

## *Burlington's Pioneer Zephyr*

The *Pioneer Zephyr* is a diesel-powered railroad train formed of railroad cars permanently articulated together with Jacobs bogies, built by the Budd Company in 1934 for the Chicago, Burlington and Quincy Railroad (CB&Q), commonly known as the Burlington. The train featured extensive use of stainless steel, was originally named the *Zephyr*, and was meant as a promotional tool to advertise passenger rail service in the United States. The construction included innovations such as shotwelding (a specialized type of spot welding) to join the stainless steel, diesel power and articulation to reduce its weight.

On May 26, 1934, it set a speed record for travel between Denver, Colorado and Chicago, Illinois, when it made a 1,015-mile non-stop "Dawn-to-Dusk" dash in 13 hours 5 minutes at an average speed of 77 mph. For three miles of the run it reached a speed of 112.5 mph (181 km/h), just short of the then US land speed record of 115 mph (185 km/h). The historic dash inspired two films and the train's nickname, "*Silver Streak*".

The train entered regular revenue service on November 11, 1934, between Kansas City, Missouri; Omaha and Lincoln, Nebraska. It operated this and other routes until its retirement in 1960, when it was donated to Chicago's Museum of Science and Industry where it remains on public display. The train is generally regarded as the first successful streamliner on American rails.



*Pioneer Zephyr* with its original 3-car consist, ca.1934.

## Concept and construction

In the early 1930s, the U.S. was in the depths of the Great Depression. Without the money to purchase new goods, freight trains were not hauling as much as they had in the previous decade. People who could not buy goods also could not afford to travel to the extent that they had before, so passenger revenues were also down. Even if they did have the money to travel, the equipment that railroads were using to carry passengers had not changed much since the middle of the 19th century. Railroads needed a way to re-energize the traveling public and offer a bit of hope for the days to come.

One of the railroad presidents who faced this challenge was Ralph Budd, formerly of the Great Northern Railway and now president of the Chicago, Burlington and Quincy Railroad, who needed a new train to get the public interested in traveling again. Naming the train was a task that was very seriously taken by Budd. He wanted a name that started with the letter Z because this train was intended to be the "last word" in passenger service; Budd and his coworkers looked up the last words in their dictionaries, but neither *zymurgy* nor *zyzzle* conveyed the meanings that Budd was looking for. The name of the new train came from *The Canterbury Tales*, which Budd had been reading. The story begins with pilgrims setting out on a journey, inspired by the budding Springtime and, the gentle and nurturing West wind of the god Zephyrus. Budd thought that would be an excellent name for a sleek new traveling machine—*Zephyr*.

In 1932 Ralph Budd met Edward G. Budd (a distant relation), an automotive steel pioneer who was founder and president of the Budd Company. Edward Budd was demonstrating his new carbody construction in a prototype rail motorcar built of stainless steel. Stainless steel provided many benefits over traditional wood and hardened steel for railroad carbodies; it was a lighter and stronger material, and its natural silver appearance and resistance to corrosion meant that it would not have to be painted to protect it from the weather. Since the carbody was much lighter than similar cars, it would be able to carry a higher revenue load for the same cost.

The problem with building stainless steel cars was that nobody could find an adequate way to hold the body together until the Budd Company patented the shotwelding technique. On August 20, 1932, Earl J. Ragsdale, an engineer at the Budd Company, filed a patent application for a "Method and product of electric welding"; on January 16, 1934, the United States Patent and Trademark Office (USPTO) granted US patent 1,944,106 to the Budd Company. Basically, because of the nature of stainless steel, traditional welding methods would unacceptably weaken the metal at the joint. In a spotweld, the two pieces of metal that are to be joined are pressed together at the joint with an electrode on each side of the joint. A very high electric current is passed through the joint, which fuses the two pieces of metal together, making a stronger bond than the surrounding metal.

Another factor in making the *Zephyr* lighter than conventional trains was that the individual carbodies in the train share their trucks with adjacent cars. In this design by Budd engineer Walter B. Dean, the train was three articulated compartments. On conventional passenger cars, each carbody rode upon a pair of trucks (wheel/axle assembly), with one truck at each end. The articulation not only reduced the number of trucks under the train, but it also dispensed with the need for couplers between each of the carbodies, further reducing the train's weight.

The exterior design of the train was left to aeronautical engineer Albert Gardner Dean (Walter Dean's younger brother) who designed the sloping nose shape, along with architect John Harbeson devised a way to strengthen and beautify the sides with the train's horizontal fluting. On April 15, 1936, Col. Ragsdale, Walter Dean and Albert Dean, filed patent applications for a "Rail Car Front End Construction". On September 23, 1941 the USPTO granted US patents 2,256,493 and 2,256,494 to the Budd Company.

The first *Zephyr* was completed by Budd Company on April 9, 1934, powered by an 8-cylinder, 660-horsepower (448 kW), 8-201A model Winton diesel engine. Like the diesel-electric locomotives that soon displaced the steam locomotive on American railroads, this engine powered an electrical generator; the electricity it generated was then fed to electric traction motors connected to the axles on the train's front truck.

The train's engineer sat in a small compartment in the nose of the train, directly in front of the prime mover. Behind the engine in the first carbody was a 30 ft long railway post office section. The second carbody consisted of a small baggage section, a short buffet, and 20-passenger coach section. The third and final carbody in the train, as originally built, was configured as half coach (40-passenger seats) and half observation car (12 passenger seats). As built, the train had 72 seats and could carry 50,000 pounds (22.7 tons) of baggage and express freight. This train's official christening occurred on April 18, 1934 at the Pennsylvania Railroad's broad Street Station in Philadelphia, Pennsylvania.

The Budd Company used the experience learned in building the *Zephyr* to build similar trains (such as the *Flying Yankee*) for other railroads, as well as a number of other *Zephyrs* for the Burlington.

## Promotion: "Dawn-to-Dusk" dash between Denver and Chicago

To catch the public's attention, this train was not simply rolled out of the factory for some dignitary to smash a bottle of champagne on its nose; it made a dash from one end of the CB&Q in Denver, to the other in Chicago. The railroad spared no expense in planning the operations. All other trains along the *Zephyr's* route were diverted to sidings and the turnouts were spiked into the proper alignment for the *Zephyr's* run. Track and maintenance of way workers checked every single spike and bolt along the train's route to ensure that there would not be any problems. Temporary speed signs were installed along the route to warn the *Zephyr's* driver of curves that would be dangerous at high speeds. On the day of the dash, every road grade crossing was manned by a flagman to stop automobile traffic ahead of the train and to ensure that the crossing was clear. Stations along the route were protected by local police officers, members of the American Legion and the Boy Scouts of America.

The train left Denver at 7:04 AM Central Daylight Time and arrived in Chicago at 8:09 PM, 13 hours 5 minutes later, at an average speed of 77 mph. For one section of the run, the train reached a speed of 112.5 mph, close to the world land speed record of 115 mph of 1903, which had been achieved in repeated runs on a dedicated test track. The non-stop 1,015 mile trip exceeded the railroad's expectations in being 1 hour 55 minutes faster than was scheduled. Reporters along the route told of the "silver streak" that sped past faster than any other train that normally rode American rails at the time. The Burlington's contemporary passenger trains plied the same distance in around 25 hours.

Riding the train were Ralph Budd, Edward G. Budd, president H. L. Hamilton of the Winton Motor Company (at that time a part of the new General Motors Electro-Motive Division), two Winton engineers to watch over the engine, a number of reporters, some Burlington employees, lucky members of the public, and Zeph, a burro that was contributed by a Colorado newspaper, the *Rocky Mountain News*, as a mascot for the train. The newspaper had described Zeph to the railroad as a "Rocky Mountain Canary" so the train's crew had originally planned only enough space for a birdcage; when they found out it wasn't a bird, the railroad hastily built a pen in the baggage section and bought some hay for it. When asked about the burro, Ralph Budd replied "Why not? One more jackass on this trip won't make a difference."

After the train arrived in Chicago, it traveled a little farther to the 1934 Century of Progress fair (noted in some press articles about the dash as the "Chicago World's Fair") where it was put on public display on opening day. After its display on the *Wings of a Century* stage, the train was taken on a 31-state, 222-city publicity tour. More than 2 million people saw the train before it entered revenue service.

Part of the tour included a test run between Chicago and Minneapolis-St. Paul a full five hours faster than the Burlington's fastest steam-powered train. Due to the *Zephyr's* success on this test run, the Burlington immediately ordered two more *Zephyr* trainsets that would be dubbed the *Twin Zephyrs*; the new trains debuted in April 1935 on this route.

## Regular revenue service

The *Zephyr's* power (leading) car was numbered 9900, the baggage-coach combine car 505, and the coach-observation 570. The train was placed in regular service between Kansas City, Missouri; Omaha and Lincoln, Nebraska, on November 11, 1934, replacing a pair of steam locomotives and six heavyweight passenger cars, weighing up to eight times as much as the *Zephyr*. By June 1935, it proved popular enough to add a fourth car, providing additional coach seating. The fourth car was originally a 40-seat coach number 525, but the following June it was switched to *Twin Cities* service, then back to the *Pioneer Zephyr* in December. Car 525 remained on the train until June 1938. Just over five years after it was introduced, the *Pioneer Zephyr* crossed the one million mile mark in regular service on December 29, 1939, near Council Bluffs, Iowa.

Ralph Budd and the Burlington capitalized on the *Zephyr's* success. However, most passenger trains needed larger capacity. Thus, as the Burlington made a transition to larger diesel-electric locomotives pulling individual (non-articulated) passenger cars, new streamlined cars of standard-size were ordered, which quickly became the standard of many railroads. However, Burlington was determined to be the leader, and ordered its large "E" series passenger diesels to also be equipped with matching stainless-steel fluting. Many of the Burlington's long distance named passenger trains began operating under the *Zephyr* banner, including the *Nebraska Zephyr*, *Denver Zephyr*, *Mark Twain Zephyr*, *Twin Cities Zephyr*, and perhaps the most famous of the namesake, the California *Zephyr*.

On the second anniversary of the train's famous dash, the original *Zephyr* was rechristened the *Pioneer Zephyr* to distinguish it as the first of the Burlington's growing *Zephyr* fleet. In 1938, car 525 was replaced by car number 500, a 40-seat buffet/lounge car, to provide light meals. Car number 505, the baggage-coach combine, was rebuilt at this time into a full baggage car, but it kept its original windows.

In regular service, the *Pioneer Zephyr* had its share of accidents. In 1939 it was involved in a head-on collision with a freight train that completely destroyed the cab. The train was rebuilt and re-entered revenue service soon afterward, but the accident strengthened the desire of locomotive designers to move the cab further back from the front of the locomotive to above a large nose, as on later EMD F-unit and EMD E-unit locomotives.

Since the *Pioneer Zephyr* was built of stainless steel, which is not as recyclable as aluminum, the train was spared from the metal recycling drives of World War II. By contrast, Union Pacific's first streamliner M-1000, built of aluminum, was scrapped in 1942 for the war effort, among other reasons.

In 1948 and 1949, the *Pioneer Zephyr* was temporarily removed from service to participate in the Chicago Railroad Fair's "Wheels A-Rolling" pageant. The fair's purpose was to celebrate 100 years of railroad history west of Chicago, and *Pioneer Zephyr's* role in the pageant was to highlight the latest strides in railroad technology. It resumed regular passenger operations when the fair ended on October 2, 1949. By 1955 the *Pioneer Zephyr's* route had been updated to run between Galesburg, Illinois, and Saint Joseph, Missouri; the trainset had been in continual service since 1934, operating over nearly 3 million miles. The *Pioneer Zephyr's* last revenue run was a trip from Lincoln, Nebraska, to Kansas City, Missouri, (along the train's regular revenue route) that then continued to Chicago on March 20, 1960. When Amtrak took over passenger rail services in 1971, the legendary *Zephyr* name was preserved, and the *California Zephyr* is an Amtrak route in the 21st century.

## Use in film

Press publicity had apparently first coined the term "Silver Streak". The *Pioneer Zephyr's* famous Denver-Chicago dash served as the inspiration for the 1934 film *The Silver Streak* starring Charles Starrett. In that story, the crew was racing to the Boulder Dam construction site with an iron lung, with only moments to spare. The original *Zephyr* trainset was used for the exterior shots in the film, while interior scenes were filmed on a soundstage in Hollywood. For the film, the "Burlington Route" nameplate on the train's nose was replaced with one that read "Silver Streak".

More than 40 years later, that classic film—or at least the name "Silver Streak"—served as the inspiration for a newer film of the same name. *Silver Streak* (1976) starred Gene Wilder and Richard Pryor; rather than using the *Pioneer Zephyr*, the combination murder-mystery and comedy was set in the era in which it was filmed, with the train being patterned more after the modern long-distance train, Amtrak's *Southwest Chief*.

## Legacy

On May 26, 1960, the 26th anniversary of the "Dawn-to-Dusk" dash, the original *Pioneer Zephyr* train (car numbers 9900, 505 and 570) was donated to Chicago's Museum of Science and Industry. Car number 500, which operated with the train from 1938, went along with *Mark Twain Zephyr* trainset 9903 to a party in Mount Pleasant, Iowa for static display in a town park, but plans for the train's display did not work out; car 500 and the *Mark Twain Zephyr* are currently stored in Chicago and plans are currently underway to display it in Fairfield, Iowa.

In Galesburg, Illinois, which is 162 rail miles from Chicago, the local high school named all its athletic teams the "Galesburg Silver Streaks" in honor of the train.

The Chicago museum displayed the *Pioneer Zephyr* outside the museum, with no protection from the weather, until 1994. At that time, the steam locomotive that shared the display space with the *Zephyr*, Santa Fe #2903, was donated to the Illinois Railway Museum, while the Chicago museum prepared a new display location for the *Zephyr*.

The Chicago museum dug a pit in front of the building and built a new display area for the *Zephyr*, where it could be displayed housed year-round. In 1998, after the train received a cosmetic restoration by Northern Rail Car in Milwaukee, Wisconsin, the pit was finally ready to receive the train. The *Pioneer Zephyr* train is still on display at the museum just outside the main entrance from the underground parking area for the museum, where it is one of the more popular exhibits.

In addition to the *Pioneer Zephyr*, two other legacies remain. An operable *Nebraska Zephyr* train was donated to the large Illinois Railway Museum at Union, west of Chicago. There, powered by one of the large "E" series passenger diesels (an EMC E5) with the distinctive and durable stainless-steel fluting, it is still operated on short runs on the Museum's substantial trackage, providing train enthusiasts and tourists with an experience reminiscent of the heyday of the Burlington's *Zephyr* service. The *Silver Charger*, power car of the *General Perching Zephyr*, is on display at the Museum of Transportation in St. Louis.

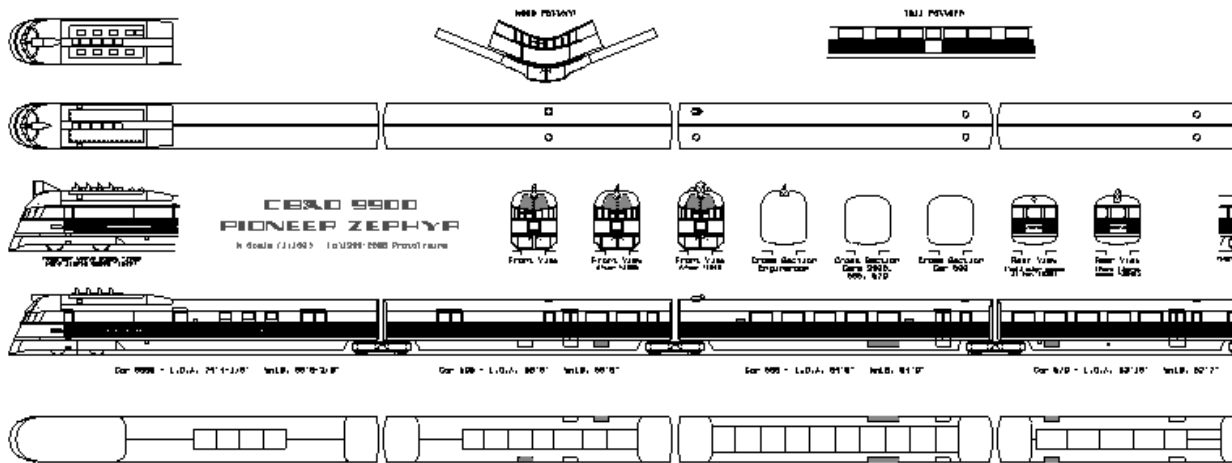
Also utilizing the famous name, the *Minnesota Zephyr* was an elegant dining train located in the historic city of Stillwater, Minnesota, although it was not directly associated with the historic Burlington *Zephyr* fleet.

Dorney Park & Wildwater Kingdom in Allentown, Pennsylvania has a miniature replica train ride called *Zephyr* which was built in 1935 and helped the park survive the Great Depression.

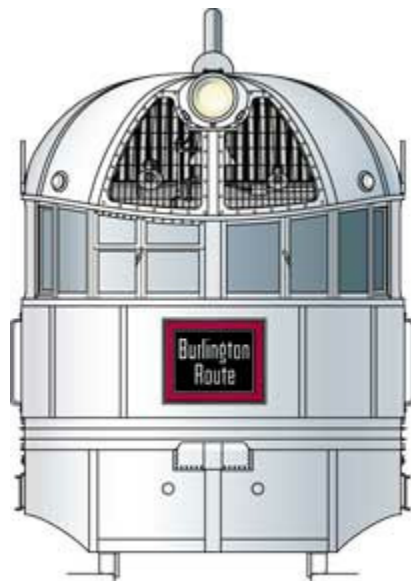
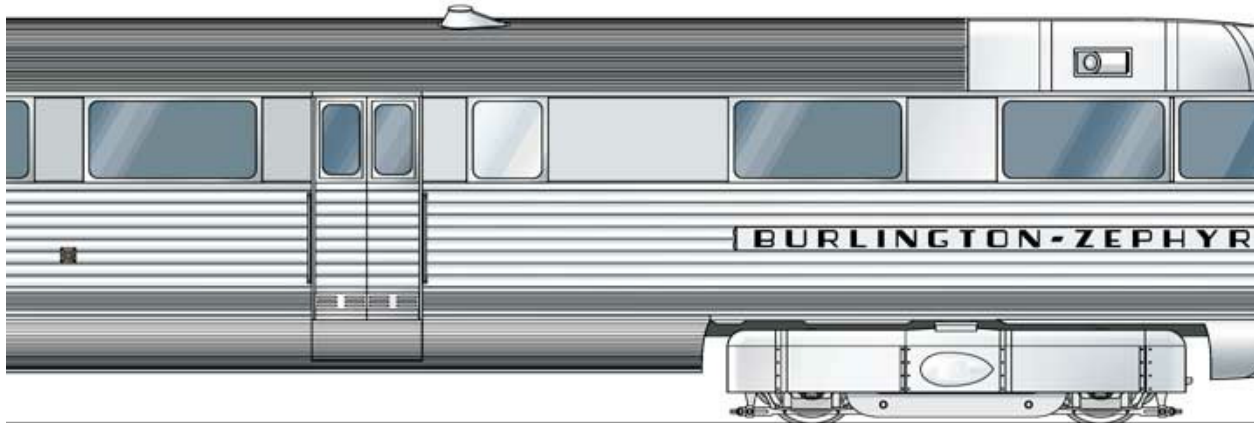
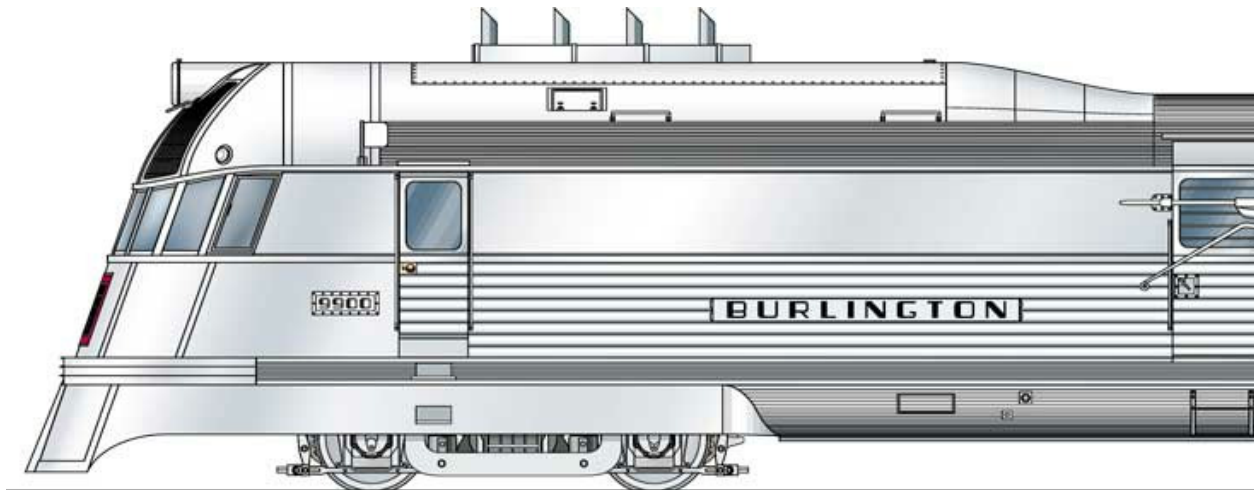
## Addendum

In its original form, it was a three-car articulated train, riding on four Timken roller-bearing trucks. It was 197 feet long, and weighed 175,000 pounds. It had seats for 72 passengers, could carry 50,000 pounds of baggage and express, and contained a 30-foot mail compartment. It was built entirely of welded stainless steel. The distinctive fluted sides and corrugated roof and floorpan introduced with this train served to stiffen the thin sheet metal used in its construction. The only rivets in the entire structure were those attaching the articulation castings to the car ends. The finest materials and furnishings were used throughout, and each passenger compartment was individually air-conditioned.

Most reference material regarding the engine often rate it as 600hp, but the gross horsepower was 660. 60hp was devoted to intrain electrical service, leaving the remaining 600hp to actually drive the train.



## Layout Drawings of the Original Zephyr



Front view



Rear view



## Technical Description and Specifications of the Delivered *Zephyr*

Streamlined from front to rear in stainless steel with satin-smooth longitudinal surfaces gleaming like burnished silver. The 18-8 stainless steel, a non-corrosive alloy consisting of 18 percent chromium and eight percent nickel, has a tensile strength three times that of ordinary steel. The fluted outer skin was not only decorative, but due to its shape and the electric shotwelding process developed by the Budd Company, it became an integral part of the train's structural support. Even the underbodies of each car were encased in the stainless steel to eliminate wind resistance.

The lead unit 9900 contained the power plant, a 30' Railway Post Office and a 15' mail storage area.

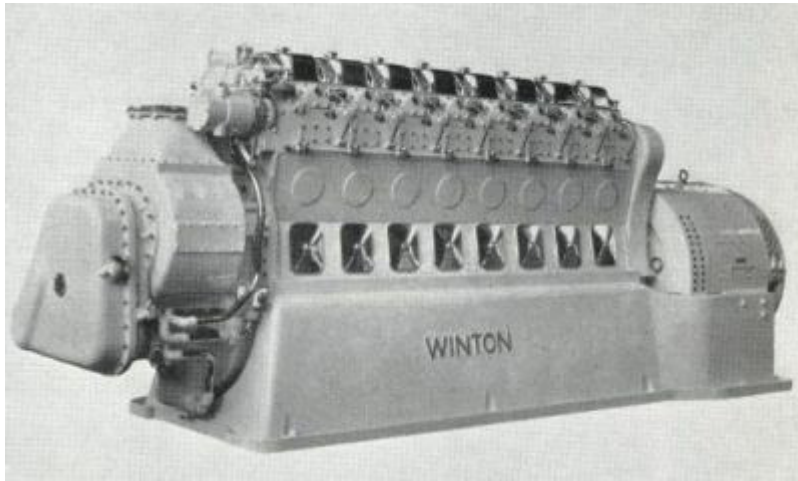
The second unit 505 was a 64' baggage and a short buffet and 20-passenger coach section. It held a small but efficient kitchen and pantry in the fore section, with a service counter separating it from a dinette. It was comprised of 16 seats grouped in "foursomes" facing tables that were set up at meal time and removed afterward. Twenty additional chairs put the capacity of this car at 36 passengers.

The final unit 570 had coach seats for 40 passengers in the fore section, while the aft contained a solarium parlor-lounge with detached chairs for another 16 passengers.

A fourth car 525 was added in 1935 providing additional 40-seat coach seating as unit three while the second unit's interior was completely remodeled.

In 1938, car 525 was replaced by car number 500, a 40-seat buffet/lounge car, to provide light meals. Car number 505, the baggage-coach combine, was rebuilt at this time into a full baggage car, but it kept its original windows.

Industrial designer Paul Philippe Cret was responsible for the *Zephyr's* art-deco interior design and decoration. The design and interior finish of the passenger compartments were characterized by color harmony without elaborate ornamentation. Pastel tints of blue and green for the side walls, and ceilings finished in ivory formed a light and pleasing background for the flash of the stainless steel window frames, sills and trim. Coach seats were upholstered in green mohair; window drapes also of green and carpet of taupe; parlor-lounge chairs upholstered in Fenway blue fabric, window drapes in lemon gold, and platinum grey carpet made the *Zephyr* both pleasing and modern. Lighting was from diffused overhead tubular ducts providing scientific designed levels of intensity at eye level. The passenger compartments were equipped with radio and were climate controlled with thermostatically controlled steam heat and air-conditioning.



660hp Winton Diesel, 6 US ton Prime Mover for *Zephyr 9900*

## ***Zephyr 9900 Specifications:***

**Builder:** Edward G. Budd Mfg Co.

**Date built:** May 10, 1934

**Cost:** \$208,561.88

**Class:** High-speed, streamline, articulated, diesel-electric train.

**Consist:** Original 1934 rollout three cars. Fourth car added 1935.

**Capacity:** Passengers - 52 coach, 12 parlor, 8 dinette - used for meal service and short haul passengers. 72 passengers total.

Mail/baggage/express - 50,000lbs total. 30-foot mail compartment, 19-foot baggage/express.

**Total length:** 197' 2"

**Total weight:** 1934 ready to run with 3 cars: 238,032lbs, 108 tons metric.

1935 ready to run with 4 cars: 284,918lbs, 129 tons metric.

**Weight comparison:** A single, standard heavyweight pullman coach weighs 85 tons.

**Weight of power car:** (Ready to run) 144,400 lbs or 65.5 tons metric - 1934 Budd blueprint.

**Weight on drivers:** 104,900 lbs.

**Weight of coaches:** (Ready to run) 47,386lbs or 21.5 tons metric - weight is averaged.

**Weight adhesive:** 175,000lbs, 79 tons metric.

**Engine:** Diesel prime mover 8-201A, 8-cylinder, 2-cycle, forced induction (scavenged) mechanically driven Roots blower.

**Engine specifications:** 503 cubic inch, 8" bore x 10" stroke, 660 gross hp@492kW.

**Engine maximum torque:** 4,201 ft. lbs.

**Manufacturer:** Winton Engine Company (A newly acquired division of General Motors.)

**Compression ratio:** 16 to 1

**Idle and max RPM:** 220 and 750

**Weight-to-power ratio:** 20 pounds per horsepower (6 tons US)

**Maximum speed:** 112.5mph (reached for 3.5 miles on Denver to Chicago run, 77.6mph average speed over 1,117.6 miles.

A later undocumented run recorded 122mph using stopwatch and telegraph poles.)

**Generator:** GE GT-534 form A1, rated 750v (938kW). - Based on a 1935 Class 1 Santa Fe diesel: 600V@750kW generator, creating a ratio of 1.25 x Volts = 938kW for extrapolation purposes.

**Traction motors:** Two General Electric model D-716, 300hp, 650v traction motors mounted on lead truck.

**Tractive effort:** 22866lbs@start, 13500lbs@10mph, 8200lbs@20mph, 3000@60mph, 1600@100mph.

**Gear ratio:** 52:25, rated for 117mph

**Truck bearings:** Timken roller-bearings applied to all axles for reduced friction and maintenance

**Drive wheels:** Powered lead truck had 36-inch wheels for traction

**Trailing trucks:** 30-inch wheels in articulated bogies

**Maximum axle load:** 45,180lbs (22.6 tons)

**Control equipment:** General Electric - 64 volts

**Auxiliary equipment:** Belt driven GT-1177 form A1 auxiliary generator, three CP-127B-11 motor-driven air compressors, and two belt-driven radiator cooling fans.

**Air brakes:** Westinghouse Air Brake W.S.C.

**Air brake compressor:** 3 GE CP-127 rated at 25 cubic feet per minute (0.41cfps for MSTs).

**Air brake main reservoir pressure:** 125 - 135 psi.

**Air brake train line pressure:** 110 psi, mean brake cylinder force 79psi.

**Fuel capacity:** 600 gallons fuel oil, 80 gallons lubricating oil, 140 gallons cooling water, 12 cubic feet of sand.

**Efficiency:** *Zephyr* used 418 gallons of fuel oil on its 1,015 mile dash from Denver to Chicago at a cost of just \$16.72, or 4 cents per gallon. That works out to 2.43 miles per gallon. The same distance in a steam locomotive would have cost \$255.

The non-stop *Zephyr* also cut twelve hours off the trip.



During its "dawn to dusk" record-breaking run, the *Zephyr* burned only \$16.72 worth of diesel fuel.

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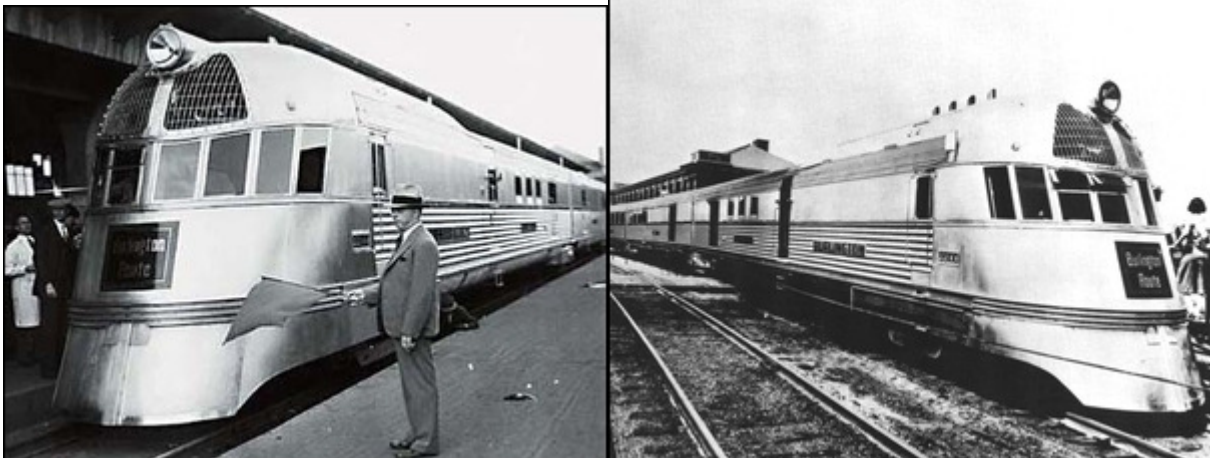
# *The Pioneer Zephyr*

~ It changed the way everyone viewed railway travel ~

The debut in 1934 of the *Pioneer Zephyr* was one of the turning points in railroad travel. For underneath the *Zephyr's* brilliant silver exterior lay a revolutionary two-cycle diesel engine that would soon replace the traditional steam engine, changing forever the nature of the entire railroading industry. The 87½-ton train itself was an impressive 197 feet of fluted, stainless steel, a lightweight material never before used in the construction of railcars. Not only was the steel beautiful to look at, it also held together better and wore longer than the metals it replaced.

Inside the train, the *Zephyr* provided luxury accommodations today's rail travellers can only dream about.

With all those advantages backing it up, the *Pioneer Zephyr* salvaged the role of the railroad as a carrier of passengers, as well as freight. In the coming years, the powerful diesel engines introduced by the *Zephyr* would prove a formidable match to the burgeoning trucking industry that threatened to take away the railroads' freight traffic.



The *Zephyr* begins its record-breaking dash across the country

In 1934, the year the *Zephyr* made its first run, some 50,000 smoke-belching steam locomotives were puffing their way back and forth across the United States, racking up 17.8-billion passenger miles and 268-billion ton-miles of rail transportation.

By 1961, following the *Pioneer Zephyr's* lead, the country had become completely “dieselized.” Approximately 28,500 diesel units produced 20-billion passenger miles and 565-billion ton-miles. In other words, the diesel-powered units were capable of doing almost four times the work performed by their predecessors, the steam locomotives.

But in the early days, the advantages of the dieselized engine were not so evident.

## Versus the Model T

Anyone watching a 1920 Model T automobile jerking and backfiring down the road would find it hard to believe that the object of so much derision would one day threaten the very existence of the railroad as a passenger carrier. But that is exactly what happened.

In 1924, the Burlington Railroad carried a whopping 18 million passengers. Only five years later, as the automobile's popularity increased, that figure dropped to 13.8 million. And by 1933, in the midst of the Great Depression, only 7-million travellers rode the rails. Passenger revenues followed a parallel descent. To the amazement of many, the railroad, with a tradition as grand as any in America, was slowly being replaced by an army of 30 mph automobiles.

Luckily for the railroad industry and the travelling public, a figure appeared on the scene in the early 1930s, with the know-how and determination to build a train to meet the demands of the 20th century traveller. His name was Ralph Budd, and he became president of the Burlington Railroad in 1932.

By the time Budd arrived at the Burlington, the automobile had edged out trains as the favoured means of transportation, even for long distance travel. Budd was among the first to admit that “the loss of railway passenger traffic during the last decade has been caused by a shifting from the railways to the highway, and not from a decline in total travel. In fact, the total passenger one-mile units of travel have greatly increased.”

Budd reasoned that since automobile engineers had derailed the passenger train, they could be the ones to put it back on the tracks. As author David Morgan noted in “Diesels West!”, such thinking implied the use of a kind of automotive internal combustion power instead of the steam locomotive, upon which the industry had relied for a century.



## Diesel Power

The expertise of no less than three firms was brought to bear on the problem of building a two-cycle diesel engine to meet the demands for train engines with increased horsepower. The work was led by the General Motors Co., which was greatly aided by the company's 1930 acquisition of the Winton Engine Co., and railcar builder Electro-Motive Co.

But it was Charles F. Kettering, General Motors' vice president of research, and the engineering staff of Winton Engine Co., that led the project to a successful conclusion.



Budd Co. family portrait with their 'baby', the *Zephyr*

In the late 1920s, Kettering began work on the two-cycle diesel engine, which eventually would become an integral part of the *Pioneer Zephyr*. His aim was to design a lightweight power unit with improved response and lower cost per horsepower than the available engines.

A period of great productivity followed the 1930 merging of the General Motors, Winton-Engine, and Electro-Motive companies. During that time, a number of significant engineering contributions were made. The unit injector was devised, incorporating the pumping and fuel metering functions into a single device to avoid high pressure lines.

Two other significant achievements were the application of the engine-driven positive displacement blower for scavenging, and the development of the welded steel crankcase, which enabled a reduction in overall weight over cast steel versions.

A major turning point occurred in 1933, when the Kettering team's eight-cylinder, 600-hp, 8-201 engine, with a weight-to-power ratio of only 20 pounds per horsepower (6 tons), was chosen to supply power to the Chevrolet exhibit at Chicago's "Century of Progress Exposition."

While visiting the Fair, Ralph Budd came upon the display, and immediately decided that the lightweight diesel engine would provide the power for his all-new, all-important passenger train. As Budd saw it, the diesel railroad was the railroad of the future—and if any company could put the diesel engine in a train, it was General Motors.



Cockpit controls for the *Zephyr* were very basic

Approximately one year later, on May 26, 1934, the *Pioneer Zephyr*, No. 9900, made its grand debut with a record-setting 1,015-mile dawn-to-dusk run from Denver to Chicago in 13 hours. Appropriately enough, the *Zephyr* was named after the Greek god of the west winds.

The train was powered by a Winton 8-201A 660 gross horsepower, two-cycle diesel engine (a revision of the model Ralph Budd saw at the fair), designed to travel at speeds of approximately 110 mph. Not only was the *Pioneer Zephyr* faster and lighter than its predecessors, (weighing less than one heavy-weight passenger car) it also reduced the Burlington's cost of passenger train operation. A new era in railroading history had begun.



The *Zephyr* is streamlined from end to end

## Inside Story

The high operating standards of the world's first high speed diesel-propelled, stainless steel three-car train were matched by the *Zephyr's* painstaking interior furnishings.

The first car held the diesel engine, engineer's cab, a 30-ft. railway post office, and space for baggage. The second car carried a larger baggage compartment, a buffet grill and, at the rear portion of the unit, a 16-ft. smoking section with seats for 20 passengers.

Third and last was a 31-ft. compartment with seats for 40 persons, and a solarium-lounge with chairs for 12.

Prior to the *Pioneer Zephyr*, the travelling public knew only ornate but gloomy railroad car interiors. All that changed with the high-stepping *Zephyr*. Each individual compartment had a distinctive colour harmony coordinating wall colours, window drapes, upholstery, and floor covering.

But more important than the *Zephyr's* looks was the uplifting effect it had on a mid-Depression America. Said a former *Pioneer Zephyr* rider, "I have always felt that the *Pioneer Zephyr*, in introducing a new type of service at a time when the Depression was still fresh in our minds, had a stimulating effect in that it lifted our spirits and had much to do with reaffirming the faith of the people in the free enterprise system. True, it was not a world-shaking event, but it pointed the way for better things to come."



Edward Budd & company enjoy the observation car during the dash to Chicago.

## Pioneer of an Era

Following the *Zephyr's* first historic run, it made another cross-country tour covering 222 cities, where it was received by some 2-million spectators. The train also was a hit attraction at Chicago's 1934 "Century of Progress".

On Armistice Day 1934, the *Zephyr* went into regular passenger service, serving the West and Midwest until its retirement.

That was only the beginning—for the diesel and for the *Pioneer Zephyr*. The train was the star of radio programs and a hit movie entitled "*The Silver Streak*." It sparked dreams of adventure in the minds of countless small boys and girls—and of distant places in the minds of their parents.

The first million miles of the *Pioneer Zephyr* were celebrated on Dec. 29, 1939. On Apr. 10, 1944, the *Zephyr* was the guest of honor at its 10th birthday party at Lincoln, Neb. The granddaddy of diesel-powered streamlined trains celebrated its 20th anniversary of regular service at Quincy, Illinois.



*Zephyrs* in regular service

Finally on May 26, 1960, the *Pioneer Zephyr* pulled up to its final destination just outside the East Pavilion of Chicago's Museum of Science and Industry, blowing the whistle on an unparalleled career that had spanned 26 years and some 3.2 million miles.



The *Pioneer Zephyr* now in an enclosed exhibit in Chicago's Museum of Science and Industry



Mark Twain Zephyr