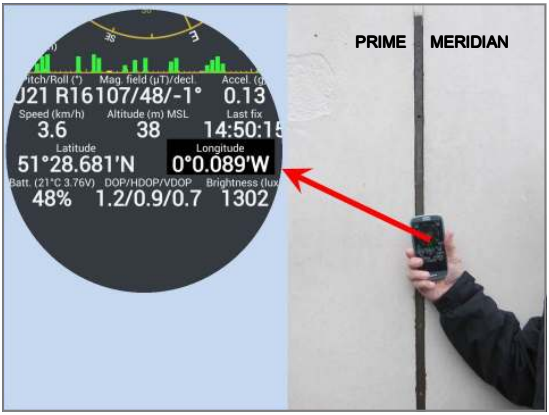
THE PRIME MERIDIAN

When you visit the Royal Observatory in Greenwich, you hear a great deal about the 'prime meridian', which is a north-south line representing zero degrees of longitude. It plays a vital part in navigation, being the 'zero' point for the measurement of longitude, for maps throughout the world. Determining your longitude, while out of sight of land, was a major obsession in both the seafaring and scientific communities for hundreds of years. A fascinating account of this problem, and its solution, is described in the excellent book '*Longitude*', by Dava Sobel, which was also made into a television documentary.

Nowadays, it is easy to find both your latitude and your longitude using a hand-held GPS receiver, a smart phone, or a SatNav system. How the GPS system works was described in *Bosham Life* (November 2010, page 11). The photograph shows me holding my smart phone in front of a marker for the prime meridian, in Greenwich. I expected it to give my longitude as zero degrees, but it didn't! According to the GPS system on the phone, the prime meridian is more than 100 yards to the east! So what is going on?



The discrepancy is due to the fact that there isn't a single standard for defining latitude and longitude—there are hundreds! By 1911, the Greenwich meridian had been accepted as the prime meridian for the whole world. However, relating the maps of an individual country or region to a standard system of latitude and longitude is not only difficult, it is nearly impossible. The earth is approximately spherical, but maps are flat. They are fitted as closely as possible to the surface of the earth in one region, but when fitting them to a standard system of latitude and longitude, there are bound to be slight discrepancies.

The differences between the coordinate systems used by different maps really didn't matter until recently. When the GPS system was introduced in the 1980s, it was realised that having dozens of 'local' systems of latitude and longitude for different countries wasn't going to work. A single coordinate system had to be devised, which would give the best results for every part of the world. It is known as WGS 84 (World Geodetic System 1984). Each local mapping system has been aligned as closely as possible to the new system, using a reference point known as a 'datum', but the fit can never be exact. According to Wikipedia, 'the WGS 84 meridian of zero longitude is ... 102.5 metres east of the Greenwich meridian...'

So, does the prime meridian run through the Royal Observatory, Greenwich? It depends on what map you are using. The datum for most Ordnance Survey maps is 'OSGB 1936', in which the Greenwich meridian is, indeed, zero degrees. Other maps, using 'WGS 84' as the datum, or any device which is based on the GPS system, will show a discrepancy comparable to the one which I found.