BR 78 – a rugged engine that saw service in many parts of Germany

Engine 78 009 seen at an exhibition in Potsdam in May 1993. Photo by Christian Splittgerber.

Two diary entries recorded the birth of the Prussian T 18. "October 20, 1912, Stettiner Bahnhof Berlin, 2 C 2, two cylinder, superheater tank locomotive, Series T 18, Contract number "8410 Stettin, built in 1912 by Vulcan, factory number 2762, coupled to passenger train headed to Berlin." The second entry was October 27, 1912 (Stettiner Bahnhof) 2 C 2, two cylinder superheater steam locomotive, Series T 18 built in 1912 by Vulcan, factory number 2759, coupled to express train headed to Stralsund.

Technical Notes and Service

The Prussian T 18 (Service class Pt 37.17), which later was redesignated as BR 78^{0-5} by the Deutsche Reichsbahn Gesellschaft (DRG), was a 2"C2"-h2t superheater tank engine designed to replace the Prussian T 10 *(Later BR 76)*. The new locomotive used the boiler, with some modifications, from the Prussian P 8 but the drivers retained their dimension of 1,650 mm (63 in.). The first ten engines, numbered 8401 " 8410, which did not have the feedwater preheaters, were assigned to Stettin and further production was assigned to Mainz as a replacement for the T 10. The T 18 assigned to the island of R"gen and ferry service to Sweden replaced the types T 11 (saturated steam) and T 12 (superheated steam) in fast passenger service. *The T 11 and T 12 were later redesignated BR 74.)* In that service it was necessary to use a tank engine since there was no turntable to turn a tender locomotive. In the end, the Prussian State Railways (KPEV) ordered 462 of the new locomotive and a further order for 20 went to the W"rttemberg State Railways (KWStE).

The boiler was approximately the same size as the one for the Prussian P 8. The frame side

rails were connected by substantial cross members and the steel castings that carried the central vertical pivot for the leading and trailing trucks were designed that they went over the frame side rails. Attaching points for couplers and draft gear were incorporated into the leading and trailing trucks. All wheels, including the trucks, featured brakes. Each truck had brake cylinders, air accumulators and directional valving. The early T 18s had two brake shoes for each driven wheel but later ones had only a single brake shoe. Water was stored in three tanks, one on each side of the engine and one in the center. Because of the considerable measurements of the coal bunkers, provisions had to be made to be able to access the farthest corners of the bunkers.

In March 1914, engine "8401 Mainz" arrived in the Berlin-Grunewald test and evaluation center. Its smokestack had been removed because the dimensions for the blast tube had been incorrect. The result was that there was insufficient pressure in the smoke box which, in turn, affected the amount of steam that was generated. At that time, this sort of thing was taken in stride as being part of the design and development of a steam locomotive. This shortcoming was soon corrected and testing of the new locomotive commenced. "8401 Mainz" with its Vulcan preheater made test runs coupled to various car consists between Berlin-Grunewald and Mansfeld. The test route featured two sizeable grades; one on the Br"ck to Nedlitz stretch measured 1 in 120 and the second one came in at 1 in 100. Outbound and inbound, the engine was superheating at 325^{o} C (617^{o} F), boiler pressure was 12 bar (174 psi) with a brief excursion to 13 bar (188.5 psi). That run was with the 392-ton train. An even tougher run was with the 464-ton had the boiler pressure at 13 bar (188.5 psi) accompanied by "screaming" of the safety valves. Tough going but the T 18 passed the tests with flying colors.

The first of the new locomotives, factory numbers 2753 to 2762, were delivered in 1912. They were stationed at Bw Sassnitz and carried road numbers "Stettin 8401 to 8419". One of these ten engines remained in service for 57 years and was mustered out by the DR in 1969. It continues life as a museum locomotive. Until 1921 all T 18s came from Vulcan and they were delivered as follows:

Regional depots	**No. of Loks**
Breslau	15
Cologne	16
Danzig	3
Eberfeld	2
Erfurt	32
Essen	30
Frankfurt	30
Mainz	31
Saarbr"cken	23
Stettin	21
Subtotal	203
Central depot	

Essen	130
Total	333

In 1925, the newly formed DRG took over 460 of the T 18 and redesignated them 78 001 to 78 282 and 78 351 to 78 528. This included delivery of engines ordered in 1922/23 by the KPEV and then delivered to the DRG with DRG numbers. The KWStE engines were redesignated 78 146 to 78 165. In addition to Vulcan's production, Henschel also built this type. In 1935 the Saar T 18s became 78 283 to 78 328, which had been built by Franco-Belge and Hanomag in 1924/25. In 1941, the two engines belonging to the Eutin-Lübecker Eisenbahn became 78 329 and 78 330. Henschel also built several T 18 for the Baghdad Railways.

By 1945 there were still 508 BR 78s in service. Some with heavy war damaged were scrapped and thus the DB wound up with 424, the DR had 53, the Polish State Railways (PKP) and the Czech State Railways (CSD) had 31 between them. Perhaps as proof that this was a rugged, useful machine, the DB still had 400 of them in service in 1962. When Holzborn and Bellingrodt (see Source below) revised their book in 1970, only ten were left in service. By then, the BR 78 had become the BR 078. These served in the Stuttgart region and many of them were fitted with the safety device Indusi.

The last heyday for the BR 78 came just before the arrival of the V 100 diesel in 1962. At that time Hamburg Hbf was home to 45 BR 78s and others were stationed in Essen, Dillingen, Friedberg and Wuppertal. Many of them were modified to work in push-pull service, which meant that the locomotive was operated from the train's last car which featured a control cabin.

The DR still had nearly 40 BR 78s in service in 1966. These had by then been fitted with Witte smoke deflectors. By June 1970 only 78 009, 030, 109 and 281 remained in Wustermark, 78 240 and 425 in Pasewalk and 78 427 in Senftenberg. Engine 78 009, renumbered 78 1009, is in the Transport Museum in Dresden. Engine 78 425 was equipped with a back pressure brake and assigned to VES-M Halle. In 1965 the same engine was fitted with a Giesl ejector, a feature that also was retrofitted to 78 394.

BR 78^{3} of the Eutin-Lübecker Eisenbahn

In 1936 the Eutin-Lübecker Eisenbahn (ELE) ordered a Prussian T 18 form Henschel. This backward appearing step to procure an engine that was last produced in 1927 must be surprising at first glance. The ELE needed a faster, higher performing locomotive to replace its earlier 1'C1' tank engines. The DRG's standard locomotive program did not have an engine with 17 tons axles loading to suite the ELE's requirements and new construction would have been much to expensive.

The T 18 that was then delivered received the road number 1. This particular T 18 performed so well that the ELE ordered a second one from Henschel in 1939. It differed from the first one in that it featured a second sand dome, Ackermann safety valves and a Knorr-Tolkien compound feedwater pump. When these two locomotives were incorporated into the DRG in 1941, they were renumbered 78 329 and 330. After the war they went to the DB. In the Hamburg region

they were modified for push-pull S-Bahn service. In 1966 they were mustered out.

BR 78^{10}

In an attempt to make greater use of the many BR 38^{10-40} (Prussian P 8) locomotives for city and suburban service, Prof. M&#65533;lbert at the Technical University of Hannover suggested converting these locomotives into tank engines. This would eliminate the need to turn these engines around when they reached the end of the line. So, in 1951 Krauss-Maffei converted 38 2919 and 38 2990 and fitted them with short 2 T 17 tenders. Connection was by means of a very short drawbar. The cabs were enclosed and access to the coal was by means of a circular opening similar to that used on the BR 52 freight locomotives. The modified engines were designated 78 1001 and 1002. They were used in the Munich-Bodensee region. No further conversions were made since the DB&#65533;s modernization was taking shape. By 1959 these unique BR 78s were withdrawn and they were mustered out in 1961.

BR 78 (T 18) Production

Prussian T 18	333
DRG BR 78	127
Stuttgart	20
Eutin-L&#65533;becker Eisenbahn (BR 78^{6}	2
Reichsbahnen - Elsass-Lothringen	27
Total	536

Specifications

Cylinder diameter, mm	560
Piston stroke, mm	630
Driver diameter, mm	1,650
Leading and trailing truck dia., mm	1,000
Main wheelbase, mm	4,100
Total wheelbase, mm	11,700
Valve gear	Walschaert
Boiler pressure, bar	12
Grating area, m2	2.39
Total heating surface area, m^2	138.49
Superheating surface area, m^2	49.2
Top speed, km/h	90 (100 starting with 78 011)

Coal capacity, tons	4.5
Water capacity, m^3	12
Weight, empty, tons	83.17
Tractive effort, tons	46.47
Service weight, tons	105.03

Sources

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