



Installing Tapered Steering Head Bearings

Steering head bearings are basically the “hinge” at the front of your bike that lets you turn the handlebars to point the front wheel in the direction you want to go. Whilst the principle is very simple, the bearings must be of robust construction, made to accurate tolerances and adjusted so that there is no radial movement of the steering stem which would cause the front wheel to wander off course making the handling imprecise and possibly dangerous.

Original equipment Kettle steering head bearings like many other bikes rely on the principle of a number of ball bearings which move in a circular track or race, at the top and bottom of the steering head. The ball bearings sit between an inner and outer race in each bearing, the outers being a tight interference fit in the frame. Steering head bearings like Swingarm bearings have limited travel and low rotational speed, however they are subject to heavy loads and incorrect adjustment plus a lack of lubrication will cause rapid wear leading to imprecise steering which can badly affect your bikes handling and potentially result in dangerous situations. All types of steering head bearings need to be lubricated with grease and adjusted periodically to prevent them from becoming dry and corroded which accelerates the degree to which they deteriorate and consequently speed their need for replacement. Loosening off the bearings to re-pack them with grease will of course require them to be adjusted so the two do go hand in hand.

Let there be no doubt that replacing steering head bearings is a major undertaking requiring you to remove the whole of the front end of the bike and you may feel that your skills are not up to the job. However, if you ensure that your bike is properly supported and not likely to topple over, adopting a methodical approach to the stripdown and rebuild, you should be able to easily complete the task in a day or less even with breaks for copious amounts of tea!!!! It goes without saying that you must of course replace both bearings and never only one..... damn, I just said it!!!! **If you are in any way uncertain about your abilities to remove and fit new bearings you must of course leave the job to your local bike shop or someone you know who is capable of carrying out the work properly!**

I know there are some who swear by the use of ball bearings in the steering head and I would not argue against that, they are well up to the job and if properly maintained give many years of reliable service. However, the construction, load bearing capabilities and abilities to stand up to less than perfect maintenance makes taper bearings a more robust option, adopted by many. I have heard it said that taper bearings can make your bikes steering more precise, but to be honest I haven't been able to see any noticeable difference!

To check your steering head bearings for wear, with the front wheel off the ground, lightly swing the handlebars from side to side and they should move freely with no “notchiness” or tight spots. Then, again with the front wheel raised off the ground, firmly grab either end of the front wheel spindle then push and pull it away from then towards you. If any movement can be felt the bearings are either in need of adjustment or worn beyond their serviceable limits and you will need to examine them more closely with the possibility of replacement being necessary. On the road, worn or loose bearings make your steering wander off course and a noticeable “clunk” can be felt when applying the brakes. Ball bearings fitted as original equipment can be more prone to wear if neglected becoming “out of round” and are also more easily damaged if not adjusted properly, particularly due to over tightening. Simply applying grease or replacing the balls in their upper and lower races will not cure worn bearings as the surface of the races will in most instances also be worn and the new balls will become misshapen and unserviceable in a very short period of time.

The brand of bearings you buy may be a straightforward replacement fit but some do call for the “adjustment” of some bits and pieces, to get them properly installed. This should not, however, put you off and will only need to be done once so any further steering head bearing replacement will not be so problematical. I did have an issue installing new bearings on a Kettle last year (more later), but the subject of the pictures in this document which the eagle eyed amongst you will notice is a GT380 was a fairly easy fit, with only a very minor but important bit of modification required as described below!!!

Removing the Front End

Having decided that the job is within your capabilities, make sure that you are able to work in a way which will keep both you and your bike safe from potential accidents. It is essential to ensure the front of your bike is properly supported before attempting to remove the forks and other ancillaries. A stable car jack or axle stands under the front lower frame tubes should be up to the job, but please be sure your bike cannot move and become unstable as you work on it, reducing to a minimum the possibility of a nasty accident..... safety warnings over!!!

Firstly, remove the petrol tank and put it somewhere safe where it won't get kicked over/fall from a great height/ get anything dropped on it, or generally come to harm and cause you much upset!

Having raised the front wheel off the ground disconnect the speedometer drive, remove the front wheel, mudguard and brake callipers, but you may want to tie the latter to the radiator guard to take the weight off the hydraulic lines particularly if your bike has rigid metal pipes up to the calipers. The fork legs are held in place by 14mm pinch bolts at the top and lower yokes and should be removed as individual units. The headlamp can remain in place but the fork shrouds and associated chrome/rubber mountings should be disconnected from the headlamp shell and removed to make re-fitting the fork legs easier later. Remove the centre steering stem plastic plug, chrome steering stem nut and loosen the clamp bolt following which the top yoke along with the still attached handlebars/switchgear/clocks/brake master cylinder can be removed and lifted forward out of the way. The lower yoke

with the steering stem will still be in place held there by the bearing adjuster ring undone with a C spanner, beneath which are the plastic dust seal and then the upper bearing. You can now remove the adjuster ring/dust seal pulling out the steering stem from the frame and your feet will probably be showered with 18 or so small metal balls as they fall out of the lower bearing when released! Someone holding a bucket or similar directly underneath the lower bearing can of course avoid this! The upper ball bearings stay in place until you take off the upper race and jiggle them out with a small screwdriver or similar.

Removing and Installing the New Bearings

As mentioned above, the outer races are an interference fit in the steering head and must therefore be drifted out of the frame. How tight they might be is difficult to say as the passage of time and corrosion can make them rather “snug” but stick at it using a long punch with a 12 – 6 – 3 – 9 pattern from the top to remove the lower bearing race and from the bottom to remove the upper bearing race. With the bearings removed you can now clean out the steering stem housing of any year’s old accumulated dirt and grease, giving the bearing housings a light cleaning with a wire brush to ensure they will be free of corrosion and the bearings can seat fully home.

The upper and lower taper bearing surfaces are installed into the headstock to replace the ones previously removed, but be careful that they are fitted in their correct locations as the bearings are different sizes. If you are in doubt, try installing them “dry” onto the steering stem and it will become quite obvious which belongs in the upper and which in the lower housing. Using the same 12 - 6 – 3 – 9 pattern install the bearing surfaces into their respective locations in the frame which should take far less effort than removing them. In this instance the upper bearing surface was not as tight in its seating as I felt comfortable with being a firm push-in fit, so I installed it using Loctite 271 Stud ‘N Bearing Fit. The old ball bearing lower inner bearing race will still be seated at the bottom of the steering stem on the lower yoke and needs to be drifted off. In order to break it free you will probably need to use a narrow metal chisel and a bit of force, but once it is loose they are generally easily removed.

Upper Bearing drifted out

Upper Bearing installed (“Stud ‘N Bearing Fit” used as it was only a tight push in fit)



Lower Bearing installed



Greased Upper Bearing in place



The bearing rollers should be thoroughly greased and the lower one installed onto the steering stem. It will be a reasonably tight fit and you may have to gently tap it into place, try using the old bearing so that you don't damage the new one. If it takes more than gentle persuasion to fit, you will be liable to damage the bearing, so a light easing of the lower section of the steering stem with emery paper will aid installation.

Steering stem/lower yoke with lower bearing in place showing the top bearing/plastic dust cover/C adjuster nut



The lower yoke can now be installed into the headstock along with the well greased upper bearing. Holding the lower yoke in place fit the upper bearing, plastic dust cover and C ring adjuster nut screwing it as far down the stem as required to hold everything loosely in place. However, I found that when screwing the C ring adjuster nut onto the steering stem it was not tightening against the metal of the bearing as it should, but the plastic surface of the dust cover, not a good or safe thing as the bearing will not be able to be adjusted properly, become loose very quickly and cause your steering to become "sloppy" and dangerous. It is essential that you get

proper metal to metal contact to correctly adjust the bearings and keep them in proper adjustment. This situation will be obvious if once the steering stem is tightened you find the plastic cover can't be easily turned by hand and it will probably be misshapen or pushed out of round. If this is the case you must adapt the dust cover using a Stanley knife to remove the inner plastic lip to make it thinner and thus get the necessary clearance for metal to metal contact. On re-assembly you should be able to tighten the C ring adjuster and turn the plastic dust cover, if not further trimming will be necessary. **This is an important issue so please make sure you get it right or your bike will be in a potentially dangerous condition.**



Plastic Dust Cap "New"



Plastic Dust Cap adapted to allow metal to metal fit of C Ring adjuster



Steering Head Reassembled with New Taper Bearings

Fitting these bearings can cause the headlamp mounting brackets to become loose in between the upper and lower yokes as they are deeper than the ball bearing type,

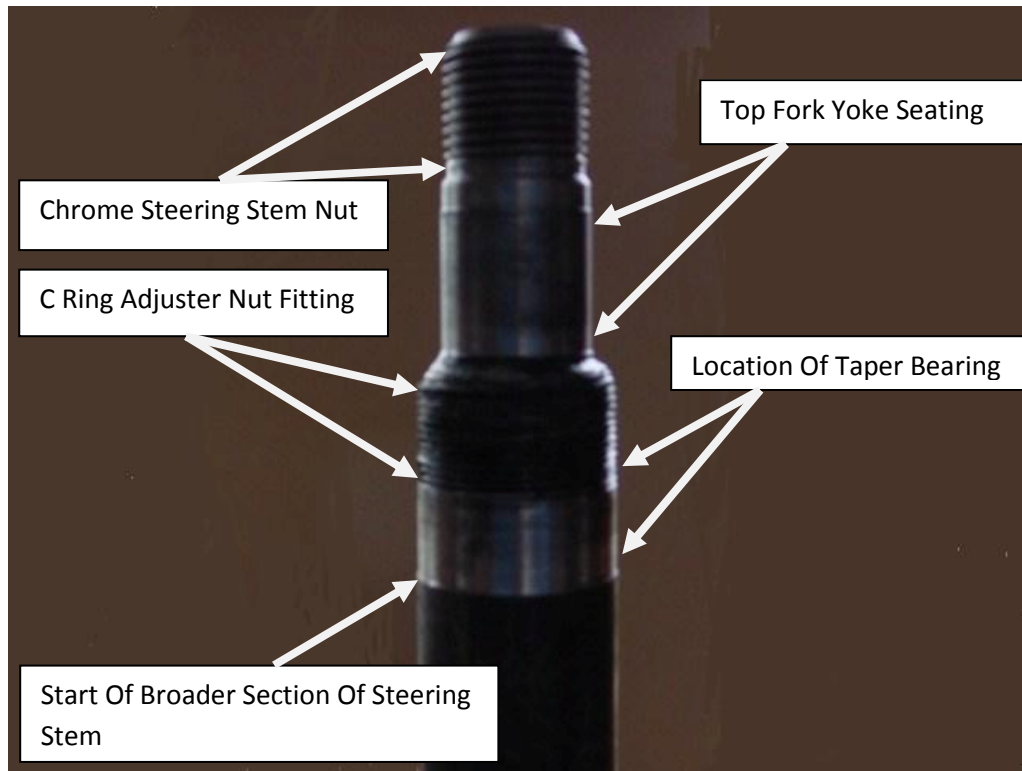
but in this instance there was no such problem. If this is the situation you may want to add an extra rubber spacer at the top of each fork shroud to take up the excessive play.

Once you have re-installed the upper yoke, handlebars and ancillaries, fork legs, front wheel etc. and tightened the fork pinch bolts you can properly adjust your new tapered steering head bearings with the C ring adjuster so that there is no radial free play and only slight resistance when moving the handlebars from side to side. Then the steering cap nut/plastic plug and the top yoke pinch bolt can be fully tightened. But before your first test ride you must make sure that your front wheel is properly aligned in the yokes, pointing directly forward and not to one side. You can see if this is the case by eye, looking down at the wheel from your normal riding position. Loosen the top and bottom fork yoke clamps slightly and twist the front wheel between your knees until you are satisfied that the wheel is perfectly straight and re-tighten the clamps. Pump the front suspension up and down a few times with the front brake held on to make sure the forks are moving smoothly with no sticking and everything is in proper alignment. Check the new bearings after a hundred or so miles and re-adjust them if necessary.

Fitting Taper Bearings – Modification Required to Steering Stem

A difficulty I encountered fitting Kettle steering head bearings again occurred when installing the lower fork yoke then tightening the C ring adjuster nut to get proper adjustment of the new bearings. The adjuster screwed as far as it would go down the threaded section of the steering stem until it became really tight but the bearings were still loose and there was no further means of adjustment. Closer investigation showed the C ring bearing adjuster nut had reached the limit of its adjustment due to the upper bearing having bottomed against a shoulder section of the steering stem which is slightly bigger than the bearing inner diameter. One solution I tried was to put a spacer (big washer) underneath the lower yoke bearing to raise it slightly, but that wasn't successful because the steering stops were now too low and missed the frame stops meaning the bars would swing too far from side to side and allow the forks to hit the tank.....not a good idea!!!! More thought was required, so I removed the spacer from underneath the lower yoke bearing and re-installed it without. I then decided the best solution would be to grind some of the broader section of steering stem back a few millimetres to allow the bearing to slide further down the shaft and give slightly more travel to provide for proper bearing adjustment. Once done the bearings could be properly adjusted without any difficulty and there were no issues that arose due to grinding the steering stem. The plastic dust cover also needed to be adapted as described above.

Steering Stem Fittings Locations



Replacing your steering head bearings is undoubtedly a task that calls for a good degree of mechanical ability but doing it yourself will save you a considerable amount of money with sets of bearings costing £20 - £40 and there is another job done where you can say "I did it"!