FITTING INSTRUCTIONS FOR MODIFIED REAR WHEEL BEARING RG8104P

The conversion mentioned below is suitable for use with all S type car half shafts, including S1, S2, S3 and their Continental derivatives.

The original rear wheel bearings are still available but very expensive. As the original bearing was metric it makes an alternative scheme fairly easy to achieve.

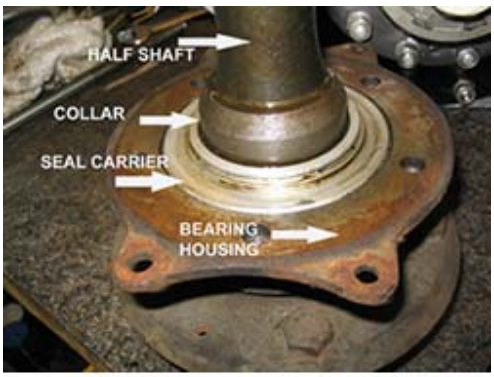

Fig1- old half shaft and bearing assembly after withdrawal from the axle tube

Fig 2 - A new 5309 and an original S type bearing including oil seals

Fig 3 - A new 5309 and an original S type bearing without oil seals.

Fig 4 - Side view of a 5309 and an original S type bearing including oil seals

Your must realise the usual disclaimers apply when a non original bearing is utilised. In the case of the original, the bearing was a single row thrust bearing which was wider in the centre section than the outer.

The various workshop manuals describe the removal of the half shaft assemblies, which are removed complete with bearings and bearing housings. **Fig 1** shows a very old unit to illustrate what the assembly looks like after its removal from the axle.

Replacement Bearing Type

Fig 2, **Fig 3** and **Fig 4** show comparisons of the original and new bearings in various states of dress.

Note in **Fig 2** how the two original side oil seals and carriers make up the width of the old assembly to fit in the wheel bearing housing.

The new bearing is nominally 100 mm x 45mm x 40 mm wide and unlike the original, it is a massive double row thrust ball bearing, the inner and outer tracks being of the same width. The conversion described is based on this neoprene sealed type bearing. This particular heavy bearing was chosen because it has far greater load carrying capacity than the original bearing and the wider outer track enables the wheel loading to be evenly spread along the wheel bearing housing. In addition the width of the bearing is the same as the housing depth and enables a straightforward replacement when the original grease seal carriers are discarded.

Tolerances - For the record the following tolerances apply:-

Axle shaft BEARING bore diameter = 1.7712 / 1.7717 inch (44.998 / 45.011 mm)
Axle shaft BEARING JOURNAL diameter= 1.7723 / 1.7726 inch (45.017 / 45.023 mm)
Axle shaft COLLAR BORE = 1.768 / 1.7685 inch (44.906 / 44.919 mm)
Interference fit, axle shaft to BEARING = 0.0006 / 0.0014 inch (0.016 / 0.035 mm)
Interference fit, axle shaft to COLLAR = 0.0038 / 0.0046 Inch (0.098 / 0.117 mm)

Fig 5 - Hub support tool showing the split joint.

Fig 6 - Hub support tool showing the outer side.

Fig 7 - Hub support tool showing inner side

Fig 8 - support tool assembled onto an old half shaft, note the outer ring.

The services of a machine shop will usually be needed to mount the half shafts in a lathe and machine away the old bearing retaining collar. Access to a press bed of at least 25 ton capacity is required to remove the old bearing and then press into place the new bearing and retaining collar. The highest load will normally be experienced when pressing off the old bearing which tend to come loose with a bang around 16 ton rather than a steady push. Expect that after fitting all the parts a final load of 20 tons should be applied.

Due to the high loads that the component parts will experience it is vital that the bearing housing is supported well to avoid damage. It is of no use changing the bearings or even an axle assembly if the bearing housing has been warped during the procedure. **Fig 5**, **Fig 6**, **Fig 7** and **Fig 8** show details of the tool, which we recommend using to hold the housing.

Fig 8 shows the tool on a half shaft with the encircling ring in position this stops the tool sliding off the housing when under load. Normally a tool could be made which would support the housing directly under the threaded bosses of the housing, as long as the situation is monitored.

Removal of the old bearing

After removal of the half shaft from the axle it is necessary to mount the shaft in a lathe and turn down the bearing retaining collar until about 0.010 inch remains when it is easy to split and remove the remaining collar with a chisel, without damage to the shaft surface. It is important that the integrity of the shaft surface at this point is protected because eventually a new retaining collar will have to be pressed on to the shaft and it is only the interference fit between the collar and shaft plus the bearing fit, which retains the road wheel and bearing assembly. An alternative would be to use an angle grinder or cutter and remove the collar without damaging the shaft. Using a lathe does enable the straightness of the shaft to be checked as any out of truth will wear both axle and wheel bearings and take its toll on the half shaft splines.

At this point it is necessary to mount the shaft in a hollow hydraulic press bed and provide a suitable support for the bearing housing whilst the shaft is pressed through, and therefore off the bearing. It is

very important that the flange of the bearing housing, which is about 0.125 inch thick, is not used to support the housing during pressing operations. The bearing housing lower end must take the load and if any load is applied to the flange, distortion and subsequent water entry will result. There is also a very serious possibility of the flange breaking away at some time in the future.

Fig 9 - The axle side of an S type half shaft before assembly.

Fig 10 - The half shaft with the spacer fitted, ready to accept the bearing assembly

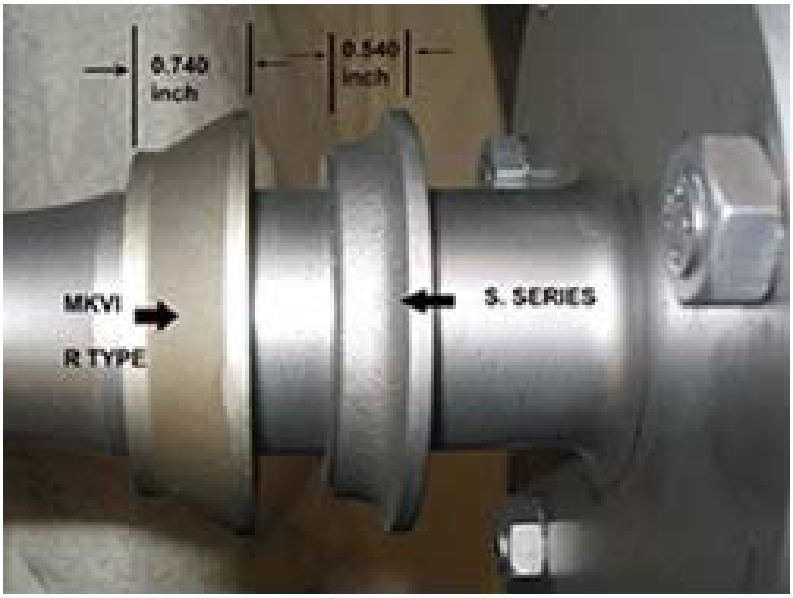

Fig 11 - Comparing spacers of the S type and earlier cars.

Once the shaft has been pressed off the bearing it is necessary to recover the bell shaped spacer from the flange end of the shaft. **Fig 9** shows the bare shaft cleaned up ready for rebuilding, whilst **Fig 10** shows the spacer fitted and the shaft then is ready to fit the bearing and housing assembly. This spacer positions the bearing the correct distance from the end of the shaft, and in doing so, sets the final running clearance between the brake back plate and the edge of the brake drum. **Fig 11** shows the comparison between the S type half shaft spacers and those of the earlier cars. It is easy to trim down an earlier spacer if required. Even in the event of needing to grind a bearing housing below the normal dimensions an early spacer could be used suitably turned down to achieve the 2.60 inch setting again as mentioned below.

Next, press out the old bearing from the housing. Examine the bearing housing and check it with a straight edge to ensure the flange is not warped. If there is evidence of distortion have the flange face ground. Then have an equivalent of the metal depth ground from the flange compensated, by then removing the same depth from the internal abutment where the bearing contacts. This allows the bearing to sit back in the housing rather than protrude. Originally the dimension, or off set, from the half shaft outer flange to the faced flange of the bearing housing is 2.60 inch to about 2.620 inch when the bearing housing has been fitted. This dimension was recorded on six shafts and bearing assemblies taken from different model S type cars.

Fig 12 - The bearing housing after pressing in a 3309 2RS bearing.

Fig 13 - The opposite side of the bearing housing fitted with a 3309 2RS bearing.

Fig 15 - The complete assembly, ready to fit back on an S type car.

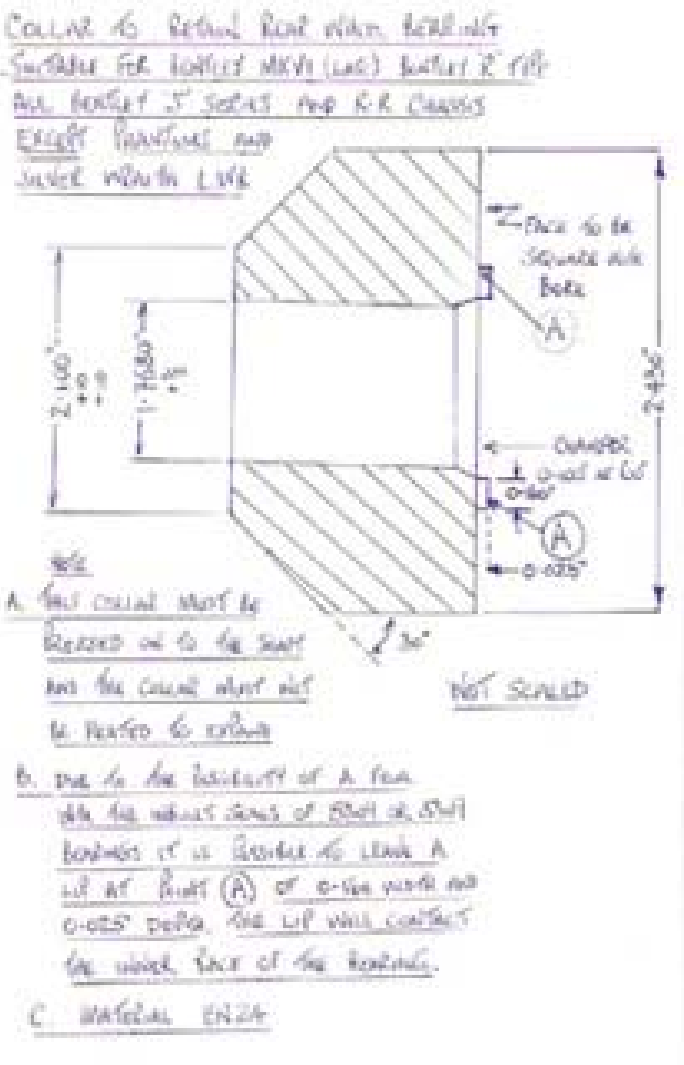

Fig 14 - A sketch of the GB 4956 wheel bearing retaining collar.

Having prepared the bearing housing it is possible now to press the bearing into the housing, taking care to only exert pressure on the OUTER bearing track. Make sure that the original bell shaped spacer has been positioned on the half shaft beforehand and it is orientated correctly with its large diameter against the flange of the half shaft. The shaft can then be pressed through the centre of the bearing and its housing. **Fig 12** and **Fig 13** show a bearing after it has been pressed into the housing.

When pressing the bearings onto the shaft journal, the bearing MUST be supported by its INNER track, certainly not the housing flange. The applied pressure, on the end flange of the half shaft will need to be in the region of 3 to 5 tons to allow the bearing to seat. Following this operation a new bearing retaining

collar part number GB 4956, see Fig 14, must be pressed onto the shaft, and then a minimum pressure of 15 tons and preferably 20 tons applied. In order to visualise both the bearing and the collar pressing operations, the half shaft flange end, that is the end where the wheel studs are positioned, is upwards and takes the force of the hydraulic pressing ram, whilst both bearing and /or collar are in contact with a piece of tubular steel, which is supported by the cross beams of the press bed. The aforementioned piece of tubular steel needs to be made wide enough to be supported by the cross beams of the press bed and thick enough to stand a 20 ton load. In addition it needs a raised section or upstand of approx 0.250 inch, some 2.150 inch (54.61 mm) outside diameter and the whole block needs boring through the centre 1.80 inch (45.72 mm), which makes it a tube. Visually this looks like a large steel ring with a smaller ring placed on the top. The upstand or smaller ring is sized so that it contacts the INNER bearing track or GB 4956 collar, depending on which operation is being performed. When the bearing is being supported the bored hole allows the tool to pass over the 1.772 inch(45 mm) half shaft diameter where the retaining collar is to be fitted. After the bearing and retaining collar are fitted, see **Fig 15**, the half shaft assembly can be replaced.