

Bringing the Tompion Regulator Clock Back to The Old Greenwich Observatory: An Appeal

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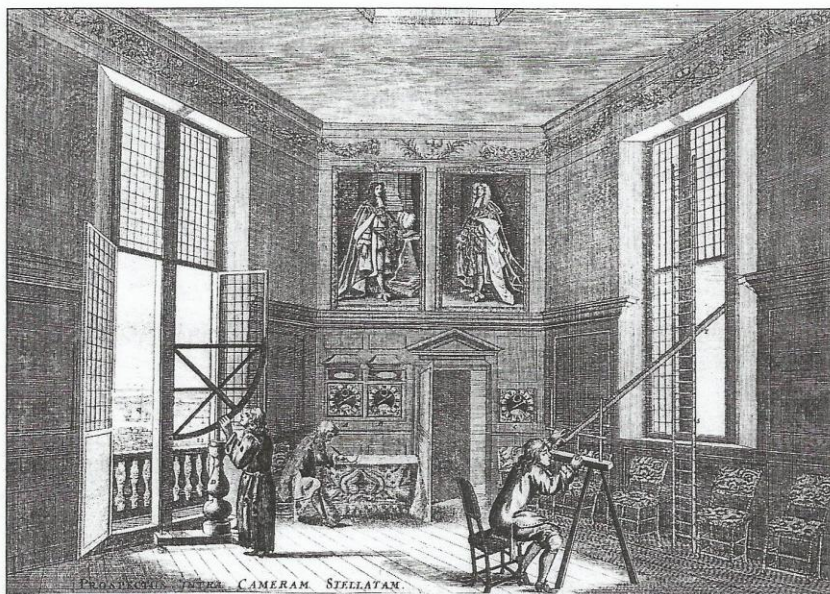


Fig.1 An engraving, made by Francis Place in 1676, of the 'Octagon Room' at the Old Royal Observatory, Greenwich. A and B mark the locations of the pair of Tompion year-going regulator clocks.

In 1676, two extraordinary clocks were built by Thomas Tompion, the leading clockmaker of the day. These year-going clocks were the most accurate time-keepers of the period, built specifically to test the hypothesis that the Earth rotated at a constant rate. One of the original Tompion clocks is now available for purchase. The National Maritime Museum has been offered first refusal, so that the clock may be returned to its rightful place. Funds are needed to bring this wonderful and historically important clock "home" to Greenwich.

The Significance of the Tompion Regulator

The Royal Observatory was founded in 1675 by Charles II "so as to find out the so much-desired longitude of places for the perfecting of the art of navigation".¹ The discovery of a reliable means for calculating longitude at sea was an international priority. Without this ability, it was nearly impossible for ships to navigate safely over the high seas. Thousands of lives and vast fortunes were at stake.

The first Astronomer Royal was appointed the same year.² His primary task was to produce a set of tables of the heavenly bodies, the first step in providing an astronomical solution to the Longitude Problem. But, before these

tables could be compiled, it was essential to establish that the Earth rotated at an even rate so he would have a constant figure as the basis of his measurements.

The newly-invented pendulum clock provided the first reliable tool with which the isochronism of the rotation of the Earth could be verified; and, in 1675, the Astronomer Royal commissioned a very special pair of year-going pendulum clocks from Thomas Tompion, the finest clockmaker in England.³ To help meet the necessary standards of precision, Tompion employed very long 13 ft pendulums, suspended *above* the clock movements (Fig.1). These beat every two seconds, rather than the usual one-second beat of contemporary pendulum clocks. Also, Tompion designed the clocks to go for a year on one winding.

In order to test the accuracy of the clocks, Flamsteed set a telescope on the balcony of the Octagon Room to observe the transits of *Sirius*, the Dog Star. The period between two transits provided Flamsteed with the exact length of one sidereal day which, in turn, could be used to calculate the Mean Solar Time the clocks were keeping. As he states in a letter dated 12 July 1677 to Robert Towneley:

... our clocks kept so good a correspondence with the Heavens that I doubt it not but they

would prove the revolutions of the Earth to be isochronical, which if guaranteed it will follow that the Equation of Days, which I have demonstrated in the Diatribe is altogether agreeable to the Heavens. I can now make it out by three months' continued observations, though to prove it fully it is requisite the clocks be permitted to go a whole year without any alterations ..."⁴

By the spring of 1678, Flamsteed had, indeed, proved his "Equation of Natural Days". As he reports to Sir Jonas Moore, the Observatory's great benefactor, who paid for the Tompion clocks as well as for most of Flamsteed's instruments:

My theory of the Equation of Days I looked upon but as a dream at first because one part on which it was founded, viz. the isochronicity of the Earth's revolutions, was only supposed, not demonstrated by me; but the clocks have proved that rational conjecture a very truth ..."⁵

For the next two centuries all astronomical research was based on Flamsteed's theorem that the Earth rotated at a constant rate, and it was not until the invention of the quartz-crystal clock that tiny variations were discovered.⁶

When Flamsteed died in 1719 his widow removed all the instruments from the Observatory, with the claim that they had been a personal gift to her late husband from Sir Jonas Moore.⁷ As a result, most of Flamsteed's original instruments have been lost - probably the victims of having been melted down or drastically remodelled, as is so often the case with obsolete scientific instruments. Flamsteed's sextant, quadrant, mural arc, seconds-pendulum clock, and all his telescopes and micrometers, have disappeared without trace. The clocks, in general, fared better than the instruments. His degree clock is currently on display at the Old Royal Observatory in Greenwich. One of Tompion's year-going clocks survives in the British Museum, and the other is currently owned by the Trustees of Holkham Hall in Norfolk (Fig.2).

The history of the Tompion clocks between 1744, when Flamsteed's wife Margaret died, and the present day is not altogether clear. At least one of the clocks seems to have been left to Flamsteed's nephew-by-marriage, James Hodgson, FRS, for he presented "the late Mr Flamsteed's clock, which stood in the Great Room of the Royal Observatory at Greenwich" to the Royal Society in 1736.⁸ A Mr Peckham was paid 7 guineas for the

manufacture of a new case.⁹ The clock, however, does not appear in the Society's inventory of 1827. The Holkham Hall Tompion is known to have belonged to the first Earl of Leicester of the second creation at least since 1842, as it appears in a list of family heirlooms drawn up on that date. Internally, the clock is inscribed with the date 26 January 1832 and the signature of Robert Hall, a local clockmaker from nearby Wells. Most scholars concur that the Holkham Hall Tompion is probably the one which belonged to the Royal Society which, by some means or other, came into the Coke family sometime around 1830.

The British Museum Tompion can be traced back only as far as a sale at Christie's on 19 July 1923. It was purchased by the well-known horologist and dealer Percy Webster, who paid £283. The clock was then bought from Mr Webster by an American collector, Mr Roland Taylor, for £300, but he subsequently sold it to the British Museum on 9 June 1928 for the same price. Reports on the earlier provenance of the clock differ. Some scholars have argued that the clock was offered for sale by the Lowther Family, who claimed to have had the clock since 1775. British Museum records, however, show that the clock was sold by the Herald's College.¹⁰

Neither of the clocks has survived in its original state. Both were modified by Tompion himself in 1678 when, dissatisfied with their running, he fitted two dead-beat escapements of his own invention, which we know were similar to the later French pin-wheel escapements. The Holkham Hall Tompion was later modified by an unknown clockmaker, possibly the Robert Hall who signed one of the motion wheels in 1832, so that it might run as an ordinary pendulum clock. Its escape wheel was changed to encompass the additional teeth required to accommodate a one-second pendulum, and the unusual top-mounted crutch for the original 13-foot pendulum was rehung behind the clock mechanism. Despite these minor alterations, however, the Holkham Hall Tompion remains overall in a better condition than its British Museum partner.

The case for an appeal

The Holkham Hall Trustees have given the Old Royal Observatory until June 1994 to raise the funds necessary to purchase the Tompion Clock. The Museum has already received a generous grant from the National Arts Collection Fund, and the Friends of the National Maritime Museum have indicated their willingness to contribute to the costs. This still leaves a substantial amount to

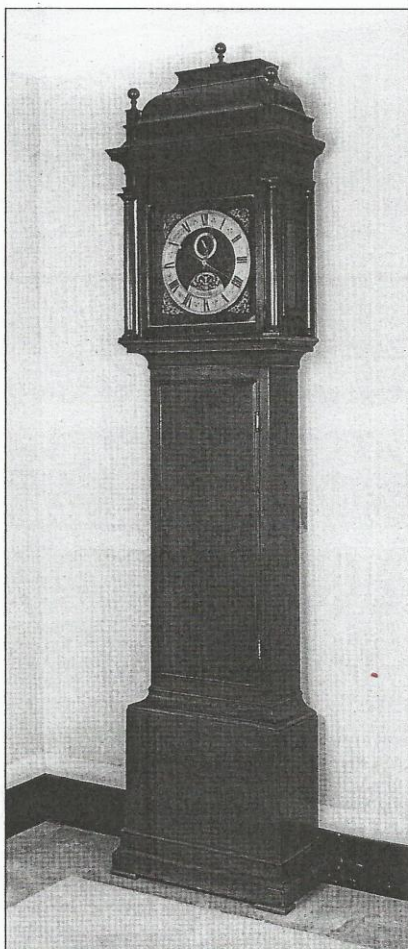


Fig.2 The Holkham Hall Tompion clock in its present case.

be raised, however. To this end, the Museum is looking to form a consortium of like-minded people – the “Friends of Tompion” – with the hope that a pool of small contributions might go some way towards meeting this sponsorship goal. The rationale is that if each member of the consortium were able to contribute a small sum, the balance would be shared amongst many and the Holkham Hall Tompion clock could be saved for the nation and returned to its original setting in Christopher Wren's Octagon Room at the Old Royal Observatory.

The response to the Museum's appeal has been very good, but we are still somewhat short of our goal. It would be a shame to have got so close, only to lose the Tompion Clock at the very last hurdle. If we are unsuccessful the clock will surely go to ground for another generation at least, with a very real chance that it would go abroad.

We are therefore actively seeking support from readers of the *Bulletin of the Scientific Instruments Society*. If you feel you can

help, or if you have suggestions about other possible sources for funding, please do not hesitate to contact either Dr Kristen Lippincott or Jonathan Betts at the National Maritime Museum (tel: 081-858-4422; fax: 081-312-6632).

Notes and references

1. Royal Warrant, 4 March 1674/5. For a full transcript, see E G Forbes, *Greenwich Observatory. The Royal Observatory at Greenwich and Herstmonceux 1675-1975. Volume 1: The Origins and Early History (1675-1835)*, London: Taylor and Francis, 1975, pp. 19-20. The original warrant is in London, Public Record Office, State Papers, Domestic Entry Book 44, p. 10.
2. *ibid.*
3. The best study of the clocks to date is by D. Howse, “The Tompion Clocks at Greenwich and the Dead-Beat Escapement”, *Antiquarian Horology*, VII, 1, December 1970, pp. 18-34 and VII, 2, March 1971, pp. 114-13, the second part of which has the valuable appendix of technical descriptions by Beresford Hutchinson (pp. 127-133). See also the resumé in D Howse, *Greenwich Observatory ... Volume 3: The Buildings and Instruments*, London: Taylor & Francis, 1975, pp. 125-126.
4. D Howse, *Greenwich Time and the Discovery of Longitude*, Oxford: Oxford University Press, 1970, pp. 33-40, esp. pp. 38-40. The quote is taken from the Royal Society Ms. 243 (Fl). Early visitors to the Observatory report that there was an inscription underneath one of the clocks, which read: *Hunc si respicies, nunquam te crastina fallet hora nec insidiis noctis capiere serenae* [If you look at this, tomorrow's hour will never fail you and you will never be overcome by the snares of a calm serene night]. It seems that Flamsteed may have suffered from a complaint common to many astronomers – falling asleep on the job! See *London in 1710 from the Travels of Zacharias Conrad von Uffenbach*, translated and edited by W H Quarrel and M Mare, London: Faber and Faber, 1934, pp. 20-27, esp. p.22.
5. D Howse, *Greenwich Time ...*, p.40 citing Royal Greenwich Observatory ms. 36, fol.54.
6. *ibid.*, pp. 173-87.
7. See Howse, *Greenwich Observatory*, 3, p. 6 citing the introduction to G B Airy, *Greenwich Observations*, London 1839. Flamsteed had argued that the clocks and instruments were his on a previous occasion when Sir Issac Newton, then President of the Royal Society, was trying to move Flamsteed towards publication of his *Historia Coelestis Britannicae* with threats of having him dismissed from his post. Edmond Halley also tried to secure the clocks and instruments, in order to ensure that they would be *in situ* when he took over the position of Astronomer Royal.
8. See D Howse, “The Tompion Clocks ...”, p. 119.
9. *ibid.* citing the Royal Society Journal Book, 9 December 1736.
10. *ibid.*, pp. 121-122.