# Medium Height Pine Shelves

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Introduction

Here is a set of inexpensive bookshelves that can be built in a weekend and a day using hand tools. The joinery is complex – through dovetails joining the top to the sides, with sliding dovetail joints for the fixed shelves – but the result is a very sturdy set of shelves with no visible fasteners. Inspiration for this project came from Charles H. Hayward's *Cabinetmaking for beginners*.

Plans

These plans show the design of the bookshelves. The height and width were chosen to allow a minimum amount of waste using eight foot dimensional lumber. A taller case would mean narrower shelves, or you would need longer stock.
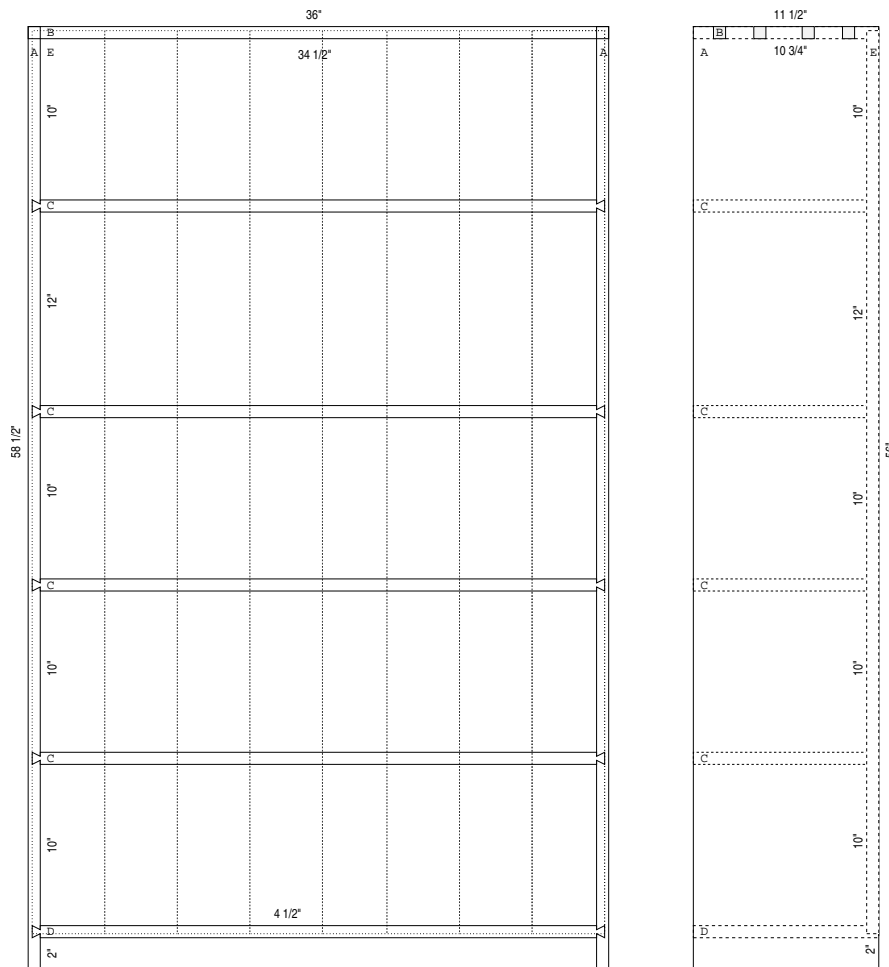
To build the project, as laid out, requires 7 eight foot pieces of 1×12 lumber. If you build the project with a plywood back, or without a back, only 4 eight foot 1×12 boards are necessary.

As mentioned, the top is joined to the sides using through dovetails, which are lightly glued. Each of the shelves is joined to the sides using sliding dovetails, which are glued at the front of the case. The sides, top, and bottom shelf are rabbetted to contain the back, which is composed of ship-lapped boards, nailed at the center of each board into the rabbets and the shelves.

Cut List

Key	Qty	Description	T	W	L	Notes
A	2	Sides	$3/4$	$11\,1/2$	$58\,1/2$	Dovetail pins on the top, rabbet cut in the back, female sliding dovetail cut for the shelves.
B	1	Top	$3/4$	$311\,1/2$	36	Dovetails on the top, rabbet cut in the underside of the back.
C	4	Middle shelves	$3/4$	$10\,3/4$	$35\,1/4$	Dimensions include a $3/8''$ male sliding dovetail on each end.
D	1	Bottom shelf	$3/4$	$11\,1/2$	$35\,1/4$	Dimensions include a $3/8''$ male sliding dovetail on each end, rabbet cut in the top of the back.
E	8	Back pieces	$3/4$	$4\,1/2$	56	Middle boards have rabbets cut on opposide sides so adjoining boards can overlap. End boards have a single rabbet along the edge.

All dimensions are in inches.

Construction Notes

The first step is to cut the sides and the shelves to size. Cut to within $1/16''$ of the line and plane the edges square and to the cut line. Use a shooting board if you have one, or a carpenter's square if you don't. Rip $3/4''$ off the interior shelves to accomodate the back, and plane the edges smooth and square.

Next, strike lines for the sliding dovetails in the sides of the shelves. Mark the lines with a marking knife, and remove a sliver of material from the waste side so your saw will track to the line. Cutting each dovetail slot exactly the same is very important. Set up a bevel gauge to the same angle as on your dovetail plane, and cut the sides of the dovetail slots with a stair saw. If you don't have a stair saw, use a cross-cut backsaw and mark the depth on the front and back of the sides. Be sure to cut at the angle indicated by the bevel gauge.

Start removing the waste by chopping in from the ends using a sharp chisel. Plow the remainder of the groove using a router plane. Be sure to plow all the dovetail slots to the same depth.

Before cutting the dovetail on the ends of the shelves, strike a line on the top face that matches the edge of the dovetail plane blade. This will reduce tearout on the portion of the shelves that will be visible. Use a mortise gauge to strike lines on the ends of the shelves to indicate how deep to plow the dovetails. Be sure to test your setup for both parts to the joint before cutting them in the shelves. Very small errors can result in a joint that is much too loose. Carefully test each joint to make sure it will be tight and square when it is finally driven home.

Now that the shelves and sides are cut, re-measure the length for the top and cut it to size. Plane the edges square.

Next, plow a rabbet in the top, sides and bottom shelf for the back pieces.

Finally, cut through dovetails to join the top and the sides. Note that the rabbet in the sides and top will need to be covered, so take this into account when cutting the dovetails and removing the waste. When viewed from the top and the sides, there should be no voids.

Note that if you are building this project from construction grade lumber, the wood will probably be much wetter than furniture grade wood, and will start drying as soon as you bring it into your shop. This means that all pieces that you aren't currently working on should be clamped into a "drying rack" so they dry flat. This is especially important for the shelves – it will be very difficult to drive the shelves into the dovetail slots if they have warped. I used the $3/4''$ offcuts from the shelves as stickers, and clamped all the shelves together with two stickers between them. If pieces warped anyway, I put wet rags on the concave surface until the pieces were reasonable flat again.

Before joining the pieces together, cut the end pieces for the back. Having at least two pieces from the back to attach will help hold the shelves square while the glue dries. The back pieces are 1×12 lumber, ripped in half, and cut to fit in the rabbet in the back of the case. For the two end pieces, plow a rabbet along only one of the long sides. All of the other back pieces receive two rabbets on opposite sides. You may want to chamfer or round over the edges of the boards where they will meet when assembled. A small chamfer helps to hide any irregularity in the joint between the boards.

With the joinery cut for the top, sides, shelves, and two back pieces, smooth the pieces and remove any defects using a smooth plane.

Now for some assembly. Put glue on the pins and tails of the top dovetail joint and fit the top to the sides. Next drive in the bottom shelf, from the front, without any glue, until the front shelf is within a few inches of the front of the case. Apply a little glue to the dovetail on the shelf and drive the shelf flush with the front of the case. Wipe up any excess glue. Drive in all the remaning shelves in the same way, with glue only at the front end of the shelf. This way if the shelves and the sides expand and contract at different rates, they can move independently, but the front of the shelves will remain flush with the front of the case.

Finally, attach the left and right end boards to the back of the case. Make sure that the case is square before nailing the boards. Use a single nail driven in to each shelf (and the top), placed near the side of the case. Also be sure that one board has the rabbet facing forward, and one has the rabbet facing backward.

Cut the remainder of the back boards, rabbet the opposite edges, and fit them to the back. Apply a chamfer to the forward edges, if desired. When there is space for only one more board, measure the proper width for this board, cut, rabbet and smooth it. Be sure that there is at least a $1/8''$ gap between the end of one board and the edge of the rabbet of the next to allow for expansion and contraction.

Smooth the back boards, fit them to the case, and nail each board to the shelves. Apply the finish of your choice.

Notes