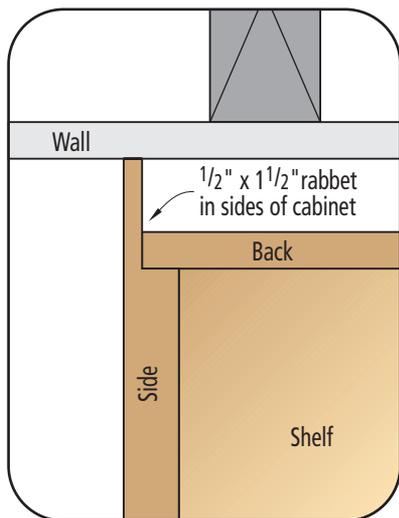
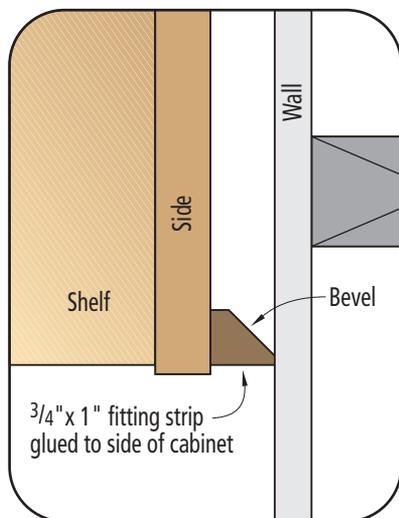


BUILT-IN BASICS



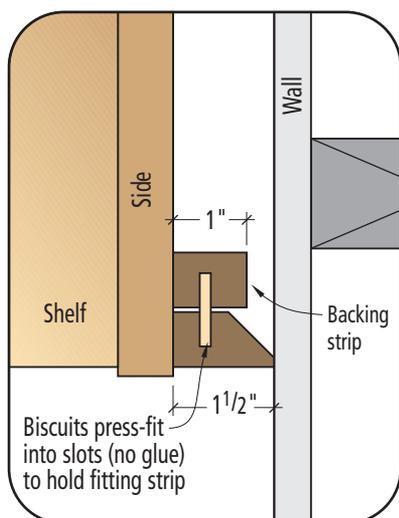
Back Rabet Detail

Plan view



Simple fitting strip

Plan view



Complex fitting strip

Plan view

Making built-in furniture isn't tough. I've seen lots of first-time woodworkers build bookshelves that fit in the nooks by their fireplace.

But making built-ins that hug the wall, sit level and are anchored firmly to the house requires a little more know-how.

Making a built-in is easy once you understand scribing, fitting strips and French cleats. Here's a solid lesson in all three.

Luckily, with a little planning and a few modifications to the plans of almost any cabinet, you can make it a built-in. After trying different systems for making built-ins, this is the one that I prefer. It's simple, rock-solid and almost foolproof.

Cabinets in a Crooked House

If you've ever hung a cabinet or built in a few shelves, you've prob-

ably noticed that your rooms aren't all square and your walls aren't all plumb. This is usually the result of your house settling. It's also possible your framers or dry-wallers were sloppy.

Either way, don't build your cabinets crooked to fit a catawampus corner or sloping wall. Always build your projects square and add a couple features to allow them to fit in an irregular space. There are two tricks to accommodating out-of-whack walls: oversized back rabbets and fitting strips.

Big Back Rabbets

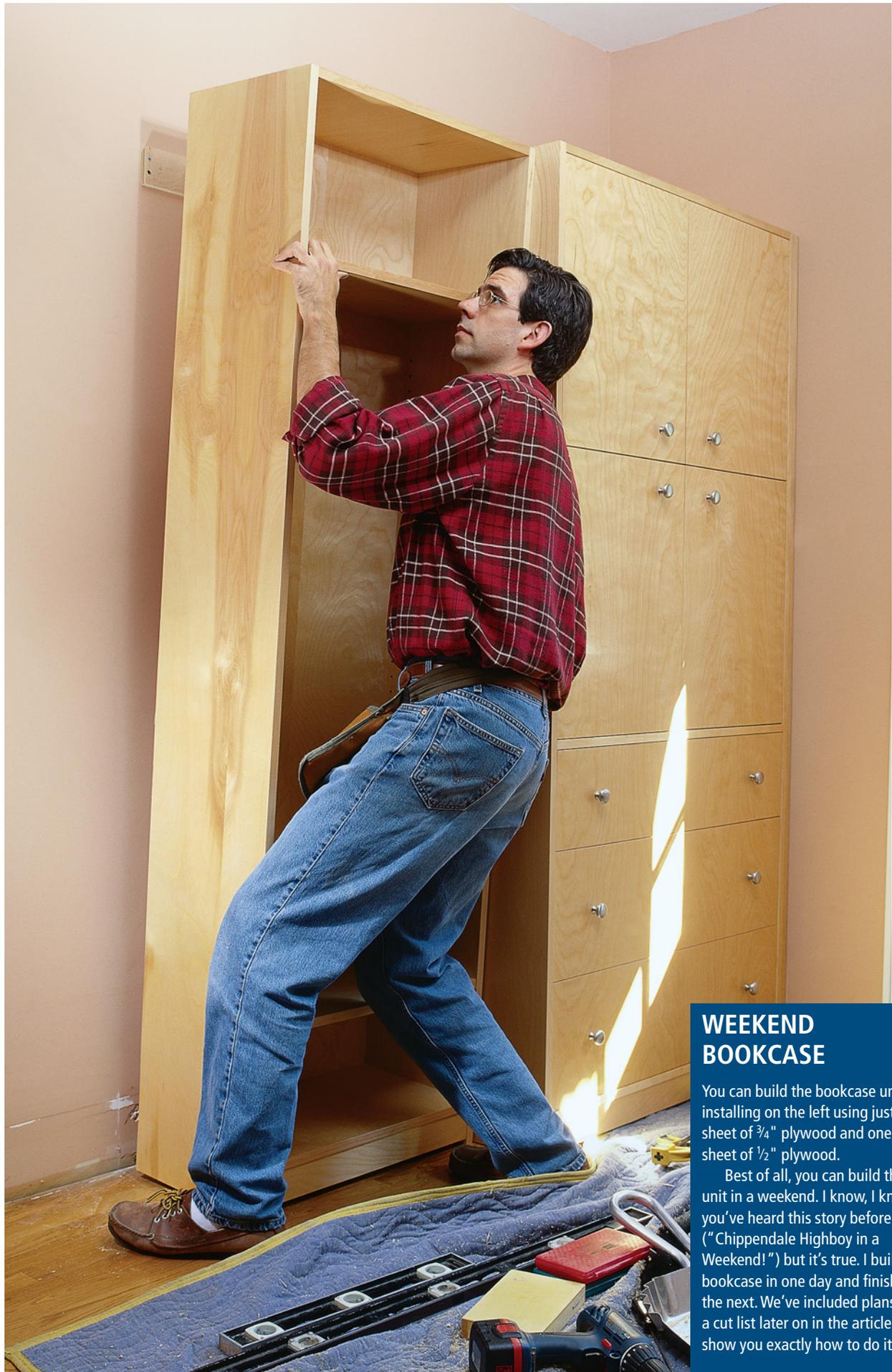
All cabinets should have a back that rests in rabbets in the sides of the case. This ensures a tight fit between the back and sides. With freestanding furniture, if your back is 1/2"-thick, then the rabbets for that back should be 1/2" wide. This is not so with built-ins.

You need to cut a rabet that is significantly wider. How wide? I usually make it between 1 1/4" and 1 1/2", depending on how out of kilter the wall is.

What this large rabet does is it creates two long tongues on the back of your cabinet that can

by Christopher Schwarz

Comments or questions? Contact Chris at 513-531-2690 ext. 1407 or chris.schwarz@fwpubs.com.



Photos by Al Parrish

WEEKEND BOOKCASE

You can build the bookcase unit I'm installing on the left using just one sheet of $\frac{3}{4}$ " plywood and one-half sheet of $\frac{1}{2}$ " plywood.

Best of all, you can build this unit in a weekend. I know, I know – you've heard this story before ("Chippendale Highboy in a Weekend!") but it's true. I built this bookcase in one day and finished it the next. We've included plans and a cut list later on in the article that show you exactly how to do it.

be scribed to fit almost any wall.

What's scribing? This is when you cut the edge of the cabinet so it matches the shape of your wall and fits tightly against it. Scribing isn't difficult, and I'll show you how I go about it later.

Fitting Strips, Scribe Stiles

"Fitting strips" and "scribe stiles" are two other weapons in your arsenal against the crooked wall. They are a lot like the large rabbets on the backside of your cabinet, except they help fit the sides of your cabinet to a wall or to another adjacent cabinet.

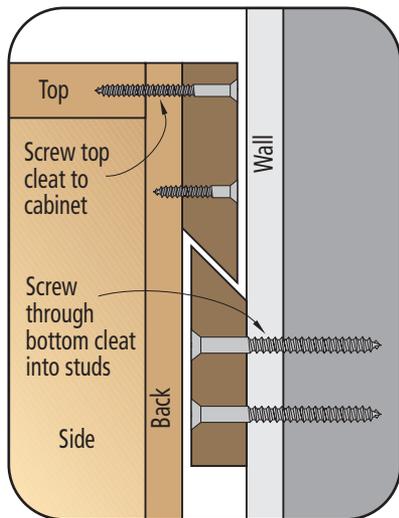
If you are building and installing a face frame cabinet, your best bet is incorporating a scribe stile into your design. With this technique you make your face-frame stiles (the vertical pieces of the frame) wider so they extend out over the sides of the cabinet by $\frac{3}{4}$ ". Cut a rabbet on the backside of the stiles, which makes them easier to scribe to fit, and you then have a seamless way of attaching your cabinets to walls or to other cabinets.

If you are building a cabinet without a face frame then you should turn to the fitting strip.

Fitting strips are attached to the cabinet sides and are cut to fit against a wall. Typically you cut a 45° angle on the backside of the $\frac{3}{4}$ " x 1" fitting strip so when you scribe it there is a lot less material to cut away. There are a variety of different ways to attach a fitting strip to a case. Whatever method you use, avoid using metal fasteners because they could get in the way when you scribe and then trim the fitting strip to size.

If the case is small, you can simply glue the fitting strip to the side of the case. If the case is large, you should come up with an alternate plan. It's no fun turning a big case on its side, trimming a little more and then setting it back up over and over again.

One solution is to glue a backing board to the cabinet behind the fitting strip that is a little narrower. Then you attach the fitting strip to the backing board using several biscuits but no glue. This allows you to set the cabinet against the wall, mark your scribe, cut it and then put the cabinet in place. Then you fine tune the fit by pulling the strip out for more trimming. See the drawing on the previous page.



French cleat detail
Profile view



There are a wide variety of cabinet levelers you can buy, but they all basically work the same way. Many of them are adjustable at both the foot and from above through an access hole you drill in the cabinet's bottom. This feature is a huge convenience when leveling your cabinet on an uneven floor.

Attaching it to the Wall

The other big issue when installing a built-in is how you actually attach it to the wall. There are a number of ways to do it. Some people simply run some long screws through the back and into the studs. This works, but the screw heads are visible inside the cabinet, and you must use really long screws to reach into the studs across your big back rabbet.

Another solution is to install a hanging strip inside your cabinet. The hanging strip is usually a piece of $\frac{3}{4}$ "-thick material that is about 3" wide and is nailed or biscuited between the sides – right beneath the top. With this system, you attach the cabinet to the wall through the hanging strip using countersunk screws, which you can then plug to hide them.

The system I prefer uses a French cleat. It sounds complicated at first, but once you get it straight in your head you'll see it has some advantages.

The French cleat uses two cleats, each with one long edge beveled at 45°. One of the cleats is screwed to the wall and the other is screwed to the back of the cabinet. The two 45° angles nest together, locking the

cabinet to the wall. This is a common way to hang kitchen wall cabinets, but I've found it's great for hanging cabinets that go to the floor, too. And I've come up with a method that makes it easy to do. But before you can install any cabinet, the first thing you have to do is get it sitting level on the floor.

A Word About Cabinet Bases

When building large cabinets, it's best to build a separate base from the cabinet itself that is about 3" to 4" in height. You can then set the base in place and level it using wooden shims or leveler feet. Leveler feet are a piece of hardware that attaches to the inside corners of your base and have feet that screw up and down. You adjust the feet until the base is level and then set the cabinet on top of the base and move on to the section on scribing.

With smaller cabinets, such as the bookcase shown here, you can skip the separate base and install the leveler feet under the bottom shelf or use shims to level the entire cabinet. Either way, you must get the cabinet level left-to-right and front-to-back before you proceed.



Once the cabinet is level front-to-back as well as left-to-right you can plug the holes you drilled to access the leveler hardware. Many brands of levelers come with their own plastic plugs, though a shop-made tapered wooden plug works just as well.

Scribing

Scribing isn't difficult, but it requires practice. The first thing to do is take a look at your cabinet. If it is going in a corner, then you should remove the big back rabbet that goes into the corner – it's only going to get in the way of scribing the other rabbet and the fitting strip (if you have one).

Now push the cabinet back against the wall or walls until some part of the cabinet meets the wall. It's time to mark a scribe line on your back rabbet. Get a compass that allows you to lock the swinging arm. Using a ruler, find the biggest gap between your wall and cabinet. Set the distance between the pencil and the point of the compass to this distance.

Now trace the shape of the wall onto the back edge of the cabinet. Use the point of the compass to follow the wall and let the pencil draw that shape onto the cabinet. Keep the compass level.

In the photos, you'll see I use a European-style scribing tool instead of a compass. This piece of red plastic costs about \$8 (ouch), but it's a lot easier to handle than a compass. This scribing tool is sold as the McGrath Scribe and

Profile Gauge, and it is available from Diefenbacher Tools, 800-326-5316 or diefenbacher.com. Ask for item # 663-1000.

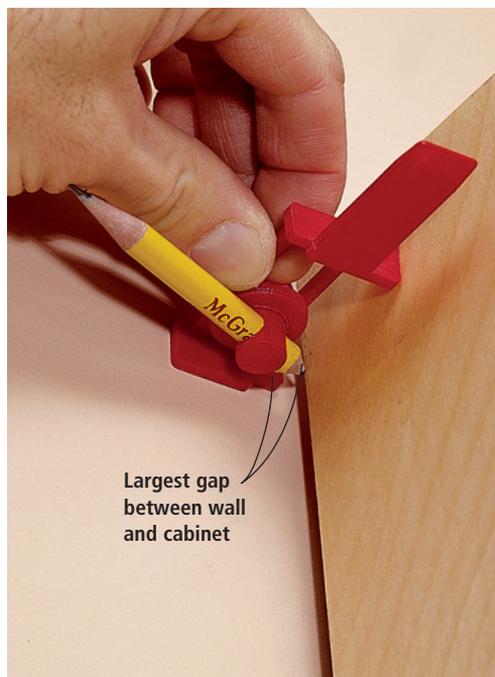
Once you've drawn your scribe line, trim the back rabbet to that line. You can use a jigsaw followed by a hand plane, a belt sander or even a hand-held power planer. Test the fit of your scribe line to the wall and make any necessary corrections.

Once the back is fit, scribe the fitting strip (if you have one) where the front of the cabinet meets the wall. Once everything fits snugly, attach the case to the wall using your French cleats.

Installing French Cleats

It's simple to get a perfect fit with these cleats if you follow these steps. I like to use plywood or any tough hardwood such as maple for the cleats. First rip your two cleats to about 3" wide and cut them to length so they're about 1" shorter than the width of the back of your cabinet. If your back piece is 23½" wide, then cut the cleats to 22½" long – this gives you some left-to-right play during installation.

The first step is to install a



To set your scribing tool, use a ruler to find the biggest gap between the back edge of your cabinet side and the wall. Set your scribe to span this distance exactly. Now run the scribing tool up the back edge of your cabinet – being sure to maintain contact with both the wall and cabinet. The pencil will draw your cut line on the back edge of the cabinet side.

Largest gap between wall and cabinet



Scribe line

Many professionals use a belt sander to remove the material down to the scribe line. Belt sanders are a little too speedy for my tastes. I prefer to use a jigsaw to cut right up to the line and then clean up the cut with a block plane. It's still quick, and there's little chance of obliterating your scribe line.



Install the first French cleat to your wall using the longest screws available. These screws must anchor the cleat into the stud wall of your house, or the cabinet could come toppling down if someone tries to climb it.

cleat on the wall so it's perfectly level and about 2½" below where the top of the cabinet will touch the wall. Screw the cleat to at least two studs in your wall using #10 x 3" screws.

Now push the cabinet in place against the wall and use a stepladder so you can work on the top of the cabinet. Take the other cleat and drop it behind the cabinet and push it into place with the bevel facing the back of the cabinet. It should drop into place with ½" or so sticking above the top of the cabinet. Mark a line on the cleat where the back and cleat intersect. Lift the cleat out and rip the cleat to width exactly to your line.

Pull the cabinet away from the wall and screw the cleat to the backside of the cabinet so the top edge of the cleat is perfectly flush to the top of the cabinet.

With the help of an assistant, lift the cabinet a few inches and place it on the cleat on the wall. The cabinet should sit flush against the wall, flat on the floor and refuse to rock or move.

If the cabinet doesn't sit on the floor, remove one cleat and shave off a tad from the bevel with a hand plane or a jointer. Or you can adjust the leveling feet. If the

cabinet rocks a bit on the cleat, add a short strip or two of masking tape to the bevel on one cleat and that will tighten things up.

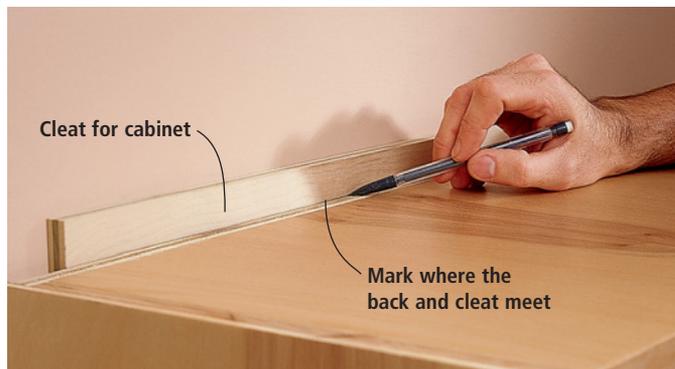
There's another type of cleat that some prefer. Instead of ripping a 45° bevel on each long edge. The rabbet should be exactly one-half the thickness of the cleat so that the cleats nest together like a shiplap joint.

Install the first cleat against the wall. When you attach the second cleat to the cabinet, nudge it up ⅛" and then screw it in place. This will prevent the rabbets from bottoming out when they nest and will give you a little play when the cabinet rests on the floor.

Cleaning Up

With the cabinet in place, you might have to screw one of the side pieces to a wall to pull the cabinet tight against the wall.

The cabinet is now complete, except for any trim around the base and crown. To finish the run of cabinets shown at the beginning of the article I still need to build and install another large unit with drawers and doors. Then comes the trim moulding. And then comes a cold beer. **PW**



With the back rabbet scribed and a cleat screwed to the wall, push your cabinet in position and drop the second cleat in place behind the cabinet back. Using a sharp pencil (top), mark a line on the cleat where the cabinet back and cleat meet. Remove the cleat (bottom) and rip it to width. If you had to scribe near the top of your cabinet, you might have to plane down your cleats a tad, too.



Clamp your cleat to the back of the cabinet with the top edges of the cleat and cabinet back perfectly flush. If they're out of kilter you're going to make trouble for yourself, so take care. Screw the cleat to the cabinet using long screws that you countersink into the cleat.

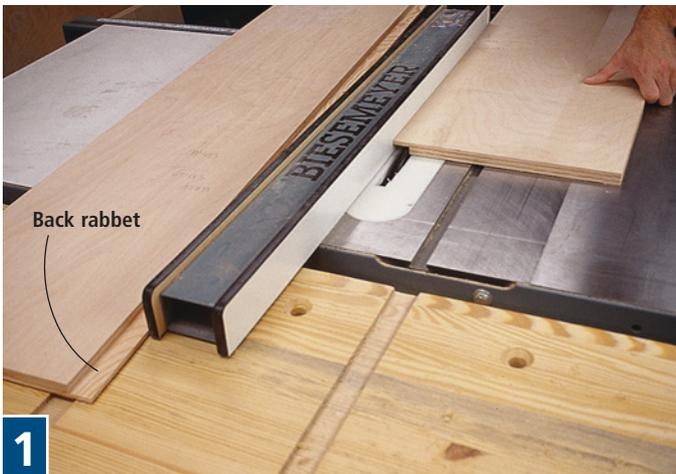
THE ONE-WEEKEND BOOKCASE

When I build a project for my family, I'll come up from the shop and the first words out of their mouths are usually something like: "Aren't you done making my (corner cabinet, entertainment center, Morris chair, carved weasel) yet?"

Well this time the joke was really on them. I went down to the shop at 8 a.m. one morning and by 5 p.m., this bookcase was sanded, assembled and ready for finishing. They were shocked.

There's nothing fancy about this basic bookcase unit, but it does hold a ton of stuff, is inexpensive to build (about \$70 in materials) and goes together as fast as a highboy on "The New Yankee Workshop." Well, OK, it's not quite that fast.

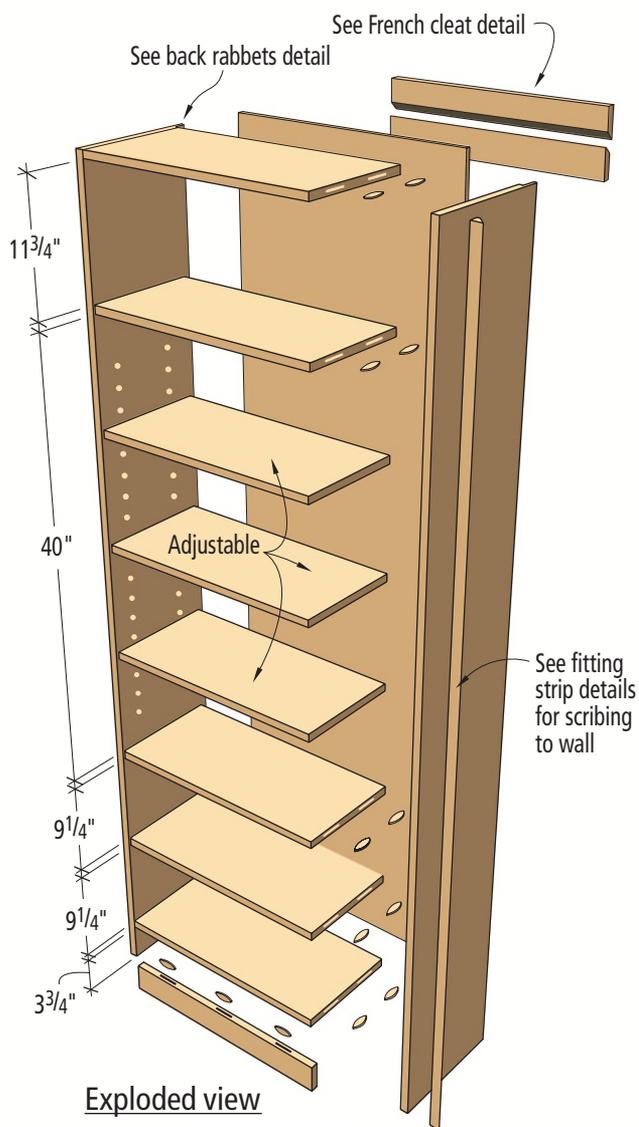
Follow the photos and drawings to build your own. But be forewarned. Once you build something this fast, your family is going to think you spend most of your time in the shop just goofing off.



Back rabbet

1

Begin by cutting the big $1\frac{1}{4}$ " x $\frac{1}{2}$ " back rabbet on the back edge of the sides. The most accurate way to make this rabbet is by using a dado stack in your table saw. Make a couple passes and be sure to keep even downward pressure.



Exploded view

THE ONE-WEEKEND BOOKCASE

NO.	ITEM	DIMENSIONS (INCHES)			MATERIAL	COMMENTS
		T	W	L		
□ 2	Sides	$\frac{3}{4}$	12	80	Plywood	$\frac{1}{2}$ " x $1\frac{1}{4}$ " rabbet for back
□ 2	Top and bottom	$\frac{3}{4}$	$10\frac{3}{4}$	$22\frac{1}{2}$	Plywood	Biscuited into sides
□ 3	Fixed shelves	$\frac{3}{4}$	$10\frac{1}{2}$	$22\frac{1}{2}$	Plywood	Biscuited into sides
□ 3	Adjustable shelves	$\frac{3}{4}$	$10\frac{1}{2}$	$22\frac{3}{8}$	Plywood	
□ 1	Kick	$\frac{3}{4}$	$3\frac{3}{4}$	$22\frac{1}{2}$	Plywood	Biscuited into bottom
□ 1	Back	$\frac{1}{2}$	$23\frac{1}{2}$	78	Plywood	
□ 1	Fitting strip	$\frac{3}{4}$	1	80	Plywood	Use if unit goes in corner
□ 2	French cleats	$\frac{3}{4}$	3	$22\frac{1}{2}$	Plywood	45° bevel on one long edge

You can download an optimization chart for this project at: popwood.com/features/mag.html



2

To lay out the location of your shelves, clamp the two sides together and use a framing square to mark the shelf locations. Use the drawing to lay out the locations of the fixed shelves, top and bottom pieces.

If you work in a small shop (like I do) the No. 1 challenge with a piece of furniture like this is cutting down the plywood into manageable sizes for my table saw.

Luckily, Nick Engler showed me how to do it quickly and accurately. Engler made a simple platform from 2 x 4s that you place on two sawhorses in your driveway. Using a special shop-made fence and a circular saw you can make perfect cuts in sheet goods.

The original article appeared in the April 2001 issue. If you don't have that back issue, we've posted this article on our web site at popularwoodworking.com. When you get to our home page, click on "Select Articles," scroll down and you'll see the article titled "Sawing Plywood and Particleboard."

I've built many cabinets using this simple jig and highly recommend it.

Screws or Biscuits?

I built this project using biscuits and a 1/2"-thick back, which makes the case quite rigid. Another possible approach is to screw the fixed shelves in place through the side pieces using #8 x 2" screws.

If the sides of your bookcase aren't going to show (or you don't mind the look of plugs) this is a solid way to make a bookcase.

One final option I'm fond of with large cabinets is to use both biscuits and pocket screws together. This hybrid system is about the fastest and most accurate way I know to build a case.

First cut the biscuit slots, then cut the pocket holes on the underside of the shelves. Glue up the case and then drive the screws home. The biscuits line up all your joints perfectly, and the screws allow you to do this all without any clamps at all. **PW**

SUPPLIES

Lee Valley Tools
800-871-8158
leevalley.com

Cabinet Levelers, One-ton Glide
Each glide is rated for 2,000 pounds. Foot adjusts over a range of 2 1/4".
Item # 01508.01, \$3.70 each

Nickel-plated Shelf Supports
Item # 94204.02, \$3.50 for a package of 50.



3

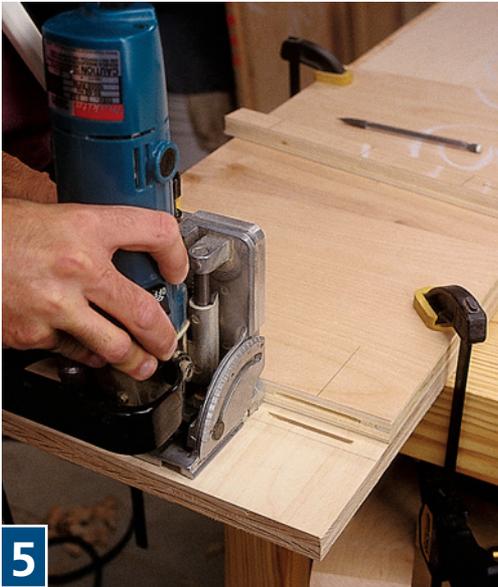
Template helps lay out biscuit locations

All the permanent shelves are attached to the sides using biscuit joints. Clamp the shelves at the location where they will join the sides. I then made a simple template to lay out the locations of my biscuit slots. This saves a lot of measuring.



4

Take the fence off your biscuit joiner (or retract the tool's fence fully into the fence assembly). Cut three biscuit slots in the shelves as shown. I used #10 biscuits because I was out of #20s.



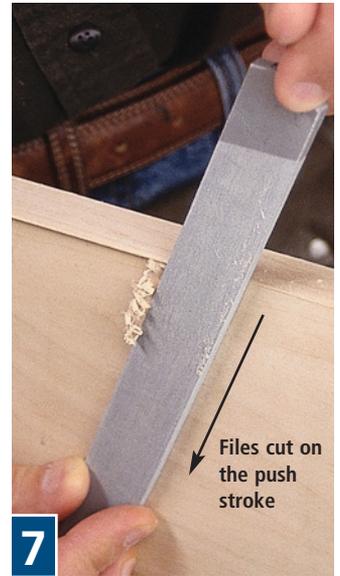
5

Now turn the biscuit joiner on its head and cut the slots in the sides pieces of the cabinet.



6

Iron on some adhesive edge-banding to cover all the visible plywood edges. Use a household iron set on "high." After a couple minutes of ironing, take the iron off the tape and use a sizable block of wood to rub the edging down. The wood acts as a heat sink to cool the adhesive and set the edge-banding in place.



7

Use a file to trim the overhang of the edge-banding. Remember that files cut only in one direction. Move them the other way and they'll cut poorly and dull quickly. Now sand all your parts at 150 grit and then 220 grit.



8

Always do a dry run before gluing up your case. Once you're sure everything works, use a slow-setting glue. I have become quite fond of the new Titebond Extend glues. They are very strong and give you just enough working time to get a big case together by yourself. Once the glue is dry, cut the back to size. You want a perfect fit because the back will keep the cabinet square once it's screwed in place.



9

Drill your shelf pin holes every 2" on center. You can use a commercial jig like the one shown or make your own from scrap. Then attach the kick to the bottom using glue plus biscuits or pocket screws. I finished the bookcase with two coats of spray lacquer in the backyard on a nice breezy day.