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Restoration of a Caledonian Engine

This document was written by Dr, John Sayer and was originally published by Worthing and District SME in their newsletter in the Spring of 2011.

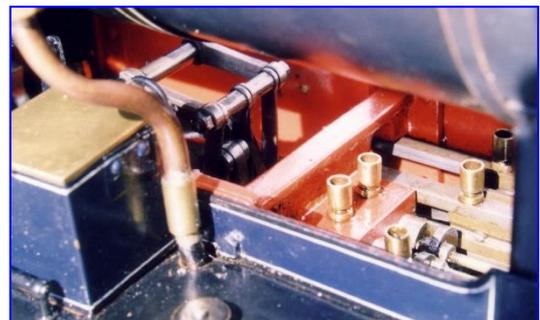
I bought this engine at an Auction in 1996. It is a 3½" gauge 4-4-0 with bogie tender, numbered 902 thus, it



must represent a Dunalastair III, one of a series designed by Mr J.F. McIntosh, which started work in December 1899. The model was not correct as it had a Dunalastair IV cab front and a drive to the mechanical lubricator from the right-hand leading crankpin, as added to the real engine much later by Mr W. Pickersgill. The cab roof was missing but the coal-fired boiler, fittings and valve gear were all present and of a high standard of workmanship. The livery was not correct as it was a hybrid, light and dark blue. The number plate gave the name of the builder and the date 1925. The engine had clearly been steamed in the past.

Through the Auction house I contacted the vendor. His grandfather was the builder named on the number plate. He had also rebuilt the engine in 1956 as shown on another date plate mounted on the base of the smoke box. The grandfather had been a toolmaker by trade and had run the engine on a short straight track in his garden. The vendor had been given rides by the engine when a boy many years ago. Unfortunately, he could give no information about any drawings that his grandfather must have used.

Searching through the *Model Engineer* for 1925, I found an article in the January issue which included a photograph of a Mr Phelps, posed behind a fine model Dunalastair that he had built. The model appeared to be of a size consistent with ¾" to the foot scale. Mr Phelps indicated that he had used a series of articles and drawings from the *Model Engineer* for 1901, called "*How to build a Model Caledonian Railway Express Locomotive Dunalastair III*". I obtained Volumes 4 and 5 for 1901 and found the articles written by a Mr E.L.Pearce. From the drawing and details given, it was clear that my 902 had been constructed from them. The drawings and the model engine followed the prototype closely when checked against reproductions of the original drawings given in contemporary issues of "*The Locomotive Magazine*" (1900), and In "*The Caledonian Dunalastairs*" by O.S.Nock. Alternative paraffin-fired water-tube and coal-fired firebox-type boilers were shown. On the Editor's page of the "*Model Engineer*" of June 1st 1901, Messer Drake & Co, of Bradford were quoted as selling "five sets of Dunalastair model locomotive castings per week".



A close-up photo taken to illustrate the beautiful workmanship of the original

Mr Pearce was mentioned several times in the *Model Engineer* for 1901 as an active member of the Society of Model and Experimental Engineers in connection with locomotives and high voltage electrical experiments. I have not been able to find any other 3½" gauge steam locomotive design by him, but would be interested if any reader can tell me of one.

A fellow-member of Worthing and District Society of Model Engineers drew my attention to articles by LBSC in the *Model Engineer* for 22nd August and 5th and 26th September 1940. He described re-building an engine closely similar to mine (judging from the photographs), scrapping its original paraffin-fired water-tube boiler and replacing it with his own design of coal-fired locomotive boiler. Further useful information came out in the later articles relating to the possible origin of this particular engine and the inclusion in it of castings possibly by Messers Carsons.

Turning from the Library to the Workshop, the gauge of the engine wheels was found to be 3 ¹⁷/₃₂", exactly to scale for ¾" to 1 foot. Our Club track is exactly 3½" gauge, so the flanges would have to be thinned down by 1/32" each for the engine to run satisfactorily.

Although the frames were set in at the front end to scale dimension, as on the prototype, there was very little room for the bogie to swing. Fortunately, the tender wheels were gauged for 3½" track and there was plenty of room for that bogie to swing. The driving wheel flanges were turned down and the bogie wheel flanges thinned to give an extra 1/16" in the back-to-back measurement. Several hexagon-headed bolts in the frames behind the bogie wheels were replaced with countersunk ones. These changes allowed the engine to run on the curves of our club track quite freely.

On dismantling the boiler, I found that no superheater had been fitted, although there was one large central fire tube, perhaps provided for fitting a superheater if needed. Clearly the whole design was for intermittent short straight runs, rather than curved and heavily-graded continuous ones. No axle-driven pump was possible but an injector and a double-acting tender hand pump were present. There were no brakes on the engine or tender. Happily, the boiler passed its hydraulic test and can still carry its original 90 lb/sq.in. steam pressure.

Brakes on the four driving wheels have now been fitted, worked by two steam cylinders under the footplate. Tender handbrakes (fully compensated) have been added together with an axle-driven water feed pump worked by an eccentric on the leading axle of the rear tender bogie.

The cab front has been rebuilt with round windows and a correctly-curved cab roof fitted with a removable panel for access to the controls. I made a hooter to LBSC's design and installed it under the footplate. It works, but is not really loud enough. A branch pipe from this hooter's steam supply leads to a dummy Caledonian Railway hooter mounted in front of the cab.

A new drive to the mechanical lubricator has been fitted, working by links from the RH crosshead as shown on prototype drawings. New tender-mounted cab doors with latches were made, again following the prototype. Much other work was needed to restore minor damage and to improve the general appearance of the engine and tender, before re-painting in Prussian blue with full lining out.

First runs in steam revealed severe slipping on starting and hill-climbing, and poor steaming. These problems were overcome by installing a 4½ lbs lead floor to the cab, dry sanding gear (LBSC) to the leading driving wheels (now removed), and adjusting the blower and blast pipe orifices.

No. 902 now pulls her 13½ stone driver round the sharp curves and steep gradients of the Worthing track quite well, if carefully fired and driven. This restoration and improvement of an eighty-six-year-old model of an historic prototype has given great pleasure, not least by re-tracing the history of the model itself and by appreciating the design of the original engine which led to its achievements on the Caledonian main line between Glasgow and Carlisle, over Beattock summit.