



After many years of forgetting to listen, I managed to hear this year's Christmas Eve transmission on 17.2 kHz at 08:00 hrs GMT from the historic VLF transmitter located at Grimeton near Varberg on the west coast of Sweden. The station is celebrating its 90th anniversary since opening in 1924 as one of a group of 18 stations set up around the world by RCA for direct long wave wireless communications with a hub station established as 'Radio Central' at Rocky Point on Long Island, New York. It was designed by Ernst Alexanderson, a Swedish immigrant to the US who had developed the AC alternator-based transmitter from earlier pioneering work undertaken by Canadian inventor Reginald Fessenden.

The Radio Corporation of America had been formed in 1919 following the purchase of the Marconi Wireless Telegraph Company of America by the General Electric Corporation. GE itself had been incorporated as the Edison General Electric Company in 1889 from a group of companies owned by inventor Thomas Edison and was financed by bankers JP Morgan and Anthony Drexel. It was one of the 12 companies that formed the original Dow Jones Industrial Average Index. The US Government had colluded with GE to buy out Marconi's American operations in order to create a US monopoly on the control of wireless wavelengths and the manufacture and supply of equipment in order to protect US wireless communications interests from the British Marconi Company. Marconi had gained a strong foothold in the world market for wireless equipment and had built up a very tightly controlled service contract base to provide and operate wireless communications facilities in many countries and on board ships. They made expanding claims to the ever diminishing VLF frequencies available for long range wireless communications and the US Government wanted to ensure that they were not left out. The newly formed RCA became GE's retail sales and marketing arm for their Alexanderson AC Alternator transmitters and were asked not to make any further sales of the transmitter to the British Marconi Company. As part of the agreement, RCA appointed a US Navy Admiral, WHG Bullard, to their board of directors. Bullard had been instrumental in initiating the US monopoly plans and the deal was sweetened with the transfer to RCA of the US Navy's big VLF communications bases, which included those confiscated from Marconi by the US Government in 1917 under emergency war powers enacted by the federal government. Under Bullard's influence, RCA were encouraged to set up a world-wide network of long range VLF stations to which they would sell their expertise and equipment in a bid to take market share from Marconi.

By 1921, Sweden's rapidly growing emigration and increased trade with the US had resulted in greatly expanded cable and wireless communications across the Atlantic, all of which was routed through Great Britain by British-controlled relay stations. It was not a situation with which Sweden or the US felt comfortable and the Swedish Government passed a bill to finance the construction of a station that would provide the country with a direct wireless link to New York. After negotiations with the Swedish Government, the transmitter hall at Grimeton was commissioned and the equipment purchased from RCA, which was also given a contract to run

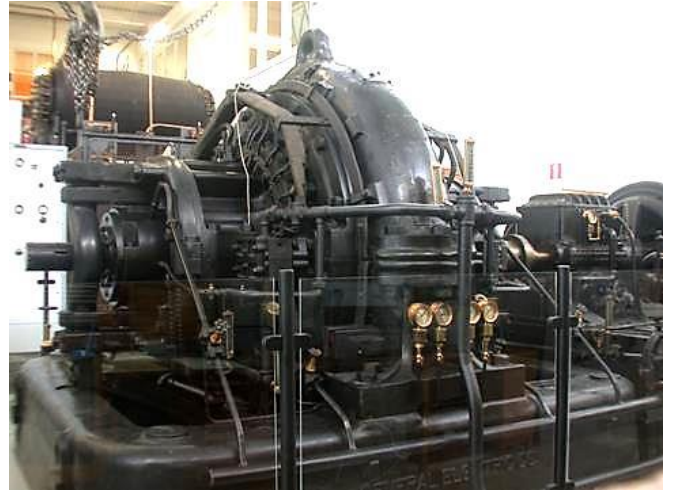


Photo by Gunther Tschuch

### **The Alexanderson AC Alternator 200 kW transmitter at Grimeton**

the entire operation using locally recruited and trained employees. The station included a receiving site a few miles north of Grimeton at Kungsbacka and the two remote sites were linked by cable to a centre in Gothenburg, where the wireless telegraph operators were based. Commercial wireless services from Grimeton began on December 1st 1924 using the callsign SAQ, with messages for transmission being designated 'via RCA'. On July 2nd 1925, King Gustaf V officially opened the Grimeton transmitter hall and sent a telegram to President Calvin Coolidge in which he extolled the virtues of Sweden's links with America. The receiving part of the station at Kungsbacka was identified with the callsign SAK.

The principle of the alternator transmitter is extremely basic by today's standards and just uses a frequency stabilised AC alternator to produce 200 kW of continuous wave transmitter power at an accurately set low frequency which is modulated to provide a Morse code signal. It was far more effective than Marconi's spark transmitters and was a technique that Marconi quickly adopted for his company's VLF transmitters following demonstrations of the equipment made to him. The carrier could also be modulated using a carbon or 'electrolytic' microphone and this system was the basis of the earliest AM speech and music experimental broadcast transmissions made by Fessenden in 1906 using equipment designed by Alexanderson and built by the American General Electric Corporation. The AC alternator transmitters of the type used at Grimeton and at the other 18 stations in the RCA network were built to operate at frequencies between 12.5–28.5 kHz, set by the number of magnetic poles used and the speed of the alternator rotor, calculated by the simple equation  $N=120f/P$ , where N is RPM, f is frequency and P is the number of magnetic poles employed in the alternator. The resultant RF output voltage was fed to a transformer, the secondary of which was connected to the aerial. 600 HP engines and gearboxes were required to drive the AC alternator and, for reasons of maintenance and reliability of service, each transmitting station was equipped with two installations weighing a total of 100 tons and occupying an area of 43 ft x 11.5 ft (13 m x 3.5 m). If required, the two systems could be

run in parallel to provide 400 kW. To complement his AC alternator transmitter, Alexanderson took a novel and, at the time, controversial approach to the design of the required 1,900 m long aerial, effectively reducing the ground resistance of 3.7 ohms in Marconi's design to 0.5 ohms by using multiple



Photo by Gunnar Larsson



Photo by Henrik Enfors.

**The 1924-built transmitter hall and VLF masts at Grimeton. Aerial masts height 127 m, spreaders 46 m. Aerial length 1,900 m (1.2 miles)**

feed points which, to the surprise of many, dramatically improved aerial efficiency.

By the time it had been installed, the AC transmitter technology used for the Grimeton VLF station was obsolescent. At about the time that Grimeton became operational, installation by the British Post Office of the Rugby VLF wireless station at Hillmorton, employing thermionic valve technology, was nearing completion. It used a valve-based oscillator, a 50 kW valve exciter and five banks

of eight water-cooled 10 kW PA valves working in parallel. Each of the 80 kW valve banks at Rugby could be paralleled to produce up to 800 kW of RF power, operating on 16 kHz with the callsign GBR

Despite its old technology, the Alexanderson AC transmitter at Grimeton VLF wireless station remained in service as a transatlantic telegraph station until the late 1950s and was then used by the Swedish Navy for submarine communications until 1996. Because it was the last remaining fully working electromechanical transmitter of its type, UNESCO declared the transmitter and the Grimeton station a World Heritage Site in 2004. Today Grimeton is also a site for FM and TV broadcast aeri- als and for Swedish Navy communications operating on 40.4 kHz with the callsign SRC. The one on the first Sunday of July and the other on Christmas Eve. Alexanderson AC transmitter shares its aerial with the Swedish Navy transmitter who make it available to the museum for transmitting on two scheduled dates each year, one on the first Sunday of July and the other on Christmas Eve.

If you did not manage to hear the message transmitted from Grimeton on Christmas Eve 2014, here it is, complete with reception errors.

SAQ SAQ <BT> THIS IS GRIMETON RADIO/SAQ IN A TRANSMISSION USING THE ALEXANDERSON 200 KW ALTERNATOR ON 17.2 KH <BT> WE CELEBRATE THE FIRST RADIO TELEGRAM SENT VIA GRIMETON RADIO TTO H TO RADIO CENTRAL ROCKY POINT NEW YORK HSA IN DECEMBER 1ST 1924 II 1ST 1924 \*W 90 II 90 YEARS AGO . WE ALSO WISH YOU ALL A MERRY <AR>H<AS>STMSS AND A HAPPY NEW YEAR <BT> SIGNED : THE WORLD HERITAGE AT GRIMETON AND THE ALEXANDER-GRIMETON VETEHTNRADIOS VAENNER ASSOCIATION <AR> <BT> FOR QSL INFO PLEASE READ OUR WEBSITE :WWW.ALEXANDER.N.SE II WWW.ALEXANDER.N.E <BT> DE SAQ SAQ SAQ <SK> <SK>

#### Sources of information

[http://commons.wikimedia.org/wiki/File:Alexanderson\\_Alternator.jpg](http://commons.wikimedia.org/wiki/File:Alexanderson_Alternator.jpg)

[http://commons.wikimedia.org/wiki/Category:VLF\\_masts,\\_Varberg\\_Radio\\_Station#mediaviewer/File:Grimetonmasterna.jpg](http://commons.wikimedia.org/wiki/Category:VLF_masts,_Varberg_Radio_Station#mediaviewer/File:Grimetonmasterna.jpg)

[http://en.wikipedia.org/wiki/Varberg\\_Radio\\_Station#mediaviewer/File:Grimeton\\_VLF\\_transmitter\\_2004.jpg](http://en.wikipedia.org/wiki/Varberg_Radio_Station#mediaviewer/File:Grimeton_VLF_transmitter_2004.jpg)