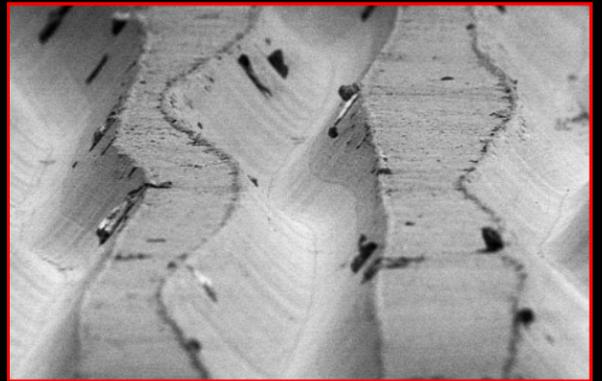


# The importance of zero play in the bearings of a Hi-fi tonearm.

Rega is famed for its tonearm designs. One unique characteristic of these designs is the achievement of near frictionless movement horizontally and vertically whilst having no measurable free play in the bearing assemblies (and in reality one or two microns of pre load). So, why has Rega spent over thirty years and invested so heavily in this area of tonearm design where the removal of even microns of movement has been pursued?

Look at a stereo vinyl LP under an electron microscope and you will see microscopic ridges and bumps that the diamond stylus of the pick-up cartridge tracks and reads. The length of a ridge depends on its frequency. The height is its amplitude.



Towards the centre of an LP, a 10Khz signal is just 26 microns long and if it's very quiet it may be less than 10 microns high. If your tonearm has 10 microns of movement within the bearing assemblies (and even very expensive tonearms usually have much more play and movement), reading the bumps will be difficult and musical vibration will be lost in arm movement.

It is impossible to quantify exactly the musical distortion or loss of measured information. This is due to the random nature of pivot or bearing movement. However, it is easy to see that accurate measurement or tracking of a 10 micron bump is not possible if the tracking stylus can move randomly at least the same distance that it is trying to measure.

**Workings :** Towards the centre of the playing area on an LP.

At 0.15m diameter the groove speed is :

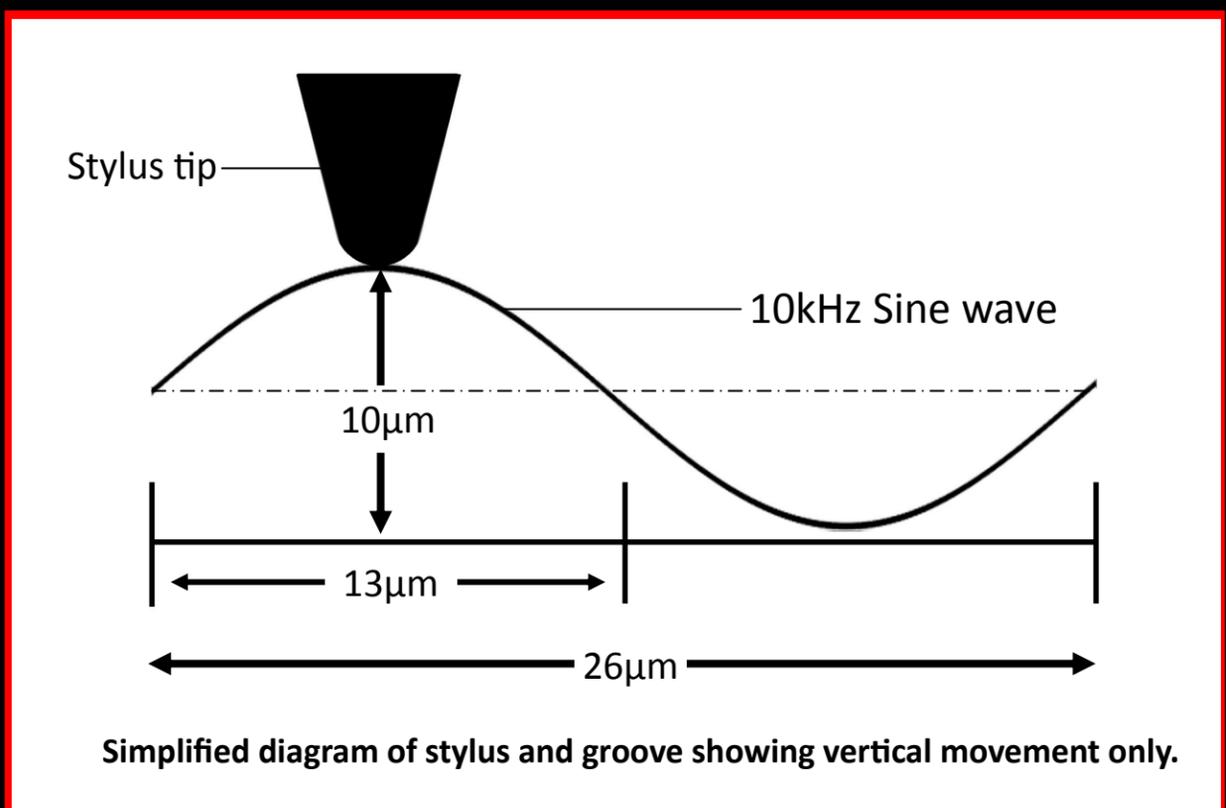
$$0.15 \times \pi \times 0.55 \text{ revolutions /sec} = 0.26\text{m/sec (linear velocity).}$$

$$\text{Wavelength} = \text{velocity of wave} / \text{frequency}$$

$$\text{One cycle } \frac{0.26}{10\text{kHz}} = 0.000026\text{m} = 26 \text{ microns } (\mu\text{m})$$

The calculated 10 kHz signal wave length is 26 microns.

Therefore a single 'bump' is half of this.



*This principal will be further discussed in the forthcoming book due to be released in 2015, an anecdotal story of Rega entitled "The vibration measuring machine" it will discuss all engineering and scientific areas of turntable design as understood by Rega.*

