

Caley Coaches Ltd

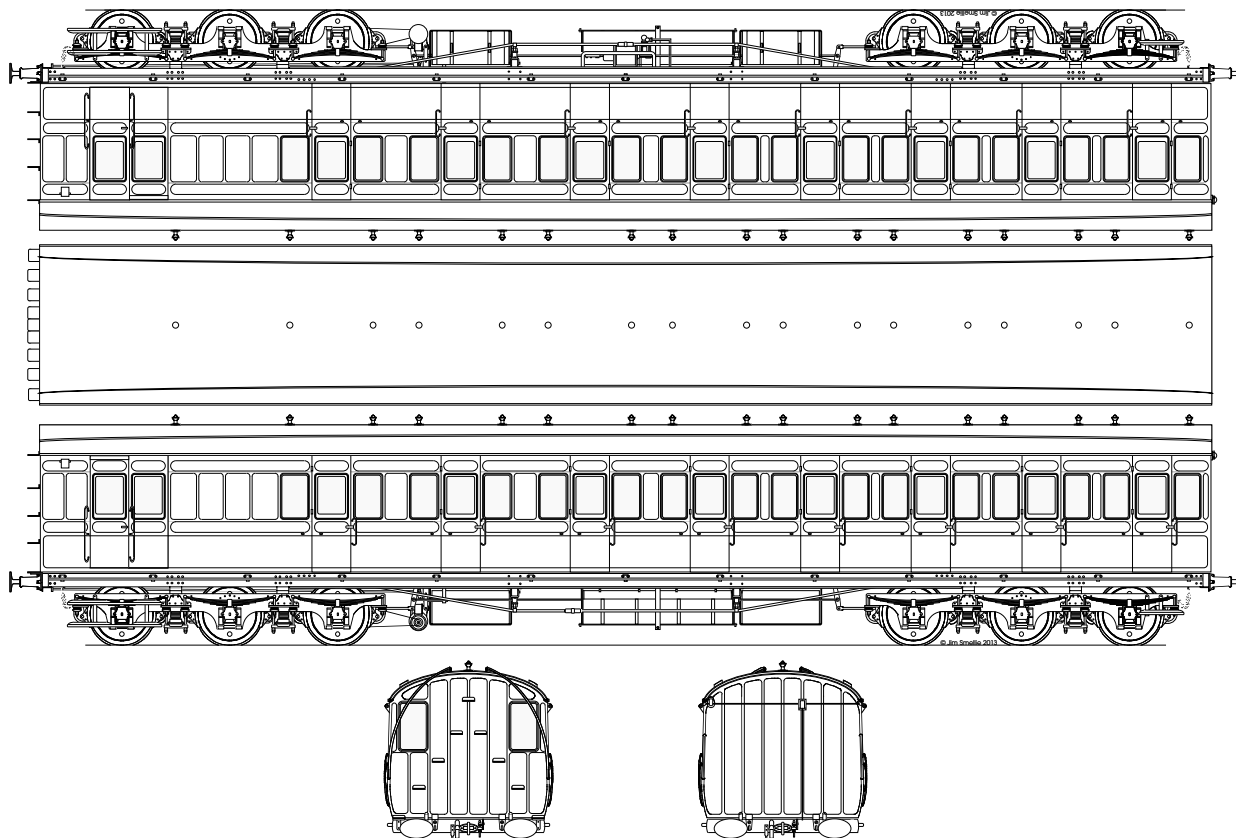
'True Line' kits in etched brass

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Caledonian Railway 65'/68' Non-Corridor Stock Prototype Notes and building instructions covering D101-105.

D101	8 Compartment Brake Third,
D101A	9 Compartment Brake Third,
D101B	7 Compartment Brake Third.
D102	9 Compartment First,
D103	'Slip' Brake Composite (3F/5T).
D104	Composite (4F/6T).
D105	11 Compartment Third.



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Company No. SC137795 VAT No. 596951084

Part 1 Prototype Notes

Section 1 Overview and Numbering

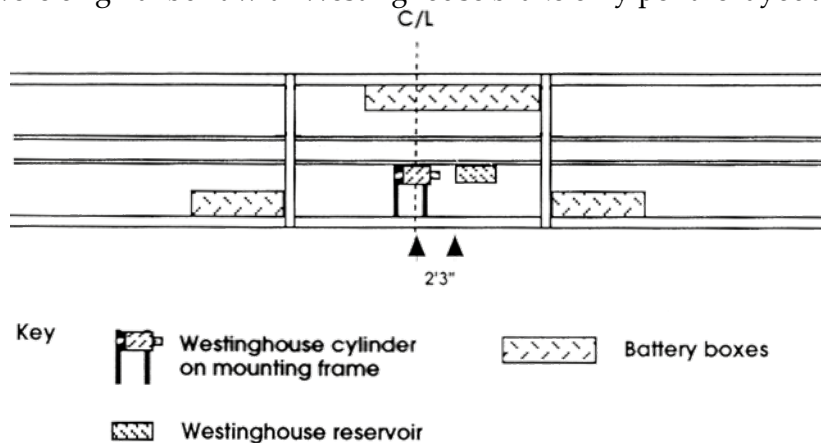
In 1906 the Caledonian Railway built some very fine non-corridor coaches mainly for use on Edinburgh to Glasgow (via Shotts) trains. They were also used on some of the prestigious Clyde Coast services. The exception was a batch of 6 Brake composites D 1 03 which were slip coaches whose use was covered in a later section.

These coaches were all 65' long with the exception of the full thirds which were of necessity 68' long in order to fit in a full 11 compartments.

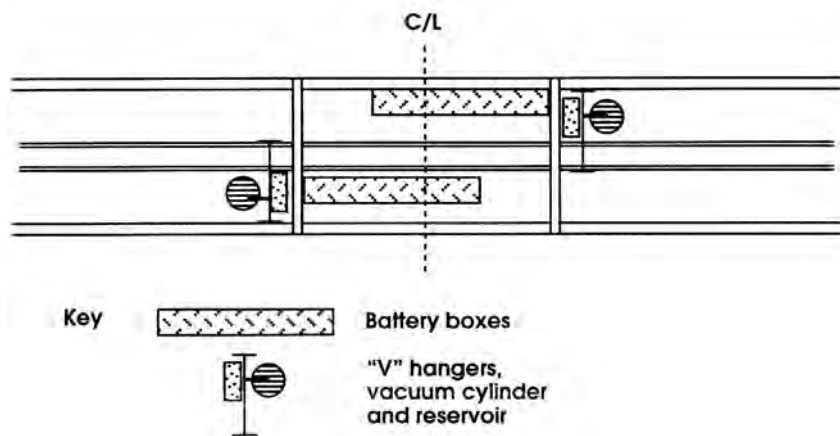
Numbering, withdrawal dates and other details, which have been gleaned from the 'Coaching and Non-Passenger Coaching Stock Register' published by the Caledonian Railway Association in 2001, are given in the accompanying tables.

The Caledonian Railway Diagram books were introduced in 1898, one for "Modem Wagons" and a second for "Carriages, Vans & Trucks". These are now generally referred to as the Large Diagram Books. A second, pocket sized version was also introduced and continuously updated throughout the Caledonian era. The diagrams -are arranged in different sequences in the two sizes of book, only one diagram has the same number in the two versions. The Van & Truck diagrams which are in the Large Carriage book are included in the Small Wagon book. How the Company and its servants used the two different diagram systems can now only be speculation.

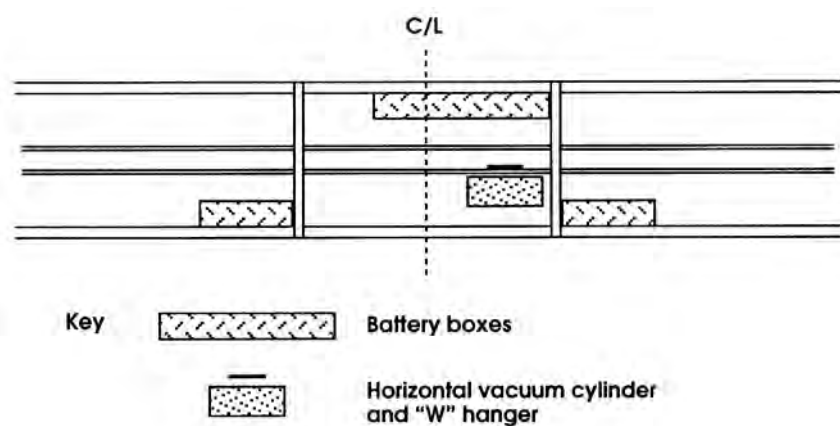
These coaches were original built with Westinghouse brake only per the layout below.



In due course at least some were vacuum fitted by the LMS. Two arrangements are known to have been used on both these coaches and the equivalent "Grampian" corridor stock:



Arrangement 1) Using 2 conventional LMS style vacuum cylinders with renewal of some battery boxes; or



Arrangement 2) Using a large horizontal cylinder of Lancashire and Yorkshire Railway origin retaining the original battery boxes. This cylinder was supported on one side by a frame similar to a wagon "W" iron!

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.

Further, at some time prior to 1933 all of the D101A Brake Thirds had a compartment removed to make a larger van. Note that while these coaches now nominally offered the same accommodation as their D101 sisters they were not identical - D101 had 6'2" wide compartments and a van which was 14'7 $\frac{1}{8}$ " long while the conversions had compartments 6'0 $\frac{7}{8}$ " wide and a van 15'4 $\frac{1}{2}$ " long.

There is an excellent photograph on page 23 of the Caledonian Railway Association's Journal "The True Line" No.114 of No.14450 near Bellshill in December 1931 with an up train for Edinburgh. The head of the consist comprises a D101B 7-compartment Brake 3rd, a D105 11-compartment 3rd and a D102 1st. The fourth coach is a Pullman buffet car which were run in many Glasgow - Edinburgh trains despite the rest of the stock being non-corridor. The well-to-do must have travelled all the way in the Pullman.

Extracts from "Local working of Carriages", dated July 1906 (left) and "Marshalling of Trains", dated July 1913 (right) [both as reprinted by the Association] show the typical early working of these coaches.

No. 1.—Edinburgh 6-Wheeled Bogie Train. 1 First and 2 Brake Thirds. 1 Third extra on Saturdays.

(Daily, except Saturdays.)

Edinburgh.		Glasgow.	
9.0 a.m.	→	10.5 a.m.	→
12.5 p.m.	←	11.0 "	←
1.5 "	→	2.10 p.m.	→
3.50 "	←	2.45 "	←
5.0 "	→	6.10 "	→
7.50 "	←	6.45 "	←

Cleaned at Edinburgh.

No. 2.—Edinburgh 6-Wheeled Bogie Train. 1 First and 2 Brake Thirds. 1 Third extra on Saturdays.

(Daily, except Saturdays.)

Edinburgh.		Glasgow.	
6.30 a.m.	→	8.18 a.m.	→
9.55 "	←	8.45 "	←
11.0 "	→	12.5 p.m.	→
2.10 p.m.	←	1.5 "	←
2.40 "	→	3.45 "	→
5.11 "	←	4.5 "	←
7.5 "	→	8.10 "	→
11.6 "	←	10.0 "	←

Cleaned at Edinburgh.

No. 3.—Gourock 6-wheeled Bogie Train. 1 First and 2 Brake Thirds. 1 Third extra on Saturdays.

Gourock.		Glasgow.	
8.27 a.m.	→	9.23 a.m.	→
Edinburgh.			
11.0 a.m.	←	9.50 "	←
4.0 p.m.	→	5.5 p.m.	→
Gourock.			
6.28 p.m.	←	5.25 "	←
SO 9.10 "	→	9.57 "	→
SO 11.0 "	←	10.15 "	←

Cleaned at Gourock.

* Brake Composite, Gourock to London, attached on rear daily.
† First, Third, and 2 Brake Thirds extra in front, to work 5.39 p.m., Paisley to Gourock.

No. 125.—12-Wheeled Bogie Train. 1 First and 2 Brake Thirds.

Edinburgh.		Glasgow.	
8.55 a.m.	→	10.5 a.m.	→
12.15 p.m.	←	11.0 "	←
SO 12.55 "	→	2.5 p.m.	→
SO 2.25 "	←	8.55 "	←
5.15 "	→	* †	→
7.5 "	←	8.12 "	←
11.23 "	→	10.5 "	→

Cleaned and Repaired at Edinburgh.
† Bogie Third extra "FO" and "SO" Returned 9.50 p.m. * 1 Third extra "SO" received off 11.22 a.m.
§ No. 135 set attached S.

No. 126.—12-Wheeled Bogie Train. 1 First and 2 Brake Thirds. 1 Third extra from 10.55 a.m. on Saturdays till 9.58 a.m. on Mondays.

Edinburgh.		Glasgow.	
6.25 a.m.	→	8.17 a.m.	→
10.0 "	←	8.45 "	←
10.55 "	→	12.5 p.m.	→
2.85 p.m.	←	1.30 "	←
4.55 "	→	6.8 "	→
8.0 "	←	6.45 "	←

Cleaned and Repaired at Edinburgh. † Third extra.
* 2 Thirds extra "SO" received 8.5 p.m.

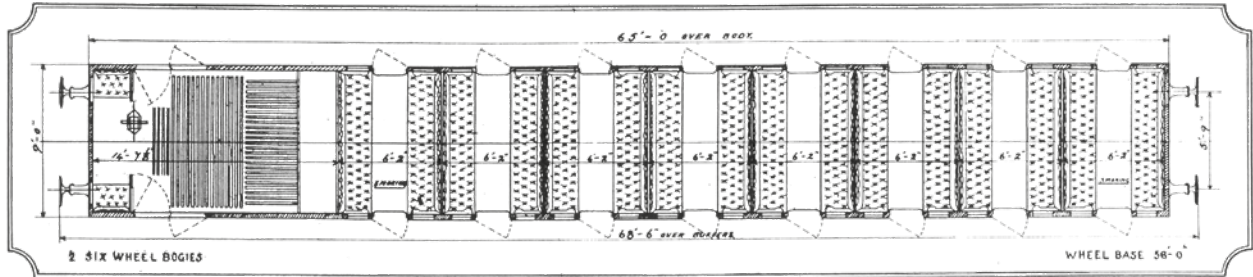
No. 127.—12-Wheeled Bogie Train. 1 First, Third, and 2 Brake Thirds. 1 Third extra on Saturdays.

Gourock.		Glasgow.	
8.20 a.m.	→	9.28 a.m.	→
Edinburgh.			
11.8 a.m.	←	9.50 "	←
SO 11.22 "	→	1.35 p.m.	→
SO 8.44 p.m.	←	2.20 "	←
3.55 "	→	5.5 "	→
Gourock.			
6.28 p.m.	←	5.25 "	←
S 8.40 "	→	9.55 "	→
SO 11.85 "	←	10.35 "	←
SO 8.10 "	→	9.7 "	→
SO 11.5 "	←	10.10 "	←

Cleaned and Repaired at Gourock.

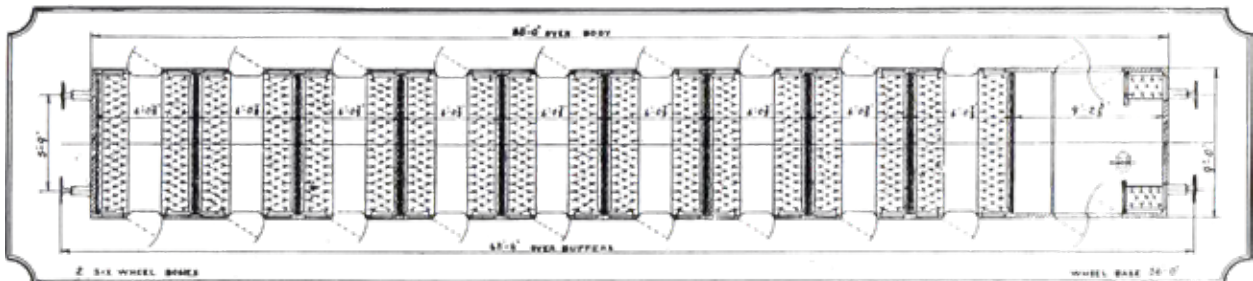
* Brake Composite, Gourock to London, on rear.
† 3 Bogie Thirds extra. One balanced at 4.5 p.m. and two at 5.10 p.m.

D101 (large book) / D65 (small book) 65' Brake Third. 8 compartments.



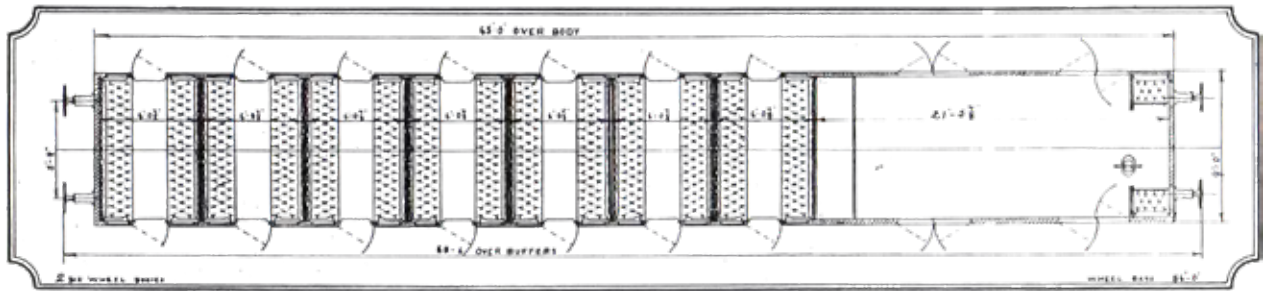
CR	LMS1	LMS2	Order	Built	Withdrawn	Notes / Disposal
107	24301	24301	H234	01/06	03/53	Body sold 05/53 Inverurie
571	16642	24302	H279	01/09	03/53	Body sold 03/53 Inverurie
792	16850	24315	H234	01/06	1925	Body sold 03/53 Inverurie
966	17024	24303	H234	01/06	06/38	
1281	17337	24316	H279	01/09	07/40	
1300	17356	24304	H234	10/05	03/53	Body sold 03/53 Inverurie
1302	17358	24305	H234	01/06	03/44	
1303	17359	24306	H234	01/06	01/55	Converted to vacuum brake 1933; broken up Heatheryk-nowe 04/55

D101A (large book) D70 (small book) 65' Brake Third. 9 compartments.
All converted to 8 compartments with larger van prior to 1933.



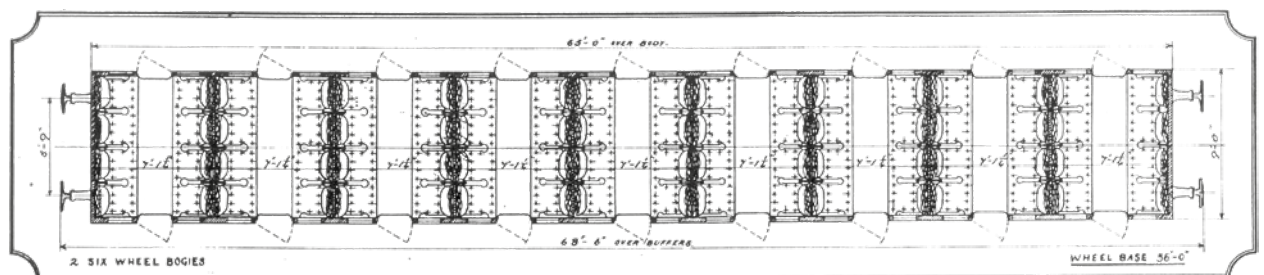
CR	LMS1	LMS2	Order	Built	Withdrawn	Notes / Disposal
227	16300	24312	H262	07/07	09/51	
454	16526	24313	H280	01/09	05/48	
518	16589	24314	H280	01/09	10/51	Converted to vacuum brake 1933
1324	17380	24307	H241	02/06	03/53	
1325	17381	24308	H241	02/06	03/53	
1326	17382	24309	H241	07/06	12/49	
1327	17383	24310	H241	07/06	12/49	
1328	17384	24311	H241	07/06	07/40	

D101B (large book) / D69 (small book) 65' Brake Third. 7 compartments.



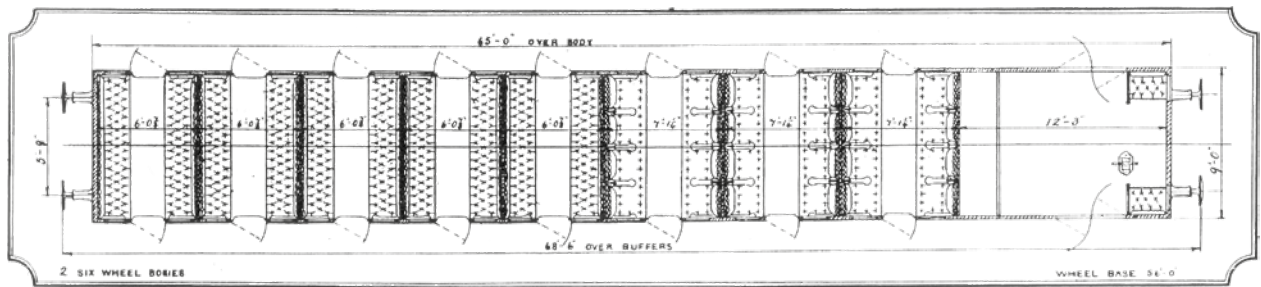
CR	LMS1	LMS2	Order	Built	Withdrawn	Notes / Disposal
343	16416	24298	H263	07/07	12/48	
686	16751	24299	H281	01/09	09/51	Broken up St Rollox 02/52
972	17030	24300	H281	01/09	12/49	
1319	17375	24293	H240	02/06	03/53	Body sold 03/53 Inverurie
1320	17376	24294	H240	02/06	05/49	
1321	17377	24295	H240	07/06	05/55	Converted to vacuum brake 1933; broken up Heatheryk-nowe 05/55
1322	17378	24296	H240	07/06	07/48	
1323	17379	24297	H240	07/06	06/45	

D102 (large book) / D66 (small book) 65' First. 9 compartments.



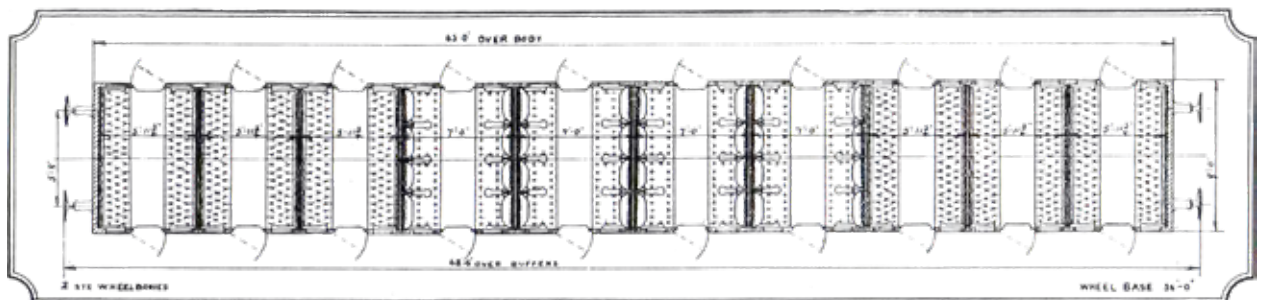
CR	LMS1	LMS2	Order	Built	Withdrawn	Notes / Disposal
42	15374	10648	H259	07/07	07/48	
67	15394	10641	H235	01/06	12/48	
125	15442	10642	H235	10/05	01/55	Converted to vacuum brake 1933; broken up Heatheryk-nowe
130	15445	10643	H235	01/06	07/48	
306	15586	10644	H237	07/06	11/48	
307	15587	10645	H237	07/06	11/48	
308	15588	10646	H237	07/06	03/44	Downrated to 108 seat THIRD no. 13510 c1936
309	15589		H237	07/06	1924	1 st LMS number never carried
310	15590	10647	H237	07/06	11/48	
311	15591	10649	H237	07/06	08/48	
312	15592	10650	H259	07/06	12/48	Body sold 03/53 Inverurie

**D103 (large book) / D71 (small book) 65' Brake Composite.
5 Third and 3 First compartments.,All slip coaches.**



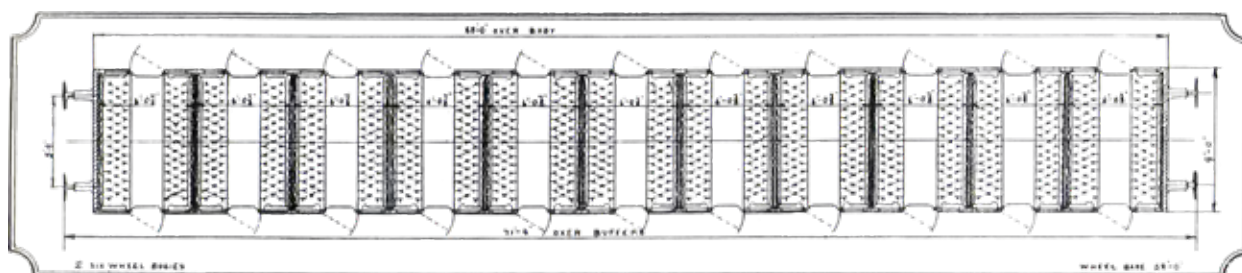
CR	LMS1	LMS2	Order	Built	Withdrawn	Notes / Disposal
348	15934	24793	H282	01/09	08/48	
365	15951	24789	H242	07/06	11/52	
366	15952	24790	H242	07/06	03/53	Downrated to 96 seat BRAKE THIRD no. 22213 c1937
367	15953	24791	H242	07/06	10/48	
368	15954	24792	H242	07/06	05/48	Downrated to 96 seat BRAKE THIRD no. 22214 c1937
373	15959	24794	H282	01/09	12/49	

D104 (large book) / D67 (small book) 65' Composite. 3 Third/4 First/3 Third compartments.



CR	LMS1	LMS2	Order	Built	Withdrawn	Notes
134	15724	17856	H260	07/07	03/53	Downrated to 120 seat THIRD c1936; body sold 03/53 Inverurie
360	15946	17851	H238	07/06	12/54	Converted to vacuum brake 1933;brokenupStRollox 12/51
361	15947	17852	H238	07/06	03/53	Body sold 03/53 Inverurie
362	15948	17853	H238	07/06	09/51	Downrated to 120 seat THIRD c1936; broken up St Rollox 12/51
363	15949	17854	H238	07/06	03/53	Downrated to 120 seat THIRD c1936; body sold 04/53 Inverurie
364	15950	17855	H238	07/06	03/53	Body sold 04/53 Inverurie

D105 (large book) / D68 (small book) 68' Third. 11 compartments.



CR	LMS1	LMS2	Order	Built	Withdrawn	Notes / Disposal
125	16198	15552	H239	07/07	07/40	
1305	17361	15541	H239	07/06		Converted to dormitory car 08/41
1306	17362	15542	H239	07/06	06/48	
1307	17363	15543	H239	07/06	03/53	Body sold 03/53 Inverurie .
1308	17364	15544	H239	07/06	12/42	To service stock
1309	17365	15545	H239	07/06		Converted to dormitory car 08/41
1310	17366	15546	H239	07/06	03/35	
1311	17367	15547	H239	07/06	03/53	Body sold 05/53 Inverurie
1312	17368	15548	H239	07/06	05/48	
1313	17369	15549	H239	07/06		Converted to dormitory car 08/41
1314	17370	15550	H239	07/06	02/50	
1315	17371	15551	H239	07/06	07/40	
1316	17372	15553	H239	01/08	06/48	
1317	17373	15554	H239	01/08	07/42	

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

Section 2 Slip Coach Working.

Information courtesy of C W Underhill and originally published in the Caledonian Railway Association's Journal "True Line" No. 36.

The information to be gleaned from the July 1914 edition of the Main Line Carriage Working instructions is set out below. . In certain cases, not having access to a WIT for the same period, the exact timings of some of the branch line workings are not known.

1. The Blairgowrie Slip

Leaving Edinburgh somewhere in the middle of the 9.25am express, this carriage had become the last vehicle by the time Perth was reached. Leaving Perth at 11.37am, the vehicle was SLIPPED at Coupar Angus and worked by the 12.07am branch train to Blairgowrie.

The carriage did not rest long at Blairgowrie, as it left again at 12.35pm for Perth, where it was attached to the 4.05pm from Dundee (West), leaving Perth at 5.10pm for Edinburgh.

2. The Grahamston Slip

This circuit is rather interesting. The carriage began its day on the back of the same 9.25am from Edinburgh which conveyed the Blairgowrie slip in the middle of the train. SLIPPED at Grahamston, the carriage was then attached .to the 9.58am from Larbert to Grangemouth.

Next, the carriage was employed as part of the 12.35pm from Grangemouth to Larbert and filled in the rest of its day by working in the 1.28pm Larbert to Alloa and return followed by the 5.58pm Larbert to Kilsyth and return.

For its return to Edinburgh the vehicle left Larbert at 7.30pm attached to the 5.10pm from Perth, thus being in the same train as the Blairgowrie slip carriage again!

This circuit shows how even a branch line train to Kilsyth could incorporate a 65ft Brake Composite Slip Carriage!

3. The St. Fillans' Slip

The slip carriage for St. Fillans was strengthened on Saturdays by a Third Class carriage for Crieff only.

Leaving Edinburgh by the 1.25pm the slip portion was SLIPPED at Gleneagles, then worked forward by the branch train to Crieff and St. Fillans.

The main carriage returned to Crieff and was worked forward to Perth via Methven Junction at 6.00pm. Having spent the night at Perth the vehicle was returned to Edinburgh by the 7.46am train next day.

The Saturdays Only Third Class carriage spent the weekend at Crieff and was balanced back at 3.04pm on Mondays.

4. The Lanark Slips

There were two Lanark slips, but their circuits followed differing patterns.

The first left Glasgow (C) at 4.30pm and was SLIPPED at Carlisle, whence it was worked forward to Lanark. It then worked the 5.30pm Lanark to Lesmahagow and 6.30pm return, spent the night at Lanark and returned to Glasgow as part of the 8.35am the following morning.

The second left Glasgow (C) at 5.00pm (SX) and was SLIPPED at Cleghorn, whence it was worked to Lanark. It then worked the 6.10pm from Lanark (SX) to Glasgow and rested overnight in Glasgow. Finally it was attached to the 6.25a'm Glasgow to Carlisle as far as Cleghorn, again worked forward to Lanark and then formed part of the 8.35am back to Glasgow, along with the other Lanark slip vehicle.

The curiosity of these diagrams is the 5.30pm Lanark to Lesmahagow and return, which must have reversed in both directions, as Poniel Junction was facing to Muirkirk.

These, then, are the 8 slips included in the July 1914 book, and quite a varied lot they are. The total circuits show how utilisation was maximised by employing the vehicles as ordinary carriages in between their use as slips proper. Incidentally, this shows how operators of model railways could justify including a slip carriage in their trains even if they can't make it slip!

Section 3 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.

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 4 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) Composite coaches would have the class was written in full on each door waist panel . Other, non-brake coaches carried the class designation in the waist panel between doors 2 and 3 (counting from each end) and brake coaches carried it between doors 2 and 3 at the non-brake end and between the last two passenger doors at the brake end.
- b) The C.R. coat of arms appeared twice on each side, usually centrally on the lower panel between the two outermost doors at each end (non bake ends) or centrally between the last passenger door and the guard's door on brake ends.
- c) The C.R. Co. monogram does not appear to have been used on these coaches.
- 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 "GLASGOW AND EDINBURGH DIRECT". 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 5 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 $\frac{3}{8}$ " 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.

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

Section 6 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 7 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 Charles Underhill for the information on slip coach working. 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

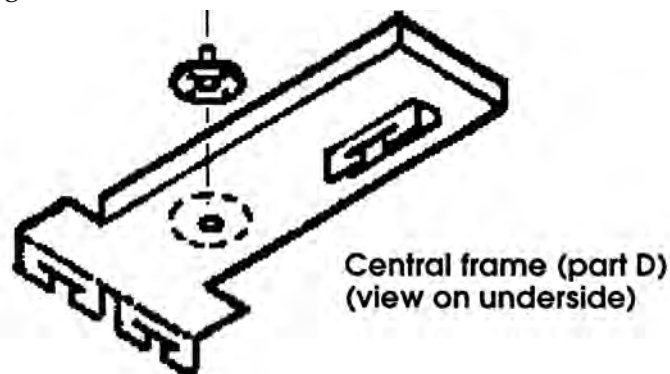
- 1.1 Your kit should contain the following items :-
 - a) Body, underframe and bogie etc.
 - b) Cast parts consisting of :-
Havoc roof vents (to suit coach), Torpedo roof vents (to suit coach), Bogie axleboxes and springs (12), Bogie bolster springs (8), Dynamo (1), Steam pipes (2), Brake pipes (2), Westinghouse pipes (2), 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 :-
Printed 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) and Press studs (2).
- 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

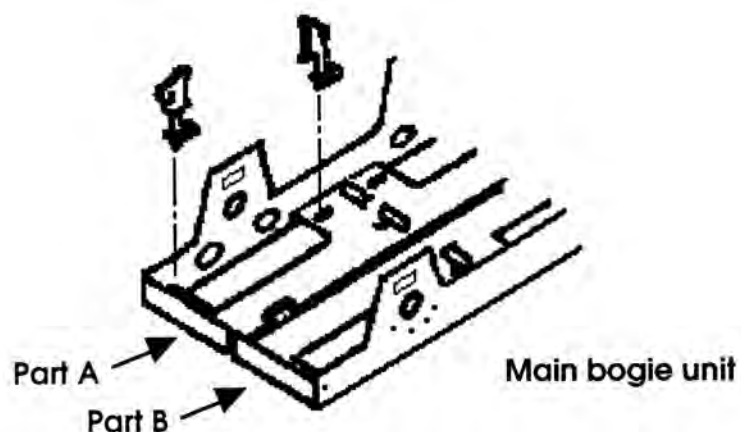
- 2.1 The basic design principle used in these bogies is that which has been applied for many years to four wheeled compensated wagons in Scalefour. The "rocking" elements are identical in function to those used in wagons but are deployed in an unusual fashion. The bogie is split into 3 assemblies each 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.

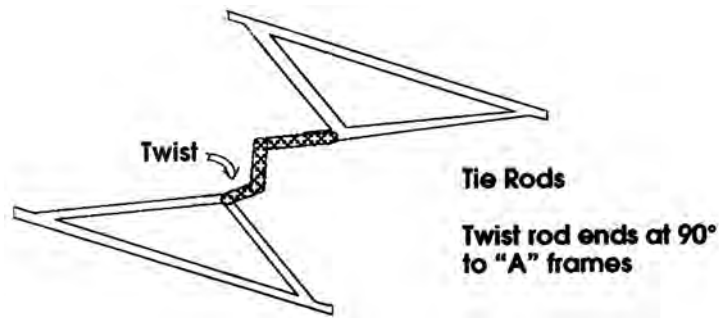
- 2.4 Fold each part together at 180° along the half etch at the bottom of the axleguards and solder the front and rear layers together via the access holes in the rear layer.
- 2.5 Fold the floor of each half at 90° to the outside frame and reinforce with a fillet of solder.
- 2.6 Fold down the end 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.

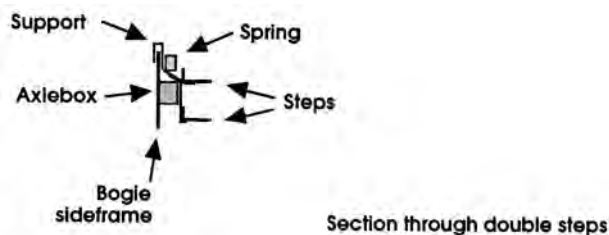


- 2.13 Each bogie is truly compensated in all directions and so one of the units must be stabilised laterally against the coach floor in order to achieve 3 point suspension. Thus make up one of the bogie mounting plates as shown in the sketch with the half moon stabilisers in the down position while on the other unit these must be bent flush with the surface. Add the female halves of the press studs to the centres.



- 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.



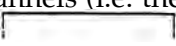

- 2.16 Clean up and paint the bogies.

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

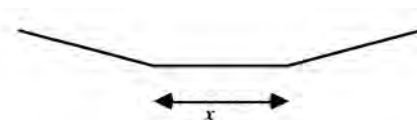
Section 3 Underframe

- 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

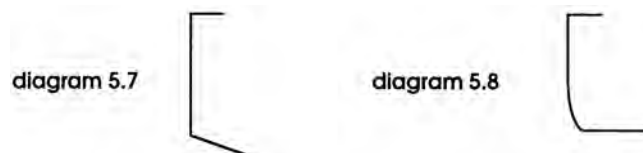
- 4.1 Please check in the prototype notes which brake arrangement you require.
- a) Westinghouse fittings—see §4.2 and 4.3,
 - b) L.M.S. 'conventional' vacuum fittings—see §4.4 and 4.5
 - c) L.M.S. 'horizontal' (ex-L&Y) vacuum fittings—see §4.6 and 4.7.
- See §4.8 et seq. for all arrangements.
- 4.2 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 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.
- 4.5 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.
- 4.6 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.
- 4.7 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.
- 4.8 Remove a section from the dynamo mounting flange such that it clears the centre longitudinal and fit in the indicated position.
- 4.9 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


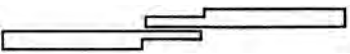
the casing then slip a spring over the tail of the buffer shank and insert into the casing and bend over the tail at the rear to retain—a scrap of plastic card with a notch in it and placed between the casing and the head helps get the right extension of the buffer every time. Solder the assemblies in 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.

- 4.10 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 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

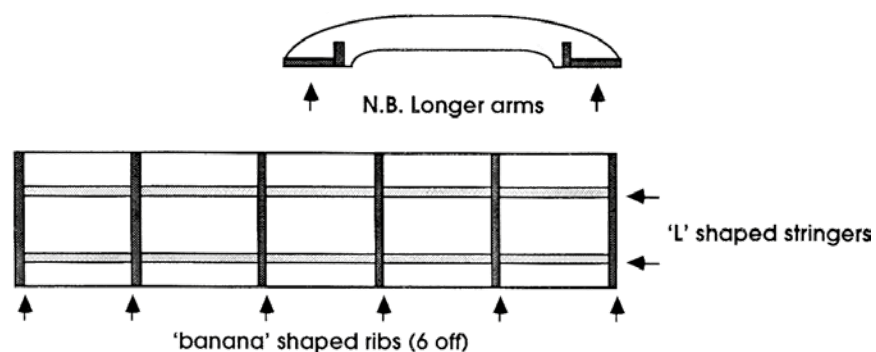



- 5.7 Form the tumbleholme in the lower body sides. Lay the bottom edge of the side on the edge of a 12" rule with the inside uppermost, take a length of central heating or similar pipe and lay it on the coach side and roll gently from the waist towards the bottom. This should produce a nice even tumbleholme and the floor should now be at 90° to the upper body side as per diagram 5.8.
- 5.8 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.
- 5.9 Solder the same side to the other end again taking care to get it square.
- 5.10 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.
- 5.11 Check the width of the coach at the floor overlaps, adjust until it matches the width at the ends and solder the overlaps together.

- 5.12 Solder the interior bulkheads in place.
- 5.13 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.
- 5.14 The basic body is now complete !

Section 6 Roof

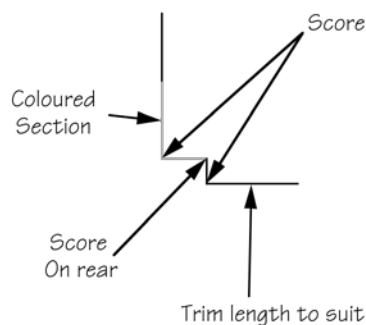
- 7.1 Fold up the two roof stringers to form 'L' shapes.
- 7.2 Slot four of the curved roof ribs into place on one of the stringers as per the diagrams. Solder in place taking care they are square and then slot all four into the other stringer and solder.



- 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 §5.7 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 Cut out and fold up the printed seats as indicated below



At each side a cut should be made at the outside edges of the coloured seat back and the resultant 'arms' folded and glued behind the seat back. Fit the assembled units in the compartments.

- 8.4 Glaze the windows using the supplied material.
- 8.5 Bolt the body and underframe together.
- 8.6 The roof need not be glued to the body unless desired as it should be held in place by the ends.
- 8.7 Fit the handrails at the step end of the coach.
- 8.8 Reattach the bogies.
- 8.9 Your coach is now ready for service and I trust you have enjoyed building it.

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Jim Smellie

