

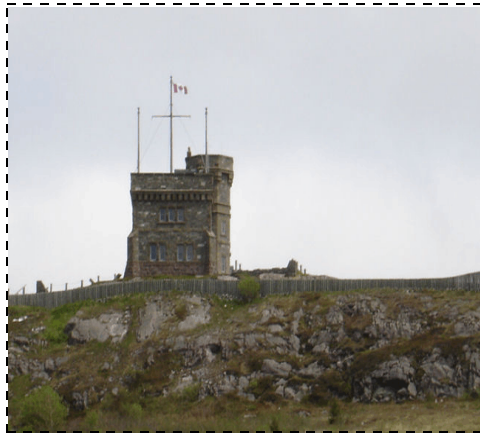
# In Quest of Marconi's Elusive 'S'

Bruce Tanner

Click, click, click; click, click, click; click, click, click... Why the man did not select a more complex Morse character or even a short word to prove his point we may never know. But Marconi's choice of the single letter 'S' to test the wireless propagation path between Cornwall, England and St. Johns, Newfoundland has from the beginning contributed to skepticism and controversy over the event. Current investigators continue to question the validity of Guglielmo Marconi's alleged accomplishment: Reception of the historic, first, Trans-Atlantic radio signals.



St. Johns Harbor from Signal Hill



Cabot Tower- Signal Hill NFD

Analysis of various historic elements by others has produced a rich but inconclusive set of theories and articles pertinent to the controversy. Now further resolution may emerge from replication events planned for the near future in which the reader might take part as short wave listener or amateur radio operator.

For context, this article first presents images of current sights and historic memorials along the Atlantic side of Marconi's radio experiment at St. Johns, Newfoundland, and along Nova Scotia's "Marconi Trail" established in 2001, to commemorate the 100<sup>th</sup> year anniversary of the historic radio event.

The reader will also be introduced to issues and theories related to the recurrent eruption of controversy over the veracity of the Marconi historical record.

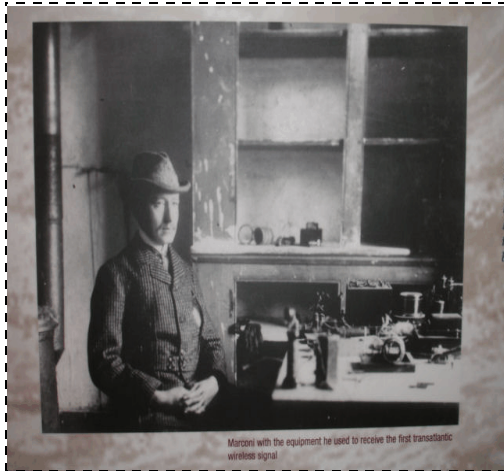
## I

Signal Hill overlooks the coastal city and spacious harbor of St. Johns and anchors a famous Canadian landmark, the picturesque Cabot Tower. The tower predates Marconi as part of an early fortress designed for defense of the harbor. Marconi's reception of the first radio signals, from Poldhu in Cornwall, England on December 12, 1901 took place in an adjacent building, no longer existing, which had earlier served as a military barracks hospital.

Today Cabot Tower provides tourists a



ARS VO1AA in Cabot Tower



Marconi with original gear at Signal Hill following detection of 'S' signals from Poldhu\*

panoramic view of the harbor and city as well as the Eastern expanse of the North Atlantic Ocean. The building is host to a well stocked gift shop and an amateur radio station (VO1AA) maintained by the Marconi Amateur Radio Club of Newfoundland.

Though Marconi's December feat at Signal Hill was left controversial due to lack of valid, objective evidence of results, he conclusively replicated the distance record three months later aboard the SS Philadelphia from Sydney Harbor, NS with both certified witnesses and Morse inker images as proof. Within a year, his company had developed a large, two way, commercial messaging station at Table Head in the Glace Bay region of the neighboring Canadian province of Nova Scotia. This site was selected after

administrators prohibited development within then Colonial Newfoundland. The ban protected assets of the Anglo-Atlantic Telegraph Co. AAT, owner of the monopolistic, transatlantic cable system, had been providing commercial message service between Europe and North America for 30 years or more in nearby Hearts Content.

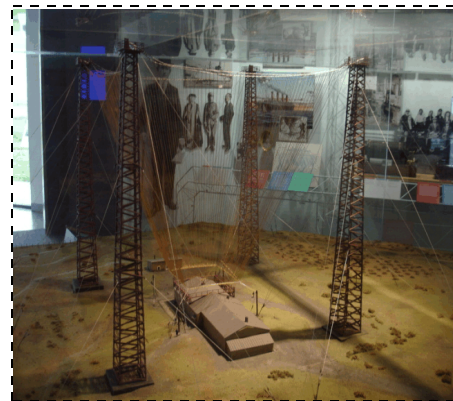
Little is left of the original Table Head station facilities whose four, wire-draped antenna towers stood 240 feet tall on the barren, rocky coast. At this point one can interact only



Table Head interpretive center

Operation there commenced in 1907. Table Head has been made a National Historic Site with an excellent Marconi museum and interpretive center.

Here, too, is amateur radio station VA1VAS maintained and operated by the Sydney Amateur Radio Club. The radio station's special call letters (VAS), commemorate original code



Scale model of Table Head site

with a few of the giant, concrete guy anchors, weathered, but surviving, around the grounds.

The station was moved for better protection from damaging winds and improved technology in 1904 to a nearby inland site now known as "The Marconi Towers".



Information desk and amateur station VA1VAS at Table Head

letters of Guglielmo Marconi's commercial ship-to-shore wireless service formerly operated from this site. Phonetically, they stand for "Voice of the Atlantic Seaboard".

Today it is clear that Marconi's discoveries have better survived the buffeting blows of his contemporaries. But will Marconi's earliest claims of transatlantic reception of "S"s at Signal Hill continue to weather the challenges of our contemporary critics and technology?

## II

Historic documents and retro engineering of Marconi's antennas and equipment have shown his signals were transmitted at a frequency of about 833 KHz (+/- 20 KHz) with a power of 15 KW. Signals were sent for several days from 3:00 PM to 6:00 PM GMT (10:00 AM - 1:00 PM EST) He reported his first reception at about 12:30 PM NFD time on December 12 (Gordon Bussey 2000).

In the absence of knowledge about the ionosphere and propagation paths, critics of Marconi's era were convinced that his experiment could not work, and had not worked. Indeed, he was accused of conspiring and falsifying the report in order to protect his reputation with investors.

It was then well known that electromagnetic waves traveled in straight lines and therefore could not travel beyond the horizon without going into space, preventing reception on Earth 2000 miles or more distant.

Eventual discovery and understanding of the role of ionospheric reflection of radio waves offered partial and temporary resolution for one of these charges. At least the possibility of propagation over the required distance from England to Newfoundland had been restored. Or was the path from South to North as some continued to believe? If he and associate George Kemp did hear the signals, they must have been atmospheric noise, perhaps lightning discharges from the South American Amazon region, charged Kimberlin (Don Kimberlin 2002) and others.

In recent years these earlier controversies have found renewal partially due to focus on the event brought about by the Marconi centennial period. But advances in engineering and knowledge of physics in general also permit more adequate, if still controversial, analysis of propagation dynamics and technology, both historic and contemporary.

Perhaps Marconi did hear the "S"s suggests Marconi historian, Joe Craig, VO1NA,(2001) but they must have been received at shortwave



Rendition of Marconi, kite supported aerial used at Signal Hill



Author locates former guy anchor for tower at Table Head location.

frequencies since signals at 833 KHz would have been absorbed in the "D" Layer and unable to reach the ionospheric "F Layer" necessary for reflection at that time of day.

Geophysical models have enabled wireless historian Bart Lee, KV6LEE (2000) to define signal paths from Europe to North America existing in December of 1901 documenting the presence of a sun spot minimum of exactly zero and potential grey line and winter solstice enhancement of signals between the two geographical locations. Theoretically, the "D Layer" would be less dense, he believes, and reflective gray line propagation at 833 KHz under those conditions might have been possible. Atmospheric noise, says Lee, would likely have shown up not as a click, click, click, but as random noise as it does even today.

In persistent defense of Marconi's claim, Lee (2001) continues his investigations by questioning the relative density, then vs now, of nitric oxide responsible for absorption, in the D Layer . It is a factor which might make a difference in reception, as well as confound today's computer models based on current polluted conditions in the atmosphere.

Lee's (2005) most recent investigations have suggested that the Marconi receiver circuit, rather than being a passive detector, may have actually developed amplified output pulses in Class "C" mode via the biased mercury detector and RF-choked telephone receiver reportedly used at Signal Hill.

I also momentarily joined the ranks of skeptics when I realized that the landing site for the AAT company's telegraphic cable is located a mere 36 miles, as the crow flies (read spark), to the Northeast of St. Johns. I began to wonder if anyone had investigated the potential for pulse noise generated by the huge, clacking relays located inside the cable terminal at Hearts Content! Later I learned that a connecting cable actually was installed between St Johns and Hearts Content!

Such digression is clearly too much, but it is interesting to note that a conductive circuit already existed between the continents without the need for a charged up ionosphere !! What a transmission line!

None of the above theories are able to be put to the final test, but each does add an alternative explanation for the sounds heard in Marconi's telephone receiver that day.

We are approaching a solar cycle propagation period when Marconi's historic moment might be reasonably replicated under similar solar conditions to those in December of 1901. Bart Lee (2001) some time ago proposed to the Poldhu Amateur Radio Club that they establish a beacon signal on the amateur 160 meter band as a signal source from England for monitoring during the pending sun spot minimum.



Repeaters at Hearts Content convert cable signals to land line circuits

The sun spot minimum for current cycle 23 is expected to occur near December of 2006. This is a condition similar to the solar propagation conditions during the Marconi experiments. In addition, the Earth and Sun will again be situated such that gray line enhancement of radio signals will be the strongest between England and Newfoundland at about the same time of day that Marconi was to have heard the famous "S" broadcast from Poldhu. Occasional reception of signals in the AM broadcast frequency spectrum, as well as amateur signals in the 160 meter band, have been confirmed recently during day light hours.

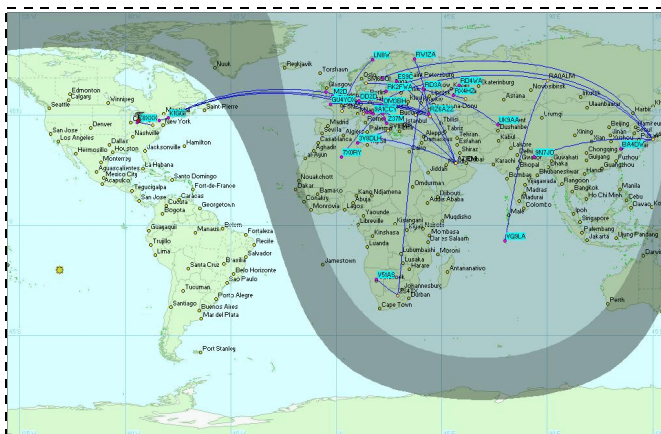
In an effort to replicate the transatlantic circuit, two amateur radio clubs on either side of the Atlantic are in preparation for an attempt to duplicate the reception of signals at St. Johns transmitted from Cornwall, England.

Though he cautions the information is provisional, Keith Matthew, GOWYS, secretary of the Poldhu Amateur Radio Club (Personal communications, August 14, 2006) indicates that his organization is in process of developing hardware with which to transmit a radio beacon signal. It will transmit continuously between November 1, 2006 and January 31, 2007. The signal will be transmitted on a frequency of 1960 KHz in the amateur radio 160 meter band. The beacon call sign will be GB3SSS. The signal content will include the call sign identification on the hour and at 15 minute intervals in CW and PSK31 modes. A series of pulses, decreasing in power by 6dB increments, will be sent throughout each cycle to aid in evaluating the relative power necessary for signals to be received.

Joe Craig, VO1NA, representing the Marconi Amateur Radio Club of, Newfoundland has reportedly installed a new Beverage antenna which will be used to monitor the signals from England and may also be used to record atmospheric noise towards the South (Bart Lee, personal communications July 27, 2006). K2AN, amateur station of the Antique Wireless Association in New York, will also be monitoring. MARC members participating as SWL's or amateur radio operators are invited and encouraged to participate during the active beacon period as well. QSL reports may be emailed to Keith and Joe at [gb3sss@yahoo.co.uk](mailto:gb3sss@yahoo.co.uk), or mailed to: 3 Marconi Close, Helston, Cornwall, TR13 8PD, UK.



Telegraphers provide services from Marconi Towers location c. 1907



"DX Atlas" image depicts 160 meter contacts between England and New England at 04:05 PM EST 1/28/06

Although nothing can completely resolve the questions about Marconi's original reception at Signal Hill, it is hoped that reports from this experiment will contribute additional real life data to help answer the question of

whether a valid propagation path can exist at this frequency between England and North America at the prescribed time and under similar levels of ionospheric activity to those Marconi enjoyed. If so, we may be yet another step closer to verifying Marconi's claim to his first radio reception at Signal Hill.

By the way, Marconi's choice of the Morse character 'S' was deliberate. He chose it for several reasons. (Bart Lee, personal communications on September 15, 2006). Among them, the demands of his father to use that letter to prove the worth of his device. He also thought the three dots would be most easily distinguished from atmospheric noise when heard, or viewed on a Morse inker readout, and his assistant, Fleming, engineering the transmitter site at Poldhu feared that more complex characters might cause the spark transmitter to fail. Unfortunately, the inker device was never used during the first attempts at reception on Signal Hill.

o o o

*Author's note: The quest to understand and share the issues involved in the controversy over Marconi's achievements was born of recent travel and brief secondary research. My wife, Marcia, and I completed one of our dream trips in retirement in the early summer of 2005. Our RV camping journey took us through the New England states, into Nova Scotia and Newfoundland. The trip provided inspiration for the composition of this article and all photos were captured during that journey. I encourage additional reading from the sources below.*

*B. Tanner*

\* It is reported that the Marconi 1901 photo was altered prior to publication to disguise the equipment actually used.

Bussey, G., Marconi's Atlantic Leap, Marconi Communications, 2000, Coventry, England.

Craig, Joe, 2001, "The First Transatlantic Wireless Message Revisited". Retrieved from <http://www.ucs.mun.ca/~jcraig/marconi.html> on 8-20-06.

Kimberlin, Don, 2002, "Marconi's Mystery", The NARTE News, Winter, 20:4. Retrieved from <http://www.narte.org/n/204/NARTENewsV20N4p6-8.pdf> on 9-14-2006.

Lee, Bart, 2000, "Marconi's Transatlantic Triumph - A Skip Into History", The Antique Wireless Association Journal, 2000, Stafford, N.Y.

Lee, Bart, 2001, "Reflections: Marconi and Ionospheric Propagation, and a Plea for Timely Experiments". Retrieved from <http://www.californiahistoricalradio.com/photos53.html> on 8-20-06.

Lee, Bart, 2005, "A Meditation on Marconi's Mercury Detector and his Transatlantic Triumph of 1901: Nothing Ventured, Nothing Gained". Retrieved from <http://www.californiahistoricalradio.com/photos63.html> on 8-20-06.