

# DISTRICT ELECTRIC TRAINS

## 20 – MORE REFURBISHMENT

by Piers Connor

### UPGRADED CIRCLES

As we've seen in previous articles, right from the start of its existence in 1933, the new LPTB organisation was determined on a policy of modernisation and improvement. For existing rolling stock, this translated providing air operated doors and e.p. brakes for all trains intended to be retained by the Board for more than 20 years. Older stock would be scrapped and replaced, or at least allowed to work out its remaining years without too much being spent on it beyond routine maintenance. The age profile and design of its existing stock meant that District was the target for much of this work, as we saw last month with the purchase of new Q Stock and the upgrading of the 1923-35 motor cars to "Q Converted" cars to run with it.

For the Metropolitan, most of the stock which fell into the 20-year age profile was compartment stock and not suitable for simple conversion to air doors. There was also an imbalance between the number of motor cars and trailers within this group. Almost half the total of 60 motor coaches owned had been bought as replacements for saloon stock motor cars and were used in VT trains<sup>1</sup> with saloon trailers. They were less than 10 years old when the LPTB took them over so they proposed that the motor coach bodies be rebuilt with new bodies and air doors so that they could run with new trailers. A plan was hatched to send two spare motor cars to Metro-Cammell in Birmingham to have them converted as a trial. The trial included the construction of four new trailers as well, which would make up a 6-car train looking generally like a new O/P/Q Stock set. Knowing the passengers preference for compartments, some designs were drawn up to combine compartment-type accommodation with powered sliding doors and various mock-ups were built or part-built at Acton. Eventually, instructions were issued in May 1939 for the two motor cars, Nos. 2707 and 2752, "to be prepared" for shipment to Birmingham. Sadly, before the project got much further, the Second World War started and the whole idea went into "limbo" until after the end of hostilities in 1945.

Another part of the Metropolitan's programme that became a casualty of the war was the planned provision of e.p. brakes on the MV and MW compartment electric stock. It was never done. In the meantime, lists were prepared which showed that most of the rest of the Met's stock was to be replaced, except for 90 cars of saloon stock, which it was decided should be "tarted up" for use on the Circle Line.

The decision to refurbish the Circle stock was first made very soon after the formation of the LPTB in 1933. It actually predated the formal 1935-40 New Works Programme. The decision seems to have been made late in that year and work started almost immediately. It was decided to select

#### METROPOLITAN MOTORS

Up to 1925, the Metropolitan Railway used four different types of traction motor. There were two suppliers and two power specifications. The suppliers were British Thomson-Houston (BTH) and British Westinghouse (BW) and each of them supplied a 200hp motor and a 150hp motor as follows:

BW150hp type 50M and BW200hp type 86M

BTH150hp type GE76 and BTH200hp type GE69

The GE69 motor was familiar to the District as it was the same type supplied for the B Stock in 1905. Indeed, many of those working on the Metropolitan were part of an order originally procured by the District in 1906 for a new batch of cars and subsequently cancelled (See Article No.9, *Underground News* 575, November 2009).

All Met. motor cars had 4 motors. BTH cars were "double-equipped", i.e. they had two complete sets of traction equipment, like the original District F Stock configuration. It was the rule that trains could only operate with matching motor cars, so the Metropolitan referred to its trains as, "BW 150hp" or BTH 200hp" etc. as appropriate. Unlike the District, the Met's trains never ran with more than two motor cars. Being double-equipped, they didn't need more.

<sup>1</sup> For a list of Metropolitan Railway stock types, see "District Electric Trains", Article 19, *Underground News* 585, September 2010.

enough cars to make up 18 x 5-car trains with the latest compatible stock available. Because of the variety of traction equipment and motors in use, an attempt was made to match cars to provide only two types of train. Up to this time, on the Circle, they used either BTH or BW 200hp trains (see box, previous page) or sometimes a BW150hp train. The cars used were always the saloon type but they were a mixed bunch with ages ranging from 1904 to 1921. The 1921 cars were well suited to the Circle, having three sets of double doors per car side. The arrangement was similar to the District's F Stock configuration. The remaining cars were similar to the District's original design with single end doors and a central double door. The selection process was based on car age and motor compatibility. They took all the 1921 Stock and as much of the 1912-13 stock as they could. A shortage of suitable 1st class trailers forced them to take 4 cars of the 1905 stock as well. These stuck out in a train formation as they were the only ones with clerestory roofs. They ended up with 5 BTH 200hp trains and 13 BW 200hp trains. The stock selected is shown in Table 1 overleaf.

The Circle stock normally ran in M-T-DT-T-M<sup>2</sup> sets and, in spite of the provision of driving trailers, trains were not divided in service. The driving trailers were included simply to provide first class accommodation in the centre of each 5-car set. The previous Metropolitan train formation didn't use driving trailers on the Circle and trains were normally made up with 1st class trailers. The LPTB didn't do the same because the 1st class trailers available were all 1905 stock – the 1st class driving trailers selected for refurbishment were mostly newer. In September 1939, the driving trailers were properly converted to trailers anyway by having their control equipment removed from the cabs. The BTH master controllers freed up by this exercise were used to replace some of the old BW controllers in the motor cars. The old BW controller deadman system was rather more complex and



unreliable. I suspect other cars were done as spare BTH controllers became available from scrapped or converted stock.

There were differences between the BW and BTH control systems used on the Circle stock, principally in that the BW kit allowed automatic acceleration but the BTH did not. The original refurbishment plan included a scheme to fit the five BTH trains with accelerating relays, which would have made the whole stock automatic but this was cancelled for some unknown reason. When BW cabs were provided with BTH controllers, it must have been confusing for drivers, not being able to see the difference between a BW and a BTH train, unless some sort of indication or notice was provided. There is no evidence that it was.

The upgrade work for the first few trains ended up being largely cosmetic. It was carried out in Acton Works during late 1933 and 1934, where cars were re-upholstered and repainted in the Underground's tube livery of cream and red outside and cerulean blue and cream inside. Apart from the experimental Metadyne train, it was the only surface stock to have this livery. The first train entered service on the Circle Line on 8 March 1934. Almost immediately after this, it was decided to

*Fig. 1: A 5-car Circle train at Neasden after returning from refurbishment at Acton Works in March 1934. This train was one of the early ones, still retaining the original luggage compartments behind the drivers' cabs. These were later reduced in size and the doors removed to allow 4 more passenger seats. In this train the motor cars at each end of the train are 1913 stock and the three trailers 1921. The middle car is a 1st class driving trailer. The red/cream "tube stock" livery was quickly replaced at the next overhaul by the all-red version preferred on the sub-surface lines. It's not even certain that all the refurbished trains had the red/cream paint job. Photo: LT Museum.*

<sup>21</sup> Except on Sundays, when most Circle services were run as 4-car sets.

add end communicating doors to the 1921 Stock, which didn't have them. I suspect they were left out of the original specification because of the desire to keep seats. The modification brought the cars up to Underground standard, allowing evacuation through the car ends if necessary.

Partly because of changes in scope and partly due to the learning curve which always goes with such projects, it took over three months to complete the first train. Then, in September 1934, by which time 11 trains had already been through the programme, it was decided that four extra cross seats should be provided on motor cars by the removal of the luggage compartments. Some space had to be left for the two motor generators provided to supply the control circuits on the BW cars so this doubled as a small guard's compartment on all motor cars. It appears that, on the trains which had already been through Acton, this work was done at Neasden.

A minor modification which appeared at Acton at the same time as the Circle work was the fitting of a tip-up driver's seat in the cab of a Metropolitan 1st class driving trailer, as a trial. This suggests that either they didn't have seats before or that the originals were unsuitable in some way. Met. motor cars certainly had cab seats, but I suspect that driving trailers didn't because of the use of the vestibule by passengers when the cab was not being used as such. Perhaps there was a request to have a tip-up seat so that the driver could stand up if he felt like it. Being able to stand up when driving was helpful, and not just to do shunting. In my time as a driver, I frequently drove standing up to relieve the strain of sitting on a hard, bouncing seat for a long time, so I see no reason why Metropolitan drivers wouldn't have wanted to too<sup>3</sup>. It isn't recorded whether any more cars were done.

**Table 1: Circle Stock 1934-1950**

Stock	Car	Equipment	Numbers	Total	Comments
1921	Motor	BW 200hp	2561-2580	20	
1913	Motor	BW 200hp	2581-2586	6	
1913	Motor	BTH 200hp	2587-2596	10	Made up into 5 BTH trains
1905	1st Dr. Trailer		6536-6538, 6542	4	6542 replaced a 1913 car which was designed to run with MW trains only.
1921	1st Dr. Trailer		6539-6541	3	
1913	1st Dr. Trailer		6543-6550	8	
1921	1st Dr. Trailer		6551-6553	3	
1913	3rd Trailer		9546-9548	3	
1921	3rd trailer		9549-9581	33	

In April 1934, it was decided to replace all the Circle stock's BW type 86M motors with GE212s recovered from scrapped tube stock<sup>4</sup>. The works instruction for this job says that they needed 78 motors for 26 motor cars. This struck me as odd because, if all the motors had been replaced, they would have needed 104. Looking at the numbers suggests that they decided that the Circle trains were over powered and that one motor car in each train should be reduced to single-equipped status. This would have reduced the power from 1,600hp to 1,200hp per 5-car train – much more reasonable when compared with a 6-car District train equipped with GE212 motors which also gave 1,200hp. It is recorded<sup>5</sup> that the BW single-equipped cars were Nos. 2584-2586, 2561, 2562 and 2573-2580. Single-equipped BTH cars are not listed but it is safe to assume that they were similarly modified by removing a set of motors from each.

In 1937, the GE69s, which were still on the 10 BTH motor cars, were swapped with GE212s currently on the District's remaining B Stock motor cars. Before the work was completed, it was decided to fit

<sup>3</sup> One of the biggest drawbacks of the cabs built for the Underground in the 1990s is that it is not possible to drive standing up without extreme difficulty. My efforts with an S Stock controller recently, showed me that it is a lot better than the 199x Tube Stock arrangement.

<sup>4</sup> The motors were from the Bakerloo's 1914 cars and the Watford Joint Stock of 1920.

<sup>5</sup> By J. Graeme Bruce, Steam to Silver, Capital Transport Publishing, 1983.

all the GE212 motors remaining on the combine with roller armature bearings. This included the Circle stock and the South Acton motor car No.37. Cyril Birkbeck, who was working in the new Acton-based drawing office at the time, told me that they had no drawings for the GE212 motors so they had to get some copies from America in order to do the modifications. He described how, when they came, "the blue prints ..... were first class, despite the 20-year old tracings from which they were taken". In 1938, the BW cars had their original 9-core jumpers and receptacle boxes replaced by 10-core, BTH jumpers so as to standardise the jumpers on the Circle fleet<sup>6</sup>.

There were constant troubles with the bogies, of which there was a wide variety. Many were already second hand when they were fitted under the cars and structurally, they were showing signs of their age. In the hope of getting some improvement in reliability, a trial was carried out in August 1943 where three trailer cars were fitted with K2 bogies reclaimed from scrapped District H Stock trailers<sup>7</sup>. This must have helped, because another 14 cars were done soon afterwards. The air compressors were another source of problems. Again, these were very old, most of them dating from 1904-05, and they were replaced by reclaimed and ever reliable BTH CP30 or Westinghouse CM38 compressors.

There was much hesitation and mind-changing during this project. An additional proposal, put forward as part of the original 1935-40 New Works Programme, was to fit air doors to 106 Met. saloon cars, including the whole Circle fleet, plus a few for the East London Line. Then, in April 1937, it was suggested that the Circle fleet should be reduced to 10 x 5-car trains and that only these trains would be converted to air doors. Service spares would consist of 4 x 5-car unconverted trains. The idea was to float around for a couple more years but work was never started and the proposal was officially withdrawn in the February 1939 revision to the programme. I can see why. Operationally, it would have meant reducing the Circle service from a 7½ headway to a 10 minute headway and mixing air-door and non air-door trains in the way proposed would have led to very variable timekeeping – making it even worse than usual. Also, a lot of work was needed for air door conversion and not all the cars really had enough doorways for Circle operation anyway. Another issue was that a third of the stock was over 20 years old and the fleet generally was not as reliable as the contemporary District stock. It was unlikely to improve with door equipment added. Finally, we shouldn't forget that the Met. cars were traditionally built, with wooden framed-bodies on steel underframes. Getting sliding doors to fully close every time within the ½ inch required to satisfy the electric interlock in the pilot light circuit would have been a problem in a body flexing and shifting with every stop.

Curiously, the Metropolitan cars were not given "A" and "D" handing and the LT car numbers allocated to them did not relate to the cab locations as on other Underground stock. This was said to have been because "Metropolitan cars are reversible" to quote the original instruction for renumbering. Well, most of the motor cars were but some of the trailers and driving trailers were not. The Metropolitan's own stock lists refer to cabs on driving trailers being located at the "up end" or "down end" as appropriate but they didn't show this for motor cars. From this, one might assume that motor cars had duplicate jumpers at the trailing ends and were therefore "reversible". Jumper locations on many cars were not standard either. Nevertheless, the renumbering went on without reference to car direction, except on the GN&C, which was a self-contained railway anyway. One other point to remember about Metropolitan Railway operation that differed from the District was that the Met. never used motor cars in the middle of the train. So much power was provided on a motor car that only two were ever needed on a train, one at each end.

## **F STOCK REORGANISATION**

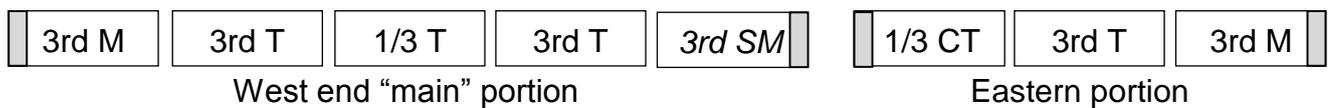
We have, since its upgrade with e.p. braking in 1928-30, neglected the story relating to the District's F Stock. Since it was, as a result of its non-standard coupler height, necessarily kept separate, this is easy to do but the stock was included in the 1935-40 New Works Programme and, being within the 20-year investment rule, it was earmarked for substantial improvements, including air doors and "improved service braking". One of the first steps was to reform the stock into 4+4-car formations,

<sup>6</sup> How would this be done? One of the 10 BTH cores in the jumper and one pin of the socket would be unused.

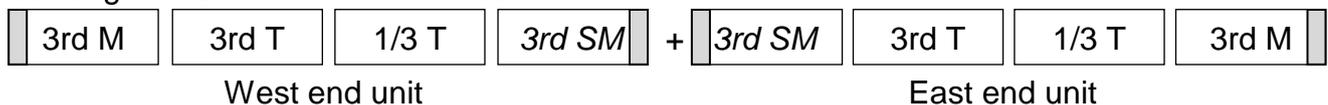
<sup>7</sup> A lot of the H Stock trailers had been scrapped by this time but there were still 25 on the books and they were used in service from time to time. After 1940, scrapping virtually stopped until the end of the war in 1945.

rather than the existing 5+3 arrangement. This was, according to the proposal documents, to allow 4-car off-peak trains to be run – the new standard all over the sub-surface network which was only to be violated by one or two shuttle services. The plan also included restoration of the power that was withdrawn in the early 1920s when a motor car in each train was single-equipped. Obviously, the Graff-Baker plan to move to more powerful trains had to include as many stocks as possible and the F Stock was right up there, top of the list. The work included the reformation of the stock and the re-installation of the traction motors, which had been removed in 1923 and subsequently used on the District's electric locomotives. As the locomotives were now to be scrapped, the motors were available once more. In order to get the 4+4 formation, the 4th car from the 5-car west end portion of each train (a 3rd class trailer) was removed and inserted into the 3-car east end unit. To even up the power on each 4-car unit, the control trailer became a single-equipped motor car. This was an easy choice as it already had a cab. It lost its 1st/3rd class accommodation, which was swapped with the 3rd class trailer so that it became a composite trailer, at least until 1st class was abolished on the District on 1 February 1940. The transformation looked like this:

#### F Stock Formation 1923:



#### Rearranged F Stock Formation 1938:



Note: *3rd SM* (in italics) refers to a single-equipped motor car. The others were double-equipped.

As we saw in Article No.8, (in *Underground News* No.574, October 2009), it seems likely that the traction control equipment for the motors which had been removed, was left in place on most of the F Stock motor cars when they were made into single-equipped cars in 1923 – shown as *3rd SM* in the diagram of the 1923 formation above. If not, it was certainly stored. For the re-arranged formation now being undertaken, the unused equipment had to be fitted to the former control trailers to make them into single-equipped (SE) motor cars. These cars were fitted with the motors taken from the scrapped electric locomotives. They needed motor bogies to carry the motors, so their leading trailer bogies were swapped with the idle motor bogies on 12 of the existing single-equipped motor cars. They also had to be equipped with air compressors. These were taken from the pool of spares being thrown up by scrapping older cars. While all this was going on, the trains were equipped with "improved service braking", otherwise known as retardation control, where the e.p. brake was modified with mercury retardation controllers and additional valves<sup>8</sup>.

As part of their 1938 rearrangement, the F Stock had their doors converted to air operation, complete with passenger door control. The air door engines used for the conversion were salvaged from scrapped Central London Railway tube cars. They were modified and refurbished for use on both the F Stock and some of the other District line conversions. Guard's door controls were fitted at the trailing ends of the double-equipped (DE) motor cars but not on the single-equipped cars. The same philosophy was applied to the provision of train telephones – DE cars only. This was doubtless a money saving exercise, since it would have required some expensive additional kit – door control batteries, phones and control panels – at a position which was unlikely to be used very often, unless the stock was to be used for 4-car off-peak operation. This leads to an interesting question. Why did they spend all that time and money rearranging the stock? Why not leave the 5+3 formation as it was. The use of F Stock for uncoupling duties was limited to one or two trains a day<sup>9</sup> and these could easily have been worked by other stocks if a 4-car off-peak formation was mandated. And, if they wanted to add motors, they could just put them back on the cars which had originally them. Why go all this trouble? Well, despite trawling through various records and papers, I found just one reference which said that they were being made "capable of being split into 4-car portions for slack

<sup>8</sup> See Article No.18, *Underground News* No.584, August 2010, for a description.

<sup>9</sup> For WTT No.11 dated 3 May 1937, there were 11 x 8-car F Stock trains required for the peak service. Only one of these uncoupled for the midday off-peak at Ealing Broadway. Another uncoupled at Upminster for the evening off-peak.

hour working". I suspect it was the Operating Department pressing for standardisation but one would have expected them to insist on having guard's door control panels at both ends of each 4-car unit, as was standard on other lines. The whole exercise doesn't really make sense and it would have failed any cost/benefit analysis I could have conducted on it. In the end, the trains were still hardly ever used on uncoupling turns and anyway, 4-car operation on the District main line was abandoned in May 1940.

Technically, the F Stock now had some more unique features. The introduction of e.p. brakes in 1928-30 had seen the fleet fitted with 50-volt batteries to operate the brake control system. The system was designed so that the battery at the driving end of the train was used for brake control while those on other driving cars were on charge. The act of opening the driver's brake valve isolating cock took the battery off charge and connected it to the brake controller. The battery charge had to last the trip. This was normal on e.p. fitted trains of the late 1920s and early 1930s. When door control was introduced on the F Stock in 1938-39, the same batteries were used for the door control circuits but, since the guard had to be at the other end of the train, a battery "busline" was provided along the train. This supplied the guard's door control position at the rear of the train from the battery on the driver's car at the front. This was not the same as the District's other air door conversions, which used two batteries, one for brakes and one for doors. The crew used the one



*Fig. 2: A train of F Stock entering Barking some time in the late 1940s. The train has air doors with passenger door control, as installed at Acton Works in 1939-40. This train has only seven cars instead of the usual eight. One of the single-equipped middle motor cars is missing. It was not unusual for short formations to be run when there was a lack of available stock. Running short trains was considered preferable to cancelling a train because one car was defective. With a fixed unit system, as is universal today, cancellation is inevitable.*

available for them on the car they were working on.

At some point before the Second World War, the 15 single-equipped motor cars had the unused driver's cab removed and the space given over to four passenger seats. The cab side doors were removed and side windows added. They were instantly recognisable because, unlike the rest of the windows, they had no glazed toplight. They also had the curved rainstrip left in place on the roof, even though the door it had protected had been removed. I have found no record of when this was done but it seems probable that it was during the 1938-39 air door installation.

The F Stock jumper arrangements, first rationalised during the e.p. brake conversion of 1928-30, were altered again for the door conversion. The 600-volt busline jumper was on the south side of each car with the traction control jumper next to it. The auxiliary jumper (for door control) was on the north side and just next to it was the e.p. brake jumper. Looking at the front of the train from the west end, the low voltage jumper initials were "A", "B" and "C" (Auxiliary, Brake & Control), an alignment copied from Standard Tube Stock ("Remember your A B C! train staff were told during their training). For the F Stock, uniquely, the battery busline was carried in the auxiliary jumper. Finally, during the 1938-39 conversion work, the F Stock's GE260 motors were fitted with armature roller bearings. With designs and reliability of roller bearings improving, it was now becoming the standard for both new and existing motors across the system.

The 1938-40 rearrangement of the F Stock allowed correction of the rather unbalanced motor car allocation within the stock, which had taken place as a result of the removal of half of the traction motors from 15 cars in 1923. The removal of the motors had left an imbalance, where there were more east-facing single-equipped cars than needed. The New Works rearrangement allowed the original 40 motor cars and 12 control trailers to become 52 motor cars – 26 double-equipped cars and 26 single-equipped cars, both types being divided into equal numbers of east-facing and west-facing cars – 13 of each. An odd feature of this was the resulting shoe gear arrangement. It didn't change, despite all the swapping of motors, bogies and control equipment. The 40 original double-equipped motor cars all had shoe gear on both bogies and they retained this, even on the 15 cars which became single-equipped. The single-equipped motor cars converted from control trailers under the 1938-40 programme still had just one set of shoe gear, as they'd had when they ran as control trailers. A summary of the original arrangement of cars after the 1923 alterations and the 1938-40 conversions are shown in Table 2 below.

**Table 2: F Stock Changes 1923-40**

Type of Car	1923 arrangement	1938-40 conversion	Comments
WB DE Motors	12	13	Additional WB DE car converted from EB SE car
EB DE Motors	13	13	No change
EB SE Motors	15	13	One car became WB DE car, one WB SE car
Control Trailers to WB SE Motor cars	12 CTs (original)	13 SE motors	12 control trailers became WB SE motor cars with 1 added from EB SE motor cars
1st/3rd Trailers	12	24	12 1st/3rd trailers converted from 3rd class.
3rd Trailers	36	24	12 3rd class trailers converted to 1st/3rd trailers

## SOUTH ACTON AGAIN

Readers may recall that, back in 1932, the short branch between Acton Town and South Acton was singled and through services between South Acton and Uxbridge and Hounslow were withdrawn in favour of a shuttle service from Acton Town. The service was operated by a single, double-ended B Stock motor car, No.37, which was specially converted for one-man-operation. When the New Works Programme was drawn up, it was proposed that the shuttle service would continue and No.37 should be retained. The rest of the B Stock fleet was to be scrapped. This idea continued through to 1940, when it was realised that, if car 37 was out of service for maintenance, there wasn't a suitable substitute. This seems to have caused a minor panic. Up to this time, it had been usual for a substitute 2-car set to be formed of a motor car and a control trailer taken from the local stock pool. With all the local stock now earmarked for scrapping, where would the substitute set come from? Well, if an M-CT set was required, it could be made up of 1910-13 stock.

There was a batch of 8 control trailers available in this fleet but they were allocated for the Addison Road shuttle and the East London Line and this seems to have stifled the idea. It was decided instead to convert two 1923 G Stock motor cars to double-ended vehicles and use them for the South Acton shuttle. No.37 was to be scrapped.

The two G Stock cars were numbered 4167 and 4176 – one eastbound and one westbound car – presumably so as to retain the balance in the main line fleet. The two cars were pulled out of the mainstream air-door/e.p. brake conversion programme in 1940 and specially modified for use on the “Acton Shuttle”, as it was referred to in the instructions. The work done on the cars was very similar to that done on No.37 – air operated doors (without passenger door control) were added, together with a cab at each end, a second brake cylinder and door-interlocked traction control to prevent the train starting with doors open. The former trailing end was provided with a single headlight and tail light rather than the full District marker light set. Originally, no alterations were made to the traction control power available during the original conversion work but later, the cars were restricted to series operation only. This was done by welding a lug to the top of the master controller to prevent the handle being moved beyond the series position.

There were two main reasons why 1923 Stock cars were chosen for this conversion. First was that they had a virtual cab at the trailing end – only a door was needed to separate it from the passenger saloon. The second was that there were windows in the trailing end wall. This was a standard feature of all District cars built up to 1923, only being abandoned for the 1927 K Stock and following batches. On the F and G Stock cars converted to air door operation, the end windows had to be removed and the openings covered to allow the guard’s door control panels to be installed.

The two cars continued in their solitary duties – one in service and one spare – virtually unchanged until the South Acton branch was closed finally on 28 February 1959. The cars were scrapped in the May. The track was lifted soon afterwards and, for many years, the old shuttle platform at Acton Town and the branch trackbed formed part of a staff footpath opened between the station and the offices at Acton Works.

## FLEET IDENTITIES

As we have come to expect in this story, the identification used for the various batches of cars, on both the District and Metropolitan, remained haphazard, even after the refurbishment programmes had been substantially completed. Very quickly,



*Fig 3: “Acton Shuttle” car 4176 (G23 Stock) departing Acton Town for South Acton with the former trailing end leading. Only a single headlight and tail light was provided at this end for the conversion work carried out in 1940. Immediately behind the car is the Acton Town signal cabin and behind that is the substation. The service was withdrawn on 28 February 1959 and this car and its sister, No.4167, were officially scrapped on 25 May 1959.*



*Fig. 4: Despite there being two Acton Shuttle cars, one in service and one spare, there were occasions when both were unavailable and a 2-car set had to be provided instead. Here a Q23 and Q27 (nearest the camera) pair of motor cars are working the shuttle service. One might ask why, given the District’s lax attitude to train formations, they didn’t save themselves the expense of the conversions and provide a 2-car set like this all the time. Perhaps it was due to there having to be a guard on this formation in order to operate the doors.*

the use of the title “pre-war steel cars” for the 1910-13 C, D and E Stocks was rendered useless because of the start of the Nazi war in 1939. For some reason, they soon became known as “BTH Stock”, although why this should distinguish them from the rest of the District’s stock, which all was equipped by the same company, remains a mystery. The name stuck though, for the rest of their time in service. Even after they were scrapped, crews who remembered working on them always referred to them as “BTH Stock”. From May 1943, the letter H was used in District working timetables, along with F and Q, next to each set number to indicate the stock to be used. The “H” indicated “hand-worked door stock”, shortened to “H Stock”. This was before all the original wooden H Stock cars had gone. Put another way, in the bizarre world of District rolling stock notation, there were actually some H Stock cars running in H Stock trains. Even though they ran in the same trains as the 1931-35 trailers, I doubt many of the passengers noticed that, even in 1945, some trains were made up of vehicles with ages ranging from 10 to 40 years.

Almost a year after the end of the German surrender in May 1945, sub-surface cars began to be turned out from Acton Works after overhaul with letters and numbers stencilled on body ends indicating their provenance. This labelling seems to have started after a memo was issued by H.H.C. Barton, one of Graff-Baker’s officers, on 26 February 1946 in which he stated that it had been decided to reclassify certain cars running on the District as follows:

1923 Gloucester motors	– now “GQ” –	to be Q23
1927 Birmingham motors	– now “KQ” –	to be Q27
1931 Feltham motors	– now “LQ” –	to be Q31
1935 Birmingham motors	– now “MQ” –	to be Q35
1938 Gloucester motors	– now “Q” –	to be Q38

Only those cars converted to air doors and e.p. brakes were included in this scheme at this time but the system stuck for once and, over the next 30-odd years, successive batches of cars on the sub-surface lines generally conformed to the same pattern. The only cars that didn’t comply were the two Acton Shuttles, which were designated “G23”. In WTTs, they were simply labelled “G”.

The earlier “GQ” type of notation mentioned in Barton’s memo doesn’t seem to have been widely used. Perhaps it arose from a memo that Graff-Baker wrote to Evan Evans, then Operating Manager (Railways), on 12 June 1942, where he said that it had been decided to give letters to the different types of rolling stock on the Metropolitan Line. Of course, they already had them and this effort seems to have been simply a tidying up exercise. It allowed the Met. stock to be lettered in line with the current pattern used for the District but without clashes. The Met’s original scheme was shown in Table 4 of last month’s article. The new designations were listed as follows:

**Table 3: Metropolitan Stock Identification 1942**

<b>Stock (as described by Graff-Baker)</b>	<b>New Letters</b>	<b>My Comments</b>
H&C Stock	“O”	Unchanged since 1937 when the letter first appeared.
Metadyne Stock	“P”	This also first appeared in 1939. Of course, the O Stock was also Metadyne equipped.
Old Metropolitan Car Stock	“R”	Previously V Stock. The letter R was to be re-used later by new District stock in the late 1940s.
M.V. motor cars 2598 & 2599	“S”	These were two unique prototype cars dating from 1925. The letter S was previously used by the Metropolitan’s special “Hustle” train dating from 1919.
Electric Compartment Stock (Modern)	“T”	Former MV and MW stocks. The T designation was retained until this stock was withdrawn in the early 1960s. The “Modern” part of the title was to distinguish it from the older bogie stock, which later came to be known as “Ashbury” stock.

<b>Stock (as described by Graff-Baker)</b>	<b>New Letters</b>	<b>My Comments</b>
Flat roofed old "bogie" stock (electric)	"U"	So-called "Ashbury" stock. It was always known on the Metropolitan as "bogie" stock. The roofs weren't flat but they were much lower than on other stocks.
M.V. motor cars with old car stock	"S.R"	The M.V. cars referred to here are the same 2598 & 2599 referred to above as "S" Stock.
Modern motor coaches with car stock	"T.R"	Previously VT stock.
Modern motor coaches with old bogie stock	"T.U"	Previously W stock

On trains composed of mixed stock types, two letters were used, as in TR and TU. Circle stock was to be known as "Circle" stock and locomotive hauled stock as "Steam" stock, regardless of the fact that it was hauled by electric locomotives for much of its time. The title STEAM was even stencilled on the ends of coaches when they were overhauled at Acton Works so as to distinguish them from T Stock vehicles, which looked very similar.

The "MV" designation was much abused, both officially and unofficially. When the first of the new electric compartment type trains first appeared in 1927 in the form of three 7-coach sets, they were fitted with vacuum brakes instead of the Westinghouse air brakes used on all the earlier batches of electric trains. This was because it was intended that the trailer coaches would be universal, so that they could be used in either steam or electric trains, and the Met's steam locos had vacuum brakes. The new trains were therefore referred to as MV trains, the M referring to the equipment manufacturer (Metropolitan Vickers) and the V referring to the vacuum brake. When more trains were ordered in 1929, they were specified with Westinghouse air brakes and they became known as MW trains, the W referring to Westinghouse. The fact that the initials MV could also refer to Metropolitan Vickers, led to considerable confusion in later years, even affecting Graff-Baker who, in his June 1942 memo, refers to the 1925-built prototype cars, equipped with Metropolitan Vickers traction equipment and Westinghouse brakes, as "M.V." cars. In reality, MV trains had ceased to exist by the end of 1935, when the last of them passed through Acton Works for their overhaul and conversion to Westinghouse brakes. What made the confusion worse was that the final batch of electric compartment stock trains built for the Metropolitan Railway in 1931 weren't equipped by Metropolitan Vickers but by GEC and they were not originally compatible with either MV or MW trains because of their traction motor power, even though they looked very much the same and had been specified to be compatible. Regardless of this, they were still designated MW stock in the working timetables. Eventually, their compatibility problem was resolved by modifying the motor gearing of the older cars.

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