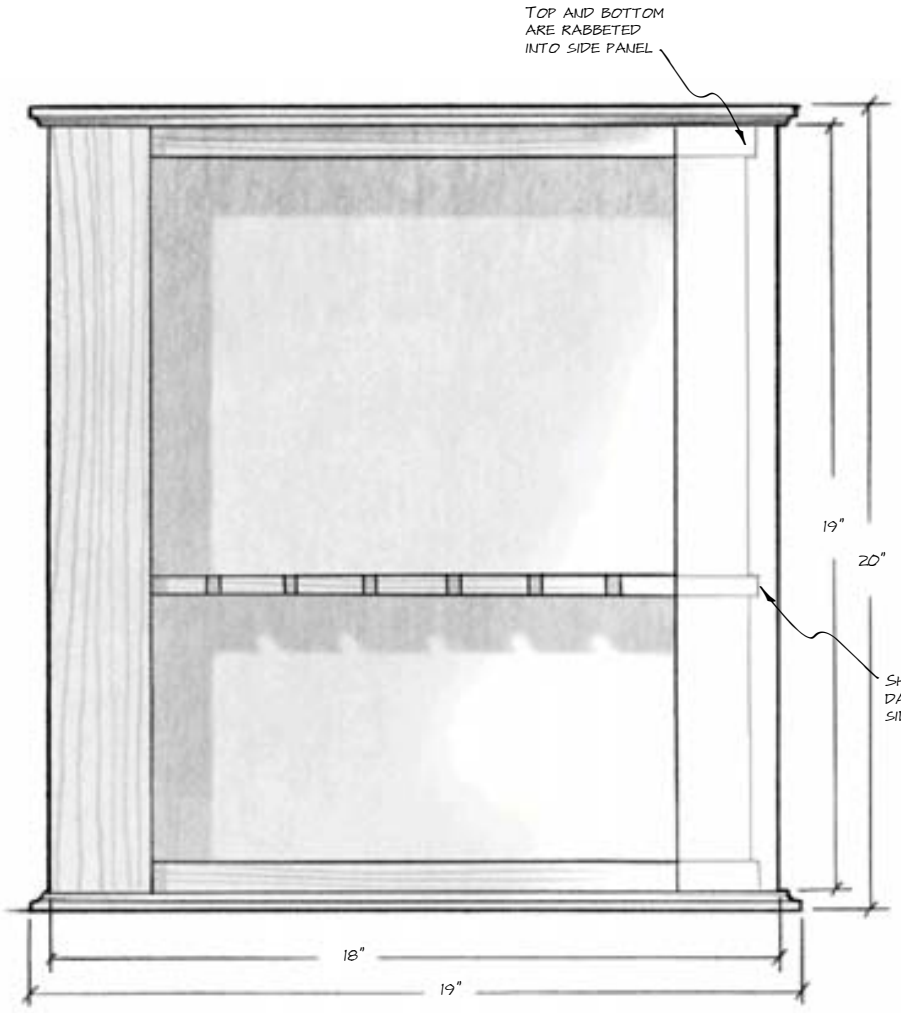
	NO.	PART	SIZES (INCHES) T	W	L	MATERIAL	NOTES
❑	2	Sides	¾	7	19	Maple	¾"-wide x ¼"-deep rabbets on ends
❑	2	Inside top & bottom	¾	6½	17	Maple	
❑	1	Shelf	½	6½	17	Maple	In ½"-wide x ¼"-deep dados
❑	2	Stiles	¾	2½	19	Maple	Glued to carcase
❑	2	Outside top & bottom	½	8¼	19	Maple	
❑	1	Back	½	17	19	Baltic birch	



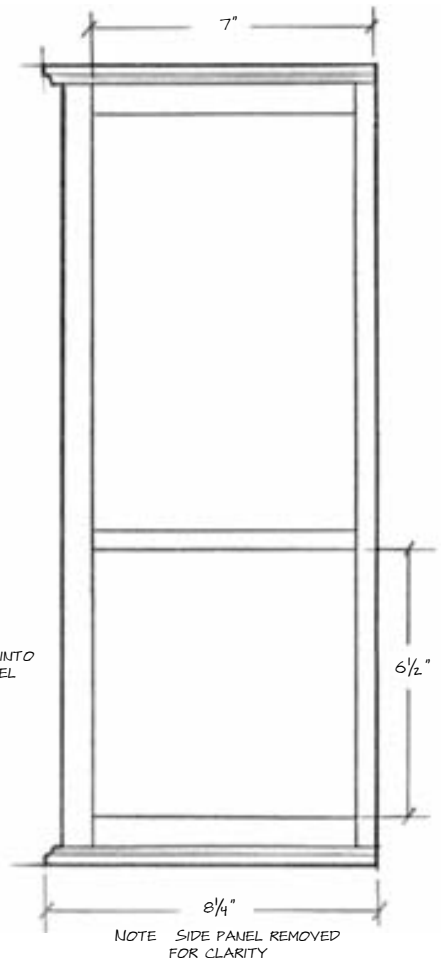
PLAN



SHELF DETAIL



ELEVATION



PROFILE

HANGING TOOL CABINET

Storing Your Tools

There's a bit of romanticism associated with a tool cabinet. Many of us can remember sorting through our parent's old tool box, eyeing everything in it fondly or quizzically, then carefully putting each tool back in its place to avoid getting in trouble.

On page 26 we show you how to build a simple, utilitarian tool cabinet. Following is a list of clever tool-storage tricks. Hopefully this will give you ideas so you can design your tool cabinet to best suit your tool investment.

■ Before you begin, use a piece of cardboard cut to the size of your cabinet to lay out your tools. Here you can play with organization to determine the best placement for shelves, cubbies and drawers.

■ Rare-earth magnets, either buried in strips of wood or attached bare to the cabinet, are great for storing metal tools, but be careful. Magnetized screwdrivers can be very handy – even the tiniest of screws will cling right to them – but magnetized chisels and files can be problematic. Swarf (the metal particles that are created during sharpening) will cling to a magnetized chisel, as will metal filings to files. These tiny bits of metal can scratch both the tool and your work, a disheartening experience.

■ Appropriately sized holes or slots drilled or cut into wooden shelves can hold all sorts of tools including chisels, screwdrivers, router bits, drill bits, awls, files and pliers.

■ Shelves are a great way to store hand planes. Contrary to what some people believe, storing a plane on its sole on a clean wooden surface won't dull the blade.

■ Hand planes also can be hung. Drill a hole into the wall of your cabinet and tie a piece of leather string, forming a loop. The string's knot holds it in place. Put your plane's front knob in the loop. Whatever you do, don't drill a hole in the sole of the plane to hang it. This hole destroys any potential value the plane had to the next generation of collectors.

■ A few appropriately sized and placed blocks of wood allow you to hang certain tools in your cabinet, such as the rule part of your combination square. Some people will even shape their blocks of wood to fit the inside of specific tool handles or the heads of hammers. This is for the ultra-organized only.

■ Deep-set doors, such as those shown on the cabinet at left, give you additional storage space that you can use for a variety of tools.

■ Store your precision instruments, such as straightedges, so they are completely flat and supported along their lengths. These instruments actually can be warped by their own weight. Dial calipers should be stored in their original plastic cases for the same reason.

■ Avoid the standard pegboard hooks. Yes, they are inexpensive. But they fly off the pegboard if you just look at them wrong. Spend a few extra dollars on the pegboard hooks that lock in place. You will save yourself years of bending over to find the little things.

■ If you're looking for the ultimate tool-storage technique, some people try "French fitting." This involves making different scroll-sawn depressions in the wood that will fit each tool precisely. But we don't recommend it. Spend your time on the projects you'll display proudly in your home.

■ Although it's best to keep your safety glasses and ear protection in your shop apron or next to your machines, designating a drawer for safety equipment is a good way to keep extras on hand – great for when family members or friends visit your shop. WM

— Kara Gebhart

"The pioneers cleared the forests from Jamestown to the Mississippi with fewer tools than are stored in the typical modern garage."

— unknown; attributed to Dwayne Laws

This tool cabinet, built by Malcolm and Glen Huey (owners of Malcolm Huey & Son, a custom woodworking shop in Middletown, Ohio) marries hand-tool and power-tool storage with drawers, deep-set doors, magnetic strips, cubbies, brass hooks, Shaker pegs and Shaker boxes.

Inside your cardboard representation, draw where you will want to place the shelves, blocks of wood and magnetic strips for holding specific tools.

Mobile Clamp Cart

BY ROBERT W. LANG

This small rack rolls easily to anywhere you need it.

Ready and mobile. *This simple cart holds many clamps and takes up little floor space.*

There is an old saying in woodworking that you can't have too many clamps. While this is true, it is entirely possible to have too many clamps in the wrong place at the wrong time. The last thing I want to do in the midst of a complicated glue-up is to set off to the far reaches of the shop in search of a needed clamp.

A rolling cart is an obvious solution, and we have had one for years. The problem with it is that it holds only parallel-jaw clamps, and is so big that there is only one place in the shop that it fits. And if we could find another place for it, it would be difficult to move. It's always reminded me of a retail store display. It looks nice, but it may as well be fixed to the wall.

I decided to make a smaller rack, one that would hold wood handscrews and F-style clamps in addition to big cabinet assembly clamps. I wanted it to be mobile and functional with a small footprint.

I sacrificed a bit of organization to gain usable space. The cabinet clamps are contained in a three-sided corral mounted on a simple cart. F-style clamps hang on the outer top rails, and wooden handscrews fit over two upright pieces at the back. Now I can have the clamps I use most often right where I'm working, and when I don't need them, I can roll them out of the way.

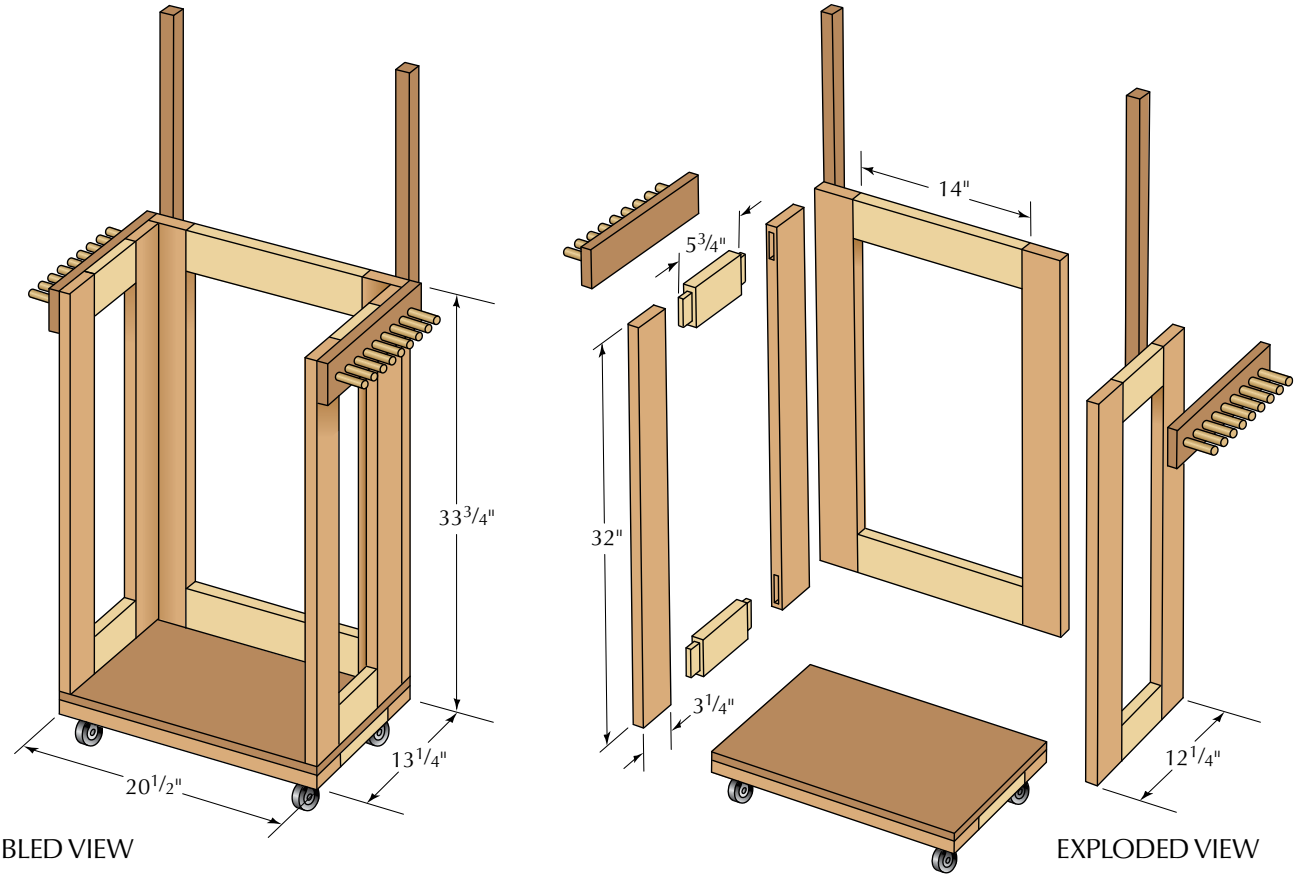
The lower part of the cart is a piece of $^{3}/_{4}$"-thick plywood, fastened to the top of a hardwood frame. On each corner at the bottom of the frame is a $2^{1}/_{2}$"-diameter swivel caster. The frame is made from 1"-thick x $3^{1}/_{4}$"-wide poplar. The three frames that form the upper part are made of the same material. Any hardwood would work, or these parts could be made from 2x4 material prepared the same way as in the miter saw stand article on page 38 in this issue.

The cart holds a lot of weight, so it should be made of solid, sturdy material with solid

Online EXTRAS

For more information on the necessary clamps for your shop, go to:

popularwoodworking.com/oct07



construction. I held the frames together with mortise-and-tenon joints, but there are any number of other joints that would be suitable. I used mortises and tenons because I had a new mortiser and shoulder plane I wanted to try.

The two outer frames are glued to the long edge of the central frame. After assembling the three frames, I attached the plywood to the bottom edges with glue and #8 x 1 3/4" screws. Then I attached the bottom frame with glue on the top face and screws down through the plywood. The wheels were attached with #10 x 3/4" pan head sheet-metal screws.

The two racks for F-style clamps are 1" x 3 1/4" x 13 1/4" poplar, with a series of 5/8"-diameter dowels. The dowels are 3" long. I made the holes at the drill press with a Forstner bit. The holes are 1/2" deep on 1 3/8" centers. After gluing the dowels in place, these assembled pieces were glued and screwed on to the top rails of the frames.

The two holders for hand screws are 1" square and 30" long. They are glued and screwed on to each side of the back with 18" exposed above the top of the frame. I used a 1/4"-diameter roundover bit to break the edges of the frame. This prevents splintering on the edges and makes the cart more user-friendly. **PW**

High and outside. *F-style clamps rest on the top rail with the bars between dowels. The dowels prevent the clamps from sliding off when the cart is moved.*

A handy home for hand screws. *Hand screws drop over a square upright attached to the back of the cart's frame. They simply stack without needing to be clamped.*

Bob is the author of "Shop Drawings for Craftsman Furniture" (Cambium) in addition to other books (more information is available at craftsmanplans.com). Contact him at 513-531-2690 x1327 or robert.lang@fwpubs.com.

Mobile Clamp Cart

	NO.	ITEM	DIMENSIONS (INCHES) T	W	L	MATERIAL
❑	1	Cart base	3/4	13 1/4	20 1/2	Plywood
❑	6	Uprights	1	3 1/4	32	Poplar
❑	2	Back rails	1	3 1/4	16 1/2*	Poplar
❑	4	Side rails	1	3 1/4	8 1/4*	Poplar
❑	2	Bottom rails	1	3 1/4	9 1/4*	Poplar
❑	2	Bottom front/back	1	3 1/4	20 1/2	Poplar
❑	2	Hand screw holder	1	1	30	Poplar
❑	18	Pegs	5/8 dia.		3	Poplar

* = 1 1/4" tenon both ends

LEAD PHOTO BY AL PARRISH; ILLUSTRATIONS BY MARY JANE FAVORITE

Saw Blade Box

Photo by Tim Grondin

Protect your investment in saw blades by protecting their brittle teeth – and keep them well organized and handy at the same time.

One of my objectives in building the "Under-the-saw Cabinet" in our December 2002 issue was to show a saw-blade storage solution for inside the cabinet. I was tired of, and embarrassed by, my traditional "nail in the wall" approach.

After building a prototype, I finalized this simple, functional and handy blade-storage box that you can build in little more than an hour using shop scraps.

by Steve Shanesy

Comments or questions? Contact Steve at 513-531-2690 ext. 1238 or steve.shanesy@fwpubs.com.

The most important thing to remember when starting this project is that you will cut the sloping, angled front *after* the box is fully assembled. What you are first building is a simple five-sided box.

The box sides are made using ¾"-thick plywood, and the "shelves" for the saw blades are ¼" plywood. Start by cutting the top, bottom, sides and back to size. Then, using your table saw or router, cut a ¾"-wide x ½"-deep rabbet on two long and one short edge of the top and bottom, and one rabbet on one short edge of each side piece.

Before assembling these five pieces, you must cut the grooves in the sides to support the ¼" plywood shelves. An angled dado is necessary to capture the secondary ¼" back, which acts as the stop for the shelves and blades.

I used my table saw with a rip blade to cut the grooves in the sides. Set the blade to make ⅜"-deep cuts. Next, lay out the locations of the five grooves on the front edge of the left side. You need to mark only one edge, and remember you will be making right- and left-handed sides. This means you'll run one side with the back edge facing the blade and the other with the front. Run both parts using the same setup.

Each groove requires two passes to make the correct size. Make an allowance for the plywood thickness being about 1/32" less than ¼" thick.

When done, cut the ⅜"-deep dado for the secondary back. I used my slot miter gauge set to 20° to make the cut.

Before assembly, cut the secondary back to size and test-fit the dry assembly. You can now glue and clamp, or nail the assembly and make sure the secondary back is in place. If you nail it, be sure to place the nails away from the future cutting path of the sloped front edge.

With the top removed you can see how the inside pieces fit together.

While the glue is drying, cut out the pieces of ¼" plywood you'll need for the shelves. Remember the bottom shelf is ¾" narrower in width because it simply rests on the bottom of the box.

Refer to the diagram and lay out the cuts for the round shapes on the front of each shelf. I used a hole saw to make the 2½" cut before band sawing the larger

DO YOU REALLY NEED 6 BLADES?

You might be wondering why this box is set up to handle six saw blades. Most woodworkers get by with just one (a combination blade) or two (a rip and crosscut blade).

Here are our thoughts on the matter: First, keep the steel blade that was likely shipped with your saw. It's not much good for fine woodworking, but it is a great "beater blade." Use it when you're cutting into material that might have content that could damage your other blades, such as nails, staples or even bullets.

In three other slots, keep a combination blade, a rip blade and a crosscut blade. Having these three blades is ideal for several reasons. As you first machine your stock, it's best to do most of your ripping with a rip blade and your crosscutting with a crosscut blade. Your cuts will be cleaner. Then use the combo blade for the general work that follows machining, which will save you time switching between blades.

The other advantage to this system is that if one of the blades gets dull, you'll still be able to both rip and crosscut with the two left.

And the last two slots? When you have the cash, get a plywood blade and leave the last slot open for the future.

This saw blade box fits perfectly in the "Under-the-saw Cabinet" featured in the December 2002 issue. The cabinet is a great project for the small shop. It offers considerable storage beneath the wing of your saw – usually wasted space. For complete plans for the cabinet, order the back issue (issue #131) by visiting our web site at popwood.com or calling 888-419-0421.

semi-circle. This larger diameter, at 10¼", will make sure any 10" blade's teeth will rest inside the wood edge and be protected from unintentional dings. Sand all the edges smooth.

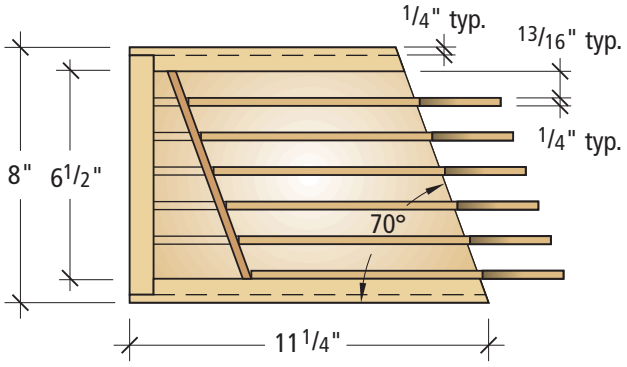
The final chore is cutting the angle on the front opening. First lay out your cut lines following the diagram. Again, make sure there are no nails in the cutting path. Make your first cuts on the top and bottom with your table saw's blade tilted to the 20° angle. Raise the saw blade only enough to clear the thickness of the plywood. Set your fence to the appropriate distance for each cut.

Next, bring your saw blade back to 90° and set your slot miter gauge to 20° to make the cuts on the sides. Again, the blade height should be only as high as necessary to clear the plywood.

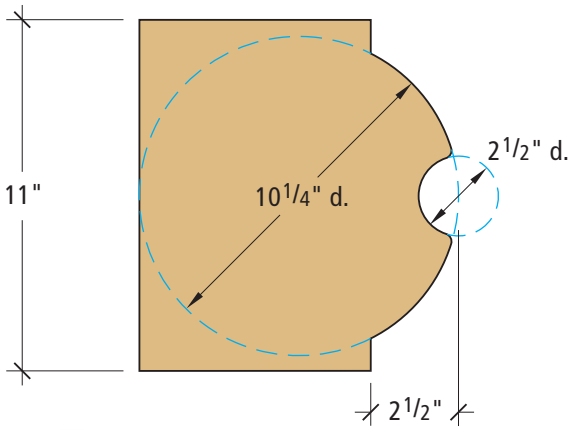
When done, give the box a light sanding, break the edges, insert the shelves and put your blades safely away. **PW**

SAW BLADE BOX

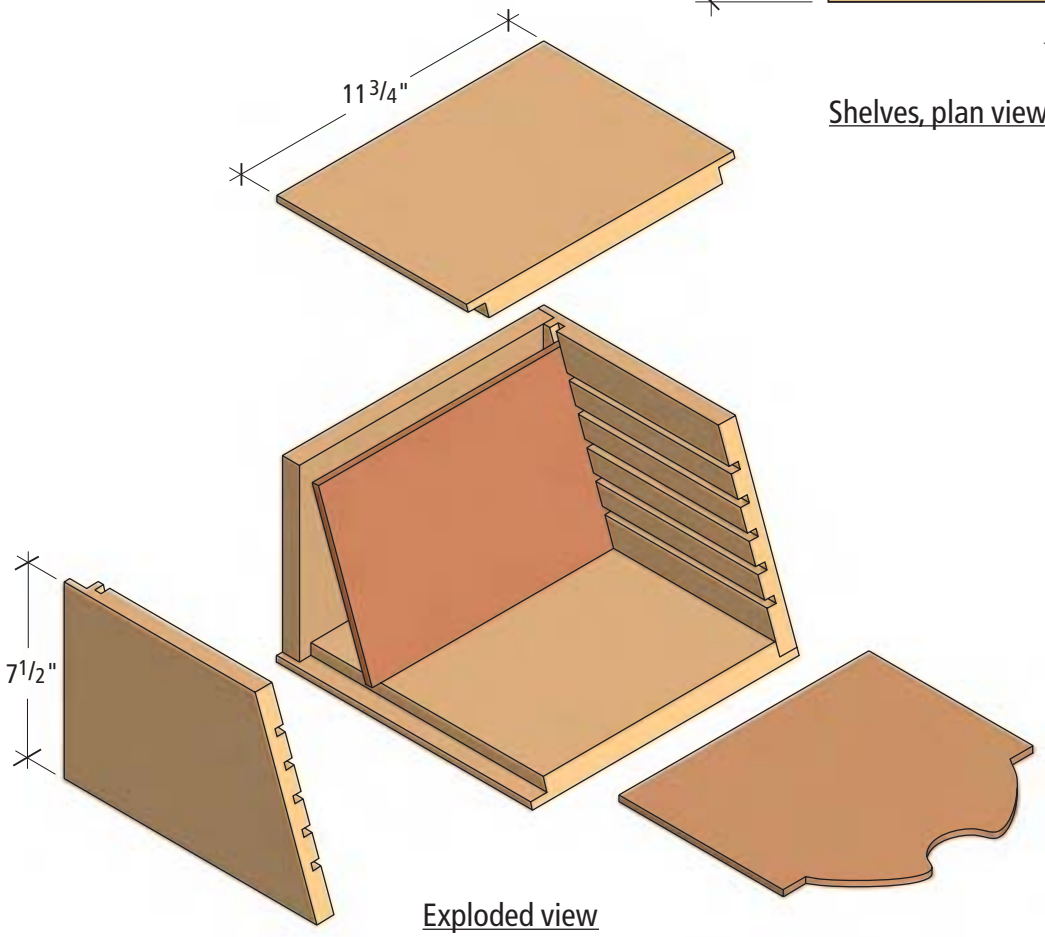
	NO.	ITEM	DIMENSIONS (INCHES) T	W	L	MATERIAL
❑	2	Top and bottom	¾	11¾	11¼	Birch plywood
❑	2	Sides	¾	7½	11¼	Birch plywood
❑	1	Back	¾	11¼	7½	Birch plywood
❑	1	Second back	¼	6⅞	11	Birch plywood
❑	5	Shelves	¼	11	10¼	Birch plywood
❑	1	Shelf	¼	10¼	10¼	Birch plywood



Section, box profile



Shelves, plan view



Exploded view

Traditional Sawbench

Plastic sawhorses are OK in a pinch. However, once you build a sawbench you will wonder how you ever worked wood without it.

PHOTO BY AL PARRISH

The reason sawbenches are so useful is the top. The fact that it is flat and has some width allows you to perform many operations on it. And the particular height of the sawbench unleashes the full effectiveness of full-size Western-style handsaws and panel saws.

Sawbenches are not sawhorses. Though both devices support your work, real sawbenches can be pressed to do so much more that they are worth building in a long afternoon in the shop.

The major difference between a sawbench and a sawhorse is the top. On a sawhorse, the top is generally long and skinny. It will not support anything on its own. A sawbench has a wide top: 7" is a common and useful width. And it's this detail alone that makes them worth building. The wide top allows you to cut many cabinet-sized parts using one sawbench alone. The top is also an excellent clamping surface, allowing you to secure work to it. The sawbench is a step stool for reaching up high. It's a mortising stool for hand-mortising operations – you secure the work over a leg and hold it down with a holdfast (hence the hole in the top). And then you sit on the sawbench astride or next to your work.

But, as they say on television, there's more. Much more. The shelf below holds your square and saw as you move your stock in position. The V-shaped mouth on the top – called a "ripping notch" – supports your work as you notch out corners with a handsaw or jigsaw. And the top is the traditional place for a craftsman to sit when eating lunch.

The sawbench shown here is based entirely on traditional English forms. If you choose to alter this plan, resist changing the height of the sawbench. The 20" height is key to using the bench in conjunction with a Western handsaw. The 20" height allows you to use your legs to secure your work without clamps and makes the handsaw work efficiently. The sawbench is high enough that a 26"-long saw at the proper cutting angle won't hit the floor and the saw won't be able to jump out of its kerf on the return stroke.

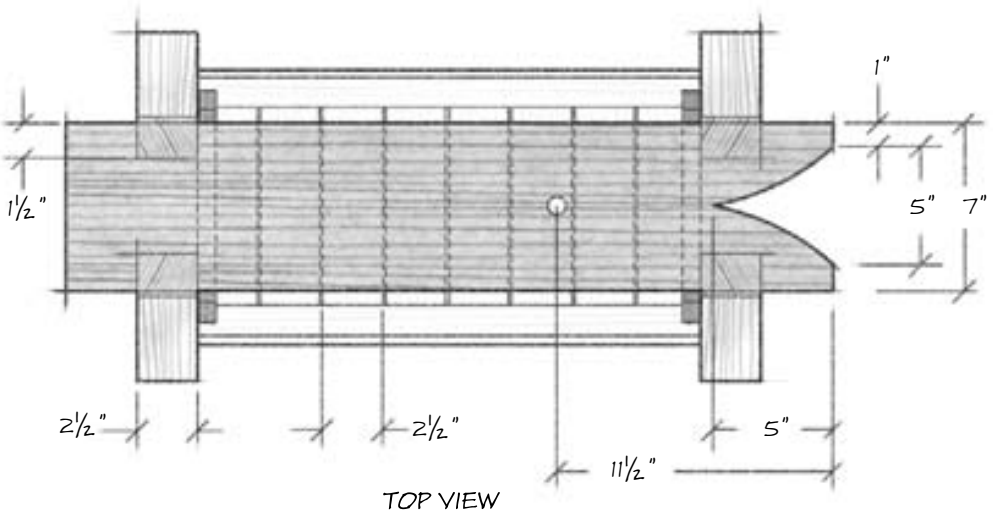
Build your sawbench out of any material that is plentiful, inexpensive and easy to work. The legs and lower braces are assembled much like the American Trestle Table in this issue: Create the through-mortise by cutting away the material before gluing the two pieces together that form each leg. If you like, chamfer all the edges of your components with a block plane or chamfer bit in a router.

Cut the ends of the legs at 10°, then cut a notch at the top of each leg that will allow it to nest into notches in the top piece. Each leg notch measures ½" x 2½" x 1¼". Cut your tenons on the lower braces then assemble the braces and legs. Drawbore the joints then wedge them using hardwood wedges and glue.

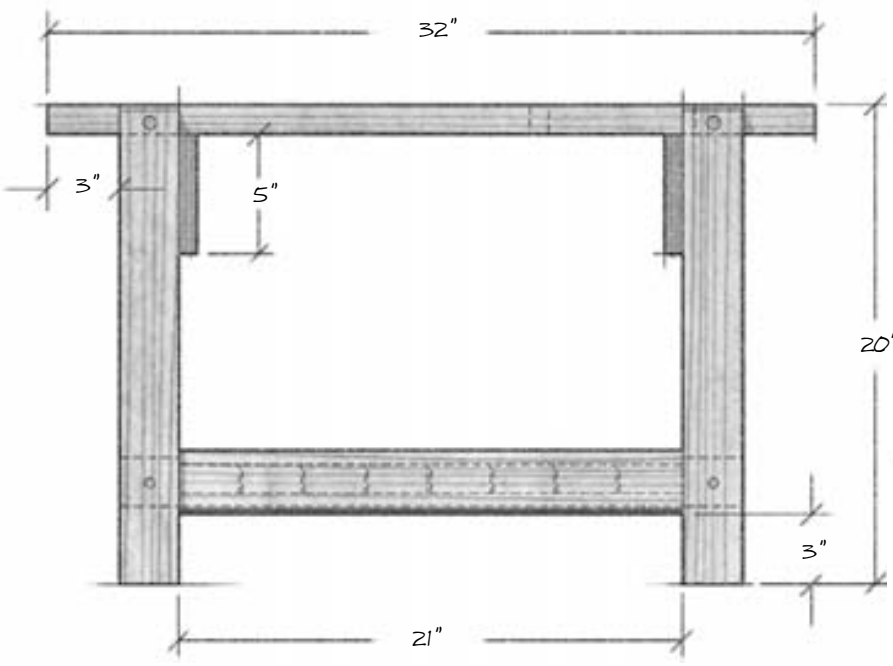
With the legs and braces assembled, clamp them temporarily to the top and mark precisely where they intersect the edges of the top. Take the clamps off and mark out the 1½" x 2½" notches in the top that will receive the legs. Saw out the notches and cut the ripping notch. Glue the leg assemblies to the top and reinforce the joint with a ½"-diameter dowel or Miller Dowel.

Clamp the plywood top braces in place and trace the angle of the legs on the braces. Unclamp the braces and saw each one to shape. Glue and screw the braces to the legs using three #8 x 2" wood screws in each leg. If you want to add a shelf, first rip a 10° bevel on the shelf braces and cut the ends of the shelf pieces at 10°. With the sawbench upside down on your bench, place the shelf pieces against the lower braces. Now glue the shelf braces against the shelf pieces and nail everything in place.

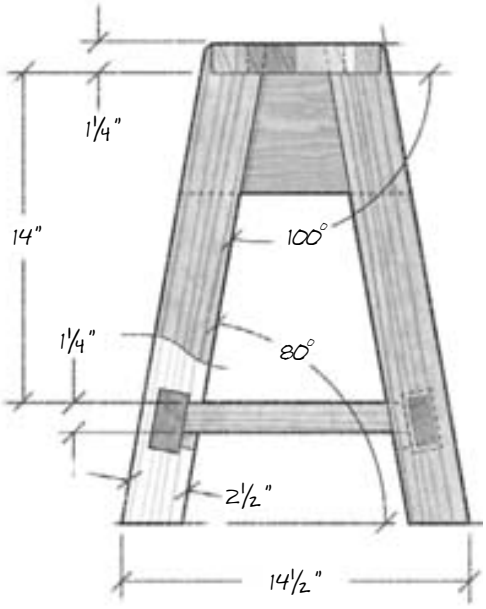
Bore a ¾"-diameter hole in the top for a holdfast or holddown. Position the hole so the pad of the holdfast will touch the tops of the legs. Mine is positioned to accommodate the Veritas hold-down. WM — *Christopher Schwarz*



TOP VIEW



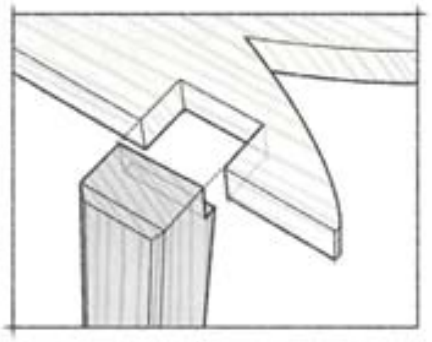
FRONT VIEW



END VIEW

Traditional Sawbench

	NO.	PART	SIZES (INCHES) T	W	L	MATERIAL	NOTES
❑	1	Top	1¼	7	32	Pine	
❑	4	Legs	2½	2½	21	Pine	Includes extra length for trimming
❑	2	Lower braces	1¼	2½	26¼	Pine	2⅝"-long tenon, both ends
❑	2	Shelf braces	¾	¾	21	Pine	10° bevel on one long edge
❑	8	Shelf pieces	1¼	2½	9¼	Pine	10° bevel both ends, cut to fit
❑	2	Top braces	¾	5	9½	Plywood	10° angle on edges, cut to fit



LEG JOINT DETAIL

SAWBENCH &

Photo by Al Parrish

SHOP STOOL

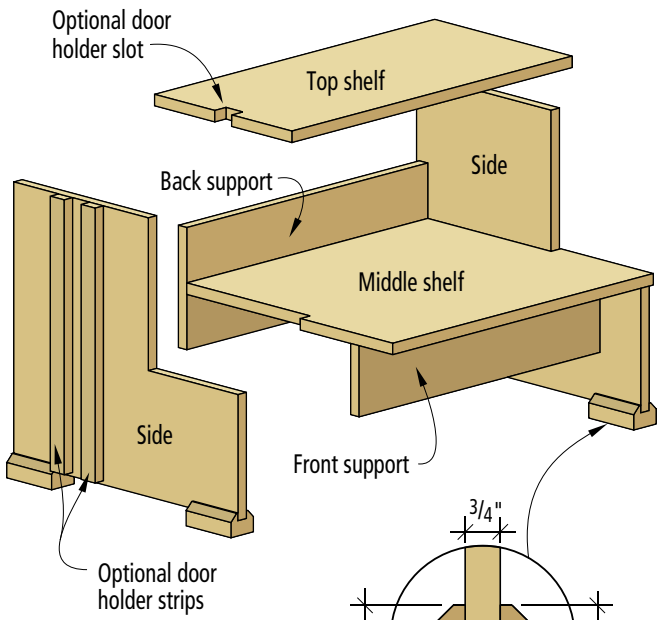
This simple afternoon project is perfect for handsawing, holding doors for planing, organizing tools and giving you a leg up. It will quickly become indispensable.

My simple plywood two-step in the old tool shed had reached the end of the road. Looking at it you could see a pile of old wood ready for the burn pile. I saw in it a project that recalled 45 years of working life. It was more than just memories that came to mind. If it was time to recycle the old stool then it was important to document what had been a most useful object, and perhaps make a successor to it before its last rites.

My time in home building and remodeling went back to four summers during college. I learned the trade of carpentering before the modern era of specialization, the days when a small carpenter crew did everything from the first framing to a completed house ready for painters. It was a good education. The shop stool represented a sort of rite of passage into the world of construction.

by John Wilson

John Wilson currently writes and operates The Home Shop in Charlotte, Michigan, where he teaches classes and sells Shaker box supplies.



Exploded view

Foot detail

Construction Steps:

1. After cutting all the plywood pieces, round over all the exposed edges in the stool using a 1/8"-diameter roundover router bit.

2. Assemble pieces using tapered drill and countersink to pre-drill for 1 5/8" deck screws. Start with the front and back supports on the middle shelf.

3. Cut 4'-long hardwood blocks for the feet with a groove to fit 3/4" plywood. Adjust the thickness of the blocks to make the stool level and glue them in place.

4. Finish with a sealer coat of polyurethane and thinner mixed 50/50.

That first summer I was too busy learning the ropes as the new kid to understand the significance of a shop stool. I borrowed someone else's when a task was at ceiling height. The second summer I was more confident of what was required on the job. After all, they had hired me back.

One day the boss suggested I stop by his shop to make a shop stool. It sounded helpful to me, but looking back on it from the perspective of years later I can see its significance. It marked my acceptance as a man who could use an on-site bench to do his work. From now on along with my growing box of tools, the back of my car held my very own work stool, something some newer member of the crew would ask to borrow. That pile of old plywood ready for the burn pile was to me a badge of rank, hard won during months of work on the job.

So what was so special about the shop stool on the job? The place at which you work is an important extension of the tools you use. This is as true of home building and remodeling as it is in the workshop. In fact this shop stool is an asset in either your shop or on the building site.

- It serves as a stable two-step work platform.
- It's a mobile work surface for cutting and assembly.
- It holds doors on edge for planing tasks.
- Two stools will replace the need for sawhorses.
- It keeps tools in one place where they are easier to find and transport to a new work site.

All of this is from a half sheet of 3/4" plywood and some deck screws. Recalling all the ways the shop stool gives good service made me realize how important it was to record its dimensions. I inherited mine from men of experience on the job. There is no better school of design than experience. So here it is for you, too.

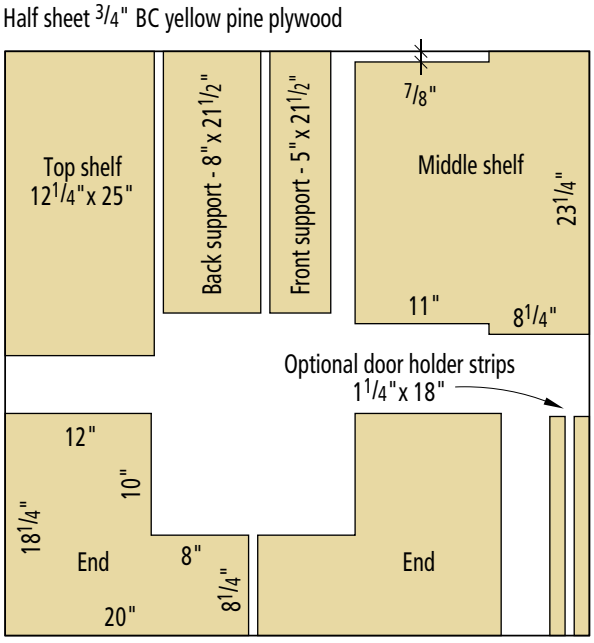
Construction Tips

While plywood is a stock construction item, I found that its quality varied considerably and that taking time to shop for a sheet with reasonable finish, free from major voids, and not warped, paid off. Some of the best plywood these days comes from yellow pine and is the BC grade with one good face. Pick the best you can.

The illustrations and cutting plan give you direction. Start by screwing the 8" back support to the middle shelf, and then screw the 5" front support under the middle shelf leaving it centered with 7/8" exposed at each end. With these in place, the sides will screw to the middle shelf more easily. The top step goes on and you are done. It's that simple.

The door holder slot, if desired, is added to one side. And there is one more addition that will add years of life to your shop stool. I found that the plywood feet abraded away with use, as you can see in the picture below. As that happens, the stool loses stability as well. So I made some simple hardwood blocks. The blocks are made from a piece of 1 1/2" x 2" with a groove 3/4" wide by 1/2" deep routed into the wider face. Cut these into four pieces 4" long and glue them onto the sides.

One further use of the stool comes at noon – all the guys sitting around the work site with their lunch pails open! **PW**



Cutting plan

Photo by the author

Here is the old stool after a life of usefulness, now on the burn pile to be returned to basic elements of the universe and to be recombined into a new generation of materials. Note the badly worn corners where the plywood feet gave out. The attachment of the hardwood "shoes" as I describe in the article will extend the life of your stool.

A Better Miter Saw Stand

BY ROBERT W. LANG

Is it the saw or where the saw lives that increases your accuracy?

There are two types of miter saws. The first can be a mainstay in the woodshop, dependably making accurate crosscuts day in and day out. Or it can be a cantankerous helper, needing constant attention and delivering inconsistent results. The difference usually isn't in the saw; it is where the saw lives in the shop – how it is set up, the table it sits on and the fence and stop.

Miter saws were designed to be portable, taken to a job site and moved often. In many shops, the miter saw is still treated as a visitor, not a permanent resident. This makes sense if you're just setting up shop, or often move your tools to share space. If, however, you have the room, a fixed location is preferred.

In our shop, our miter saw has floated around for several years on a mobile cart with folding tables. We still have a limited amount of space, but we assessed our needs, the way we work and the way we share our shop, and a permanent miter saw workstation was at the top of our list of shop upgrades.

Meeting of the Minds

I met with the other editors and we talked about how we use the saw and what our expectations were. And we listed the things we didn't like about the old setup. We planned a new stand and decided to concentrate on the important things, leave the bells and the whistles for someone else to add, and keep to a tight budget.

The two main tasks our saw faces are breaking down rough lumber at the beginning of a project and then making precise, repeated cuts after the lumber has been milled. Most saws on the market today are capable of being very precise with one big "if." Tossing rough lumber around can knock a wimpy saw stand out of whack with the first piece of 8/4 hardwood that comes its way, so the first requirement is strength and stability.

But this strength needs to be focused and refined. The alignment of tables and fences needs to be right on – and stay that way – or the saw is useless for precise work.

At least nine out of 10 cuts we make are with the bulk of the material to the left of the saw blade. We decided to trade some flexibility for precision and build a solid stand to the left of the saw. To the right of the blade is a rolling stand that's the same height as the saw to hold material and to give some support when we need it.

Pulling Out the Stops

The final point we agreed on was a stop system. We use stops on a regular basis to cut multiple parts to an exact length. We needed a simple and easy way to add a stop when we needed one. We also decided that it's hard to beat a block of wood and a clamp (especially on the price).

LEAD PHOTO BY AL PARRISH; ILLUSTRATIONS BY MARY JANE FAVORITE

Right at home. *This miter saw workstation is compact and inexpensive to build. As a bonus, our crosscuts are more accurate, and our shop is cleaner.*

All messed up and nowhere to go. *Our old stand had lots of bells and whistles, but it lacked a way to deal with scraps and debris.*

We've seen more than our fair share of systems with T-track and fancy stops that flip up and down and decided that for us the time, expense and chance of a stop moving or slipping weren't worth it.

One of my pet peeves is the buildup of offcuts and sawdust around the saw, so we left the saw table open on top, with a trash can directly below the saw.

We also borrowed a trick from the zero-clearance insert on our table saw. The kerf in the insert shows the exact location of the blade, and is an excellent aid to cutting right to a layout line. It sure beats trying to line up a cut to a tooth on the saw blade, especially if you're trying to cut to one side of your line, or trying to split the line.

We added a sacrificial insert that sits outside of the saw's metal fence. It won't last forever, and it will get trashed as soon as we bevel the saw, but nearly all of the cuts we make are at 90°. The additional accuracy we get from having the insert makes moving or changing it on occasion no big deal.

Little Things Mean a Lot

The saw we chose to use, the DeWalt DW781, has a lot going for it. It is capable of wide crosscuts in thick material. The detents lock in place without wiggling around, it's simple to change the settings and it is solid overall. One of the things we like most is the small footprint and short length of the saw's slide bars. This saves space, of course, but more important, short bars reduce the leverage that works against precision in this type of saw.

Many saws we have used work fine on a narrow piece, but get sloppy when the bars extend to make a wide cut. The guide tubes still take up space behind the saw, but much less than other saws in this category. The thing we like the least is the dust-collection bag, but with the way we mounted the saw, most of the debris falls into the trash can below.

The saw has a flat, level table and a straight fence, but most of the wood you are going to cut will sit off the table. If it isn't properly supported, the quality of cuts will suffer. If we can extend the machine's surfaces, we can cut confidently. What may seem like a tiny error can turn into a woodworker's worst nightmare.

A quarter of a degree, caused by a sagging outfeed table may not seem worth worrying about, but when you assemble four table legs and four aprons all with that error, there will be a lot more to be concerned with. Little errors are a social bunch. They like to gather in one corner of a project and have a party. And when they party, they like to cause trouble. That insignificant deviation can now become a racked carcase, a twisted drawer, or an out-of-square door.

Design Around the Saw

What we came up with works well for us, is adaptable to nearly any saw and shop, and you won't spend a lot of time or money making your own. The first part of designing your stand is establishing the footprint of your miter saw. I set ours on a piece of plywood to mark the layout. Put the front edge of the saw on the edge of the plywood, and push the head of the saw as far back as it will go (if it has a sliding carriage).

Hold one leg of a framing square against the back of the guide tubes and mark the plywood. Swing the table to its right and left extents and make marks both at the back of the guide bars and at the control handle at the front of the saw. Extend the fences out from the saw and mark the distance at full extension. These marks will determine the size of the stand that the saw sits on. When the saw stand is complete, you want it to be tight against the wall, and the saw should be able to move to any position without interference.

Our stand fits in a limited space between an existing lumber rack and a corner of the room. The integral lumber rack we added holds the back of the saw stand away from the wall by $3\frac{1}{4}$". Taking this into account with the footprint of the saw, this stand would be $3\frac{1}{4}$" deeper if we omitted the lumber rack.

We also made this stand a little narrower than the actual width of the saw with the fences extended. This puts the end of the left-hand fence over the end of the fence assembly. This means cutting a notch in the right end of the fence, but makes it easier to line up the end of the fence assembly with the saw's fence.

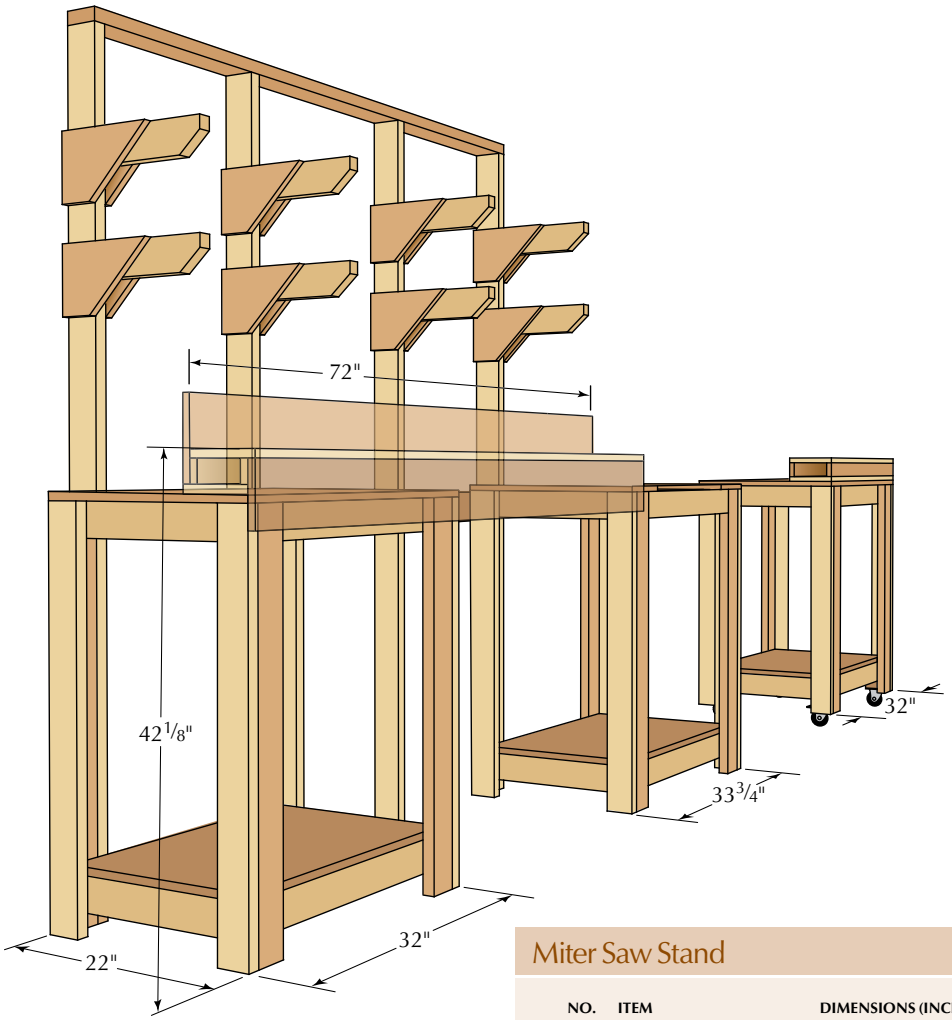
The final parameter is the height above the floor. We chose $42\frac{1}{8}$"—which might seem tall, but it makes it much easier to see our work and line things up without an awkward bend.

Cheap is Good, With Patience

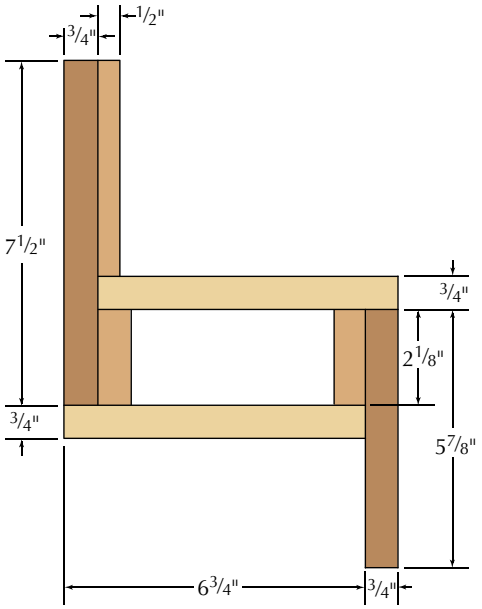
The construction of the tables makes use of a common, cheap material and an assembly method that gives a solid and sturdy surface

Sow's ear. *Construction lumber is so wet that it will twist and warp as it reaches equilibrium with the shop environment. If used in this state, your work won't come out straight.*

Silk purse. *After drying, jointing and planing, this common material is now fit to use.*



3-D VIEW



FENCE, END VIEW

with basic joinery. All of the solid-wood parts began as spruce, pine or fir 2x4s from the home center. In our neighborhood, the least-expensive hardwood available is poplar, and in 6/4 material, it costs about $2 a board foot.

I paid $2.38 each for "pre-cut" studs, slightly less than 8' long; this works out to about 70 cents a board foot. The drawback is that this stuff can be soaking wet when you buy it. This can be overcome, but it requires time and effort.

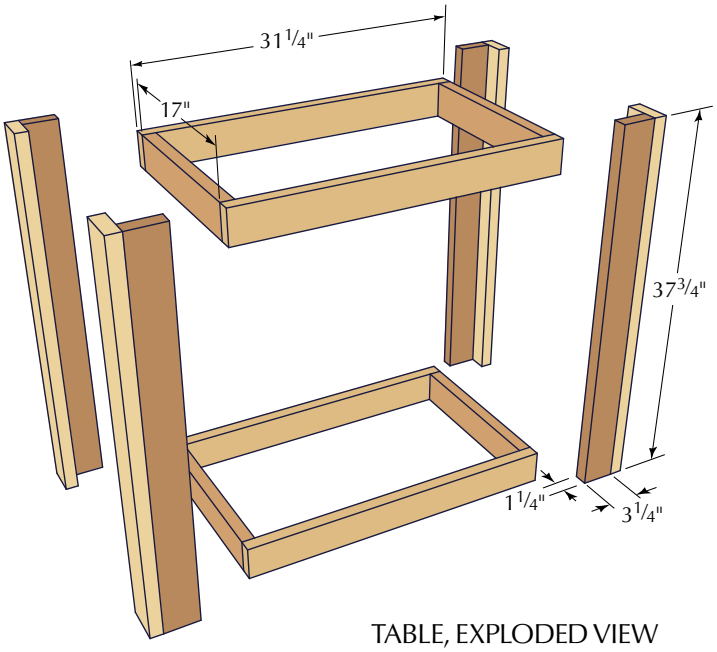
Construction lumber is kiln-dried, but it comes out of the kiln at 18-20 percent moisture content. Similar material that has been in our shop for a year is between 8-10 percent moisture content. As the 2x4s reach equilibrium with the shop's environment there will be some shrinkage, warping and twisting.

I've found some ways to work around this. The most important thing to do is wait. The drying process can be assisted, but it still takes time. When the wood gets to equilibrium, I mill it on the jointer and planer and obtain

Miter Saw Stand

	NO.	ITEM	DIMENSIONS (INCHES) T	W	L	MATERIAL	COMMENTS
❑	16	Fixed table legs	1 1/4	3 1/4	37 3/4	SPF*	
❑	8	Rolling table legs	1 1/4	3 1/4	34 5/8	SPF	Adjust to wheel diameter
❑	12	Table frame side rails	1 1/4	3 1/4	19 1/2	SPF	
❑	8	Left & right table frame rails	1 1/4	3 1/4	27	SPF	
❑	4	Saw table frame rails	1 1/4	3 1/4	28 3/4	SPF	
❑	1	Saw table front rail	1 1/4	3 1/4	27 1/4	SPF	
❑	4	Rack uprights	1 1/4	3 1/4	80	SPF	
❑	1	Rack cross piece	1 1/4	3 1/4	71 7/8	SPF	
❑	1	Lower brace between tables	1 1/4	3 1/4	50 1/8	SPF	
❑	8	Lumber supports	1 1/4	3 1/4	12	SPF	
❑	16	Support brackets	3/4	6 1/2	9 3/4	Plywood	
❑	2	Saw supports	3/4	7	20 3/4	Plywood	
❑	2	Tabletops	3/4	20 3/4	32	Plywood	
❑	2	Table shelves	3/4	19 1/2	29 1/2	Plywood	
❑	1	Saw table shelf	3/4	19 1/2	31 1/4	Plywood	
❑	2	Fence top & bottom	3/4	6 7/8	72	Plywood	
❑	2	Fence front & back	3/4	6	72	Plywood	Notch back for saw fence
❑	2	Fence strips	3/4	2 1/8	72	Plywood	Match height of saw table
❑	1	Fixed fence	1/2	4 3/4	60	Plywood	
❑	2	Sacrificial fence	1/2	4 3/4	47 1/2	Plywood	Make extras
❑	1	Cut-off stop	1/2	4 3/4	9	Plywood	

*SPF = Spruce, pine or fir



TABLE, EXPLODED VIEW

straight and flat material. Even though I am a procrastinator, I wanted to speed the process so I cut the studs to rough lengths.

Most of the moisture exits the board through the end grain, so this opens up the middle of the board and lessens the distance the water in the wood needs to move. Then I cut a bunch of scraps into 1/4"-square strips and stacked the rough-length 2x4s with spaces between the edges of the boards and my 1/4" stickers between each layer of the stack. I scanned a few boards with a pinless moisture meter every few days, and in about a month the wood was dry enough to use.

Without a moisture meter, it's still possible to tell when the material is dry enough to use. If you have a piece of similar material that has been in your shop for several months, you can use that as a comparison to the new material. Wet wood will be heavier, and noticeably damp and cool to the touch.

The length of time it takes for the wood to acclimate will vary depending on where you live, and the environment of your shop. A month in our air-conditioned shop is the best-case scenario, but it could take two or three months in a damp basement shop. If you live in the desert, it could dry on the way home from the lumberyard.

Pretend it's Rough Lumber

When the wood was dry, I milled it down to 1 1/4" x 3 1/4" on the jointer and planer. This may seem like a lot of waste, but in my experience, this is what it takes to get straight material from 2x4s. With a pile of now-straight and square stock, I cut the parts to final length and assembled the benches.

There are two subassemblies to the benches: "L"-shaped legs, and butt-joined frames. Glued and screwed together, the jointed edges of the leg components hold each other straight, resisting warping and twisting. The legs are far stronger than just a 2x4, and the shape allows solid attachment of the frame. This method can be used to make sturdy benches of nearly any size. I also made stands for a lunchbox planer and a mortiser and you can see more details of these online at popularwoodworking.com/oct07.

The legs are held together with #8 x 2 1/2" screws and glue. Set one of the leg parts on edge on the bench, and apply glue to the top surface. Put the other part on top, using a piece of scrap to support it while you align the edge with the face of the vertical piece. With the parts aligned, drill countersunk holes and drive three or four screws to connect the two parts of each leg. The frames are glued and butt-joined and these joints are also screwed together.

The frames fit in the inside corner of the leg assemblies. Lay two legs on the bench with the inside of the "L" facing up. Put some glue on the inside faces of the legs and put a frame unit in place with one of the long pieces down. Drill holes and connect the frame to the legs with #8 x 2" screws. With a combination square, mark the location of the lower frame 20" up from the bottom of the leg and glue and screw it in place. When the three tables are assembled,

Dynamic tension. *The jointed edge of one part helps keep the face of an adjacent part straight. Held together with glue and long screws, these legs are strong and straight.*

All together now. *With the frames inside the leg assemblies, this table is ready for a plywood shelf and top.*

attach the plywood shelves and tops to the frames with glue and #8 x 1¼" screws.

The right-hand table has shorter legs so that it can roll on swivel casters. A block of scrap leg material is glued into the inside corner at the bottom of each leg, providing a place to mount the wheels with #10 x ¾" panhead sheet-metal screws. A simple plywood box, the same height as the fence beam, can be placed on top of this rolling table to provide support for material to the right of the saw when needed.

Leave Yourself an Opening

The front upper rail of the saw table is reinforced with a second piece of wood that fits between the legs. I didn't bother with screws; I just glued it on, holding it to the existing frame's front with clamps while the glue dried. The plywood on the top of this unit isn't a solid piece; it is two 7"-wide strips going front to back at the right and left ends. The lower shelf on this unit may need to be slightly lower than the other units to ensure that the trash can fits. I used a Rubbermaid 32-gallon "Brute" that I purchased from the home center, but you'll need to adjust the opening size if you opt for a different container, or if you change the height of the saw table.

On the Fence

The fence assembly is a plywood box-beam. The extended front and back pieces of the beam are held to the top and bottom with strips of plywood. This beefs up the beam, and the width of the strips helps to level the surface to the surface of the saw table. In this entire project, the width of the strips is the only dimension that is important to hit exactly. This dimension will depend on the exact thickness of the plywood, and on the distance from the top of the saw's table to the base of the saw.

Because ¾" plywood is notorious for being undersized, I took two scraps and placed them on top of each other, next to the base of the saw. To get a precise measurement I took my combination square and set the head on the saw table and slid the blade down until the end of the blade rested on the plywood scraps. After cutting a test strip, I put it on top of the scraps and used the blade of the square as a straightedge to check the width. If the strips are a bit too narrow, that won't cause any problems, as the fence beam can be shimmed up to match the saw table.

One strip is attached to the long edge of each of the front and back pieces. I used 1¼"-long narrow crown staples and glue, but the strip can also be held in place with nails or screws. Be careful to keep the long edges of

Gauge the distance. *Stacking two pieces of plywood next to the saw table will give you a precise distance without measuring.*

Double check. *Checking the width of the strips with a straightedge will help keep the fence beam at the same height as the saw table.*

Keep the edges flush. *The thin plywood strip reinforces the front and back of the fence assembly, and locates the top and bottom correctly.*

Quick and strong. *The box beam construction keeps the fence assembly straight, and the narrow strips of plywood make it easy to put together.*

A place to put your stuff. *Adding brackets to the back of the stand is a convenient way to store material about to be cut and parts that have just been cut.*

Right where you want it. *Using the kerf in the subfence allows you to cut inside or outside a pencil line, or split it down the middle.*

Zero clearance equals accurate cuts. *A replaceable sub fence indicates exactly where the saw blade will be during the cut.*

the two pieces of plywood flush during assembly. Attach the beam bottom to the edges of the front and back, then attach the top of the fence beam. If you need to notch the end of the fence, you can cut the notch with a jigsaw, either before or after assembly.

The box that sits on the rolling table is made from the same size parts as the box beam fence, minus the wider pieces that extend up and down. I glued and screwed the parts together and considered attaching it to the rolling tabletop, but it does its job, supporting long pieces to the right of the saw just as well if left loose.

A material rack is built into the back of the saw stand. It isn't designed to hold a lot of material; it is more of a temporary place to put material before and after cutting parts to length. Three 80"-long uprights are screwed to the back legs on the left-hand table, and the back left leg of the saw table. A cross piece connects the two tables at the back, keeping the entire assembly from racking, and this provides a place for a fourth upright. The supports are short pieces of 1¼" x 3¼" material, held in place with simple plywood brackets.

With the tables and fence assembled, the complete saw station can be put in place and assembled. Start with screwing or bolting the saw to its table, then level the table with shims under the legs as needed. The left table is set in place, and the fence beam is set across the two tables. Check to see that the fence beam is sitting level, and that the fence itself is in line with the metal fence on the saw.

When everything is level and in line, attach the fence assembly to the two tables with a couple screws. Attach the ½"-thick secondary fence to the thicker back fence with #6 x ¾" screws. We used Baltic birch plywood, which comes in sheets that are 60" square. The permanent portion of the secondary fence is one rip from the sheet.

Making Sacrifices for Accuracy

Rip some extra pieces from the sheet for the replaceable fence sections. Hold one of these against the right-hand edge of the permanent piece and mark the length directly from the right edge of the metal fence on the saw. To provide clearance for the saw carriage, you'll need to trim the upper portion of the replaceable fence in the middle. Hold it in place, trace the outline of the saw's fence on the back, then make the cut on the band saw or jigsaw.

The sacrificial fence is held in place with #6 x ¾" screws. Most saws have a few holes in the metal fence that will allow you to run a few screws in from behind, and you can run a couple screws from the face of the fence into the thicker plywood back fence. With the saw set at 90°, make a cut through the plywood fence.

This cut through the fence gives a convenient and accurate way to line up a cut line on your work with the saw blade. When you need to renew this kerf line, you don't need to replace the entire piece.

Remove the sacrificial fence, cut the edge back to square and put it back, pushing the freshly cut end against the edge of the remaining right-hand fence. This will leave a gap on the other end, but that won't hurt anything.

The only remaining part is the stop, which is a cut-off piece of ½" plywood. I nicked off the end at a 45° angle to keep sawdust from building up between the end of the stop and the material being cut. **PW**

Keeping it simple. *An offcut of plywood and a clamp make an effective stop system.*

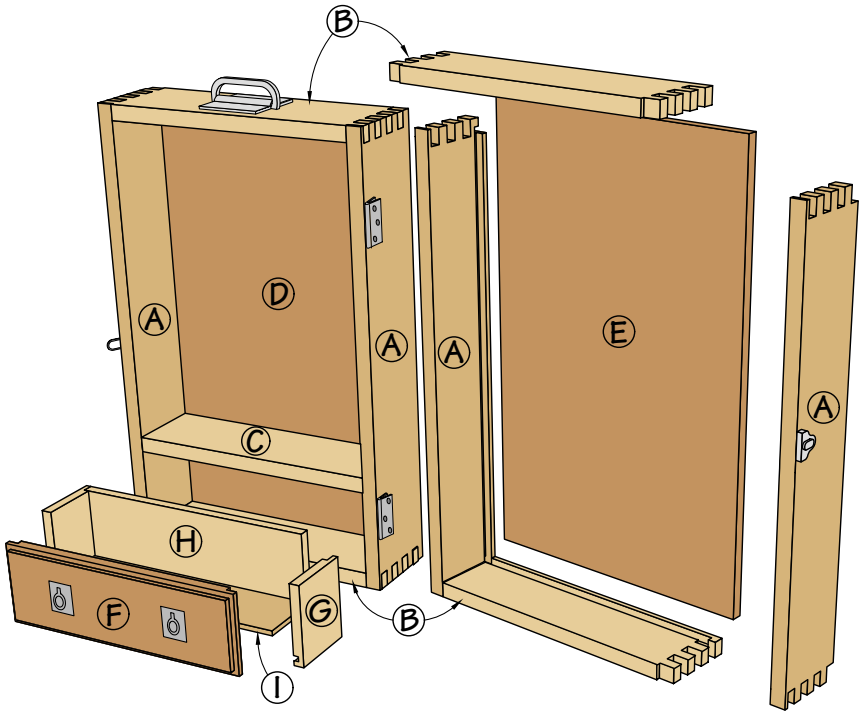
Dealing with the trash. *Miter saws can make a mess, but leaving the top open below the saw lets dust and scraps fall into the trash can below.*

Bob is the author of "Shop Drawings for Craftsman Interiors" (Fox Chapel) and other books. More information is available at his web site: craftsmanplans.com. Contact him at 513-531-2690 x1327 or robert.lang@fwpubs.com.

STANLEY Tool Cabinet

Keep all your important tools at your fingertips using this adaptation of a Stanley classic that's built to travel.

by Christopher Schwarz



SCHEDULE OF MATERIALS: STANLEY TOOL CABINET

No.	Lett.	Item	Dimensions TWL	Material
2	A	Sides	3/4" x 8" x 22"	M
2	B	Top & bot.	3/4" x 8" x 14"	M
1	C	Divider	3/4" x 3 3/4" x 12 1/2"	M
1	D	Back	1/2" x 13 1/2" x 21 1/2"	P
1	E	Frt. panel	1/2" x 13 1/4" x 21 1/4"	P
1	F	Drw. front	3/4" x 4" x 12 1/2"	M
2	G	Sides	1/2" x 4" x 3 1/4"	P
1	H	Back	1/2" x 3 1/2" x 12"	P
1	I	Bot.	1/4" x 3" x 12"	P

M=primary wood: maple • P=plywood

The man running the antiques booth was certain he'd found a sucker. I was fawning all over a well-preserved tool cabinet emblazoned with Stanley's "Sweetheart" logo — so called because it featured a heart with the initials "S.W." inside. As I examined the piece, the dealer dropped the price bit by bit.

Finally, I looked up at the dealer. He smiled because he smelled a sale — until I told him I'd rather build one and walked away. For the next couple weeks I tried to research the cabinet, but I couldn't find a photo or drawing of it in any of our old Stanley catalogs. The cabinet I examined looked similar to the old #862 from the early 1920s, but it wasn't quite right. So I gave up and built this one from memory and my notes. This cabinet is similar to the #862, but it's 1 3/4" deeper, has a small drawer at the bottom and is made from maple instead of a dark-stained oak. A great feature of this cabinet (and the #862)

Here's how to cut the finger joints. Put a dado stack in your table saw to make a 1/2"-wide cut. Raise your blade just a hair over 3/4". The jig is a piece of plywood screwed to the miter gauge. First attach the ply to your gauge, then make a cut in the ply using your dado stack. Now cut a small piece of plywood that's exactly 1/2" x 1/2" x 3/4". Glue and screw this block exactly 1/2" away from the cut on the plywood as shown in the photo. Cutting your finger joints is now simple ***(below).***

is the large handle on top of the cabinet. This makes it portable when you need to take your tools on a job — or when you quit your job. Cabinetmakers are an itinerant bunch.

Construction

I built this cabinet and door as one box and then parted the front door off using my table saw. It's tricky to keep the blade from binding during this operation, but I'll show you a way to make this procedure safer. The case itself is assembled using rugged finger joints. The back panel rests in a rabbet. The front panel sits in a groove on all four sides, and the drawer divider is biscuited into place. Begin construction by cutting your parts to size according to the Schedule of Materials.

First cut the ½" finger joints on the ends of the top, bottom and sides. I use a homemade jig for my table saw like the one shown in the photo. Now cut the ½" x ½" stopped rabbet for the back panel on the back inside edge of the four sides. Then cut the groove to hold the front panel. The front panel rests in a ½"-wide by ⅜"-deep groove that's ¼" in from the front edge of the sides. Now cut the biscuit slots for the drawer divider, which is 4¾" up from the bottom edge of the sides. Make sure the divider is flush to the back panel when the case is assembled.

Get out your clamps and assemble the case without glue. The front panel should square up the case. Now assemble the case again, this time with glue.

Finally it's time to part the front door off the case. As I mentioned before, this can be tricky. Get out a hot melt glue gun and eight 6"-long blocks of wood. Glue two of these to the inside of each side of the box. These blocks will hold the box together, and the kerf open, as you cut the case on the table saw.

Now set your table saw's rip fence to 4¼" and raise the blade to just over ¾". Make sure the back part of the cabinet is running against the fence. First cut along the top, then one side, then the bottom and the other side. Pry the blocks loose after the cut and remove the glue with a scraper.

Drawer Construction

The drawer is a simple thing that's great for holding hardware. Here's how I built it: the ½"-thick drawer sides rest in ½" x ¼" rabbets on the ends of the drawer front. The back rests in ½" x ¼" rabbets in the sides. And the ¼"-thick drawer bottom rests in a ¼" x ¼" groove in the sides and front that's ¼" up from the bottom edge. I also cut a ¼" x ¼" rabbet on the drawer front as a decorative detail.

Glue your drawer together, then nail the sides to the front and back. Nail the bottom in place to the back.

Now attach all the hardware. The drawer gets two finger pulls. Screw two cabinet hangers to the back so your cabinet can be hung on the wall. Don't forget the handle on the top. Also, put two screws at the bottom of the back piece to allow you to level it against the wall.

Finally, protect your cabinet with three coats of clear finish and nail the back in place. Hang it above your bench using wall anchors, but don't make those screws too tight. You never know when you might have to change jobs. **PW**

*Use hot melt glue to attach 6"-long blocks that keep the saw kerf open when you cut the front off the cabinet **(inset)**. After that, ripping the cabinet is almost cake.*

SUPPLIES

2" butt hinges are available at any hardware store. The magnetic tool strip is available in most woodworking catalogs.

The rest of the hardware can be obtained from Lee Valley Tools (800-871-8158).

- **Flush Ring Pulls (2 needed) item # 00L02.01. $10.95 each.**
- **Chest Handle (1 needed) item # 06W02.01. $11.75 a pair.**
- **Draw Catch (1 needed) item # 00S70.01. $3.95 a pair.**

TABLE SAW
Outfeed Tables

Don't let the simplicity of these tables fool you. When used together they make many operations easier and serve many other tasks that aren't immediately obvious.

You can find all sorts of devices for sale to support your stock as you feed it over your table saw. Some sport rolling pin-style rollers, some have a series of roller balls. Some attach directly to your saw, others offer micro-adjustment to level it to the precise plane of your saw table.

My humble outfeed table offering has no such features. In fact, they are about as "plain Jane" as you can get. Remove them from the shop and no one would take them for anything other than what they are — a pair of trestle tables.

So what's the big deal? Well, if you operate in a small shop space, say a garage or basement, these tables will serve so many useful purposes you'll wonder how you ever did without them.

I've been using a pair of tables just like these in my basement shop for the past five years. They surround my table saw and can be easily repositioned for ripping long stock, crosscutting a full sheet of plywood and supporting long crosscuts using my table saw's sled (and they give me a place to hang the sled when it's not in use). But wait, there's more.

These tables also serve as stock support for both sides of my compound miter saw. I use them as smaller assembly tables, for stacking stock while I'm planing or jointing it. Sometimes I finish projects on them. And because they are also the same height as my regular assembly table, I can put larger objects on both.

I arrived at the trestle-style design because it's not only stout and material-efficient, but it keeps the base enough "inboard" so that you're not bumping table legs with your feet. It also keeps the weight down and makes them easy to slide on your shop floor.

Getting Set for Building

Before you start construction, measure the distance from the floor to the top of your table saw. There can be as much as an inch or two variance in heights. The plans given here are for a saw that is just over 34" high. You should make your tables' height ⅛" less than your saw's height and reduce the height by as much as another ⅛" if your shop floor isn't very level around the saw. What can make these tables useless is if they are even a bit higher than the saw table. In my book, being slightly under doesn't matter.

And if you wonder why I didn't use levelers, I'll tell you. It's just not worth the hassle of adjusting them every time you move a table, let alone two of them. And you'd have to do this every time, owing to variations in the floor or the fact that most screw-adjustable levelers will wind or unwind just by dragging the table across a floor. When maintaining a plane in critical work, perhaps with a miter saw, shims or wedges are quick and easy.

Construction Details

I built these tables using both mortise-and-tenon joints and dowel joints. You could use only dowels if your shop isn't set up with mortising equipment. And in fact, my original tables were constructed entirely using biscuit joints and screws and are no worse for the heavy service they have seen. If you don't use mortises, remember to deduct the length of the tenons from the parts list.

I used stout white oak for the bases because I had some 8/4 stock on hand. But since I finished it out to 1½" thickness, you might want to consider using ordinary 2 x 4s. Just don't use twisted ones.

Follow the diagrams and cutting list to prepare your stock in the correct sizes, making any allowance for a difference in table saw height in the leg parts.

Next take the feet, top rails and legs for Table 1 and lay out the mortise locations as shown in the diagram. All tenons are ½" thick by 1¼" wide by 1¼" long. Make the mortises the same dimensions except in depth. Make them 1/16" deeper so the tenons don't bottom out before they seat home.

Layout Trick: Work From the Center Out

When I do layout work I often find it handy to use a couple tricks. Take the top rails and feet of Table 2, for example. It's really important that the mortises and dowel joints line up perfectly for the legs. To pull this off, I group all the parts together so their ends align perfectly. You can

Photo by Tim Grondin.

by Steve Shanesy

Comments or questions? Contact Steve at 513-531-2690 ext. 238 or steve.shanesy@fwpubs.com

even throw a square on the group to make sure they aren't creeping out of alignment. Clamp them so they can't move.

Next, locate and mark from each end the center of the leg locations (7⅛") on one of the parts. Since the feet get mortises that are 1¼" wide, measure out ⅝" from each side of the center lines. Now take a square you know to be true and transfer these lines to the other parts. For the top rail, use the same lines to align your doweling jig. Later, you can transfer these lines onto the leg parts for identical jig alignment. Grouping parts and measuring from the center out cuts down on simple errors of missed or inconsistent measuring on common parts. The beauty of this method is that even if you are off slightly, everything remains off consistently. After laying out the mortises, cut them all.

Cut the Tenons

Next cut the tenons, fitting them to the mortises. I use the table saw for this job, setting up the saw using scraps of fall-off from the actual parts so their dimensions are consistent with the materials I'm working with.

I cut the cheeks using the table saw's fence, standing the parts on end to run them over the blade. Use a back-up block to support the tall stock when making these

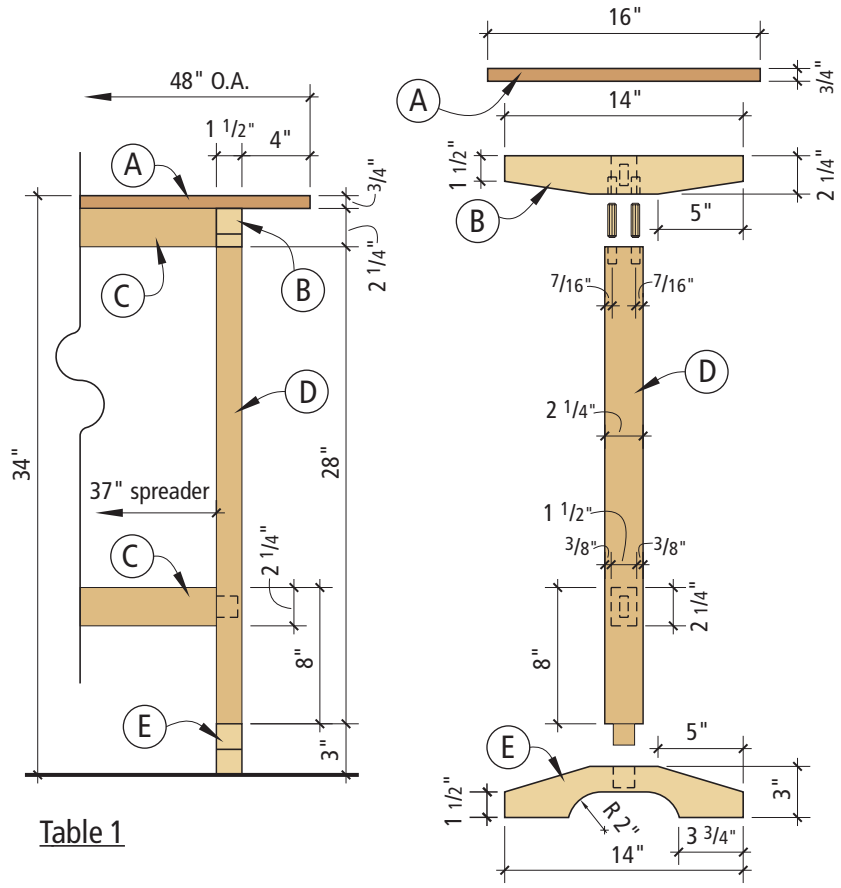


Table 1

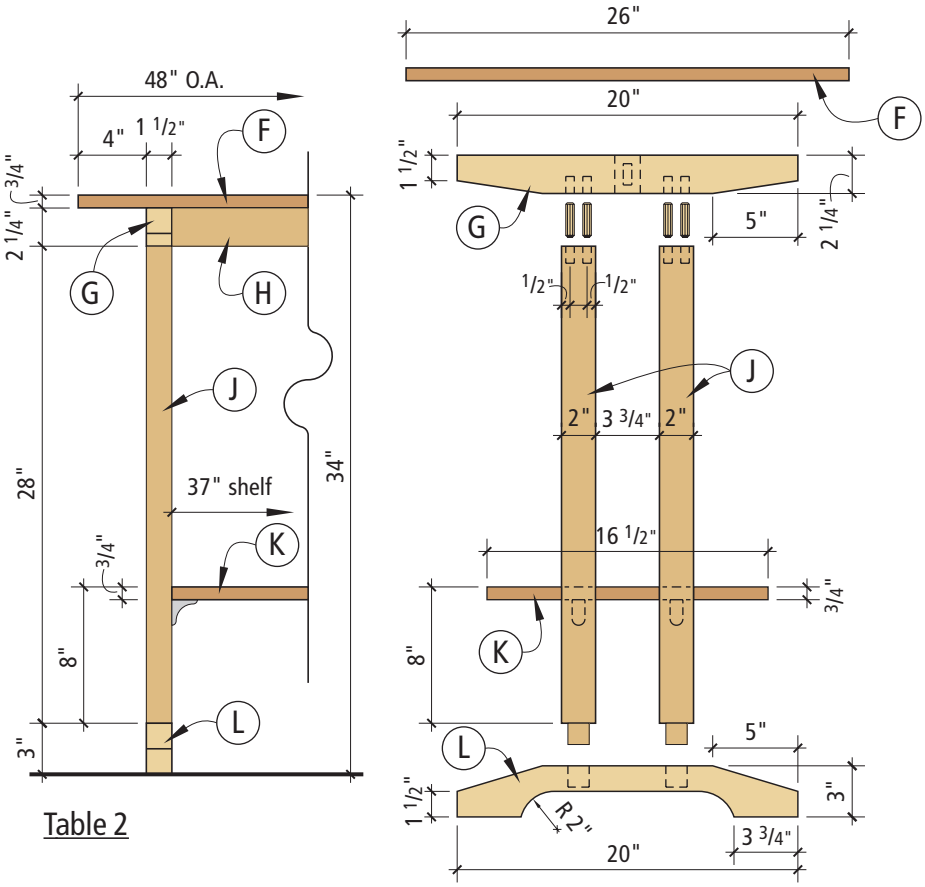


Table 2

It may take a little "persuading" to seat the tenons in their mortises, but if properly fit should only require tapping in place.

cuts. To finish the tenons I band saw off most of the waste from the cheek cut. I then set the table saw fence to establish the final length of the tenon. With the stock on its side and guided by a slot miter gauge, trim the remainder of the cheek waste. Then turn the part to the other side and make the shoulder cut.

In this project, since there weren't a lot of tenons, I just made a series of passes over the rest of the shoulder to cut away the waste. Otherwise, I would have set up a dado stack to do the work more quickly.

Before you make the final shapes on the top rails and feet, lay out and drill for the pair of

When gluing up, assemble the ends first and let them dry before completing the table base assembly by gluing the stretchers to the ends.

Joining the top stretcher to the top rail and the leg to the top rail on Table 1 requires the dowel placement to straddle the mortise.

The top rails are joined to the legs using two ½" dowels for each leg while the bottom uses a mortise and tenon. Other joinery options include dowels only, mortises only or biscuits.

dowels at the top of the leg-to-rail joint on Table 1. Position them so they straddle the mortise in the rail as shown in the diagram.

Next make the angle cuts on the rails and feet, and the cutout on the bottom of the feet. Follow the layout in the diagram, then band saw out the waste. Smooth the rough band-sawn edges.

Before gluing up, make a dry-run assembly to make sure everything is right before you get to that panic glue-up stage. After making any adjustments, start gluing up, but don't try to do everything at once. First glue up and clamp the leg/rail end sections. Once those are dry, glue the stretchers to the ends. Although this takes a bit longer, it allows you to make sure your glue ups are square and flat. A twist in a table base is a real pain.

Once the base is completely assembled, you can call it done or rout a ⅜" radius profile on all the edges except where the feet meet the floor and the top rail and stretcher attaches to the top. I did this on my tables and think it makes them appear more "finished."

The tops and shelf are straightforward. Cut plywood to the sizes given, then glue and tack on ¾"- x ½"-wide solid edging. Tack below the center point so you can rout a ¼" radius profile on the top edges. This detail isn't optional; the rounded edge helps prevent stock from catching on the edge when the tables are in use.

Before attaching the shelf on the larger table, sand the base and tops to your satisfaction. I didn't bother with a finish on my tables. These are for the shop, after all.

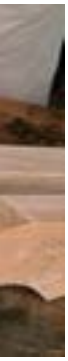
To attach the shelf, use corner braces at each of the four legs. If you change the height of the shelf for any reason, just make sure it won't interfere with your table saw's motor hanging out the back of your contractor saw.

And by the way, if you are already set up and happy with an outfeed system for your shop, remember that you can always change the height of these tables and use the design and joinery for any number of other trestle-style tables. **PW**

OUTFEED TABLES

	NO.	ITEM	DIMENSIONS (INCHES) T	W	L	MATERIAL
TABLE 1						
❑	1	Top (A)*	¾	15	47	birch plywood
❑	2	Top rails (B)	1½	2¼	14	white oak
❑	2	Top-Bot stret (C)	1½	2¼	39½	white oak
❑	2	Legs (D)	1½	2¼	29¼	white oak
❑	2	Feet (E)	1½	3	14	white oak
❑	2	Solid edging	¾	½	48	any hardwood
❑	2	Solid edging	¾	½	15	any hardwood
TABLE 2						
❑	1	Top (F)*	¾	25	47	birch plywood
❑	2	Top rails (G)	1½	2¼	20	white oak
❑	1	Top stret (H)	1½	2¼	39½	white oak
❑	4	Legs (J)	1½	2	29¼	white oak
❑	1	Shelf (K)*	¾	15½	36	birch plywood
❑	2	Solid edging top	¾	½	48	any hardwood
❑	2	Solid edging top	¾	½	25	any hardwood
❑	2	Solid edging shelf	¾	½	37	any hardwood
❑	2	Solid edging shelf	¾	½	15½	any hardwood

*Dimension given does not include ½"-thick solid edging to be added.



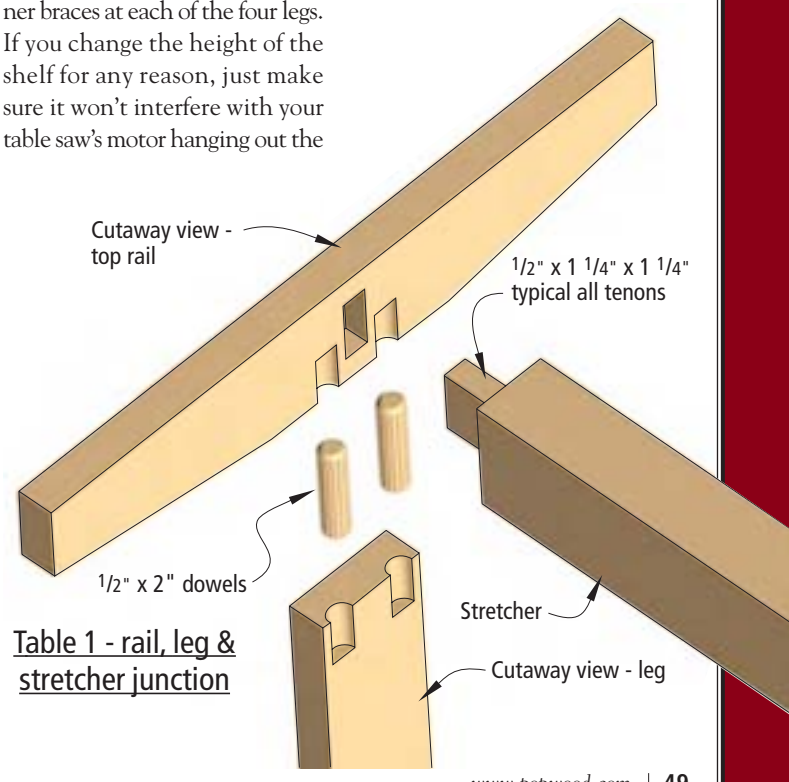


Table 1 - rail, leg & stretcher junction

Tool Tote

A good bevel gauge makes the angles in this simple piece easy to make (and perfect dovetails be darned – sloppy will hold just fine).

PHOTO BY AL PARRISH

Don't let the angled ends put you off – this simple tool tote is a great beginner project. Even if your dovetails don't look perfect, they'll still impart the strength necessary to hold up under a heavy load.

Before the advent of plastic tool boxes, carpenters, joiners and the like would carry their tools from job to job in a wooden tote. (In fact, we have a family picture of my great grandfather carrying a similar tote, and he was a plumber). For this tote, we took the 24" interior bottom length (just long enough to hold a framing square) from an early 19th-century Canterbury, N.Y., Shaker example that sold for $400 at a recent Willis Henry auction. I decided on 12½" x 6½" for the interior width and height. The ends are about 22° off vertical.

This piece presents an excellent opportunity to practice your dovetails without having to worry about cutting them perfectly. Even if your pins and tails look like an illustration from an 18th-century dentistry tome, they'll still hold. And after all, this is a working piece, which means it's going to quickly get munged when you toss tools into it and lug it around the house or to a job site. (And paint is an excellent way to cover small gaps and wonky cuts.)

But first things first. I chose to use poplar not only because it's affordable and readily available, but because it's relatively lightweight. Once this sucker gets loaded down with hunks of metal, it's fairly heavy, so it's best to avoid adding to the tare weight, which can tear up your back.

Mill all your stock except the handle to ⅝", then joint the edges. The sides are 7¾" wide x 30¼" long, and the ends begin at 8½" wide x 13¼" long (however, the angle dictates the width, so rough-cut and tweak your final width later after the pieces are dry fit). Initially, I had milled the handle to ½" to gain a smidge more interior room, but concluded afterward that ½" cut into my palm too much. So, I milled another piece to ¾" and rough-cut it to 11" x 30".

Glue up a 14" x 25" panel for the bottom (a bit larger than finished size in width and length so you'll have enough extra stock to angle the ends and to fit it) then set it aside to dry.

Now, lay one of your side pieces flat on your workbench, and grab your sliding bevel gauge (see page 22 for tool recommendations). Set it to an angle that pleases your eye and lock the blade in place. You're going to leave your bevel gauge at that setting until you're done with construction. Mark that angle on one end of a side piece.

Because you're going to gang cut the sides on the miter saw, you need only mark the angle on one end of one piece. Line up your two side pieces at the top and bottom, then secure them together by sinking a 1" nail into the waste portions at both ends.

As you can see, all my tails are a bit proud, and the fit at the baseline is gappier than I'd like. But they'll do for a workaday project like this one.

With the saw off, pull the blade down on your work and adjust the cut angle by eye. When you're close, press the handle of your bevel gauge against the miter saw fence, and tweak the saw blade angle until the gauge's blade is flat against the saw blade along its entire length. Lock in the angle. (As with your bevel gauge, once you lock the angle on the miter saw, leave it set until the project is complete.)

Now align the angled mark on the side piece with the blade and make the cut. Flip the pieces over carefully (you've cut away one of the nails securing them together), measure 24⅜" along the bottom edge, and make the second cut.

It's time to cut the angles on the top and bottom of the end pieces – maybe. You may prefer to cut your dovetails now using your preferred method, and plane the top and bottom edges to the correct angle once the box is assembled. These are not compound joints, but regular old dovetails, so if you haven't cut too many dovetails, it might be easier to leave the edges square while you do so – just be sure to leave enough overhang at the top and bottom so that you can plane the angles flush with the sides when you're done.

Or, you can set up your table saw for an angled cut (again using your bevel gauge to set the blade), and cut the proper angle at the bottom of each side, then line up the bottom edges of the side and

ends before marking out and cutting the joints. I chose this option because I'm not a virtuoso with the plane; the table saw blade was far more likely to result in a matching profile to the sides, ensuring the tote would sit flat on a surface.

After I cut and dry-fit my dovetail joints, I pulled them apart, added yellow glue, then reassembled them. Check the bottom edges of the box for square (theoretically both the top and bottom edges should be square, but because you have to fit the tote bottom, if it's a choice between the two, go with the bottom).

Once the glue is dry, use a block plane to bring the top edges of the end pieces flush with the side pieces (and if you didn't cut the bottom angle before dovetailing, flush the bottom edges now as well).

Now align, glue and nail ½" x ½" cleats to the bottom edge of the side pieces. For added strength, you could also add angled cleats to the end pieces, then plane them to flush the angle with the ends. But that's fairly involved.

Measure ⅝" up from the cleats, and calculate your measurements for the size of the bottom panel from that point. Cut the ends to the proper angle at the table saw, or plane them to fit. The bottom panel should drop in and sit flat on the cleats. There's no need to secure it; the handle will keep it in place.

"It is not only fine feathers that make fine birds."

— Aesop (c. 550 B.C.)
fable writer

Now it's back to the miter saw to cut the angles on each end of the handle. As you did with the side pieces, simply mark one angle with the bevel gauge, make the cut, flip the board end for end then measure 24" at the bottom's length and make the second cut. (It's a good idea to confirm your length by measuring at the bottom of the tote, or make your initial cut a little long, and sneak up on the final dimension.)

What I found trickiest about this project was shaping the handle – or actually, deciding on what shape and handhold size looked and felt best. As I mentioned, I first milled wood to ½" thick for the handle, and after cutting out the handhold, found that was too narrow a width to be comfortable. So I went with ¾" instead. To lay out the curve at the top, I first measured in 3" from where the handle ends would meet the box at the top edge, and sunk a nail just outside the line on the waste side on either end.

I then found the centerpoint at the top edge, grabbed a thin offcut from the trash can, and used the nails to hold it in place while I pushed up at the center to find the curve. Then I marked it with a pencil (see picture at right).

I cut to my line at the band saw, then measured 1¼" down from top center, and 1¼" to the right and left from that point. I chucked a ⅞" Forstner bit in the drill press, lined up the center of the bit with my two outside marks, and drilled holes (you may wish to make a larger handhold, depending on your hand size). I cut away the rest of the handhold with a jigsaw, curving the top edge slightly to match the handle profile, and to provide a more comfortable grip.

With a rasp, I rounded over all the edges in the handhold, then used #120-grit sandpaper to break all the edges and clean up the rasp marks.

I decided to paint my tote a smoky gray-blue … my default color. But, to make it a little more interesting (and to avoid constantly chipping the paint with the movement of tools), I masked off the inside top edges with tape, and painted only the outside surfaces of the box (filling in my dovetail gaps in the process) and the handle.

After the paint dried, I marked the centerpoint on each end piece, dropped the handle in place, drilled three pilot holes through each end into the handle, and secured the handle in place with 1¼" cut nails. WM

— Megan Fitzpatrick

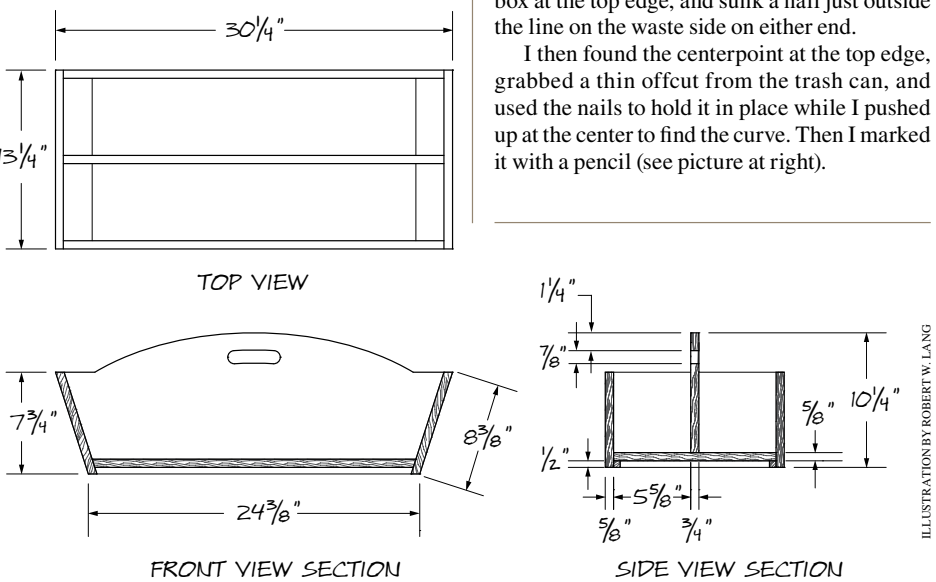


ILLUSTRATION BY ROBERT W. LANG

Tool Tote

	NO.	PART	SIZES (INCHES) T	W	L	MATERIAL	NOTES
❑	2	Sides	⅝	7¾	30¼	Poplar	Dimension w/out angles
❑	2	Ends	⅝	8½	13¼	Poplar	Dimension w/out angles
❑	1	Bottom	⅝	12	24	Poplar	Dimension w/out angles
❑	1	Handle	¾	10¾	29⅛	Poplar	Dimension w/out angles
❑	2	Cleats	½	½	23	Scrap	

Two nails and a thin piece of offcut make a fine (and cheap) arc marker.

Use a drill press to cut the outside ends of your handhold, and a jigsaw to remove the remaining waste. You'll do the final shaping with a rasp and sandpaper.

Under-the-Saw Cabinet

Photos by Al Parrish

The space below your table saw is a prime storage area that's likely been doing little more than gathering scraps.

In my eternal quest to find more shop space, I discovered a respectable piece of real estate right under my nose, err, well my table saw anyway. Yes, right below the table board was a beat-up box of odd cut-offs that were about as valuable as ice cubes are to Eskimos.

After noodling around with design ideas I settled on the rig you see here. Not only does it provide a lot of useful storage, but it has really helped me organize my blades and accessories that weren't always at my fingertips. There's even extra storage on the "outfeed" side of the cabinet.

The Shaker-style flat-panel doors gave me a chance to try out some new router bits. We've included a special pull-out poster that provides all the details for making these doors, or other doors, that will make a handy reference when hung in your shop.

Build the Case

Cut out the plywood for the sides, top, bottom, the common back, partition, front rail and full bottom that goes below the router-bit storage tray.

On the two sides, cut a rabbet on the top edge that's ½" deep by ¾" wide that will hold the top. For the bottom, make a dado ½" deep by ¾" wide that starts 3" up from the bottom edge.

Next will be several ¼" by ¼" dados and grooves. These joints join the common back to the sides, the partition on the "infeed" side of the cabinet where it joins the common back, and where the rail and full bottom form the drawer openings. Refer to the drawings for the placement of each of these dados. Remember to stop the dado on the cabinet side for the router bit section bottom so it doesn't pass beyond the common back.

Before assembly, handsaw 3"x 3¾" notches in the sides at the bottom corners to make the toe kick space.

For the corresponding parts, cut ¼" tongues on the edges. On the back, these are on the two sides; for the partition, they're on the back edge. The 4" rail has tongues on both ends, and the full bottom on both long edges.

Now, before you begin assembly, notch the bottom corners of the sides to create the setback for the toe kick. The height of the kick is the same as the lower edge of the dado you cut for the cabinet's bottom.

Dry Fit, then Assemble

Dry-assemble the case to check the fit of the joints. Make sure that during the real assembly you have all the parts oriented in the right direction so you don't turn a part with a ¼" tongue around and create a cabinet that won't go together.

When you are ready for final assembly, have a friend around or assemble the parts in stages.

Before nailing the top in place, screw two cleats into the sides of the router bit opening that are ½" up from the bottom. Make sure a ½" piece of plywood will slide smoothly in the space because this will be the simple slide method for the router bit pull-out tray.

by Steve Shanesy

Comments or questions? Contact Steve at 513-531-2690 ext. 1238 or steve.shanesy@fwpubs.com.

Apply a hot iron to hot-melt-glue backed edge veneer, then file off any veneer overhang using the teeth on your file's edge. It works just like a saw.

When done, install the top. Next, turn the cabinet upside down and nail or screw through the bottom into the bottom edges of the common back and partition.

While the case is in this position, nail on the kick pieces after edging the ends with hot-melt glue-backed veneer tape. While the iron is hot, veneer the other edges of the cabinet and shelves to conceal the plywood core.

Make, Install the Drawers

The project requires one regular drawer and two pull-out trays. All three are made the same except the trays have a cut-out front. The router bit storage behind the other drawer front isn't really a drawer at all, but another kind of tray. Here's how to make the regular drawer and trays.

Cut out the parts according to the cutting list. On the draw-

Mark the cutout on the fronts of the pull-out trays and then band saw to the line and sand. Then go ahead and assemble the trays.

Both the pull-out panel and the pull-out tray are guided by simply creating grooves for them to slide in and out.

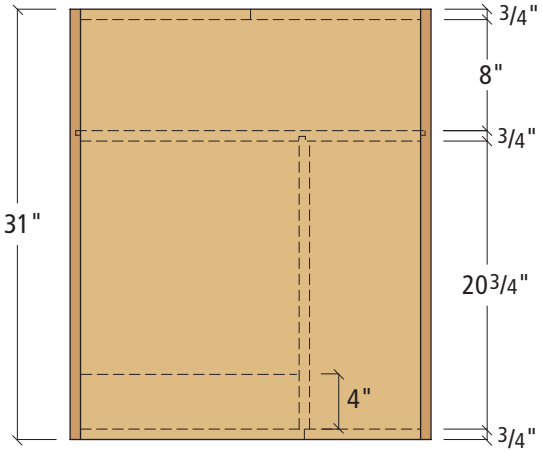
er fronts and backs, cut rabbets that are 5/16" deep by 1/2" wide. These accept the sides. The back is 1/2" narrower in width than the sides and front. This allows the bottom to slip in 1/4" x 1/4" grooves cut in the sides and front, 1/4" up from the bottom edge. Before assembling the trays, make the cutout on the front. Make the cut 2 1/2" in from the side and the top edge. To assemble, use glue and nails. After the glue has dried, slip the bottoms in place, then check for square before nailing the bottom in place.

Install the drawers following the instructions for the type of drawer slides you use. The drawers are sized to use common 1/2"-thick drawer slides.

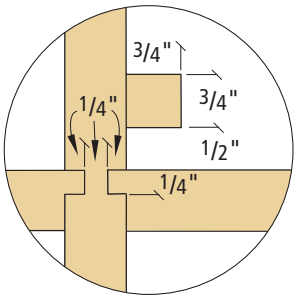
The tray for the router bits is just a 1/2" piece of plywood glued into a 3/8" x 3/8" groove in the drawer front that starts 5/16" up from the bottom edge.

Position the plywood to allow for the drawer front gap on the right side of the front. Later, add another layer of plywood with holes cut to stand your bits in place, then screw this second layer to the tray bottom.

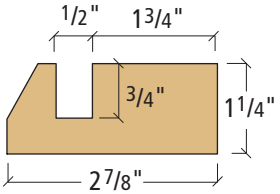
Now turn to the vertical pull-out panel. It is simply 1/2" plywood that runs in grooves on top and bottom to guide it. A hole near the front edge gives you a place to grasp and pull. Cut two pieces of stock 1 1/4" x 2 7/8" x 21 3/4", then cut a groove 3/4" deep by 1/2" wide that's 1 3/4" from the edge. Screw these to the cabinet in the upper and lower corners.



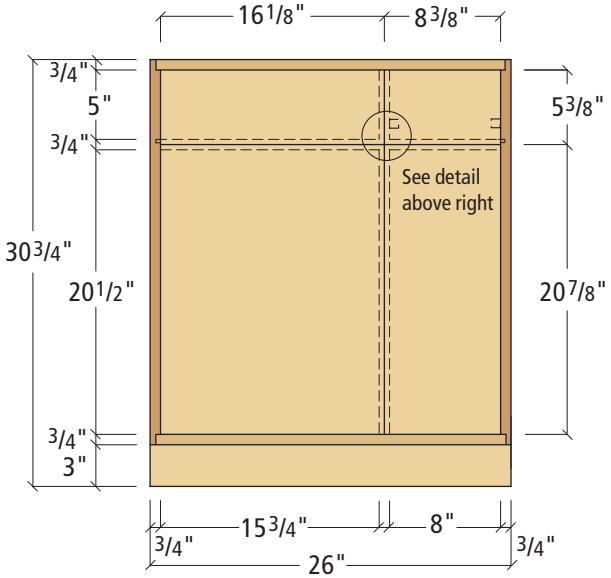
Plan



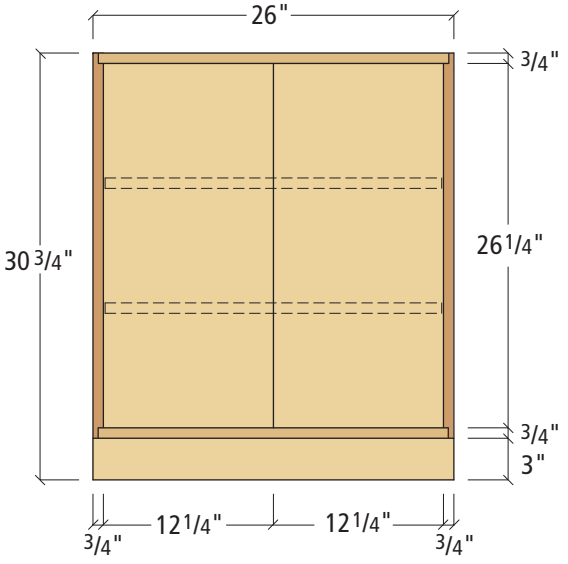
Partition detail



Vertical-panel guide profile



Infeed elevation



Outfeed elevation

Use your router and an edge guide to mortise the hinges on the door stiles. I set my hinges 3" from the stile ends.

Swaging hinges will allow a better door fit. Place the hinge on a solid surface, cover the leaves with a piece of steel up to the hinge barrel, then give it a good whack with a hammer.

Make and Install the Doors

Turn to the center spread of this issue for a special pull-out poster containing complete details for building the doors.

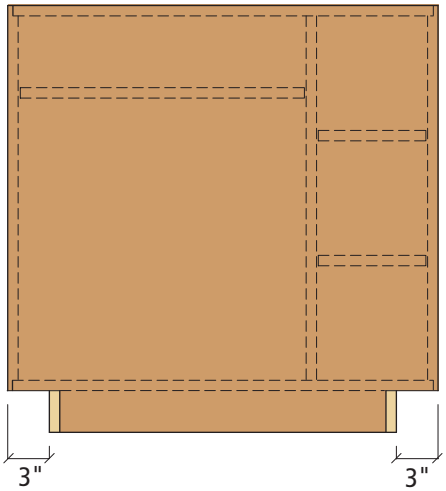
Mortise the butt hinges on the stiles to the thickness of one hinge leaf. I used a router with a ¼"-diameter bit. Use a chisel to square up the mortise corners. To swage the hinges, see the photo at right.

Screw the hinges on the doors after drilling pilot holes. Use paraffin on the screw threads and a screwdriver if you're using brass screws, which are quite soft.

Position the doors in the opening and use shims to set the door up from the bottom. Carefully pencil the hinge locations, then mark and drill the pilot holes for the hinges and install.

To complete the project, drill holes for the adjustable shelves. I spaced mine 1½" in from the front and back, then from the bottom, up 8½", 10", 11½", 17", 18½" and 20". Before finishing, install door catches, and the door and drawer pulls.

For finish, your cabinet deserves a little protection so give it a clear coat of your favorite finish material. **PW**



Profile

UNDER-THE-SAW CABINET

	NO.	ITEM	DIMENSIONS (INCHES) T	W	L	MATERIAL	COMMENTS
❑	2	Sides	3/4	31	30 3/4	birch ply	rabbet top edge
❑	1	Common back	3/4	25	26 1/4	birch ply	rabbet both sides
❑	1	Partition	3/4	20 15/16	26 1/4	birch ply	rabbet back edge
❑	2	Top/bottom	3/4	25 1/2	31	birch ply	
❑	1	Rail	3/4	4	16 1/4	birch ply	
❑	1	Full bottom, router area	3/4	8 1/2	20 3/4	birch ply	rabbet 2 long edges
❑	2	Toe kicks	3/4	3	26	birch ply	
❑	2	Shelves	3/4	7 5/8	24 5/16	birch Ply	
❑	1	Pull out panel	1/2	20 3/4	19 1/2	birch ply	
❑	2	Panel guides	1 1/4	2 7/8	19 1/2	solid hardwood	
❑	1	Drw front	3/4	5 3/8	8 3/8	solid birch	
❑	1	Drw front	3/4	5 3/8	16 1/8	solid birch	
❑	1	Router bit tray bottom	1/2	7 15/16	21	birch ply	tongue, 1 short end
❑	1	Drw sub front	1/2	4 1/4	14 3/4	birch ply	rabbet 2 short ends
❑	1	Drw back	1/2	3 3/4	14 3/4	birch ply	rabbet 2 short ends
❑	2	Drw sides	1/2	4 1/4	19 5/8	birch ply	
❑	1	Drw bottom	1/4	14 1/4	19 3/4	birch ply	
❑	4	Sides, pull out trays	1/2	4 1/2	20	birch ply	
❑	2	Fronts, pull out trays	1/2	4 1/2	13 9/16	birch ply	rabbet 2 short edges
❑	2	Backs, pull out trays	1/2	4	13 9/16	birch Ply	rabbet 2 short edges
❑	2	Bottoms, pull out trays	1/4	13 1/16	19 3/16	birch ply	
❑	4	Door stiles	3/4	1 1/2	20 7/8	solid birch	
❑	2	Door rails	3/4	1 1/2	6 1/4	solid birch	tongue 2 short ends
❑	1	Door panel	1/2	6 3/16	18 11/16	solid birch	
❑	2	Door rails	3/4	1 1/2	14	solid birch	tongue, 2 short end
❑	1	Door panel	1/2	13 15/16	18 11/16	birch ply	
❑	4	Door stiles	3/4	1 1/2	26 1/4	solid birch	
❑	4	Door rails	3/4	1 1/2	10 1/8	solid birch	tongue, 2 short end
❑	2	Door panels	1/2	10 1/16	24 1/16	birch ply	

Wall-hung Tool Racks

Tool storage out of the box: A flexible system takes root and grows on the walls of our shop.

I used to keep my hand tools in drawers in machinists' and mechanics' tool chests. My tools were organized and protected, but it wasn't very convenient. Edge tools rattled against one another as drawers opened and closed, and my layout tools were never at hand. During projects, tools stayed on the bench where they could be found, but soon were buried as my work, shavings, scraps and more tools piled up.

When I opened my first shop, I decided to make a wall-hung tool chest. Two wide doors opened off a cabinet. I designed the doors around the tools I used regularly, and in between the doors were shelves and a bank of dovetailed drawers. It changed the way I worked. The tools had a place to live and were right at hand. If I started to see too much empty space in the inside of the doors, I knew it was time to take a break and clean up.

While the wall-hung chest functioned well, I never quite completed it. I intended to put in a latch and lock mechanism to keep the doors closed, but after a few months, I realized that I rarely closed the doors. It was like a television cabinet in most homes – the doors are functional but if the TV is always on (or the tools always being used), the doors really aren't needed.

When I came to work at *Woodworking Magazine*, I planned to bring in my tool chest and hang it on the wall. My plan had to be aborted when I recognized that our shop's biggest blessing, an abundance of windows, didn't allow the 6' of wall space I needed. I was back to tools in drawers

PHOTO BY AL PARRISH

Waiting in line, ready to be used. A rack of tools directly above the bench keeps them out of harm's way and makes them easy to locate.

and odd boxes, and I pondered how to add a wall without losing any windows. I wanted the accessibility, safety and organization of the chest, but I was developing an impractical plan.

One day as I walked into the shop, I glanced to the left as I almost always do. Most of the time there will be some interesting project or part of a project or esoteric tool on Editor Christopher Schwarz's bench. What caught my eye that morning was his simple and elegant solution to the same problem I faced. He had installed a simple rack across the window directly above his bench and it held more tools than I would have thought possible.

Recognizable as leftover baseboard, two ¾"-thick boards, about 3½" wide, were held ½" apart by wood spacers in between. The back board was a few inches longer than the one in front, allowing it to be easily mounted to the wall, or in this case the wood casing on our window. By that afternoon, I was loading a similar rack across the window above the bench in my corner of the shop.

I was delighted at how well this simple solution solved a problem. My only reservation about hanging my tools was securing them so they wouldn't fall. When I made my tool chest, I made French-fit holders for individual tools. With the new rack, most would fit neatly within the slot between the two boards. They were handy, in sight and out of danger. A few didn't fit between the slots, so I drove a few screws and nails to hang them on the outer part of the rack.

Organization came in time. Instead of planning where each tool should go ahead of time, I started using the slotted rack as I worked, putting tools in a slot as I completed typical tasks. Before long, an organizational scheme emerged that works better than I would have planned. I also found that the slots were good for many tools, but not everything fit quite the way I wanted.

Above the bench at the other end of the shop, Shaker pegs began to appear on the outside of my shop mate's rack. First, a few near one end, then an entire row with hammers hanging from them. A day or two later, another row of pegs appeared above the first rack, holding more than a dozen saws. Not being a collector, I didn't need that

The simple start is two pieces of wood, ¾" thick x 3½" wide, of a convenient length. The back piece is longer than the front by a few inches to allow fastening to the wall. The rack is wide enough to hold tools securely, and provides a place for Shaker pegs for hanging tools.

The two pieces are separated by ½"-thick spacers, and tools drop into the space. This was a "sweet spot" for our tools and can be varied to accommodate your tools.

Screws and nails aren't as attractive as Shaker pegs, but function well – especially in tight spaces and for tool-specific hanging.

The flexibility of using the slots gives you freedom to change the overall arrangement as your tools, needs, habits or projects change over time.

much space – I only have four saws and five hammers, but my tool rack did need some improvements and additions.

My first addition was a simple shelf, about 4" wide that rests on band-sawn brackets. This provided a place for planes and a few other tools that I didn't want to hang, but needed at hand. The remaining problem to solve was the chisel chaos. They fit between the boards of the rack, but because they're top heavy with wide handles, they wouldn't hang straight. It bothered me to see them leaning against each other like a gang of out-of-work loafers. I wanted them standing straight – at attention and ready for action.

My solution was another shelf, held in notched brackets with a series of holes that fit the chisel handles. I experimented with some different-sized holes and various chisels and found that a 7/8" diameter worked for almost all of them. I also wanted a slot at the front of the hole so I wouldn't need to lift a chisel its entire length to get it in or out of the rack. A little more experimentation and a couple test-fittings later, and I had my final dimensions; the holes were drilled with the edge of the hole 1/8" back from the front edge of the 2"-wide board. A center-to-center distance of 1 1/8" provided room to reach each handle individually.

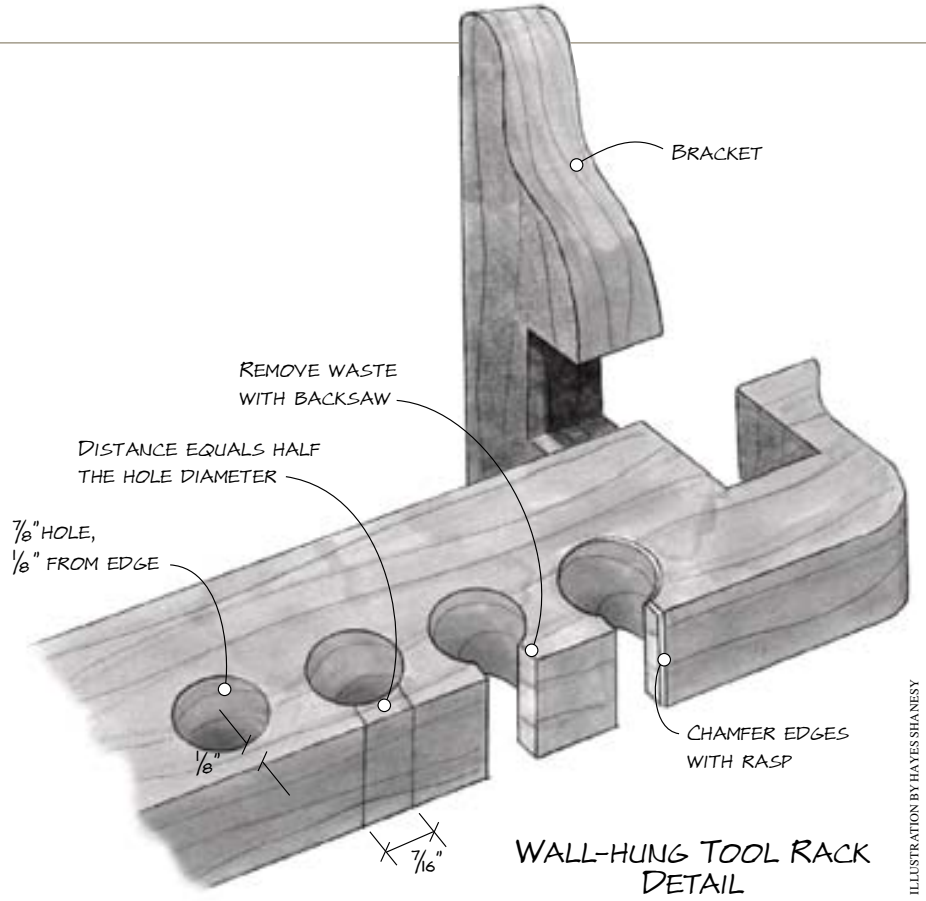
After marking off the series of equally spaced centerlines, I stepped off one-fourth the diameter from each side of the centerlines and sawed slots from the front edge of the shelf to each hole, leaving a 7/16"-wide slot connecting each hole to the edge. I used a rasp to chamfer the edges of the holes and slots, connected the shelf to the brackets, and mounted them in place. Wider chisels need a bit of a turn as they go in and out of the rack. Narrow ones slide right in. They all are held securely.

More concerned about function than decoration, I made my racks out of scrap hardwoods and didn't use a finish. A light sanding and a coat of shellac, lacquer, oil or wax would make them look nicer, but I rarely bother with doing that on something for the shop.

I considered doing some decorative carving on the brackets, but that reminded me that my carving chisels still live in canvas rolls in drawers in a nearby cabinet. I'm not a collector, but I will need a rack for 40 or 50 of them, and while I'm at it, I may as well start gathering the 30 or 40 more carving chisels that I really need. Maybe I can clear some space on the building column to the left of my bench for a row of them.

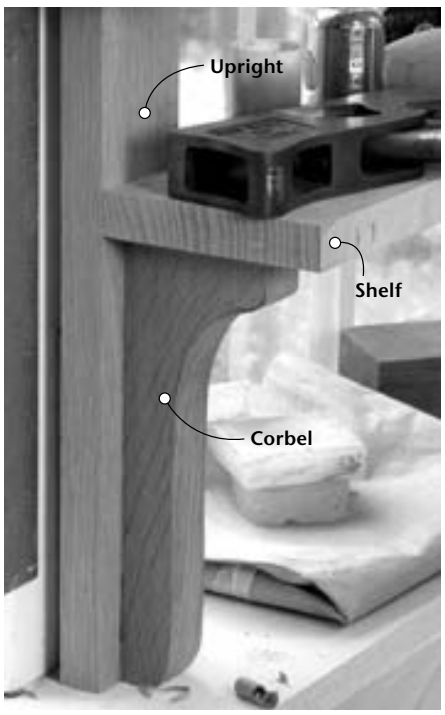
The great thing about these racks is that they are adaptable and made easily and quickly. As happened to me, once you start, you'll need another two or three as the list of necessary tools grows, and the way you work and the things you work on change. If you cross the line to "collector," you might need many more than that. WM

— Robert W. Lang

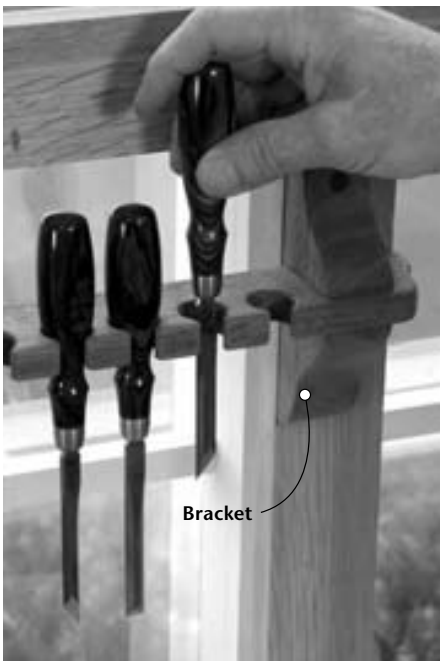


WALL-HUNG TOOL RACK DETAIL

ILLUSTRATION BY HAYES SHANESY



This rack has uprights at both ends and in the middle. These provide a place for brackets and corbels that can support shelves.



A 7/8"-diameter hole, 1/8" in from the edge of a 2"-wide shelf holds a variety of handle sizes. The sawn slot connecting the hole and edge allows you to hold a chisel with a blade that is wider than the handle diameter.