

MARCONI: THE MAN AND HIS WIRELESS¹

Guglielmo Marconi (1874-1937), inventor, electrical engineer, and winner of the Nobel prize for physics, was the first to perfect the devices used in space telegraphy. To his genius is due the great scientific triumph of wireless telegraphy.

Orrin Dunlap states that he gives us the exciting story of how the first wireless signal was flashed across the Atlantic sky, because "it is not only unforgettable, but one of the great climaxes in the history of wireless, and in Marconi's life." From his book comes the following story about Marconi's invention.

Marconi at the dawn of a new century caught the vision of a dream. He saw men sitting on the edge of the North American conti-

nent listening to what a lambent spark was sputtering across 2,000 miles of broad, curving ocean.

New Year's Day, 1900, ushered in an electrical age of speed and scientific wonders — a Century of Progress.

The question in 1900 was, how can 20 kilowatts spread out to every point of the compass provide sufficient energy to traverse 2,000 miles in one direction? Would America and England be brought in touch with each other without the aid of the submerged cable costing from \$4,500,000 to \$9,000,000 or up to \$2,500 a mile?

Marconi thought so, and was working feverishly toward that conclusion.

The cable secluded in the bed of the sea could carry dots and dashes, but the idea that thoughts might pass through the ocean air in less than a second was something to balk human credulity.

¹Orrin E. Dunlap, *Marconi: The Man and His Wireless*, by permission of The Macmillan Company, publishers, New York, 1937, p. 87-90, 93-99, 100-101.

How less tedious, less expensive it would be to utilize a free right-of-way in the heavens instead of laying a cable in Neptune's dreary sanctum? The idea had possibilities calling for a miracle man. The skeptics, of course, were countless. It was true, this man Marconi had convinced the doubting world that wireless lifted messages for short distances, but the Atlantic — well, it was much wider than the English Channel.

It was not so difficult to comprehend, in view of Marconi's achievements, that a boat 250 miles off the English coast picked up a wireless signal from the shore. But that must have been a freak of nature aided by extraordinary atmospheric conditions. So argued the die-hards. It was eight times that distance from England to America!

Marconi, a conservative scientist, knew the Atlantic project was fraught with daring — a little too much for the public mind to grasp. He realized the significance of premature announcements.

Wireless across the sea meant the very shrinkage of

the earth. It meant new and revolutionary communication between every nation on the face of the globe. Wisdom called for secrecy. If the dream turned out to be a bubble it would be a matter of disappointment only to the dreamer. If successful it would be a signal of progress for mankind. So he would work quietly, unassumingly, with plans unpublicized.

He was looked upon as a modern wizard whose human traits outwardly failed to betray any eccentricities of genius. Londoners who saw him in Piccadilly or Pall Mall observed a rather sad, keen-eyed, thin-lipped young man with unlimited capacity for work and a firm faith in his own ability. His brown hair was neatly trimmed and carefully brushed; sometimes he shaved twice a day. His attire, if anything, was a little too neat for a scientist. He was fond of a fur coat and was not above afternoon tea. One who passed him in the street would class him with the average club or city man, fond of the good things in life, yet his manner and step revealed he was by no means

an idler. He looked like a man faithful to friendship but the type who would give it rarely.

Divested of the fur coat he looked frail. His movements were slow and direct, yet there was an odd air of diffidence very apparent when he was in the company of strangers. This shyness was emphasized if wireless telegraphy was the topic. He appeared much younger than his twenty-six years, and more than one great scientist eyed him incredulously when seeing him for the first time.

Superficially, Marconi had little to distinguish him from the average man, but closer acquaintance invariably impressed one with his tremendous energy. The doctrine of strenuous life never had a more faithful follower. He labored under high pressure and expected his subordinates to feel the same intense enthusiasm that gripped him during experimental periods. He worked by night and day when a problem presented itself.

Such was the calibre of the man intent upon transatlantic wireless; the man who was preparing for what he

termed, "the big thing" — wireless between the Old and New Worlds.

Marconi, accompanied by Major Flood Page, managing director of the Marconi Wireless Company, and R. N. Vyvyan, engineer, in July 1900, went to the barren southwest tip of England and selected Poldhu, near Mullion in Cornwall, as the site for a pioneer transmitter, 100 times more powerful than any station ever built. Construction began in October.

There history would be etched electrically on the blue canopy of the globe. Professor James Ambrose Fleming of University College, London, appointed Scientific Adviser of the Marconi Wireless Company in 1899, was entrusted to design the installation. He was a specialist in high tension alternating currents. Mr. Vyvyan was selected to supervise construction. Newspapers printed meagre reports that an Italian inventor hoped to link two far-distant points without the aid of visible wires.

The word "visible" appearing in the accounts of 1896-99 indicated the incredulity of the general public. The

Gay Nineties were conservative in regard to electrical miracles; people shook their heads in doubt and wonderment

A queer-looking structure, never before seen on the English landscape or anywhere else for that matter, was attracting attention on the forbidding rocks that jut out into the Atlantic at Poldhu. It was Marconi's latest idea of what an aerial system should comprise. There was to be a ring of twenty wooden masts, each about 200 feet high, arranged in a semicircle 200 feet in diameter, covering about an acre. It was designed as the "frame" of a conical aerial consisting of 400 wires.

By the end of August, 1901, the masts were nearly completed, but a cyclone swept the English coast on September 17; the big masts blew down like so many tooth-picks after it had taken eleven months to erect them. Disappointment swept through the Marconi ranks. The engineers said it meant postponement of three months or more to remove the wreckage and build anew.

The "sister" towers on

Cape Cod suffered a similar disaster a few weeks later.

Marconi was too anxious, too unconquerable a soul to permit fallen masts to get the best of him. He decided it might be possible to utilize a simpler aerial. So two poles, instead of twenty, each 150 feet high, were erected. A triangular stay was stretched between the masts and from it were suspended fifty-five copper wires. They were about a yard apart at the top and conveyed at the bottom, forming a fan-shaped aerial.

Everything was ready for a preliminary test.

The fiery spark crashed across the gap electrifying the makeshift web of wire and the bleak November air.

A wireless outpost at Crookhaven, Ireland, 225 miles away, heard the signals with such intensity that the engineers felt certain the power was sufficient to drive a message across the Atlantic — ten times as far as Poldhu to Crookhaven!

Marconi was sure it would. He decided to conduct the first test in Newfoundland — the nearest point in America to the Old World.

Bound on a historic jour-

ney, he sailed on November 26 from Liverpool on the liner *Sardinian*, accompanied by two assistants, G. S. Kemp² and P. W. Paget.

They had odd baggage for three men. Small captive balloons and a number of large kites were in the luggage. They knew the inclement weather in Canada at this season of the year and the shortness of the time at their disposal made impossible to erect high masts to hold aloft antenna wires. But the kites and balloons might do the trick, thereby saving time and expense and possibly make history.

Undramatically, in fact, unnoticed, the trio of pioneers landed at St. Johns on Friday, December 6, and the following day, before beginning operations they visited the Governor, Sir Cavendish Boyle, Premier Sir Robert Bond, and other members of the Ministry, who promised heartiest cooperation. They cheerfully placed the resources of every department

² Mr. Kemp was one of Marconi's most valued electricians and his diary of wireless was a great asset to Marconi when in court fighting patent litigation and infringements.

of the government at Marconi's disposal to facilitate his work.

"After taking a look at various sites," said Marconi, "which might prove suitable, I considered the best one was on Signal Hill, a lofty eminence overlooking the port and forming a natural bulwark which protects it from the fury of the Atlantic winds. On top of this hill is a small plateau some two acres in area, which seemed very suitable for manipulation of the balloons and kites. On a crag on this plateau rose the new Cabot Memorial Tower, erected in commemoration of the famous Italian explorer John Cabot, and designed as a signal station. Close to it there was the old military barracks, then used as a hospital. It was in the forum of this building that we set up the apparatus and made preparations for the great experiment.

"On Monday, December 9, we began work. On Tuesday we flew a kite with 600 feet of aerial as a preliminary test, and on Wednesday we inflated one of the balloons, which made its first ascent during the morning. It was

about fourteen feet in diameter and contained about 1,000 cubic feet of hydrogen gas, quite sufficient to hold up the aerial, which consisted of wire weighing about ten pounds. After a short while, however, the blustery wind ripped the balloon away from the wire. The balloon sailed out over the sea. We concluded, perhaps the kites would be better, and on Thursday morning, in spite of a gusty gale we managed to fly a kite up 400 feet.

"The critical moment had come, for which the way had been prepared by six years of hard and unremitting work, despite the usual criticism directed at anything new. I was about to test the truth of my belief.

"In view of the importance of all that was at stake, I had decided not to trust entirely to the usual arrangement of having the coherer signals record automatically on a paper tape through a relay and Morse instrument, but to use instead a telephone connected to a self-restoring coherer. The human ear bearing much more sensitive than the recorder it would be more like-

ly to hear the signal.

"Before leaving England I had given detailed instructions for transmission of a certain signal, the Morse telegraphic 'S' — three dots — at a fixed time each day beginning as soon as word was received that everything at St. John's was in readiness. If the invention could receive on the kite wire in Newfoundland some of the the electric waves produced, I knew the solution of the problem of transoceanic wireless telegraphy was at hand.

"I cabled Poldhu to begin sending at 3 o'clock in the afternoon, English time, continuing until 6 o'clock; that is from 11:30 to 2:30 o'clock in St. John's."

As the hands of the clock moved toward noon on Thursday (December 12, 1901), Marconi sat waiting with the telephone receiver held to his ear. It was an intense hour of expectation. Arranged on the table were the delicate instruments ready for a decisive test. There was no calibrated dial tuner to facilitate adjusting the circuit to a specific wave length. In fact, the wave of Poldhu was not measured.

There was no device to measure it. Professor Fleming thought there should be some method of measuring wave length but he had yet to invent his cymometer or wavemeter.

The length of Poldhu's wave was a guess. There was nothing precise or scientific about tuning. But based on the fact that the aerial was 200 feet high and that it was linked with a series coil or "jigger," Professor Fleming estimated the wave length was not less than about 3,000 feet or 960 meters.

Marconi had to hunt for the wave.

A wire ran out through the window of Cabot Tower, thence to a pole and upward to the kite which could be seen swaying overhead. It was a raw day. A cold sea thundered at the base of the 300-foot cliff. Oceanward through the mist rose dimly the rude outlines of Cape Spear, the easternmost point of the North American continent.

Beyond rolled the unbroken ocean, nearly 2,000 miles to the coast of the British Isles; wireless might leap that

in one ninety-third of a second! Across the harbor the city of St. John's lay on the hillside. No one had taken enough interest in the experiment to go up through the snow to Signal Hill. Even the ubiquitous reporter was absent.

In Cabot Tower, the veteran signalman stood in the lookout's nest scanning the horizon for ships, little dreaming that mysterious waves might be coming out of the sky from England.

Wireless was ready for the crucial test. Its destiny was at stake. So was Marconi's. Everything that could be done had been done. The receiving outfit was as sensitive as Marconi could make it; he had faith that these instruments would pick up the faintest trace of a signal.

Marconi listened and listened. Not a sound was heard for half an hour. He inspected the instruments. They looked perfect. Had something gone wrong at Poldhu? Had some mysterious force led the signals astray? Was the curvature of the globe a barrier? All these things flashed through his mind, coupled with the

fact that it was almost fantastic to believe an unseen wave of intelligence could cross through the ocean air and strike such a slender target as a copper wire. It seemed incredible. It would be so easy for the message to travel off in some undesired direction.

Marconi knew, however, if the signal went east, north or south it would also go west and to that wire antenna dangling from the kite.

Without warning there was a sharp click in the ear-phones. What caused it? Was some stray static playing a prank? Indeed not! Marconi had at last found the right tuning adjustment to put him in touch with Poldhu!

"Suddenly, at about 12:30 o'clock, unmistakably three scant little clicks sounded several times in my ear as I listened intently," said Marconi, in recounting the day. "But I would not be satisfied without corroboration.

"Can you hear anything, Kemp?" I said, handing the receiver to him.

"Kemp heard the same thing I did, and right in my anticipation," recalled Mar-

coni. "Electric waves which were being sent out from Poldhu had traversed the Atlantic serenely ignoring the curvature of the earth, which so many doubters considered would be a fatal obstacle. I knew then that the day on which I should be able to send full messages without wires or cables across the Atlantic was not very far away. Distance had been overcome, and further development of the sending and receiving instruments was all that was required."

Wireless had flashed across the Atlantic's sky like "some meteor that the sun exhales."

Again and again Marconi and Kemp listened to be sure there was no mistake. Padgett was called in. He listened but heard nothing; he was slightly deaf. What Marconi and Kemp heard must have been Poldhu. There was no other wireless station in the world to send that pre-arranged signal. And a marvel was that it was noon time; it would have been so much easier to perform the feat at night when darkness aids the flight of long-wave wireless. Marconi was not aware of that.

It was mid-afternoon. The kite gyrated wildly in the gale that swept in from the sea. The antenna failed to maintain the maximum altitude and the fluctuating height naturally influenced reception. The wind tugged and tugged at the kite, finally at 2:20 o'clock the antenna was lifted within range of the repetitious dots. And that gave further verification.

At dusk the inventor and his companions went down the hill toward the city sparkling with lights. He made no statement to the press. In fact, he felt rather depressed because he had not intercepted a continuous stream of signals. Possibly the stress of the preceding days had something to do with his disheartened feeling.

It is said that a secret is no longer a secret if more than one person holds it, but that night three men kept a secret from the world. And what they harbored was front-page news — news that would find a place in history books.

They went to sleep dreaming of what they had heard and in hope that a new day would put the stamp of suc-

cess on their work by further verification. It almost seemed too true for them to believe their own ears. They would listen again for the three elusive dots.

They were up on the hill early the next morning, anxious to lend an ear to space at noon, for that was the appointed time for Poldhu to broadcast.

The signals came on schedule but were not quite as distinct as the day before. The changing weather on a 2,000 mile front could make a radical difference in behavior of the waves. There was no doubt, however, that wireless had spanned the Atlantic. Nevertheless, the modest inventor hesitated to make his achievement public, lest it seem too extraordinary for belief.

Finally, after withholding the news for two days, certainly evidence of his conservatism and self-restraint, Marconi issued a statement to the press, and that Sabbath morning the world knew but doubted. . . .

The scientific world was mindful that Marconi had never released a statement in public until absolutely

certain of the facts. He never had to withdraw a notice as to his progress. As soon as the significance of the event was realized star reporters and special magazine writers rushed northward from New York to get the story from the lips of the inventor.

He told them it cost \$200,000 to get the three dots across the Atlantic! To Marconi there was nothing problematical about the future; he had spanned the Atlantic. He had upset the calculation of mathematicians. — *By Orrin E. Dunlap.*

SELF ANARCHY

Harold Laski has this story to tell: I discussed recently with a Hindu I knew — a man of great culture — the question of Indian Independence. "If England were to withdraw from India," I said, "wouldn't the country relapse into a state of anarchy — much like what it was in the 18th Century when Clive and Hastings laid the foundations of the British Raj?"

My friend assented sadly, "Yes, I suppose you are right."

"And that would be followed by a tyranny, or several tyrannies, would it not?"

"Yes, probably."

"And then the pendulum would swing back to anarchy again?"

"Yes," he said, "yes, I am afraid it would!" Then, after a long pause, he added, "but it will be our tyranny and our anarchy!"