

J-1e Hudson 5344 as streamlined for the "Commodore Vanderbilt" in December, 1934.



NEW YORK CENTRAL STREAMLINED STEAM LOCOMOTIVES

Carl F. Kantola
Assistant Engineer, Equipment Engineering Department

The Commodore Vanderbilt Locomotive

On December 27, 1934 the "World's First-Powered Streamlined Steam Locomotive" was exhibited at the Grand Central Terminal. The New York Times and other newspapers gave it a headlined article with photographs and proclaimed it to be a great day for the railroads and the beginning of a new era in locomotive design.

Here is the inside story of how it happened. It was early in the year 1934 and the country was coming out of the great depression years. The railroads had also felt the economic distress and something was needed to inspire more interest in the railroads. Streamlining seemed to be the coming thing in industrial design, so why not try it on the railroad?

Since I was a bachelor at that time, with free time in the evenings, I drew up a pencil sketch of a streamline design for a Hudson type locomotive. At the office we presented the sketch to Mr. Paul W. Kiefer, Chief Engineer of Motive Power and Rolling Stock, who was quite taken with the idea. He then showed it to Mr. F. E. Williamson, President of the New York Central. Mr. Williamson thought it would be very good publicity for the railroad and gave us the authority to promptly proceed with the streamline project.

Having started the idea, it became my assignment to draw up the working plans from my preliminary sketch. Work was started, and in two months the plans were drawn and blueprinted ready

for construction. The president's office advised that the locomotive should be named the "Commodore Vanderbilt," after the founder of the New York Central System. A cast aluminum New York Central oval was designed for the front of the locomotive. The 16-gauge steel cowling over the boiler and front end was designed to be supported on lightweight structural steel angle attached to the boiler. The throttle rods and various piping were concealed under the cowling. Recessed openings were provided for the bell, whistle, safety valves and low water alarm. The front end cowling had a hinged door for access to the smokebox inspection door, and also provided access to the two cross-compound air compressors and the turbo-electric generator which was relocated on the front pilot beam. Access to the drop-type front coupler and air hoses was had by removing a cowling panel. A smoke lifter was built into the design by forming an air scoop around the smoke stack, with head end air entering the scoop through a grill in front of the scoop. An additional smoke-lifting feature was designed by forming scoops back of the right and left side running board steps. Head end air entered these scoops and was directed upward through grills in the running boards and along each side of the boiler cowling. The side panels extended forward of the steps to make more effective scoops.

The 16-gauge steel side panels were designed with a long sweeping arch over the engine truck and driving wheels. A fixed section of these panels extended above the running boards. The lower side panels were in several sections, and were hinged at the

running boards so that they could be raised for maintenance and inspection. When closed they were supported on structural frames and locking devices were provided to secure them to the frames.

Covering the coal space on the tender presented a problem. However, we designed a cover consisting of four longitudinal panels welded to longitudinal rods which ran the length of the coal space. These rods extended beyond the front of the coal space doors and were provided with levers to swing the covers to a vertical position for loading coal.

The gangway between engine and tender was closed off with curtains. We designed canvas side curtains which operated on vertical rollers mounted to the rear edges of the cab. The free edges of these curtains were attached to the tender by slotted fixtures. A heavy canvas curtain attached to the roof contour was provided to enclose the space between the cab roof and the tender coal space covers.

The painting specifications called for black metal lacquer on the engine and tender with white lettering and striping.

Model tests in a wind tunnel indicated that this streamlining would reduce headend air resistance by 30 percent at speeds of from 60 to 80 miles per hour.

Six U.S. patents were later granted covering various features of the completed design.

About November 1, 1934 I went to West Albany Shops where the work was to be done, to direct the construction and to stay until the work was completed. With the wonderful cooperation of the locomotive shop superintendent, Mr. John Parsons, a real gentleman; Mr. Frank McMahan, the shop engineer; and all others concerned, the job went along well. As it happened, although we did not know it at the time, we won the race to complete the first streamliner. At the same time the American Locomotive Co. in Schenectady was building the Milwaukee Road's first streamlined steam locomotive, but this was not completed until sometime in 1935.

A Hudson type 4075 horsepower passenger locomotive with 79" drivers, class J1e #5344 was just being outshopped, so this was picked for the streamline project.

The streamlining was completed on December 14, 1934. Photographs were taken outside of the shops with the modern 228-ton streamliner posed alongside of the 7½ ton "Dewitt Clinton," replica of the New York Central's first locomotive in 1831.

The 5344 had roller bearings on all of the driver axles and on the engine truck axles. As first outshopped, the driving wheel centers were of the original spoke type, but on September 12, 1935 they were replaced with solid type driving wheel centers. At this same time Timken roller bearing main and side rods were installed, and this was the first New York Central locomotive to be so equipped.

After a trial run at Albany the 5344 "Commodore Vanderbilt" proceeded to Harmon, N.Y. Here it was prepared for exhibit at Grand Central. In order to clear the overhead third rail for electric locomotive pantographs the overall height had to be reduced. This was accomplished by using smaller gibs in the spring hangers, thus lowering the engine about two inches, and to further lower it to the boiler was filled to capacity. It was then towed to Grand Central Terminal by an electric locomotive with light cars between the locomotives to distribute the weight on the Harlem River bridge and Park Avenue viaduct. It was a close operation, but the trip into the Park Avenue tunnel was made with a scant two inches of clearance from the overhead rail.

After the exhibit at Grand Central Terminal the locomotive was returned to Harmon roundhouse where the standard spring hanger gibs were replaced. The locomotive was then fired up and sent on a exhibition tour of the principal cities on the New York Central. Following the tour, it was placed in regular 20th Century service on Lines West, so that it could be seen by the public and travelers.

As had been predicted, this first streamliner was followed up by similar designs on many other railroads in the United States and Canada.

After the delivery of class J3a Hudsons #5445-5454 with modified streamlining in 1938, #5344 "Commodore Vanderbilt" lost her distinctive shroud and was restreamlined to resemble the later ten locomotives.

The Rexall Streamlined Convention Train

During his travels, Mr. Louis K. Liggett, president of the United Drug Company had occasionally seen our streamlined "Commodore Vanderbilt" locomotive and had been very much impressed. One day it occurred to him that it would be a great idea to have their own streamlined train to travel over the country. Their personnel convention meetings could be held on this train at the various cities, rather than to have all 10,000 people come to a central convention, and in addition the train could be a traveling display of their products.

Mr. Liggett contacted our president, Mr. F. E. Williamson, about having a streamlined locomotive like the "Commodore Vanderbilt" for the proposed train. Mr. Williamson agreed to furnish the locomotive, and Mr. Liggett made arrangements with the Pullman Company to furnish 12 cars for the train.

The big question was could we furnish the locomotive in the 30 days that was specified for completion. Anyhow, since I had recently drawn the plans for the "Commodore Vanderbilt" and had directed the construction, this project was assigned to me.

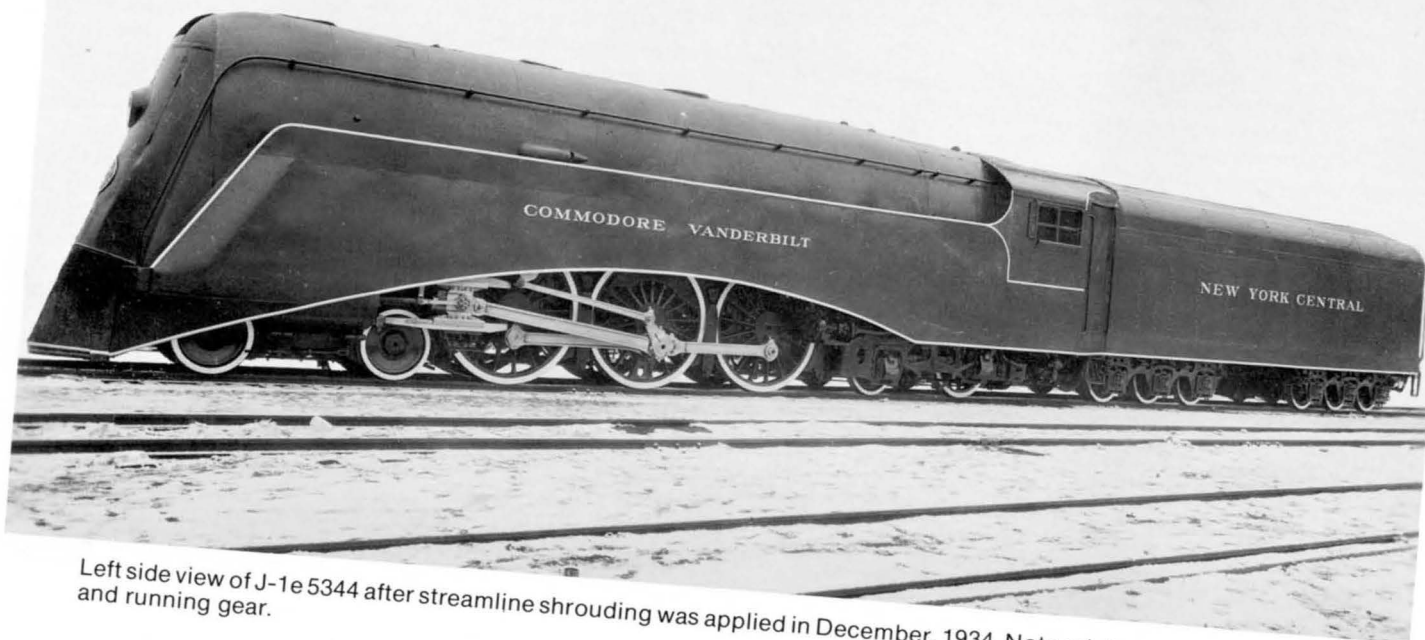
On March 1, 1936 I went to our West Albany Shop with a set of the "Commodore Vanderbilt" prints. However, they were for reference only as they were for a Hudson type locomotive. A fast freight locomotive was to be streamlined for the Rexall train as it would be pulling a 12-car train over the steep grades of the western mountains.

Locomotive #2873, a class L2c Mohawk with 69" drivers and with roller bearings on all axles except the engine truck and with trailing truck booster was selected for this project as it had been recently outshopped but had been in service long enough to be broken in. Since #2873 was a freight locomotive steam heat and train air signal equipment had to be installed, and since some western railroads burned oil the locomotive had to be converted to an oil burner.

As it developed, this turned out to be not only a 30 day, but a 30 day and 30 night project. The shop management and personnel were very cooperative and with the help of Frank McMahan, the shop engineer, we covered the day trick and the second trick to expedite the project. Each night I would mark up my set of prints to suit the dimensions of the L2 locomotive and used them for the next day's production. Some of the work was just a custom made job to suit conditions. The paint shop with their usual skill and artistic ability did a beautiful job of painting it with the Rexall blue and a wide white stripe on the side of the locomotive panel and the tender. This was to match the colors the stripe on the 12-car train. "The Rexall Train" was lettered in blue on the white stripe of the locomotive. We also had an aluminum casting made of the "New York Central" oval and placed on the front cowling below the headlight. There were no other outward signs of the New York Central. The locomotive number was stencilled on the back wall of the cab.

Mr. Bert Daniels, road foreman of the Mohawk Division, was assigned to travel with this locomotive on the tour. He took a good supply of tools, grease, lubrication, etc. along. As he related later, his greatest concern was the friction bearings on the engine truck axles which required frequent inspection and maintenance.

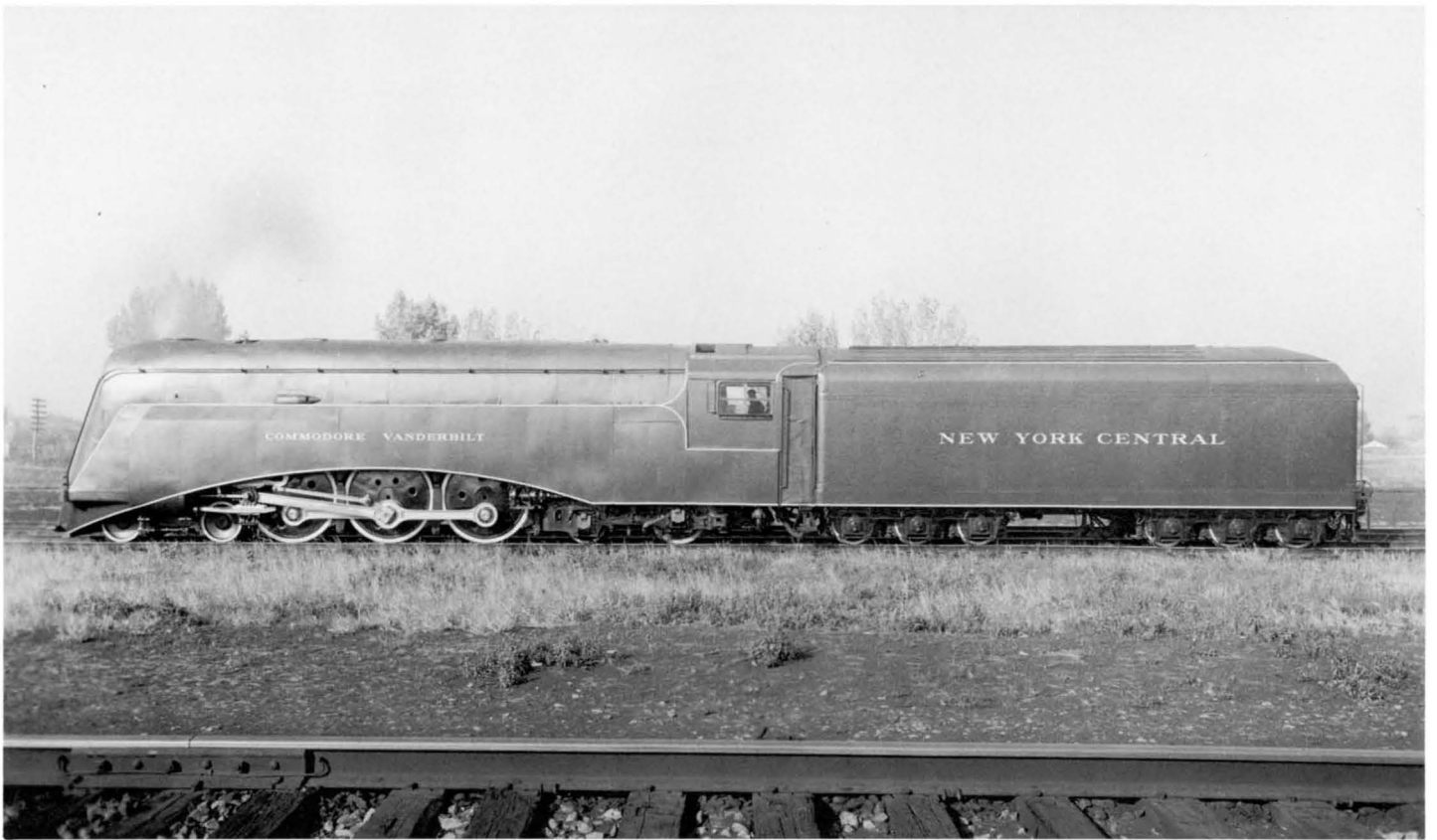
On Sunday morning March 22, 1936, with a full tender tank of fuel oil, the locomotive was run down to the Rensselaer, N.Y. yards where we met the special train of Pullman cars. No. 2873 was coupled to the train and pulled out on the B.&A. Division to Boston, Mass. where the tour was to originate. Fuel oil was obtained from tank trucks until we were on the western railroads.



Left side view of J-1e 5344 after streamline shrouding was applied in December, 1934. Note original spoked drivers and running gear.



"Commodore Vanderbilt" 5344 after spoked drivers were replaced with disc type.



"Commodore Vanderbilt" 5344 shows off her new disc drivers, but still no engine number is carried below cab windows as was usual N.Y.C. practice.



3/4 rear view of "Commodore Vanderbilt" 5344 shows that no engine number was applied to rear of tender tank, but water and coal capacities were applied.



"Commodore Vanderbilt" 5344 and train



WORLD'S FIRST STREAMLINED HIGHPOWERED STEAM LOCOMOTIVE
USED ON TWENTIETH CENTURY LIMITED

Promotional photo showing 5344 complete with disc drivers and roller bearing rods. Carl F. Kantola Collection

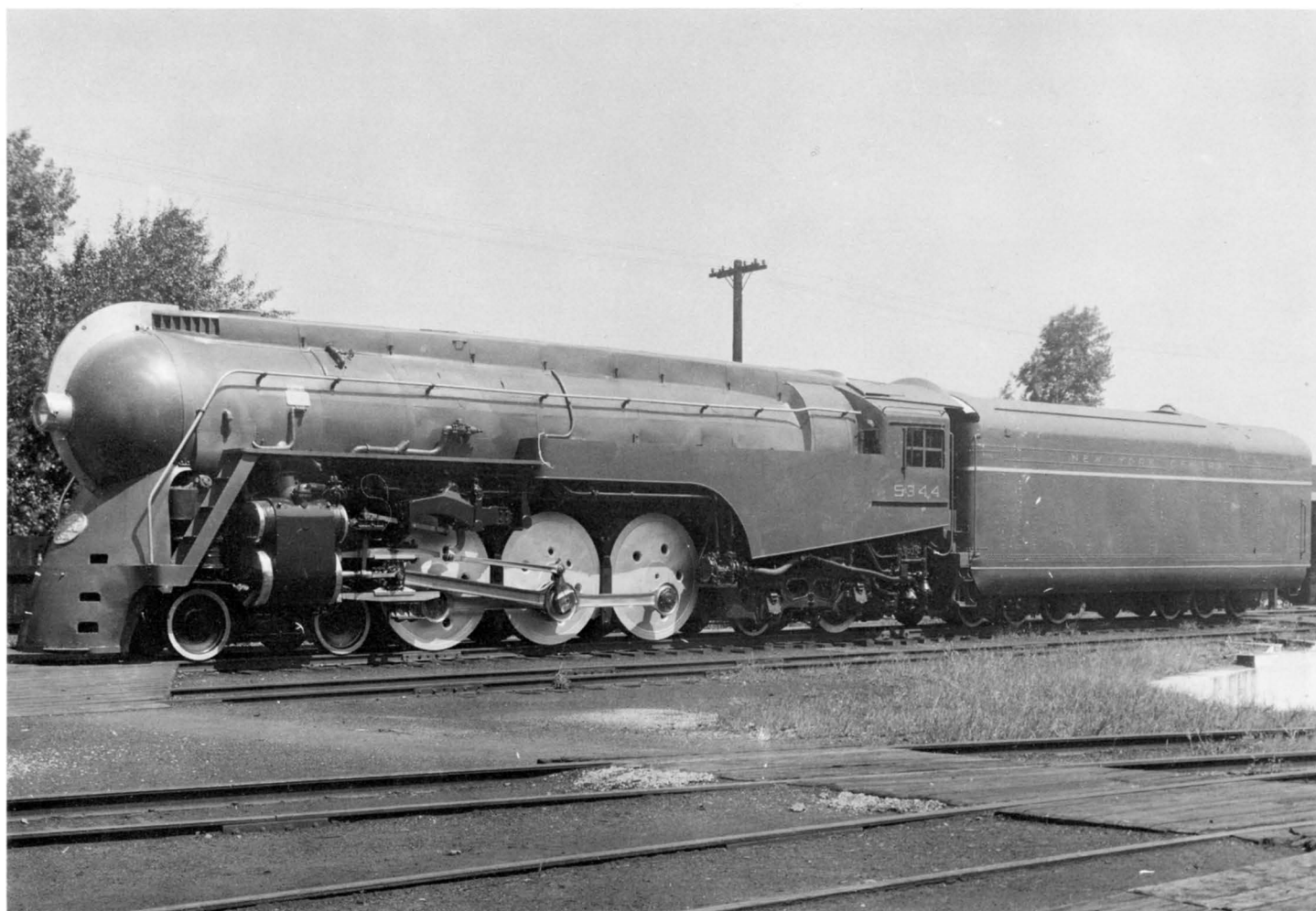


"Commodore Vanderbilt" 5344 as it appeared at West Albany Shops on September 12, 1935 with streamlined shrouding removed for application of disc drivers and roller bearing rods.

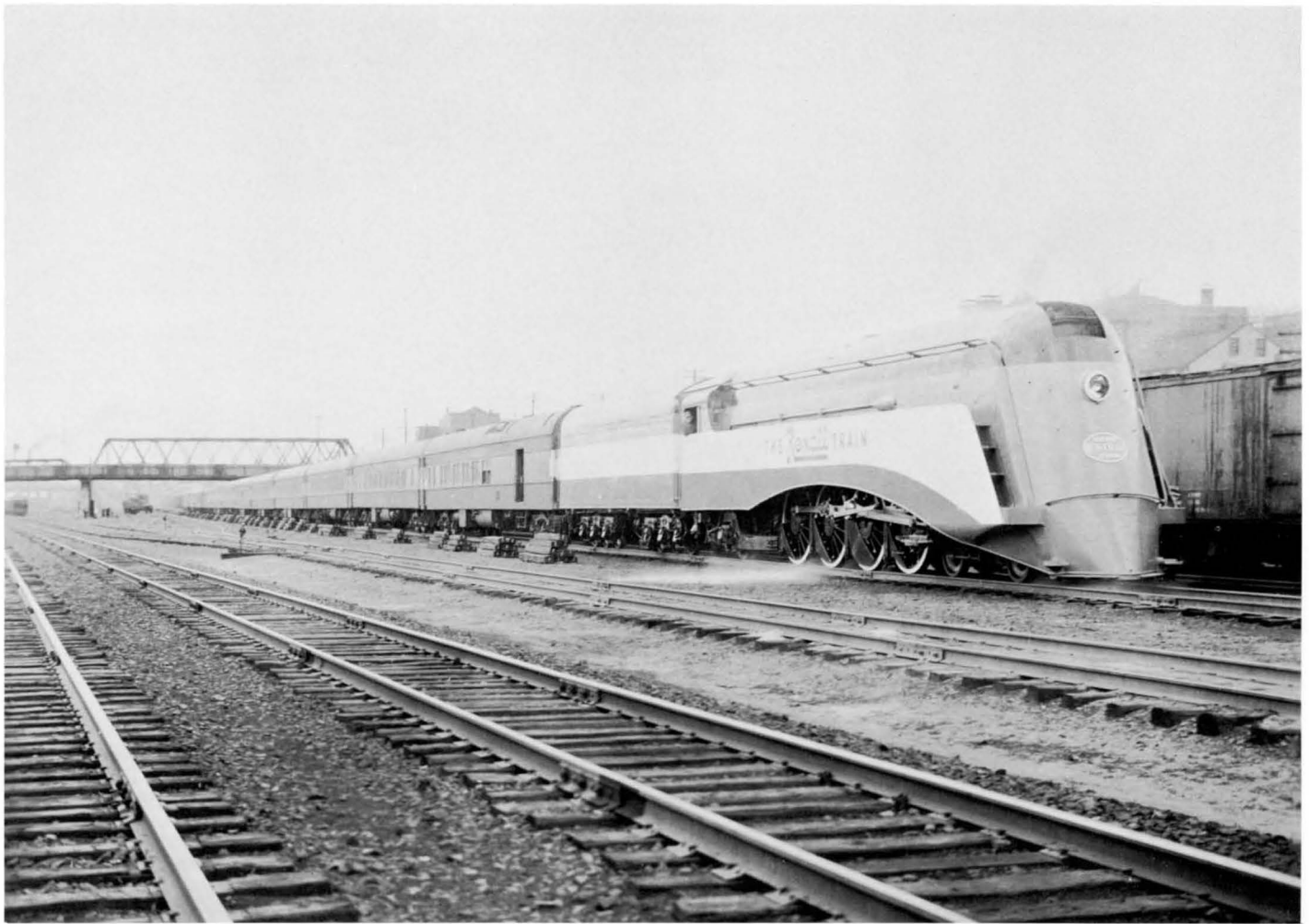
Carl F. Kantola Collection



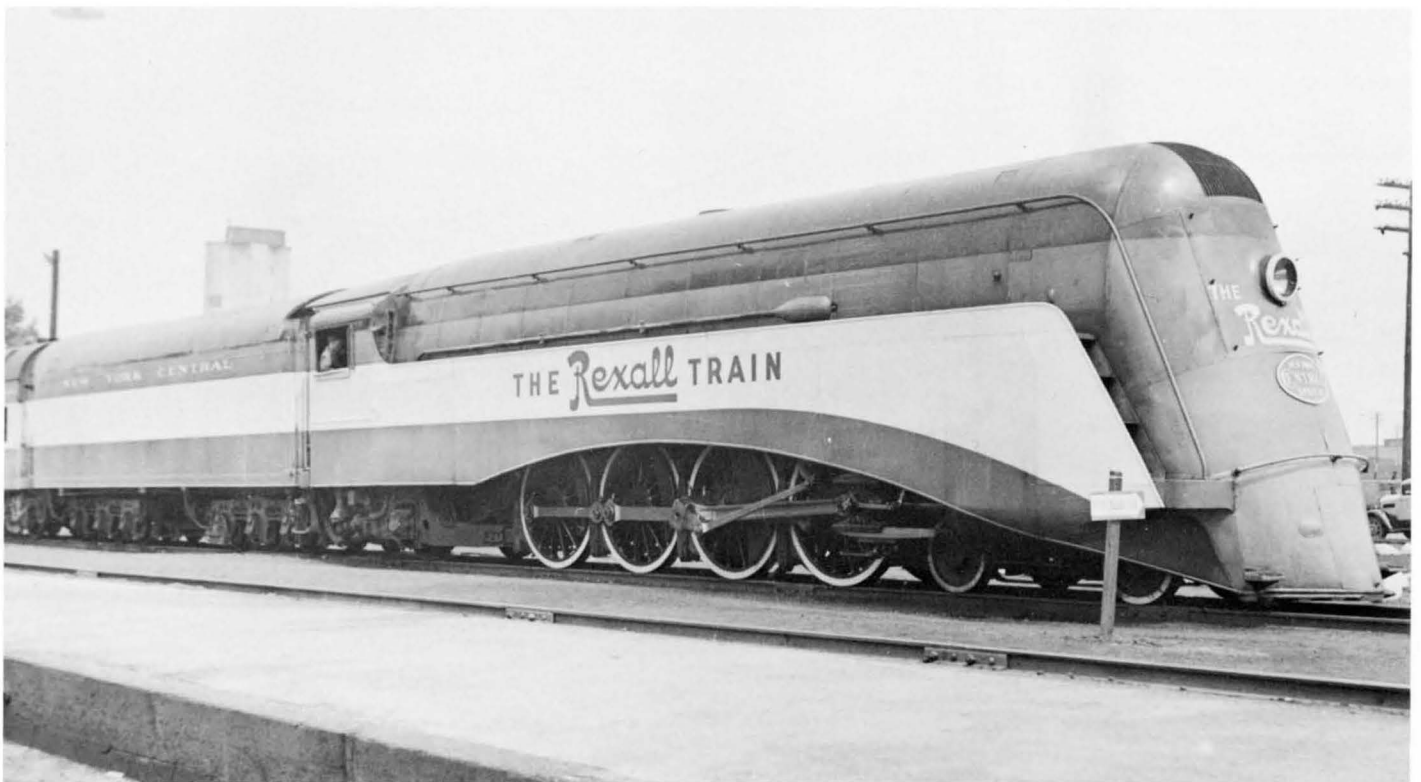
"Commodore Vanderbilt" 5344 on test run in the Albany, N.Y. area at high speed. Note the effect of the wind scoop at smoke stack lifting the smoke clear of locomotive and train. Carl F. Kantola Collection



5344 as re-streamlined at Collinwood Shops in 1939. Engine number is now carried on cab sides to conform to similar appearing J-3a Hudsons.



The L-2c locomotive 2873 streamlined for the Rexall train. The cars of the Rexall train had just arrived at Rensselaer, N.Y. from Chicago and are about to depart for Boston behind the 2873. Note the dirt covering the white stripe on the cars, we wiped a corner clean to be sure that it was white. Carl F. Kantola Collection



The Rexall train stops at Green Bay, Wis. on July 3, 1936. The oil-burning 2873 and her 12 car train measured 1080 ft. long and traveled 29,000 miles in 200 cities through the U.S. and Canada serving as a mobile convention center for 10,000 Rexall druggists and 20,000 salespeople. Paul W. Prescott Collection

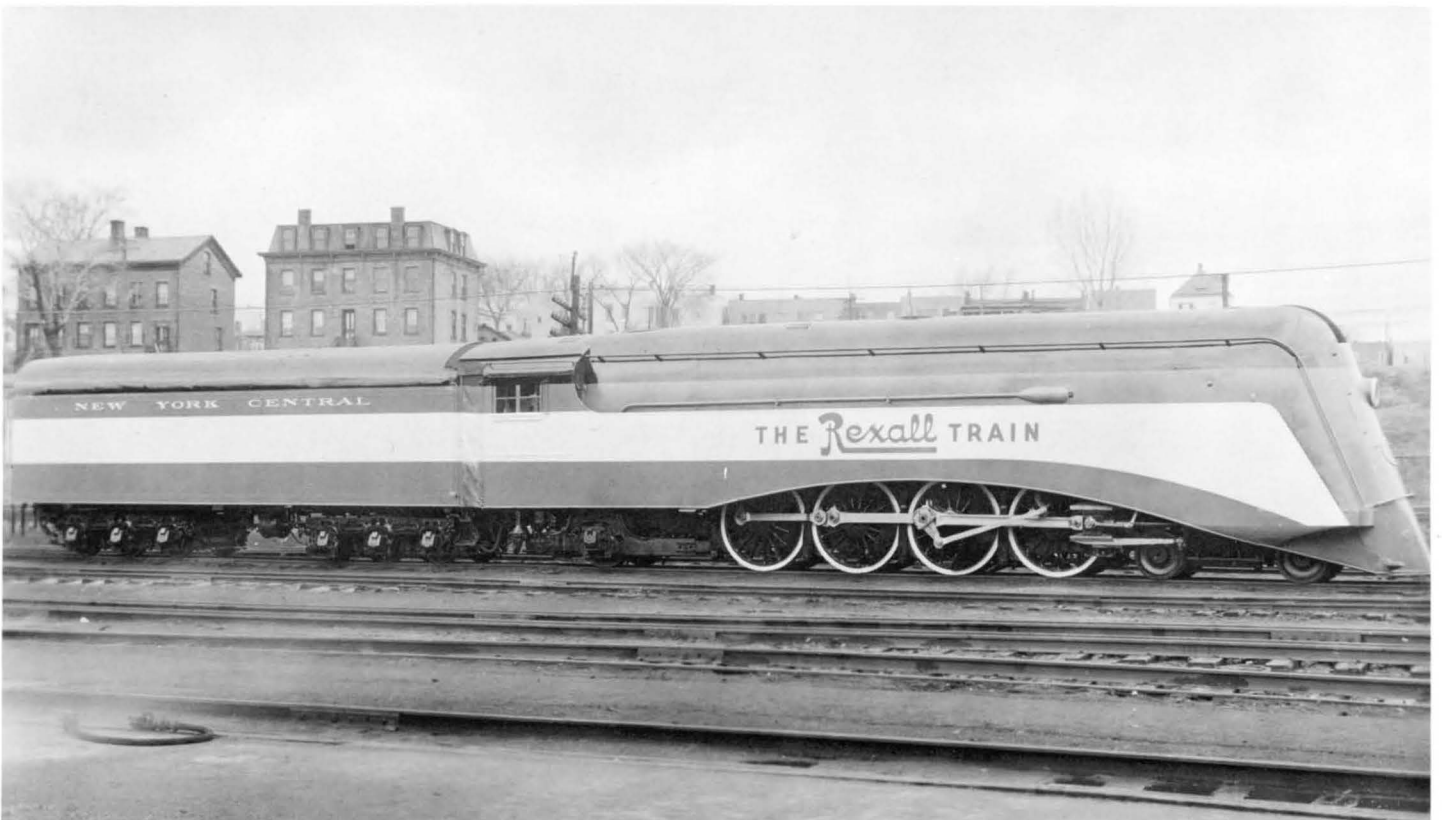


Front view of the "Rexall Mohawk" 2873 showing air scoops back of side steps and at stack.

Carl F. Kantola Collection



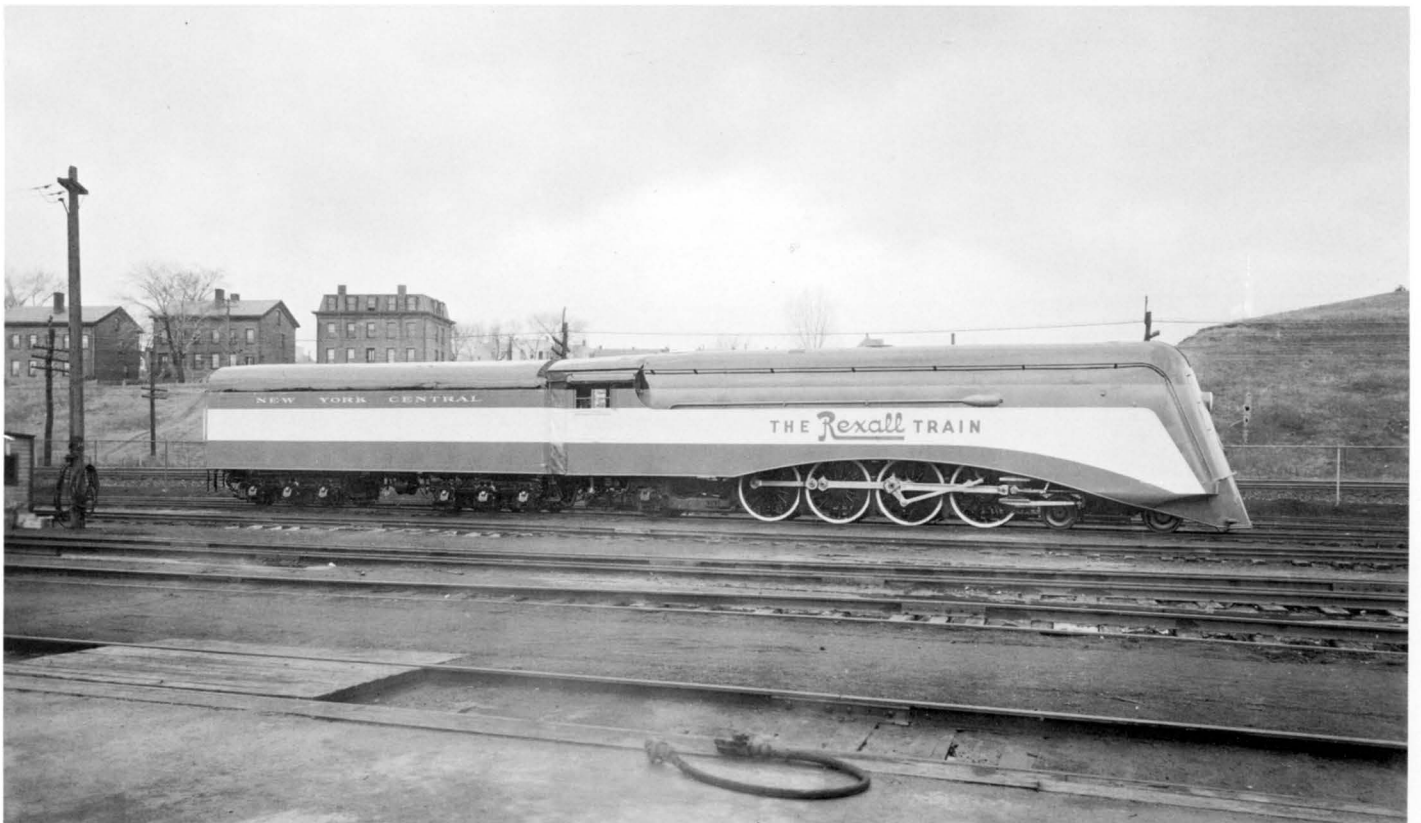
N.Y.C. L-2c "Mohawk" converted to an oil burner and streamlined for the Rexall train in 1936.

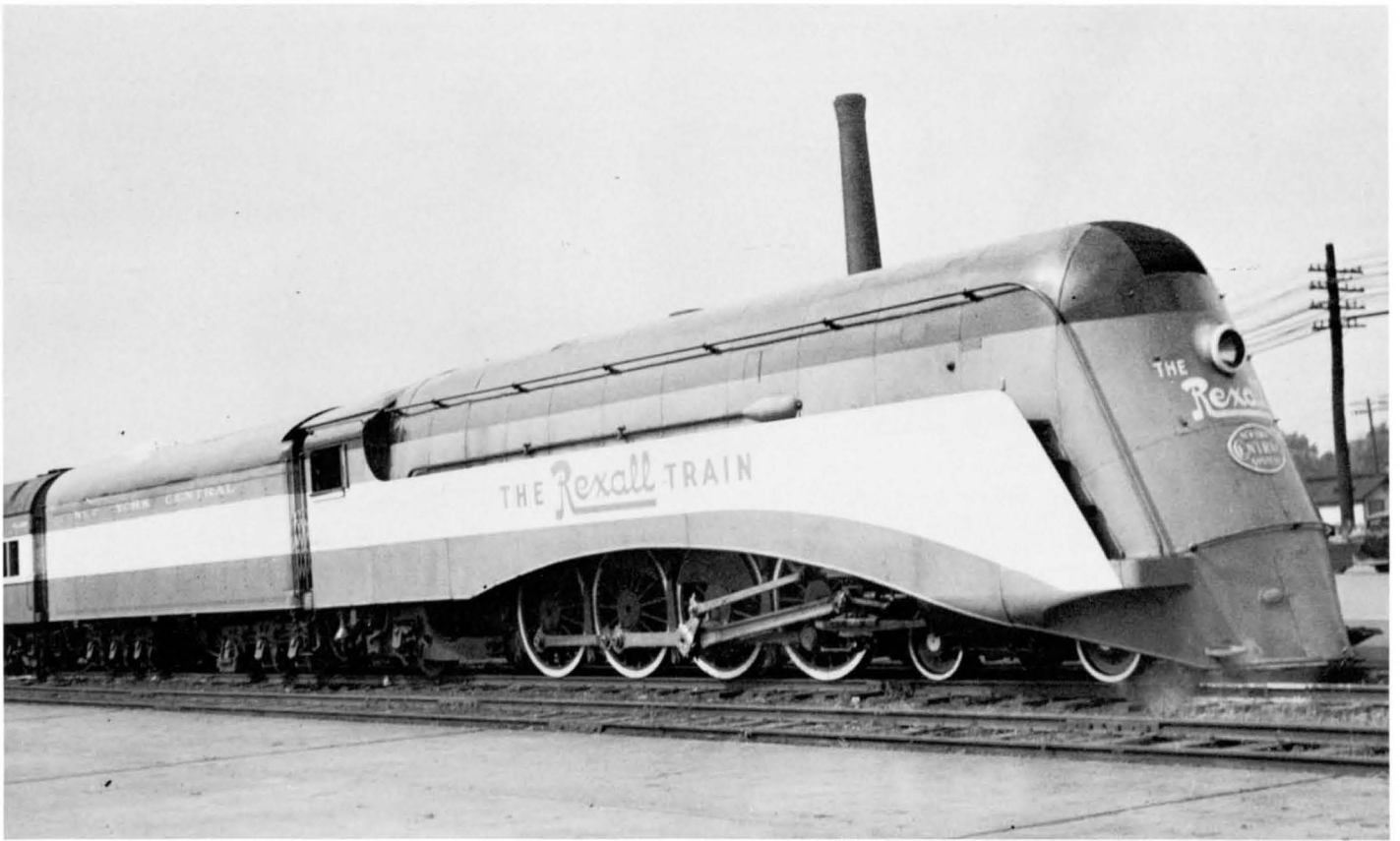


The streamlined 2873 at West Albany, N.Y. in 1936. Note neat, tight fitting diaphragm between cab and tender. Did the engine crew have to crawl in and out of the window?



The "Rexall Mohawk" after streamlining at West Albany Shop in 1936.





The Rexall train with L-2c 2873 is seen at Syracuse, N.Y. on September 16, 1936. Note the "Rexall lettering applied to the front nose between the headlight and the N.Y.C. oval. George E. Votava Collection



Was this N.Y.C. speed attempt a direct descendant of the same type of "inverted bathtub" shrouding used on the original "Mercury," "Commodore Vanderbilt," and "Rexall" streamlining efforts? The jet powered R.D.C. M-497 is seen at Bryan, Ohio on July 24, 1966. Mrs. Howard W. Ameling, Howard W. Ameling Collection

I proceeded to Boston also where final arrangements were made for the 9 month and 29,000 mile tour of the United States and parts of Canada. Stops were scheduled for 200 cities on the tour, which covered 52 railroads. The locomotive and train were placed on exhibit at the South Station in Boston and before leaving on tour on March 28, 1936, the train was christened by Mrs. Minard, a 33-year Rexall employee. Mrs. Minard broke a bottle of champagne on the right side main crank pin of the locomotive, also marking the 33rd anniversary of the United Drug Co. Mr. Liggett stood by.

About 10,000 Rexall druggists and 20,000 Rexall salespeople attended convention meetings on the train. The Rexall product exhibit was open to the public during the daytime and was viewed by more than a million people.

The train consisted of twelve cars, a converted baggage car next to the locomotive equipped with a gasoline engine and generator for lighting and air conditioning, two sleeping cars for the train staff of 50 people, four cars of Rexall exhibits with the regular seats removed, two lecture cars for convention work having folding chairs which could be removed when the orchestra played for dancing in the evenings, a lounge car, a dining car serving buffet type meals, and finally, Mr. Liggett's private car. On tour we had orders to keep the locomotive on the train during the daytime exhibits and to head into all terminals so that the streamlined locomotive would be seen by all entering the train from the station. The locomotive would only be removed from the train after dark and on those occasions when it was necessary to go to a roundhouse for servicing. I well remember spending Easter Sunday on the locomotive in St. Louis station. Bert and I had a grand view of the girls coming onto the train in their Easter finery. And Wichita, Kansas where we had run through one of the dust storms and nearly ruined the paint job by the sandblast effect.

I left the train there and didn't see it again until it was in Chicago for mid-tour inspection of the locomotive at Englewood roundhouse and the cars at the Pullman Co. From there it went on to complete the tour. All in all it was a successful tour and a record for one locomotive to complete without any breakdowns or accidents. For this Bert Daniels deserved a great deal of credit.

The "Mercury streamlined steam locomotives and train

On June 25, 1936 the streamlined locomotives and cars for the Cleveland-Detroit "Mercury" were completed; the locomotives having been streamlined at the West Albany Shops and the cars at the Beech Grove Shops. This train was to be on a 60 mph schedule with top speeds of 85 mph. One intermediate stop was scheduled at Toledo, Ohio. Service was inaugurated on July 15, 1936.

Two class K5b Pacific type locomotives #4915 and #4917 (originally #6515 and #6517) were streamlined for this train. These locomotives had 79" drivers, originally with spoke type centers. These centers were replaced with solid disc type centers when the locomotives were streamlined. Roller bearings were applied to the engine and trailing truck axles at this time, but the driver axles retained the original friction bearings.

Henry Dreyfus, an industrial designer, was credited with the streamline design of these locomotives. However, it will be noted that the design followed that of our two previous streamliners very closely, having the smoke lifting devices in the cowl over the boiler and at the running board steps, as well as the raised portion of the side panels over the driving wheels and the New York Central oval on the front end below the headlight. The tender coal space cover and the cab curtains were also similar to our own previous designs. One new feature was the illumination of the driving wheels at night, with flood lights located inside the side panels.



Christening ceremony for the "Mercury" at Indianapolis, June 25, 1936. The train was christened by Miss Louise Landman, daughter of general passenger traffic manager L. W. Landman, using a bottle of champagne from Sandusky, Ohio. Following the ceremony the train was moved to New York for display at Grand Central Terminal, June 28-29, 1936.



N.Y.C. K-5b 4917 shown in James Whitcomb Riley service at Indianapolis, Ind. on November 3, 1941.
Howard W. Ameling Collection



The "Mercury" headed by K-5b 4-6-2 4917 roars through open country near Cleveland, Ohio in May, 1937.
Photo by Andrew Hriz, Bruce Young Collection

The train consisted of refurbished commuter cars originally built for service on the Putnam Division. These cars had an arch type roof which readily contributed to the streamline effect when enclosures were added between the cars and at the rear of the locomotive tender. The interiors of the cars were completely remodeled, and tightlock couplers with improved draft gears were applied to allow smoother train handling. Large "Winged Mercury" medallions on the sides of the cars at each end added a distinctive note to the "Mercury."

(See the "Central Headlight" issue for October, 1972 for additional information on the "Mercury" equipment.)

Streamlined steam locomotives for the 20th Century Limited

The first of fifty new and improved Hudson type passenger locomotives went into service September 7, 1937. These class J3a locomotives were #5405-#5454 and were built by the American Locomotive Company at Schenectady, New York.

In 1938 the last ten of this order, #5445-#5454, were completed with a modified streamline design. This consisted of a cowling at the top of the boiler enclosing the bell, whistle, safety valves, low water alarm and main turret. The smoke lifting scoop was designed around the stack. A semi-spherical enclosure covered the front end of the boiler with the headlight located in its center. Below this a skirt with a New York Central oval on it extended down to the bottom of the pilot, covering the drop coupler. A narrow panel extended along the edge of each running board. This panel curved downward back of the rear drivers and then extended to the rear of the cab in a line above the trailing truck. The coal space of the tender was covered and the rear of the tender had an enclosure to match the enclosures on the cars. Locomotives and tenders were painted light gray to match the color of the train.

All class J3a locomotives had nickel steel boilers carrying 265 pounds pressure, and all axles were roller bearing equipped. The

79" drivers had solid type wheel centers and the last five locomotives #5450-5454 were equipped with Timken Roller Bearing main rods, side rods, and crosshead pins. These rods were of lightweight, high tensile steel. The tender capacity was 14,000 gallons of water and 30 tons of coal (13,600 gallons of water and 28 tons of coal on the streamlined locomotives). The tenders were equipped with a tightlock coupler and rubber draft gear on the rear to match the car equipment for smoother train handling, and with improved high speed 85 mph water scoops.

The weight of these locomotives was 66,000 lbs. on the engine truck, 196,000 lbs. on the drivers and 98,000 lbs. on the trailing truck of which 42,500 lbs. was on the front axle and 55,500 lbs. on the rear axle supporting the booster engine, for a total weight of 360,000 lbs. All of these engines were equipped with automatic train control, stokers, power reverse gear, feed water heaters and low water alarms, besides the usual standard equipment.

These streamlined locomotives were used on the all new 20th Century Limited trains which were inaugurated on June 15, 1938.

Streamlined steam locomotives for the Empire State Express

In 1941 two additional class J3a Hudson type locomotives #5426 and #5429 were streamlined for the all new Empire State Express which made its inaugural run on December 7, 1941.

This streamlining was generally similar to that which had been applied to class J3a locomotives #5445-5454 when they were built in 1938. About the only difference in these two engines was that the upper half of the boiler jacket, top cowling and front end enclosure was painted light aluminum. The lower half of the boiler jacket, the front end skirt, and the cylinders were painted black as was the lower half of the spherical smoke box enclosure. The side panels below the running boards were made of fluted stainless steel and extended along the lower part of the tender sides to match the fluted sides of the Budd-built stainless steel cars. A clear panel area on the

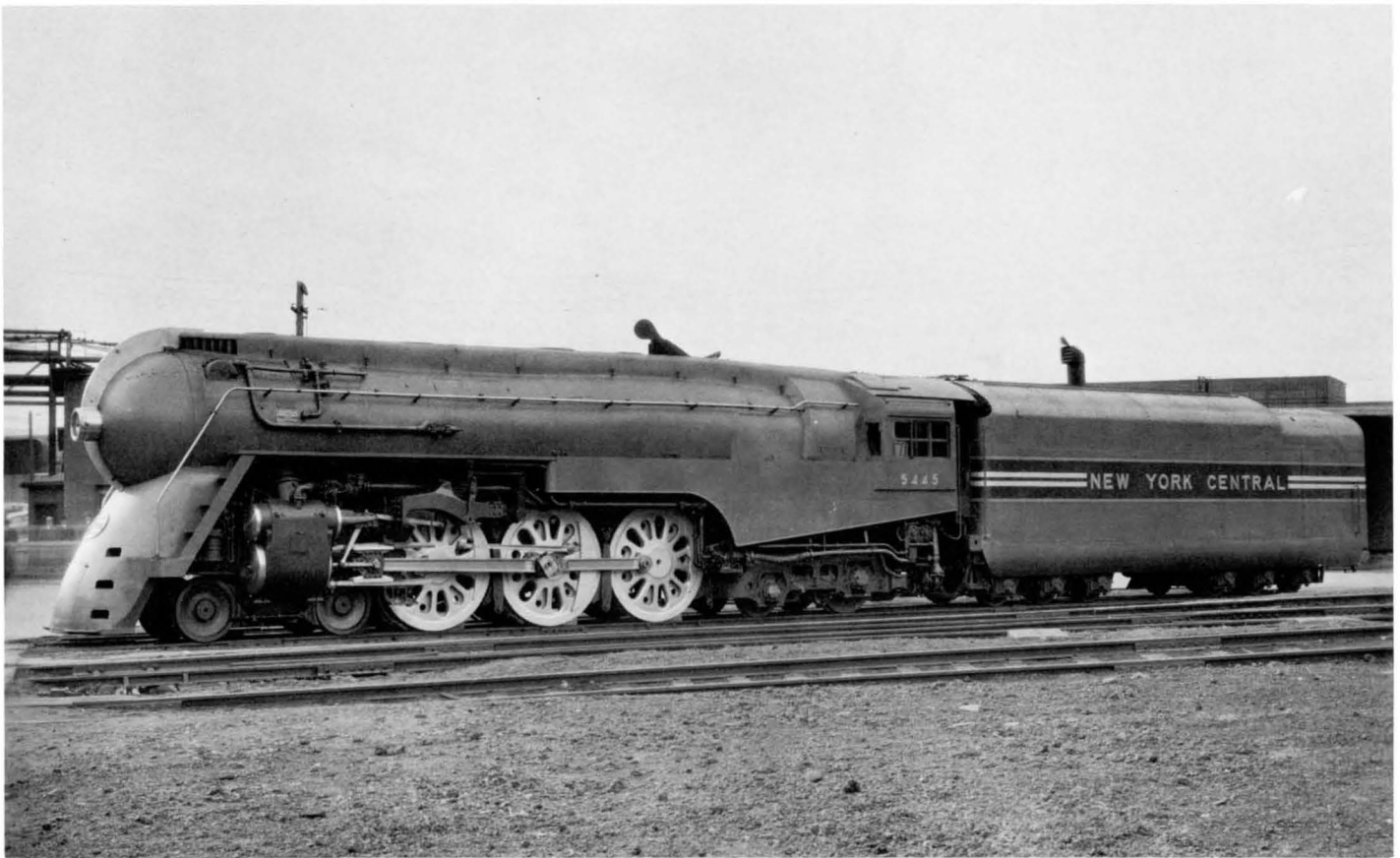


J-3a Hudson 5445 as built by Alco-Schenectady in 1938 for 20th Century Limited service.



New at Alco-Schenectady in 1938





tender matched the pier panel area on the cars, and a second fluted panel above matches the fluted letterboard area of the cars. The clear panel of the tender was lettered "New York Central" while the engine number appeared in the usual place on the side of the cab. "Empire State Express" was lettered in script on the front end skirt directly above the New York Central oval. The solid type driving wheel centers were painted light aluminum, while the engine and trailing truck were painted black.

It is interesting to note that of the names we have mentioned, only the "Empire State Express" survives, on an Amtrak train operating between New York and Buffalo.

ABOUT THE AUTHOR

Carl F. Kantola

Birthplace: Ashtabula, Ohio

Education:

High School - Ashtabula Harbor, Ohio - 1920

College - Pratt Institute, Brooklyn, N.Y. - 2 years nights 1926-27.

I.C.S. Drafting and Engineering Corresponding Course - 1921-23.

Railroad Education Bureau Corresponding Course - 1924-25 -

Steam locomotives

Mechanical and electrical course - diesel locomotives - Electro-Motive Division, GMC, LaGrange, Ill. - 1954.

Employed by the New York Central R.R. March 18, 1920

- Machinist Apprentice - Steam locomotives and machine shops - 1920-1924. Ashtabula and Collinwood, Ohio.

- Machinist - Collinwood Locomotive and Machine Shops -1925.

- Transferred to Equipment Engineering Dept. New York City February 5, 1926 as Draftsman and later Assistant Engineer.

Special Achievements —

- Designed and supervised construction of first streamlined steam locomotive, the "Commodore Vanderbilt," used on the 20th Century Limited 1934.

- Designed and supervised construction and testing of a high speed waterscoop used for picking up water from track pans at 80 mph. 1943. Ten patents were issued in connection with the above two designs.

- Designed and supervised conversion of a gas rail car to a self propelled diesel-electric clearance car used by the N.Y.C. for checking clearances through bridges and tunnels and along roadway.

- Designed and supervised modernization of a rail defect detector car used for finding hidden flaws in rails.

- Designing-modernization of diesel locomotives. Transferred to the General Engineering Dept. in 1957 as an Electrical Designer.

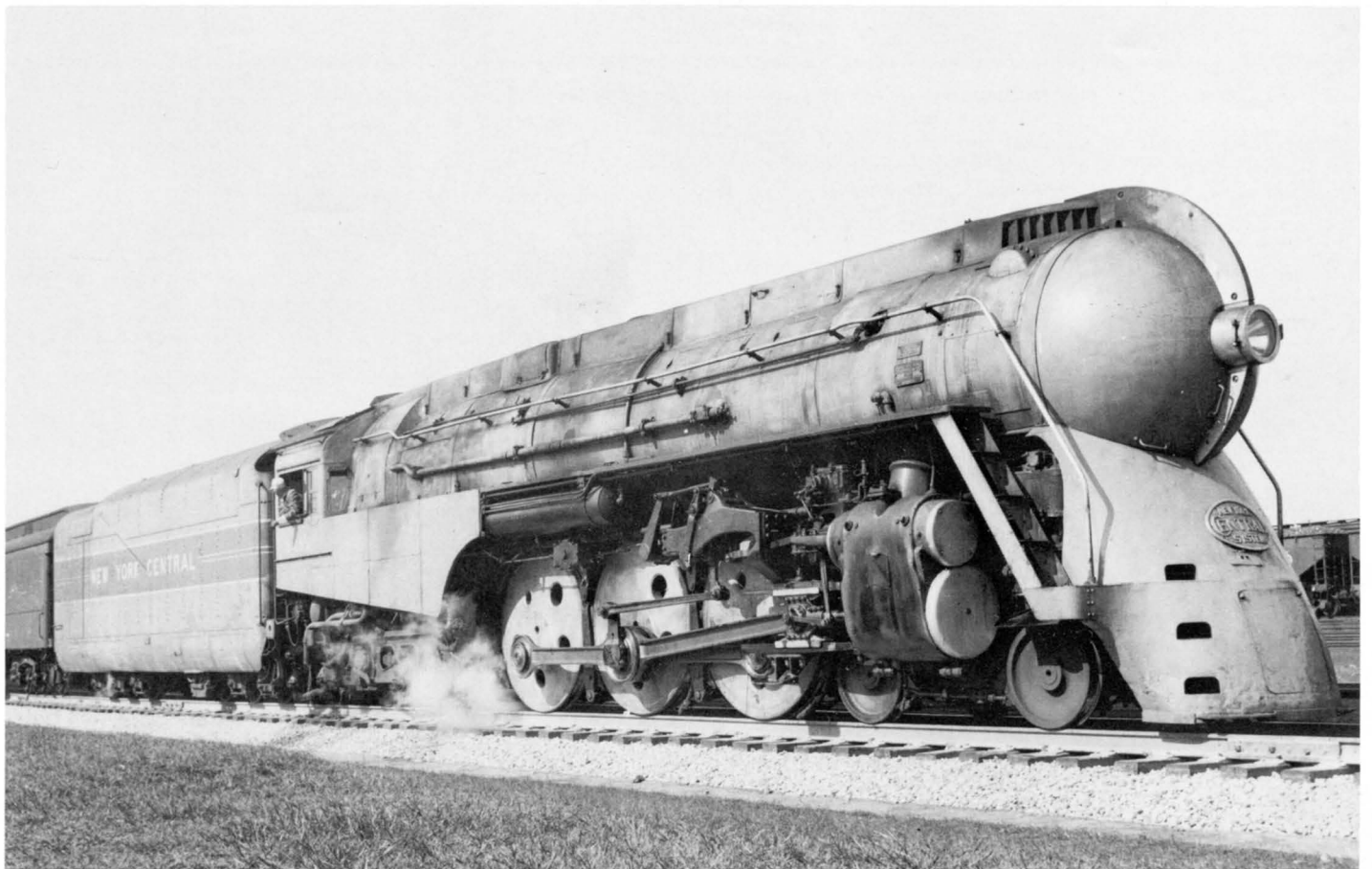
- Projects-Electric power distribution systems and flood-lighting for railroad yards, electric snow melters for track switches, transformer stations, switchgear, interior lighting, electric heating, etc.

- Designed and patented automatic track gauging device 1967.

Retired from the New York Central Railroad on October 31, 1967 after 47 years of service. Now, at age 78, lives at Holiday City Berkeley, Toms River, N.J. 08757. Carl, or "Chuck" as he was well known in his travels on the New York Central System, is not only a retired railroader and railroad enthusiast, but also a charter member of the New York Central System Historical Society.



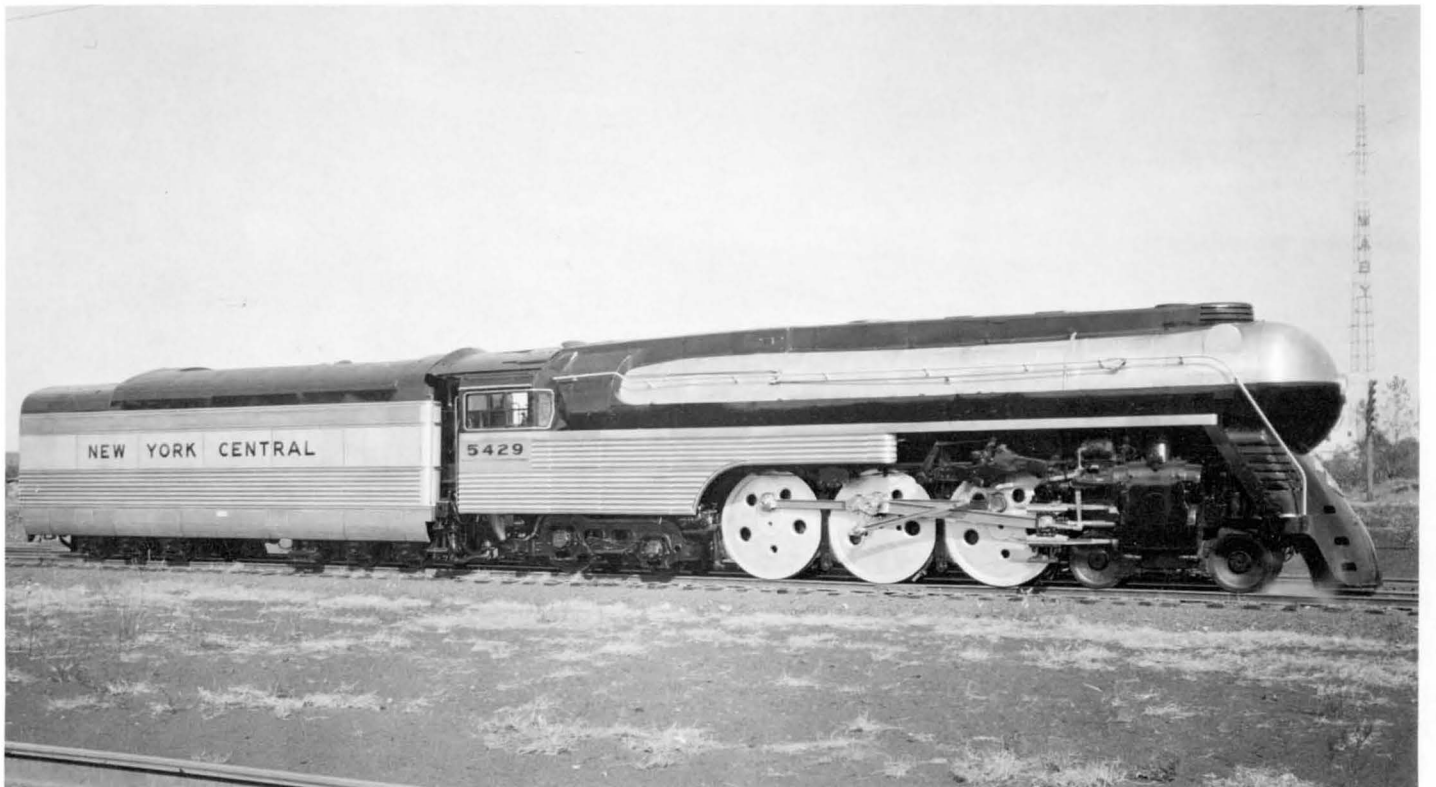
N.Y.C. Streamlined Hudson 5452 at the Harmon, N.Y. coal dock on May 30, 1938. George E. Votava Collection



Even with part of her streamlined shrouding gone, J-3a 5454 shows great dignity as her engineer waits for the highball at Englewood, Ill. in 1945. Howard W. Ameling Collection



J-3a 5429 with the brand new "Empire State Express" in December, 1941.



J-3a 5429 as streamlined for the 1941 "Empire State Express"

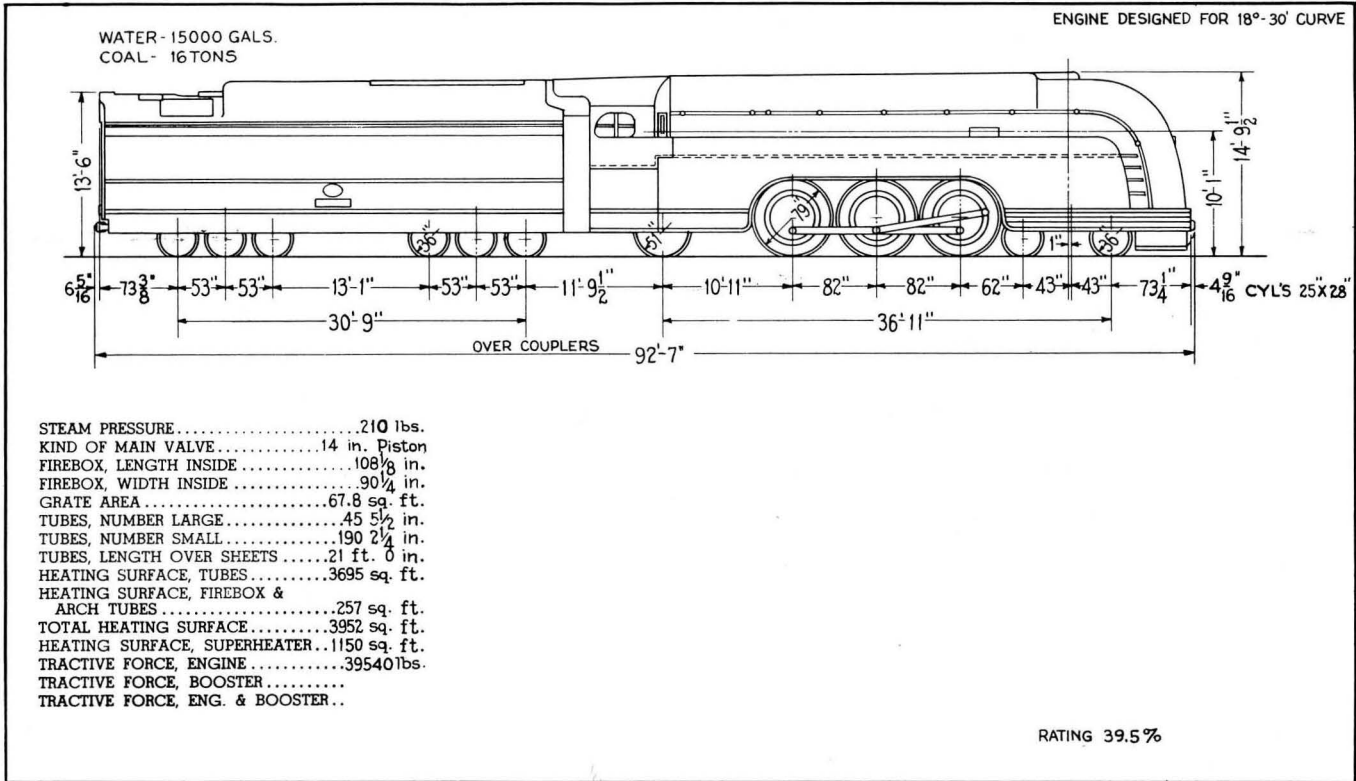


New Empire State Express
**NEW YORK CENTRAL'S STAINLESS STEEL SUPER-STREAMLINER
BETWEEN NEW YORK, BUFFALO, CLEVELAND AND DETROIT**

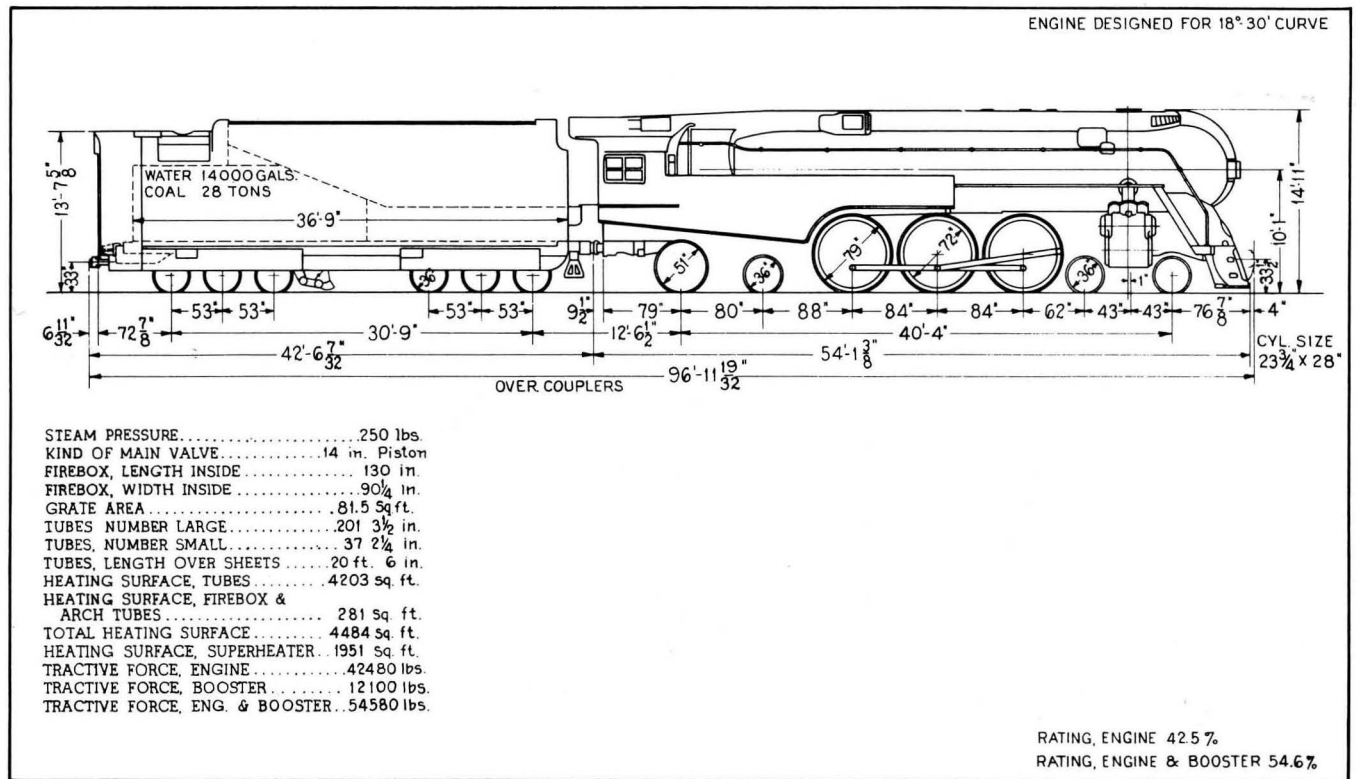
Artist's rendering of the 1941 "Empire State Express" for N.Y.C.S. advertising.

Carl F. Kantola Collection

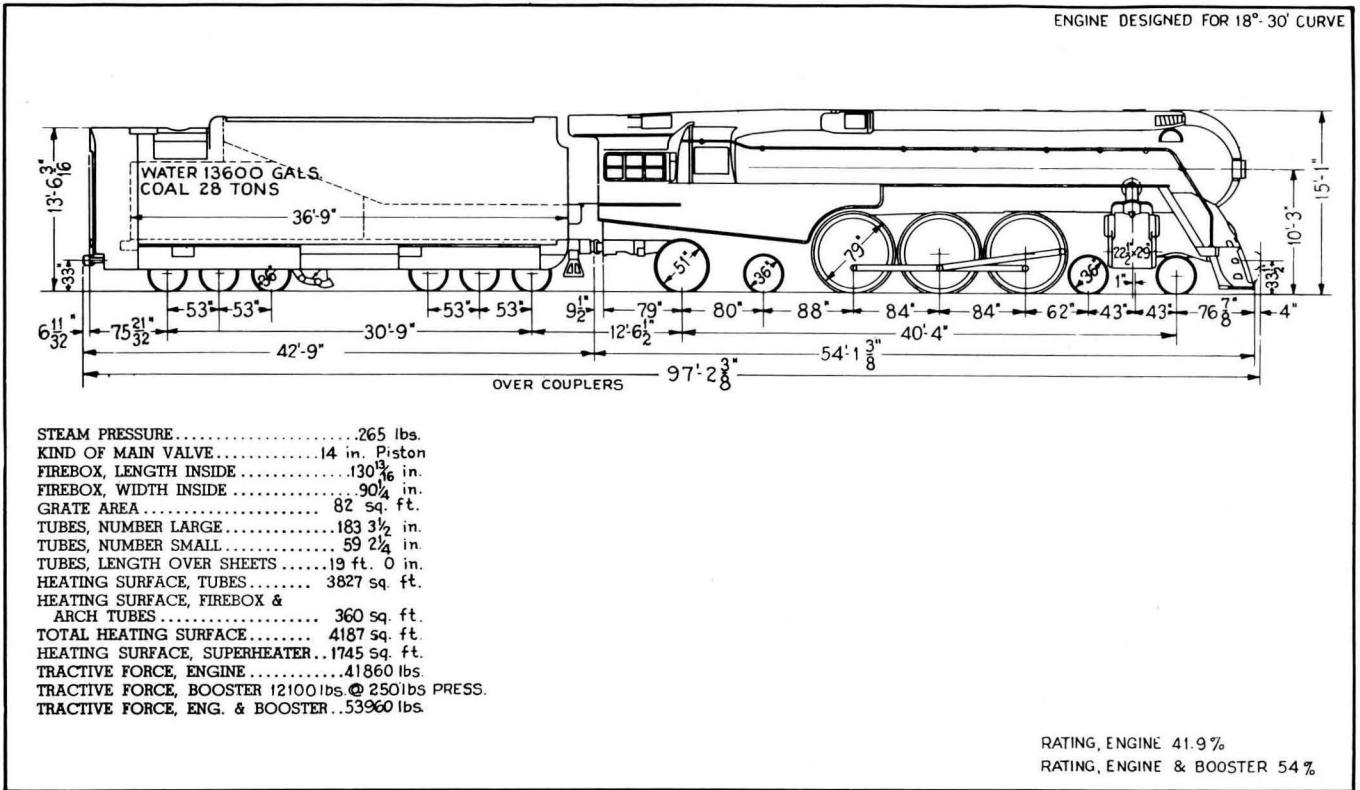




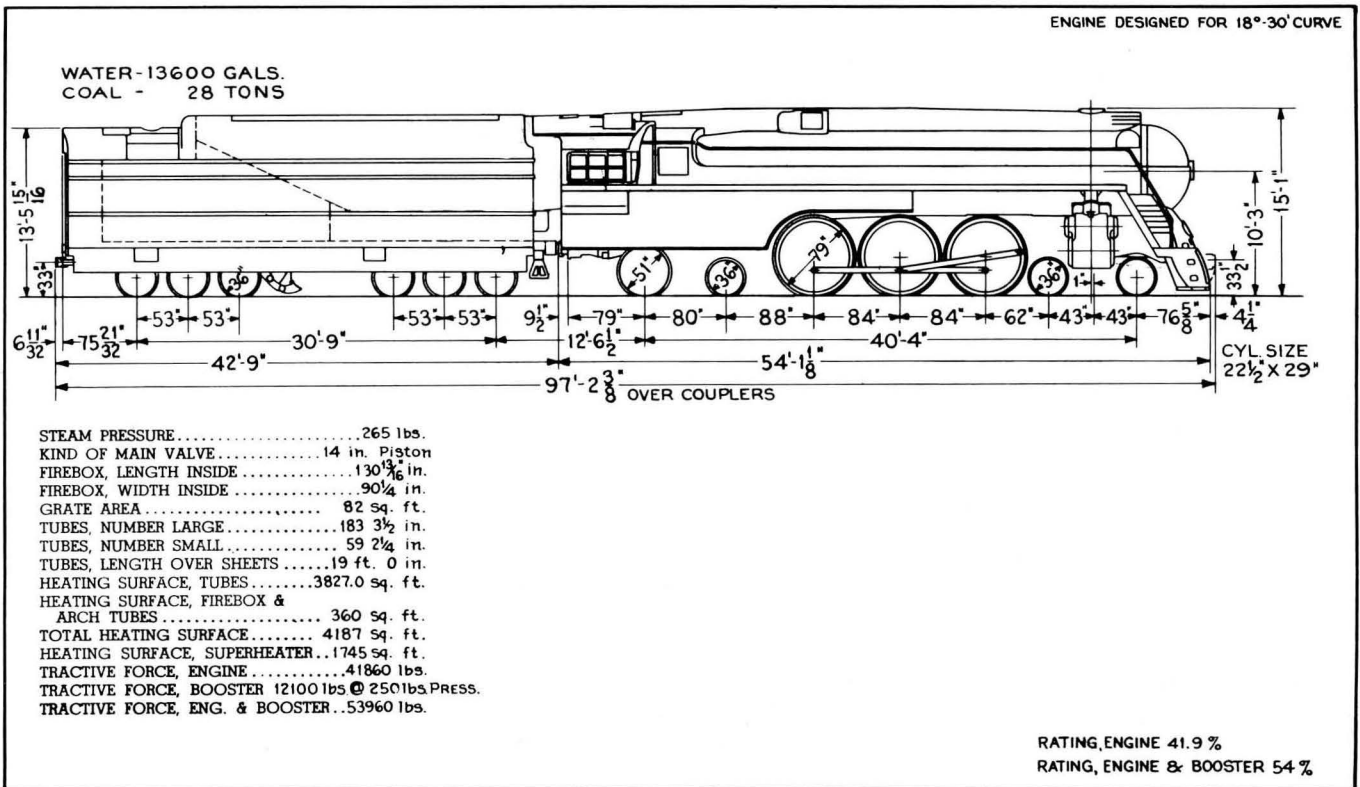
Official N.Y.C. Diagram for K-5b "Mercury" Locomotive



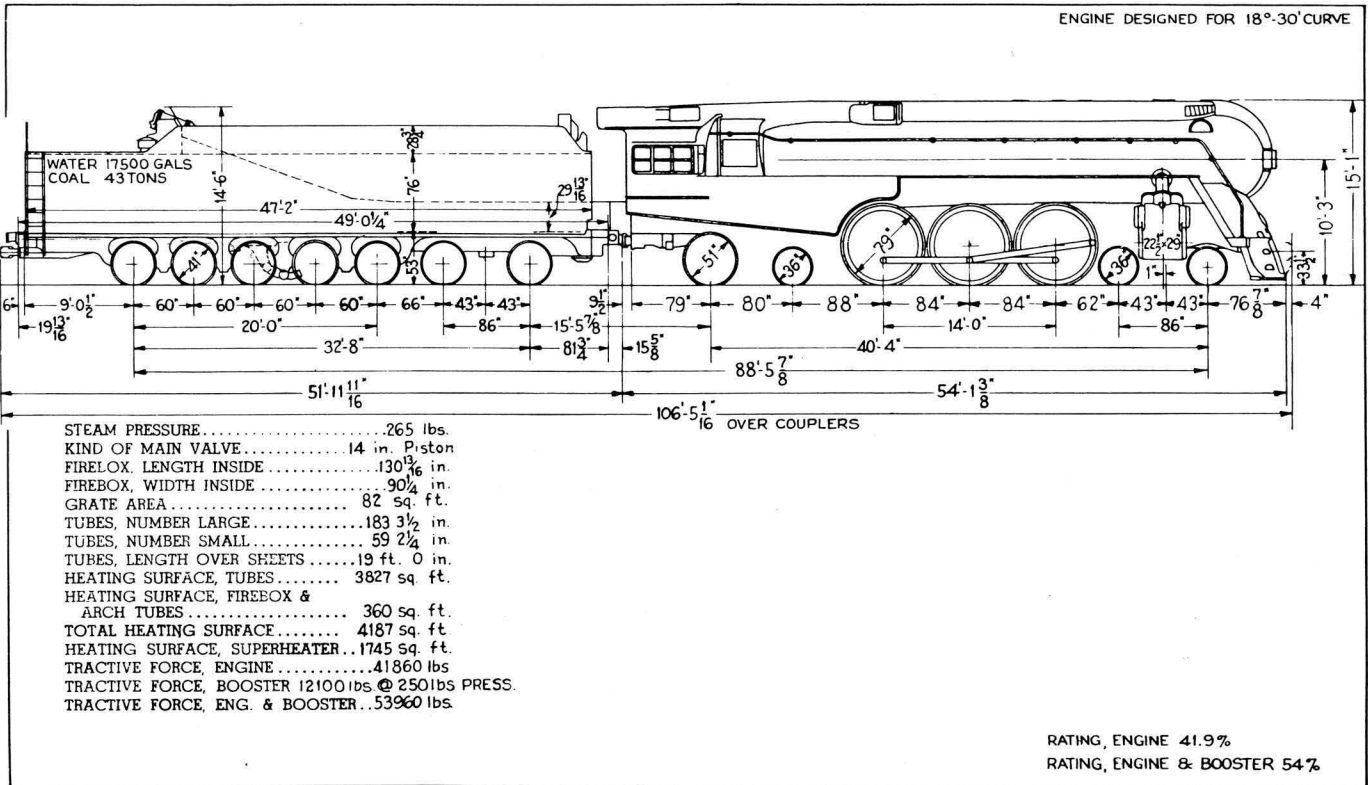
Official N.Y.C. Diagram for J-1e 5344 after 1939 rebuilding and streamlining.



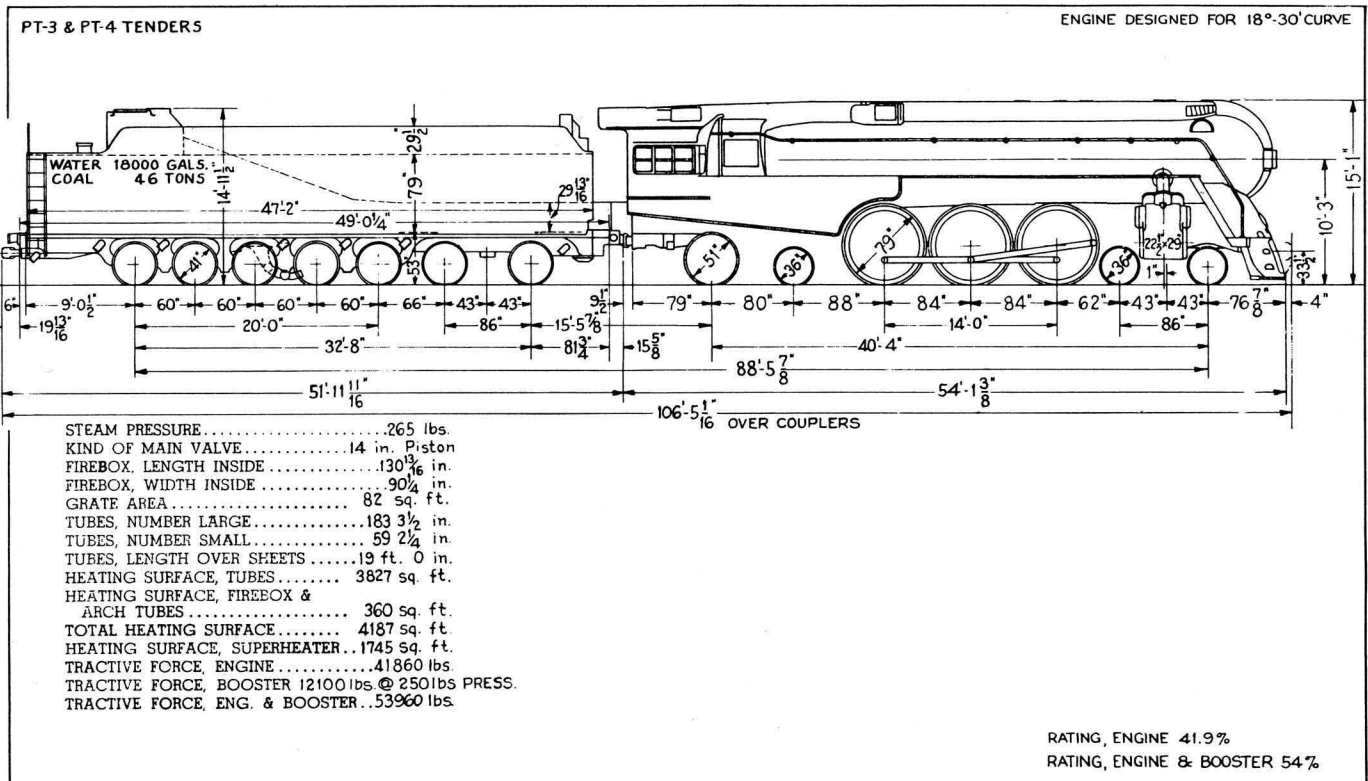
Official N.Y.C. Diagram for J-3a "20th Century Limited" Streamlined with original tender



Official N.Y.C. Diagram for "Empire State Express" Streamlined with original tender



Official N.Y.C. Diagram for J-3a "20th Century Limited" Streamlined with PT-1 tender



Official N.Y.C. Diagram for J-3a "20th Century Limited" Streamlined with PT-3 & PT-4 tenders