RADIO IN RETROSPECT

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Our modern Broadcasting Services and Radio Communication Systems are so intricate and far-flung in character, that today we look upon them as a part, an essential part, of our existence. In New Zealand our radio services have progressed in a more or less parallel manner with those of other countries, notwithstanding our comparative isolation.

Thirty-five years ago, our Government saw fit to impose a fine of 500 pounds on anyone possessing wireless receiving apparatus. Fortunately for a number of us in those days, this was not strictly enforced. As far as the writer is aware, only one conviction was ever entered, an experimenter living in Hastings being the unlucky person concerned. One lone receiving license had been granted as early as 1906 to an experimenter, Mr W J Huggins, to whom the writer was later indebted for much valuable advice and some useful apparatus.

At that time (1911) our equipment naturally was rather elementary, consisting of simple "loose coupler" type crystal receivers. Practically everything, including variable condensers, had to be built up from raw materials. Headphones being one of the very few items which were obtainable overseas. The Electro-Importing Co of New Yorks had available a limited range of radio apparatus and later we were able to purchase even variable condensers from this source. By getting on side with the museum authorities, we managed to extract a selection of crystals and after going through large quantities we usually found one or more, which would work to our satisfaction, galena being the favourite.

We knew the names and call signs of all the coastal ships and many of the overseas ones which were then fitted with spark transmitters and would frequently sit for hours in the hope of hearing Morse code from one of these, or from the only existing New Zealand coast station on Tinakore hills, Wellington (NZW). In spite of our rather primitive and necessarily limited apparatus we began regularly to pick up Australian coast stations with these crystal receivers. This was due in no small measure to the use of very high and long aerials as compared with the modern counterpart.

It was not uncommon to have poles from 60 to 80 feet high and about 150 feet apart, with from four to ten wires stretched between spreaders. South Island blue gums made admirable poles but much exertion was needed to get them standing upright. However as the aerial was by far the most important part of the installation, one was well rewarded by going to some trouble to have a good one.

It seemed, at that stage, that further progress was limited. A crystal will do just so much and no more, no matter how efficient the aerial. However, in 1913 the writer was fortunate in obtaining one of the early De Forest thermionic type audion valves. This normally was little more sensitive than a good galena crystal, but when a magnetic field from several horseshoe magnets was applied to it in a particular direction, sensitivity was greatly improved. This early type of valve was a simple triode, with two hair-pin tungsten filaments, a flat grid and a flat plate (hence the name) and soft by modern standards. When one filament burned out the other could be used, a fortunate provision as there were no replacements to be had. Naturally we treated this with loving care.

Filament voltage for this audion valve was obtained from a four volt storage battery, operated in series with a rheostat, the latter being necessary to allow for variations in voltage according to the state of the battery's charge. One could not risk exceeding the normal four volts and have the valve burn out prematurely. Either filament being, tungsten, gave easily enough light to read a newspaper by. Thirty-five volts were required for the plate. This we obtained from a number of flat type torch batteries connected in series. The audion was more or less spherical in shape, with a screw type base fitting a standard torch battery socket not unlike that of a modern dial lamp. This was for the filament connections. Both plate and grid were connected to wires projecting from the top of the valve envelope. Circuit arrangements were very simple. The valve merely replaced the crystal in a normal crystal arrangement. We had no information about "ticklers" or reaction coils. Owing to the softness of the vacuum, however, it is doubtful whether any great advantage would have resulted from its use.

During the period of the Great War considerable progress was made in radio, particularly for military use. New high vacuum valves were produced in Britain, France and USA. A standard valve used in all British forces in the field was known as the French "R" type. Other standard types used by the British Navy at this time were designated V24 and "Q". All of these valves were triodes with tungsten filaments in which respect they were similar to the Audion. However all plates now became cylindrical or oval in shape and grids became cylindrical spirals, a construction which with modifications has been retained over the years. The high vacuum obtained enabled them to be used effectively as oscillators. The French "R" type in particular was used in the later years of the war in a number of field transmitters. Even telephony was tried out although not very successfully, in several instances.

Generally field transmitters still retained the old spark system. Prominent among these were the "B.F." or British field Set designed to use either 350, 450 or 550 metres as required, and the "Wilson Set", an improved spark transmitter using an ingenious type of tuned commutator interrupter. A modification of this, the Hamilton-Wilson transmitter, was in use until about twenty years ago as low powered equipment for ship to shore communication. On returning to New Zealand in 1919 the writer brought home about a dozen French "R" valves. These enabled us to experiment with amplifiers without undue concern in the event of a burn-out.

As yet there was no broadcasting although now we knew something of regeneration, we were able to construct receivers to pick up the European and American long-wave arc and high frequency alternators transmitters.

These transmitters operated, as many of them still do, on very long waves, Bordeaux, in France (LY) at that time transmitted press news on 23,300 metres (approx 13 kilocycles), the longest wavelength that has ever been used commercially. Receivers for these long waves were simple cascaded resistance coupled amplifiers, which functioned satisfactorily owing to the comparatively low radio frequencies employed, the only tuned circuit required being that connected to the input of the first valve. Regeneration was applied by means of a small variable capacity between the plate of the second valve and the grid of the first.

In 1920 much interest was aroused by the arrival in New Zealand of an American ship (the name escapes the writer) fitted with radio telephony. As far as we were aware this was the first occasion on which radio was used for telephony as distinct from telegraphy, in this part of the world. One can imagine the thrill we obtained on hearing actual speech on the air. It came as a surprise because we were unaware of the presence of this ship.

Not many months after this, however, regular test broadcasts were made from Otago University by Professor Jack. These transmissions created great interest among enthusiasts. Although the power used was never greater than about 30 watts, on a frequency in the neighbourhood of 600 kilocycles, the regular Sunday evening broadcasts were heard reasonably clearly in Christchurch and further afield.

In connection with this, the writer well remembers an incident, which took place at Canterbury College, Christchurch. The College authorities had arranged for a transmission from Dunedin by Professor Jack during which a speech was broadcast by the Chancellor of the University. This was to be picked up for the benefit of about 300 members of the Canterbury Philosophical Society assembled in the College Hall. A number of us were concerned in an endeavour to make this pioneer broadcast a success. Test transmissions were made available on several occasions prior to the event, and by means of a Magnovox horn speaker we managed to make these rehearsals intelligible throughout the hall. The secretary of the Philosophical Society at the time was Mr Gilbert Archey (now Director of the Auckland War Memorial Museum) and the proceedings were organised by the late Dr. Farr (Professor of Physics).

When the time came for the broadcast proper we were greeted by loud and continuous bursts of static with a quite unintelligible voice in the background. As few, if any, in the audience had heard radio before, something had to be done. Dr Farr rose to the occasion and explained at some length to the audience that the speech would be taken down by headphones where, he said, reception would be much clearer. We switched the receiver onto headphones and proceeded to write fragmentary words on a sheet of paper, which after a while we handed to Dr Farr who put it in his pocket, explaining to the audience that we had been able to copy almost all the speech via the headphones. Taking another sheet of paper from the same pocket he handed it to Mr Archey, who read the speech in its entirety to the applauding audience. Fortunately, Dr Farr, knowing some of the fickleness of radio, had taken the precaution of having a copy of the speech posted to him the day before! There were occasions such as this when radio had its lighter side.

During 1922 and 1923 several other regular broadcast transmissions were put on the air. These included 3YC, operated by the Radio Society of Christchurch, and using a 15 watt Benwood Transmitter. The International Radio Coy. of Wellington broadcast with similar equipment and the original 1YA commenced operation from Scots Hall, Symond Street, Auckalnd. The writer, in 1922, also broadcast regular Sunday evening programmes in Christchurch using recordings. The power used was approximately 30 watts with the callsign 3AA.

Practically nothing was known at this time about the advantages of short wave for long distance transmission. All frequencies higher than 1500 kilocycles were looked upon as being of no commercial value and were an open field for experimenters. However, in the United States in particular, amateurs had been covering great distances with very low power, using frequencies around 1500 K.C. (200 metres). They discovered, moreover, that the higher the frequency, the greater the effectiveness of the transmission for long distances, and very soon higher and higher frequencies came into general use by amateurs, although as yet no use had been made of these commercially.

In October 1924, with the assistance of the late Mr A E Shrimpton, then Chief Telegraph Engineer, the writer was fortunate in obtaining permission to instal an experimental transmitter on S.S.Curtis

when making a trip to England via Cape Horn. Regular transmission schedules were kept with amateurs in New Zealand, particularly with Mr F D Bell, a friend of the writer, who lives at Shag Valley near Palmerston South and with Mr Ivan O'Meara of Gisborne.

These tests confirmed the results found by others that frequencies higher that 1500 K.C. covered proportionally greater distances with a specified power input. Two-way contact was maintained with Mr Bell during the trip as far as Montevideo (6,000 miles from New Zealand). The frequency used for these tests was 2,000 K.C.(150 metres). Shortly after this Mr Bell established two-way communication with California, a distance of 6,500 miles, and a world record for that time.

Three weeks later, Mr Bell, using 3,000 K.C. (100 metres) obtained the first two-way contact with an experimental station at Mill Hill School, London, operated by Mr Cecil Goyder (G2SZ). On arrival in England, the writer got a great thrill on visiting the school the day after the original contact had been made, and being allowed to use the equipment to converse (in Morse code) with his friend in Otago.

Although it was thought at the time that these transmissions might be of a freakish nature, numerous subsequent contacts between New Zealand and British amateurs proved that this was not so. In 1927, an experimental short-wave broadcast transmitter (G5SW) was set up by the BBC at Chelmsford, England. Many who used short-wave receivers in those days will testify to the success of those BBC transmissions, and will remember the first thrill of listening to Big Ben chiming the hour. The success of G5SW paved the way for the now universally accepted Empire Broadcasting System with its numerous transmitters. Although it is, as yet, not technically possible, we all look forward to the day when we will see, as well as we now hear, events on the other side of the world.

Photo with acknowledgment to "More Golden Age of Radio" by John W Stokes