The Final Solution: 12/4 Hot Spot Tubes

Gordon McAllan

The 1935 Falcon's engine fired promptly and ran so very sweetly, but demonstrated the need to attend to the considerable water leaks from both sides of the block - indications, I divined, of perished hot spot tubes.

Off came both the inlet and exhaust sides of the engine: Zenith carburettor and inlet manifold, and the exhaust manifold (all standard parts on this so-original Riley motor). It was immediately evident that in the outer hot spot tubes, or at least the lowest of them, lay the problem. These tubes (outer and inner: the inner ones can easily be removed from their manifolds, by gentle twisting: the holes in the exhaust manifold can then be sealed) were part of a system of carburettor pre-heating introduced in many Golden Age Riley engines, intended both to promote easy starting and to obviate carburettor icing. The innermost tubes conducted warm gases from the exhaust manifold through the upper section of the block and the cylinder head to the inlet manifold and carburettor(s) on the driver's side; in so doing, they passed through the outer tubes, which were a force-fit in the block and were themselves were surrounded by the warm water of the water jacket. Therein lay the Falcon's problem, one well-recognised by Riley Register and RM owners over the years: when the coolant eventually corrodes these outer steel tubes, water leaks from the cooling system and washes down the exterior of the crankcase, on both sides.

The comprehensive advice from SRE friends was clear: yes, it was possible to replace the old tubes with new but, especially with modern run-hotter fuel, the pre-heating system was unnecessary (indeed, if you have a Riley from that era, it may well have lost its tubes many years ago, perhaps even before you acquired it. When opportunity presents, it may be wise to check whether the job has been done, in what manner and whether it is satisfactory, after time). Practical solutions varied, but spoke of either driving a plug of suitable diameter into each of the open ends of the tubes (ie the two tubes in the block; it was considered that their larger-bore counterpart in the cylinder head would be most unlikely to warrant attention), or of endeavouring to remove them, a task which, I was advised, might be pretty wretched, thanks to corrosion, and difficult of access, with the engine still in the car. Nonetheless, since I do not have a lathe, and could not spend time shuttling back and forth to one with turned-down plugs on a try-fit basis, I decided upon the latter course, not least because the tubes on this Falcon seemed to have ends different from those of colleagues' experience. I reasoned that it would be better, however awkward and tedious the job, to effect a permanent repair (though a purist could easily remove the plugs and reverse the operation, if desired, at some time in the car's future).

On the N/S of the block, both tubes appeared to have plain flanged ends; these, I discovered, were in fact threaded washers, spun on to the tubes and fitted with thin copper washers, to seal the tube ends to the block. On the opposite (driver's) side of the engine, sitting in a shallow niche in the crankcase casting, the tubes were finished off with similar washers, this time with 4 rim notches, a form of castellation clearly intended to accommodate the pegs of a bespoke socket tool. This washer/flange must have been intended to draw each tube through the block and to apply sealing pressure. Therefore, if I wanted to remove the tubes, here was the starting point - but would anything "give", after all these years?

To my surprise (and relief!), a fairly gentle tap with hammer and small cold chisel caused first one and then the other notched washer to turn. They and their copper washers were off in a trice. Phew! One of the draw-washers bore traces of a wrench around its rim, suggesting either that Riley did not bother with a socket tool or that these tubes had already been replaced at some stage. I gave each protruding tube end a desultory tap, but they wouldn't budge.

If I simply battered away, I would peen over the tubes and make their release impossible. I decided to grind each end carefully, as far as I could, to the register on the block (and no further - the case is 3/8" thick cast iron and throughout this job, I was near-petrified as to the risk of cracking it. Cast iron is strong, but can shatter without warning.). I then tried knocking the tubes through with a large Allen-headed bolt, sleeved in plastic tubing to centralise it, as the drift. Nothing doing.

Drawing upon my experience of fitting starter gear rings (flywheel in the family freezer overnight, despite protests from the distaff side, and gear ring in the hottest-possible oven - thank you, AGA: you never dreamt of that one!), I chose what I hoped would be subtlety. A supply of 22mm Acorn plastic piping was cut into 6" lengths, one end of each sealed with gaffer tape; the pipes were filled with water and then popped into the freezer. When ready, each ice core was to be slid out after its plastic pipe had been warmed briefly under the hot tap, and eased into the offending hot spot tubes. Would this work?

It certainly did! The block's upper tube drove out almost immediately. The lower one, later found, as expected, to be the more badly corroded and the source of the leak, proved tenacious, however. I resorted to firing WD40 into the water jacket (the lower tube, red with corrosion, is easily visible within), as well as on to the ground-off tube ends, in an effort to un-weld the tube from its rusty surroundings, and came back the following day for another go. If that failed, I would try heating the block around the tube ends (the actual press-fit block-to-tube surface being only 3/8" at each end, of course) with an electric paint stripper (I do not have oxy-acetylene gear and did not want to scorch the engine, anyway) and then doing the ice trick as rapidly as possible.

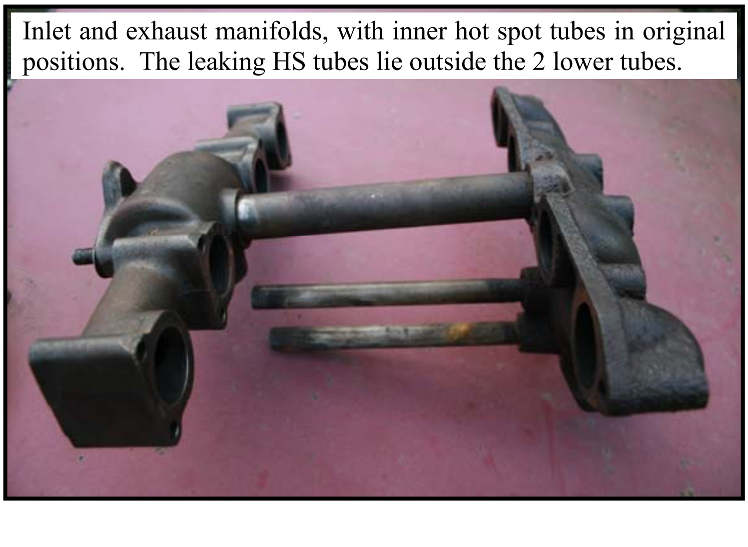
In fact, one further "cold" application of the "ice poles" was all that was necessary. Once it began to move, the lower tube was wriggled out without further difficulty. Success!

A Birmingham firm, **Prestision**, supplied a set of four 1" stainless steel cup-type core plugs. I had heard of quite new mild steel plugs failing prematurely on pre war and post war engines and was not going to take that chance. Geoff Quinney, the Boss, was most helpful. Prestision can be contacted at Unit 16, St Andrews Industrial Estate, Sydney Road, Small Heath, Birmingham B94 Q13. By telephone 0121 772 4414; website www.prestision.co.uk

The four 1-inch O/D stainless steel cup-type core plugs arrived promptly and it was a short task to clean the hot spot tube holes in the block, smear them with gasket sealant just in case, and tap the plugs carefully into place. It is essential to drive each squarely, to prevent distortion and possible subsequent water leakage - after all, the object of this whole operation is to stop leaks! A short length of dowel or hand-tapered wood is ideal for this purpose, initially, though I found that an unworn, level-headed hammer, used lightly but firmly, made the final ¼ - inch of insertion a positive and "clean" job. No hamfisting, mind!

As a precaution, in order to ensure removal of any debris released within the water jacket of the block by my exertions, I backflushed the block with the garden hose at full pressure. I suspect that I released more muck than I had freed during my work! While I was at it, I also took the opportunity to backflush the radiator. Filling and running the engine with Radflush or similar may help further to ensure the best-available service from the thermosyphon cooling system, whose narrower reaches may well have "furred up", over the 70 years or so. Then it was time for the final filling of the system with 50% anti-freeze coolant and a check on all hoses - and those core plugs. Not a drop, thank goodness.

The job was completed completed by re-assembly of the manifolds, after the 3 holes in the exhaust manifold had been plugged. This Falcon will never again have weak hot spot tubes, or leaks where they used to be.



Inlet and exhaust manifolds, with inner hot spot tubes in original positions. The leaking HS tubes lie outside the 2 lower tubes.

The exhaust manifold,inverted, showing the 2 lower inner tubes in place; the upper inner tube has been removed. All 3 holes must be plugged, gas-tight.

RH (driver's) side of block, looking under carburettor to ends of hot spot tubes, after removal of cast alloy elbow from manifold.

LH side, after removal of exhaust manifold, showing hot spot tube ends - flanged, on this car, with plain threaded washers.

RH (driver's) side of block, after removal of inlet manifold. On this car, the flanged ends on this side are notched for a socket.

LH side of block, showing the upper of the two lower hot spot tubes being withdrawn, still with threaded and copper washers.

The lower hot spot tubes, removed. Both are seriously corroded and the bottom tube is badly perforated, allowing coolant to leak from the water jacket. The threaded washers which form flanges at each end are evident, the RH side being notched for a socket tool. Thin copper washers have been fitted to complete the seal between tube and block at each end. These particular tubes may not be typical: flanges are not always fitted, but the tube principle is consistent. New tubes are available, but were not used in this method.

LH side of the block, after fitting of 1-inch stainless steel cup-type core plugs, to seal the holes in the casing left by removal of the hot spot tubes. The result is neat and effective. Full leak-free coolant circulation in the water jacket is restored. Both inlet and exhaust manifolds can now be refitted, the latter sealed where its inner hot spot tubes used to be located. The cooling system, block and radiator, must be flushed - preferably backflushed - before being filled with 50% anti-freeze for all-year motoring.