Preliminary Results using the Martin Farmer Worm Block

Here are some preliminary results for Martin Farmers new worm block. This data was captured using a pre-production prototype block that is inferior to the planned production block in two main ways.

1. This block was machined incorrectly which placed the worm 2mm offset towards the gearbox. This means that the worm was running on a 'virgin' part of the gear, not the surface that I have worn in. It also meant I had to space the gearbox out from the mount using some washers in order to fit the Oldham coupling.
2. The prototype block does not have the worm end float bearing pre-load compensation that the final block will have. Without this, it is possible to set the pre-load as I did on during the day, then at night when the mount cools, everything shrinks and the preload increases. I found the preload had increased to the point that the bearings became 'notchy' when turned by hand. The final block will not suffer from this problem.

All the data was captured using the standard steel worm that ships with the mount. I also reused the bearings that I had previously fitted to the Losmandy blocks; these were replacements for the Losmandy supplied units.

The setup I used was a SV4 102mm f/6.25 refractor with a QHY5 autoguider head. The data was captured using PEMPro.

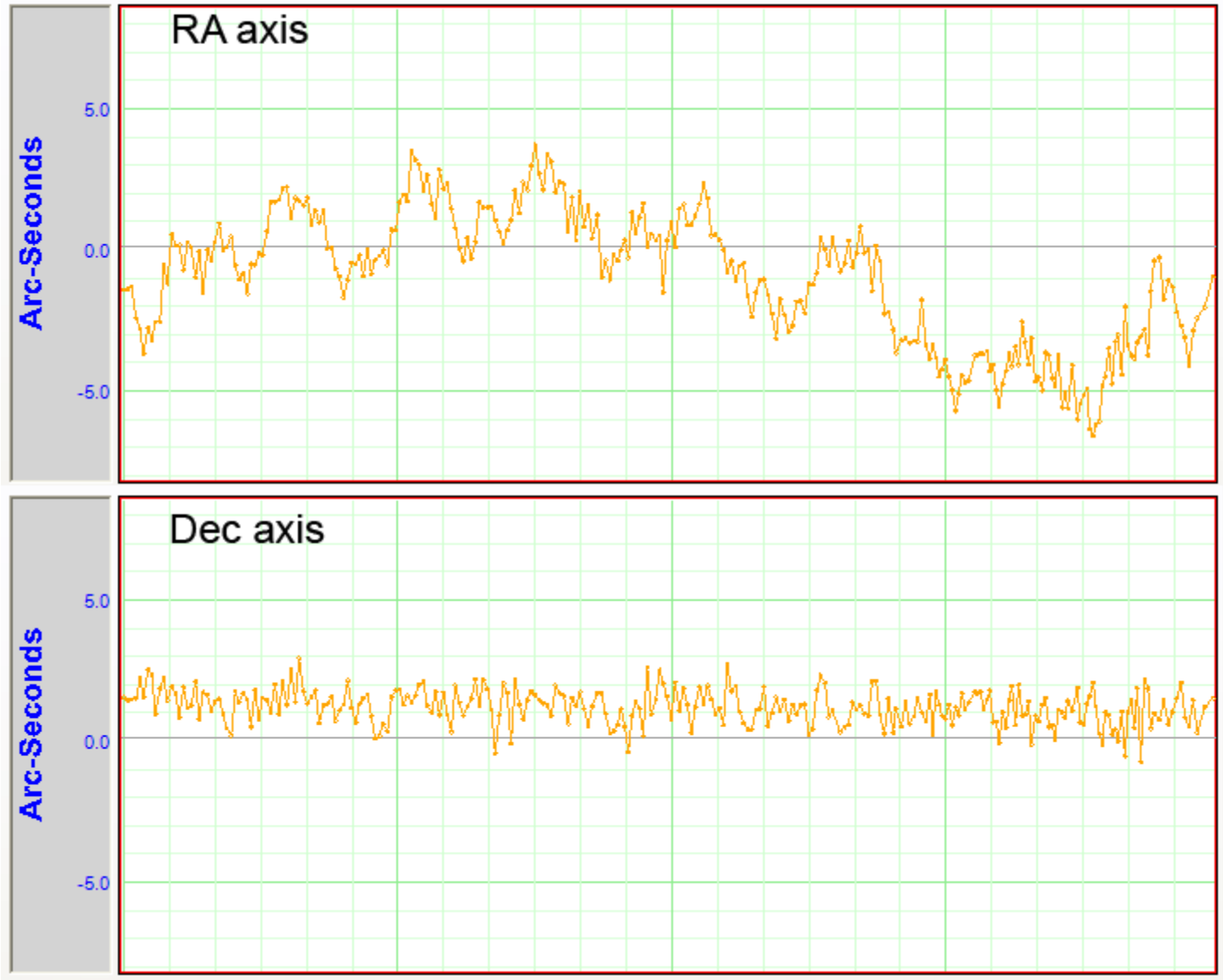
Mark Crossley, July 2008

Update, August 2008.

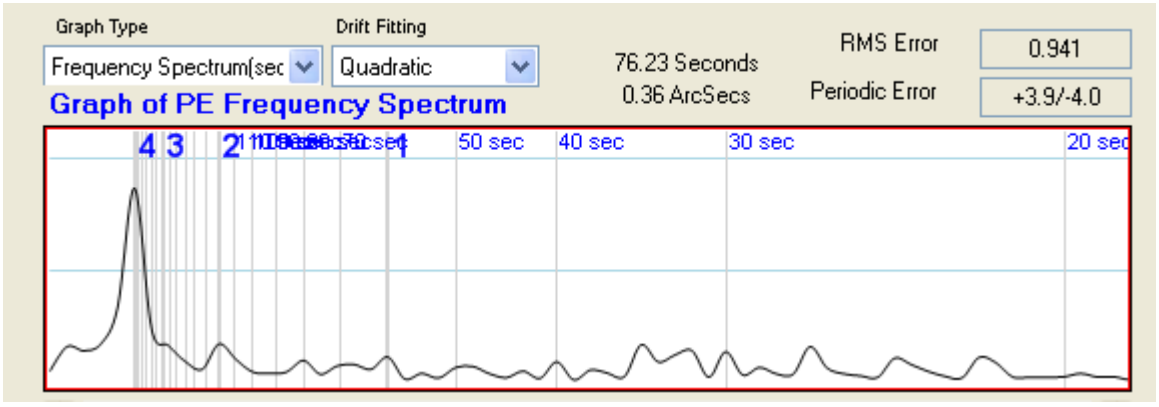
I received a new Brass high precision Losmandy worm from Greg Nowell. I fitted this to the prototype MFB block with the same bearings used for the steel gear. At the end of this document you can find the raw RA and Dec plots together with a frequency analysis from PEMPro.

RAW PE with the new block

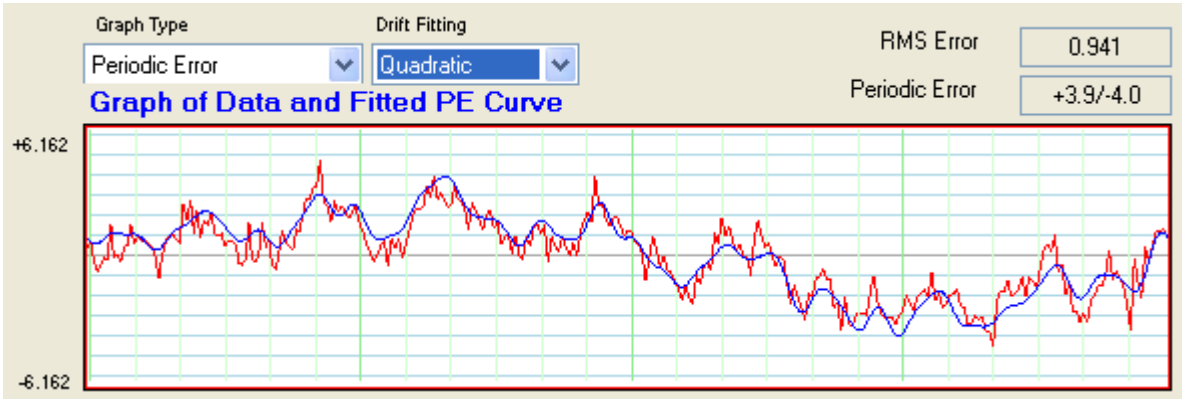
The two graphs below show a typical worm cycle of the steel worm in the new block, I have included the Declination axis to show the effect of seeing on the curve.



No 76 second error is present – result.



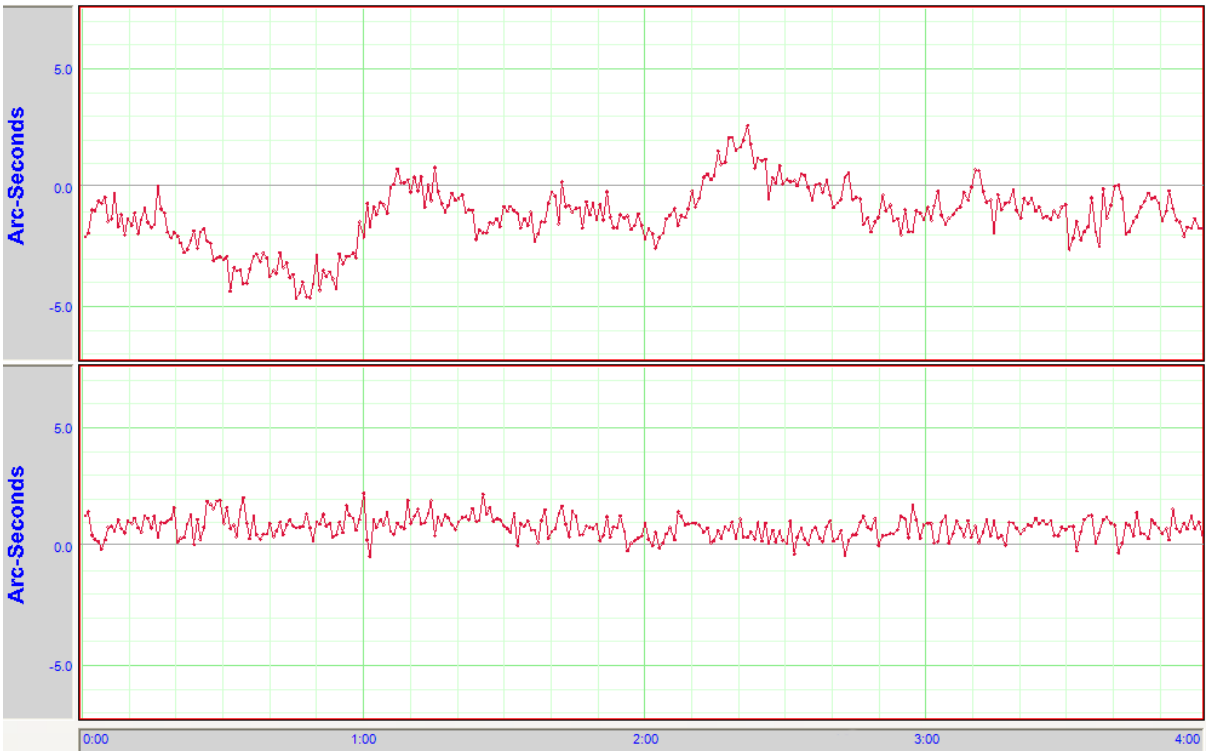
PEMPro's analysis of the raw PE.



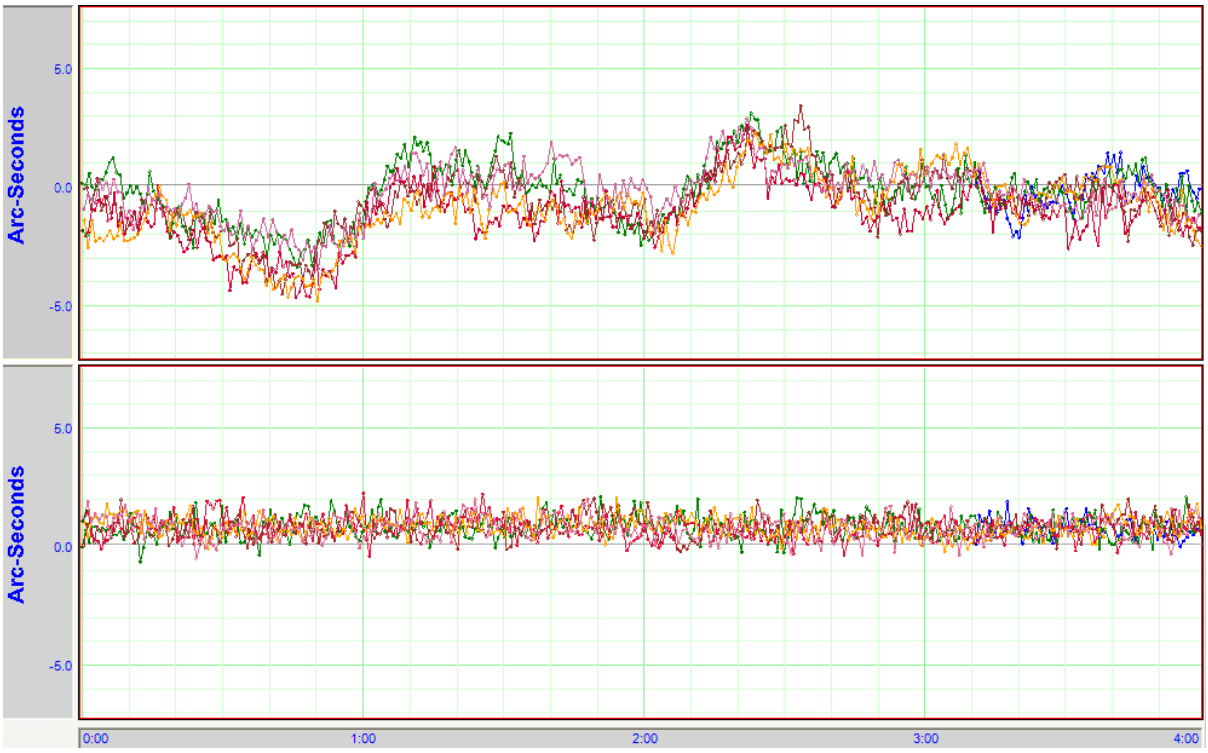
I then tried training the PEC on Gemini; unfortunately I only had enough clear sky to capture one and half cycles of data – not enough to perform any analysis. So here is just the raw data of the new block with PEC switched on in Gemini.

New Losmandy Brass Worm

A Losmandy brass worm was fitted to the same prototype block and bearings to compare it with the steel version. As you can see below the characteristics are different. The total PE is lower, and it looks less ‘noisy’ than the steel worm.



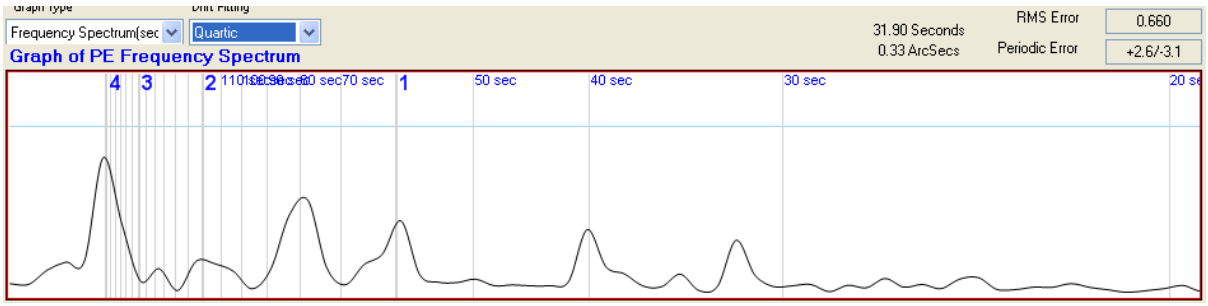
Overlaying multiple RA plots shows that whilst the general correlation is quite good, there is some deviation probably to non-periodic terms...



Finally the frequency analysis shows some interesting ‘features’.

There is quite a strong third harmonic at 80 seconds (not the 76 second thankfully) that was not present in the steel worm results.

Most of the errors lie on integer harmonics (1 = 4m, 2 = 2m, 3 = 80s, 4 = 60s, 6 = 40s) however there is quite a strong component at 32 seconds that comes from the gearbox. The value of this is 0.34 arcsecs, or nearly 40% of the primary frequency error. I suspect that this is the major contributor to the inconsistencies in the multiple overlay plot above.



Note the vertical scale on the graph shows a horizontal line at 1 arcsec.