



The majority of these tips have appeared in club newsletters over the years. Please note that you use them at your own risk as neither the Bristol Austin 7 Club nor the authors can be responsible for the results of trying to follow the instructions given.

### Engine cooling system - water branch - blockage problem - Jim Blacklock

I read with great interest the article by Ian Brough, in the PWA7C December Newsletter, about the blocking up of Austin 7 water jackets, by a build-up of white powder, especially in the area of the side water manifold. The photos of Ian's blocked water jacket were truly horrific – made more so by the colourful antifreeze and rust staining of the aluminium oxide. However, it did prompt me to write about my thinking about this problem, which I hope fellow Austineers will find of some interest and possibly useful.

For many years, I worked in the oil and gas drilling industry, around the world, and spent quite a bit of my time on various types of offshore platforms, in various oceans. One thing that all of these structures had in common were big blocks of aluminium fixed to the steel legs - either jacking up the drilling platforms or hammered into the seabed to support the production platforms. These aluminium blocks prevent rusting of the steel structures, by providing Cathodic Protection, which is a technique used to control the corrosion of steel and iron surfaces in contact with the sea, by making it the cathode of an electrochemical cell. This simple method of protection connects the metal to be protected (i.e. the ferrous steel structure) to a more easily corrodible sacrificial metal (i.e. the blocks of aluminium, as can be seen in the photo), to act as the anode and the sea acts as the electrolyte, thus making a simple electrical cell (just like a car battery). The sacrificial metal then corrodes instead of the protected ferrous metals. When aluminium corrodes (or oxidises), as a result of this electrical action, it forms a white powder that will not dissolve in water – in the offshore platform scenario that is not a problem, as the aluminium oxide powder is washed away by the sea.

In the Austin 7 engine cooling system, this same situation has been created, in that we have the aluminium water inlet and outlet branches (anodes) bolted to the side of the cast iron engine block and the cast iron cylinder head (cathodes), plus the water in the cooling jacket (which acts as a simple electrolyte solution,

bearing in mind that even rain water these days tends to be acidic), so we have a simple electric cell. Again the white insoluble aluminium oxide is formed in the engine cooling system water, but as there is no way of flushing it away (because the Austin 7 cooling system works on the thermo-siphon cycle – i.e. there is no water pump), so it builds up over time in the engine water jacket and clogs it up. At the same time, the inside surfaces of the water branches corrode away. (Here are a couple of photos of an example engine, which were taken in October 2020 – in the upper photo you can see that the side inlet water branch was so badly affected by aluminium oxidisation, which has eaten its way through to the outer surface and it just crumbled away as it was removed! The lower photo shows the build-up of aluminium oxide powder, in the cylinder block water jacket, stained with rust and antifreeze.) Thus we end up with overheating Austin 7 engines, which will have to be stripped down, the aluminium oxide powder removed chemically (such as by a hot caustic acid bath, as mentioned in the Austin 7 article in the December 2020 issue of Practical Classics), and the engine rebuilt with new water branches and all the other costs and time that are involved.



I had been thinking about how to resolve this problem, for a number of years. Then when my Austin 7 Arrow engine needed rebuilding (after the front main bearing lip broke), it rather prompted me to get serious about considering the

problem. The solution that I came to in the end was to realise that in order to stop the electrolytic action happening, all we need to do would be to “break” the electrical circuit. My initial idea was to just paint the aluminium water branches all over, with some heavy duty enamel paint.

But when I was discussing my thinking about this problem with Ian Tillman, of Oxfordshire Sevens, he immediately suggested using powder coating on the aluminium water branches. Apparently, Ian has years of experience with powder coating (is there no end to his talents when it comes to improving our humble Austin 7?) and he told me that as well as providing an electrical insulator, it is the longest lasting, and most colour-durable quality of finishes available on virtually any type of metal; that powder coated surfaces are more resistant to chipping, scratching, fading, and wearing than other finishes; that it can withstand temperatures up to 550OC, so the Austin 7 engine environment would not be a problem. So we think that we have found the solution to stop the Austin 7 engine water jacket becoming blocked up with aluminium oxide, leading to overheating, which can result in further expensive repair bills.





Ian and Oxfordshire Sevens is now producing kits of powder coated water branches, in a matt aluminium colour, as shown in these photos, (though you can order them in any colour you want – for instance yellow!!!!!!).

For the earlier engine (1923-36) it is the JBIT-001 Kit

For the later engine (1936-39) it is the JBIT-002 Kit.