THE CENTRAL LONDON ELECTRIC TRAIN
3 – CARRIAGES AND TRAINS

by Piers Connor

CHOICE OF DESIGN

By the time that the Central London Railway (CLR) opened to the public on 30 July 1900, two other electric tube railways were running in London – the City & South London Railway (C&SLR) and the Waterloo & City Railway (W&C), so the Central London had some experience to look to in the development of its systems. In fact, since the CLR had adopted the same traction voltage as the W&C at 550 volts DC, they are recorded, in one of the company's board meeting minutes, as having persuaded the W&C to allow them to test one of the locomotives on their railway. Quite how they did this is open to speculation, since the only way of getting a locomotive down into the W&C was by means of the vehicle lift at the line's Waterloo terminus and this lift was limited to 30 tons capacity. Of course, the locomotive could have been partially dismantled and lowered in bits but most likely they took down the bogies first and then the body shell. No records of the results of the tests appear to have survived.

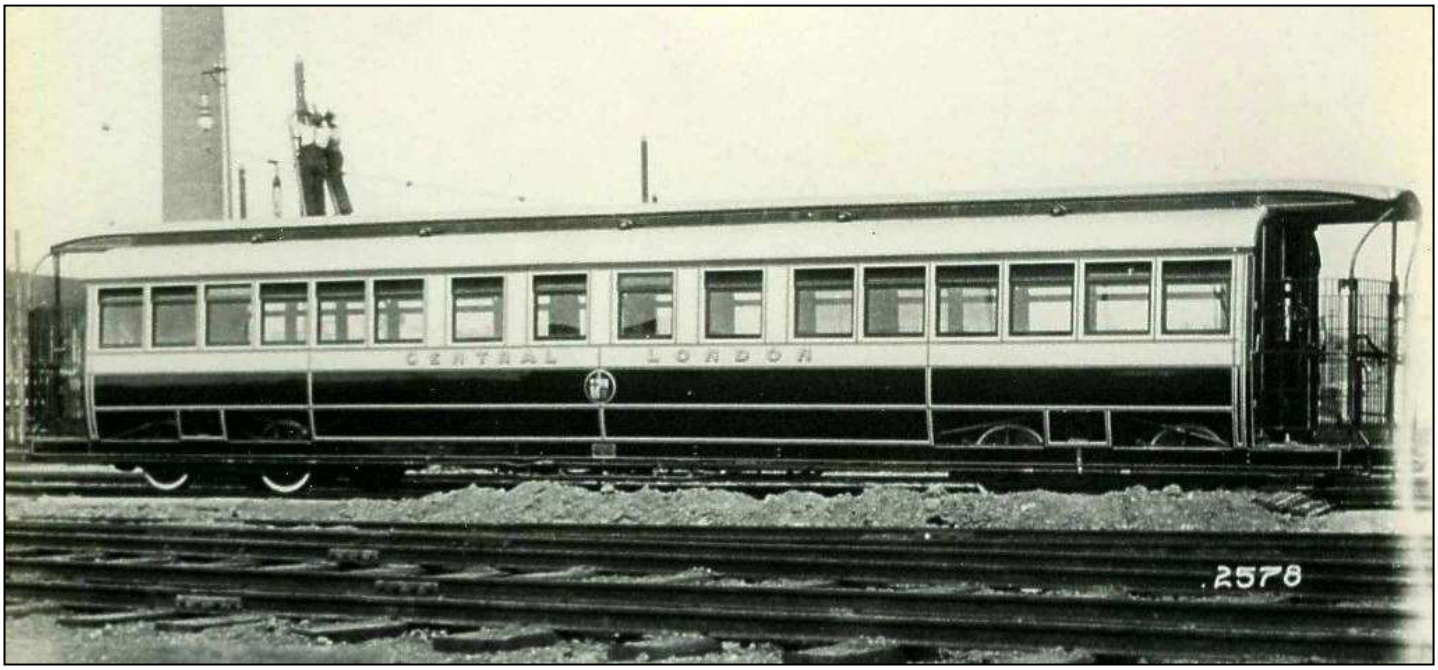


Figure 1: A Central London Railway trailer car seen in Wood Lane depot shortly after delivery from the manufacturer. The open entrance platforms are clearly visible. A feature of all the cars when delivered is that externally visible vehicle numbers were not provided. Note also that the central window pillars are wider than those towards each end of the car. The thicker pillars mark the location of the transverse seats. This particular photo is interesting in that workmen can be seen behind the car apparently working on installing overhead wiring. Very soon after the depot was opened, it was decided to provide overhead wiring so that specially equipped locomotives could be used for shunting in the yard. The steam locomotives originally bought for the purpose do not seem to have been sufficient.

The experience gained by the earlier tube railways encouraged the Central London to go large in the design of their trains. After all, they had the premier route in London and they expected traffic to be substantial. They chose a 7-car train formation, with each car 45 feet in length, some 3 feet longer than the W&C trailer cars and 19 feet longer than the C&SLR cars.

The cars had seats for 48 persons and could accommodate 40 standing passengers within the seating area, calculated on the basis of the standard 5/m^2 used in London today as "observed" standing capacity. This would give a total train capacity of 665 persons. In comparison, the equivalent Central Line train capacity today would be 678, not much difference really but offering less seats.

Of necessity, the car design had to have open end entrances, like those of the C&LSR and W&C. This was because the small diameter tube tunnels required the car body to curve into the roof from a low cant rail level. If side doors had been provided, they would have needed to curve to the same profile. No one at this time was really sure how side doors could work, so it was easier to adopt the American style open platform design. The end entrances had sliding doors separating them from the passenger saloon but the platform entrances had inward opening steel grille gates. In this there was a difference from the W&C and C&SLR cars – they had sliding "Bostwick" lift style lattice gates, not swinging gates. To give sufficient headroom for the passengers, the roof covering over the entrances was confined to the central part of the platform only. The car body roof had a central clerestory and it was this part that was extended over the end platforms.

BOGIES

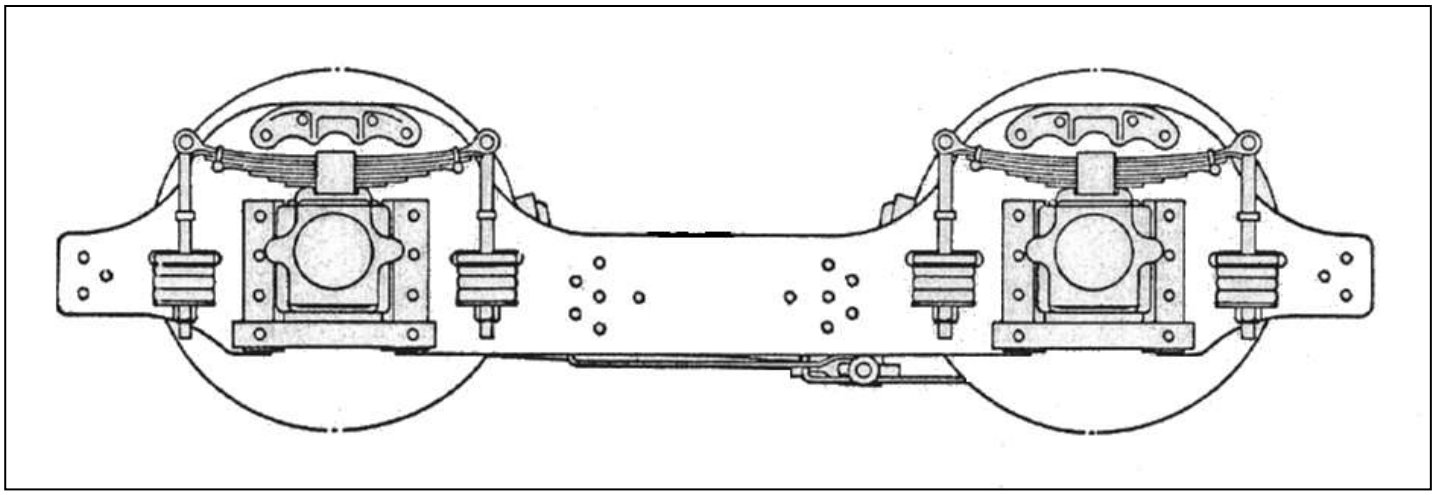


Figure 2: Drawing of CLR trailer car bogie. It had a 5ft wheelbase and 29 inch wheels. This drawing, by the late Stuart Harris, shows it as similar to but not identical to that seen in the original drawing of the trailer car shown in Figure 3. It was described as the "S" type bogie in the Underground's catalogue of the 1930s. There was also a very similar "R" type bogie. Neither drawing matches the original exactly but both incorporate many of the features. The design has traditional British features with leaf primary springing and steel coil bolster springs. The spring hanger dampers are rubber pads. The brake shoes were squeezed in behind the bogie side frames on the inside edge of the wheels.

The bogies had to solve the problem of the low floor and how the wheels were to fit. To accommodate the wheels, the underframe and floor were given clear openings. These were covered over in the car interior by longitudinal seating. The bogies were specially designed to fit in the very confined space.

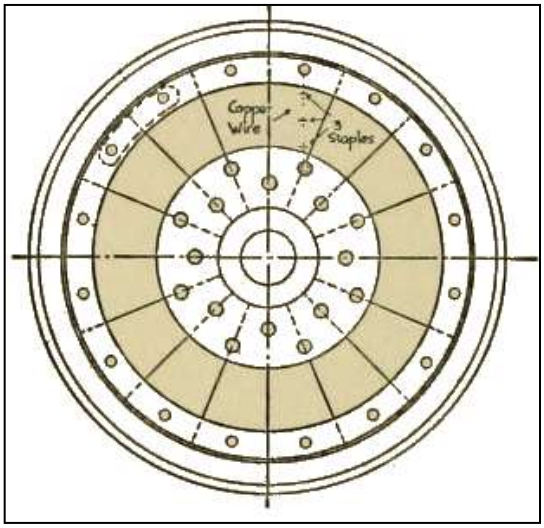


Figure 3: Drawing of wooden centred Mansell wheel as used on Central London trailer cars.

In spite of the American style car body, the bogies were British in concept (Figure 2). They each had a pressed steel frame with laminated steel axlebox springs and rubber hanger spring pads. There appear to have been some very small steel coil bolster springs too but they can't have been too effective. Each wheel had a single brake block mounted to operate on the inside tread of the wheel. Another scale view of the bogie appears in the drawing of the trailer car reproduced in Figure 5 below. The bogie frames were 8ft 8¼ins long and they were shaped so that the top edges dropped between the wheels to allow the low body bolster to fit transversely in the space between the wheelsets.

The wheels themselves had wooden centres in place of the steel or wrought iron spokes usual at the time (Figure 3). The wooden part consisted of 16 wooden segments arranged round a steel boss. They were secured by bolts passing through circular steel straps on each side of the wheel. The tyre casting was shaped to allow it to fit securely on the segments. The design was patented by Robert C. Mansell in 1848. Mansell was the carriage superintendent of the South

Eastern Railway at the time, a position he held until 1877. Mansell's wheel had become quite popular as it provided better sound deadening qualities than wrought iron or steel wheels. However, as both the weight of coaches increased and suburban operations with frequent stopping became more common, the increase of the braking duty on wooden centred wheels became a concern. It led to higher rates of tyre heating and the possibility of tyres expanding and working loose. As a result, by the start of the first world war, production of Mansell wheels had stopped and all-metal wheels became standard. However, Mansell wheels were adopted for the Central London stock, in spite of another disadvantage that had become apparent by this time.[1]

The separation of the tyre from the axle by wooden inserts meant that the wheelset was insulated from the track electrically. While this wasn't an issue for Victorian era railways, it did become a problem in the early 20th Century as railways began to adopt track circuits for signalling. The Mansell wheelset could not connect the running rails electrically and therefore the vehicle wouldn't be detected by the track circuit. The problem was simply solved by the insertion of a copper strap that connected the tyre to the wheel boss.

CAR LIGHTING

For electric railways, which up to this time all had traction systems that used the running rails for the return circuit, the copper strap on the Mansell wheels was also essential to connect the electrical equipment on the cars to the return circuit. In the case of the Central London, this would possibly have been required by the lighting system. I say "possibly" because I have not found a reference that describes the lighting circuit for the cars in any detail.

The interior lighting on the CLR trains was fed at 550 volts DC from the traction supply. Since the only traction supply that was provided on the train came through the collector shoes on the locomotive, the return could have come back to the locomotive if we assume that the lighting cable was twin core (positive & negative). Alternatively, it could have been earthed on each car, requiring the return to have been completed through the wheelsets and their copper straps.

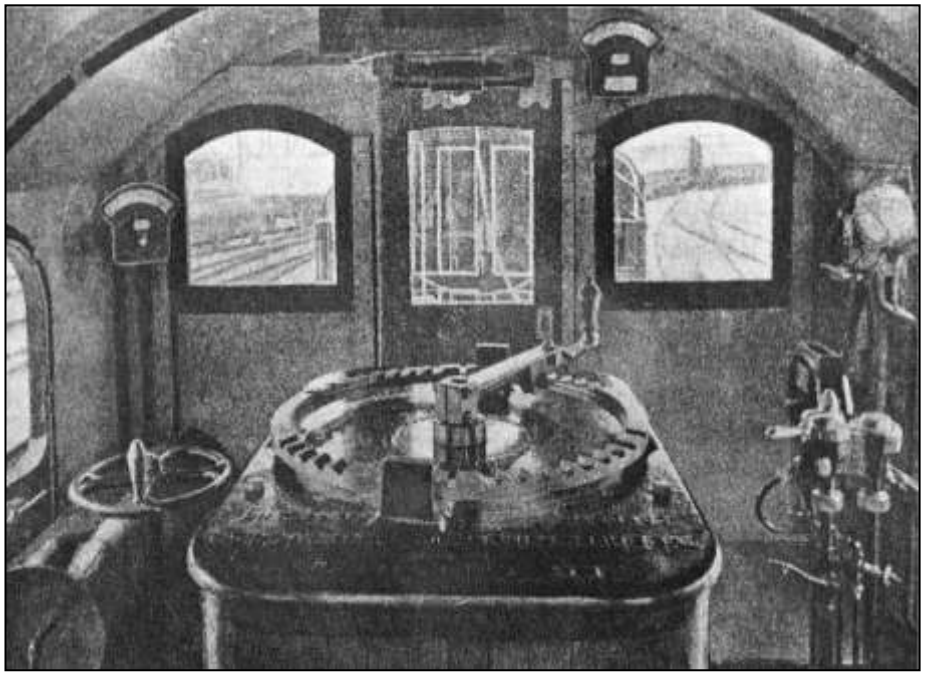
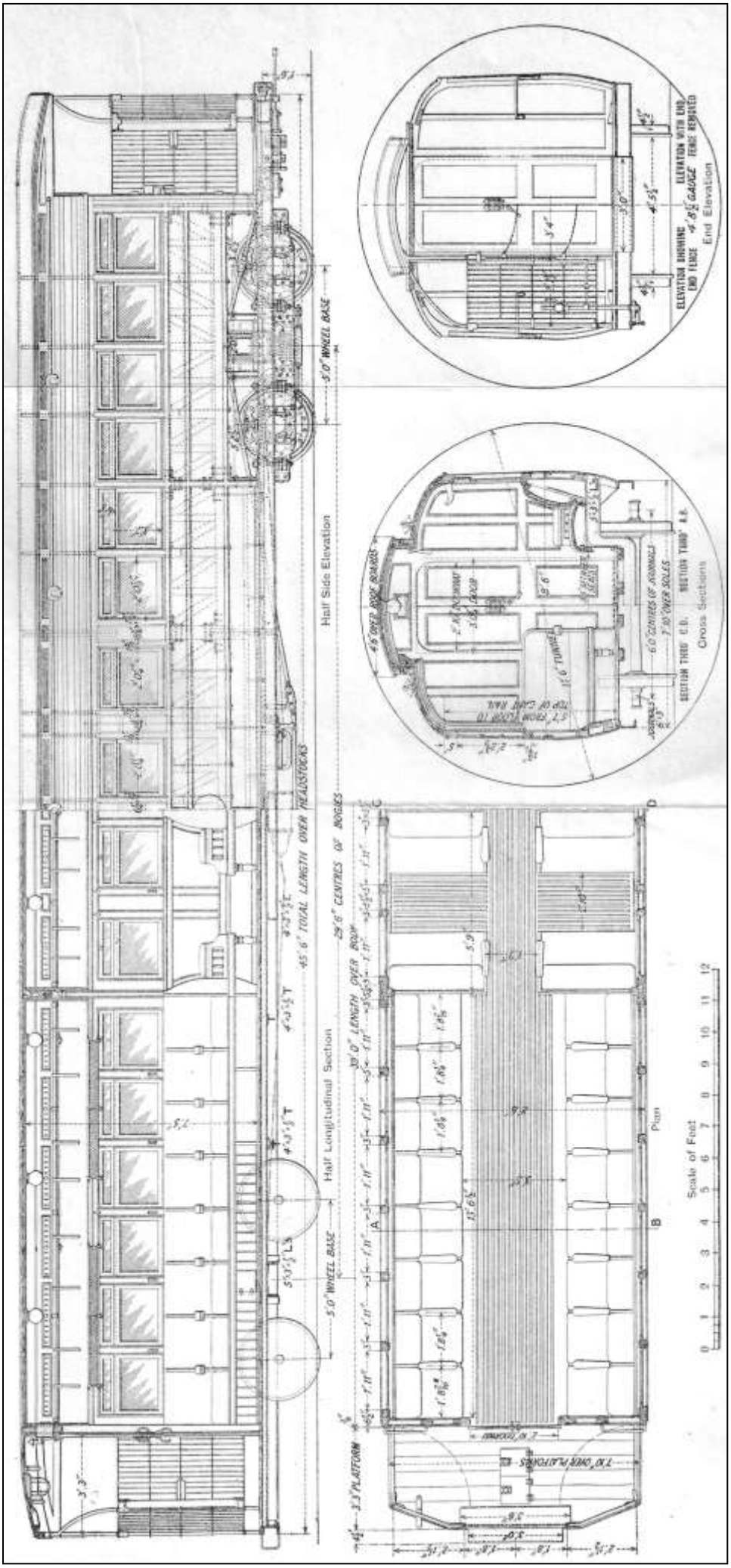


Figure 4: A rather poor but interesting photo of the interior of a CLR locomotive showing, through the end door, the lighting cable between the loco and its train. The cable is plugged into a socket on one of the loco bonnets and a socket under the roof canopy of the adjacent trailer. The large power controller is in the centre of the cab, with a brake valve and duplex gauge on the right. The handbrake wheel and auxiliary reservoir can be seen on the left while two electrical meters are mounted on the end wall. The train is in Wood Lane yard.

I have seen no details that suggest the provision of lighting switches on each car, so it could be that lighting was controlled from a master switch on the locomotive. This would be logical for a line that ran almost entirely in tunnel and it was a cheap solution. Only eight lamps were provided in each car, plus one on each end gangway. There was no emergency electric lighting. Instead, an oil lamp was provided in each bulkhead over the entrance doors. These lamps were barely enough to provide much comfort, at least according to one Henry Van Cutsem writing in a letter to "The Times" on 4 September 1900, where he described an incident on Saturday 18 August, when the current

[1] The drawing (Figure 3) and most of the details of the Mansell wheel come from "Railway Mechanical Engineering" by A.R. Bell et al. Volume 1, published by the Gresham Publishing Company Ltd., London, 1923.



went off and his train was stalled in the tunnel between Holland Park and Notting Hill Gate for 2¼ hours while "we were kept prisoners in the dark, rendered visible only by two dim oil lamps". Eventually "some boards were laid down" and the passengers were walked back to Holland Park station. What Mr. Cutsem hadn't realised was that the boards were already there. Walkboards had been provided along the four-foot to one side of the current rail from the opening of the line but Cutsem assumed the delay in evacuation was due to the boards having to be laid along the track before evacuation could take place. It transpired that the cause of the delay was the derailment of a locomotive "at the points". This was not a unique incident, as two other locomotive derailments were recorded by Wilson and Haram in their book "The Central London Railway" (Fairseat Press, London, 1950).

Figure 5: Drawing of original CLR trailer car of 1900 taken from Electric traction on Railways by P Dawson, published in 1909.

FIRST CLASS

It was originally intended that the Central London trains would be provided with first class as well as ordinary seating and that both would be allocated smoking and non-smoking cars. Orders were placed with the Ashbury Railway Carriage & Iron Company in Manchester (143 cars) and the Brush Electrical Engineering Company of Loughborough (25 cars), to give a total of 168 cars that provided 24 x 7-car trains. With the need to provide first class for smokers and non-smokers, we could assume that the plan was to have the two

middle cars of each train as first class (smoking & non-smoking) and the others as what ever they would call their ordinary class – presumably third class. Photographic evidence from several sources suggests that the end cars of trains were smoking cars.

The division of classes was seen in the upholstery provided. Third class had rattan seating, while first class had cloth seating. Photos of various types of cloth seating have survived – a flowery pattern and a plain finish. There is also a later photo of a car with leather seating.

Figure 6: Interior of a Central London trailer car when new. In this view, the type of upholstery isn't clear but note the match strikers fitted to the back of the seat frames. It was the custom to provide these small plates in railway vehicles for the use of smokers who wanted a suitable surface upon which to strike their matches. It was supposed to reduce damage to the varnished surfaces caused by striking matches. Glass bowls, covering the electric lights, are positioned down the centre of the ceiling and a wooden rail carrying the leather hand straps is fitted along each of the lower edges of the clerestory roof structure. There was much indignation in the press about the idea that standing in trains was expected and was provided for. Hat racks and hooks are fitted over the windows above the longitudinal seats. Each window has an inward tilting toplight. The floor is grooved wood, a durable design still being provided on new trains in the 1980s.

Cars were painted in a two-tone body livery rather similarly to the contemporary London & North Western Railway style, with cream on the upper body structure and what was described as "purple-brown" below the waist. The name CENTRAL LONDON in blocked, gold letters was added along the panel below the side windows with a rather nice, stately looking coat of arms placed in a circular plaque below it. One odd feature of the cars was that, judging from all the photos of the vehicles as delivered, none of them appear to have been allocated numbers until some time after they arrived at Wood Lane. I would imagine that the Railway Inspectorate told the CLR that the cars had to be numbered before they entered service. One photo of a car when new suggests that the class was indicated on the car roof. However, the class idea was abandoned before the public service was started. Just for the record, the Ashbury cars were numbered 1-125 and 151-168. The Brush cars were Nos. 126-150. All the cars, apart from the second Ashbury batch, which were delivered in 1901, are noted in the company returns as being delivered in 1900.

THE TRAIN SERVICE

The history of the delivery programme for the trailer cars begs some questions about the train service. Obviously, the lack of numbering on the vehicles when delivered makes any subsequent reference to numbers and dates of delivery suspect, to say the least. And, in general, railway

company car number returns were not always too accurate. Also, the Central London was supposed to be running a 24 trains per hour (tph) service. All of these variables show us some inconsistencies. They don't all match.

Although it seems that no original Central London timetables have survived, from the train service data we do have, we know that the plan was to operate a 2½-minute service and that this was done at peak times, apparently using 7-car trains. This would have required the whole car fleet to be in service and would have required a round trip time for each train of 60 minutes, including turnrounds. This time is less than the 62½ minutes recorded in published records. Since the company records suggest that several train's worth of cars weren't delivered until at least six months after the line opened, this obviously didn't happen. Perhaps some trains were limited to 6-car formation until the whole fleet was delivered. Perhaps the company records related to the dates the cars were paid for and thus entered the company's asset list later than when they were commissioned for service. Perhaps they tried to operate 24 tph but couldn't, not on a regular basis anyway.

Eventually things settled down and, apparently, they did run a 24 tph service on a regular basis. On Sundays, it was usually 15 tph (every 4 minutes). Trains were manned with a crew of two on the locomotive and a "gateman" or conductor on each car – a total of nine staff. A gateman stood at a pair of gates on adjacent cars and opened and closed the gates at each station. T.S. Lascelles, in an article in "Railway Pictorial and Locomotive Review" of August 1950, described the station starting process as "quite a dignified ritual." He went on, "The intermediate conductors, having closed their gates, held out a hand and, on seeing all [the] hands extended, the front conductor held up a green hand-lamp and called out "right forward". The rear conductor then showed a green hand signal and whistled, whereupon the front one turned round and showed his green lamp to the driver, or assistant driver". The gatemen closed the saloon end doors as the train started, first calling out loudly to the passengers the name of the next station.

POPULARITY

The railway quickly became popular. Lascelles notes that the traffic rose to an average of 130-140,000 passenger journeys per day in 1902. This was a very respectable figure in its own right but it was topped on 29 October 1900, City Imperial Volunteers' Day[2], when 229,000 passengers were carried. The average daily totals suggest that the Central London was carrying 13-14,000 passengers per hour in the peak direction, not far short of its capacity of 16,000 with 24 trains per hour. This was soon to push the railway into expanding its services, as we shall see in a future article.

To be continued …..
