



# CABINETS & DRAWERS

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# Shaker Cupboard: Rejuvenated

A White Water Shaker stepback is sprinkled with water from the fountain of youth.

BY GLEN D. HUEY



**(Top)** Inspired by an original cupboard at the White Water Shaker community, our revitalized Shaker stepback blends nicely into the surroundings of the North Family dwelling.

**(Left)** The original cupboard, on which our piece is based, has lost its crown moulding. And no one is sure there were ever any feet to lift the cupboard base off the floor.

*Shaker stepback cupboards* aren't abundant. In fact, there are only a few examples in the many published books on Shaker furniture. Unless you have a sharp eye for Shaker furniture, or are excited about painted furniture with a heavily worn surface, I doubt you would give a second look to the original cupboard on which this project is based. However, the fact that the original is part of the White Water Shaker Village collection propels this piece, in my opinion, toward the top of Shaker cupboards. A reproduction of this cupboard is a must. And in the process, we can turn the clock back to see the cupboard in its earlier days.

## INSPIRATION FROM THE ORIGINAL

The original Shaker stepback, with its missing crown moulding and other absent features, required detective work before construction began. As we move through the project, we'll examine some missing features and try to reach conclusions that bring this piece back to an earlier day.

The first question is: What about feet? The cupboard at White Water has a three-sided frame that rests on the floor. Was that the original design? Or were the feet worn away or removed?

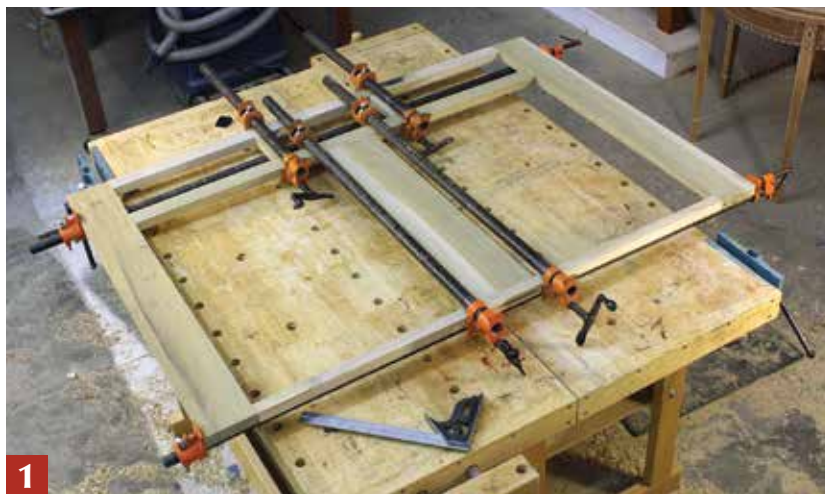
Also, what happened to the crown moulding? It's obvious there was a moulding, but it is long since gone. What was the profile?

Other features to look at are the unique drawer construction and the use of a half-dovetail sliding joint to secure the shelves to the case sides—even with this complex but strong joint, the builder nailed in the shelves.

## FACE (FRAME) FACTS

Before we get to the detective work, we need to build the cases and face frames. The frames for both sections use mortise-and-tenon joints. Mill your parts to size according to the materials schedule, but leave an extra  $\frac{1}{8}$ " in width on the stiles. After the frames are fit to the cases you'll use a router and flush-trim bit for a perfect fit.

Locate and mark the mortise locations for  $\frac{1}{4}$ "-thick tenons. Wherever possible, each joint should have a  $1\frac{1}{4}$ "-long tenon. With the face-frame material at  $\frac{7}{8}$ " in thickness, a  $\frac{5}{16}$ " face shoulder produces



a centered tenon. An edge shoulder of a matching size ensures a stout joint.

There are two frame joints where the matching edge shoulder is not used: on the bottom rail of the lower section where the tenon would end up  $\frac{3}{8}$ " wide, and on the bottom rail of the upper section where the tenon would be  $\frac{5}{8}$ " in width.

As always, cut your mortises first then cut your tenons to fit the mortises. Set up and cut all the mortises on your face-frame parts. It's best to cut the mortise then reverse the position of the workpiece and make a second pass at each mortise. Yes, the resulting mortise may be wider than  $\frac{1}{4}$ ", but the joint will be centered on the stock, and that's most important.

Cut your tenons using your favorite method, then test-fit all your joints. When your tenons fit snug and can be slid together with a little muscle, it's time to assemble the face frames. Work methodically through the assembly. Apply glue to both the mortises and the tenons to achieve the most strength. Clamp the frames and allow the glue to dry.

## FREAKY DOVETAIL JOINTS

Dovetails abound in the carcasses. Both

sections have half-blind dovetailed corners and shelves attached with half-dovetailed sliding joints.

On the upper section the case top is dovetailed to the sides; on the lower section, the case bottom has the dovetails. The pins of the half-blind dovetails are positioned in the sides with the tails in the mating pieces. Also, there is a  $\frac{3}{4}$ " difference in widths between the upper case sides and the top, and the lower case sides and the bottom. Those offsets capture the backboards.

The half-dovetail sliding joint is easy with two router setups. You can work with a single router, but you'll need to change the bits multiple times or position the fence in the exact same location each time.

The setups are this: One router has a  $\frac{3}{4}$ "-diameter, 14°-dovetail bit coupled with a  $\frac{5}{16}$ " outside-diameter template guide bushing. The second router has a  $\frac{5}{8}$ "-diameter pattern bit with a top-mount bearing.

Begin by marking lines across the sides at both the top and bottom edges of the dados. Position and clamp a  $\frac{3}{4}$ " fence at the top edge of a shelf location. Always work with the fence set to the left of the area to be routed. If these guidelines aren't followed, you can form the half-dovetail

1. To assemble the face frames correctly, you'll need to work in a specific order. Plan the steps and have plenty of clamps handy.

2. The bottom of the lower section is joined to the sides with half-blind dovetails, as is the top of the upper section.

3. Two routers, two bits and a guide bushing take the guesswork out of creating the half-dovetailed sliding joints.

on the wrong edge.

Begin with the dovetail router bit setup. Set the bit to cut  $\frac{1}{2}$ " deep into the case side, then hold the guide bushing tight to your fence as you make a pass. The cut should be close to, but not beyond, the lower shelf layout line.

Grab your second router, set up with the bit tweaked to cut at the same depth, then make a second pass making sure to hold the bearing tight to your fence. This cut completes the socket. Move to the next shelf location and repeat the process.

Before moving on, cut the grooves in the side pieces for the backboards. The grooves are  $\frac{3}{8}$ " in from the back edge of the case sides; each is  $\frac{3}{8}$ " wide and  $\frac{1}{2}$ " deep. A dado stack makes this quick work.

## JIG UP THE SLIDE

Now it's time to cut the mating shape on the horizontal shelves. To hoist these large panels onto your router table is quite a task. But with a simple shop-made jig, you won't need to. Instead of taking the panel to the router, you'll take the router to the work.

Build a jig to create the sliding half-dovetail with two straight pieces of  $2\frac{1}{2}$ " wide and  $\frac{3}{4}$ "-thick scrap that are 24" long. Screw the pieces together to form a "T" with one leg of the top piece set at  $\frac{7}{8}$ ".

For the jig to work, you'll have to size that top leg according to your router setup. This time use a  $\frac{3}{4}$ " outside-diameter template guide bushing with the same dovetail router bit. (The matching diameters allow the router bit to cut where the bushing rubs.) Clamp the jig on a test piece, then make a pass to create the half-dovetail profile as shown below.

Check the test piece in a socket. If the test piece is too wide, take a light table saw cut off the working edge of the jig, make another test cut and check the fit. Continue to take light passes off the jig to sneak up on the correct fit.

If your test piece is too narrow to fill the half-dovetailed slot, you'll have to

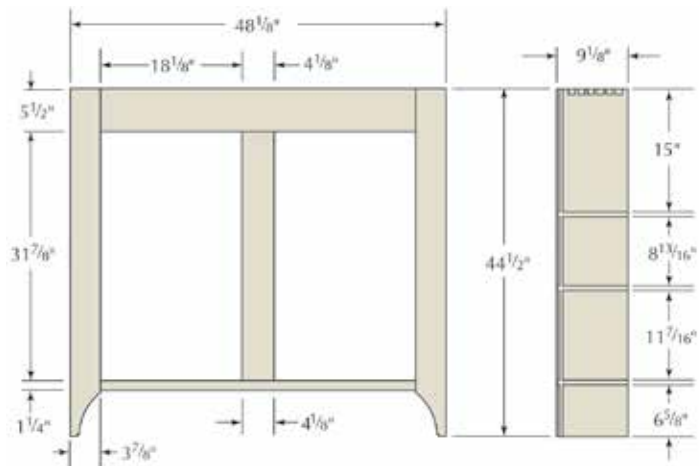


remove thickness from the bottom piece of the jig, or remove or replace the top piece at a new location. Once the fit is correct—the workpiece slides into the slot without slop—the jig is ready to go.

Clamp the jig in position, then run the router bit to shape the profile on both ends of each shelf. (Use the jig and clamps to pull out any warp in your shelves.)

Each shelf in the upper case receives two plate grooves on the top face (the lower section's shelf is not grooved).

The grooves are 2" and 4¼" from the back edge of the shelf and extend from end to end. Use a router and a core box router bit.



UPPER FRAME & CABINET DETAIL

### BUILD THE BOXES AND PEG THE FRAMES

Assemble the boxes by swabbing glue in the sockets (and a small amount on the shelf ends), then slide the pieces together.

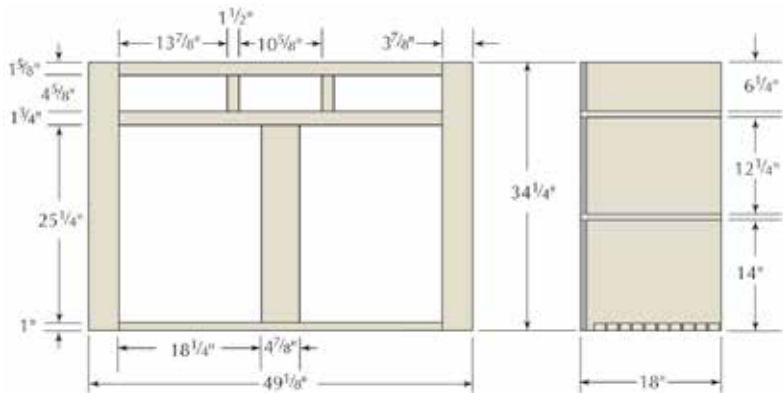
After the shelves are installed, butter the dovetail pins with glue, then tap those joints together.

When the glue is dry, fit the face frames to their boxes. It's important to align the middle rail of the lower section with the drawer support. A thin bead of glue secures the frame to the boxes. Position the frames, add clamps then allow the glue to dry.

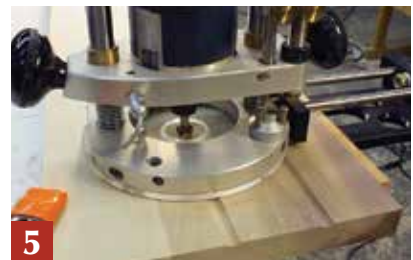
Drive square pegs into the face frames. Doing this after the glue sets provides additional strength so there is less of a chance to split the frame pieces. To match the original cupboard, evenly space four pegs in each rail and outside stile.

Before adding the pegs, trim the stiles to the case with a flush-trim router bit with a bottom-mount bearing. The uppermost stile's peg is located behind the cove moulding. As is done on the original cupboard, don't forget to drive a couple nails into the shelves.

The detail work on the upper section face-frame stiles is router work. To cre-



LOWER FACE FRAME & CABINET DETAIL



**4.** This shop-made jig not only dials-in a perfect sliding dovetail, it allows you to pull any warp out of your shelves.

**5.** It's not often you find plate grooves behind blind doors. It's a bigger wonder as to why two different grooves were plowed. Maybe it's for plates and bowls?

**6.** The glue swells the wood and makes the joint fit more tightly than before, so light taps with your mallet might be needed.

ate the design, make a plywood pattern of the curve—the pattern keeps the look consistent from side to side—then make the cut using a router with a pattern bit. Square the inside corner with a chisel.

### THROUGH-TENON DOORS

Construction of the four doors is identical, so after you mill the parts to size, gather your stiles and mark them for ¼"-thick tenons with ½" edge shoulders.

With through-mortises, work from both edges of your stile as you mortise so you don't blow out the exit edge. Transfer your layout lines to both edges of the stiles and make sure you work within those confines.

Work past the halfway point of each mortise, then flip the stile edge for edge to clear the mortise.

Most 10" table saws have a maximum 3½" depth of cut. The door stiles on this piece are 3¼" in width. Because the through-mortise joinery on the doors exceeds the maximum cut, it's best to install your dado stack and sharpen your shoulder plane or bullnose plane.

Set a dado stack to its widest cut, raise the blade to just less than ⅝", position your fence to create a 3¼"-long tenon, then make the passes needed to clean away the waste.

The door's flat panels fit into a ¾" deep x ¼" wide groove in the rails and stiles. Plow the grooves through the entire length of the stiles. (Doing so requires haunched tenons to fill in the small lengths of groove beyond the edge of the mortise. The haunches are formed with the dado stack as well.)

Fit each joint so the tenon fit is snug, but doesn't require a mallet to assemble.

Dry-assemble the frames, then measure the openings for the panels. Measure across the opening, then add ⅝" (this builds in ⅛" of space for panel movement). Mill the four panels to size. Finish-sand the panels and knock off the sharp inside edges around the panel area before assembling the doors.

When ready, add a thin layer of glue to the tenons and in the mortises, then slip the joints together. Add clamps (keep clear of the through-tenons) and let the glue dry.

Chances are you'll have small top-to-bottom gaps in the tenon fit. If so, cut thin wedges milled to the same width as your mortise to fill them. This cleans up the look. Fit and hang your doors.

### A DRAWER BUILD – D'OH!

I can't count the number of antique drawers I've studied, or the number of drawers I've built. I don't think I have ever seen drawers built as they are on the original

White Water cupboard. The drawers use typical 18th-century construction methods, but the drawer backs are different—the backs are square at the top and bottom and are held a ¼" below the top edge of the drawer sides. At first glance, this looks odd, but there is a nice benefit to it.

The cupboard drawers are flush fitting with minimal gaps between the drawer fronts and the case. If you build with tight

*7. You could complete the face frame stile detail before the frame is attached to the box, but there's added stability afterward. Here, a plywood pattern ensures a perfect match.*

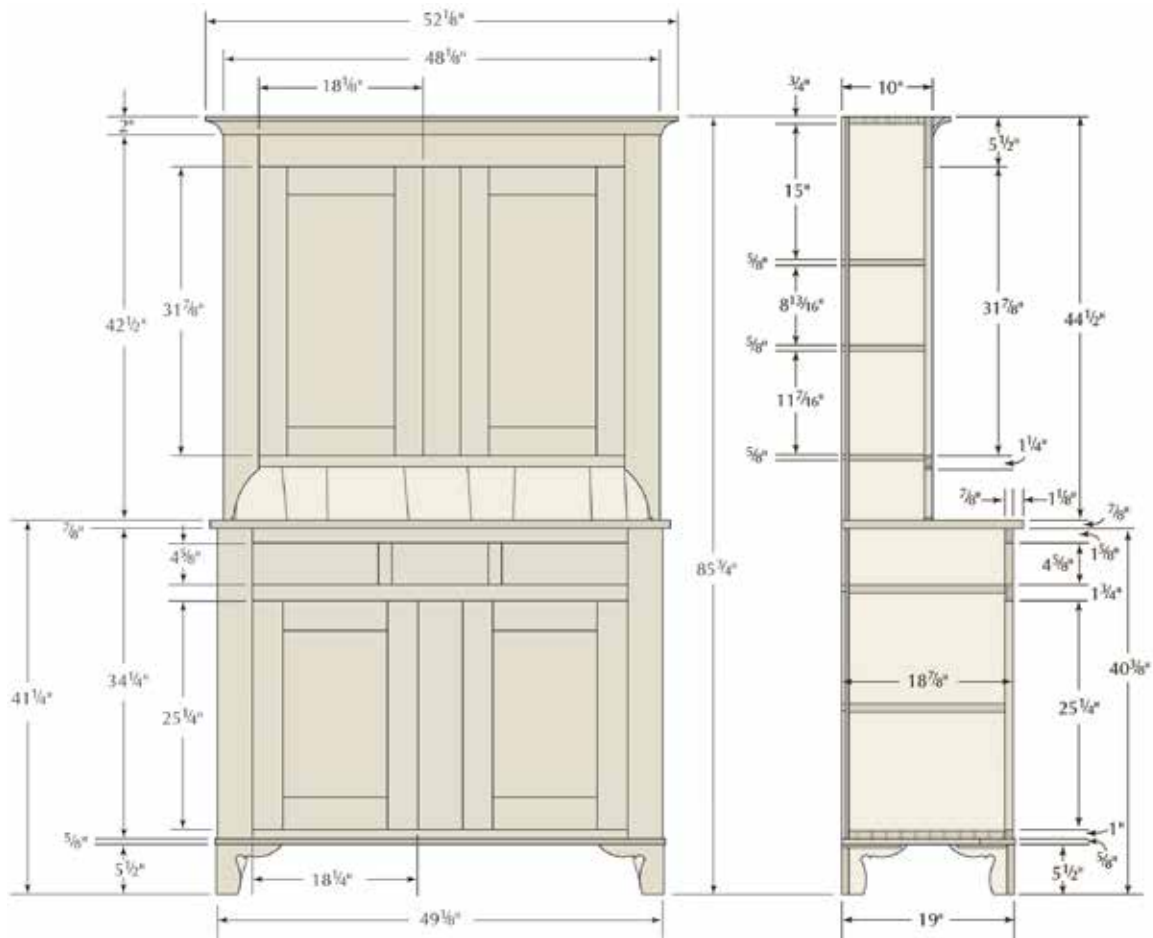
*8. The door mortises are best accomplished by working down from both edges of the stiles. And be sure to keep the slot centered for the best results.*

*9. Because this dado cut is not a through cut, it's OK to use your fence as a stop when using the miter gauge, too.*

*10. I usually grab my Shinto rasp to fine-tune my tenon fit, but with the amount of work left to do, I found a bullnose plane did the work that much more quickly.*

*11. With #120-grit sandpaper, knock off the sharp edges around the panel area. This area is difficult to sand after the panels are in place, and the softened edges help age the cupboard's appearance.*





ELEVATION VIEW

SIDE VIEW

reveals, and the wood expands, you have stuck drawers. Drawer sides, stepped down from the fronts, allow the drawers to function, but this says “less-than-perfect craftsmanship” to me.

If you step down the drawer back in relation to the sides, you can fit the drawer front tight to the opening and slightly taper the top edge of the sides from front to back, all without any interference from the drawer back. I like it.

Build and fit your drawers. To keep the drawers traveling straight, you need drawer guides. To locate the guides, hold the drawer in position and mark along its edge.

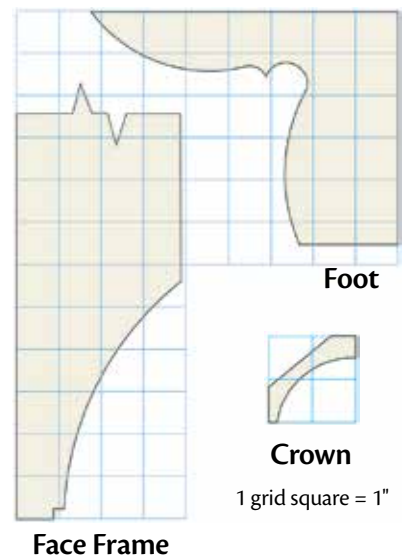
Installation of the guides is easy. Spread glue on the first 5" of the guides (cross-grain construction precludes fully gluing the guides), place the pieces tight to the back face of the face frame, then tack each in position with brads. Also, add a couple brads near the back of the guide to keep it tight to the dust panel until the glue dries.

(Don't use screws; unlike nails, they won't move with the seasons.)

Restriction of side-to-side movement is another interesting detail found on the original cupboard. The furniture maker added small keepers cut from pieces of 1/2" thick stock to both sides of each guide. Create a small bevel on the end of your board, crosscut the length to 3/4", then rip pieces to width. (These are small pieces. Use a zero-clearance insert and a push stick, or cut them with a handsaw.) I couldn't tell how the pieces were attached. I used glue and tacked the pieces with a 23-gauge pin.

### SWEPT OFF ITS FEET

The feet on the original are a mystery. There is no known photo showing any feet. The three-sided frame that today sits on the floor has no noticeable remnants of feet—no glue blocks or nail holes. In fact, nothing shows that feet were ever on this



PATTERNS



## Shaker Cupboard

NO.	ITEM	DIMENSIONS (INCHES)			COMMENTS
		T	W	L	
2	Sides	$\frac{7}{8}$	18	$34\frac{1}{4}$	
1	Bottom	$\frac{7}{8}$	$17\frac{1}{4}$	$48\frac{3}{8}$	Dovetailed to sides
2	Shelves	$\frac{7}{8}$	$17\frac{1}{4}$	$48\frac{3}{4}$	Sliding dovetail ends
1	Top	$\frac{7}{8}$	20	$50\frac{3}{4}$	
1	Base frame front	$\frac{5}{8}$	$3\frac{3}{8}$	$49\frac{5}{8}$	Miter both ends
2	Base frame ends	$\frac{5}{8}$	$3\frac{3}{8}$	$19\frac{1}{8}$	Miter one end
6	Drawer guides	$\frac{5}{8}$	$1\frac{1}{2}$	17	
1	Back	$\frac{1}{2}$	$48\frac{3}{8}$	$34\frac{1}{4}$	Tongue-and-groove
6	Profiled feet	$\frac{3}{4}$	$5\frac{1}{2}$	$7\frac{1}{4}$	
2	Rear feet*	$\frac{3}{4}$	5	5	

### BASE FACE FRAME

2	Stiles	$\frac{7}{8}$	$3\frac{3}{8}$	$34\frac{1}{4}$	
1	Top rail	$\frac{7}{8}$	$1\frac{5}{8}$	$43\frac{7}{8}$	$1\frac{1}{4}$ " TBE**
1	Middle rail	$\frac{7}{8}$	$1\frac{3}{4}$	$43\frac{7}{8}$	$1\frac{1}{4}$ " TBE
1	Bottom rail	$\frac{7}{8}$	1	$43\frac{7}{8}$	$1\frac{1}{4}$ " TBE
1	Vertical divider	$\frac{7}{8}$	$4\frac{7}{8}$	$27\frac{3}{8}$	1" TBE
2	Drawer dividers	$\frac{7}{8}$	$1\frac{1}{2}$	$7\frac{1}{8}$	$1\frac{1}{4}$ " TBE

### BASE DOOR PARTS

4	Stiles	$\frac{7}{8}$	$3\frac{1}{4}$	$25\frac{1}{4}$	
2	Top rails	$\frac{7}{8}$	$3\frac{1}{4}$	$18\frac{1}{4}$	Through-tenons
2	Bottom rails	$\frac{7}{8}$	$3\frac{1}{2}$	$18\frac{1}{4}$	Through-tenons
2	Panels	$\frac{1}{4}$	$12\frac{3}{8}$	$19\frac{1}{8}$	

### BASE DRAWER BOXES

2	Outside fronts	$\frac{7}{8}$	$13\frac{3}{4}$	17	
1	Center front	$\frac{7}{8}$	$10\frac{5}{8}$	17	

### TOP

2	Sides	$\frac{7}{8}$	$9\frac{1}{8}$	$44\frac{1}{2}$	
1	Top	$\frac{7}{8}$	$8\frac{3}{8}$	$47\frac{7}{8}$	Dovetailed to sides
3	Shelves	$\frac{7}{8}$	$8\frac{3}{8}$	$47\frac{7}{8}$	Sliding dovetail ends
1	Back	$\frac{1}{2}$	$47\frac{7}{8}$	$44\frac{1}{2}$	Tongue-and-groove
1	Crown front	$\frac{3}{4}$	3	55	
1	Crown end	$\frac{3}{4}$	3	24	

### TOP FACE FRAME

2	Stiles	$\frac{7}{8}$	$3\frac{3}{8}$	$44\frac{1}{2}$	
1	Top rail	$\frac{7}{8}$	$5\frac{1}{2}$	$42\frac{7}{8}$	$1\frac{1}{4}$ " TBE
1	Bottom rail	$\frac{7}{8}$	$1\frac{3}{4}$	$42\frac{7}{8}$	$1\frac{1}{4}$ " TBE
1	Vertical divider	$\frac{7}{8}$	$4\frac{1}{8}$	$33\frac{7}{8}$	1" TBE

### TOP DOOR PARTS

4	Stiles	$\frac{7}{8}$	$3\frac{1}{4}$	$31\frac{7}{8}$	
4	Rails	$\frac{7}{8}$	$3\frac{1}{4}$	$18\frac{1}{8}$	Through-tenons
2	Panels	$\frac{1}{4}$	$12\frac{1}{4}$	26	

\*All pieces are poplar with the exception of the back rear feet which are oak.

\*\*TBE = tenon both ends

**12.** Achieving a tight top-to-bottom fit of your tenons takes time and wastes time. The holding power of the joint is the flat-grain connection — and that's not found on the edge shoulders. A small wedge can tighten up the appearance.

**13.** Drawer construction for the cupboard is in typical 18th-century fashion, but the drawer backs are below the sides by a  $\frac{1}{4}$ ". Is this a boon or bust?

**14.** Small profiled pieces of wood hold the drawer guides from side-to-side movement while glue at the guide fronts and a few brads keep things tight to the dust board.

**15.** If you flip the position of your miter gauge in the slot, you can guide one half of the foot pairing for its  $45^\circ$ -bevel cut. It's similar to using a panel-cutting sled.

**16.** Make two passes with your blade set at  $45^\circ$  to form the slots for the splines. Add a fence extension and use a push stick to guide your foot through the blade.



17



19



18

**17.** One of the easiest ways to join feet to furniture is with a plate added to the top edge of your foot pairs. Screw the plates down then add a single block at the miter for extra support.

**18.** The treatment of the backboards on the Shaker cupboard is unusual. The thin boards have tongue-and-groove joinery and the end boards are beveled into dados in the case sides. To be true to the original, not one of the top section's backboards is rectangular.

**19.** It's best to attach the top after dye and shellac, but just before adding the paint to the cupboard.

stepback. But the piece doesn't look right without something to stand on.

If you're a purist, skip the feet. If you look at the cupboard and think there's something missing, make the feet. Undecided? Make the feet separate and attach them with screws. If you change your mind, remove the feet.

Trace the foot pattern onto your stock, cut the profiles and sand the edges with a spindle sander. Arrange the feet into pairs. At the table saw, cut a 45° miter onto two sets of the pairs. Your miter gauge, with a short wooden fence attached, is the tool to use. Place the top of the foot (the long side) against the fence, then push the foot through the blade to bevel one half of your pair. To cut the opposing foot, reverse your miter gauge in the slot. Again, keep the top edge of the foot tight to the auxiliary fence, then push the piece through the blade while using a push stick to hold the stock tight to the tabletop and fence as shown below.

A 45° cut into a 45° angle forms a per-

fect slot for a spline to hold the pairs as one. Leave your table saw blade set at 45°, add an extension to your saw's fence and slide the fence into position. Make a cut into the bevel of each foot. Reposition the fence to make a second pass to increase the slot width to match a piece of 1/4" plywood. Plywood is a great choice for splines because of its strength and stability.

Slip the front feet and splines together with glue. While the glue dries, dovetail the other profiled feet to the rear feet. Place the pins in the shaped feet with the tails in the rear feet.

Each foot unit receives a plate that's set in a 3/8" deep rabbet at the top edge. Make that cut at a router table using a rabbet bit. The operation leaves a rounded corner. Square the corners or round the plates to fit. Afterward, glue and nail the plates to the feet.

The base frame's top edge is profiled with a 3/8" roundover bit set to a 1/4" depth of cut. The corners are mitered. I recommend a mitered half-lap. When complete, nail the frame to the case. The feet are

then attached to the frame using screws through the top plates.

## TOPS, MOULDINGS & BACKS

The lower section top is a simple plank of 3/4"-thick stock. Cut a stop-rabbet on the under-side of the back edge where the backboards attach. Align the top's rabbet with the grooves in both case sides.

The crown moulding is designed from examples found on other Ohio Shaker pieces. The moulding is made using a table saw. Cut the cove while pushing the stock at an angle over the blade. (Raise the blade incrementally with each pass and make multiple passes.) The remaining cuts are made with the blade angled at 45° and the fence maneuvered to appropriate positions.

Miter the moulding at the corners and fit it in position. Use brads to attach the pieces and make sure to add glue to the short grain of the miters for a better hold.

The backboards on the original cupboard are unusual. Not only is the thickness 1/2" (rather than the usual 3/4"), the pieces are tongue-and-grooved together. The joint is thin and fragile until installed.

Additionally, the upper section's back is comprised of non-rectangular pieces. It is an interesting assembly, but one that is difficult to copy without increasing the workload.

## AN UPDATED FINISH

The finish schedule for the cupboard is involved, but easy to replicate. Sand the piece to #180-grit. Dye the piece with a water-based cherry aniline dye. A couple coats of 1 1/2-pound shellac, sanded between coats with #400-grit sandpaper, allow the top coat of acrylic latex paint to be manipulated. Apply the paint, then rub through the paint at appropriate areas to simulate age. My mantra for aging paint is "less is best." Overdoing it is easy.

It's obvious that we've pulled our Shaker Cupboard back to an earlier day in its history. But the big question is: Did the detective work pay dividends? The feet are of a Shaker design and accurately scaled for this size cupboard. The moulding is in balance with the new base and the overall design is proportionally pleasing. Job done. There's no way you could walk past this cupboard without giving it a look-see. **PW**

# Drawer Slips

An historical detail adds refinement to projects both period and modern.

BY GEREEMY COY



**The 18th century**—a time when human hands were set to work in order to create the objects of material culture; when men and women by their sweat and ingenuity wrought wares in the latest fashions; when the cabinetmaker, toiling away in dusty corners of the world, rode at the vanguard of improvement and progress.

Over the course of that century, anonymous workers of wood trained their planes and chisels on many problems, perhaps none so unassumingly complex as that of making drawers. Their search for elegant and durable methods of affixing bottoms, in particular, led them to one of the final developments in the art of crafting fine drawers by hand: slips.

Drawer slips—slender pieces of wood glued to the sides of a drawer and grooved to accept the bottom—have remained largely mysterious, especially to those of us on American shores. But the time has come for the light of history to shine once again on these milestones of human thought and hallmarks of careful craftsmanship.

## IN THE BEGINNING

The earliest drawer bottoms were little more than boards nailed to the underside of boxes. This arrangement was perfectly satisfactory, as drawers did not ride upon their bottoms. Instead, grooves plowed into their thick sides engaged with guides attached to the surrounding case.

As time passed, new types of lumber were made available, novel forms of furniture emerged, and fashion began to dictate slimmer drawer components.

English cabinetmakers abandoned the exterior groove, instead designing cases in which drawers rode directly on their bottoms. But the bottoms wore and nails loosened, compromising the integrity of both drawer and case. Something needed to be done.

In particular, the drawer bottom needed to be raised. The most straightforward solution was to affix slender pieces of wood underneath the bottom and sides. These runners, sometimes referred to as “slips” (though of a different sort than the subject of this article), were usually applied with glue

and could be easily replaced. The whole arrangement appeared awkward, however, and was sufficiently unsound that further experiments were warranted.

A breakthrough came in the 1720s. Rabbits were cut into the lower, interior edges of the sides and front, allowing both the drawer bottom and runner to be tucked neatly within the confines of the drawer. It was a remarkable achievement in construction. The bottom and runners were stabilized within the rabbets, the runners were still easily replaceable, and, with a nod to appearance, the entire assembly was now hidden from view.

One weakness remained, however: the bottom was fixed in place, unable to shrink and swell with the seasons. Though rabbets-and-runners remained the dominant form of attaching drawer bottoms through decades worth of cyclical expansion and contraction, the inevitable splitting of bottom boards called for more ingenious ways forward.

## SLIPS ONTO THE SCENE

References to slips began to appear in print by 1788, when the first edition of the “Cabinet-makers London Book of Prices” included a succinct entry for “slipping drawers.” Later editions of the same work (1793 and 1803) offered more detail in proposing prices for “slipping drawer sides and plowing in bottoms.”

A definitive description of drawer slips was not published until 1803, when the following appeared in Thomas Sheraton’s “The Cabinet Dictionary:”

“Slips are sometimes glued on the inside of drawers, and plained [sic] to receive the bottom, which is the best method for preventing drawer bottoms from splitting, as is too often the case when they are confined by a rabbet, and the slip is glued down at the under side.”

Ten years later, Thomas Martin cribbed Sheraton’s definition for his “Circle of the Mechanical Arts,” an appropriation repeated by Peter Nicholson in his “Practical Carpentry, Joinery, and Cabinet-making” of 1826. Nicholson, at least, elaborated on the reasoning behind the use of slips:

“Drawers made of unseasoned wood, break at the joints: to prevent this, slips are sometimes glued on the inside of drawer-sides or ends, and these are



1. Grooves to accept a drawer bottom are plowed into the edge of a wide board, which will then be cut into narrow slips.
2. After its groove is plowed and top edge shaped, each slip is marked for width and sawed free.
3. The back of each slip is planed to remove saw marks and to square up its gluing surface.
4. Small tenons are formed on the front ends of a round slip (left) and a flush slip (right).
5. The round slip's small tenon fits into a groove in the drawer front, making alignment during glue up a cinch.

grooved to receive the bottom, and the upper edge rounded; this is esteemed the best method for preventing drawer-bottoms from splitting..."

It is notable that these early chroniclers mention only that slips were employed to avoid split bottoms. This may have been the real problem that spurred period makers to action. Sensing that drawer bottoms would be able to more freely expand and contract in a groove than in a rabbet, they discovered a clever way to retain the best features of earlier systems—an elevated bottom and wide bearing surfaces—while leaving the bottom free to move, even in the thinnest of drawer sides.

This discovery almost assuredly took place in England, where a preference for slipped drawers in bespoke work persists to this day. The English taste for thin drawers never made its way across the Atlantic, where thick sides in softer woods have long been more common. Because slips were likely developed at a time when England's influence in this country was waning, using rabbets-and-runners and plowing grooves directly into thick sides remained the standard methods of attaching bottoms for American cabinetmakers.

## MAKE YOUR OWN

In examining how slips are made, it's natural to begin with the rounded version, generally regarded as the earliest form.

First, prepare the front, back and sides of a drawer in the usual manner. Lay out the dovetails in front, keeping in mind that despite using slips along the sides, the drawer front must still receive a  $\frac{1}{4}$ " x  $\frac{1}{4}$ " groove to support the bottom. Therefore, plan to cover the groove with a full or half tail.

With the drawer box assembled, prepare a board from which to cut the slips. It should be longer than the drawer sides and wide enough to produce several slips (which also makes it easy to hold in a vise). Its thickness should be equal to the height of the slips, plus an extra  $\frac{1}{64}$ " or so for trimming. In practice, the position of the groove in the drawer front determines the finished height of the slips, because each slip must bear a corresponding groove in its inner face. Also, enough wood must re-

main to support the bottom;  $\frac{3}{16}$ " above and below the groove is a good compromise between strength and appearance.

Secure the board, square the upper edge and plow a  $\frac{3}{16}$ "-deep groove a hair more than  $\frac{3}{16}$ " from the reference face. This slight addition will allow the slip to project from the drawer side so that it may be planed perfectly flush after gluing.

Plane the upper, interior edge of the future slip into a series of long facets, blending them with light passes to arrive at a final rounded shape. Referencing from the grooved edge, scribe the width

of the slip on both faces of the board. Saw just outside the line, and plane the resulting slip down to its finished width.

Prepare the slip to meet the drawer front and back. First, cut a small tenon at the front end. Mark a shoulder line  $\frac{1}{4}$ " from the end, and saw away the material above and below the groove. The resulting tenon is a positive version of the groove's negative space and should register neatly with the drawer front. Next, form a notch at the top rear of the slip. Its depth is equal to the amount of material above the groove, which allows the top of the groove and the bottom of the drawer back to align.

Butt the shoulder of the slip's tenon against the back of the drawer front and scribe where the rear of the slip meets the inside and outside of the drawer back. Transfer the latter mark around the entire slip, and cut and plane it to length. Use the inside mark to square across the top of the slip, then transfer it down both vertical faces to the top of the groove. Saw and pare away the waste above the groove.

All that remains is to glue the slips in place, clamping to ensure solid contact along their entire length.

flush with the top surface of the slips—a look that appeals to more modern sensibilities. In order to achieve this, the sides of the drawer bottom must be rabbeted along their top edges, and the lower, front edge of the bottom rabbeted to fit a groove plowed higher up the drawer front.

After plowing a  $\frac{3}{16}$ "-wide x  $\frac{1}{4}$ "-deep groove in each slip, cut a tenon on one end. This time, square across the bottom face of the slip  $\frac{1}{4}$ " from the front end, and transfer the mark up the vertical faces to the top of the groove. Saw out this lower portion, then repeat for the other slip.

Because flush slips simply butt against the underside of the drawer back, they don't require a notch at rear.

Seat the tenons into the groove in the drawer front, mark and cut the slips to length, and glue them to the drawer sides.

Now make the rabbeted drawer bottom. First, cut a rabbet into the top of one side. The rabbet's depth should be the distance from the top of the slip to the top of the slip's groove and its width identical to the depth of the grooves. Next, cut a rabbet into the lower front edge of the drawer bottom. Its width is again equal to the depth of the grooves, but this time its depth should be the

**6.** Round slips are notched to pass under the drawer back and align their grooves with the back's bottom edge.

**7.** Affixing a slip to protrude slightly below the drawer side allows you to plane it perfectly flush after gluing.

**8.** The groove in the drawer front accepts a flush slip's tenon and eventually, the rabbeted front edge of the drawer bottom. The bottom's rabbeted sides slide into grooves in the slip.

**9.** With the slip firmly seated against the drawer front, mark its finished length directly from the back of the drawer.

**10.** Flush slips require a specially shaped bottom; it is first rabbeted along the top of one side, flipped over, then rabbeted again along the front edge.

## MODERN STYLING

Flush slips are so named because the top surface of the drawer bottom sits





**11.** To ensure a clean fit, the shoulder of the first side rabbet is pressed against a slip while the second rabbet's shoulder is scribed directly from the other slip.

**12.** Flush slips support a drawer bottom along its sides, while a groove in the drawer front receives the bottom's rabbeted front edge.

**13.** A view of the back of a drawer reveals the profile of a flush slip and a rabbeted bottom.

**14.** To simplify the fitting of the mitered slips, glue the front slip in place before mitering and notching the side ones.

**15.** A small scrap of wood planed to perfectly fit the grooves of mitered slips guarantees that they'll be aligned after glue up.

**16.** A drawer front, drawer side and two mitered slips combine to form a seemingly complex joint.

distance from the bottom of the slips' grooves to the bottom of the groove in the drawer front.

Set the drawer box on top of the partially rabbeted bottom, pressing the shoulder of the side rabbet against its corresponding slip. Scribe a line where the bottom meets the other slip; this establishes the

edge of the second side's rabbet. Cut the rabbet into the top edge of the second side to the appropriate depth.

The bottom should now slide in from the rear, its top surface butting against the bottom edge of the drawer back, its sides engaging with the grooved slips and its leading edge ultimately entering the groove in the drawer front.

## ANOTHER ANGLE

Mitered slips are perhaps the easiest version to make. Because they do not require a groove in the drawer front, they involve much less initial planning and make laying out symmetrical dovetails a straightforward affair.

Start by preparing a grooved slip for the front of the drawer. Miter both ends to fit snugly between the drawer sides, profile the top edge to your liking, and glue the slip in place. Next, miter one end of each side slip, press it against the corresponding miter at the front, and mark for length and notching. As in their rounded brethren, the top of the groove in mitered slips should align

with the bottom of the drawer back. Cut the notches accordingly, profile the top edges to match the front slip, and glue the side slips to the drawer.

## WORTH THE EFFORT

Slips do require a bit of extra effort, but as symbols of attentive and thoughtful work, they imbue meaning even to parts normally hidden from view. They evoke, too, the spirit of cabinet-makers past who, through decades of experimentation, wrestled with the intangible forces of weight and wear and the seasonal expansion of wood to produce a tradition of small boxes capable of great endurance and subtle beauty.

Given the vast scale of industry and manufacture governing our era, it is now rare for those devoted to the intimacy of craft to effect such widely influential change. But for those of us engaged in making fine things out of wood, quiet moments of pride at having done the simple things well and beautifully—slipping drawer bottoms, for instance—often prove satisfaction enough. **PW**

# Roy Underhill's Nail Cabinet

It's a crate. It's a cabinet.  
It's useful shop furniture.

BY CHRISTOPHER SCHWARZ



*Roy Underhill's nail cabinet is a converted crate. The cabinet has seen a lot of use and has held up pretty well.*



**One of the enduring features** of Roy Underhill's "The Woodwright's Shop" PBS television show is the familiar and rambling back-drop of former projects, parts, tools and wood that frames most episodes. My favorite item in his shop is his nail cabinet—a pine wall-hung cabinet tucked in the far back corner.

On the inside of the door of the cabinet, Roy has hung a print of a lovely lady holding a bock beer alongside an admiring goat. And while that's some nice lens candy for the television cameras, I'm more attracted to the 21 drawers on the right side of the cabinet. These drawers are more useful to the married woodworker.

Nail cabinets show up frequently in traditional workshops of many trades, and they are illustrated and discussed in books about traditional shops. These cabinets stored the screws, nails and bolts that a workshop might need. And because these fasteners were valuable, many of the cabinets would have a lock.

The last time I visited Roy, I asked permission to measure and reproduce his nail cabinet, which he purchased during a yard

sale in Washington, D.C. As I measured the piece, I was bemused by its unusual construction—it was a finger-jointed carcass covered in nailed-on battens.

Then Roy showed me the reason for the odd construction: The cabinet was built from an old crate for Ohio Blue Tip Matches made by the Ohio Match Co. of Wadsworth, Ohio (1895-1987). For me, this made the project even more fun: I had to first build a crate and then turn it into a wall cabinet.

As a result, some of the construction techniques might seem a bit odd. If you don't like them, feel free to change them. My goal was to make a respectable reproduction of this charming cabinet because I've always liked the one on Roy's show.

## CONSTRUCTION OVERVIEW

The original is made entirely of pine—probably Eastern white pine—though any dry softwood will do. The carcass of the original crate is joined at the corners with finger joints (though I opted for dovetails on my version). The back of the carcass is nailed-on  $\frac{3}{8}$ "-thick boards that

are shiplapped.

The assembled carcass is covered with narrow 1x battens to make the "crate" easy to grab and lift. These battens conceal the joinery on the corners of the carcass.

Once you have your "crate" built, you can turn it into a cabinet. The interior is divided into 21 spaces using thin pieces of pine that are joined with an egg-crate joint. The drawers are simply glued and nailed together; the only thing difficult about the drawers is that you have to build 21 of them.

Finally, the entire cabinet is fronted by a door with mitered corners. The panel of the original door was simply nailed to the inside of the mitered door frame. The panel had cracked over time, so I chose to make my panel float in grooves plowed into the rails and stiles.

The whole thing is finished with shellac and hung on the wall with a French cleat.

## THE WALLS OF THE CRATE

As mentioned above, the walls of the original crate were joined at the corners by narrow finger joints (you can see the joints



1



2



3



4

1. Whenever possible, I gang-cut my tail boards, which saves time and (in my opinion) makes it easier to keep the saw 90° to the face of the board. A shallow rabbet on each tail board makes it easy to keep things square during transfer.

2. Take extra pains to get the carcass square at glue-up. It will save you frustration later when you fit the door and the 21 drawers.

3. The shiplapped joints on the long edges of the backboards hide any gap that would open up when the boards shrink in the dry season.

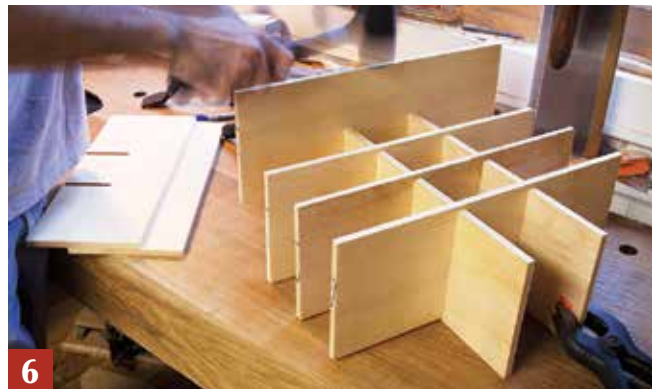
4. Nails will bend, allowing the back to expand and contract without splitting the backboards. Be sure to use nails with a pronounced head to hold the backboards in place.

5. Lay out the slots on one board, clamp all the dividers together and make the cut in one go. Here on the table saw, I'm using the saw's miter gauge and a high fence to push the dividers through the blade.

6. You should have to knock the joints together with a mallet. Then pin all the intersections with 1"-long headless brads. You'll have to nail them in diagonally to secure them.



5



6

from the inside where they have separated a bit). I don't have the jigs or desire to make narrow finger joints here, and cutting this machine joint by hand is just silly.

So I joined the case sides, top and bottom using through-dovetails. The joinery is all covered by battens in the end, so the end result looks the same as the original. For strength, I put the tails on the case sides; the pins are on the top and bottom bits.

Glue up the carcass, paying close attention to keeping the corners square at both the front and rear of the case. I use hide glue for joints like this because it's reversible.

If you can't get the case perfectly square at glue-up, you have one more chance to pull it square with the backboards. The backboards are  $\frac{3}{8}$ "-thick boards of pine that are shiplapped on their long edges and nailed to the back of the case.

I used 3d cut fine finish standard nails to affix the back, though 4d will do.

If your case is out of square, pull the case square with a clamp diagonally across two corners, then nail the backboards in place. This usually helps if the case isn't too racked.

## THE INTERIOR DIVIDERS

The interior drawer dividers of the origi-

nal nail cabinet were obviously built up using miscellaneous scraps that were nailed and glued on to get the job done. Some parts were rough-sawn; some were different species.

Instead of replicating every odd scrap in the cabinet, I simplified the construction while still maintaining its look and function. On the original, the horizontal and vertical dividers are joined with eggcrate joints, and so I used that same joint for my dividers.

The dividers are all  $\frac{3}{8}$ " thick and 6" wide. Every divider has  $\frac{3}{8}$ "-wide slots cut into it. The slots on the horizontal dividers are 2 $\frac{1}{2}$ " long. The slots on the vertical

dividers are 3" long. When the dividers are knocked together, they will be offset by  $\frac{1}{8}$ " at the front, just like the original.

Lay out the locations of all the slots using the drawings as a guide. I used dividers to step off the drawer sizes, and I used an actual piece of the drawer divider to lay out the width of the slots. Note that the three bottom drawers are taller than the others.

I cut the slots on a table saw, though they are easy to cut by hand or on a band saw. After cutting the slots, knock the dividers together and pin the joints by toenailing them with headless brads.

With the dividers together, knock the assembly into the carcass. The front edge of the horizontal dividers should be located  $1\frac{1}{2}$ " from the front edge of the carcass. That spacing allows room for the bin pulls and knobs on the drawers.

The next step is to nail the horizontal dividers to the carcass. This is done easily with a simple jig that makes it (almost) impossible to miss with your nails. (See the photo above for details on the jig.)

Use 4d headless brads to secure the horizontal dividers to the carcass. There's no need to nail the vertical dividers to the carcass; gravity and friction are sufficient.

## MAKING IT A CRATE

The fun part of this project is taking this nice carcass and turning it into a packing crate. You do this by nailing on 1x battens so they look a bit like rails and stiles. There is no other joinery between the battens—just glue and nails.

Cut the battens to the sizes shown in the cutlist. The easy way to install these is to first attach them to the carcass sides, trim the pieces flush to the top and bottom of the case then finish up the work on the top and bottom.

The important thing to remember is that the battens should extend out  $\frac{1}{2}$ " (or a tad more) from the front lip of the carcass. This  $\frac{1}{2}$ " lip creates the opening for the door. Before you attach the battens, make sure their position works with the hinges you have purchased for

the door. If the hinge leaf is wider than  $\frac{1}{2}$ " you have to shift the battens forward a little on the case so the hinge can open and close.

All the battens are attached with brads and glue.

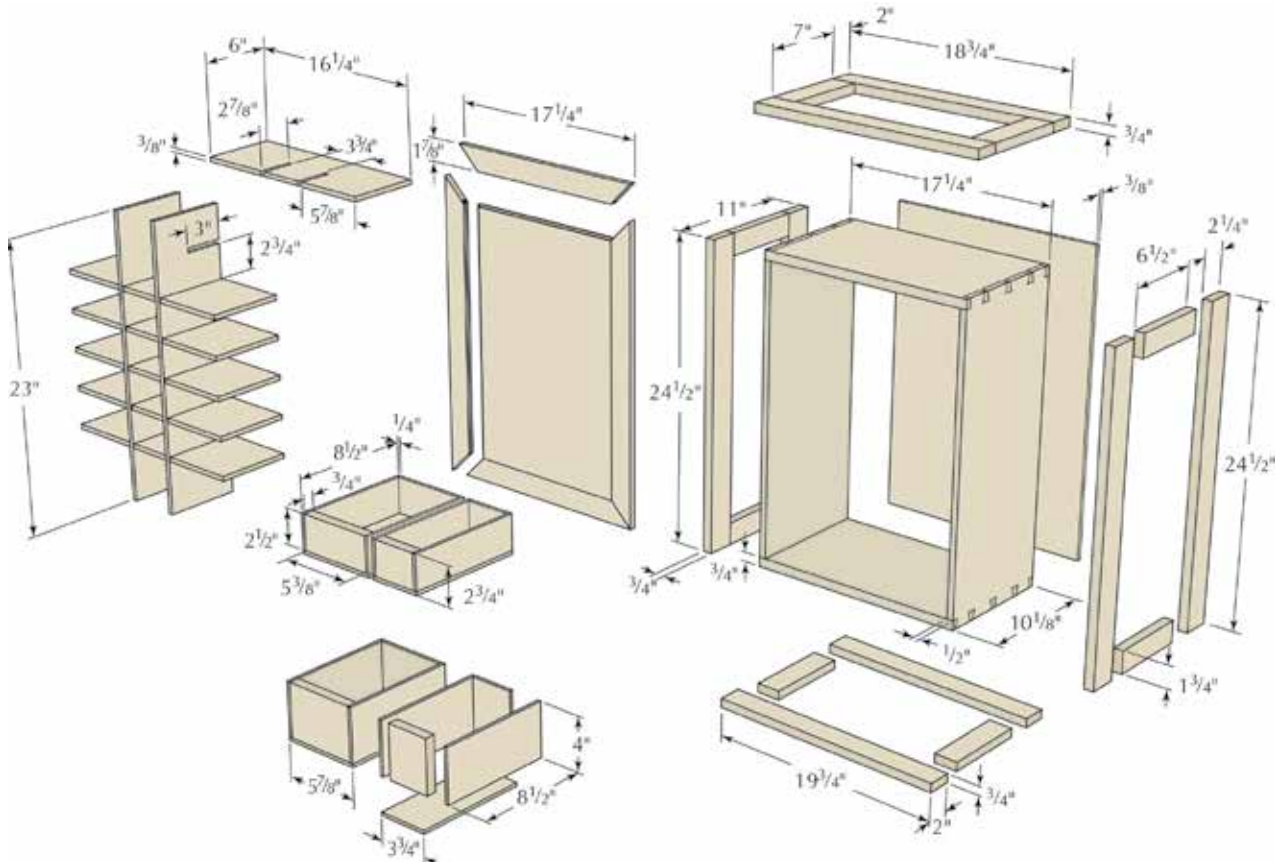
## MITERED DOOR

With all the battens attached, you can determine the final sizes of your rails and stiles for the frame-and-panel door. The corners of this light-duty door are joined by miters that are glued and nailed, just like the original.

When I cut miters, I saw them first then trim them to a perfect length and a perfect 45° with a miter shooting board and a handplane.

Even if you love your chop saw, I encourage you to give this a try some-time. I've found no easier way to cut perfect miters. By shooting the miters with a handplane you can control the length of your rails and stiles in .001" increments. And you can hit dead-on 45° with ease.

Once the miters are cut, plow a  $\frac{3}{16}$ "-



## EXPLODED VIEW



## Nail Cabinet

NO.	ITEM	DIMENSIONS (INCHES)		
		T	W	L
2	Sides	$\frac{1}{2}$	$10\frac{1}{8}$	$24\frac{1}{2}$
2	Top/bottom	$\frac{3}{4}$	$10\frac{1}{8}$	$17\frac{1}{4}$
1	Back	$\frac{3}{8}$	$17\frac{1}{4}$	$24\frac{1}{2}$
2	Door rails	$\frac{1}{2}$	$1\frac{7}{8}$	$17\frac{1}{4}$
2	Door stiles	$\frac{1}{2}$	$1\frac{7}{8}$	$24\frac{1}{2}$
1	Door panel	$\frac{3}{8}$	$13\frac{3}{4}$	$21\frac{1}{8}$
<b>TOP FRAME</b>				
2	Stiles	$\frac{3}{4}$	2	$18\frac{3}{4}$
2	Rails	$\frac{3}{4}$	2	7
<b>SIDE FRAMES</b>				
4	Stiles	$\frac{3}{4}$	$2\frac{1}{4}$	$24\frac{1}{2}$
4	Rails	$\frac{3}{4}$	$1\frac{3}{4}$	$6\frac{1}{2}$
<b>BASE DRAWER BOXES</b>				
1	Front stile	$\frac{3}{4}$	2	$19\frac{3}{4}$
1	Rear stile	$\frac{3}{4}$	2	$18\frac{3}{4}$
2	Rails	$\frac{3}{4}$	2	7
<b>INTERIOR</b>				
2	Vertical dividers	$\frac{3}{8}$	6	23
6	Horizontal dividers	$\frac{3}{8}$	6	$16\frac{1}{4}$
12	Wide drawer fronts	$\frac{3}{4}$	$2\frac{1}{2}$	$5\frac{3}{8}$
6	Narrow drawer fronts	$\frac{3}{4}$	$2\frac{1}{2}$	$3\frac{1}{4}$
2	Wide lower drawer fronts	$\frac{3}{4}$	4	$5\frac{3}{8}$
1	Narrow lower drawer front	$\frac{3}{4}$	4	$3\frac{1}{4}$



**7.** This scrap-wood jig helps you locate exactly where the horizontal dividers are located. It is made using two thin pieces of scrap that are nailed to a scrap of  $\frac{1}{2}$ "-thick pine. Slip the jig onto the carcass and press one of the thin slips against the dividers inside the case. Trace its location on the exterior. Repeat.

**8.** With the lines drawn on the carcass sides, drive in the cut headless brads and set them  $\frac{1}{16}$ " below the surface.

**9.** The battens form the rails and stiles that frame the exterior walls of the crate. As on the original, they are simply nailed and glued to the carcass — there's no joinery between the rails and stiles. So this is fast work.

**10.** The 45° setting on my iron miter box is off by about half a degree. But I don't mind. That's because I shoot my miters, which allows me to sneak up on the perfect length and angle.

wide x  $\frac{3}{16}$ "-deep groove on the inside edge of the rails and stiles. The  $\frac{3}{8}$ "-thick panel fits into the groove thanks to a rabbet cut on all four edges of the panel. Be sure to size the panel so it has a little room for expansion and contraction in its width.

I don't own any fancy clamps for gluing mitered corners — most band clamps are fairly frustrating to use — so I glue up miters, corner by corner.

First I spread a little glue on the two mating surfaces of the miter and let them dry for a minute. Then I add more glue to the joint. I press the two pieces together

and drive a single nail through the stile and into the rail.

I repeat this process for each corner (don't forget to slide the panel into the frame before adding the last piece).

Then I clamp up the joints using four ordinary bar clamps. The nails prevent the miters from sliding as you apply pressure at the corners.

## 21 DRAWERS

Because this is a cabinet for nails, it's appropriate that the drawers are nailed together. All the drawers are constructed in a simple manner: The front and back

are captured by the sides. The bottom is then nailed on.

The drawers look a little odd — the end grain of the sides and bottom is visible on the drawer front. But they are acceptable for a piece of shop furniture — and the drawers in the original have survived many years of use.

Begin by fitting all the drawer parts for each opening. I try to do as much fitting as I can before assembly. This usually means the drawer will require little or no tweaking after assembly. First I fit each bottom to its opening. Then I fit the sides, front and bottom. Then I begin as-



11



12



13



14



15



16

**11.** A single nail through the stile and into the rail prevents things from sliding around as you clamp up this mitered joint. This was, by the way, how the original door was assembled.

**12.** Get each bottom board to slide in and out of its opening before sizing the other drawer parts. If the bottom binds, the assembled drawer will bind.

**13.** Dry-assemble the drawer to feel if the drawer front is too long.

**14.** Because the parts are all softwood, which doesn't move much once it's dry, you can get away with both gluing and nailing this cross-grain joint.

**15.** If the drawer front is too long, shoot it to perfect length with a plane on a shooting board. Count your strokes. Then reduce the length of the drawer back by the same number of strokes, provided your original lengths were the same.

**16.** When I have to do something 14 times, you can bet I'm going to make a jig to ensure my mind doesn't wander and cause me to make a fatal error at this stage of the project. This simple jig locates the holes for the bin pulls in the correct place. For the taller drawers on the bottom, I set the jig  $\frac{3}{8}$ " lower on the drawer front.

sembling the drawer.

To do so, place the front and sides in position on the bottom. Feel if the drawer front needs to be reduced in length so the sides are flush to the bottom. If you need to trim the drawer front, trim the back by the same amount.

Glue and nail the sides to the front. Then glue and nail the back to the sides. Finally, glue and nail the bottom to the drawer. Fit each drawer to its opening, numbering the drawer and its opening as you go.

## HARDWARE & FINISH

As on the original, I used bin pulls for the larger drawers and knobs for the smaller drawers in the center. To ensure I got the bin pulls located correctly, I made a quick drilling jig that I clamped to each drawer front. The jig ensured I didn't make a layout error.

The knobs are located dead center in the fronts of the smaller drawers.

Were I to make changes to this cabinet, it would be with the hardware. While I like the bin pulls, it would be more helpful to have pulls like an old library card

catalog; the card could tell you what type of fastener is inside the drawer.

To solve the problem, Roy simply wrote what is in each drawer on the bin pull. I think he did it with pencil—it's almost impossible to see on camera.

Another thought: Add 2" of depth to the cabinet and you can hang hammers, screwdrivers and other accoutrements of fastening and unfastening on the inside of the door.

Install the hinges and knob on the door. I used a magnetic catch to hold the door shut. Because I'm the only person who works in my shop, there's no need for a lock.

I finished the nail cabinet with two coats of garnet shellac, sanding between the coats. The cabinet hangs on my shop wall with a French cleat made from  $\frac{1}{2}$ "-thick material.

And now comes the fun part: Emptying my tackle boxes of nails and screws and putting them into their new drawers, which are located conveniently above my workbench. Oh, and I guess I'll have to look for a picture of a lady and a goat. **PW**



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