



diesel railcars
FOR BRITISH RAILWAYS



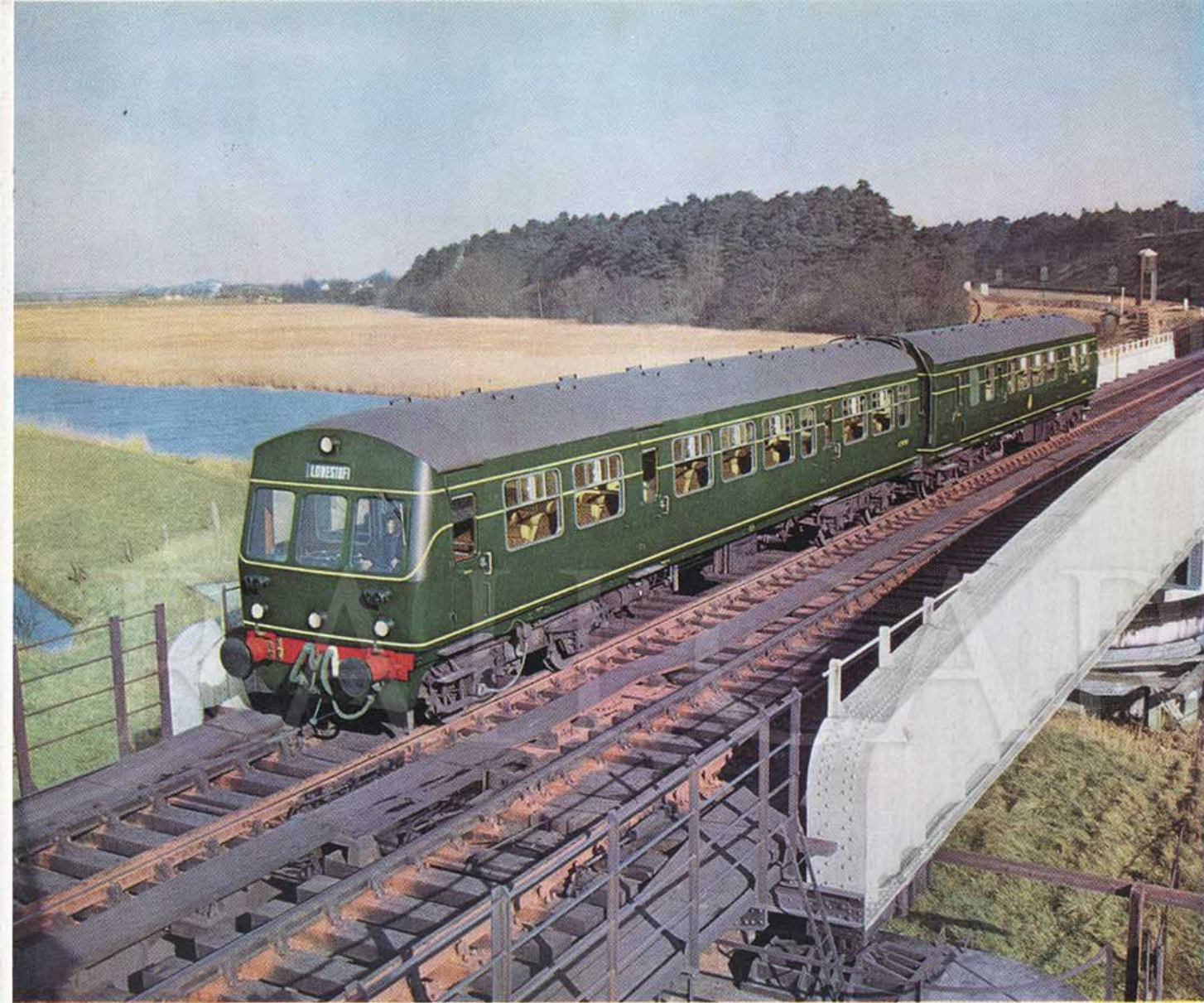


RAILCAR.CO.UK

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Railcars in East Anglia.





INTRODUCTION

The British Transport Commission announced at the beginning of 1955 that a Modernisation Plan costing £1,200,000,000 would be launched to re-equip and modernise British Railways. One of the first decisions as part of the Plan was to replace steam-hauled non-corridor compartment coaches with diesel railcars—with the intention of providing fast, clean and more economical services in suburban and country areas.

The productive capacity of Metropolitan-Cammell Carriage & Wagon Company Limited was readily sought, and it was with this Company that the first contract with a private firm was placed for Railcars for British Railways under the Modernisation Plan.

In May 1954, Metro-Cammell was awarded a contract for 72 Railcars in 36 two-car sets—each set comprising one power car and one driving trailer car with identical driving

compartments at each end to allow operation in either direction—and this was followed early in 1955 by a further contract for 339 Railcars, making a total of 411, consisting of two-car, three-car, four-car and six-car sets.

Of the first 36 two-car sets, 7 were delivered to the Bury-Bacup line of the London Midland Region and 29 to various destinations in East Anglia on the Eastern Region—all of these being in service by the middle of 1956.

Deliveries against the second contract followed on during the latter half of that year in the form of 7 four-car sets for service between Newcastle and Carlisle on the North Eastern Region—each set comprising two power cars and two trailer cars. These were followed by 10 two-car sets for the West Riding of Yorkshire, each set consisting of two power cars for service on the steep gradients in that area.

In January 1957 deliveries began of the 13 four-car sets for the Darlington area of the North Eastern Region, followed by 4 two-car sets for the London Midland Region and 36 two-car sets for Darlington and Durham.

All the railcars under the present contract are scheduled for completion in April 1958, after which uninterrupted production is expected to continue against a more recent contract placed early in 1957 for a further 160 Railcars, making a total of 571, due for completion by the end of 1958.

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During 1957 further 2-car, 3-car and 4-car units were delivered to the North Eastern Region, making a total of 277 cars in service in that area. These were followed by 18 3-car units for the Derby and Birmingham area of the London Midland Region.

By the end of April 1958, Metro-Cammell had supplied 411 Diesel Railcars to British Railways, and regular deliveries of Twin Units are now being made to the Scottish Region.

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Near the North-East Coast.

BODY STRUCTURE

The body structure is of the integral type embodying novel features in design and construction. All units are carefully jig built to ensure interchangeability, and care has been taken in the disposition of body members, etc., so that the required variations in the layouts of the different type of cars may be produced from the same jig.

The side framing, chiefly of steel pressings, extends as a complete unit from below the underframe well up into the roof portion, thus providing an excellent structure to take care of all super-imposed loads. The side panels, also of steel, are spot welded to the structure and are sprayed with asbestos on the inside as a protection against condensation and noise. The framing members of the central part of the roof are of aluminium alloy, and the outer roof sheets are of aluminium, with aluminium roof ventilators riveted on.



Production line at Sallley Works.



The body ends are of steel, those at the trailing ends having doorway openings to accommodate flexible gangways, whereas the leading ends have openings for three windows and are shaped to give a pleasing appearance.

The underframe members are made up of rolled sections and fabricated units, the end framing including headstock and bolsters, being a completely fabricated unit. The buffing and drawgear is of a standard type, the buffers on the first units supplied being self-contained with india-rubber springs whilst on the remainder of the cars they are the oleo-pneumatic type.

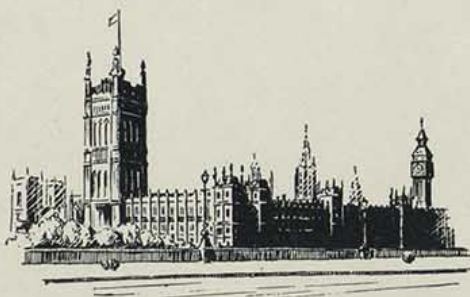
As the British Transport Commission specified that the design should be suitable for a 200 per cent overload, the first body shell built was test loaded with $26\frac{1}{2}$ tons of weight, representing full equipment and three times the normal seated load.

The side windows, framed in anodised aluminium and provided with flexible rubber mountings to the bodysides, fit into the general design and contour of the cars. With the special inside frames and india-rubber seals the windows may be fixed at any stage during the finishing of the cars and can be easily removed if required for repair or overhaul. A further advantage is that transmission of noise through the glass is minimised. The steel passenger entrance doors and the doors of either side of the drivers' cabs are interchangeable with those on standard main line steam stock and are fitted with full drop balanced windows.



First and second class accommodation.





INTERIOR LAYOUT

A pleasing and spacious effect is produced in the interiors by careful selection of colours and materials. The sides from near the floor to above the parcel racks and all cross partitions are covered with plastic panels in choice colours which will give long life with minimum maintenance.

In all cars having first class accommodation there are two seats on either side of a central gangway. Seating arrangements in the second class cars vary according to the service on which the units operate, some having two seats on either side of the gangway and others three on one side and two on the other. The seats are upholstered in moquette of a modern design—midnight blue in the first class and either maroon or green in the second class. Tubular seat framing is used throughout and is finished in maroon, the same colour being used for the lining of the inserts of the aluminium frames and mouldings.

Parcel racks are fitted to the whole length of the bodysides. In some cars, these are made of aluminium brackets and tubes with netting, and in others the racks are entirely constructed of aluminium. All mouldings, inside window frames, and edgings are of polished anodised aluminium.

The ceiling panels are an "off-white" finish and the electric light fittings together with the neat ventilation grids, which may only be opened or closed by the Railway staff, give a pleasing effect.

Heating of the cars is by warm air through insulated ducting arranged immediately above the floor on the bodysides with suitably designed apertures below a number of seats. The warm air is provided by oil-burning air-heaters with the necessary oil tank and filter, etc. fitted below the floor of each car, and is controlled from a switch mounted on the driver's table. The system is fully automatic and the units may also be used to circulate unheated air on warm days.

There is communication between all cars, some of which have a combined luggage and guard's compartment, whilst in the remainder there is a lavatory compartment at the trailing end.



RAIL

COACH

COUK



A Metro-Cammell/Rolls-Royce production.



At a wayside station.

RAIL DRIVER'S COMPARTMENT

The driver's compartment is finished in maroon and black to minimise glare and reflection. It is commodious and all controls, instruments, gauges and switches are arranged to the best advantage. The table to which all these are secured occupies the full width of the cab and the hand brake has been embodied in the complete assembly. Removable panels from the table to the floor provide maximum accessibility to all equipment cables and junction boxes. An air-operated windscreen wiper is fitted to the window immediately in front of the driver, and a sun blind is provided for his use. The driver's seat is of the adjustable pedestal type, upholstered in hide.

A speed indicator is fitted at each driving end and a mileage counter is mounted on the axlebox of the leading axle of each power car. Twin warning horns are also provided at each driving end. Marker lights are fitted on the ends and a route indicator above the central window.



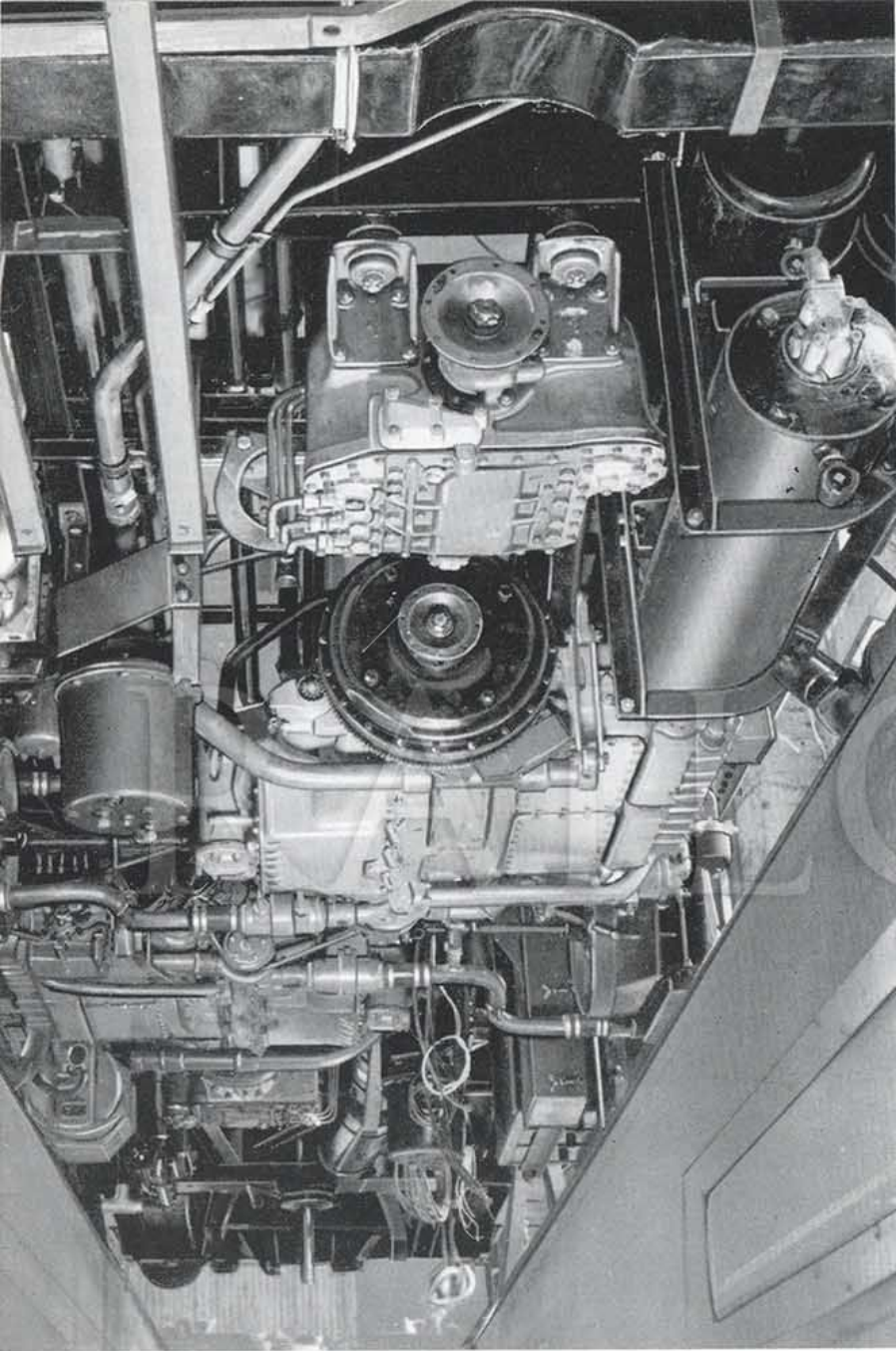
YORK MINSTER

BOGIES

The bogies are of conventional type with the frames constructed of fabricated sub-assemblies and rolled sections and plates riveted together. The bolsters are of the swing type, but anti-sway hydraulic dampers are fitted in the bogies to control and minimise lateral motion of the cars. The bogies are thus allowed normal action when the cars are running, but any tendency to swing is quickly and smoothly damped.

On the power cars, the bogies are designed to accommodate the final drive on the inner axle and have brake blocks on both sides of all four wheels operated by a standard 22 in. vacuum brake cylinder mounted in the outer end, thus leaving the whole of the space in the underframe between the bogies free for the power equipment. The trailer cars are fitted with 18 in. vacuum cylinders mounted in the underframe. The wheels are 36 in. diameter of the solid type with separate tyres and the roller bearing axleboxes are fitted with manganese-steel liners. Springing consists of laminated side springs with india-rubber auxiliaries and nests of coil springs in the bolsters.

The brake rigging is arranged for combined screw and pin adjustment and standard brake heads with renewable shoes are fitted. The power brake is operated by the "Gresham" two pipe quick release vacuum system, which uses a high vacuum storage arrangement to obtain rapid release of the brakes irrespective of the exhauster speed. Emergency application of the brakes can be made by the passenger communication chains over the entrance doorways, or by operation of the deadman control when the driver's throttle control lever is released. Handbrakes are provided in each car and an operating wheel is fitted on the top of each driver's table.



B.U.T. power equipment during assembly.

POWER EQUIPMENT

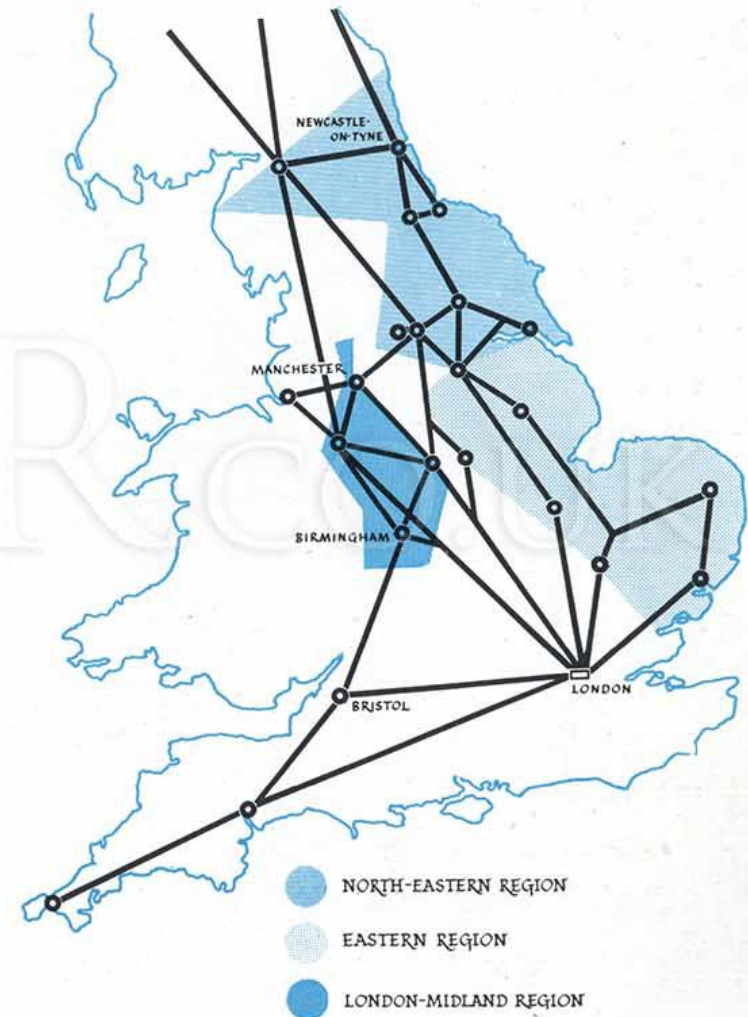
In the majority of the cars, the power equipment and controls are supplied by the British United Traction Company. There are two engines per power car, each having 6 cylinders giving 150 h.p. at 1,800 r.p.m. and driving a 4-speed "Wilson" type gearbox through a hydraulic coupling and short cardan embodying a "free wheel". A main cardan shaft from the gearbox is coupled to a final drive which is mounted on the inner axle of the driving bogies and incorporates the forward and reverse gears. The controls for the operation of engines, gearboxes and forward and reverse gears are of the electro-pneumatic type. The face of the underfloor radiator is in line with the side of the car, and the cooling fan is driven from a bevel drive mounted on the engine. A fuel tank for each engine is provided in the power car underframe; these are nominally of 80 gallons each, but one of them has extra capacity to supply the oil heater. An air compressor of 10 cu. ft. per minute capacity at 1,000 r.p.m. is mounted on each engine to provide compressed air for the control system, windscreen wipers and air horns. Two rotary exhausters are fitted to each power car, driven by Vee belts from pulleys mounted on the input ends of the gearboxes; each exhauster has its own oil-air separator.

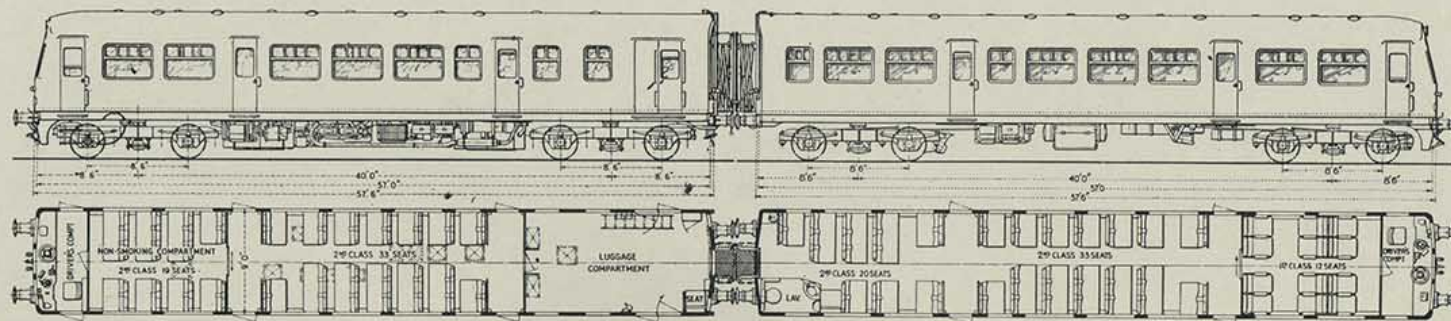
A Stone's generator of 150 amperes output is mounted on the frame of the power cars, and is controlled by a Tonum regulator. The generator is driven by four Vee belts from a pulley on the output end of one of the gearboxes and has a special adjuster for belt stretch. On the trailer cars the generator is of a similar type but is fitted on the inner headstock of one of the bogies and is driven by belts from a grooved pulley on the axle.

The batteries on the power cars are of either 400 or 440 ampere-hour capacity, whilst those on the trailer cars are 300 or 440 ampere-hour, according to the types used.

Each of the 4 two-car units for Manchester on the London Midland Region are fitted with two Rolls-Royce horizontal engines having 6 cylinders giving 180 h.p. at 1,800 r.p.m. A slightly larger 4-speed gearbox, manufactured by the Self-Changing Gear Company is fitted on these cars, but the general scheme of the power equipment, together with the control system, is similar to that on the B.U.T. engined cars, thus making it possible to run the two different types together in multiple if necessary. Later, 10 three-car sets will be equipped with similar Rolls-Royce engines for the Leeds area of the North-Eastern Region.

Shaded portions indicate areas where Metro-Cammell Rail-cars are in service.





**GENERAL
DATA
for a
2-Car Unit**

Length over buffer faces		60 ft. 8 in.
Length over headstocks		57 ft.
Bogie centres		40 ft.
Bogie wheelbase		8 ft. 6 in.
Diameter of wheels		3 ft.
Width over body panels		9 ft.
Overall width		9 ft. 2 in.
Height from rail to top of roof panel		12 ft. 4½ in.

