



Stylish shelves

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stylish



**Store-bought cabinets
make the project simple
to build and easy to
adapt to any room**

by Gary Wentz

shelves



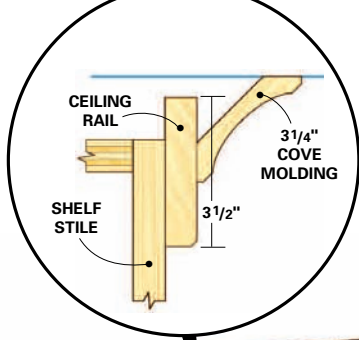
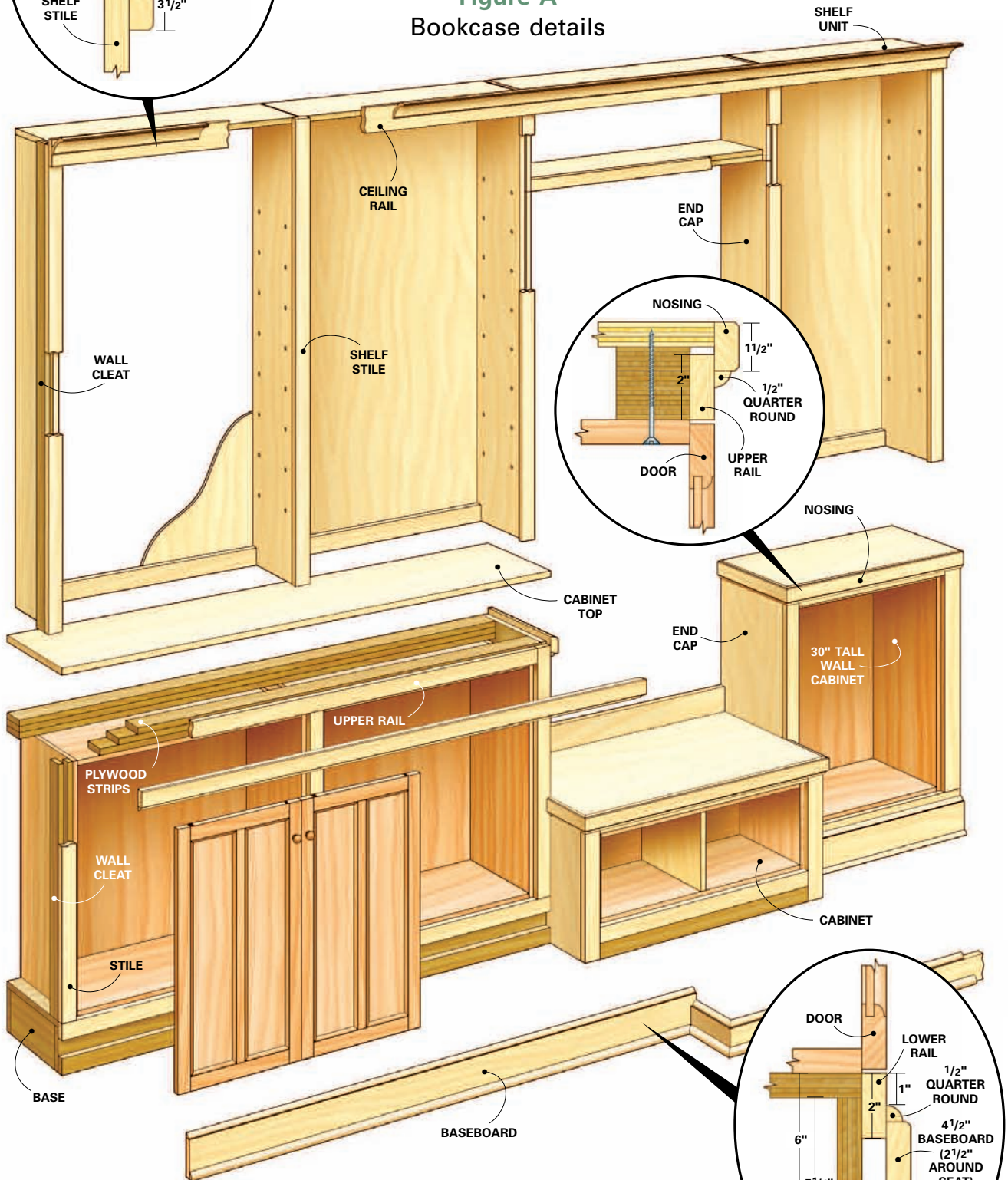


Figure A
Bookcase details



EXACT DIMENSIONS VARY
WITH YOUR ROOM SIZE. SEE
TEXT FOR SIZING GUIDELINES.



= BIRCH PLYWOOD
OR SOLID MAPLE



= STANDARD
CABINETS



= 3/4" FILLERS

So you think building wall-to-wall shelving is beyond your skill level? Well, take a closer look. We designed this project around standard cabinets, which eliminates the most difficult work. The rest is plywood and boards—no tricky joints or fancy curves. This project will fit gracefully into just about any room. It's stylish enough to dress up a living room but informal enough to suit a casual bedroom. Its open shelves will display collectibles in the family room, and its closed cabinets will add practical storage space in a home office.

Whatever the room, this design doesn't require a lot of space. It protrudes less than 14 in. from the wall and can be as long or short as you like. Because it's built in sections, it could run partway along a wall or completely cover the longest wall in any house. The window seat and the shelf above it are optional.

Usually, the most difficult, time-consuming part of a project like this is building and installing cabinet doors. We eliminated those steps by building this bookcase around standard kitchen cabinets. We used "upper" cabinets, shallow wall cabinets meant to be hung above kitchen countertops. But we didn't want this project to look like it belonged in a kitchen. To avoid the kitchen look, we framed around the doors with solid wood rails and stiles, which gives them the inset appearance of traditional built-in furniture.

Tools, time and cost

Compared with most built-in furniture, this bookcase is easy to build. But it's not for a beginner. In addition to standard tools, you'll need a table saw, a miter saw, a router, a random orbital sander and some experience using them. If you don't have a compressor and 2-in. brad nailer, consider adding them to your tool arsenal for \$300 or less. Air nailing will give you better results and save hours of hammer work.

Expect to spend about three weeks on a bookshelf like the one shown here. The materials for ours, which covers a 12-ft. long, 8-ft. tall wall, cost about

\$1,000. Your costs will vary depending on the cabinets you choose and lumber costs in your area. There's a complete list of the materials we used on p. 60.

Custom-fit the plan to your room

Because this whole project is built around cabinets, you have to carefully plan their positions and spacing. By experimenting with various cabinet and spacing widths, you can find a combination that perfectly fits the length of a wall. Start with a list of available cabinet widths. Cabinets are usually available in 3-in. increments: 21, 24, 27, etc.

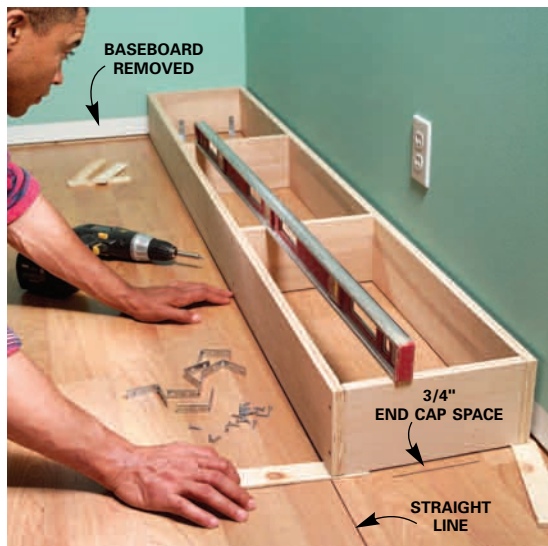
You could do a scale drawing on graph paper, but it's easy to make disastrous mistakes that way. Instead, cut wood scraps that represent various cabinet and spacing widths. Then experiment with various combinations (**Photo 1**). Make all the spaces *between* cabinets the same, ideally between 1-1/2 and 2-1/4 in. Take up the odd inch or two by using different spacing at walls. In our situation, for example, we placed our first cabinet 2-1/4 in. from the wall. Then we spaced cabinets 2 in. apart until we reached the other wall, where we ended up with a 3-in. space. The spacing widths you choose will determine the widths of the spacers between cabinets (**Photo 4**), the cabinet stiles (vertical trim; **Photo 15**) and the shelf stiles (**Photo 18**). When you've determined your layout, make a sketch with measurements and order your cabinets (see "Choosing Cabinets," p. 56, for more details).



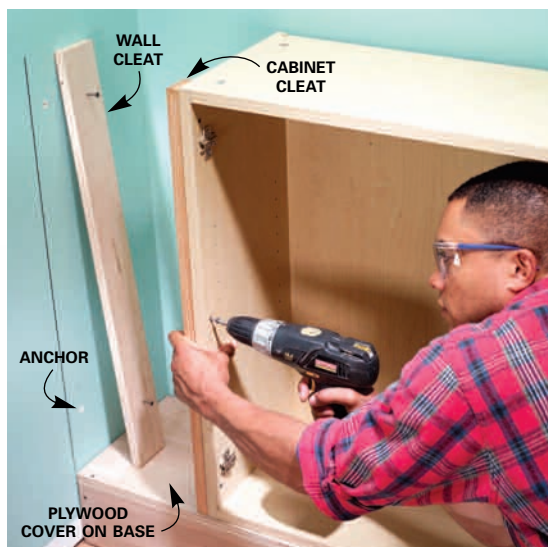
1 Cut wood strips to match cabinet widths and various spacing widths. Experiment until you determine the sizes that best fit your space.

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2 Build the plywood base and level it along both its length and its width. Fasten it to the floor with metal brackets. Cut off the excess shims and then screw the plywood cover to the base (Photo 2).



3 Predrill and screw a cleat to the end cabinet and another to the wall to support the end stile. Use screw-in drywall anchors to mount wall cleats.



4 Join cabinets by driving 1-5/8 in. screws into the spacers between them. Predrill and make sure the spacers are flush with the cabinet fronts. Position the cabinets and screw them to the base.



Start with the bases and cabinets

The cabinets sit on plywood bases that are fastened to the floor with L-brackets (**Photo 2**). Make the bases match the depth of the cabinets and install them about 1/4 in. from the wall to allow for any irregularities in the wall. When determining the length of the base, subtract 1/4 in. to give yourself some adjustment space. Be sure to allow 3/4 in. for the end caps (**Photo 2**). The plywood sides of the bases may not be perfectly straight, so draw a straight line on the floor before you install them. When the bases are level and fastened, screw on the plywood covers.

Next, set the wall-end cabinet on the base. Push it up against the wall and draw a line on the wall to mark the position of the wall cleat (**Photo 3**). Screw-in anchors make fastening the cleat to drywall easy. Just hold the cleat in place and drill 3/16-in. holes through it and the drywall. Then screw in the anchors and drive screws into them. Also screw a cleat to the cabinet with 1-1/4 in. screws.

Position the cabinets, join them by screwing into spacers (**Photo 4**) and screw them to the base. We used pine for the spacers. Make sure the fronts of the cabinets are perfectly flush with the base. When you reach the end of the base, take a moment to double-check the cabinet positioning. Since everything is fastened with screws, you can still make corrections easily. Then screw two spacers to the last cabinet so you can nail on the end cap (**Photo 5**). Unlike the base and cabinets, which stand about 1/4 in. away from the wall, the end cap should fit tightly against the wall. You may have to “scribe” it using the technique shown in the inset to **Photo 15**.

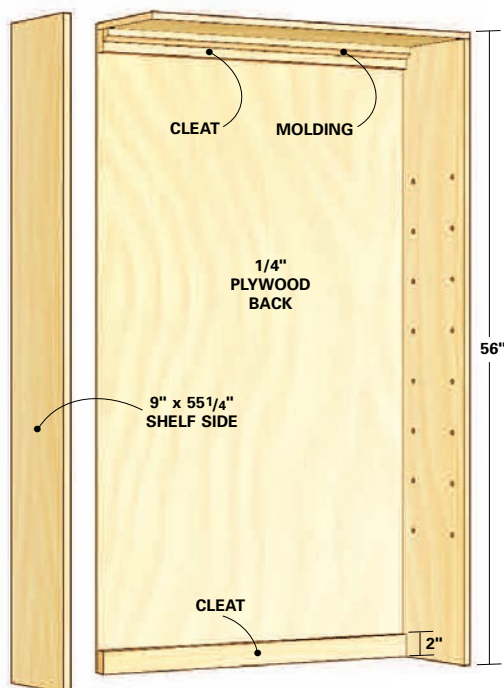
Prepare for the cabinet top by tacking three layers of 3/4-in. plywood to the cabinets (**Photo 6**). These stacks of plywood strips raise the top above the cabinets, providing space for the upper rail and nosing (**Photos 16 and 19**). Make sure the front stack is perfectly flush with the cabinet. Drill pilot holes through both the front and the back strips every 12 to 16 in. so you can fasten the top from inside the cabinets (**Photo 6**). The cabinet top must protrude 3/4 in. beyond the cabinet fronts—a hair more isn’t a problem, but a shorter overhang will create a gap between

the top and the nosing. Don't worry about gaps between the wall and the back edge of the top. They'll be hidden by the shelf units.

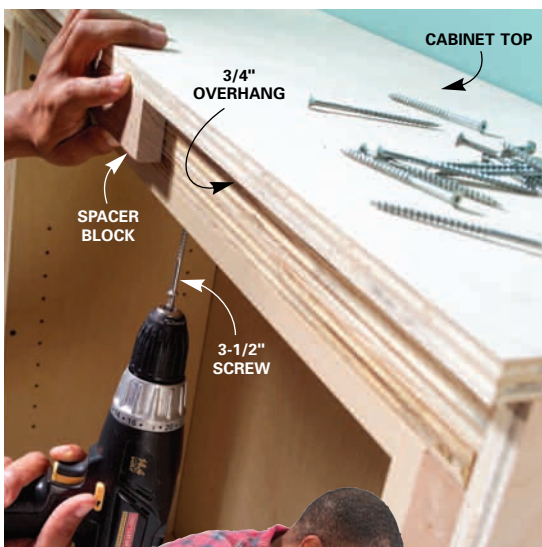
Set the shelf units on the cabinet top

Plan the widths of the shelf units so the stiles you'll nail on later (**Photo 17**) will line up with the stiles on the cabinets below (and match widths). To figure the shelf widths, simply position scraps of stile material on the cabinet top and take measurements. Shelf units will meet at the center of stiles, but positioning will vary a bit at ends (wall and window). If you don't have an 8-ft. ceiling, adjust the height of the units to leave about a 1-1/2 in. gap to the ceiling. Trim will cover the gap.

Figure B
Upper shelf details



5 Screw spacers to the end cabinets and nail on the end caps. Cut the end cap to fit tightly against the wall, flush with the front of the cabinets, and to stand about 2-1/8 in. taller than the cabinet.



6 Build up the front and back edges of the cabinets with three layers of plywood strips. Drill 3/16-in. pilot holes through the strips and cabinets. Fasten the cabinet top with 3-1/2 in. screws. Use a spacer block to ensure that the front overhangs 3/4 in.



7 Assemble the shelf unit sides and cleats and square the unit by measuring diagonally both ways. When the measurements are equal, the unit is square. Then nail the back into place.



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8 Attach wall cleats even with the fronts of the shelf units. Join units with glue and then clamp them. Put wax paper under them to keep excess glue off the cabinet top.



9 Position the shelves, then fasten the fronts of the shelf units with 2-1/2 in. screws. Drill a recess for the screwhead with a countersink bit and then drill a pilot hole.



10 Screw the shelf units to the wall studs. Cover the screwheads (and missed-the-stud screw holes!) with door stop molding.



Tack the shelf unit parts together with a brad nailer. Then add 1-5/8 in. screws for strength. Before you set the units in place, locate the wall studs, measure their distances from a corner and jot down those measurements. You'll need them later when you screw the units to the wall.

Mount wall cleats for the shelf units just as you did for the cabinets (see **Photo 3**). Before fastening the units in place, join them with a single bead of glue near the fronts (**Photo 8**). After the glue has set for about an hour, position the units and screw them to the cabinet top, making sure the sides and backs of the units are square (**Photo 9**). Next, check your stud-location list and fasten the units to studs with 3-in. screws. Don't worry if you miss a stud and have to try again—the screwheads and holes are covered by molding (**Photo 10**).

Tack spacer strips of 1/4-in. plywood to the end cabinet and then add the end cap. You may have to scribe it to fit the wall (see the inset to **Photo 15**). If you plan to place a shelf above a window, the end cap will stand a couple of inches above the window height and support the shelf. Otherwise, run the end cap all the way to the ceiling.

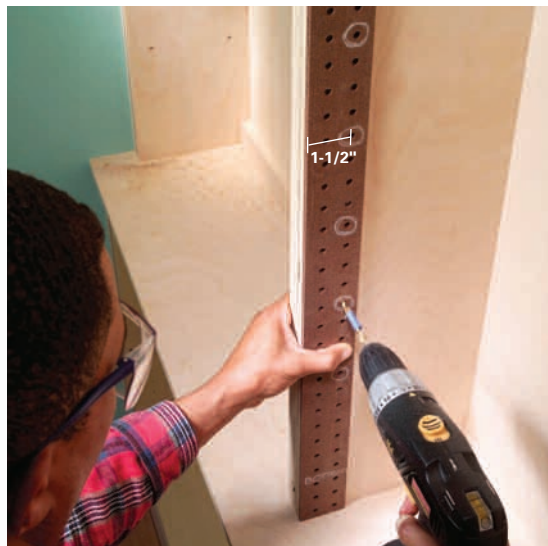
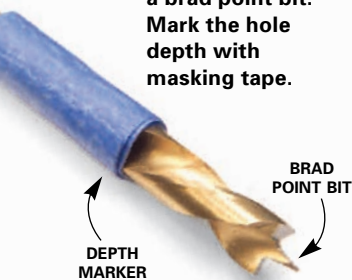
If you want to put a shelf over the window (**Photo 11**), first make sure there's enough space between the window trim and the ceiling. To determine how tall the shelf opening will be, measure from the trim to the ceiling and subtract 7-1/2 in. (to allow for the ceiling rail, a 2-in. space between the shelf and the trim, and the shelf itself). A shelf opening less

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11 Cut the end caps and nail them into place. Assemble the window shelf (Figure A). Then set it on the end caps and nail it into place. For easier installation, make the shelf 1/8 in. narrower than the opening.



12 Drill holes for the adjustable shelf supports (usually 1/4 in.) using pegboard as a guide. To minimize splintering, use a brad point bit. Mark the hole depth with masking tape.



13 Screw a straight-edge in place to help you perfectly align the door tops. Hang the doors. Hinges on frameless cabinets let you adjust the doors simply by turning screws.



than 8 in. tall will look awkward. Another consideration is the span of the shelf. Although the shelf is made from two layers of 3/4-in. plywood, it shouldn't span more than 4 ft., especially if it will hold books or other heavy stuff.

The adjustable shelves are simply plywood with wood nosing (see **Figure B**). A strip of pegboard makes a great guide when you're drilling holes for the adjustable shelf supports (**Photo 12**). We placed our lowest holes about 10 in. above the cabinet top, spaced them 4 in. apart and stopped about 8 in. from the top.

Frame the doors with rails and stiles

In cabinet lingo, horizontal parts of doors or frames are "rails" and vertical parts are "stiles." Before you can add either of them, you have to install the cabinet doors and align them perfectly (**Photo 13**). The tops of the doors must form a straight line, and the space between the doors on adjacent cabinets must be right. The right spacing is the stile width plus 1/4 in. That allows a 1/8-in. gap between doors and stiles. You'll remove the doors later in order to finish the bookcase, so label them with masking tape stickers.

With the doors in place, fire up your table saw and rip 2-in. wide boards for the rails. Also rip the stile material, but don't cut stiles to length until the lower rail is in place. Before you make any crosscuts, grab a square and check the accuracy of your miter saw. If it doesn't make perfect 90-degree cuts, you'll end up with ugly joints between rails and stiles. Adjusting the saw takes only a few minutes and prevents headaches later.

Fasten the rails and stiles with 2-in. brads every 12 in. or so. Nail the lower rail in place first (**Photo 14**), then set the stiles on it (**Photo 15**). Avoid leaving the ends of the rails exposed. The "end grain" turns darker than the face grain of wood when finished. To hide the end grain of the upper rail, we ran our end stiles up to the cabinet top. The end of the lower rail was later hidden by the window seat.

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14 Nail the lower rail into place first, using 1/8-in. spacers under the doors to position it. Also add a strip of plywood below the rail to serve as backing for the baseboard.



15 Position stiles using 1/8-in. spacers. Stiles between doors should stand exactly 1/8 in. higher than the doors. Run end stiles up to the cabinet top. Scribe and trim the wall stile if the wall is uneven.



16 Set the upper rail over the stiles and nail it. If brads aren't strong enough to hold a crooked rail in place, drive screws where they'll be hidden by trim later.



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17 Center the shelf stiles using thin spacer blocks and fasten with 2-in. brads. Aim carefully so brads don't poke through the sides of the shelf unit.



18 Nail the ceiling rail over the shelf stiles. Leave a 1/2-in. gap above the rail to allow for an uneven ceiling. Add cove molding to cover the gap.



19 Chamfer the nosing with a router and glue and fasten it with glue and nails. Miter the corners. Nail quarter-round molding under the nosing.



If your rails aren't perfectly straight, you might find that brads aren't strong enough to hold them tightly against the stiles. Since both the upper and the lower rails get partially covered by trim, you can use screws to fasten stubborn ones (**Photo 16**). Just be sure to keep screws well away from the 1-in. wide area that will be exposed. Installing the shelf stiles (**Photo 18**) is similar to installing the cabinet stiles. You may have to scribe them to match uneven walls (see inset to **Photo 15**). Unlike

Choosing cabinets

We used the Fairfield line of cabinets made by Mill's Pride and available at Home Depot (www.millspride.com or 800-441-0337). Unlike most cabinets, they come in flat boxes—assembly required. You can fit all the cabinets you'll need in your trunk, and assembly takes just a few minutes. Other cabinets will work for this project, as long as you follow a few guidelines:

■ **Use frameless cabinets.** In order to add rails and stiles as we did, you have to use frameless cabinets (also called "European cabinets"). Frameless cabinets are simply a box with doors mounted directly on the front—there's no face frame (trim) attached to the front of the box.

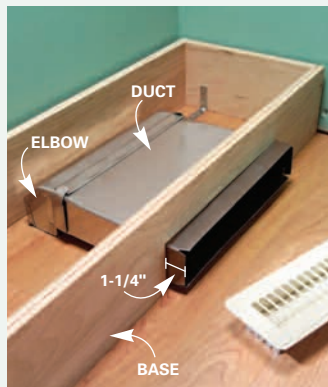
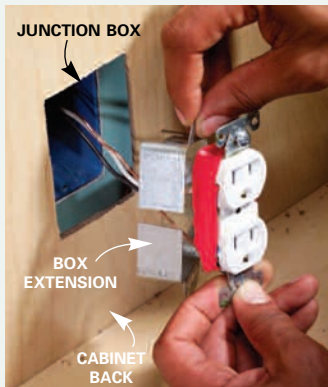
■ **Choose a finish you can match.** You'll have to finish your bookcase to match both the sheen and the color of the manufacturer's finish on the doors. Do some experiments using samples of the wood you'll use for the rails, stiles and trim. Our cabinets have a "natural" finish—no stain, just a clear coating. We found that Minwax Polycrylic satin water-based polyurethane matched the manufacturer's finish almost perfectly. If you choose stained cabinets, the color is usually very difficult to match.

■ **Select doors with simple edges.** Many cabinet doors have a deep or wide profile around their outer edges. This would clash with the square edges of surrounding rails and stiles. The doors we used have only a shallow 45-degree chamfer on the outer edges.

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Dealing with outlets and registers

The easiest way to deal with an outlet that will be covered by your cabinets is to cut a hole in the cabinet back that's larger than the outlet's cover plate. This looks a bit sloppy, but it's perfectly safe. For a neater appearance, cut a hole that's slightly smaller than the junction box and add a box extension (\$1 at home centers) so that the outlet and cover plate are mounted on the cabinet back.



If you run into a heat register, remove the grille and measure the duct below so you can buy ductwork of the same size. You'll need a "short way" elbow, a short section of duct and cleats to join them (about \$12 altogether at a home center). You'll also need a metal snips (\$14) to cut the duct to length. It should protrude about 1-1/4 in. from the base. We ran our duct about 1/2 in. above the floor so the new grille's edge would rest on the floor. We cut notches in the base and baseboard to fit over the duct and later spray-painted the grille to match the wood finish.

20 Screw the sides of the window seat into place first (Figure C, p. 60). Then screw cleats to the wall studs. Nail a cleat at the front, slip the plywood base in and nail it.



the cabinet rails that are flush with the stiles, the ceiling rail runs across the fronts of the shelf stiles (**Photo 18**).

Combine homemade trim with stock moldings

We designed the trim on this project to resemble the profiles of the cabinet doors. The outer edges of the doors have a bevel, or "chamfer," profile. We matched this profile on the ceiling rail, shelf nosings, cabinet top nosings and baseboard using a router and 45-degree chamfer bit (see **Figure A**). To match the quarter-round profile that surrounds the door panels, we bought 1/2-in. quarter-round molding and placed it under the cabinet top nosing and over the baseboard.

Before you install any trim, smooth out any uneven spots where rails and stiles meet. This is much easier before the trim is in because you can use a random orbital sander. Use a light bead of glue and brad nails to fasten the nosing around the cabinet top and window seat (**Photo 19**). The rest of the trim is simply nailed in place.

Build the window seat around a cabinet

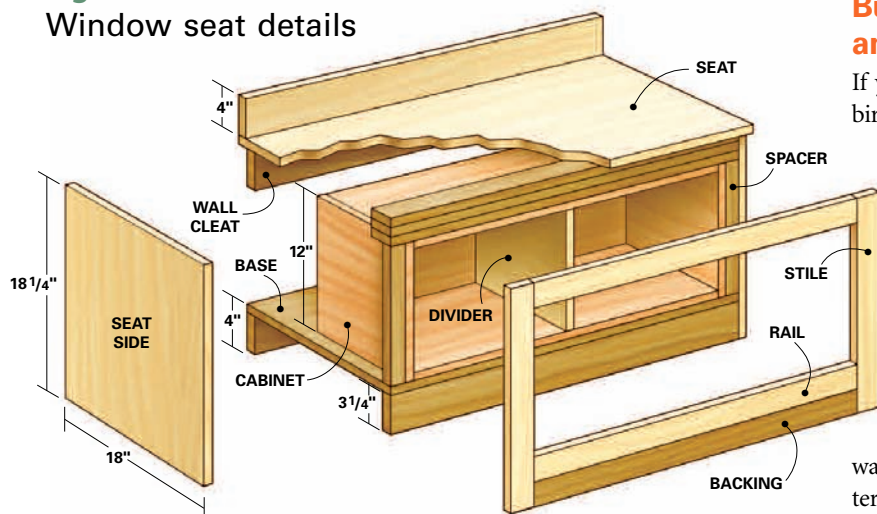
The structure of the window seat is similar to that of the lower section of the bookcase. It begins with a plywood base (**Photo 20**) and is built around a wall cabinet (**Photo 21**). The cabinet box is less than 12 in. deep, so there's about 6 in. of wasted space behind it. Because the box isn't designed to support the weight of a person, we strengthened it with a plywood divider inside. The rails, stiles and trim are identical to those on the other cabinets. The only difficult part of building the window seat is making the plywood top fit neatly against the wall and between the neighboring cabinets. Rather than fuss with the fit, we left a gap along the wall and covered it with a chamfered trim board (**Photo 22**). If you end up with gaps along the adjoining cabinets, you can add trim there, too.



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Figure C

Window seat details



21 Center the cabinet box and screw it to the base. Install spacers and tack three layers of 3/4-in. plywood to the top of the box. Hang and align the doors so you can add the rails and stiles.



22 Add the seat top and trim. Hide any gaps around the window seat by nailing trim to the wall or adjoining cabinets. Add the baseboard (Figure A) and apply the finish to complete the project.



Buying lumber and plywood

If you choose maple cabinets as we did, use birch plywood for this project. Birch plywood looks almost identical to maple and is much easier to find. Home centers usually have the lowest prices (\$40 for 3/4-in. plywood), but beware of the quality. You may find that the plywood sheets have large areas of dark wood. For better-looking plywood, we paid about \$60 per sheet at a traditional lumberyard. We also bought our maple boards and moldings there. The price was about the same as at our local home centers, but the quality was better. Oak boards and plywood are readily available in most areas, so oak cabinets are easy to match. If you choose cabinets made from other woods, you'll have to hunt for matching materials. Lumber dealers who cater to cabinet shops carry (or can order) boards and plywood in a range of species (check the Yellow Pages under both "Lumber" and "Cabinet Supplies"). Depending on the wood, you might pay about the same as we did for maple and birch, or you might pay twice as much.

Shopping List

Here's what it took to cover our 12-ft. wall with a bookcase and window seat. Your shopping list will differ according to your situation.

ITEM	QTY.
33" x 30" wall cabinet	2
27" x 30" wall cabinet	1
36" x 12" wall cabinet	1
1/4" birch plywood	3
3/4" birch plywood	5
1x6 x 8' maple	10
1x4 x 12' maple	1
1x6 x 8' pine	1
3-1/2" maple crown molding	12'
1/2" maple quarter-round molding	30'
Maple door stop molding	10'
2" L-brackets	10
Screw-in drywall anchors	10
1/4" shelf supports	36
Cabinet knobs	8
Screws: 1-1/4", 1-5/8", 2-1/2", 3-1/2"	1 lb. each
Nails for nail gun: 1-1/4", 1-1/2", 2"	1 pkg. each

Art Direction • BECKY PFLUGER
Photography • BILL ZUEHLKE
Illustrations • FRANK ROHRBACH