The ARRL Board of Directors Historical Committee

The ARRL Heritage Museum Presents The Historian's View

Chapter 10, 7/01/2019

Origination — Wireless Comes to America

(The Big Picture: The British Bring Wireless to America)

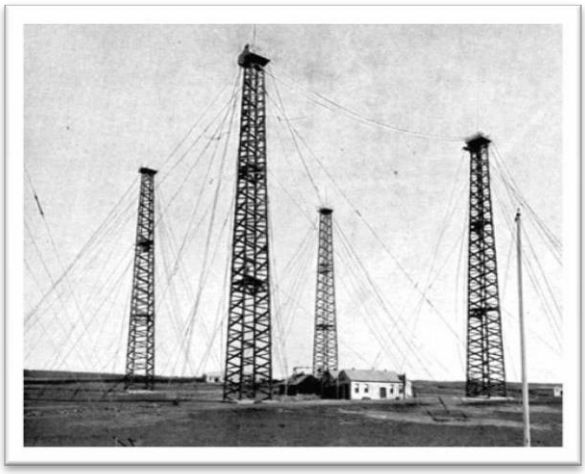
By: Michael W. Marinaro, WN1M

Signor Guglielmo Marconi (1874-1937) achieved many "firsts" during his career as a physicist and world esteemed inventor. The conduct of the first two-way wireless message exchange between the US and Europe was accomplished from the major Marconi station, CC, erected at South Wellfleet, Massachusetts. This achievement in early 1903 received great notoriety. But, contrary to common belief, this station at Cape Cod was not the first Marconi wireless installation in the United States or on the North American continent.

In 1895, Marconi began to engage in serious experimentation to perfect his discoveries to generate and detect electromagnetic waves. Efforts to gain the interest of the Italian government were not successful, so Marconi brought his concepts and models to Great Britain, leading to the formation of The Wireless Telegraph and Signal Company, Ltd in 1897, which supported both Marconi's continuing experimentation and the initial objective of communication with ships at sea. The latter endeavor was eminently successful as wireless signals reached farther around the British Isles and to France with excellent reliability. The enterprise was commercially successful as well, with the increase of coastal shore and shipboard stations and revenue growth. By the end of 1904, the company had 69 land stations and 24 ship stations in operation. The value of wireless communication was widely accepted in Britain, and the scope of activity widened.

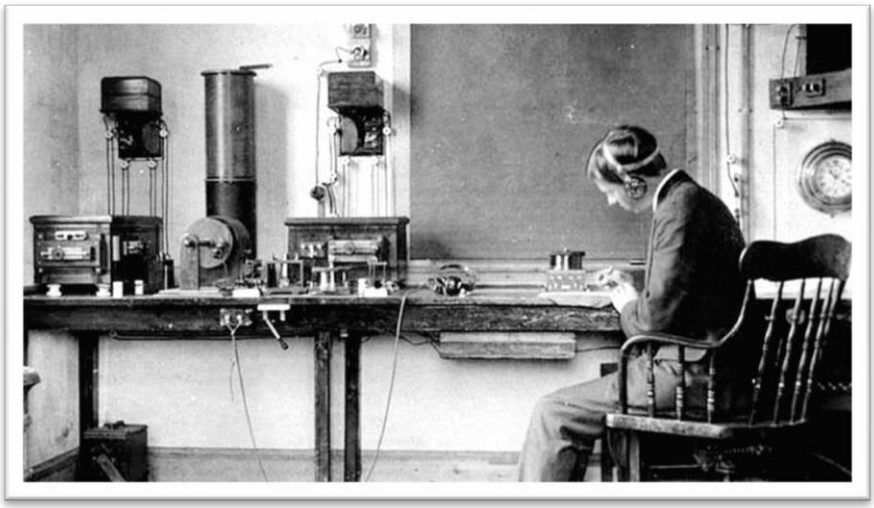
With domestic acceptance increasing, Marconi's attention was drawn to bridging the Atlantic and the ships that sailed there. Transatlantic communications were the evolving goal. Several events were to contribute to the achievement of this aim and the introduction of wireless to

the North American continent, some occurring simultaneously. The western sites selected were in Canada at Glace Bay, Cape Breton Island, Nova Scotia; and in the United States on the shores of Long Island, New York, and the State of Massachusetts. But first, it would be necessary to establish a base station in Britain to anchor the eastern end of the endeavor.



Poldhu Towers

Poldhu Cove



Poldhu operating position.

Britain

The site for the world's first permanent great wireless station was selected for its western location and nearness to the new world. In 1900, work began at the headlands overlooking Poldhu Cove in south-western Cornwall, and at a complementary monitoring and domestic coastal service station at the Lizard, six miles away. Initially, Poldhu was configured with a 25 kW spark-gap transmitter and an aerial of 60 wires strung fan-wise between two 170-foot masts — unique and extraordinary for the time.

Canada

The kite in the wind – Marconi second from right.

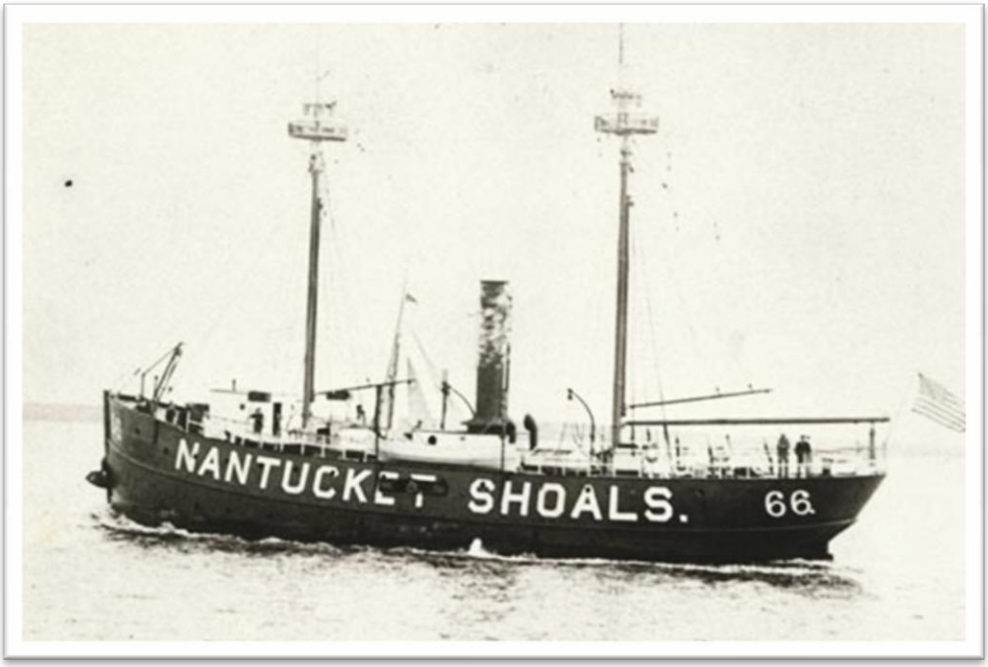
Cabot Tower

"…, s" was the Morse code letter that Marconi used to preface and identify his experimentally transmitted signals. It was this letter, sent repeatedly from Poldhu, that Marconi monitored at Signal Hill in Newfoundland in 1901, even as the Poldhu works neared completion. Anxious to prove his theories, Marconi sailed to St. John's, Newfoundland with his team, receiving gear and a long antenna wire which was to be lifted aloft by helium balloons or kites. He awed the world with the news that he had heard the signals on a kite-supported 600-foot aerial, from 2,200 miles over the Atlantic.

The Great Station at Glace Bay.

Marconi set out to prove that two-way commercial service could span the Atlantic reliably. Steps were taken to establish a permanent installation in Canada and with the cooperation and support of the Canadian government a site was selected. Not unlike at Poldhu, the site was atop the cliff-hung headland, Table Head, on Cape Breton Island in the province of Nova Scotia. Similar in layout to Poldhu, the new station was more powerful and utilized a unique vertically-polarized antenna with 400 wires forming a cone. The station was operational on December 14, 1902 when messages were exchanged with Poldhu that inaugurated the first regular transatlantic wireless service. In 1905, this facility was dismantled and moved to a larger site, five miles to the southwest. Known today as the "Marconi Towers," the giant station involved an enormous horizontally-polarized antenna exhibiting highly directional radiation characteristics.

United States



While the above-rendered events were evolving, Marconi and his teams were establishing wireless activity on the US east coast. At first, the effort utilizing their unique expertise afforded sea-to-land communication. The *New York Herald* contracted with the Marconi entity to furnish news of shipping transiting the sea lanes off Nantucket Island. Two stations were equipped with current design two-way equipment and antennas — one in Siasconset at the east end of the island, and another aboard the *Nantucket Shoals*' lightship, 42 miles at sea southeast of the island. Service began in mid-1901. Reports received at the island station — call letters MSC — were relayed via telegraph undersea cable and the conventional land pole strung telegraph system to the newspaper's offices in New York. Approximately 250 vessels transited these sea lanes daily, and the knowledge of vessels passing was of commercial and social value. As passing vessels became equipped with on-board stations, they were able to engage in two-way communication directly with the island station passing messages.

But neither Nantucket nor Long Island was the first US location of Marconi wireless activity. Both locations could be termed temporary stations, as they were shortly superseded by the major transatlantic stations, Glace Bay and Cape Cod. Another temporary station was the first instance of wireless being generated in North America.

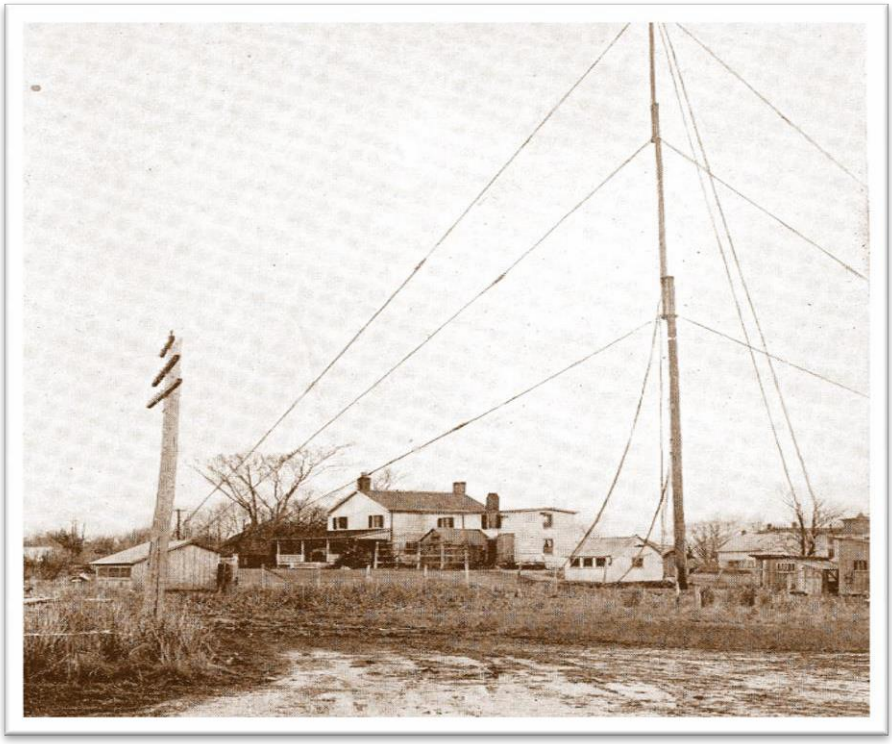
Contestants in 1899 America's Cup Race — yachts *Columbia* and *Shamrock*.

As mentioned previously, as the century was to close Marconi's short-range demonstration, transmissions in Europe had begun to dispel skepticism. However, his "space telegraph" was still considered a novelty and was not well recognized in North America. In the late summer of 1899, Marconi set out to gain publicity for his invention, sailing to New York City and establishing a syndicate with major newspapers. He was to report the conduct of the America's Cup yacht race, which was to be held in in lower New York harbor off New Jersey's Sandy Hook. His receiving station, with linkage to telegraph and telephone lines, was situated in a signal tower on the shore. *Ponce* was fitted out as the transmitting station with appropriate antenna. From this vessel Marconi, with yachtsman-like precision, personally keyed in 1,200 messages describing the sailing duel between the *Columbia* and *Shamrock*, moment by moment. The reporting of the event was flawless and created a sensation. Wireless had come to the North American Continent and was positively received.

The US Navy was so impressed, that it insisted that Marconi demonstrate his system aboard their vessels immediately. Signals were successfully interchanged between two battleships, a torpedo boat and a lighthouse land facility in the port of New York and at sea. The Navy was convinced of the practicality of the Marconi system and scheduled installations.

A confident, newly incorporated Marconi America began to scout for temporary and permanent station locations along the US northeastern beaches. The impermanent stations were to serve as local, limited distance, shore-to-sea messaging facilities with integral operator training schools. Two such posts were in operation by 1902 at Sagaponack and Babylon on the south shore of Long Island, New York.

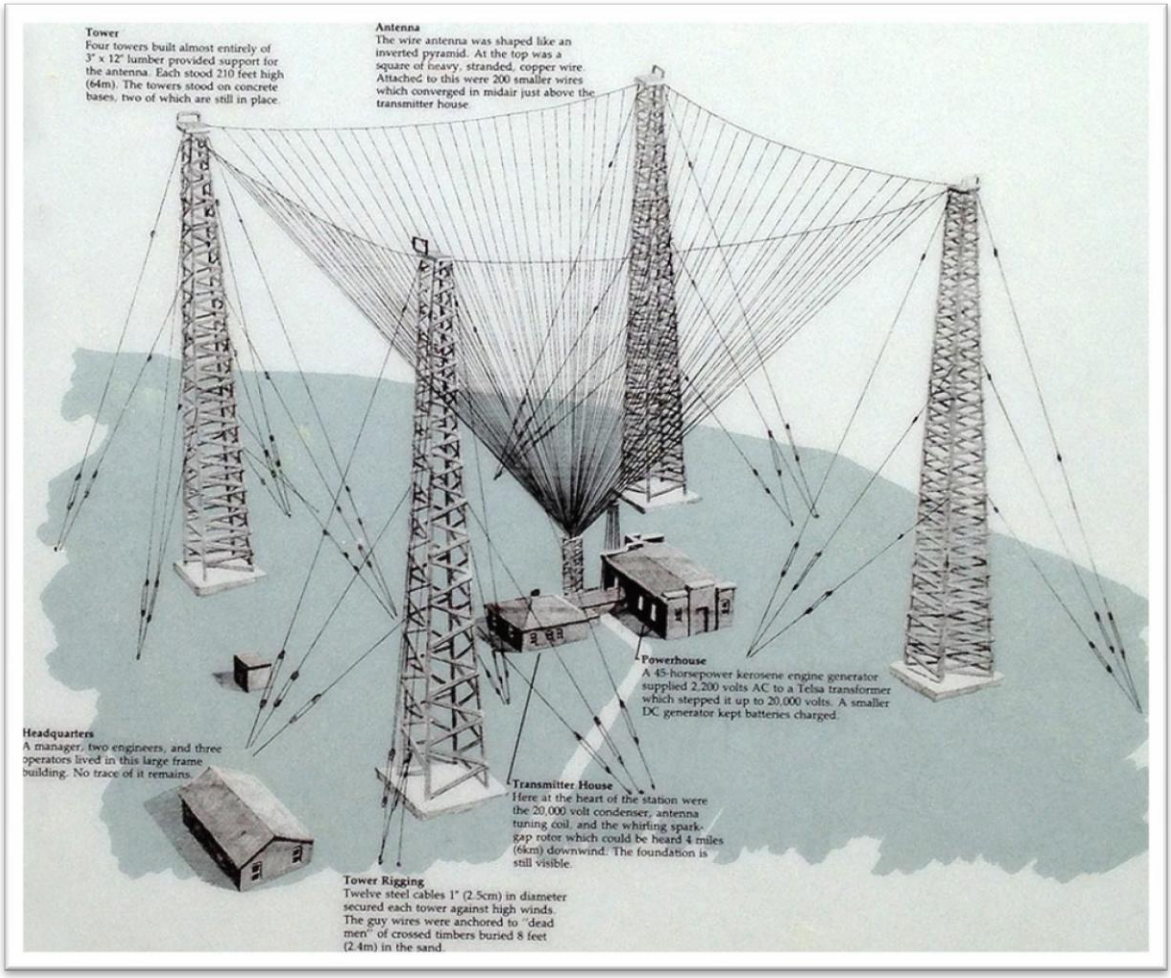
Signage at Babylon Station, Long Island



Babylon, Long Island Station — Radio shack at the foot of the 210-foot mast.

While the two lesser Long Island locations were coming on the air, a permanent US transatlantic class station was cited on the desolate bluffs of Cape Cod, near South Wellfleet, Massachusetts. Larger in design and scale, CC was to complete the first transatlantic circuit linking with its sister stations at Poldhu and Glace Bay. And, consequently, this was the station from which the first two-way wireless communication was accomplished between the US and Europe. This event was so broadly publicized that it became popularly known as the very first wireless activity within the US.

CC under construction — first antenna mast arrangement.



US National Park Service Waymarker exhibit — original layout of Marconi Station.

The above drawing, prepared by the US National Park Service, illustrates the station arrangement upon completion in February of 1902. The major components are the three buildings and the four 210-foot wooden towers. The original pole antenna arrangement shown in the earlier image was destroyed in a storm before the station came on the air, and Poldhu had suffered a similar antenna loss at about the same time. It is noteworthy that the towers were set on square concrete slabs — the bases of the two most easterly towers, set about 165 feet from the edge of the bluff. The station began transmitting on 1500 meters, using the call letters CC. A spark of 20,000 V was created — a spark so powerful that it could be heard in the neighboring village. The station was linked directly by telegraph line to the local mainland line telegraph station in South Wellfleet, and beyond that to the *New York Times* in New York City. Messages to be sent by radio transmission were received in this manner, and likewise, messages received by radio were dispatched for delivery. Additionally, daily news stories, primarily from Boston and New York, were accumulated and condensed into a newspaper format, punched into a paper tape, and transmitted to ships at sea three times each night on 1500 meters. Ocean liners such as the Cunard Liner RMS *Lusitania* and RMS *Mauretania*, subscribing to the service, presented their passengers with a ship-published newspaper the following morning. This news service was a main activity of the station throughout its existence.

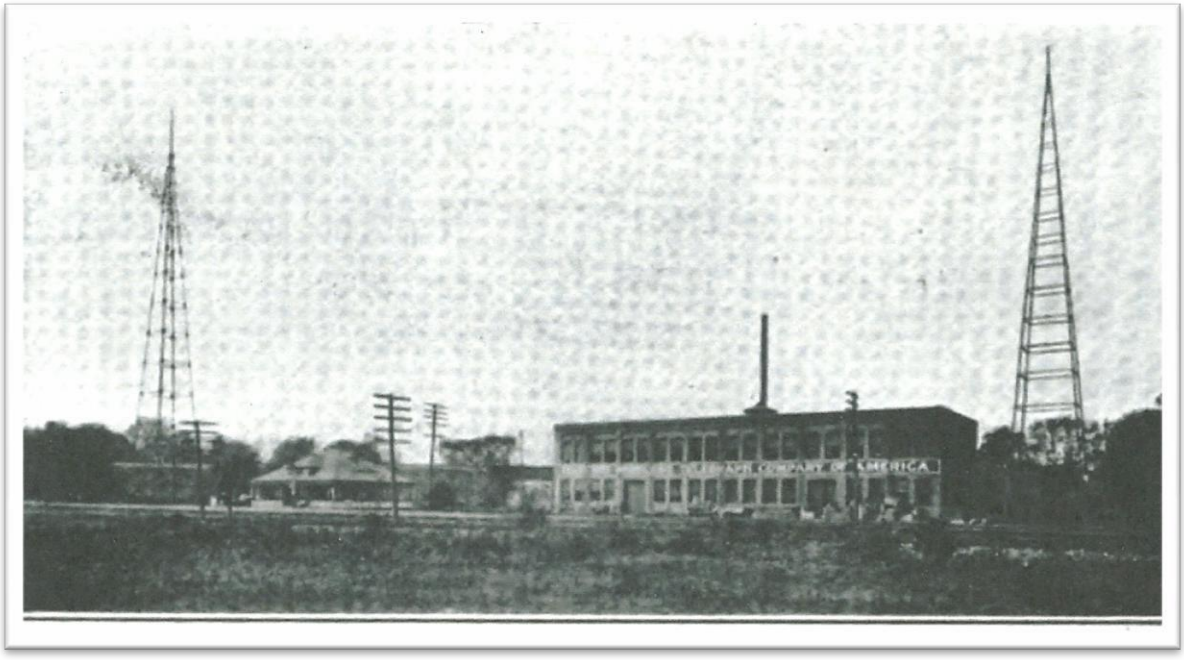
Shortly after the station was in full operation, a momentous exchange of messages took place from the station. On January 18, 1903, a message was successfully sent by CC from President Theodore Roosevelt addressed to King Edward VII. The message was received by ZZ at Poldhu, and a response from the King, then residing at Sandrinham House, was received in turn at the Cape Cod station. It is purported that Marconi was the one who keyed in the message. This was the first instance of a two-way US transatlantic communication, and the first wireless telegram exchange between the US and Europe.

Advances in technology pointing to the use of short wavelengths and the demise of spark-gap, and the forces of nature evident in the rapidly eroding cliffs, were beginning to doom the long-

term existence of the station. In 1908, the call letters were changed to MCC, “Marconi Cape Cod,” and in the late 1912 to early 1913, the call letters were changed to the final WCC.

By 1910, operations had begun from two new Cape Cod locations. A receiving site was situated at Chatham, Massachusetts — the “elbow” of Cape Cod — 34 miles south of Wellfleet. To reduce the overloading of the then poorly selective receivers, and permit simultaneous receiving and transmitting, the transmitters were located 40 miles west in Marion, Massachusetts. The two sites were linked by telephone and telegraph.

American Marconi established two additional major stations in the US in 1913 and 1914, both deployed in pairs to operate in duplex fashion. One was constructed on Cape Reyes, California with the transmitting station KPH at Bolinas, and the receiving site at the town of Marshall. The second, an enormous state of the art facility was situated in New Jersey, with the transmitting site in the town of New Brunswick, and the receiving location at Belmar.



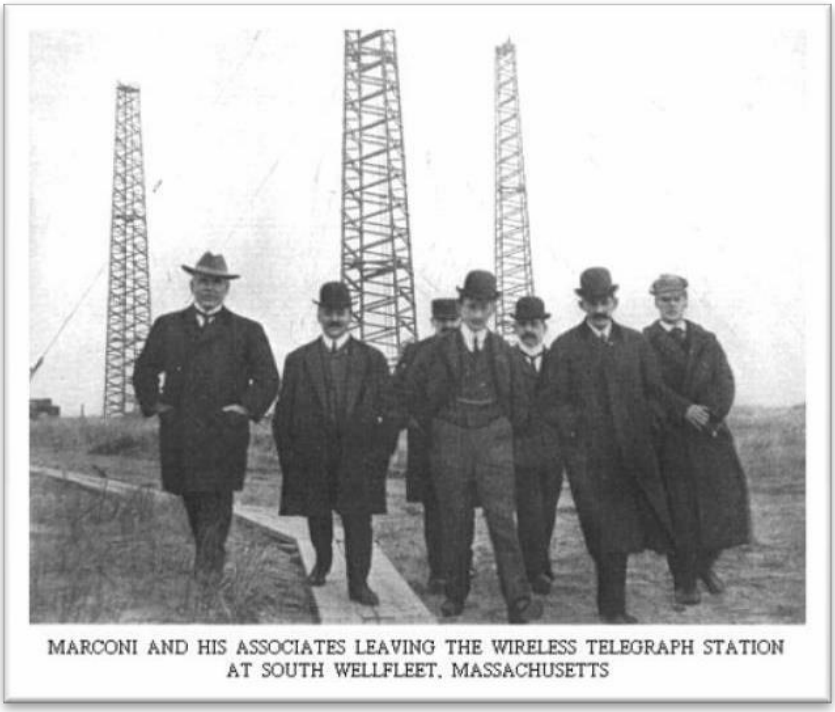
New Brunswick Station

The last of the great facilities, New Brunswick, was the most technologically advanced. By 1918, after four years of experimentation and progressive improvements, it included a mile-long receiving antenna, a 5,000-foot transmitting array supported by eight 400-foot masts, and by midyear, an Alexanderson alternator transmitter with an output power of 200 kW at 17 kHz.

With the advent of World War I, this was the best of the foreign commercial installations on the US mainland commandeered by the US Navy. The US entered the war in April 1917. After the partial failure of transatlantic telegraph cables, the New Brunswick facility was confiscated by the Navy in January 1918, to provide vital transatlantic communications. New Brunswick Naval Radio Station became the principal wartime communication link between the United States and Europe using the call sign NFF.

After the war ownership of the station, along with that of American Marconi's other US stations, was transferred from the Navy to the Radio Corporation of America. American Marconi disappeared as an entity as the US government legislated that all commercial wireless be conducted by US firms.

Over a period of 18 years, Marconi and his associates had built phenomenal transoceanic stations on both US coasts and in Hawaii. These stations maintained regular communications with Europe, Hawaii, and Japan, and were the initial links in the wireless chain which envisioned to gird the globe.



MARCONI AND HIS ASSOCIATES LEAVING THE WIRELESS TELEGRAPH STATION AT SOUTH WELLFLEET, MASSACHUSETTS

A world-circling chain was indeed subsequently created by the British parent firm, Marconi Wireless and Telegraph Company. Promoted by the British government, the system (completed by 1920) became known as the Imperial Wireless Chain, linking the countries of the British Empire. Concurrently, RCA created their own worldwide network. Marconi had brought the marvel of wireless to America and a gratefully enhanced world.

"But, I too am but an amateur."