

The BR 184: *An Early Multi-Current Locomotive*

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TEE Roots in Multi-current Designs



Figure 1 - BR 184 003 at Milano Centrale (photo AEG)

The development of the Trans Europe Express system of rapid international passenger service and the affirmation of electric traction as the preferred method of powering trains led several railway administrations to begin the search for solutions to Europe's tangle of dissimilar catenary systems. Though the Italian Railways (FS) was not a prime participant in this research, multi-current locomotives did find their way onto Italian rails.

Conceived in the early 1960s, German Federal Railways (DB) class E 410 was built in 1966 and consisted of three locomotives numbered 001 to 003. With body by Krupp and electrical equipment by AEG, the E410 was designed to operate under four different voltages:

- 15kV, 16 2/3Hz AC – Germany, Austria, Switzerland
- 25kV, 50HzAC – France, Luxembourg
- 1,500 VDC – France, Holland
- 3,000 VDC – Belgium, Italy

The engines also mounted four single-arm pantographs with varying shoe widths and compositions to meet the mechanical and clearance requirements of the various railway systems. It is important to note that operation under a particular system required a selection of pantograph and a selection of voltage (a pantograph was not 'hard-wired' to a specific voltage system).

Operational Considerations

The intended purpose of this locomotive was the operation of trains between Germany and the Low Countries (Holland, Belgium, and the Netherlands), comparatively short runs that otherwise required several time-consuming locomotive changes. Essentially, this was to be a multi-current version of the DB's successful E10 (later BR 110) class and the heart of the current conversion system was a thyristor that could convert direct current power to a form of AC that could then be used to power the locomotive.

Mechanically, one of the challenges in producing the locomotive was the necessity to reduce overall height by 300mm (almost 12 inches) to stay within the international loading gauge (the DB had adopted a larger dimension for its internal service). This was done via a combination of space saving and by designing a suspension system that allowed the body to sit lower on the bogies (trucks).

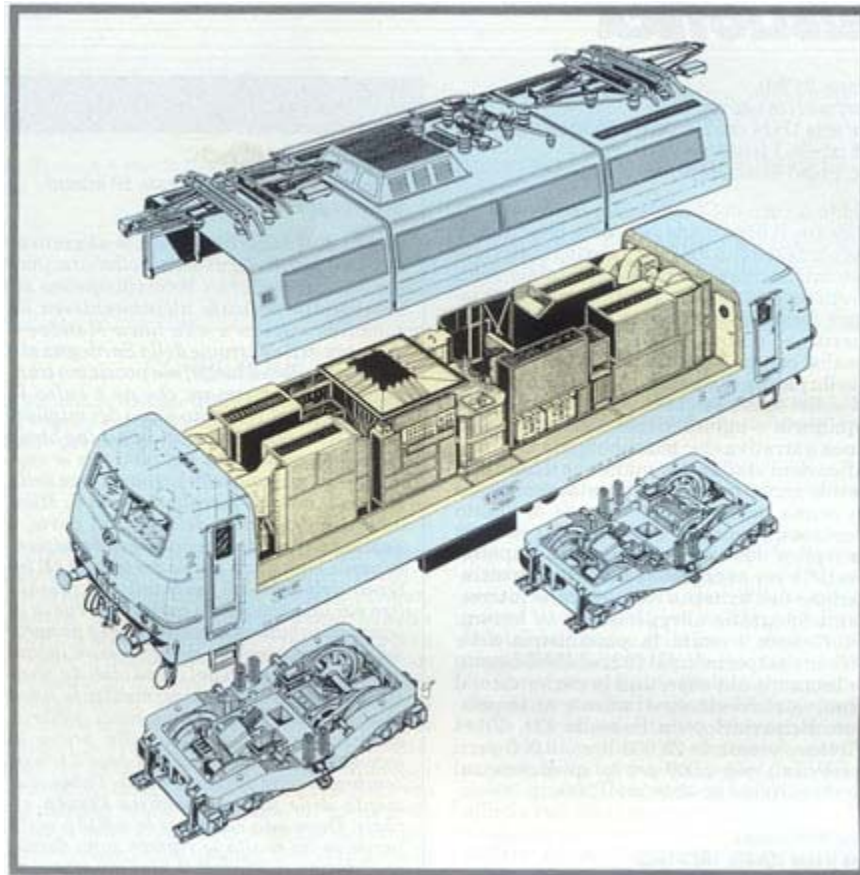


Figure 2 - Isometric Drawing (AEG)

In an improvement from earlier one-piece designs, the E410's body could be disassembled between the cabs in three sections to allow easy access to the electrical equipment inside. The joints between sections are marked by black rubber gaskets.

With the implementation of computer-based numbering in 1968, the class was renumbered BR 184 001~003.

Tests in Italy

Since the Belgian catenary power is equal to that used in Italy, it was possible for the BR 184 to operate on the FS. This finally occurred for a few days in the spring of 1972; loco 184 003 came to northern Italy for trials. The purpose was to test the effect of the locomotive's sophisticated electronics on lineside systems such as telephone circuits, signaling equipment, block occupancy detectors, and railway crossing actuators.

BR 184 003 spent April 13-20 operating along the Milano-Chiasso and Milano-Venezia main lines. The typical consist included a dynamometer car, an oscillographic car, a second-class UIC-X coach, and an E444 electric loco (first series E444.001~004) just in case of failure. AEG and probably DB technical personnel accompanied the loco during these trials. A few days later, the BR 184 003 pulled a 682 ton train over the *Direttissima* line between Bologna and Prato, maintaining a minimum speed of 95 kph on the steepest gradients and exerting an impressive 220 kN of traction measured at the drawbar.

The Realities

Notwithstanding its designed-for purpose and impressive power, the BR 184 was not a full-fledged success. Ultimately, the DC portions of its electronics were shut down and two of its four pantographs removed. The three locomotives spent most of their operational career in the company of their four dual-current BR 181 (ex-E 310) cousins shuttling passengers and freight across the French border to and from west-central Germany. They never did enter regular service on the Germany-Netherlands routes.

As of this writing, BR 184 003 – the loco that visited Italy – is still in service and based at Saarbrücken. Years ago, its paint was updated from all blue to blue and crème, and unless you know your history, you likely wouldn't recognize it for the innovative locomotive that it once was.

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