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Heirloom Bookcase

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- Exploded view and elevation drawings.
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- Tips to help you complete the project and become a better woodworker.



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Heirloom Bookcase

With its bowed front, fluted accents and mahogany veneers, this classic bookcase design will expand your woodworking skills and deliver a project worthy of the ages. If you haven't yet invested in a vacuum press for veneering, now would be a good time to get one—you're going to need it.

Wouldn't it be great to know that something you build today will be around four generations from now? That's the kind of notion that tends to keep you going when you tackle a big project like this bookcase. Although there's a lot of work tied up in a piece of casework like this, it's definitely got heirloom potential.

As different as the various sections of the bookcase look, all the lumber used here is farm-raised Honduras mahogany in various guises. Solid mahogany stock is attractive, stable and a joy to work. The shelves and back of the case are built from mahogany plywood, but the distinctive beauty of the piece is created by contrasting mahogany crotch and ribbon veneers.

Flattening the Veneer

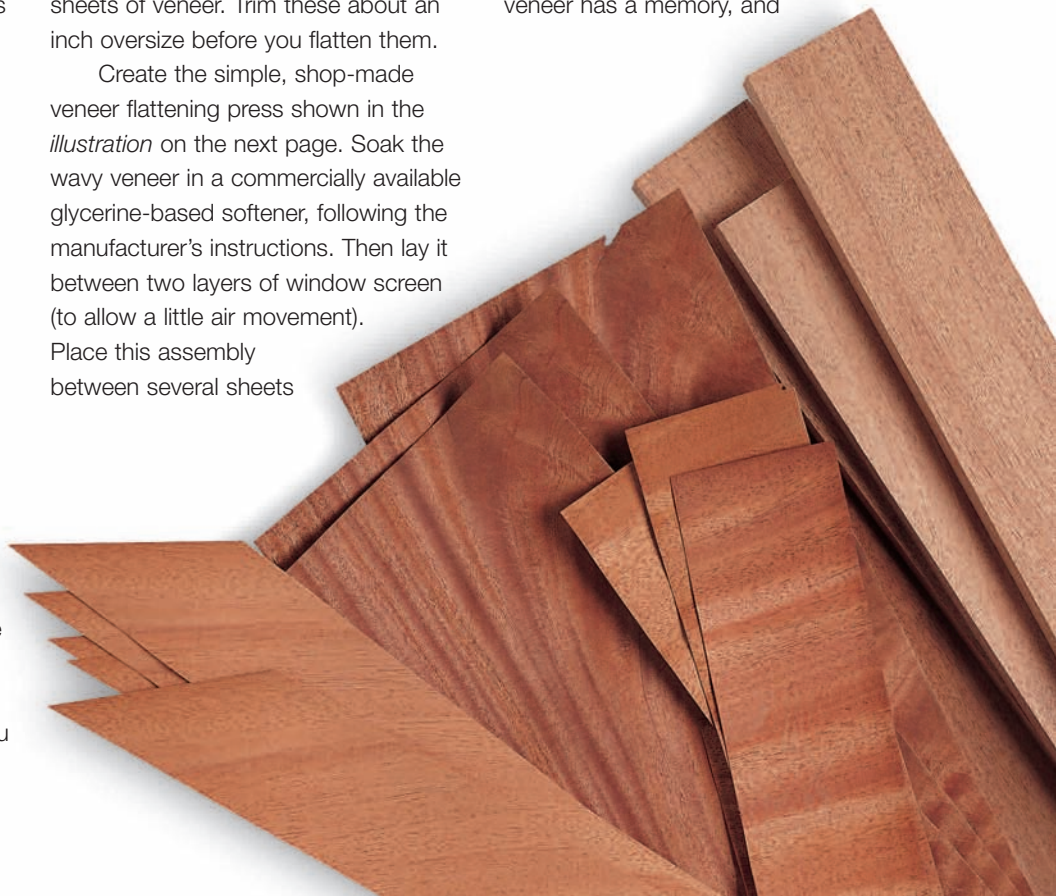
You'll need to address the crotch veneers up front because it takes a little time for them to become workable. They're taken from the part of a tree where two large branches create a "Y", so it's their nature to have erratic grain, making them wavy and brittle. By clamping them in a press now, you can straighten them while you

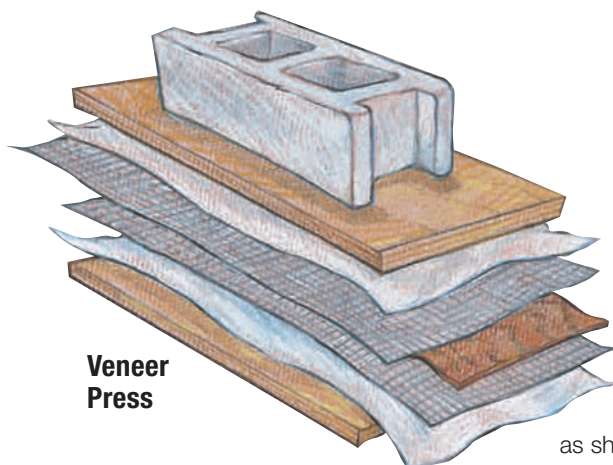
build the bookcase base. That way, they'll be available when you get ready to make the sides.

A nice trick is to take a large piece of paper and cut a rectangular hole in it the same size as the veneer you require. Use it as a moving window to view and select just the right areas of dramatic grain pattern from larger sheets of veneer. Trim these about an inch oversize before you flatten them.

Create the simple, shop-made veneer flattening press shown in the *illustration* on the next page. Soak the wavy veneer in a commercially available glycerine-based softener, following the manufacturer's instructions. Then lay it between two layers of window screen (to allow a little air movement). Place this assembly between several sheets

of brown kraft paper—the type used to make grocery bags—to soak up the excess moisture. Use a scrap of 3/4" plywood on the top and bottom to ensure flatness, then weigh the whole thing down with a concrete block or two. After the veneer has dried, quickly apply it to its plywood substrate and put it under pressure. Crotch veneer has a memory, and





Veneer Press

Nothing fancy to a simple veneer press like this—it's just a couple scraps of plywood, layers of kraft paper and window screen weighed down with a cinder block or two. The veneer is centered between the layers of this sandwich.

its wavy nature will reappear if it is not quickly glued and clamped in place. While the veneer is drying, start working on the base.

Building from the Bottom Up

We'll order the rest of the construction process so you build the bookcase from the ground up. Make

the four feet (pieces 1) from a 24"-long, glued-up block of mahogany measuring 2½" x 3¼".

Crosscut the stock to length and chamfer the two back feet as shown in the *drawing*, next page.

Chop a stopped mortise and a corresponding large rabbet into the back and inside faces of the legs. See the *Pinup Shop Drawings* for dimensions and locations of the construction details.

Cut the base front, back and sides (pieces 2 and 3) to size. Use a cove bit and a straightedge to create the stopped flutes in the outside faces of the sides, following the dimensions shown on the *Pinup Shop Drawings*.

Make the fluted foot plinth blocks (pieces 4) by following the guidelines in the *sidebar* on page 104. Next, cut the two curved plywood supports (pieces 5)

to size and shape. Screw and glue these supports to the base front, then rip the ¼" plywood backer (piece 6) to size. Secure the backer to the curved supports with glue and brads, then refer to the *sidebar* below to apply ribbon veneer (pieces 7) to the backer. After the glue dries, trim the veneer flush with the edges all round using a sharp knife, sandpaper and a file.

Finish off the base by adding 1/4"-thick moldings (pieces 8 through 10) at the locations shown on the *Exploded View* at right. Shape both front edges (the bullnoses) of each of these pieces on the router table with a 1/8" roundover bit and a fence. Note that the bullnosed moldings are of various widths and that the top pieces are mitered where they meet. After dry-fitting these pieces to the base

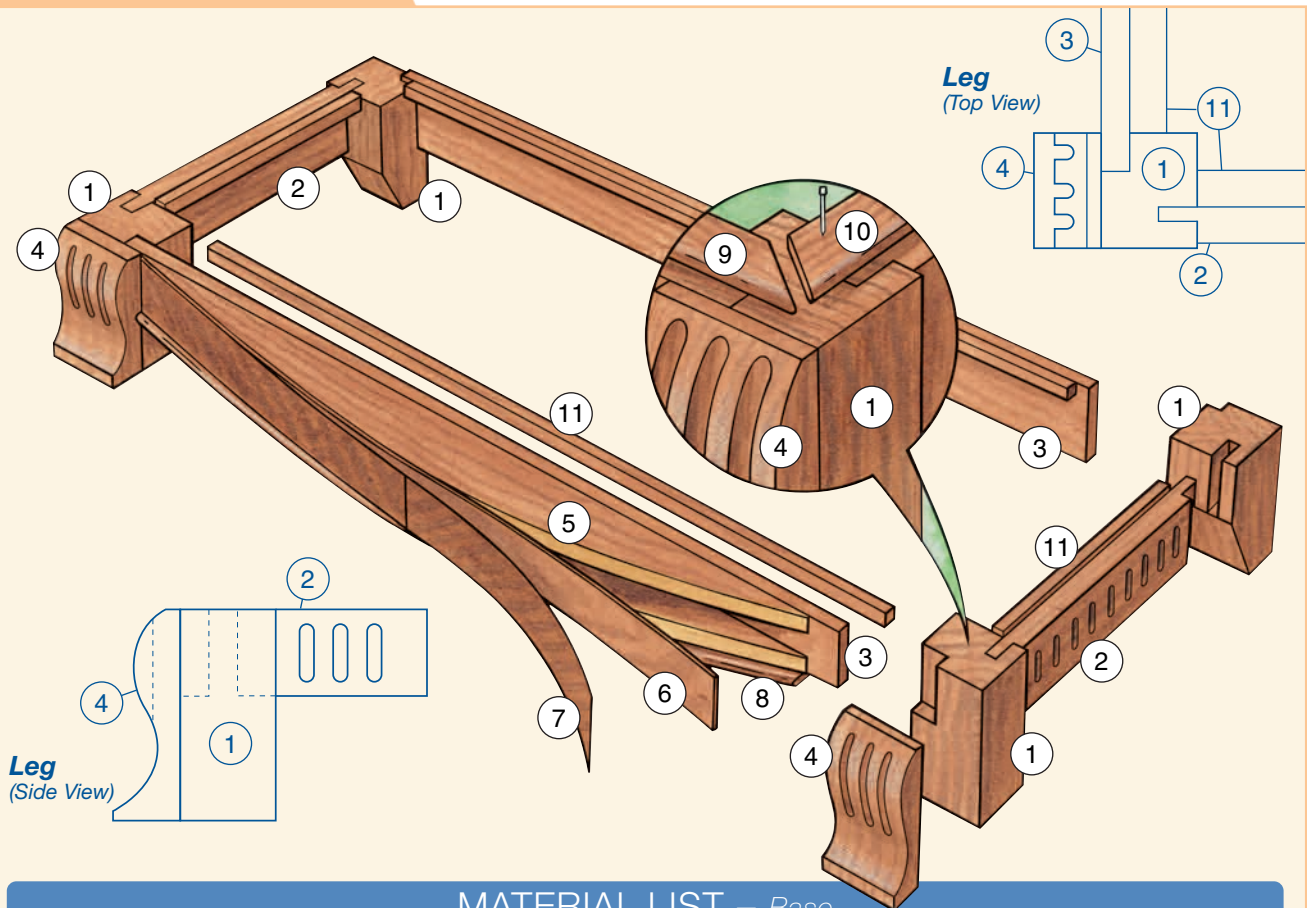
USE A VACUUM PRESS FOR CURVED SHAPES

Applying veneer to a curved surface, like the base front sub-assembly, is much easier with a vacuum bag press. You can also use it for flat panels, making it a versatile and convenient addition to your shop. Tape the veneer together, apply the glue (left), and let the vacuum do the rest.

Base Subassembly Cutaway



Base Exploded View



MATERIAL LIST – Base

	T x W x L		T x W x L
1 Base Feet (4)	2 1/2" x 3 1/8" x 5 1/4"	7 Base Ribbon Veneers (2)	1/32" x 2 3/8" x 16"
2 Base Sides (2)	1 3/16" x 2 1/2" x 10 1/2"	8 Bottom Base Molding (1)	1/4" x 3 5/8" x 31 1/2"
3 Base Front and Back (2)	3/4" x 2 3/8" x 34 3/4"	9 Top Base Molding (1)	1/4" x 4" x 38 1/2"
4 Base Plinths* (1)	3" x 3 1/4" x 12"	10 Side Base Molding (2)	1/4" x 1 3/4" x 14 3/8"
5 Base Curved Supports (2)	3/4" x 2 3/8" x 31 3/4"	11 Base Cleats (1)	3/4" x 1" x 81"
6 Base Curved Backer (1)	1/4" x 2 3/8" x 32"		

*Dimension shown allows for machining as demonstrated in the sidebar on page 104.

assembly, secure them with glue and clamps. Cut, fit and attach the base cleats (pieces 11) to the inside faces of the base sides, front and back.

Building the Carcass Sides

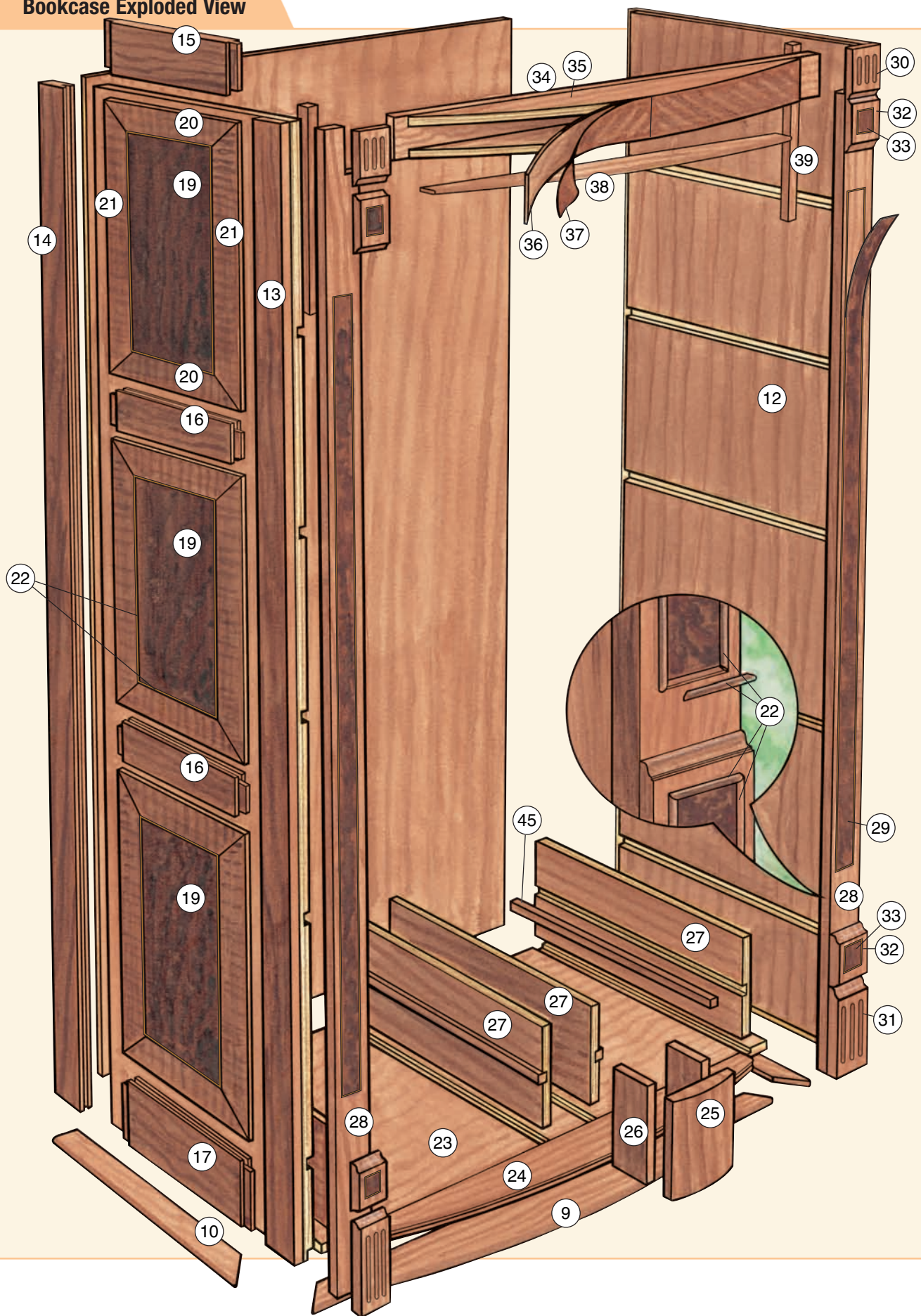
The bookcase is built around two 3/4" plywood sides (pieces 12), to which the shelves and the stile and rail sub-assemblies are attached. Before ripping them to width, locate and plow five

dadoes and a rabbet on the inside face (check the *Pinup Shop Drawings* for locations). By doing this before you separate the panels, you ensure that the dadoes and rabbet will line up perfectly.

The outside faces of these plywood sides are covered with stile and rail subassemblies. Each is comprised of two vertical hardwood stiles (pieces 13 and 14) and four horizontal rails (pieces 15, 16 and 17). After ripping

them to size, use a 1/4" dado head to plow a groove down the center of one edge of each stile. Make a matching groove in one long edge of each top and bottom rail and in both long edges of the middle rails. Then form two rabbets on each end of the rails, producing a tongue. Dry-assemble the stiles and rails to check their fit, then disassemble before moving on to the six panels.

Bookcase Exploded View



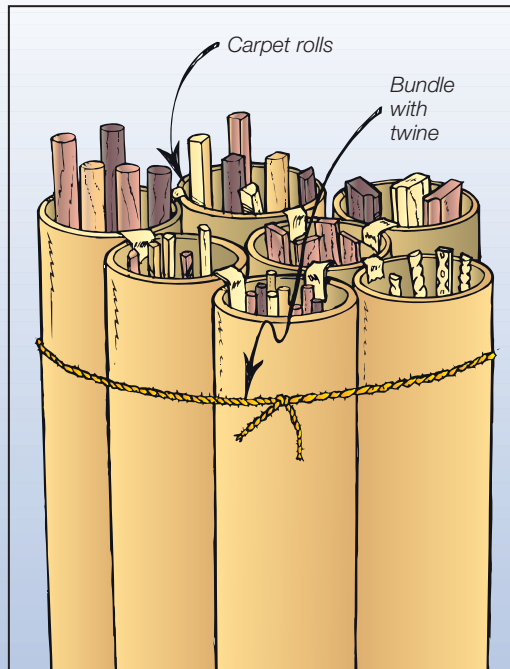
MATERIAL LIST – Carcass

	T x W x L		T x W x L
12 Carcass Sides (2)	3/4" x 12 1/2" x 73 3/8"	26 Drawer Returns (2)	3/4" x 2 3/8" x 4 1/2"
13 Front Stiles (2)	3/4" x 1 3/4" x 73 3/8"	27 Drawer Walls (4)	3/4" x 5 1/4" x 12 1/2"
14 Back Stiles (2)	3/4" x 2 3/8" x 73 3/8"	28 Decorative Front Stiles (2)	3/4" x 3 1/8" x 73 3/8"
15 Top Rails (2)	3/4" x 4" x 9"	29 Front Stile Burl Veneers (2)	1/32" x 2" x 48"
16 Middle Rails (4)	3/4" x 2 1/2" x 9"	30 Top Fluted Plinths (2)	3/4" x 3 1/8" x 4"
17 Bottom Rails (2)	3/4" x 5 3/4" x 9"	31 Bottom Fluted Plinths (2)	3/4" x 3 1/8" x 6"
18 Side Panels (6)	1/4" x 8 15/16" x 19 15/16"	32 Veneered Plinths (4)	1/2" x 3 1/8" x 4 1/8"
19 Crotch Veneers (6)	1/32" x 4 15/16" x 16 1/16"	33 Plinth Burl Veneers (4)	1/32" x 2 1/4" x 2 1/4"
20 Horizontal Ribbon Veneers (12)	1/32" x 2 1/2" x 9"	34 Apron Backer (1)	3/4" x 3 7/8" x 33 3/4"
21 Vertical Ribbon Veneers (12)	1/32" x 2 1/2" x 20"	35 Apron Horizontal Supports (2)	3/4" x 2 3/8" x 31 3/4"
22 Bullnose Molding Strips (1)	1/8" x 1/4" x 525"	36 Apron Front (1)	3/4" x 3 7/8" x 32"
23 Shelves (6)	3/4" x 12 1/2" x 35 3/4"	37 Apron Veneers (2)	1/32" x 4 1/2" x 17"
24 Shelf Edging (6)	3/4" x 3 3/8" x 31 3/4"	38 Apron Bottom Trim (1)	1/8" x 2 7/8" x 31 3/4"
25 Drawer Divider (1)	7/8" x 2 1/2" x 4 1/2"	39 Glue Blocks (2)	1" x 1" x 11 3/8"

QuickTip

Small Stock Storage

Heavy cardboard carpet tubes (usually available at no cost from a carpet layer or store) can be cut to any length and bundled together with cord. Use them to separate different dowel scraps and leftover hardwood moldings. This way you can check your inventory at a glance. Mount the tubes on a plywood base to keep the ends of the contents off the floor.



Creating the Veneered Panels

Each stile and rail framework houses three plywood panels (pieces 18), which are veneered on their outside faces (with pieces 19, 20 and 21). Follow the guidelines on page 105 to lay up the panels.

Remove the panels from the press and use a 1/8" veining bit to plow stopped grooves, as shown in the bottom photos on page 107. These grooves straddle the joint between the ribbon and crotch veneers and house the bullnose molding strips (piece 22), which help create the 3D effect of a raised panel. Miter the molding to fit, then glue and clamp it in place.

Once the panels are well sanded, assemble the two frames and panels. Glue and clamp the frames together, checking for squareness and flatness as you go. Don't glue the panels in their grooves: they should be allowed to float freely. Sand the frames after the glue dries, then set them aside for a while.

FLUTING ON THE ROUTER TABLE



The front feet are adorned with curved and fluted plinth blocks, which are fluted before being cut apart. Band-saw the curved shape (see the Full-size Pattern on the *Pinup Shop Drawings*), then use a 3/8" core box bit in your router table to create the three flutes in each block. Crosscut them into two blocks on the table saw, then sand them before attaching them to the front feet with glue and clamps.



Step 1: Start by band-sawing the curved shape onto the front face of each plinth block while they are both still part of the same piece of raw stock.



Step 2: Use a core box bit to plow three flutes in both pieces at the same time (see Full-Size Pattern for shape). As you can see, the flute cut will be deeper at the center of the curve.

Making the Shelves and Starting the Assembly Process

This bookcase is built around a carcass that takes shape when you attach the two dadoed sides you made earlier to a series of six fixed shelves. The lowest shelf is covered by a pair of drawers. All six shelves are mahogany plywood rectangles (pieces 23), faced with curved, solid-wood edging (pieces 24).

After cutting the shelves to size, band-saw the front faces of the edging to shape (see the *Pinup Shop*

Drawings). This can be done in groups of threes by taping the stock together, as shown on page 106. Keep the waste pieces and use them as clamping blocks when gluing on the edging.

Sand the curves, then mill a triple bead in them with a beading bit chucked in the table router. To keep things lined up, cut biscuit slots in the shelves and edging before applying glue and biscuits. Make use of the curved waste pieces when clamping the edging in place, as shown on page 106.

After the glue has dried, sand

the shelves smooth. Cut the drawer divider (piece 25) to shape (see the *Pinup Shop Drawings*). Cut the drawer returns (pieces 26) from hardwood stock and the drawer walls (27) from plywood. Now machine the grooves in the drawer walls (for the drawer runners) and the grooves on the lower and second shelves (for the walls). Screw and glue the shelves into the carcass dados. Apply glue to the grooves in the bottom two shelves and slide the four drawer walls in place. Moving fast, glue the divider and returns to the interi-

or drawer walls and clamp these pieces in place between the two bottom shelves. Now screw and glue the completed base assembly in place. Finally, glue and clamp the stile and rail assemblies to the outside of the carcass.

Forming the Decorative Stiles

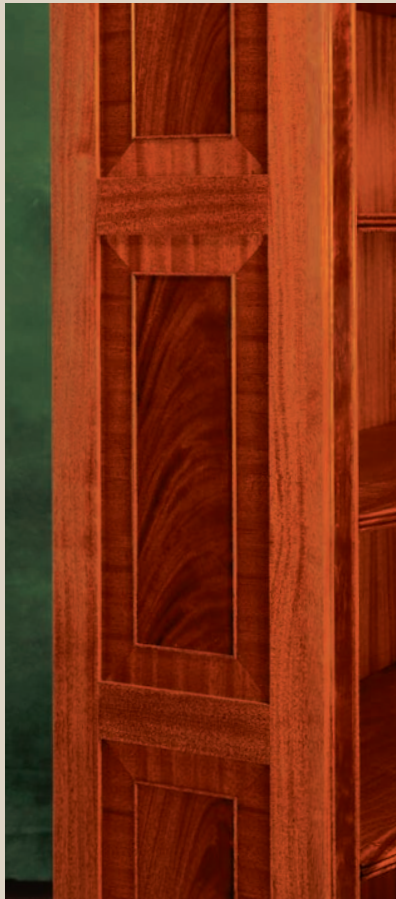
The front facade of the bookcase features two hardwood stiles (pieces 28) that are embellished with plinth blocks and veneered panels. Note the notched cutout shape at the top of each, creating

a right and left stile. Start on these pieces by trimming two long strips of burl veneer (pieces 29) to size, then gluing these to the stiles at the locations shown on the *Pinup Shop Drawings*. If these pieces are too long to fit into your vacuum bag system, use yellow glue and a clamping caul (a strip of melamine-covered MDF) to provide ample pressure for veneering. Use a veining bit to plow stopped dadoes around the edges of the veneer strips (like you did earlier on the side panels),

then use up more of the 1/8" bullnose trim you made earlier. Miter this molding to fit into the dadoes and glue it in place.

Cut the top and bottom fluted plinth blocks (pieces 30 and 31) to size, then use a core box bit to plow flutes in their front faces. On such small pieces, make several router passes to reduce the tool's drag and preserve your grip (not to mention your fingers). After fluting, chuck an ogee bit in the table router to mill a classic profile on the top edge of the bottom plinth and the bot-

VENEERING THE SIDE PANELS

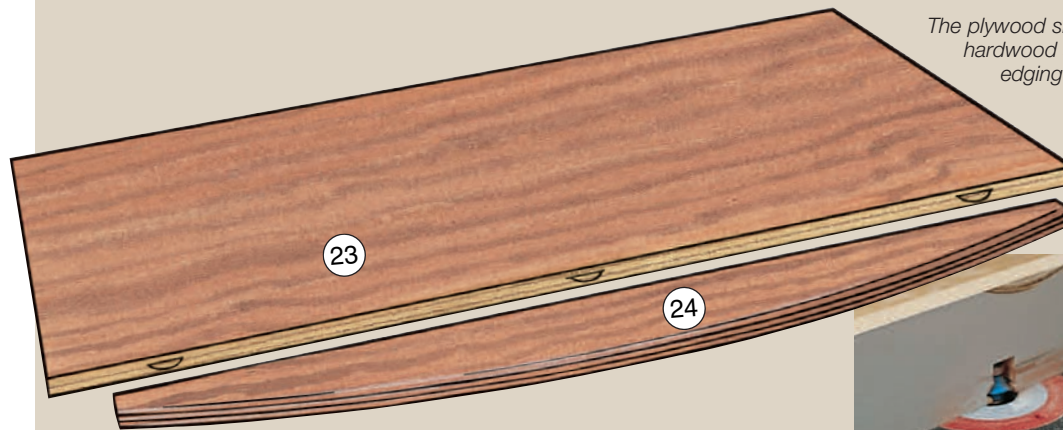


Cut the veneer segments to size and carefully join them with veneer tape. Apply glue and sandwich them between thicker stock to ensure that you'll get even pressure.



Each of the six veneered side panels is laid up on a 1/4"-thick plywood base. The center of each panel is a piece of mahogany crotch veneer, and this is surrounded by a 2"-wide mitered frame of ribbon veneer (shown at left). Trim the pieces to their proper shape with a sharp knife and steel straightedge, then use veneer tape (on the faces that will be exposed) to assemble the five pieces. The tape will be sanded off later. Spread the glue and apply even pressure with your veneer press to flatten and bond the veneer to the plywood.

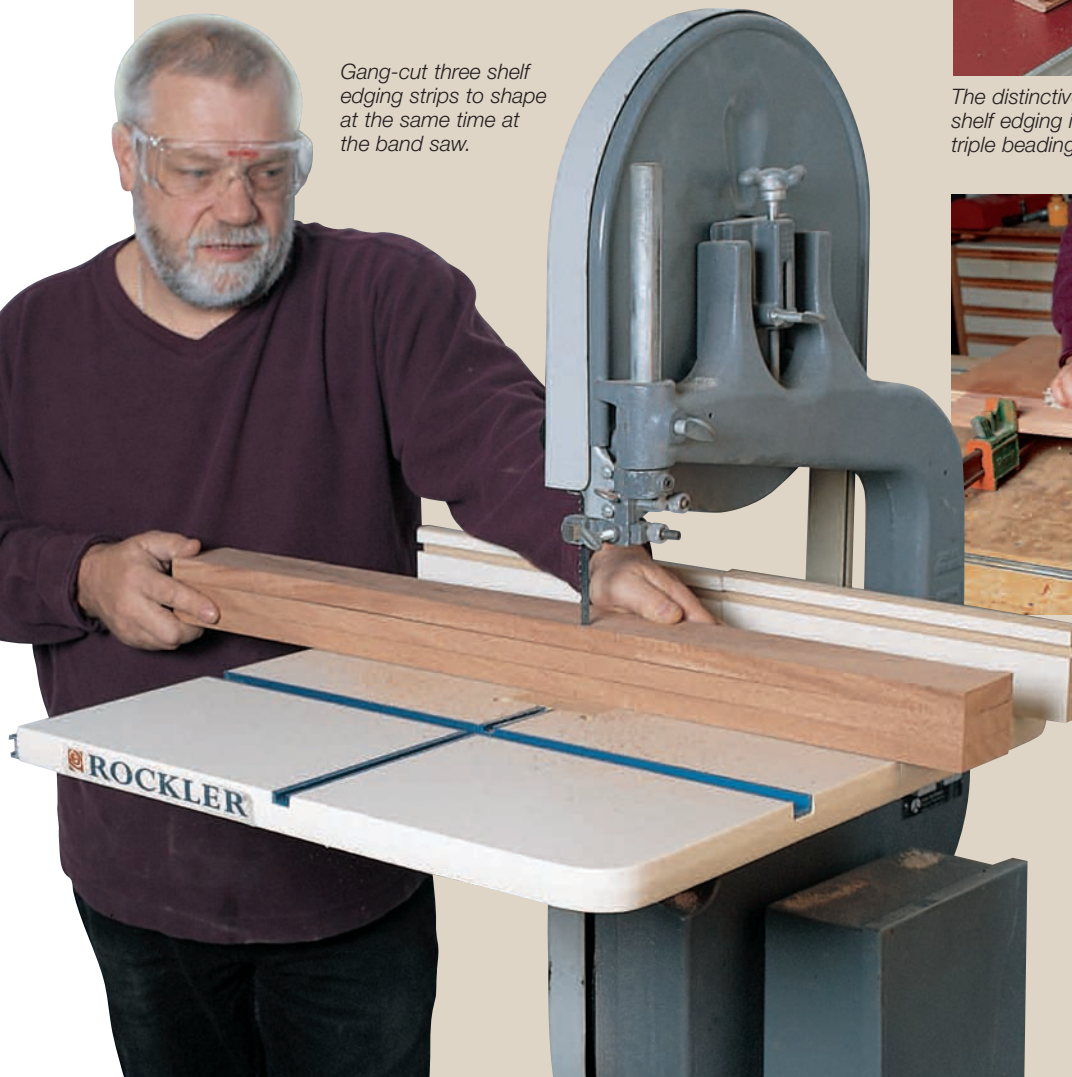
MAKING BOWFRONT SHELVES



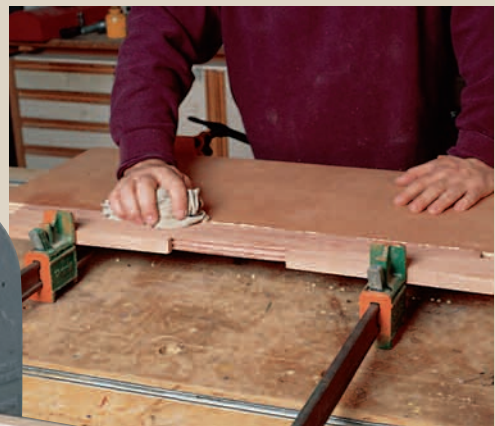
The plywood shelves are edged with hardwood after the front face of the edging has been beaded.



The distinctive front of the shelf edging is formed with a triple beading bit (see inset).

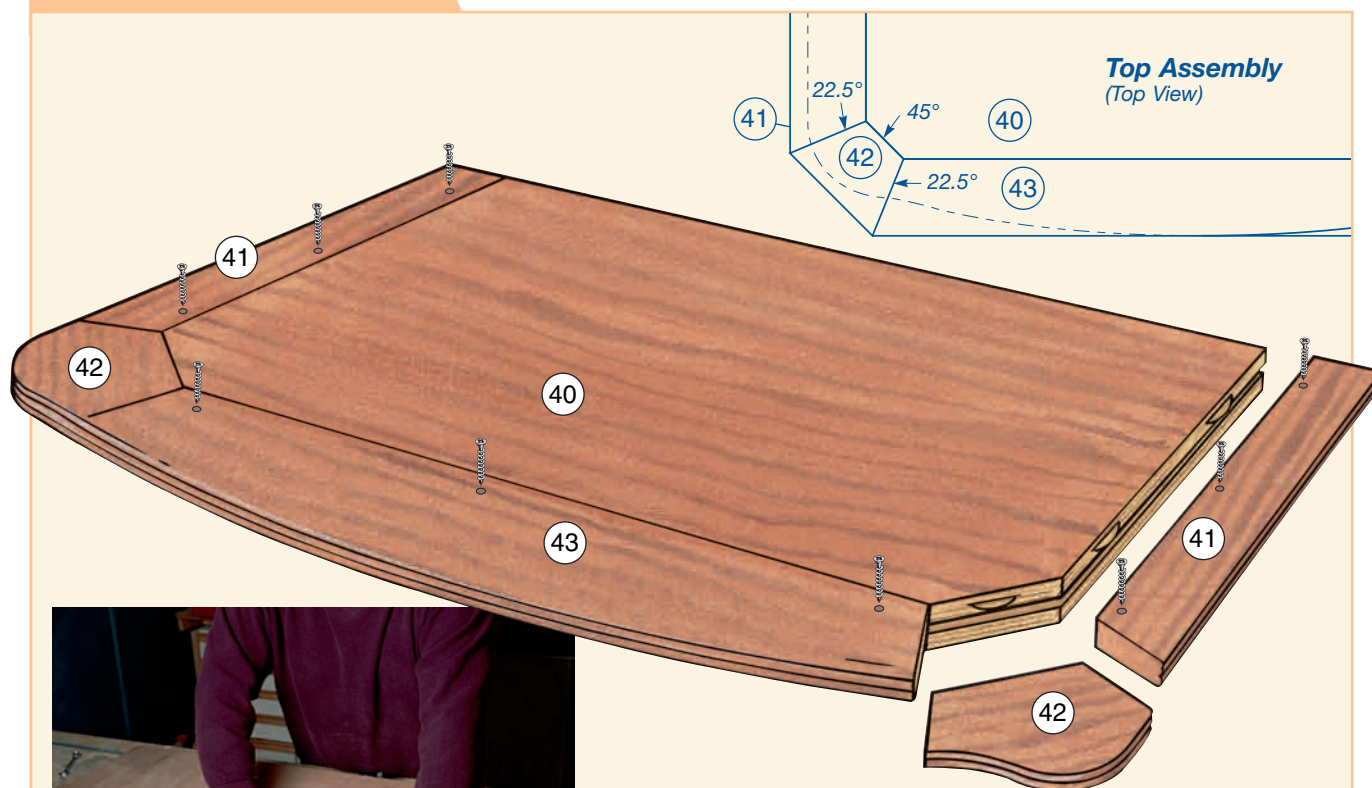


Gang-cut three shelf edging strips to shape at the same time at the band saw.



After cutting the biscuit slots and applying glue and biscuits, use the curved waste piece to help clamp the edging to the shelf.

Top Exploded View



After slotting for biscuits, apply glue and then secure the five pieces of beaded trim around the top using a band clamp.

MATERIAL LIST – Top and Back

	T x W x L
40 Top Panels (2)	3/4" x 13 1/2" x 35"
41 Top Side Moldings (2)	1 1/2" x 4" x 13"
42 Top Corner Moldings (2)	1 1/2" x 4" x 5"
43 Top Front Molding (1)	1 1/2" x 4" x 33"
44 Bookcase Back (1)	1/4" x 36 1/2" x 73 3/8"

tom edge of the top one. Sand them free of machining marks, then glue and clamp them to the decorative stiles.

The last two elements on each stile are smaller veneered plinths (pieces 32) with an ogee cut along their top and bottom edges. Glue a small rectangle of burl veneer (piece 33) to each block, as shown on the *Pinup Shop Drawings*.

Once again, use your table-mounted router to plow shallow stopped dados around the veneer, and miter more of the bullnose molding (piece 11) in the dados. After sanding, glue and

clamp these blocks to the decorative stiles. Dry-fit the stiles to the carcass to check their height, then temporarily secure them with clamps while you move on to the top apron.

Building the Curved Top Apron

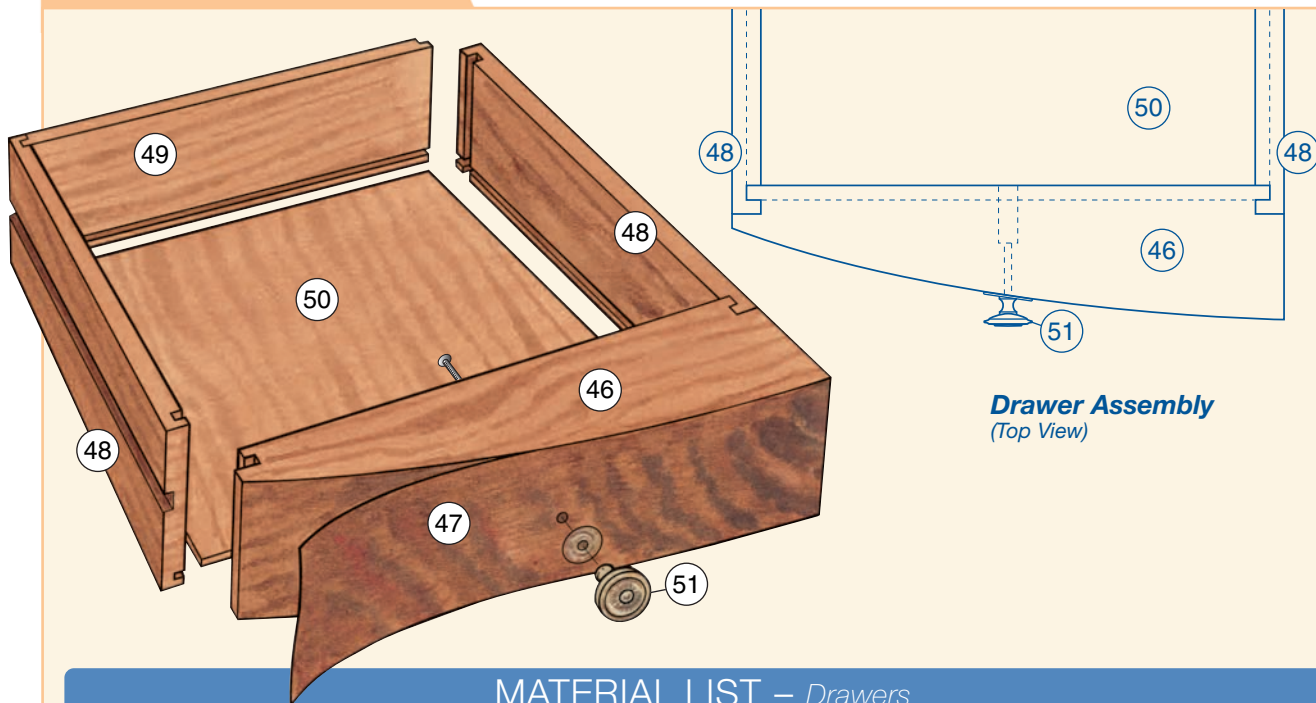
The curved apron that supports the top of the bookcase starts with a 3/4" plywood backer (piece 34). Two horizontal supports (pieces 35) are screwed and glued to this after their front edges have been band-sawn to a curve. Bend a piece of 1/4" plywood



Bullnose trim hides any imperfections from your veneer glue-up, but plowing the grooves is tricky. Use a 1/8" veining bit in your router table and establish your start and stop points with tape, as shown in the inset.



Drawer Exploded View



Drawer Assembly
(Top View)

MATERIAL LIST – Drawers

	T x W x L		T x W x L
45 Drawer Runners (4)	1/2" x 3/4" x 12 1/2"	49 Drawer Backs (2)	3/4" x 4 3/8" x 13 1/2"
46 Drawer Fronts (2)	3 1/2" x 4 3/8" x 14 3/8"	50 Drawer Bottoms (2)	1/4" x 13 1/2" x 12 3/8"
47 Drawer Veneer (2)	1/32" x 4 5/8" x 15"	51 Drawer Pulls (2)	Antique Brass
48 Drawer Sides (4)	3/4" x 4 3/8" x 13"		

(piece 36) along the curve and secure it with glue and small brads or pins.

Select two pieces of book-matched ribbon veneer with grain at about a 45° angle (pieces 37), then glue these to the curved front of the apron using your vacuum press, just as you did to the curved base subassembly. Dry-fit the stiles and apron to the carcass, trim as needed to improve the fit, then cut the hardwood trim (piece 38) that will face the bottom of the apron.

Make minor adjustments for a perfect fit, bullnose the front edge of the trim, then glue and clamp it in place. Now glue the decorative stile and apron assembly in place on the carcass with the help of a couple of hidden glue blocks (pieces 39), as shown in the *Exploded View Drawing* on page 102.

Assembling the Top

To achieve the proper sense of proportion, the top of the bookcase is made from two sheets of 3/4" mahogany plywood (pieces 40) face-glued together. And to stay in keeping with the rest of the design, the top is edged on the front and sides with hardwood (pieces 41, 42 and 43). This molding is glued on in its sticked-up form. Band-saw the gently curved shapes after the top has been glued up.

Chop a few biscuit slots in the top and the moldings, then assemble the parts. Exert equal pressure all the way around with a band clamp, as shown in the *photo* on the preceding page. After the glue dries, band-saw the edging to shape and bead the fresh edges (see *Pinup Shop Drawings*).

Secure the top to the case with counterbored screws driven down through the top into pilot holes drilled in the top rails and apron. Cover the screws with mahogany plugs and sand them flush.

Installing the Back

With the top assembly in place, you can close up the bookcase by attaching the back (piece 44). Chuck a small rabbeting bit in your portable router to mill a 1/4" rabbet in the top and carcass sides to inset the back panel, then square the corners with a chisel. Cut the back to fit with about 1/16" of play. Make sure the cabinet is perfectly square before you secure the back panel with 1" panel pins. Pin the back to the shelves, too.

Making the Drawers

The drawers slide on hardwood runners (pieces 45) that are cut to size and installed into the grooves you plowed earlier.

Band-saw the drawer fronts (pieces 46) from a glued-up solid piece of mahogany and create the locking rabbets on either side with a dado head in the table saw. Sand the curved fronts. Again, select book-matched crotch veneer (pieces 47) and glue it to the drawer fronts, then trim it flush all around. Cut the sides (pieces 48) to size, then use the dado head to plow a groove in each of them for the drawer slides. Stay with the dado head to cut matching locking dadoes to secure them to the front and the drawer backs (pieces 49), then change the cutterhead to 1/4" width to mill grooves in the fronts, sides and backs for the drawer bottoms (pieces 50). Drill a hole in each front for a pull (piece 51): this will have to be counterbored from the back, as the screw won't be long enough.

Temporarily clamp each drawer together and test-fit it in its opening. When everything appears right, assemble the drawers permanently with glue and clamps.

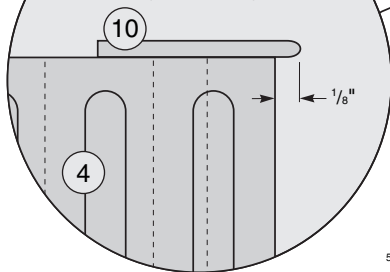
Finishing Up

Sand the entire project through the grits up to 220. We used a light walnut General Finishes stain on the bookcase to good effect. It brought out the various grain patterns and veneer pieces well. Follow that with three coats of semi-gloss polyurethane to bring out the rich depths of the mahogany veneers and to protect the shelves from scratches. Now you've got a long-lasting finish to complete a long-standing bookcase.

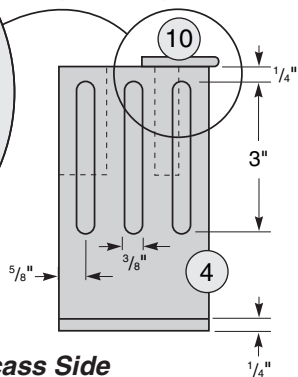


Pinup Shop Drawings

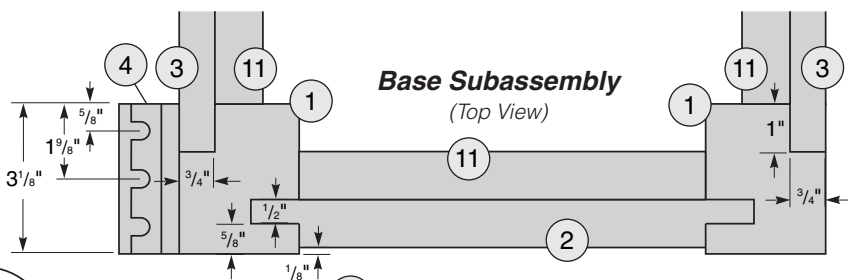
Side Base Molding
(Front View)



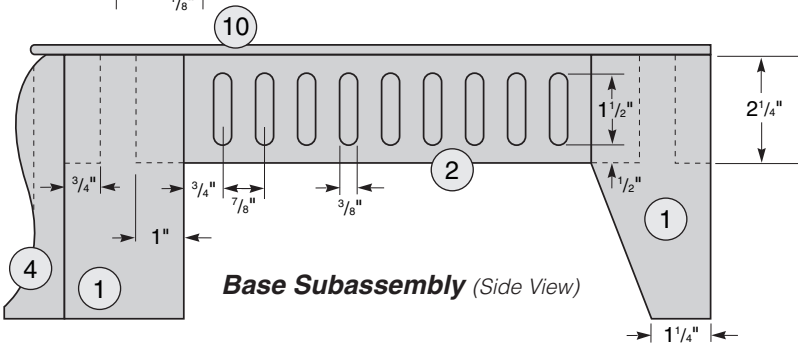
Base Plinth
(Front View)



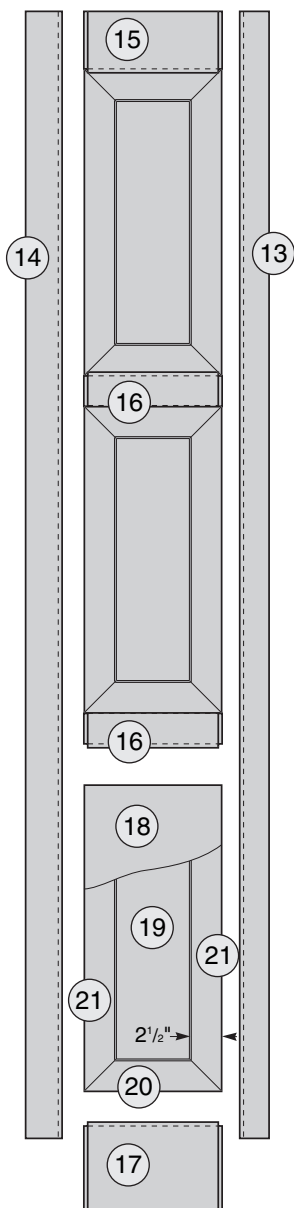
Base Subassembly
(Top View)



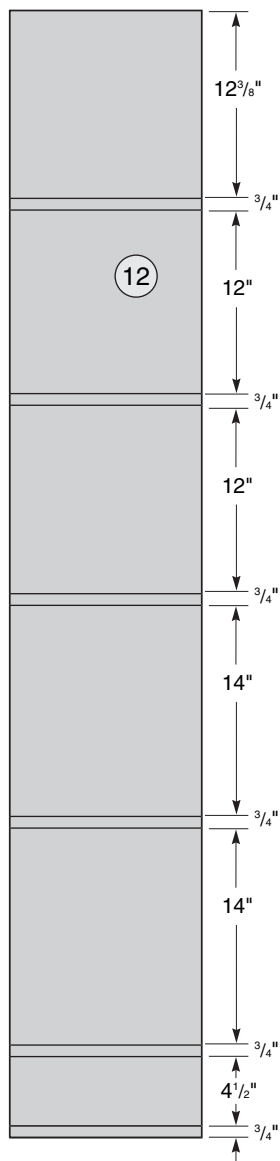
Base Subassembly (Side View)



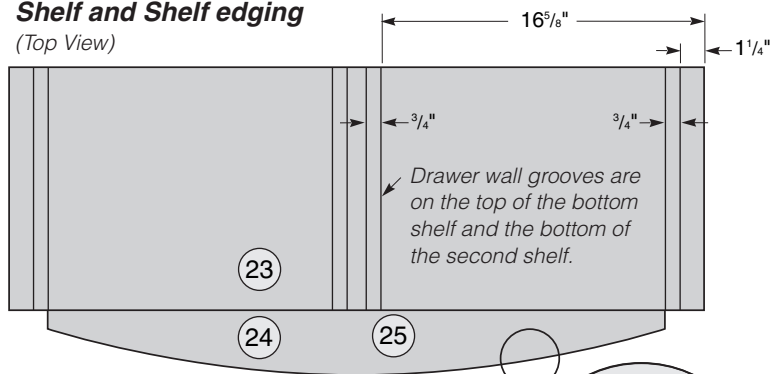
Side Panel Assembly
(Front View)



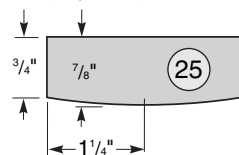
Carcass Side
(Inside View)



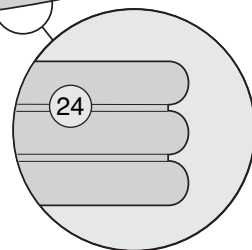
Shelf and Shelf edging
(Top View)



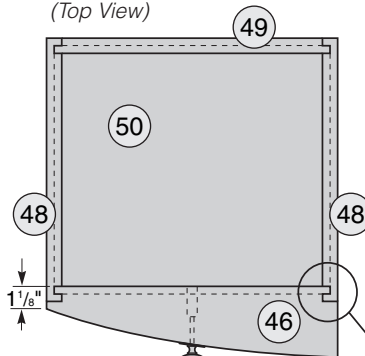
Drawer Divider
(Top View)



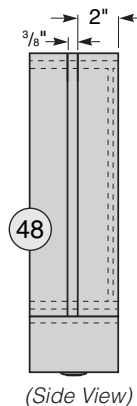
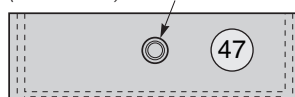
Shelf Edging
(Triple Bead Detail)



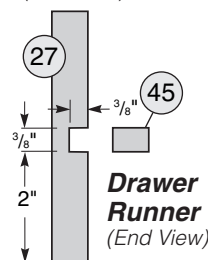
Drawer Assembly
(Top View)



(Front View) Center knob on drawer face.

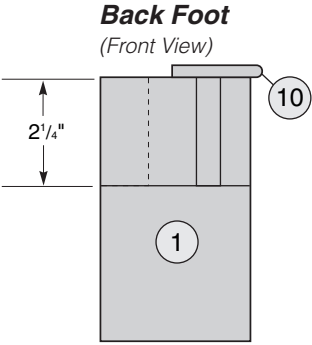


Drawer Wall
(End View)

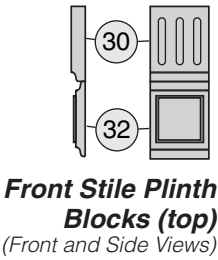
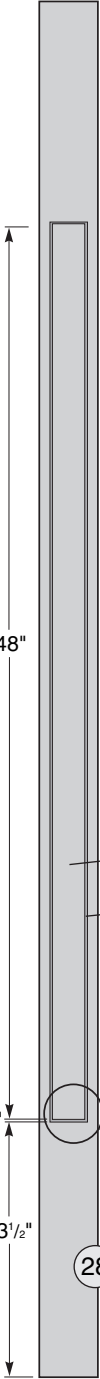


Drawer Runner
(End View)

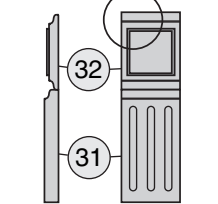
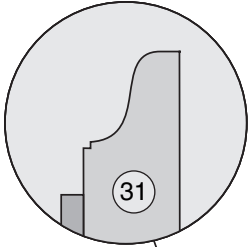
NOTE: Grooves for the side panels (in the stiles and rails) are 1/4" wide by 1/4" deep.



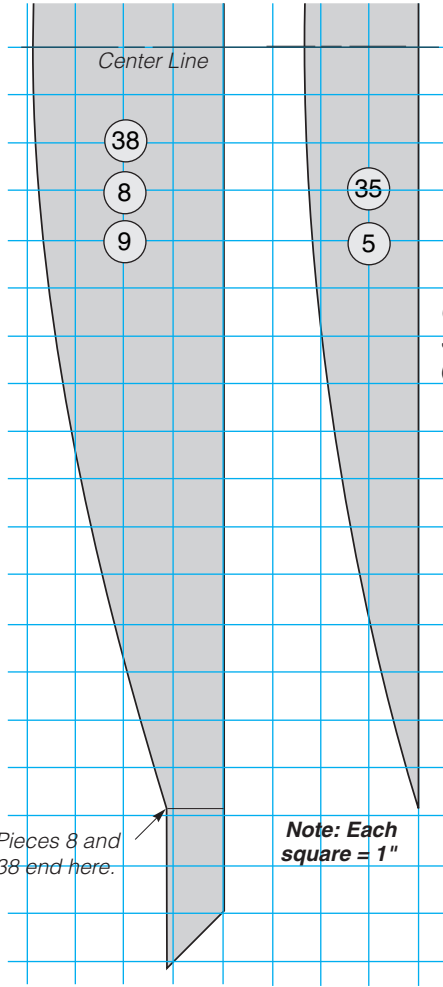
Front Stile
(Front View)



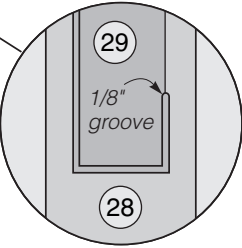
Veneered Plinth Top Detail
(Side View)



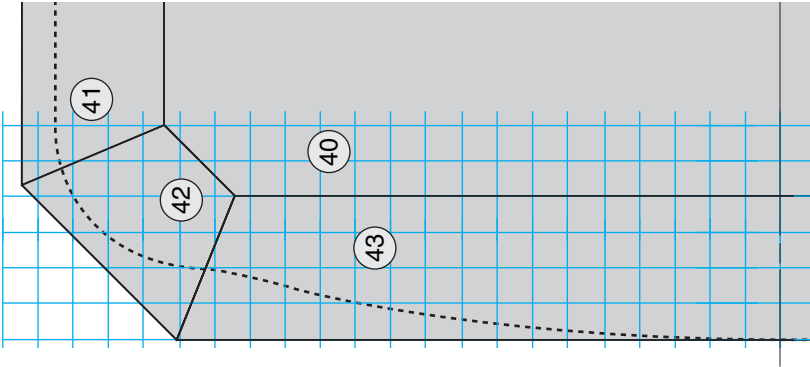
Front Stile Plinth Blocks (Bottom)
(Front and Side Views)



Base Molding and Apron Trim
(Top View)



Bullnose Groove Detail
(Front View)



Top Panel and Molding Detail
(Top View)

Note: Each square = 1"

Heirloom Bookcase

4

Base Plinths

Flute depth setting

Note: Both plinths are made out of the same piece of stock. They're separated after forming the flutes, as shown on page 104.