

# THE FIRST WIRELESS TIME SIGNALS TO SHIPS AT SEA

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In 1907 the Dominion of Canada became the first country in the world to apply the infant wireless communications technology to a new purpose, a purpose which was a boon to navigation. That year the Marconi coastal station in Halifax began to broadcast an automated daily time signal by wireless telegraphy from the Canadian Meteorological Service to ships at sea, although the term "broadcast" had not yet been used in connection with wireless.

At the turn of the twentieth century, the pace of commerce and of everyday life was on the increase. The industrial world had entered the age of electricity, the age of automation and the beginning of a new efficiency of operation. Time was money and life was consequently more and more regulated and determined by the clock. It was becoming increasingly important to know the correct time.

Railways required accurate time, as did factories, surveyors, watchmakers and caretakers of public clocks. And the navigators of naval, merchant marine and cable ships needed a time fix for correct determination of longitude: the angle between the local meridian and the prime meridian at Greenwich.

Longitude is determined most accurately by the difference between local and Greenwich times. For example, noon local time, determined by observation of the sun or stars, is convertible into longitude with respect to the prime meridian at Greenwich; each hour difference from Greenwich represents 15 degrees of longitude. Ninety years ago most ships carried at least three chronometers with Greenwich reference time, while those requiring nicer navigation had more: a flagship kept five and a cable ship up to fifteen. Chronometers, however, may go off by seconds after a few weeks at sea, and at the equator, four seconds is a sea mile. The resulting faulty calculation of longitude could bring disaster.

The responsibility for maintaining and disseminating the correct time fell to the government. In Canada this was handled by the Meteorological Service of the Department of Marine and Fisheries.

## Pre-Wireless Dissemination of Time Signals

Mean solar time is determined by observation of one or more "clock stars," whose positions with respect to the sun are known with great precision. These are observable day or night, if the sky is clear. Then, with the aid of the tables in a nautical almanac, the sidereal or star time can be used to determine mean solar time to within three to five tenths of a second. To get a more precise fix requires contact between observatories. Direct telegraphic connection by land line was too expensive and long-distance telephone too cumbersome, but by 1910 wireless

telegraphy (W/T) offered a relatively inexpensive, instantaneous method of communication.

The Canadian Meteorological Service made its own observations of the standard stars at several locations for the fundamental determination of time. Using its Troughton and Simms meridian telescope, the Dominion Observatory at St. John, New Brunswick, maintained the master standard Riefler sidereal clock for the Maritime Provinces and disseminated the information as best it could. Until 1907, the Meteorological Service used three major methods to get this information instantaneously to the consumers of time data: visual, telephone and telegraph. The St. John Observatory was connected by Western Union land telegraph lines to relay the 10 a.m. signal from its mean time transmitting clock to every Western Union office in the Maritimes. The signal was sent for the two minutes ending at 10.00 a.m. of the 60th meridian. A local telephone line in St. John carried the beats of a sounder connected to the transmitting clock, and from June 1903 there was also an official clock in the lobby of the St. John Post Office, connected by wire with a standard mean time Observatory clock and automatically synchronized every hour [1], [2].

The St. John harbour had a tower with a falling ball device, a "time ball" with an electrical release, much like the New Year's Eve falling ball in Times Square, New York City. The falling ball signalled 1.00 p.m., 60th meridian time, every week day, based upon Observatory time.

An electric clock in the Western Union office in Halifax was one of those synchronized by wire every day with the St. John Observatory standard transmitting clock. In Halifax, a temporary "time ball" apparatus, put into service on October 1, 1904, was replaced by a new one of 16-oz. copper, 44 inches in diameter, based on the St. John design. This was inaugurated on August 1, 1908, the signal being sent automatically from the Halifax Western Union clock.

There were also systems of electric lights in harbours for night signalling, but that was largely for weather reports. Therefore, in order to receive the observatory's official time signals, a ship had to be within sight of certain harbours or else an officer had to get to the receiving end of a telegraph or telephone land line.

The wireless was an astounding revolution for the shipping business, an invaluable aid to navigation, a supplement to the fog signal service and a source of news and weather reports, revised sailing orders and commodity prices at different ports. Formerly, a ship out of sight of land or of passing vessels was beyond assistance. Marine disasters, even within a few miles of civilization, could go undetected and survivors often perished in lifeboats or on sandbars outside of the normal shipping lanes. Insurers such as Lloyd's of London invested heavily in wireless almost from the beginning to track their ship positions and arrivals. Six Marconi stations were operating under Dominion government contract in the river and gulf of St. Lawrence before the close of the navigation season in 1904 (Fame Point and Belle Isle, Quebec; Heath Point, Anticosti; Point Amour, Labrador; Cape Ray and Cape Race, Newfoundland), with three government steamers assisting in W/T distance testing [3].

Sable Island, the "Graveyard of the Atlantic", was linked into the Gulf system in the summer of 1905 [4]. The next logical use of W/T was to offer time signals to ships.

## Wireless Time Signals

Daniel Leavitt Hutchinson [5] was appointed Director of the St. John Observatory in 1891. He replaced his father, George H. Hutchinson, who had been director since 1871 and responsible for meteorology and time since 1883. D.L. Hutchinson suggested in April 1905 that the new Marconi-owned and -operated wireless station being fitted out at Camperdown near Halifax be equipped with machinery to permit it to transmit the daily time signals from the Western Union lines to ships at sea [6], [7].

Robert Frederic Stupart, F.R.S.C. [8], Director of the Canadian Meteorological Service, Toronto, liked the scheme and recommended it to the Department [9]. Stupart wrote to Col. F. Gourdeau, Deputy Minister of Marine and Fisheries, Ottawa, on April 24 advising that since coast steamers in the Gulf were equipped with wireless, it would be useful for these ships to receive the 10 a.m. St. John time signal from proposed Marine and Fisheries wireless stations at Halifax, Amherst Island and Sable Island [10]. On April 11, 1906, Stupart informed Gourdeau that he wished to arrange for supplying the wireless stations with weather forecasts and for the Halifax station to begin transmitting a time signal to shipping [11]. After some delay, Stupart requested that Gourdeau instruct Mr. Cecil Doutre, Acting Accountant, Marine and Fisheries, Ottawa, "to arrange for the transmission of daily time signals by wireless telegraphy from Camperdown to Sable Island and ships at sea. Our daily time signals are sent over the Western Union Telegraph lines from St. John to Halifax and Camperdown can be included in the circuit" [12]. Stupart sent Hutchinson a cheque for the Vaughan Electric Company of Halifax on May 16, 1907, for installing Marconi apparatus [13]. By May 1907 an automatic key connected to the transmitting clock at St. John was sending the time signal instantaneously down the telegraph lines to the Camperdown station each weekday at 10 a.m., Atlantic time [7].

At St. John, "an automatic key...is thrown in circuit with the land line immediately before the time signal is received and out of circuit when the signal ceases." [7] In Halifax a special apparatus, operated automatically by Western Union wire, operated the key to transmit the signal. Thus, all of the relaying was automatic. Mr. Hutchinson concluded in his 1907 report, "Thus the daily time signals from the transmitting clock at St. John will be available to ships at sea, equipped with the wireless apparatus, within the wireless zone of the above station." [14] He looked forward to improvements in wireless which would overcome local disturbances, and permit transmission to ships at sea all around the world to make impossible disasters through miscalculation of longitude [7].

Marine and Fisheries issued a "Notice to Mariners" in May 1907, stating:

*The Meteorological Service of the Dominion of Canada is now sending time signals from the Observatory at St. John by telegraph to the Marconi Wireless Station at Camperdown, where special apparatus has been installed to automatically transmit the signal to ships at sea within the zone of that station.*

*Time signals will be sent each week day morning as follows: Beginning at 9h. 58m., a.m., Atlantic time, dots are made each second up to and including 9h. 58m.*

*57s., then a pause of two seconds, followed by a dot at 9h. 59m., then a pause of two seconds follows. The clock then makes dots each second up to and including 9h. 59m. 50s., a pause is then made, followed by a dot at 10h. a.m., Atlantic or Standard time of the 60th meridian west longitude, equivalent to 2h. p.m. Greenwich mean time. [7], [15]*

The C.P.R. steamer R.M.S. Empress of Ireland, out of Liverpool with 1056 passengers and the English mails, bound for St. John via Halifax, reported reception of the very distinct 10 a.m. wireless time signal on April 23, 1908, while 160 miles southeast of Halifax. The Navigating Officer appreciated being able to check the ship's chronometers by wireless. [7], [16]

The first European wireless time signal for inter-observatory communication and ships in the Eastern Atlantic and Mediterranean was inaugurated in 1910, when the Bureau des Longitudes and the Paris Observatory arranged with the military wireless post at the Eiffel Tower to send out observatory time signals at night. A daytime service began soon afterward and, in Germany, the Norddeich wireless station began broadcasting time signals supplied by the Wilhelmshaven Observatory [17].

The best known daily wireless time signal, from the famous high-powered United States Navy station, NAA, at Arlington, Virginia, did not come on the air until February 1913. The Navy opened bids for equipment for NAA in 1909, specifying a year-round radius of reception of 3,000 miles. The contract was won by the National Electric Signalling Company, Reginald Aubrey Fessenden's firm, which supplied a 100-kW synchronous rotary spark transmitting set [18].

It is interesting to note that the Year Book of Wireless Telegraphy and Telephony did not mention the Canadian time-signal operation until 1919, after the Great War, when it commented, "A Time Signal is sent out by the Camperdown Station daily at 2 pm (G.M.T.) on a wavelength of 600 metres." [19]

The last of the time balls disappeared by the early 1930s and the fundamental determination of time in Canada was abandoned after 1931, except at St. John, in favour of radio time signals from Ottawa or Washington. The St. John Observatory continued to send automatic signals down the Canadian Pacific Railway land lines to radio transmitter VCS, Camperdown, seaward from Halifax harbour, as late as 1936 [20] and to VAV, the Marine and Fisheries coastal station near Halifax at Chebucto Head.

That year, however, the Dominion Observatory in Ottawa became responsible for correct time and the Meteorological Service was no longer concerned with the task [20]. The St. John Observatory remained active because of public pressure and its network of time circuits remained operational until 1949 [21].

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\$25.00 (US); elsewhere, inquire.

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7. D.L. Hutchinson, "Wireless Time Signals from the St. John Observatory of the Canadian Meteorological Service," *Proceedings and Transactions of the Royal Society of Canada*, Section III, 3rd Series Vol. 2, page 153, 1908. The Camperdown station at the entrance to Halifax Harbour, was owned and operated by the Marconi Wireless Telegraph Company of Canada, Ltd., and had a range of 250 nautical miles. Its call signal, VCS, was not listed by the Radiotelegraph Branch, Department of the Naval Service until the 1914 report: *Department of the Naval Service, Sessional Papers of the House of Commons, Ottawa*, No. 38, Vol. 50 #26, page 72, 5 George V, 1915.
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