

N° 57

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**ALDRED & SON**

**MARINE CHRONOMETER OF 8-DAY DURATION**



Circa 1880

Height 9" (23cm), Width 8 ¾" (22cm), Depth 8 ¾" (22cm)

Signed Aldred & Son, Gt Yarmouth, et numbered 2775

Bibliography: Brian Loomes, *Watchmakers and Clockmakers of the World Vol 2*; Tony Mercer, *Chronometer Makers of the World*











## 8-DAY MARINE CHRONOMETER

Signed Aldred & Son, circa 1880

Brass movement, polished, decorated, molded pillars, chain/fusee, Earnshaw-type spring detent escapement on a platform, Poole's auxiliary compensation bimetallic chronometer balance with 4 screws and 2 weights, freesprung blued helical balance spring.

Silvered dial, signed Aldred & Son, Gt Yarmouth, numbered 2775; inlaid radial Roman hours, large auxiliary seconds, auxiliary 8-days power reserve indicator, spade gold hands.

Mahogany case, brass inlays, applied bone shield indicating Aldred & Son, Gt Yarmouth, 2775, outer handles, three body with lid and glass, brass gimbals and bowl.

Original ratchet-winding key.

Size of the case: Height 9" (23cm), Width 8 3/4" (22cm), Depth 8 3/4" (22cm)

Together with its repair rate certificate by the Thomas Mercer workshop, dated July, 6, 1982.





## Chronometer Makers

2-Day Marine and 2-Day Greenwich.

8-Day Marine and 8-Day Greenwich.

2-Day Survey and 8-Day Observatory.

8-Day Household Chronometer Clocks.

High Quality Chronometer & Clock Repairs.

Mean Solar & Sidereal Rating.

Valuation, Dating and historical information.

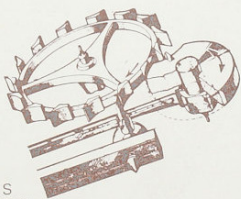
Directors:

F. A. Mercer, F.B.H.I., T.G. Mercer, F.B.H.I., F.I.E.I., J.L. Mercer  
T. A. Mercer, K.J. Coleman, B.Sc.(Eng), F.I.Mech.E., F.I.E.E.  
D.E. Bryan, B.C. Strand, F.C.A.

Ref. 20850.026



BCS  
APPROVAL  
No. 0069



## Thomas Mercer

*Maker of Chronometers since 1858*

Eyewood Road - St. Albans - Herts  
Telephone St. Albans 55313/54356/68273  
Telex 27514

## Thomas Mercer

THOMAS MERCER, the founder of the Company, was born in 1822 at St. Helens, Lancashire, England, one year after Napoleon died in St. Helena. He lived to be 78 years old and died in Paris in 1900. He was a watchmaker who learnt his craft the hard way and in 1854 decided that the future of watch making in England was on the decline because the English watchmakers, who were supreme at the time, refused to accept modern production machinery. He therefore came down to London by stage coach to buy a ticket to America. Happily for us he had to wait a few days for a berth so decided to explore Clerkenwell, the watch and clock centre in London. He saw an advertisement in the shop of John Fletcher, an outstanding chronometer maker. He went in, was given the job and then cancelled his passage to America. After 4 years he decided he was able to start on his own and so founded the firm of Thomas Mercer in 1858. Since his death in 1900 the Company has developed and made every piece of the marine chronometer, guided by his son Frank Mercer (1882-1970), and now by his two grandsons, T. G. & F. A. Mercer. Thomas Mercer Limited still makes chronometers of the highest quality for Marine, Surveying and for the Home. These chronometers together with many other linear measuring instruments are sold throughout the world and so help to carry on the skills and traditions of the British craftsman.

## REPAIR RATE CERTIFICATE

This is to certify that *Eight Day Chronometer*  
*N<sup>o</sup> 2775 by Aldred + Son*  
has been repaired by us on *July 6 82* and  
was tested and inspected and conforms to  
standards of quality and accuracy acceptable  
for its age and design.

### DAILY RATE

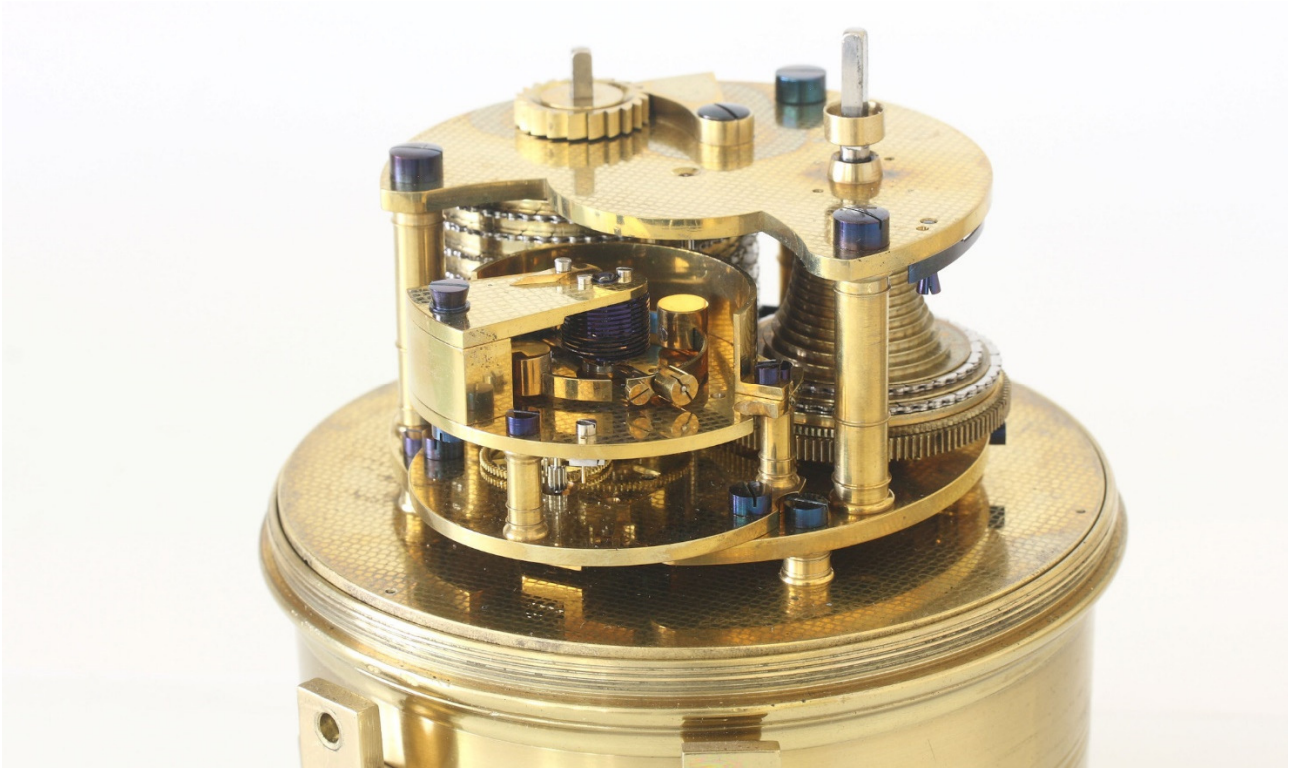
*+ 1.0* SEC. PER DAY

REMARKS *Rated at 20 °C*

SIGNED

*R. Matthews*

BRITISH CALIBRATION APPROVED No 0069





## THE INVENTION OF THE MARINE CHRONOMETER IN THE 18th C.

Until the mid-1750s accurate navigation at sea out of sight of land was an unsolved problem due to the difficulty in calculating longitude. Navigators could determine their latitude by measuring the sun's angle at noon (i.e., when it reached its highest point in the sky, or culmination). To find their longitude, however, they needed a time standard that would work aboard a ship, and that would have to be a precision mechanical clock.

The creation of a timepiece which would work reliably at sea was difficult. Until the 18th Century the best timekeepers were pendulum clocks, but both the rolling of a ship at sea and the up to 0.2% variations in the gravity of Earth made a simple gravity-based pendulum useless both in theory and in practice.

The first true chronometer was the life work of one man, John Harrison (1693-1776) (fig.1), spanning 31 years of persistent experimentation and test that revolutionized naval navigation enabling the Age of Discovery and Colonialism to accelerate (fig.2).



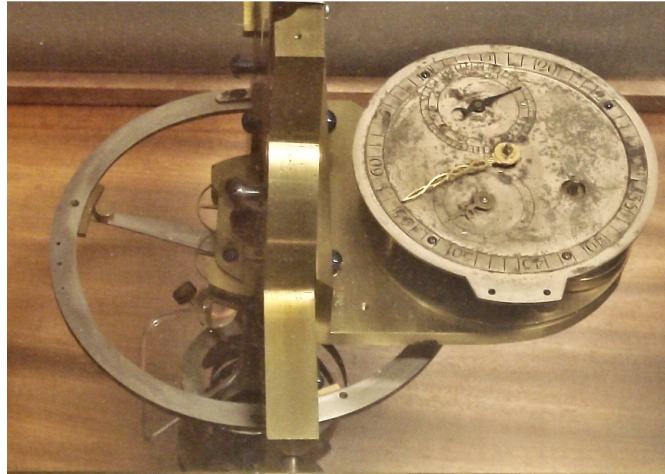
**Fig.1. P.L. Tassaert's half-tone print of Thomas King's original 1767 portrait of John Harrison, located at the Science and Society Picture Library, London**



**Fig.2. Harrison's « Sea Watch » finished in 1761**

The purpose of a chronometer is to measure accurately the time of a known fixed location, for example Greenwich Mean Time (GMT). This is particularly important for navigation. Knowing GMT at local noon allows a navigator to use the time difference between the ship's position and the Greenwich Meridian to determine the ship's longitude. As the Earth rotates at a regular rate, the time difference between the chronometer and the ship's local time can be used to calculate the longitude of the ship relative to the Greenwich Meridian (defined as  $0^\circ$ ) using spherical trigonometry. In practice, an error of one second equals 600 yards and a minute equals 6 nautical miles. In practical terms, a nautical almanac and trigonometric sight-reduction tables permitted navigators to measure the Sun, Moon, visible planets, or any of 57 navigational stars at any time that the horizon is visible.





**Fig. 3. Pierre Le Roy' marine chronometer, 1766**

About the same time in France, Pierre Le Roy (1717-1785) invented in 1748 the detent escapement characteristic of modern chronometers. In 1766, Pierre Le Roy created a revolutionary chronometer that incorporated a detent escapement, the temperature-compensated balance and the isochronous balance spring: Harrison showed the possibility of having a reliable chronometer at sea, but these developments by Le Roy are considered to be the foundation of the modern chronometer. The innovations of Le Roy made the chronometer a much more accurate piece than had been anticipated. (fig.3).



**Fig.4. Ferdinand Berthoud, Chronometer N° 24, 1782**

Ferdinand Berthoud (1727-1807) in France, as well as Thomas Mudge in Britain also successfully produced marine timekeepers. Although none was simple, they proved that Harrison's design was not the only answer to the problem (fig 4).

The greatest strides toward practicality came at the hands of Thomas Earnshaw and John Arnold, who in 1780 developed and patented simplified, detached, "spring detent" escapements, moved the temperature compensation to the balance, and improved the design and manufacturing of balance springs. This combination of innovations served as the basis of marine chronometers until the electronic era.

Although industrial production methods began revolutionizing watchmaking in the middle of the 19th century, chronometer manufacture remained craft-based much longer. Around the turn of the 19th to 20th century, Swiss makers such as Ulysse Nardin made great strides toward incorporating modern production methods and using fully interchangeable parts, but it was only with the onset of World War II that the Hamilton Watch Company in the United States perfected the process of mass production, which enabled them to produce thousands of their superb Hamilton Model 21 & Hamilton Model 22 chronometers of World War Two for the United States Navy & Army and other Allied navies. Despite Hamilton's success, chronometers made in the old way never disappeared from the marketplace during the era of mechanical timekeepers. Mercer of St. Albans in Britain, for instance, continued to produce high-quality chronometers by traditional production methods well into the 1970s.

Without their accuracy and the accuracy of the feats of navigation that marine chronometers enabled, it is quite likely the ascendancy of the Royal Navy, and by extension that of the British Empire, would not have occurred; the formation of the empire by wars and conquests of colonies abroad took place in a period in which British vessels had reliable navigation due to the chronometer, while their Portuguese, Dutch, and French opponents did not. For example: the French were well established in India and other places before Britain, but were defeated by naval forces in the Seven Years' War.