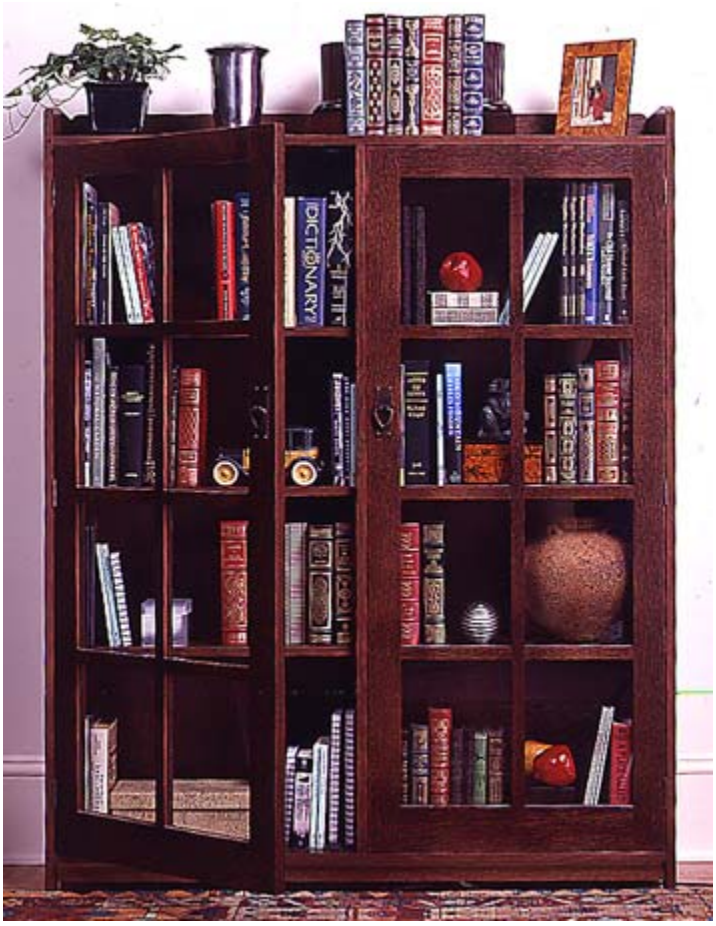
Mission Style Bookcase from Popular Mechanics

Traditional glass-pane and wood-muntin doors highlight this free-standing piece.

TEXT AND PHOTOS BY NEAL BARRETT



As the saying goes, there's nothing like good books. But they can present some storage problems--especially if you like to keep them after you've read them. Wall-mounted shelves are a common storage solution for all this bound wisdom. But they're not easily portable if you want to rearrange the furniture or if you're moving to a new house. Because of this, modular furniture units that combine storage for books with audio and video equipment have become the sensible solutions for most of us.

Unfortunately, many of these pieces can be a bit overpowering, making you feel like you're in a NASA control room instead of the comfort and privacy of your own home. The bookcase we show here is meant to be a tasteful alternative to these other approaches. Its multipaned glass doors, exposed tenons and quarter-sawn oak construction work together to create a sense of seriousness and an air of solidity that are unusual these days. This overall design is a synthesis of several traditional Arts & Crafts pieces. But we did scale down the size of the case slightly so it could be easily placed in a family room, den, living room or bedroom without dominating the space.

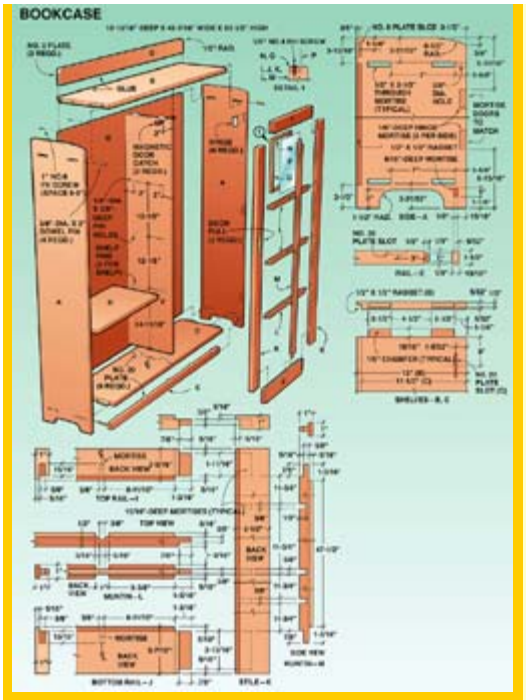


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ILLUSTRATION BY EUGENE THOMPSON

Materials List--Bookcase		
Key	No.	Size and description (use)
A	2	13/16 x 12 x 60" oak (side)
B	1	13/16 x 12 x 48-7/16" oak (top)
C	1	13/16 x 11-1/2 x 48-7/16" oak (bottom)
D	1	13/16 x 3 x 46-9/16" oak (rail)
E	1	13/16 x 1-1/2 x 47-9/16" oak (rail)
F	1	13/16 x 11-1/2 x 53-3/8" oak (partition)
G	1	1/2 x 47-9/16 x 54-11/16" oak plywood (back)
H	6	13/16 x 10-3/8 x 22-3/4" oak (shelf)
I	2	1 x 2-5/16 x 20-1/8" oak (door rail)
J	2	1 x 3-7/16 x 20-1/8" oak (door rail)
K	4	1 x 2-1/2 x 53-1/4" oak (door stile)
L	6	1 x 1 x 20-1/8" oak (muntin)
M	2	1 x 1 x 49-7/8" oak (muntin)
N	32	5/16 x 9/16 x 9" oak (glass stop)
O	32	5/16 x 9/16 x 11-1/8" (glass stop)
P	16	1/8 x 81-5/16 x 11-11/16" glass (pane)
Misc.: Yellow glue, 120- and 220-grit sandpaper, 0000 steel wool, aniline stain, tung oil varnish, No. 0 and No. 20 joining plates, 1-1/2" brass butt hinges, magnetic door catches, brass shelf pins, No. 4 rh screws.		

Case Joinery And Assembly

Since most of the case parts are all 11 to 12 in. wide, and quarter-sawn stock is generally quite narrow, you'll have to glue up panels for the case sides, partition, top, bottom and shelves. Begin by ripping and crosscutting slightly oversized boards for your glued-up panels. Edge-join the mating boards, then lay out No. 20 joining plate slots, 6 to 8 in. on center, along the joints. Cut the slots using a flat tabletop as the registration surface. Apply glue to the slots, edges and plates and assemble each panel, clamping the joints tight until the glue sets. When all the panels are dry, rip and crosscut the parts to finished size.

Lay out the arched cutout at the bottom and the curved profile at the top front edge of each case side. Use a sabre saw to make these cuts.

Mark the end limits of the rabbets on the case sides that will house the back panel. Use a router with a 3/4-in.-dia. straight bit and an edge guide to make the cuts. Square the ends of the rabbet with a chisel. Then, use the same setup to cut the rabbet along the back edge of the top shelf.

The through tenons that join the top and bottom panels to the case sides are cut in several stages. Begin by cutting a continuous tenon on the ends of the top and bottom panels, using a dado blade in your table saw. Use the same blade setup to cut the tenons on the ends of the bottom front rail. You'll have to move the stopblock for these rail cuts, since these tenons are shorter than the through tenons.

Next, use a band saw to make the end cuts that define the width of each tenon. Clamp a rip fence and stopblock to the band saw table to make the repeat cuts. Then chop out the waste between the through tenons with a sharp chisel.

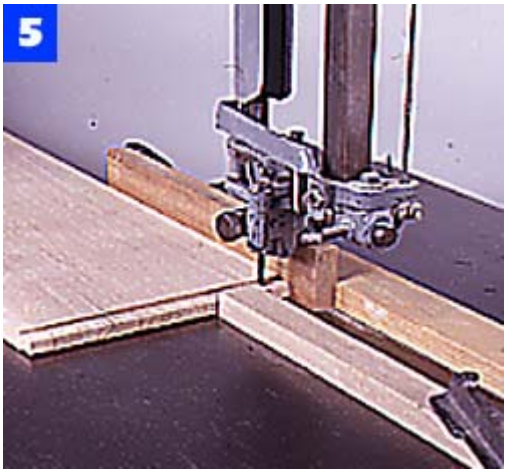
Cut and joint stock for the sides, top, bottom, partition and shelves. Then cut slots in mating edges with a plate joiner.

Lay out the exact locations of the through mortises on the case sides. A plunge router with an up-cut spiral bit is the ideal tool for cutting these joints. And be sure to use a straightedge, clamped to the case side, to guide the router. Make the cuts in several passes and finish each mortise by squaring the ends of the cut with a sharp chisel.

Mark the cutouts at the bottom of both sides and make the cuts with a sabre saw. Smooth the cuts with a spokeshave.

Cut the rabbets for the back panel in the case sides and top using a router with a 3/4-in.-dia. straight bit and edge guide.

Use a table saw with a dado blade installed to make the tenon cuts on the ends of the case bottom and top.



Use a band saw and stopblock to make the shoulder cuts on the through tenons for the top and bottom panels.

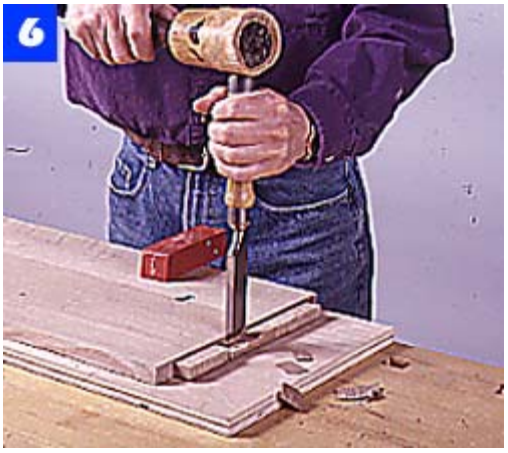
Use a router and straightedge guide to cut the mortises in the case sides for the bottom rail. Again, square the mortise cuts with a sharp chisel. Test fit all these joints, and when satisfied, use a chisel to cut a 1/8-in. chamfer on the ends of each through tenon.

Lay out the locations of the plate slots for the joints between the center partition and the top and bottom panels. Then clamp a straightedge guide to the panels to help position the plate joiner and cut the slots. Next, lay out and cut the slots for the joint between the bottom rail and the case bottom. Apply glue to this joint and clamp the rail to the bottom.

Lay out the rounded profile at each end of the top rail and use the sabre saw to make the cut. Cut a No. 0 joining plate slot in each end of the rail, and a matching slot in each case side. Apply glue to the bottom edge of the rail and clamp it along the back edge of the case top.

Sand the top and bottom assemblies and the partition with 120- and 220-grit paper, then dust them off thoroughly. Next, apply glue to the plate slots and plates and clamp the partition to the case top and bottom. While the glue sets on this assembly, lay out the hinge locations on the case sides. We used solid brass 1-1/2 x 2-in. butt hinges, part No. 67H5, from Whitechapel Ltd., Box 136, 3650 West Highway 22, Wilson, WY 83014; 800-468-5534. Use a sharp knife to outline each mortise. Then, make a series of parallel chisel cuts 1/8 in. apart down the length of the mortise and pare away the waste.

Apply glue sparingly to the mortise-and-tenon joints and joining plate slots, then clamp the sides to the top-partition-bottom assembly. Compare opposite diagonal measurements to be sure that the case is square, adjust the clamps if necessary and let the glue dry. Then, bore a 3/8-in.-dia. dowel-pin hole into each through tenon from the front edge of each case side. Apply glue to these holes and tap in a white oak dowel to lock the joints and provide a decorative accent. Finish the case assembly by cutting a piece of 1/2-in.-thick white oak plywood to size for the case back. Sand the panel smooth with 220-grit sandpaper, then attach it to the case with screws.

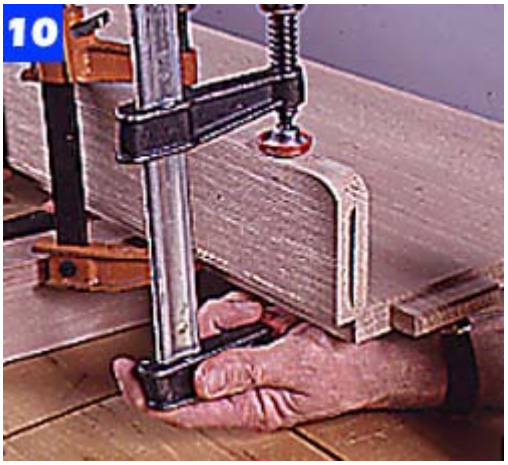


Use a chisel to remove waste between the through tenons. Work from both sides of the board to prevent tearout.

Cut the through tenon mortises in the case sides using a router with an up-cut spiral bit. Square the cuts with a chisel.

Cut plate slots in the case top and bottom for the partition. Clamp a guide board in place to align the plate joiner.

Join the bottom front rail to the case bottom with joining plates and glue. Clamp together until the glue sets.



Cut the top rail to size and shape and cut a plate slot in each end. Apply glue and clamp together until the glue sets.

Door Construction

Mill 5/4 stock to finished dimension for the door parts. Lay out the mortise locations in the door stiles and at the center of each door rail for the vertical muntins. Remove most of the waste from each mortise by boring overlapping holes using a drill press with a 3/8-in.-dia. bit. Use a sharp chisel to square the ends and walls of each mortise.

Set up the table saw to cut the glass rabbet on door parts. Cut the rabbets in two steps, making the first cut, then readjusting the saw and fence to make the perpendicular cut. Begin with door rails and stiles to perfect your technique, then finish up with the smaller muntins.

Use a dado blade in the table saw to cut the tenons on the rail and muntin ends. Cut the back side of each tenon with one setup, then move the stopblock on the saw table to make the face cuts.

Study the plan to understand the configuration of the half lap joints at the intersection points of vertical and horizontal muntins. Then, use a dado blade to cut these joints.

Use a sharp chisel to cut recesses in the case sides for the flush-mounted hinges. Work carefully for a precise fit.

Test fit each joint and then apply glue and clamp the muntin assembly together. Next, glue and clamp the top and bottom rails to the vertical muntin and compare diagonal measurements to ensure that the assembly is square. To avoid a frantic glue-up process, join only one stile at a time to the muntin-rail assembly.

Cut strips of stock to form the glass stops, then crosscut them to size to fit around each pane of glass. Test the fit of all stops, but do not fasten the glass in place until after the doors are finished.

Check the fit of each door in its opening in the bookcase, making sure that there is a uniform 1/16-in. margin on all sides. Then scribe the hinge outline on the door edge with a sharp knife, and cut the mortise using a sharp chisel. Install the hinges and hang the doors on the case. Install the pulls and magnetic catches as shown on the plans. The pulls we chose are part No. 106STH3 from Whitechapel, and the small magnetic catches are a common hardware store item.

Cut the shelves to finished size and check for proper fit. Then, remove the shelves, doors, stops and hardware and finish sand all the pieces with 220-grit sandpaper. Remove all the dust.

Finishing

We used the finishing techniques on the bookcase that we discussed in "Rocking Chair". When the finish is done, install the glass panes in the doors and fasten the stops with 5/8-in. No. 4 rh screws. Since the door pulls we chose have an antique bronze finish, we wanted our brass hinges to match. Whitechapel offers a solution (part No. AS1) that darkens the finish on brass hinges. Just be sure to carefully follow the application instructions on the package--this solution is poisonous.

To cut the door stile mortises, use a drill press to bore overlapping holes. Then square up the holes with a chisel.

Cut the rabbets for the door rails and stiles on a table saw. Make the first cut on the board edge and the second on the face.

Cut the muntin rabbets in two passes on a table saw. Be sure to use a fingerboard and pushstick to make the cuts.

Use a table saw and dado blade to cut the half lap joints where the muntins cross. Check the blade setup on scrap stock first.

Check the fit of each muntin half lap joint before applying glue. Use a sharp chisel to make any minor adjustments.

Glue the muntins together, then clamp the door rails in place. Check for square by comparing diagonal measurements.

Cut the glass stops to size and attach with screws. Do not install the glass panes until after the finish has been applied.