

C.R. numbers 104-111, 167-170; L.M.S. numbers 15147-15158



Number 111 resplendent in Caledonian livery.

HMRS V8317

## General Description

Built at the St. Rollox works of the Caledonian Railway in 1899 to order number Y56, the 12 locomotives of this class were designed by John F. McIntosh especially for passenger working on the Cathcart Circle in Glasgow and on the Balerno Branch in Edinburgh—the latter remained the special preserve of the class until the 1930s. On both lines there were closely spaced stations, steep gradients and tight curves making a small wheeled 0-4-4T the most suitable type of motive power. What emerged from St. Rollox was a very neat locomotive but, as with most McIntosh designs, it was evolutionary rather than revolutionary—many parts and/or design features were shared with some of its predecessors. The valve chests and the cylinders were very similar to those of the Class 1 4-4-0T of 1893, the boiler was the same as that on the Class 782 0-6-0T (1898), the suspension similar to that of the Class 92 0-4-4T (1897) while the bogie owed much to those on earlier Drummond 0-4-4Ts (e.g. the Class 171 0-4-4T of 1884). A major departure from Caley tradition, which was never repeated, lay in the cab which was the full width of the running plate unlike other tank locomotive designs. Perhaps it was the cab and bunker side sheets being flush with the side tanks which contributed much to the neat and uncluttered lines of the design. The sight-feed lubricator

was in the front left-hand corner of the cab and the quadrant carrying the levers operating the cylinder cocks and the forward and backward sanding lay on top of the cab toolbox to the left of the reversing lever. The Westinghouse brake valve was attached to the side-sheet above this toolbox and the Westinghouse steam cock on the extreme right of the faceplate.

The Westinghouse pump, which was fitted with a governor, was located in front of the right-hand side tank with the reservoir slung transversely below the rear of the bunker. Sandboxes for bunker first working were fitted to the main frames behind the driving wheels while those for chimney first working were incorporated with the front driving wheel splashers—the standard C.R. practise for inside cylinder tank locomotives of post-Britain design without leading bogies—i.e. all except the Class 1 4-4-0Ts.

The allocation of the class speaks volumes about their duties. In Edinburgh the class handled virtually all the passenger work on the Balerno and Barnton branches until the early to mid 1930s and were sometimes to be seen on the Leith branch. Latterly they also handled some goods workings between Morrison Street Yard and various private sidings on the Balerno Branch but they were not really suited to goods duties.

Such duties on the branch were normally handled by 0-4-2s of the Class 670 which were amongst the last remaining vestiges of pre-Drummond thinking on the Caley or, later, by L.M.S. standard 2F 0-6-0T “dock” tanks designed by Fowler.

The Glasgow based engines worked the Cathcart Circle as well as other local work out of Glasgow Central. The manner in which the Circle was worked limited their duties on this line : many trains were worked by engines which had worked into Central from further afield killing time as it were before they worked home. For example, one Carstairs engine worked a morning train from Lanark, did three turns on the Circle and then worked home.

Locomotive number 15147 (104) was serving as the Buchanan Street carriage-pilot around the time of the grouping. and, paradoxically, the last surviving member of the class, locomotive number 15153 (110), was the one engine which normally worked off “home territory”—it was withdrawn from Kilbirnie Shed, Ayrshire (an outstation of Polmadie) in 1938 having earlier, at least, worked the Beith branch. The three earliest withdrawals were the other Glasgow engines.

In comparison with many C.R. designs the class was withdrawn relatively quickly after grouping but this needs to be seen in context. The class

was designed with two specific tasks in mind and once strengthening work had taken place on the Cathcart Circle and Balerno Branch in the 1920s they were largely redundant—the larger and more numerous Class 439 0-4-4Ts could now tackle anything they could and much more. Thus being but a small and (relatively) non-standard class they succumbed to the L.M.S. standardisation policy which held that big was beautiful and certainly cheaper to run. Spares for the (numerically and physically) larger classes could be economically held at the works allowing for a quicker turn around at overhauls etc. and so generally better availability for traffic. As a class they gave valuable service for some 30 odd years each, clocking up a rough average of a 900 000 miles apiece—as will be seen later, number 106 is thought to have amassed the highest mileage at 1 202 906 miles over 37 years.

### L.M.S. Boiler Records

A valuable primary source of information on Caley locomotives are the Locomotive Boiler Repair sheets which are available for inspection at The Scottish Record Office, Edinburgh having been deposited there by the late Alan Dunbar, the first President of the Caledonian Railway Association. In the case of the Class 104 the boilers were classified N16 by the L.M.S. and

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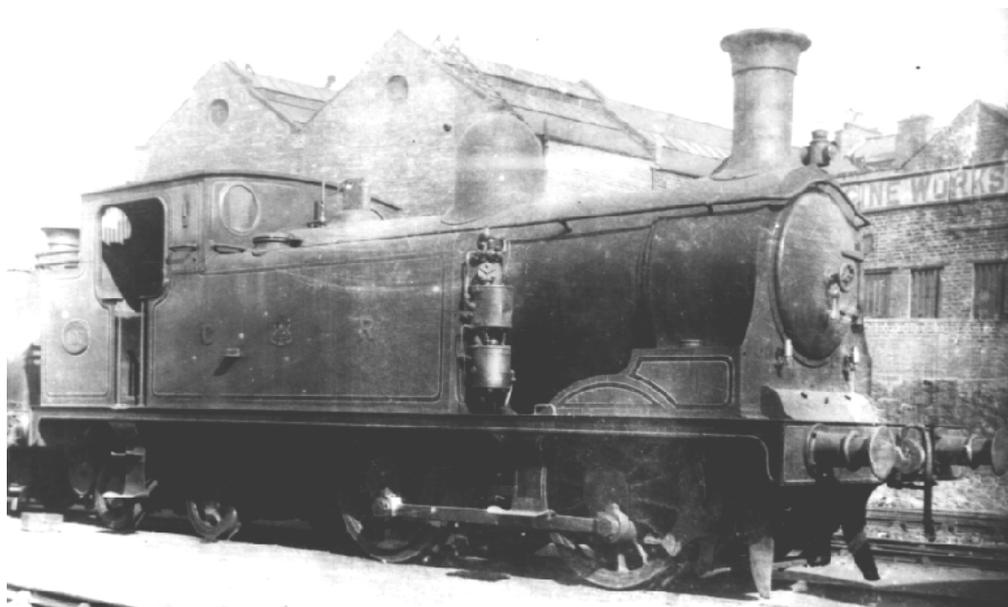
## Numbering and Allocation

No.	Date to service	L.M.S.		Allocation.		Withdrawn
		No.	New	c1921	c1933	
104	3/1899	15147	Polmadie	Balornock	—	8/1929
105	3/1899	15148	Polmadie	Polmadie	—	8/1931
106	3/1899	15149	Dalry Road	Dalry Road	Dalry Road?	5/1936
107	3/1899	15150	Dalry Road	Dalry Road	Dalry Road	8/1935
108	3/1899	15151	Dalry Road	Dalry Road	Dalry Road	6/1937
109	3/1899	15152	Dalry Road	Dalry Road	Dalry Road	10/1934
110	4/1899	15153	Polmadie	Polmadie	Polmadie	3/1938
111	4/1899	15154	Polmadie	Polmadie	—	7/1930
167	4/1899	15155	Dalry Road	Dalry Road	Dalry Road	10/1935
168	4/1899	15156	Dalry Road	Dalry Road	Dalry Road	3/1937
169	4/1899	15157	Dalry Road	Dalry Road	Dalry Road	12/1934
170	6/1899	15158	Dalry Road	Dalry Road	Dalry Road	10/1935

Loco #	Boiler #	Date Built	Date Record Started	Mileage at Card Start	Date Scrapped	Mileage when Scrapped
104	? 544	No card found				
105	? 545	No card found				
106	546	1899	02/06/30	1067890	16/05/36	<u>1202906</u>
107	547	1899	08/09/30	913936	07/09/35	<u>1044597</u>
108	548	1899	16/02/29	808463	23/04/33	920600
	935 <sup>1</sup>	1906	31/03/33 <sup>2</sup>	—	10/07/37	<u>81606</u> <sup>3</sup>
						<u>1002206</u>
109	549	1899	02/04/30	736009	03/11/34	<u>855139</u>
110	550	1899	24/05/30	753653	24/02/34	850671
	1267 <sup>4</sup>	1912	02/02/34 <sup>5</sup>	—	16/04/38	<u>122969</u> <sup>6</sup>
						<u>973640</u>
111	? 551	No card found				
167	? 552	No card found				
	1114	1909 <sup>7</sup>	13/05/32	730216	02/11/35	<u>807824</u> <sup>8</sup>
168	553	1899	21/09/29	891258	20/03/37	<u>1045541</u>
169	554	1899	09/04/30	926878	29/12/34	<u>1007250</u>
170	555	1899	22/06/29	707189	02/11/35	<u>845487</u>

Notes :-

- 1 Boiler number 935 was built in 1906 and previously fitted to locomotive number 450, a Class 439 0-4-4T of 1900 built to order Y64. The recorded mileage of the boiler was 725430 when taken off number 450 on 14/02/33 and put to stock.
- 2 Date fitted to locomotive number 108 having been retubed at a cost of £19. Firebox also partly recaulked at this time, cost £21.
- 3 Mileage while on locomotive number 108.
- 4 Boiler number 1267 was built in 1912 and previously fitted to locomotive number 17003 (variously number 705, 253 and 1253 in Caley days), a Class 670 0-4-2 of 1881 built by Dübs & Co. and reboilered in 1912. The recorded mileage of the boiler was 24682 when taken off number 17003 on 29/12/32 and put to stock.
- 5 Date fitted to locomotive number 110 having been retubed at a cost of £40. A half box of firebox copper stays were also set up at this time, cost £2.
- 6 Mileage while on locomotive number 110.
- 7 Date of fitting to and mileage on locomotive number 167 are unknown.
- 8 Boiler mileage.



Number 106 "at home" at Dalry Road Shed in CR days.

HMRS V8036

## Locomotive Dimensions

Height above rail :	
Chimney	: 12'10 <sup>3</sup> / <sub>16</sub> "
Boiler centre line	: 7'3"
Width over :	
Running plate	: 8'6"
Cab sides	: 7'9"
Length over buffers	: 31'7 <sup>1</sup> / <sub>4</sub> "
Total weight in working order	: 51T 2 <sup>1</sup> / <sub>2</sub> cwt.
Total adhesive weight in working order	: 32T 0cwt.
Tractive effort (@ 85% WP)	: 16 376lb.
Water capacity	: 1 000 gallons
Coal capacity	: 2 <sup>1</sup> / <sub>4</sub> T
Frames and motion :	
Frame length	: 28'6"
Frame thickness	: 1"
Coupled wheelbase	: 7'6"
Bogie wheelbase	: 5'0"
Total wheelbase	: 20'6"
Driving wheel diameter	: 4'6", 14 spoke
Crankpin stroke	: 18"
Crankpin arrangement	: In line with spoke
Bogie wheel diameter	: 2'6", 8 spoke
Cylinder size	: 17" by 24"
Cylinder centres	: 2'4 <sup>1</sup> / <sub>2</sub> "
Port length	: 15"
Steam port breadth	: 1 <sup>3</sup> / <sub>8</sub> "
Exhaust port breadth	: 3"
Connecting rod length	: 6'6"
Eccentric length	: 4'7"
Driving journal length	: 7 <sup>1</sup> / <sub>2</sub> "
Driving journal diameter	: 8"
Boiler :	
Max. external diameter	: 4'4 <sup>1</sup> / <sub>8</sub> "
Length between tubeplates	: 10'4"
Tubes	
Diameter	: 1 <sup>3</sup> / <sub>4</sub> "
Number	: 206
Outer firebox casing length	: 5'5"
Depth of firebox below boiler centre line	
Front	: 5'6"
Rear	: 5'0"
Working pressure	: 150 lb.in <sup>-2</sup>
Heating surface :	
Tubes	: 975 feet <sup>2</sup>
Firebox	: 110.9 feet <sup>2</sup>
Total	: 1 085.9 feet <sup>2</sup>
Grate area	: 17 feet <sup>2</sup>



15155 at Dalry Road in post-1928 “St. Rollox” style livery.

Author’s collection

the relevant SRO references are GD344/4/35, GD344/4/36 and GD344/4/37. This type of boiler was also fitted to Class 7820-6-0Ts of batches Y42, 52 53 and 55 and to Class 439 0-4-4Ts of batches Y59, 60, 61 and 64. (Later batches of each class had boilers with a modified tube arrangement and a slightly higher working pressure.) Some McIntosh rebuilds of the Brittain designed Class 670 0-4-2s also acquired this type of boiler.

The cards start at various dates between 1929 and 1932 (see table) and probably represent the date of the first major overhaul by the L.M.S. when the old Caley records would be copied to the new company’s standard form (of Midland origin?). Cards for locomotives 104, 105 and 111 appear not to exist and, given their relatively early withdrawal, this probably implies they were never given a major overhaul by their new owners. The lack of the Caley records also complicates the picture for locomotive number 167 which had obviously been reboilered probably in C.R. days and certainly before the introduction of the L.M.S. format record card. No deductions can therefore be made as to the mileage amassed by locomotives 104, 105, 111 and 167.

It is worth noting that visibly riveted smokebox wrappers began to appear around the same time as these overhauls. Although accurately dated

photographs are scarce, it seems reasonable to assume that the locomotives acquired this feature during the overhaul—it was no doubt cheaper if less aesthetically pleasing than the flush riveting of the Caley.

### Livery

In C.R. days these locomotives would have carried the full blue passenger livery. This was likely to be Prussian blue prior to 1906 and Ultramarine (or perhaps just a slightly lighter shade of the Prussian blue—there is some controversy over this point) afterwards although the change would not have happened overnight—as with any change of livery policy the old and new styles would coexist for several years. Lining, consisting of a black band  $1\frac{3}{8}$ " wide edged either side by a white line  $\frac{3}{16}$ " wide, was applied to the tank/cab/bunker sides (lined as one unit since they were flush), tank fronts, cab front, splasher sides and sandboxes (lined as two units even though they were flush!), bunker rear, gangway doors, Westinghouse pump and boiler bands (note that the width of the black band effectively meant the bands were painted black and edged with a white line). The cab roof, smokebox, chimney and bunker interior were all painted black. Polished parts included the smokebox door hinges, handle and wheel, the

whistle, handrails and cab spectacles although it was not uncommon for individual crews to polish other parts such as the edges of the wing plates. The buffer beams, valance and step brackets (but not the steps themselves which were black) were painted crimson lake and lined white inside black. The buffer housings were also painted crimson lake with a band of standard lining near the front end. The upper half of the cab interior was painted a creamy yellow colour and the lower half black.

The outside of the frames were painted black with vermilion used for the insides. The motion plate, and axles were also vermilion. The bosses, spokes and rims of the wheels were painted blue to match the superstructure and sometimes, after 1919, white lined tyres were to be seen.

A vermilion panel, edged with white, was applied to the front buffer beam between the buffers and the letters C.R. (with a square full stop between them) appeared on this panel to the left of the hook and the number to the right in gilt with a red shading below and to the left. The number also appeared in gilt (shaded red) on the centre of the bunker rear. The crest was

applied to the tank sides flanked by the letters C and R. The number plate was carried on the bunker side and surrounded on the bunker panel by a black border which was edged with a white line to the outside. These number plates were of the "McIntosh" style which was a cast brass oval plate 18" by 11½" with raised figures, lettering and border. The background of these plates could be blue or red (which seems to have disappeared by 1922) with some sources also listing black as a possibility.

The plates were lettered as shown in the sketch below. The height of the locomotive number was 3⅞".



Works plates were not originally carried by these engines as the information was incorporated in the number plate however the L.M.S. affixed small oval works plates with raised lettering which were fitted either on the lower bunker sides (including 15150/152/155/157) or on the



Pristine 15151 at Dalry Road in conventional post-1928 livery. Note the lamp-irons with a cut-out in the steam chest cover to clear the centre one and visibly riveted smokebox. Smokebox door embellishments were common in the days of "one man, one engine".  
 Author's collection.

front splasher (including 15149/151/153/154). These were rather anachronistically lettered as illustrated below with the third row being the year of building—i.e. many a year before the formation of the L.M.S. !



After the demise of the Caley all the locomotives would have firstly been painted in L.M.S. crimson lake and then, following a policy change in 1927, most of them would be repainted in black. In both cases lining would be carried.

In the first L.M.S. livery the entire superstructure of the locomotive was painted crimson lake with the exception of the smokebox, footplate and splasher tops and cab roof which were all black and the buffer beams and shanks which were vermilion. Lining was yellow with black edging and was applied to the tank / cab / bunker sides (again as one unit), tank fronts, cab front, splasher sides / sandboxes (lined as one unit this time), bunker rear, gangway doors, boiler bands, Westinghouse pump, footplate valance and buffer beams. Below the running plate everything was painted black. The locomotive number was carried in large gold leaf figures on the tank side with the L.M.S. crest carried on the bunker side above the works plate. Smokebox number plates were normally carried at this time.

After the policy change, these locomotives no longer qualified for the crimson lake livery (it being reserved for the large “top link” express passenger engines) and they became lined black. The lining was now a single red line, generally where there had previously been a yellow one but this is difficult to corroborate as photographic emulsions of the day were not very sensitive to red light and it is usually difficult to detect lining on photographs of engines in this livery. It can only be presumed it was there since it should have been there and St. Rollox normally went by the book in such things. Two basic styles of insignia could be observed which are now generally referred to as “conventional” and “St. Rollox”. The conventional style placed the loco number on the bunker side with the initials L M S on the tank side at about 30" centres while the St. Rollox style continued to place the number on the tank side with the company initials on

the bunker side. This style is said to have come about after a directive to use up stocks of old transfers—St. Rollox must have had quite a lot in stock for this was a common livery for tank engines shopped there at this time. Smokebox numberplates were officially dispensed with at this time and the “1P” power classification mark began to appear in 2¼" figures just below the cab-side lamp bracket.

Confirmed liveries include :-

Pre-1928 (both lined Crimson Lake)

18" figures, L.M.S. coat of arms

15148/151/155/158

14" figures, L.M.S. coat of arms

15147/150/151/154

Post-1927 (all lined black)

18" Midland style figures, St. Rollox insignia

15153/155

Black shaded gold insignia, 12" figures, conventional insignia

15150/156

Black shaded gold insignia, 14" Midland style figures, conventional insignia

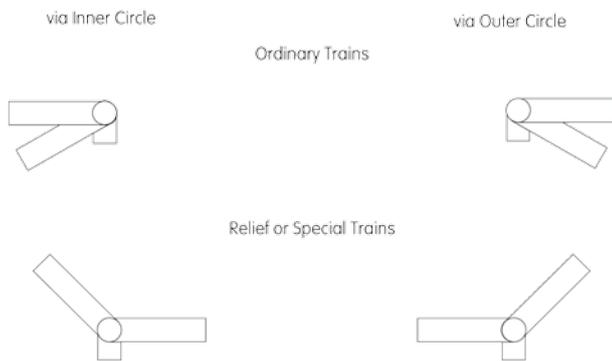
15149/152/153/157/158



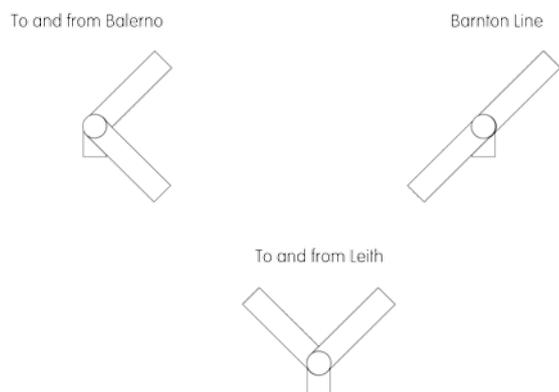
A driver surveys his charge at Glasgow Central Station in 1935. Note the Cathcart Outer Circle route indicator.

Lacy Collection/HMRS L3574

Glasgow Central to and from Cathcart



Edinburgh Princes Street and the Edinburgh Branches



## Semaphore Route Indicators

All engines working passenger trains to and from both Glasgow Central and Edinburgh Princes Street carried a semaphore route indicator. In Caley days this was perforce carried either on the lamp-iron in front of the chimney or at the centre of the bunker coal rails, depending on the which end of the engine was leading, but the L.M.S. General Appendix to the Working Time Tables, Northern Division of 1937 differs. This states that engines working passenger trains must carry the indicator on the lamp-iron at the centre of the buffer beam and light engines going either Central or Princes Street stations must carry the indicator appropriate to the train they are going to work in front of the funnel (or on the end of the bunker if working bunker first.) In reality train engines are known to have carried their indicator on any of the lower three lamp-irons but it is not clear if there was a set pattern to this.

The sketches above (which are not to scale) illustrate the indicators relevant to the 104 Class—that is, the Cathcart Circle and the Edinburgh branches. There were many others (including

ones for routes to and from the ex-Glasgow and South Western station at Glasgow St. Enoch in L.M.S. days) but they are outwith our present scope.

## Drawings

Two 4mm scale drawings of the locomotives accompany these notes, one showing the class as built which was scaled from a copy of the St. Rollox works drawing number 9645. The other depicts various modifications which have largely been derived from photographs. The modifications can be summarised as follows :-

- 1) Rear window guard bars—almost certainly fitted in C.R. days to prevent coal smashing the glass,
- 2) Steam heating pipes—again these would be an early fitting but is difficult to judge from photographs as the flexible hoses were always removed during the summer months when the heating was not in use (and most photographs taken ?). In L.M.S. days, the flexible hoses were taken of by June 17th and sent to the works for overhaul. They had to be refitted by September 1st.
- 3) Lubricators—many engines acquired a more bulbous pattern of lubricator. No dates can be given but they certainly began to appear in C.R. days.
- 4) Lamp-irons—these are to the standard L.M.S. pattern and would be fitted soon after the grouping to bring the locomotives into line with their new owner's standards. (The Caley relied on the cab-side lamp-irons, normally reserving the single lamp-iron front and rear for the semaphore route indicator.)
- 5) Vacuum piping and ejector—the L.M.S. adopted the vacuum brake system as a standard over the Caley's (superior) Westinghouse air-brake system and thus fitted the engines with the necessary equipment. The arrangement drawn seems to have been fairly standard on this class but a photograph is your best guide if you wish to accurately model a particular locomotive—one known deviation concerns locomotive number 15150 (107) where the footplate pipe ran

in front of the cab-steps and not cranked to pass behind them as drawn. This locomotive also differed from the norm in that its vacuum ejector pipe passed into the cab below the cab-front handrail rather than above as was usual (the arrangement which is shown in the drawing) : was it perhaps fitted with its vacuum gear somewhere other than St. Rollox ?

Note that the tank fillers have been omitted from the front elevation of the modifications drawing in order to show where the vacuum ejector pipe passed into the cab and the cab-front handrails. These handrails were present from new.

- 6) Visibly riveted smokebox wrapper—this feature appears to date from the late 1920s/early 1930s and is most likely to be associated with each loco's first major overhaul by the L.M.S. (See section on L.M.S. Boiler Records.)
- 7) Ross-pop safety valves—a rare fitting on this class and currently only locomotive number 15156 (168) is confirmed as having carried them. The date of fitting is unknown.

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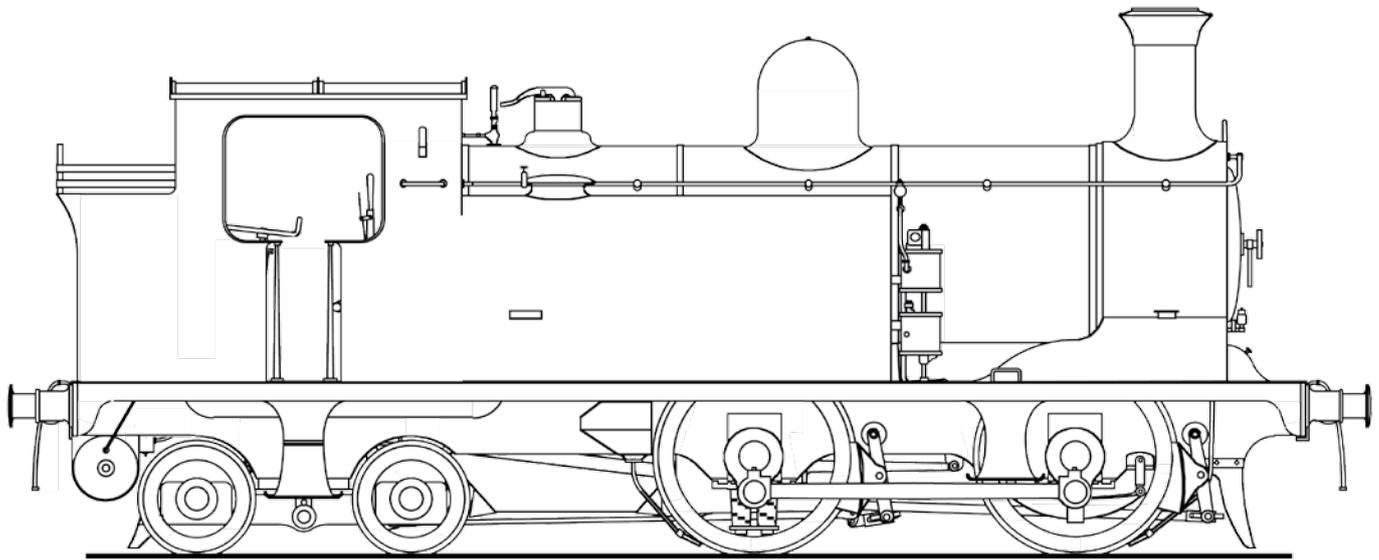
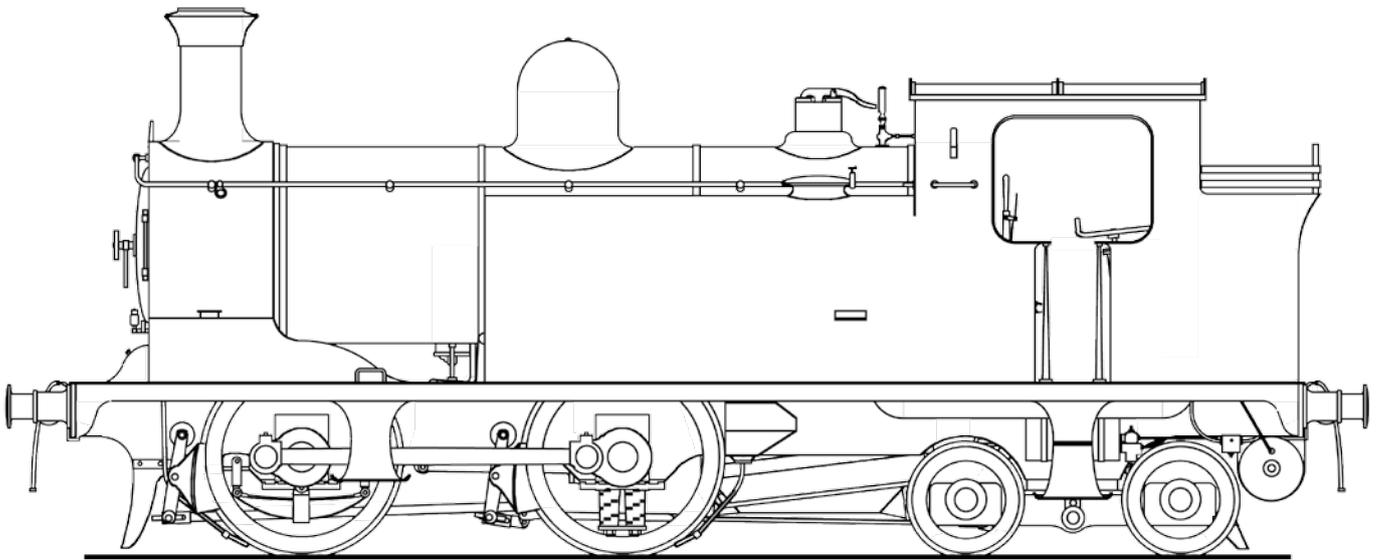
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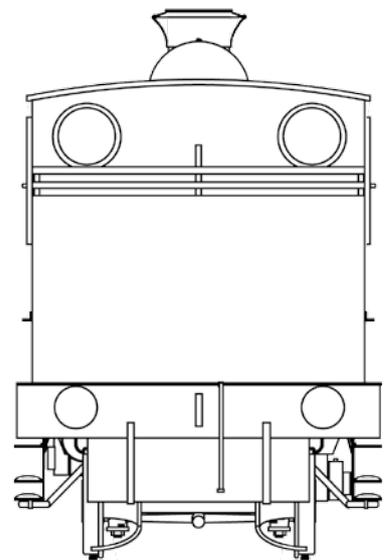
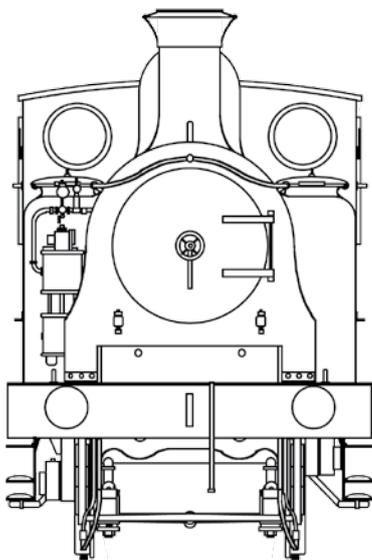
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Caledonian Railway Class 104 0-4-4T Locomotive

as built



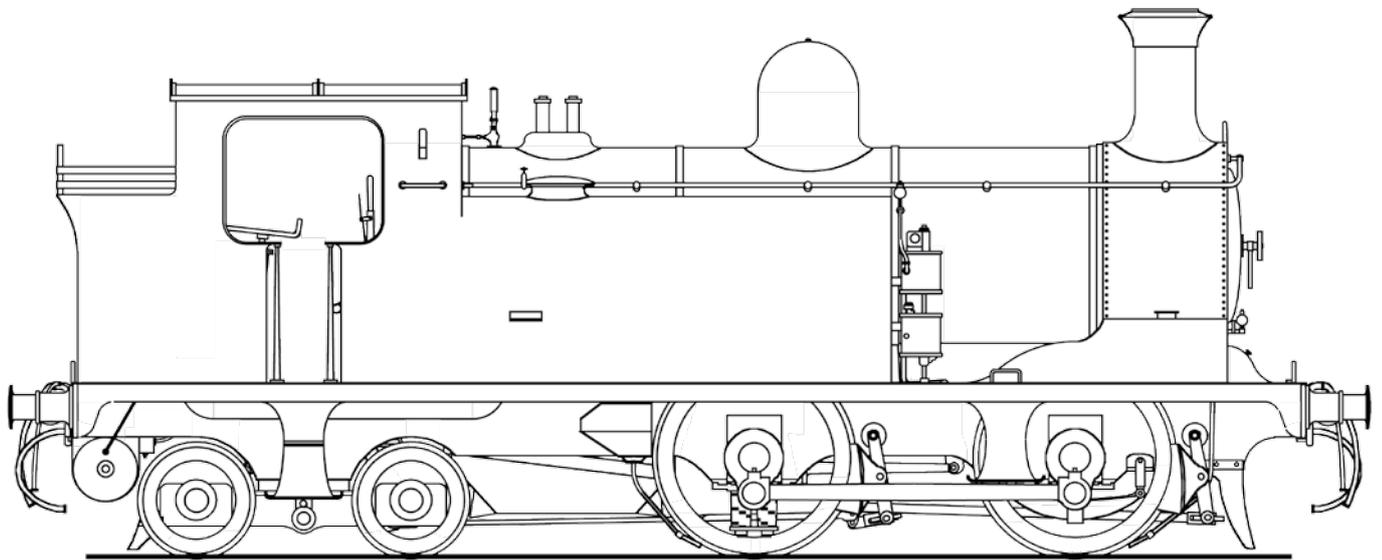
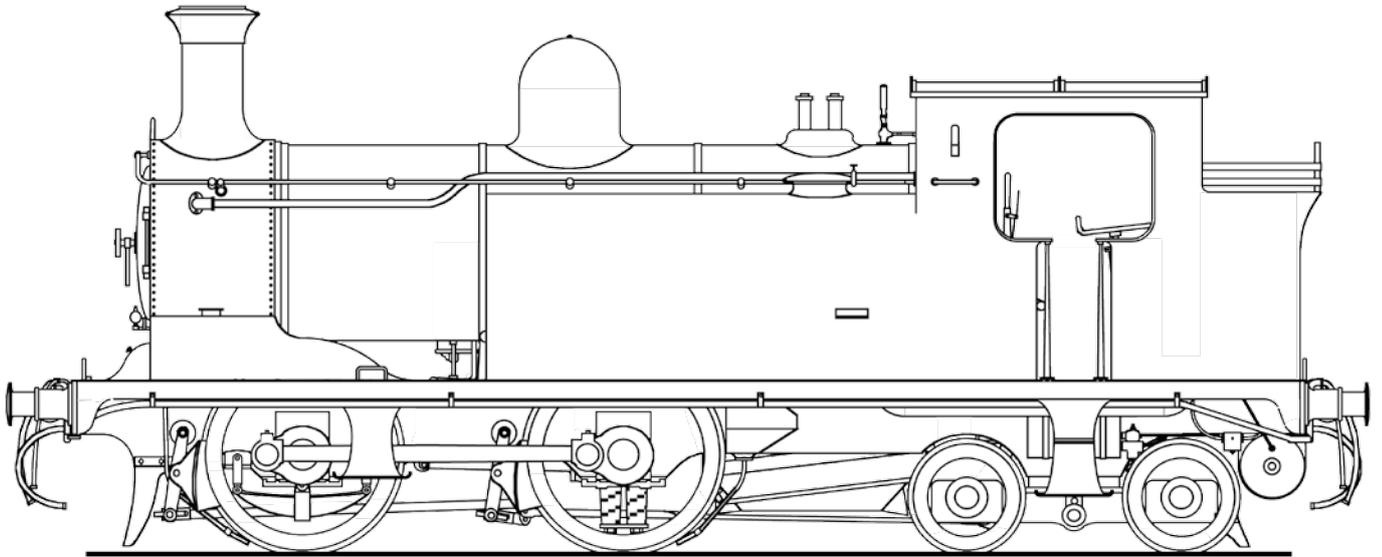
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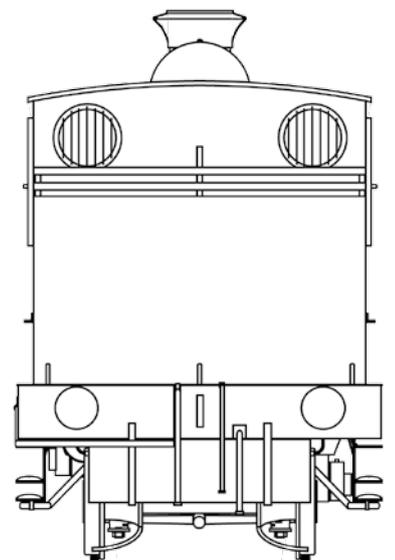
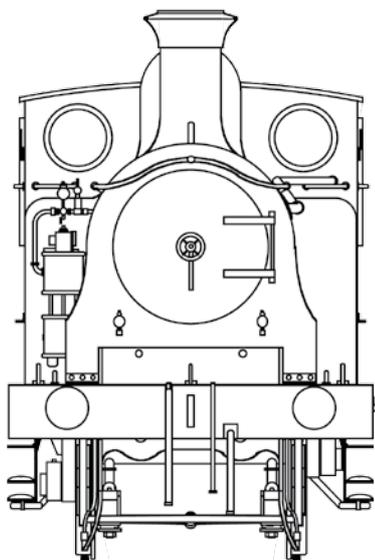
*Jim Smellie, July 1991.*

# Caledonian Railway Class 104 0-4-4T Locomotive

showing known modifications



10'



*Jim Smellie, July 1991.*