

RADIO MAGIC

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Magic, Myth and Marconi: Part 3

“Three years ago electromagnetic waves were nowhere. Shortly after, they were everywhere.”—Oliver Heaviside

Diary excerpts of George S. Kemp

Retired British Royal Navy petty officer and “electrician” (electrical engineer) George Stephen Kemp was Guglielmo’s lifelong assistant and ever loyal lieutenant (part 2 refers). They worked together for over 35 years (until Kemp’s death). If you wanted to get to Marconi, you had to go through the diminutive British “bulldog” Kemp. He was the “wing man” who worked quietly in Marconi’s huge shadow, but without him there would be no Marconi. Kemp’s handwritten diaries cover their years working together from 1897 to 1932; he supervised their transcription to typewritten bound books for the Marconi company archives.

St. John’s, Newfoundland, 1901

December 6th

“We saw at daybreak this morning that there had been a hard frost during the night. We sighted the Block House at St. John’s. To the North were icebergs while, to the South of the Harbour, the spouting of whales was seen. We landed at Shea’s Wharf and put up at Cochrane House where Premier Bond had apartments. In the afternoon we went to the Block House and to the Club in the evening.”

Marconi arrived with his assistants Kemp, Percy W. Paget and receive-only equipment (see Figure 1). Some delicate gear was damaged but brilliant engineers Kemp and Paget improvised repairs. Two pool reporters from the New York City *Herald* and the London, England *The Graphic* greeted the Marconi; over the next week he fed them just enough information to keep up his deceptive cover story (part 2 refers).



Figure 1: The triumphant trio

Kemp (left), Marconi (centre) and Paget. A huge Baden-Powell Levitor "man-lifter" kite stands behind them. Credit: James Vey, Library and Archives Canada. *Note: Marconi hired well-known St. John's professional photographer James Vey to capture the historic event albeit Vey's series of famous pictures were staged after the fact!*

December 7th

“All of the cases of instruments and some of the Gas cylinders were conveyed to Signal Hill, and we arranged with Mr. More to provide us with 20 sheets of zinc. The room given to us, for the purpose of storing our kits and balloons, by the Marine Minister was situated at the Hospital at the end of the Block House and opposite to Cabot Tower. The 20 sheets of zinc were prepared ready to be earthed near the door of the Store.”

The “Hospital” was an abandoned *general* hospital (part of a former military barracks or “Block House”), but an abandoned *isolation* (fever and tuberculosis) hospital was located down a difficult trail and the two are often confused (see Figure 2).

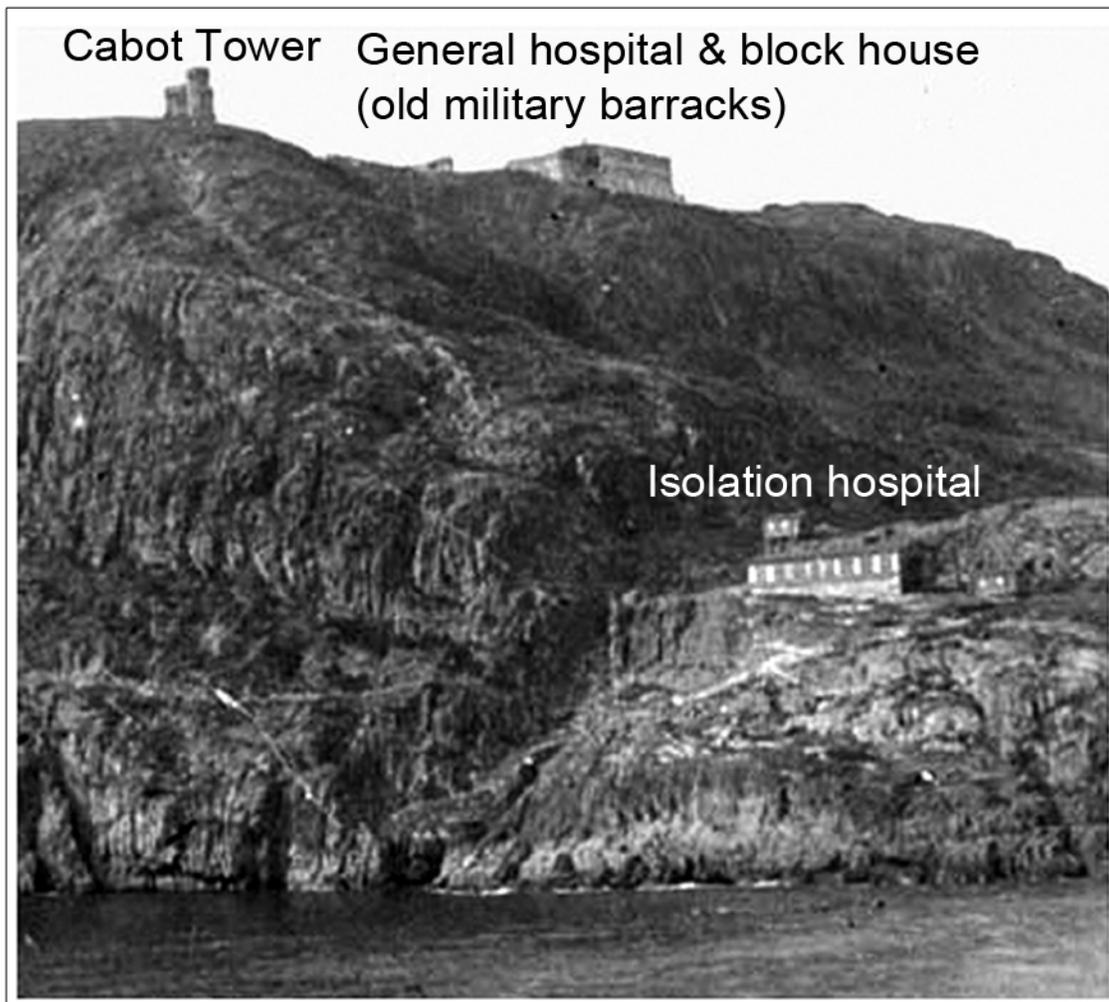


Figure 2: Starboard entrance to St. John’s harbour, Signal Hill, ca. 1900
The abandoned hospitals were repurposed old military structures but Cabot Tower was newly built in 1897. Credit: Newfoundland and Labrador Heritage.

December 8th

"Sunday – In the evening I went to the Cathedral and was given a seat in the Governor's pew. This building was almost gutted during the Great Fire of St. John's when I was onboard H.M.S. Blake at Halifax; food and tents were sent at full speed to St. John's and we were in time to assist in extinguishing the fire."

Kemp was feted as a returning hero by city officials. The "Cathedral" is Cathedral of St. John the Baptist. The early July 1892 "Great Fire of St. John's" incinerated everything not made of stone including food, medicine and other supplies.

December 9th

"The zinc plates were connected and earthed, after which No. 2 balloon was oiled in the Block House and then two kites were prepared with lines 750ft. long."

December 10th

"A kite and 600ft. of wire were raised on Signal Hill for experiments in connection with reception from Poldhu Station, Cornwall. Mr. Marconi proposed to make a new receiver, which would be more sensitive, when we returned to England."

December 11th

"The balloon was partly filled with hydrogen gas and I had great trouble with it. This was due to the strong wind that had suddenly sprung up at 3 p.m., which carried away the special mooring line, supplied by Mr. Spencer, and, had it been carried away on the mooring side instead of the balloon side, I should have gone with it as its speed was like a shot out of a gun. Mr. Marconi tried all the detectors from time to time, while we had the balloon under control, and called me in at intervals to try the receivers. Signals appeared at intervals on a telephone in series, when using our sensitive tube circuit, and, at times dots threatened to appear on the tapper."

Marconi instructed Poldhu to send "S" signals at specific intervals coinciding with Newfoundland local time between 11:30 a.m. and 3 p.m. Of course, no one knew then that this was a really bad time of day for the reception of wireless wavelengths estimated as *"not less than 3000 feet"* (Fleming). Note: About 909 metres (m) or 330 kilohertz (kHz). In 1904, Fleming invented a wavemeter for accurate measurements.

December 12th

"We received the three dots or the S signal repeated. We lost the first kite with 2 wires, each 510ft. long, after it had been the means of giving us one hour for reception which was better than yesterday. Another kite was raised with one wire 500ft. long, which appeared more in harmony with the earth's electric medium and the signals from Poldhu Station. We were able to keep this kite up for three hours and it appeared to give good signals."

Marconi's diary entry: "Sigs at 12.30, 1.10 and 2.20".

December 13th

"A representative of 'The Graphic' visited Signal Hill and made a sketch of the outside of the Hospital which we were using for reception. The wind from the Hump, near the Block House, was very strong and variable. I tried three kits but not one of them could be kept up. Photographs were taken at the Block House."

Marconi's diary entry: "Sigs at 1.38". See Figures 3, 4A and 4B (next page).

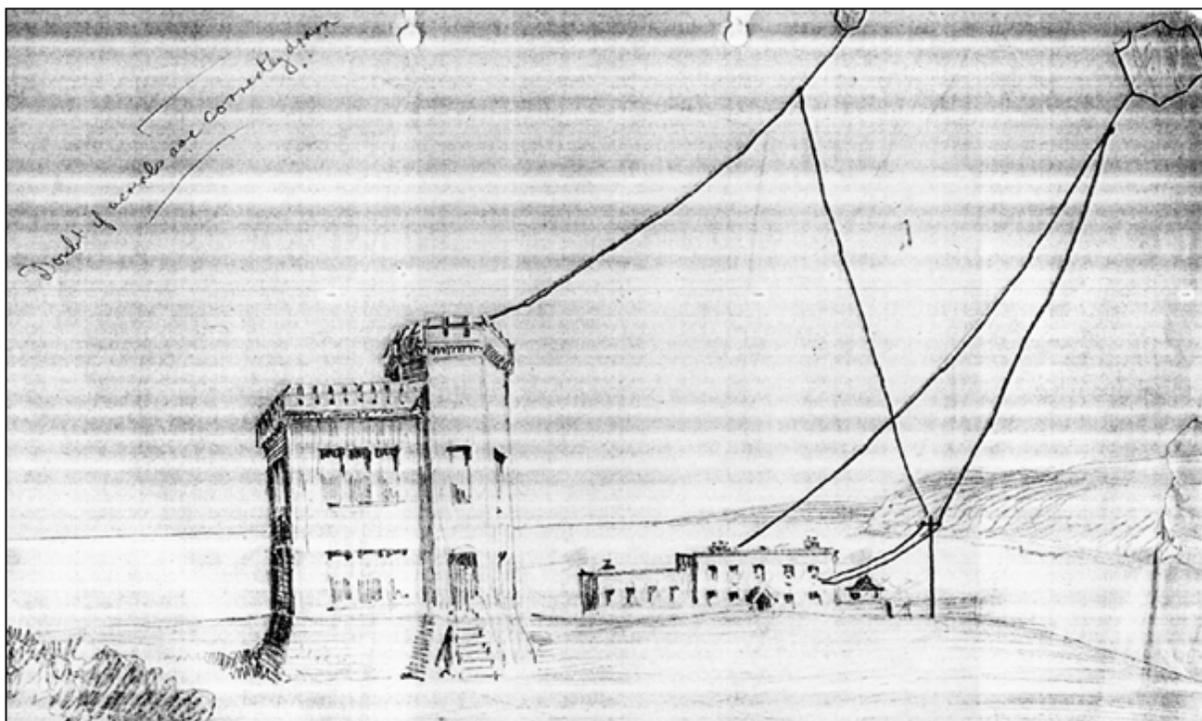


Figure 3: Reporter's sketch, Signal Hill, 13 December 1901

Artistic license or did he draw what he actually saw? Someone later wrote on this copy "Doubt if aeriels are correctly drawn". Credit: CNS, Memorial University of Newfoundland.



Figure 4A: "Let's go fly a kite..."

Start of a (staged) Levitor kite aerial launch as Paget watches (back to camera). Note the telegraph pole and leaning ladder (right) from where Kemp stands and watches. Credit: James Vey, Library and Archives Canada.



Figure 4B: "Up to the highest heights..."

Marconi (left); Kemp (centre) is now behind a tall, skinny man holding the line; the one who held the Levitor moves behind them and Paget holds it. Kemp names the two local hires as Michael Cantwill and D. J. Crotty. Credit: James Vey, Library and Archives Canada.

On December 14th, Guglielmo sent victory cablegrams to his company Manager, parents and Italian King. He informed the Governor of Newfoundland who cabled the British government and King Edward VII; later that evening he told the reporters. On December 15th, the sensational story appeared in the morning newspapers sending a shock wave around the world. Over the next few days, politicians and curious tourists arrived at Signal Hill to meet the man of the hour (see Figures 5 and 6, next page). Marconi's opponents were simply stunned, poleaxed and paralyzed by this sudden wireless thunderbolt from out of the blue, and it gave him exactly what he needed the most of all—time. The field was his and his alone! But staunch anti-Marconi groups also formed in England and Europe because they believed that both he and Kemp didn't hear any "S" signals (Paget heard nothing when he listened). They were right, but once Marconi let the transatlantic wireless "genie" out the "magic box" it couldn't be put back! No one (especially posterity) cares about who was second at anything.

THE ST. LOUIS REPUBLIC.

YEAR. ST. LOUIS, MO., SUNDAY, DECEMBER 15, 1901. PRI

**MARCONI ANNOUNCES SUCCESSFUL
TRANSMISSION OF A SIGNAL
ACROSS ATLANTIC WITHOUT WIRES.**

Inventor of the Wireless System Says That He Received a Message at St. Johns, Newfoundland, Which Had Been Sent From Cornwall, England—Claims to Have Solved the Most Difficult Scientific Problem of Modern Times—Imperfect Machinery Used in the Test and the New Wizard Believes That a Perfect System Will Place Communication Between Continents on a Commercial Basis.

SCIENTISTS ASTOUNDED BY PROSPECTIVE REALIZATION OF FEAT AKIN TO THE MIRACULOUS.

"If Marconi says he did it, it must be so."—Edison

Figure 5: "...it must be so"

With Bell and Edison's endorsements, Marconi's lack of evidence or impartial witnesses didn't matter. It happened at the right time, at the dawn of the 20th century, when all things seemed possible. Wireless became the "internet" of its time and it rocked the world like an atomic bomb!



From a photograph, by courtesy of the Century Company.
Signal Hill, St. John's, Newfoundland. X, Room in which the Message
from Cornwall was received.

Figure 6: Postcard from the famous edge, December 1901

Signal Hill quickly became a tourist attraction once the word got out. Note the temporary telegraph pole and still leaning ladder (left). Credit: Library and Archives Canada.

December 19th

"I went up on Signal Hill at 9 a.m. and packed all the apparatus, after which I unearthed the zinc plates and returned to Cochrane House at 5 p.m. I conversed with Mr. Marconi concerning the new receiver that he proposed to work on similar lines as the one that he will show me later. I told him that it was a great shame we could not remain to try our cliff wire, which extended from Signal Hill to one of the icebergs stranded in the Harbour quite close to us. This cliff wire would probably give us better harmony with the earth's electric medium and the transmitter at Poldhu. These cliff wires had been very successful at Swanage, Ballycastle, the Needles and South Foreland and, by their use, signals were received from the Lightship and France when the main Station was troublesome."

December 20th

"I transferred all the apparatus from Signal Hill and packed it in store at Shea's Wharf, Agents for the Allan Line. I paid Michael Cantwill and D. J. Crotty the sum of 10 dollars. These are the two men from Newfoundland, seen in the Signal Hill photograph, who helped us to construct and demolish the Station on Signal Hill."

December 21st

"I met with Mr. Stannard Baker in the evening; he had come from McClure's Magazine Offices in New York in order to receive, from Mr. Marconi, the first account of his great and wonderful achievement."

"Veni, Vidi, Vici"

The Anglo-American Telegraph Company wasn't at all amused because its stocks nosedived overnight and it had the monopoly for all telegraph operations in Newfoundland (then a British colony) and threatened immediate legal action if Guglielmo didn't cease and desist. Upon hearing this, Alexander Graham Bell offered him "sanctuary" and use of his Cape Breton property; then the Canadian and Nova Scotian governments proffered a shipload of money for Marconi to come, build and operate Canadian-based wireless stations. No fool, Guglielmo beat retreat and sailed to North Sydney, Nova Scotia. He arrived on Christmas Day, world famous even beyond his wildest teenage backyard dreams (part 1 refers)! See Figure 7, next page.

Public acceptance aside, there was initial scepticism in the scientific community, even among his proponents, until they read Marconi's sworn and signed statement. He was given the benefit of the doubt by almost everyone because he was well-known for only making announcements when real breakthroughs were achieved—unlike his rival Nikola Tesla. Speaking of the devil, back in New York a Tesla company engineer remarked "Looks as if Marconi got the jump on you!" Nikola replied naively "Marconi is a good fellow. Let him continue. He is using seventeen of my patents." But he was struck by a devastating and fatal blow, one from which he would never recover; Tesla's investors abandoned him quickly and just as quickly hitched themselves to Marconi's rapidly rising star and soaring stocks. "The king is dead. Long live the king!"



Figure 7: Marconi the Conqueror

He became an overnight, world-wide "rock star radio god", and remained so for the rest of his life and for all time. Credit: *The San Francisco Call*, 18 Dec. 1901.

The Critical Critic Returns

Curmudgeon Oliver Lodge penned another polite but backhanded letter (part 1 refers), published in the *London Times* newspaper on 20 December 1901:

"It is rash to express an opinion either way as to the probability of the correctness of Mr. Marconi's evidently genuine impression that he has obtained evidence on the other side of the Atlantic of electrical disturbances purposely made on this side, but I sincerely trust that he is not deceived. He has probably been using as detector the very simple device depicted in my little book on the subject published by *The Electrician*, p.27; and I know how sensitive this plan is, for with it messages could be easily heard across the Bristol Channel at Weston-super-Mare with a pole only 12 ft high; hence I am not indisposed to credit the assertion that with great power on one side a faint trace could be perceived on the other side even of the Atlantic.

The danger of referring even hypothetically to such subjects lies in the fact that needless financial disturbances are sometimes brought about; but, as I have expressed myself critically on some of the early achievements of Mr. Marconi, which from the first were erroneously heralded before the British public as scientific novelties, I should not like to be behindhand in welcoming, even prematurely, the possibility of so immense and barely expected an increase of range as now appears to be foreshadowed. Proof, of course, is still absent, but by making the announcement in an incautious and enthusiastic manner Mr. Marconi has awakened sympathy and a hope that his energy and enterprise may not turn out to have been deceived by the unwonted electrical dryness of the atmosphere on that wintry shore."

"Something"

In a really ill-advised rebuttal, Marconi's company Manager Major Flood Page "misspoke" (meaning he accidentally told the truth):

"...Lodge is altogether wrong in his suggestion that Marconi was 'using as detector the very simple device depicted in my little book on the subject.'... Mr. Marconi was using something that Principal Lodge has never yet seen."

Everyone immediately demanded to know the details about this never yet seen "something". Then the contradictory *McClure's* article hit the fan with "Marconi's Achievement: Telegraphing Across the Atlantic Without Wires":

"...And so when critics suggested that the inventor may have been deceived at St. John's by messages transmitted from ocean liners, he was able to respond promptly: 'Impossible. My instrument was tuned to receive only from my station in Cornwall.'... The importance of the new system of tuning can hardly be overestimated..."

We know that Guglielmo tried a syntonized (inductively tuned) receiver using two “coherers” (part 1 refers) of different metal filing combinations, which just so happened infringed on Lodge’s patented circuit (he sued and Marconi settled—in 1911). But received signals were too weak to drive a Morse code register (part 2 refers). Because he really had no idea of where to tune to hear Poldhu’s signals, he switched to an untuned (broadband) detector using the more sensitive “Italian Navy” coherer and a Bell telephone earpiece (see Figure 8).

This was the “something” referenced by Page, invented in 1898 (but not patented) by the multifaceted genius Jagadish Chandra Bose as the “iron-mercury-iron coherer with telephone detector” (it was a type of “liquid-state”, point-contact semiconductor). In 1894, Bose was first to generate and study “microwaves”, invented many commonly used (today) microwave components and introduced experimental science to the Indian subcontinent (Bose Institute refers). In 1896, he met Guglielmo, in London, during a lecture tour demonstrating microwave “magic”. And Marconi’s employee, John Ambrose Fleming, attended the April 1899 Royal Institute (London) meeting where Bose read his paper “On a Self-Recovering Coherer...” However, Guglielmo claimed he had no prior knowledge of it, and that his childhood friend, Italian Navy officer Luigi Solari (who supposedly said it was his invention) supposedly gifted him “something”, which Marconi unashamedly patented. (“The ‘Italian Navy Coherer’ Scandal Revisited”, P. K. Bondyopadhyay, 1998) refers.

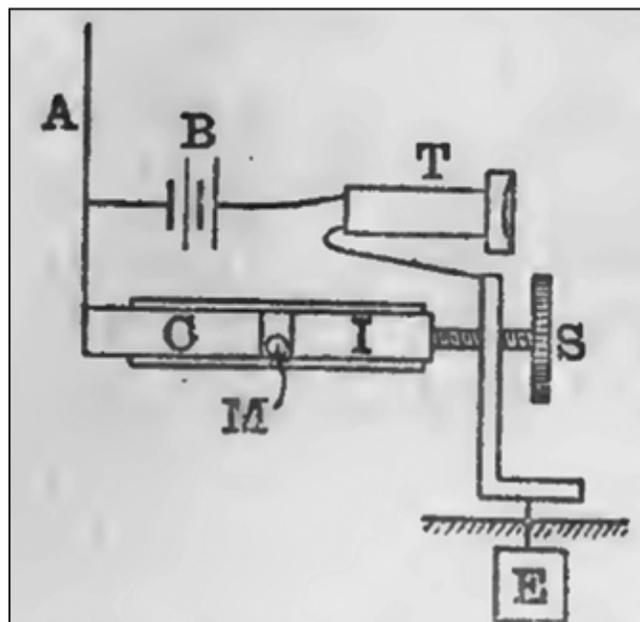


FIG. 17.—ITALIAN NAVY SELF-RESTORING KUMASCOPE. C, carbon plug; I, iron plug; M, mercury globule; A, aerial; B, battery; T, telephone; S, adjusting screw.

Figure 8: Italian Navy coherer

Fleming called coherers “kumascope” (ancient Greek: “wave seeing”). Credit: “Hertzian Wave Wireless Telegraphy”, J. A. Fleming, 1902.

S. S. Philadelphia

In late February 1902, Marconi, Kemp and company engineer R. N. Vyvyan sailed on the S. S. Philadelphia from England to New York. Underway, they conducted carefully controlled reception tests with Poldhu using a 60 m cage vertical antenna (attached to the main mast). They soon discovered, to their dismay, that at distances over 1120 kilometres (km) from Poldhu, any messages or "S" signals transmitted during the day couldn't be received (Lodge was right)! Fortunately, messages transmitted at night reached 2480 km (recorded by Morse register) and "S" signals (heard by earpiece) out to 3360 km (see Figure 9). Vyvyan noted that the syntonic receiver and conventional coherers worked well but the Italian Navy coherer's performance was poor. Marconi used this invaluable information to redesign his wireless stations' transmitters and antennas, abandon Morse registers and coherers and proceed with a new detector type—the magnetic detector or "Maggie".

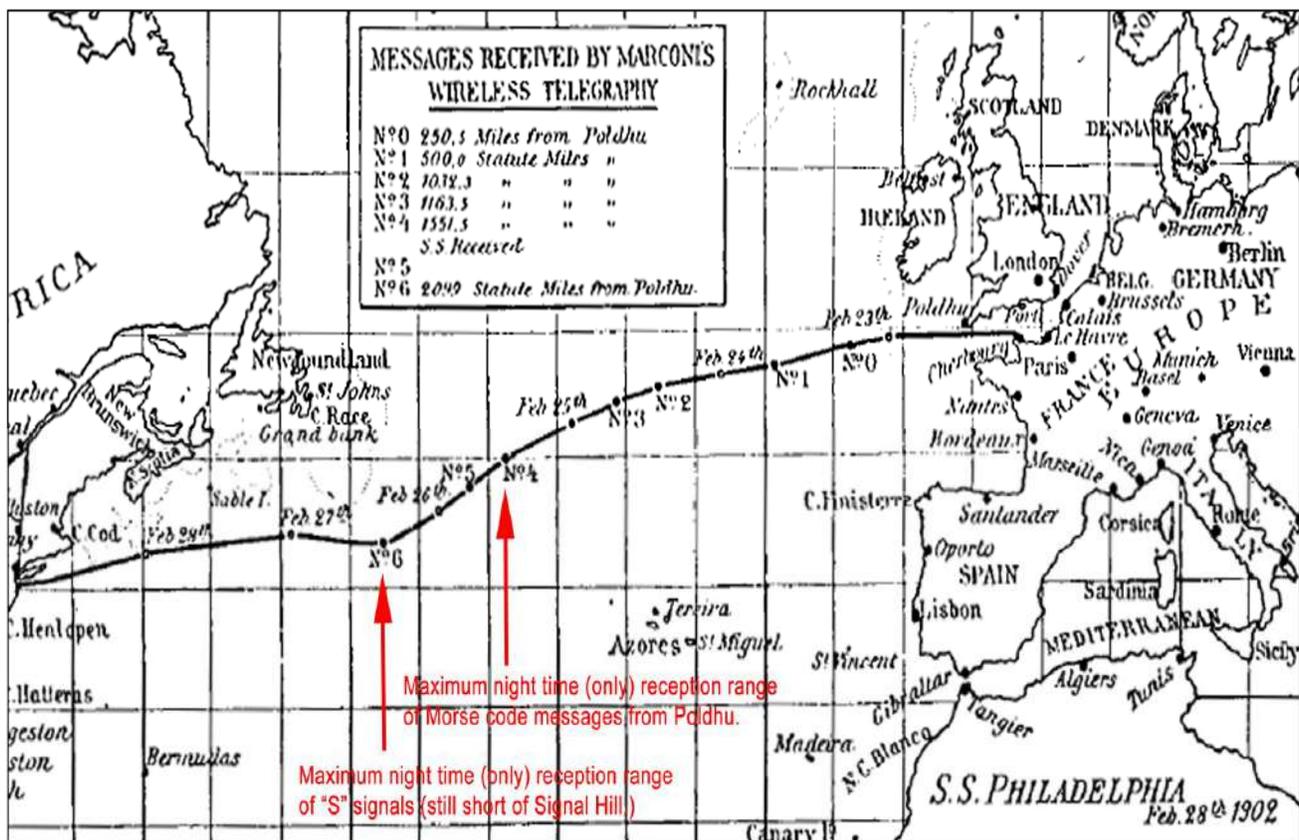


Figure 9: Voyage of the S. S. Philadelphia

If Tesla hadn't pressed Marconi so hard, this trip should have logically preceded the Signal Hill attempt, and Poldhu would have transmitted "S" signals at midnight instead of midday. I've added the red annotations. Credit G. Marconi.

How to Spin a Scandal

The so-called "Italian Navy Coherer Scandal" began when a Professor Banti wrote a scathing editorial in the May 1902 Italian journal *L'Electricista* accusing Marconi and Solari of stealing "something" from a signalman named Castelli. Caught in a tangled web, Guglielmo disowned and discredited "something" at a Royal Institute meeting:

"...A technical paper gave out that a signalman in the Italian navy was the inventor of the improved coherer, and I was at once accused in certain quarters of suppressing the alleged inventor's name. I therefore wrote to the Italian Minister of Marine, asking him to make an authoritative statement on the matter, which reads: *The coherer has been with good reason baptized with the name of 'Italian Navy Coherer,' as it must be considered fruit of the work of various individuals in the Royal Navy and not that of one...*"

"...These non-tapped coherers have not been found to be sufficiently reliable for regular or commercial work. These coherers are, however, useful if employed for temporary tests in which the complete accuracy of messages is not all-important, and when the attainment of syntonic effects is not aimed at. They are especially useful when using receiving vertical wires supported by kites or balloons, the variations of the height of the wires (and, therefore, of their capacity) caused by the wind making it extremely difficult to obtain good results on a syntonic receiver..."

And in the June British journal *The Electrician*, Fleming wrote:

"...Assertions were subsequently made that Marconi had achieved the feat of detecting electric waves across the Atlantic by the aid of other inventions than his own. As the object of these first experiments was to discover if the waves could be detected at all, he naturally made use of the most appropriate means known to him. The use of a telephone as a means of detecting small but sudden changes in the resistance of a microphonic or imperfect contact was already well known, and there was no reason why he should not have employed it if convenient."

Fait Accompli

Meanwhile, Marconi quietly built a new wireless station at Glace Bay (Table Head), Nova Scotia (see Figure 10, next page). In mid-December 1902, he exchanged spark gap Morse code messages with Poldhu but, for some unknown reason, daytime messaging was erratic. It took him another five years of trial and error (and money) to overcome the various "peculiarities" (his term). He finally achieved commercial success with transoceanic stations using extremely long wavelengths (very low frequencies), thousands of watts of radiated power and massive antenna systems.

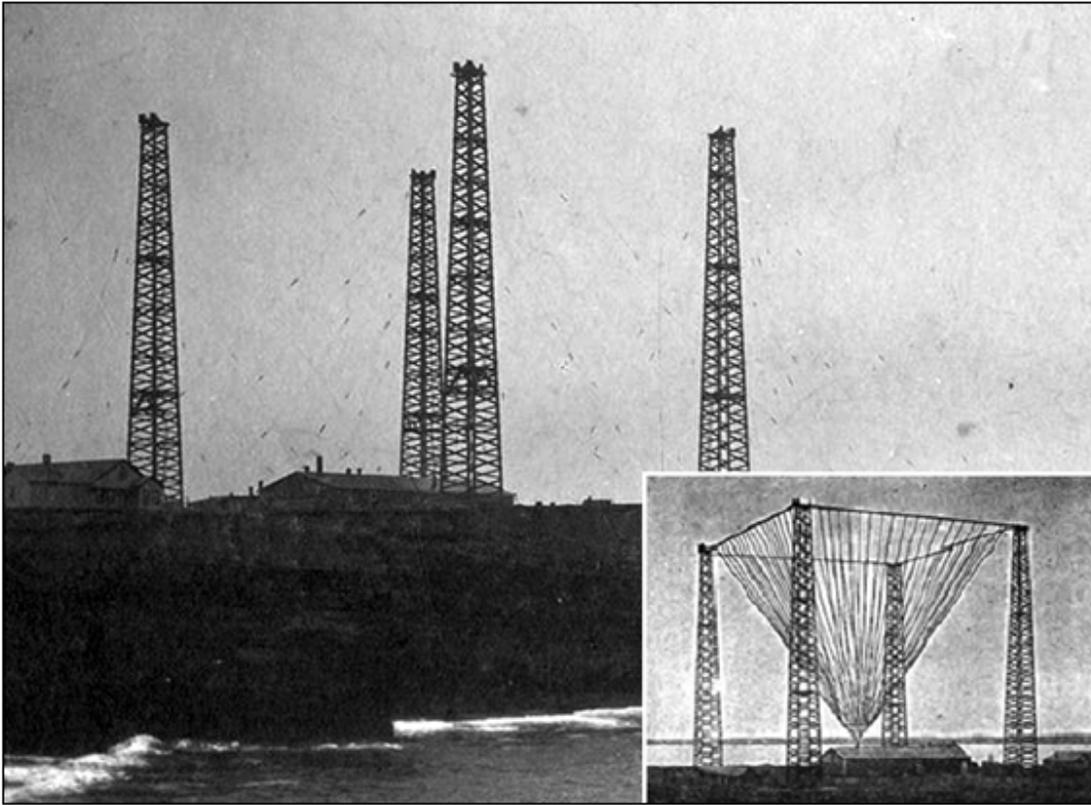


Figure 10: Glace Bay station and antenna (late 1902)

Four 61 m tall guyed wooden towers stand in a 61 m x 61 m square. Soon-to-be strung with wires formed an inverted pyramid (insert). Credit: Beaton Institute Archives, Cape Breton University.

His Thoughts and Words

"In the new era, thought itself will be transmitted by radio. Have I done the world good, or have I added a new menace?"—Guglielmo Marconi.

Excerpts from Marconi's Nobel Prize for Physics lecture (Royal Swedish Academy, Stockholm, 11 December 1909) wherein he provided copious details for the years before and after Signal Hill, yet spoke only two terse sentences about that historic event!

"...I therefore decided to try the experiments by means of a temporary receiving station erected in Newfoundland, to which country I proceeded with two assistants about the end of November 1901. The tests were commenced early in December 1901 and on the 12th of that month the signals transmitted from England were clearly and distinctly received at the temporary station at St. John's in Newfoundland..."

"...A result of scientific interest which I first noticed during the tests on S.S. 'Philadelphia' and which is a most important factor in long distance radiotelegraphy was the very marked and detrimental effect of daylight on the propagation of electric waves at great distances, the range by night being usually more than double that attainable during daytime..."

"...I am now inclined to believe that the absorption of electric waves during the daytime is due to the electrons propagated into space by the sun, and that if these are continually falling like a shower upon the earth...then that portion of the Earth's atmosphere which is facing the sun will have in it more electrons than the part which is not facing the sun, and therefore it may be less transparent to electric waves... The fact remains, however, that for comparatively short waves, such as are used for ship communication, clear sunlight and blue skies, though transparent to light, act as a kind of fog to these waves..."

"...Whatever may be its present shortcomings and defects, there can be no doubt that wireless telegraphy—even over great distances—has come to stay, and will not only stay, but continue to advance."

My Final

Detailed technical analysis by renowned Canadian radio scientist Dr. John S. Belrose, VE2CV/VE3CVV proved conclusively that Poldhu's transmissions couldn't reach Signal Hill during the day (A Radioscientist's Reaction to Marconi's first transatlantic Wireless Experiment—Revisited, 2006) refers; *as confirmed by Marconi's own S. S. Philadelphia tests 100+ years earlier!* He knew the awful truth then and only his de facto Glace Bay success saved him from ignominy. Regardless of reality, facts and fictions intermingled slowly as time passed and memories faded until the man and the event blurred into myth. And once a myth is written into the fabric of society it can't be unwritten whether it's true or not.—73