From Star to Clock...
Timekeeping at Ladd Observatory

Michael L. Umbricht
Observatory Curator
Train wreck on the Providence & Worcester Railroad
Daguerreotype by L. Wright, August 12, 1853
Courtesy: George Eastman House
AWFUL RAILROAD ACCIDENT.

FOURTEEN LIVES LOST.

Thirty or Forty Seriously Injured.

By Telegraph to the New-York Daily Times.

Disagreeable necessity obliges us to shock the sensibilities of our readers, by the recital of another terrible calamity from a collision of Railway trains.

At 8 o’clock, yesterday morning, a collision occurred on the Providence and Worcester Railroad, which caused the death of fourteen persons, and seriously injured about forty more. The collision occurred between the regular up train and the excursion train from Weeting’s. The latter was out of time, and met the up train at Valley Falls.

The collision occurred at a sharp curve beyond
More Slaughter by Railroad.

Our columns groan again with reports of wholesale slaughter by Railroad trains. Hard upon the heels of the catastrophe upon the Camden and Amboy road, come tidings of a similar and still more dreadful disaster upon the road between Providence and Worcester. There is a startling similarity in the circumstances of the two. Both were due to the same cause,—the collision of two trains, running at a high speed, in opposite directions upon a single track;—and to complete the likeness, the variation of a time-piece is assigned as the immediate occasion of the meeting. The heart sickens over these incessantly recurring reports of death and destruction on our public thoroughfares. We lose all
This instrument, while a fairly satisfactory instrument, was not of such superior excellence as the builder expected it would be. He therefore, without any suggestion on my part, offered to rebuild it without expense...

Prof. Winslow Upton to the President of Brown University, 1895
"The transit work has been done during its absence by a smaller instrument kindly loaned by the Hon. Hezekiah Conant of Pawtucket, who continues his warm interest in the Observatory."

Prof. Winslow Upton to the President of Brown University, 1895
Sidereal Time

Sun

Earth

12:00:00

11:56:04

12:00:00

23 h 56' 04"

3' 56"

24 h

a sidereal day

a mean solar day

A handbook of descriptive and practical astronomy
George F. Chambers, 1889
Illustriertes Preisverzeichnis über Astronomische Uhren von Clemens Riefler
“In the summer of 1893 arrangement were made by which accurate time signals were furnished the Rhode Island Electric Protective Co., and by that company distributed to jewelers and others in this vicinity. The service was put in operation September 12, 1893, and the signals have been sent continuously since that date. The work at the Observatory consists of transit observation nearly every clear evening, and of daily comparison of the clock which transmits automatically the signals with the standard time-piece of the observatory. The transmitting clock runs continuously, and its ticks are heard day and night in the main office of the Protective Co., which repeats the signals three times each day to the jewelers, and also controls thereby several hundred electric dials and regulators in various business offices.”

Prof. Winslow Upton to the President of Brown University, 1894

“A separate wire belonging to the City Fire Department also connects the Observatory with the City Hall, so that the noon and 8:30 p.m. signals sounded on the fire-alarm bells may be accurately given.”

Prof. Winslow Upton to the President of Brown University, 1906
STANDARD TIME.

Now Obtained from the Chronometers at Ladd Observatory.—
Arrangements Completed Tuesday.

At 3 o’clock Tuesday afternoon Providence received its electric time from the chronometers at Ladd Observatory. This is the first time that the city and State have been independent of other cities and States for standard time, and the departure was hailed with delight by all to whom the fact was made known. Previous to this Providence has received its standard time twice a day from Cambridge, New Haven and Washington over the wires of the Western Union Telegraph Co. In many cases this has been a great inconvenience, and has often resulted in inaccuracy, caused by delay in transmitting, or by some accident. The arrangements, as now completed, allow almost no possibility for incorrect time.

TIME SIGNALS.

Ladd Observatory Furnishes Them to Providence Jewelers.

THE ASTRONOMICAL OBSERVATIONS REQUIRED.

Reductions to Solar Time.—Error of the Transmitting Clock Rarely More Than a Quarter of a Second. Paraphernalia of Time Reckoning.

PROVIDENCE jewelers are no longer dependent upon Harvard Observatory at Cambridge or the National Observatory at Washington for standard time. It is essential in their business to have an accurate system. Since early in September the flight of time for this meridian has been scientifically and astronomically noted and recorded by Prof. Winslow Upton at the Ladd Observatory and from there communicated to the Rhode Island Electric Protective Company. This company in turn sends it out over private wires to those jewelers who are subscribers.
"Hereafter the Ladd Observatory time will be the standard for Providence. The Western Union Telegraph Co. have heretofore had charge of this [distribution] system, but it will in future be controlled by the local [fire and burglar alarm] company."

Jeweler's Circular and Horological Review, 27 September 1893

as quoted in *Selling the True Time*, Ian R. Bartky, 2000
May 3 1905

Comparison of Washington and Ladd Observatory times.

Telegraphic connection was furnished by the American Telegraph and Telephone Company. (Mr. Emmons Tel. Long distance 82)

The time signal wire which runs to the Elec. Protective Co. was connected with the long distance wire in the Union exchange.

During the first part of the evening the seeing was very bad and the clouds troublesome. A number of stars were observed but not used for times. (See F.S. Notebook) From these stars Among the values \(a = -0.31\) and \(a_e = 0.19\) were obtained. These values agree well with the corresponding values found in preceding evenings. Later after 9:00 the sky cleared and the following three stars were observed by 9.8 and F.S. with chronograph and Kiefer. After midnight the sky again cleared over.
"Signals received perfectly 0.07 second late." F. Slocum
May 4, 1905 telegram to the U.S. Naval Observatory
Special Wireless Signals from Washington

Received at Mr. Drake's Lines.

1st second
2299 after passu

25 35.5
10.5
24 33

57.2

25 35.5
10.5
24 33

57.2

8 17 19.5 = 23 57 30

20 19
40 30

672

let second after passu

Notebook of Prof. Winslow Upton, November 1913
John Hay Library
FIG. 13. — THE APPARATUS FOR SENDING THE WIRELESS TIME SIGNALS FROM THE EIFFEL TOWER.

(After Bouasse, Pendule, Spiral, Diapason.)

Time & Timekeepers
Willis I. Milham, 1941
### Amateur Radio Stations—First District—Alphabetically by Owners of Stations—Continued.

<table>
<thead>
<tr>
<th>Call signal</th>
<th>Owner of station</th>
<th>Location of station</th>
<th>Power (Watts)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1HK</td>
<td>Denison, Horace W.</td>
<td>60 Garland St., Chelsea, Mass</td>
<td>500</td>
</tr>
<tr>
<td>1BC</td>
<td>Dimick, Leon R.</td>
<td>27 Cliff St., St. Johnsbury, Vt</td>
<td>100</td>
</tr>
<tr>
<td>1JA</td>
<td>Dimond, Fred A., jr.</td>
<td>4 Purchase St., East Carver, Mass</td>
<td>100</td>
</tr>
<tr>
<td>1UR</td>
<td>Doherty, James E.</td>
<td>22 Orms St., Providence, R. I.</td>
<td>100</td>
</tr>
<tr>
<td>1UD</td>
<td>Donle, Harold P.</td>
<td>18 Observatory Ave., Providence, R. I.</td>
<td>300</td>
</tr>
<tr>
<td>1KH</td>
<td>Doten, H. B.</td>
<td>7 South St., Plymouth, Mass</td>
<td>1,000</td>
</tr>
<tr>
<td>1UO</td>
<td>Doyle, John B.</td>
<td>306 Thurber Ave., Providence, R. I.</td>
<td>100</td>
</tr>
<tr>
<td>1HZ</td>
<td>Duncan, Harrie E.</td>
<td>34 Foster St., Newtonville, Mass</td>
<td>250</td>
</tr>
</tbody>
</table>
“During November and December Professor Upton availed himself of the Paris-Washington wireless signals to obtain data for a more accurate determination of the longitude of the Observatory. Whenever the Washington readings and corrections are available, the observations will be reduced.”

Prof. R.G.D. Richardson to the President of Brown University, 1914
Ladd Observatory is open to the public on Tuesday evenings (weather permitting)

(401) 863-2641

http://brown.edu/ladd

@LaddObs