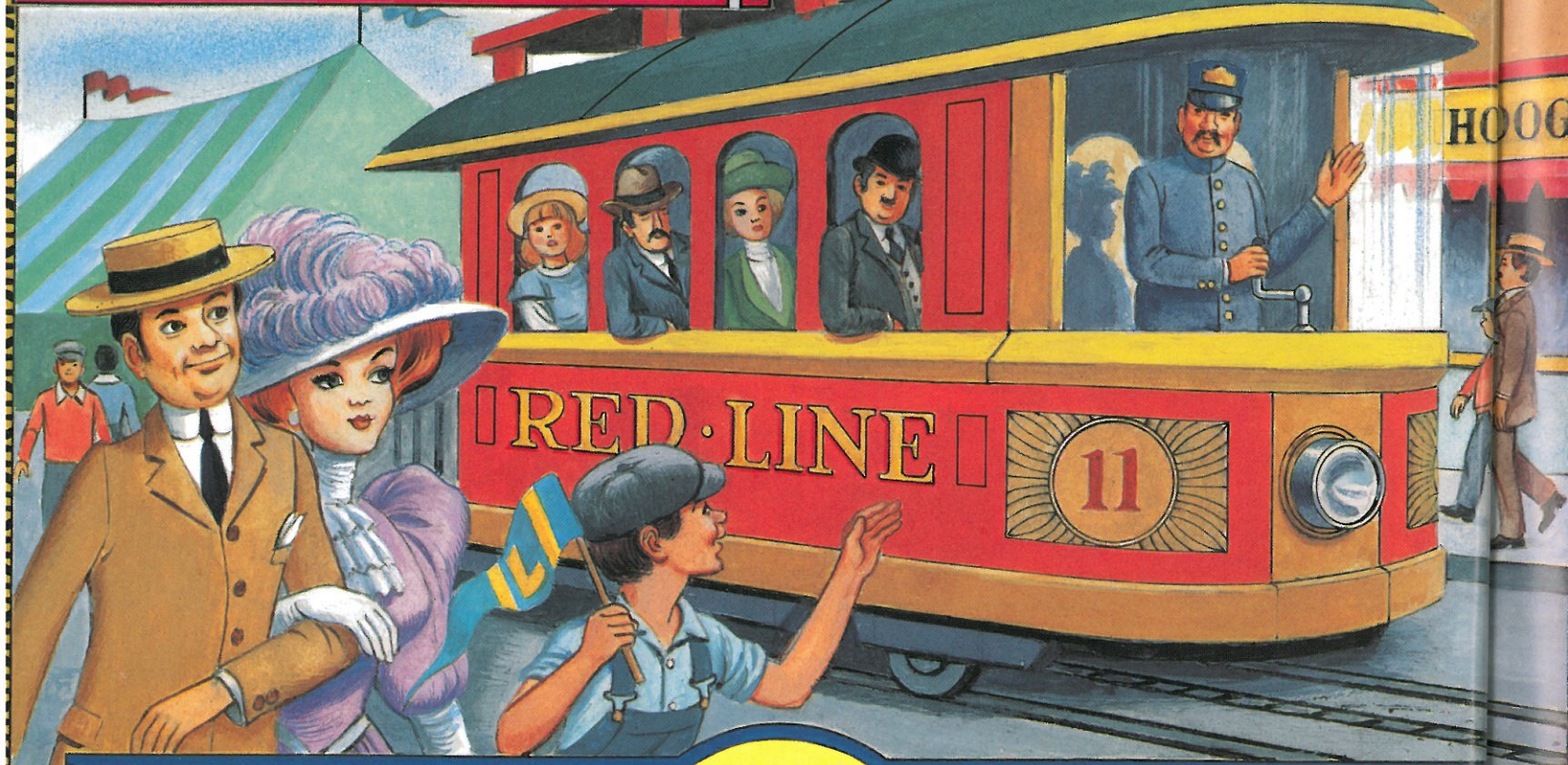


Grandpa's Transit Map



On winter nights years ago when it was too cold and snowy to go outside, Grandpa would tell us stories of his youth:

"I grew up in Lignite County, Pennsylvania, which just happened to have the weirdest transit system in the United States. Here's a map I saved that shows what the system was like in 1910. I was thirteen years old then." Grandpa's map is shown on the next page.

"The circles are the villages of Lignite County, and the colored lines are the transit lines. None of the lines ran through a village. Instead, they only took you to the village center. If you wanted to travel further, you had to change to another line.

"We had four types of transit lines. They are shown on the map like this:

Horse car lines: =====

Cable car lines: ~~~~~

Trolley lines: ———

Bus lines: - - - -

Three different companies ran these transit lines. We always referred to them as the Red, the Blue, and the Green companies, since those colors were used on the map to show which company ran which line.

"There was a system of free transfers between lines, but it was pretty complicated. Transfers were allowed only at the village centers. Each of the three companies allowed free transfers between its lines. So, if you came into a village on, for example, a Blue line, you could leave the village on another Blue line. Also, the county government had passed a law that the companies had to accept transfers from the same type of line. So, if you came into a village on, say, a Red trolley line, then you could make a free transfer to a Blue trolley line or to a Green trolley line (or you could also transfer to a different Red trolley line).

"You were not allowed to ride a line into a village, do some shopping, then use your free transfer to get back on the line you used to enter the village. However, we found that sometimes there were tricky ways to avoid paying an extra fare. Suppose you had just taken the Red cable car line from Crumbsburg, east to Klutztown." Grandpa drew the names of these two villages on the map.

"You cannot now use a free transfer to take the cable car line back west to Crumbsburg. But you can do the following: Use your free transfer to get on the Red

horse car line that goes east to the next village. Then transfer to the Green horse car line that goes south-east. At the next village, transfer to the Blue horse car line that goes west. Then transfer to the Blue bus line going north. You're now back in Klutztown, and since you arrived on the Red bus line you can now transfer to the Red cable car line and take it back west to Crumbsburg.

"One day during the summer of 1910, I visited the county fair at Startsburg. When I was ready to go back to our home in Endenville, I discovered that I had spent all my money except for one nickel. The nickel was just enough to pay my fare on the Red cable car line that left Startsburg, but I would have to use free transfers to get to Endenville. After studying the map a long time, I figured out a way I could get to Endenville using only free transfers. I had to ride so many different lines that by the time I got home it was almost midnight. But I was pretty proud of myself for figuring this out."

How could Grandpa have gotten from Startsburg to Endenville on only one fare?

