



BOARDED BOOKSHELF

Chapter 18

Do we need to adjust every shelf?

Trying to improve a simple set of bookshelves might seem ridiculous. But I think there are significant things to say about the warped state of bookshelf construction in the modern age.

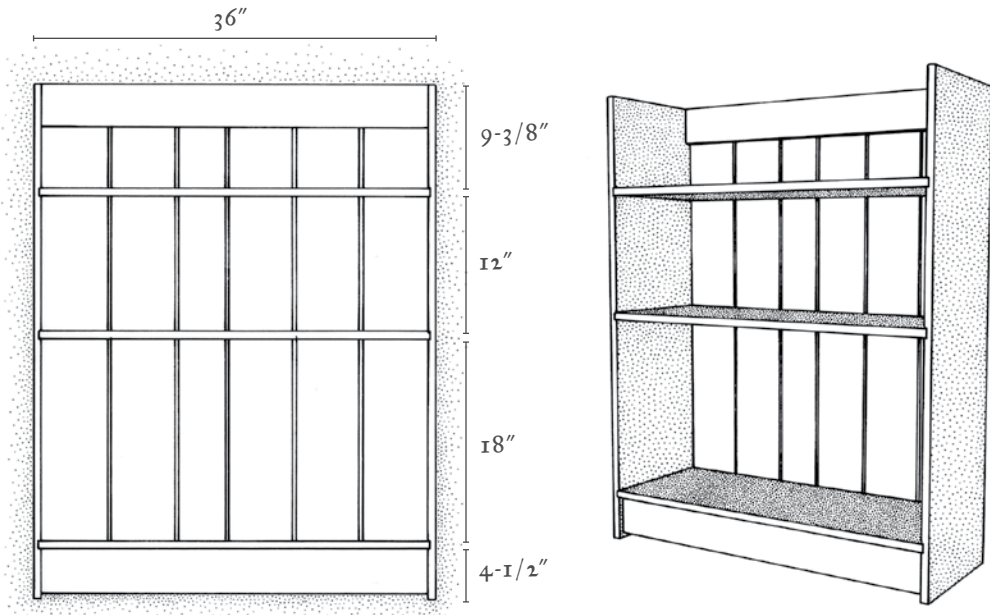
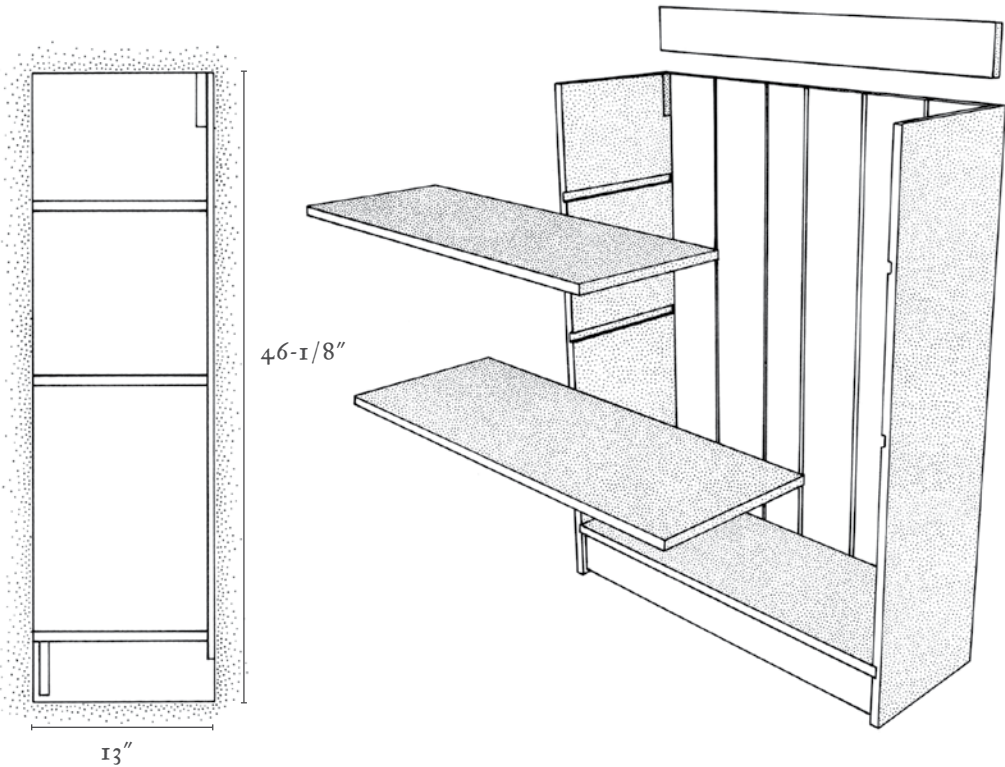
What could be wrong about horizontal surfaces fastened to vertical ones? Plenty.

For starters, I'm not a fan of adjustable shelving. I think that if you gave enough monkeys enough mescaline, you might be able to come up with a plastic jig to drill the right number of holes for adjustable shelf pins that weren't a waste of time or space. But that's a lot of mescaline. Adjustable shelving is, in my opinion, mostly a cop-out.

Books come in fairly standard sizes. Heck, they once came in sizes that were based simply on how many times you folded a large sheet of paper. But thanks to the miracle and wastefulness of modern book manufacturing, we now have some bizarre sizes to deal with.

These odd books are at the extreme ends of a bell curve of book shapes (called "form factors" or "formats" in the design world). You can find books out there that are 18" wide and 8" high (yup, a book on billboards). But if you are someone who reads woodworking books, novels and non-fiction (and not art books on Estonian midget nudist wrestlers), then trying to accommodate whack-doodle form factors isn't necessary.

So I've always viewed adjustable shelving with great suspicion. Do we need to adjust every shelf in a carcass 1" up or down? I don't.



What Sizes are Important?

Go to any bookstore and you'll find that most books come in roughly three sizes: small, medium and large.

Small books are 6" x 9" or smaller – these are the novels and standard woodworking books of the 19th and 20th centuries. It's a convenient size for reading in the subway or the park. And they fit easily into a knapsack or shoulder bag.

The medium size is about 8-1/2" x 11" (slightly more if it's a hard-back). This became a fairly standard size for how-to books in the latter 20th century and is economical to print. So you will encounter a lot of these books as you build your library. I find them to be a stepchild size. They are too big to travel with easily. Yet when I am reading them at home I always wish they were bigger.

The large size of book is 11" x 17" or some close variant. These books are uncommon in the modern age, unless you are into art books or old books. But when I find them they are worth the extra expense.

Many excellent old books on woodworking, including the 18th-century pattern books, were oversized folios. So I think it's worth making a place for them in a bookshelf. It might be wishful thinking, but so what?

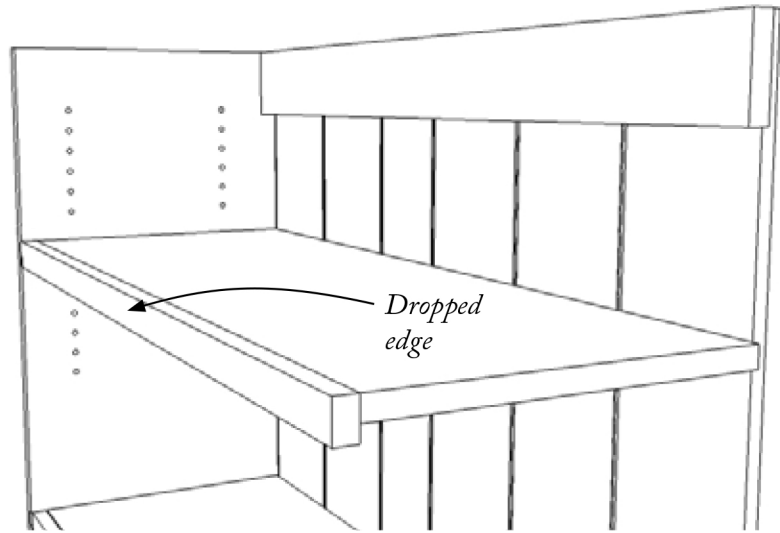
So this bookshelf has shelf openings of three sizes: 18" high for big books, 12" for the medium books and 9-3/8" for the small ones. (However, the top shelf has no top, so you can fit taller books up there if you wish.)

Other Advantages of this Form

So now that you know the typical book sizes, wouldn't it be sweet to provide just a wee bit of adjustability – up and down – for odd sizes? No, it wouldn't.

Fixed shelves are far stiffer than adjustable ones. You can nail a fixed shelf in place through the back of the carcass. This adds immense stiffness so the shelf won't sag. (And if you think that sagging shelves aren't a problem then you don't own enough books.)

The other advantage to fixed shelves is they add to the overall soundness of the carcass. If you have only two fixed shelves – which is typical in a commercial bookcase – the carcass is more likely to rack compared to a carcass that has multiple shelves that are nailed through both the back and the bookcase's vertical uprights.



Dropped edge on a shelf.

One last thing I like about fixed shelves: They don't ever collapse or slide off their adjustable shelf pins.

How to Cheat

So let's say you think I'm full of crap or you pine desperately for adjustable shelves. Can you make a shelf unit that is stiff enough? Yup. Do these two things: Use a plywood back that is glued and screwed in place. That will stiffen the carcass. To make the shelves stiff, use what is called a "dropped edge" on every adjustable shelf. This is when you attach a strip of solid wood to the front and/or rear of the shelf to stiffen it.

A typical dropped edge is 1-1/4" wide and is attached to the front of the shelf. Note that the dropped edge can also be used to hide the fact that you used plywood for the shelves. (Naughty, naughty. Plywood isn't as stiff as solid wood – hence the name "solid" wood.)

If you look at the bookcase in this book, the "kick" (the horizontal strip affixed to the lower shelf) works exactly like a dropped edge. There's good reason for it to be attached to the lower shelf because it's designed to hold the heaviest books.



Roughing it. These pine planks were almost 15" wide when I started flattening them. I dressed them with a jack plane by traversing the grain. After truing them up as best I could, I ripped them down and put them through my electric planer.

Or Build this Thing

This bookshelf is designed to hold the three standard sizes of books. It is made with a minimum of material. And it is dirt simple to build because it is nailed together with just a little glue and a few shallow grooves and dados.

With this particular example, I began building it Friday afternoon and was painting it Sunday night.

The only difficult part of the bookcase is finding wood that is 13" wide. A standard 1x12 is 11-1/4" wide, which is too narrow to hold the biggest books. So if you are using dimensional lumberyard stock, you'll need to glue up some panels for the sides and shelves. Using 1x8s is a good place to start.

If you find some rough pine that is wide enough, you are likely going to have to process it by hand. That was where I started on a Friday with a jack plane and a full head of steam.



One side. You can see how I use a fence and saw to cut a perfect wall for the dado. After sawing this first wall, don't remove the fence.



The pusher block. This is same operation as above, but on the other side of the fence. Note the pusher block.



Use the shelf. The shelf is the best indicator of the second wall of the dado. Mark it in pencil and then saw inside the line.



Quick work. Knock the chisel with a mallet to remove the waste. Use the chisel bevel-down so you have more control over how aggressive the cut is.



Clean-up. The router plane will make the bottom of the dado perfectly flat and the same depth – even if the stock is a bit cupped.

Housed Joints for Shelves

The three shelves are held tight in six 1/4"-deep dados in the sides. Dados are easy to cut with hand tools, even if you don't have a dado plane (I don't).

The way I make dados is to saw the two walls of the joint using a handsaw and a fence made from a scrap clamped to the carcass. After sawing out the walls, I remove most of the waste with a chisel used bevel-down for the most part. Then I clean up the bottom of the dado with a router plane set for the final depth – in this case 1/4".

Use the construction drawings to set out and cut the six dados. The last little bit on the carcass sides is to cut two short grooves – also 1/4" deep – that hold the top rail of the bookcase.

These grooves are even easier to cut than dados. Mark them out using a knife or a marking gauge and define the walls with a wide chisel. With a narrow chisel – I used 5/8" – chop out the area where the groove ends.



Sawn walls. If you are in a sawing mood, cut the walls with a tenon saw.



Chiseled features. You can simply chop out most of the waste with a chisel, working across the grain for the most part. Be careful if you decide to chop parallel to the grain because you could split the entire case side.

If you are an assassin with a tenon saw, cut the walls of the groove. If you prefer the chisel, bust up the waste with that tool. Then follow up with a router plane, which will peel out the waste with ease.

Assemble the Carcase

Headed nails do most of the work in holding this bookcase together, though some well-placed glue can also help things stay together during the long term.

First fit all the shelves and the top rail into their housed joints. I prefer to plane down the shelves to fit the dados rather than adjust the dados (but that's because I don't own side-rabbit planes).

Once all the shelves and the top rail fit into their housings you are ready to add glue.



Tape guides me. I use a strip of painter's tape to lay out the location of the nails on the sides of my carcass. Once I lay out the pilot holes on the first joint, I mark the location of the pilot holes on the tape with a marker. Then I re-stick the tape to a new place.



Long-grain kick. The kick is glued in place to the underside of the lower shelf. Then it is nailed in place through the sides of the bookcase.

If you own clamps, I recommend you glue the joints, clamp them up and wait for the glue to set before nailing the sides to the shelves and top rail. If you don't have clamps, the nails will be your clamps.

Paint glue on the end grain of the shelves. Let the glue sit for a minute. Apply more glue to the dry spots. Now paint glue in the housings and drive the shelves and top rail into place with a mallet. Add the other side piece. If you have the clamps to hold things in place, clamp the sides until the joints close.

If you don't have clamps, glue things up, drive everything home then nail the sides to the shelves with cut or wrought nails while the glue is still wet.

Before you drive the nails, lay out their locations on the case sides and drill pilot holes – the size and depth of the holes depends on the nails you're using. I used 6d nails for this joint but 5d would also have worked.

I used five nails to fasten each shelf in place. That's a bit of visual overkill, but the sides of this case will be painted, so I knew it wouldn't be a big deal. If you are going to finish this piece without paint, use only three or four nails per shelf.



Shiplapped & beaded. The backboards have a 1/4"-thick x 5/16"-long tongue on their long edges. On the tongues that face the viewer, I cut a 3/16"-wide bead to help conceal the joint between the backboards.

Add the Kick

Once the carcass is complete and the glue has cured, you can add the kick below the bottom shelf. This 4"-wide piece of pine helps prevent the carcass from racking and strengthens the lowest shelf, which takes the most abuse.

Shoot the end grain of the kick board so it fits snugly between the case sides. Glue it to the underside of the bottom shelf so it's set 1/4" back from the front edge of the shelf. Then nail the kick in place through the sides of the carcass.

The Back

The 1/2"-thick back strengthens the carcass and completes construction of the whole bookcase.

I used four back pieces that were slightly less than 9" wide and shiplapped. The shiplaps conceal any wood movement during the seasons.



Secure the back. Nailing the back to the shelves helps prevent the shelves from sagging and the backboards from pulling away from the carcass.

I glued and nailed the two outermost back pieces to the case sides. The two interior bits were simply nailed in place. All four back pieces were nailed to the three shelves, which greatly increases the strength of the entire piece.

After cutting the shiplaps and beading the backboards, glue the outermost backboards to the sides of the carcass. Clamp them up and lay out pilot holes so you can nail the backboards to the back of the shelves. Drive two nails through the backboard into each shelf.

Finishing

For this bookcase, I painted the exterior of the sides with a brick red milk paint (sanding between coats with a #300-grit sanding sponge). Then I coated the entire thing with lacquer.

I took this tack because I didn't want to get any paint on my books. But I also wanted to use the dark paint to frame the light-colored interior of the case.

Before cleaning up the case and leveling all the joints, I taped off the front and back edges of the bookcase and painted the case sides with two coats of paint. Then I removed the tape and used a block plane to level the front edges of the shelves and sides (and remove any paint that seeped under the tape).

With the details sorted and cleaned up, I broke all the hard edges with #220-grit sandpaper and finished the bookcase with two coats of lacquer. And I called it done.

BOARDED BOOKSHELF

NO.	PART	SIZES (INCHES)		
		T	W	L
2	Sides	3/4	13	46-1/8
3	Shelves	3/4	12-1/2	35
1	Top rail	3/4	4	35
1	Kick	3/4	4	34-1/2
	Backboards*	1/2	34-1/2	43

* Made up of multiple shiplapped boards

No Thanks, Billy

I'm an easygoing guy for the most part. My friends are liberal, conservative, devout and agnostic. Homosexual and ammosexual.

But it annoys me when I see an IKEA Billy bookshelf in a wood-worker's house.

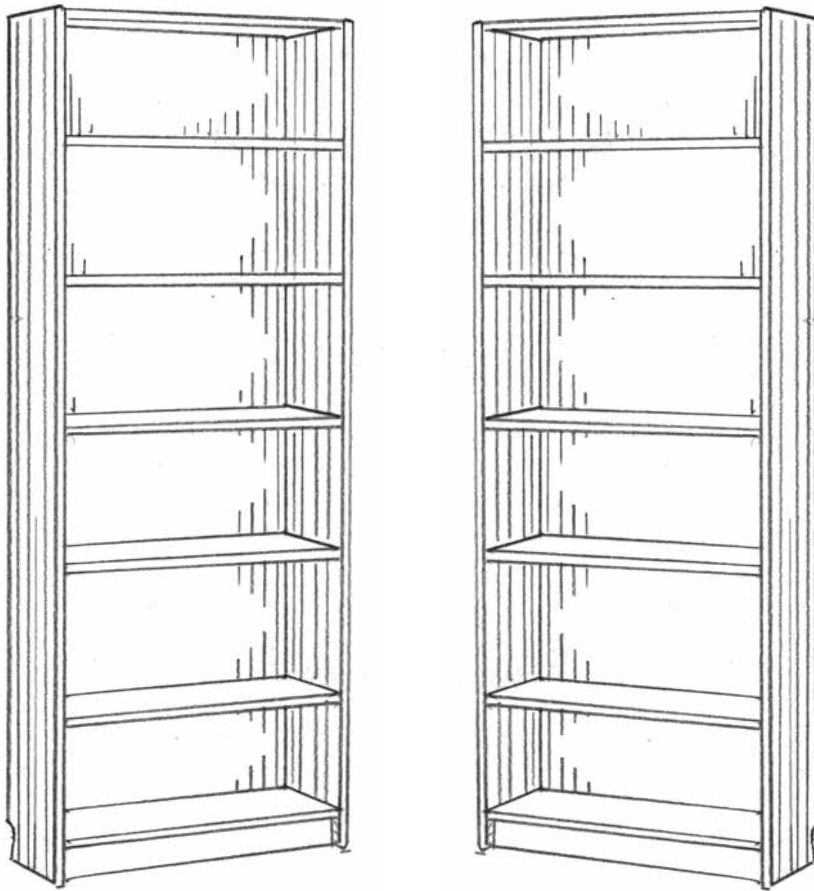
This 31-1/2" x 11" x 79-1/2" bookshelf is sold for a penny less than \$80 at IKEAs all over the world. That seems like a great deal to people with a lot of books – my in-laws have almost a dozen of them. But the Billy is an abomination if you have any hand skills.

Yes, you get about 15 linear feet of shelving, but the carcass is ridiculously unstable. Only two of its shelves are fixed. So unless you secure the Billy to the wall (or other Billy bookcases), it will rack in short order.

The shelves are rated to hold 66 pounds each, which isn't bad if you read only paperback novels, but the shelves sag like crazy if you own old books with stout bindings.

I say all this with experience. When my wife and I bought our first old house in Lexington, Ky., we actually drove to Virginia to visit the nearest IKEA and bought two Billy bookcases for our book collection.

I put them together and immediately felt wronged. After a few months I let them do what they do best: fall apart. Then I started building shelves for our home.



Billy wrong. The IKEA "Billy" bookcase represents everything that is wrong with bookshelf design. Yet even people who know better cannot resist the \$79.99 price tag.