

# THE CENTRAL LONDON ELECTRIC TRAIN

## 10 – FROM GATES TO DOORS

by Piers Connor

### CHANGES AT WOOD LANE

The Central London service to Ealing Broadway started on 3 August 1920 and, at the same time, a new track layout and new platforms were brought into use at Wood Lane. The work involved was quite extensive, particularly because the changes required the westbound (WB) and eastbound (EB) tracks to be connected to the existing terminal loop. It also required additions to the accommodation at Wood Lane Depot so that they could get some of the Ealing Stock under cover.

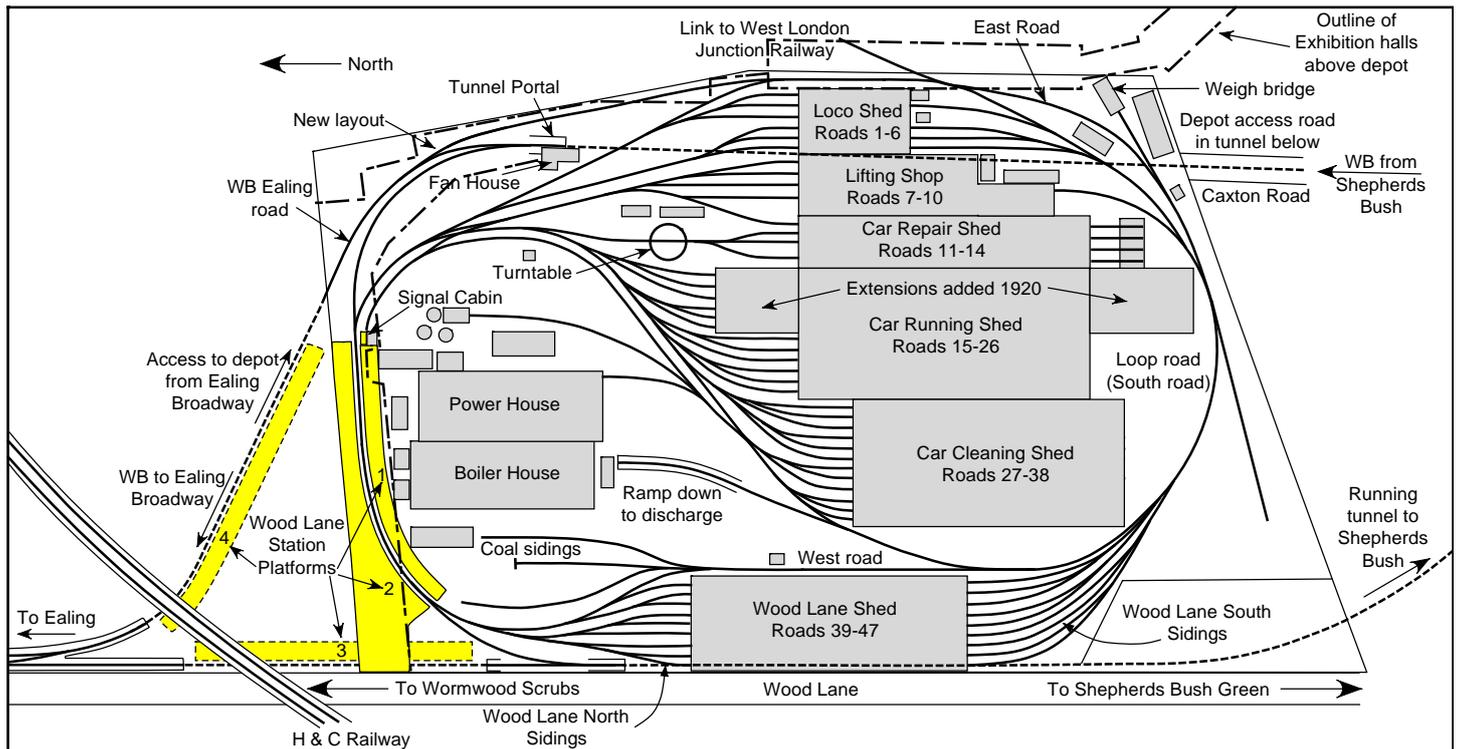


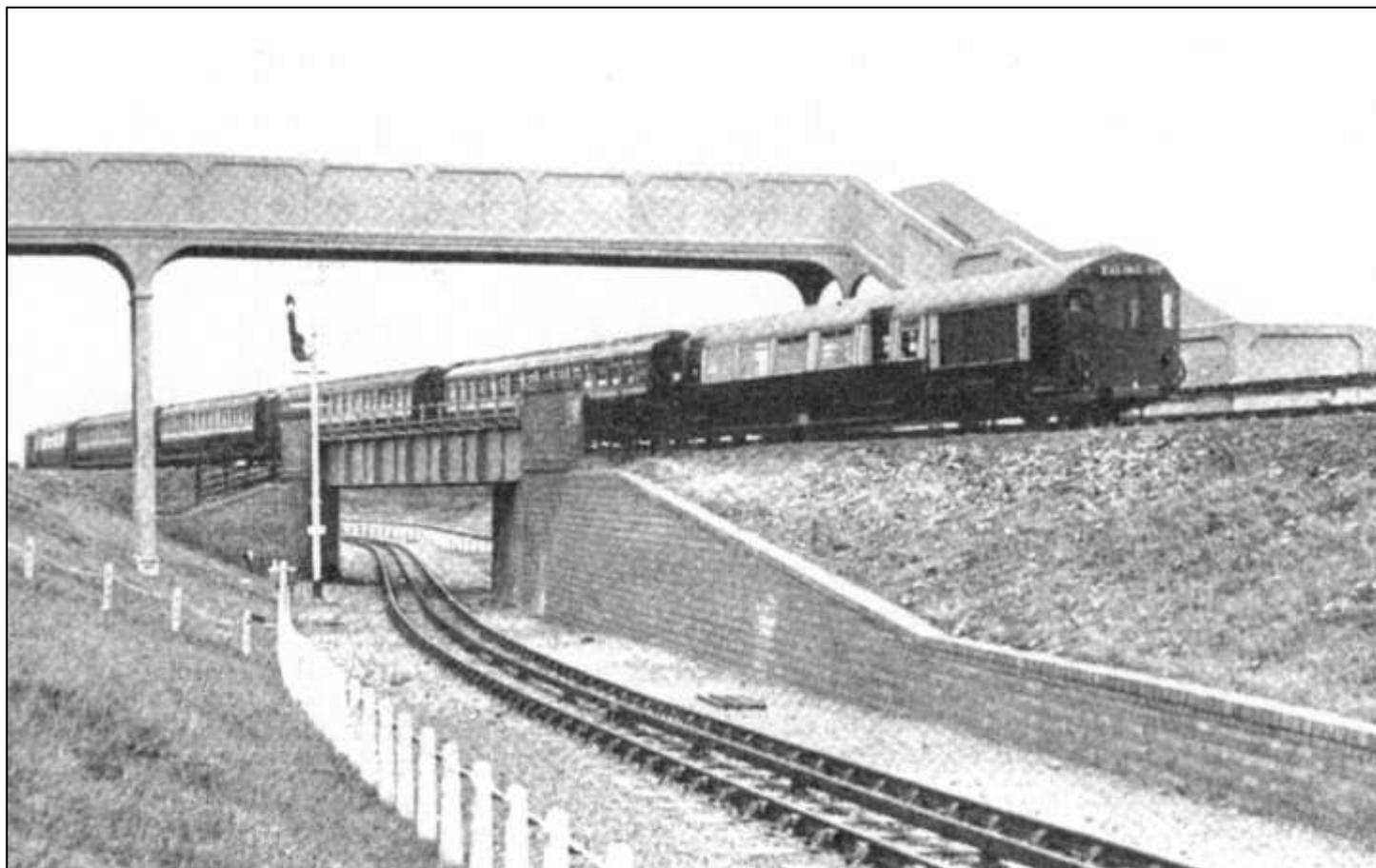
Figure 1: Diagram of Wood Lane station and depot as arranged for the Ealing extension in 1920. The sheds on 15-20 Roads have been extended to accommodate 2x6-car trains, a turntable has been provided and two new platforms have been added to Wood Lane station. The new platforms were built below ground level. They had to be arranged to match the triangular track layout needed to connect the original loop track to the new westbound and eastbound tracks of the Ealing extension. The layout meant that trains going to and from Ealing ran on the right had track in their direction of running as opposed to the usual left hand running on British railways. The lines crossed back on a specially built flyover at Du Cane Road. Drawing by author.

Looking at the depot first (Figure 1), there were a number of changes that were put in to make room for the Ealing Stock. The most significant was an extension at each end of the car running shed buildings over Roads 15-20 so that each of these roads could accommodate 2 x 6-car trains. The Central London's fleet now consisted of 12 x 6-car Ealing Stock trains and 30 x 6-car Tunnel Stock trains plus four spare Tunnel Stock motor cars. Allowing for three trains to be in the car repair shed (Roads 11-14) and 12 x 6-car trains on Roads 15-20, the remaining fleet could be stabled on Roads 21-47.

Another addition was a turntable. This was provided outside the car repair shed so that cars could be turned when required to fit into a unit with other cars. Remember that Central London cars had to couple the right way round to other cars because of the location of the brake pipe down one side of the train. Whilst on the subject of brake pipes, by this time all the trains had been fitted with a main reservoir pipe down the opposite side of the train from the brake pipe. This was done as part of the conversion of trailers to control trailers. Once control trailers started to appear in 1908, the whole fleet had to be done if any reasonable level of standardisation was to be achieved. The control trailer driving cab needed a main reservoir supply whenever the driver needed to release the brakes

and the only place he would get one is from a motor car, where the air compressor was located. If he was driving the train from the control trailer cab, both the air supply and the current needed to operate the traction control had to come from the motor car at the rear of his train, so all cars on the train had to have the main reservoir pipe.

By this time too, motor cars were sporting both main and brake hoses at the front. One might assume that they weren't necessary since motor car front ends were never normally coupled to anything but there would have been occasions when a failed train needed a push out and an air supply would have been very useful. Without it, the failed train would have to be moved without brakes – a 'swinger', as we called it – and it would have been very difficult to control because the driver, at the front, would be six cars away from the brake valve!



*Figure 2: The flyover built near Du Cane Road to restore the normal left hand running on the Central London's Ealing route. The train comprises a 6-car Ealing Stock set with 1915 motor cars and 1900 trailers. The signal on the EB track is one of the new 3-position automatic semaphores introduced by the Great Western Railway. This one is showing that the line is clear all the way to the Wood Lane home signal. Photo: Railway Magazine, Vol. 47, pp 172-174.*

To connect the Ealing extension tracks to the existing terminal loop, a new track layout had to be installed at Wood Lane. At the WB tunnel exit the track now split into WB Ealing and platform loop lines. Each had its own platform. The WB Ealing platform (No.4) was built, separately from the old station, north of the loop platform. The new platform track had to be used bi-directionally to allow trains coming from Ealing to get into the depot and any train going into service on the Ealing line had to go "round the farm" on the loop via the south road and the east road in order to get into the WB Ealing platform. There was no other way in or out. Trains from Ealing had to go into the depot in the same way. I expect the Ealing trains would normally have been stabled in the Wood Lane Sheds, Roads 39-47, to make the moves easier.

The EB Ealing platform (No.3) was built west of the original Wood Lane platforms on a straight track that led directly into a junction with the original EB running tunnel going towards Shepherd's Bush. The arrangement meant that the trains to and from Ealing were running "wrong road" when compared with the usual British left-hand running rule. This aberration was corrected by constructing a flyover near Du Cane Road, about  $\frac{3}{4}$  mile west of Wood Lane, so that WB trains crossed over the

EB track to get back to the normal left hand operation (Figure 2).

## YORKE'S CONVERSIONS

When the Central London's service to Ealing started, only the station at East Acton was open. There was very little development anywhere else and the rest of the route ran through open countryside, initially at least, and traffic was rather low. However, traffic from Ealing began to increase as people realised that the new service gave a better connection to the West End and the City than either the District or the Great Western<sup>1</sup>. Just three years later, on 23 November 1923, two additional stations were opened, one at West Acton and one at North Acton. North Acton had been planned as Victoria Road but West Acton was an addition brought on by the prospect of the development of factories and housing. These quickly followed that station's opening.



*Figure 3: A 6-car Tunnel Stock train approaching East Acton shortly after the Central London service was extended to Ealing Broadway. The Central London seems to have been quite casual about using Tunnel Stock trains on the Ealing service, despite their being under powered for the route. Eventually, some Tunnel Stock trains were upgraded for the Ealing service to match the performance of the Brush cars – the “Yorke” conversions. Photo: LT Museum.*

The CLR soon realised that the 10-minute headway wasn't enough at peak times, so they had to increase the frequency by running Tunnel Stock trains out to Ealing as well as the usual Ealing Stock. A few of the Ealing trains were made up to 7-car formations. One problem that quickly arose was that, compared with the Ealing Stock, the Tunnel Stock trains were under-powered. The 1915-built Brush cars had more modern and more powerful motors than the 1903 cars. The 1903 cars had GE66 motors with a 154 h.p. one hour rating but the 1915 cars had an improved version, the GE212, which had a 234 h.p. rating, more than 50% higher. The design was refined and it incorporated interpoles. Interpoles were additional pole windings inserted into the motor between the ordinary poles to improve efficiency and reduce arcing at the motor brushes.

Eventually, it was decided to upgrade some of the Tunnel Stock trains to Ealing Stock standards. The engineer in charge of the upgrade at Wood Lane was one L.J. Yorke and his name quickly became associated with the conversion work, even to the extent that they became known officially as

<sup>1</sup> See “Rails through the Clay”, Jackson, A.A. and Croome, D., Capital Transport Publishing, 2nd edition, 1993.

the “Yorke” conversions<sup>2</sup>. Four trains were tackled, each being given new motor bogies, type G2, which were basically the same as the G type provided for the 1914 Brush motor cars but they were modified to reduce their weight by over half a ton. They were also fitted with GE212 motors and new automatic traction control equipment. To accommodate the new bogies, the steel frame plates that covered the lower part of the original bogie area under the switch compartment were cut away and new, deeper stiffening plates were added to the raised solebar area. This had the effect of widening the width space and of exposing the bogie (Figure 8, page 414).

The switch compartment had to be modified to take the new traction control equipment. Amongst other new features, the system had two more contactors than the original setup and, to allow better access from the outside, the original two external sliding louvred doors were removed and replaced by three louvered panels that looked very similar to those provided on the 1914 motor cars.

The Yorke trains were provided with modified control trailers, complete with Type T trailer bogies, like those provided on earlier Ealing Stock control trailers, so that they could be split into short trains for off peak services. The project saw a total of eight control trailers and eight motor cars done. The work was apparently carried out between October and December 1925. By this time, other schemes were afoot.

L.J. Yorke started with the Underground organisation shortly after his return from military service at the end of the First World War in 1918. He was appointed as the project engineer at Ealing Common with responsibility for rebuilding the wooden B Stock trailer cars that were suffering from dropped ends and rotting wooden frames. Once that job was well under way, he was sent to the Gloucester Railway Carriage & Wagon Company to act as the Underground’s inspector for their contract to convert the Piccadilly Line Gate Stock motor cars to air door operation. Sometime later he turned up at Wood Lane.

## DOORS

The experience of the Underground with working trains under the pressure of increasing traffic levels had pushed them into looking for ways of improving throughput and capacity. The pre-war introduction of new motor cars with centre doors had shown how additional doorways could speed up loading times at stations and the introduction of powered door technology on subway trains in the US offered a possible way of improving times even more and of reducing train staff.

The idea of adapting the Underground’s existing tube fleet to have powered doors seems to have appeared during the First World War and, after more than two years of design and procurement work, in December 1921, a 6-car train equipped with air-operated doors appeared in service on the Piccadilly Line, made up of new trailers and two converted Gate Stock motor cars. After some modifications to the equipment on the first train, another nine, similar trains were introduced on the line over the next couple of years. The conversion work was difficult. The Piccadilly cars had all-steel bodies and cutting into these to create the door openings in the centre of the body was not without the risk of causing too much damage. It was time-consuming and expensive too. A number of variations in the design were tried before one was settled upon. The open end platforms had to be enclosed too and the gates replaced by sliding doors. Pockets had to be inserted into the body sides to provide space for the open doors and the pneumatic door engines.

The introduction of air door stock on the Piccadilly Line ran in parallel with orders for more new tube cars – the fleet that was to become known as “Standard Stock”. Originally intended for the Piccadilly Line and a proposed extension of tube services to Richmond, the new stock had a fully enclosed body with the doorways on the trailer cars set a one-third and two-thirds of the car length. Motor cars had a (roughly) central doorway and a lockable guard’s door at the trailing end that was not used by passengers. The first experimental cars of this type appeared in 1923 and were run experimentally on the Piccadilly Line until the Hampstead Line was ready for them in 1924.

## NO BRAINER

Despite some teething troubles with the technology and fears that “all this extra equipment will reduce reliability and increase maintenance costs”, the experience gained with the air door trains

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<sup>2</sup> LPTB Drawing No 21778 Sheet 4a, dated 23 January 1935.

quickly showed the huge benefits they generated when compared with the old Gate Stock trains. Dwell times were reduced and crewing costs were slashed by half. Conversion to air doors was the proverbial “no-brainer”, whether the conversion was done by rebuilding the existing fleets or replacing them with new trains. Initially, despite the problems they had with the Piccadilly cars at Gloucester, conversion of all the existing Gate Stock fleet was considered a viable option. After all, the oldest cars were only 20 years old and the LER fleets were several years younger. Being the oldest, the Central London fleet was considered first.

The wooden bodies of the Central London’s cars presented a somewhat easier prospect for conversion than the steel Gate Stock and it was decided that this should be the first fleet to be done. The Standard Stock doorway arrangement was settled on as the most suitable, principally because it presented a more even spacing of doors along a train whilst retaining a reasonable number of seats. However, the Central London trailers were to be given single leaf doors, giving a 3ft 3in opening, whereas the Standard Stock had double doors giving a 4ft 6in opening. This was probably done this way because the Central London cars were over four feet shorter than the LER cars and it was considered important to retain sufficient seats. Passengers like seats, especially passengers going all the way from Ealing Broadway to Bank.

Yorke’s experience at Gloucester put him in an ideal position to advise on what could be done and how the Central London’s conversion project should be managed. He would most likely have advised that a trial conversion was a good idea and, if he did, his employers eventually took his advice. 1900-built trailer car No.40 was given a prototype conversion, which was completed in October 1925.



*Figure 4: CLR trailer car No. 40 standing outside the old loco shed at Wood Lane depot in January 1926 after its conversion to air door equipment. Two single leaf doors are provided on each side and the open platforms enclosed. The end coupling arrangements have been altered to suit. Photo: LT Museum.*

Despite the conviction that the wooden bodies of the Central London cars would make the conversion work easier, there were some problems to be overcome, apart from those related to cutting in door openings and fitting sliding doors. The enclosure of the end platforms meant that some modifications to the jumper cables were necessary. The emergency lighting jumper remained at roof level but the control and lighting jumpers appear to have been moved to the sides of the car ends. While car No.40 was under test, it had to be provided with special, long jumpers to allow it to be worked in a train with gated stock.

The car was also provided with door operating controls on the exterior of the end panel at waist level either side of the centre communicating door. These were placed here to allow the gateman of the adjacent car to open and close the doors. I suspect they were fitted at one end only. They can just be seen in the view of the car in Figure 4.

The door insertion was apparently helped by the good underframe design of the original vehicles. These do not seem to have been modified in any visible way in order to compensate for the insertion of the doorways. They should not have needed it, as the basic design was simply in the traditional railway form of a rigid platform upon which the wooden body of the vehicle was built. I once heard it

described as “garden shed” technology but it worked as long as the vehicle didn’t hit anything too hard.

Another important factor in the conversion was the need to design the door fittings and suspension so that doors wouldn’t stick. Any shift in the car body structure or the door alignment would soon show up in service when doors would fail to open or close properly – the dreaded “sticky door”. Anecdotal evidence relates that train reliability plummeted during the first few years of air door operation on each line as it went over to air door trains, whether they were new or converted trains. Even in recent times, door system problems make up 50% of train equipment failures.

The cutting in of door openings and the enclosure of the end platforms of No.40 naturally required the rearrangement of the car’s seating. Perhaps not surprisingly, the original layout was retained as far as possible. The central section between the doorways had transverse seats, while the end sections had longitudinal benches – they had to in order to cover the wheel boxes. The spaces at the car ends were provided with a pair of seats either side of the end communicating doorway.



*Figure 5: Interior of CLR trailer car No.40 after conversion to air doors in 1925, showing the transverse seating between the two doorways. The interior finish shows a close similarity to other Underground vehicles built around this time, both Standard tube stock and the District’s 1923 G Stock. The lighting has been rearranged with shaded bulbs scattered around the seating areas. Only the doorways have lamps at ceiling level. Photo: LT Museum.*

Another feature of the conversion was the trial of some new clerestory ventilation grille covers. The constant problems with car ventilation drove the Underground to try a lot of different designs over the years, none of which were entirely successful. After all, one man’s air conditioning is another man’s draught. In the mid-1920s, the trial that appeared on Car No.40 was also added to at least one LER car as well.

In looking at this story, I wondered why there was a rather long interval between the conversion of the Piccadilly cars in 1921-23 and the trial conversion of No.40 on the Central London in 1925 and I suspect that there were two reasons. Broadly, I think it was down to time and money. During the early-1920s, there were schemes for expansion of the Hampstead tube line to Edgware and the rebuilding of the City & South London Railway to standard tube dimensions and its extension to Morden, there were big new rolling stock orders and there was much trouble on the District with the condition of their wooden cars. I can see the debate about whether to convert the Central London cars, or not, centering on the knowledge that their wooden construction would make the job easier but the fear must have been that the condition of the framework might found to be in bad condition once the panelling was removed. Yorke had learned this lesson from his work on the District Railway trailers and, not surprisingly in view of our apparent inability to learn from history, modern day rolling stock refurbishers are still learning this lesson today.

## **PRODUCTION CONVERSION**

The conversion of No.40 and its subsequent testing seems to have proceeded well and work was soon started on the rest of the fleet. The problem was finding somewhere to do the work.

Space for stabling and everyday maintenance work was already limited at Wood Lane depot and the recently opened Acton Works was only large enough at that time to do major overhauls for District and Piccadilly cars, so alternative space was sought and was eventually acquired in Feltham. Part of a former aircraft factory there was leased specially for the Central London's reconstruction work under the auspices of a shell company set up by the Underground group, the Union Construction Company (UCC). The company was originally registered in 1901 but had lain dormant until it was resurrected for the CLR work. The first four cars, motors 207 and 214 and trailers 10 and 68 went to Feltham in March 1926 and were eventually returned to Wood Lane in September 1926. The first control trailers didn't appear from the conversion programme until November 1926. Photo and car record evidence suggests that they had a 6-car train available for service by early October 1926. It was made up of four trailers with a motor car at each end.

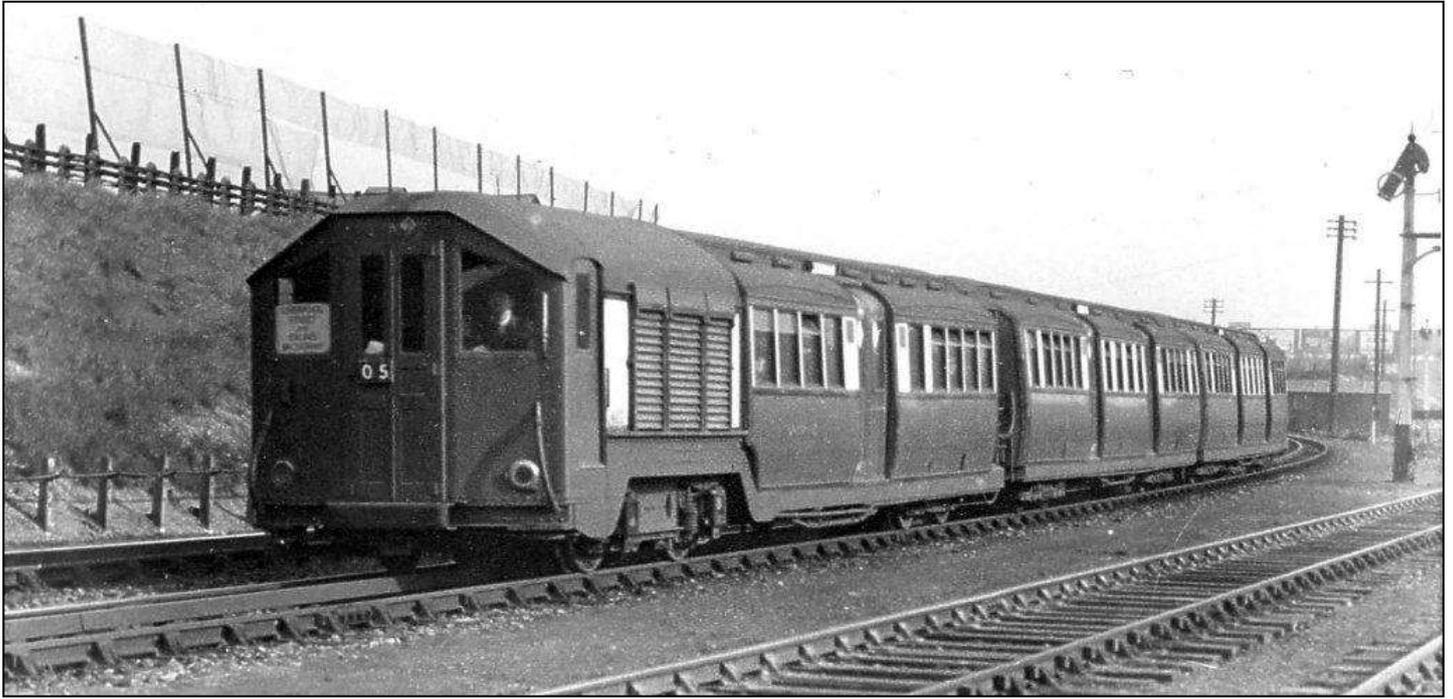


*Figure 6: A 6-car train of CLR Tunnel stock after conversion to air door operation is standing on the loop track in front of the main sheds at Wood Lane in October 1926. The train has four trailers and two motor cars. We might speculate that the manager standing in front of the leading car is Mr. Yorke himself. Photo: LT Museum*

It took two years to do the whole fleet. The programme was arranged so that Tunnel stock trains would be done first, followed by the Yorke conversions for the Ealing service and finally the Ealing stock. The Ealing motor cars originally built by Brush in 1915 underwent a much more comprehensive body reconstruction. Their steel passenger saloon body shells were completely removed and replaced by wooden framed copies of the Tunnel stock body. One might speculate that this was because Yorke's experience with the Piccadilly cars persuaded him that trying to make sliding doors fit into the curved steel bodysides of the Brush cars would be an exercise in futility if the job was to be completed within the available budget and timeframe.



*Figure 7: CLR train of Ealing Stock is approaching the Ealing Broadway terminus next to the GWR. The leading car is a 1915-built Brush motor car showing the new, wooden body it acquired as a result of its conversion to air doors. It has the G type bogies that were fitted when it worked on the Watford line. It still has the axlebox mounted shoebeam brackets it needed on that line.*



*Figure 8: A 3-car train of "Yorke" stock approaching Ealing Broadway. The train has been converted for air door equipment. The motor car shows the modifications carried out for the Yorke conversions, with the modified underframe below the switch compartment, new louvre doors and type G2 bogies.*

**To be continued .....**