



Robert the Bruce

A freelance conversion

In present-day modelling culture the word 'freelance' is often frowned upon because it is associated with sloppy model work and unlikely model design. This is of course the old discussion that keeps cropping up regularly, with the contemporary modelling market offering so many excellent scale kits that there really is no reason to throw together your own model from several unlikely sources. Or is there? I find the process of designing a locomotive from parts that weren't meant to go together, and arriving at a likely-looking model, quite relaxing and a welcome change from the constraints of scale work. The critics will pounce on this to prove the superior value of scale work and probably they are quite right, but I mix freelance and scale models on my layout unashamedly and I think they go together without any problem.



Two giants at Rae Bridge shed...



Robert the Bruce at the coaling stage.

Unlikely materials

Some years ago at the 009 Society sales stand I purchased a battered Arnold N gauge 2-6-4 tank loco of German outline dating from the 1960s. These mechanisms are very strongly built however, and despite its tatty condition it still ran quite nicely apart from a bit of noise. I intended to use it for a Campbelltown 0-6-2, but on measuring up I found that its coupled wheelbase was far too great and in addition it was rod-coupled which meant it couldn't be fitted with dummy outside cranks and rods. So the mechanism lay around for some time. Until I had a look at a Triang TT Jinty body sent to me by Mick Thornton that was probably older than the Arnold chassis itself.

Over a rainy weekend in December I took the plunge and put the Arnold loco to the saw, intending to convert the Jinty to a tough 0-6-4 goods tank to augment the CDR's 'big engine' roster, something like the C&L 'King Edward'. I intended to use the Arnold body as a starting point to fit the Triang shell to, as this results in the strongest possible construction. The narrowness of the Triang boiler meant that the entire forward section of the Arnold body had to be removed. Part of the Arnold cab and bunker top were sawn off and a slot was cut into the Triang bunker rear to accommodate a bulge in the Arnold body containing the motor's rear bearing. This was later covered with a thin sheet of styrene. The TT scale cab was removed from the Triang shell and replaced by parts of an old Airfix (Dapol) 'Pug' kit, and I added a brass chimney from the scrapbox and a plastic dome made from the handle of a throwaway paint brush. The chimney had been filed out to about 3.5mm, enabling a smoke unit to be inserted.



How it all started. The Arnold loco as obtained, and the Triang body slightly modified.



The assembled loco in works grey at Loch na Cailliche.

When test fitting the Triang body to the remnants of the Arnold loco it became clear that separating the bunker portion from the front part of the Triang body would enable the entire chassis to be moved rearwards for about 7mm, thus providing more space inside the boiler to add ballast. I also found that the incomplete model with the pilot truck attached had very pleasing lines reminiscent of a large-wheeled suburban passenger tank, so I decided to change to a 2-6-4 concept. I can hear the scale brigade muttering about this change of theme, but being able to follow up an attractive idea is one of the advantages in freelance modelling. The loco would be very tall but no taller than the Dundas W&L (Sierra Leone) Hunslet I have. So I epoxied the Triang parts to the cut-down Arnold shell, taking care to keep them square. When all had set however I noticed that I made an error, fitting the bunker 2mm lower than the tanks! Epoxy being what it is, I decided to opt for camouflaging tactics rather than trying to break up the assembly.

Technical problems

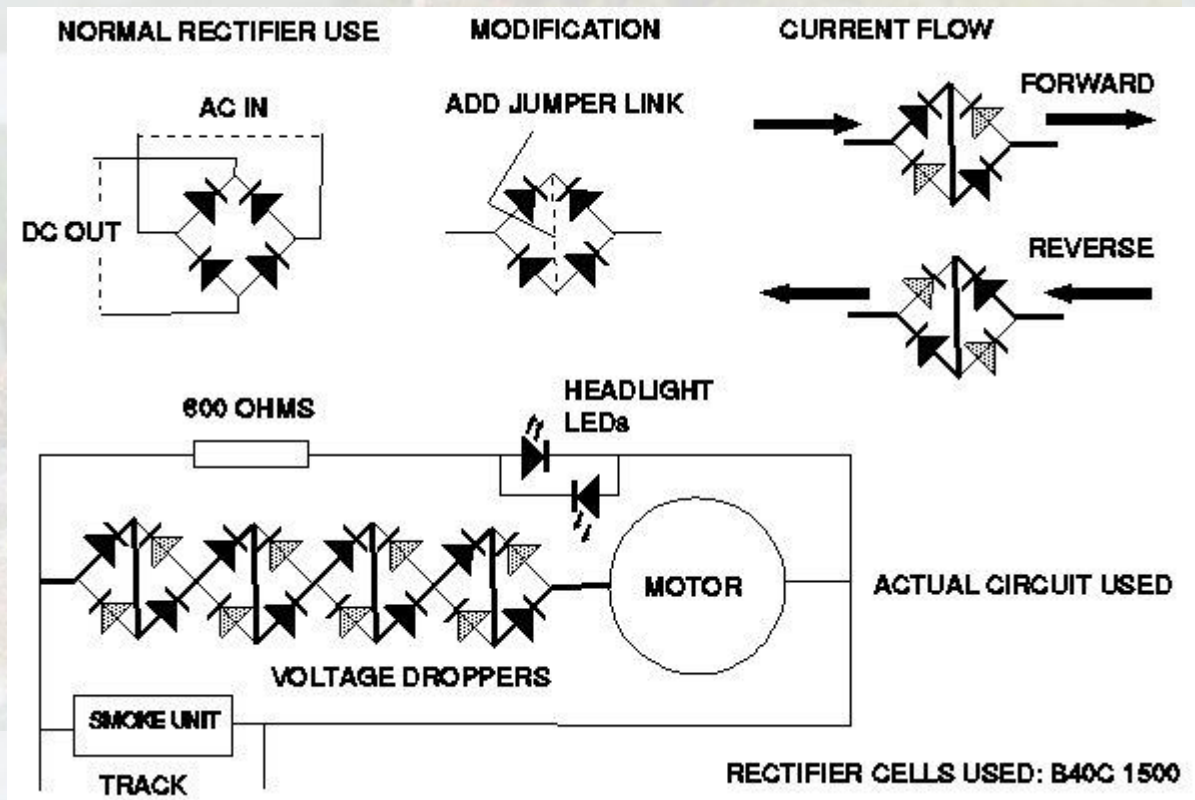
By this time I was not surprised by the appearance of a major balancing problem. The entire front end of the metal Arnold shell had been removed, and with most of the plastic Triang body aft as well and the motor in the bunker the loco tipped aft. So I set to adding sheet lead ballast inside the boiler over the front drivers, leaving a space in the smokebox for the smoke unit. In addition I added a few sheets of lead to the chassis over the pilot truck. This increased the weight on the front drivers to 30g compared to 80g on the rear drivers, which clearly wasn't enough. So I decided to extend the tanks, using the sawn-off part of the metal Arnold tanks, filled solid with lead. This increased the weight up front with another 10g, following which the loco ran quite sweetly. Having less weight on the rod-coupled front drivers means less crankpin wear as well.

Then extensive road trials were conducted which proved that the chassis still wasn't all right: its old-fashioned flanges were too deep to negotiate the Peco 009 points without stalling. The problem seemed to be mainly the rear drivers, as the other wheels showed signs of having been turned down at an earlier stage. Without access to an instrument lathe I took rather drastic measures not to be recommended for a modern nylon-g geared chassis. I wired up the motor, clamped the chassis in a vice, oiled the coarse metal gears liberally, put on the juice and put the file to the rear driver flanges to take off about 0.1 to 0.2mm, rounding off the flange profile in the end. The result was remarkable: the loco now took all pointwork without hesitation.

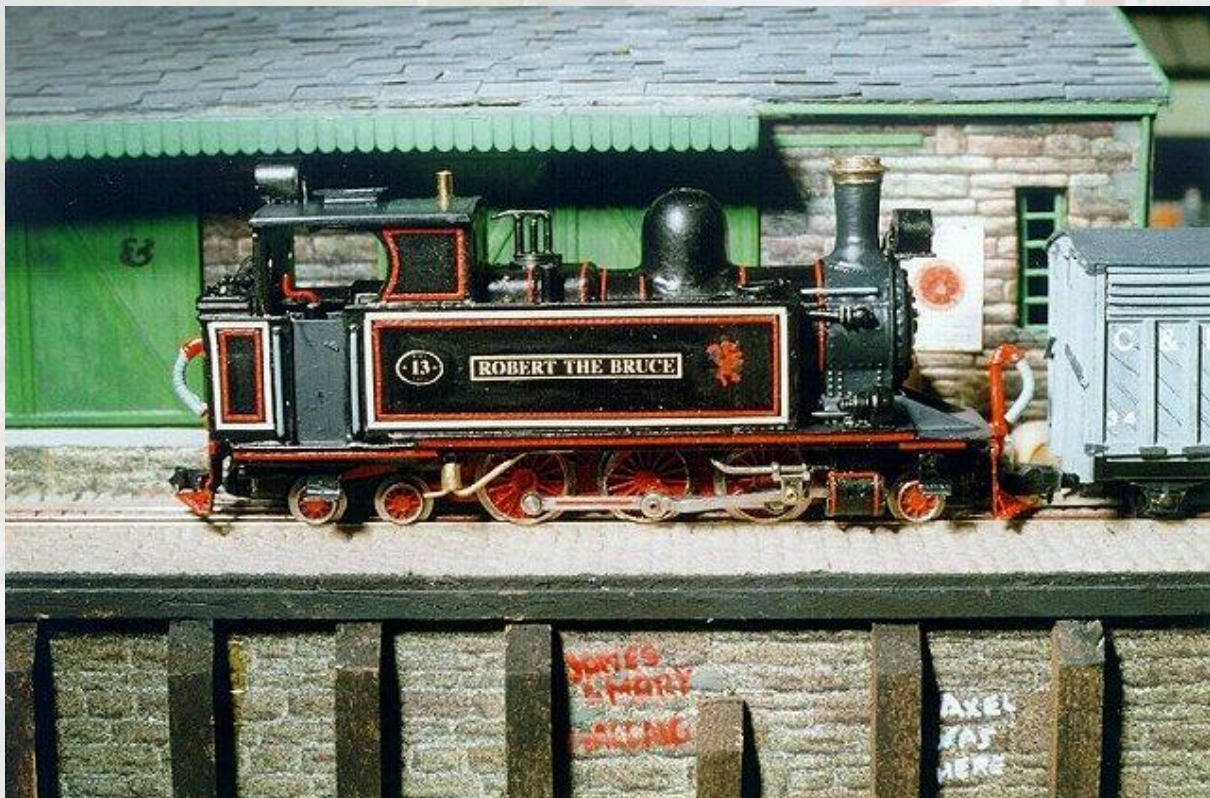


The chassis, showing the mounting of the cowcatchers on the bogie and pilot truck. The row of black objects in front of the motor is three of the rectifier cells soldered together. Note the contact spring to power the smoke unit.

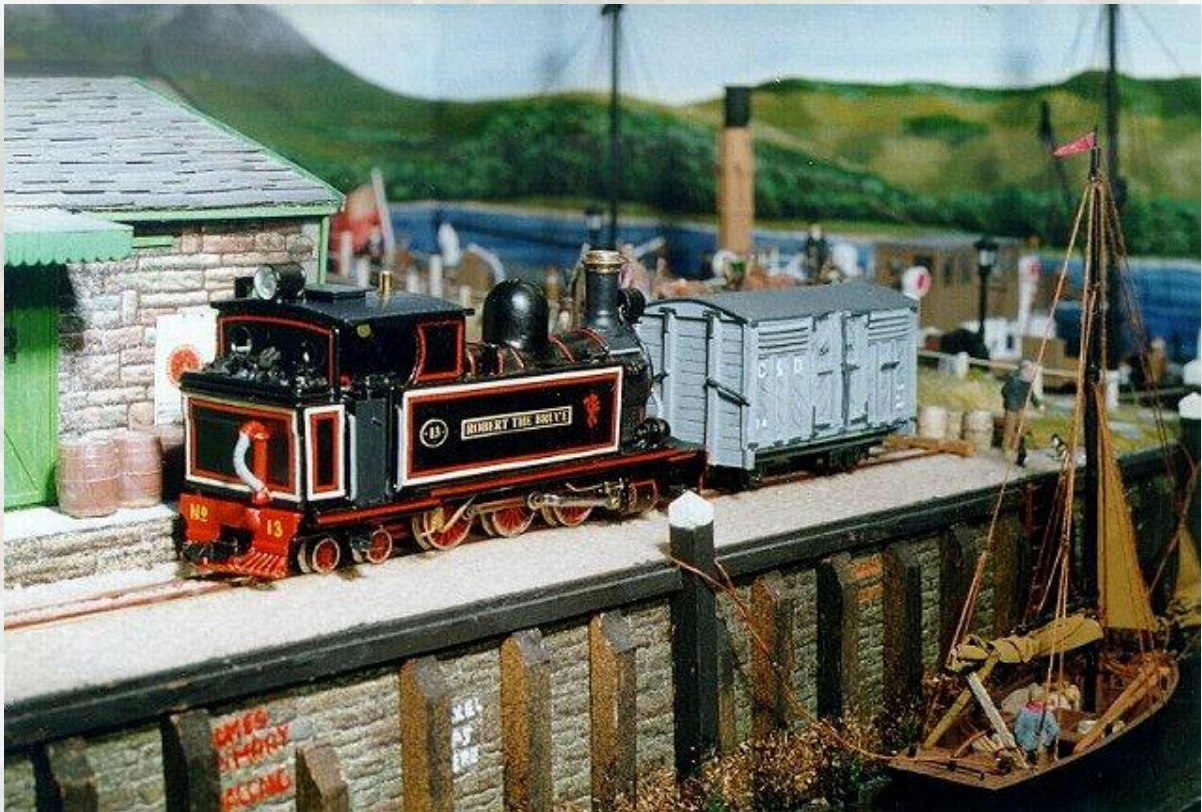
The smoke unit and LED headlights were fitted and connected using springs bearing on a contact plate on the chassis. As usual I supposed the motor could be wired in series with diodes to slow the model down for the smoke unit to be effective. Here another serious problem arose: the loco proved to run at scale speeds at no more than 3 volts whereas the smoke unit didn't start work until 8 or 10 volts were reached. At about 0.7 volt voltage drop for each diode I would need no less than 8 of them each way, meaning 16 diodes to be fitted in the loco, which despite the considerable space available proved impossible. Until I came across a small integrated bridge rectifier cell (coded B40C1500 or B80C1500) suitable for about 1.5 amps. If these are wired up in a specific way you end up with two diodes in the circuit whatever way the current flows (see diagram). With a lot of filing I managed to cut down the rectifier housings far enough to squeeze in four of these, wiring up the loco as shown in the diagram. Initially the circuit floated around the transmission between the motor and the worm, which is of the clutch type, causing a racket and sometimes even fouling the transmission. Further filing increased the free space around the moving parts, enabling the diode circuit to be set against both inside walls of the body, centering it and leaving the moving parts free.



Now the loco sits motionless with the LED headlight on until about 6 volts are reached, it is perfectly controllable from a crawl to about 100mph which obviously isn't needed, and the smoke unit comes on at slightly above scale speed on the flat, which means it will work uphill on heavy trains. More smoke can only be achieved with HF booster circuits which may cause the neighbours to complain when their TV set goes on the blink.



State portrait on the quay at Dunalistair.



Rear view of the loco doing some dockside shunting at Dunalistair.

Completing the loco

New cab side sheets were added and waist level doors meant to camouflage the remains of the Arnold body visible inside. A plastic front footplate was added, and various gaps filled with successive applications of superglue and sanded smooth. Then I experimented at fitting two etched-brass Langley cowcatchers on the front truck and the bogie, the result of which I liked so much that I left them in place. Cowcatchers should be fitted to the main frames and buffer beam, of course, but that would mean the bogie-mounted couplings would need far too wide a slot to move sideways (do I hear someone muttering about scale curves?). I always fit them to the bogie, cutting away the centre bars only to accommodate the coupling. This means that the cowcatcher and buffer beam move sideways on curves, but I would rather accept that than having to mutilate the cowcatcher. In addition, if only to satisfy the scale buffs, soldering the cowcatchers together proved good experience for my next project which is a Backwoods Miniatures Campbeltown 0-6-2!

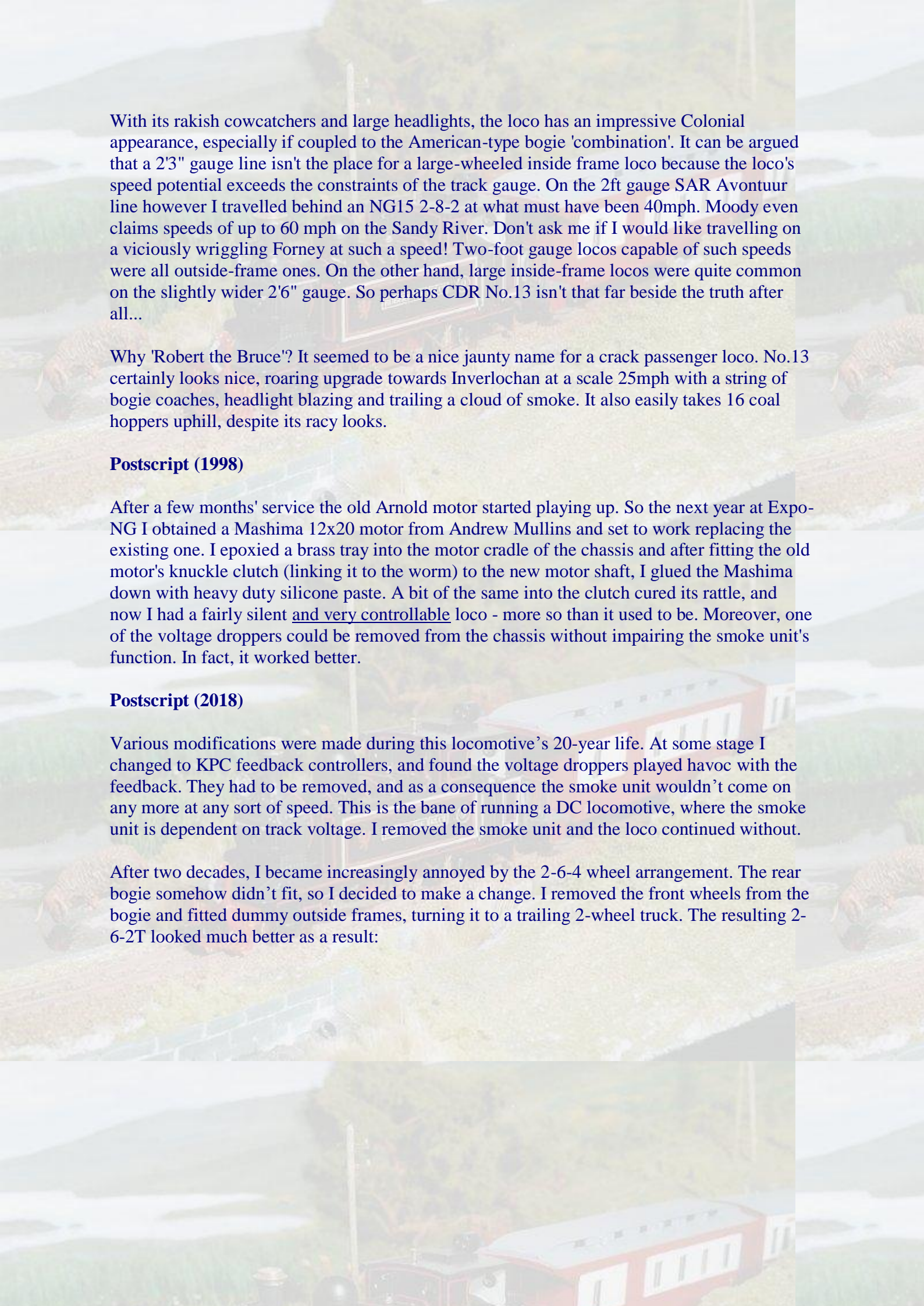
Final detailing included a scratchbuilt plastic generator on the footplate, a whitmetal blower pipe, tank filler covers, safety valve and vacuum pipes. Injectors were made from scrap brass and handrails from staples. The model was degreased with alcohol, primed with a whiff of car body matt grey and then painted eggshell black, with red buffer beams and cowcatchers, and an anthracite black smokebox. The white and red lining was applied using Mick Thornton's method of narrow strips cut from tracing paper painted beforehand, and a coat of eggshell varnish completed the paintwork. Name and number plates were made on the computer and scaled down on yellow paper using a photocopier.



On the turntable the loco shows its massive front end and Colonial looks.



The completed loco crossing Inverlochan Moor. Note the effectiveness of Mick Thornton's lining method.



With its rakish cowcatchers and large headlights, the loco has an impressive Colonial appearance, especially if coupled to the American-type bogie 'combination'. It can be argued that a 2'3" gauge line isn't the place for a large-wheeled inside frame loco because the loco's speed potential exceeds the constraints of the track gauge. On the 2ft gauge SAR Avontuur line however I travelled behind an NG15 2-8-2 at what must have been 40mph. Moody even claims speeds of up to 60 mph on the Sandy River. Don't ask me if I would like travelling on a viciously wriggling Forney at such a speed! Two-foot gauge locos capable of such speeds were all outside-frame ones. On the other hand, large inside-frame locos were quite common on the slightly wider 2'6" gauge. So perhaps CDR No.13 isn't that far beside the truth after all...

Why 'Robert the Bruce'? It seemed to be a nice jaunty name for a crack passenger loco. No.13 certainly looks nice, roaring upgrade towards Inverlochan at a scale 25mph with a string of bogie coaches, headlight blazing and trailing a cloud of smoke. It also easily takes 16 coal hoppers uphill, despite its racy looks.

Postscript (1998)

After a few months' service the old Arnold motor started playing up. So the next year at Expo-NG I obtained a Mashima 12x20 motor from Andrew Mullins and set to work replacing the existing one. I epoxied a brass tray into the motor cradle of the chassis and after fitting the old motor's knuckle clutch (linking it to the worm) to the new motor shaft, I glued the Mashima down with heavy duty silicone paste. A bit of the same into the clutch cured its rattle, and now I had a fairly silent and very controllable loco - more so than it used to be. Moreover, one of the voltage droppers could be removed from the chassis without impairing the smoke unit's function. In fact, it worked better.

Postscript (2018)

Various modifications were made during this locomotive's 20-year life. At some stage I changed to KPC feedback controllers, and found the voltage droppers played havoc with the feedback. They had to be removed, and as a consequence the smoke unit wouldn't come on any more at any sort of speed. This is the bane of running a DC locomotive, where the smoke unit is dependent on track voltage. I removed the smoke unit and the loco continued without.

After two decades, I became increasingly annoyed by the 2-6-4 wheel arrangement. The rear bogie somehow didn't fit, so I decided to make a change. I removed the front wheels from the bogie and fitted dummy outside frames, turning it to a trailing 2-wheel truck. The resulting 2-6-2T looked much better as a result:

