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THE YEAR OF THE VICTORIA LINE



A tunneller on the Victoria Line in the experimental section of the line near Finsbury Park in March 1966  
Photo by David Ferris

On the morning of Sunday 1st December 1968 the second section of the Victoria Line, south from the first part of the line at Highbury and Islington to Warren Street, was opened. The first public trains commenced their journeys from the opposite ends of the new section at almost the same time - the 07.32 from Walthamstow Central being timed to leave Highbury and move on to the new line bound for Warren Street at 07.45, while the northbound train from Warren Street left at 07.46. Neither train had anything like the sendoff, or the passengers, that were to be seen when the first part of the line opened on 2 September.

The newly-opened part of the line brings a Victoria Line service to three more stations - Kings Cross St Pancras, Euston, and Warren Street. All of these are, of course, interchange stations, the first two giving an extremely useful connection between some of the most important London termini on the northern side of the city.

The new platforms, approaches and escalator shafts all follow the general design of the stations already open, and present a pleasant appearance. One of the best features of the decor on the whole of the new line is the ornamental tiled panels inset behind the seats on all platforms, each station having a motif of its own and thus providing regular passengers with an additional means of identifying their destinations - an elaboration of an idea used long ago on the Underground when platforms were decorated along their whole length with different coloured tiles.

Now that it has reached Warren Street, the Line is on the fringe of the West End, and should do at least a little to ease the Christmas rush which always causes such pressure on public transport in that area.

The opening date of the third - and last - section of the Line as originally authorised has not been announced yet, only being given in official pronouncements as in the Spring of 1969; rumour, however, has it that it will be opened on Sunday 2nd March. Time will tell - and once it reaches Victoria it will be possible to tell in a very short time how useful the line will prove.

## ASPECTS OF UNDERGROUND RAILWAY DESIGN AND EQUIPMENT

A Paper Presented To  
The London Underground Railway Society  
At Hammersmith Town Hall  
On the 11th October 1968

By

Desmond F. Croome

as

The President's Address  
for 1968

1.

The scope of this subject is so vast, that its choice for the subject of a Presidential Address represented a "triumph of hope over experience". In the following pages I have selected some aspects of the design and equipment of underground railways that have particularly interested me; possibly on a future occasion I may be able to fill the gaps, if the Society wishes.

A few words of explanation before plunging into the main subject - firstly the word "Underground", in this context, covers railways which have open or elevated sections (i.e. "Rapid Transit" or "Metropolitan" railways); secondly, whilst the author is normally reluctant to cite proposed railways as examples of techniques, there are several references to the planned Manchester Rapid Transit line. This is partly because it does seem likely that this line (or part thereof) will be built, and partly because of the thoroughness with which the working party examined world rapid transit techniques, and adapted them to Manchester conditions to produce a practical system. (I would strongly recommend that all our members buy, beg or borrow a copy of the Manchester Rapid Transit Study (two volumes). This leads us to the third and final preliminary observation - that urban railways must be adapted to the

characteristics of their particular location - to national characteristics such as, a preference for high - or low - density housing; the extent to which the state is prepared to put community interests before those of individuals; and a preference for either Planning; and comprehensive solution of problems, or for compromises, expedients and palliatives - and to local characteristics such as the level of the land and the nature of the subsoil, the layout of the existing road and rail facilities, and the distribution of housing, industry, business and shopping areas.

### (1) How Far Out?

This is a fundamental question in planning a rapid transit railway, since so many other aspects of design and equipment are decided by the radius of operation.

Perhaps the most striking comparison in this field is between Paris and London. In Paris (excluding the Ligne de Sceaux and the east-west R.E.R. Line) all outer Metro termini but one lie within a five-mile radius of the centre, whereas in London, the typical Underground terminus is 10 miles out, and several lines break through the 15 mile ring, particularly those to Chesham (24.7 miles radial distance), Ongar (20.4), and Upminster (17).

The following table is based on the maps in Havers' "Underground Railways of the World" (1966), and includes lines then under construction or planned for the near future. The table is intended to show the relative extent of the different systems, rather than the precise extent of any one.

#### Table I - Rapid Transit Railways -

##### Radial Distance Of Outer Termini From The City Centre

(The words refer to the number of termini within the mileage bracket)

	<u>1-2½m</u>	<u>2½-5m</u>	<u>5-10m</u>	<u>10-15m</u>	<u>15-20m</u>
Barcelona	Most	Three			
Berlin		Most	Five		
Boston		Most	One		
Budapest	Most	One			
Buenos Aires		Most			
Chicago			Most	Two	
Hamburg		Most	Two	One	
Kiev		Two			
Leningrad		Most	Three		
Lisbon	Most	One			
London			Most	Four	Seven (Inc. those over 20 m)
Madrid	Most	Three			
Milan	Most	Three			
Moscow			Most	One	
New York			Six	Most	Two
Osaka		Most	Two		
Paris (Urban)		Most	One		
Stockholm		Most	Four		
Tokyo			Most	Four	
Toronto		One	Two		

Before considering the practical considerations affecting the radius of operation, it is interesting to recall some theories on the subject, in its London context. In 1925 Frank Pick gave his opinion that 15 Miles from Charing Cross should be the absolute limit, with 10-12 miles more reasonable. In 1933 Lord Ashfield put forward the theory that a passenger should not spend more than 30 minutes travelling on his main journey to work, thus establishing the desirable tube maximum radius as 11-12 miles, and Pick followed the same theme in 1935, although by 1938 he had raised his sights to 15 miles. In its 1949 Report, the London Plan Working Party (of Railway and London Transport Executive members and officers) recommended that an "Urban" (all station) service, with a low speed, should not extend beyond 12-14 miles from the centre (journey time 35-40 minutes), and that termini at greater radius should

be served by "suburban" services with higher average speeds (derived from non-stopping), and different rolling stock with more seats. In the days before railway planning became sophisticated, the outer termini often corresponded roughly with the edge of the continuously built-up area. In the cities of mainland Europe, the extensive use of flats instead of houses results in a much more concentrated residential area than in Great Britain; furthermore, in certain continental cities there has been a tendency to constrict rapid transit development within the line of the former city walls. On the other hand, natural barriers (e.g. lakes, estuaries, mountains) breaking into the built-up area have increased the radius of development, as in Stockholm and New York.

For historical reasons, London Transport and its predecessors have, up to now, been considered, in some respects (particularly during wartime control) as "another main line railway", so that it has been possible to enlarge the system by running over, or parallel to, or taking over, suburban railway lines. In other cities, where the rapid transit system is run as a department of the local government, there is much less community of interest with the main line railways, and thus less incentive to take over existing suburban railways. Another historical aspect of the London network is that suburban extensions often involve lines that come out into the open air, where construction costs are far lower than in tunnel. Until very recent years, there was a strong financial incentive to extend the London lines into open country in order to feed the dearer tunnel sections with the full traffic for which they had the capacity.

For Manchester, the Working Party recommends a cross-city line with a route mileage of 16.15, each terminus just crossing the  $7\frac{1}{2}$  mile radius from the centre. Latest press reports state that an 11 mile line is recommended for first priority.

The changes in design and equipment that are desirable for outer-radius lines arise from the need to give the longer-distance passengers a fast ride, in greater comfort. The rolling stock should have a higher top speed, with more powerful motors and more efficient suspension and braking. More seats, but fewer doors, are needed. Efficient car heating becomes more

important. Station stops should be further apart, and, ideally the tracks for the outer-surburban service should be entirely separate from those of the urban service, as in Paris, on the outer-suburban Ligne de Sceaux, or the new east-west Réseau Express Regional line (whose cars allow 23.7% of the crush load to be seated, compared with 14.9% on the urban network (rubber tyred cars)).

If trains run through from outer-suburban to urban systems, their tractive, seating and door standards must be a compromise between the needs of the two systems (e.g. good acceleration, but also high top speeds) as with London Transport's A.60 and A.62 stock on the Metropolitan Line.

## (2) The "Attitude" of the lines

This useful phrase is adopted in the Manchester report to mean the level of the line in relation to ground level, and how it is placed at that level.

### (a) Earthworks

Although a line at ground level entails the lowest construction cost, it is acceptable only in permanently undeveloped countryside, or where it would run alongside an existing or new physical barrier, e.g. in the median strip of a motorway. Elsewhere, the next cheapest method is the conventional cutting or embankment, but needing a fairly wide swathe of land, governed by the angle of rest of the soil, so that undeveloped territory is normally the only suitable environment. Next there is open cut with vertical concrete or masonry retaining walls, needing less land but with higher construction costs, and, again normally restricted to estwhile undeveloped sections of route.

### (b) Elevated

The term "elevated railway" normally brings to mind the "EL's" of New York or Chicago, with their all-metal structure, their darkening of the streets beneath, and an unholy roar whenever a train passed. The modern elevated line is a more acceptable structure, with reinforced-concrete beams resting

on pillars; new elevated construction may be seen in Chicago, Rotterdam, Stockholm and San Francisco (Bay Area Rapid Transit), although some of the San Francisco construction has aroused strong local opposition, and part of the Rotterdam installation is either at the dockside or in the centre of a park strip. The Manchester report sums up the attitude of many observers when it states that elevated construction is unacceptable in the densely built-up areas of the inner city, because of visual intrusion and noise, whilst in residential areas it must be at least 150 feet away from the nearest housing, and then only if specially screened to reduce the emission of noise. Of the 16.15 route miles proposed for Manchester, about five would be elevated.

To be continued.

## THE EARLY HISTORY OF THE DISTRICT RAILWAY

H. Lourdes Cresswell

### 3

The joint committee, with the help of independent experts considered the various systems of electrification and selected the system submitted by Ganz and Co. of Budapest as the most economic, simple and suitable for the conditions ruling on both railways. This was 3 phase A.C. current at 3000 volts with two overhead wires, earthed through the rails, the motors on the trains being controlled on the cascade system with regenerative braking. In Feb. 1901, the Board of the Metropolitan recommended the adoption of this system.

Opposition to this now appeared in the person of Mr Charles Tyson Yerkes, who held out for the adoption of a four rail D.C. 600 volt system. Yerkes was a financier who had recently reorganised the transport system of Chicago with great success. He saw an opportunity to repeat his success by solving the growing problem of London's traffic. He purchased large blocks of shares in the District and having gained control of the company opposed the recommendations of the joint committee. He was a convinced adherent of the low-voltage D.C. system, already



extensively used in the U.S.A. and lately adopted by the Central London Railway. He imposed his ideas on the District which resulted in deadlock between the two railways. The matter was referred to arbitration and after two months enquiry, Yerkes triumphed and the electrification contract went to the U.S.A., one of the results of this influence being the similarity of outline between the older District stock with U.S.A. Rapid Transit stock of that date.

Another American practice was advocated by Yerkes, in his proposal for an express line for the District; a junction was to be made with the existing line east of Earls Court and then it would continue in deep tunnel to Mansion House with only one intermediate station. Nothing but "Expresses" would travel over this line which would thus provide the "Non-stop" trains in outer areas. The line was sanctioned by Parliament in 1897 but was never built, except a small portion between Earls Court and South Kensington which was incorporated in the Piccadilly line, another of Yerkes' schemes. Mr. Yerkes died in 1905 after he had left his imprint on the face of London's transport map. He was succeeded by Sir George Gibbs from the North Eastern Railway where he had been General Manager. In 1907, Mr. A.H. Stanley, (later Lord Ashfield) took over and held office until the formation of the London Passenger Transport Board, of which he became the first Chairman.

During this period, another company at the western end of the District, the Ealing and South Harrow Railway, was authorised in 1894 and taken over by the District in 1900. The line was completed in 1901 from Hanger Lane Junction to South Harrow. This section was never worked by steam but was electrified and used for training motormen ready for the conversion of the District to electric working. The current was obtained from the temporary power station that had been used in the Earls Court-High Street Kensington experiment but now moved to Alperton. It continued to work until the opening of Lots Road Power Station on 1. Feb. 1905. This new extension was opened from Mill Hill Park (now Acton Town) to Park Royal on 23. June 1903 and extended to South Harrow on 28. June 1903. A further extension was made on 1. March. 1910 from South Harrow to the

Uxbridge line operated by the Metropolitan from their Harrow-on-the-Hill station on their own "Main Line", The District line joined this branch just north of Rayners Lane station (then called a "Halt"). This line was transferred to the Piccadilly line when it was extended westwards from Hammersmith on 4. July 1932.

Electric trains began to take over from 1. July 1905 when the Ealing - Whitechapel service became electrically operated and other routes followed in quick succession until the Inner Circle became electric on 24. Sept. 1905. Apart from the East Ham - Barking electrification on 1. April 1908 this completed the conversion of the District. The last steam train ran on 5. Nov. 1905.

"Non-stop" running was commenced on 16. Dec. 1907, these trains being distinguished by a large circular board carried below the left hand front window front of the drivers compartment, on which the words "Non-stop" were painted in red on a white background. The time taken by these trains from Ealing to Mansion House was 30 minutes as against 48 minutes by the steam hauled trains. A complete circuit of the Inner Circle in steam days took 70 minutes, this was cut to 48 minutes on the introduction of electric trains.

Concluded

TUBE TRAINS UNDER LONDON:  
SOME COMMENTS FOR THE CONNOISSEUR  
B.J.Prigmore

PREFACE

The interested layman and the newcomer to the study of tube rolling stock will find "Tube Trains under London", by J.G. Bruce (London Transport, 1968; 12/6d) an excellent review of a little-known subject, with a superb set of illustrations. Those who have already studied the subject in some detail will regard the pictures as the specially valuable part of the book, and will realise that some oversimplifications have been made to the story in order both to start it from scratch and keep its length within bounds. These enthusiasts will doubtless already belong to TLURS, and will probably be interested in

this reinforcement of parts of the pre-1940 content of the book.

The author thanks Mr. J.G.Bruce for discussing these comments during their preparation, and for giving his blessing to their publication.

#### CHAPTER 1 - C. & S.L.R. LOCOS

This story had been oversimplified. Locomotives 1-14 (of which one is in the Science Museum), were 1889-90, by Mather and Platt, having straight sides and gearless (armature-on-axle) motors with large U-magnets projecting through the floors; 15-22, of 1898-1901, were a mixed bag, and 23-52, of 1899-1901, were by Crompton, having curved sides and split-frame underfloor gearless motors. Between 1904-10, Nos. 3-12 were rebuilt at Stockwell with some side-glazing of the cabs, with geared axle-hung motors, and tram-type series-parallel controllers.

Revised Captions:

Fig 2 is of a Crompton loco.

Fig 3 (left) is of a similar loco, with, in front of it, a split-frame gearless motor - one of which is now in the Science Museum.

Fig 3 (right) is of No 8 after rebuilding, showing the tram-type controller: in front of it is a geared axle-hung motor, with axle and axle-boxes.

#### CHAPTER 4 - WATERLOO AND CITY

The train motor cars had gearless motors. The single cars of 1900 were double-ended, had 2 x 60hp geared axle-hung motors and tram-type series-parallel controllers.

Fig 8 is of Fig 10 but taken through the bulkhead.

An interior of a Jackson and Sharpe motor car is in the middle picture of p.514 of the Railway Gazette, 15th November 1940.

#### CHAPTERS 5-7 - CENTRAL LONDON STOCK

On p.14 the phrase "master controller" is misleading because it implies control of other equipment, which is not the case: "one immense drum controller" should be substituted. On p.17, the smoking cars had rattan seating and match-striking plates, and the others flowered moquette seating, according to pre-service photographs in the

possession of the author. 'Smoking' boards may have been necessary to allow for re-marshalling, for the 'smokers' were the end cars. The four 1903 trailers had perforated ply seating. On p.20, the driving positions on the 'tunnel' stock remained on the south side until the end (Figs 47 and 49 show this): 'Ealing' motor cars, if not also control trailers, all had left-hand drive.

#### CHAPTER 9 - BAKERLOO 1914-15

There were two matching Leeds Forge trailers with the two motors, giving one matching four-car train. Photos 21-2 are of a Leeds Forge car with a single swing door after its substitution for a pair of narrower doors. Brush car 48 in its original state is in Fig 273 of the earlier editions of Dover's "Electric Traction", and 41 in its later state in Fig 7 of "Sixty Years of the Piccadilly".

Revised Caption:

Fig 23 is the interior of Fig 18: it is of an original motor car interior taken from the bulkhead door of the gallery above the motor bogie. The ends of the gallery and the sloping handrails to the steps may be seen. Notice that the electric light wiring is dangling through the ceiling: lighting fittings have yet to be added, as have also maps and advertisements.

#### CHAPTER 10 - CENTRAL LONDON, 1915

There were actually 16 transverse seats, in bays by the first two windows on the trailing side of the central swing door: on the motor side of the door were four longitudinal seats (two each side). (An excellent picture is in T&RW, April 1917, p.229).

#### CHAPTER 12 - 1919/22 AIR DOOR STOCK

Figs 32-3 show the emergency door-control valve near the bottom of the door pillar.

Fig 29, whilst basically 'as originally built', is a 1923 photograph, after the vertical grab rails, originally installed, had been removed. (Fig 9 of "Sixty Years of the Piccadilly", shows these grab rails).

Fig. 34 shows two converted motor cars with double-leaf sliding doors: many, if not most, had single-leaf doors.

#### CHAPTER 13 - 1923/25 STANDARD STOCK

To remove an ambiguity on p.45 it is remarked that the opening train for the Hendon extension was composed of two converted motors with single-leaf centre doors, and three trailers of 'Birmingham 1923' type (vide Fig 22 of "Sixty Years of the Northern"). The prototype trailers were not used on the opening train: they could be distinguished by their continuous clerestory, uninterrupted by door sockets. (Figs 47 and 35 make this distinction in another context. As an aside, the trailer of the MPM tube train in Fig 12 of "Sixty Years of the Bakerloo" is the latest photographic record known to the author of a prototype car).

#### CHAPTER 18 - 1931/4 STANDARD STOCK

At the end of the first paragraph of p.61 is reference to the slight distinguishing features between 1931 and 1934 stock. Hidden differences were the detail of the weak-field relays and a tidier layout in the control compartment (these points kindly given to the author by Mr Bruce). The only easily visible distinguishing feature known to the author is that the opening lights above the fixed windows are gravity controlled, as on 1938 stock, rather than spring-toggle controlled as previously. This distinction is now essential to note as some of the (dated) step-plates have become interchanged on the Isle of Wight, some 1934 cars having 1931 step-plates, and vice versa.

A minor misprint is on p.77: for '57' read '58' at the end of the last line of the left-hand column.

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#### BOOK REVIEW

H.V. Borley & R.W.Kidner; The West London Railway and the W.L.E.R.; Lingfield, 1968; 8/6d net; 7" x 5"; 32pp + 6pp illustrations, with 5 maps and plans in text; No 22 of The Oakwood Library of Railway History; The Oakwood Press.

This brief history of one of the most important of the links between the railways of north and south London fills a long-felt want. Written by two well-known authors on transport subjects - one of them a much-respected Past President of the Society - all the much-chequered story of an at-first ill-starred line is told in outline, and gives a very interesting summary of the services which have run over the West London and its extension.

Although not strictly part of the Underground system, there have been so many connections with the Underground that it is essential to include the West London if making a study of the system - and up to now this has been very difficult because of the lack of readily-available books and articles on the subject. Now this has been remedied most successfully in this book, which should earn the gratitude of all London railway students. If any criticism can be levelled, it is that, with the wealth of stories about the line (particularly the earliest days of the WL itself) a much longer book could have been produced; but this is, perhaps, unfair comment, for clearly the authors have set out to produce a factual story, and this they have succeeded in doing in an admirable manner.

### Book Notes

Members may like to have their attention drawn to two books of general railway interest published by Paul Hamlyn; neither of these were reviewed in this journal when first published, but both have material of Underground interest in their pages.

Both books are mainly pictorial, the larger being "The Pictorial Encyclopedia of Railways" by Hamilton Ellis; priced at 30/- this is probably the best value for money in railway books obtainable today - 592 pages with over 800 illustrations in colour and black and white, well printed and stiff-bound, it is really an illustrated history of railways (including the London and other Underground lines) with more illustrations than history. Excellent value.

The other book is called simply "Railways", and is by Howard Loxton. In a larger format than the above-

mentioned work, but on very much the same lines. It is very profusely illustrated with an interesting text, but in this case the colour pictures are not so successful - they are clear but not true colours in most cases. Once again, the Underground is not neglected, and of particular interest here are two rarely-reproduced engravings from the Mansell Collection of the experimental atmospheric railway constructed in tunnel at Crystal Palace; unfortunately the caption to these valuable pictures dates the line incorrectly - giving 1846 instead of 1866.

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#### SOCIETY NOTICES

Subscriptions for 1969 are now due; rates are 25/- for Members and 10/- for Associate Members; please send as soon as possible to the Registrar, M.T.Connell, 6 Redcliffe Street, London, S.W.10. Membership Cards will be despatched with the next issue of the Journal to save postage. The February issue of the Journal will not be sent to members whose subscriptions have not been received by the date of despatch - except for overseas members, who will be given a little longer to remit their money.

Special Advice Service facilities will be made available again for 1969 for those members requiring them. Please include an additional 5/- with Subscription if you want to be advised of last-minute items which are too late for inclusion in the Journal.

1968 Accounts Officers, Assistant Officers and Committee Members are reminded of the detailed notice which appeared last month re settlement of outstanding items, and notification of stocks held, to the Treasurer by 7th January. Please assist by complying!

#### Change of Officers

It is with the greatest regret that the Committee have to announce that, for personal reasons, Ken Benest has found it necessary to resign from the Committee and give up the Treasurership of the Society. The Society owes an enormous debt to Ken, who was one of the original members of the Committee and has been Treasurer since 1961; he will be sadly missed by his fellow Committee-members.

To fill the vacancy, the Committee have been fortunate enough to obtain the services of John Crowhurst, who has been co-opted to the Committee and appointed Treasurer. John will not take over his financial duties until the 1968 Accounts have been completed, so all end-of-year settlements and reporting should be to Ken as in the last seven years. Ken has retained his post as our Publications Secretary, and John is also (for the present at least) remaining as Sound Librarian and Assistant Cartographer.

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#### THE TIMETABLE

18.00 Thursday 2nd January Library Evening at 62 Devonshire Road, Ealing, London. W.5.

19.00 for 19.15 Friday 10th January An Address, to be illustrated with colour slides, on "The Preservation and Restoration of Railway Vehicles" by John H. Scholes, Curator of Historical Relics, British Railways Board. No better authority could speak to us on this subject, so a really interesting evening is assured - at the Hammersmith Town Hall, King Street, London, W.6. (enter by the door in Nigel Playfair Avenue).

11.30-21.30 Saturday 11th January Stand at the First Trolleybus and Transport Exhibition organised by The National Trolleybus Association and to be held in the St. Silas Church Hall, 74 Penton Street, London, N.1. Come along to support this new enterprise, and to meet your fellow-members at the TLURS stand. Admission is 2/- for adults and 1/3d for children; refreshments will be available, there will be film shows and sales of trolleybus items.

18.00 Thursday 6th February Library Evening at 62 Devonshire Road, Ealing, London, W.5.

19.00 for 19.15 Friday 14th February A Victoria Line Film Show, in preparation for the anticipated opening of the rest of the originally-planned line; arranged by Ken Harris

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CORRECTION to "1920 Tube Stock" in this issue.

p.I, para 4, line 4; for 'Hungarian' read 'French'

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