# INTRODUCTION

In June 1938, Baldwin Locomotive Works of Eddystone, Pennsylvania, delivered three steam locomotives, numbered 700, 701, and 702, to the Spokane, Portland & Seattle (SP&S) Railway. Built to pull passenger trains between Portland and Spokane, these grand machines were the culmination of more than a century of improvements to steam technology, as Baldwin had constructed more than 62,000 locomotives since founder Matthias Baldwin built his first in 1831.

The 68-foot-long boilers of the 700-class series rested on one-piece, cast-steel frames that ingeniously included hollow spaces to hold compressed air for a train's air brakes. Fitted with roller bearings on every wheel to minimize resistance, superheaters in the boiler so that every drop of water was converted to steam before entering the cylinders, and some of the largest fireboxes ever used for oil-burning locomotives, the 700-class engines were considered "exceptional" by rail historian Robert Le Massena.[1]

I was fortunate enough to help restore the SP&S 700 to fully operational status in 1989 and 1990. The railroad had donated the locomotive to the city of Portland in 1958, and it sat in a city park for more than two decades before it was removed for restoration in the early 1980s. The all-volunteer crew doing the work included welders, boiler makers, machinists, woodworkers, and other skilled craftsmen. I possessed none of those skills, so I did grunt work and wrote and edited the group's newsletter.

More than 110 feet long including the tender, standing 17 feet tall, and weighing 440 tons when loaded with fuel and water, the locomotive was an awesome sight at any time, but especially when steamed up and in motion. Even standing still, the breathing of the air compressors, the whir of the steam turbine powering the locomotive lights, and various other sounds made it seem alive. At mainline speeds, the chuff of the cylinders combined with the intermittent, multitoned whistle made it abundantly clear this was no Disneyland toy. As of this writing, it is the third-most-powerful operating steam locomotive in the world.

With four pilot wheels to help the locomotive navigate curves at high speeds, eight 77-inch-tall driving wheels, and four trailing wheels to hold the weight of a firebox as big as a moderate-sized bedroom, the locomotive was known as a 4-8-4. This made it a Northern, named after one of the SP&S's parent railways, the Northern Pacific, the first railroad to order a locomotive with this wheel arrangement in 1926. Locomotive refinements between 1926 and 1938 included roller bearings, higher-pressure boilers, and more efficient methods of injecting water into the boiler.

"The year 1937 represents the high-water mark of steam locomotive development and construction," wrote Le Masenna three decades later.[2] Locomotives were not only bigger, they were twice as powerful per ton as locomotives from just two decades earlier. Advances such as roller bearings and large fireboxes increased locomotive efficiencies in ways not revealed by ordinary measurements of power. The 700-class fireboxes, for example, were large because the locomotives were based on a Northern Pacific design that burned low-grade coal. The SP&S modified them to burn oil, which was far more efficient. Thanks to its huge firebox, the 700 could pull a 12-car train at 100 miles per hour, turning the wheels just 440 revolutions per minute, and the locomotive crew didn't have to worry about running out of steam as long as there was water in the tank because the boiler could turn five gallons of water into steam every second.

The first diesel locomotives—then called "oil electrics" to avoid the stigma of a German name so soon after World War I—went into use in 1924, but Baldwin was convinced steam would remain preeminent for decades. In 1930, Samuel Vauclain, the company's chairman and a notable locomotive designer in his own right, predicted steam would remain the

dominant form of railroad power for at least another 50 years. Despite the appearance of lightweight diesel-powered passenger trains in 1934, another Baldwin executive argued in 1937 that diesel locomotives could never handle the job of pulling heavy freight, and "sometime in the future, when all this is reviewed, it will be found that our railroads are no more dieselized than they are electrified."[3]

In March 1939, however, just nine months after Baldwin delivered the 700s, General Motors (GM) produced the first-class FT diesel locomotive and sent it on an 83,764-mile tour of 20 major railroads, pulling trains in 35 states. The FT—which stood for 1,400 horsepower (even though it was really just 1,350) but was also an abbreviation for freight—was actually four different units, each powered by a 16-cylinder engine, which powered electric motors for each wheel. Skeptical railroaders knew steam locomotives with two to four cylinders were complicated enough to maintain, and they shuddered at the thought of maintaining a locomotive with 64 cylinders.

Yet on the tour, the 5,400-horsepower FT easily outperformed the best steam locomotives in existence. The SP&S Railway, for example, had the engine pull a 6,000-ton freight train up a continuous grade for nearly 100 miles. The FT was able to sustain an average speed of 26 miles per hour, while the SP&S's most powerful steam locomotive, a 4-6-6-4 rated to produce about 50 percent more power than one of the 700s, could manage only 10 miles per hour. SP&S's parent company, Northern Pacific, required three steam locomotives to pull its premiere *North Coast Limited* passenger train over the Rocky Mountains if the train had more than 12 cars. Without assistance, the FT pulled a 17-car train over the passes and easily stayed on schedule.[4]

As a result of this demonstration tour, that first FT became known as "the diesel that did it" because it persuaded most in the railroad industry that diesel-electric locomotives were superior to steam. It "must be ranked as perhaps the most influential piece of motive power since Stephenson's Rocket," said *Trains* magazine editor David P. Morgan, "for in one stroke it broke steam's historic monopoly of freight traffic and thereby forecast total dieselization, here and abroad."[5]

Diesels didn't have to stop for water every hundred miles or so, and they could be in service 98 percent of the time, while steam locomotives

were down for maintenance as much as half the time. A diesel locomotive cost more than a similarly powered steam locomotive, but because of their service records, two diesels could work as many hours per week as three or four steamers, and with lower fuel and maintenance costs. Running two or more steam locomotives on a single train required separate crews for each locomotive, while a half dozen or more diesels could be operated together by a single crew. Any one of these advantages made diesels a threat to steam; all of them together were fatal to the future of steam locomotion.

General Motors ended up selling more than 7,600 FTs and successor F-unit locomotives to the railroads, as well as thousands of other engine styles. By the end of 1956, most major American railroads had completely converted their steam-powered locomotives to diesels, and they would have done so several years earlier had not World War II intervened. Baldwin attempted to convert to diesel production, but it eventually went out of business after making its last locomotive, a diesel switch engine, in 1956. Its failure to fully adapt to the needs of the new diesel technology was one reason why it went out of business. Single-piece, cast-steel frames worked for steam, for example, but they tended to crack due to the vibrations of diesels with their high number of revolutions per minute.[6]

## Technology Replacement

Historians consider the rapid conversion of steam to diesel to be a classic example of *technology replacement*. Transportation history is full of such replacements, from sailing ships to steamships, canals to railroads, and horsecars to electric streetcars. This book is about the replacement of urban railcars and intercity passenger trains with other forms of transportation and the curious efforts by American governments to prevent or reverse that replacement. Since 1970, federal, state, and local governments have spent hundreds of billions of dollars building new passenger rail lines and restoring old ones despite knowing not a single penny of that cost would ever be recovered out of passenger fares.

I write this book as a love letter to a dying friend, as I've been thrilled by passenger trains since I was five years old. I rode my first train from Grand Forks, North Dakota, to Portland, Oregon, in 1958. That summer,

we drove in my parent's first new car from Oregon to Ohio, where my father's family lived, and then to North Dakota, where my mother's family lived. With no vacation time left, my father drove home alone, leaving my mother and me to enjoy a few weeks in Grand Forks before taking the train back to Oregon.

I don't remember much of the train ride, but I do remember asking my mother before we left what the fastest train in the world was. "The *Western Star*!" she proudly but incorrectly answered. Great Northern Railway's premiere train, the *Empire Builder*, bypassed Grand Forks, and the secondary *Western Star* was the only direct connection between Grand Forks and the West Coast, so it was natural for us to take it. Since then, the Great Northern has always been my favorite. Considering my later economic and political beliefs, I couldn't have picked a better railroad to love, for the Great Northern was the first transcontinental to be built without government subsidies.

For Christmas that year, my parents gave me my first model train, a silver passenger train lettered for the Burlington, the Great Northern's connecting railroad that really did operate the world's fastest train. The following Christmas was even more special, as my father had secretly painted all of those silver cars with Great Northern's orange-and-green color scheme. I still treasure those cars.

Two years after that first train ride, my mother, infant brother, and I returned to North Dakota on Northern Pacific's *North Coast Limited*. The *Western Star* no longer went to Grand Forks, so my grandfather had to drive 80 miles to Fargo to pick us up, regardless of what train we took. Instead of a Great Northern train, my mother was probably attracted to the *North Coast Limited* by Northern Pacific's Slumbercoach, which offered sleeping car rooms at coach fares. I remember the narrow beds in the rooms, walking with another little boy to the train's observation car, and most of all riding in the dome cars, which offered 360-degree views of the countryside.

When I was 16, I volunteered to work for the Oregon Electric Railway Historical Society, helping society founder Paul Class restore and operate the group's collection of streetcars. Soon thereafter, my first paying job was helping Paul cosmetically restore an old Portland streetcar to

be the centerpiece in a new restaurant, the first in a chain called the Old Spaghetti Factory.

Since then, I've traveled hundreds of thousands of miles by train in 10 countries on four continents. On one cross-country trip, I met Vickie, the woman I eventually married, proving there is still romance on the rails.

While we were helping to restore the SP&S 700, I purchased and briefly owned five railroad passenger cars that we hoped to restore to operate with the locomotive. I've performed living-history portrayals of James J. Hill, the builder of the Great Northern and SP&S railways, in educational programs aimed at helping people understand the importance of railways to American life today and in the past. At night, I dream of riding in a dome car, and my nightmares, such as they are, are of enjoying train rides so much that I fail to get off at my scheduled stops.

Though few people can say they love passenger trains more than I do, I am but one of millions of Americans who have a nostalgic view of intercity passenger trains, streetcars, and other forms of rail passenger transportation. In an era of congested highways, the streetcars that once could be found in every American city of more than 15,000 people seem like a carefree way to travel. Compared with today's sardine-can-like airliners, the idea of a luxury passenger train with room to wander, gourmet meals in the dining car, and beautiful scenery in full view out the windows, has a lot of appeal. The sleek, streamlined passenger trains of the 1930s through the 1950s made an especially indelible impression on most Americans, and I still think riding in a dome car is the most elegant form of travel imaginable.

Early in my career, I joined the National Association of Railroad Passengers (NARP) and supported more funding for Amtrak. Later, I realized Amtrak was poorly managed and supported Amtrak reform. More recently, along with NARP founder Anthony Haswell—who is sometimes called the Father of Amtrak—I became completely disillusioned with the idea of government-run trains and have argued for abolishing the heavily subsidized federal passenger rail corporation.

My attitudes toward urban transit have also undergone a transition. In 1972, as an undergraduate student, I wrote a paper for the Oregon Student Public Interest Research Group (OSPIRG) advocating low-cost transit

improvements in Portland aimed at attracting people out of their automobiles and reducing air pollution. When the director of OSPIRG later became general manager of TriMet, Portland's transit agency, he implemented some of those improvements, and transit ridership surged. To be honest, I didn't propose rail transit reform in 1972 simply because I didn't think there was much chance of that happening. However, I later became more skeptical of rail transit when Portland built an expensive light-rail line, followed by more lines that were even more expensive.

That skepticism has led some people to call me "anti-transit" and "anti-passenger train." But I'm not. If someone could design a rail system that attracted riders and efficiently moved them from place to place, I'd be the first to endorse it. As this book will show, however, this is no more likely to happen than the freight railroads converting back to steam power. The next technology replacement will not be people trading in their cars for high-speed trains and light rail. Rather, it will be people trading in their human-driven cars for increasingly autonomous cars that drive themselves.

The short answer to the question of why passenger trains and streetcars have been replaced by planes, cars, and buses is that rails are more expensive and less flexible than the alternatives. To understand why, the first 10 chapters of this book will delve deep into the history of rail to show how passenger rail transportation once worked, who it worked for, and what has changed so that it no longer works today. This history demonstrates why statements such as, "High-speed trains have faster downtown-to-downtown times than flying" or "Light rail provides an alternative to congested roads going to work" are not relevant. Chapter 11 discusses the question of why passenger rail seems to work in Europe and Asia but not in North America.

Chapters 12 through 17 will each focus on a different kind of passenger rail, from streetcars to high-speed rail. Finally, Chapter 18 will demonstrate why we love trains, but also why we can't expect them to do for us what they did in the 19th century.

Passenger rail was once an important part of our history, but today it represents a drag on our economy. I still love passenger trains, but I don't think other people should have to subsidize my hobby.