REAR AXLE OIL LEAKS AND RELATED ISSUES

I have been a Bristol devotee for many years, having owned a 408 Mk II previously. However, upon taking early retirement from the motor industry after over thirty years, where I had been employed as a development engineer, I decided to buy another Bristol as a retirement present to myself.

Eventually, I found and viewed a 408MkII in Ipswich, it was in good condition, and the chassis and bodywork had been overhauled. The power unit and gearbox had been similarly reworked. I decided that although I hankered after a 411, this 408 was too good to pass up, so we agreed a price and drove the car home a couple of weeks later.

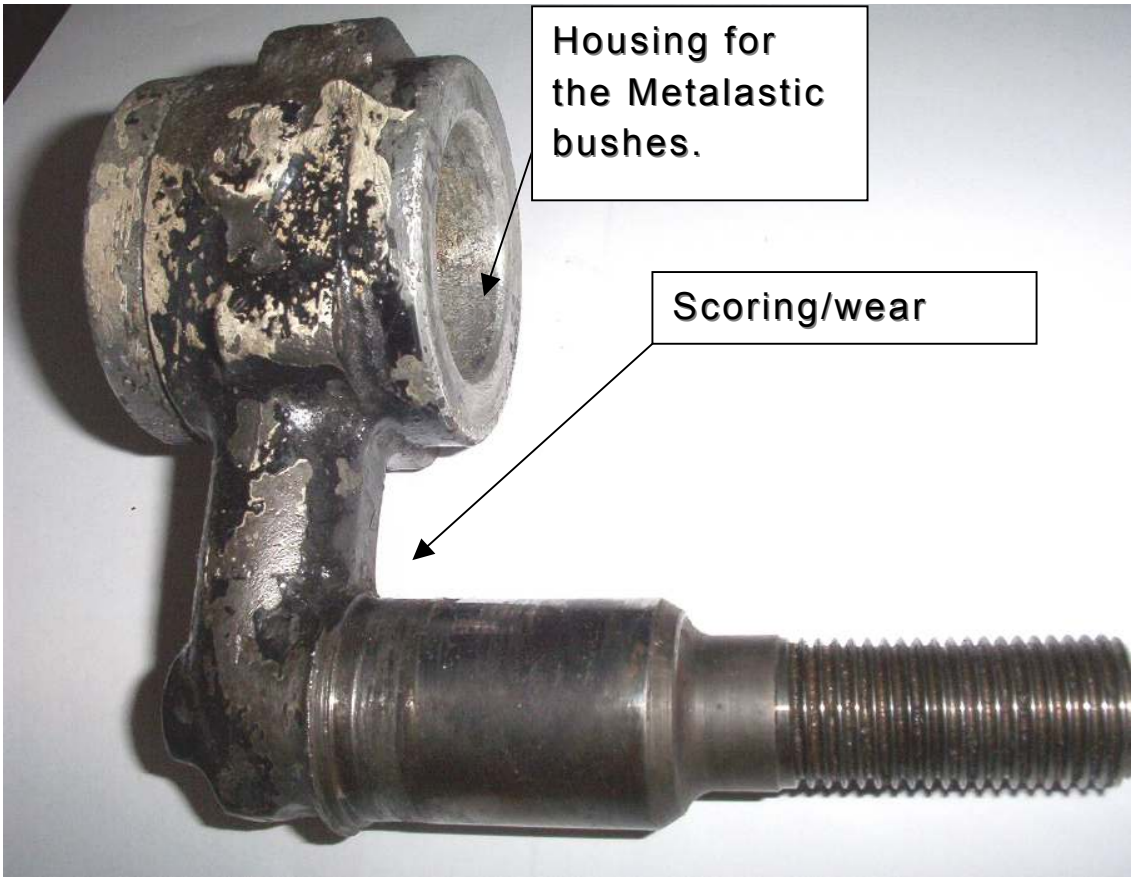
It was used it at weekends for about six months, and then one September morning, I backed the car out of the garage, and noticed hypoid oil on the floor. After it had been exhibited at the local steam fair, I inspected the axle assembly the following weekend, and found that oil was indeed coming from the swivel shaft oil seals. I removed the axle from the vehicle, and after taking the oil seals out, realised a new bush was required for the RH side, as the brass lip was missing on one side of the periphery. These items were very promptly supplied from BCL Parts Department. After re-assembly, and a road test, all appeared to be OK. However, a short time later, the leak re-appeared on the LH side. So, off came the axle once more, and a detailed examination of the shafts, bushes and seals was made.

The original swivel shaft had a slight taper, with corresponding dimensions on the inside of the brass bush. This I believe, was designed to force a snug oil seal fit on to the shaft when the axle was installed in its correctly aligned position. The LH swivel shaft had wear marks at the point of fit, and the bush had an eccentric internal diameter. The RH shaft was OK, as was the new bush and seal. I decided that a fresh approach was required, to engineer a modern oil seal into the bush caps.

No information as to why the drop arm shaft was tapered could be found, as there was no reference to it during my deliberations. However, modifying the dimensions was pondered for a while, as it could affect the alignment and stability of the axle under suspension loading, whilst the car was being cornered for example. Eventually, I decided to have the shafts machined to

29mm diameter, to removed the scoring marks, and give a smooth finish for the new oil seal lip. Apart from making the shaft non-tapered, the amount turned off in the lathe was about 1mm. This small change would not compromise the mechanical strength of the shaft.

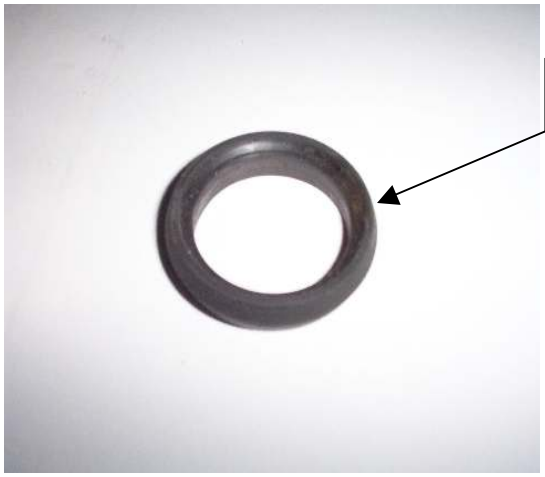
LH Swivel shaft assembly



Both of the shafts were machined to 29mm diameter to match the size of a modern oil seal, readily available from a specialist supplier, and to remove deep scoring as can be seen in the above picture. Both the original LH brass bush, and the new RH part were dimensionally too small to take the proposed oil seal after re-machining, so the bushes were re-designed with an open end to accommodate a press fit for the new oil seals. A local engineering company, then produced the parts turned out of brass. The internal diameter was allowed to be 0.2mm larger that the shaft diameter, so that when the bush was pressed into the axle, the shrinkage across the diameter achieved a snug fit when the swivel shaft was inserted.

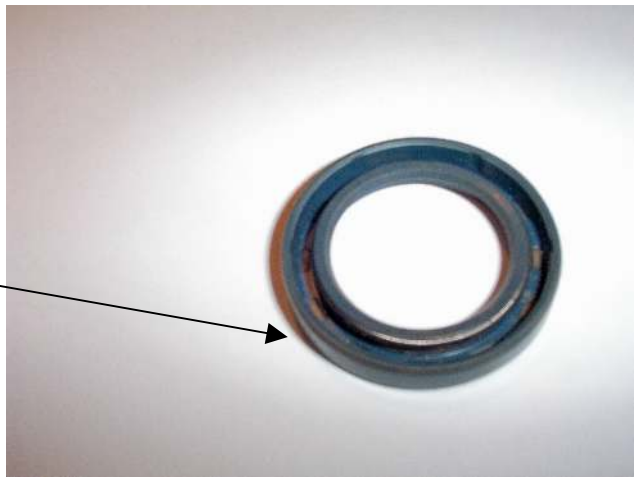
Original LH

New bush from RH side, with lip removed for a dimensional check for modern oil seal fitment.



Original pattern

Modern type showing lip spring.



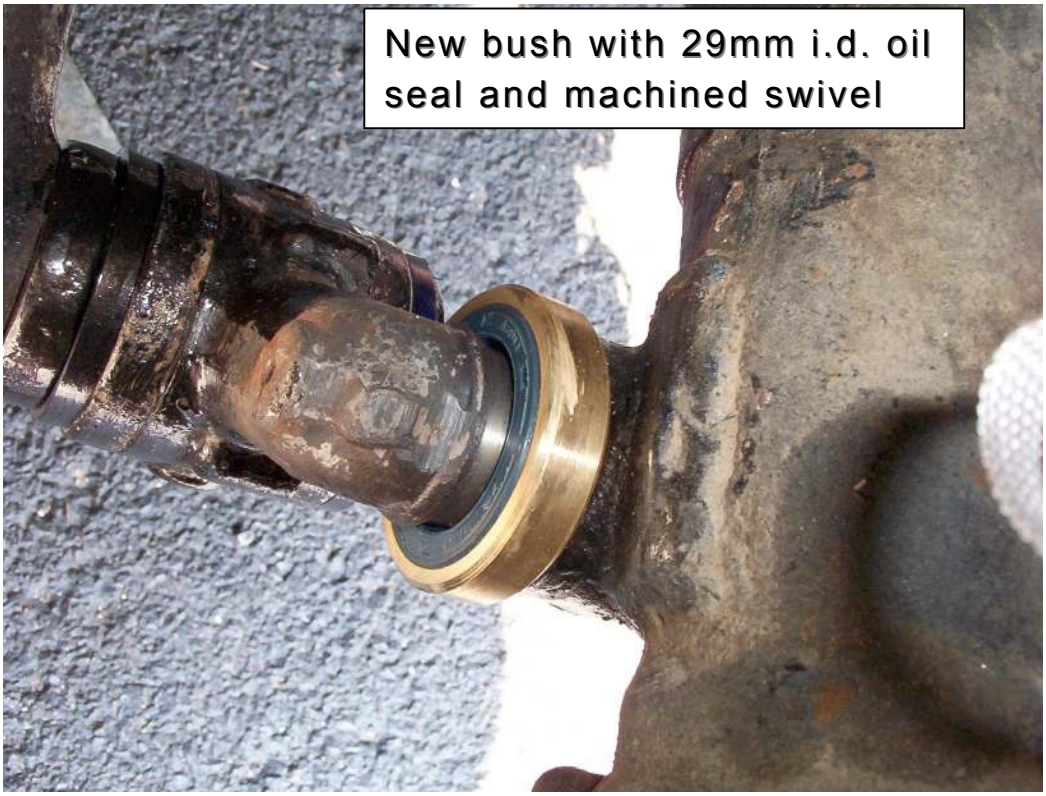
One other issue that appeared when the axle was removed, was the poor condition of the drop arm Metalastic bushes. The inner spacer tubes originally bonded to the rubber cones, had become detached, and on the RH side, one remained on the drop arm shaft when the axle was removed. After a squirt with WD40, it was extracted intact. Having made some enquiries with my motor industry contacts, it became apparent, that these particular Metalastic items were not available, as I suspect the tooling had been destroyed some time ago when Metalastic was taken over by Trelleborg. (When the car was running, the axle noise had become quite intrusive between 35 and 55 mph, and although the axle oil was changed to a multigrade EP with a molyslip additive, there was no discernable improvement.) The dimensions of the bush were taken from the most intact item, and compared to the swivel arm housing dimensions.

The most intact bush removed from the swivel

A length of polyurethane bar was obtained, and the bushes were machined to the drawing made of the above. To achieve a good compliance, and to ensure that the ride quality was not compromised, SPROD2-90 Shore was used. The only problem encountered with this material was, that it needed to be placed in a deep freeze 48 hours prior to machining, to prevent drift at the cutting tool. An initial sample was made to check the dimensions against the swivel shaft housing, this proved to be acceptable, and four more bushes were machined. Finally, the spacers were

removed from the original Metalastic bushes, cleaned, and pressed into the centres of the polyurethane bushes. The parts were given a final dimensional check prior to fitting, and all items such as the drop-arm shafts, were cleaned in preparation for re-assembly.

The polyurethane bush before the original steel spacer was pressed into the centre. The bush was machined to a 1.0mm under size, so that when the metal spacer was pressed



New bush with 29mm i.d. oil seal and machined swivel

The oil seal was pressed into the end of the bush with a smear of Hylomar on the outside circumference, to ensure that the fit was oil tight. The new polyurethane bushes were assembled on to the drop arm shafts, and then the shafts plus bushes and swivel shaft

assemblies, were mounted onto the axle, prior to re-fitting to the vehicle.

Axle alignment after fitting was determined using measurements taken from marked points on the axle and the torsion bar mountings. This ensured that the axle position was aligned to its original fit. As a final check, the car was driven in a straight line so that the castor action of the steering would line up the front hubs. The hub caps were removed so that the front hub to rear axle centres on both sides of the vehicle could be checked with a drawing square and spirit level attached. If the alignment was incorrect, then this could be corrected by the integrated adjusters situated on the lower shock absorber attachment point on each side of the axle tubes.
The Workshop Manual gives the wheelbase as 114 inches. However the measurements taken between the hub centres on each side of the vehicle gave exactly 114.5 inches per side. So although the on this particular vehicle, the wheelbase had appeared to increase by 0.5 inch, there is no evidence to suggest that the swivel shaft bush modification was the cause, as the measurements taken from the marked up points beforehand, were confirmed after the axle was refitted.

Although the rear axle oil is quoted as EP90 in the Workshop Manual, I refilled with a 90/140EP multi-grade, and an additive that firms up the seal lips to prevent weeps and seeps. This modification was carried out in 2007, and to date, only the left hand shaft has leaked a very insignificant amount of oil past the seal, and this has only appeared when the car has been parked up over the winter period. During the summer, when more miles are put on, there is no evidence of oil leaking out when the car is standing,

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