

Dropping the Ball for Cincinnati Time

Have you ever been curious how accurate time was maintained in the Greater Cincinnati area prior to radio signals, and prior to electronic methods? Certainly, your answer would include the traditional sundial and maybe the pendulum clock. But the question is how did a clock registering noon on the west side of Cincinnati coincide with the exact same time as a clock on the east side? Many folks depended on railroad time, but how did the railroad determine accurate time?

Consistent with many locations across the country and especially along the coast line, the local astronomical observatory was the only source for accurate time. At the Birthplace of American Astronomy, the Cincinnati Observatory provided a time mark for exact noon in Cincinnati. This was not noon by Greenwich Mean Time or noon by Standard Time but rather Astronomical Noon* in Cincinnati.

When the Observatory was situated on Mt. Adams, from 1845 until about the 1870's, the astronomers determined the accurate time with the aid of the Robert Molyneux clock, pictured right. The clock was manufactured in London during the mid-1840's, and its temperature compensating pendulum and the weight were both filled with mercury. The clock was stored in a room adjacent to the observing room because the observing room was kept at the same temperature as the outside. As the pendulum would swing back and forth, a needle attached to the bottom of the pendulum would contact a pool of mercury, which would open/close an electric circuit. Hence, time was communicated back and forth to the astronomer and the clock. The astronomer would be viewing the stars through his telescope to determine the time.



The astronomer on Mt. Adams would supply accurate time to four jewelry shops in the city below Mt. Adams. Then the citizens would bring their pocket watches and home clocks to the jewelry shops to see if their clocks were running fast or slow.



In 1873, when the Observatory was relocated from Mt. Adams to Mt. Lookout, the astronomers needed a different method of communicating time to the citizens. In the absence of radio signals that were used to transmit accurate time, a clever method used here and throughout the country was a visual notification to the residents of Cincinnati. A large, black ball mounted to a 60 foot pole attached to the Cincinnati Observatory building atop Mount Lookout, provided a visual time mark for exact time to anyone with line-of-sight to the top of the pole. At precisely noon the ball would drop, free-fall, indicating astronomical noon. About 15 minutes prior to noon the ball would be raised to half mast and at 5 minutes to noon the ball would be lifted to the top, providing the viewers with 15 and 5

minutes advance notice. At exactly astronomical noon at the Cincinnati Observatory the ball was dropped free-fall style. This method of dropping the time ball was used from about the mid-1870's to the mid-1880's. The Observatory's master clock at this time was a pendulum clock manufactured by Jas. Ritchie & Son, Edinburgh. Some observatories would use a shock absorber at the base of the pole to absorb the energy from the fall helping to minimize structural fatigue to the ball.

In order to provide time to the citizens who lived in the city during the 1880's the Observatory arranged for a time ball to be dropped from the top of the Carlisle Building, which was on the corner of Fourth and Walnut Streets. There were repeated communication-transmission problems between the Observatory in Mt. Lookout and the Carlisle Building. Eventually a downtown jewelry shop assisted with the raising and lowering of the ball. Then the downtown ball was replaced by a large clock outside of the Carlisle Building that was controlled by the Observatory. Transmitting of the time signal from the observatory to downtown was terminated because the President of the telephone company took down the telephone lines between the Observatory and downtown because he had a disagreement with the University of Cincinnati, the operator of the Observatory.

The Observatory also transmitted daily noon time signals to the local fire stations so that the citizens could check with their local fire station to determine the accurate time.

A time ball drops from the State, War and Navy Buildings in Washington, DC.



The first time ball in the United States was established at the U.S. Naval Observatory in Washington, D.C. around 1845. Before 1883 there was no standard time in the United States, but in the late 1800's most major cities had time balls. They were dropped at noon every day. People looked up from their work and checked their own watches. Everybody wanted to be "on time," and the time ball was a signal that the whole town could use. Jewelers had clocks in their windows or outside their doors, each one claiming to have the correct time. Observatories would even sell their time to various organizations like railroads and jewelry stores.

During the 1860's and 1870's as the railway system expanded, the trains were traveling through multiple, city centered time zones. Consequently, they encountered difficulty keeping their schedules on time that resulted in multiple accidents and loss of life. The railroads then started purchasing time from the astronomical observatories, and the whole railroad line operated on the time from the selected observatory. In 1883, the railroads established provisional time zones to coordinate their train schedules. Hence, Standard Railroad Time was established. Eventually the railroads petitioned Congress who passed the Standard Time Act in 1918 to make the railroads' time zones into law for all of us.

In the late 1860's Western Union synchronized their clocks in the principal cities by telegraph with the U.S. Naval Observatory. Over time this practice was established across the country.

In 1939, Shillito's started using an automatic Audichron device to transmit time to Cincinnati via the telephone. Customers were required to telephone Parkway 1700, and the feminine voice would provide a short advertisement for Shillito's and then tell them the

time, hour and minute. The telephone time service (plus weather) still functions, sponsored by Cincinnati Bell; give it a try, call (513) 721-1700.

*Solar time is measured by the apparent diurnal motion of the sun, and local noon in solar time is defined as the moment when the sun is at its highest point in the sky (exactly due south or north depending on the observer's latitude and the season). The average time taken for the sun to return to its highest point is 24 hours.

A sidereal day is approximately 23 hours, 56 minutes, 4.091 seconds; corresponding to the time it takes for the Earth to complete one rotation relative to the vernal equinox. During the time needed by the Earth to complete a rotation around its axis (a sidereal day), the Earth moves a short distance (approximately 1°) along its orbit around the sun. Therefore, after a sidereal day, the Earth still needs to rotate a small extra angular distance before the sun reaches its highest point. A solar day is, therefore, nearly 4 minutes longer than a sidereal day.

Leap year is based on the sidereal year--the period that it takes the Earth to orbit, revolve, around the sun in reference to a distant star. The period is 365.25636 days. Hence every four years the earth's position in reference to the first point of Aries (Ascending node of the intersection of the Celestial Equator and the Ecliptic) is off by one day. In order to keep the astronomical year in synch with the calendar year an extra day is inserted on February 29 every four years, with a few exceptions on the century years.

We govern our daily lives via solar time, but the Observatory's telescopes operate on sidereal time.

By: Leland L Hite, Retired Engineers and Scientists of Cincinnati, with considerable input from John Ventre, Historian and former director for the Cincinnati Observatory Center, November, 2009.