The invention of **precision** timing

Once in short supply, down-to-the-second timing was nonetheless essential for survival at sea and was a major factor in determining which of the great powers ruled the waves. It was this era that saw the appearance of the regulator, with its off-centre hour and seconds hand and a minute hand in the middle. The Portuguese Régulateur takes up the tradition.

By Urs Egginger

Separate displays for the hours, minutes and seconds are characteristic features of a regulator. This was the first type of watch that could be relied upon to keep time accurately at sea, and it was crucial to marine navigation.

Photo: maatjesdesign, van Grondel & Frei; requisites: Meridian Galerie Chr. Belser

The history of modern precision timing began with a bang – a big one, with some dire consequences. On 27 September 1707, a Royal Navy fleet under the command of Sir Clowdisley Shovell set out from Gibraltar to return to its home base in Portsmouth. On the way, the fleet ran into violent Atlantic storms that stretched Her Majesty's seamen to the limit. Visibility was as low as morale.

But on the evening of 22 October, according to calculations made by the fleet's navigators, they must almost have reached their goal. At any moment, they were expecting the coast of England to appear, with the familiar lights of the harbour.

And then it happened. Without warning, the first of the ships to run into the dreaded cliffs of the Scilly Isles, just off the southwestern coast of England, was the Association, with 650 men on board. They had no chance to warn their


IWC
SCHAFFHAUSEN
REGULATEUR
12
3
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9
MADE

comrades. Three more ships ended on the rocks and 1600 seamen died. A mere 26 of them survived a maritime disaster which, at that time, was of even more terrifying proportions than the loss of the Titanic 205 years later. For the loss of the fleet was due entirely to a navigational problem for which, back then, there was no solution.

The helmsmen had only been a few miles out. However, after weathering the storms, they had had no way of knowing how far away they really were from the coast. But they were not at fault. With the instruments standard at the time – charts, compass, sextant and log – it was simply not possible to determine a ship's longitudinal position with any degree of useful precision.

The repercussions of the catastrophe touched one of the kingdom's most sensitive nerves: the threat to its dominance of the world's oceans.

Every other famous mariner before them, from Vasco da Gama to Columbus, had been confronted with the same problem on their voyages of discovery. Using the stars, it was relatively simple for them to calculate their latitude. However, working out their exact longitude – i.e. their position, east or west, on the lines running from pole to pole – was a completely different matter. For hundreds of years, the problem had confounded some of seafaring's most monumental figures, such as Henry the Navigator, who had built a kind of academy for mariners on Cabo Sao Vicente, Portugal's southernmost plateau. The remains of the building can be seen to this day.

But the discoveries of his famous captains happened more or less by chance. Nevertheless, one thing was clear to him: the country that discovered a method of determining its precise position at sea would rule the waves. Two hundred years later, the British faced exactly the same existential question.

The rest of the story that followed the Scilly Isles disaster is well known. In the Longitude Act of 8 July 1714, Parliament promised the unimaginably huge sum of 20,000 pounds as a reward to anyone who was able to come up with a method of determining a ship's position reliably to within a maximum of half a degree of longitude. A working man in those days earned ten pounds a year. Twenty thousand pounds was equivalent to the value of more than ten sea-going ships and today would be worth a good two million euros.

> “The discoveries made by famous captains were more or less fortuitous.”

On his second major voyage, Captain James Cook had the advantage of using the K-1. This one-to-one replica of John Harrison's H-4 was built by the London watchmaker Larcum Kendall in 1769.

Photos: Getty Images

England's naval hero Admiral Nelson likewise relied on a regulator. This watch (below right), made by Josiah Emery about 1787, fetched the princely sum of 400,000 pounds in an auction at Sotheby's of London in 2005.

News of the jackpot awaiting the man smart enough to crack the conundrum reached the ears of John Harrison, a talented carpenter in northern England. Unlike his more learned rivals, who sought the answer in exotic solutions like the lunar-distance method, he was convinced that a vessel's longitudinal position could be determined precisely if the main parameter used by the navigator for his angular measurements was the exact time at his home base. In 1753, Harrison's H-4, the last, most compact and most advanced of his deck watches, passed a test voyage to Jamaica and back with flying colours and a deviation of just five seconds, easily within the required limits. This was shown by comparing it with observatory time, which is based on the passage of the sun across the meridian at exactly noon. This also meant that the instrument was capable of accurately measuring longitude, which requires the precise time.

This, effectively, was the sea change that opened the doorway to the modern age. Until this point, time had had an approximate value. The first portable watches, designed and built in Nuremberg around 1500, had merely a single iron hour hand. But even later timepieces such as pocket watches, wall and grandfather clocks failed to match the new demands of the precision age heralded by the H-4.

Down-to-the-second timing was now a valuable commodity that not only determined the balance of political power and the fate of ships' crews. Other areas where this new commodity, time, was in much demand included laboratories, later on the railway services, and, not least of all, watch manufacturers who had to regulate their new timepieces. The exact time was supplied by the observatories that monarchs and princes built and maintained as proof of their scientific curiosity and sovereign knowledge of astronomy. This was where time or, more precisely, countless different local times were determined by true solar time. Nevertheless, exact time remained some-

thing ephemeral, as unreliable as the clocks to which it was entrusted.

A small example should suffice to explain. In the Grand Duchy of Baden, at the onset of the railway age, the exact time was "obtained" by a railway employee from the local observatory before the departure of the first train in Mannheim. In other words, he would set a railway pocket watch to the second by the observatory time, take the watch with him on the train and then use it to set the clocks at all the stations in the Rhine valley or the Black Forest. Later, this function was taken over by telegraph lines. From that point on, even the watch manufacturers no longer had to go and get the exact time personally.

This era of technical and scientific upheaval saw the advent of a special kind of clock, the regulator, as it is known – the mother of all timepieces, because it could always be relied on to supply the correct time to others that were less accurate. Most of these were complex precision grandfather clocks, which had special compensating pendulums to offset the inaccuracies generated by changes in length inevitable with temperature fluctuations. Unlike the usual large pair of hands in the centre, however, the most striking feature on these clocks was the separation of the three conventional units of time – hours, minutes and seconds. Even spring-driven marine chronometers were occasionally equipped with such an arrangement.

The reason for the decentralized arrangement of the dial is

John Harrison

Although entirely self-taught as a clockmaker, carpenter and joiner, John Harrison (1693–1776) was one of the greatest of them all. He won the competition publicized by the British parliament in its Longitude Act of 1714 for a reliable method of determining longitude precisely with his design for a marine chronometer that kept the exact time back at home and thus gave seafarers a relatively dependable form of astronavigation.
After making several oversized movements, some with cogs made of wood that required no lubrication, he finished the H-4 in 1759. It was a clock in the form of a very large pocket watch (13 cm in diameter and weighing 1.45 kg) and was not only seaworthy but also reached the required standards of accuracy. On an 81-day voyage to Jamaica and back in 1761, it returned only five seconds out. His critics scoffed, claiming it was a fluke. Harrison was obliged to dismantle the clock before the Longitude Committee, hand over the design plans and nominate another clockmaker (Larcum Kendall) to rebuild the H-4 using the plans.
For years, he was locked in a battle for the 20,000 pounds reward that was his due. In 1765, he was given half this figure. Eight years later, after submitting the H-5, a further improved model built without the help of his original plans, intervention on his behalf by King George III secured him another 8750 pounds.
Harrison introduced numerous technical improvements to the art of horology. All his clocks, from the H-1 to the H-5, are still in full working order to this day.

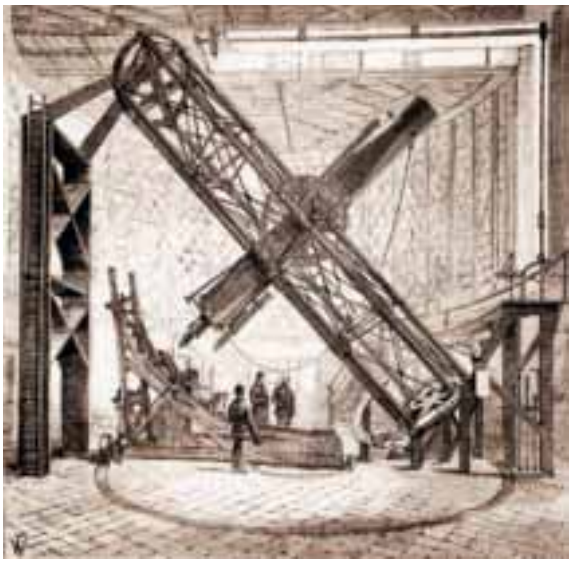
John Harrison's clocks can be seen at the
Royal Observatory,
Greenwich Park,
Greenwich, London SE10;
open daily from 10 a.m.
to 5 p.m.

Further information at
www.nmm.ac.uk

With his H-4, John Harrison (above left) literally ushered in a new way of looking at time. The watch marked the beginning of precision timekeeping. It is still in perfect working order and can be seen in Greenwich.

Photo: National Maritime Museum, London

> “The regulator was the most accurate way known to man of measuring time.”



John Harrison's watches can be seen today at the Museum of the Royal Observatory in Greenwich (below a view in about 1800). The exact time could be obtained with the telescope (above, about 1888). The watches in the chronometer room (right, around 1900) were set accordingly in order to relay the time.

surprisingly simple. When the slow-moving hour hand was in the lower half of the dial, it could easily reduce the legibility of the ever-so-important second hand for a fairly prolonged period. This is why the hour hand, formerly the main protagonist on the dial, was relegated to its own inner dial up next to the 12 and away from the other hands. The seconds hand has the lower section of the dial to itself and only the minute hand rotates from the centre of the dial.

The regulator clock thus came to stand for the most accurate means available to man of measuring time. It is therefore understandable that IWC, which once was obliged to obtain the exact time from an observatory, kept its own in-house precision pendulum clocks for as long as possible in order to regulate all its new watches.

And this is where we come full-circle, from the disaster that hit the royal fleet in 1707 to the wristwatch-size Régulateur with which IWC, after 300 years, pays tribute to an important piece of watchmaking history. If a specialist timepiece like the regulator was rarely a feature of private homes at one time, for the simple reason that ordinary mortals had no need of down-to-the-second timing, it is attracting more and more devotees these days. Because it identifies its owner as a connoisseur who is able to appreciate a slightly unorthodox way of displaying the time within its historical context.

As a symbol of precision timekeeping, the regulator has always placed immense demands on classical watchmaking. There are also several good reasons why the first Régulateur to come from IWC is housed in a Portuguese case. For the first wristwatch-size pocket

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Vienna watchmaker Eugen Kovacs expertly converted an IWC 52 calibre into a regulator. This unique item can be seen today in the IWC permanent collection.

watches from Schaffhausen, which today lend their name to an entire watch family, were delivered to the Portuguese market 70 years ago, basically as an unofficial deck watch. Their reputation was founded on the superb mechanics ticking away inside the case: the original IWC pocket watch movement with its legendary accuracy.

The Portuguese Régulateur remains true to the company's tradition. With its IWC-manufactured 98245 calibre, it is powered by a pocket watch movement that is not only one of the most beautiful but also one of the most authentic of its kind made anywhere in the world. For connoisseurs: the calibre number, of course, gives away the fact that the actual movement is based on the 98 calibre, a veritable milestone in watchmaking technology that has been steadily developed at IWC for over 70 years. It has also been combined with a number of the quality features found in the earliest IWC pocket watch movements and going back to company founder F.A. Jones and 1868. Among these are the non-warping three-quarter plate and, as a particularly typical characteristic, the elongated index, also known as the "Jones arrow", designed to facilitate precision setting.

All the technical watchmaking advances made since the days of Jones are of course distilled into this high-end movement with its classical balance frequency of 2.5 Hz. These include a shock absorption system, a hacking seconds and regulating cam on the arms of the beryllium screw balance. A glance through the sapphire glass back shows that the movement, which has also been used in the Portuguese Special Edition Jones for some time now, has a different style of engraving. Inside, the motion train under the dial has been modified to position the separate hour display at 12 o'clock. The stylish silver-plated dial allows the Portuguese Régulateur to show off its generous dimensions to full advantage. All the displays, such as the chemin de fer-style chapter ring, which is reminiscent of railway tracks, or the relatively large seconds hand, are arranged to guarantee maximum legibility. The hacking seconds, operated by pulling out the crown, enables the owner to set the time exactly to the second.

Today, lovers of the great outdoors and sailors can rely on small GPS devices to pinpoint their exact geographical position. Nevertheless, the classical regulator remains a pleasing memento to the invention of precision timekeeping. And the fusion of this piece of watchmaking history with the case of a design classic like the Portuguese is a marriage made in heaven. **IWC**

The Portuguese Régulateur

Wristwatch-style pocket watch with regulator display, mechanical hand-wound movement with three-quarter plate, beryllium balance with weight screws and precision adjustment cams, Breguet overcoil spring, elongated precision adjustment index (after Jones).
Movement: 98245-calibre
Frequency: 18 000 bps / 2.5 Hz
Jewels: 22
Power reserve: 46 hours
Case materials: platinum; 18 ct. rose gold; stainless steel
Glass: sapphire, antireflective, see-through back
Dimensions: diameter 43.1 mm, height 11.75 mm
Water-resistance: 3 bar (30m)
Weight: platinum, 128 g; rose gold, 114 g; stainless steel, 89 g
Straps/clasps: crocodile skin, black (platinum), dark brown (rose gold), pale brown (stainless steel). Deployant clasps in platinum, rose gold or stainless steel available on request
Limited editions: platinum version limited to 500 pieces, rose gold and stainless steel unlimited