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Caledonian Railway 65' Corridor Stock
Prototype Notes
and building instructions covering D94-97A.

D94 Corridor Composite,

D95 Corridor Brake Composite (3F/4T),

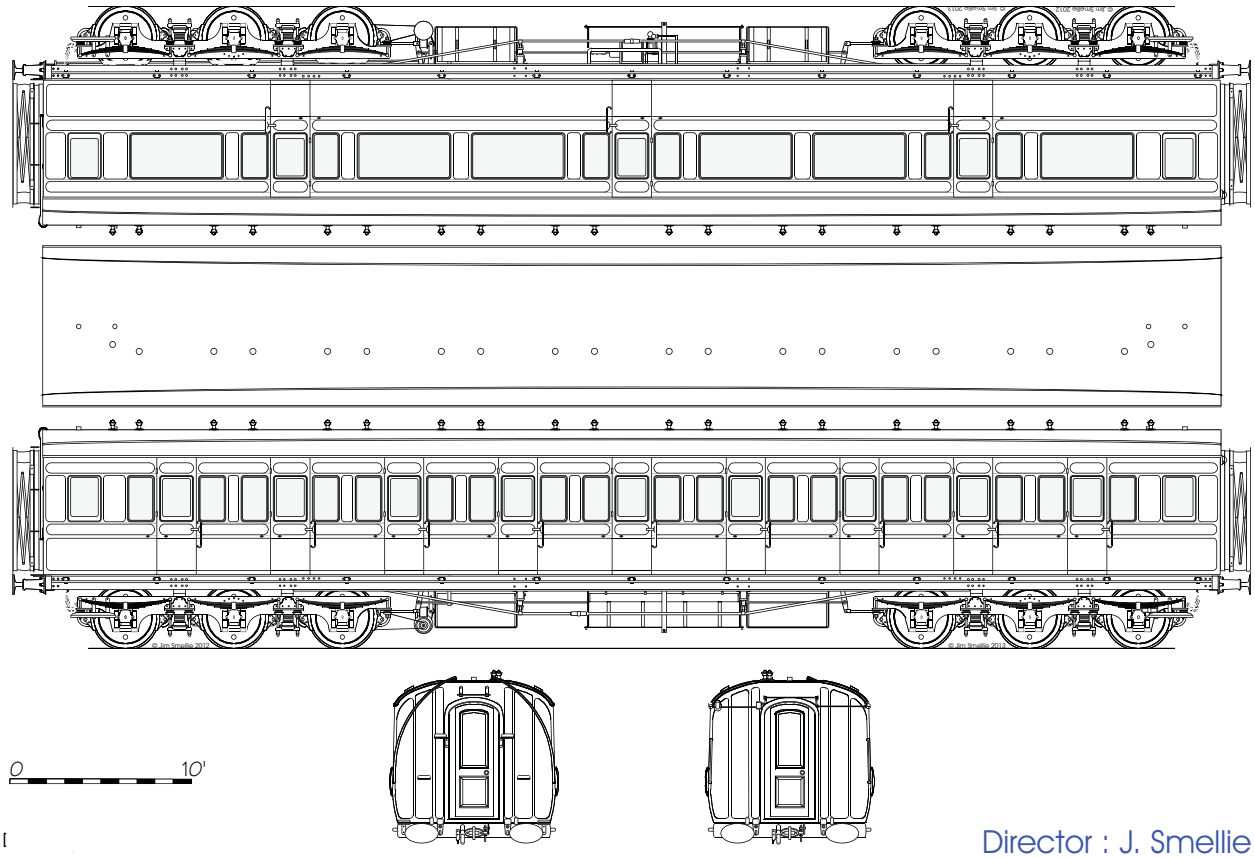
D95A Corridor Brake Composite (4F/3T),

D95B Corridor Brake Composite (2F/5T),

D96 Corridor 3rd (illustrated below),

D97 Corridor Brake 3rd (5cpt),

D97A Corridor Brake 3rd (7cpt).



Director : J. Smellie
Company No. SC137795 VAT No. 596951084

Part 1 Prototype Notes

Section 1 Introduction

The August 1905 edition of 'The Railway Engineer' carries a feature headed "65ft. Composite Corridor Carriages; Caledonian Railway" which starts -

" THE Caledonian R. Co. have lately built some new trains for their service between Glasgow and Edinburgh and Perth and Aberdeen. They are composed of corridor carriages 65ft. long over the bodies and 68ft. 6ins. over the buffers, and which were designed by Mr. J. F. McIntosh, M.Inst. C.E., locomotive carriage and wagon superintendent of the Caledonian R. …**"**

The feature continues -

" The carriages were built at the company's works at St. Rollox, Glasgow. They are fitted with every convenience, including hot and cold water in the lavatories, and form the finest trains ever built for purely Scottish traffic. The carriages are connected by gangways throughout. They are fitted for steam heating and electric light (Stones's system).**"**

'The Railway Engineer' carries a copy of the General Arrangement drawing for the corridor composite to diagram 94 but corridor brake composites (diagrams 95, 95A and 95B), corridor 3rds (diagram 96) and corridor brake 3rds (diagrams 97 and 97A) were also built for these services.

Diagram	Type	Weight	3rd class seats/comps.	1st class seats/comps.
94	CK	38t0c	24/3	30/5
95	BCK	38t11c	32/4	18/3
95A	BCK	37t4c	24/3	24/4
95B	BCK	37t14c	40/5	12/2
96	TK	36t10c	72/9	–
97	BTK	35t0c	40/5	–
97A	BTK	37t12c	56/7	–

Few people would argue that these were magnificent coaches and, mounted on six-wheel bogies, they must have looked enormous beside the everyday 45' and 50' stock, not to mention 4 and 6 wheel stock, on other trains. Their introduction was undoubtedly used to good effect by the Caley's publicity department in the "war" over the North British for Aberdeen traffic.

The third class compartments were the first in the U.K. to provide 4 aside seating in side corridor stock. Careful attention was paid to the springing and upholstery of the seats which were covered in a blue material "having a black floral pattern with orange spots". The floors were covered with brightly patterned cork linoleum. The ceilings, which were symmetrical, were covered in white enamelled Lincrusta panelling and the walls were finished in mahogany. The four light bronze electrolier was rated at 32 candle power. A patent device to fix the window blind fixed in any desired position and automatic draught excluders were also incorporated.

The first class seated 3 aside and were rather more roomy and luxurious and finished in polished walnut with gilt scrolls and much other gilt work. The upholstery was brown moquette trimmed with lace. The electrolier was this time gilt and rated rather higher at 40 candle power. The non-smoking compartments were given Cashmere rugs over the floor linoleum while all the doors were leather padded.

In both classes of compartments the wall panels were decorated with mirrors and railway notices including the then newly prepared (and in recent years, much copied) panoramic map of the Caledonian.

The lavatories were lined with zinc sheets coloured to imitate tiling and were the first in the U.K. to boast hot water albeit only when the training heating equipment was in use.

The vans were fitted with the necessary brake equipment, controls for the train heating and lighting (half lighting could be selected) as well as a safe and bicycle racks.

In order to provide a smooth, quiet ride the bogies were elaborately sprung and the coaches double floored with the entire body insulated from the underframe by rubber blocks. A layer of hair felt was built in under the floor, in the side walls and along the roof to reduce noise.

All the coaches shared a common underframe which was 64'10" long over the headstocks and built almost entirely from steel sections. The exception to this was the centre longitudinal members, except at the bogie mountings, which were of oak. This facilitated the fixing of the various underframe fittings. The underframe was braced with four queen trusses whose posts were carried on cross members below the soles. These members were let into the centre longitudinal members.

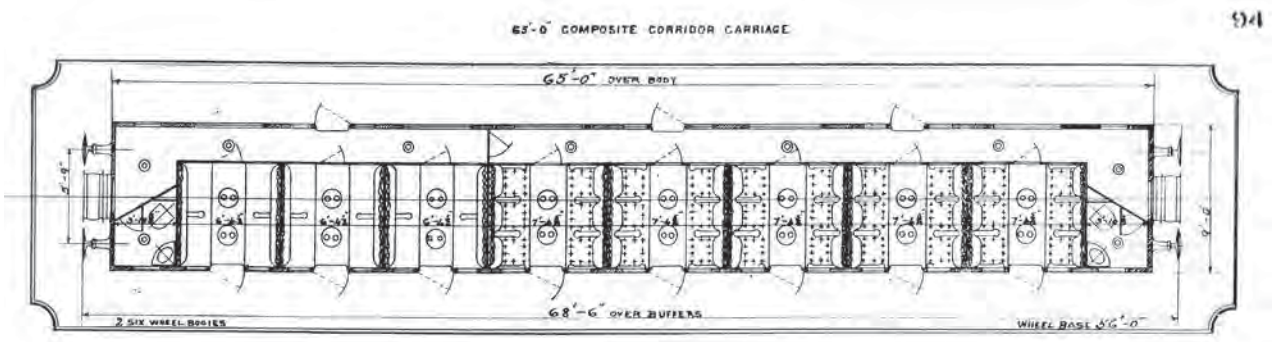
The brake composites to Diagram 95B were unique in having the first class lavatory sited between the First and Third Class compartments instead of between the First Class and the van. These coaches appear to have been used on through Glasgow-Taunton workings and a photograph of one with a destination board lettered 'Glasgow Central & Bristol via Severn Tunnel' appears in O.S. Nock's book 'The Caledonian Railway'. It is the leading coach in the 10am Glasgow to Euston train in the photograph.

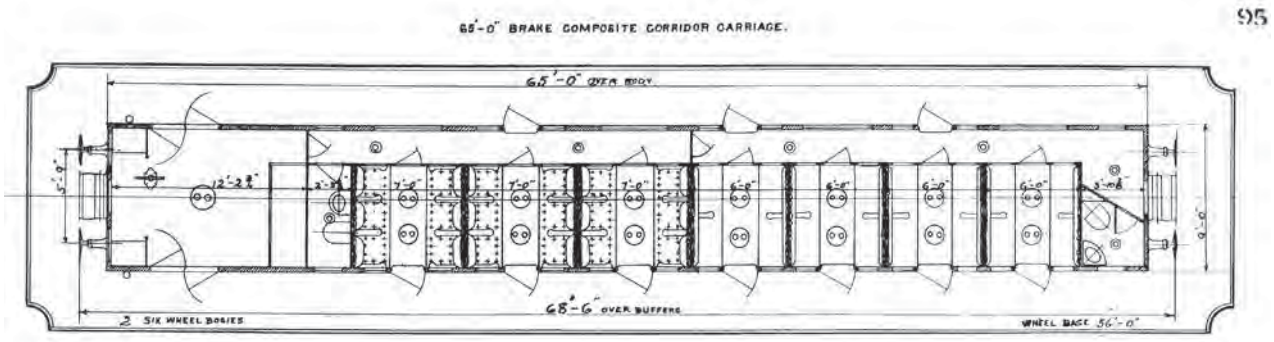
The original lots of D94, D95, D96 and D97 were 12'1" to the top of the roof and had a cove roof profile having a definate 'flat' in the middle as modelled in the kits. Later lots and D95A, D95B and D97A were 12'3" to the roof top and had a full ellipical roof profile. D95A, D95B and D97A are modelled with this latter roof profile. In the numbering table lots marked ‡ are cove roofed.

The accompanying 4mm scale drawings show the coaches in original condition.

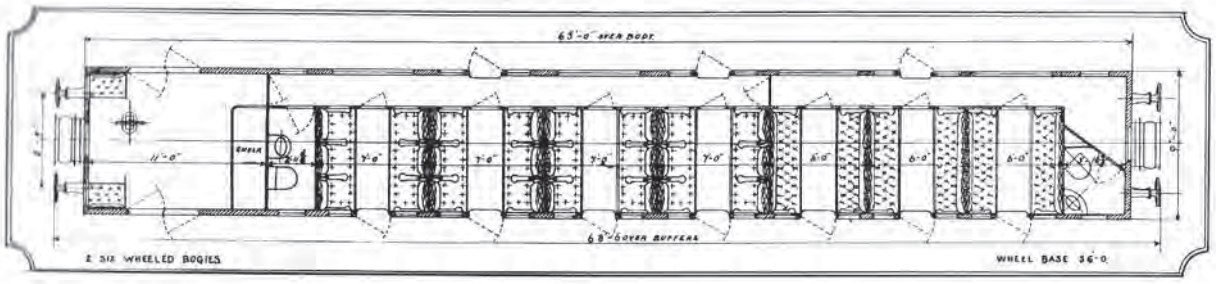
Section 2 Interior Plans

These interior plans are taken from the Caledonian Railway Large Diagram Book.

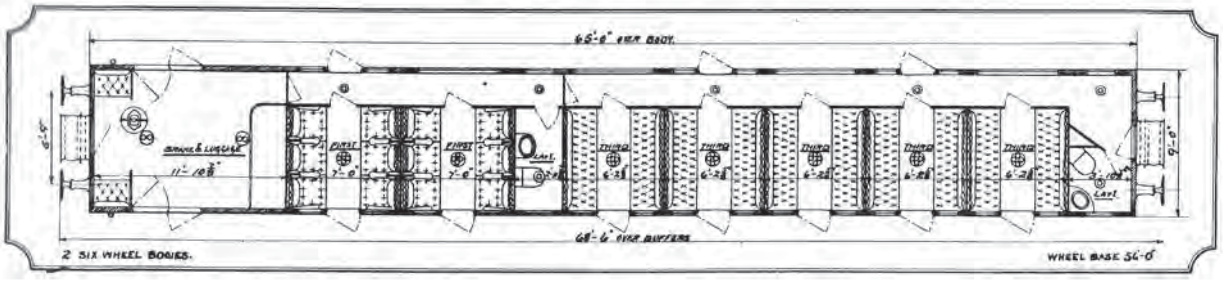




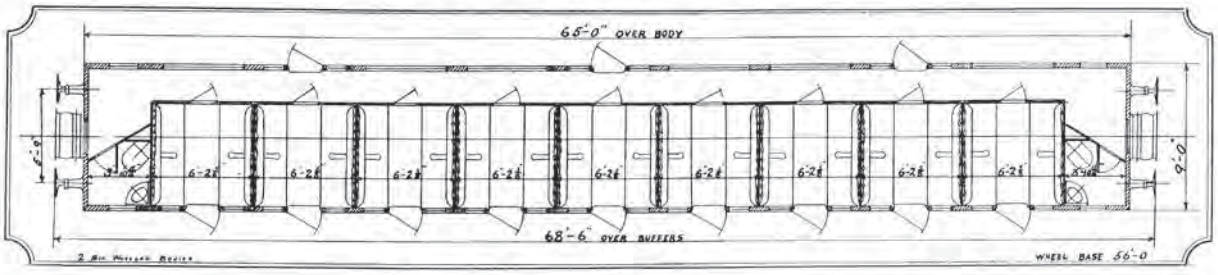
63'-0" BRAKE COMPOSITE CORRIDOR CARRIAGE. 95 A



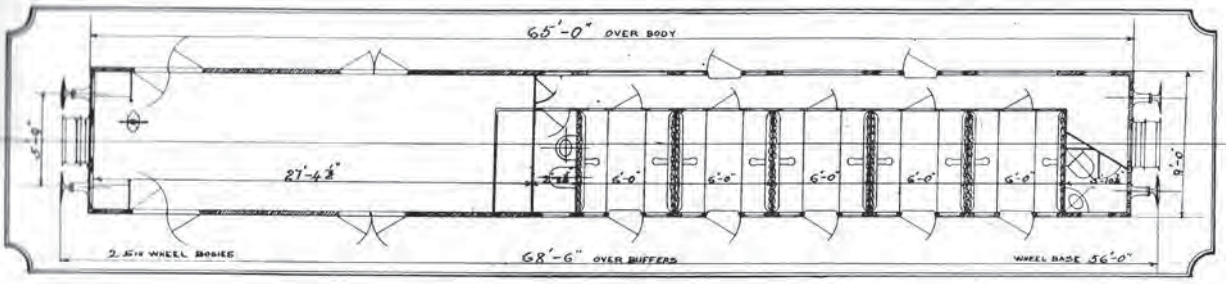
65'-0" BRAKE COMPOSITE CORRIDOR CARRIAGE. 95 B



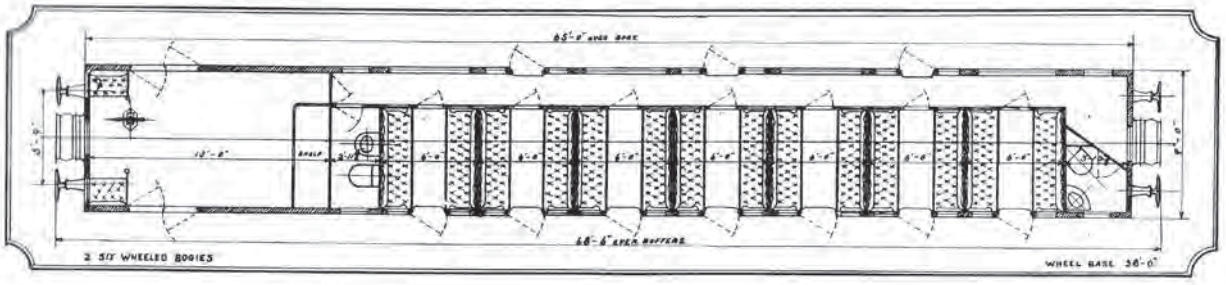
65'-0" Third Class Corridor Carriage 96



65'-0" BRAKE THIRD CORRIDOR CARRIAGE 97



65'-0 BRAKE THIRD CORRIDOR CARRIAGE 97 A



Section 3 Numbering

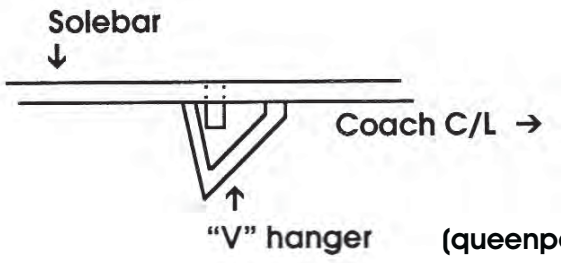
In the following table all years should be prefixed 19 i.e. /07 represents 1907 etc.

D	C.R. No.	L.M.S. 1st No.	L.M.S. 2nd No.	Order	Built	With-drawn	Disposed	Brake as built	Brake at 31/12/33
94	15	15611	4967[+]	H243	01/07	09/47		West.	Vacuum
94	69	15659	4966[+]	H230[‡]	01/05	03/48		West.	West.
94	130	15720	4970[+]	H243	07/07	01/05/54	05/59	Dual	Dual
							Disposed of at Inverurie, body sold		
94	135	15725	4971	H243	07/07	05/48		West.	West.
94	136	15726	4975	H275	07/08	04/44		West.	West.
94	137	15727		H226[‡]	07/04	1924 ?	Mishap ?	West.	—
94	140	15730	4972[+]	H243	07/07	05/48		West.	West.
94	174	15764	4973	H243	07/07	05/48		West.	West.
94	217	15804	4968	H253	07/06	05/48		West.	West.
94	256	15842	4974	H269	01/08	12/34		West.	Vacuum
							Accident at Warrington 12/08/34		
95	57	15650	7379	H248	01/07	05/48		West.	West.
95	76	15666	7381[+]	H267	01/08	04/12/54	12/54	West.	Vacuum
95	120	15710	7380[+]	H248	01/07	25/08/51	08/51	Dual	Dual
95	132	15722	7382[+]	H248	01/07	19/06/54	09/54	West.	Vacuum
95	138	15728	7383[+]	H248	07/07	28/08/54	10/54	Dual	Dual
95	146	15736	7377[+]	H227[‡]	01/05	04/44		West.	West.
95	148	15738	7378	H231[‡]	07/05	04/44		West.	West.
						Carriage register lists building date as 07/04			
95	238	15824	7384[+]	H274	07/08	18/04/53	06/53	West.	Vacuum
95	293	15879	7385[+]	H274	07/08	11/06/55	05/55	West.	Vacuum
95	369	15955	7386[+]	H274	07/08	25/12/54	01/55	West.	Vacuum
95	370	15956	7387[+]	H274	07/08	04/48		West.	West.
95A	154	15744	7389	H251	07/05	02/48		West.	Vacuum
95A	173	15763	7390	H251	07/05	12/55	12/55	West.	Vacuum
95A	58	15651	7388	H251	07/05	05/55	05/55	West.	Vacuum
							Disposed of at Inverurie, body sold		
95A	262	15848	7391	H251	07/05	07/55	08/55	West.	Vacuum
95A	117	15707	7392	H255	01/07	03/41		West.	Vacuum
95A	151	15741	7393	H255	01/07	05/47		West.	Vacuum
95A	263	15849	7395	H268	01/08	11/52	12/52	West.	Vacuum
95A	228	15815	7394	H255	01/07	06/54	08/54	West.	Vacuum
95B	228	15957	7373	H277	07/08	06/49		Dual	Dual
95B	371	15958	7374	H277	07/08	04/55	09/55	Dual	Dual
95B	372	19560	7375	H285	07/09	06/51	06/51	Dual	Dual
95B	375	19561	7376	H285	07/09	10/51	12/51	Dual	Dual
96	549	16620	3345[+]	H233	07/05	03/48		West.	West.
96	784	16842	3358[+]	H276	07/08	13/09/52	10/52	West.	Vacuum
96	786	16844	3346[+]	H233[‡]	07/05	10/07/54	08/54	West.	Vacuum
96	1000	17057	3347	H233[‡]	07/05		05/48	West.	West.
96	1001	17058	3359[+]	H287	07/09	17/09/55	10/55	West.	Dual
96	1298	17354	3360[+]	H287	07/09	08/47		Dual	Dual
96	1335	17391	3348	H224	07/07	12/05/51	05/51	Dual	Dual
96	1336	17392	3349	H224	07/07	15/09/51	12/51	Dual	Dual
96	1337	17393	3350	H224	07/07	15/09/51	11/51	Dual	Dual
96	1338	17394	3351	H224	07/07	25/10/52	11/52	Dual	Dual
96	1339	17395	3352	H224	07/07	10/03/51	03/51	Dual	Dual
96	1340	17396	3353	H224	07/07	10/05/52	05/52	Dual	Dual

96	1341	17397	3354+	H224	07/07	19/06/54	03/55	Dual	Dual
96	1342	17398	3355	H224	07/07	07/51		Dual	Dual
96	1343	17399	3356	H224	07/07	09/47		Dual	Dual
96	1344	17400	3357	H244	01/08	11/51		Dual	Dual
97	6	16080	6566+	H232‡	07/05	04/44		West.	West.
97	281	16354	6574+	H256	01/07	01/50	03/50	West.	Vacuum
97	304	16377	6567	H232‡	07/05	04/48		West.	West.
97	511	16582	6568+	H232‡	07/05	04/48		West.	West.
97	523	16594	6569+	H232‡	07/05	06/51		West.	Vacuum
97	617	16687	6570	H228‡	01/05	05/48		West.	West.
97	618	16688	6571	H228‡	01/05	04/48		West.	West.
97	619	16689	6572	H228‡	01/05	19/06/54	08/54	West.	Vacuum
97	620	16690	6573	H228‡	01/05	04/44		West.	West.
97	965	17023	6575+	H256	01/07	11/51		West.	Vacuum
97	996	17053		H256	01/07	1924 ?	Mishap ?	West.	—
97	1076	17132	6577+	H256	07/07	09/54	09/54	West.	Vacuum
97	1349	17405	6576+	H246	07/07	11/12/54	01/55	West.	Vacuum
97	1350	17406	6578+	H246	07/07	07/04/51	04/51	West.	Vacuum
97A	1329	17385	6579	H247	07/06	11/54	11/54	West.	Vacuum
97A	1330	17386	6580	H247	07/06	05/55	06/55	West.	Vacuum
							Disposed of at Inverurie, body sold		
97A	1331	17387	6581	H247	07/06	02/55	02/55	West.	Vacuum
97A	981	17038	6585	H247	01/07	07/55	08/55	West.	Vacuum
97A	1334	17390	6586	H252	07/07	11/51		West.	Vacuum
97A	1345	17401	6587	H252	07/07	11/54	11/54	West.	Vacuum
97A	1346	17402	6588	H252	07/07	12/54	01/55	West.	Vacuum
97A	1347	17403	6589	H257	07/07	06/54	10/54	Dual	Dual
97A	1348	17404	6590	H257	07/07	11/52	04/54	Dual	Dual
97A	117	16190	6582	H266	01/08	07/51		West.	Vacuum
97A	197	16270	6583	H266	01/08	05/51		West.	Vacuum
97A	409	16482	6584	H266	01/08	11/46		West.	Vacuum
97A	496	16568	6592	H286	07/09	11/40		Dual	Dual
						Destroyed Willesden Air Raid 28/09/1940			
97A	1055	17111	6591	H286	07/09	04/55	09/55	Dual	Dual

Section 4 Brake Equipment

When built all of the coaches were fitted with Westinghouse brake equipment and some were also fitted with vacuum equipment for through working onto other lines. The type of equipment originally fitted is noted in the "Brake as built" column of Section 3. Figure 1 illustrates :-



"V" hanger orientation (queenposts omitted for clarity)

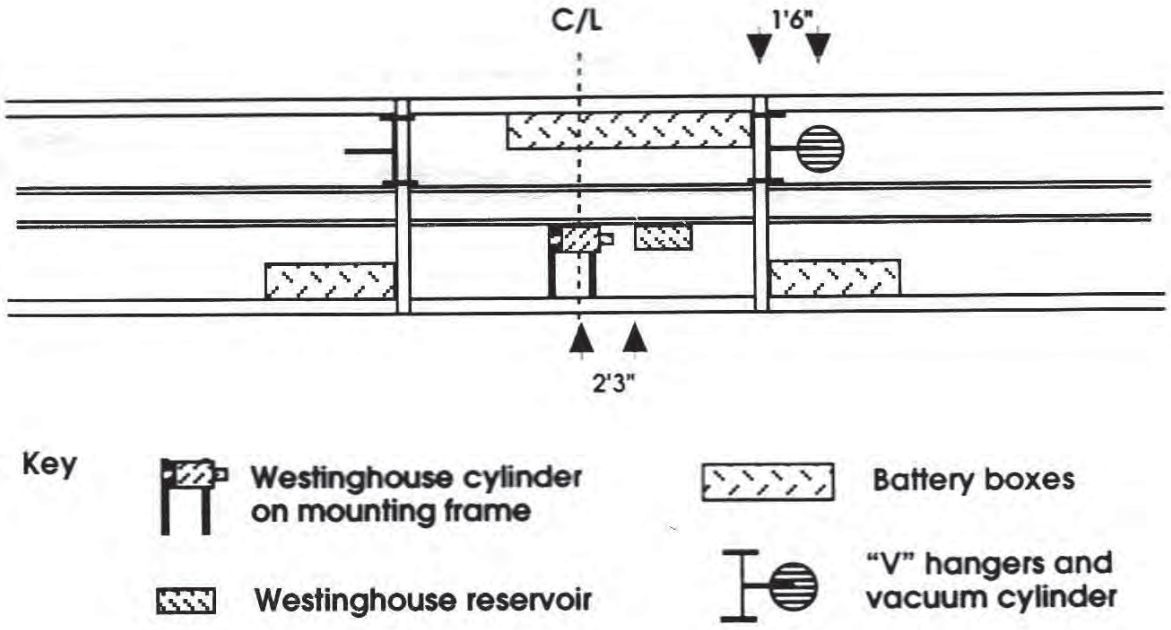


Figure 1 View on underside showing original brake equipment and battery boxes

In the early 1930s the L.M.S. undertook a large programme to convert all Westinghouse braked stock with a reasonable life expectancy to vacuum brake which it had adopted as standard at the grouping. The L.M.S. coaching stock list of 31/12/33 indicates which brake system(s) each coach was fitted with at that date and this information is listed in "Brake at 31/12/33" column of Section 3. As can be seen, most stock originally dual fitted was still so equipped while a large proportion of the Westinghouse stock had already been converted—presumably there was no urgent need to remove the Westinghouse equipment from the former. However, the coaches could have been converted to vacuum brake using one of two (known) arrangements :-

Arrangement 1) Using 2 conventional LMS style vacuum cylinders with renewal of some battery boxes (see figure 2), or

Arrangement 2) Using a large horizontal cylinder of Lancashire and Yorkshire Railway origin (see figure 3) retaining the original battery boxes. This cylinder was supported on one side by a frame resembling nothing more than a wagon "W" iron!

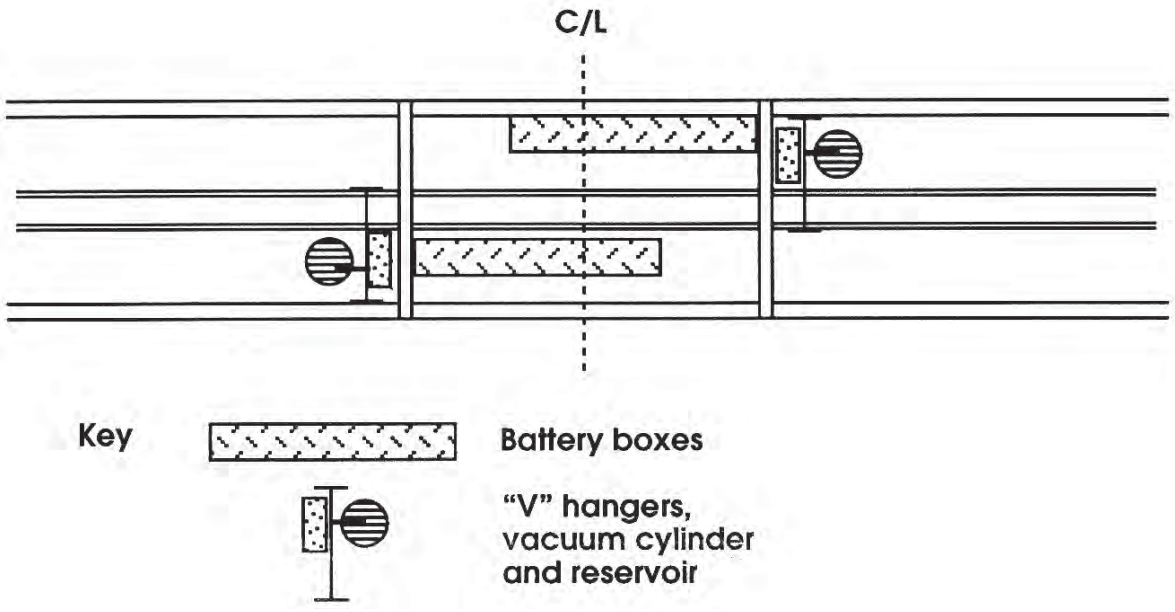


Figure 2 View on underside showing "conventional" style vacuum brake conversion and replacement battery boxes

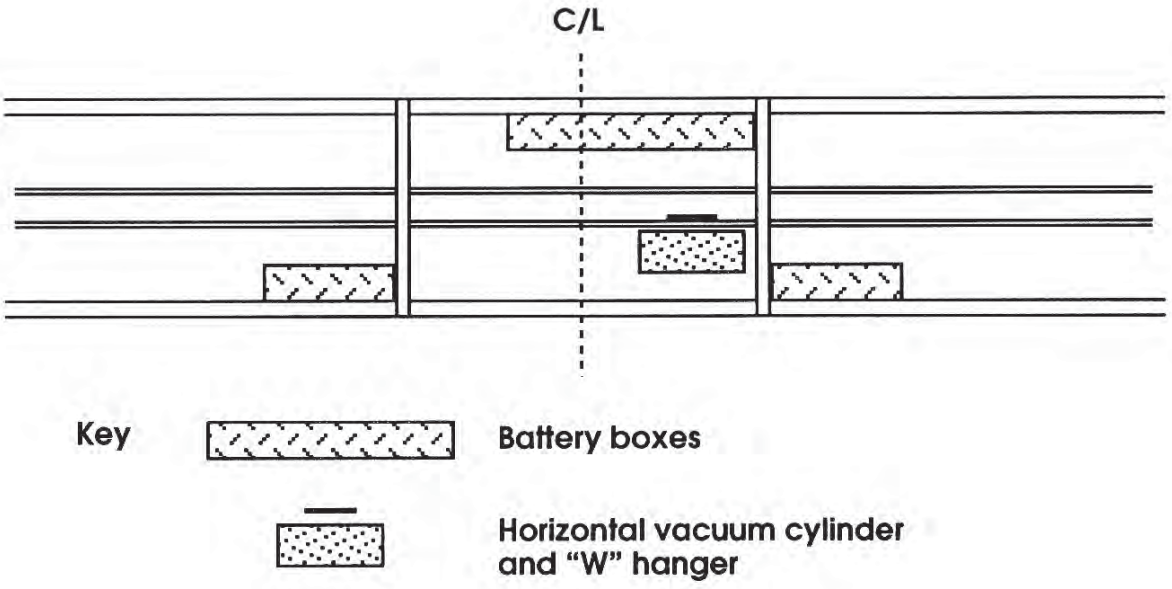


Figure 3 View on underside showing L&Y style vacuum brake conversion

(As an aside, the L&Y carriage and wagon works at Newton Heath was closed in 1930 with much of the surplus parts stock being transferred to St. Rollox where, no doubt, the Northern Division made good use of what it was given in its usual parsimonious fashion.)

I can offer no guidance on which conversion arrangement was used on any particular coach. I assume in the case of the dual fitted coaches the Westinghouse gear would, eventually, merely be removed but a photograph will be your best guide for the other coaches.

Section 5 External Changes

Livery apart, these coaches saw little external change during their lives but those which there were are documented below.

When built it is believed that these coaches all had "Havoc" roof vents—available photos and drawings certainly indicate this. By B.R. days however the survivors appear to all have Torpedo style roof vents. When this change came about is not known presently, it may have been a gradual change as the Havocs required replacement or later batches of the coaches may have been built with Torpedos as the C.R. were certainly standardised on Torpedos a few years later. It may even be a combination of the two sets circumstances.

Below the guard's compartments the bogies sported double footboards while all the other bogies sported single footboards in C.R. days. These single boards were progressively removed in L.M.S. days and were very rare if present at all by nationalisation.

Another point of mystery concerns the central lavatory of the Diagram 97 BTKs. While the general arrangement drawings and all available photographs show these coaches having a lavatory between the van and the passenger accommodation, there is some evidence that these coaches were originally, at the least, planned without this feature. It may be that either -

1) the plans were amended at the design stage and the coaches were built with this lavatory from new **or**
2) the coaches were altered at a very early date (perhaps after the initial running trials and **before** the publicity photographs were taken) and the G.A. drawings were amended to suit after the event.

The only other external change to at least some coaches would be the inevitable but ugly repairs to the panels using matchboarding in later L.M.S. and B.R. days.

Section 6 C.R. Livery

The C.R. livery was purple brown with off-white panels at waist level and above. The edges of all the mouldings were lined with a single yellow line, while the outside edges of the coach sides and bottom were given a thin red line. Lettering was gold, shaded to the right and below in red, with white highlights. The positioning of the insignia was as follows:-

a) The class was written in full on each door waist panel of **composite** coaches and twice on each side in the waist panel between the end and second compartments on **all third** coaches.

b) The C.R. coat of arms appeared twice on each side, usually centrally on the lower panel between :-
   i) the two outermost doors at each end of the compartment side, and
   ii) the outermost door and the coach end on the corridor side.

c) The C.R. Co. monogram appeared once on each side, roughly in the centre of the lower body side either on the centre door if one existed or centrally placed on the panel which crossed the centre line.

d) The coach number and the company initials were placed on the waist panel with the number always appearing to the right of the central door and **C·R** to the left, each centrally placed in the panel.

Some at least of these coaches carried lettering describing the service in the panels above the windows when new. This read either "Corridor Express. Glasgow, Perth and Aberdeen" or "Corridor Express. Edinburgh, Perth and Aberdeen" according to the section of the train (see the photograph in O.S. Nock's book "The Caledonian Railway" for an example of the former). This lettering was probably only carried for a short time as to be so lettered later on would have limited their usefulness on other services.

When new the roofs were white. This, of course, would quickly weather to a grey/black in service. Underframes and bogies were black. The wheel tyres were white lined.

Section 7 L.M.S. Livery and numbering

Soon after its inception the L.M.S. adopted the old Midland colour of crimson-lake for its coach livery. All raised beadings were painted black and edged in a $^{3}/_{8}$" gold line. Ends were crimson-lake with steps etc. picked out in black. Roofs were generally painted lead grey above the rainstrips and black between the rainstrips and cantrail but again this would soon assume an overall muddy grey colour in service.

The insignia was applied in gold leaf transfers with the letters L.M.S. (3" high) in the waist panel as near to the coach centre line as possible. The coach number appeared twice in the waist panel towards each end of the coach. It is unlikely that the L.M.S. emblem was used on these coaches. Class was designated by the figure '1' or '3' (8" high) on the doors.

The foregoing describes the initial L.M.S. livery but many changes took place before the demise of the L.M.S. and are tabulated below. Remember, however, that coaches were only due for repaint about every 7 years and that in the late 30s and during the war it was quite usual only to "touch up and revarnish". Therefore an individual coach would not sport every change and it is quite

possible that some coaches ended the war still fully lined out.

1923-8	As described.
1928	L.M.S. now placed towards the left-hand end and the number towards the right-hand end.
1933	Coaches renumbered using plain gold transfers. Roof colour specified as metallic aluminium.
1934	Full lining discontinued. Coaches lined with a single ½" yellow line just below the cantrail and ½" yellow line just above the top of the windows. The top section of the waist moulding would be painted black and edged with ½" yellow lines. Note that the yellow for both lining and insignia is now a chrome yellow.
1936	End colour specified as black.
1940	Form of the class designating 3 changed to a flat top version.
Wartime	Roof colour specified as grey and lining discontinued.
1946	Simple lining reinstated but in straw yellow.

The HMRS make an excellent range of L.M.S. transfers which are recommended.

The original numbers assigned to coaches by the L.M.S. were none too consistent with coaches from the same diagram not assigned to contiguous blocks. To simplify things, a major renumbering scheme was commenced in 1932. This assigned blocks of numbers to each generic coach type (Third, brake composite etc.) and a large effort appears to have been made to allocate coaches to a sub-block of numbers first by pre-grouping owning company and then by diagram within that company's stock. Carried to its full conclusion each diagram should have been numbered in building date order in a series—numerous exceptions existed however. In section 3 vehicles marked $^{+}$ against their 2nd L.M.S. number were running with the new number by 31/12/33, the others were still with their original L.M.S. number (N.B. This data is not currently to hand for D95A, D95B and D97A). It is interesting to note that a fairly high proportion of the coaches which had been originally Westinghouse fitted only and which had been converted to vacuum brake by this date had also been renumbered. From this it is possible to infer a visit to a carriage works (St. Rollox?) for some attention, most likely the conversion of the brakes, after the introduction of the renumbering scheme. Thus the date of the conversion for these coaches may be inferred to be between 1932 and the end of 1933.

Reference : L.M.S. Coaches, an illustrated history. Jenkinson & Essery (OPC, 1977)

Section 8 BR Livery

It is thought that most of the coaches surviving into the 1950s would have received the BR crimson and cream livery but that none survived long enough to be repainted in the 1957 maroon livery.

The crimson and cream livery was lined yellow/black along the waist at the junction of the colours (i.e. the centre of the waist panel) with the yellow against the crimson. Often a crimson band was applied to the top of the coach side and when present this was lined at the junction with the cream in a similar manner. The band is present in all photographs I have seen of these coaches in this livery but if you know of any exceptions please let me know.

The coach number appeared in small yellow letters and figures towards the right hand end of the coach. Class figures were now only on first class doors. The guard's door was usually marked as such in small letters in the waist panel of the door.

Section 9 Train Formations

In these notes the B.R. coach classification scheme has been adopted. Although never used by the Caley nor indeed the L.M.S. (I believe it to be based on the L.N.E.R. scheme) it has the advantage of being relatively simple and logical. A coach's classification is derived by combining the appropriate letters from the undernoted list (which is not comprehensive but sufficient for our needs) to describe its accommodation :-

T : Third class,
C : Composite First and Third class,
B : Brake (i.e. with guard's compartment),
K : Corridor,
L : Lavatory accommodation but no corridor between coaches.

Thus a corridor brake composite such as Diagram 95 would be described as BCK. Coaches are non-corridor, non-lavatory stock unless otherwise stated, e.g. a simple "suburban-type" third class coach is simply described T.

In 1905 the prototype sets ex-Aberdeen were formed :-

BCK+BTK	to Edinburgh,
BTK+CK+BTK	to Glasgow

The TKs were used as required to strengthen the formations. There was also a Pullman diner, probably placed between the two sections. The train was known as the "Grampian" express and left Buchanan Street Station, Glasgow, at 10AM and Prince's Street Station, Edinburgh, at 9.25AM. The return from Aberdeen was at 5.25PM.

Such rigidity of formation did not last for very long and the coaches (plus those to three later 65' corridor diagrams) were soon to be found all over and indeed beyond the C.R. system. A few examples culled from the 1914 marshalling circular show just how widespread the use had become by then :-

4.05PM from Buchanan Street :

T+65' BTK+65' CK+ 65' BCK	to Crieff	} divided
65' BTK+65' CK+65' BCK	to Callander	} at Stirling

4.45PM from Buchanan Street :

57' BTK + 65' BCK	to Crieff,
65' CK + 65' BTK	to Callender,
57' BTK + 57' CK + 57' BTK	to Oban,
57' BCK	ex-Edinburgh to Oban,
LC + LBC	ex-Edinburgh to Callender.

7.40AM from St Fillans :

T+65' BCK+57' BTK+65' BCK	to Glasgow
T+T+BC+57' BCK	to Edinburgh

In July 1914, set 138 working the Peebles Branch :
65' BCK+65' BCK

By 1920 it appears that 57' and 65' vehicles could be marshalled interchangeably with only the Oban road being banned to the latter. Examples of 1920 workings which can definitely be ascribed to 65' coaches are :-

9.15AM from Buchanan Street :

65' BTK + 65' BCK	to Dundee,
BT + C + BT	to Perth.

8.35PM from Perth to Aberdeen :

BCK (W.C.J.S.)	from Perth
65′ BTK+65′ BCK	from Glasgow
57′ C+57′ T+Full Brake	from London (non-corridor or so the marshalling circular says !)

Moving off home territory and onto the Great Western, there was, in 1911, a C.R. 65′ BCK leading the 1.55PM G.W.R. Crewe-Bristol train having originated in Glasgow. The Caley coach would of necessity be a dual fitted example. From Bristol it was worked forward on the 9.10PM to Taunton, returning to Glasgow via the 7.07AM Taunton-Crewe. The full make up of these trains was :-

1.55PM from Crewe to Bristol :

C.R. 65′ BCK	from Glasgow
W.C.J.S. BTK	from Edinburgh
(following all G.W.R. stock)	
BCK	from Birkenhead to Bristol
BT+BTK+BCK	from Birkenhead to Cardiff
T (SO)+BC	from Crewe to Cardiff
BCK	from Snow Hill to Cardiff

9.10PM from Bristol to Taunton :

C.R. 65′ BCK+W.C.J.S. BTK	ex-1:55pm Crewe to Bristol
G.W.R. BCK+G.W.R. BTK	ex-6:30pm Paddington to Bristol

7.07AM from Taunton to Crewe :

Full brake+BT+BC	Cardiff to Manchester
BC	Taunton to Manchester
(above all G.W.R. stock)	
W.C.J.S. BTK	Taunton to Edinburgh
C.R. 65′ BCK (probably D95B)	Taunton to Glasgow
(following all G.W.R. stock)	
BTK+Diner+CK+BTK	Taunton to Birkenhead
BCK	Cardiff to Birkenhead

Although Somerset is probably the farthest any of the 65' coaches strayed in pre-grouping days (unless **you** know differently) there is little doubt that the L.M.S. made good use of such fine coaches and they would roam far and wide especially after the conversion of the Westinghouse fitted vehicles to vacuum brake. One example I can cite is contained on page 27 of A.J. Lambert's "Highland Railway Album, volume 2" where there is a photograph of a 65′ BCK on a Kyle of Lochalsh - Elgin excursion in 1937. It is minus footboards on the 'non-van' end bogie and, judging from the battery boxes fitted, it is either dual fitted or vacuum braked with the 'horizontal' cylinder.

Section 10 Acknowledgements

In addition to the published sources already acknowledged in the text, I am indebted to Niall Ferguson and the late Duncan Burton for the prototype and numbering information, Peter Tatlow for L.M.S. brake and numbering information and to Chris Youett and John Lewis (the H.M.R.S. G.W.R. steward) for the G.W.R. train formation information. The 4mm scale drawings were prepared from copies of the original G.A. drawings supplied by BR/OPC.

Part 2 Building Instructions

Section 1 General

1.1 Your kit should contain the following items :-

a) Body, underframe and bogie etch.

b) Cast parts consisting of :-

Havoc roof vents (to suit coach), Torpedo roof vents (to suit coach), Bogie axleboxes and springs (12), Bogie bolster springs (8), Dynamo (1), Steam pipes (2), Brake pipes (2), Westinghouse pipes (2), Vacuum cylinders (2), LMS vacuum reservoirs (2), LMS (ex- L&YR) 'horizontal' vacuum cylinder (1), Electrical jumper cables (4), Westinghouse cylinder and reservoir (1), Buffer casings (4).

c) Miscellaneous parts consisting of :-

Plastic seating (to suit coach), Glazing material, 0.45mm wire (4), 0.33mm wire (1), Split pins (4), Nuts and bolts (6), Buffer heads (4), Buffer springs (4), Buffer bushes (4), Turned brass "T" door handles (to suit coach), Small bore tube (1), Press studs (2), Black paper and Plastic card.

1.2 Read the instructions (including the General Instructions) and identify all the parts. Please inform me immediately of any shortages.

1.3 Soldered construction is recommended and these instructions assume its use although some parts are easier to fix with glue and either Superglue or Epoxy is recommended. Thixofix Contact Adhesive is useful for finally fixing the roof in place as it allows time for everything to be lined up before going off.

1.4 A half-etched line is provided where you are required to fold up parts. Unless otherwise stated by the specific instruction, this line goes to the INSIDE of the fold and all folds are at 90°.

Section 2 Bogies

2.1 The basic design principle used in these bogies is that which has been applied for many years to four wheeled compensated wagons in Scalefour. The "rocking" elements are identical in function to those used in wagons but are deployed in an unusual fashion. The bogie is split into 3 assemblies each containing a two wheeled "rigid" group and all three assemblies rock on a central frame. Two of the rocking elements are in line with the track centre and the third is at right angles to it. This means that looking on the side of the bogie there is a split in the side frame. This split is however concealed behind part of an axleguard and thus is not obvious when the bogie is on the track.

2.2 Punch out all the rivets from behind using a slightly blunt map tack.

2.3 Remove parts A and B from the fret and fold out the axleguard location pieces from the top section such that they can pass through the slots in the lower section once the two are folded together.

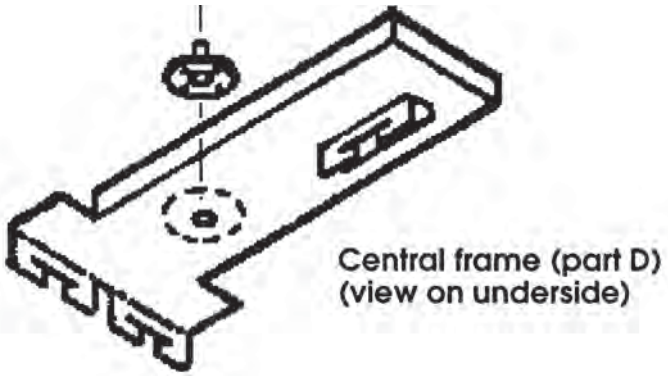
2.4 Fold each part together at 180° along the half etch at the bottom of the axleguards and solder the front and rear layers together via the access holes in the rear layer.

2.5 Fold the floor of each half at 90° to the outside frame and reinforce with a fillet of solder.

2.6 Fold down the end flange and reinforce by soldering it to the side frames and with a fillet of solder along the fold.

2.7 In a similar manner make up part C which has two axleguards joined by the floor.

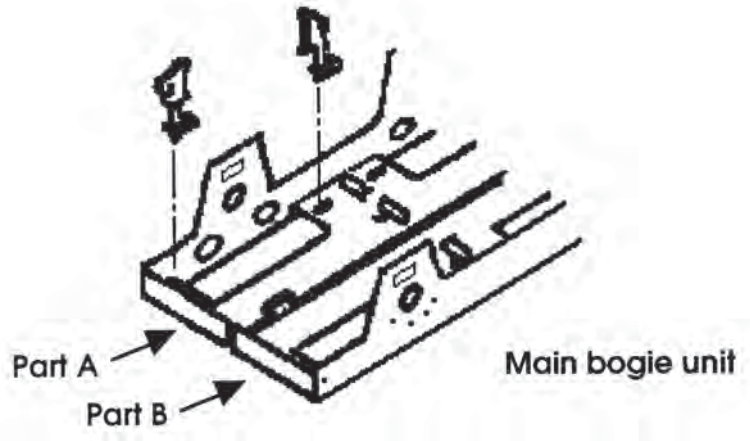
2.8 Solder a pin point bearing into each of the axle holes.



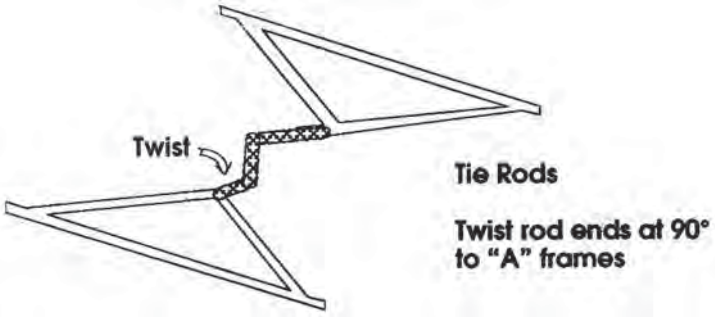
2.9 Fold up the bogie central frame as shown in the sketch and add the press stud male to the central hole. It is essential to reinforce all folds with solder fillets.

2.10 Twist the tabs on the central frame to allow them to pass through the slots in the floors of the three bogie components, mount the three components and straighten the tabs to hold everything in place.

2.11 While they are still on the fret, fold up and solder the brake blocks to the brake hangers. Now remove the brake hangers and solder into the twelve slots in the bogie floor.



2.12 On each "A" frame twist the rod ends to 90° and then fit by soldering the ends of each "A" frame to the brake blocks.



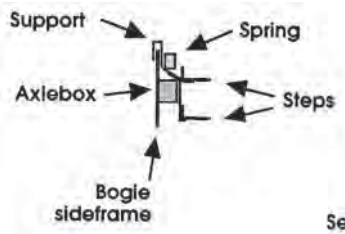
2.13 Each bogie is truly compensated in all directions and so one of the units must be stabilised laterally against the coach floor in order to achieve 3 point suspension. Thus make up one

of the bogie mounting plates as shown in the sketch with the half moon stabilisers in the down position while on the other unit these must be bent flush with the surface. Add the female halves of the press studs to the centres.

Bogie centre

2.14 Solder the castings carefully in place

2.15 Fold up the lips on the footboards and fit as shown in the G.A. drawing. (As mentioned in the Prototype Notes, the footboards were progressively removed from 'non-brake' ends in LMS/BR days.) The single footboards have an integral support which should be soldered to the bogie frame while the supports for the double boards should be made from the narrow strips on the bogie etch.



Section through double steps

2.16 Clean up and paint the bogies.

2.17 Insert the wheelsets and put the bogies aside until the underframe etc. is complete.

Section 3 Underframe

3.1 Identify and remove the main floor unit from the fret.

3.2 Press out the rivet detail on the solebars as per §2.2

3.3 The solebars on these coaches were inverted channels (i.e. the lower leg of the "U" points inwards) so first fold the lower legs down to give ⌐ ¬ and then fold the sides down to give └ ┘.

3.4 Fold the buffer beams down from the floor and reinforce with a fillet of solder. Also reinforce the corners between the buffer beam and solebars with solder.

3.5 Solder the buffer beam overlays in place after pressing out the rivet detail

3.6 Press out the rivet detail on the solebar footstep fixing brackets, fold up the brackets and locate the footstep tabs into the slots in the solebars, brackets to the top of the step. Solder in place.

3.7 Locate the bogie mounting plates in their slots on the floor and solder in place.

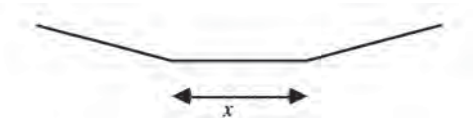
3.8 **Read section 4 now to determine which from among the safety loop, "V" hangers and "W" bracket your brake arrangement requires and fold these down at right angles to the floor.**

3.9 The main transverse girders fold up from four thicknesses of metal. First fold in half to 180° with the half-etched line to the inside and then fold back the two outer sections again to 180°. Solder the seams trying not to get solder into the two holes in the inner layers and clean up.

3.10 The girders locate across the coach 25mm either side of the centre line - the four bolt heads in a square pattern on the solebar mark the positions. Solder in place.
N.B. if modelling a dual fitted coach (see section 4 and the prototype notes) the C.R. style "V" hangers require to be positioned **prior** to soldering these girders in place (see §4.4).

3.11 Trussing comes next. The outer queen posts are supplied on the etch while the inner ones are represented by spilt pins. The truss rods themselves are made from the 0.45mm wire supplied.

3.12 Start by measuring the distance over the outer edges of the transverse girders (should be 52mm) and then fold 2 lengths of 0.45 mm wire thus -



Where *x* should be the size you have just measured. The ends need to be at least 60mm long but should be left overlong for now. These are the outer trusses.

3.13 The outer queenposts are to be found on the etch adjacent to the bogie brake gear 'A' frames. The central portion wraps around the wire truss rod with the half etch to the inside. Tin the portions either side of the half etch, wrap round the truss rod at either end of the central portion and bend over the top flanges. Position the queenposts on the outer ends of the transverse girders and solder the queenposts together and to the transverse girders.

3.14 Fold two more lengths of 0.45mm wire in a similar manner to §3.12 but *x* should be decreased by 1mm

3.15 Thread two split pins onto each inner truss rod and close them round the wire, locating one at each bend. Insert the ends of the split pins into the holes in the transverse girders after drilling out if necessary and solder in place such that the height of the inner truss rods matches the outer ones.

3.16 Check the positions of the outer ends of the truss rods, adjust as required and solder to the back of the solebars or floor after trimming. Note that you may have to locate the ends inboard from their true positions to allow the bogies enough side play on underscale curves.

Section 4 Underframe Fittings

4.1 Please check in the prototype notes which brake arrangement you require.
- a) Westinghouse fittings—see §4.2 and 4.3,
- b) C.R. vacuum fittings—see §4.4,
- c) L.M.S. 'conventional' vacuum fittings—see §4.5 and 4.6

d) L.M.S. 'horizontal' (ex-L&Y) vacuum fittings—see §4.7 and 4.8.
See §4.9 et seq. for all arrangements.

4.2 Westinghouse fittings (requires safety loop only bent down)—all the coaches had the arrangement of two small and one large battery box as shown in the sketch in the prototype notes. Form the battery boxes by folding over the floor and sides (relief to the outside) and solder in position on the coach floor.

4.3 The Westinghouse fittings are supplied as a three part lost-wax brass casting with the cylinder and reservoir linked by a pipe. Take the base frame and shorten to fit by cutting the "L" irons flush with the linking piece and to an overall length of 11mm, solder in place on the underframe opposite the safety loop behind the large battery box with the linking piece uppermost such that the **hole** in the frame is on the coach centre line. Take the cylinder and reservoir and twist such that the cylinder can mount on the frame with the reservoir on the centre longitudinal in the position indicated by figure 1 of the Prototype Notes. Solder in position.

4.4 In this arrangement both sets of vacuum equipment are on the same side of the coach as the large battery box. Unfortunately this is a fact which wasn't realised until I came to write these instructions and consequently one set of "V" hangers do not have mounting slots and require the mounting tabs removed such that they mount flush on the floor. Hopefully you will have been pointed to this instruction by §3.10 so that the separate C.R. style "V" hangers can be slid onto the transverse girders and soldered in position before the girders themselves are fixed. Pass a wire between each set of "V" hangers, threading on the operating crank as you go and solder in place. Finally cut the mounting spigot off of the C.R. style vacuum cylinders (the ones with the large projection which goes to the operating crank) and fix to the floor, centres 6mm from the line of the wire between the two "Vs". Return to section 3 to follow any instructions you may have skipped by the necessity of taking this one out of sequence.

4.5 L.M.S. 'conventional' vacuum fittings (requires "V" hangers only bent down)—this uses two large battery boxes, the one mounted nearer the centre longitudinal being a replacement fitted at the time of the brake conversion. Form the battery boxes by folding over the floor and sides (relief to the outside) and solder in position on the coach floor. The replacement box requires two braces made from 0.45mm wire fitted between its floor and the coach floor at either end. There is also a brace in the middle and the lug on the box should be bent back at 90° and a wire fitted. See figure 2 of the Prototype Notes for a sketch of this arrangement.

4.6 Solder the vacuum cylinders to the coach floor in the indicated position. There are also small reservoirs which fit to the coach floor between each cylinder and the adjacent cross-truss. Pass a wire between each set of "V" hangers, threading on the operating crank as you go and solder in place.

4.7 L.M.S. 'horizontal' vacuum fittings (requires safety loop and "W" bracket down)—this retained the original the arrangement of two small and one large battery box. Form the battery boxes by folding over the floor and sides (relief to the outside) and solder in position on the coach floor. See figure 3 of the Prototype Notes for a sketch of this arrangement.

4.8 Basically this conversion entailed removing the Westinghouse gear and putting a horizontal vacuum cylinder in its place retaining the original safety loop. Solder the cylinder in place between the "W" bracket and the outer solebar.

4.9 Remove a section from the dynamo mounting flange such that it clears the centre longitudinal and fit in the indicated position.

4.10 Profile the buffer heads to an oval 8mm by 3.5mm—if the process becomes a complete disaster then reduce the diameter still further and solder the supplied etched heads in place. Assemble each buffer by drilling out the casing with a 1mm drill, solder a bush to the rear of the casing then slip a spring over the tail of the buffer shank and insert into the casing and bend over the tail at the rear to retain—a scrap of plastic card with a notch in in and placed between the casing and the head helps get the right extension of the buffer every time. Solder the assemblies in position on the coach. Be sure to clean the buffers carefully—the heads and shanks are steel and can rust if flux or water is left in prolonged contact with them.

4.11 Fit the steam heat and brake pipes to the coach ends together with the screw link or other couplings as required.

Section 5 Body

5.1 Each end is assembled from two layers. On each inner end bend the lampirons and steps (or train alarm gear lugs) forward at 90° such that they will pass through the slots in the corresponding outer end and bend the side location tabs to the rear. On the outer ends, press out the rivet detail from behind as per §2.4 and fold the corridor connection locating lugs forward. Tin the outside of the inner ends and the inside of the outer ends.

5.2 Fit the outer ends over all the projections on the corresponding inner end and sweat together.

5.3 Using a thin piece of scrap brass from the fret as a spacer and fold the lamp irons up parallel to the body.

5.4 Fit the cast jumper cables and train alarm gear and fit to the ends.

5.5 Fit the handrails on the end without steps and drill two 0.5mm holes to take the lower ends of the handrails on the ends with steps. The upper end of these handrails locate on the roof and so are among the last parts fitted.

5.6 Take the sides and remove any parts from inside the window frames, remembering to dress the tabs.

5.7 Fold the body top stiffener back at 90° to the body sides and then fold the sub-floor to almost 90° such that, when viewed from the end, the side looks like diagram 5.7


diagram 5.7


diagram 5.8

5.8 Form the tumbleholme in the lower body sides. Lay the bottom edge of the side on the edge of a 12" rule with the inside uppermost, take a length of central heating or similar pipe and lay it on the coach side and roll gently from the waist towards the bottom. This should produce a nice even tumbleholme and the floor should now be at 90° to the upper body side as per diagram 5.8.

5.9 Take one side, noting at which end the steps go (its marked on one of the sub-floors), and solder to an end taking care to get it square.

5.10 Solder the same side to the other end again taking care to get it square.

5.11 Offer up the other side to the ends making sure the half etched overlaps on the sub-floors

lie correctly (i.e.  , **not**

) and solder in place.

5.12 Check the width of the coach at the floor overlaps, adjust until it matches the width at the ends and solder the overlaps together.

5.13 Fold up the sides of the corridor connections and curve the two halves of the top to roughly the right shape so that you end up with a piece looking like :-

Don't solder the tops together yet.

5.14 Locate each connection over the lugs on the ends and solder in place. Check the top curve against the aperture, adjust and solder the tops together.

5.15 Fold down the footboard (which goes inside the body of the connection) from the outer frame and locate the frame over the four lugs on the body of the corridor connection. Solder in place and clean up the tabs.

5.16 Make and fit a handle from wire for each of the end boards which should then be put aside until the final assembly stage.

5.17 Offer up the body to the underframe and bolt together (two bolts at each end, two near the middle). Solder the nuts to the coach floor and unbolt again until final assembly.

5.18 The basic body is now complete !

Section 6 Interior

6.1 The etched interior parts are tabbed such that they can only locate on the floor in the correct position but, due to space limitations on the etch, it has not proved possible to provide all the compartment bulkheads. Make the deficit from brass or plasticard using the etched parts as a pattern.

6.2 Bend the corridor partitions to shape using the floor plan as a guide.
i.e. Except at brake compartment ends make a right angle bend between the last compartment and the lavatory and then bend the lavatory wall back to an angle of about 45° at the next etched line such that the end of the wall can be soldered to the coach end clear of the gangway with the tab located into the subfloor. At brake compartment ends simply fold the door to 90°.

6.3 Solder the supplied interior parts together and fit the other bulkheads as required.

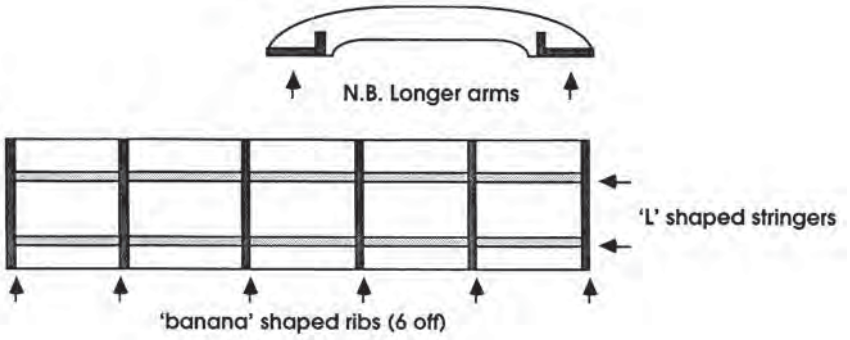
6.4 Fit the seats.

6.5 Fix the interior to the coach floor lining up by the tabs and slots. File the tabs flush with the underside of the floor. You may prefer to leave this until after painting and glazing as the interior can impede access.

Section 7 Roof

7.1 Fold up the two roof stringers to form 'L' shapes.

7.2 Slot four of the curved roof ribs into place on one of the stringers as per the diagrams. Solder in place taking care they are square and then slot all four into the other stringer and solder.



7.3 Solder the other two ribs in place, one at each end of the stringers in the recesses provided.

7.4 Clean up the end ribs and the base of the stringers such that there are no projections which might impede the proper seating of the roof.

7.5 Try the roof skeleton in place on the coach to check that it seats properly and is not too long. Adjust if required—it should be a reasonably tight fit between the ends of the coach body.

7.6 Form the roof cover to approximately the right shape by putting a "tumbleholme" on each side in the manner of §5.8 to give an  shape.

7.7 Taking care to get it central both for length and width solder the cover to the centre of one of the end ribs. Working from the middle out complete the seam with solder.

7.8 At the edge of the rib note the amount of overhang in the cover and, keeping the overhang constant, solder one edge of the cover to the stringer.

7.9 Working from the soldered side towards the free edge, solder the cover to each of the other ribs.

7.10 Complete the fixing of the cover by soldering the free edge to the other stringer.

7.11 Cut four short lengths from the small bore tube provided for use as the lavatory filler pipes and solder in place in their roof holes.

7.12 When built it is believed these coaches all had Havoc ventilators but at some time most, if not all, were fitted with torpedo ventilators. Both types are provided so fix the ones of your choice to the roof (see Prototype Notes).

Section 8 Final Assembly

8.1 Paint body, underframe and roof according to period, line and letter. (See General Instructions and Prototype Notes).

8.2 Fit the door and grab handles as indicated on the drawing.

8.3 Each brake coach has a handrail each side at waist level (two each side on the Brake 3rd). Bend up from 0.33mm wire and fix in place.

8.4 Glaze the windows using the supplied material.

8.5 Cut two strips of black paper 5mm by 59mm and carefully glue inside the lazy-tongs of the corridor connections. Fit the end boards if required.

8.6 Bolt the body and underframe together.

8.7 The roof need not be glued to the body unless desired as it should be held in place by the ends.

8.8 Fit the handrails at the step end of the coach.

8.9 Reattach the bogies.

8.10 Your coach is now ready for service and I trust you have enjoyed building it.

Copyright

This kit is just one of many devoted to the Caledonian Railway available in the ***Caley Coaches*** range—why not check out the web site, www.caley.com.

Jim Smellie