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Vacuum hoses

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Nearly all the railways in this country used the automatic vacuum brake on passenger trains and only four of the main English companies (LBSCR, LCDR, GER & NER) and a couple north of the border opted for the air brake. Towards the latter part of the 19th century when continuous brakes were developed, and then made mandatory, a method of connecting the engine to the carriages was required for supplying the energy for brakes and the signal to apply them. The options available were broadly to use mechanical, fluid or electrical means.

The chain brake quickly revealed the limitations of mechanical couplings between vehicles and as electricity was not sufficiently developed at the time the solution was to be found in some sort of pressurised fluid. Air was the obvious choice as it was freely available and did not freeze, so compressed air supplied from a steam driven pump on the engine could be piped to the train via flexible coupled hoses and it would apply the brakes on each vehicle by pushing against a piston. The American company Westinghouse offered a well-designed system that was not only continuous (operating on all vehicles when applied) but also automatic (applying automatically if pressure was lost, e.g. a divided train).

In this country another method was developed, still using air, but in this alternative instead of the piston being pushed by high pressure it had a partial vacuum on one side and was pushed by air at atmospheric pressure acting on the opposite face. This became the vacuum brake that was used almost universally on our railways during the era of steam locomotives. At first glance these systems appear to be more or less the same thing but in reality, there are fairly big differences. The air brake operates at about 60 psi and needs a pump on each engine together with some quite complicated components on each carriage. In the case of the vacuum brake with full atmospheric pressure being about 15 psi a partial vacuum only gives a difference of about 10 psi or less to act on the piston, so large volumes of low pressure air are involved. On the other hand, the engineering of the basic vacuum system is much simpler (and therefore cheaper) and a steam locomotive can easily create a vacuum using an ejector, a really simple device with no moving parts.

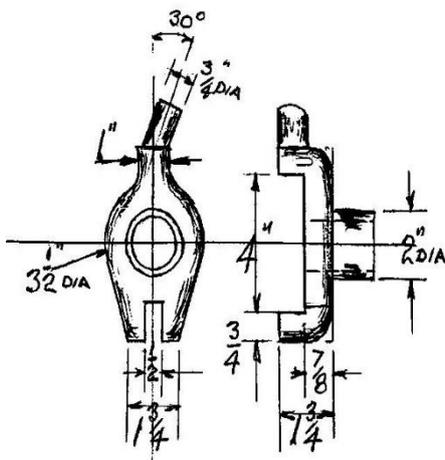
Each company was confronted with the expenditure of equipping several hundred passenger engines and thousands of carriages with Westinghouse or vacuum brake equipment and in almost all cases business sense prevailed and they rejected better engineering in favour of the "value for money" vacuum brake. Of course, the systems were completely incompatible but at least the Brighton and Chatham were only regional railways whose trains did not wander far, and through trains from other railways were dealt with by equipping a few engines with dual systems. However, the LNER rather suffered as although the GER was regional the main route to the North was a different matter and both types of brake were in use on it. As usual the GWR did its own thing and in this case, it re-engineered the vacuum system to use a bigger vacuum (25 in. Hg instead of 21 in. Hg) thereby acquiring improved braking without much additional expense, fortunately this was not incompatible with others but when another company's engine took over from a GW locomotive the higher vacuum had to be destroyed on each vehicle by "pulling the strings" on the relief valves before recreating the usual 21". This variation persisted into the Western Region of BR.

On most railways the engines themselves continued to be fitted with steam brakes worked by a valve in combination with the vacuum brake control. When not working a fitted train the driver could economise by shutting off the ejector and applying the steam brake directly. The GWR and LNWR used vacuum brakes on

large engines, and so my Claughton was built this way. It worked quite well and provided a bit of fun pulling up on vacuum but in the end, I became tired of dismantling and unsticking non-return valves on engine and tender after each winter lay-up, and the equipment is now just an adornment.

Irrespective of its brakes, any model of a vacuum fitted engine needs front and back hoses to look the part. I purchased a very nice set of working hoses and couplings although as each company tended to have its own shape of standpipe and swan neck, I had to modify them to suit. Unfortunately brake hoses are located in a position where they are easily damaged, so when I recently got round to fitting out the Midland Compound, I decided to try something different. The engine and tender are steam braked so I saw no need to put in vacuum components or working hoses. Furthermore, Derby had the strange custom of mounting a rather tall standpipe and long kinked hose way up on the platform where they are very visible (so needing to look right) but also very vulnerable to knocks, so I decided to make dummy pipes and hoses. A look at a few drawings convinced me that the O/D of the hose was $2\frac{1}{2}$ " , with strengthening ribs at about $\frac{7}{16}$ " pitch.

VACUUM HOSE CONNECTOR



Now although the ribs are actually parallel (not spiral) I reckoned that a suitable screw thread might not look wrong and I tried a bit of M6 with the sharp crests turned down a few thous. The pitch of 1mm is almost spot-on the scale 26 tpi so things looked quite good when painted matt black. In order to copy the rather distinctive "kink" of the real MR hose I drilled a 3mm hole up a couple of inches of 6mm copper rod, threaded it and annealed it dead soft so as to shape it without a struggle. I found that the really fiddly bits were the actual connectors, each hose carries one at the outer end and another one is need for the "dolly" at the base of the standpipe to fit the hose when not in use. It just comes down to silver soldering a small lug on to a piece of 18g brass sheet followed by lots of filing. The shape is a disk of about $\frac{5}{16}$ in. diameter with

two projecting bits opposite each other. One bit is a rectangular extension carrying a lug on one side of centreline and a slot on the other side of c/l to receive the mating lug when coupled up. Diametrically opposite there is a round wire-like pigtail bent forwards which "links arms" with its opposite number when done up. The standpipe, swan neck, hose and connectors are soft soldered together to form a fairly solid structure, which I hope will stand a few knocks.



The orientation of the connectors is important: when viewed from the side; two coupled hoses have the "pig tails" below and when they have been engaged the connectors are pushed together so that the lugs on top pass through the slots then held by a split pin on a chain. When on the dolly the "pigtails" are uppermost. Keep yourself entertained seeing how many incorrect versions you can spot on models.