



DIESEL ELECTRIC PULLMAN TRAINS



Head Office and Works:

SALTLEY · BIRMINGHAM · 8

LONDON OFFICE: VICKERS HOUSE · BROADWAY · WESTMINSTER · S.W.1



Designed and produced in collaboration with
THE METROPOLITAN-CAMMELL CARRIAGE & WAGON CO. LTD., by Maurice G. Parker Ltd.,
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INTRODUCTION

One of the main features of the British Government's Modernisation Plan for British Railways was the provision of High Speed Luxury Diesel Electric Trains to run between large cities. This proposal was contained in a White Paper presented by the Minister of Transport & Civil Aviation to Parliament in October 1956 in which it was stated that these trains

"will contain all that is best to offer for the comfort and amenity of the passenger. Their future introduction will depend on the way in which they are received by the travelling public".

It was in December 1956 that Metropolitan-Cammell Carriage & Wagon Company Limited of Saltley, Birmingham, was nominated by the British Transport Commission to design and construct thirty-six vehicles, forming five train sets, as follows :—

- 2 six-car trains, with first-class accommodation only, for the London Midland Region for service between St. Pancras and Manchester.
- 3 eight-car trains, with first and second-class accommodation, for the Western Region for service between Paddington and Wolverhampton, and Paddington and Bristol.

These trains were to be unique on British Railways with new features throughout.

A **FIRST CLASS** ACHIEVEMENT



DE LUXE EXPRESS SERVICES

It has been a feat of engineering skill. Whilst carrying out research and development over a long period, highly qualified technicians have been checking at every stage of the design to ensure that the highest standards are maintained.

The formation of both six-car and eight-car trains are made up of three-car and four-car halfunits respectively, and the whole power equipment and auxiliaries—which provide maximum accessibility for maintenance—is duplicated in Power Cars at either end of each train. To carry all this equipment in a vehicle also carrying passengers needed careful consideration to reduce vibration and noise; this entailed special care in the body frame structure, the equipment suspensions, and body and floor insulation.

The whole Power equipment is immediately to the rear of the Driver's compartment and comprises 1,000 h.p., NBL-MAN engines and G.E.C. electric transmission.

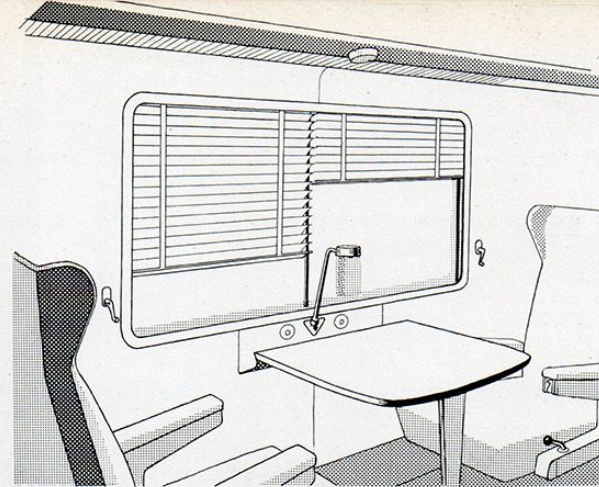
In the vehicles next to the Power Cars provision had to be made not only for the Auxiliary Power Equipment—two eight-cylinder under-floor engines, providing current for the air-conditioning equipment, lighting and battery charging—but also for the air-conditioning equipment itself, and—in the six-car trains—all the detail and fixtures connected with a Kitchen Car.

A special Westinghouse E.P. brake has been adopted which has an automatic feature superimposed on the normal system which permits retardation at higher pressures over pre-determined speeds, thus enabling the trains to be stopped within prescribed distances. The brake cylinders which are mounted on the bogies have automatic slack-adjusters.

All trains are equipped to receive and operate with the latest forms of Automatic Train Control, and there is also direct tele-communication between Driver and Guard.

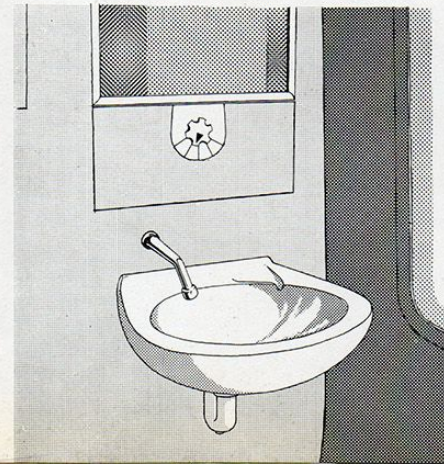
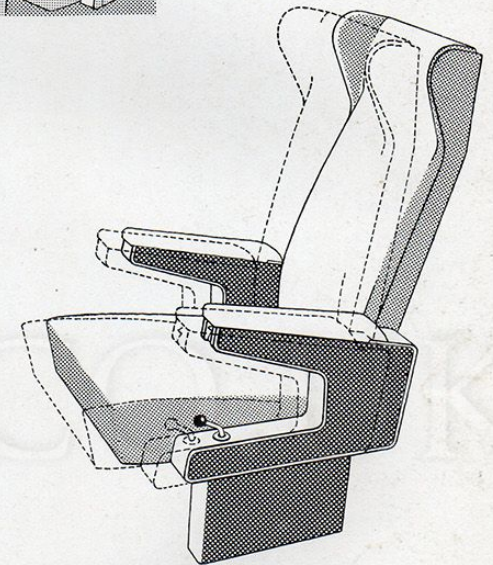
TECHNICAL DATA

Total length of train over Buffers:—6-Car train	409' 1"
8-Car train	545' 1"
Length of Power Car over Body	66' 5½"
Length of Trailer Car over Body	65' 6"
Maximum width of Body	9' 0"
Height from rail to roof	12' 4½"
Bogie centres	46' 6"
Bogie wheelbase:—Motor and leading Bogies	9' 6"
Trailer Bogies	8' 6"
Diameter of wheels	3' 6"
Number of Driving Axles	8
Traction Engines (NBL/MAN type L 12V 18/21) 2 engines, each of 1,000 H.P. at 1,500 r.p.m.	
Auxiliary Engines (Rolls-Royce type C8 NFH Series 821) 2 engines, each of 190 B.H.P. at 1,500 r.p.m.	
Maximum operating speed	90 m.p.h.
Seating Accommodation:—6-Car train 1st Class	132
2nd Class	—
8-Car train 1st Class	108
2nd Class	120
		Total 132
		Total 228



Besides fluorescent lighting in the centre ceiling panels, incandescent lights are built into the underside of the passenger luggage racks to restore colour balance. Independently controlled table lamps are also provided. Between the double window glasses are venetian blinds which are adjustable to any height or angle of inclination.

Whilst the seats can be adjusted at the touch of a finger to a reclining position, they also provide the passenger with all the support necessary for dining in comfort.



New washing facilities in the Toilets enable passengers to wash in fresh running water without the need for anti-splash rims or the risk of water spilling on to the floor. By setting a small knob positioned above the wash basin a measured quantity of water, at selected temperatures, is ejected by a spray nozzle directed into the open basin. Continued supplies of water can be obtained by re-setting the control.



1st. CLASS PARLOUR CARS

In conjunction with the British Transport Commission Designs Panel, special decor, fittings, upholstery and carpets have been introduced to present an air of restrained luxury by blending, in proper balance, traditional and well-proved features of Pullman saloons with contemporary materials and techniques. Two distinct colour schemes have been introduced in first class saloons, whilst second class accommodation in the eight-car trains has also received the same careful consideration in the choice and blending of colours.

Air-conditioning equipment will control heat and ventilation, and this permits fixed double glazing to be applied throughout each train.

The new Metro-S.I.C. gangway provides a clean and easy form of access between cars, not only free from draught and dirt but supplied with conditioned air from adjacent passenger saloons. The actual gangway tunnel is controlled by a system of levers attached to the ends of the coaches to ensure smooth and quiet movement round curves etc.

The new form of coupling is designed to eliminate any snatch or jerk when starting, and will reduce considerably the tendency of adjacent car ends to sway when running, thus contributing to the overall stability at speed.

A fully suspended floor, which is free to float independently of the main structure on rubber suspension units, has been provided to reduce any harsh vibrations or structure borne noises emanating from the track.

There are two fully equipped kitchens and pantries in each train and all working surfaces and walls, which are covered in stainless steel or Melamine faced plastics, provide a clean hygienic atmosphere. Besides deep freeze equipment and domestic refrigeration there are new sterilising sinks with constant boiling water. Cooking is by Propane gas.

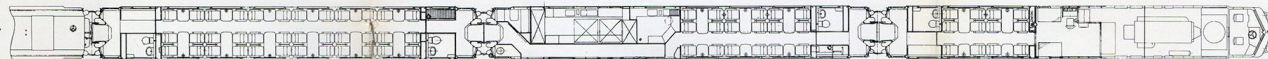
A public address system has been installed throughout each train.



LAYOUT OF HALF OF THE 8-CAR TRAIN



LAYOUT OF HALF OF THE 6-CAR TRAIN



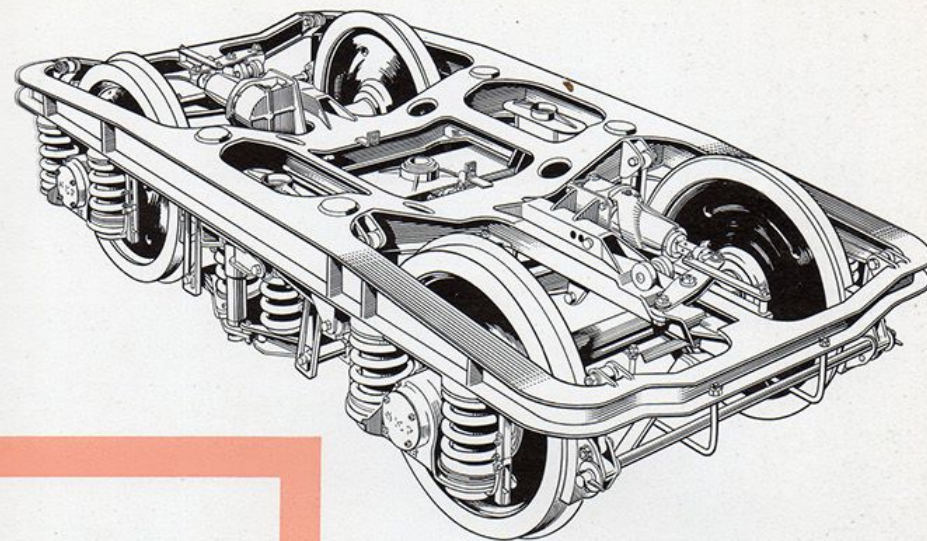
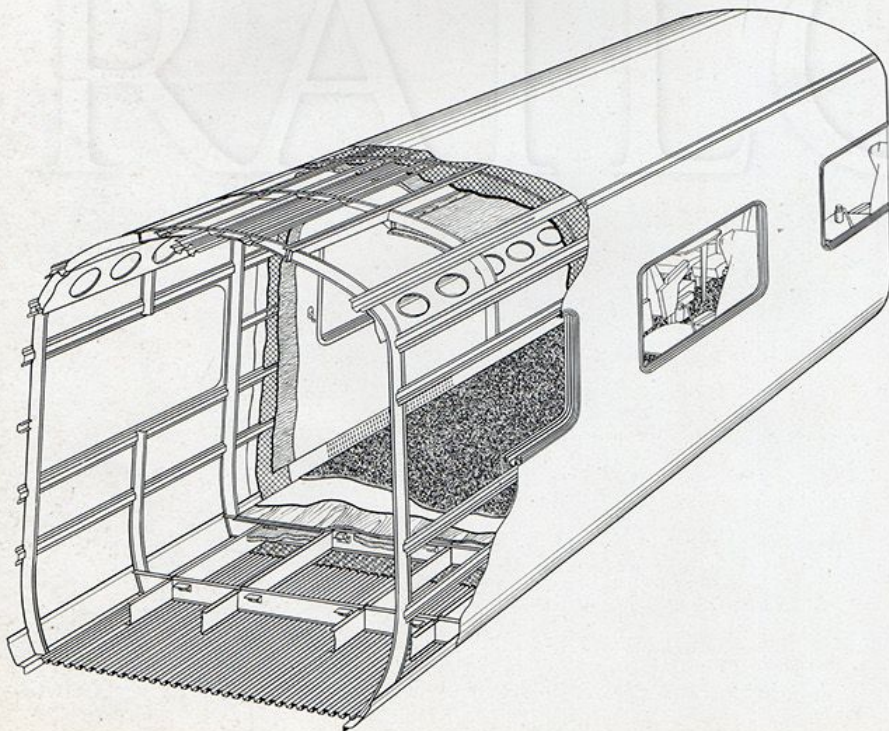
A new concept for railway travel in Great Britain has been evolved. An entirely new contour and external appearance in blue and white is now before the public and many new features have been incorporated to attract the passenger.

All this has been achieved with the advice and help of the British Transport Commission and the Designs Panel, also the Pullman Car Company Limited and Metro-Cammell's own Design Consultant. Two full size "mock-ups" were prepared in the early stages in which all ideas of interior decor and passenger amenities were discussed for both first and second class accommodation. The arrangement of the front end of the Power Car and the cab was altered many times before the final contour and lay-out was fixed. It was only after every detail had been fully investigated that decisions were taken for the main production.

INTEGRAL CONSTRUCTION

This latest form of integral construction as applied to railway coaches represents the culmination of many years of development. Due to the lighter and stronger type of construction, and in spite of much special equipment to be carried, these cars have been designed to permit higher speeds and greater operating economies than have previously been possible. Much of the body is built of a low alloy corrosion resisting steel of high strength, and spot welding has been extensively employed.

To ensure quiet and comfortable riding the body structures are heavily insulated in the roof, sides and floor against heat and sound.



METRO-SCHLIEREN BOGIE

Both Motor and Trailer Bogies are of the all welded Metro-Schlieren type and have been specially developed by Metro-Cammell for these trains.

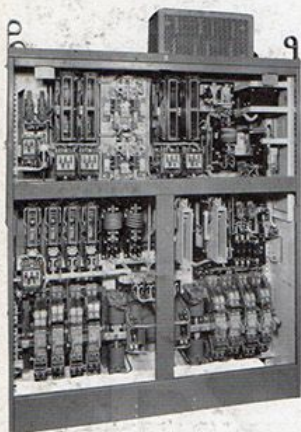
One of the outstanding features of the design is its capacity to retain a high standard of riding over large mileages with very little maintenance, an achievement due largely to the elimination of many of the wearing surfaces found on more conventional bogies. The Primary Suspension is based on the well proved Schlieren Unit—already selected for many important trains on the Continent—which employs a robust telescopic guiding and damping assembly within the helical spring housing to control axle movements.

To ensure their suitability for British Railways operating conditions, six Metro-Schlieren Bogies have been on trial on British Railways for 12 months. A comprehensive series of riding tests under various conditions has thus been carried out and much valuable and advanced data has been collected and assimilated.

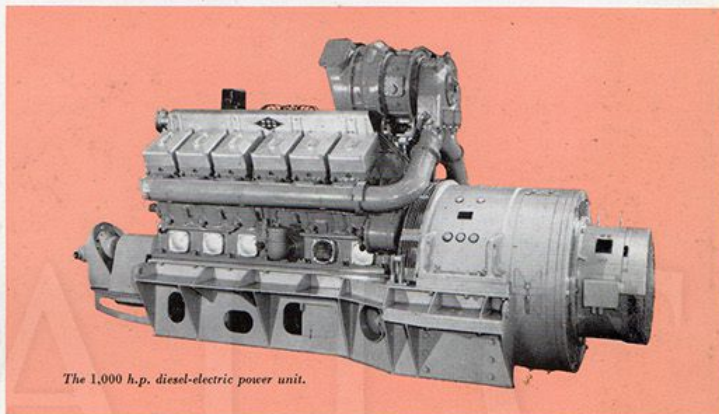
POWER EQUIPMENT

G.E.C.

The whole of the Power Equipment was supplied by The General Electric Company Limited, and includes the main power units, driving motors and associated control gear.



The power apparatus cubicle.

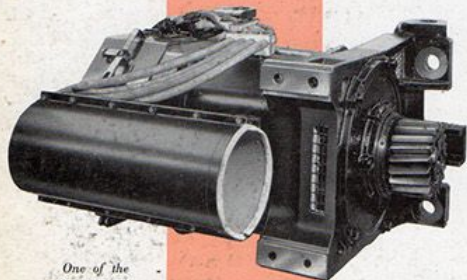


The 1,000 h.p. diesel-electric power unit.

In each of the power cars of the train is mounted a 1,000 h.p. pressure-charged, Vee 12-cylinder NBL-MAN Diesel Engine directly coupled to a single bearing combined main and auxiliary generator. The drive to the road wheels is of the Brown-Boveri type and is transmitted by fully spring-borne traction motors mounted on the bogies. For each train there are eight self-ventilated traction motors, two motors being mounted in the trailing bogie of each power car and two in the leading bogie of each auxiliary power car.

The main items of control gear are mounted in cubicles in the generator compartment of the power cars. The power units are controlled from a master controller mounted in each driver's cab at the ends of the train. Both power units are controlled from the operative cab for the particular direction of motion of the train.

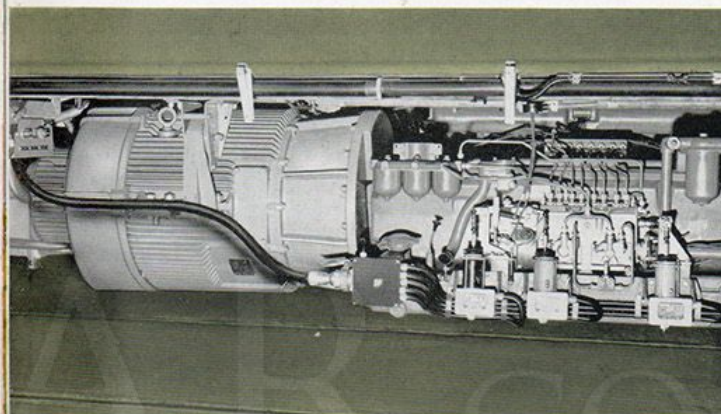
The system of control is such that the available engine power is fully utilized over the complete speed range of the trains. This form of control has already proved particularly successful on diesel-electric locomotives already in service on British Railways.



One of the self-ventilated traction motors.

AUXILIARY POWER, AIR CONDITIONING, AND LIGHTING EQUIPMENT

The air-conditioning, refrigeration and lighting equipment together with auxiliary power have been supplied by J. Stone & Co. (Deptford) Ltd., who have been manufacturing equipment for railway carriages for over a century.



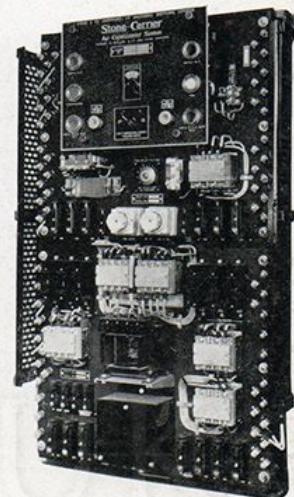
Alternator plus Rolls-Royce engine.

All cars are fully air-conditioned, and the temperature of the air in each car is automatically regulated by a Vapor thermostatic control system. Each vehicle carries a sealed motor compressor unit and condenser unit on its underframe, an air-conditioning unit in the roof and a control panel in the vestibule. Air-cooling and dehumidification are achieved by means of the Stone-Carrier mechanical refrigeration system, and heating is provided by electric elements in the air-conditioning unit, and at floor level in saloons.

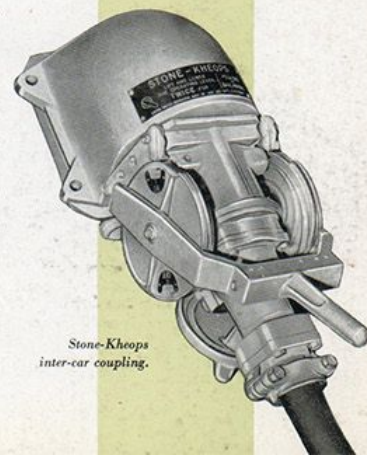
The power for the air-conditioning equipment and other services is supplied by two auxiliary power units. Each unit consists of an engine alternator set powered by a Rolls-Royce eight-cylinder engine of 190 h.p., the alternator and associated switchgear. For summer cooling and normal heating conditions, one unit will be used, the other acting as a standby. Both units will, however, operate under winter conditions when required.

Special Stone-Kheops inter-car couplings between cars with built-in safety devices distribute three-phase alternating current throughout the train.

THE
Stone
Group



Main air-conditioning control panel.



Stone-Kheops inter-car coupling.