

Using the Ruler Tool to Keep Your Tracks Straight

Revised November 2008

Suppose you had to lay a section of track 8000 feet (2424m) long. The track will include a station and several industrial sidings. How do you keep such a track straight?

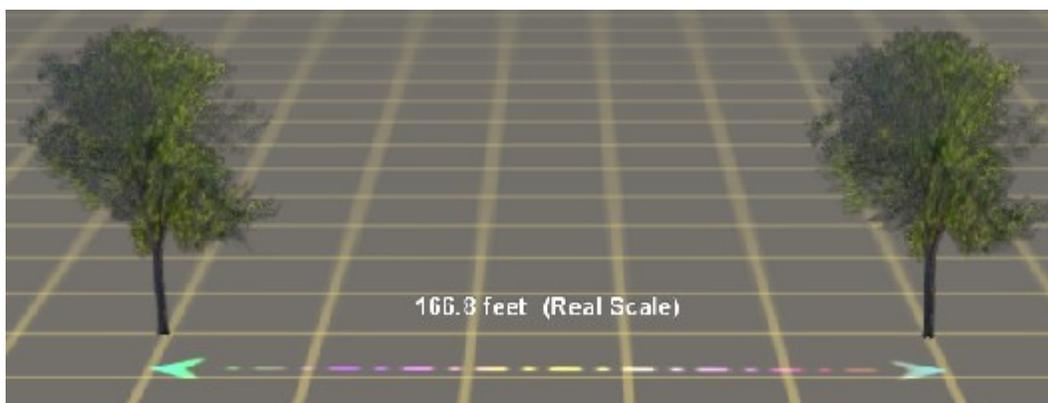
There are probably a number of ways to do it, but what I want to share in this tutorial is the method I use, the Surveyor Ruler tool. Let's start by looking at the ruler itself. You access it by clicking on the wrench icon, which brings up the Tools menu.



The menu has several options, but what we'll be concerned with now is the top section, as outlined in red.

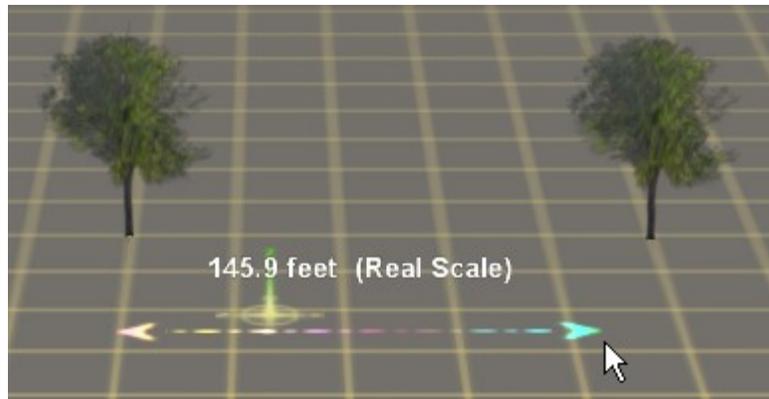
The left icon of the three is used to create a new ruler. The middle button is used to move an existing ruler and the icon with the red X through it is used to delete an already placed ruler.

In its simplest form, the ruler can be used to measure the distance between two objects. In the drawing below, we've used the ruler to measure the distance between two trees.



In this case, the distance between the trees is 166.8 feet. The choice of Imperial versus Metric distances is made when you first create a map, so if you specify metric when you first define your map, the ruler will show your distances in metric.

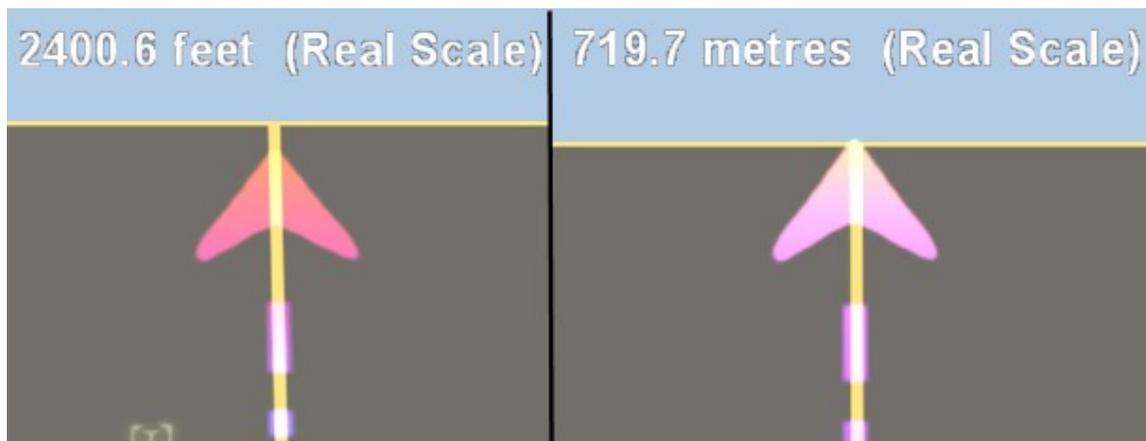
You create a new ruler by clicking on the left, “create” icon. Position the mouse cursor where you want the ruler to begin. Press and hold the left mouse button to drag the ruler to the desired destination. In the drawing below, I clicked the mouse on the line near the left tree and I’m dragging the ruler to the right toward the right hand tree.



Once the ruler is placed, you can move either end of it by selecting the middle, “move ruler” tool. Then click one end of the ruler and drag it to the new location.

My experience is that it’s sometimes easier to drag the ruler to approximately the right spot, then use the move option to place the ruler exactly where you want it. This is especially true when you are measuring the distance between two objects so far apart you can’t see them both on the screen at the same time.

When we started this tutorial, I said I wanted to create a straight track 8000 feet long. Well, how far is that in the Trainz world? How many baseboards? Okay, then, let’s begin by measuring the width of one baseboard. I clicked on one edge of the baseboard and dragged the ruler to the opposite side, as shown in the left picture below:



The measured distance for one baseboard is about 2400 feet. I also created a second, brand new map, using the metric system, and measured that as well. As you can see,

the distance is about 720m. [And since I'm from the USA, that number is meaningless to me, but you misguided folks who speak metric all the time will find it a perfectly acceptable number. ;-)]

Since we need a track 8000 feet long, we'll need four baseboards to accommodate it.

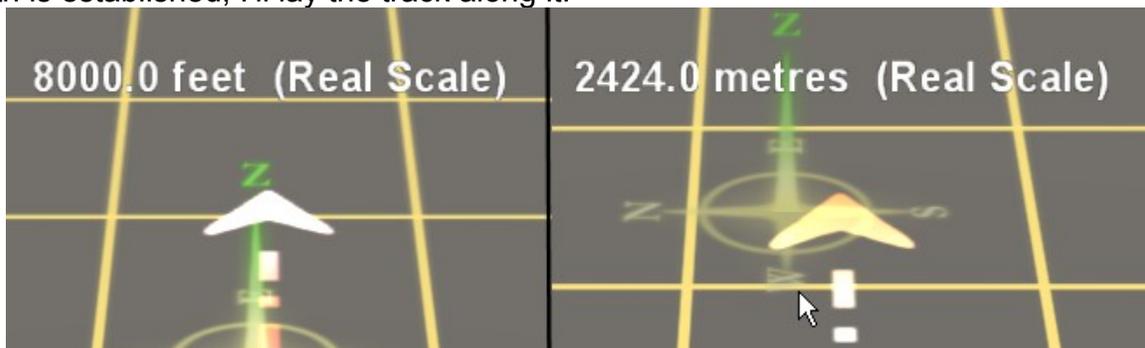
Now some of you are probably saying, "What's the big deal? If I need a straight track that long I can just lay it in one piece and be done with it. What's with all the ruler stuff?"

That's an excellent question. Here's the answer. You can certainly lay a section of straight track. But if you want it 8000 feet, you'll need the ruler to measure it.

More importantly, we sometimes modify that section of track, by inserting crossovers, sidetracks, or stations. Other times we might need to move a turnout, by dragging it to a new location. Under those conditions, it's easy to lose track of what's straight and what isn't. Often you end up having to sight down the track, trying to detect when a particular spline point is not in the right place. Been there, done that, many times, friends. ;-)

To keep the track straight, we need a reference that doesn't change if we modify the track. That's when the ruler can play an important role.

Let's get started. First I'll add three more baseboards to the map to get a total of four. Then, before I lay any track, I'll use the ruler to establish the 8000-foot path. Once the path is established, I'll lay the track along it.



Above you see the results. We now have a long straight line onto which we add track, and which will remain straight no matter what we do with the track.

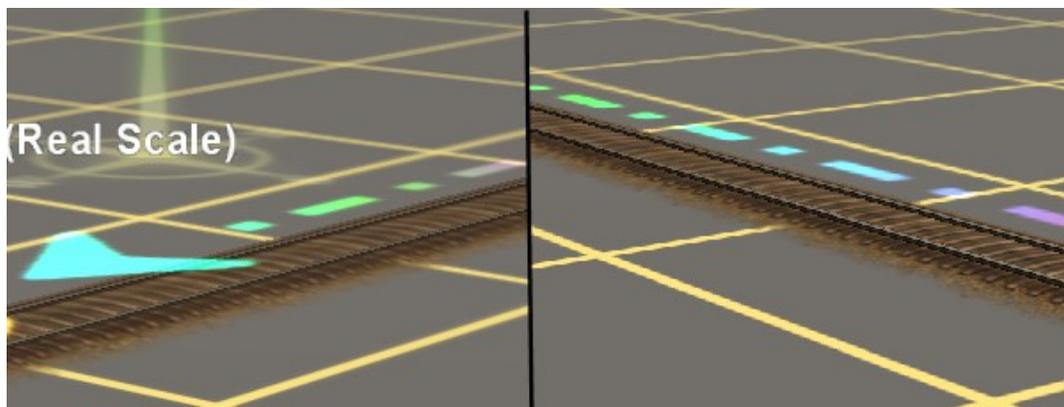
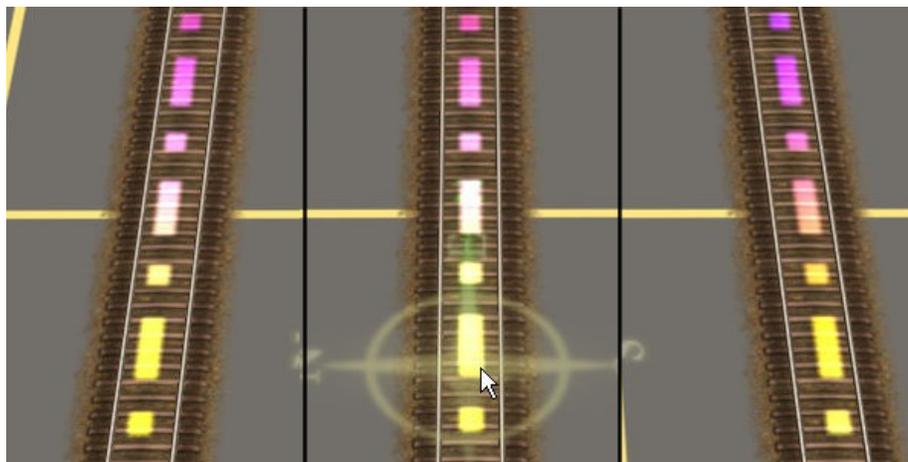
Before we lay the track, though, there's one important thing to remember about the ruler. It does not lay flat on the surface of the map. It actually a short distance *above* the surface. Check out the drawing below:



We're looking at the ruler from the side. From this angle, it's difficult to see, so I added the black "arrow" in the drawing above. Notice the ruler sits *above* the track. In fact, it appears to be about the same height as the track spline marker. Can you see the spline on the left side of the drawing?

I point out this height difference because the angle you view the track and the ruler can have a major effect in your track placement. The main principle is this: *In order to view the ruler and the track accurately, you must be directly overhead.* If you view them from either side of directly overhead the view will not be accurate.

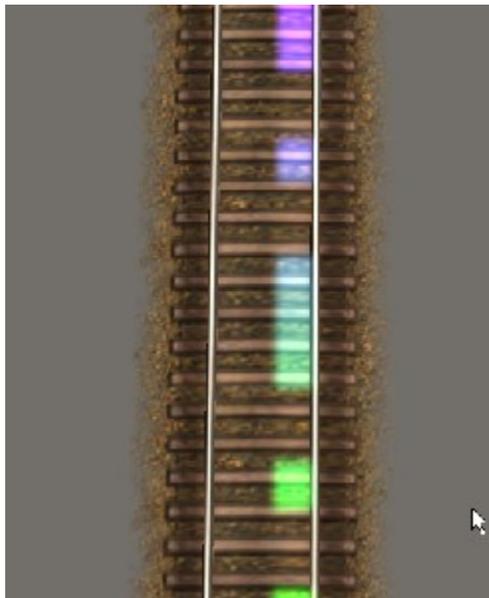
Check out the five pictures below. Which do you think is likely to be the most accurate?



If you said the middle picture in the top row, you are correct. The only thing that's different in all five pictures is the angle we view them from. Can you see why we're the most accurate when we look from directly above?

Having worked with this method a long time, I can't stress enough how important the "directly overhead" principle is. For track laying purposes, the ruler is not very precise, so we have to do everything we can to improve accuracy.

I say imprecise because it's difficult to position the middle of the track directly under the ruler. If you really want the track straight, check out the picture on the next page:



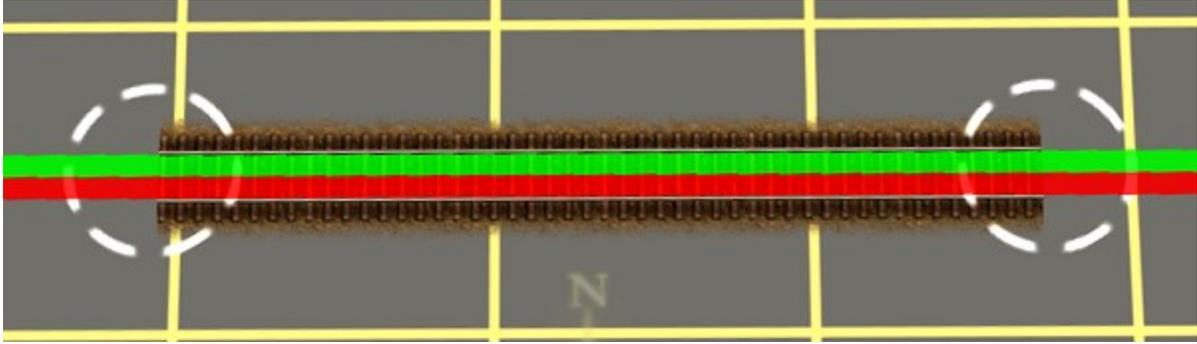
As I hope you can see, this is a much more accurate method of laying the track under the ruler. By placing the ruler right against the rail, we leave little room for "slop" in the placement, and the care you take lining them up will have a direct bearing on how straight your track is.

Let me repeat the principle one more time:

Look at it from directly overhead!

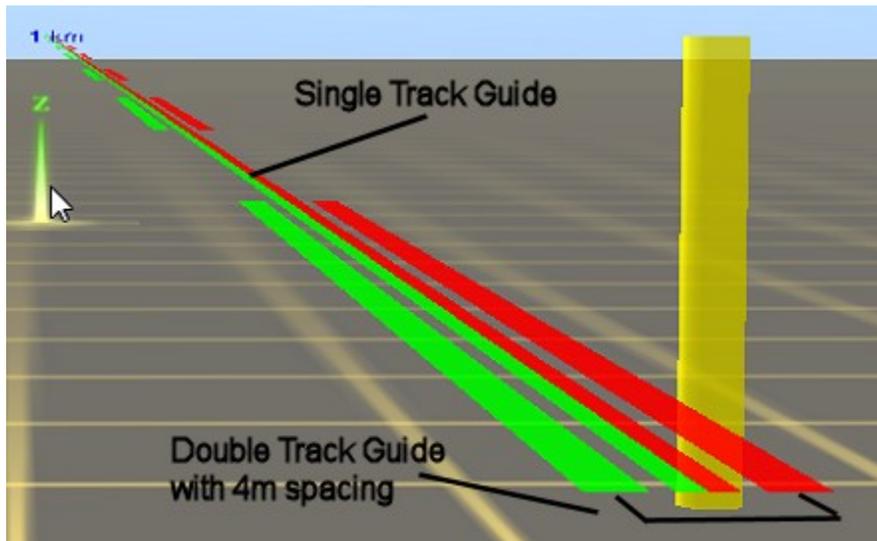
[Edit: 29 November 2008—

Since this tutorial was originally published, I've learned of another tool you can use to keep your tracks straight. It's the Guide Angle <kuid2:70337:23019:1> by Martinvk. It's a formatted straight edge 10,000m (32,500ft) long and is designed to lie directly between the rails of your track.



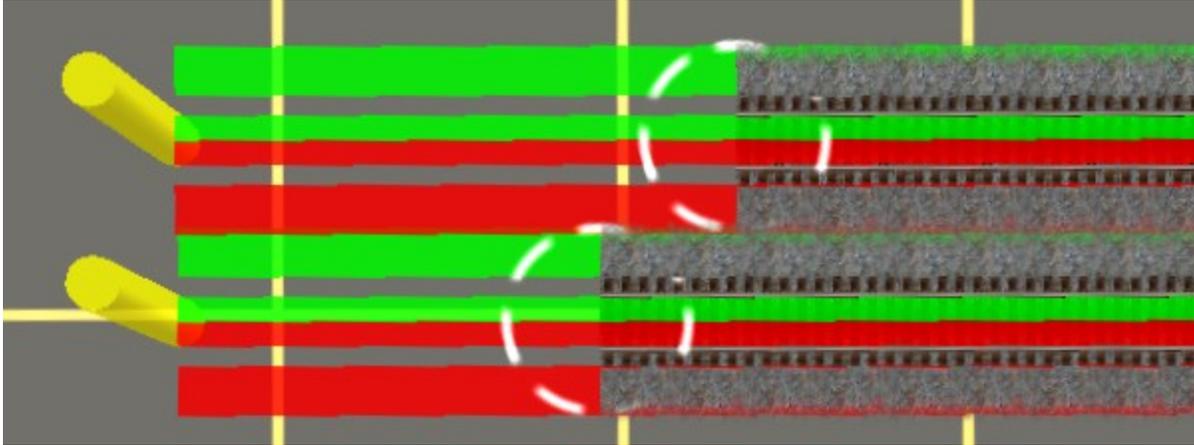
As you can see, the guide fills the space between the rails completely, making it easy to align your track over it. Furthermore, the guide is height adjustable, meaning it can lay right down on the ground with the track. It doesn't float above the track like the Trainz Ruler tool, making it more accurate and less subject to error when viewed from the side. For best results, though, my preference for precise alignment is to always view it from directly overhead.

The Guide Angle is a scenery object. You select it from the scenery menu, and you can place it and rotate it similar to a portal track, except, of course, it's far longer than a portal. Here's the way it looks when you paste it into your map:



The long, red/green center section is the single-track guide, and the separate red and green short sections are for two parallel tracks with 4m spacing. The short sections are 100m/333ft long and the main single track is marked a 1km intervals.

If you use multi-track spacing other than 4m, like I do, the guide can still be a big help: just lay two of them, side-by-side, at whatever spacing you need:



When you place the guide on your map, you rotate it from one end only, at the yellow pole, very much like you would a portal. Unlike a portal, however, which can only rotate in one degree increments, the guide angle can also rotate in 1/10 of a degree increments as well. Just hold the <CTRL> key down while you rotate it, as shown below:



Overall, the guide angle is a very useful tool and a good alternative to using the Trainz ruler for laying straight track. Furthermore, since it's a single scenery item, it takes less system resources than using a bunch of separate Trainz rulers.

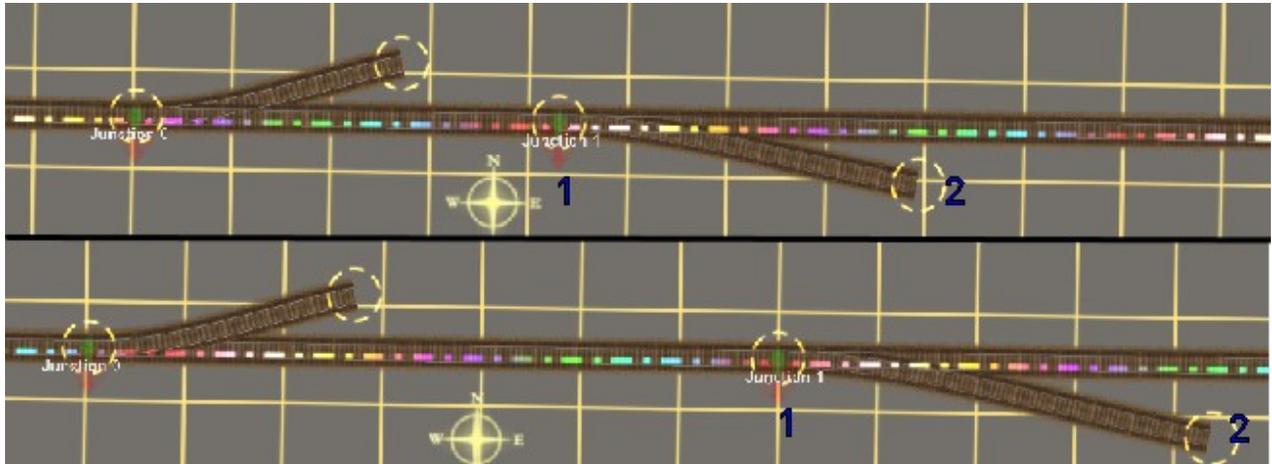
(And speaking of that, be sure to delete Trainz rulers when you are finished with them, since they do tend to bog the system down.)

Now let's return to the original text of the tutorial, keeping in mind the guide may be a better alternative in some cases:

[End of Edit]

Keeping tracks straight

In the drawing on the next page, we demonstrate how having a ruler straight edge makes it easy to move turnouts and keep everything lined up.



In the top picture, I've placed two turnouts, each with a short stub of track. In the bottom picture, I dragged switch 1 and spline 2 further to the right. With the ruler as our mainline reference, it's easy to drag the turnout down the ruler and still keep it lined up. Even if the mainline section is 8000 feet long, the ruler is our guide to straight track.

Pretty cool, huh? 😊

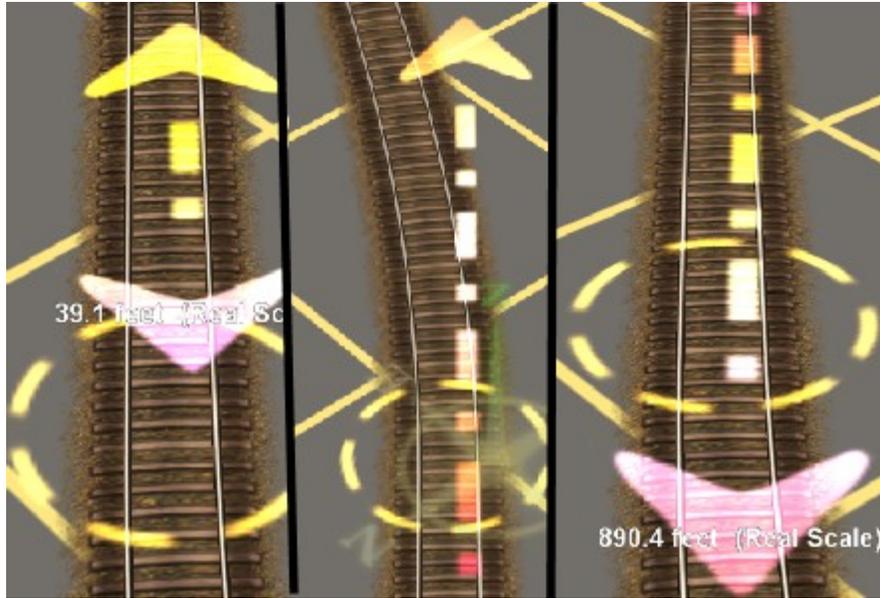
Before we close, I want to show you how to use the ruler on an existing track segment and how to extend an existing ruler.

Check out the drawing below:



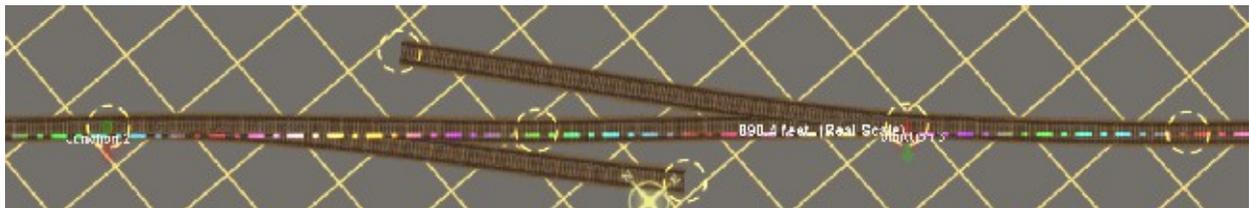
The track above is almost 900 feet long and it's pretty hard to see at this scale. But what I want you to notice is the two points A and B. Point A is at the end of a curve that comes in from the lower left of the picture. The track from point B curves toward the upper right of the picture. The track in between has five spine points and is supposed to be straight, but I've purposely misaligned some of them for this example.

Let's start by laying a ruler. Check out the drawings below:

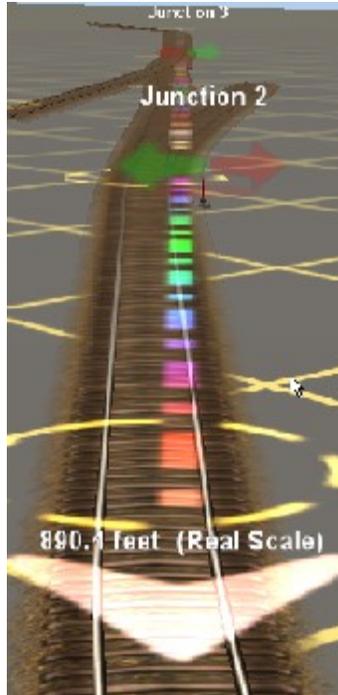


In the left picture, I've laid a short ruler near point A. Notice the lower arrow is not lined up against the rail, but I took care to line the vertical dashed line against the rail, since the vertical line is the part we care about. Next, in the middle picture, I dragged the ruler upward and *past* point B. Extending it past point B allows me to lay the vertical of the ruler right against the rail at the middle of the spline point. Get the idea?

Now check out the right picture. I've returned to point A and dragged the ruler down through the spline, so I can again lay the dashed ruler against the rail at the middle of the spline point. What you end up with is the picture below:

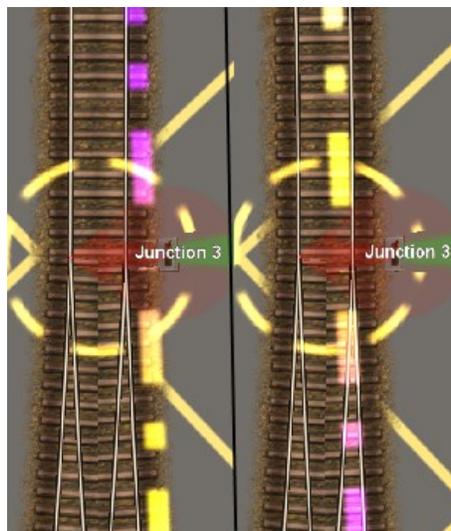


Again, it's a little difficult to see, but notice in particular the spline at the right of the picture. The ruler is almost in the middle of the track, instead of lined next to the rail like it's supposed to be. Check out this picture:

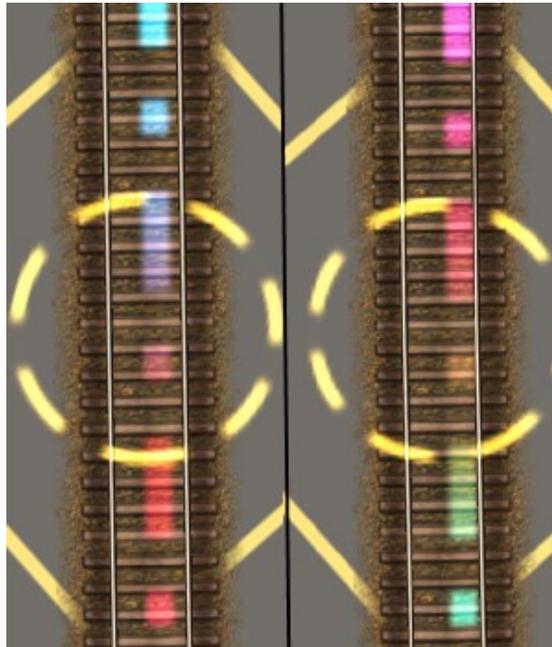


Now it's easy to see how badly the track is misaligned. Not to worry. All we have to do is go to each spline point, one at a time, position the view directly overhead, and drag the spline point so it lines up with ruler.

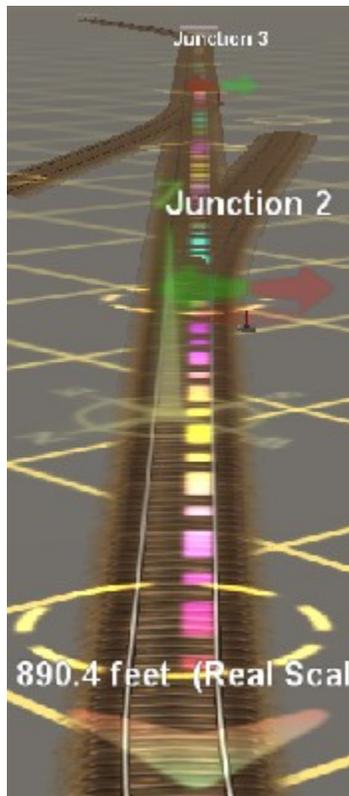
In the left picture below is Junction 3, and if you look carefully you can see how the track is misaligned. In fact, the track is actually to the left of ruler, and the right rail must be dragged to the other side of the ruler to get it lined up. See the right picture.



On the right, things are looking much better, but notice how the track at the top of the picture bends away from the ruler. That's because the next spline point is also misaligned. Okay, then, let's go fix that one as well:



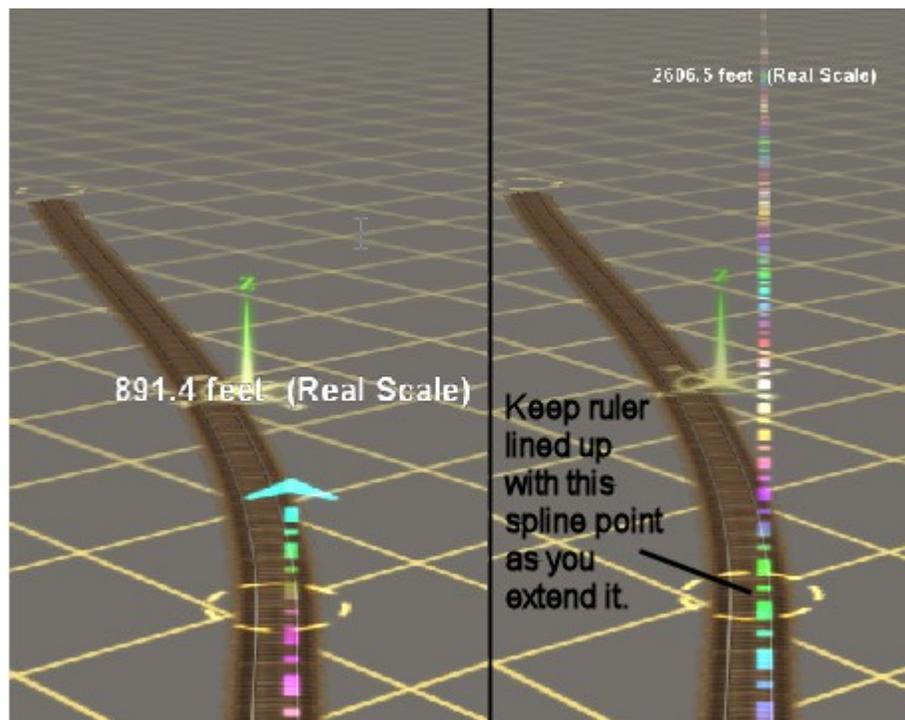
We repeat the same procedure, moving from spline point to spline point, pulling the track back into alignment with the ruler. Sometimes you have to go back and forth between points, as a change in one might require a slight adjustment in the adjacent points. When we get done, we end up with this:



This method isn't perfect, but it's a lot better than having to just look down the track and guess if it's straight.

One final thing. How do we lengthen a ruler? Or how do we create a new ruler that's longer than an existing track?

The method is the same in either case. You start by laying a ruler over an existing section of straight track, just the same as we did in the picture above. Then, once we've established a start and end point for the ruler on existing track, we can lengthen one end of it.



On the left is our existing track at point B. In the right picture, I've used the ruler-move function to extend the ruler another 1500 feet. The essential element in accomplishing this is to start with two known points. Then, when you go to extend one end of the ruler, you *keep the ruler aligned with the rail at the end you're moving*. In the drawing above, even though the end of the ruler is out of sight, the ruler is still aligned with the rail.

Do you see it? As long as you start with two known points, and keep the ruler aligned with both as you extend it, you'll be fine.

One small caveat. The further the distance between the known points, the more accurate the extension. If you have a track that's 200 feet long and you want to extend it a mile, you don't have a very accurate known ruler. On the other hand, if you have a ruler that's, say, 1000 feet long, you'll get a more accurate extension.

Think of the difference between a pistol and a rifle. A pistol barrel might be only four or five inches long. A rifle barrel might be twenty inches or more. The bullet from a rifle has to travel further before leaving the barrel, giving it much greater accuracy. That's why most people don't shoot a pistol at an object 400 meters away. So, the longer the known distance between the known points the better.

On my own Midwest Central, I've actually used this method to extend my rulers by thousands of feet. It's a little tricky, but it can be done if you're patient.

That's it. We're done. I hope you've found this information helpful.

Chuck
January 13th, 2008