

## The Problem



In 1972 the NORTON- works had great problems with their gear- boxes. I think, if you look closely to the photo the problem becomes clear.

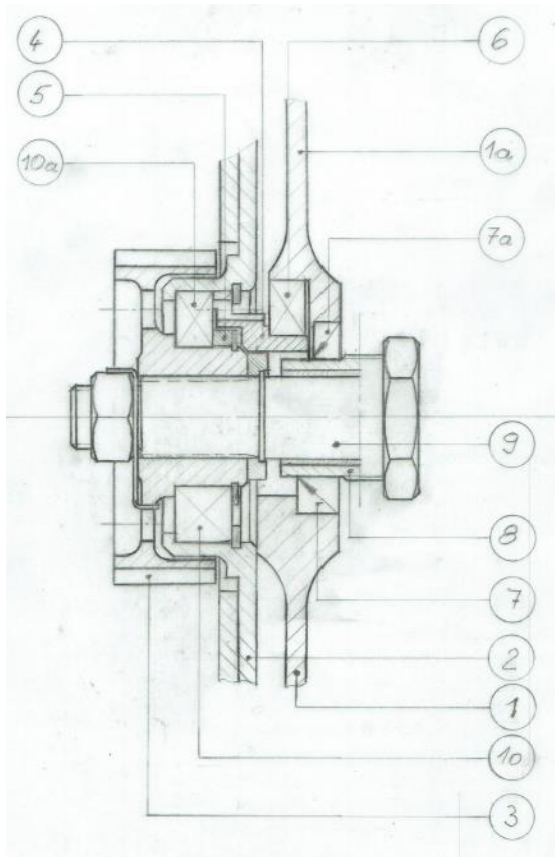
We do have a great distance between the center of the triple- row primary chain and the first bearing of the main- shaft/sleeve gear inside the gearbox. This fact gives us enormously high bending moments to the shaft, which results in high elasticated deformations if the shafts are heavily loaded.

Especially if we deal with the highly tuned torquey NORTON- Engines which in most cases are even over- bored up to 920, 950

or even 1020cc, we need to reduce the loads between the outer clutch basket and the first gearbox bearing by means of an outrigger bearing. Nevertheless we have to bear in mind that this solution is only suitable for the Commando MK IIIs because of their rather stiff inner primary chain case and its rather wide layout around the gearbox main- shaft brake through.

I know there are solutions with outrigger bearings for dry- running belt drives, but unfortunately my driving belts never lasted any longer than 5.000 miles, which drove me to the decision that the original design with the triple row primary chain would be the better, more reliable solution especially with an additional outrigger bearing.

## The solution



- 1.) Inner Primary Chain-Case
- 1a.) Inner Primary Chain-Case (machined with a seat for the outrigger bearing)
- 2.) Outer Clutch Basket (Assy.)
- 3.) Inner Clutch Basket
- 4.) Carrier for Outrigger Bearing
- 5.) Spacer Ring
- 6.) Outrigger Bearing 16008  
(for dry- running belt- drives we could use an 160082RS if these are available)
- 7.) Seal Ring  
Standard dimensions: 1-1/8"x1-7/8"x3/8"
- 7a.) New dimensions: 1-1/8"x1-7/8"x1/4"
- 8.) Sleeve Gear
- 9.) Gearbox Main-Shaft
- 10.) Clutch bearing
- 10a.) Standard: 6207 (for dry- running belt drives a 6207 2RS could be used)

Below centreline: original solution without outrigger bearing

Above centre line: My solution with outrigger bearing



The new clutch bearing (Pos. 10a) and the spacer ring are pressed in place.

The ears of the circlip had to be slightly ground by 1mm at their outer contours, because it would run into the inner diameter of the outrigger bearing carrier.

One sees the bearing carrier before its assembly.



### The Outrigger Bearing Carrier

It is equipped with 9 x 5mm bores to assist the lubrication of the outrigger bearing. There are also 3 bores with an M 4 thread. These could be used for dis- assembly by means of pushing off screws of this size. It must be noted that the bearing carrier is pressed into the clutch bearing bore with the same press fit as the clutch bearing itself.



The bearing carrier is fitted. Also at this circlip the ears had to be slightly ground off by 1,5mm, because an assembly as well as a disassembly would have been impossible.

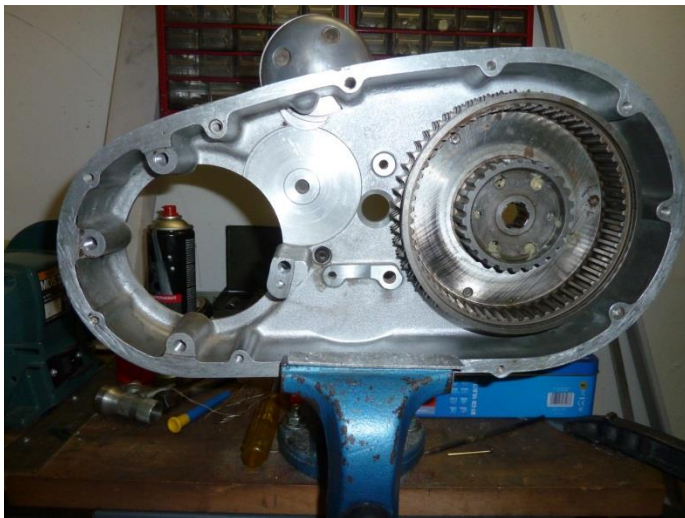




The outrigger bearing (Pos. 6) is mounted to its carrier and pre-greased.

Here we have surface load, so we need to have a press fit between the inner diameter of the bearing and the outer diameter of the bearing carrier.

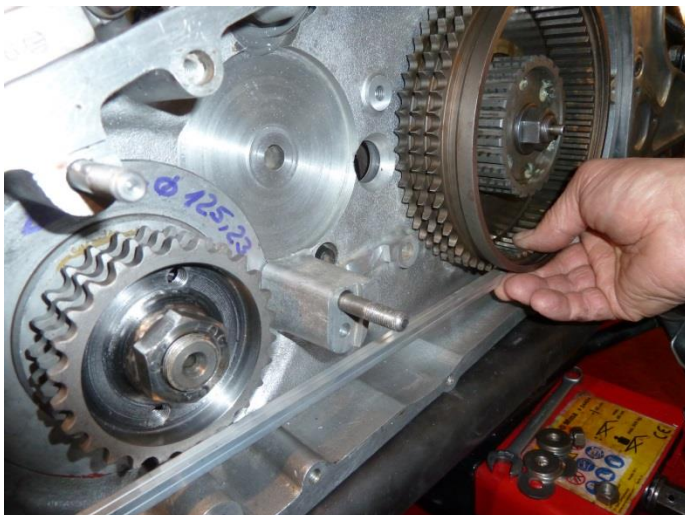
The clutch is now ready for assembly.



The clutch is now fitted to the inner primary chain-case. The bearing has a light sliding transition fit, because we have point load in this area.

Attention! In these pre-assembled conditions the gearbox will be aligned in relation to the engine.

The seal ring between the primary drive and the sleeve gear is not mounted to prevent damage to the sealing surfaces.

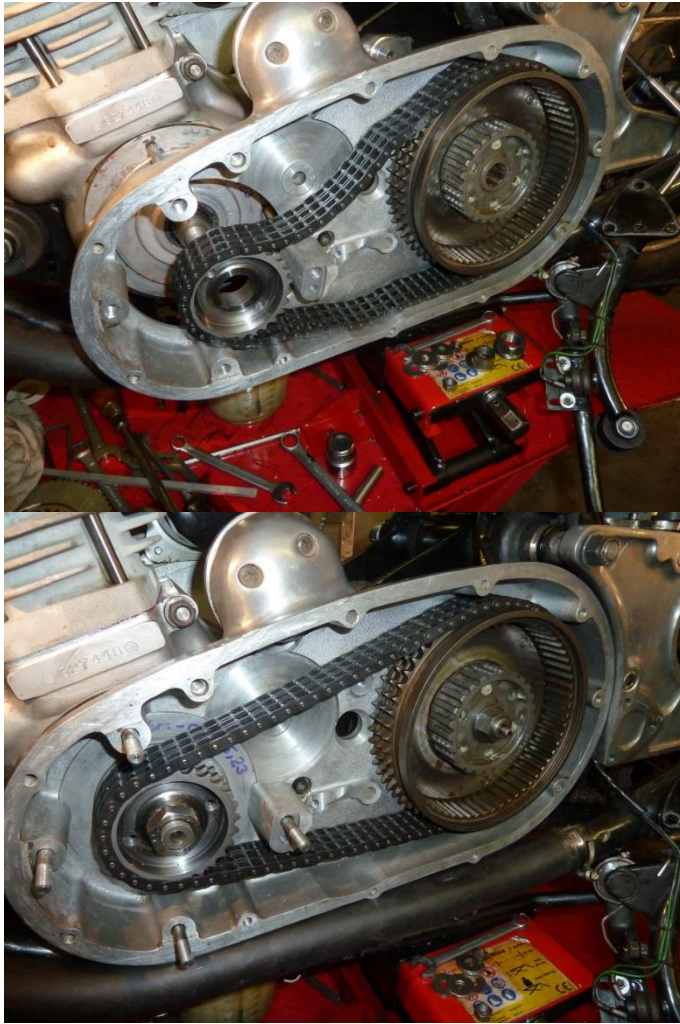


The inner primary chain case is now fully aligned in relation to the engine. All fastening bolts as well as all chain adjusters are undone to in-able the gearbox to aligning itself just by primary chain-case / outrigger bearing / clutch bearing / gearbox main shaft – unit. The inner clutch basket is fully fastened to the gearbox main- shaft.

This unit is also fully fastened to the engine crankcase. After all the mentioned bolts are fastened the aligning job is completed and the gearbox- bolts can also be fastened. Also the chain adjusters could be fastened but we can now do without them now.

As one can see everything is aligned as requested. The fastened clutch rotates well together with the gearbox main-shaft.

Well, it has to as design- wise misalignments are not possible. The clutch can only be aligned in relation to the front (engine-) pulley by means of spacer washers.



The Primary chain case incl. seal ring, outrigger bearing, clutch unit primary chain and engine- pulley can now be easily assembled as a set.

This is a rather easy job because everything is well aligned.

Now the Primary drive is completely assembled. The necessary rest like the hydraulic chain adjusters, electric starter alternator etc. can be assembled as explained in the workshop manual.

As one can see there are a lot of non-standard parts fitted to my bike: Like the Moto Cross Nourish crank which is without the cylindrical portion for the alternator rotor.

But this is another project and not matter to this subject. But if requested I can describe this as well. Unfortunately in this case the electric starter will have to be left away.

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