= 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 , 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 (1 @,@ 633 km) non @-@ stop " Dawn @-@ to @-@ Dusk " dash in 13 hours 5 minutes at an average speed of 77 mph (124 km / h) . For one section 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 a 1934 film and the train 's nickname , " The Silver Streak " .

The train entered the regular revenue service on November 11 , 1934 , between Kansas City , Missouri ; Omaha , Nebraska ; 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 railroads .

= = Concept and construction = =

In the early 1930s , the US 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 . Automobile travel travel had increasingly cut into rail ridership since the mid @-@ 1920s , making faster , more efficient service imperative for railroads to compete . 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 (Burlington) , who sought to develop a more efficient high speed train to replace conventional steam @-@ powered heavyweight equipment to lower operating costs , attract more customers , and restore profitability to passenger service . The project hinged on two major elements : developing lighter railcars and developing an internal combustion driven power system adequate for high speed service .

In 1932 Ralph Budd met Edward G. Budd (no relation) , an automotive steel pioneer who was founder and president of the Budd Company . Edward Budd was demonstrating his new Budd @-@ Michelin rail motorcar built of stainless steel . Pneumatic @-@ wheeled railcars never found popularity for actual service in the US - they tended to derail - but they demonstrated the successful construction of lightweight stainless steel unibody railcars .

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 .

In developing the Budd @-@ Michelin railcar , the Budd Company used the formed steel technology in which they were industry pioneers and solved the most difficult problem in using stainless steel for railcar construction : developing a welding technique that would not compromise the strength and corrosion resistance of the stainless steel . 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 . Shotwelding , as Ragsdale termed his method , involved automatic control of the timing of individual spot welds . In spot welding , the two pieces of metal that are to be joined are pressed together with an electrode on each side of the joint . A very high electric current is passed through the joint and fuses the two pieces of metal together . If a spot weld is heated too long , heat will spread from the weld at a middling temperature that weakens the stainless steel and compromises its corrosion @-@ resistant properties unacceptably ; Ragsdale 's precisely @-@ timed welds solved the problem . With their patented welding process at the core of stainless steel railcar construction , the cars produced by Budd were a truly unique product .

The other major problem Ralph Budd faced in developing a practical high speed lightweight train was to find a powerplant adequate to drive a trainset at a speed competitive with the faster steam trains . The existing powerplants for motorized railcars were completely inadequate . Contemporary four @-@ stroke Diesel motors had unacceptably low power @-@ to @-@ weight ratios and were only efficient under an unacceptably narrow range of operating conditions . Spark @-@ ignited petroleum distillate motors also suffered from low power @-@ to @-@ weight ratios along with being maintenance @-@ intensive and smokey , and gasoline motors showed limited potential for higher power hauling applications . The solution to Budd 's problem presented itself in the new two @-@ stroke Diesel motors developed by the partnership of the Winton Engine Company and General Motors , which represented a factor @-@ of @-@ four improvement in power @-@ to @-@ weight ratio over the previous generation of Diesel motors . Their efficient operating range was also improved , owing largely to improvements in fuel injection developed by GM and Winton . A Diesel @-@ electric system driven by the new motor was used to power General Motors ' automotive assembly exhibit at the 1933 Century of Progress Chicago World 's Fair . Budd saw the compact , efficient system in action , saw a major piece of his lightweight train puzzle fall into place , then approached GM about developing it into a system for rail propulsion . The result was a Diesel @-@ electric drive system powered by an eight @-@ cylinder , 600 hp Winton 201A Diesel motor installed in a new three car stainless steel streamliner within a year . In 1933 a Century of Progress exhibit inspired the Zephyr streamliner ; the following year the new Zephyr streamliner inspired the Century of Progress fair and the rest of the country .

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 (pivot @-@ mounted 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 . It did , however , mean that train lengths could not be easily changed by switching out cars .

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 , with architects Paul Philippe Cret and John Harbeson , devising a way to strengthen and beautify the sides with the train 's horizontal fluting . On April 15 , 1936 , Colonel 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 streamlining extended to the undercarriage as well to reduce drag .

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 by Zephyrus , the gentle and nurturing west wind . Budd thought that would be an excellent name for a sleek new traveling machine ? Zephyr .

The first Zephyr (9900) was completed by the Budd Company on April 9 , 1934 , powered by an eight @-@ cylinder , 600 @-@ horsepower (447 kW) , 8 @-@ 201 @-@ A model Winton 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 in 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 (9 @.@ 1 m) long railway post office section . The second carbody consisted of a small baggage section and 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 tonnes) 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 .

Following the Zephyr Budd built an identical trainset , the Flying Yankee , for the Boston and Maine railroad , and went on to build a series of larger and more powerful Zephyr trainsets for Burlington .

= = Promotion : " Dawn @-@ to @-@ Dusk " dash = =

To catch the public 's attention , this train was not simply rolled out of the factory ; it made a dash from one end of the CB & Q , in Denver , to the other , in Chicago on May 26 , 1934 . 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 spike and bolt along the train 's route to ensure that there would not be any problems , and temporary speed signs were installed along the route to warn the Zephyr 's crew 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 and members of the American Legion and the Boy Scouts of America .

The train left Denver at 07 : 04 Central Daylight Time and arrived in Chicago at 20 : 09 , 13 hours 5 minutes later , at an average speed of 77 mph (124 km / h) . For one section of the run , the train reached a speed of 112 @.@ 5 mph (181 km / h) , close to the world land speed record of 130 @.@ 6 mph (210 @.@ 2 km / h) of 1903 , which had been achieved in repeated runs on dedicated test track . The non @-@ stop 1 @,@ 015 mile (1 @,@ 633 km) 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 ran by 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 , H. L. Hamilton , president of the Winton Motor Company (at that time a part of the new General Motors Electro @-@ Motive Division) , a number of reporters , some Burlington employees , 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 was not 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 were dubbed , the " Twin Zephyrs " , starting the spread of the Zephyr brand .

= = The early Zephyr series trains = =

Following the Pioneer Zephyr 9900 , two identical trainsets , 9901 and 9902 , were built and put into service as the Twin Cities Zephyr between Chicago and Minneapolis - St. Paul in April 1935 . The four car set 9903 entered service as the Mark Twain Zephyr between St. Louis and Burlington , Iowa in October 1935 . The six car sets 9904 and 9905 began service as the Denver Zephyr in May 1936 then replaced 9901 and 9902 on the Twin Cities run in December 1936 ; the smaller trains were assigned to new Zephyr routes . Two new ten car trains , 9906 and 9907 , replaced 9904 and 9905 as the Denver Zephyr in November 1936 . The last of the classic Zephyrs , 9908 , entered service as the General Pershing Zephyr between Kansas City and St. Louis in 1939 .

While 9900 @-@ 9903 were power cars , only one more , the unique 9908 , was built . 9904 @-@ 9907 were locomotives with the twin 900 hp 12 @-@ cylinder engine layout that the early E @-@ units would use . 9906 and 9907 , built for the ten car Denver Zephyr sets in 1936 , included booster units . 9908 used the new 1000 hp EMD 567 motor in a single motor configuration . After 9908 , all Burlington passenger engines were standard production locomotives , except for the cosmetic stainless steel bodywork of the E5s .

9900 , and sisters , 9901 @-@ 9903 , were successful as streamliners , but had the drawbacks of articulated trainsets and early two @-@ stroke Diesel motors . However , despite their shortcomings , 9900 and 9902 @-@ 9908 were all in service until at least 1954 . 9900 remained in service until 1960 . The 9908 power car remained in service until 1966 . As of 2016 9908 is undergoing restoration to operational condition .

Winton Diesel engines were used in early EMC designs , and 9900 had an eight @-@ cylinder 201A model developing 600 hp at 750 rpm . Two @-@ stroke Diesel motors , while a breakthrough in locomotive power , were an immature technology . Some of their early reliability problems were mitigated with changes to individual parts such as pistons ; other solutions had to wait for a differently designed motor . For example , the first generation of pistons in the Winton motor only had about 50 @,@ 000 miles of useful life , later extended to about 100 @,@ 000 miles . EMC 's next generation Diesel motor had pistons with a useful life of over 500 @,@ 000 miles . The problems were most acute under the operating conditions of locomotive , rather than stationary or marine , use . Even with the problems of the 201A , their maintenance regime was significantly lower than for steam locomotives .

9900 and 9901 @-@ 9903 were articulated trainsets , with common trucks (Jacobs bogies) between each car . This caused operating problems , as train lengths could not be changed for demand and any single failure affected the entire train . All following power units were separate from their train , although four more articulated and semi @-@ articulated carsets were built .

= = 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 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 , 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 back from the front of the locomotive to above a large nose , as on 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 M @-@ 10000 , 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 the 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 (4 @.@ 8 million kilometres) . 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 " .

= = Legacy = =

= = = Influence on trains = = =

The sensation caused by the new Zephyr trainsets sparked intense competition centered on speed and styling in the region served by the CB & Q. In May 1935 the Milwaukee Road introduced the Class A steam @-@ powered high speed streamliner locomotive on its Chicago @-@ Twin Cities Hiawatha run . The styling of the Class A was directly evocative of the Zephyr , with a " shovel @-@ nose " front end featuring a high @-@ mounted headlamp ensconced in grillework . Another early adopter of streamline styling was the New York Central railway with its Commodore Vanderbilt steam locomotive , showing styling elements borrowed from the Zephyr , unveiled in December 1934 . A Zephyr @-@ type trainset , the Flying Yankee , started service between Boston and Portland , Maine in April 1935 , signaling new competition for steam @-@ powered passenger service on the east coast . The Gulf , Mobile , and Northern Rebel featured styling similar to that of the Zephyr , entering service on July 10 , 1935 between New Orleans and Jackson , Tennessee .

The race was on nationally to develop faster and more stylish locomotives for passenger service , boosting the streamliner trend .

Style and structural elements of the Zephyr were incorporated into the EMC " E " series diesel locomotives introduced in 1937 , featuring " shovel @-@ nose " front ends beneath their elevated cabs . The E5 units produced for CB & Q paid homage to the original Zephyr trainsets with a stainless steel body , fluted lower bodywork , horizontal black stripes across the front , and faux grillework flanking the upper headlamp . The lightweight construction introduced to mainline service by the Zephyr trainsets became the standard for new railcars used with the new EMC @-@ powered Diesel streamliners such as the AT & SF Super Chief .

= = = Zephyr @-@ mania = = =

With Zephyr @-@ mania sweeping the country , tributes turned up in the names of everything from sports teams to commercial products . In 1934 , Father Becker , principal of the newly built St. Mary High School in Menasha , Wisconsin , was so inspired by the dawn @-@ to @-@ dusk run that he chose " Zephyrs " as the mascot for the new school . 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 . In 1935 , the H. N. White Company changed the name of its top @-@ line saxophones to " King Zephyr . " Ford Motor Company introduced the " Mercury Zephyr " with the 1936 model year . If advertisers could find a way to cash in on Zephyr @-@ mania , they did .

= = = Later years = = =

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 (MSI) . 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 Granite City , Illinois and plans are currently underway to display it in Fairfield , Iowa .

MSI displayed the Pioneer Zephyr outdoors , 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 (IRM) at Union , west of Chicago , while MSI prepared a new display location for the Zephyr .

MSI dug a pit in front of the building and built a new display area for the Zephyr , where it could be displayed 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 . Rohn Metal Fabricating , known for its expertise in stainless steel fabrication , played a part in the interior restoration of the Zephyr . The Pioneer Zephyr train is still on display at MSI just outside the main entrance from the museum 's underground parking area , where it is one of the more popular exhibits . Thomas Rohn , owner of Rohn Metal , was " happy to lend his company 's expertise " in the train 's restoration .

In addition to the Pioneer Zephyr , two other legacies remain . An operable Nebraska Zephyr train was donated to IRM . 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 Pershing Zephyr , is on display at the Museum of Transportation in St. Louis , and the same train 's " diner @-@ parlour and observation car " is now the Silver Star Cafe in Port Hedland , Australia .

Also utilizing the name , the Minnesota Zephyr was a dinner 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 .

= = Models = =

Due to the Zephyr 's place in American railroad history , many model railroaders have built their own versions of the Pioneer Zephyr in miniature . Several model manufacturers are now producing commercial ready @-@ to @-@ run models or kits of the train for modelers to build . This list is ordered by the manufacturer 's release date :

American Flyer introduced one of the earliest versions of the Zephyr in 1934 . Originally sold as a three @-@ car set , the body shells were produced in sand @-@ cast aluminum and hand @-@ polished to represent the stainless steel @-@ skinned prototype . Additional cars became available and the locomotive or " power unit " underwent some refinements during production ; and a less expensive stamped lithographed steel version was also produced . The Zephyr set appeared in the 1934 @-@ 1938 American Flyer catalogs . With the purchase of the American Flyer line in 1937 by the A. C. Gilbert Company , a new line of O scale (1 : 48) trains moved into production phasing out the Zephyrs and previous O @-@ scale products collectively known as " Chicago Flyer " .

Challenger Imports imported limited production ready @-@ to @-@ run brass models in HO scale (1 : 87) of the four @-@ car Pioneer Zephyr , Mark Twain Zephyr and the Boston and Maine Railroad 's Maine Cheshire and Maine Minuteman in 1993 .

Fine N @-@ Scale Products released a kit in 1996 in N scale (1 : 160) that includes an option for car number 500 .

Con @-@ Cor made limited @-@ run models available in both HO scale and N scale that were released in 2005 , and then again in 2012 .

River Raisin Models released a ready @-@ to @-@ run model in S scale (1 : 64) of both the Pioneer Zephyr (in three- and four @-@ car configurations) and the similar Flying Yankee , in 2005 .

MTH Electric Trains released a limited production ready @-@ to @-@ run model of the three @-@ car Pioneer Zephyr in O scale in 2005 .

In 2007 , Fisher @-@ Price released an engine called " Knight " for their GeoTrax Rail & Road System that is clearly inspired by the Zephyr .