Time & Again

Titanic's Final Hours

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Contents

Cover photograph: *A J. W. Ray & Co. chronometer, nearly identical to* Titanic*'s, reads 5:13 a.m. – a fateful time.*

Introduction

By J. Kent Layton

'Time is more complex near the sea than in any other place, for in addition to the circling of the sun and the turning of the seasons, the waves beat out the passage of time on the rocks and the tides rise and fall as a great clepsydra.'
— John Steinbeck, *Tortilla Flat*

It has been over 106 years since *Titanic* sank. Yet her history still fascinates us, still offers fresh insights through diligent research, and simultaneously provides fodder for great debate. Our picture of what happened aboard the liner during her maiden voyage undergoes continual refinement and improvement as new facts are discovered. Yet, the story of *Titanic* – the actual "history" of the ship – would all too easily become lost and distorted into some great, fictional, legendary tale, if it was not protected and made a matter of public record.

Even the smallest details in *Titanic*'s history can have a profound impact on our understanding of events during the maiden voyage and ensuing disaster. Take, for example, the question of time. Today, except when traveling great distances across multiple time zones, or on the dreaded night when Daylight Saving Time – an invention implemented during World War One that still toys with our internal body clocks today – begins, time seems a constant in our lives.

However, timekeeping at sea, particularly aboard *Titanic* during her maiden voyage, is a subject not only of fascination – many attempt to recreate the events of the sinking in 'real-time' every 14-15 April anniversary of the event in an effort to remain connected with the disaster – but also of historical importance. In what way?

Back in 1912, just as today, as one traveled from place to place, the time kept in one location might be different from that kept in another one, depending on how far one traveled eastward or westward. This became a particularly thorny problem for the railroads, as they tried to set schedules for arrivals and departures. It was soon realized that a system of time zones, whereby all localities within the same zone would keep to the same time, would make life easier for everyone. Within the United States and Canada, such a system took effect on 17 November 1883 when the railroads established standard times zones. These were later adopted into official United States law. However, for travelers at sea, there were no such standards.

Confusingly for the modern traveler, navigator, or historian, liners of the period did not adjust their shipboard clocks by whole-hour increments as they crossed established time zones. Instead, ships of the day adjusted their clocks so that when the sun reached the highest point in the sky at noon, all clocks would read 12:00 p.m. The time that this celestial event took place was called 'local apparent noon' (LAN). Because of the movement of the vessel east or west, the time from LAN one day to LAN the next day would be somewhat greater or less than twenty-four hours, depending on the direction and distance of travel; the amount of the daily change in time would also depend on a ship's speed.

For example, a ship steaming at fifteen knots would alter its shipboard time (known as Apparent Time Ship, or ATS for short) by less every day than a ship making twenty knots, while a ship making twenty knots would make a smaller adjustment every day than a ship making twenty-five knots. For a relatively fast-moving vessel heading westward, one could expect to find that time from LAN one day to LAN the next day might be as much as 45 or 50 minutes longer than 24 hours.

For this reason, clocks on board ocean going vessels were adjusted by either advancing the clock on a vessel heading eastward, or retarding the clock for a vessel heading westward; the exact amount of the alteration depended on how far the vessel was expected to trav-

el eastward or westward from LAN one day to LAN the next day. Usually, this adjustment was performed overnight, while most passengers were sleeping; in the morning, a sighting of the sun was taken to obtain the ship's longitude, and if any minor correction to the time adjustment was necessary, this would be made before noon based on the longitude that was obtained. An accurate determination of a ship's longitude was thus needed, not only to know where a vessel was at some specific point in time, but also in order to properly adjust all of the clocks on board.

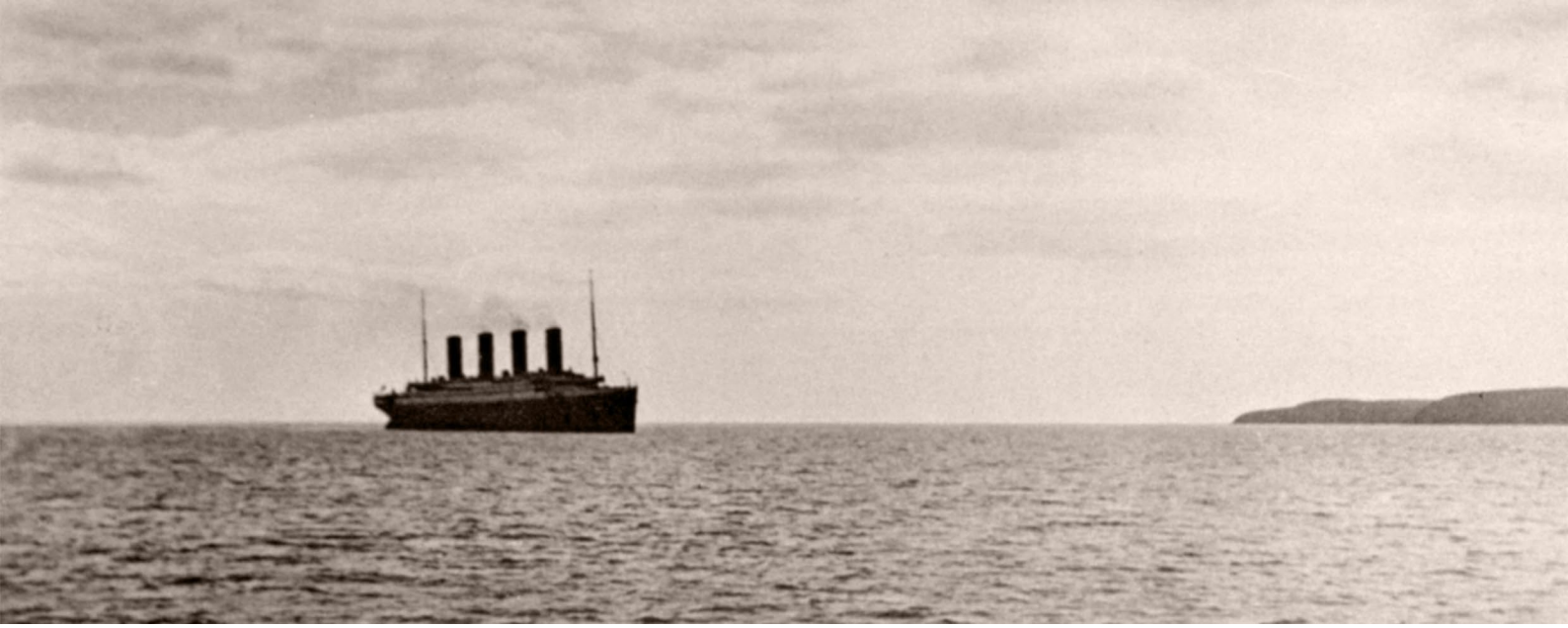
A person's longitude (east or west position on Earth) has always been a source of consternation to navigators at sea. Attempting to solve the problem of correctly estimating one's longitude eventually led to the creation of reliable marine chronometers. These highly accurate timepieces, largely impervious to the motion of a ship by their very design, were set to the time of a specific, known longitude before leaving port; with that time thus readily available to the ship's navigators throughout their voyage, they could easily compare the timing of celestial events at that known longitude with observations they made during their voyage.

Such observations were taken by measuring the angular heights of certain celestial objects such as the sun, stars and planets with the use of a sextant. The precise time of each sight would be recorded by noting the time of the sight to the nearest second on the chronometer, which carried the local mean time of a specific location on earth. Comparing the known shore time with the time suggested by local observations would give the difference between that shore time and local time – for example noon there, and noon at the ship's present position. In very basic, rough terms, the difference between the two times would then translate back to an estimated longitude at a rate of four minutes per degree of longitude.

At this point, another question would arise. What would the standard reference longitude be that one measured one's east or west position against?

In 1880, the legal time for Great Britain was made Greenwich Mean Time (GMT) by Act of Parliament. In the same act the legal time for all of Ireland was made Dublin Mean Time (DMT); eventually in 1916, four years after *Titanic*'s maiden voyage, Irish Time was changed to match GMT. At the International Prime Meridian Conference in October 1884, the Prime Meridian for the world was established as an imaginary line that passed 'through the center of the transit instrument at the Greenwich Observatory' in Britain. This decision reflected the fact that Great Britain had more shipping than the rest of the world put together at the time, and also that the Greenwich Observatory had produced high-quality data for over a century leading up to that conference. By making Greenwich the Prime Meridian, or 0° longitude, mean time for the Prime Meridian, or GMT, could be used as a basis for determining one's longitude in degrees east or west of Greenwich by comparing one's local mean time (LMT) with GMT. For example, Local Mean Time for someone standing on the 75th meridian of west longitude (75° 00'W) would be precisely 5 hours 0 minutes behind GMT.

A famous photo of the clock on Olympic*'s forward First Class Grand Staircase. It was ensconced in an elaborate carving depicting 'Honour & Glory Crowning Time', and likely nearly identical to one aboard* Titanic*. Its central location shows that even while at sea, timekeeping was important for passengers. Time was an even more vital subject for the Captain and officers, who used time, instruments like chronomters, and celestial observations to help determine their location.*



A lonely photo of Titanic at Queenstown, Ireland. Ahead of her, and the 2,208 souls who would travel upon her, lay a trans-Atlantic course that would encompass some 2,891 miles.

As mentioned previously, a system of time zones was established in the United States and Canada in 1883. Port cities such as Boston and New York were part of the Eastern Time Zone, which was keeping time for the 75th meridian of west longitude. Thus, clocks in those cities were set exactly 5 hours and 0 minutes behind GMT, while clocks in port cities in Great Britain such as Liverpool and Southampton were keeping GMT. Passengers aboard *Titanic* would expect, then, that when they stepped ashore in New York, clocks there were precisely five hours behind the clocks in Southampton when they had departed the previous Wednesday. Incremental adjustments would thus have to be made during the course of the voyage so that ship's time agreed with shore time as they were arriving in that port.

Naturally, officers and crew would need to be well aware of time adjustments during the crossings, in order to ensure that watches were kept in an organized manner; someone also had to maintain both of the chronometers supplied to *Titanic*, to make sure they were properly wound, to take note of any variances in their timekeeping, and the like. Passengers were also kept informed of time adjustments, and many would adjust their personal timepieces to match current ship's time, so as to know when daily shipboard events – such as the all-important meals – would take place.

So why does any of this matter today, at a remove of 106 years? This is why: everyone knows that *Titanic* struck the iceberg at 11:40 p.m., April 14, 1912, and sank at 2:20 a.m. the following morning, an apparent time gap of some two hours and forty minutes.

Those times, however, correlated to *shipboard* time, or ATS – *not* land time. So the question becomes: how did those shipboard times correlate with, say, New York and Greenwich times on that night in 1912? Thus, how did events taking place aboard *Titanic* relate to events taking place in New York, London, Southampton, or even aboard other ships such as *Carpathia* and *Californian?* One can easily see that studying all of these events chronologically aboard *Titanic*, on land, on other ships, and in relation to each other could have an enormous impact on our understanding of the timeline of events in general; this, in turn, could dramatically affect our entire understanding of *Titanic*'s story.

However, the question of how much time separated *Titanic*'s clocks from Greenwich Mean Time (GMT) and New York Time (NYT), is a complicated one to sort out. In fact, it is so complex that the American Inquiry, the British Inquiry and the Limitation of Liability hearings, all arrived at different conclusions:

- **American Inquiry:** *Titanic* was 1 hour and 33 minutes ahead of New York Time;
- **British Inquiry:** *Titanic* was 1 hour and 50 minutes ahead of New York Time;
- **Limitation of Liability:** *Titanic* was 1 hour and 39 minutes ahead of New York Time.

Clearly, they all can't be correct. Worse yet, in recent years some researching the *Titanic* disaster have suggested that a little-known clock change was made before the collision, thus altering the length of time that the sinking took, or how shipboard time related to some standard time ashore.

Since answering this question is so important, we are going to break it down in thorough detail. We will use navigational data, survivor testimony, and a variety of other lines of evidence in an attempt to hopefully establish beyond reasonable doubt how much time separated *Titanic*'s clocks from time ashore. For the first

time, information that has been spread across dozens of books, articles, and other resources will finally be collected in one place for handy reference.

About the team: This team consists of seven *Titanic* historians from around the world. Some of us have gained a general knowledge of *Titanic*, while others specialize in technical knowledge of the ship, and others are particularly adept in navigational computations. Working as a team, we will be able to avoid the pitfalls that might befall a lone researcher; we fill in gaps in the knowledge of each individual researcher, and behind the scenes we have 'hashed out' every detail that we can possibly find that relates to this subject.

'Errata' and 'outlying' evidence: Our team members have studied *Titanic*'s history long enough to understand that even once we are finished, we will only be reaching a conclusion based on the majority of the evidence; there will always be 'errata', or 'outlying' evidence, that is to say, data or testimony that falls outside the general body of evidence, and which disagrees with the majority of it. Some researchers with a different perspective will no doubt try to argue, ad nauseum, that it is that very evidence that proves their point, not ours.

To that dubious argument, we can only say: we will follow the picture built by the majority of evidence. We will not follow a stray piece of evidence that does not fall in line with the overall picture, simply to drive a favorite narrative. In other words, if eight or nine out of ten lines of evidence are telling us one thing, we will not follow the evidence that lies in the minority and doesn't fall in line. If we are able to, we will offer possible or likely explanations for 'outlying' or 'errata' evidence; if we are not, we will present the contrary evidence and leave it for the reader to decide.

In the course of this article, we will use a number of abbreviations, which we will place here for reference:

- **Greenwich Mean Time (GMT):** The time that clocks in London, Southampton, and Liverpool, England were keeping in April, 1912. The mean time for the prime meridian of Greenwich (0° longitude).
- **New York Time (NYT):** The time that clocks in New York City were keeping in April 1912. The mean time for the meridian of 75° west longitude. The equivalent of the Eastern Time Zone. This time was also kept by cities such as Washington, D.C., Toronto, Canada, etc.
- **Apparent Time Ship (ATS):** The time that is carried on board the vessel being discussed in that context. It is time that was based on the apparent position of the real sun at Local Apparent Noon. This is important because ATS for *Titanic*, *Olympic*, *Carpathia*, and *Californian*, among others, were all different from each other.
- **Dead Reckoning (DR):** The process of calculating a ship's current position by using a previously determined position, or fix, and advancing that position based upon known or estimated speeds over elapsed time and course.
- **Local Mean Time (LMT):** Time that is based on a fictitious sun that circles the earth in precisely 24 hours forming a uniform time scale at a specific longitude.
- **Local Apparent Noon (LAN):** The instant the real sun's center crosses the local meridian where one is located.

With this introduction now in hand, we advise that you grab a cup of your favorite coffee, perhaps even pull up paper and a pencil to run through the mathematics, and enjoy the voyage of discovery that you are about to embark on.