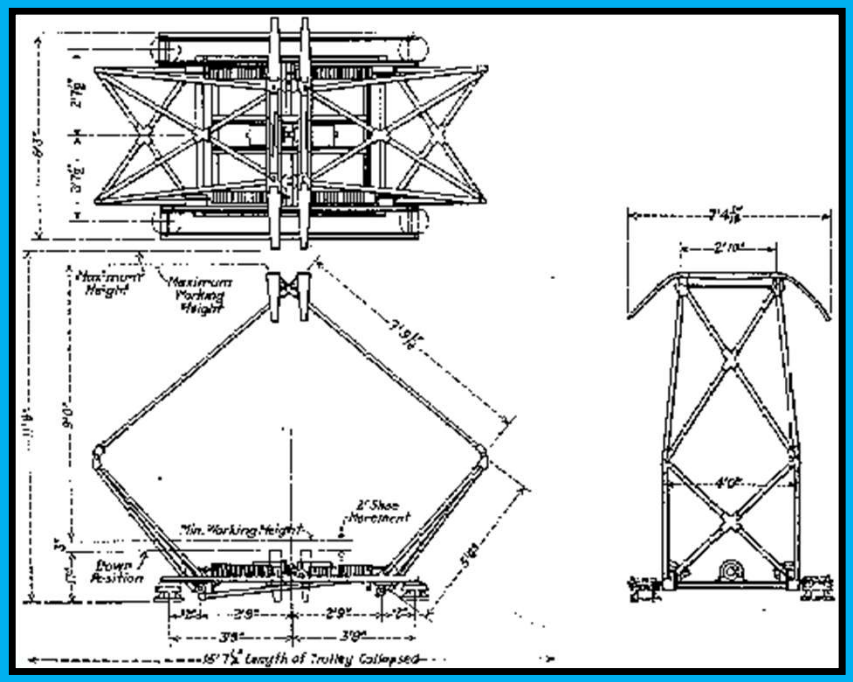

EVERY MILE
between
PENNSYLVANIA 4800
New York &
Washington
ELECTRIFIED!

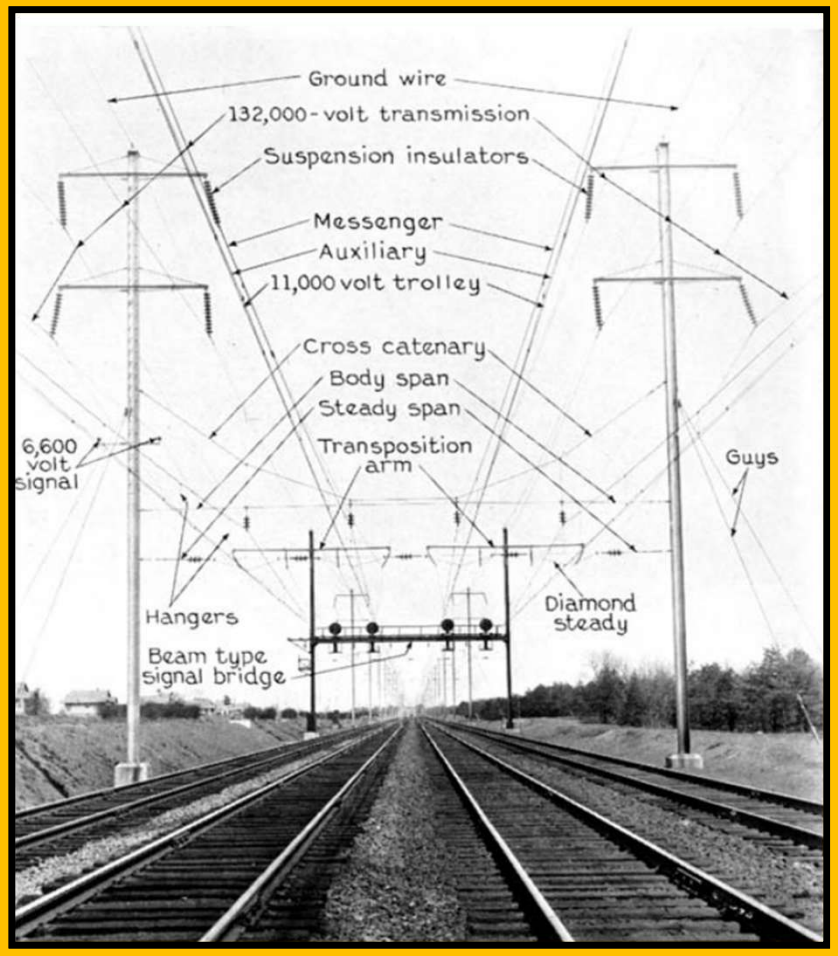
THE EVOLUTION OF THE GG1; The World's Most Famous Electric.

Did the GG1 just happen ? Not quite! Let's begin with a brief PRR electrification history.

It helps to have this!



And this to go along with it. . .



1895: Burlington & Mt. Holly Branch converted to DC trolley ops. Electric service discontinued in 1901 after power house burns.

1901: PRR makes decision to build tunnels under the North and East Rivers and build Pennsylvania Station.

1904: Construction begins. Due to smoke abatement, DD1 electric engines will be used getting power from 600 volt DC 3rd rail.

1908: PRR erects 5 miles of catenary on LIRR for testing AC electric No. 10003. PRR decides to remain with DC 3rd rail as opposed to the NH's pioneering 11000 volt, 25 cycle AC catenary.

1909: First DD1 is delivered from Altoona for testing.

1910: Pennsylvania Station opens.

1915: Catenary in service between Philadelphia and Paoli, PA.

1917: Hell Gate Bridge opens providing thru route between the NH and PRR. NH catenary ends near Sunnyside Yard.

1924: PRR announces plans to string wires between NY and Phila.

1928: Wires go up between Phila. and Wilmington.

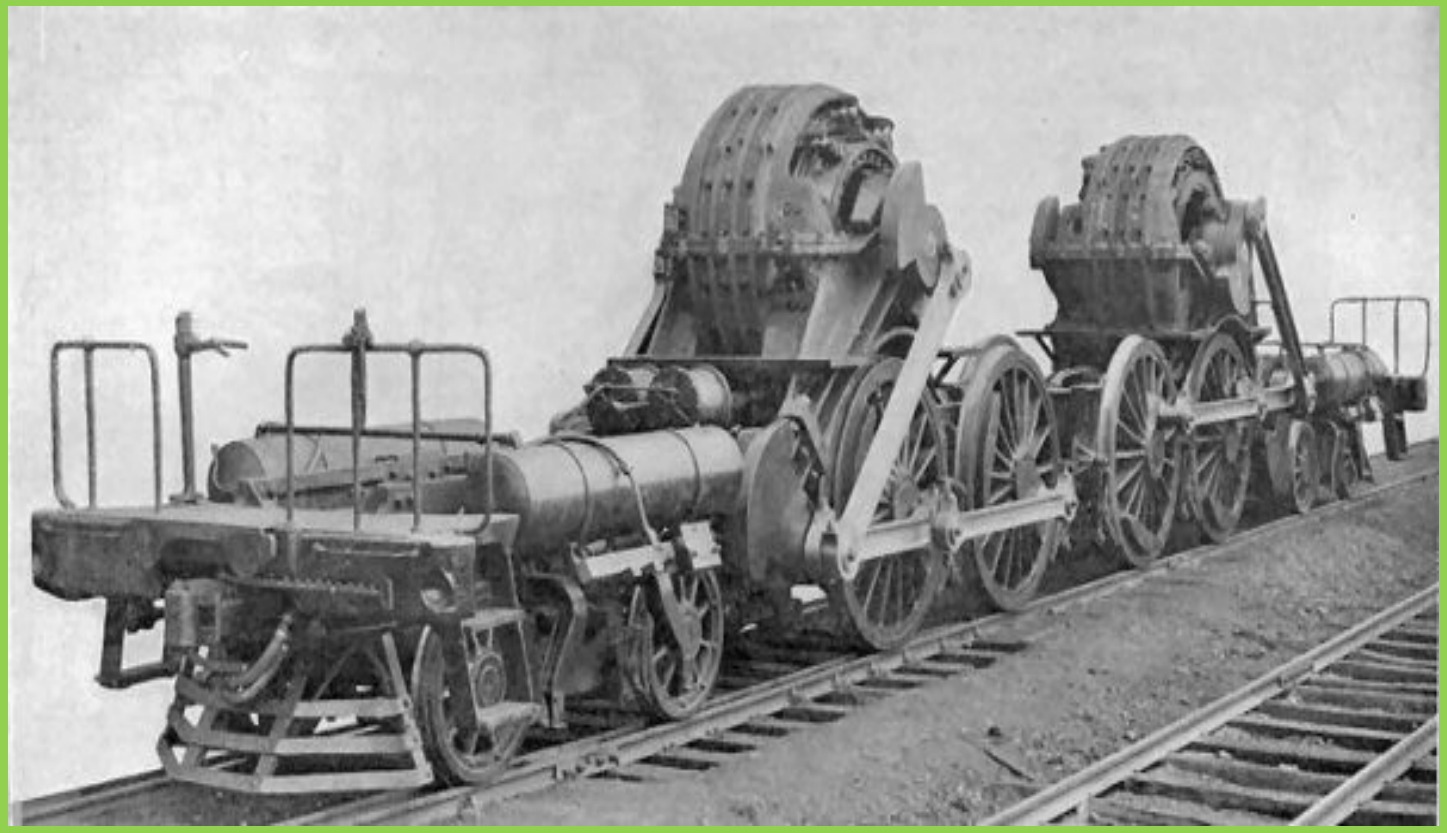
1933: NY-Washington electrification was completed. Total cost, $175 million.

The PRR also borrowed a New Haven EP-1 for testing on a stretch of overhead on the LIRR.

The experimental No. 10003 built 1907.
It had a 2-B wheel arrangement. This was the test engine on the temporary 5 miles of catenary on the LIRR. It became the prototype for the DD1.

The engine that made Penn Station possible was the DD1. They developed 1,580hp.

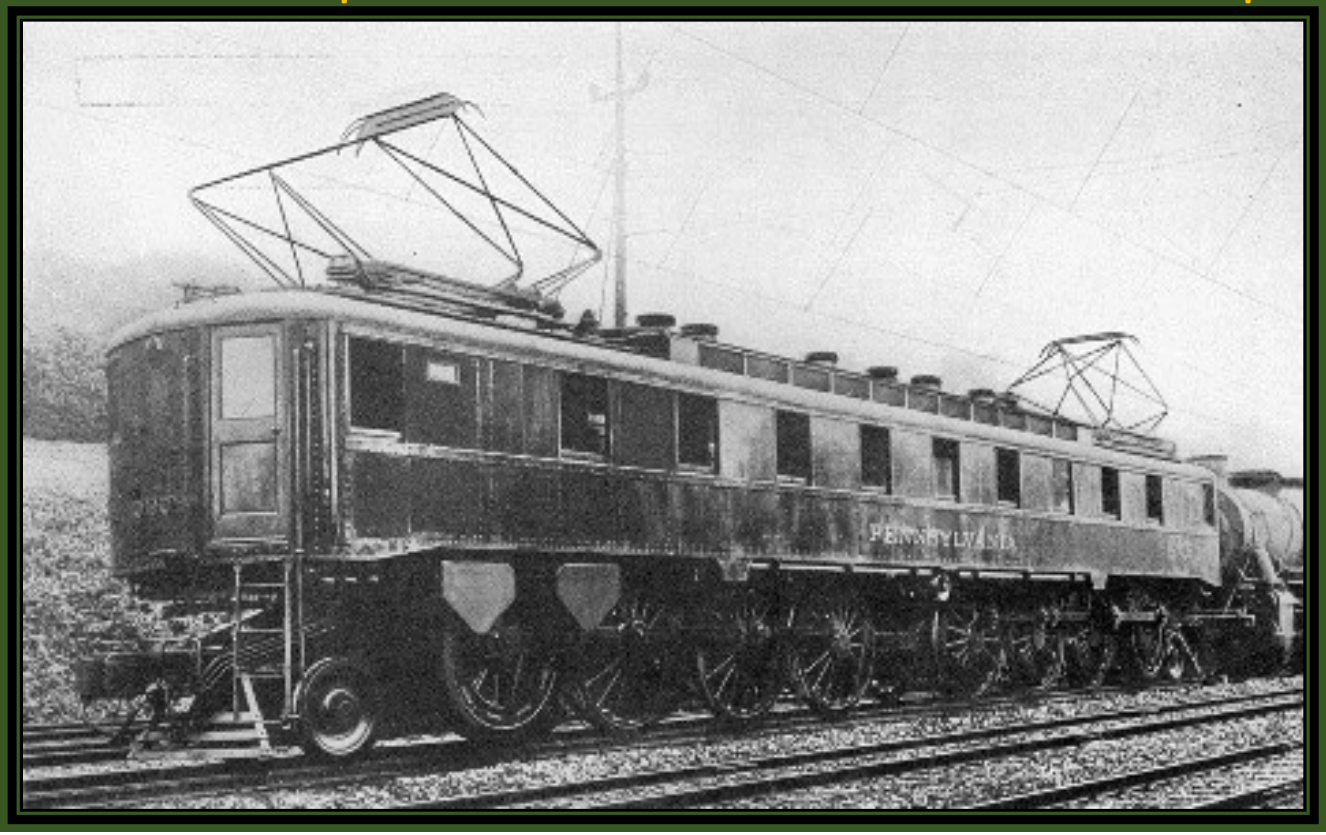
Huge DC motors connected to jack shafts.
The DD1's had no steam generators. The run from Penn Station to Manhattan Transfer was only 15 mins.



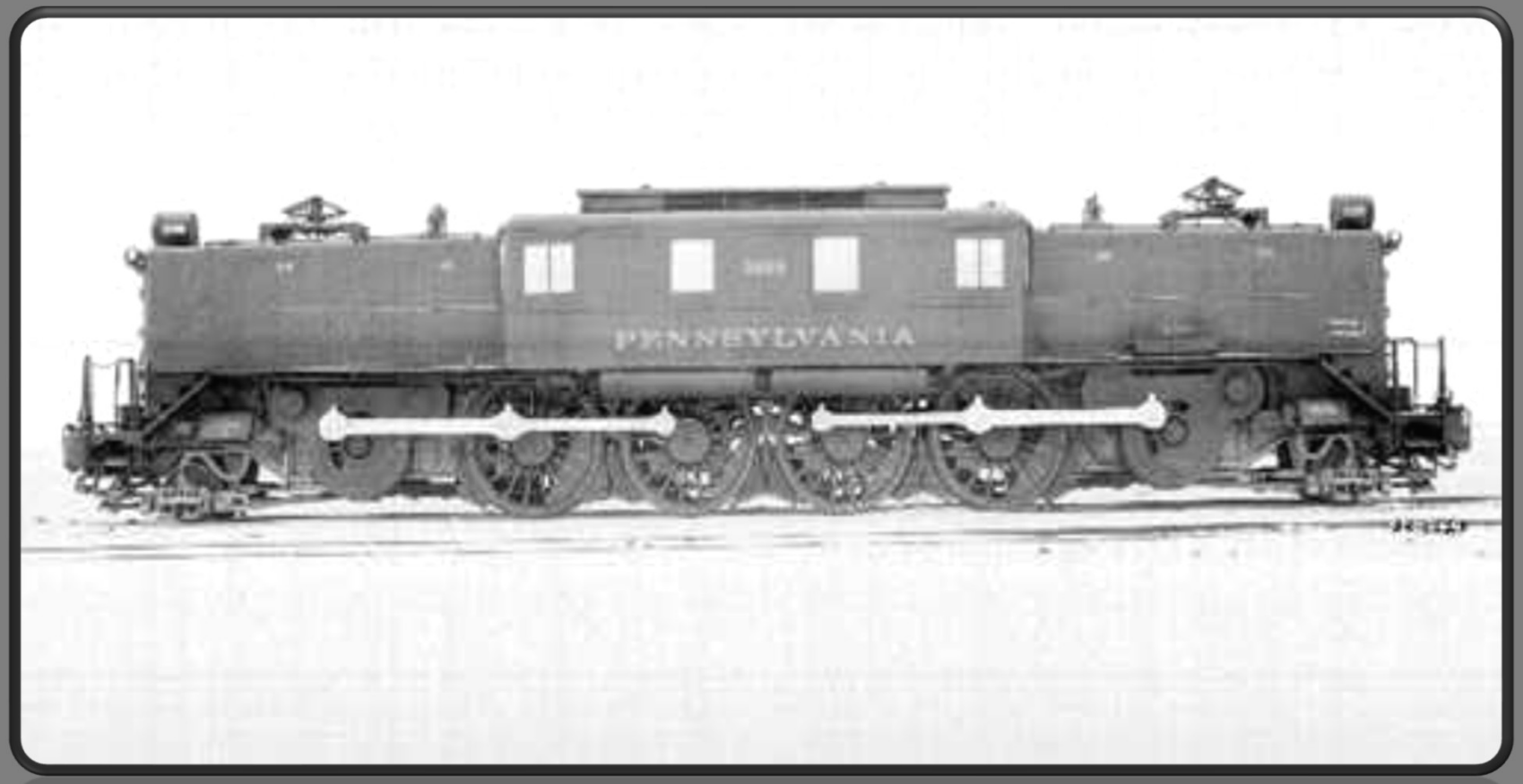
Between 1917 and 1931 the PRR began experimenting with various types of electrics.

- Most of them were not too successful.

In 1917, the PRR built the FF1, known as "Big Liz." It developed 4000HP and had a 1-C+C-1 wheel arrangement. It was so powerful, it actually pulled the couplers from the cars it was pulling.

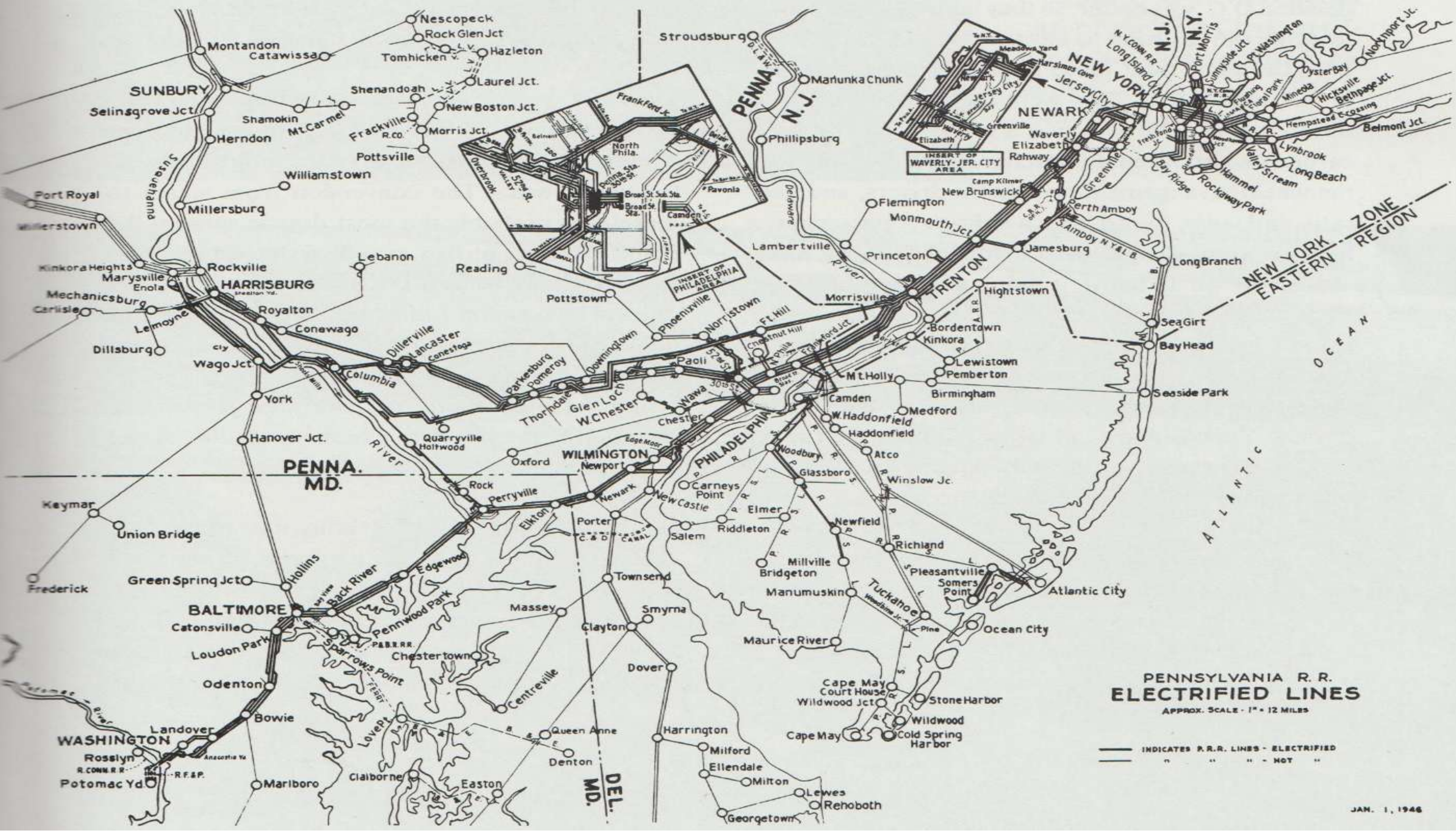


A total of 23 L5pdw engines were built in Altoona between 1925 and 1927 to eventually replace the DD1's. They didn't match the DD1's performance. They developed 3340HP. They were scrapped in 1942.



L5paw No. 3930. This was the only L5 equipped to run off of catenary.
The L5's had a 1-B-B-1 wheel arrangement,
Developed 3,340 HP.

With the electrification having proved successful between Phila. and Paoli, the PRR announced a major electrification project in 1928. It was determined that side-rod engines would not be feasible.


PENNSYLVANIA R. R.
ELECTRIFIED LINES
APPROX. SCALE - 1" = 12 MILES
INDICATES P.R.R. LINES - ELECTRIFIED
" " " - NOT "
JAN. 1, 1946
INSERT OF PHILADELPHIA AREA
INSERT OF WAVERLY-JER. CITY AREA
NEW YORK ZONE
EASTERN REGION
PENNA.
N.J.
N.Y.
PENNA.
MD.
DEL.
MD.
ATLANTIC
OCEAN
Susquehanna
River
Delaware
River
Nescopeck
Rock Glen Jct
Hazleton
Tomhicken
Laurel Jct.
Shenandoah
New Boston Jct.
Frackville
Morris Jct.
Pottsville
Montandon
Catawissa
SUNBURY
Selinsgrove Jct
Shamokin
Mt.Carmel
Herndon
Williamstown
Port Royal
Millersburg
Kinkora Heights
Marysville
Enola
Rockville
HARRISBURG
Lebanon
Reading
Mechanicsburg
Carlisle
Lemoyne
Royalton
Conewago
Dillsburg
Wago Jct
Columbia
Dillerville
Lancaster
Conestoga
Parkesburg
Pomeroy
Thorndale
Downingtown
Glen Loch
W.Chester
Paoli
Pottstown
Phoenixville
Norristown
Ft.Hill
Chestnut Hill
Wawa
Chester
York
Hanover Jct.
Quarryville
Holtwood
Oxford
WILMINGTON
Edge Moor
Newport
PHILADELPHIA
Rock
Perryville
Elkton
Newark
New Castle
Porter
C.&D. CANAL
Keymar
Union Bridge
Frederick
Green Spring Jct
Hollins
BALTIMORE
Back River
Edgewood
Catonsville
Loudon Park
Pennwood Park
Sparrows Point
P.&B.R.RR.
Odenton
Bowie
Landover
WASHINGTON
Rosslyn
R.F.&P.
Potomac Yd
Marlboro
Massey
Chestertown
Centreville
Love Pt.
Queen Anne
Denton
Claiborne
Easton
Townsend
Smyrna
Clayton
Dover
Harrington
Milford
Ellendale
Milton
Lewes
Rehoboth
Georgetown
Stroudsburg
Manunka Chunk
Phillipsburg
Flemington
Lambertville
Princeton
Monmouth Jct
Morrisville
TRENTON
Jamesburg
Hightstown
Bordentown
Kinkora
Lewistown
Pemberton
Mt.Holly
Birmingham
Camden
Medford
W.Haddonfield
Haddonfield
Atco
Woodbury
Glassboro
Winslow Jc.
Carneys Point
Salem
Riddleton
Elmer
Newfield
Richland
Millville
Bridgeton
Manumuskin
Pleasantville
Somers Point
Atlantic City
Tuckahoe
Pine
Ocean City
Maurice River
Cape May Court House
Wildwood Jct
Stone Harbor
Wildwood
Cape May
Cold Spring Harbor
Camp Kilmer
New Brunswick
Perth Amboy
Long Branch
Sea Girt
Bay Head
Seaside Park
Rahway
Elizabeth
Waverly
NEWARK
Jersey City
NEW YORK
Greenville
Bay Ridge
Long Island
Port Morris
Sunnyside Jct.
Pt.Washington
Oyster Bay
Northport Jc.
Mineola
Floral Park
Hicksville
Bethpage Jct.
Hempstead Crossing
Belmont Jct
Lynbrook
Long Beach
Valley Stream
Hammel
Rockaway Park
Meadows Yard
Harsimus Cove
Frankford Jc.
North Phila.
Penna. Sta. 30th St.
Broad St. Sub. Sta.
Broad St. Sta.
Pavonia
Camden
Overbrook
52nd St.

The O1, O1a,O1b,O1c, built 1930-31. They developed 2500HP. There were 2 units per class that could only mu in kind within their own class. They had a 2-B-2 wheel arrangement. Scrapped 1948-49. Two in 1961. They proved to be too light.

And so, the search continued for a suitable electric. . .

Enter the P5a.

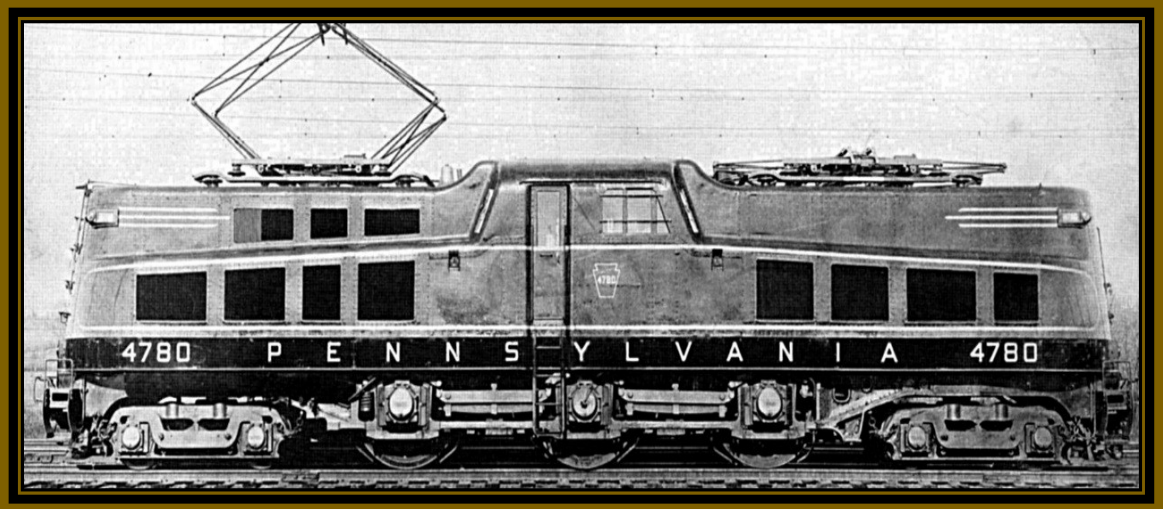
Two experimental P5 units were built at the PRR's Altoona Shops. They were essentially extended O1's with an additional axle giving it a 2-C-2 wheel arrangement. They weighed 180 tons, and had a continuous rating of 3750 h.p. with a short time rating of 5600 h.p.

In 1931, orders were placed with GE for 25 P5a's. They were eventually going to be placed in NY-Washington service. They would be the PRR's prime passenger motor. . .?

In the meantime, the New Haven's 1907 and 1914 pioneering electrification, and the engines it powered was turning in a superb performance.

- After testing the 2 P5a prototypes, the Pennsy placed a 90 unit order to be built by Baldwin-Westinghouse, GE and the Pennsy's Altoona Shops between 1932 and 1935. After a fatal 1934 grade crossing accident the cab design was changed on the last 28 units moving the cab to the center of the engine. These would become to be known as "P5a Modifieds."
- While the tracking qualities of the P5a's was better than the O1's, they were not entirely satisfactory. Cracks began to develop in the driving axles!
- In 1933 in an effort to solve the P5a's tracking problems a special high-speed test track was set up near Claymont, DE.
- More important to the PRR, was not just finding a remedy for the P5a's .
- Not only the tracking problems, but a program aimed at developing an electric with better riding qualities. From the results of these Claymont tests would emerge the design for the greatest electric engine in the US!


PENNSYLVANIA


4780 PENNSYLVANIA 4780

P5a "Modified" in service.

One P5a was modified by adding traction motors to the leading and trailing trucks. It was reclassified P5b. Only one was converted.

Now the Pennsylvania was faced with a serious dilemma. It was apparent that their P5a had serious issues. A speed restriction had to be placed on the P5a's due to the axles cracking.

Needless to say, this was unacceptable!

So, what did the PRR do??

“Oh, the humanity!” They were “forced” to go outside their own ranks and go to the New Haven to borrow one of their new 0351 series electrics built by GE in 1931.
Whereas the PRR engines had rigid frames, the New Haven engine had a articulated 2-C+C-2 wheel arrangement which was pioneered by Alco-GE on the CUT P-1a electrics in 1929.


CLEVELAND
UNION TERMINAL
1050
1050


NEW HAVEN
0354
0354

NH’s articulated running gear.

The 0354 was regeared by the PRR for 120 mph for testing on the Claymont test track.

Just imagine what a blow this was to the hubris of "The Standard RR Of The World!"

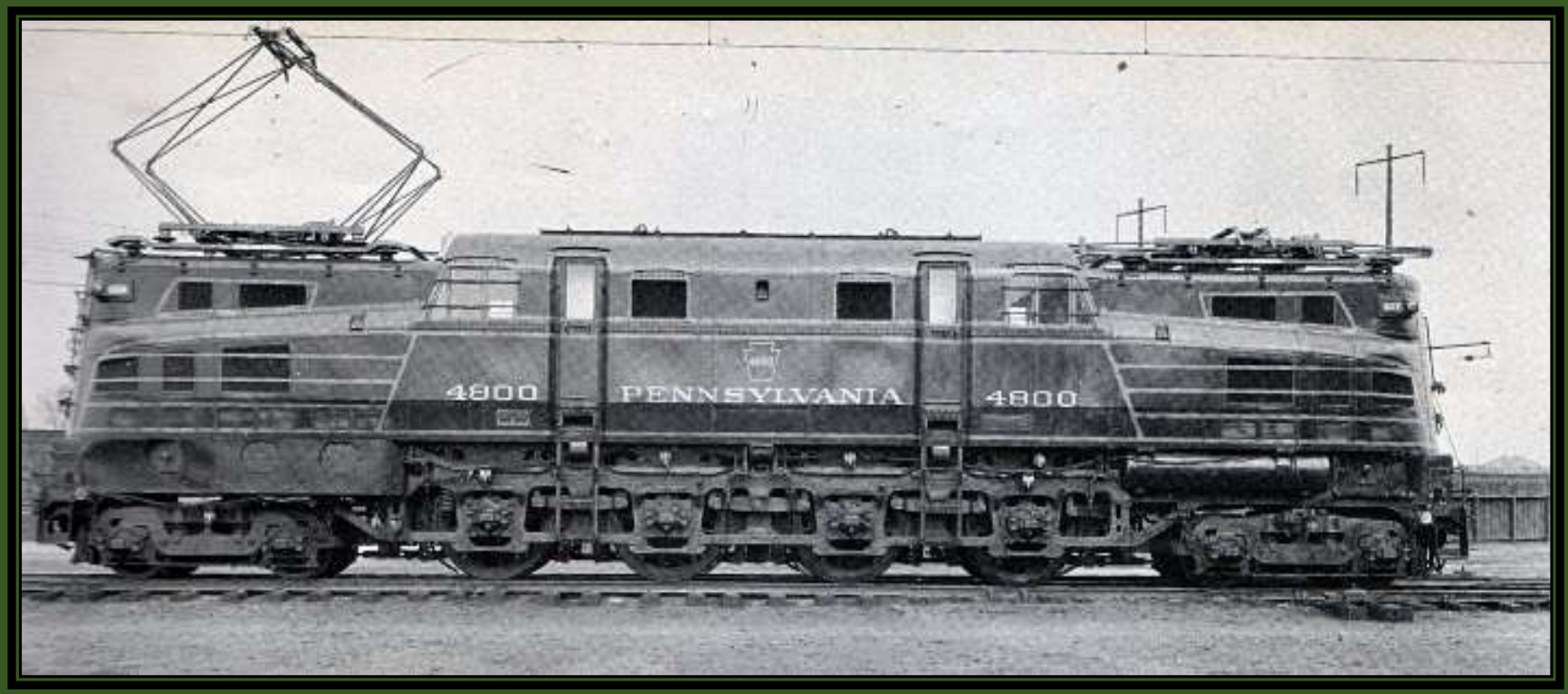
So, not to be out done by the NH, the PRR ordered their own design from Baldwin-Westinghouse. It would have a rigid 2-D-2 wheel arrangement and be classed R1.

The "competition" for the R1 would be designed jointly by Gibbs & Hill, Westinghouse, GE, Baldwin and the PRR's Altoona shops.

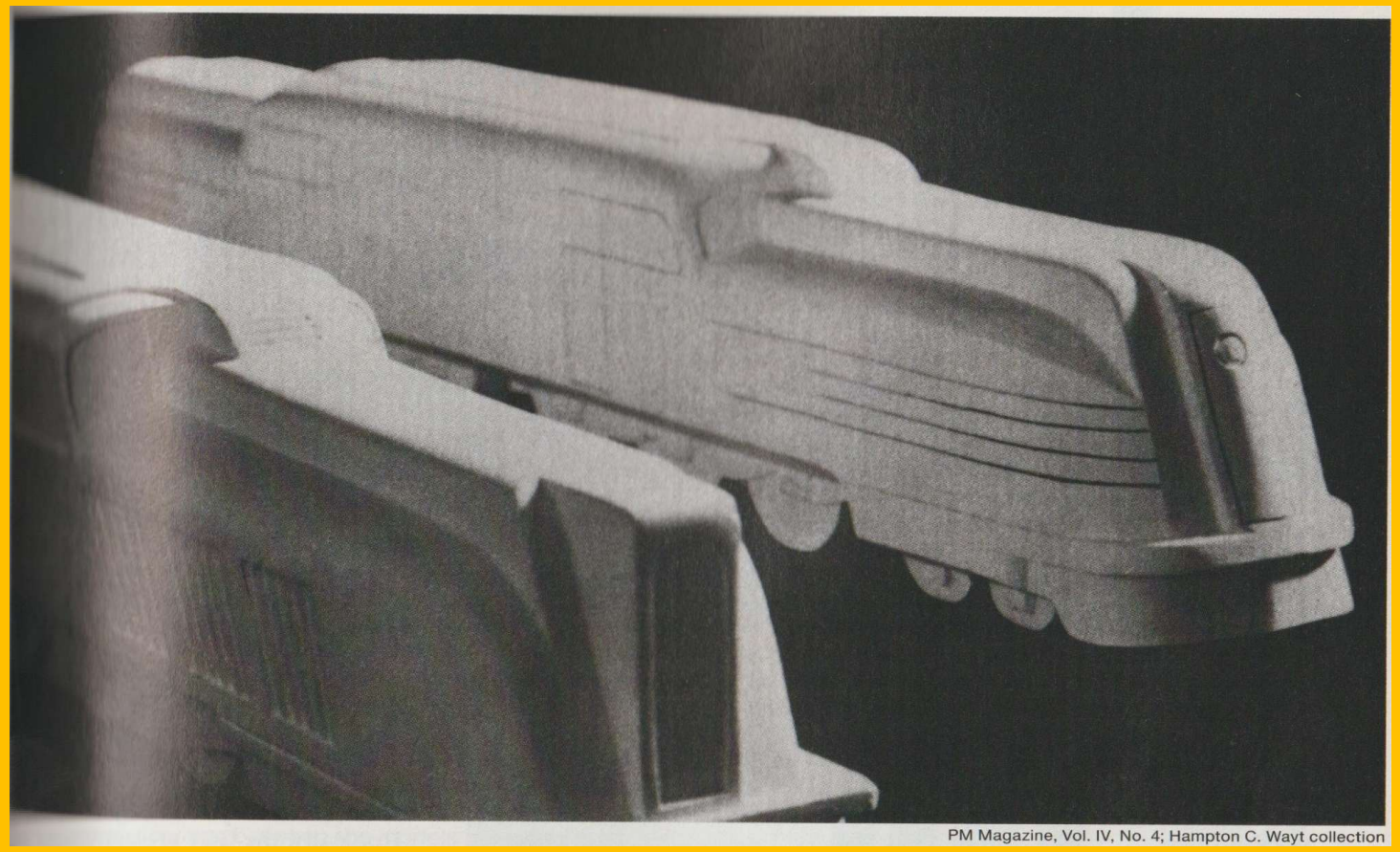
It would have the same articulated 2-C+C-2 wheel arrangement as the 0354. The carbody would be designed by industrial stylist Donald Dohner of Westinghouse.

The engine would be classed GG1. The R1 was given road number 4800; the GG1 4899. The PRR figured their R1 would win the "competition". . .hence No.4800!

The R1 4800, 5000HP.



Donald Dohner’s design models for the GG1.



PM Magazine, Vol. IV, No. 4; Hampton C. Wayt collection

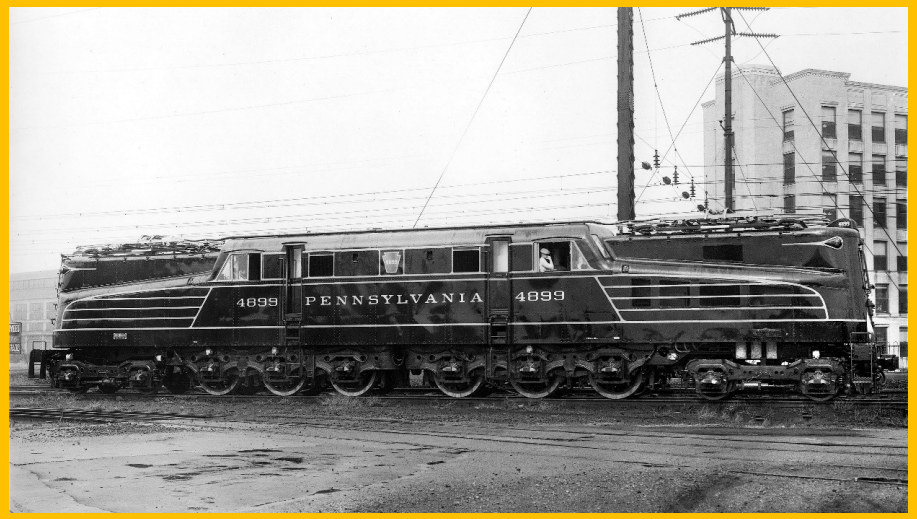
GG1 4899 showing riveted carbody.

The completed 4899, 4620 HP.

Comparison of R1 and the GG1.

2-D-2, 5000HP

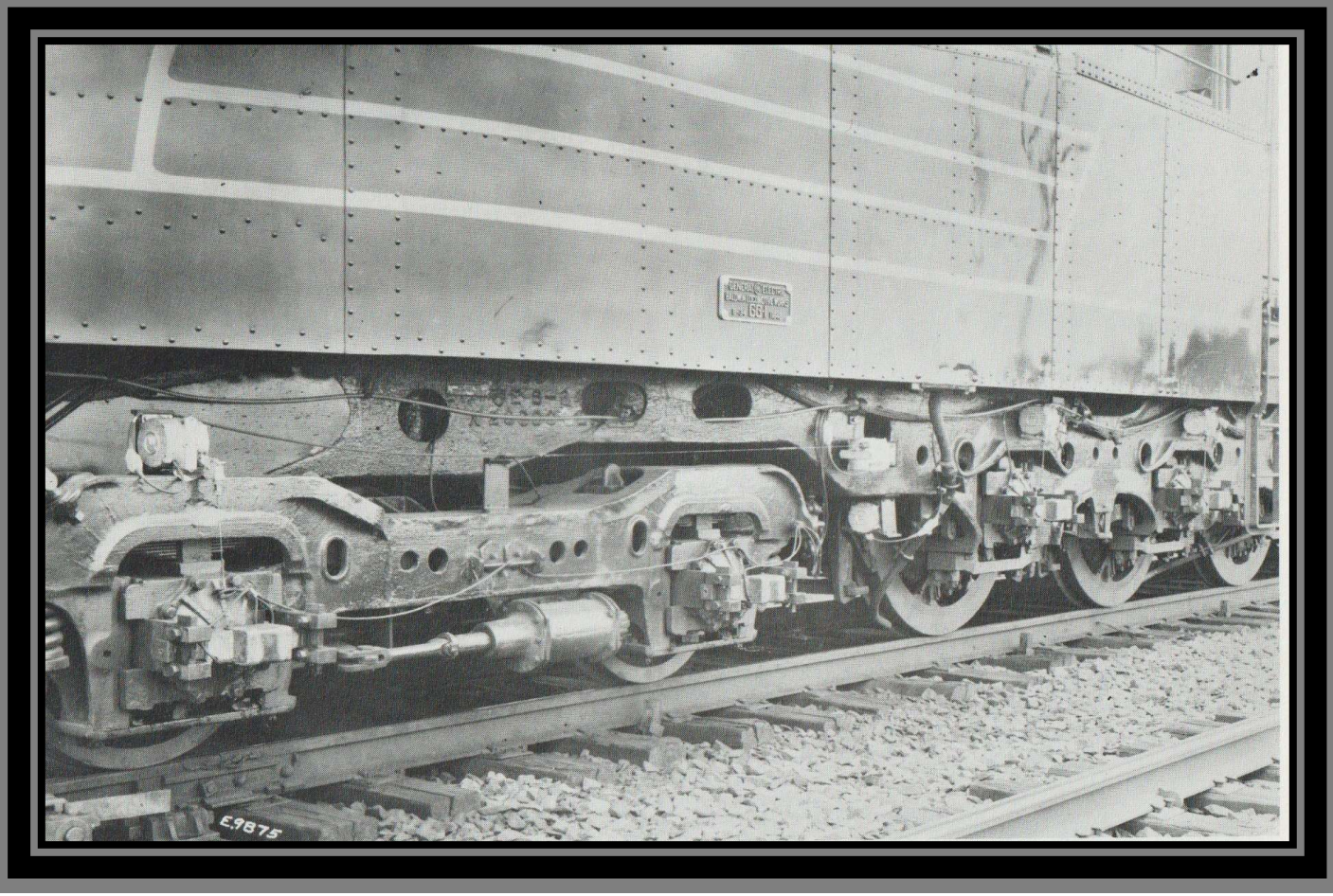
2-C+C-2, 4620HP



So, both competitors met at Claymont, DE.
"Let the games begin!"

4899 “wired-up” for testing at Claymont. She accelerated to 100 m.p.h. in 64.5 seconds.

No. 4899 with wiring on trucks for testing.



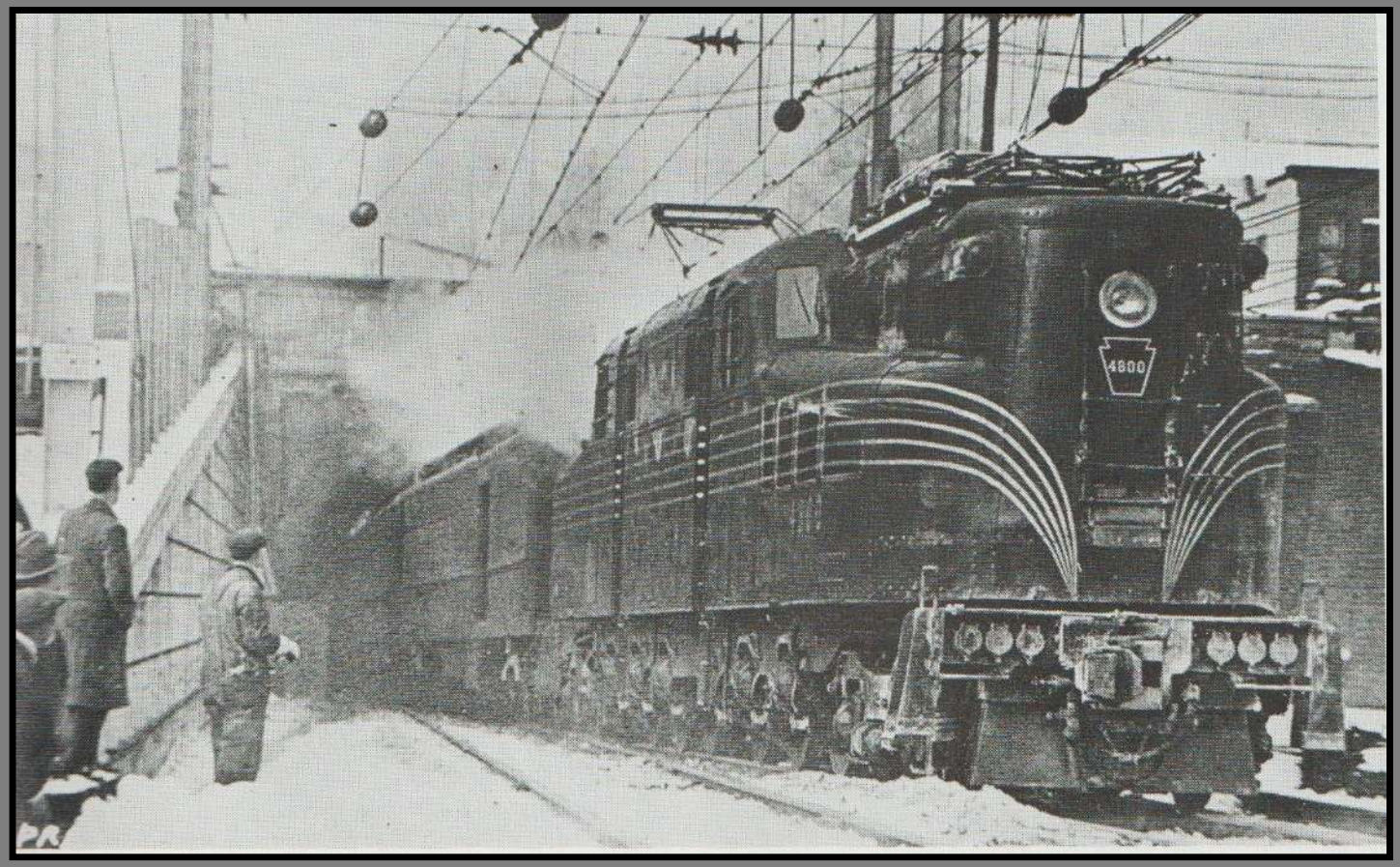
After the tests between
the R1 and the GG1,
the GG1 was declared the winner!
They exchanged road numbers; GG1
4899 was renumbered 4800 and the
R1 renumbered 4899. With more
GG1's to come, the R1 was
renumbered 4999.

Although the R1 lost the competition, she remained in service for another 30 years!

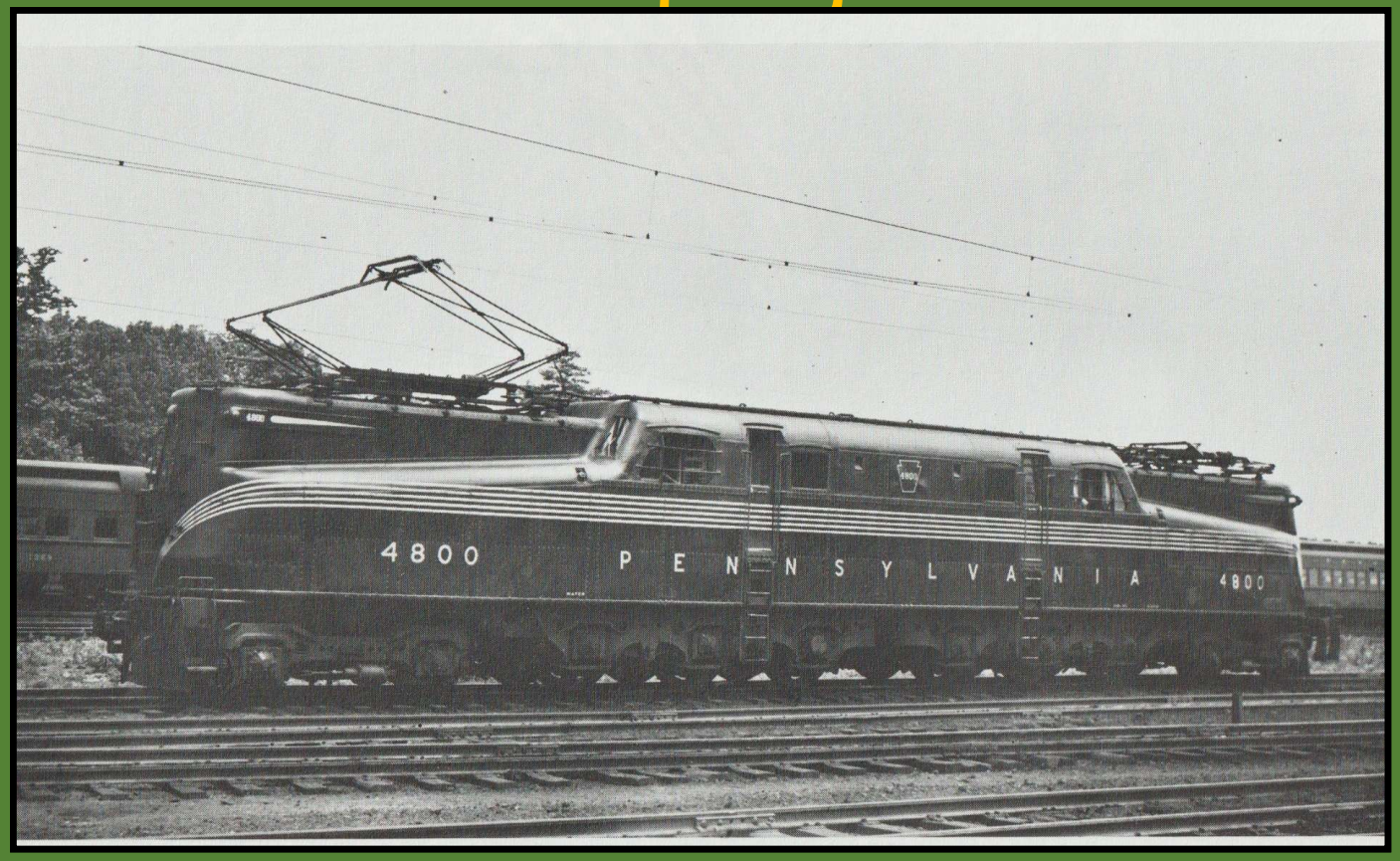
After the GG1 was declared the winner, the PRR brought in Raymond Loewy to “clean-up” the appearance of the engine. The first thing he did was to do away with the disjointed striping and replace it with smooth flowing 5 stripes.

Original striping, and re-designed by Loewy.

On a bitter, snowy January 28, 1935, 4800 arrives in Baltimore with the first electric train from Washington to New York.

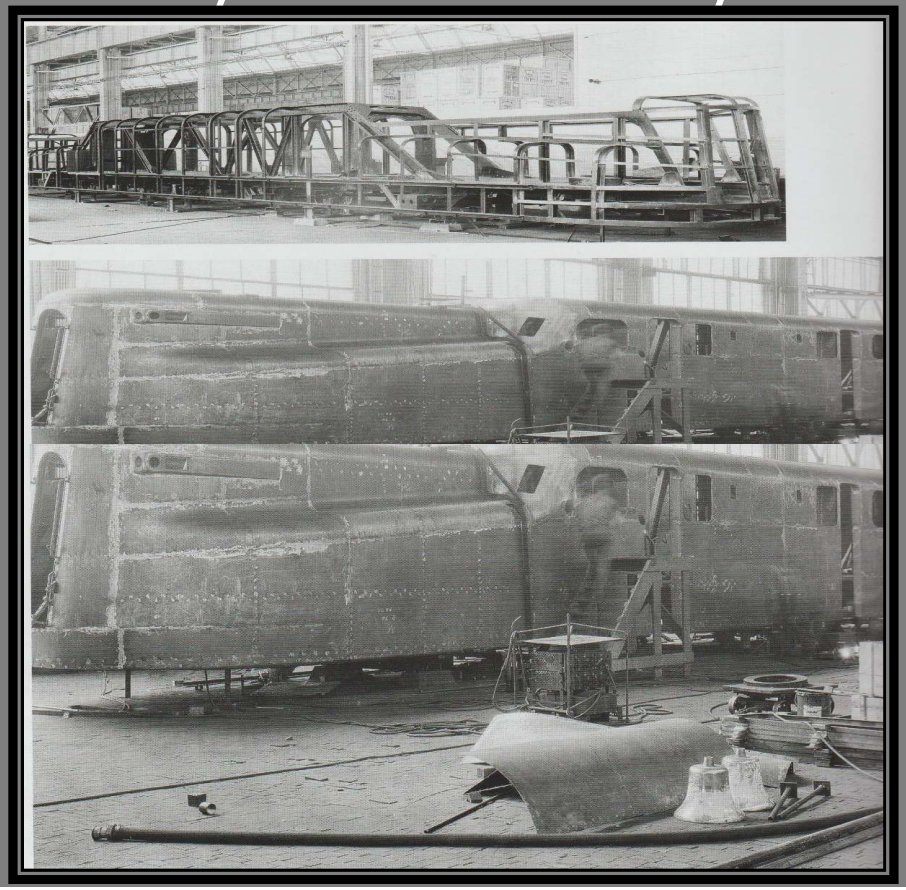


GG1 4800 with new, closely grouped striping.



In December of 1934, the PRR built a full size model of one end of a GG1 for Loewy to plan the styling of the production GG1's.

GG1 under construction.
Note the bridge-like body truss and the welded carbody introduced by Loewy.



4801 was the first GG1 to have the all welded carbody.

This poster by the PRR advertised the 4800
in February, 1935 to be placed on display in Philadelphia.

Raymond Loewy and the GG1.

With their new electrification turning in a spectacular performance, the PRR looked to extending the wires to Pittsburgh from Philly. The PRR went to Baldwin to design such an engine for this proposed extension. It would be classed DD2 and have a 2-B+B-2 wheel arrangement.

The engine would develop 5800 HP.
Alas, the electrification never happened and only one DD2 was built. It was scrapped in 1962.

The GG1 proved to be so successful, a total of 139 were built; 4800-4938.

Initially as built, they were used specifically in passenger service and did not have mu capability. They were designed however, to be retrofitted should the need arise.

With passenger service decreasing after WWII, GG1's were eventually retrofitted with mu to be used in freight service.

Main shops for the GG1's was in Wilmington,DE.

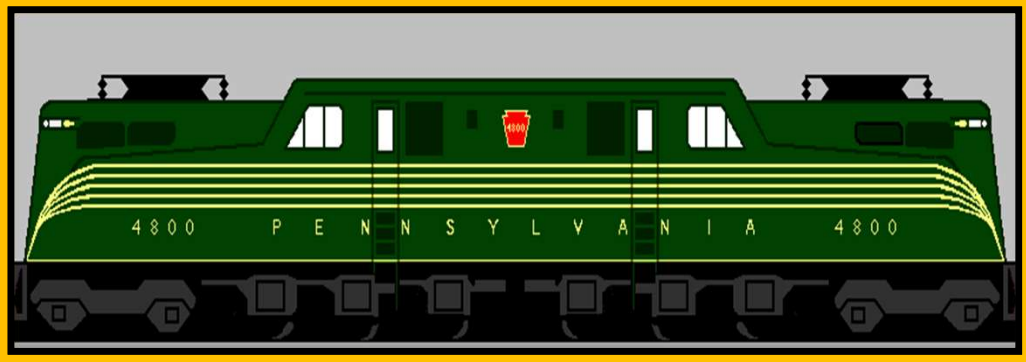
The most "spectacular" incident involving a GG1 was when 4876 entered the basement of Washington Union Station in January, 1953.


WAITING ROOM

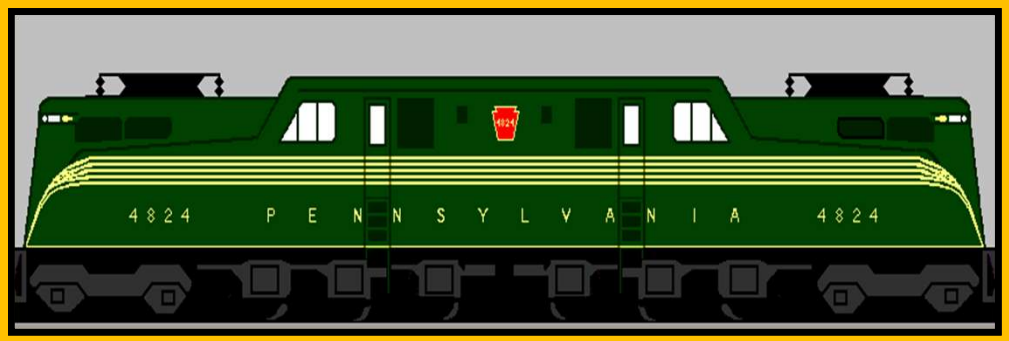
The 4876 was cut into sections, removed and transported to the PRR's Altoona Shops where she was completely rebuilt!

This is 4876 today at the B&O Museum in Baltimore, MD.

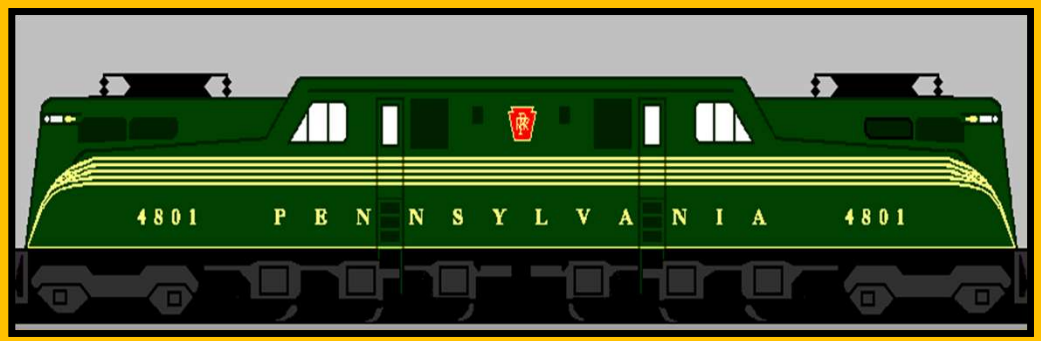
Various GG1 paint schemes.



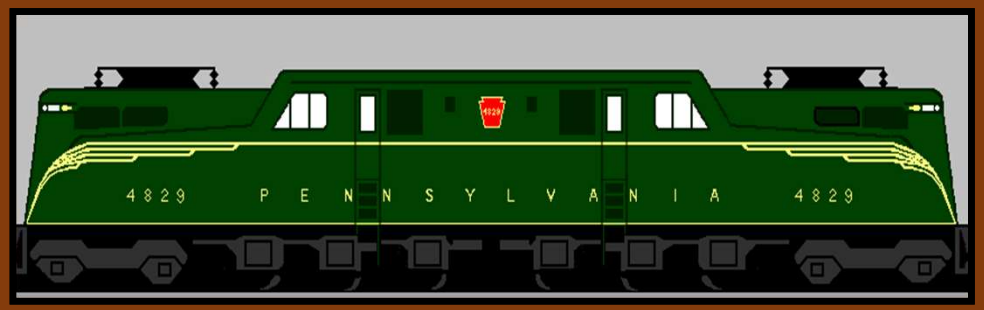
Futura Lettering.



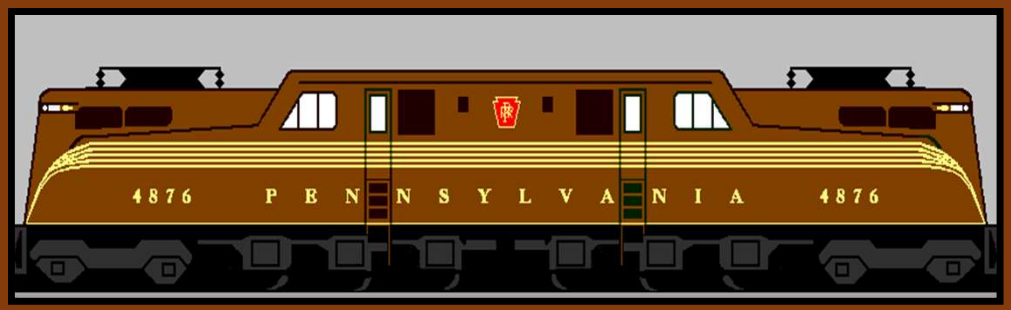
Clarendon Lettering.



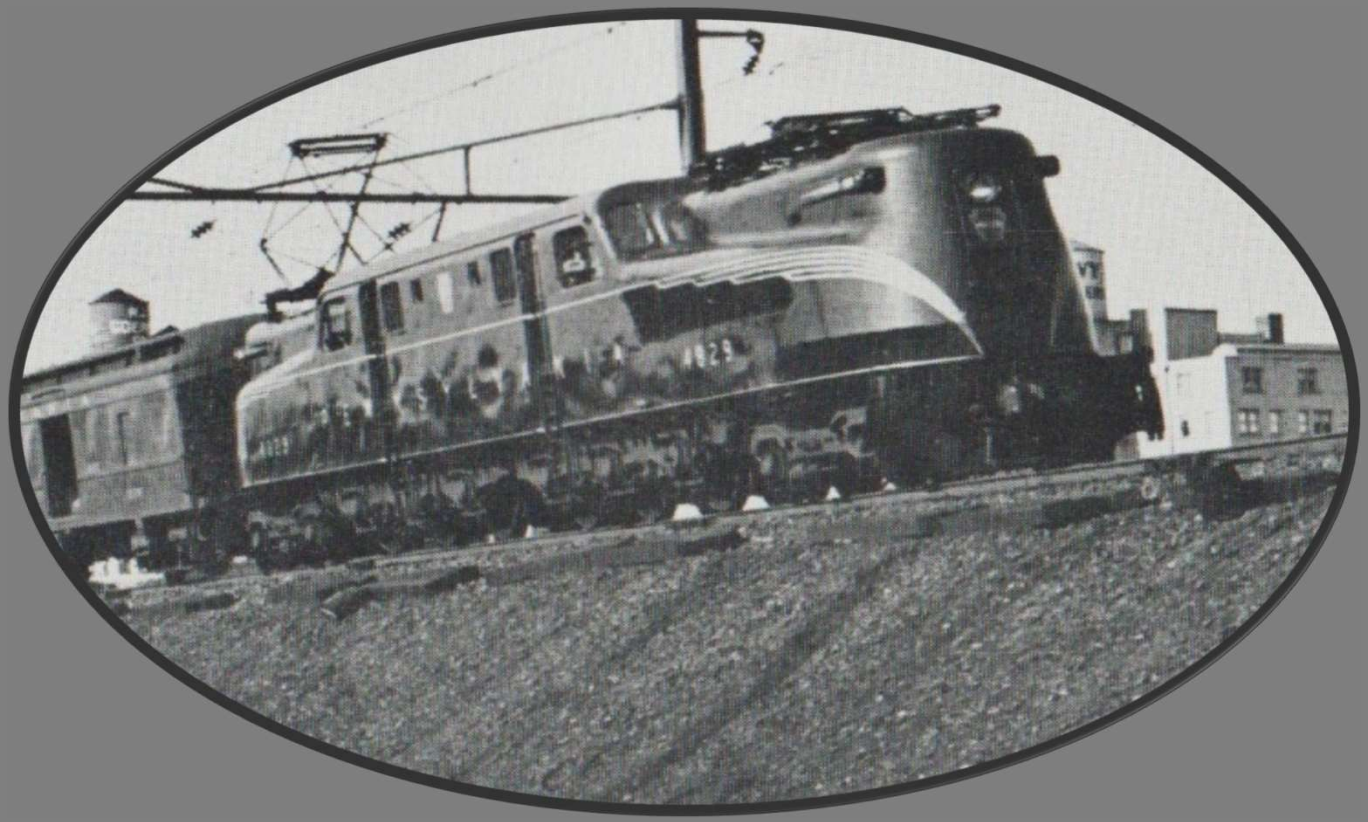
Feathered Stripes



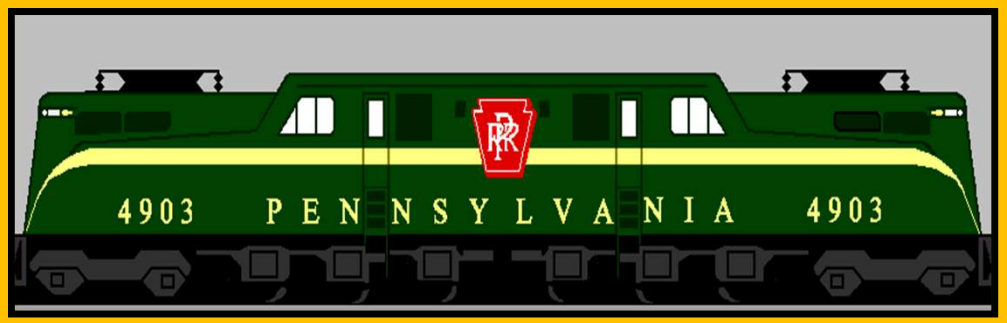
Tuscan Red, 5 stripes



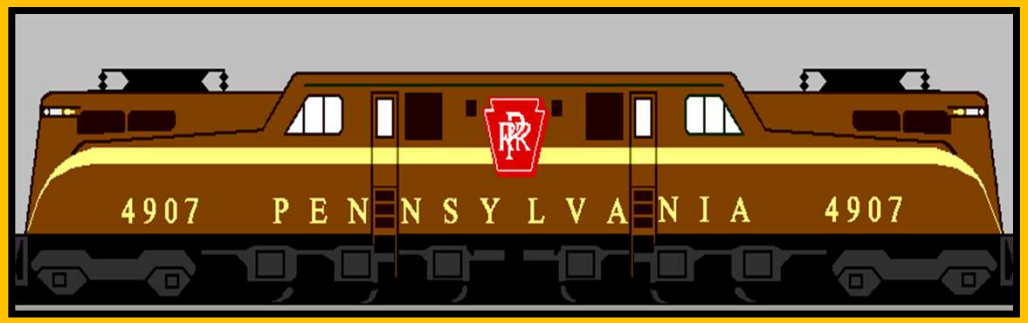
4829 in the “feathered stripes.” The only one!



Brunswick Green, solid stripe



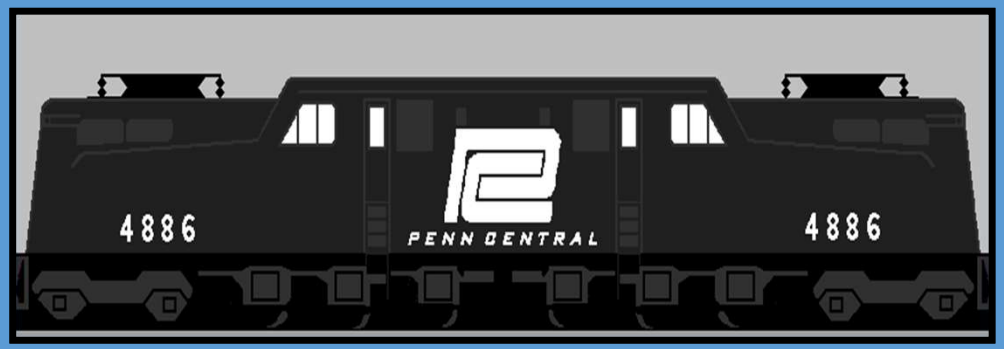
Tuscan Red, solid stripe



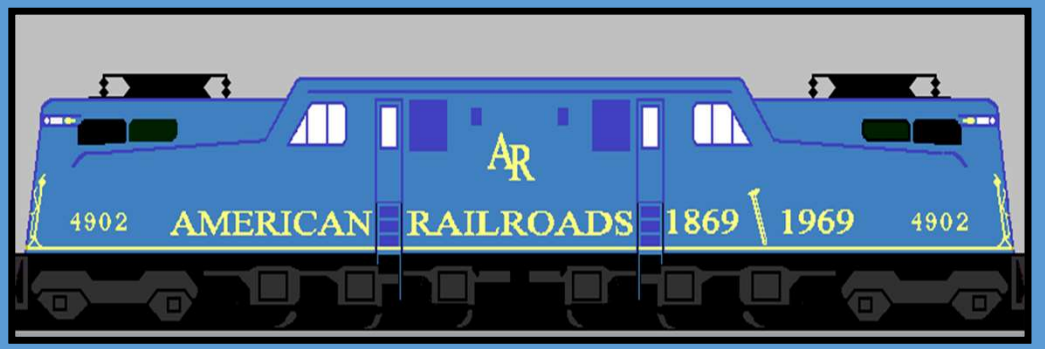
Experimental silver scheme applied to only 3 engines for Congressional Service. It didn't last.

Here's why it didn't last too long. . .

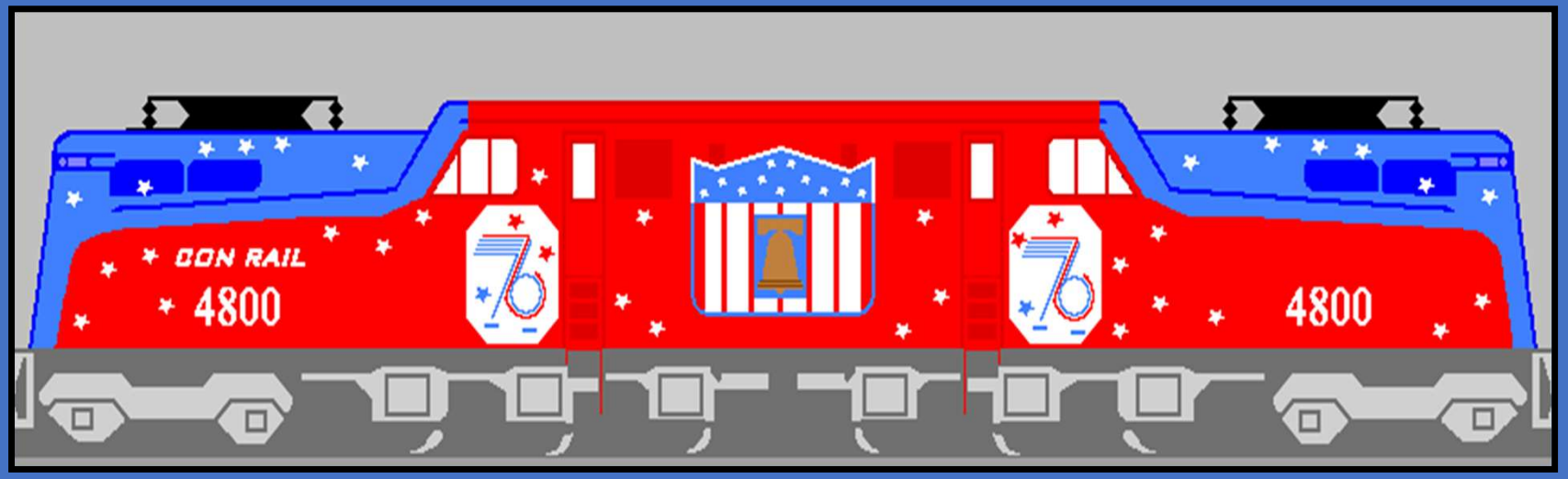
Penn Central black



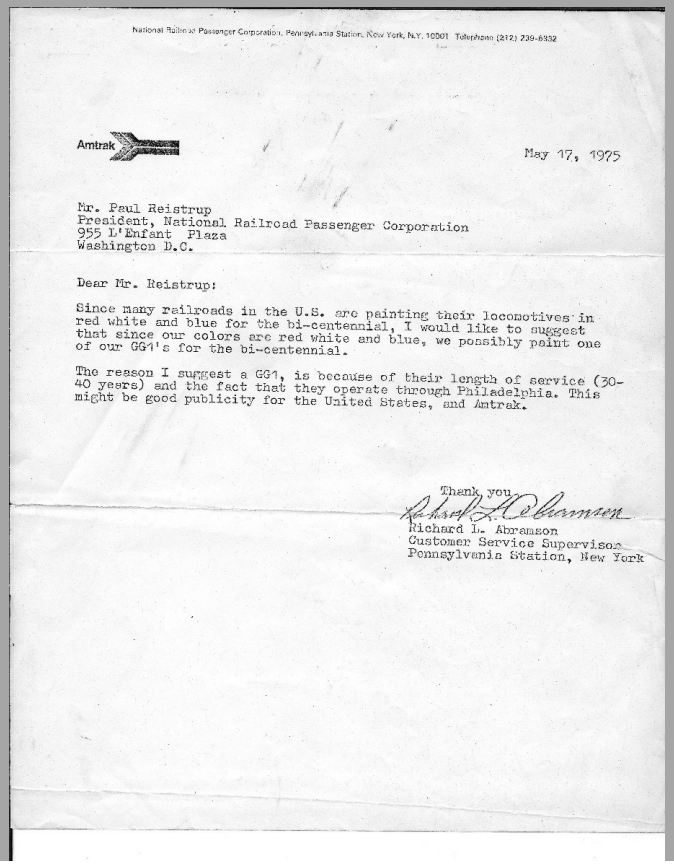
4902 decorated for the Golden Spike Centennial



Conrail GG1 4800 decorated for the Bi-Centennial



In 1975 I wrote to Paul Reistrup, President of Amtrak with my suggestion for a Amtrak "Bicentennial GG1."



National Railroad Passenger Corporation, Pennsylvania Station, New York, N.Y. 10001 Telephone (212) 736-6932

Amtrak

May 17, 1975

Mr. Paul Reistrup
President, National Railroad Passenger Corporation
955 L'Enfant Plaza
Washington D.C.

Dear Mr. Reistrup:

Since many railroads in the U.S. are painting their locomotives in red white and blue for the bi-centennial, I would like to suggest that since our colors are red white and blue, we possibly paint one of our GG1's for the bi-centennial.

The reason I suggest a GG1, is because of their length of service (30-40 years) and the fact that they operate through Philadelphia. This might be good publicity for the United States, and Amtrak.

Thank you

Richard L. Abramson
Customer Service Supervisor
Pennsylvania Station, New York

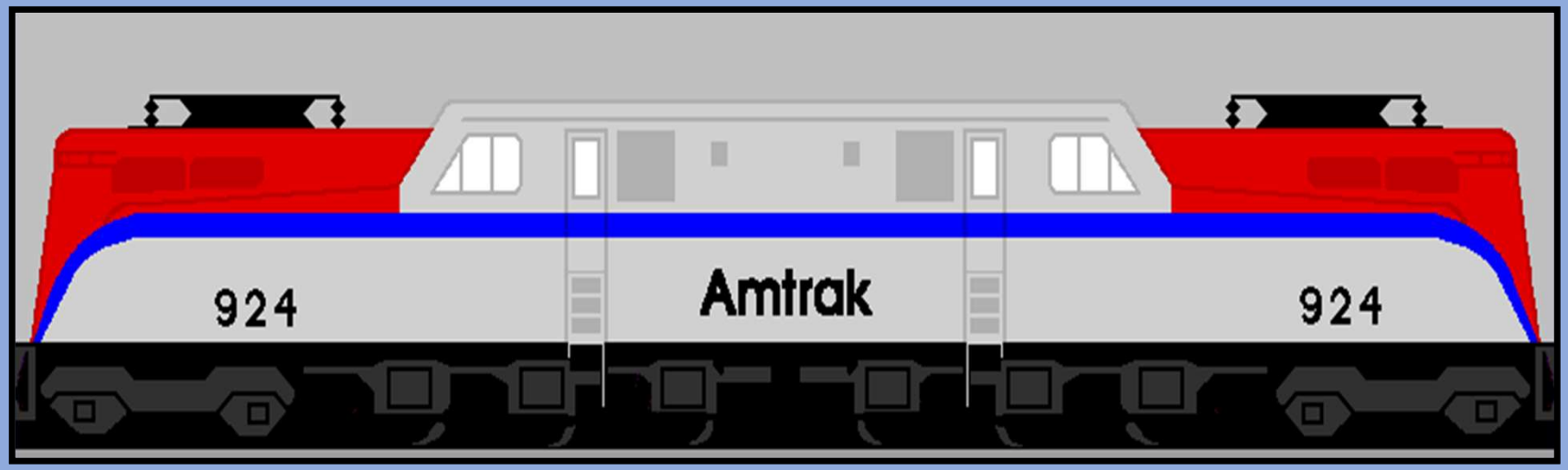
My design.

I DESIGNED THE SCHEME FOR AMTRAK, AND PAINTED A RIVAROSSI HO GG1 TO DEMONSTRATE IT.

Conrail's version.

My suggestion to Amtrak

Amtrak red, blue and silver.



GG1's "rubbed shoulders" with the NH at Penn Station, NYC.

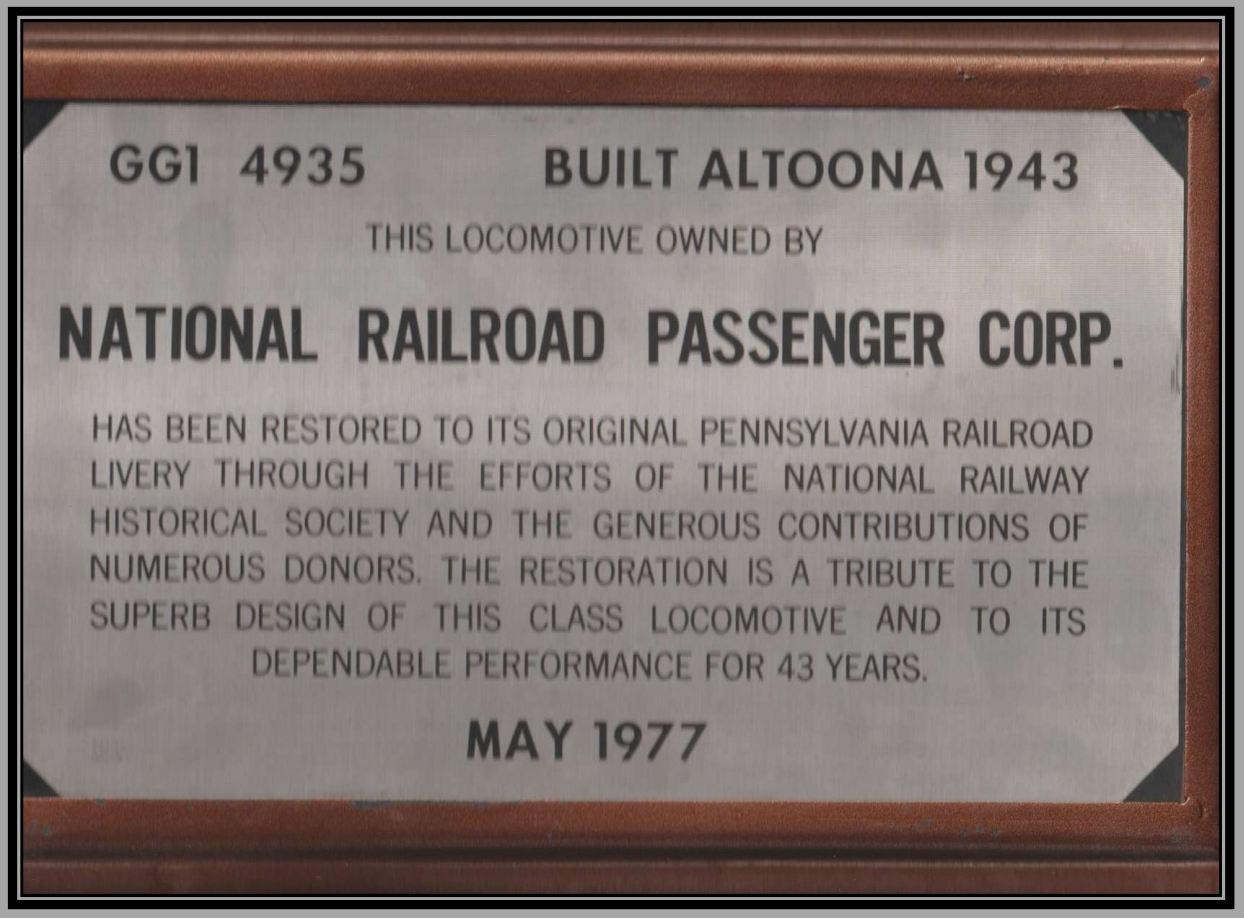
GG1's sometimes ran to New Haven long before the PC takeover.

Oak Point in The Bronx, 1961.

Pelham Bay, 1964.

In 1975, Friends of the GG1 was established to raise money to restore a GG1 to its PRR livery.
Amtrak chose 4935
due to it never having been modified.

Ownership plate affixed to 4935 after its restoration to PRR colors.



4935 and myself at the RR Museum of PA.

4877 as restored by NJ Transit. Ironically, the 4877 never wore Tuscan Red!

The last run of the GG1 took place on October 29, 1983, sponsored by NJ TRANSIT.

THE LAST RUN OF THE GG1

Ticket for the last run.

RAILPACE COVERAGE OF THE EVENT.

4877, 4879 preserved at the United RR Historical Society in Boonton, NJ.

4913 at the Railroaders Memorial Museum in Altoona, PA.

Ironically, Amtrak never observed the last run of a GG1. After a 50 year career, the curtain finally fell on what is regarded as the most famous electric locomotive.

In 1975, Amtrak began shopping around for a replacement for the GG1's.
On paper, it looked good. In reality it didn't work out as planned. . .

The planned successor to the GG1. It didn't quite work out that way!

The ultimate successor to the GG1. The AEM7.

Engineer Tommy May and myself in the cab of GG1 929 in Penn Station, NY; 1974.

Amtrak GG1 929, formerly PRR 4938; the last GG1 built in 1943, out of service in Wilmington. She carried the last PRR color scheme to the end!

In 1981, the superintendent of the Wilmington Shops presented me with the bell from GG1 929.

The “new” 929 in 1981, what remains of it now.

The “new” 929.

What remains of it today.

The End!