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SBB modified shunting locomotive type E3/3.

by M. Hardy-Randall

The board of the Swiss Federal Railways in 1913 decided to carry out a trial on the Gotthard line using electric power. This decision was taken because the railways did not want to find itself in a situation where the supply of coal for its locomotives would be too expensive or even impossible to obtain. This plan started the conversion of the entire system to electric power that today covers 98% of the track-work.

After the outbreak of the second world war the price of coal increased on almost a daily basis as more and more of the supply areas fell into the area of conflict. To try to alleviate this problem some locomotives burnt wood - which had a low calorific value and was a limited resource - and nobody could foresee the end of the war that at that time was spreading rapidly. So it was decided to carry out an experiment on two steam locomotives used for shunting purposes to convert them to electrically powered steam generation to compliment the coal fired system.

The Federal Railway workshops at Yverdon and the Brown Boveri company in Baden were, in 1942, given the task of designing and building the equipment required for the conversion of locomotives type E3/3 numbered 8521 and 8522. The cost of this work was of the order of SFr100,000 on each locomotive, originally built at a cost of just over SFr42,000 by SLM Winterthur in 1913.

The conversion allowed the locomotives to be brought to steam in just one hour from cold. To carry this out, power at 15 kV 16 $\frac{2}{3}$ Hz AC was

collected via a cab-roof mounted pantograph of standard BBC design, and fed through 36 volt battery powered control systems to transformers supplying two coil heating elements mounted in the boiler. These elements operated at 20 volts at a maximum level of 12,000 Amps.

Water was taken from the bottom of the boiler and fed by two 36 volt force feed pumps through the two heater assemblies at the rate of 5 litres per second. This produced steam at the rate of 300 Kgs per hour fed via injectors into the boiler which itself operated at a pressure of 12 bars.

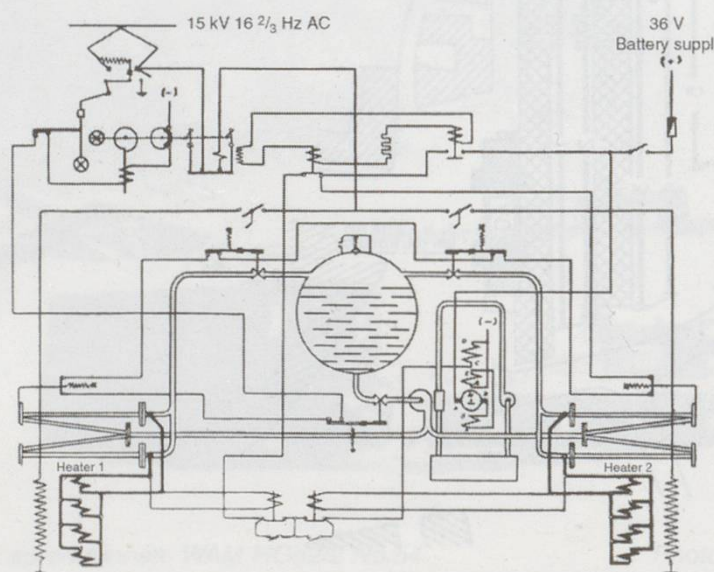
A small coal fire was maintained in the firebox to facilitate running on lines - not fitted with catenary supply - for periods of up to 20 minutes. This would give the locomotive access to lines in factory yards that for safety reasons could not be fitted with overhead catenary.

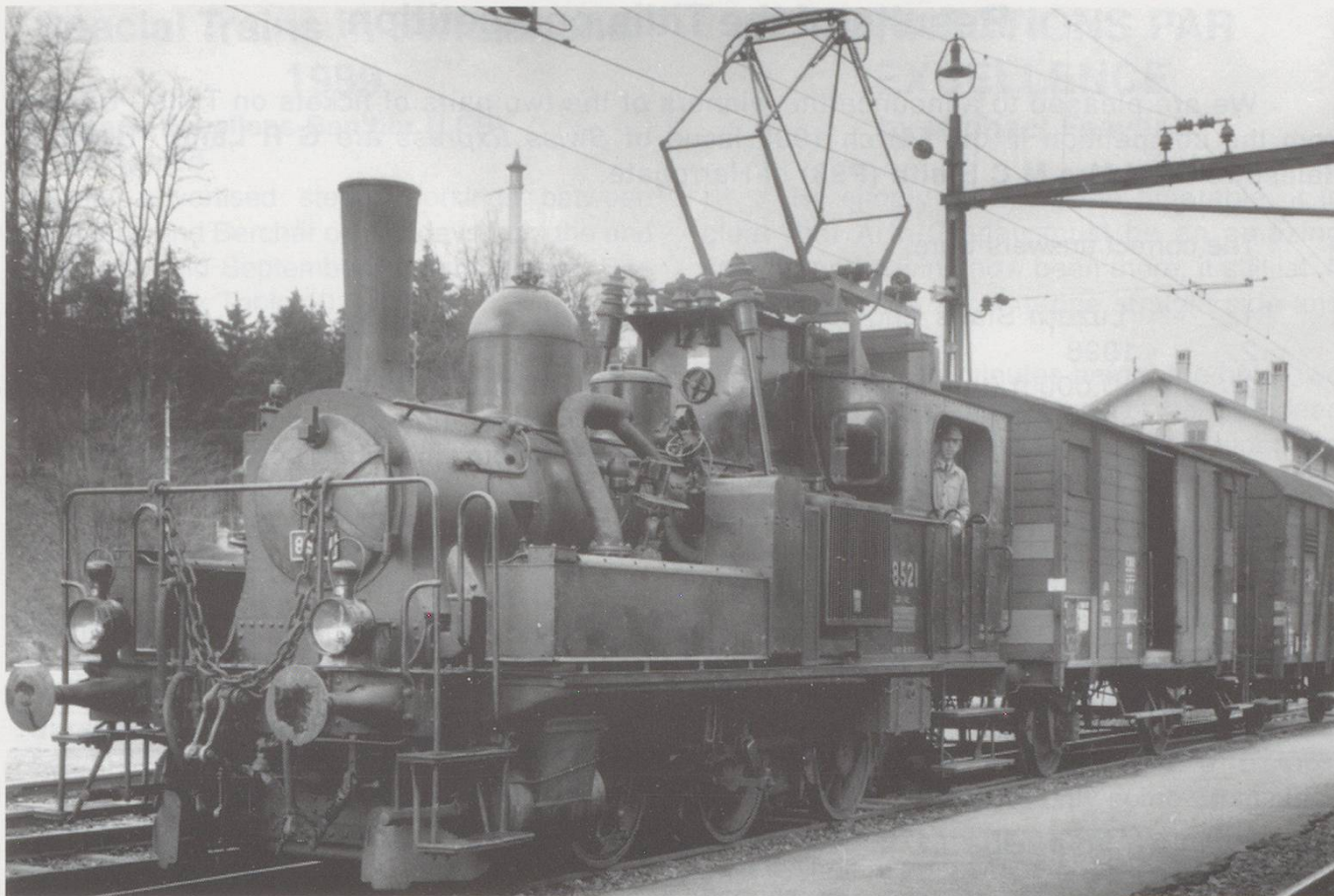
The 36 volt supply came from a standard battery bank rated at 100 Ah that was charged through a rectifier circuit supplied by the transformer. The total weight of this extra electrical equipment amounted to just on 7 tonnes which increased the service weight to 42 tonnes. To cater for this extra weight the locomotive springs had to be strengthened.

The amount of coal that was saved amounted to between 700 - 1200 kgs per working day which came to 300 tonnes per year. At war-time prices the saving was SFr36,000 in the first year of operation, and with coal becoming scarcer and therefore more expensive the saving in the second and third year was considerably higher. Locomotive number 8521 was sent to work in the Zollikofen area and number 8522 worked in the Brig area.

Diagrams reproduced from the supplement to 'Der Dampfbetrieb der Schweizerischen Eisenbahn' by Alfred Moser in 1946 and 'Dampf - elektrische Lokomotiven' by Dipl Ing Roman Liechty in 1943.

Many years ago there was a conversion kit to be used with the ROCO "HO" scale model of this locomotive, but I have no idea if that kit is still available or indeed who produced it. If anybody has information would they kindly let me know and I shall pass it on.





SBB locomotive type E3/3 No.8521 working a light freight service.

Photo: [BBC] Hardy-Randall collection.

15,000 v 16 $\frac{2}{3}$ Hz AC

