The Railroads of the U.S.S.R.

By Academician V. Obraztsov
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HE vast territory of the Soviet Union stretches from the Black Sea to beyond the Polar circle, from the Gulf of Finland to the Sea of Japan. The wealth of the country multiplies with every passing year. New towns, industrial centers, mines and factories spring up in various parts of the Soviet Union. Deposits of gold and other rare metals are discovered in its mountain regions. The collective farms and state farms yield ever increasing harvests.

The importance of the railroad system for the U.S.S.R. can be compared with the
importance of the mercantile marine for Great Britain. The part played by Soviet railroads in the general life of the country is steadily increasing. The rapid growth of industry and agriculture, the development of new regions and the strengthening of the country’s defense powers require a highly efficient railroad service and the Soviet Government is devoting much attention to developing and securing the smooth running of the nation’s railroads. In recent years the railroad system has advanced to one of the foremost places in Soviet economic life.

The Soviet Government received a meager heritage from the tsarist regime. War and intervention led to the destruction of some 4,500 railroad bridges with a total length of over 60 miles. The Murman railroad, the Amur railroad and other lines, construction of which was begun during the World War, were never brought to completion by the tsarist government. Practically no repair work was done for seven or eight years, railroad ties were not changed and the roadbed was not renovated. Thousands
The "JS" (Joseph Stalin) locomotive
of miles of line, numerous water-towers and station buildings were reduced to ruins. Dilapidated cars and battered locomotives filled the sidings of railroad junctions. Traffic declined heavily. Average daily car-loadings fell from 27,400 in 1913 to 6,200 in 1918, which was only 22.8 per cent of the 1913 figure. During the same period the volume of traffic declined from 40,900,000,000 ton-miles to 8,700,000,000 ton-miles.

It should be added that of the 43,798 miles of railroads in tsarist Russia in 1913, over 7,000 miles were ceded to Poland, Lithuania and other border states. The U.S.S.R. was left with 36,300 miles of line.

The Soviet Government left no stone unturned in its efforts to revive the railroad system without resorting to foreign loans. The revolutionary enthusiasm of the masses, the splendid response of the railroad workers to the appeal of the Soviet Government, their labor enthusiasm and improved working conditions made it possible to surpass the pre-war volume of traffic by 1926-27. Carloadings increased steadily. In 1913
average daily carloadings amounted to 27,400 cars, in 1918 this figure dropped to 6,200 but rose to 28,800 in 1927. Freight traffic increased at an even greater rate. In 1913 the volume of freight traffic amounted to 40,900,000,000 ton-miles, in 1918 it dropped to 8,700,000,000 ton-miles but reached 51,200,000,000 ton-miles in 1927 and has continued to advance at an even higher rate in the subsequent years.

The Soviet railroads experienced a particularly rapid growth in the period between 1928 and 1937. In 1928 the Soviet Government adopted its First Five-Year Plan for the economic development of the country which laid down a definite program of expansion for each year. This plan was fulfilled ahead of schedule. The Second Five-Year Plan (1933-37) was likewise fulfilled successfully. In 1938 the Soviet Union began the fulfillment of its Third Five-Year Plan which will be completed in 1942.

The Five-Year Plans stipulate definite programs for each branch of industry and agriculture. Every factory, mill, railroad
and depot is given a specific program for the five year period. The nation judges the quality of work of industrial establishments and their general efficiency by the fulfillment of their production plans. In this way the work of every enterprise is under the constant control of the people and the fulfillment of production schedules becomes a matter of honor for the workers of every factory.

The planned development of economy has led to a marked improvement in the operation of the railroads. By the end of the First Five-Year Plan period average daily carloadings grew to 51,400 and to 89,800 by 1937. By the beginning of the Third Five-Year Plan period carloadings on Soviet railroads were over three times as high as before the war.

The volume of freight shipped increased by leaps and bounds—from 156,200,000 tons in 1928 to 267,900,000 tons at the end of the First Five-Year Plan period and 517,300,000 tons in the last year of the Second Five-Year Plan period. Soviet railroads transported almost four times as many passengers in 1937 as in 1928.
Coal, oil, ore, and metal account for 42 per cent of the aggregate volume of freight traffic. Taking the figures for 1928 as 100, shipments of coal and coke amounted to 383 per cent in 1937, ore to 435 per cent, metal to 460 per cent and timber to 270 per cent. These figures testify to the tremendous development of industry in the Soviet Union.

The freight density of Soviet railroads exceeds that of any other country, as may be seen from the following table:

Traffic per mile of line in operation
(in ton-miles)

<table>
<thead>
<tr>
<th></th>
<th>1913</th>
<th>1929</th>
<th>1936</th>
<th>1937</th>
</tr>
</thead>
<tbody>
<tr>
<td>U.S.S.R.</td>
<td>689,000</td>
<td>909,000</td>
<td>2,416,000</td>
<td>2,589,000</td>
</tr>
<tr>
<td>Germany</td>
<td>788,000</td>
<td>944,000</td>
<td>722,000</td>
<td>—</td>
</tr>
<tr>
<td>Great Britain</td>
<td>—</td>
<td>589,000</td>
<td>514,000</td>
<td>—</td>
</tr>
</tbody>
</table>

Such is the progress made by the Soviet railroads in the last ten years.

It must be pointed out that the radical reconstruction of the railroad system began actually in 1935 with the appointment of L. Kaganovich to the post of People’s Com-
Z. Troitskaya, first woman locomotive driver, and P. Krivonoss, General Manager of the South Donetz Railroad and Member of the Supreme Soviet of the U.S.S.R.
m. issar of Railroads. Since then the rolling stock of Soviet railroads has been replenished by the introduction of two new types of powerful locomotives—the “FD” (named in honor of Felix Dzerzhinsky) for freight traffic and the “JS” (Joseph Stalin) for passenger traffic. These locomotives exceed the old “EM” and “SU” type locomotives by 50 per cent in traction power. The “FD” and “JS” locomotives are the first in the U.S.S.R. to be equipped with mechanical stokers.

The introduction of Diesel-electric locomotives, which were unknown in prerevolutionary Russia, marks a great step forward in Soviet railway engineering. Diesel-electric locomotives of the “E-EL” and “VM-20” (V. Molotov) type have proved very efficient and are being used extensively on the Central Asiatic railroads which pass over arid country.

Great progress can also be recorded in the electrification of the railroads. This work was facilitated by the fulfillment of the national electrification plan adopted by the Soviet Government on Lenin’s initiative.
There were no electric railroads in Russia prior to the Revolution. The first electric line was built in 1926; it was a suburban line between Baku and Sabunchi. At present the U.S.S.R. has 1,116 miles of electrified railway, of which 198 miles are suburban lines and the remainder trunk lines.

The introduction of electric traction necessitated the construction of high-power electric locomotives. This problem was solved by Soviet industry, which has provided the railroads with the “VL” (V. Lenin) electric locomotive for passenger and freight traffic, the “SS” locomotive for freight traffic and the “PB” for passenger traffic. All these locomotives use 3,000 volt direct current. The “PB” locomotive can develop a running speed of 87 miles, the “VL” 53 miles and the “SS” 43 miles per hour.

The latest innovation in Soviet railroad technique is the new “SO” (Sergo Orjoni-kidze) condenser locomotive. The condensing installation of this locomotive converts the steam discharged by the cylinders into water to be used again for steam. The original
water supply can pass through the condensation process from 10 to 13 times, providing a steady flow of pure distilled water for the boilers. The "SO" locomotive can run from 620 to over 1,000 miles without taking water. The importance of this locomotive is especially great in arid districts and where water is of poor quality. Another feature of the condenser locomotive is that it reduces fuel expenditure by 15 to 20 per cent.

The number of condenser locomotives in use on Soviet railroads is steadily increasing. In 1938 alone Soviet plants built 406 "SO" condenser locomotives as compared with 399 built during the entire First Five-Year Plan period. Other types of locomotives are also being fitted with steam condensation installations. The Voroshilovgrad Locomotive Works has produced a new type of "FD" condenser locomotive, the largest of its kind in the world.

The Kolomna Locomotive Works has produced a new type of locomotive, the 2-3-2, with a running speed of 93 miles per hour; a similar locomotive has been built by
the Voroshilovgrad Works with an even higher running speed (112 miles per hour). The Kolomna locomotives are used on the Red Arrow Moscow-Leningrad express.

The Kolomna Locomotive Works has also produced and is now testing a new type of high-pressure locomotive equipped with a uniflow boiler. Another type of high-pressure locomotive is being designed at the Voroshilovgrad Works and will be placed on the line next year. The Voroshilovgrad plant is also constructing an experimental steam-electric locomotive, designed by engineer Meizel. Its efficiency will be more than double that of the ordinary steam locomotive.

Both in industry and in railroad transport the U.S.S.R. has surpassed all other countries in rate of development. This is brought out for example by the increase in the number of locomotives on the line. During the five years from 1927 through 1932 the Soviet Union produced 3,412 locomotives as against 458 locomotives built in 1927. During the Second Five-Year Plan period (1933-37)
The “SO” (Sergo Orjonikidze) locomotive
the U.S.S.R. built 5,957 locomotives, of which 1,215 were built in 1937 alone.

The cars in use on Soviet railroads have been completely reconstructed. Railroad cars have been fitted with automatic brakes and one fourth of all cars in use have been equipped with automatic coupling. The standard 16 ton railway car is now being replaced by powerful four-axle box cars, gondola cars, hopper cars, tank cars and flat cars of from 50 to 70 tons capacity.

Soviet factories are now preparing for mass production of a new type of all-metal passenger car which will afford every modern convenience.

The following figures show the renovation of cars in use on Soviet railroads. From 1927 through 1932 the Soviet railroads were supplied with 66,361 new freight cars and 4,092 new passenger cars. From 1933 to 1937 Soviet industry produced 170,375 freight cars and 5,315 passenger cars. In 1935 alone about 70,000 new cars were put into service.

The construction of 216 car-repair shops,
most of them good sized plants, was completed in record time. In addition to these, 64 car depots, 17 wheel repair shops, automatic brake inspection and repair shops have been built and many shops have been reconstructed.

At the same time there has been a marked improvement in station facilities. By 1937 over 22,000 mechanized and electrified interlocking switches had been installed on the railroads. Construction has been completed of 22 ordinary humps and 33 mechanized humps fitted with automatic retarders. Automatic block signals have been installed on 3,202 miles of line.

New lines are being built at a more rapid pace. Every year thousands of miles of new railroad lines are put into operation. During the last five years approximately 3,000 miles of second tracks were laid and about 3,700 miles of existing line were reconstructed. During the same period over 62,000 miles of line were overhauled and repaired.

Soviet railroads have been provided with 54 track laying and repair stations equipped
with the latest machinery. This makes it possible to perform repairs much more quickly with the use of ballasting machines, track graders, pneumatic sleeper-packing machines, motor rail-jacks, etc.

Railroads are never closed down in the U.S.S.R. for lack of traffic, and the total length of line is steadily increasing. Between 1918 and 1936 the Soviet Union built over 9,000 miles of new line, while many additional lines have been completed. The rapid growth of Soviet railroads is graphically demonstrated by the following table:

Aggregate mileage of Soviet railroads

<table>
<thead>
<tr>
<th>End of</th>
<th>1913</th>
<th>36,300 miles</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>1929</td>
<td>47,700</td>
</tr>
<tr>
<td></td>
<td>1932</td>
<td>50,733</td>
</tr>
<tr>
<td></td>
<td>1936</td>
<td>52,700</td>
</tr>
</tbody>
</table>

The development of the Soviet railroad system was possible because the Soviet Government devoted much attention to training highly skilled engineers and workers for all branches of the system.
The number of institutes training railroad engineers has increased sixfold since the Revolution, the number of railroad colleges has doubled and the number of technical and apprenticeship schools has increased almost elevenfold. During the years of the Second Five-Year Plan period Soviet institutes trained over 15,000 railroad engineers and 34,000 technicians. The institutes of railroad engineering now have a student body of over 21,000 and employ some 2,000 professors and teachers. Many thousand people attend railroad colleges and apprenticeship schools.

An extensive network of study courses and classes has been established to provide technical training to railroad workers after working hours. In 1938 these courses were graduated by one million railroad workers. Technical training centers, offering courses in popular technology and hundreds of technical libraries and laboratories are doing work of first-rate importance in raising the skill and knowledge of the huge army of railroad workers.
An electric train on the Nikopol-Zaporozhye line
This work is already bearing fruit. The Stakhanov and Krivonoss movement, a movement of people who have mastered their job to perfection, has spread far and wide throughout the entire railroad system of the country. This movement derives its name from its initiators, Alexei Stakhanov, a coal miner, and Pyotr Krivonoss, a locomotive driver. Locomotive drivers like Krivonoss, Ognev, Troitskaya, and Makarov have found the ways and means of raising the efficiency of locomotives. They have increased running speeds and the weight of trains, and are running their locomotives longer distances without repairs. Shunting foremen Krassnov, Kozhukhar, and others have devised methods of making up trains in a shorter space of time and improved the methods of marshalling cars. The methods introduced by these and other foremost workers have more than doubled labor productivity.

The example set by Krivonoss and his followers served as a stimulus to all the railroad workers. The Krivonoss movement,
a movement for technical progress and higher efficiency, has grown to be a mass movement. At present there are approximately 600,000 Stakhanovites on the Soviet railroads. One thousand five hundred railroad workers have been decorated by the Soviet Government and six thousand have been awarded the railroad workers' Merit Badge.

The initiators of this movement have been promoted to important executive posts in state and economic organizations. Makarov, erstwhile locomotive driver, is now assistant chief of the Central Locomotive Administration of the People's Commissariat of Railroads. Another ex-locomotive driver, Ognev, is now general manager of the Dzerzhinsky Railroad; Troitskaya, also a former locomotive driver, has been appointed general manager of the Moscow Circuit Railroad. Zakorko, a former dispatcher, is now general manager of the Stalin Railroad and Kutafyev, also a former dispatcher, is general manager of the Southern Railroad.
Increased labor productivity is attended by a rapid rise in wages. Locomotive drivers employed in passenger traffic earn upwards of 1,000 rubles a month; drivers employed in freight traffic average 850 rubles a month. The average monthly wages of railroad workers in 1937 amounted to 284 rubles, which represents a 100 per cent increase against 1932.

The U.S.S.R. will witness still greater economic development under the Third Five-Year Plan. The fulfillment of this great plan necessitates the further development and improvement of the railroad services.

The Third Five-Year Plan provides for the construction of 6,820 miles of new line, the laying of 4,960 miles of second track and the electrification of 1,141 miles of line.

The most important of the new lines to be constructed under the Third Five-Year Plan are the Akmolinsk-Kartaly line (part of the Stalinsk-Magnitogorsk trunk line), and the Kizlyar-Astrakhan line. The completion of these lines will reduce railroad
distances by hundreds of miles. New railroads are to be built in Georgia, Armenia, Azerbaijan, the Urals, Siberia, the Ukraine and in the central regions of the U.S.S.R.

Under the Third Five-Year Plan 37,300,000,000 rubles will be expended on capital construction on the railroads, as against 20,700,000,000 rubles under the Second Five-Year Plan.

The plan also provides for an increase in the number of locomotives by 8,000, particularly condenser locomotives, which in the next few years will become the leading type of locomotive in use on Soviet railroads for freight traffic. During the period of the Third Five-Year Plan 4,200 condenser locomotives will be placed on the line.

The railroad system will receive 225,000 four-axle freight cars and 15,000 passenger cars; 300,000 freight cars and 4,000 passenger cars will be equipped with automatic coupling. Automatic brakes are to be installed on 200,000 cars. The number of
repair shops, both for locomotives and cars, is to be increased, especially on the Ural, Siberian, Far-Eastern and Central Asiatic roads.

One of the provisions of the Third Five-Year Plan is the further extension and development of railroad junctions. Large-scale construction is to be undertaken primarily on the Donbas-Krivoy Rog and Leningrad-Moscow lines, in the Eastern Ural districts, on the lines linking up the Northern territory and the Murman region with the central part of the Soviet Union, Western Siberia with Central Asia and on the lines running through the southwestern, western and eastern districts of the country.

The fulfillment of this plan will result in the increase of freight traffic from 220,000,000,000 ton-miles in 1937 to 316,700,000,000 ton-miles in 1942.

The Third Five-Year Plan holds out the prospect of further rapid development of the Soviet railroad system.