

Vibrations from the Front Axle

Part 1 of GARP, The Great Axle Reconstruction Project

Over the past few months our Oka developed an occasional but worrying vibration at 60-70 km/h from what appears to be the front axle/wheel area, possibly from the passengers side. Braking or turning or de-clutching didn't seem to affect it and it was there in 4wd and 2wd.

At first I thought it was just knobbly tyres on a rough road surface (that's what it sounds like), or the brake callipers (see [this article](#), which is relevant to Oka brakes), but I thought I had fixed any calliper/pad rattles and looseness. Then I thought maybe a wheel bearing shell might be jamming occasionally and rotating on the spindle, but why only at one speed? Investigating that possibility is a rotten job, with freewheeling hubs and brake callipers to remove, lock washers, messy grease etc. and anyway I had checked/greased the bearings last year and recently had the wheels balanced.

"Tim" on the Oka Owners Group website suggested that the vibration might be caused by a worn steering damper. I haven't investigated that yet, since everything is now in pieces, but it is a possibility, although I don't quite understand how it could occur or why turning the steering wheel didn't affect it. I had considered ignoring the problem completely and just turning up the radio, but after checking the steering rods and swivels, springs and shockers, and any part of the bodywork which could have been vibrating in the wind, I bit the bullet and took the wheel hub assembly to pieces.



Pic 1. The groove and ridge ringed on the spindle shaft.

It only took an hour or so to get to the heart of the problem, the outer bearing shell had indeed been rotating on the spindle and worn a groove (about 0.5 mm deep), so that the bearing was a fairly loose fit on the shaft. A ridge had also developed which prevented it from sliding freely, and this would affect the bearing pre-load adjustment as well. See ringed area on Pic 1.

What to do about it was the next question. If we were in the US, a replacement spindle for a Dana 60 axle would be easy to find (and cost around \$US100-150), but in Oz, from Oka the price was out of this world (\$600, each).

So I investigated a repair process. I found a company in Adelaide (Adelaide Grinding) that would deposit a coating of metal on the shaft (by replating or metal spraying) and then regrind the bearing surfaces to their original dimensions. Since I wanted to do this only once, I also had the inner bearing surface treated at the same time, even though it wasn't as badly worn. Even better, the total cost was less than a quarter of the new spindle price.

While I was at it, I took the other spindle off and, not surprisingly, it was in a similar state of disrepair so I had that repaired as well.



Pic 2. The repaired spindle. Bearings are a good tight slide fit on the reground shafts.

I will also replace the oil seals at the rear of the spindles and the seals on the drive shafts to keep water out of the bearings. The needle roller bearings which centre the drive shaft were very gunged up but not badly worn, so a good clean out and regrease is all that is necessary.

The 6 nuts holding the brake calliper and spindle on to the steering knuckle weren't as tight as I was expecting, considering that they support the whole weight of the vehicle, plus traction and braking loads as well, so I will Loctite them and torque them to 60 to 70 ft-lbs. The torque setting for Dana 60 Spindle nuts is 65 ft-lbs (88 Nm) and I assume it would be the same for Dana 70 rear axles.

I did consider rotating the spindles so that the previously worn section was now having a rest and a new section could take up the load. However, that plan came to nought when I discovered that the spindle bolt holes are not symmetrical and the spindle will only fit one-way. It is possible to interchange the left and right side spindles however, which might have a marginal benefit.

The Low Point Approaches...

While the hubs were off being repaired, I took the opportunity to change the front diff oil.

So I loosened the diff cover bolts to let the oil out (for there are no drain plugs on these axles) and heard a "clink" as something dropped into the tray. Rather than dirty my fingers, I got my magnetic wand out and stirred it around in the dirty oil. When I removed it there was part of a gear tooth attached to the end.

My heart sank as I knew what that would mean, and sure enough, when I removed the cover and turned the inner gears around there was one with part of its tooth missing.



Pic 3. Toothache in the differential.

Had there been a drain plug I would never have noticed the missing tooth, but since I now knew about it, it simply couldn't be ignored. From a pragmatic perspective, there would never be a better opportunity to repair the diff, as removing it was only 4 bolts away, since the hubs, wheels, brakes and drive shafts had already been removed.

This was also the unexpected opportunity I had been waiting for to replace the inner axle oil seals which are only accessible when the diff is removed. Muddy water from Kimberley creek crossings had got into the diff housing past the worn seals and laid at the bottom of the housing. This had caused surface rusting and pitting on some of the crown wheel teeth and bolts, since the front diff is stationary for much of the time. Mine site seals are available to block off the openings to the axles tubes, but the advice I received is that they tend to trap water in the tubes leading to worse corrosion problems, and it's better to allow them to drain open to the atmosphere.

Removing the diff was surprisingly easy and after freeing the 4 bearing cap bolts, it just about fell out, or would have done, except for the steering tie rod which crosses right in front of the diff cover. This tie rod can't be easily removed since it hits the bottom of the springs before the tie rod ends can be lifted free from the steering knuckles. Luckily, after a bit of manoeuvring I managed to turn the diff carrier

assembly on its side and slide it out under the tie rod. If you've already loosened one or both tie rod ends, it would probably help to clamp the rod up as high as possible to keep it out of the way. I just hope putting it back will be as easy.

So, buoyed with the negligible enthusiasm which stems from having reluctantly removed the diff, I went on the hunt for replacement gears, and once again in the US they are easy to come by, but not so easy in Oz. They are available from a few auto parts companies specialising in American vehicles, (eg [here](#) and [here](#)) but to be sure I got Oka compatible components, I acquired a second hand set from Paul Nott at [East Coast Oka](#) in Melbourne (which turned out to be a lot less worn than my original set). With some replacement oil seals on the way from Oka in Perth I am now able to start GARP, the *Great Axle Reconstruction Project*.

GARP [Part 2](#) documents the axle reassembly phase from this low point to being ready to roll.

Don't you just love it when the manuals say "To reassemble, simply reverse the disassembly procedure"?