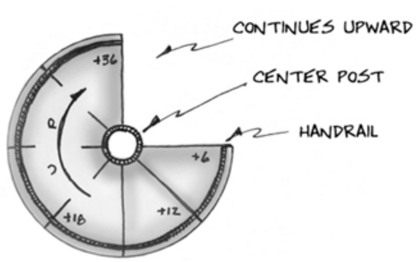
How Do You Make …

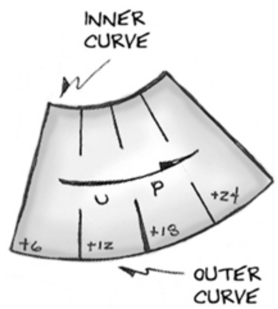
Curved Stairs

Spiral stairs have a center post or column. Today they are usually manufactured from steel, although the treads of older ones were cast iron. The treads are cantilevered out from a center pipe and are kept in place with a spiral handrail. It is certainly possible to weld together that sort of structure from steel pipe and plate, but you would most likely be better off with a factory-made version or something from architectural salvage. It would be cheaper and easier in the long run. Spiral stairs tend to be all the same, other than in size.



SPIRAL STAIR

Curved stairs are something else, and are more likely to be built in a shop. They are quite often much wider than a spiral stair, and the bottom carriages are boxed in. Actually, this method will work with any odd shape, not just a circular curve. You might expect Scarlett O'Hara to come down this kind of staircase, if it were very large and grand.



CURVED STAIR

This method of constructing curved stairs is similar to the one shown for rectilinear stairs in Chapter 19 in the book. It features all plywood construction and uses nailing strips on the

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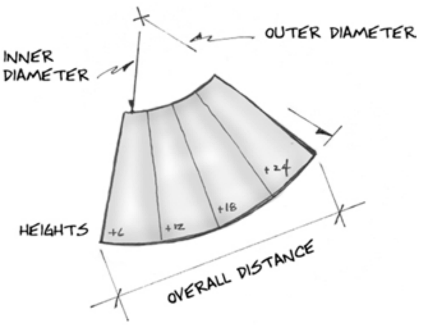
risers. It uses many of the techniques associated with full-scale patterns. You may wish to refer to those topics if you are unsure of the techniques shown here. I feel this method is somewhat easier than building up a curved surface for the carriages using laminated plywood.

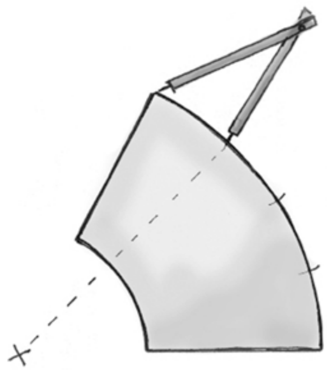
Begin by laying out a full-scale pattern of the stairs you wish to make. You can do this on paper and transfer the pattern to wood, or just lay out the whole assembly on ¾″ plywood from the beginning, if it is small. Use trammel points to mark the inner and outer diameters. The treads may not be dimensioned on the plans. Even if they are, it is generally more accurate to mark the outside profile of the unit and then divide the space up into the correct number of treads. Be sure to clearly mark the center point of the two arcs you made in originally laying out the curves. That center mark is the convergence point of all the lines needed to mark the depth of the treads.



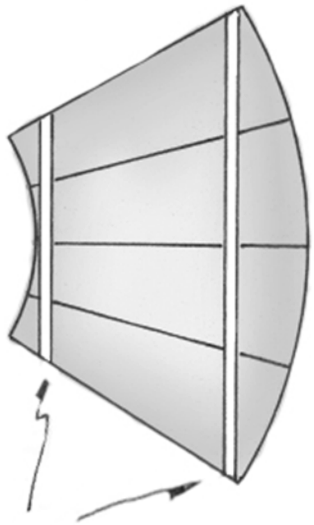
YOU NEED THESE DIMENSIONS

You can use a bow compass and the trial-and-error method to divide the outer arc into the desired number of parts. Set the compass to a trial size and divide the arc into segments. There will be some amount of error at the end of the process. Estimate your correction by dividing the error amount by the number of segments. You should be able to determine a reasonably accurate layout within three or four tries.

Mark straight lines across the arcs as shown in the diagram. These two lines delineate the locations of the two carriages. The exact placement is somewhat arbitrary, but pick a spot reasonably close to the edge of the stair. If the carriages are parallel to one another, it will be easier to construct the framing, but it is not absolutely essential. (You may need to deviate from parallel if the stair spirals, or has some other unique curve.) Mark another pair of lines ¾″ to the inside of the original ones. This space represents the location of the ¾″ ply used to form the carriages.



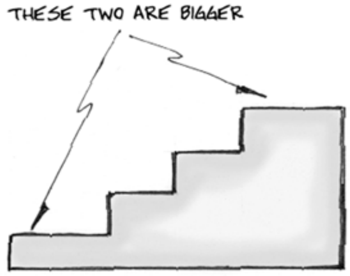
USE A COMPASS TO DIVIDE THE STAIR INTO EQUAL SEGMENTS

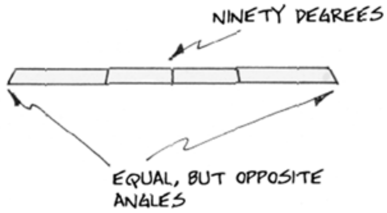


MARK THE PLACEMENT OF THE TWO CARRIAGES

THEY SHOULD BE PARALLEL TO ONE ANOTHER

Use this pattern to lay out the size and shape of the two carriages. They will not be the same, as they intersect the diverging rays at different distances from the center point. You will be making straight carriages to fit against round steps, and this is definitely the hard part of the job. You will need to cut angles for each intersection of carriage and riser. The angles will be different from step to step, but the same angles will transfer from the inner to the outer carriage, if the carriages are parallel to one another. You can determine the angles using a protractor, or with a trial-and-error method on the miter saw.





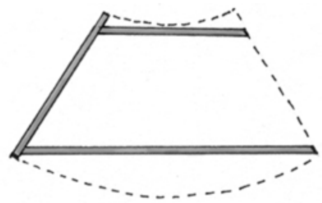
Tread depths will vary, because of the way the lines run across the steps, so you will have to measure each one separately. This is the difficult part about this method, measuring and transferring all of the angles and sizes. It will take the most time, but it is important to get a good fit. Use an adjustable jigsaw or circular saw to cut the angles needed for the vertical cuts. All of the horizontal cuts will be 90-degree angles.

Cut out the treads from the pattern. This would be a great time to use the saw guide jig shown previously. Notice that if you made the pattern directly on the plywood there will be some loss of tread size, because of the kerf created by the saw blade. The loss is fairly small, and won't matter all that much.

A larger staircase will not fit on one 4 × 8 sheet. You will need to make a paper pattern, cut out the individual treads, and mark them on ¾″ plywood. The treads are all identical, so you really need only one pattern, but you need to mark out the entire footprint of the unit in order to determine the carriage size.

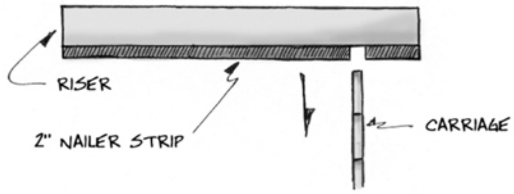
The length of the riser parts is the same as the length of the treads. The risers will go all the way from side to side because there are no carriages to fit inside of, like in a rectilinear unit. Instead, the risers will be trimmed to fit on top of the carriages. The ends of the risers are all 90-degree angles. Make the bottom rise of the carriages ¾″ short on the first tread to allow for the thickness of the tread.

Connect a 2″ nailer to the front of each riser. The nailer is used to attach the back of the tread from the step below. Look up Building Stair Units, Chapter 19 in the book. Place each riser on top of the pattern and mark where it hits the carriage. Cut a notch through the 2″ nailer and bottom of the riser so that the riser will set on the carriage with the nailer sticking down and the top of the riser even with the top of the next



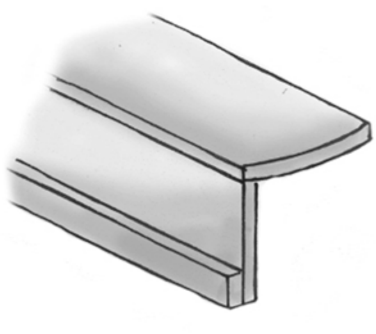
THE BOTTOM RISER INTERSECTS IN THIS MANNER

step on the carriage. You can cut this slot at an angle if that is easy for you to do, but really it is only necessary to cut the slot wide enough to account for the thickness of the material at an angle. They *do not* fit at a 90-degree angle.



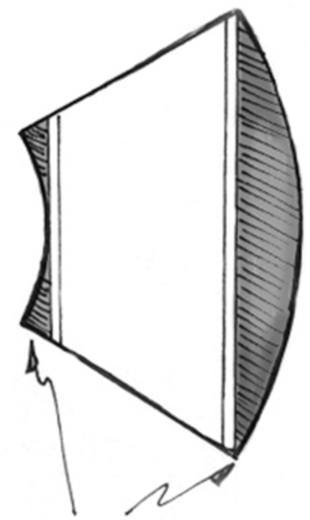
CUT A NOTCH IN THE RISER SO THAT IT WILL FIT DOWN ONTO THE CARRIAGE

When all of the notches are cut, assemble the treads and risers into units. It is very different from the technique used with rectilinear stairs. This is due to the fact that it is difficult to line up the risers and carriages in the same way as a normal stair since there are odd angles and shapes involved. It is more accurate to line up the riser of one step with the tread of the next to get the closest fit. If you have a pattern marked on paper, you can use that to help judge the best alignment. In any case, be sure to lay all the pieces out together and check the fit before you begin to assemble.



ASSEMBLE THE TREADS AND RISERS FIRST, THEN ADD THEM TO THE CARRIAGES

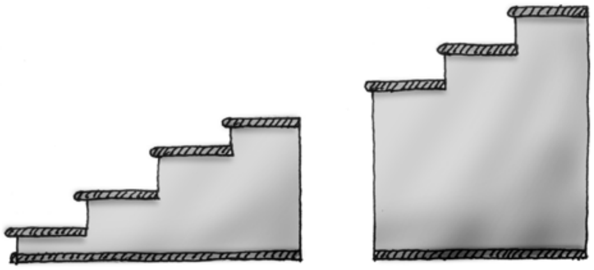
One other piece must be taken into consideration before you begin assembly. This is a curved piece used at the bottom to help in putting a facing on the unit. You may need one for each of the curved sides, or if one faces upstage, just the side that faces the audience. The facings do not have much of a structural function and are really just decorative.



It is best to mark these pieces at the same time as you are laying out the original pattern. Lay a section of plywood so that one edge is against the outer mark of the carriage. Use the compass to mark the same curve as will be to the outside of the stair. Cut out this piece so that one side is the arc, and the other a straight line.

Attach this section to the bottom of the carriage, the bottom of the lowest riser, and any support pieces to the rear of the unit. If the stair is large, you may wish to add some uprights between some of the treads and the bottom curve in order to have more support for the sides. Use 3/8″ bending plywood to cover the curved sides, or 1/4″ plywood if the curve is gentle enough. Add some stretchers at the bottom of the unit to hold the carriages in place.

If you need a unit with more than five or six treads, consider making it in more than one piece. The curve of the treads on anything larger will probably be too tight for the straight line carriage, and/or the unit will be very heavy.



MAKE SEVERAL SMALL UNITS
IF ONE WOULD BE TOO LARGE AND CUMBERSOME