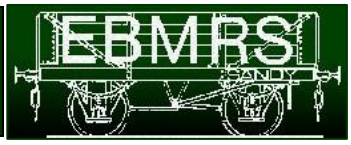


The Oerlikon EMUs – some recent learns and possibilities

London Road Models continues to advertise a kit for this as 'full kit coming soon'. We shall see….but in the meantime, what can I learn? In early December I was double-checking whether there was anything new on RMWeb, and to my amazement there was a post from, of all people, a young American who has an interest in pre-grouping railways of the UK! He had even visited the NRM and photographed a whole file of drawings – wow! – and had posted them all on RMWeb – all 170 of them. Double wow!!! Needless to say, I have downloaded the whole lot, and have managed to determine that most are indeed for the Oerlikon, some for the original Siemens units and some for the later LMS GEC units. These, along with various photos available, should enable all parts to be attempted.

Using this information plus other sources I managed to cobble together a summary of the units' history (as far as I am able), and I shared this on the RMWeb thread. Some of it you may already know from previous mutterings, but as it includes new observations and gives context, I've repeated the whole RMWeb piece here:-

I've cobbled together what I can find from railway magazines of the day, especially the RCTS Railway Observer for 1957 to 1960, the March 1960 Railway World, the Historical Model Railway Society, the web, The LNWRS Journals Volume 9 and books on The North London Line by The North London Railway Historical Society, Middleton Press, Dennis Lovett and Michael Robbins.

For the uninitiated, the electric trains went as far back as 1914 when four 3-car EMUs were introduced by the LNWR on services between Willesden and Earl's Court. These had electrical equipment supplied by Siemens, a German firm, and previously it was presumed WW1 put paid to their further involvement as the following stock was equipped by Oerlikon of Switzerland. However, it has come to light that it was probably simply Siemens' inability to fulfil anything further, as the Oerlikon contracts were being prepared in 1913.

With differing electrical control systems, the two types were incompatible, so whilst an Oerlikon could stand in for a Siemens on an Earl's Court service, the Siemens units were never seen on the Euston or Broad Street services. In that regard I can largely put the Siemens versions to one side, however, the only engineers' drawings I've seen are for the Siemens so the underframes will have to be based on that, or I rely on London Road Models to complete their kit. I understand the correct drawings are held in the archives for Metropolitan Carriage, Wagon & Finance Company at Birmingham library – but these are viewable in person only and I'm unlikely to get there.

Having set the scene somewhat, I'll attempt to review the EMUs chronologically, with a mix of context and details for creating the models.

1913
Contracts let - contract 1 to Siemens, contract 1A to Oerlikon. The HMRS drawings I know of are annotated Contract 1.
The sets were formed of a Motor Car 3rd class, Composite Trailer and Driving Trailer 3rd class, with a saloon style layout in each and sliding doors at each end. The Composite was divided into 3 saloons, and there were gangway vestibules between each car.

1914
Siemens units introduced on Willesden – Earl's Court services.
Numbering: Motors 1E to 4E, Trailers 301E to 304E, Driving Trailers 601E to 604E
Full LNWR coach livery

1915
Oerlikon sets introduced. 38 sets of 3 cars (actually run as 19 sets of 6 cars), with 5 spare motor cars.
Numbering: Motors 5E to 42E (spares 43E to 47E), Trailers 305E to 342E, Driving Trailers 605E to 642E
Sets initially set up as M -T - DT – DT – T – M, e.g. 5E – 305E – 605E – 606E – 306E – 6E, with the odd-numbered motor facing Richmond and the even- numbered motor facing Broad Street. If the sets ran as 6 cars normally, but split for off-peak services, they normally paired up again later as part of the carriage working diagrams.

These were basically the same designs as the original Siemens units, but with small differences. These had reduced seating in the centre trailer, to allow more space for the First Class seats, and the motor car had a passenger access door at the inner end only to provide space for a further 8 seats. Externally the cars also differed by having raised panelling only around the cab and equipment compartment (which had slightly deeper ventilation louvres), and had emergency windows fitted in each car.

As built, the guard's compartment doors had a window only on the left door on each side.

One line of roof ventilators, centrally.
Delivered with tapered shoebeams on bogies as per the Siemens
Underframes very similar to Siemens. Trailers use LNWR pattern trussrods and queen posts
Knorr compressors fitted.
Roofs and ventilators different to Siemens, details not known. Long curved rainstrips fitted on roof
Also delivered in full LNWR coach livery

1917
Drawings dated 20 October for the roof ventilators to be extended to 3 rows on each coach, to a 1916 hemispherical vent pattern. It's believed all units eventually so treated (photos suggest so)

1920
Window was fitted to the Guards section right-side door (as viewed from outside) of the pair on each side as units were sent for service. A lower footstep also added. As the additional ventilators were added, the rain strip was removed over the saloons leaving small sections at each end. Raised gutter strips fitted to the roof edge over each door.

1921
A further 30 sets and 3 spare motors ordered under Contract 25
Numbering: Motors 43E to 72E, Trailers 343E to 372E, Driving Trailers 643E to 672E
The original spares 43E to 47E were renumbered to 251E, 250E, 253E, 252E and 255E in that order. The new spares numbered 254E, 256E and 257E.
The motor car ventilation louvres were in 4 door columns instead of 3 fixed panels. The 1915 units were adapted to match when overhauled.
Delivered in early LMS lined livery.
Coil springing replaced by rubber springing and additional secondary springing. Spring safety stops added over the leaf springs; leaf springs were thinner on the trailing bogie.
Wolverton designed a heavier pattern shoebeam for the driving trailers, suggestion the earlier units were updated too.
Compressors on this stock were BTH CP30A

1922
The practice of even numbers facing Broad Street ceased, following the introduction of a triangle line at Colne

1923
A final order of 2 motors and 7 pairs of trailers was delivered at the time of the Grouping
Numbering of this batch was in the LMS series: Motors 5719, 5720 Trailers 8873 – 8879, Driving Trailers 10013 to 10019
The Siemens sets were now numbered 5721-4, 8801-4, 9941-4.
The 1915 sets numbered 5725 – 62, spares 5794/3/6/5/8 in order as above, 8805-42, 9945-82.
1921 sets numbered 5763-92, 8843-72, 9983-10012, 3 spare motors to 5797/99/800.
Guards' door windows were fitted to both doors from new, and the cars were also fitted with coach side destination panels and 'non-stopping' indicators. Indicators were horizontal plates, 1.5" by 24", fitted instead of a window by the doors either side of the (erstwhile) gangways.
Internally the 1st Class partition had been moved along by one bay and there were some differences in fittings and décor.
Around this time the LMS stopped trying to keep sets together, though the trailers generally remained as pairs.

1924
Motor 253E involved in an accident, rebuilt and reappeared in 1926 as 5796 with a 1926 build plate. Same fittings as 1921 stock, except a wooden blank was fitted in the window space instead of the indicators.

1925
Positive shoe fuseboxes removed from the shoebeams, replaced by 2 boxed under the solebar on the right side of the coach, all stock believed so treated. Shoebeams updated to stepped type
Non-stopping indicators removed from set 18E – 318E – 618E

1927

Non-stopping indicators removed from all sets on servicing, with wooden panel replacing it. Eleven Oerlikons didn't have the indicators in the first place, so they retained the glass window. These were numbers 28224/31/32/33/36/46/55/63/64, 29038 and 29738.
Attempts were made to reunite motors and original trailers on overhaul

1931
Further attempts were made to reunite motors and original trailers on overhaul.

1932
LMS renumbering scheme
Siemens 28219-22, 29721-24, 29021-24
1915 sets – 28223-262, 29725-62 (except 29726), 29025-42 (except 29028). The trailer numbers then went out of original sequence, with 9973-81 allocated 29043-51 and 9963-72 allocated 29052-61. 9982 numbered 29062. Spare motors to 28262, 261, 000, 263, 264 in that order.
1921 sets – 28265-94, 29763-92, 29063-92. Spare motors to 28295-97
All sets painted simplified LMS livery
Drawing dated 1932 for the removal of centre section of upper footboards, leaving around 9' at each end. On motors it extended to the Guards Compartment.
Trip-cocks fitted on the right side of the leading bogie at each end in connection with the new automated signalling.
Attempts to reunite motors and trailer pairs abandoned

1934
Vestibule connections were removed on servicing, the sliding doors being fixed in place – but still visible from the outside.
What would have been 29028 and 29728 scrapped due to an accident
Corridor connections removed.

1940
28236 and 29097 destroyed by separate bombs
Marker lights had a black ring fitted for wartime blackout conditions.

1941
28247 & 28282 - War damage at Euston - rebuilt 1943 with flush body and rounded corner windows, frosted-glass toplights and late LMS shell-type roof ventilators, guard's windows both sides. Ends apparently unaltered.
First class abolished

1948
Units painted BR malachite green, unlined, on overhaul

1951
28231 fitted with de-icing equipment for use on branches, the only one so treated.
Lamp brackets for tail lamps added

1953
28295 was the last car still in LMS livery, until sent for overhaul in December
28299 fitted with bracing for a cracked roof by the guard's compartment – the front halves of the front passenger windows were blocked in to cover it.

1954
General withdrawal begins

1955
219 cars in service at the end of the year
Carriage circuit numbers displayed in cab windows – a 6 car set would show an A suffix at the front and a B suffix in the rear if the train split for off-peak working, the sets usually recombining later.

1956
212 cars in service
1957
124 cars in service

28224, 29066 & 29766 freshly overhauled in 1957
29055 paired with 29744 05/57, 29061 paired with 29752 05/57

1958
83 cars in service
29051 paired with 29749 11/58, 29070 paired with 29759 11/58

1959
04 1959 – 54 cars in service
08 1959 – 13 cars in service
12 1959 – 6 cars in service
29784 still had a LNWR scenic poster in the erstwhile First saloon

1960
Final 6 cars withdrawn
The last unit in service, 28/4/60, was 28269, 29036 & 29736, on the Croxley Green branch. The only other operational unit at that time was 28249, 29033 and 29733, and had been seen running with GEC unit 28808, 29605, 28018 on 21/12/59. The combination of Oerlikon and GEC was known as 'mild & bitter'!
28249 is preserved at York.
One last pair 28262 & 29027 was retained for testing and ran with a lower yellow warning panel, the only set so treated.

Further design notes

Motor bogies 8'9" wheelbase, other bogies 8'. Trailer bogies standard LNW design. Incidentally the motor bogie design was repeated on the GEC units.
The main buffers were of the Spencer Dual Action type, also used on contemporary LBSCR EMUs. Units were coupled with short side buffers and a semi-permanent coupling.
On motors the brake pipes were routed outside the solebars and under the footboards – when the footboards were cut back the brackets had to be retained to support the brake pipes.

End fixed lamps did not originally have shades fitted, but dates of introducing the shades is not known. Also it's believed they were only lit at night.

Internally the wooden finish was dark graining.

The 1915 trailers had 2 emergency windows, the 1921/1923 trailers had 3. The LRM kit is based on the 1921 version.

Cab windows had cowlings fitted – but when were these introduced?

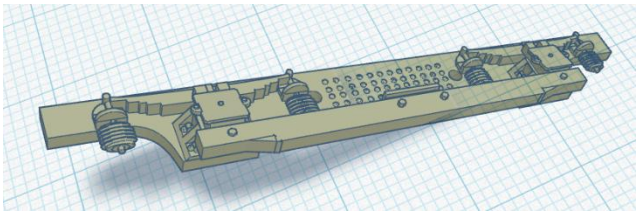
Seating arrangements
MOTOR
1915 sets - 24 transverse, 24 longitudinal Initially smoking , later not
1921 sets - 24 transverse, 24 longitudinal non-smoking

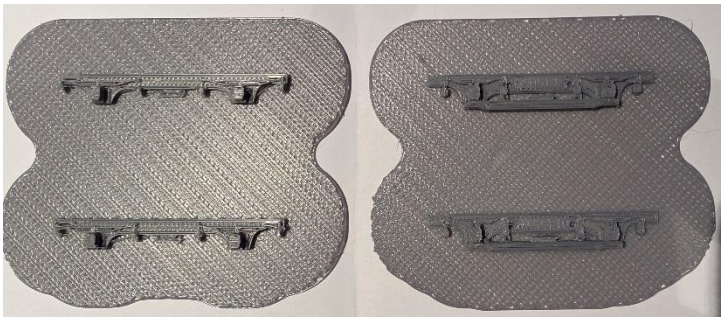
TRAILER
1915 sets - 14 longitudinal, 8 transverse as third non-smoking, later smoking
12 transverse first smoking, later non
13 transverse, 8 longitudinal first non-smoking, later smoking
1921 sets - 14 longitudinal, 8 transverse as third smoking
18 transverse, first smoking
7 transverse, 8 longitudinal first non-smoking

DRIVING TRAILER
1915 sets - 22 longitudinal, 16 transverse, 22 longitudinal third non-smoking, later smoking
1921 sets - 22 longitudinal, 16 transverse, 22 longitudinal third smoking

This activity prompted a discussion between me and Dave Sutton. Dave has some experience of kit design, and of resin moulding, so I shared with him some of the drawings I have, to go with those he's already sourced.

Dave has kindly used his CAD experience to draw an example motor bogie which could be 3D printed (thank you Dave). This could prove extremely helpful, though I won't rush it yet, as there's all manner of aspects I need to check before being satisfied enough to make a complete model. Here's a copy of one of the drawings, and an early version test print.





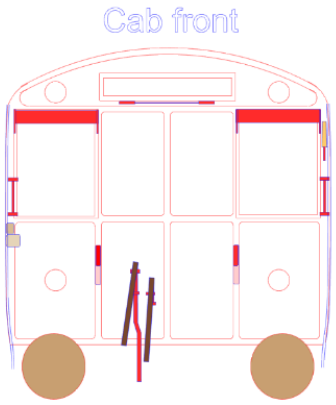
As a general overview, the kit (currently) has nothing under the floor pan, no roof and no interior.
The interior is one part I don't think can be ignored – the windows on these units are quite large and therefore any kind of absence of interior is going to be plainly obvious. But there's more than just that – what of the available parts of the kit already in the box? I spent some time investigating those too, and have yet to complete this.

What I have managed is to scan the cab and coach ends into the Silhouette Cutter drawing programme which, with the RMWeb pictures, has enabled me to make a scale drawing.

The plain red outline is basically the etch of the cab (and panelling).

- I've marked a handrail below the indicator panel
- Window cowlings in bold red
- Whistle shown in bronze (on right sight, just below cowling)
- Small handrails either side of cab windows
- Lamp irons positioned on panel frame
- Pipework positions
- Small works plates below small handrail on left side
- The blue lines on each side of the bodywork are the rainwater pipes
- There will also be a window wiper on the window by the whistle

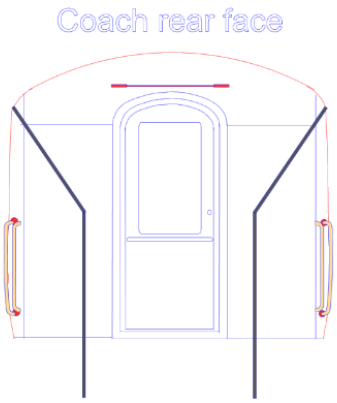
None of these items are provided for in the kit.



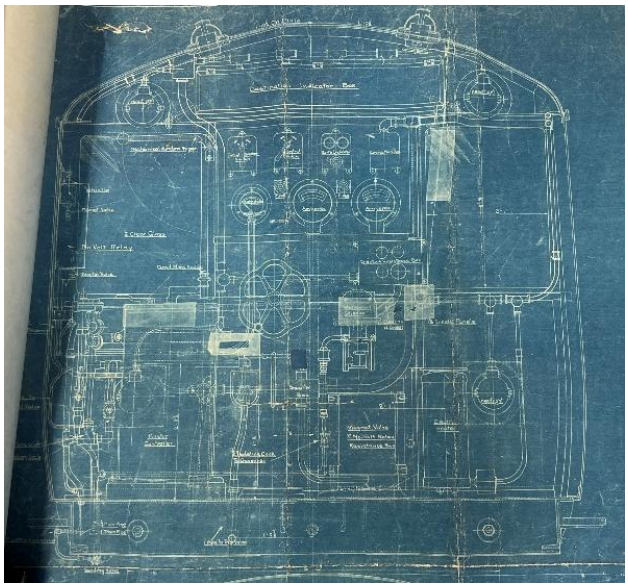
Coach ends appear to be the same throughout the set

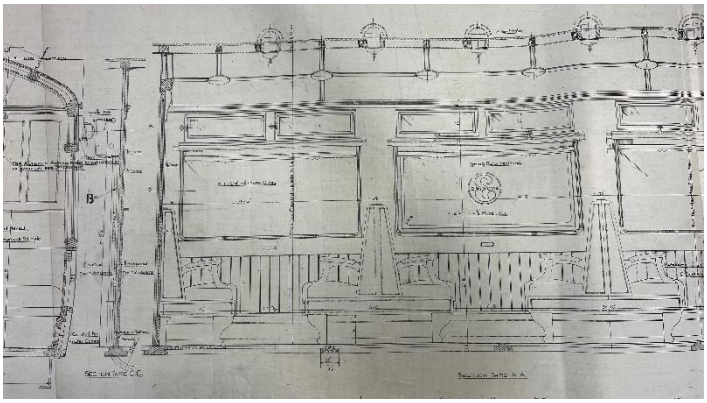
The kit provides only a blank end

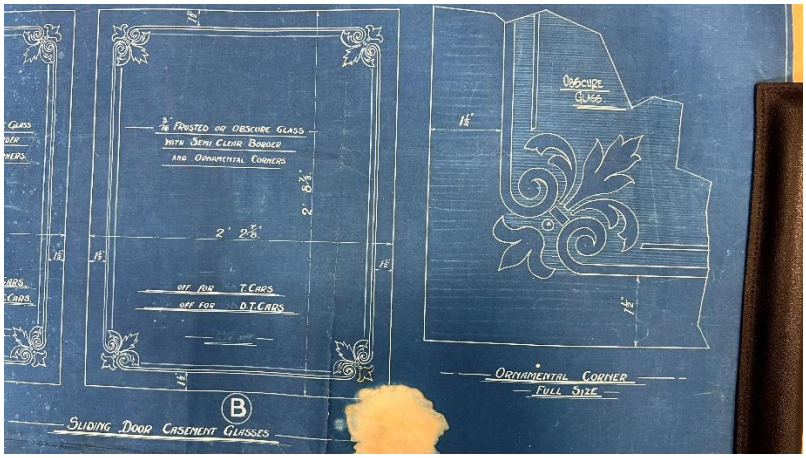
- Dark blue is rainwater pipes
- Handrail above the doorway
- All the blue lines are the visible panel joint lines, plus the doorway is recessed, which means having to cut a chunk from the fret.
- I've shown the pairs of handrails on either side purely to demonstrate their position in the side doorways which themselves are recessed at the coach end.



Here's a couple of examples of the drawing pictures I've obtained.







As you can see from this, there is potentially a large amount of work required for this 'kit', and I know I'll have to make some shortcuts to speed some of it along – but as yet those decisions have not been made.

I spent a considerable time reviewing all the photos of Oerlikons that I can find, which is something in the region of 200. As one would expect, many are not good quality or are too distant to make out details. However, there are a decent number to be able to identify particular aspects, and this task continues.

What I've looked at first is what external details there are on the units that I can identify and see how they compare to the supplied kit etches – if indeed they are included. It's brought up some interesting results.

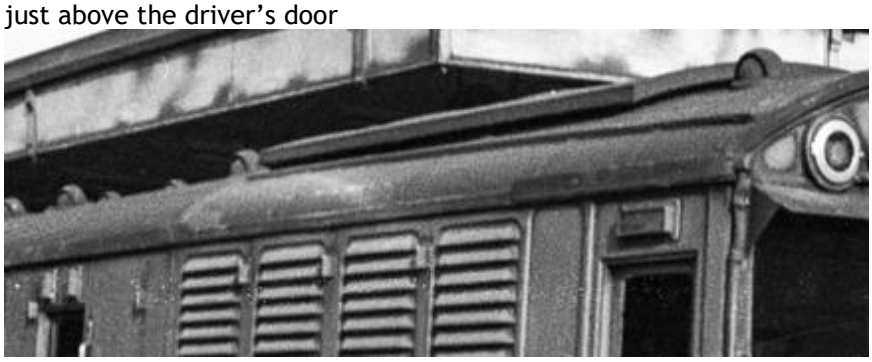
As a brief reminder, the units were supplied in 3 batches, in 1915, 1921 and 1923. I know that the original Siemens units were built under Contract 1, the 1915 Oerlikons under Contract 1A and the 1921 units under Contract 25, so any drawings that display the contract numbers are a help. My notes are aimed at how they appeared in the late 1950s.

Motor Cars

1915 build
Motor car roofs were fitted with 11 sets of 3 ventilators over the saloon area
The guard's door is only glazed on left side of the pair, as viewed from outside. The glazed door is lettered GUARD. The driver's door is lettered PRIVATE

The driver's door has a horizontal ventilator above the window, pictured right. The glazed guard's door is usually fitted with 2 smaller vertical ventilators (below right), but not always - it can have the same style as the driver's door. I am presuming that this is because doors could be interchangeable on servicing and it was easy to use the next available door. Interestingly, the 3 examples I've seen with the horizontal vent also have the Lion & Wheel emblem under the 3rd saloon window, whereas the others have it positioned under the 2nd window.

The rain strip on the roof below the electric compartment panel is there on the large majority of vehicles, one example seen apparently without. Equally, many vehicles were also fitted with a rain guard above doorways, a simple strip that appear to be rivetted to the body. The example below has both, the rain guard being visible as a darker strip just above the driver's door



Examples noted (H= horizontal vent, V pair = 2 vertical vents)

Driver vent	Guard vent	Rain strip	Rain guard	Lion & Wheel	Notes
H	V pair	Yes	Yes	2nd window	28229, 28246, 28249, 28252, 28259, 28262, 24 others
H	H	Yes	No	3rd window	28264, 1 other
H	H	Yes	No	2nd window	28243
H	V pair	No	Yes	2nd window	1 example
H	H	Yes	Yes	2nd window	1 example
H	V pair	Yes	No	2nd window	1 example

1921 & 1923 build
Motor car roofs had 12 sets of 3 ventilators above the saloon.

Both Guard's doors are glazed, each side.
The majority of examples have the horizontal ventilators above the driver's and both guard's doors, but most seem not to have the rain strip below the electrical compartment roof panel.

In the following table, the vents above the guard's doors are noted as a pair, oriented as cab side/saloon side. There's quite a few variations, linked with the Lion & Wheel emblem being seen in 3 different positions.

Driver vent	Guard vents	Rain strip	Rain guard	Lion & Wheel	Notes
H	H & H	No	Yes	2nd window	Examples 28265, 267, 277, 280, 282, 283, 284, 289, 292, 295, likely 281, 19 others
H	H & H	No	Yes	3rd window	Example 28278
H	H & H	No	Yes	Between 2nd & 3rd windows	3 examples
H	H & H	No	No	See notes	9 examples, all in pre-BR livery
H	H & V pair	No	Yes	Between 2nd & 3rd windows	Example 28288, viewed on right side
H	H & V pair	No	Yes	2nd window	4 examples
H	V pair & H	No	Yes	2nd window	1 example, viewed on left side
V pair	V pair & V pair	No	Yes	2nd window	3 examples, likely LMS livery
V pair	V pair & V pair	No	No	2nd window	1 example
V pair	V pair & V pair	No	No	Between 2nd & 3rd windows	Example 28299

At cab ends there were (usually, not always?) works plates.

The upper one says

SEATS
0
48

whilst the lower one says

57'0"
9'-6"

A few cars also display a painted sign which appears to be a works service date, this is the clearest view I've found – it appears to say Lifted ???? 27.2.56

The lower left light panel was also fitted with a clear square lens panel, which was also fitted on the Driving Trailer.

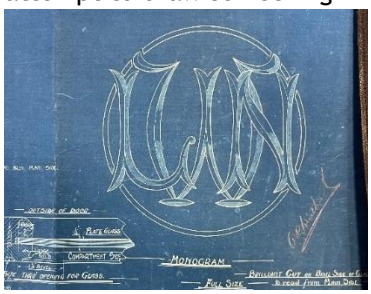
Driving Trailers
The external arrangements of the Driving Trailer cars appear to be identical in all builds, with 16 sets of 3 ventilators above the saloon and a rain guard being fitted above each set of doors.

Trailer Cars
1915 build
Trailers had roof ventilators split into 3 groups, with gaps above the walls that divided the 3rd class from the 1st smoking and 1st non-smoking. 4 sets were above the 3rd class – always at the motor end – 3 sets above the middle section and 5 sets above the last. Also (from the motor end) there were 2 emergency windows at window 2 and window 5.

1921 & 1923 build
Trailers had 14 sets of ventilators equally spaced.
3 emergency windows were fitted in these batches, at windows 2, 4 and 6 (measured from the Motor car)

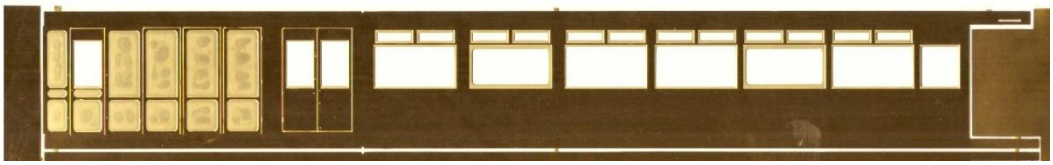
In General
Most cars had the window adjacent to the saloon doors originally showing service indicators (eg This train is for Euston calling at….etc), but in the 1950s these had long been removed. 11 cars were never fitted with them originally, so retained a glass window, but those with the indicator removed had a wooden panel instead. This can be seen on the NRM car, and the second picture shows how destination boards were fitted outside instead.

It's difficult to be certain for all vehicles, but the public doors had the LNWR monograph engraved in one of the windows as seen here, original works drawing to compare to the window on the NRM vehicle. The passenger entrances also had a sticker on the end door window with an instruction to close the door – this is my crude attempt to draw something in the style of the original.



A comparison of the body etches in the London Road Models kit against my observations of the originals.

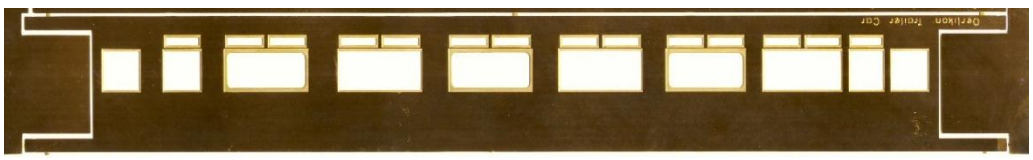
Motor Car etch, left side (with the cab at the front).



To build a 1915 motor means having to fill in a guard's window each side. On this left-side etch, the right-hand window of the pair would be filled. One possibility is to use a piece of brass to the same gauge as the etch, and cut and file to shape. Then solder to a (slightly larger) backing plate, before glueing to the back of the window. The resulting minor gap could then be filled and sanded smooth – unless anyone has better suggestions?

From the left, the 4 toplights over the first two saloon windows open toward the cab. At the opposite end the farthest 4 opened away from the cab. The 4 central toplights opened outwards (hinged at the top) and had a triangular-ish shaped fin set vertically on the body either side of the toplight, the fin roughly to the same angle profile as the extent of the opening window.

Central Trailer Car etch, right side (i.e. Motor Car to the right)
One can see the main saloon windows (from the left, 6 to 1), with 6, 4 and 2 showing the infill as part of the emergency window.



To model a 1915 version requires windows 6 and 4 to be filed out to the same profile as normal windows, then window 5 requires a fillet added to represent the emergency window. The suggestion is to add a piece of brass larger than is required and then file back to the correct profile. Thank you to Dave and Bern for their input for these adaptation suggestions.

There are toplight windows above the 6 main saloon windows, and above the 2 smaller windows at each end.
As far as I can tell (!), the 1915 trailers vary slightly to the 1921/23 trailers.
The two smaller windows open outwards and are shielded by fins each side.
As viewed in this orientation, in order from the left, the toplights above each main window open as follows:
1915: outwards (with fins), right, left, right, left, right.
1921/23: right, left, outwards (with fins), right, left, right.

Driving Trailer Car etch, left side
From the left (cab end), there is one smaller saloon window and 8 main windows. The first two pairs open left, the last 2 pairs open right and the central 4 pairs open outwards with fins either side of each pair.

And to illustrate the fins by the toplights, here's part of Motor 28267, which also shows the position of the 'No Smoking' labels.

I note the 'Lion & Wheel' emblem faces forwards to the cab end on both sides.

As mentioned in issue 50, the London Road Models etches are obviously designed for the 1921/1923 versions. The challenge is whether I attempt units purely on those cars, or consider alternatives. A set could be fully 1915 cars, fully 1921/23 cars, 1915 motor with 1921/23 trailers or 1921/23 motor with 1915 trailers. The toplight windows could be fun too, especially if one wishes to model any of them in the 'open' position. My favoured path currently would be to have a mixture, perhaps like this:

Motor	Trailer	Driving Trailer
Set 1, all 1921 build		
28295 12 sets of roof ventilators Rain guards but no rain strip Horizontal vents on both guard doors BR emblem between 2nd & 3rd windows	29784 14 sets of roof ventilators 3 emergency windows Outward-opening toplights at 4th window from motor end	29084
Set 2, all 1915 build		
28264 11 roof ventilators Rain strip and guards both present Small vents on guard door BR emblem under 3rd window One guard door to be filled each side Glass window for non-stopping indicator	29749 4-3-5 pattern roof ventilators 2 emergency windows Requires 4 windows to be filed back and 2 to have a lip added Outward-opening toplights at driving trailer end	29051
Set 3, 1915 motor, 1921 trailers		
28225 11 roof ventilators Rain strip and guards both present Small vents on guard door BR emblem under 2nd window One guard door to be filled each side	29767 14 roof ventilators 3 emergency windows Outward-opening toplights at 4th window from motor end	29067

I'm still working on the internal details and also how the underframes and bogies were arranged, but there's a huge amount to consider just from the above.