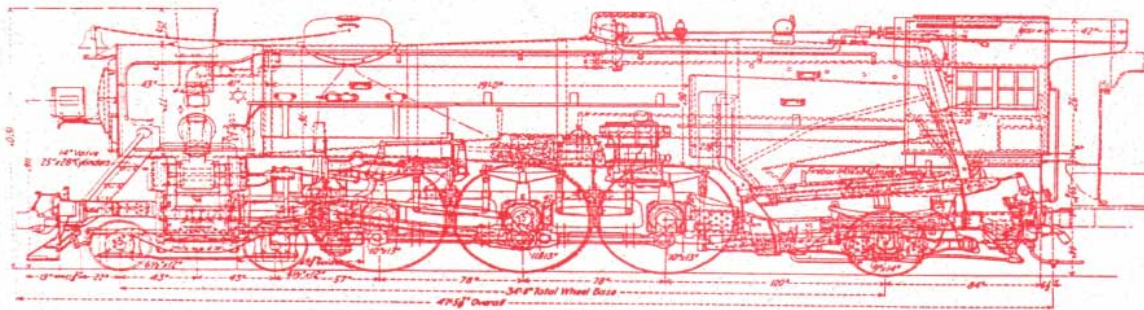


USRA STEAM LOCOMOTIVES

Atlantic Coast Line 1504

and

Baltimore and Ohio 4500



A National Historic
Mechanical Engineering Landmark

Prime Osborn Convention Center

Jacksonville, Florida

and

Baltimore and Ohio Railroad Museum

Baltimore, Maryland



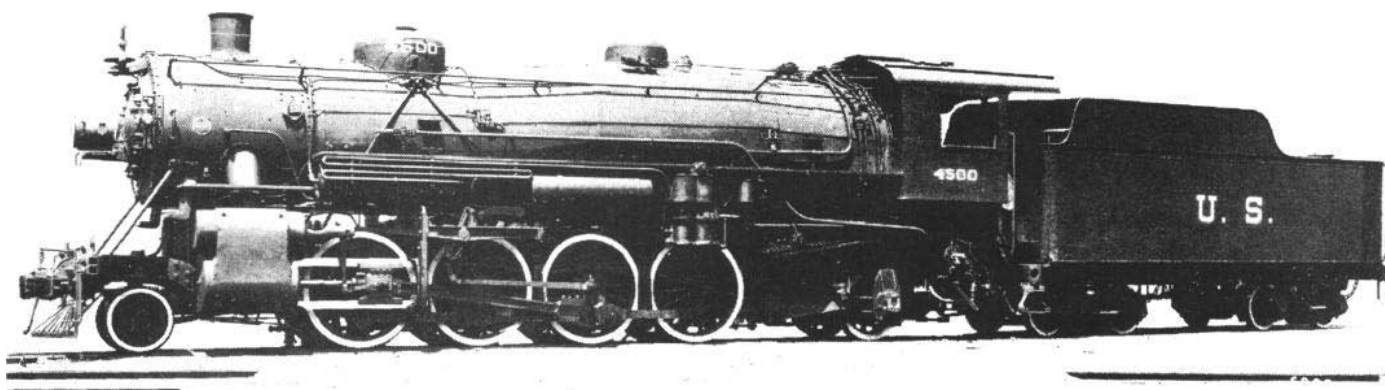
October 23, 1990

USRA LIGHT 4-6-2 AND 2-8-2 LOCOMOTIVES

A National Historic Mechanical Engineering Landmark

The United States Railway Administration (USRA) was created in December of 1917 to coordinate the operations of the U.S. railroads during World War I. One of the enduring legacies of the USRA was the production of standard designs for steam locomotives and rolling stock for universal use by many of this nations railroads. Prior to this, most of the nations railroads custom ordered all of their locomotives and rolling stock, and the economies of standardized parts and mass production were not realized.

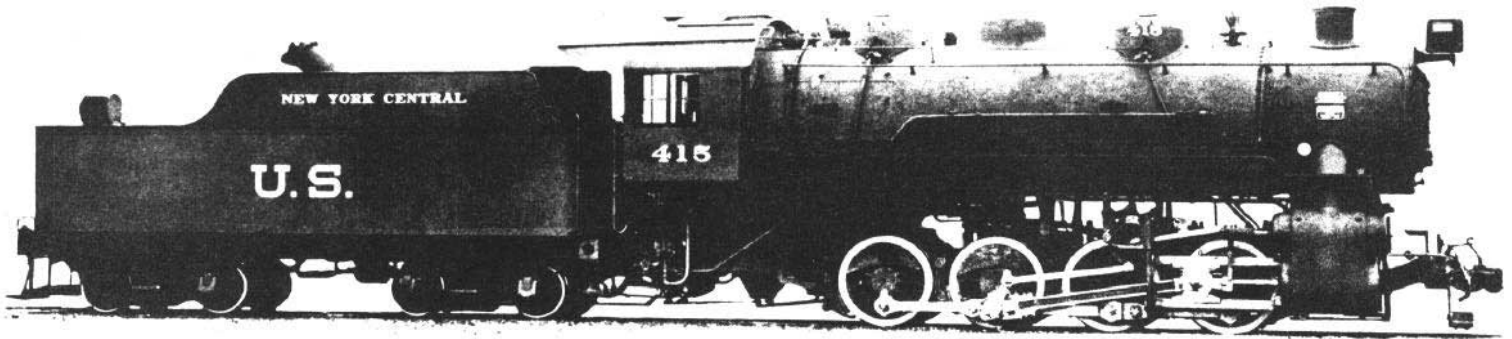
The USRA produced standard designs for 0-6-0 and 0-8-0 switching locomotives, 2-6-6-2 and 2-8-8-2 compound articulated freight locomotives, and light and heavy versions of the 4-6-2 Pacific, 4-8-2 Mountain, 2-8-2 Mikado and 2-10-2 Santa Fe-type locomotives. The light versions were built with axle loads of about 54,000 pounds for service on light rail, and were designated with the suffix "A". The heavy versions used a 60,000 pound axle load, and were designated with the suffix "B". 1856 original locomotives of all types were produced during the reign of the USRA. Due to the basically sound design of these engines, a further 3251 copies were built to USRA designs after the war ended. A total of 97 railroads used one or more of the USRA steam locomotive designs.



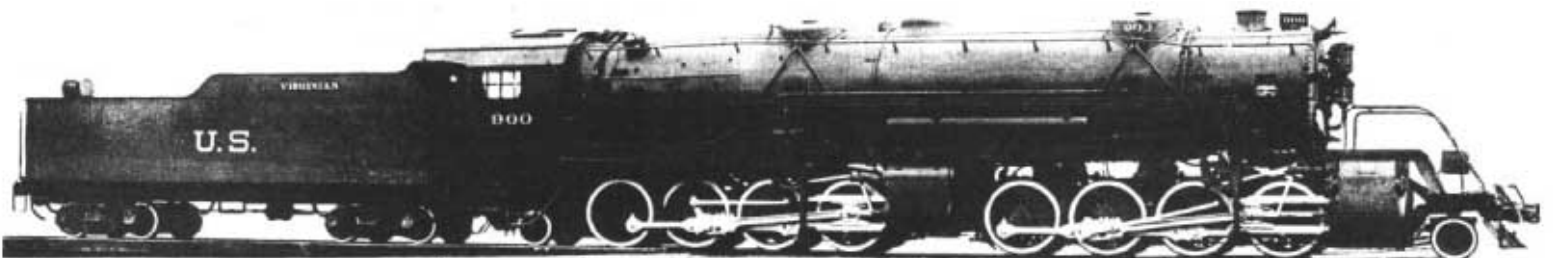
Builders photograph of B&O 4500, taken on July 4, 1918. Shortly after this photograph was taken, the tender was re-lettered for the B&O and the engine was bedecked with flags for more photographs. 4500 was delivered to the B&O the next day.

Following is a complete list of the twelve designs:

Type	Name	No. Built
0-6-0	6-Wheel Switcher	255
0-8-0	8-Wheel Switcher	175
2-8-2A	Light Mikado	625
2-8-2B	Heavy Mikado	233
2-10-2A	Light Santa Fe	94
2-10-2B	Heavy Santa Fe	175
4-6-2A	Light Pacific	81
4-6-2B	Heavy Pacific	20
4-8-2A	Light Mountain	47
4-8-2B	Heavy Mountain	15
2-6-6-2	Mallet	30
2-8-8-2	Mallet	106
	Total	<u>1856</u>



Builders photograph of a USRA 0-8-0 switcher. The last steam locomotive built for domestic use was built to this design in 1953.



Builders photograph of a USRA 2-8-8-2 compound articulated freight locomotive. The last steam locomotive built for domestic freight service was built to this design.

The USRA Locomotive Committee was responsible for the design of the USRA locomotives. The committee used proven engine designs as a starting point, then incorporated the best of current technology, which resulted in modern but conservative locomotive designs. Because of this philosophy, the USRA engines were well balanced, durable and practical locomotives. The committee consisted of representatives from eleven railroads and the three major locomotive builders. Representing the locomotive builders were J. B. Ennis of the American Locomotive Company (ALCO), W. E. Woodard of the Lima Locomotive Works and H. Glaenzer of the Baldwin Locomotive Works. Because Baldwin, located in Philadelphia, was closest to USRA headquarters in Washington, the committee used the Baldwin office and drawing room to blueprint the engines.

Joseph B. Ennis was Vice President in charge of Engineering for ALCO while on the USRA Locomotive Committee. He began his career in 1895 as a tracer in the drafting room of the Rogers Locomotive Works. From 1899 to 1902, he held the position of elevation draftsman with the Schenectady Locomotive Works, the Rogers Locomotive Works and the Cooke Works, all of which later belonged to ALCO. He was transferred to New York in 1902 and put in charge of designs and calculation-specifications for locomotives. In 1906 he became an Assistant to the Mechanical Engineer, then successively held the positions of Designing Engineer, Chief Mechanical Engineer, and in 1917, Vice President in charge of Engineering.

William E. Woodard was born in Utica in 1873 and received an engineering degree from Cornell in 1896. He worked successively for Baldwin Locomotive Works, Cramp's Shipyard, the Dickson Locomotive Works and the Schenectady Locomotive Company. By 1900 he was the Chief Draftsman at Schenectady, and by 1916 he rose to the position of Assistant Mechanical Engineer. He left Schenectady when it became part of ALCO, and joined Lima Locomotive Works as Vice President in charge of Engineering. After his work with the USRA Locomotive Committee, he went on to become one of the most influential of American locomotive designers. He is credited with the creation of the "Superpower" concept of locomotive design, which stressed high power output at speed over the low speed drag freight concept then in vogue.

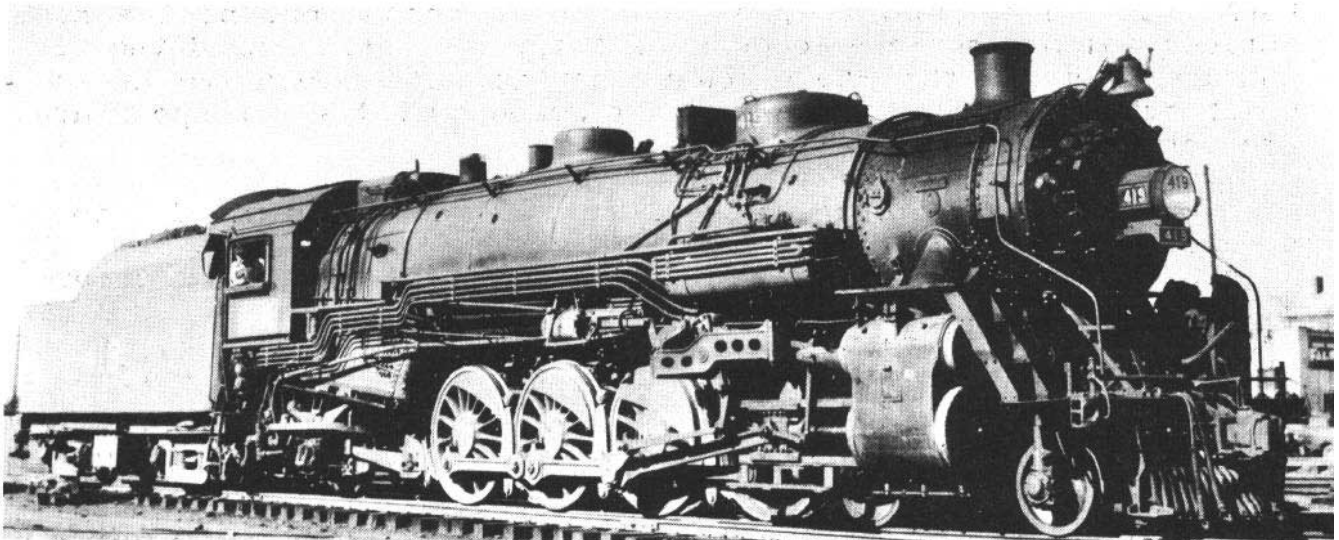
Harry Glaenzer received his education in the technical schools of Baltimore, Maryland, and at the University of Pennsylvania. He joined Baldwin Locomotive Works in 1899, and his work there covered all phases of locomotive design. After his work with the USRA, he was appointed Assistant Chief Engineer of Baldwin in 1919, Chief Engineer in 1921, and Vice President in charge of Engineering in 1922.

Some of the last steam locomotives built for domestic use in the U.S. could trace their lineage back to a USRA design. For example, the last road freight steam locomotive built was a Norfolk and Western Y6B class 2-8-8-2, which was a development of the original USRA design. Other famous locomotives which borrowed

heavily from USRA design were the Southern Railway Ps-4 heavy 4-6-2, the Baltimore and Ohio P-7 "President" heavy 4-6-2 and the Louisville and Nashville L-1 light 4-8-2. The last steam locomotive produced for U.S service was built to a USRA design by the Norfolk and Western in 1953. It was a N&W class Sla 0-8-0 switcher which, except for modern accessories, was built to the original 1918 USRA design. In fact, roughly one quarter of the 2-8-2 Mikado type freight locomotives used in the U.S. were USRA designs or developments of USRA designs.



Southern Railway Ps-4 Heavy Pacific. This engine is basically a USRA heavy pacific design with a driver diameter of 72 inches instead of 80 inches for service on heavy grades.



Louisville and Nashville L-1 Light Mountain. This engine was built by Baldwin in 1930.



The 1504 just after its last overhaul. The engine has been restored to this condition.

NATIONAL HISTORIC
MECHANICAL ENGINEERING LANDMARK

UNITED STATES RAILROAD ADMINISTRATION LOCOMOTIVE
ATLANTIC COAST LINE CLASS P-5-A 4-6-2 No. 1504
1919

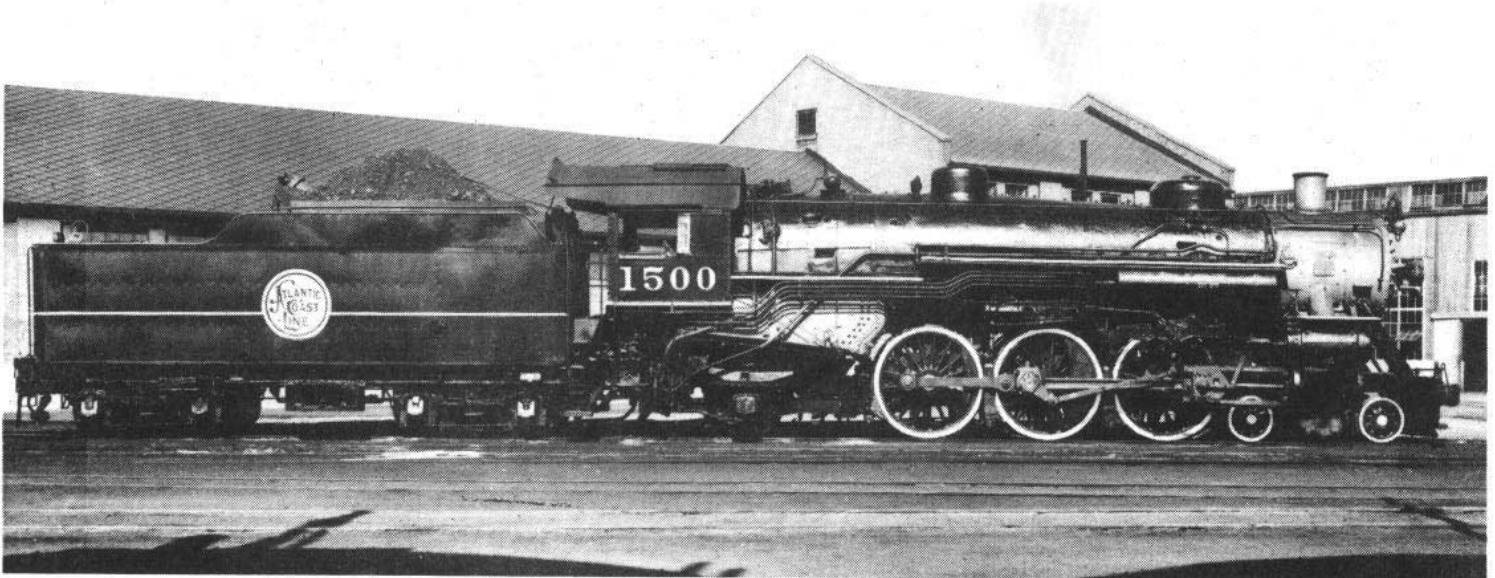
DURING THE WORLD-WAR I EMERGENCY, AMERICAN RAILROADS WERE PLACED UNDER THE CONTROL OF THE UNITED STATES RAILROAD ADMINISTRATION (USRA) TO FACILITATE CONSTRUCTION, OPERATION, AND MAINTENANCE, ALL NEW STEAM LOCOMOTIVES ORDERED DURING THIS PERIOD WERE BUILT TO ONE OF TWELVE STANDARD DESIGNS DEVELOPED BY A COMMITTEE COMPOSED OF USRA, RAILROAD, AND LOCOMOTIVE-BUILDER REPRESENTATIVES. THIS FAMILY OF LOCOMOTIVES, RANGING FROM 0-6-0 TO 2-8-8-2 IN SIZE, INCORPORATED THE BEST PROVEN FEATURES OF THE DAY AND WAS THE FIRST SUCCESSFUL STANDARDIZATION OF AMERICAN MOTIVE POWER. ALTHOUGH THE USRA PERIOD LASTED ONLY THREE YEARS, LOCOMOTIVES CONTINUED TO BE BUILT AROUND THESE BASIC DESIGNS FOR ANOTHER DECADE. ACL 1504, BUILT BY AMERICAN LOCOMOTIVE CO. RICHMOND WORKS, IS A "LIGHT PACIFIC", THE MOST COMMON USRA PASSENGER DESIGN. IT WAS IN SERVICE ON ACL FOR OVER 30 YEARS, AND HAS SURVIVED IN ALMOST ORIGINAL CONDITION.



THE AMERICAN SOCIETY OF MECHANICAL ENGINEERS - 1990

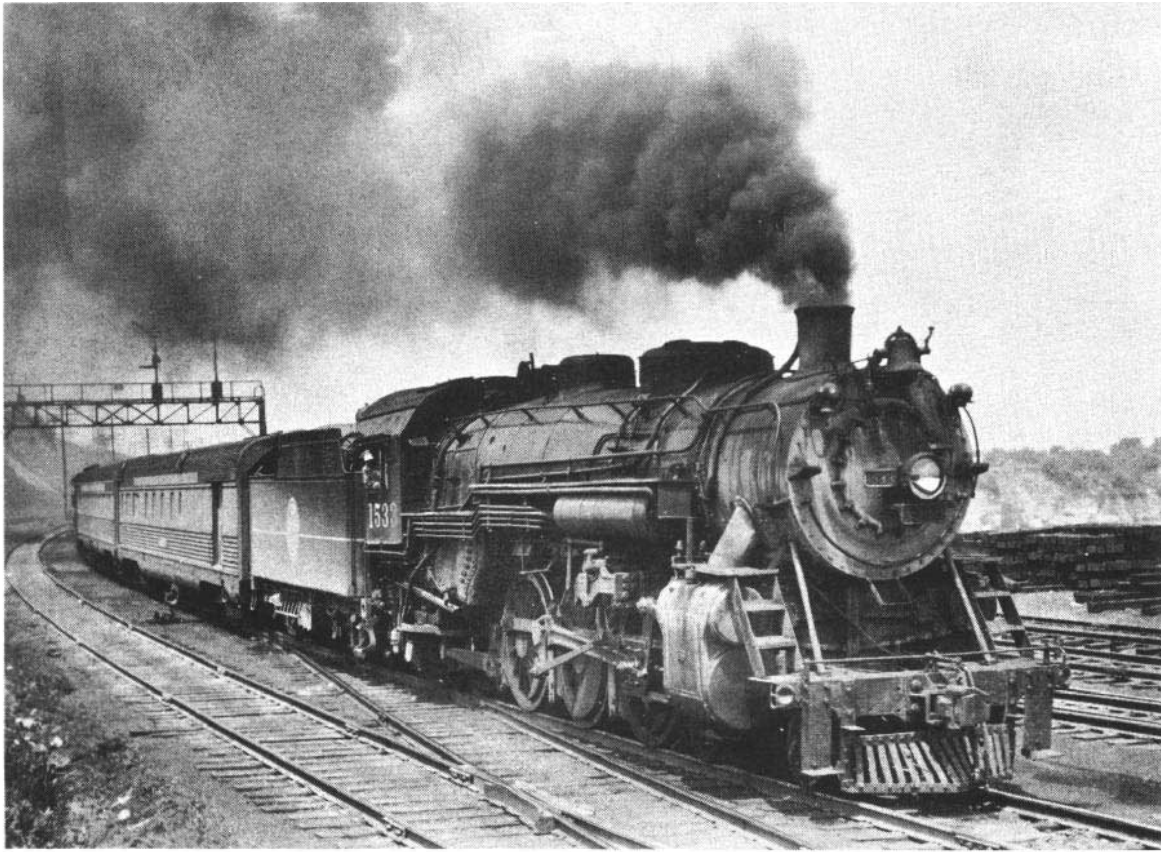
Atlantic Coast Line (ACL) engine 1504 is the most original in appearance of the few remaining USRA engines in existence today, while the Baltimore and Ohio (B&O) 4500 was the first USRA locomotive constructed. Both of these engines are excellent examples of the USRA family of locomotive designs. These engines, in common with other USRA locomotive designs, shared many common parts, such as trailing trucks, tenders, domes, boilers and fireboxes.

ACL 1504 is the only remaining original USRA locomotive in essentially as-built condition. The only major items which differ from the original are the headlight, tender trucks and pilot truck wheels. The remainder of the locomotive is in original or in as designed condition, including most of the piping arrangements, tender, cab, domes, driving wheels, coal pusher, non-lifting injectors, trailing truck, running boards and pilot.



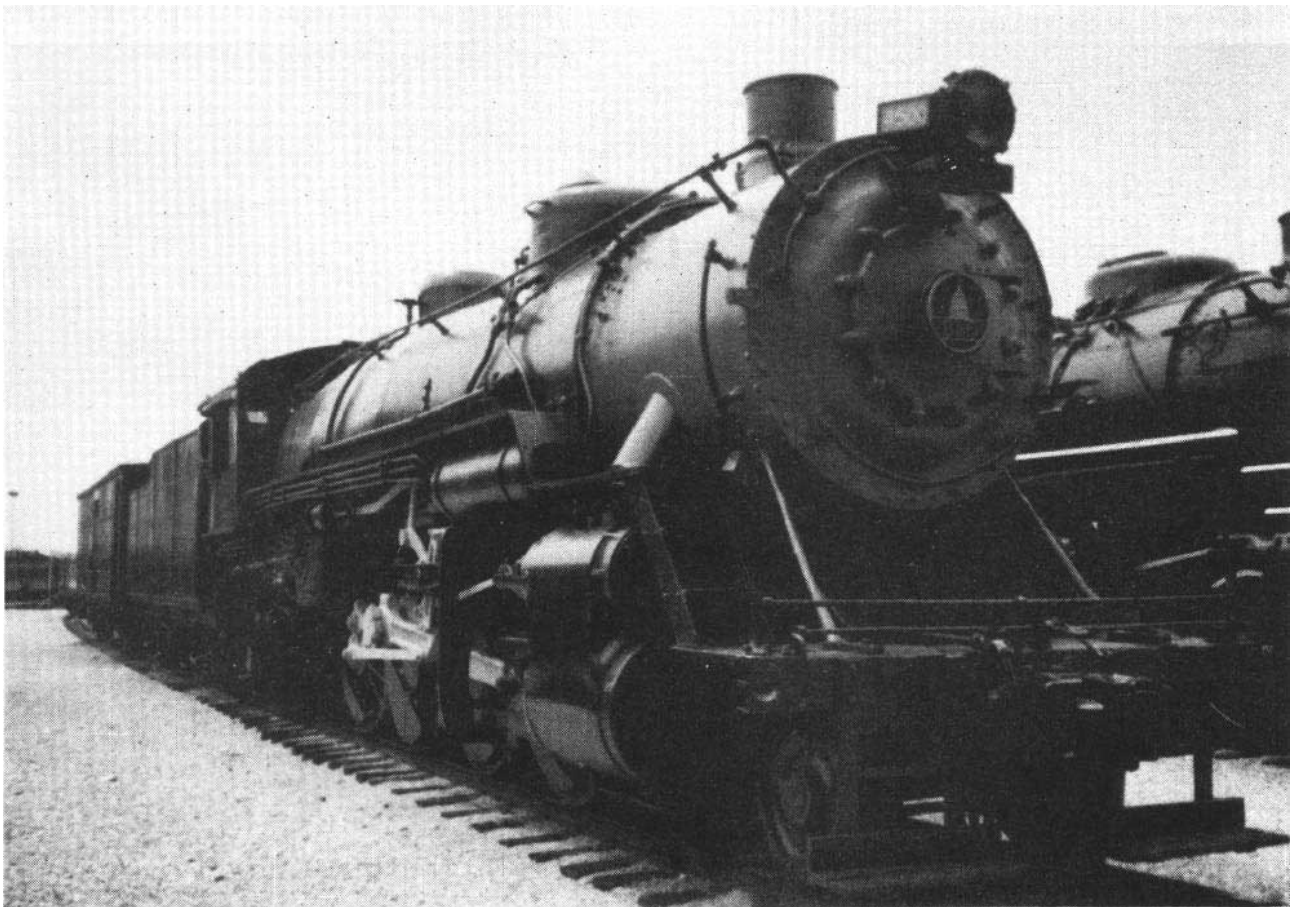
Atlantic Coast Line 1500, a sister engine to 1504, in freshly overhauled condition.

The 1504 was classed by the ACL as a P-5-A Pacific passenger engine. It was one of the original 81 USRA 4-6-2As produced, of which the ACL owned 70. The 1504 spent the first twenty years of its long life in passenger service hauling 10 to 12 car trains at speeds of 70 to 80 mph. Some of these famous name trains hauled by the 1504 and the other P-5-A engines were the *Miamian*, the *Florida Special*, the *Palmetto Limited*, the *Southland*, the *South Wind*, and the *Dixie Flyer*. After the advent of diesels on the ACL after World War II, the P-5-A engines were used in fast freight service. 1504 spent its last years in freight service in the Tampa area, and was retired in 1952.



Atlantic Coast Line P-5-A 1533, a sister of 1504, pulling the stainless steel all-coach *South Wind* into Montgomery, Alabama. (Frank Ardrey)

The 1504 was selected for preservation by ACL president Champion Davis and John W. Hawthorne, head of the ACL Mechanical Department. In 1960, after some years in storage, the engine was given a thorough mechanical overhaul and placed on display in front of the then new ACL General Office Building in Jacksonville. The 1504 has since been cosmetically restored and moved to the nearby Prime Osborn Convention Center. The restoration has not altered the engine mechanically in any way, and because the engine has seen no service since its last overhaul, restoration to service at a future date is possible. The Prime Osborn Convention Center was originally the Jacksonville Terminal Co. Depot built in 1919, the same year as the 1504. The 1504 spent much of its life pulling passenger trains in and out of this depot, so its enshrinement here is particularly fitting.



The 4500 as it appears today at the B&O Transportation Museum.

NATIONAL HISTORIC
MECHANICAL ENGINEERING LANDMARK

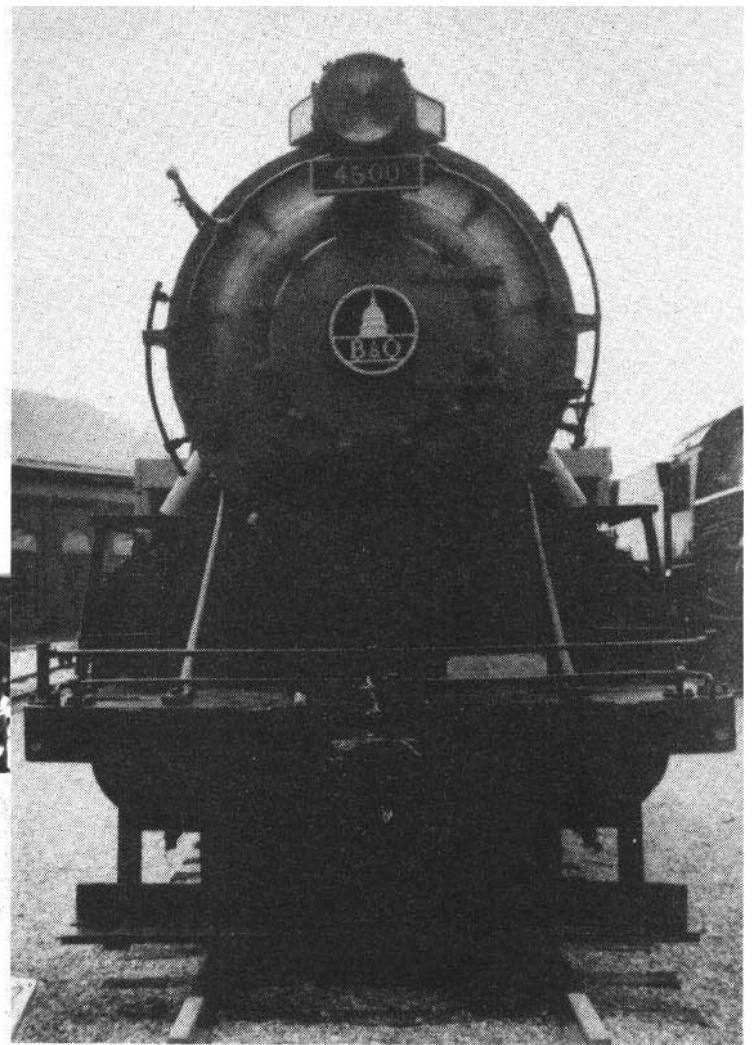
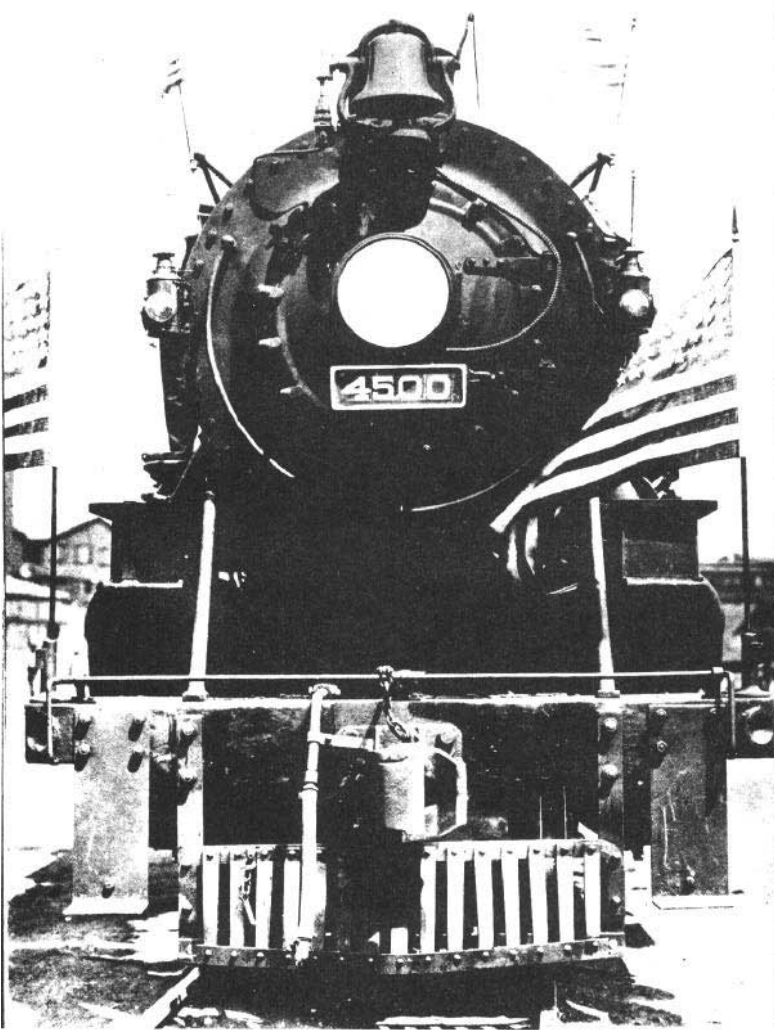
UNITED STATES RAILROAD ADMINISTRATION LOCOMOTIVE
BALTIMORE AND OHIO CLASS Q-3 2-8-2 No. 4500
1918

DURING THE WORLD-WAR I EMERGENCY, AMERICAN RAILROADS WERE PLACED UNDER THE CONTROL OF THE UNITED STATES RAILROAD ADMINISTRATION (USRA) TO FACILITATE CONSTRUCTION, OPERATION, AND MAINTENANCE, ALL NEW STEAM LOCOMOTIVES ORDERED DURING THIS PERIOD WERE BUILT TO ONE OF TWELVE STANDARD DESIGNS DEVELOPED BY A COMMITTEE COMPOSED OF USRA, RAILROAD, AND LOCOMOTIVE-BUILDER REPRESENTATIVES. THIS FAMILY OF LOCOMOTIVES, RANGING FROM 0-6-0 TO 2-8-8-2 IN SIZE, INCORPORATED THE BEST PROVEN FEATURES OF THE DAY AND WAS THE FIRST SUCCESSFUL STANDARDIZATION OF AMERICAN MOTIVE POWER. ALTHOUGH THE USRA PERIOD LASTED ONLY THREE YEARS, LOCOMOTIVES CONTINUED TO BE BUILT AROUND THESE BASIC DESIGNS FOR ANOTHER DECADE. B&O 4500, BUILT BY BALDWIN LOCOMOTIVE WORKS, WAS THE FIRST USRA LOCOMOTIVE BUILT. IT IS A "LIGHT MIKADO", THE MOST COMMON USRA FREIGHT DESIGN, AND WAS IN SERVICE ON B&O FOR ALMOST 40 YEARS.

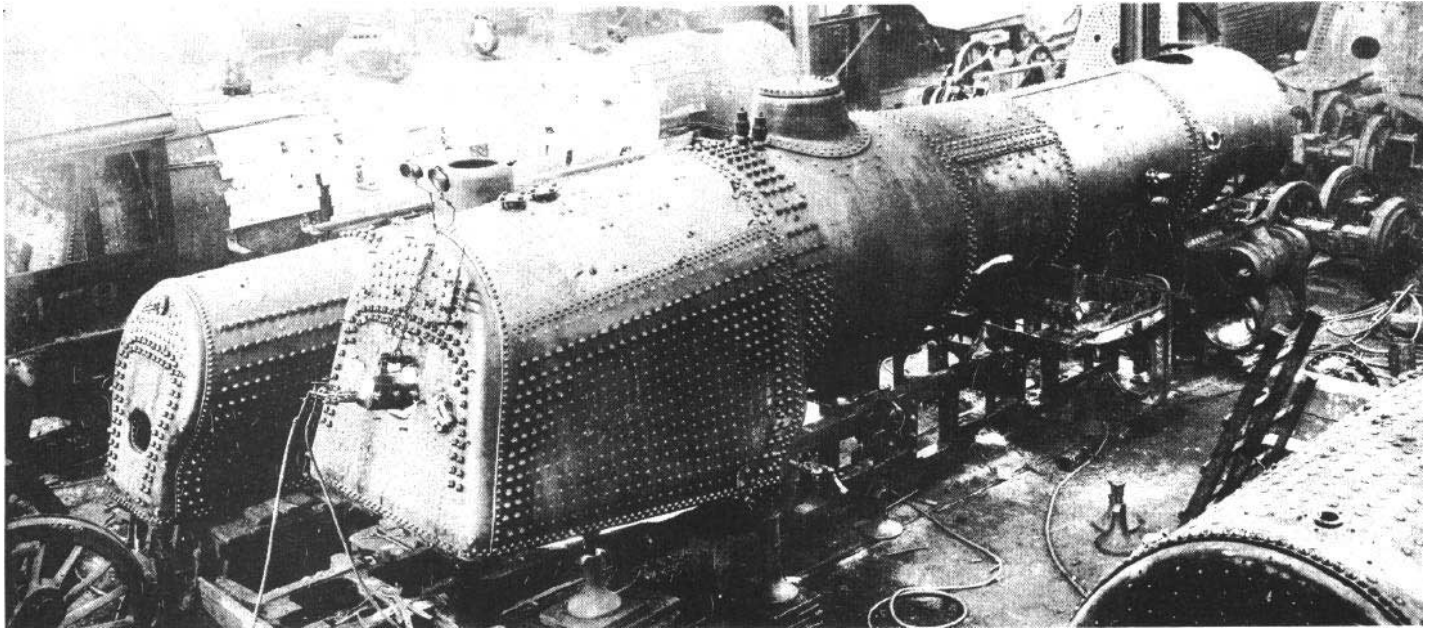


THE AMERICAN SOCIETY OF MECHANICAL ENGINEERS - 1990

The B&O 4500 was the first USRA engine built. Being the prototype USRA 2-8-2, its flatter cab roof and lack of front end ladders made the 4500 slightly different from the following USRA engines. Mechanically, the 4500 is essentially as built. Over many years of service, the engine received some of B&O's distinctive cosmetic changes in the form of a different smoke box front, a raised headlight, modified running boards, the addition of front ladders, the substitution of a footboard pilot, an extended cab for the brakeman and a different bell location. The engine retains the original tender and trailing truck.



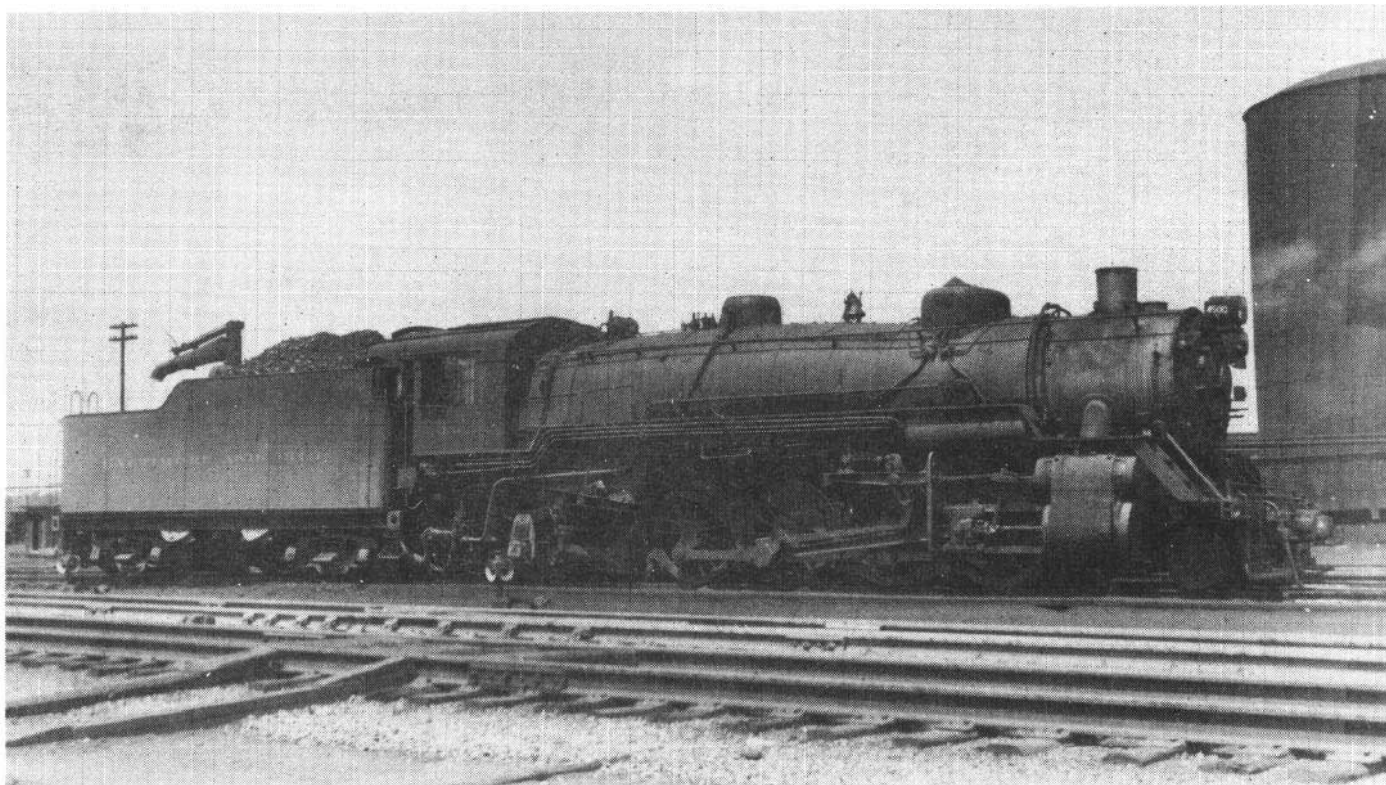
The left photograph shows B&O 4500 on July 4, 1918, with American flags on the pilot beam and smokebox flag holders. The right photograph is the 4500 as it appears today. Note the different smoke box front, headlight location, footboards in place of the pilot and the addition of front end ladders.



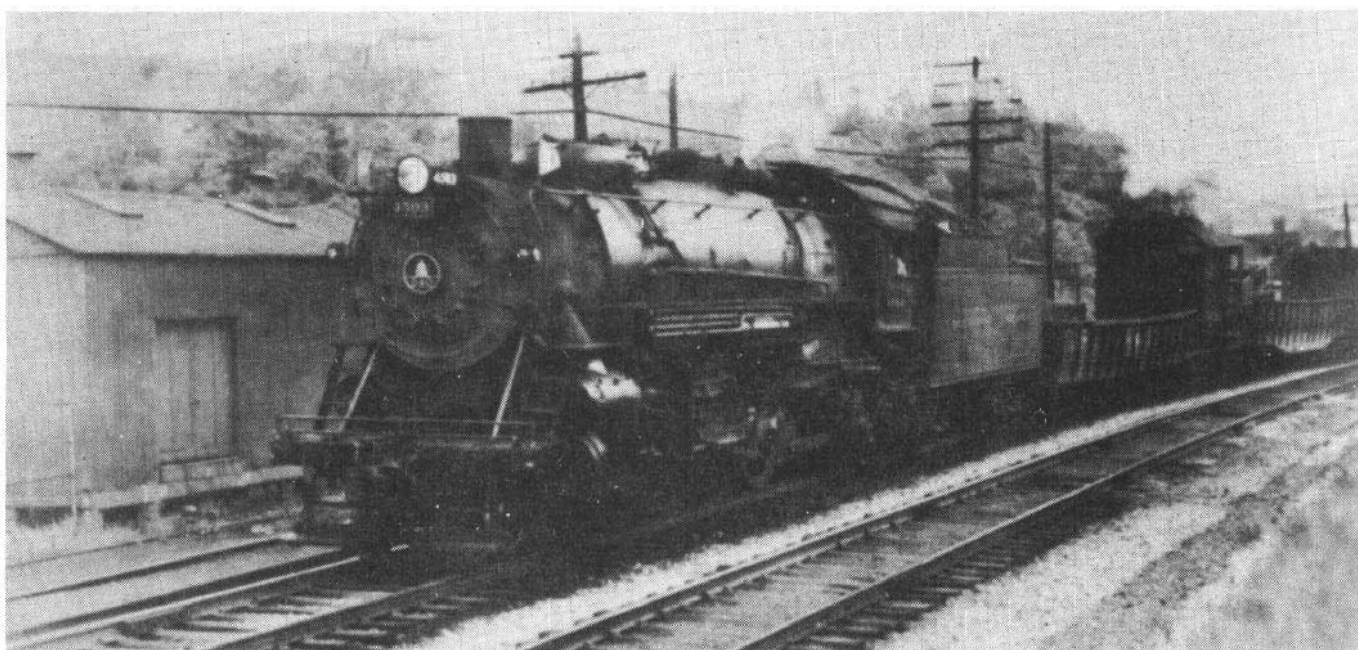
B&O 4500 under construction at Baldwin on June 27, 1918. The boiler has been set on the frame and cylinder assembly and is undergoing a hydrostatic test. Note the hose attached to the firebox backhead and the blanking plates over the steam turret connections at the top rear of the boiler.

The 4500 was built in only 20 days, which is a record for any locomotive of similar capacity. This was the result of the wishes of Samuel M. Vauclain, then the Senior Vice President of Baldwin, who wanted his company to have the honor of completing the first USRA engine. In accordance with his orders, the engine was finished on July 4, 1918, and was decked out with American flags for the occasion.

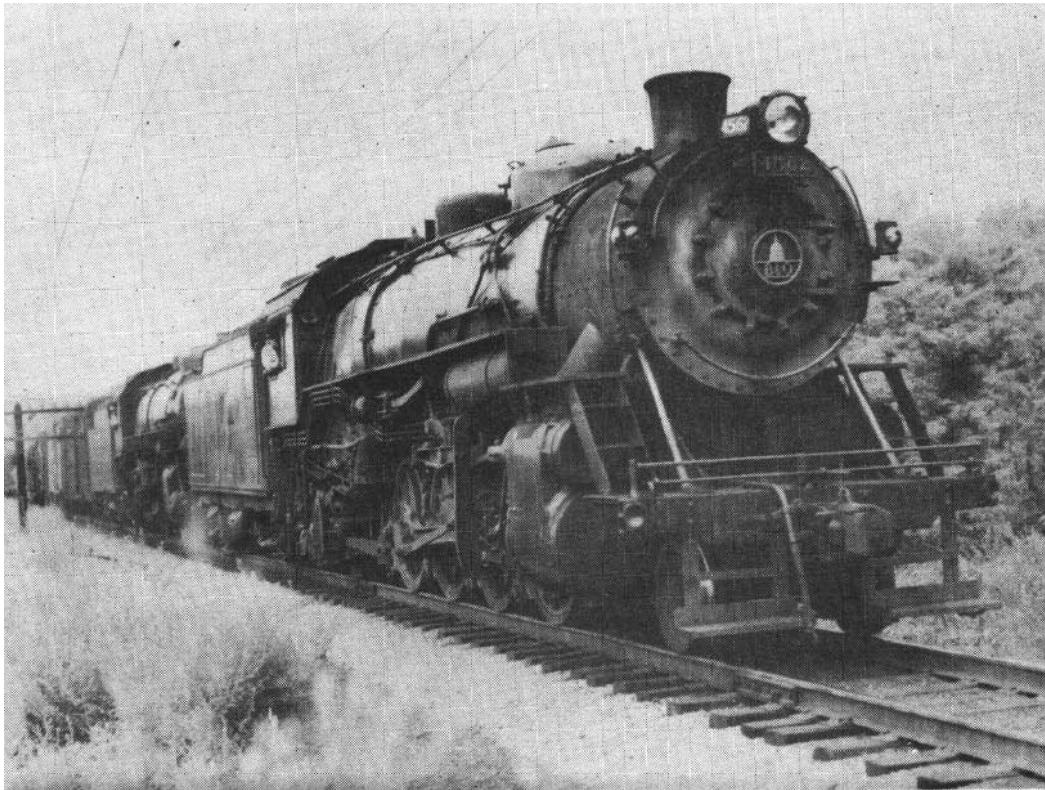
The B&O classed the 4500 as a Q-3 Mikado freight locomotive, and as such it toiled in anonymity primarily on the Ohio and St. Louis divisions of the B&O for 39 years. During this time, the 100 Q-3 class engines gained a fine reputation among B&O enginemen as free steaming, powerful, easy riding and comfortable engines. The 4500 was retired in August of 1957 and put on display at the B&O Transportation Museum in 1964. As with all of the displays at this fine museum, the engine is well cared for.



B&O 4500 in service at Willard, Ohio on August 1, 1950.
(E. L. Thompson photo - BOHS Archives)



B&O Q-3 No. 4503 at Berkeley Run Junction, W. Va., on June 9, 1955.
(Photo by H. N. Barr)



B&O Q-3 Nos. 4562 and 4530 west of Knight, W. Va. on June 9, 1955. Note the detail differences between 4562 and 4500 in its present condition. These differences, common in the days of steam, were the result of differing and ever-changing practices at each individual shop on a railroad. (Photo by H. N. Barr)

Mechanical specifications of the USRA 4-6-2A and 2-8-2A locomotives are listed below. This data is for the ACL P-5-A class 4-6-2 Pacifics and the B&O Q-3 class 2-8-2 Mikados.

	4-6-2A	2-8-2A
Builder	ALCO - 1919	Baldwin - 1918
Tractive effort	40,750 lbs.	53,800 lbs.
Boiler pressure	200 psi.	200 psi.
Driver diameter	73 in.	63 in.
Weight on drivers	162,000 lbs.	221,500 lbs.
Engine weight	277,000 lbs.	290,800 lbs.
Total weight (loaded, engine + tender)	471,000 lbs.	484,800 lbs.
Cylinder bore & stroke	25" x 28"	26" x 30"
Heating surfaces		
Tubes & flues	3333 sq. ft.	3497 sq. ft.
Firebox, arch tubes and combustion chamber	261 sq. ft.	286 sq. ft.
Grate area	66.7 sq. ft.	66.7 sq. ft.
length overall (engine & tender)	80' 9-1/2"	81' 11-3/4"
Tender capacities		
Coal	16 tons	16 tons
Water	10,000 gal.	10,000 gal.

BIBLIOGRAPHY

- Barr, H. N. and Barringer, W. A., *The Definitive History of the Baltimore and Ohio Q Class Mikado Locomotives*, Barnard, Roberts and Co., Inc. Baltimore, Maryland
- Westwood, J. N., *Locomotive Designers in the Age of Steam*, Associated University Press, Inc., Cranbury, N.J., 1978
- Model Railroader Cyclopedia - Vol. 1 - Steam Locomotives*, Kalmbach Publishing Co., Milwaukee, Wisconsin
- Mainline Modeler*, March, April 1980; May - July, 1982; February and October, 1983; September, 1984; January, 1985; April, May and August, 1987, Hundman Publishing Co., Edmonds, Washington
- Westing, F., *The Very First USRA Engine*, *Trains*, Dec 1960, Kalmbach Publishing Co., Milwaukee, Wisconsin

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The ASME History and Heritage Recognition Program began in September, 1971. To implement and achieve its goals, ASME formed a History and Heritage Committee, composed of mechanical engineers, historians of technology, and the Curator Emeritus of Mechanical Engineering at the Smithsonian Institution. The Committee provides a public service by examining, noting, recording and acknowledging mechanical engineering achievements of particular significance. The History and Heritage Committee is part of the ASME Council on Public Affairs and Board on Public Information. For further information, please contact Public Information, The American Society of Mechanical Engineers, 345 East 47th Street, New York, NY 10017-2392, 212-705-7740.

The Baltimore and Ohio 4500 and Atlantic Coast Line 1504 USRA Locomotives are, respectively, the 94th and 95th National Historic Mechanical Engineering Landmarks to be designated. Since the ASME History and Heritage Program began, 135 Historic Mechanical Engineering Landmarks, 5 Mechanical Engineering Heritage Sites and 1 Mechanical Engineering Heritage Collection have been recognized. Each reflects its influence on society, either in its immediate locale, nationwide, or throughout the world.

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