

How Wireless Began

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and the telegraphic broadcast was then taken over first by Clifden, then Carnarvon, then Leafield, and is now sent out from Rugby. It was about 1906 that my company put up a proposal to the British Post Office that they should be allowed to broadcast news to all the newspapers in the country. However, this was not agreed to.

Returning now to a consideration of the general progress in wireless telephony, at the time of Fessenden's 1906 tests, while I was personally very much occupied in improving my transatlantic stations at Clifden and Glace Bay, Nova Scotia, Captain H. J. Round, one of my assistants, had a small arc transmitter working near the battery in New York, from which speech and phonograph records were transmitted to various places in New York, including the "Times" building and ships lying in the docks. There were, of course, no valve amplifiers in existence at that date, and for best results the microphone was connected in the aerial circuit. In order to use power in the aerial heavy current microphones were required. The best of these were the liquid microphones of Q. Majorana and G. Vanni. Employing arc transmitters Majorana was able to transmit in 1908 from Rome to Sicily, a distance of 300 miles, and Vanni, in 1912, communicated from Rome to Tripoli, a distance of 600 miles. The invention of the Fleming valve in 1904 and the three-electrode valve of Lee de Forest in 1907 enabled the disability which had delayed the commercial development of wireless telephony to be removed, and the present state of the art to be realised.

As was to be expected, with the new system early results were obtained working over short distances. It was in June, 1913, that Dr. Meissner employed the oscillating valve for the first time as carrier wave generator for transmitting speech between Berlin and Nauen, a distance of 23 miles.

My first tests with a valve generator were made in the following year. In March, 1914, I had the apparatus installed on an Italian warship at Augusta in Sicily, and speech was received on a second vessel. The two ships steamed out on to the high seas for further tests off the Sicilian coast, and consistently perfect reception was registered over a distance of 35 kilometres, a distance subsequently increased to 70 kilometres, with very limited power. Communication was constantly maintained throughout a period of 12 hours, the experiments including periods when signals were transmitted entirely over sea and also when land intervened. One complete wireless installation was also sent to New York and communication was established between New York and Philadelphia by telephone working both ways.

On the outbreak of war, experiments in wireless telephony were discontinued commercially and were carried out only in connection with the military ser-

vices, as far as this country was concerned; but in America commercial research continued, and at the end of 1915 the American Telephone and Telegraph Co., working in conjunction with the Western Electric Co., succeeded, when conditions were favourable, in transmitting speech from the U.S. Laval station at Arlington to the Eiffel Tower Station, Paris, a distance of 3500 miles. Over 300 valves were used in the oscillator and modulator circuits.

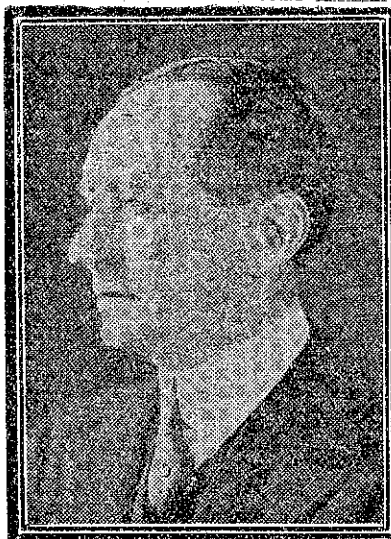
On the conclusion of the War it became possible for European countries to resume their tests; and in March, 1919, with the object of demonstrating that trans-Atlantic telephony could be achieved using comparatively small power, one-way communication was established and satisfactorily maintained for ten days with Louisburg, Canada, by transmission from my station at Ballybunion, Ireland, using a valve transmitter with only 2.5 kw. output from the generator, a wavelength of 3800 metres and an aerial 500 feet in height.

In the same year my assistant, Mr. C. S. Franklin, carried out a short-wave telephony Beam test on 15 m. across the Irish sea, a distance of 80 miles, and work on this wavelength was continued in 1921, when two-way telephone communication was established between Hendon and Birmingham, a distance of 97 miles, using reflectors.

Then, in 1920-21, following a successful test of duplex telephony on 100 m. between Chelmsford and Southend, experimental stations were erected by my engineers at Southwold and Zandvoort, Holland, which worked duplex across the North Sea with 1 kw. to the aerial on 100 m. At Christiansund, Norway, good quality telephony was received from these stations both at night and during the day time; while at Oslo, a distance of 700 miles, very loud and constant signals were received during the night, but the day reception was reported variable.

The year 1920 is memorable for a number of important wireless telephone transmissions which had both news and entertainment value, and thus had the same character that broadcasting has to-day. To encourage public interest, demonstrations were given to show that no special skill was required to talk into the telephone and that musical items could be transmitted and satisfactorily received. In February, 1920, a programme of vocal and instrumental music for two half-hourly periods each day for a fortnight was broadcast from my Chelmsford station using about 5 kw. in the aerial, and the same wavelength of 2800 m. which

was being employed by Poldhu for the news broadcast to ships. This was in order to test the range of the transmitter. Amateurs and the shipping companies were advised and asked to send in reports. Dame Nellie Melba gave her first broadcast in June, 1920, from this station, and Lauritz Melchior in July. World-wide interest was aroused by these broadcast concerts and good reception was reported from distances as far away as Persia and Canada. In November, 1920, the Westinghouse Electric and Manufacturing Company, having given due notice beforehand, broadcast the re-



A recent photograph of Senator Marchese G. Marconi.

turns of President Harding's election from their Pittsburg station as they came to hand. Many thousands of people were ready with receivers, and when the results came through they were thus able to anticipate the newspapers.

This caused a great sensation. During the year 1921, amateurs and the commercial interests in the United States erected broadcast stations in considerable numbers, and the public demand for receivers grew at an extremely rapid rate, resulting later in an enormous development of broadcasting in the United States.

I cannot detail here all the steps which put British broadcasting finally on a permanent basis; it is sufficient to say that in order to satisfy the experimental needs of the British amateur the Postmaster-General finally agreed, in 1922, to a limited service of vocal and gramophone selections and calibration signals being sent out from my company's station at Writtle. The movement begun on this basis rapidly became a popular one in which the non-technical listener who required to be interested or amused by news or music predominated, and his needs are certainly well catered for to-day.

Commercial telephony is satisfied with intelligibility and a hand or wall microphone; but for the transmission of music and broadcasts from groups of artists nothing less than true reproduction and a microphone that can pick up the variations of sound at a distance and yet reject mechanical vibrations is demanded. This has led to inten-

sive development in studio design and equipment, the first efforts in this direction being applied at the original 2LO station at Marconi House, opened in November, 1922, and later, with great thoroughness, at the new studios, when 2LO was removed to the headquarters of the British Broadcasting Corporation at Savoy Hill.

I understand that the elaborate and comprehensive equipment of the future home of British broadcasting at Langham Place, London, leaves nothing to be desired, and I am convinced that under the able direction of Sir John Reith the British Broadcasting Corporation will worthily maintain its recognised position as the leading broadcasting organisation.

At one time it was a stock argument against the use of wireless that messages sent by this means could be picked up in all directions. This characteristic, however, has made it an ideal method for communicating with moving objects such as ships at sea or aeroplanes in flight, and with the advent of broadcasting this widespread radiation has become a most valuable feature.

There are, however, many services for which a more confined channel has distinct advantages, and this requirement, I am glad to say, is effectively met by my Beam system, by means of which signals can be concentrated and directed in any desired direction and the power necessary is reduced to a minimum. Directional or Beam wireless transmission has made world-wide telephony possible, and to-day we can speak to our friends at the ends of the earth or on ships at sea wherever they may be, and recognise with the pleasure of personal contact the familiar intonations of their voices.

On May 30, 1924, I was able to speak from Poldhu to Sydney, thus conveying intelligible speech from England to Australia for the first time, and last year, when on board my yacht Eletira in the Mediterranean, utilising one of our small ship wireless telephone installations, I again spoke whenever I wished to do so to friends in Australia over a distance of 9000 miles. I also spoke to others in London, Buenos Aires, Rio de Janeiro, New York, Montreal and Capetown, a range covering practically the whole world.

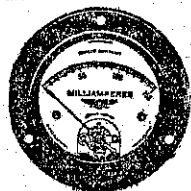
The great need of the present day is for a better understanding between men and nations, and this understanding can be fostered and helped by improvements in our communications. The most direct and satisfying means of communication between men is the spoken word. In this respect, broadcast telephony occupies a unique position as being the most potent means for the instantaneous and universal dissemination of information, instruction and entertainment that the world has ever known.

I am happy if by any efforts of mine I have been able to make some contribution towards international sympathy and understanding.

NEVER "short-circuit" grid-bias battery leads, for this can be much more harmful than disconnecting a G.B. plug when a valve is working.

DO not readjust your crystal more often than you need, as not only is this bad for the crystal but it often interferes with neighbours' reception.

AN ordinary R.F. choke inserted in the negative lead from a "B" eliminator is often efficacious in getting rid of hum or distortion.



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