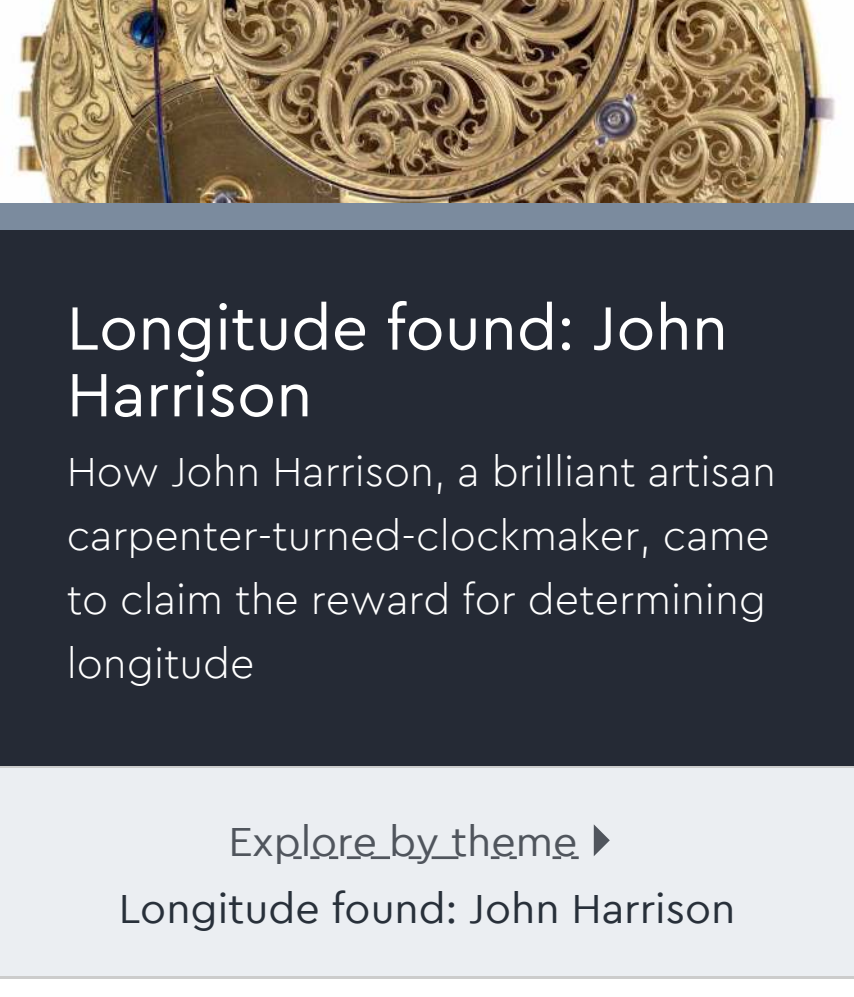


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Longitude found: John Harrison

How John Harrison, a brilliant artisan carpenter-turned-clockmaker, came to claim the reward for determining longitude

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Longitude found: John Harrison

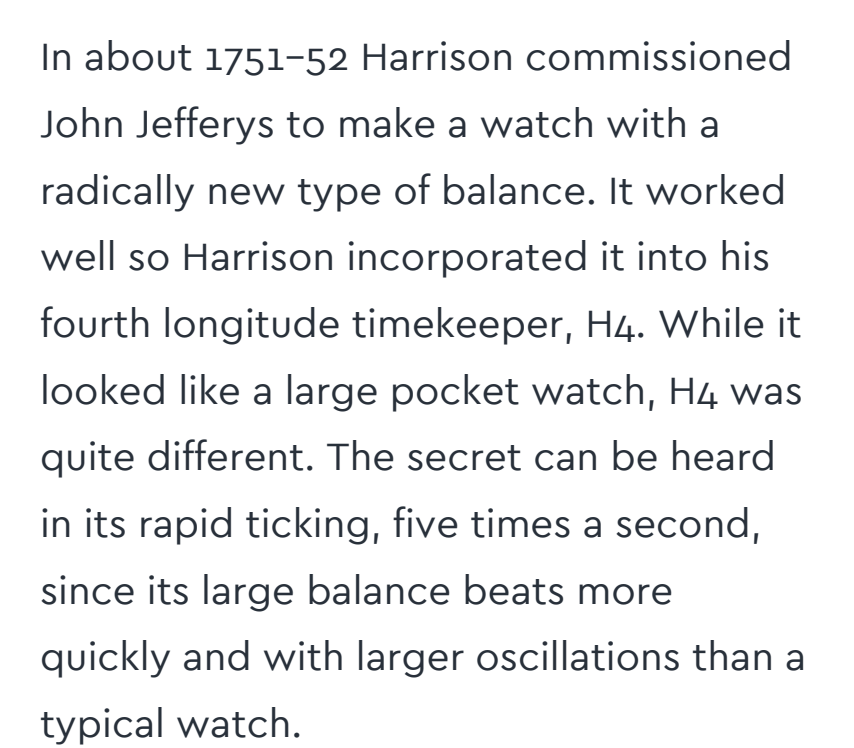
Longitude found: John Harrison

Who was John Harrison, and how did his inventions help to solve the problem of finding longitude at sea?

John Harrison came to London in about 1727–28, looking for support and the rewards promised by the 1714 Longitude Act. He began with Edmond Halley, second Astronomer Royal and a Commissioner of Longitude, who received him warmly at Greenwich but felt unable to judge his work and so sent him to clockmaker George Graham.

Harrison's first clock, H1

For the next few years Harrison worked in Barrow upon Humber on a marine timekeeper, now known as H1, probably helped by his brother, James. After testing the clock on the river Humber, Harrison proudly brought it to London in 1735 and installed it in Graham's workshop to be shown to London's scientific community. At last, it seemed, here was a timekeeper that might be used to determine longitude at sea. A trial was called for.



John Harrison's H1 Marine Timekeeper

A trial at sea

In May 1736, Harrison and H1 were taken aboard HM ship Centurion, about to set sail for Lisbon. The voyage out started poorly for both Harrison and his clock. But he had his machine going more reliably by the time they reached Lisbon, where it was transferred to the Orford for the return, with much better results. As they neared England, Harrison announced – correctly – that a headland the officers had thought was the Start was in fact the Lizard: they were sixty miles off course and in danger.

The Board of Longitude gathers

Back in London, the results of the Lisbon trial suggested that Harrison might qualify for a reward under the Longitude Act and the Admiralty requested a formal meeting of the Commissioners of Longitude. Accordingly, eight of them assembled on 30 June 1737 to discuss Harrison's 'curious Instrument'. The Commissioners agreed a payment of £500, £250 to be paid up front, to allow Harrison to build an improved clock, which he promised to do within two years.

H2 and H3

Harrison moved to London soon after the Lisbon trial and within the two years promised he finished his second sea-clock, but H2 never went to trial after Harrison discovered a fundamental flaw.

Harrison began work on H3 in 1740. He worked on it for nineteen years. It was running and being tested within five years but it became clear that the clock would struggle to keep time to the accuracy desired, forcing him to make changes and adjustments.

H4, The sea watch

In about 1751–52 Harrison commissioned John Jefferys to make a watch with a radically new type of balance. It worked well so Harrison incorporated it into his fourth longitude timekeeper, H4. While it looked like a large pocket watch, H4 was quite different. The secret can be heard in its rapid ticking, five times a second, since its large balance beats more quickly and with larger oscillations than a typical watch.

In 1761 the Commissioners gave permission for John's son, William, to prepare for a voyage to Jamaica to trial the watch. The trial seemed to go well. On the way out, William used it to predict an earlier landfall at Madeira than the crew were expecting, so impressing the captain that he asked to buy their next timekeeper.

The Harrisons and the Board of Longitude fall out

It was back in England that trouble began. The Commissioners decided that the test had not been sufficient. This was the point when relations between the Harrisons and the Commissioners began to deteriorate. Harrison's friends and supporters began a propaganda campaign of newspaper articles, broadsheets and pamphlets.

A triple trial

In the meantime, however, other methods had been coming to fruition. John Harrison had enjoyed twenty years as the only serious contender but by the 1760s two rival schemes had emerged that might challenge his claim: lunar distances and Jupiter's satellites. Both would soon be put to test with H4.

The destination for the new trial was to be Barbados, with Nevil Maskelyne appointed as the astronomer in charge. Once at Barbados, they were to determine the island's longitude by observations of Jupiter's satellites in order to assess the two astronomical methods and the performance of H4, which would travel separately with William Harrison. Maskelyne, departed England on the Princess Louisa in September 1763, arriving in Bridgetown in early November. Harrison sailed with H4 in March 1764, arriving in May.

Good times and bad

There was much to discuss when the Board met in February 1765 to consider the result. These confirmed that John Harrison's watch had kept time within the most stringent limits of the 1714 Act, its error being just 39.2 seconds or 9.8 miles (15.8 km) at the latitude of Barbados.

Their recommendation was that parliament award Harrison £10,000 when he demonstrated the principles of the watch, with the remaining £10,000 (less payments already made) to be awarded once it was shown that other makers could produce similar timekeepers. The Harrisons felt that the full reward was already due under the terms of the 1714 Act and the Commissioners had unfairly changed the rules.

The recommendations became law in a new Longitude Act of 10 May 1765. The trials were over. It was up to the Commissioners to bring the new methods into practice.

Harrison rewarded (but not by the Board of Longitude)

Relations did not improve between the Board and the Harrisons. The desire of the Commissioners to publish and share information contrasted sharply with Harrison's instinct to protect his methods. A series of disputed trials at the Royal Observatory further soured relations.

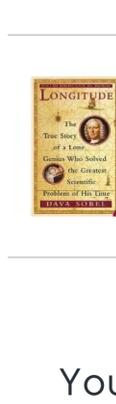
Harrison eventually received generous compensation, but not all that he felt he was owed, after Parliament ruled that he should be rewarded for his services to the nation, no doubt with the King's encouragement.

What made the search for a way to determine longitude so important? ▸

The Royal Observatory is open daily from 10.00 daily

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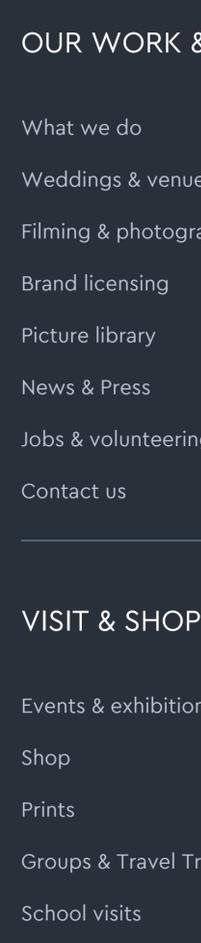
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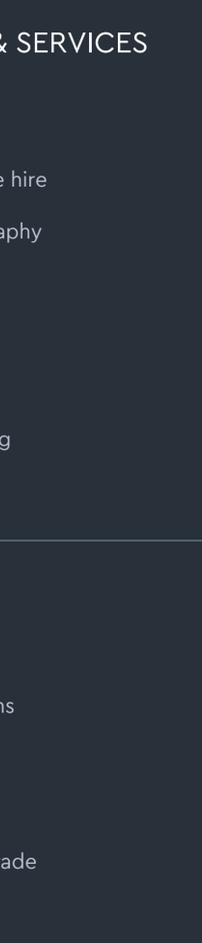
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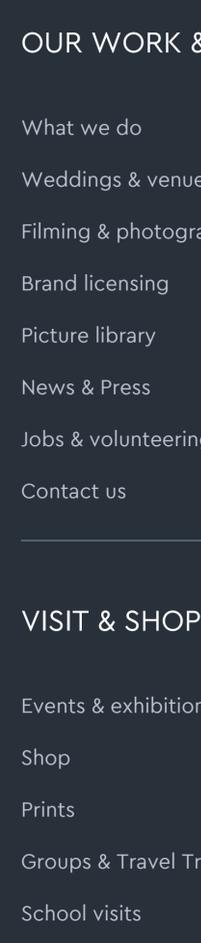
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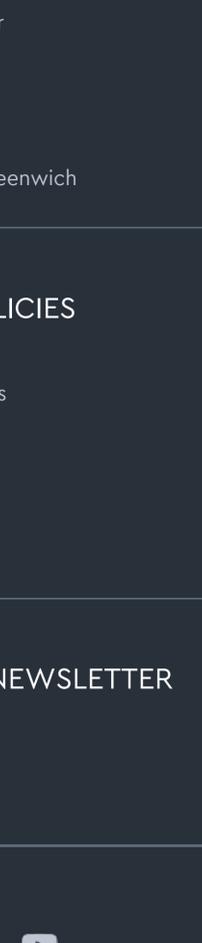
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