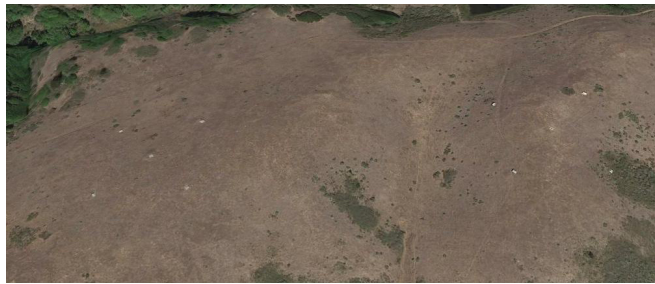


BEVERAGE ANTENNA AT MARSHALL – MARITIME RADIO HISTORICAL SOCIETY

The Marconi Wireless Telegraph Company of America built the Marshall, CA, receive site in 1913-1914 as part of the West Coast link in Marconi's "wireless girdle of the world" that would compete with undersea cables in providing commercial communications between the continents. This site and its corresponding transmitter site in Bolinas, CA, were designed to communicate with the Marconi high-power station being built in the Hawaiian Islands. While the exact configuration for the Marshall antennas seems to have changed several times prior to construction, the final design was similar to other Marconi high-power stations built at the time. The original wire antenna was a mile in length and was supported by seven steel masts set in concrete. The still-existing foundations and anchors for these 270-foot towers can clearly be seen today using Google Earth. (See two of the foundation and anchor sets below.)



In addition, a "balancing" antenna was built roughly perpendicular to the receiving antenna at all of the Marconi receive sites. This long-wire antenna pointed toward the nearby transmitter station. The output of the balancing antenna was shifted in phase and used as destructive interference to null out the strong signals received from the transmitter site.

Unfortunately, the Marconi Company's dream to encircle the globe with its own wireless network ended with the beginning of World War I. Most of the Company's work was halted, including construction of the new receive and transmit stations at Chatham and Marion, MA, which were intended for point-to-point service between the US and Stavanger, Norway. Later, all commercial radio stations in the United States were taken over by the US Navy, and, following the war, when wireless service by private companies resumed, the Marconi Wireless Telegraph Company of America ceased to exist when it was integrated into the Radio Corporation of America (RCA).

Although the Great War restricted commercial wireless activities in the United States, the US Navy pressed forward with extensive research in the developing science of radio. As part of this effort, radio pioneer Harold Beverage and his colleagues experimented with long-wire receiving antennas and developed what was termed the "wave antenna". In 1920, Beverage discovered that a long-wire antenna can become unidirectional by placing it close to the lossy earth and by terminating one end of the wire with a resistor. This antenna was patented in 1921 and was named for Beverage. The reduced static and unidirectional nature of this design was important in the days before vacuum tube amplification of received signals.

After RCA took over Marconi's network of stations in the United States, RCA began work on several larger, more powerful stations in the United States, Europe, and South America. Major modifications were also made at the existing stations. At the Chatham receive site, for example, five of its six steel towers were removed, and a vertical antenna was installed on the remaining tower. The "loop" antenna was also gaining wide use during this period, and several large loop antennas were installed there.

Similar work must have been performed at Marshall at this time, because an article in *Radio* magazine described the station's antennas as:

“...[a] tall mast on top of the hill, which is about 600 feet above the water, [that] carries the aerial for the commercial (600 meter) receiving sets. For the long wave, high power receiving, two large rectangular loops, supported on telegraph poles, are used. They are 300 feet long and about 30 feet high, set at right angles to each other, and in addition to these a very novel and efficient form of loop is employed by using the guy wires of the main mast in the shape of two triangular loops, which are also at right angles to each other.”

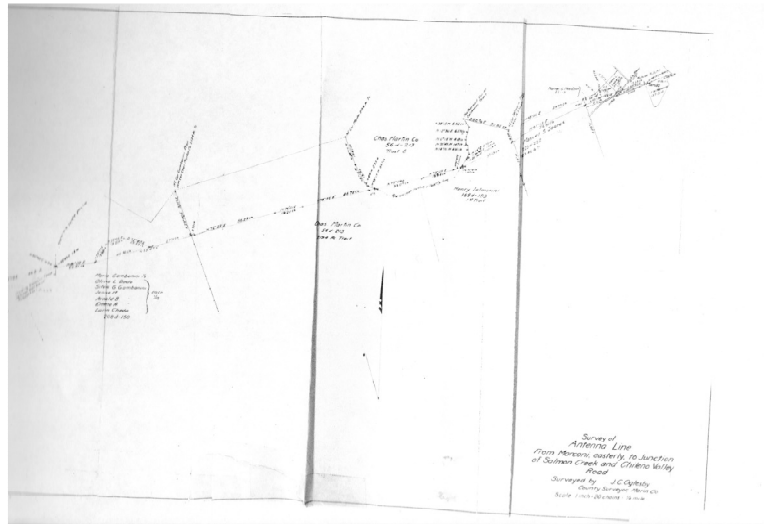
Even with these station upgrades, RCA recognized the additional value to be gained in its point-to-point service using the new directional Beverage wave antenna, and by 1921 it had installed Beverage antennas up to nine miles long at four of its East Coast receive sites (Riverhead, NY; Belfast, ME; Belmar, NJ; and Chatham, MA). These antennas were composed of two copper wires suspended on 30-foot telegraph poles.

However, as late as 1923, two years after the installation of the Beverage antennas at the other RCA sites, a magazine article describing the antennas at Marshall did not mention a long-wire antenna. While research continues today to find official RCA documents and drawings that confirm the existence of the antenna, no solid evidence of a Beverage antenna has been identified until now. Nevertheless, local stories were told regarding miles-long antennas at Marshall, and Ray Smith/RC, the last Senior Morse Operator at KPH at Point Reyes, recounted how Joe Sciallo, a young RCA employee, patrolled the Beverage antenna at Marshall on horseback. Also, several years ago our own Richard Dillman/RD photographed "Marconi poles", the name still used by ranchers, standing on two properties east of Marshall. All of this information certainly suggests that a Beverage antenna was eventually built by RCA in California.



To search for additional confirmation, a document search was recently conducted of Marconi- and RCA-related records at the Marin County Recorder's Office. Three documents executed in 1924 were found that granted a right-of-way to RCA for poles and lines "to be maintained and used for radio receiving purposes." As compensation, the land owners were paid ten dollars per pole to be calculated in a final settlement based upon the actual number of poles erected. Unfortunately, the documents did not describe the route of the right-of-way or its length. However, a lucky break came when it was discovered that one of these documents had a small, folded map taped to it. The map was titled, "Survey of Antenna Line

from Marconi easterly to Junction of Salmon Creek and Chileno Valley Road". (This introduced another mystery, since Salmon Creek and Chileno Valley Road do not intersect. It was later found that the title should have read "Junction of San Antonio Creek and Chileno Valley Road".) This right-of-way map described a 40-foot wide swath of land that began at the Marshall station and stretched east-northeast for exactly ten miles.



Hard copies of the documents were ordered which took a week to arrive because the County's scanned versions of the documents were blurry, and the helpful staff at the Recorder's Office had to travel to storage and find the original record book from 1924 to create copies.

Unfortunately, the map only showed two physical features, but it did indicate the property lines crossed by the right-of-way. These property lines were compared to the current Marin County parcel maps online, and, luckily, many of the property lines have not changed in 100 years.

Armed with the original path of the right-of-way, a search was made using Google Earth, hoping that perhaps one or two poles might be seen along the route. Surprisingly, one pole was found, then two poles, and eventually the remnants of an entire line of poles.



In the end, 39 tall wooden poles were identified that still exist along the antenna right-of-way. Several more poles are probably hidden within groups of trees and cannot be seen using Google Earth, but these could be found by walking the route. It is difficult to determine how far the antenna extended, because the final poles in the line were likely removed after the receive station closed and the land crossed by the antenna was developed. However, the last existing pole is 8.3 miles from the Marshall station.



The Google Earth view below looks toward the east from the Marshall station's operations building. It shows the foundations of the original steel towers in the foreground (blue) and the line of wooden poles in the background (yellow). This view seems to confirm that the straight line of wooden poles could be nothing other than supports for a long-wire antenna.



On the 1924 map, the antenna right-of-way leaves the Marshall site at an azimuth of 72° for four miles before it turns slightly to avoid a road. This value is significant. The reciprocal of 72° is 252° , and at an azimuth of 252° and a distance of 2,370 miles from Marshall, one finds the site of the former Marconi high-power transmitting station at Kahuku, HI.

Research is continuing and will hopefully provide more details regarding the design of the antenna, when it was built, and how long it was in service.