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THE FUEL CRISIS AND LONDON

When the trams disappeared from their streets in 1952, many Londoners were not happy, and by no means all the objectors were those concerned with nostalgic memories.

Others wanted to retain tramways for more practical reasons, and opposed their replacement by diesel bus services on grounds of noise (for properly maintained trams and tracks provide far quieter facilities than diesels), air pollution (there is none from the tram, and little from its power station) and, most important of all, the switch from electricity to diesel fuel as motive power put the source of supply in the hands of foreign powers.

The objections raised fell on deaf ears; the tram got in the way of the motor car and had to go - so it was decreed in the corridors and offices of power. And, ten years later, when the same fears were voiced on the impending demise of the London trolleybus, those same ears were as deaf as ever. Were they still wearing the plugs supplied by the internal combustion engine lobby? Anyway, the trollies went the way of all trams and diesel reigned supreme - until now.

What a pity that our politicians and civil servants were not then more receptive to the views of those farsighted students of transport, mainly amateurs, who took a longer view of the possible dangers to which oil supplies were subject. There is, of course, considerable satisfaction in being able to say "We told you so", even though twenty-one years at least have elapsed - but that is going to be cold comfort when, if not near to an electric railway, one has to walk to work (bicycles are already in short supply).

Can we have our trams back please; and can we have some more of the Fleet Line financed out of the cut back motorway programme; and can some of the other Underground plans at present projected for the end of the decade be brought forward and given urgent priority?

Or sleeps still the ministry? Time will tell.

THE BRUNELS - THE THAMES TUNNEL - ROTHERHITHE - AND
THE EUROPEAN ARCHITECTURAL HERITAGE YEAR

An Important New Project

Most, if not all, Underground students are well aware of the Brunels' monumental pioneer work in the construction of the Thames Tunnel, and will know that the Tunnel, 150 years after its building was planned and authorised in 1824, still carries the East London Line under the river as proof of its durability. Not so many will be aware that the original pump house, workshop and great shaft still stand in Rotherhithe, albeit derelict and inaccessible to the public.

However, a group of individuals under the sponsorship of the local amenity society, the Bermondsey and Rotherhithe Society, are fully alive to all this, and have formed the Brunel Exhibition Project, Rotherhithe. This Project has four immediate objectives:

1. To record the long association of Marc and Isambard Brunel with Rotherhithe - Marc was a resident for 14 years.
2. To commemorate the Brunels' engineering achievements generally and in particular the Thames Tunnel, which was the first underwater tunnel in the world.
3. To renovate the engine house.
4. To enhance the St Mary, Rotherhithe Conservation area by providing a recreational amenity for local residents, for Southwark and for London as a whole.

A permanent exhibition relating to the Tunnel and the Brunels' other achievements is planned to be opened in and around the engine house after restoration and the object of the Project organisers is to bring their plans to the stage where they can hand over the exhibition as a going concern to the London Borough of Southwark, for the Council to continue in perpetuity as a local amenity and tourist attraction.

Detailed plans have been made for the contents of the exhibition, which will use audio-visual aids and, while covering the whole field of the Brunels' work will place emphasis on those schemes which had particular relevance to Rotherhithe and the Thames - with a possible long-term expansion in mind which would cover the general history of wharfing and boatbuilding in Rotherhithe with a maritime museum alongside.

To speed the work, a Local Working Party has been set up, also one to deal with Exhibits and another to cover all the Building aspects. These three working parties have the benefit of a lot of professional help from a panel of advisers who between them cover most of the skills needed to bring the Project to a successful outcome, and these include Mr Tim Bidwell of the GLC's Historic Buildings Department as the Building Restoration expert. All these work with the assistance of a Project Co-ordinator and an Honorary Secretary.

A great deal of enthusiasm has been aroused by the Scheme, and our Society has expressed its wholehearted support for the Project, as is only fitting for a Society so much concerned with underground London and where the oldest civil engineering structure on the railway system it studies is none other than the very Thames Tunnel which is the focal point of the whole Project. And it should be added that support may well be needed - not necessarily only financial either. For the ultimate objective to be achieved, the interest and goodwill of the local authorities concerned is essential, so a certain amount of political pressure may be required - it is too early to say yet.

The buildings belong to London Transport and are in no danger from LT, from whom it is hoped they may be leased at a nominal rent when the time comes, but it is known that the local Council has plans for a housing estate in the immediate area, and it will be essential to ensure that these plans do already, or are adapted to, make allowance for the retention of the Brunel buildings.

However, it is probably true to say that no time could be more propitious for such a scheme; the general and increasing interest in Industrial Archaeology, coupled with the fact that the sesquicentenary of commencement of work on the Thames

Tunnel in 1825 coincides with European Architectural Heritage Year in 1975 should combine to give both protection to the buildings and publicity to the Project.

As a preliminary exercise, and to introduce their scheme to the public, the Project organisers have arranged a Thames Tunnel Exhibition, to be held in St Mary's Church, Rotherhithe from Saturday 19th to Sunday 27th January 1974; this will feature historical texts, photographs and original exhibits and will be open from 10.00 to 17.30 each day between the above two dates inclusive. To lend support to the Project, and to see an exhibition which well deserves to be seen in its own right, an official Society visit has been arranged for our members to take place in the afternoon of Saturday 26th January. Details of this visit appear in the Timetable on p 16.

Any member requiring more detailed information on the Project should write to the Editor at 62 Billet Lane, Hornchurch, Essex, RM11 1XA, or to one or other of the following Project officials:

Project Co-ordinator:
Nicholas Falk,
46 Ainger Road,
London, NW3 3AH.

Honorary Secretary:
Christopher Bradby,
35 Rectory Road,
Walthamstow,
London, E17 3BG.

GIFT TO SYON PARK BY SIR JOHN BETJEMAN

Sir John Betjeman, the Poet Laureate, presented in July a watercolour of Aldersgate & Barbican station by David Tindle to the London Transport Collection at Syon Park. The painting is 18" x 13" and shows the former 80-ft span arched roof of iron and glass; it was commissioned by Sir John in 1955 to record the beauty of the 1965 structure at what was then his local Underground station. The roof was dismantled in 1955 after being damaged in the Second World War. Sir John, a life-long admirer of railways, has written a poem - "Monody on the Death of Aldersgate Street Station" - which laments the changes at the station and concludes:-

"Snow falls in the buffet of Aldersgate station,

Toiling and doomed from Moorgate Street puffs the train,
For us of the steam and the gas-light, the lost generation,

The new white cliffs of the City are built in vain."

This is one of a number of poems about the Underground by Sir John.

THE CENTRAL LONDON RAILWAY ELECTRIC LOCOMOTIVES

Piers R. Connor

1

Introduction

The Central London Railway Company was incorporated by an Act of 1891. By this Act it was empowered to build an Underground railway from Shepherds Bush to a terminus under the Great Eastern station at Liverpool Street; but in fact the line was constructed only as far as the Bank owing to the breakdown of negotiations with the Great Eastern Railway at the end of 1896. The extension to Liverpool Street was not opened until 1912.

The line was constructed in twin tube tunnels having an internal diameter of 11'8 $\frac{1}{4}$ " (12'5" on curves), these measurements subsequently being adopted by other tube lines opened in the early 1900's. However, the internal diameter of the Central London's tunnels was reduced to a minimum of 11'6" by a proposal to line the interior with concrete. In the event this lining was confined to short sections at each end of the stations but it was sufficient to cause a restriction on the loading gauge which, coupled with poor alignment during construction, has not been fully resolved to this day.

From the very earliest it was intended that the Central London should be worked by electricity. It had already been proved (by the City and South London Railway, opened in 1890) that this was feasible, and it seems that initially this railway served as a model upon which the Central London would base its own operations. It was realised however that the frequency of service depended upon the ability to provide rapid turnrounds at terminals, and in this the C & S L R was restricted by the use of one locomotive per train which had to be uncoupled at the termini. It was suggested that the use of two locomotives, one at each end of the train, would eliminate this problem and would also allow a more even distribution of power on the train. This proposal also envisaged that the rear locomotive would be controlled from the leading end by one driver who would change ends at the terminus. The traction motors of the rear loco would be connected to the driver's controller on the leading loco by a power cable running the length of the train.

Had this system been adopted the locomotives would probably have been larger versions of the C & S L R's four-wheeled locos, with about six gate-ended trailer cars coupled between each pair. By the early 1890's however the Board of Trade had become increasingly aware of the insulation problems involved with the use of long cables carrying the large currents required by railway traction motors. The risk of dangerous conditions which could arise in the event of a cable fire in the confines of a tube tunnel caused the Board to refuse permission for the use of power cables carrying motor current between cars on tube railways. This restriction ran counter to the Central London's scheme and the two-locomotive idea had to be abandoned in favour of the conventional use of one locomotive. In later years this problem was solved by the invention of the multiple-unit control system whereby a multi-core control cable was used to connect all the sets of power control gear on the train to a master controller operated by the driver. With this system no motor current needed to pass from car to car, only the much lower current needed to operate the control equipment.

As it was intended that the trains were to be longer and heavier than those of the C & S L R the Central London was now faced with the problem of finding a design of locomotive which had sufficient power and adhesive weight but which was small enough to fit inside the tunnels. In the end the design was a compromise which might have proved successful had it not been for several glaring errors which came to light soon after the opening of the line and which resulted in the withdrawal of the locomotives after only three years in service.

Ordering and Delivery.

Much of the early development work on electric traction was done in America so it is not surprising that it was from there that the Central London obtained its locomotives. The fact that the order was placed with an American company gave rise to some criticism in certain sections of the British press. These complaints were answered by the Central London who stated that no British manufacturer had been able to give a set delivery date owing to the unsettled state of the labour market - an excuse not unfamiliar to us over seventy years later!

In fact it was not the Central London who actually placed the order. An organisation had been specially set up by the

C L R to build and equip the line at a total cost of £3-million and it was this company, the Electric Traction Co., who placed an order for 32 electric locomotives with the General Electric Company of America. The total number was reduced to 28 at the end of 1896 following the postponement of the construction of the Bank to Liverpool Street section of the line. A total of 30 locomotives has often been quoted as the number actually built owing to the existence of a photograph showing one of them bearing the number 30. The answer to this apparent inconsistency lies in the fact that they were numbered from 3 upwards, the numbers 1 & 2 being used by the two 0-6-0T oil fired steam locomotives owned by the Central London from 1899.

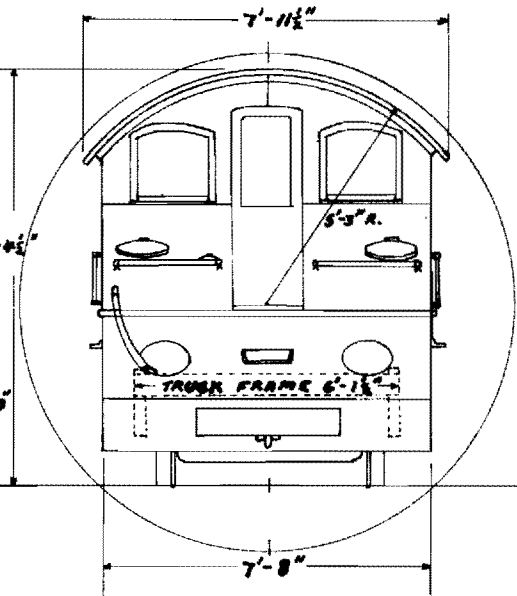
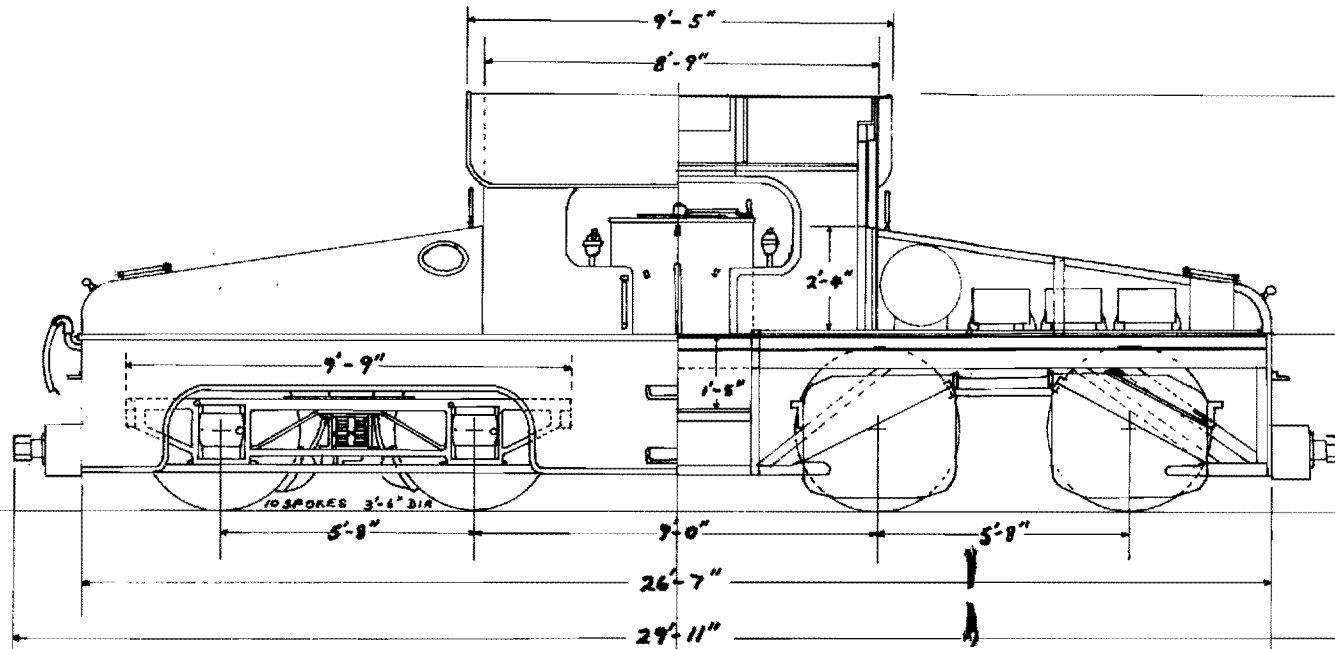
The electric locomotives were constructed at the GEC works in Schenectady, Pennsylvania and were shipped to England in parts to be assembled at the Central London's own workshops in the Wood Lane depot. It is of interest to note that the workshops where assembly was done are still in existence, in spite of the many alterations which have taken place at the depot over the years; although they are now disused and almost obscured by the massive halls built around the depot in 1908 to house the Franco-British Exhibition. The four road shop where the locos were completed became their stabling shed, while maintenance was done in another shop next door.

The delivery schedule had been arranged so that by the end of 1898 half the locomotives would be in the process of assembly at Wood Lane, but work did not start on the first five until the Spring of 1899. Once begun however construction proceeded rapidly; by June 1899 two had been completed and by the end of the year all 28 had been finished.

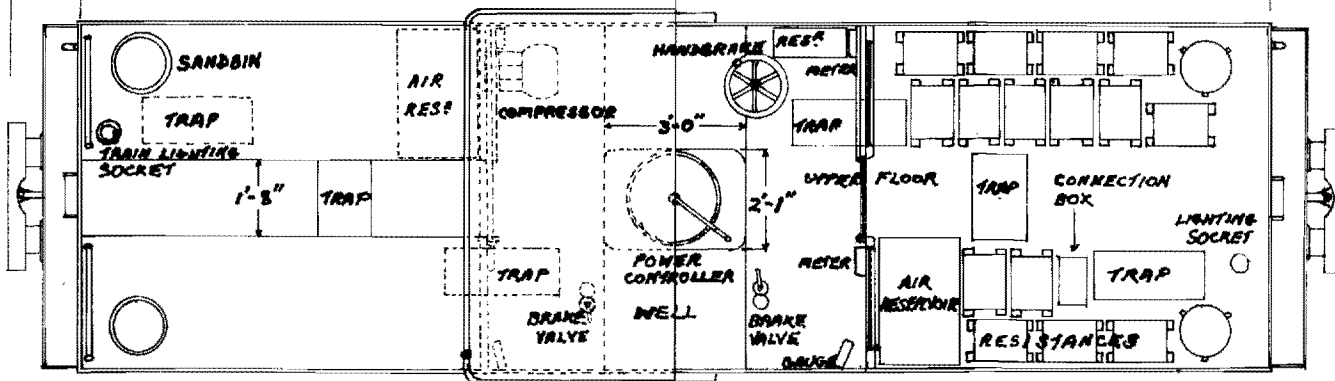
The completed locomotives had cost £3000 each exclusive of labour costs incurred at Wood Lane. A total of £84,000 was paid for the whole batch of 28 machines, which represents something like £900,000 at present day prices. In view of the fact that within a few years most of them were redundant and were worth only their scrap value, it seems that a large proportion of their cost was to represent a loss to the company.

Body Design and Construction

The genesis of the locomotives' design had already



PAC 1275



CLR Electric Locomotive



appeared in America in 1895 in the form of three 96-ton centre-cab (sometimes called camel-back) locomotives built by G E C for the Baltimore & Ohio Railroad electrification of the Baltimore Tunnel. Apart from the obvious consideration of size there were a number of essential differences between the American and British versions of the design. The American type had overhead current collection, instead of the 550v DC centre positive conductor rail (with running rail return) of the Central London; totally enclosed cabs, which were much larger in comparison with the body than those of the British type, sprung armature suspension (quill drive), as opposed to fixed armatures without springing; and all the usual embellishments (cowcatchers, bells, etc) peculiar to American railways which were not required here. Although a suitable scaled down version of the B & O design was accepted by the Central London and the plans were published in a number of periodicals when the line was opened, the locomotives as built had undergone some modifications which had been incorporated during construction. The drawings accompanying this article show the locomotives as built, and may be compared with the original plan which was reproduced in the October 1971 issue of this Journal.

The main framework consisted of heavy steel girders arranged in a box-shape, the top of which formed the floor of the locomotive. The sides and ends of the 'box' were covered in $\frac{1}{4}$ " thick sheet iron plates, except for openings left around the truck sides to allow the axlebox covers and bolster springs to protrude. The loco floor was cut across its full width at the centre by a 3ft long well, 1'5" deep, provided to accomodate the power controller and the crew. A continuous longitudinal girder ran full length down the centre of the locomotive frame and formed a bridge across the well. The power controller was built round, and was partially supported by this girder.

The cab was built over the well and also extended over the main floor level so that it had a total depth of 8'9". Its sides were made with $\frac{1}{8}$ " sheet iron strengthened with L-shaped girders, and the roof had $\frac{1}{2}$ " sheeting arched so as to provide a 6-inch gap between itself and the tunnel interior along its whole length. Both cab ends were provided with a sliding door in the centre, with a glazed upper panel, and lookout windows on either side. It was originally intended that one of each pair of windows should be droplight but as

built all were fixed. The doorways were provided to give the crew access to a control aisle which ran from the cab to the locomotive ends. Either side of these gangways sheet iron bonnets, sloping down towards the ends provided covers for equipment mounted on the loco's floor. The inside panels of the bonnets were left open to allow easy access and ventilation, while additional ventilation was provided in the form of small oval grilles in the outer panels near the cab.

The cabs were not brought up to the standard of the original B & O design as they were to spend almost all their revenue earning life in tunnels. The main omission was the lack of any side doors or windows: only an opening after the fashion of steam locomotives was provided. Brass handrails and a pair of footsteps were fitted on each side, but even so clambering into the cab without self injury must have been something of an art as the height of the entrance was only 3'6" and a 1'5" drop into the cab had to be negotiated as well! It was no doubt easier to enter by climbing over the buffer beam and walking down the gangway. A footstep below the end of the gangway and handrails on the bonnets were provided for this purpose.

The massive buffer beams were separate extensions of the main body structure. Each one carried a central buffer comprising two sprung supports which carried a channel section steel buffer plate. Between and slightly below the supports a link and pin coupler was fitted and the top and bottom of the buffer plate was cut away to allow the pin to be pulled easily.

The total length of the locomotive body was 26'7", but including buffers etc. this was increased to 29'11" overall. The width was 7'8" over bodyside panels and 7'11½" overall. The weight of the body came to just over 9 tons, but in full working order this was increased to 44 tons. The remainder of this total was taken up by the trucks, motors and electrical equipment.

Trucks and Motors

Each locomotive body rested on two 4-wheel bogie trucks set with their centres 14'8" apart. Each truck had a wheelbase of 5'8" and was fitted with 10--spoke, 42" diameter wheels. The track frames were of cast steel construction and had swing

bolster suspension with each bolster supported on four sets of elliptical springs. The axleboxes were mounted rigidly on the side frames without any form of suspension. The side frames each had two longitudinal members connected by diagonal braces and by the axlebox castings. Each lower member had an externally fitted cast lug which carried a fulcrum pin for the brake rigging. This rigging was mounted between the truck frames and the bodyside panels and operated a single brake shoe on the inner side of each wheel. The usual method of using a single rod between the brake cylinder and each truck was impossible in this case because of the size of the traction motor casing, and of the danger of fouling the centre positive rail. The brake cylinder itself was hung exactly in the centre of the locomotive directly beneath the power controller.

The side frames of the trucks were connected by a cast steel cross member at each end and by two steel girders in the centre forming the transom. The traction motor casings of soft cast steel, were hung by brackets at each end, and by further brackets across the centre of the truck which were bolted to both casings and to the transom. The casings each carried four field coils which in turn surrounded the armature. The latter were of the series wound, drum type, and were built round a hollow brass sleeve through which the axle was forced. The commutator could be inspected by means of hinged covers in the motor casing, and the casing itself was constructed in two halves to facilitate examination of the interior.

The form of gearless drive was adopted because at the time of the design in 1896 geared drive had not been sufficiently developed to enable its use without excessive noise. The method of construction of motors and trucks on the Central London locomotives provided for extreme rigidity, which might at first sight seem to be an advantage, but which in fact took no account of the stresses set up by running over the rigid track necessary in tube tunnels. The dead weight of $8\frac{1}{4}$ tons per axle (33 tons for the whole locomotive) and the absence of any form of motor or axlebox suspension were to prove to be the final nail in the coffin of these machines.

- to be continued

LETTERS TO THE EDITOR

26.10.73

Dear Sir,

In answer to Mr Lewis' query about 1972 units 09 x 11 being paired, this was the way they were delivered from Ruislip because of material shortages. I am surprised that my colleagues on the Northern Line have managed to keep most of the units numerically paired as long as they have since there is nothing to prevent them being interchanged.

Mr Newman's query about C69 non-smoking cars can best be answered by recalling that the CO/CP stock on the H & C had four non smoking cars and two smokers (the trailers). When the C69 stock was delivered as 2-car units the trailers were again the smokers but now there were three per 6-car train - an undesirable increase of 50%. Since any C69 unit can run in any of the three positions in a train it was clearly impractical to nominate a third of the stock as 'middle units' and make both cars non-smokers. The solution therefore was to fit brackets to all trailer cars as described by Mr Newman and to slip in 'Non-Smoking' plates when the unit was in the centre of the train. Human nature being what it is, sometimes the staff at Hammersmith forget to change the signs to the appropriate units.

Mr Picketts apparently saw at Bramley the three pre-1938 control trailers - I believe they are numbered 3022/3/4 - which were sold to the Bramley Military Railway in the early 1960's. It is interesting to note that three 1938/49 UNDMs, 30005/26/43, were transferred from Ruislip to Bramley on 22nd August, probably to replace these earlier cars. The old C.M.E. Instruction Train went to Bird's for scrap some years ago.

With regard to part of Mr Clark's query, several Northern and Bakerloo cars were modified at the depots during 1970/71 with dual pilot lights and he has noticed one of these cars.

Yours sincerely,

H. Clarke

Divisional Engineer 'B'
(Railways)

Acton Works,
London, W3.

REVIEWS

Exhibitions

E. McKnight Kauffer: Poster Art 1915-1940; A Travelling Exhibition arranged by the Circulation Department of The Victoria and Albert Museum. Seen on display at the Geffrye Museum, London, during November and December 1973.

The Underground Electric Railways Company of London started in 1908 a programme of poster advertising which in a very short time raised the standard of the poster out of all recognition, and out of which true commercial art was born. It was brought perhaps to the highest stage it has yet reached by the work of E. McKnight Kauffer, who was given his first commission for this type of work by Frank Pick in 1915. In employing Kauffer, Pick was displaying his flair for the cultural aspects of commerce to the full, and began Kauffer's long association with London's Underground, which was for many years his major client - although he did much valuable work for other important organisations such as Shell, Eastmans and the Orient Line.

This exhibition, quite small in size with less than fifty exhibits (a very small number when compared to Kauffer's total output), gives an excellent idea of his superb sense of style and fitness and, because it is representative of all his periods, shows too, how he developed over the years to a degree of assurance in execution which has never been surpassed.

Kauffer was an American, born in Great Falls, Montana in 1890, and he grew up in Evansville, Indiana. He trained as a painter and found a patron who enabled him to study in Paris - and decided that when his money ran out he would copy the young French artists and make his living by selling poster designs. This was a common practice in France, and meant that the French led the field in poster design at that time. There was nothing like this in England and it was Kauffer who introduced the new conception over here. By the time he died in 1954 he was recognised for what he was - a brilliant artist who had achieved his greatest successes in the commercial field.

In 1955 a Commemorative Exhibition of his work was held at the Victoria and Albert Museum, and an unexpected bonus to the first lucky few to see the present exhibition was the opportunity to obtain a copy of the catalogue of the 1955 show - but supplies have probably run out by now.

NEWS FLASHES

1304 Question Time at the Greater London Council meeting on 24-5-1973 produced the information that New Addington is six miles by road from the nearest railway station (BR or LT) and that feasibility of a rail service to the town was being referred to the London Rail Study.

1305 It was also disclosed at the GLC Meeting on 24-5-1973 that the possibility of a London Transport rail line to Collier Row and Harold Hill was under consideration for reference to the London Rail Study.

1306 It is understood that the Westbourne Sewer which runs across Sloane Square station in piped form readily visible from the platforms is to be removed in the near future.

1307 On the evening of Sunday 18-11-1973 a train from Baker Street to Watford was diverted via Rickmansworth to partially replace a train cancelled through staff shortage.

1308 There is a scheme under investigation to connect the North London Line to the Widened Lines by a flyover north of Kentish Town.

1309 Pressure is being mounted for the reopening of the North London Line from Stratford via Victoria Park to Highbury and Islington.

1310 At the beginning of the present soccer season LT issued a warning to clubs that, unless hooliganism by supporters was ended stations adjacent to football grounds would be closed at times when the so-called fans would be travelling to or from a match.

1311 During the latter part of September 1973, LT mounted a television campaign to recruit more guards.

1312 A new power control room for the Northern and Central Lines is being built in Long Acre. This will take the place of the three existing control rooms at Wood Lane, East Finchley and Charing Cross - and will eventually take over from that at South Woodford also.

1313 To guard staff from violent passengers, an experimental protective box for ticket collectors is being built and will probably be installed initially at Leicester Square or Seven Sisters. It is designed to be used in conjunction with a manually operated turnstile, and will have a slot through which passengers will pass their tickets to the Collector.

1314 Broad Street station is threatened with closure. The proposals for replacement include a new station to the north of the present one (thereby losing the present interchange at Liverpool Street) or new platforms above or below Liverpool Street.

SOCIETY NOTICES

End of Financial Year All officers and members holding funds belonging to the Society, or being owed money by the Society, are asked to send their remittances or claims respectively, made up to 31st December 1973, to the Treasurer, P.R.Connor, Flat B, 1 Marchwood Crescent, Ealing, London, W5, to reach him not later than 7th January 1974.

Annual General Meeting This will be held on Saturday 23rd March 1974, at a venue to be announced later. Members are asked to send any proposed changes in the Rules of the Society, and Nominations for Committee service, to the Secretary, S.E.Jones, 113 Wandle Road, Morden, Surrey, SM4 6AD, to reach him by 15th February 1974.

THE TIMETABLE

19.00 for 19.15 Friday 11th January at Hammersmith Town Hall; A Talk by Piers R.Connor on "1939 Sample Standard Tube Stock"; this talk by our own Committee member who is an acknowledged rolling stock expert will be illustrated.

Saturday 19th January Visit to Richmond Signal Box; names to the Editor at 62 Billet Lane, Hornchurch, Essex, RM11 1XA as soon as possible.

14.00 Saturday 26th January Visit to the Thames Tunnel Exhibition arranged by the Brunel Exhibition Project, Rotherhithe (see pp 2-4). Meet at time stated outside Rotherhithe station, East London Line - no booking necessary.

19.00 for 19.15 Friday 8th February at Hammersmith Town Hall; a Talk by D.F.Edwards on LT Publicity. Mr Edwards is one of our own members and addressed us on the same subject some years ago - and a very interesting evening he provided on that occasion.

THE TAIL LAMP

Last month we reported that London Transport regretted; it is probably true to say that they did the same over the following notice - spotted by another reader of The Times and published 11th October 1973:

Gents and lift out of order
Please use the stairs

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