

John Harrison, Clockmaker Extraordinaire

English Instrument Maker. Born: Foulby, Yorkshire, March, 1693; Died: London, March 24, 1776

In the latter half of the 17th century, continuing through to the latter half of the 18th century, the determination of one's longitude was a major problem. Latitude is fairly straight forward to compute (see my blog on Friday, July 31st) and had been done for over 1 000 years. Longitude, however, was hard to compute and no known method to get any sort of accuracy was available to the Western World at this time. The British Government arranged for a prize, of up to 20,000 pounds, to whomever to "crack" this case. There were many attempted solutions including one that had ships anchored around the world every 10 degrees of longitude. The one that seemed to have the most possibility was one which needed an accurate measure of time. The best clockmaker in Europe at that time, John Harrison, leaped into the breach.

I urge my readers to read two books: the first, *Longitude*, by Dava Sobel. This book is a great look at the work that John Harrison put into his solution of the problem. The second book is a controversial book, *1421* (and the next volume, *1434*), by Gavin Menzies. These books are about the great ocean voyages by the Chinese in these two years. It is controversial because of Menzies' conclusions that North America, Australia, and South America were all charted by the Chinese before Columbus (and others) in 1492 and beyond. He also claims that Columbus, and Magellan and others had charts and knew where they were going. Whether you agree with his conclusions or not, there is quite a lot of evidence that the Chinese knew how to calculate longitude early in the 15th century. I'll leave my readers to judge who is correct.

With the problem of longitude, if you knew the time at Greenwich, England, and the time at your point on the earth, then you can compute your longitude. For instance, as I write this it is 12:14 PM here, and 8:14 PM at Greenwich, England. The difference of 8 hours is multiplied by 15 degrees longitude to put my address at 120 degree longitude. Actually, I am a bit further west at 123° 38 ' 13.31 " West and 48° 47' 50.89 " North. The extra 3 degrees comes from the fact that most of British Columbia takes the time from the 120° longitude although the sun arrives about 12 minutes later on Vancouver Island than 120°.

Harrison, son of a carpenter and self-trained, began on the problem in 1728 with a series of 5 clocks, each better than the others. The clocks were mounted so that they could take the sway of a ship and not lose time. He used two metals that expanded differently so that the pendulum's period was not changed. There was also a mechanism that allowed the clock to continue while it was being wound. His clocks were more accurate at sea than anything otherwise available on land. One lost less than one minute after 5 months at sea. The first four clocks were large (up to 66 pounds), but the fifth was the size of a large watch.

The British Government were very poor at paying off Harrison. Although he met their requirements, they kept changing the rules. There seemed to be some class discrimination here as Harrison was a mechanic and not a member of the Royal Society. When Captain James Cook came back from his first or second voyage he confirmed that it could be used for longitude. Finally, with the urging of King George III, he received his money in 1765, at the age of 72!

Harrison's chronometer was used for the next 150 years until radio communication came about.

Extra puzzle: Captain James Cook went on three ocean voyages, he died on one of them. Which one?