



Building a Radius Guide

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A radius guide is a tool to check the curvature of your rail whether it is the track or the switch. I prefer a board, rather than a straight tool with tabs to mark the radius. With the board you can see warbles in the rail and where it is deviating from the desired radius. If using strap iron rail the radius board works well right out of the box. If using scale rail you have to build it with 3/8 inch board offset underneath, high enough to rise radius board above the screws holding down the foot. A 12-14 foot long board is best, but a little awkward to carry around, especially in a truck bed. A 10 long board is a compromise.

You can use a one inch thick board, but get one that is straight with no knots in the cut line. The width needed will depend on the radius, and you will see what you need when you run the computations. A six inch wide board will work for 60 foot radius or larger.

There are two ways to make a radius board. The first way is the direct approach. Put a pin in the ground, attach non-stretchable cord, then draw arc on the board and cut to line. This is a quick method and can be good enough for many users. If you use this method it is important that neither the pin nor the board move, and you use a constant tension keeping the line perfectly straight.

The second method is more precise, but involves some math. The first step is to calculate the sagitta of an arc. This can be done with calculator on the web at <http://liutaiomottola.com/formulae/sag.htm>. You input the radius of the arc and 1/2 the length of the cord, and it calculates the sagitta. If you choose 70 foot radius and a 10 long board then 1/2 the cord is 5. The sagitta is 0.179 feet. Take this figure down to bottom of web page and use another calculator to compute the "Height of an Arc at any Point". You enter the sagitta, the radius, and the horizontal offset (distance from end). It gives you the height of the arc at that particular point in feet. Compute the arc height at least in 0.5 foot increments, from 0 to 5 feet (or 1/2 length of board). Convert these feet figures to inches. I add 2 inches to each of the measurements to add strength to board. Use a dial caliper to measure distance from bottom edge of board to arc, and lightly pound in a small brad to mark each point.

Once all the brads are in place find two pieces of thin, flexible piece of wood or metal about 3/4 inch wide, and preferably at least 1/2 length of the board. Thickness is not crucial as it is all relative, but 1/8 of an inch thick works well. Then press the thin piece of material against the brads to form the arc. Hold in place and mark line. Before cutting it is a little safer to place a second strip over first strip to mark a second line an eighth of an inch from the arc. Remove brads and cut to the second line. See figure below for clarification. Use the first line to see where you should plane board to get a smooth arc. Unless you are an excellent woodworker this extra step is mainly to eliminate your saw warbles. Put a coat of sealer on board to protect it from moisture and warping. Below is a diagram of a radius board with 2.00 inch offset. Use mirror reading from 5 to 10 feet.

For 70 foot radius using 10 foot long board here are figures for first half:
 0.5 - 2.41, 1.0 - 2.78, 1.5 - 3.08, 2.0 - 3.38, 2.5 - 3.61, 3.0 - 3.80, 3.5 - 3.96
 4.0 - 4.06, 4.5 - 4.12, 5.0 - 4.15 use mirror readings for other half.

