

## **Fitting a YA Differential**

**By Bryan Ditchman**

With modification to the banjo axle casing, this preloaded unit with taper roller bearings can be fitted to J,P,L and N-types. The units are inherently stronger than the original Triple-M diffs, and the pinion flange mates with the 4-bolt propshaft flange without having to shorten the propshaft.

There are two ratios which suit our casings:-

7:36 (5.142) fitted to the YA (painted black)

7:37 (5.284) fitted to Morris 10 (painted red)

When properly set up they are ideally suited for trialling, and my modification includes full length bolts through the axle casing with inner compression tubes.

In order to carry out the modification and setting up accurately, I suggest it is preferable to carry out the work with the axle casing off the car. This is particularly useful when redrilling the banjo, as the peripheral bolt table of the Y-type diff casing is rotated  $11\frac{1}{4}$  degrees. Redrilling the differential casing is an option, but in my opinion weakens the casing, which is not really thick enough where the holes are to be redrilled.

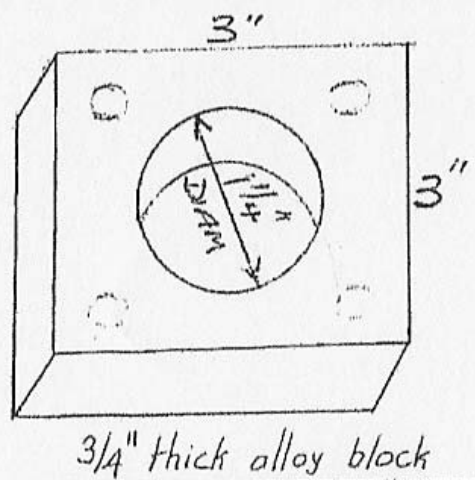
**STEP 1** – When obtaining such a differential, make a good visual inspection of all teeth, especially those on the pinion (use a torch) to ensure that there is no penetration of the case hardening, showing up as pitting and black lines along the lines of the teeth. Also check that there is minimum or no for and aft movement in the pinion. If there is no preload on the pinion, then it is advisable to rebuild the differential to reset the preload and backlash. Note that the cost of the four taper roller bearings, and rear oil seal works out at around £250 incl VAT.

Usually it is only the pinion bearings which need replacing, reducing the cost to about £180 incl. VAT.

Now it is advisable to read the section entitled "rear Axle" in the YA workshop manual (pages G3-G9 and S2 and S4) showing the special tools, which are the spanner for the adjusting nuts and the torque recording spanner for the pinion assembly. (I can supply a copy to any one that needs it).

Note that it is no longer possible to purchase the pinion bearing set with the distance tube "G" as mentioned in the text, so do not loose the one in the diff unit as this will be used as a datum in the first assembly with the new bearings, and will probably need to be replaced with a longer one.

To carry out the work on the differential, you will greatly benefit from having a substantial bench vice, minimum 6", and also a flange adapter as per the diagram, to bolt onto the pinion flange, to enable easy loosening and tightening of the pinion nut.



To be continued in  
the next Bulletin.

## **Fitting a YA Differential – Part 2**

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**STEP 2-** If the differential needs rebuilding then proceed as follows.

Bolt the aluminium block to the pinion flange, and mount the unit, Crown wheel uppermost, in the vice. Using a 5/8"BSF (9/16" Whit) socket through the block, loosen the pinion nut and remove with its washer.

Now open up the vice, pop mark and remove the pinion flange. Replace the casing in the vice, and loosen the 4 bolts holding the crown wheel bearing caps. Remove the lock plates and the caps (these are handed and numbered to the main casing). The locking nuts can now be carefully removed using a brass drift. Do not use a punch or drift in the ring of adjusting holes, as this will distort the nuts. Remove the crown wheel unit, being careful to keep the outer races with their respective bearings. Press out the pinion and thoroughly clean the casing, including the pinion oil feed gallery, and proceed in accordance with the workshop manual.

When refitting the pinion with new bearings, be prepared for 2 or 3 assemblings before getting the acceptable pre-load, which is governed by the spacer length. New spacers should be made from EN36B or EN16T.

Timken bearing numbers:-

Large pinion bearing– taper roller No. 2473/2420

Small pinion bearing – taper roller No. 15250/15100S

Pinion oil seal 250.137.50. R23.

When buying the bearings for the pinion, show the originals to the supplier to ensure they get the bearings to the original specification. (I have recently had a problem with NTN bearings requiring an oversized spacer tube and face grinding to ensure the pinion head meshes correctly with the crown wheel. So use Timken or SKF bearings.



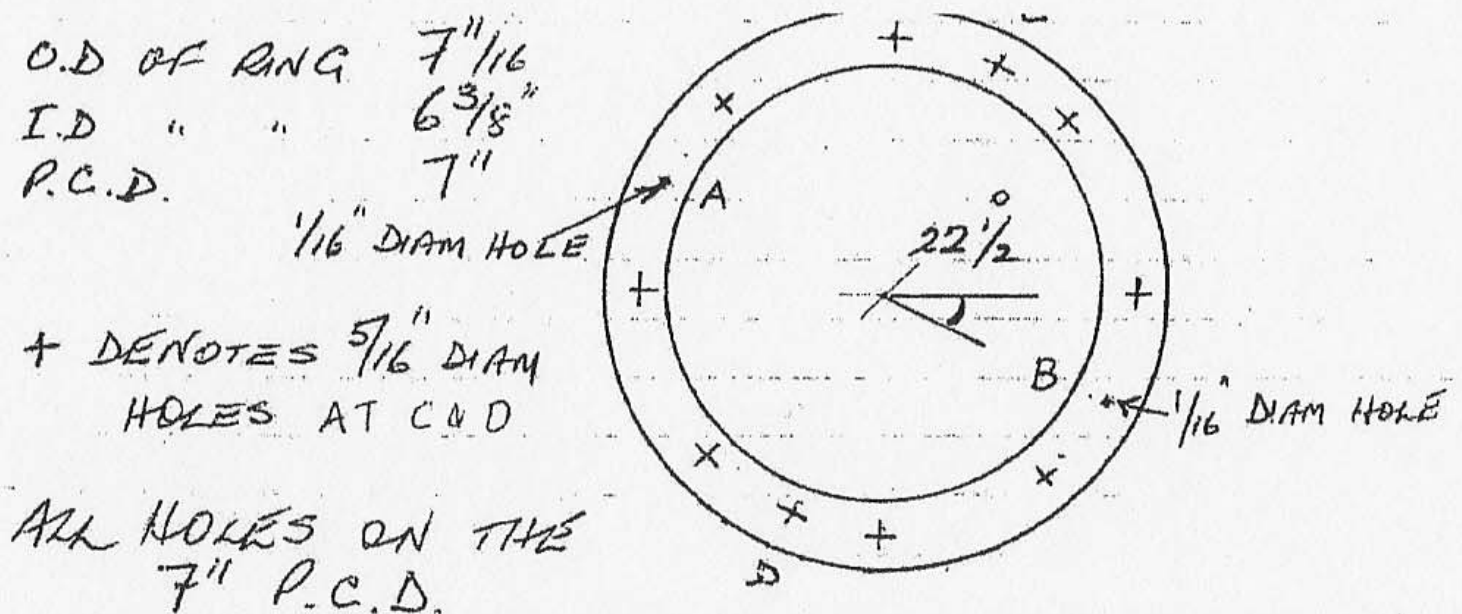
(Note- the oil seal bearing surface on the flange should be polished, but do not fit the oil; seal until the correct pre-load has been obtained).

At this stage I propose to continue with the axle casing, but firstly replace the differential bearing caps (without the crown wheel unit at this point, so as to save weight when fitting/testing the diff casing in the banjo).

### STEP 3 – The Axle Casing

To help accurate marking out and redrilling of the bolt holes on the correct P.C.D, I recommend that a guide ring is made from  $\frac{1}{4}$ " plate steel (find someone with a laser profile cutter), and then get a Machine shop to drill eight  $\frac{5}{16}$ " diameter holes as the diagram, with further holes at points A and B of  $\frac{1}{16}$ ", and  $\frac{5}{16}$ " diameter holes at points C and D on the P.C.D.

For assembling with compression tubes between the front and rear banjo flanges, six  $4\frac{3}{4}$ " long high tension bolts will be required. Four holes are now on the centre line of the half shafts, and this means that four nuts must be welded to the inside of the banjo flange to take four shorter bolts,  $1\frac{1}{4}$ " in length.



When the check has been made on the diff casing, fix the guide ring to one face of the banjo casing with two  $\frac{5}{16}$ " short bolts and drill a pilot hole through each  $\frac{1}{16}$ " guide hole (A&B),

and continuing round the P.C.D. The eight pilot holes can then be opened out in stages; finish the two holes at 3 and 9o'clock first, thereafter the final 5/16" drilling must be done using the guide ring fixed by bolts at points C and D. Repeat the exercise on the other face of the banjo, and then do a dummy assembly, using the long bolts in the diff casing. Do not cut the bolts to length at this stage, but make up the six compression tubes which fit between the inside faces of the banjo flanges; these should be a good tight fit between the flanges. Tack weld the tubes to the casing at one end only on the differential side of the banjo.

Now with the diff casing in the vice (bearing caps uppermost), lower the banjo casing over it. The locking nut locators must be in place on the bearing caps, and it will be found that the tin hat cover will not seat on the axle casing. The steel guide ring is now used as a spacer. (N.B. This ring is also used for making up 6 gaskets, 3 for spare). One can now cut the long bolts to length and thread them to suit.

Lastly the old tapped holes in the banjo can be drilled out to 5/16" to enable a Triple-M diff to be fitted in the future, using the long bolts and spacer tubes.