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- Construction drawings and related photos.
- Tips to help you complete the project and become a better woodworker.

Convertible Step Stool & Chair



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Convertible Step Stool/ Chair



Every day of the week, project requests from readers arrive here at *The Woodworker's Journal* offices. Some are in letters, other are scribbled on the backs of subscription renewals, and often the request is accompanied by a sketch. Over the years, one of the most requested projects has been the step stool/chair. Readers have referred to it as a library chair, a convertible chair, a folding step chair, and a host of other things, but whatever they called it, the function was the same: a chair that quickly converted into a little step ladder.

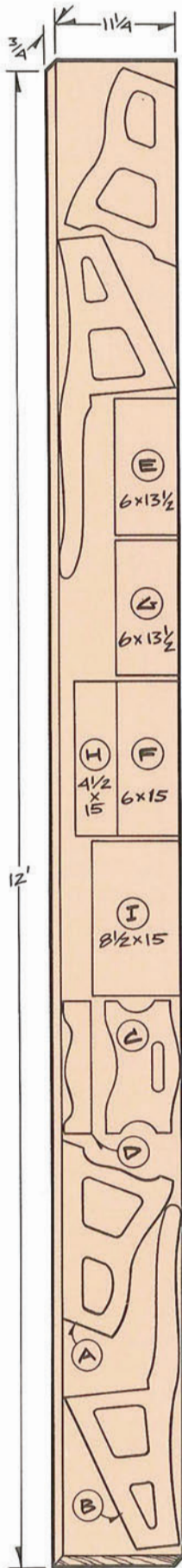
Although we have previously published plans for a similar step stool/chair (we called it a 19th Century Step Chair;

), that chair was an antique, and didn't have a look that fitted in easily with most home decors. So our eyes have always been open, looking for a good new step stool/chair plan to publish. When a snapshot of this version arrived in our mailbox, sent by Texas woodworker A.B. Beavers, we knew we had a winner. After studying similar pieces, A.B., who is a retired machinist, worked up these plans himself. And since, as he says "I've always wanted my wife to see New England and eat fresh lobster," A. B. and wife Darline decided to drive up and hand-deliver the step stool/chair here to our Connecticut offices, while at the same time taking in the sights—and

tastes—of a mini New England vacation.

We think A.B.'s design is simplicity itself. As illustrated in the cutting diagram, all the parts can be obtained from a single 1 by 12 board, measuring $\frac{3}{4}$ in. thick by $11\frac{1}{4}$ in. wide by 12 ft. long. As pictured, the chair is crafted in oak, but almost any good hardwood, such as cherry, maple or walnut, can be used. The attractive use of gentle curves, clean lines and rounded edges makes this chair fit in with almost any decor, whether it's

CUTTING DIAGRAM



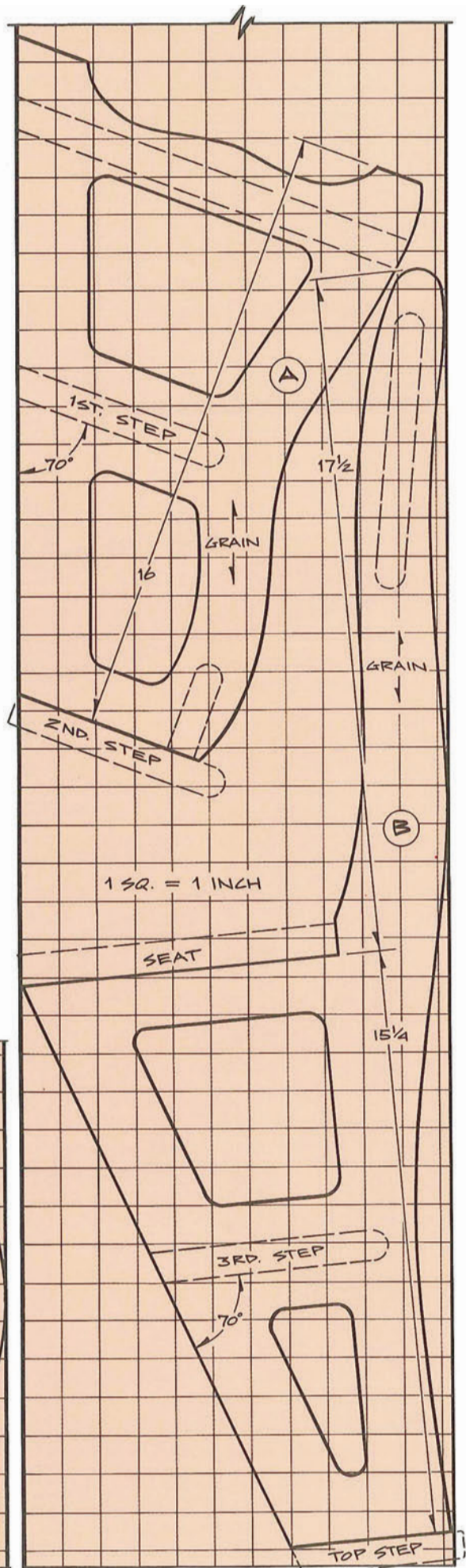
used in the kitchen to reach those high shelves in the upper cabinets, in the bedroom to get to the closet shelf, or elsewhere.

The design that allows these projects to convert from a step stool to a chair, and back again, is both clever and simple, but it's somewhat hard to visualize if you don't have the chair in front of you. Basically, the chair is designed so that there are two sections, linked by a piano hinge. To convert from the step stool to the chair mode, the top section of the stool is pivoted over the lower section, so that the top step of the stool is now resting on the floor. Hopefully, our time-lapse illustration on page 51 will help with visualizing the conversion.

Getting Started

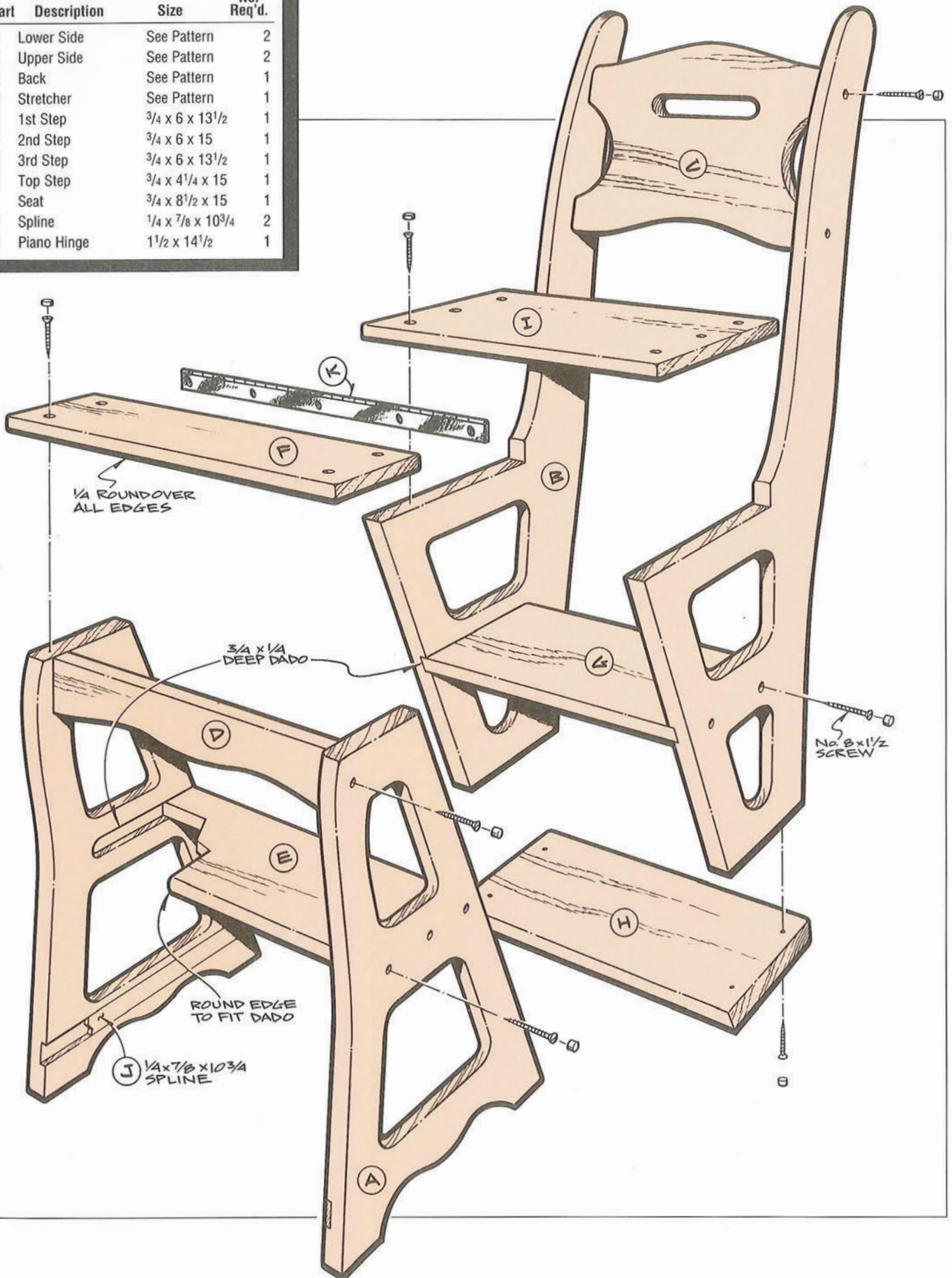
Thankfully, building the step stool/chair is considerably easier than trying to imagine how it works. The most important parts—the lower and upper sides (A, B)—are provided as a grid pattern exactly as they are to be laid out on your 1 by 12 board. As the Cutting Diagram shows, one of each of the sides is laid out on each end of the 1 by 12 board. The way to make these four parts is to first lay out one each of the side sections on the bottom end of the board, exactly as they appear in the grid pattern.

Transferring the Patterns: There are several ways to accomplish this. First, if



Bill of Materials
(all dimensions actual)

Part	Description	Size	No. Req'd.
A	Lower Side	See Pattern	2
B	Upper Side	See Pattern	2
C	Back	See Pattern	1
D	Stretcher	See Pattern	1
E	1st Step	3/4 x 6 x 13 1/2	1
F	2nd Step	3/4 x 6 x 15	1
G	3rd Step	3/4 x 6 x 13 1/2	1
H	Top Step	3/4 x 4 1/4 x 15	1
I	Seat	3/4 x 8 1/2 x 15	1
J	Spline	1/4 x 7/8 x 10 3/4	2
K	Piano Hinge	1 1/2 x 14 1/2	1



you have access to a photocopier that can enlarge, just enlarge the pattern until the squares on the grid pattern are 1 in. across. Because of the size of the pattern, you'll need to make the enlargement in several sections, and then cut and tape the sections together. The other option is to lay out a 1 in. square grid on some kraft paper, and then draw in the pattern of the two side parts. This really isn't difficult, since much of the pattern is just straight lines. On the upper section, the seat and steps are at 70 degrees to the front edge, and on the lower section the steps and bottom are positioned at this same 70 degree angle with respect to one edge. These straight lines are easily laid out with just a protractor or angle gauge and a straight edge.

The curved lines on the side sections aren't all that fussy, and they needn't be exactly the same profile as on the pattern. In fact, if you'd rather use a few heart-shaped cutouts (or some other shape that you like) in the sides instead of the cutout profiles that we show, you can dramatically change the look of the piece. About the only critical points that you'll need to check before cutting the sides out are the 70 degree angle of the seat and steps, the 15 $\frac{1}{4}$ in. and 17 $\frac{1}{2}$ in. dimensions from the seat flat to the bottom and top ends respectively of the upper side, and the 16 in. dimension from top to bottom on the lower side. If these dimensions check out, and if your seat and step stock is exactly $\frac{3}{4}$ in. thick, when assembled, the chair will work exactly as intended, no trimming required.

Once you've cut the first part of each pair of sides from the bottom end of your source board, just use these as a template to trace the profiles of the remaining side parts on the top end of the board. Once cut out, you should have two pairs, an upper side pair and a lower side pair.

Cut the Step and Spline Dadoes: Next, you'll need to cut the dado grooves in the lower and upper sides for the 1st and 3rd steps, respectively. Use a router equipped with a $\frac{3}{4}$ in. diameter mortising bit or straight cutter, and clamp a straight edge to the work piece as a guide. First, though, be sure to identify exactly which side of the workpiece you'll be cutting the dado into, and mark clearly with an "X". This is not the time to cut a step dado on the wrong side. Make the $\frac{1}{4}$ in. deep step dadoes with at least two depth settings of the router bit, removing about $\frac{1}{8}$ in. of stock each time. With the step dadoes cut, don't forget to also lay out and cut the spline dadoes in the lower sides. These splines add reinforcement to the short grain area of the lower sides that is most likely to break.

Make the Back and Stretcher: You can transfer the patterns for the back (C) and stretcher (D) using the same system that you used for the sides, or just cut these parts to their 13 in lengths, and come up with your own profiles for the curves.

Again, use your imagination—perhaps carrying the heart theme through to the back and stretcher.

Make the Steps, Seat and Splines: The remaining parts—the steps (E, F, G, H), the seat (I) and the splines (J)—are cut from the remaining source board. Apply a $\frac{3}{4}$ in. bull-nose to one edge of steps 1 and 3, to match the ends of the respective router-cut dadoes into which they fit, but don't apply the bevel to the opposite edge yet. That's best done with a hand plane after the piece has been assembled.

Glue Splines and Round Edges: Test-fit the splines into their mating dadoes, then glue and clamp. Once the splines have dried, and after sanding, a $\frac{1}{4}$ in. radius round over is applied to most edges. You can hand-sand the radius, but it's quicker to just chuck a $\frac{1}{4}$ in. radius roundover bit in the router or laminate trimmer, and use that to radius the edges.

Assembly

The step stool/chair is assembled with glue, screws and plugs. If you don't have a source for ready-made face grain plugs, buy a plug cutter and cut your own. By cutting the plugs from face grain, and matching the grain direction, your plugs will be all but invisible.

Before gluing and screwing, dry-assemble the two chair sections, and check that everything fits as intended. If all checks out, drill and counterbore for the screws and plugs, and final assemble. If you haven't used them yet, we recommend that you try the new square-recess screws. The screws pull in easily, and the driver bit never cams out. Drill pilot holes for the screws to avoid any chance of splitting the wood.

Finishing Up

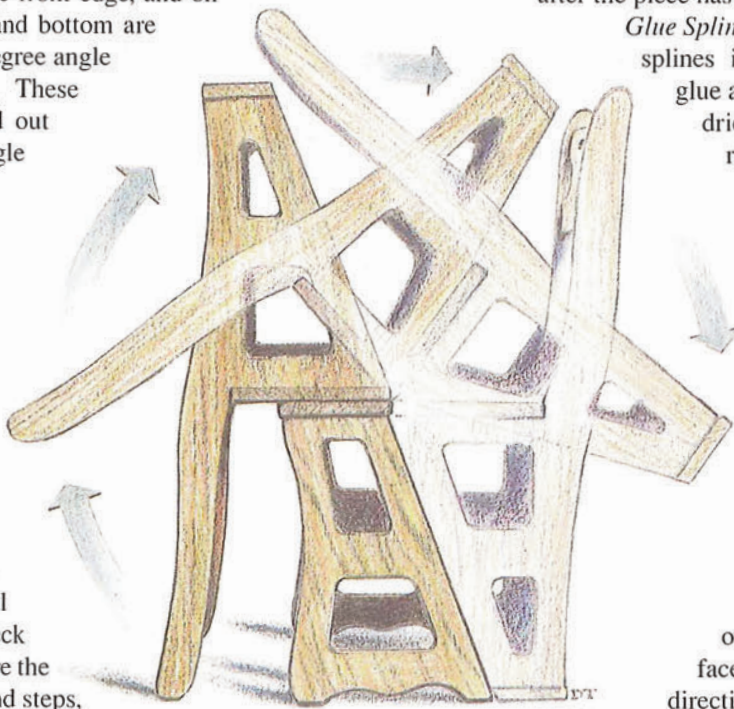
With the two sections complete, and the plugs trimmed and sanded, now you can apply a finish. As shown, the piece has a light maple stain, followed with four coats of Deft Clear Wood Finish (lacquer).

Once the finish has dried, all that's left is to join the two sections with the piano hinge (K). Piano hinges (typically in 4 ft. lengths) are sold in most hardware stores,

Cut the piano hinge (with a hacksaw) to the required 14 $\frac{1}{2}$ in. length, and screw in place. Note that piano hinges are not mortised in, but are just face mounted to the edges to be joined.

If your side parts were cut as shown in the pattern, the step stool/chair should work perfectly—no adjustment needed. If one section or the other doesn't match up perfectly with the other, just sand as needed to even everything up.

Now, with the piece in its chair configuration, sit down and enjoy a brief rest in your latest creation.



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Matt Becker
Internet Production Coordinator