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BR's RELUCTANT SAVIOUR

Despite progress by the 'Big Four' constituent companies, British Railways initially had no interest in DMU development until its hand was forced, a move that ultimately helped save many rural lines.



AFTER the North Eastern Railway's early 20th century trials with petrol power (see previous pages), the next big steps in multiple unit history came in the 1930s, with the development of diesel engines powerful enough for rail use.

The potential for diesel-powered railcars was recognised by three of the 'Big Four' private rail companies that were formed in 1923, and in the period leading up to the Second World War a variety of prototypes and production run vehicles were constructed. The exception was the Southern Railway, which instead pushed forward investment in third-rail electrification that was installed on a significant number of its routes.

After the war, however, the wider introduction of railcars was not resumed with the formation of the Railway Executive (which became British Railways) in 1948. Robert Riddles, appointed Member for Mechanical and Electrical Engineering, lacked enthusiasm for diesel traction – believing that greater efficiency could be obtained from improving steam power until such time as the cost of electrification could be justified.

BR'S DMU DEVELOPMENT

There was no encouragement from the Government either, who did not want to pay for the cost of imported oil when the UK produced plentiful amounts of coal.

The only discordant view came from the British Transport Commission, which was responsible for the strategic direction of all modes of transport, and it established the Harrington Committee to consider future traction policy.

Although starting work in 1948, the committee's findings were not published until 1951, but it was to result in the first BR designed diesel multiple units. The report confirmed the benefits of providing diesel-powered multiple units on lines with lower traffic density, allowing the 'no diesel' policy to be reversed.

As a result, a £2 million project was launched in advance of the 1955 Modernisation Plan to develop lightweight rail cars, which were built at Derby and introduced in 1954.

A contemporary description of the design described the care taken to reduce weight wherever possible, with the use of light aluminium alloy for the underframe and panelling, with the result that when fully fuelled the two-car unit weighed just 54 tonnes. The strategy was to minimise the size of the engine required and therefore fuel consumption.

The initial power twins equipped with 125hp engines had 16 First and 114 Third Class seats and, as expected, the trains reduced costs on branch lines. They also brought increased revenue

on routes where they were allocated, such as Leeds-Bradford-Harrogate (first introduced on June 14, 1954), services in West Cumbria, the Llandudno-Blaenau Ffestiniog branch, and the Manchester-Buxton commuter route.

Ultimately 213 cars were constructed during 1954 and 1955, made up of 11 separate batches. The first eight units had hydraulic transmission,

but thereafter mechanical drive was used. They did not remain in passenger service beyond 1969, however, and so did not receive a TOPS class allocation – the extensive use of asbestos in their construction being a factor in the relatively short service life.

The popularity of the initial trains, and a critical shortage of footplate staff, led to a decision as part of the 1955 Modernisation Plan that 4,600 railcars would be introduced for use on local services. It was judged there was insufficient time to issue a standard specification so, not unlike the pilot programme for diesel locomotives, individual manufacturers were asked to submit designs they could quickly build.

Although production continued of the Derby Lightweight cars, it was decided that the design was expensive and production switched to vehicles constructed from steel. Other builders, such as Metropolitan-Cammell, Birmingham Railway Carriage and Wagon, Cravens of Sheffield, Pressed Steel, and Gloucester Railway Carriage and Wagon received significant orders as well as the BR works at Swindon. There were

"Lady Hamilton ran from King's Cross to Newcastle in July 1932, recording an average speed of 47.6mph"

One of the first Modernisation Plan DMUs was Gloucester RCW's Class 100, of which 40 two-car sets were built. A green and blue-liveried pairing is captured at Corstorphine on December 30, 1967 with a working to North Berwick. Corstorphine was the end of a short branch in Edinburgh's western suburbs, but was officially closed two days after this shot on January 1, 1968.



Park Royal built a small batch of 20 two-car units that were later designated Class 103. These were successful enough to survive 26 years in service from 1957, although no further orders were received. One set is pictured stabled at Bangor in 1976 with Driving Trailer Composite Lavatory No. 56165 nearest the camera. A three-car Class 104 arrives in the background.

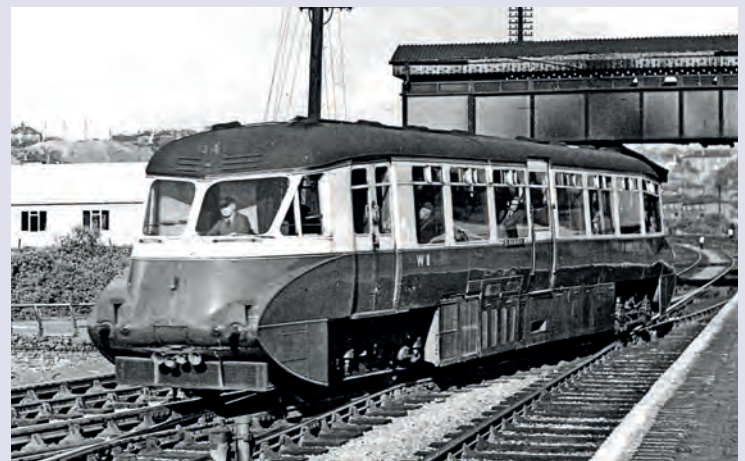


Met-Camm's Class 101 fleet was one of the most widely used and longest surviving first generation DMUs, being in service from 1956 to the end of 2003. A five-car set headed by Nos. 51429+51499 is pictured at the former Bradford Exchange station on September 6, 1964, forming the RCTS' 'West Riding Rail Tour'.

BR DMU COUPLING CODES

■ Blue Square	Standard engines and transmission
★ Orange Star	Higher Powered Class 125 Lea Valley units
▲ Red Triangle	Derby Lightweight 125hp and Class 127 Midland suburban types
◆ Yellow Diamond	Derby Lightweight and Met Camm 150hp with Wilson gearbox
● White Circle	Swindon main line units for Scottish Region

'BIG FOUR' DIESEL RAILCARS: GWR



Sleek GWR diesel railcar No. W8 leaves Old Hill (West Midlands) with the 6.32pm to Dudley via Windmill End in the 1950s. J N Faulkner

THE diesel multiple unit, initially described as a railcar, was made possible by the development of engines of sufficient output to power a rail vehicle capable of achieving point-to-point timings compatible with other train movements. That moment arrived in 1933, when engines were produced by Associated Equipment Company (AEC) for use by London Transport in its bus fleet.

AEC had a number of subsidiaries, including Hardy Rail Motors and Park Royal Coachworks, and with the cooperation of the London Transport Passenger Board it finalised the design of a prototype lightweight railcar that was bought by the Great Western Railway and allocated to Slough depot in December 1933.

This 63-seater ran a total of 60,000 miles in 1934, which is a tribute to the success of the design,

and six further railcars were ordered in the same year with a higher specification and fitted with two 130hp engines.

The higher spec enabled the railcars to operate at a maximum speed of 80mph, resulting in the 117-mile Birmingham to Cardiff route being scheduled in 2 hours 20 minutes. Tickets had to be booked in advance to prevent overcrowding, as capacity was limited to 44 seats, but these were charged at the normal Third Class price.

The Great Western Railway went on to order 38 further examples of the type, although the class members varied considerably in their appearance. Fourteen examples were built by the Gloucester RCW company, and the final 20 were built during wartime by the GWR at Swindon.

The final four vehicles were power twins: the more familiar two-car diesel unit.



Birmingham RCW's Class 104 sets saw widespread use across the London Midland Region, but January 3, 1970 saw two-three car sets unusually appear at Penistone while forming LCGB's 'Pennine Venturer' railtour from Manchester to Goole.



A more powerful version of the Class 104 sets appeared in 1961 for use in Lancashire and Yorkshire on the testing Calder Valley route. On an unknown date in the mid-1960s, one three-car set descends from Halifax towards Sowerby Bridge at Milner Royd Junction, the lines in the foreground being those from Brighouse and Mirfield/Huddersfield.

Also smaller scale suppliers who built prototypes where fleet orders did not result.

The power equipment was provided by 150hp AEC or Leyland engines marketed by BUT, with Rolls-Royce and Leyland also supplying higher powered traction where this was required.

Both mechanical and hydraulic transmissions were used. As a result, coupling codes had to be introduced to indicate if power equipment was compatible between different units (see box).

The introduction of the TOPS operating control system in 1972 resulted in class identification being applied, although it did not reflect any chronological order or grouping by manufacturer, which is the basis chosen in this article for analysing the fleet make-up.

Individual vehicle numbers were retained as allocated when built, but some renumbering took place using 53xxx and 54xxx to avoid a clash with locomotive classes.

MODERNISATION PLAN ORDERS

Gloucester RCW

One of the first of the Modernisation Plan types introduced in 1957 were classified as Class 100 and comprised 40 two-car sets.

They were constructed on lightweight principles, but not chosen for mid-life refurbishment – which meant they were withdrawn by 1988, although the Eastern Region operated one set as the General Manager's saloon until 1990.

These were followed in 1958 by 81 Class 119 vehicles for the Western Region, which had a similar cab design to units being built at Derby. They were formed into 25 three-car units, with the use of an intermediate buffet vehicle, leaving three sets formed as just two-car power twins.

Standard 125hp engines were used and, to increase capacity, sets were strengthened with locomotive hauled coaches from the Hawskworth era, with seven-car formations running between London and Oxford. Despite the use of asbestos in their construction, the '119s' received life extension work and were not displaced until 1992 by the Class 165/6 'Turbo' units.

Twenty single-car Class 122 vehicles

Derby Works was responsible for building a large number of first generation DMUs, including Classes 107, 108, 114, 115, 116, 125 and 127. Three-car '107s' were used in the Glasgow area, one set pictured at Kilmacolm in April 1977. This station was once on a through-route to Greenock Princes Pier, but became a terminus at the end of November 1965 and closed completely in January 1983.

BR DMU VEHICLE NUMBERING

79xxx	Early units (not allocated TOPS class)
50xxx	Driving motor vehicles
55xxx	Single vehicle units
56xxx	Driver trailer vehicles
59xxx	Non-driving trailers

"The Harrington Committee report confirmed the benefits of providing diesel-powered multiple units on lines with lower traffic density"



were built in 1958 for the London Midland Region, with nine additional trailers that had only a single cab. The closure of secondary routes and branch lines resulted in the transfer of some examples to Scotland, where three of the single cars were later converted for parcels use and reclassified as Class 131. The final example was not withdrawn until 1995.

Gloucester RCW also built 10 new Class 128 vehicles for carrying parcels in 1959, which were provided with uprated 230hp engines and operated until 1990.

Metropolitan Cammell

A total of 633 vehicles were built from 1956, which were initially recorded as

Class 101 (AEC engines) and Class 102 (Leyland engines), but later numbering was simplified with all carrying the Class 101 prefix. They were allocated throughout the network and, being chosen for mid-life refurbishment, continued in service right through to 2003.

An improved version of the design followed in 1957 designated Class 111, which attracted orders for another 339 vehicles with the power train uprated using 230hp Rolls-Royce engines, of which two were fitted in each power car. The three-car sets offered 920hp, which was a valuable benefit on routes with heavy gradients. Final examples of these were withdrawn in 1989.



The once extensive network of lines in Lincolnshire included a loop from the Boston-Grimsby main line that served the coastal town of Mablethorpe until October 1970. A few years prior to this, a two-car Class 105 Cravens set has just arrived from the main line at Willoughby.



■ Park Royal Vehicles

The Class 103 type was a small class of 20 two-car vehicles designed to lightweight standards by Park Royal but constructed at the Crossley Motor works with standard BUT engines. They entered service in 1957 but did not attract further orders.

Although the final examples lasted until 1983, there had been previous withdrawals as a result of a need for bodywork repairs.

■ Birmingham RCW

A substantial number of Class 104 vehicles were delivered between 1957 and 1959 for use on the London Midland Region.

Units were formed of two, three

and four cars with a total of 302 cars constructed. Later examples were used by the North Eastern Region after the Tyneside electric services were discontinued in 1967, these trains being themselves displaced in 1980 when the Tyne and Wear Metro was opened. The final examples were withdrawn in 1995 after being used on the Gospel Oak to Barking route.

An improved design was provided in 1961 when 30 three-car units were constructed for the Calder Valley route. The original units had been provided with the standard 150hp engines, but the later vehicles – which were to become Class 110 – were powered by 180hp Rolls-Royce traction. The sets were refurbished and



Derby built the high density Class 115 sets, with a door per seating bay, for use on the Chiltern lines from Marylebone. One of the four-car sets is pictured at Quanton Road on May 26, 1975 with a shuttle service from Aylesbury to the Buckinghamshire Railway Centre.

'BIG FOUR' DIESEL RAILCARS: LNER



LNER Armstrong Whitworth railcar at Scarborough in the 1930s. BR

LIKE the GWR, the LNER also recognised diesel railcar potential, and there were a number of prototypes.

The initiative was again taken by a private company, Armstrong Whitworth, which built a diesel-electric railcar with a 250hp Sulzer power unit using General Electric traction motors allowing maximum speed of 65mph. The body was built by Cravens using riveted sheet steel. Internal design provided two saloons divided by a central vestibule, with double sliding doors and accommodation for 50 passengers in a 3+2 seating arrangement.

This first railcar was named *Tyneside Venturer* and commenced trials in April 1932 in the Newcastle area, being purchased by the LNER in November that year. Two further examples *Lady Hamilton* and *Northumbria* were acquired in 1934. What must have been a memorable trial took place with the second prototype *Lady Hamilton*, which ran from King's Cross to Newcastle in July 1932 recording an average speed of 47.6mph and 6.27mpg fuel consumption.

A fourth Armstrong-Whitworth vehicle entered service with the LNER in 1933. This was an unnamed lightweight rail bus, which had mechanical drive and a streamlined

body constructed by Park Royal with seating for 57 passengers.

During regular operation, the Armstrong Whitworth diesel-electric railcars suffered from declining reliability, with long periods out of service due to engine and bearing failures. There were no specialist maintenance facilities, and it is likely that operating from depots geared up to servicing steam locomotives was not ideal. However, in 1935, *Northumbria* was based at Neville Hill to work services on the Leeds, York, Harrogate triangle in an attempt to improve passenger levels. This was so successful that extra steam services were added.

All of the vehicles were withdrawn in 1939, but not before the first of the diesel-electric cars had recorded a quarter of a million traffic miles.

Immediately before the Second World War, Metro-Vick-Cammell built an individual vehicle based on a design from Hungarian company Ganz, which operated from Hull in 1939 on services to Pontefract, Selby, York and Withernsea for several months. It was not taken into LNER stock, however, and was returned to the builder on the outbreak of war. It reappeared in 1951, regauged to 5ft 3in and worked for the Ulster Transport Authority until 1965.



Derby's high density version for the Midland suburban routes from St Pancras was the four-car Class 127 – Nos. 51650+59633+59592+51636 pictured arriving at the London terminus in July 1967. Hugh Llewelyn/Creative Commons

continued in service until replaced in 1988 by second-generation 'Sprinter' units.

A further order was fulfilled for 15 three-car sets for the Western Region designated as Class 118, which were delivered in 1960. These were equipped with the standard 150hp engine and were notable as they lasted in service until 1994.

■ Cravens

The Sheffield-based company had a long tradition of building railway rolling stock, and a substantial fleet of 302 Class 105 vehicles was constructed from 1956, which were distinctive as they had the same design outline as the BR Mk.1 standard coach. Three single-car vehicles were also built to convey parcels, which were later designated as Class 129.

The motor coaches were equipped with the then standard 150hp BUT engine, but from 1960 higher-powered units were built using the 238hp Rolls Royce engine. These were classified as Class 112 with mechanical transmission and Class 113 with hydraulic transmission. 25 two-car units of each type were delivered, which were power twins, and used by the London Midland Region in the North West where gradients required greater tractive effort.

All vehicles had been withdrawn by 1988 as asbestos had been used in their construction, which made life extension prohibitively expensive.

■ BR Derby

Aside from the pre-Modernisation Plan Lightweight units, there was a significant building programme at Derby Works using steel rather than aluminium construction.

The Scottish Region received 26 three-car sets in 1960 designated as Class 107, which used two standard 150hp engines in the driving coaches for routes radiating from Glasgow Central. Life extension work allowed the vehicles to remain in service until 1991.

They were pre-dated by the Class 108 type, of which 333 cars were built under 21 different lot numbers. They were used throughout the Eastern and London Midlands Regions marshalled as two, three or four-car sets. Most were power twins using standard engines with mechanical transmission.

The Eastern Region had ordered



BR's Swindon Works is best known for its long-distance DMUs, such as the 'Cross Country' Class 120 and 'Inter-city' Classes 123, 124 and 125. Here a two-car, headlight-fitted Class 120 leads a three-car '101' at Builth Road on the Central Wales Line on November 17, 1968. The train was a Warwickshire Railway Society railtour from branches in South West Wales.

Derby-built vehicles before, as it received 50 Class 114 two-car units for use in Lincolnshire in 1956. The final set was equipped with trial equipment to test a Rolls-Royce power pack producing 238hp with hydraulic transmission.

The reason for the Rolls-Royce trial was to assess the power system for the Class 127 four-car units built for Midland suburban services using St Pancras. These 30 four-car units were introduced in 1959 with installed power of 952hp and seating for 352 passengers per unit in an all-Standard Class layout, as it had not been the practice to provide First Class accommodation in the Midland suburban area.

Another type that used the higher-powered Rolls-Royce engine was the 30 Class 125 three-car sets designed specifically for use on the Lea Valley route. Improved acceleration was needed as the rolling stock was used over electrified sections of the North East London lines and so needed to be capable of keeping to similar point to point timings as electric units.

Construction followed in 1960 of 41 Class 115 four-car sets for Chiltern

routes, which also saw service on the Great Central main line to Nottingham Victoria before the route was closed in 1966. They were built to a higher interior standard and had 30 First Class seats, which reflected the travel pattern at the time. They were withdrawn from Chiltern routes in 1992, but continued in use on alternative services until 1998.

The diesel units provided for suburban services in the Birmingham area were also supplied by Derby, with 108 high density Class 116 sets delivered from 1957. These were mainly three-car units, as 94 trailer composites were constructed. The class saw lengthy service, with three two-car sets being redesignated as Class 130 units for parcels traffic, which were used with intermediate GUV vehicles. They were not displaced until 1990.

■ D Wickham & Co

Wickham vehicles had different design principles from other manufacturers, being constructed without a traditional underframe but instead having a body formed from a welded box made from steel tube, and panels made from

aluminium. The design had been based on a prewar export order, and again had weight reduction as a priority.

Designated Class 109, there were only five two-car examples, which entered service in 1957. The traction equipment was the standard 150hp Leyland equipment, with two such engines provided in the power car. Two of the five sets were sold back to the manufacturer to fulfil an export order to Trinidad and Tobago, and BR operations ceased in 1971 although there is a surviving set in preservation after extensive renovation to remove asbestos.

■ Pressed Steel

Some 123 vehicles designated Class 117 were delivered between 1959 and 1961 for service on Western Region suburban services in the London area, where they were based at Southall, and in Cornwall from Plymouth Laira depot. Formed into three-car sets, the power cars were fitted with two 150hp engines to meet the required point to point timings.

Their service life was lengthy, with units being transferred to both Regional Railways and Network South East in the



Wickham's Class 109 DMUs were tested on the Buntingford branch in Hertfordshire, which was close to the company's factory in Ware, and one unidentified set is pictured on the branch at Hadham on July 31, 1957. BR



The Pressed Steel Company built 41 high-density three-car Class 117 units for Western region suburban services, followed by 16 single-car Class 121 versions for branch lines in the Thames Valley and Cornwall. One of the latter is pictured at Fowey in the 1960s, and while the passenger service from here to Lostwithiel ceased in January 1965, most of the line survives today for china clay traffic.



Class 123 units were built as four-car sets with gangway connections to form longer trains. By the time this shot was taken on May 26, 1979, many had been reduced to three-cars to join with Class 124s on trans-Pennine duties - this one captured at the former Millhouses station, south of Sheffield, with a working to Hull.

1980s and 1990s, and the final examples were not withdrawn until 2000.

A single-car version of the type was also ordered, with 16 built in 1960 fitted with two 150hp engines, supplemented by 10 trailer cars without gangways for use on busier services. Allocated as Class 121, the vehicles were the final first-generation type in service being withdrawn by Chiltern Railways in 2017.

■ BR Swindon

As part of the 1955 Modernisation Plan, BR placed orders in 1956 from BUT, the AEC Leyland consortium, for sufficient traction and ancillary equipment to build 98 power cars and 47 trailers that were to be constructed at Swindon Works for longer distance services on the Western Region.

The standard 150hp engine was again used, but despite the intention to operate longer distance services, top speed was limited to 70mph. The trailer cars were equipped with buffet facilities, and the units entered service in 1958 as part of a plan to fully dieselise West of England services in 1959.

Similar Class 120 rolling stock was built for the Scottish Region (21 vehicles) in 1959 for use between Aberdeen and Inverness, and a further nine sets for the Western Region in 1961. The final examples were withdrawn in 1989.

In 1963 Swindon produced a higher specification Class 123 main line DMU, with 10 four-car sets produced for use between Portsmouth and Cardiff using upgraded Leyland 230hp engines. These vehicles were fitted with gangways and also used the standard Mk.1 underframe rather than the shorter 57ft frames fitted to most of the first-generation units. Although withdrawn from service in 1984, a number of vehicles were held in reserve until second generation units were introduced into traffic.

One of the stand-out DMU designs emerged from Swindon in 1960 with the


production of eight six-car express sets for trans-Pennine services between Hull and Liverpool, which unusually included the provision of three spare vehicles. There was 920hp power provided by two power cars using the 230hp Leyland engine, although maximum speed remained limited to 70mph. The challenging gradients, that included the climb to Diggle, was to result in high maintenance costs, and over time the number of vehicles in each set was reduced.

In the final period of operation, the serviceable vehicles were combined with Class 123 examples that had been displaced by the Western Region. When withdrawn in 1984, the service reverted to loco-hauled formations.

Swindon also built 30 three-car Inter-City units for use on the Ayrshire Coast route, which entered service in 1960 and were later designated Class 126 under the TOPS numbering system. Again, they were a development of earlier types, and had gangways to allow coupling as six-car sets. The power was provided by two 150hp engines in each power car, which gave an output of 600hp. The final examples of the class were withdrawn in 1983.

REVIEW OF BR POLICY

The DMU story is one of what might have been. Fleet introduction of diesel cars had taken place by the GWR prior to Nationalisation, but effectively a decade was lost as BR preferred to build new steam power for secondary services rather than continue the development of diesel technology until the production of Derby Lightweight units was authorised.

It can only be speculation that the crippling railway deficit, which led to the 1960s closure programme, may not have been so great if earlier action had been taken to operate cost effective, attractive rolling stock on secondary and branch routes. 



Six-car Class 124 units were arguably one of the best looking ever produced, with their rounded cabs and curved cab windows. This BR publicity shot shows a six-car at Leeds in the early 1960s as the units sought to improve trans-Pennine workings



Swindon's Scottish version was the Class 126, which like the '123s' had end gangway connections. Two three-car sets are pictured leaving Stranraer Harbour for Glasgow Central in the late 1970s.

'BIG FOUR' DIESEL RAILCARS: LMS



The LMS' streamlined three-car articulated unit. BR

At the time the GWR was introducing railcars with AEC equipment, the LMS asked Leyland Motors to construct three four-wheel vehicles where each was powered by a 95hp engine. After trials, the railcars were allocated to services between Blackburn and Clitheroe.

These had a less flamboyant look than GWR's, reflecting the bus design of the period, but great care was taken with the seating layout and upholstery. They were taken into operating stock in June 1934 and based at Lower Darwen depot.

They were not as successful as the GWR vehicles, but were clearly regarded as prototypes for a far more ambitious project that the LMS launched in 1938 with a three-car unit designed for main line use. This was

an articulated train, with two outer coaches that were 64ft in length and a shorter 52ft inner vehicle. Each vehicle was powered by two 125hp Leyland engines, which gave an overall output of 750hp, providing a high power to weight ratio for a train that weighed 74 tons.

Passenger accommodation was organised to provide 24 First and 138 Third Class seats, and a kitchen was provided so that use on St Pancras to Nottingham services provided facilities that were comparable with locomotive-hauled rolling stock.

Construction of a second unit was authorised, but this did not materialise following the outbreak of the Second World War, and after that the original unit was confined to departmental service.