

of this once replicas are complete and tested, such a design appears likely to perform considerably better than the kind of regulator available to the scientific world of Harrison's day, and if eighteenth century astronomers such as Nevil Maskelyne had listened to Harrison and had encouraged him to complete his regulator and made others, eighteenth century science would have had a time standard not seen until the 20th century. But here is where another myth has appeared in recent times. Some commentators now suggest that even if the Harrison design was capable of such a fine performance, the eighteenth century scientific community actually *didn't need* a better time standard and were content with what they had! This is reminiscent of the child who, when told he can't have something, then remarks that he didn't want it anyway!

The scientific community *certainly* wanted better timekeepers - we know that throughout the history of science, practitioners like Maskelyne were always looking for better, more accurate instruments. Specifically in Maskelyne's example, he and the Board of Longitude on which he sat, were constantly searching for improved designs for pendulum regulators. And they were prepared to spend considerable sums of money to encourage improvements, a practice which continued throughout the nineteenth century with George Airy and into the twentieth century. Every observation on the transit instrument required not only accurate measurement of declination, using the degree scale on the instrument, but Right Ascension - the sidereal time at which the body being observed transited the meridian. The more accurate the regulator, the more accurate the observation, and errors in the regulator translated directly into errors of star position, so accurate timekeeping was vital, especially given variable weather conditions in the UK and the likelihood of many days between checking the clock by observation of clock stars.

The Theory

The excellent articles by John Haine and Andrew Millington provide a fascinating mathematical model for how Harrison's pendulum clock system works, and appear to confirm that his thinking was sound. However, whether Harrison himself applied much in the way of complex mathematics in his work is doubtful. It seems more likely that, for the most part, his philosophy and practical designs were in fact based, to use his own words, "...on Reason and Experience".
