

DISTRICT ELECTRIC TRAINS

30 – DEVELOPMENTS

by Piers Connor

TRAIN WORKING

During the life of the O and P Stocks and after their conversion to PCM equipment, almost every possible combination of train formation was used at various times. These combinations ranged from 4-car trains using 2-car units to 8-car trains using two 3-car units and a 2-car unit. The 4-car train was first used on the initial service trains on the District in 1937 and during the following two years on the Hammersmith & City when a 6-car train was reduced to four cars by removing the 2-car unit from one end after the end of the peak-hour services. When the 3-car unit was introduced by the insertion of a trailer car into each two-car unit, the train formation on the H&C became six cars. For a short time up to the start of World War II in 1939, 3-car trains were run during off-peak periods but 6-car formations became the rule from then on.

After the war, it was not considered wise to run a 3-car unit on its own with only one compressor, in case it failed and left the train stalled without air¹. However, there were subsequent occasions when a 3-car set was run on its own, but a portable compressor was fitted to the train, usually inside one of the cars, and these occasions were restricted to special test runs without passengers.



Fig. 1: Eight-car O/P Stock train departing Amersham for Baker Street with an evening peak hour train in the early 1960s shortly after electrification was extended north from Rickmansworth. The stock was usually confined to the Uxbridge services but there were regular timetabled trips to other destinations.

The 6- or 8-car train formation remained the standard in use until 1947 when a new Metropolitan timetable was introduced which included two 7-car trains, which were run during the rush hours. However, it was not unusual for other 7-car sets to appear when a shortage of the right sort of units prevented the required 8-car train. In 1947 too, 5-car sets of P Stock began running on the Circle. It was also the custom for some Circle trains to make trips up the Metropolitan main line in the early morning and late evening. These included two early morning trips from Watford to Baker Street which were common during the 1950s and, even up to the time of the withdrawal of the CO/CP Stock from the Circle an early morning train was reversed at Rayners Lane before travelling to Baker Street and on to the Circle. Some of these trips involved trains stopping at the Bakerloo Line (now Jubilee) stations between Wembley Park and Finchley Road.

Apart from the occasions mentioned above, it was usual for this stock to be confined to the Uxbridge service during its life on the Metropolitan Line. However, a regular trip was made on weekday afternoons for school traffic on the Watford line and during disruptions to the service it was not unusual for Circle trains to be diverted over the Metropolitan Line to cover gaps in services.

¹ I wonder if the decision to introduce this rule was as a result of the unreliability of the KLL4 rotary compressors introduced on some of the new pre-war stocks. After all, all lines had operated trains with only one compressor for over 30 years up to this time and many of their old compressors lasted longer than the KLL4s, so what other reason could there be?

On 3 July 1969, one such occasion caused the use of the stock on the Amersham service and sometimes the stock was used during 1960-61 on the City to Chesham service to cover for electric locomotive-hauled trains which normally worked this service.

During the early 1960s, the conversion work being carried out north of Harrow-on-the-Hill to increase the number of tracks from two to four involved considerable alterations to services which increased the number of unusual workings. The most notable of these was the use of a 4-car P Stock set on the Chesham branch shuttle service for a time.

As we saw last month, from early in 1962, following its conversion to PCM traction control, CP Stock began regular working on the District and, until October 1964, it was not unusual for it to work on the District service to Hounslow. On its way to Hounslow, it would have passed the test tracks between South Ealing and Acton Town where, in 1962, trials with automatic train operation (ATO) were being carried out.

ATO ON THE DISTRICT

The operation of a train equipped with automatic acceleration and retarder controlled braking can, within quite close limits, be reasonably well predicted. Most London Underground trains had these features by the mid-1950s and from 1955 the idea began to take shape that some sort of automation could be incorporated into every day train operation. In looking for a suitable site for trials, it was suggested that practical tests could be done on either of the single line branches between Acton Town and South Acton or Holborn and Aldwych. Both of these, however, would have involved a high level of technology for a limited service and with limited scope. It was decided, therefore, to carry out the initial trials on the eastbound "test track" between South Ealing and Acton Town, and then do a trial on a service train.



Fig. 2: Experimental ATO train on the test track between South Ealing and Acton Town in December 1962. This is the east end car, No. 22681, which was fitted with the ATO pick-up coils under the front headstock. To the right is a temporary kiosk used to house some of the test equipment. There was another one at South Ealing station. Photo: LT Museum.

The principles of ATO are quite simple². Motoring is activated by closing a switch and braking is activated by opening that switch and closing another. However, problems arise when you want to prevent the train going into a section occupied by another train, or when you want to stop the train

² See "The Underground Electric Train No. 34, *Underground News*, 556, April 2008.

accurately in a station platform but it was do-able. By May 1958, sufficient work had been done on the safety aspects of ATO to convince the Ministry of Transport that LT should be allowed to start trials. Almost two years later, in March 1961, it was decided to fit a 2-car east end unit (23580-22681) with the necessary equipment. This particular unit was chosen because it had the trial Motor-Alternator-Rectifier unit³, and it was expected that the type of output it gave was the same as would be used on the ATO equipment on new trains in the future.

By mid-1962, the work of designing and fitting the ATO equipment was well advanced. It was arranged that the equipment would be in two parts. One part was called the Safety Box while the other was the Auto-Driver Box. The Safety Box governed the emergency braking so that, if the train attempted to approach within a safe braking distance of the train ahead, it would stop. The Auto-Driver Box governed motoring and braking under clear line conditions and station stopping.

To transmit the signals from the track to the train so that the train would know the state of the line ahead and know where to stop at a station, a pair of induction coils was mounted on each side of the leading bogie of 22681. The coils picked up coded signals from the track, which gave the safety indications plus the braking commands for signal and station stops. The test train was also equipped with a radio for communication between the cab and the test engineers' hut at South Ealing.

Test running began on 3 December 1962 and a rapid build-up of confidence in the system persuaded the test team to show it off to the Vice-Chairman, Anthony Bull, on 25 January 1963. The success of this demonstration led to the authorisation of the next step in the scheme – a trial of an ATO train working in passenger service. The eastbound District line between Stamford Brook and Ravenscourt Park was chosen for the trial and, after the press were given a demonstration run at South Ealing on 21 March, the date for the first day of public running was announced for 8 April.

The equipment for the public trial was taken off 22681 and fitted to 22682 between 27 March and 4 April. The signalling between Stamford Brook and Ravenscourt Park was connected up for ATO on the night of Saturday/Sunday 6/7 April and a series of trials with a 6-car train (22682 leading) took place on the Sunday morning. The MoT carried out an inspection in the afternoon. The inspectors were satisfied with the setup and the first public run took place on the morning of the 8 April in the working of train No.123⁴.

The trial was arranged so that train No.123 was made up with 22682 leading each weekday morning and, when it arrived at Stamford Brook, the driver closed a special automatic control master switch. When he wanted to start the train, he pulled and then pushed a special double-action starting button. The double action was to prevent inadvertent operation.

The starting button could show a white, blue or yellow light to indicate that the code being received from the track was “high”, “medium” or “low” respectively, according to the state of the line ahead. The white allowed full speed running, the blue allowed controlled speed running at about 20mph while the yellow gave a signal stop brake command.

At Ravenscourt Park, the train would stop at the 6-car stopping mark where a special yellow marker board was provided. Here, the driver switched out the automatic control and carried on the trip in manual as normal. Between April 1963 and April 1964, 22682 made a considerable number of appearances as an automatic train. From time to time, the unit was withdrawn for alterations to the equipment as a result of the service experience, or for test runs over the South Ealing to Acton Town section.

During the summer of 1963, as a result of the success of these trials, it was decided to convert some units of 1960 Tube Stock and go ahead with a full-scale trial on the Woodford – Hainault section of the Central Line. The new Victoria Line, which was finally authorised in 1962, was also to get the system. When No.22682 was sent to Acton Works for overhaul in April 1964, its automatic equipment was removed and the car converted back to normal.

³ See “The District Electric Train” No.28, *Underground News* No.594, June 2011.

⁴ Simple souls like me might wonder why things don't happen so quickly these days. With all the method statements, risk analyses, independent checking, letters of no objection and other systems for delaying a decision on implementing something new, getting a new signalling system to work has become a painful and, if the Jubilee Line project is anything to go by, not very efficient process. One can only assume that engineers in the mid 20th century were much more confident in their own skills and effectiveness than we are today.

CO FOR Q

With the arrival of CP Stock in 1962, scrapping of Q Stock began in earnest. Within two years, 91 cars had gone, replaced by CP Stock brought in from the Metropolitan Line. This was the beginning of the end for the District Railway electric car design heritage that went back to the earliest days of electrification in 1903 and its American roots of the 19th Century. The oldest Q Stock cars, dating from 1923, were already over 40 years old and even the youngest District designed cars went back to 1935.

More Q Stock was soon to go. This time it was to be replaced by CO as well as CP Stock. In September 1970, new trains of C69 Stock began to enter service on the Hammersmith & City Line. The whole of the CO/CP Stock working on the H&C and the Circle lines was to be replaced by the new stock and transferred to the District where, in turn, it would replace the remainder of the Q Stock, apart from 7 x 4-car Q38 units that were to be retained for the East London line. Shortly after the start of the CO Stock transfers from the H&C to the District began, it was decided that all the Q Stock should be scrapped and that CO/CP Stock would be used on the East London Line as well.



Fig. 3: A Saturday morning Q6 train arriving at Aldgate sometime in the 1960s. These Saturday and Bank Holiday trips to Aldgate were a feature of District timetables until February 1972 and they were always worked by Parsons Green crews who were the only ones trained for Circle working



Fig. 4: 4-car train of Q Stock standing "on juice" at New Cross depot in 1964. Q Stock was used on the East London Line between September 1963 and September 1964 and again between May 1965 and September 1971

At this time the Q Stock was programmed to provide 20 x 8-car trains and 2 x 6-car trains for the District peak hour timetable. These were to be replaced by the same number of CO/CP trains which, with the East London allocation, needed 44 x 3-car units and 34 x 2-car units. All of the available units on the H&C were in a 3-car, M-T-M formation. There were 80 units altogether. The 34 x 2-car units required by the District were formed by removing a trailer from the required number of 3-car units. The transfer and reformations began in September 1970 and the second phase of Q Stock

scrapping started on 9 November 1970, when 7 cars were cut up at Ealing Common. The bulk of withdrawals took place between January 1971 and June 1972, with trains being stripped at Ealing of anything useful (and there wasn't much of that) and then towed to Ruislip Depot. Most cars were then removed to Birds at Long Marston for scrapping.

The last Q Stock in normal service ran on the District on 30 June 1971 and there were a number of farewell tours during the September. On 17 September, the last Q Stock working ran on the East London Line and a special public working was operated during the pm peak on Friday 24 September. A final tour took place on 26 September.

The introduction of CO Stock brought the same problems to the District as it had on the Metropolitan – a CO Stock motor car, with its guard's controls in the cab, could not be used at the outer ends of an 8-car train because of the tight platform lengths. Care had to be taken when making up trains.

CO Stock began appearing on the District late in 1970. The stock was used on all the District services including the four trains provided for the Circle by the District on Sundays. Until February 1972 the stock was also used on the District service which worked from Aldgate, Liverpool Street and Moorgate to Edgware Road and then over the existing District Line to the Wimbledon branch.

CP Stock was introduced on the East London Line in September 1964. From this time on, the East London had a chequered few years with its rolling stock. When the F stock was withdrawn in September 1963, it was replaced on the East London Line by 4-car trains of Q stock, but these only lasted for a year, after which 6-car trains of CP Stock were used, made up of pairs of 3-car units from the District Line. Due to the extra length, one less train could be stabled in New Cross Depot, so the service was reduced with their introduction. The CP Stock was unpopular with the crews, since the trains were longer than the platforms at Rotherhithe and Wapping, where the end doors had to be cut out. Consequently, from May 1965, they reverted to the use of 4-car Q stock trains and these remained on the line until the last of them were withdrawn on 17 September 1971. Having, by then, 2-car units available to make up the trains, the replacements were initially 4-car CO/CP Stock sets, the first three of them entering service on 13 September 1971. Two days later the first 5-car train arrived on the line and these were to provide the mainstay of the service, apart from occasional 4-car trains, until the end of traffic on 12 January 1974, after which the line was worked by 4-car 1938 Tube Stock

The use of CO and CP Stock on the District continued from 1971 to 1981 with various formations ranging from occasional 5-car sets used on the Sunday Circle workings (in place of the more usual 6-cars) to 8-cars, reduced to 7-cars from October 1971, as I describe below. Sometimes, 6-car all motor car formations were used in times of shortages of 3-car units.

NOW WE ARE SEVEN

Another development took place in the summer of 1971 when it was decided to stop uncoupling on the District and run all trains the same length all day. The scheme envisaged all District trains being formed of seven cars, except for those working the Edgware Road to Putney Bridge service, which were to be of six cars because of the restricted platform lengths between High Street Kensington and Edgware Road. The reformation required a wholesale reorganisation of the R Stock, because of its inability to run as anything other than a 6- or 8-car train but it only affected the CO/CP Stock by requiring more two-car units, so that a seven-car train would consist of 3-car + 2-car + 2-car instead of the 3-car + 3-car + 2-car formation of an eight-car train. Trains in 7-car formation began entering service on 4 October 1971.

The decision to go to the 7-car formation was precipitated by growing staff shortages which had begun during the early 1960s and reached a peak during the early 1970s. The operation of 8-car trains and the uncoupling for off-peak services used a lot of staff. Not only were crews needed for uncoupling duties at Ealing Broadway, Parsons Green and Upminster, but an agreement with the staff originating from the removal of front guards in 1927, required station attendance at every platform where 8-car trains were operated. Surprisingly, little objection came from the staff when the 7-car proposal was put forward, in spite of the loss of at least nine trainmen's duties and the reduction of some station staffing rosters. This apparent lack of concern about job losses seems to have been due to a change in the union affiliation, which had come a few years earlier after a dispute at Northfields depot.

The dispute arose over the use of District crews to cover shunting duties at Northfields. Before October 1964, the date when District trains stopped working to Hounslow and using Northfields Depot, some District crews had been allocated to Northfields in addition to the usual Piccadilly staff.

These men were transferred to Acton Town over the next two or three years, apart from the depot shunting crews. As shunting jobs were always much sought after for their variety, general lack of

stress, excess of free time and regular, highly paid night work, there was much resentment amongst the Piccadilly crews at Northfields. They regarded the District men as greedy. After all, it was said, they had all the Ealing Common depot jobs and the Acton Works job covering pilot duties for empty stock trains in and out of the works (the infamous “depot furniture⁵”). Why should they cover Northfields as well? This was now exclusively a Piccadilly Line depot and should have exclusively Piccadilly based shunters. The dispute was aggravated by the local union representatives, who were all District men. The Piccadilly men eventually went against their own union advice, which they regarded as suspect, and staged a one-day stoppage as a protest. The dispute was quickly resolved – the Piccadilly men eventually got their way and the shunters’ jobs – but it led to a vociferous anti-District campaign at the next local union elections and, as a result, a majority of Piccadilly candidates were elected as branch officials. When the question of withdrawing the District uncoupling crews arose, the Piccadilly-based branch committee showed a predictable lack of interest in it and it seems to have gone through “on the nod”.

Under the 7-car programme, the CO/CP units transferred from Hammersmith were now to be formed into 22 x 3-cars and 56 x 2-cars to make up the trains and maintenance spares required. There were still 2 x 3-cars units left over, and these were eventually scrapped. In fact, the final totals reached after all the transfers and reformations were completed were slightly adjusted so that the units

transferred to the District became 23 x 3 cars and 55 x 2 cars. By early 1973 a total of 55 COP trailers had been withdrawn together with the two spare 3-car units.

During the reformation programme care had to be taken to ensure that CO Stock cars were not used at the outer ends of seven-car trains. The restriction on their use was still maintained as it had been in the days of eight-car trains. To make the work of making up trains for service with the correct formation easier, it was arranged that many of the units at Hammersmith which had CO Stock motor cars at both ends were re-formed so that they each had a CP Stock motor car at one end. When the reformation was complete, many units had been integrated with the existing District stock of 44 x 3 cars and 5 x 2 cars. Reading west to east, the totals at the end were as shown in Table 1 above.

Formation	No of cars per unit	No of Units
CO-COP-CO	3	17
CP-COP-CP	3	25
CO-COP-CP	3	21
CP-COP-CO	3	4
CO-CO	2	11
CP-CP	2	17
CO-CP	2	8
CP-CO	2	24

The COP cars were the trailers and had been given this notation since the PCM conversions. The formations given above refer to the units as running with the “A” (53xxx) cars facing west. When they were first transferred to the District they were taken from Hammersmith Depot via Aldgate to Ealing Common Depot so that the 54xxx cars faced west to match the existing arrangements on the District⁶. Early in 1972 however, when all CO/CP Stock had gone from the Circle, it was decided to turn the whole stock so that it faced the right way round, i.e. with the 54xxx cars facing east. From March 1972, work began on turning trains already on the District and from that time onwards transfers were arranged to give the correct direction of running by reversing trains at Edgware Road on their journey between Hammersmith and Ealing Common. All trains were turned by June 1972.

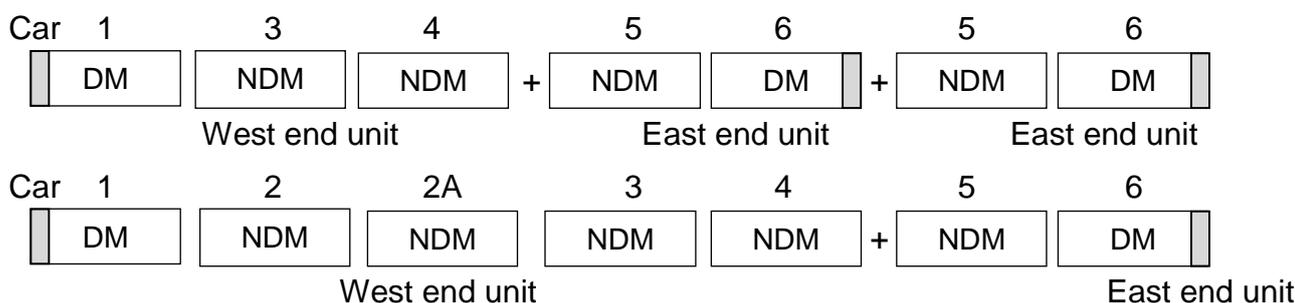
⁵ There was a 3-shift rostered driver and guard at the District’s Acton Town crew depot kept specifically to pilot crews from other lines bringing stock into and out of Acton Works for overhaul. Such movements were limited to a few a week and the crews who did this duty were nicknamed “depot furniture”, since almost the only time they were required to move from their seats in the canteen was when the cleaner wanted to sweep the floor. The depot furniture jobs were regarded as the most senior positions on the line. Shunters’ jobs came next.

⁶ CP Stock operating on the District ran with the “A” cars facing east instead of west so that it matched the Circle stock on the District side of the Circle. See “The District Electric Train” No. 29, *Underground News* No.595, July 2011.

R STOCK REFORMATION

For 7-car operation of the R Stock, a number of different problems had to be resolved. For Ealing Common Depot, it was reasonably easy, if rather time consuming, to get the cars their new formations but some there were some changes to the lighting supply arrangements. Initially, the reduction of an 8-car train to seven cars was a simple operation requiring the removal of one car. The easiest to remove was the No.2 car as it needed no expensive alterations to the couplings and its removal did not result in the loss of any essential equipment. Of the other cars, the Nos.1 or 6 cars had to be kept for their driving cabs; Nos.4 and 5 cars had auto-couplers and had to be kept so that the 2-car east end units could remain unchanged and the No.3 car had the traction control fault isolating switch (FIS) and had to stay where it was, so the No.2 car was the only one which could go. The following diagrams show the two new formations.

R Stock 7-car formations 1972:



The removal of the No.2 cars from the existing 36 x 8-car trains of R Stock left 36 x 7 cars and the existing 15 x 6 cars. Each of the 15 x 6 cars were increased to 7 cars by adding one of the surplus No.2 cars left over from the 8-car trains. The 15 trains involved therefore had two No.2 cars, the additional one being distinguished by the letter 'A' being added below the original car number. All R Stock trains were re-formed between October 1971 and March 1972.

The R Stock units now consisted of three different types instead of the earlier two. The numbers of units was as follows:

36 x 3-car units	211xx-233xx-234xx
15 x 5-car units	211xx-232xx-232xxA-233xx-234xx
87 x 2-car units	235xx-226xx (unchanged)

This allowed 15 trains of 5+2 cars and 36 trains of 3+2+2 cars. It also meant that 21 No.2 cars were left over. These had much of their equipment removed and most of it was stored in the disused locomotive workshops at White City Depot. The compressors (Westinghouse DHC2s) were fitted to some CO/CP cars in place of their much older ones. They also had their windows removed and stored as spares, as the rebated glass was by then very expensive to replace. The cars were all of the R47 type, Nos. 23200-3, 23205-6, 23209-11, 23211-15, 23217-21, 23223-26, and they were all eventually removed to Ruislip for storage pending scrapping.

One interesting result of the re-formation of the R Stock was the issue of a special instruction to train crews. This told them not to attempt to get a train composed of the 3-car + 2-car + 2-car formation up the bank east of Bow Road if the traction control system had failed on the eastern part of the train. It was realised that two motor cars were not powerful enough to push the remaining five cars up the 1 in 28 gradient without assistance from another train. This restriction only applied to the trains with a 3-car unit in the make-up because of the position of the No.3 car. This car carried the traction control fault isolating switch (FIS) which was used to divide the control line in the event of a fault developing. Once the FIS was opened the driver would try the driving controls at either end of the train and use whichever end worked. Sometimes this meant driving the train in reverse from the rear with the guard in the front giving instructions over the phone. However, it was an effective way of moving a faulty train without having to call upon the following train to push it out of the way. Unfortunately, the re-formation of the R Stock caused the FIS on the 3+2+2 trains to be in such a position that it divided the traction equipment into 2-car and 5-car portions. Hence the special instruction to train crews that

assistance from the following train must be called for if only two cars of motors were available on Bow Bank.

Another unexpected result of the R Stock re-formation was the occasional re-appearance of 5-car R Stock trains on the Circle Line. The custom of using two or three District trains on each direction of the Circle service on Sundays led to the appearance of a 5-car R Stock train on these workings from time to time. They were used in place of the usual CO/CP Stock on occasions during the 1970s. They were formed of a 3-car unit and a 2-car unit.

As a result of the re-formation, the supply arrangements for car lighting were altered because the MGs on the No.1 and No.4 cars could no longer supply two cars of lighting each. The 4-car portion was now reformed to 3 or 5 cars, and it was arranged that the MG on the No.1 car of a 3-car unit only supplied its own lights and the two MGs on the 5-car unit supplied their own car, the adjacent car and shared half the lights on the centre car.

In the end, the original formation of the R Stock was to get its own back. The transfer of withdrawn cars from Ealing Common to Ruislip for eventual disposal was limited to four cars per trip. This meant that withdrawn 5-car units of R Stock had to be reformed into 4-car sets to allow their transfer to Ruislip. The single cars left over from these re-formations were inserted into existing 3-car or 2-car units. As a result, some of the east end 2-car units were made into 3-car sets (235xx-232xx-226xx) after their withdrawal.

LIVERY LOTTERY

During the 1970s there were a number of livery changes on the District. I've already described how the R Stock was painted in various shades of aluminium, grey and white (see Article No.28, *Underground News* No.594, June 2011) but the CO/CP Stock also saw a number of changes. Beginning in February 1973, cars passing through Acton Works on overhaul had white car numbers and solid white LT roundels applied in place of the traditional gold lettering. The new lettering was provided on trailer cars as well as motor cars, which had not been done since LONDON TRANSPORT was omitted from the sides of trailer cars from 1953⁷. Then, from November 1973, units of CO/CP Stock coming out of Acton Works after overhaul, appeared in a new livery of "bus red" instead of the usual, darker "train red". The new colour was adopted as standard from this time but not all units had it before heavy overhauls on the stock ceased in September 1978 with the last unit, numbered 53056-013164-54197. Cars finished in the new livery also had the white numbering and LT roundel.



⁷ Except for one car. No.014259, which ran between 1966 and 1971 with LONDON TRANSPORT on its waist panels.

The new liveries were the idea of a design panel run by a Dr. Misha Black, (later Professor Sir) under the guise of a company called "the Design Research Unit". Whilst he had been reasonably successful with the design of the Victoria Line's 1967 Tube Stock with its clean, unpainted body shape and curved cab windows, the bus red and white blobs that he applied to the CO/CP and 1938 Tube Stocks, were horrible. The bus red took on an orange hue when applied to trains and the white just added to the mess.

All seats were moquette-covered in whichever pattern was in vogue at the time of the cars' overhaul but it was not unusual in later years to see different types of pattern in use on the same car. During 1973-75 nine CO/CP cars were painted grey inside, instead of the usual "blue", so that they could match the grey/red/black patterned moquette which was standard for some aluminium bodied stocks at the time. The cars concerned were Nos. 53024 53055, 53193, 53204, 53218, 53245, 53255, 54001 and 54054. The grey moquette was being used because of a shortage of the red/green usual for older Stocks and in fact it appeared in some cars which still had the "blue" interiors. This occurred when damaged seats were temporarily replaced by whatever was available at the time. It always gave me the impression that no-one cared to get it right by providing sufficient spares of the right

Fig. 5: (Previous page, Lower) COP trailer car No. 013144 in a train at Stamford Brook after being desecrated by Dr Misha Black's bus red and white blob in May 1977. The car was one of seven fitted with de-icing equipment in 1965, hence the shoegear seen here that was originally used for detecting the location of the positive current rail. This car was also unique in that it retained the housing for the external R Stock type of door fault detector light that it acquired when it was part of the experimental Q Stock train fitted with the equipment in 1949.

type. Doubtless, passengers thought the same.

Some R Stock cars appeared in service after overhaul with grey painted interior panels and red/grey moquette in place of the usual green/red moquette. Cars affected and their overhaul dates were as follows:

23571-22665	11.73	23551-22651	1.74
23570-22667	11.73	23580-22682	3.75
23547-22642	12.73	23247	2.75

An interesting experiment took place in 1967 when the transverse seats on COP car No.014082 were replaced by moulded plastic seats of a dark red colour. The idea was that seats of this type would overcome the problem of vandalism which had been on the increase for some time. Although this may have been achieved the new seats were uncomfortable and were not generally adopted. No.014082 retained these seats until it was scrapped in 1971.

The original design of the 1938 surface stock car body included a gutter on each side of the roof immediately above the cant rail. Downpipes were provided in the corners of the body to dispose of rainwater. The trouble with this neat arrangement was that blockages in the gutters and downpipes often caused water to flow over doorways, particularly as the train came to a stop.

From 1957 some cars appeared with the gutter sides cut away between the side doorways but this did not entirely solve the problem and, after a few years, some cars which had not had this original modification, had their gutters enclosed over the driver's doors. Later, the same was done to the guard's end of some P Stock motor cars and to both ends of the R Stock driving cars. In addition to this, two CP Stock cars had the guttering enclosed along the full length of the car and had curved rainstrips fitted over each of the doorways. These were No. 54202, done in December 1970, and No. 53247, done in May 1973.

The flooring of all cars was of the then standard grooved maple wood. From time to time trials were conducted to find an alternative covering which would look better, be as wear resistant and easier to sweep. An experiment was tried in 1945 on trailer car No.013076 when it was fitted with a grooved metallic floor covering, but this was removed after a few years in service, partly because of its

tendency to rust near the doorways. In 1971, two trailer cars, Nos. 013159 and 014094 were fitted with asbestos vinyl tiles and Ferobestos "stair tiles" respectively as floor coverings. Neither of these proved worthy of general adoption. It was only under the train refurbishment programme of the 1990s that a suitable floor material was found that could replace the maple wood.

To be continued