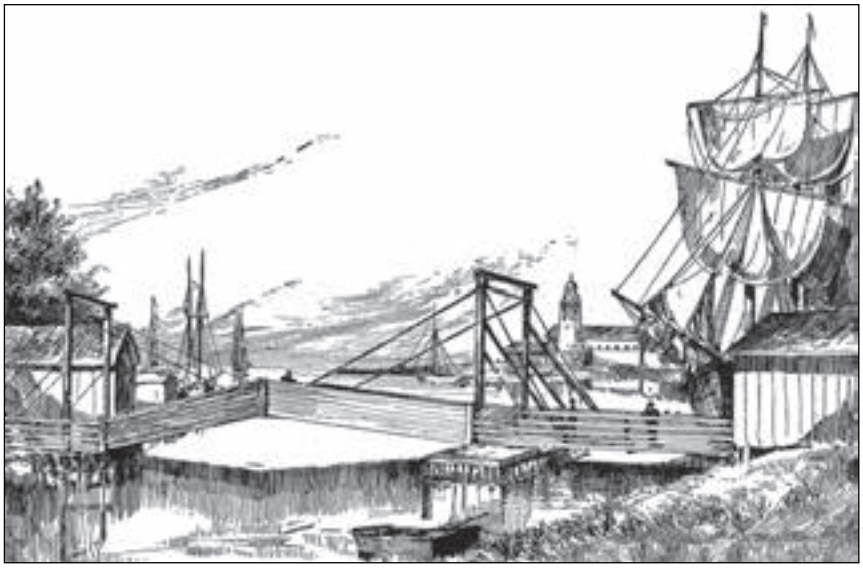
What Time is it at the Lighthouse?

By Terry Pepper

A few months ago, one of our members emailed me stating that she had read a transcription of an interview with a lighthouse keeper at Big Sable Point light station in Lake Michigan, in which he made reference to the fact that they ran the lighthouse on sun time. Not having encountered the term previously, she wrote to ask if I knew what "sun time" was, and how and why it would have been used at Big Sable Point.

After formulating my response, I felt that the subject might be of sufficient general interest to warrant writing the following article.



Frank Leslie's Magazine,

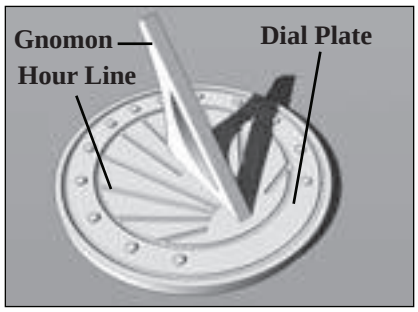
Even with the development of clocks of relative accuracy, widely spread settlements served as standalone pockets of civilization, and maintained their clocks only to local sun time

Sun Time

Time is an arbitrary measure created by man to mark the movement of the sun across the sky. It is thus hardly surprising that the sundial was our first attempt at actually measuring the process of each rotation, with the sun casting its rays on graduated markings, and thereby breaking the rotational cycle into equal increments we have come to know as "time."

The exact middle of a single cycle of the sun occurred at the point at which the sun was most directly overhead, and the shadow cast by the sun dials gnomon was at its shortest length. Appropriately, this instant during a single cycle became known as midday, and has subsequently come to be referred to as "noon."

This is sun time in its simplest and purest form.



Terry Pepper

The components of a rudimentary sun dial

This apparent movement of the sun from east to west is continuous, gradual and constant and the speed at which it appears to move across the face of the earth can be calculated as follows: Since the earth is known to be approximately 25,000 miles in circumference and it takes 24 hours for the earth to rotate completely, we can calculate that the sun travels across the surface of the earth at a speed of 1,041.66 miles per hour, or 17.36 miles per minute, as follows:

25,000 miles divided by 24 hours = 1,042 miles per hour and 1,042 mph / 60 = 17.36 miles per minute

As such, midday as indicated by the sun in Detroit, Michigan will occur approximately 4.608 minutes earlier than it does in Jackson, Michigan, which is a short 80 miles to the west.

Even with the development of clocks of relative accuracy, this disparity of time over distance was of little concern in the early days of our country. Settlements served as standalone pockets of civilization, and our modes of travel were so slow that interconnection between settlements was very limited.

A prominent clock in each community was frequently set to local sun time at noon, and then everybody in the area coordinated their clocks to that "master" clock. In this manner, each community maintained its own standard and people could schedule their days knowing that everyone else's clocks with whom they would come in contact would be in concert. However, we must remember that clocks in other towns to the east and west of any given point on the surface of the earth would be set differently based on their own local sun time.

This infinite combination of sun times within a geographic area posed a significant problem to the railroad companies in the latter part of the 19th century, as they tried to formulate, maintain and publish schedules at points hundreds and even thousands of miles apart. With every single community across the country conforming to its own local sub time, the railroads faced a herculean task in trying to inform the communities along their routes at what time their trains would be arriving or departing without undertaking all the calculations needed to create schedules that conformed to local sun time at every whistle stop along the way.

Library of Congress

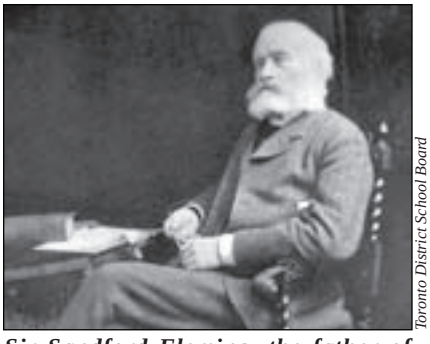
The implications of driving the golden spike at Promontory Summit, Utah on May 10, 1869 were deep and long-lasting, with the very nature of time itself changed forever

Standard Time

We in North America were not the first to grapple with this problem. As a result of the huge distances involved in the growing British Empire, the Great Western Railroad Company in England adopted something known as "Standard time" in 1840. Using that same knowledge that the earth takes 24 hours to undertake a complete rotation, the timekeepers at the Great Western Railroad divided the entire 360 degree surface of the earth into 24 zones with the "zero meridian" located at Greenwich, the home of the mighty British Admiralty. Since 360 / 24 = 15, each of these 24 zones was centered on 15 degree increments of longitude emanating east and west from Greenwich. The simplicity inherent in this system was that every clock within each of these 24 zones would adopt the sun time as it existed at the central longitude for each of those 24 zones, making scheduling much simpler.

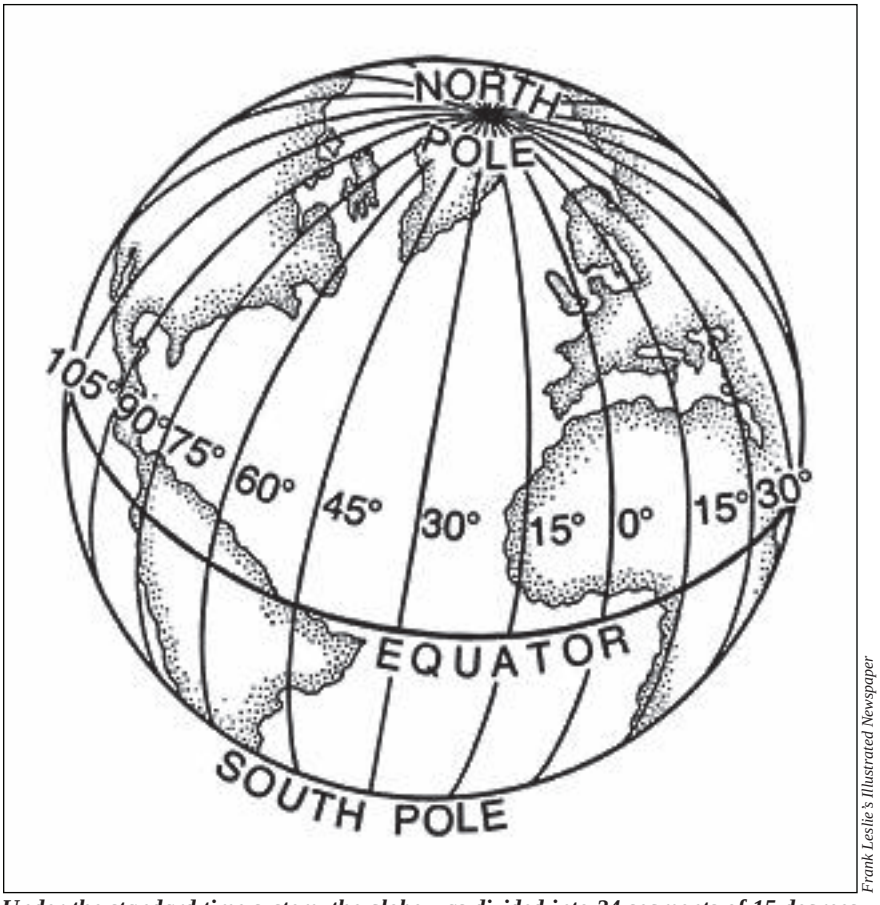
With the construction of transcontinental railroads here in North America, our railroads came head to head with this problem, and Canadian railway planner Sir Sandford Fleming outlined a plan for worldwide standard time in the late 1870s. Following his initiative, representatives of the railroads from round the world assembled at the "The Meridian Conference" in Washington DC in 1883, at which an agreement was undertaken to adopt the British system on a worldwide basis.

In extrapolating the British system across the Atlantic, the North American continent was thus divided into four time zones, with their defining 15 degrees of longitude located as follows:



Toronto District School Board

Sir Sandford Fleming, the father of Standard Time in North America



Frank Leslie's Illustrated Newspaper

Under the standard time system, the globe was divided into 24 segments of 15 degrees longitude, with the zero point centered on the naval center of Greenwich, Great Britain

Scientific American, May 1920

The Time Zones of the United States as they appeared in 1920. Note that at that time the border between the Eastern and Central Time Zones followed the eastern Michigan state line

Eastern Time with all its clocks set to sun time at the 75 degree longitude
Central Time with all its clocks set to sun time at the 90 degree longitude
Mountain Time with its clocks set to sun time at the 105 longitude
Pacific Time with its clocks set to sun time at the 120 longitude

It became quickly evident that the arbitrary longitudes delineating each of the time zones would be meaningless to the average Joe. Thus, the borders of the time zones in North America were soon relocated to run along the nearest state border lines, which were already becoming familiar to everyone. These time zone borders were further modified a number of times over the ensuing years, with various states and parts of states lobbying to be included in a different zone, a progress which continues to this day – notably in Indiana which was still modifying which of its counties conform to the Eastern and Central time zones as recently as 2008.

While originally adopted only by the transportation industry, with the invention of telegraph, telephone and an ever increasing speed of travel and communication causing people to interact over increasing distances, the use of Standard time became more widely applied. Standard Time was finally adopted throughout the country by federal mandate with the passage of the Standard Time Act by Congress on March 19, 1918.

Now, with all this background out of the way, we can turn to the matter of why and how sun time was used at lighthouses, and why it might still have been in use at Big Sable Point - even after the passage of the Standard Time Act.

An oblivion to time

It is revealing to note that prior to the mid 1920's, there is nothing in any government documents that I have come across which calls out at what specific time ANYTHING needed to be done at lighthouses. While the official instructions specified many things that a lighthouse keeper was mandated to do throughout the day, and spelled-out exactly how each of them had to be done in minute detail, I can find no mention of the exact time at which anything should be done.

Using the 1902 volume "Instructions to Light Keepers" published by the Lighthouse Board as an example, there are but two tasks to be undertaken each day about which the Lighthouse Board was very specific as to when they had to be undertaken. On page 20 of the volume, it succinctly states that "Lights must be lighted punctually at sunset, and must be kept burning at full intensity until sunrise."

This timely exhibition and extinguishing of the light was deemed to be of paramount importance to the Lighthouse Board, and failure to comply with this instruction was considered grounds for immediate termination from the service.

National Oceanic and Atmospheric Administration

United States Time Zones as they are defined as of 2012. How will they look in 3000?

Tim Sweet

On a clear day, a keeper needed only look to the horizon to see the sun rising or setting

Duty to the light was considered so critical that the Lighthouse Board posted notices in newspapers in all coastal areas around the country in 1868 requesting that:

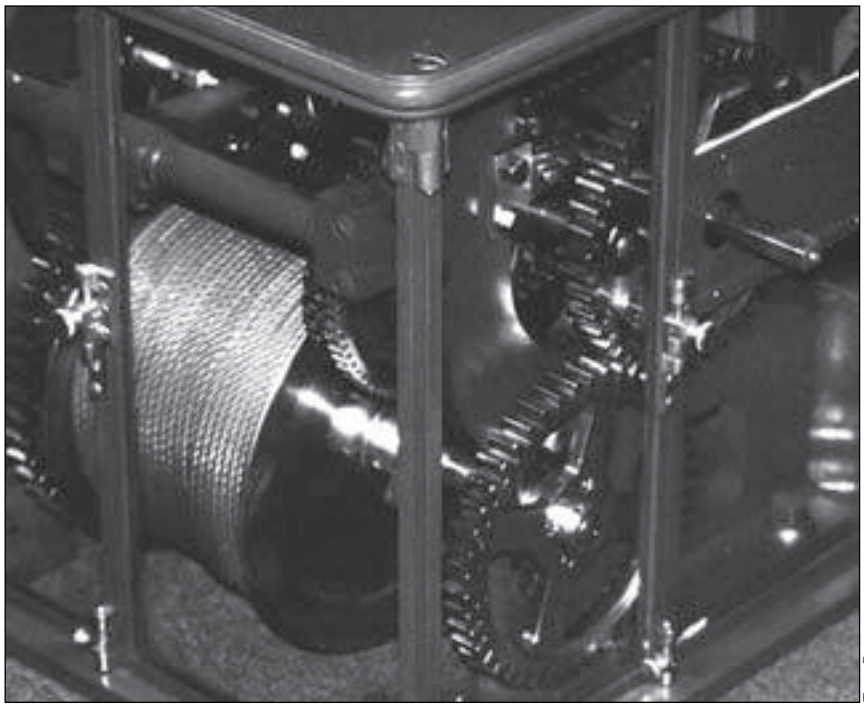
"Mariners and others interested in commerce, and the preservation of life and property from loss by shipwreck on the coast of the United States, are earnestly requested to give prompt information to the inspectors or superintendents of lights, or by direct communication of the Light House board, of cases in which lights are not lighted punctually at sunset and extinguished at sunrise, or in which they are not properly attended to during the night"

Thus, with every Tom, Dick and Harry mariner passing by a lighthouse given the virtual power of judge and executioner for their livelihood, it goes without saying that the keepers took timely operation of their light dead seriously.

The exact time of sunrise and sunset was easy to determine on clear days, especially at a lighthouse where the keeper had an unobstructed view of the horizon. All he or she had to do was look out the lantern in the appropriate direction and watch the sun rise above, or fall below the horizon. However, this task was a little more challenging on overcast days when the sun was blocked from view. For such occasions, each of the Lighthouse Districts annually published a booklet containing sunrise and sunset tables so that the keepers would know exactly when to light and extinguish their light on any given day of the year when they were unable to personally observe the rising or setting of the sun.

Because as previously explained, the specific instant of sunset and sunrise moved gradually across each district from east to west at a precise speed, the exact time of sunrise and sunset only had to be computed accurately in one location. By keeping the clocks at each lighthouse within the district accurately adjusted to local sun time, the published sunrise and sunset times were valid for all lighthouses within the district.

Were the lighthouse service to have adopted Standard time, the District Engineer would have been required to publish the annual sunrise and sun set table each year based on the exact longitude of each lighthouse within the district. With well over 150 lighthouses in the Eleventh District alone, and spreading over 360 miles of longitude, this would have created a huge book, and would have taken a great deal of time to calculate. Thus, the lighthouse service saw no advantage in adopting



Terry Pepper

While keepers were required to maintain strict accuracy of the interval of lights, bells and steam whistles, they were not required to be operated at any specific time of day

Wayne S. Sapulski

A USLHE clock with hand-painted marks added by the keepers to remind when the radiobeacon was timed to automatically transmit

standard time at its lighthouses, and each lighthouse continued to use local Sun Time well into the second decade of the 20th century.

While keepers were charged with keeping their lights, fog bells and steam whistles in conformance with the characteristic published in the Light List, these characteristic were self contained. They specified only an amount of time between flashes, between blows or between blasts, but never a specific time of day when anything should occur.

The dawn of Clock watching

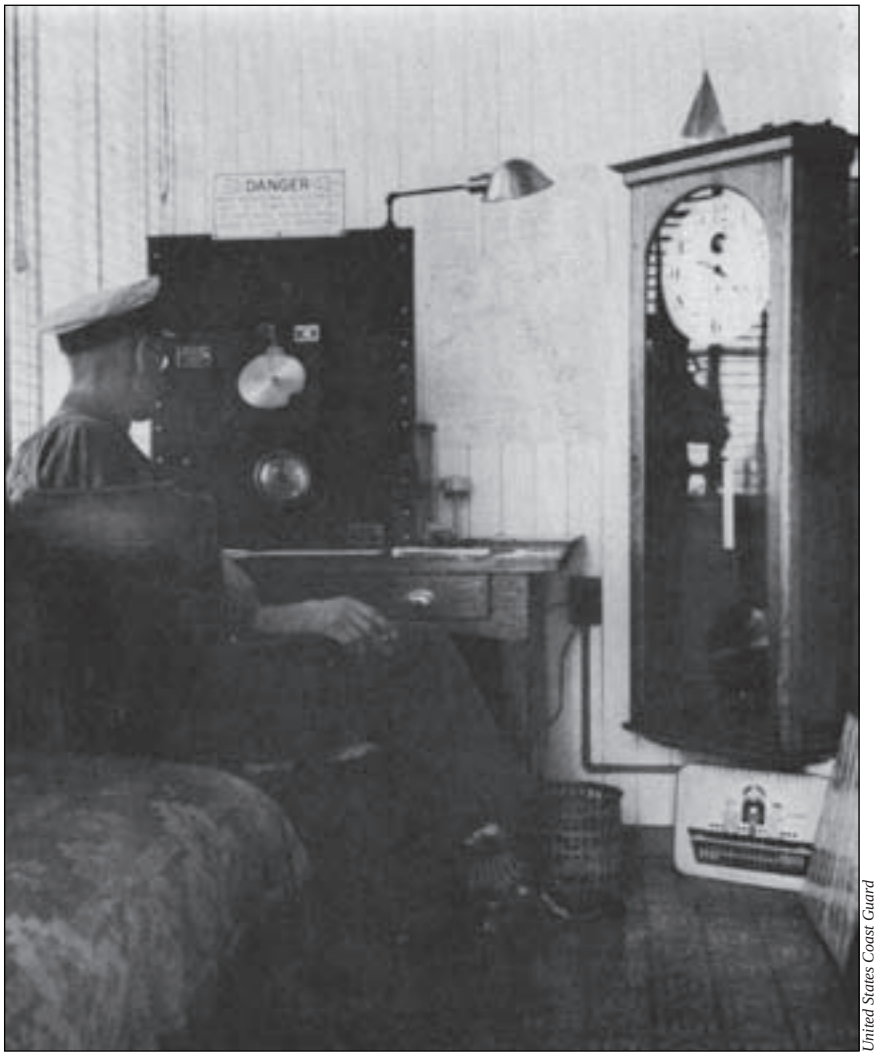
All this would change with the introduction of radio transmitters at lighthouses in the 1920's as stations with radiobeacons suddenly found themselves dragged into the real world. Mariners operating on Standard Time relied on a timely set of station specific Morse Code characters being transmitted by the lighthouse keepers at specific times during the day.

As such, lighthouses were immediately required to adapt to Standard Time for all operations with the exception of their lighting and extinguishing the light, which was still done using Sun Time. Whereas it took direct physical activity to light or extinguish a lamp, the radiobeacons were activated automatically at the specified time at each station by a clockwork mechanism.

However, just as the keepers were held responsible for ensuring that their lights were exhibited and extinguished at the exact point of sunset and sunrise, they were similarly held accountable for the operation of their radiobeacons at exactly the right second.

Since it was an automatically activated radio pulse, correct operation of the radio was not something that the keeper could easily see nor hear, having to don headphones or observe a light emanating from a vacuum tube in order to verify timely transmitter operation. To this end, keepers with radiobeacon installations frequently marked the faces of all clocks in the fog signal building with the exact time periods in each hour when the radiobeacon was supposed to transmit. This would serve as a reminder for them to verify that the transmitter was operating properly whenever the clock pointed at that marked time on its face.

As a result, lighthouse keepers suddenly found themselves inexorably tied to the clock, which was surely a cruel awakening to men and women who had previously lived with their lives timed by the sun.



United States Coast Guard

With the installation of radiobeacon systems, clock-watching became a necessary evil