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Eastern Shore Chest



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Eastern Shore Chest

Here's the perfect project for expanding your skill base with a router. This chest combines cope and stick joinery, sliding dovetails, panel raising and a few flutes just for fun. It's got the appearance and quality of an heirloom keepsake, so it's an excellent candidate for investing in premium lumber and taking your time to get things just right.



This lidded chest was a dream project for Bill Hylton, one of our regular contributors, for about six or seven years prior to his work on this story. For his inspiration, he modeled it after a similar chest he saw in the Museum of Early Southern Decorative Arts in Winston-Salem, North Carolina.

A few years later, he created the final design while writing a book about furniture construction (Illustrated Cabinetmaking, published by Reader's Digest Books; ISBN 0762-1018-30). It served as the basis for a drawing showing how a frame-and-panel chest should be made.

Bill got his overall dimensions from the museum. Using a photo, he worked out the dimensions and made educated guesses as to the joinery and construction of the base, the chest bottom and the back. Using a CAD program, the chest took its final form for this project.

Bill calls it the Eastern Shore Chest because the archetype was built (around 1760) in the part of Virginia that's on the eastern shore of the Chesapeake Bay. It's in no way a reproduction or a duplicate of the museum piece. For example, Bill used cope and stick joinery, unknown in the 1700s, to construct the frame-and-panel assemblies. He also used some eye-popping walnut rather than choosing a painted finish, like the original.



Planning and Shopping

This is an ideal project for contemporary, router-cut cope and stick joinery. So, you won't find the front, back and end assemblies constructed with mortise and tenon joints. If you happen to have Illustrated Cabinetmaking, you can compare the drawings on page 231 with the drawings published here. Bill changed the construction of the base frame, the style of the breadboard ends on the lid and the molding profiles.

The most obvious departure from the original chest is the wood and finish. What better way to highlight the panels than to use highly figured stock and a clear finish? Bill chose walnut, as it's a native species that might have

VENEERING BASICS



The author attached highly figured, shop-made, veneer to plain sawn walnut panels. Apply glue to the panel only. Note that the panel is sitting on a plywood caul protected by wax paper.



Put the veneer onto the glued panel and prepare to clamp it up between a sandwich of plywood cauls protected from the excess glue by layers of wax paper.



Use plenty of clamps to ensure that sufficient pressure is applied across the clamping cauls. Allow plenty of time for the glue to cure: at a minimum, overnight.

been used in the 1700s to make a chest like this.

Bill opted to use a less costly secondary wood—poplar—for parts of the chest that don't show. This was a common practice in the 1700s, and it still is today. The back assembly, chest floor,

back frame member and feet are all made of poplar.

For hardware, Bill used a pair of hand-forged fish-tail hinges from Dave Fisher of Fisher Forge (610-562-5425; www.fisherforge.com) and bought cut nails—3d and 4d fine finish nails—from Tremont Nail Company (800-842-0560; www.tremontnail.com).

Taking Care of Prep Work

Bill's first job was to redraw the plans, incorporating the changes he wanted to make. Then he prepared a cutting list and, from that, estimated the amount of stock he'd need. It's good practice to start a project by roughing out all the parts. This means laying out the parts on your stock, then crosscutting, jointing and planing the stock to rough dimensions. Mill your parts about 1" longer, 1/8" or 1/4" wider, and about 1/8" thicker than their finished sizes. It's also wise to stack up the parts with stickers between them and allow them to acclimate to your shop. There usually is enough of a margin for re-flattening a board that develops a modest bow, cup or twist. (Mild twisting did occur with one of Bill's lid boards.)

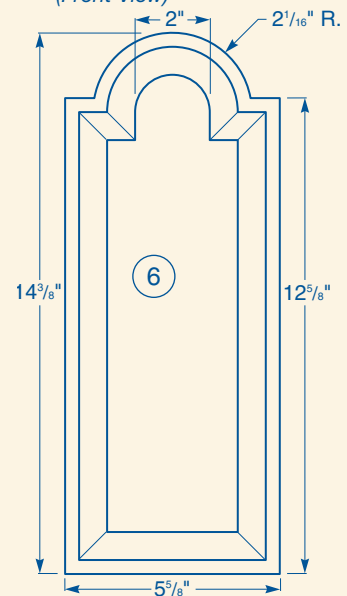
When his wood was ready, Bill started with the frame-and-panel assemblies, moved on to the base and then assembled the chest body and mounted it on the base. The lid and moldings were made and installed last.

Before dressing out the working stock, you may want to prepare some poplar and made test cuts with your cope and stick bits and with the panel raiser. It will help to establish the settings you'll need for the appearance that suits you.

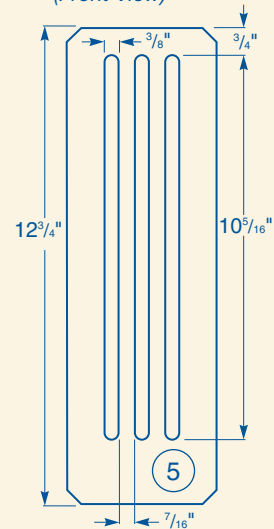
As it turned out, to get the panel profile he wanted, Bill had to cheat the system. The geometry of panel-raising bits is inflexible. The width of bevel he

Cabinet Exploded View

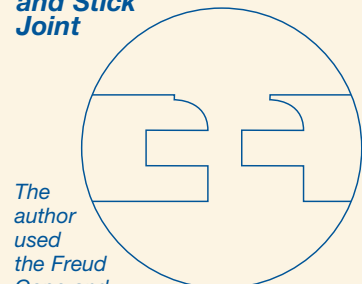
Tombstone Panel
(Front View)



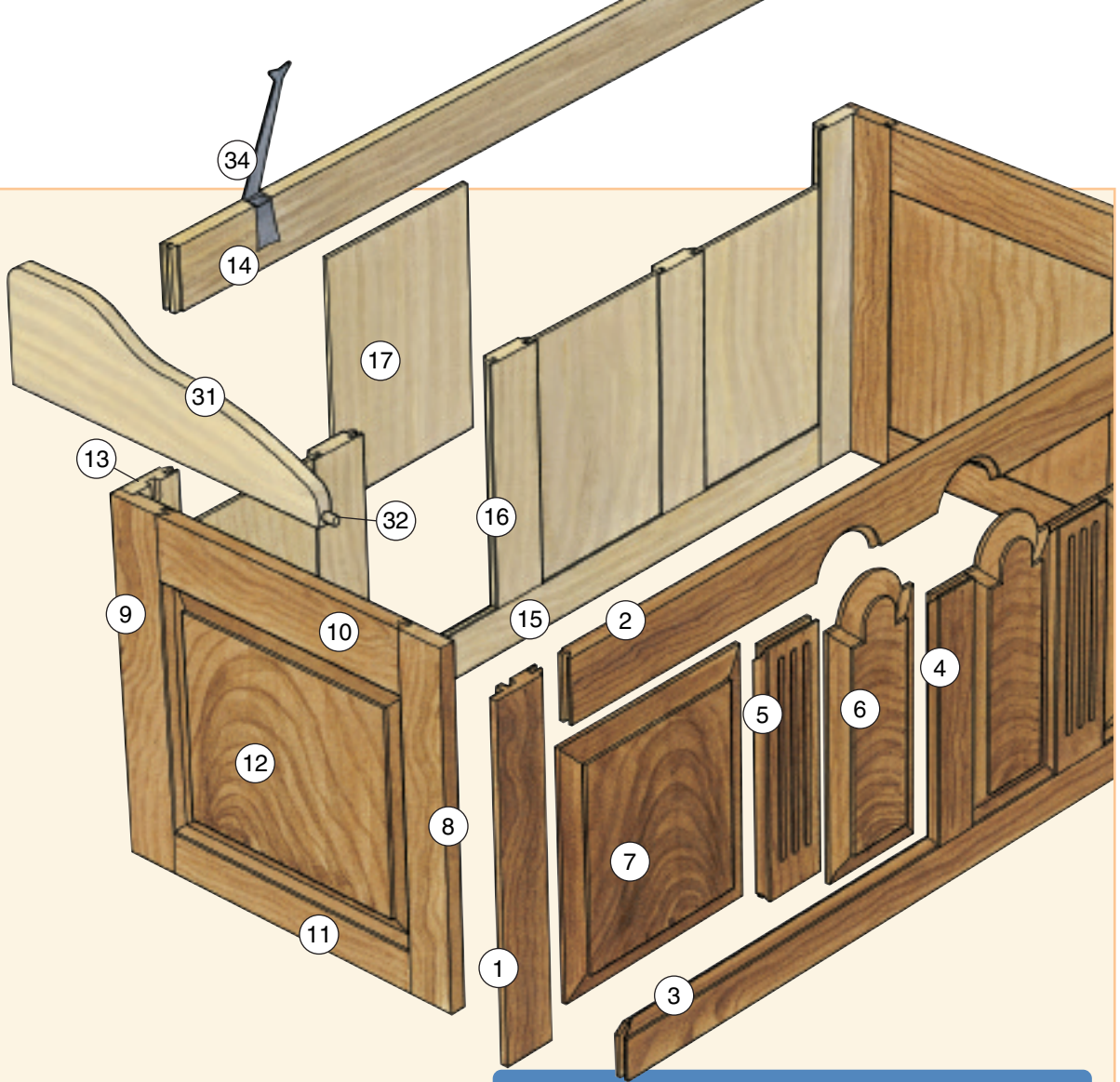
Fluted Stile
(Front View)



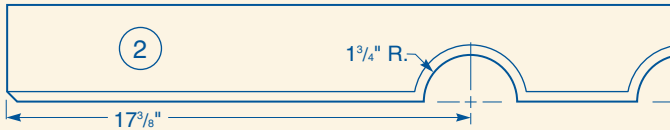
Typical Cope and Stick Joint



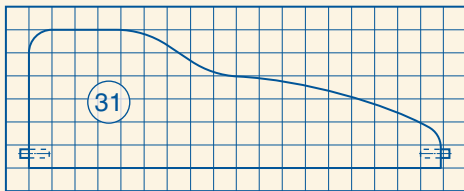
The author used the Freud Cope and Stick bit set #99-260



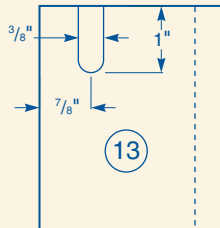
Top Rail
(Front View)



Lid Prop One square equals one inch.

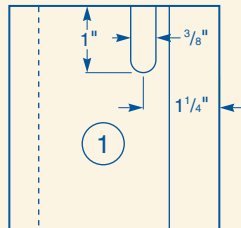


Back Stile
(Inside View)



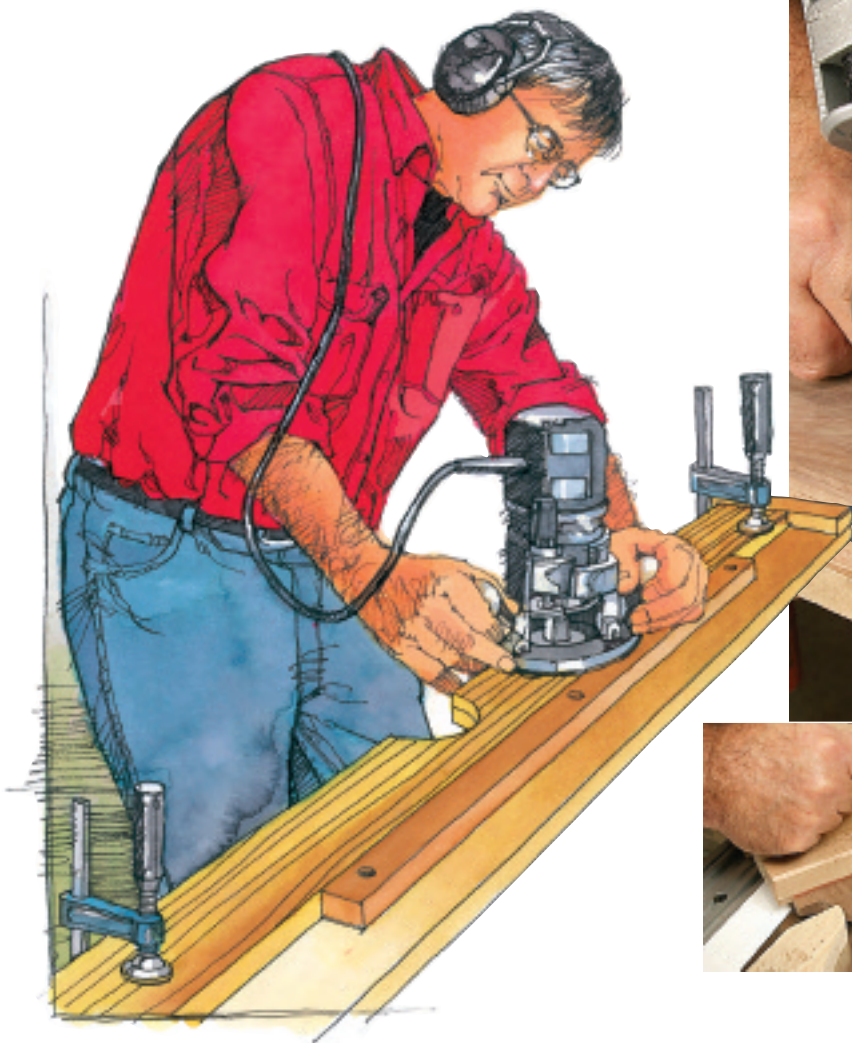
One set of opposing stiles have a short groove routed in their inside faces for the lid prop's pivot dowel.

Front Stile
(Inside View)



MATERIAL LIST –
Front, End, and Back Assemblies

	T x W x L
1 Stiles (2)	13/16" x 3 1/8" x 18 1/8"
2 Top Rail (1)	13/16" x 3 5/8" x 42 3/4"
3 Bottom Rail (1)	13/16" x 2 1/2" x 42 3/4"
4 Center Stile (1)	13/16" x 3" x 12 3/4"
5 Fluted Stiles (2)	13/16" x 4" x 12 3/4"
6 Tombstone Panels (2)	11/16" x 5 3/4" x 14 1/2"
7 Panels (2)	11/16" x 11 1/4" x 12 3/4"
8 End Front Stiles (2)	13/16" x 2 3/4" x 18 1/8"
9 End Back Stiles (2)	13/16" x 3 1/8" x 18 1/8"
10 End Top Rails (2)	13/16" x 3 5/8" x 14 1/8"
11 End Bottom Rails (2)	13/16" x 2 1/2" x 14 1/8"
12 End Panels (2)	11/16" x 14 1/8" x 12 3/4"
13 Back Stiles (2)	13/16" x 2 3/4" x 18 1/8"
14 Back Top Rail (1)	13/16" x 3 5/8" x 42 3/4"
15 Back Bottom Rail (1)	13/16" x 2 1/2" x 42 3/4"
16 Back Intermediate Stiles (3)	13/16" x 3" x 12 3/4"
17 Back Panels (4)	11/16" x 9" x 12 3/4"



The tombstone panels (and the rail that receives them) require some template routing. When raising the curved ends of the panel, use a safety block to apply downward pressure.

was after was 3/4", rather than the standard 1". From Freud, Bill bought bit (#99-511) to produce the width of bevel he wanted, but the 25°- to 26° bevel angle was steeper than desirable. His test cuts demonstrated that to get the correct fillet around the raised field, he'd have to add 1/16" to the thickness of all his stock. And, of course, that meant cutting the sticking profile a little deeper, too. Consequently, the rails and stiles are 13/16" thick, while the panels are 11/16" thick.

If you experiment similarly with your bits, label the final set of test samples and save them for use in setting the bits for the actual working cuts.

The next step was to prepare the frame stock and panels. The latter was easy, a matter of dressing the parts to 13/16", ripping them to width, and

crosscutting them to length. The panel blanks were a slightly different matter.

Building the Chest Body

Construction of the chest body is largely a straightforward frame-and-panel affair. In brief, you cut the parts to width and length. Rout the copes, then the sticking. Raise the panels and assemble. There are a few departures in this chest, and at least one in the way Bill generally prefers to do things.

One of Bill's idiosyncrasies with this type of project is that he likes to allow the stiles (just the full-length ones) to run long. It's one less alignment to make during assembly, when things can seem a little frantic. Instead, Bill allows some excess to project past the rails. After the glue dries and the clamps come off, he trims off the excess and at

the same time squares the assembly.

In this chest, you have some intermediate stiles, which must be coped, and a front top rail that must be contoured for the tombstone panels. The two small cutouts can be roughed out with a jigsaw, then routed to match a template. Do this before routing the copes and the sticking. In addition, you have the flutes to cut into the two stiles that flank the tombstone panels.

The panels represent the biggest departures from the norm. What Bill wanted in the panels was highly figured grain. He also wanted to book-match the pairs of panels, especially on the chest front. What he opted to do, with some help from a friend with the right tools for the job (specifically, a 20" band saw and a drum sander), was to resaw a block of expensive stock into veneers.

OLD WORLD PANEL GEOMETRY REQUIRES CAREFUL STOCK SELECTION

He milled stock for the panels from straight-grained walnut, then glued a leaf of veneer to each.

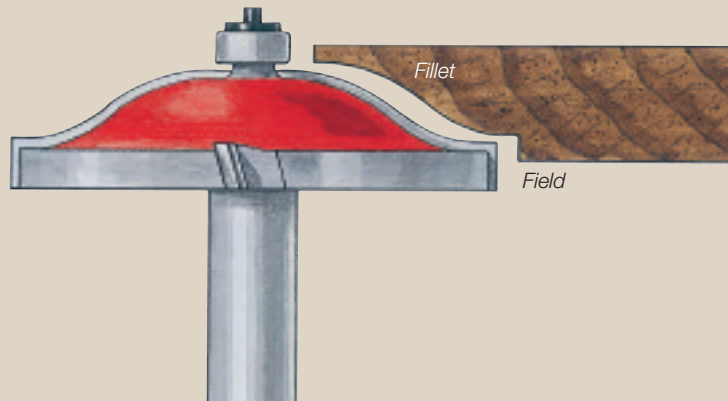
We won't detail here how to resaw on the band saw. Suffice it to say that if your resaw capacity isn't 12" to 13", you can resaw a 6" to 7"-wide block and book-match the leaves to form wider veneers for the panels.

Once you have the veneers cut, they must be surfaced. Planing veneers can be perilous, even when they are straight-grained. Surfacing curly, burl or crotch-grain veneers is best done on a wide belt sander or drum sander. Bill was able to smooth the face and back of each leaf at the same time and reduce them to a thickness of just under 1/8" on a wide drum sander.

The conventional wisdom is that you must veneer both the face and the back to balance the panel. (If you don't, the panel is likely to warp.) Here, the panels are completely trapped in their frames so it isn't absolutely necessary to veneer the panel backs. Bill didn't.

Veneering panels for the chest requires a dozen or so clamps (including some deep-throated ones), a couple pieces of 3/4" plywood, MDF or melamine, and some waxed paper. Apply yellow glue to the panel, not the veneer, then place the veneer on the glue. Spread waxed paper on one plywood clamping board, set the panel on it, cover it with more waxed paper, then add the second clamping board. (Waxed paper prevents squeeze-out from gluing the panel to the plywood.) Apply your clamps.

Be mindful of how raising the panels will parse their thickness. You need a 1/4"-thick tongue, and you also need the raised field to be the thickness of the veneer. The seam between the substrate and the veneer will show if it falls on the bevel. Bill raised the panels before the final thicknessing, sneaking



When you look at a raised panel cabinet, the size of the field (the flat center plane) as it relates to the bevel's width (or fillet) helps create the "look" of the piece. And, of course, the fillet also has to be balanced against the widths of the stiles and rails. Getting the right "look" can be a tricky business!

Most standard panel-raising bits form a 1" fillet. The original cabinet, which this project is based on, has 3/4" fillets, made with a hand plane. To achieve a 3/4" wide bevel on your cabinet's raised panels, use a Freud #99-511 bit. To create the exact fillet using that specific bit, you'll have to size your stock to these exact thicknesses: 13/16" for the stiles and rails and 11/16" for the raised panels.

up on the "disappearance" of the seam from the bevel. Then he thickness-sanded the panels to get the proper tongue dimension and to reduce the thickness of the raised field.

Raising a Tombstone Panel

The two tombstone panels on the chest front require some extra work—some of it hand work—to shape and raise. To begin, make a template to shape the two panels (after they've been veneered). Bill made his from 3/4" MDF, and he mounted 1/4"-thick fences to locate the panel. After cutting the rough contour on the top of a panel, set it on your template, clamp it securely, then use a router and flush-trimming bit to rout it to match the template. Of course, the tight inside corners will have

to be pared square with a chisel.

Raise the panel on the router table next. Because of the arch, you can't use the fence to raise the top edge, but you can—and should—use it when raising the side and bottom edges. To reduce tearout, do the top edges first, then do one side, the bottom, and the second side. Now comes the hand work. (Relax...the panels are small, and there are only two of them.)

Lay out the inside corners on the raised field and at the shoulders of the tongue that borders the bevel. Draw a line across the outside corners of the raised field. Then drop perpendicular lines from the arch to this shoulder line. The line at the tongue can be sketched freehand.

With your bench chisels, cut away the inside corners of the raised field.



After squaring up the inside corners of the field with your bench chisels, switch to skew chisels—first right and then left—to finish the fillet.

You want square, straight shoulders. That done, use a small rule and a utility knife to slice a line from the inside corner of the field to the inside corner at the edge of the panel. This is the juncture between the planes of the bevel. You must pare the bevels to this line, sloping them to match the rest of the bevel. For this work, you'll need a pair of skewed chisels, one angled left, the

other angled right (see *photo*, left).

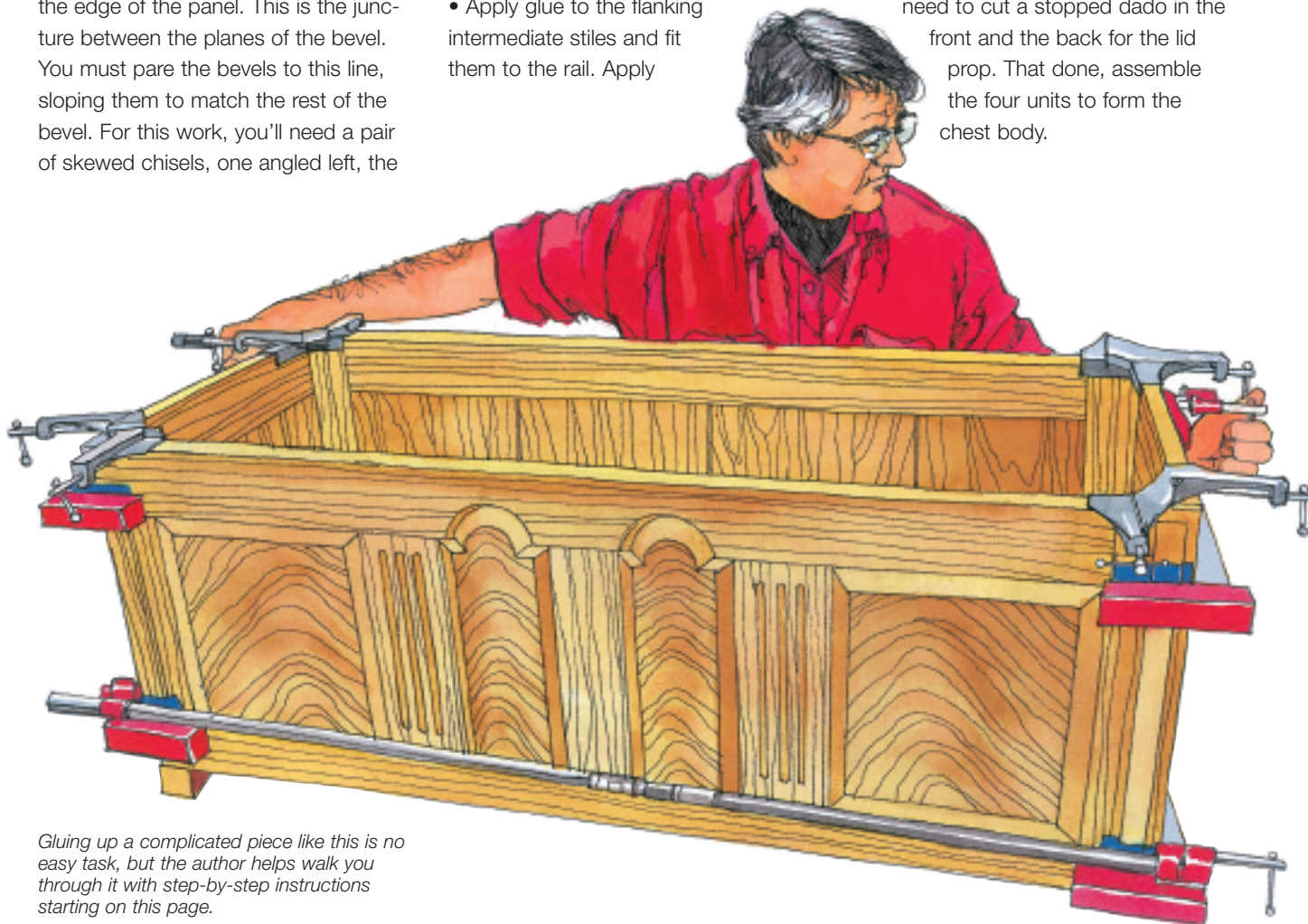
Assemble the units one at a time. The end units are easy, since each is composed of only two rails, two stiles, and a panel. The front and back units are more involved, so a dry-run is essential. Make sure the parts go together easily, your alignment marks are in place and all your clamps are at hand. Here's the assembly sequence:

- Apply glue with a small brush to the stub tenon on the center stile and push it into the top rail. Use a center mark on the stile and align it with a mark on the rail. Apply a clamp to seat the stile.
- Fit the panels in place. No glue, of course, to allow for wood movement.
- Apply glue to the flanking intermediate stiles and fit them to the rail. Apply

clamps to seat and hold them.

- Install the remaining panels.
- Remove the clamps and tip the assembly up so glue can be applied to the stub tenons on the three stiles.
- Fit the bottom rail onto the assembly. Use center marks to align the rail without having to slide it (to keep glue out of the groove so it won't stick to the panel).
- Apply glue to the rail ends and fit the full-length stiles.
- Extend long clamps across the assembly at each rail, then reapply clamps across the assembly at each stile.

That's it. Once the units all are assembled, trimmed, and sanded, cut the rabbets that join them. You also need to cut a stopped dado in the front and the back for the lid prop. That done, assemble the four units to form the chest body.



Gluing up a complicated piece like this is no easy task, but the author helps walk you through it with step-by-step instructions starting on this page.

Building the Base

The base frame, upon which the chest body rests, is a flat frame formed from three pieces of 5/4 walnut (the front and two end members) and one piece of 5/4 poplar (the back member). The back joins the ends with mortise and loose-tenon joints. The ends and front are joined with splined miters. Mill the stock, cut the parts, cut the joints, and glue your frame together.

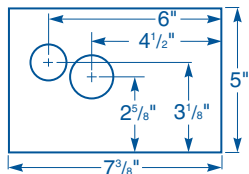
More involved to make are the feet. Each is an assembly, consisting of two shaped faces, joined end-to-end in a miter joint and reinforced with a triangular glue block. The assembled feet are simply glued to the underside of the base frame at the corners.

Begin constructing the feet by making a cardboard pattern, using the drawings at right. Note that the faces for the ends of the chest are 1/2" narrower than those on the front. The back faces are simple poplar blocks.

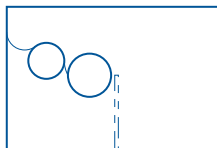
Cut the blanks to size next. First, mill the stock to 7/8" thick and rip it to width. Then cut a 45° bevel on one end of each piece. While you can trace the contour of the bracket on the blank, cut to the line on the band saw, and smooth the edges, Bill took a different tact. First, he laid out the centerpoints of the concave arcs on each blank, measuring from the bottom and the beveled edges. At the drill press he used Forstner bits to bore holes at these spots (see photo, top right). This ensured that the arcs would be consistently sized and placed. After tracing the pattern onto each face, he cut the vertical shoulder on the table saw. This way, you'll get a straight cut of a consistent height on each blank. On the band saw, cut the convex arcs, freeing the waste. (Use them as glue blocks later, when attaching the feet.)

After sanding the contoured edges (use a drum sander chucked in your drill press), rip the excess from each face.

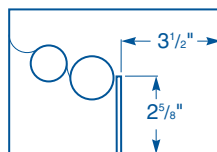
Lay out the centerpoints of the concave arcs on each blank, measuring from the bottom and the beveled edges. Then use appropriately sized Forstner bits (1/8" and 1/2" respectively) to bore holes at these spots.



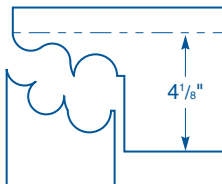
Next, trace the pattern onto each face, using the holes to orient the pattern. Remember that there are left and right, as well as end and front pieces.



Cut the vertical shoulder on the table saw. This way, you'll get a straight cut of a consistent height on each blank. White pencil or chalk is easier to see on walnut than a regular pencil line.



Use the band saw to cut the convex arcs, freeing the waste (which is the perfect size to use as glue blocks later, when attaching the feet). Sand the saw marks smooth using a drum sander on your drill press.



Glue the feet together in two stages assembling the miters first, then adding the glue blocks. As you do this, be sure to create the assemblies you need (i.e., glue a right front face to a left side face). Glue the feet to the frame.

Mounting the Body on the Base

Once the chest body and the base assembly are glued up, you can join

them. Set the chest body bottom up on the bench or assembly table. Apply a bead of glue to the edges, then align the base on it. Mark the center of the body and the base and line up the two marks, making sure the back edge of base is flush with the plane of the chest back. Apply a couple of clamps to hold things, then drill pilot holes and drive 12 4d cut nails through the base into the



The author made some handy clamping cauls to help hold the mitered foot joint firmly. The triangular blocks are glued to 1/4" plywood. The plywood is clamped to the foot blank and pressure is applied to the triangular blocks. Easy and effective.

edges of the chest body.

Make and install the chest floor next. Use random-width strips of poplar, thickened to 3/4", for this. Cut shiplaps on the edges and fit the strips one by one to the chest. Install the strips with 3d cut nails, as shown in the *drawing* on the next page.

While you're working on the chest, make and fit the lid prop. A till was a common feature of chests like this, and the till lid doubled as a prop for the chest lid. You'd open the chest lid, lift the till lid just past perpendicular, then lower the chest lid against its corner. Bill didn't include the till, but he did adapt the till lid as a lid prop.

Cut the prop and trim it to just fit between the front and back of the chest. Bore a hole into each end for a pivot dowel, and drive a dowel into each hole, trimming as necessary so they'll drop more easily into the dados cut for the purpose. Shape the prop however you like, but leave it about 6" wide at the back end so it can support the lid. That corner can be trimmed after the lid is hinged to the chest.

For the base molding, use a cove and bead profile that you can make on the router table with a 3/8"-radius

roundover bit and a 1/2"-diameter round-nose bit. Form the profile on both edges of a long strip of walnut, then rip them from the blank. Crosscut the parts to rough length, then miter-cut the ends and glue them to the chest and base.

Making the Breadboard Lid

The lid is a broad panel with breadboard ends, mitered at the front and square at the back. The molding along the front edge and across the ends has a quarter-round profile, with a Roman ogee below it forming the lip. The lid is hinged to the chest with hand-forged fishtail hinges.

Breadboard ends help prevent the broad panel from cupping and also make it easier to attach the lid molding across the ends, since you end up with a long-grain to long-grain glue joint. The joinery presents the challenge. The breadboard end is crossgrain, so gluing it securely to the end of the lid virtually guarantees the panel will buckle in humid conditions and split in dry ones. Bill opted to use an unglued sliding dovetail to mount the ends to the panel. Since the ends are joined to the lid at the front with miters, glue them there. Here's how to make the lid.

Start with 5/4 stock, face-jointing and planing it to 7/8" thick. Cut the two breadboard ends and set them aside. Next, edge-glide boards to form a panel 19 7/8" wide and 50" long. Rip the panel to exactly 17 1/8". The 2 5/8" strip that you end up with (1/8" is lost to the cut) will be mitered and become the front edge that joins the breadboard ends. Finally, cut equal amounts from both ends of the panel, reducing its length to 44 3/4".

Cutting Sliding Dovetail Joints

Rout a centered dovetail groove in one edge of each breadboard end. Use a 1/2", 7° or 8° dovetail bit, and make the groove exactly 3/4" deep. It's beneficial to use a 5/16" straight bit to rout a centered groove first. This eliminates as much waste as possible before switching to the dovetail bit and forming the dovetail groove.

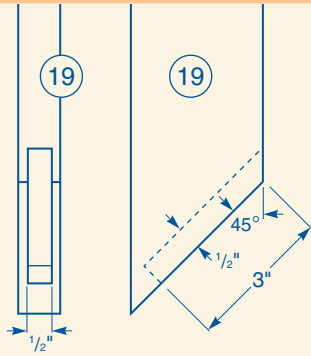
When you cut the grooves, also cut the same groove in a gauge made of the same stock as the breadboard ends. (Use the scrap crosscut from the panel, for example.) The gauge should be about 4" long.

The next process is to cut a mating dovetail on both ends of the panel. Don't touch the bit as you change over the table setup. You need to use the



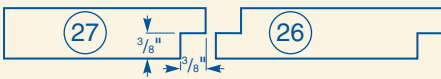
After plowing a 5/16" groove centered on the edge of the breadboard ends (to remove most of the waste), the author formed a 3/4"-deep dovetail groove.

Base Exploded View

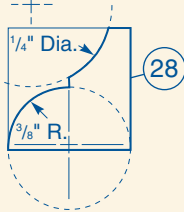


Base Frame End
(Front Miter; Top and Side Views)

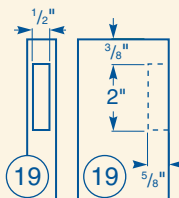
Chest Bottom Boards (End View)



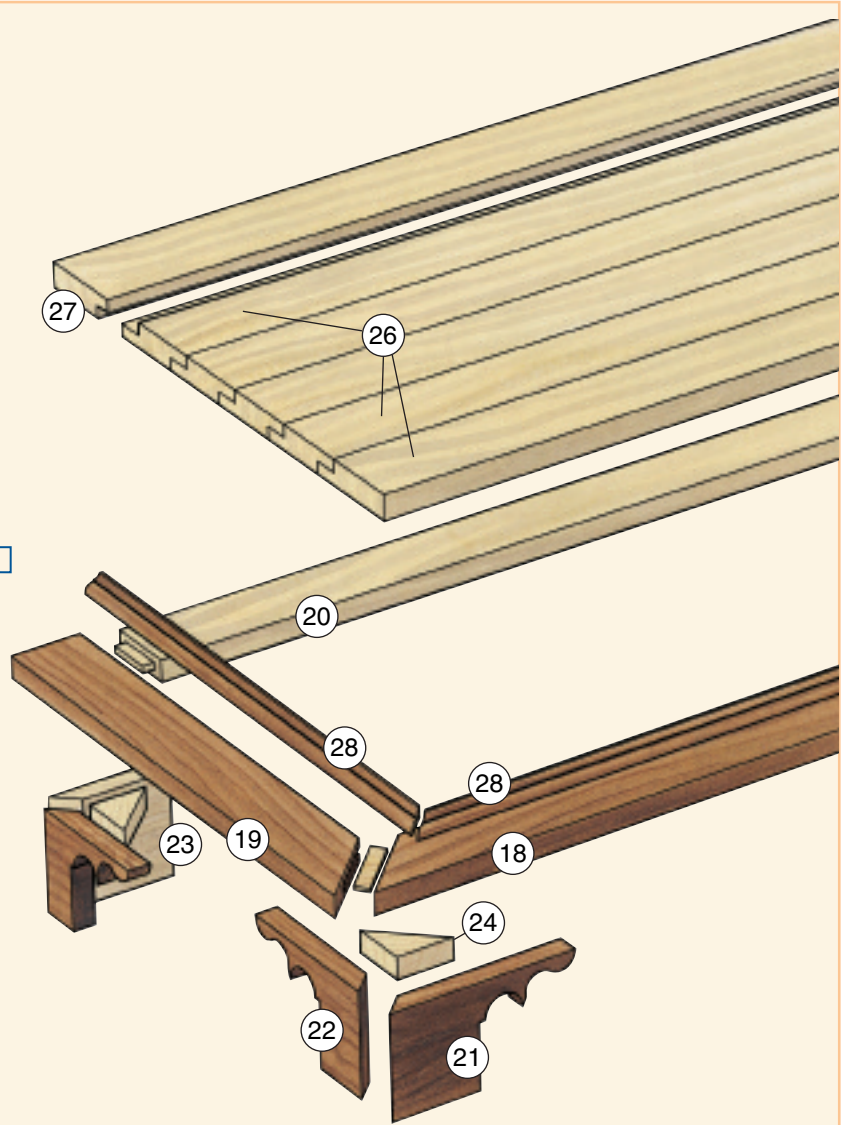
Base Molding
(End View)



Base Frame Back
(Top and Side Views)



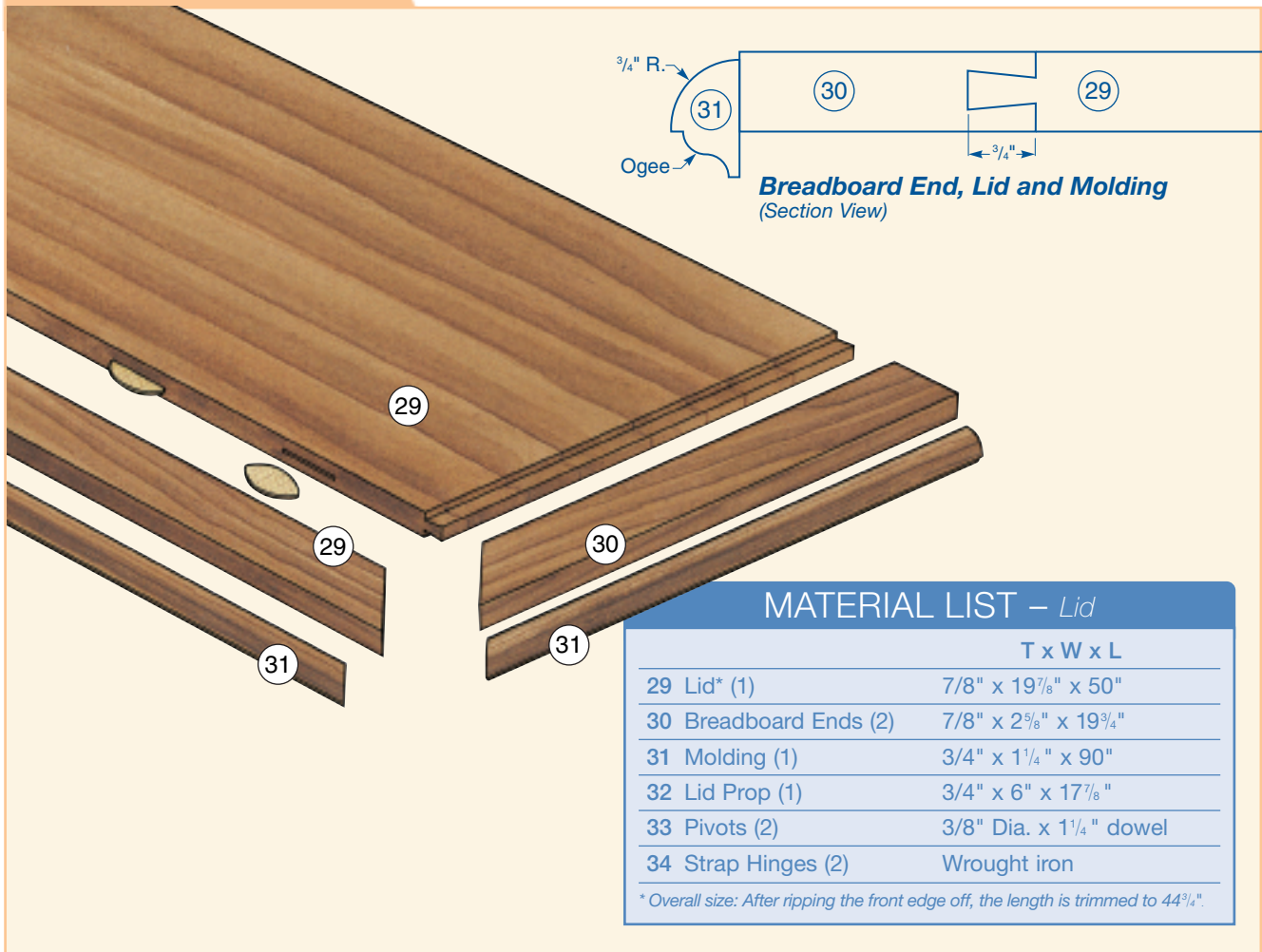
Base Frame End
(Back Mortise; Top and Side Views)



MATERIAL LIST – Base

	T x W x L
18 Base Frame Front (1)	7/8" x 2 3/4" x 50"
19 Base Frame Ends (2)	7/8" x 2 3/4" x 20 1/2"
20 Base Frame Back (1)	7/8" x 2 3/4" x 44 1/2"
21 Bracket Front Feet (2)	7/8" x 4 1/8" x 7 3/8"
22 Bracket End Feet (4)	7/8" x 4 1/8" x 6 7/8"
23 Bracket Back Feet (2)	7/8" x 4 1/8" x 2 5/8"
24 Blockings, Front (2)	5/4 Poplar
25 Blockings, Back (2)	5/4 Poplar
26 Chest Bottom Boards (5)	3/4" x 3 3/8" x 46 5/8"
27 Chest Bottom Board (1)	3/4" x 3" x 46 5/8"
28 Base Molding (1)	3/4" x 3/4" x 96"

Lid Exploded View



same height setting for the tail that you did for the slots. Just shift the fence to house all but an edge of the bit. Make setup cuts on your scraps of the lid stock, sneaking up on the width of dovetail that fits the grooves you've already cut. When the fence setting is perfect, cut a dovetail across each end.

Now miter the breadboard ends and the strip ripped from the panel. The ends are easy, but the panel strip must fit just right. The miter-to-miter distance must exactly match the shoulder-to-shoulder length of the lid. Miter one end of the strip, then clamp it to the panel to mark the opposite end.

To help align the mitered element with the lid when regluing it to the lid,

use biscuits. After mitering the ends, clamp the strip in place and mark the biscuit locations. Then cut the slots.

Assemble the lid. First, drive the breadboard ends onto the dovetails. No glue, remember. It helps to clamp the front strip to the panel—no glue—while you do this. Then remove the strip, spread glue along its edge and on the miters, and remount it. Install clamping cauls for flat miters to the lid as you do this, so you can apply a clamp perpendicular to each miter.

Adding Lid Molding

The lid molding consists of two profiles routed on the same piece of wood. Because it's easier to glue and

clamp it to the lid while it's square, hold off routing the large quarter-round profile until after the molding is glued in place on the lid.

Rout the Roman ogee profile before mounting it. Mill this ogee on both edges of a strip about 3" wide and 52" long. Then rip the strip into two 1¹/₂"-wide strips. Halve one strip, miter the ends, and glue them to the lid.

After the glue is dry and any squeeze-out cleaned up, rout the quarter-round with a 3/4"-radius roundover bit. The pilot bearing will hang below the profile, so you must use an edge guide to control the cut.

When you are done, sand the molding well to remove the mill marks.

Installing Hinges

The hand-forged hinges Bill chose look great and work well. The leaf that mounts to the lid is 16" long, and the one that mounts to the chest has a right-angle bend. It sits on the top edge of the back and extends down the inside face. To accommodate the barrel, the chest leaf must be recessed into the chest back. Form a notch in the top rail that's about 1/2" deep.

Mount the hinges to the lid first. Line them up on the underside with the hinge pins parallel to the edge. (It may not be perfectly square, but that's the charm of handmade hardware.) Then screw them in place. Set the lid and hinges on the top back edge of the chest and mark along the hinges in the chest edge. Cut the notches. Bill found that he could set the lid in place, with the hinges down in the notches and the prop holding the lid open. It stayed that way, freeing his hands for drilling pilots and driving the remaining screws.

Finishing Up

Bill used multiple coats of Waterlox to finish his chest. He brushed on the first and second coats, then applied subsequent coats with a soft, lint-free cloth. A rub-down with fine steel-wool between coats ensures a smooth finish. Clean up all the dust and debris with tack cloths before applying more finish.

This dream project was a long time in the works, but as you can see by the results, it was well worth the wait. Good luck with yours!

Sliding dovetails are the perfect joinery choice when wood movement is an issue. Mill these on the router table.



The lid prop, supported by two short dowels, holds the finished cabinet open, exposing the hand-forged hinges.

