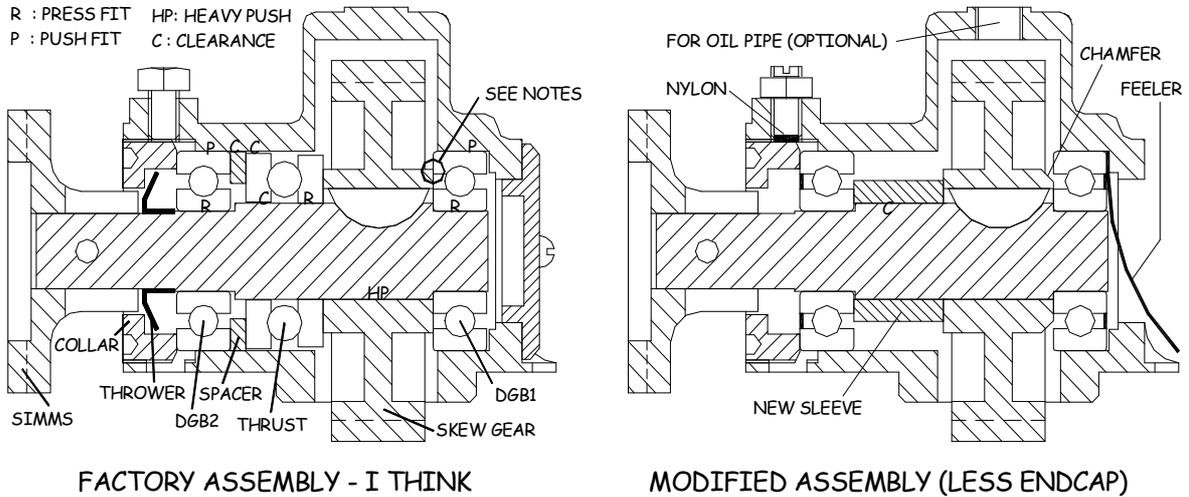


## Meadows 4ED magneto drive - a flawed design



There are six relatively minor flaws and one major.

### The minor flaws

Using a radial screw to lock the collar mangles the thread on the collar: Meadows could easily have followed the practice of using a locking ring in the manner of the bottom bracket of a bicycle.

Although there is a drain hole intended for oil ejected by the thrower there is no conduit between the thrower chamber and the hole.

Part of the edge of the hub of the gear is in contact with the stationary outer ring of DGB1 (DGB = Deep Groove Ball bearing) if that ring is fairly thick. That thickness seems to vary between manufacturers and, in my case, there was a shiny ring on the edge of the gear hub where it had been touching the bearing ring. A small chamfer on the edge of the hub eliminates the problem.

The minimum shaft shoulder height for an RLS5 bearing is specified as being  $5/64$ " , so the major diameter of the shaft should be at least  $25/32$ " whereas it is only  $3/4$ " : in practice neither of the shoulders is subject to significant axial load so the error can be discounted.

Only about 65% of the width of DGB2 is contained by its housing but, because it is almost certainly only working at a fraction of its capacity, that can also be discounted.

The final stage of disassembly is the removal of the thrust bearing, spacer and DGB2 from the shaft. That is done by supporting the small thrust bearing washer and pressing on the drive end of the shaft which will impose excessive loads through the balls of both bearings: that will make them unsafe for further use. In the words of SKF, "Under no circumstances should force be applied through the rolling elements during mounting".

### The major problem

Lies in the combined use of a DGB and a thrust bearing and the manner in which they are mounted. The thrust bearing's two grooved raceways (called washers by SKF) both have clearance between their ODs and the housing bore but one (which I call the smaller) is a press fit on the shaft and the other has clearance.

Once a bearing or the smaller washer has been pressed on to the shaft it can be considered to be solid with the shaft, as the press fit forces are vastly greater than the forces when running.

Firstly consider assembling the shaft and bearings etc. without the housing. DGB1 is pressed on to the shaft up to the shoulder followed by pressing on the gear and the **smaller** washer from the other end.

Now the balls, the larger washer and the spacer can be slipped over the shaft and DGB2 can be pressed on using a square ended sleeve acting on **both** rings of DGB2. Until the spacer is nipped, the thrust bearing will serve no purpose but if DGB2 is pressed on slightly too far then there will be an excessive load on the thrust bearing, probably damaging it: when the pressing sleeve is released, that load will be transferred to DGB2. The chance of getting DGB2 in exactly the "right" position (if there is one) is slender because of the jerky (stick/slip) motion that is difficult to avoid when pressing the parts together. With the assembly out of the housing it is possible to observe the fit but, as it has to be assembled within the housing, it is impossible to observe or measure the fit so the probability of getting it "right" is negligible.

As there are still plenty of 4EDs still running, I think that these must have been assembled with DGB2 pressed on to less than the "right" position which means that the thrust bearing has been unloaded and DGB2 has taken all the thrust.

*† Note that if the thrust bearing is installed the wrong way around (which was how mine had been done) it will do nothing because both washers are rotating elements whereas the spacer is trapped between stationary and rotating elements!*

#### Possible solutions

Replacing DGB2 with a roller bearing would overcome the major problem but it doesn't appear that one of suitable dimensions is available.

The spacer could be replaced by a (thinner) internal circlip acting on the larger washer but machining the groove for it in exactly the right place and at right-angles to the bore would be tricky. The collar would need to be adjusted to provide clearance between itself and DGB2.

The solution that I have adopted is to assume that an RLS5 is capable of taking the thrust and to replace the thrust bearing and spacer with a new sleeve that is a clearance fit on the shaft. The length of the spacer should be such that, when added to the width of the hub of the gear, the total is slightly greater (say 10 thou.) than the distance between the shoulders of the major diameter of the shaft.

I used an RLS5 RS, with the seal on the left side, for DGB2 which eliminates the need for a thrower and oil escape route: it also prevents the ingress of dirt. If you can only get the 2RS version then the inboard seal can be removed. DGB1 can also be an RLS5 RS with the seal outboard.

A small amount of end float (about 2 thou. minimum) is required to provide for differential thermal expansion between the shaft assembly and the housing. To do that I inserted a 5 thou. feeler gauge between the right end of the outer ring of DGB1 and its seating (as shown) then tightened the collar until the feeler was just nipped.

Finally I inserted a small piece of Nylon between the locking screw and the collar to avoid bruising the thread of the collar.

#### Other notes

It is probably a "good thing" to refit the gear in the same direction as it was before dismantling so mark it accordingly.

After dismantling, the thread of the collar can be de-mangled using a 26 TPI thread restorer. Check that it can be screwed into the body without undue force so that, at the very least, the face is flush with the end of the housing. On mine the female thread has a small taper.

Page 111 of the Workshop Manual stresses the importance of aligning the magneto [or distributor drive] with the magneto drive. Pages 89 and 113 discuss additional lubrication for the drive and page 87 mentions correct meshing of the gears.

I've faked-up (Wiltshire parlance) a set of mandrels and guides for dismantling and assembling the drive which are available on loan.