IEEE, ITRE, Memorial University and Amateur Radio Groups

Commemorate the Centenary of Marconi's first Transatlantic Wireless Experiment

1.0 Introduction

On the morning of the centenary day, on the campus of Memorial University just a few kilometres from where the building once was where Marconi made history a century earlier, weak but readable signals in Morse Code were heard on a radio operated by members of the Marconi Radio Club of Newfoundland. The signal was greetings from His Excellency Sir Guy Green, Governor of Tasmania on the opposite side of the world, to His Honour Dr. Maxwell House, Lt. Governor of Newfoundland, commemorating the historic day.

Later, following a ceremony at which the young winners of the Marconi Crystal Radio Contest were announced, a radio message from Poldhu England relayed greetings to all participants including many dignitaries and event organisers.

Just after 12.30 local time, a succession of S's transmitted from Poldhu by Carolyn Rule were heard as clicks on a receiver manufactured by the company Marconi started himself. This event marked the centenary year with the most authentic re-enactment of Marconi's experiment yet achieved.

Wednesday 12 December 2001, the centenary of Marconi's first transatlantic wireless experiment, was marked by a joint effort by the Institute of Electronics and Electrical Engineers (Newfoundland and Labrador Section) the ITRE in Tasmania, Memorial University of Newfoundland and the Poldhu Amateur Radio Club (PARC) and Marconi Radio Club of Newfoundland (MRCN).

2.0 An early start

Collaboration between these groups when the author, while in conversation with Mr. Frank Davis, P. Eng, MIEEE early in 2000. Frank suggested that Mr. Yves Fontaine, P. Eng and chair of the Newfoundland Section of the IEEE should be contacted so that arrangements could be made to make the centenary event both productive and memorable. The event had been commemorated by several amateur radio organisations for the past four decades, and more recently by re-enacting a transmission from Poldhu where Marconi's original transmitter was located using modern equipment. The centenary year we wanted to re-enact the original experiment in as much detail as possible, bearing in mind the remark of Mr. Fontaine that we should plan things so that we had a reasonable chance of success; a caution that was taken very seriously. Some time later, Mr. Fontaine contacted Prof. Siu O'Young who would be in charge of the IEEE participation in the event. Following a meeting between Profs. O'Young and Zede of the Physics Department and myself, the idea of a special competition and re-enactment on the 12th of December was conceived. We considered this to be an excellent opportunity for collaboration for promotion of science, engineering and Amateur Radio.

3.0 A re-enactment?

It was thought that it might be possible to use apparatus similar to that used in 1901, but was quickly decided that this was not practical. There was too much man-made interference to use a crude receiver although methods of synchronous diode detection was discussed. In addition, a spark transmission of sufficient power would disrupt existing radio services. Instead, to preserve some authenticity, several Marconi receivers were obtained and refurbished, thanks to the assistance of Mr. Barry Hayes, Mr. Hayes of CMC electronics, formerly the Canadian Marconi Company, arranged for the supply of surplus equipment and provided technical expertise. The IEEE assisted in obtaining crystals for the local oscillators in the superheterodyne receivers.

4.0 Promotion to our youth

The promotional aspect of the event was to be in the form of a receiver competition for junior high school students. Exposing students in this age group to radio and electronic principles created a valuable opportunity to spark their interest in both engineering and amateur radio. Further meetings centred on defining the parameters of the competition: no amplification was to be used and they would be judged on merit in terms of sensitivity and selectivity. The receivers would be built from inexpensive parts provided by the university students who designed a kit while working at Dr. O'Young's Instrumentation, Control and Automation (INCA) Centre at Memorial University under the direction of engineering student Jeff Newhook.

There was considerable input from traditional radio amateur operators who were well known for their wealth of experience and expertise especially as it pertains to designing and building radio apparatus. During
A ground connection was made via window and over some nearby trees. These were tried in a lab on the ground floor in the Engineers. These kits were used instead. Unfortunately, this transmitter could not be duplicated and modulated in the time remaining, but a source of low power AM transmitter kits was located. These kits were used instead.

6.0 Final preparation

Towards the end of November, the site for the Marconi Crystal Radio Contest was chosen. It was decided that the music building at Memorial University was the best site. It had high ceilings so that the aerials for the receiver competition could be raised with helium balloons and a good location for an aerial for the amateur radio transmitter which would operate on 14 MHz for the contacts with Hobart on the opposite side of the world, Poldhu and other sites of historic importance in the Marconi Legacy.

The aerial was constructed with the assistance of the Physics Department machine shop and parts provided by Dr. J. C. Craig, who participated in the 1961 commemoration and the author’s father. We also received help from the CBC. The aerial comprised telescoping aluminium tubing 3 cm at base to 1 cm diameter at top and its length was determined from the standard equation, 

$$\lambda = \frac{c}{4f} = \frac{300 \text{ m/s}}{4 \times 14 \text{ MHz}} = 5.4 \text{ m}$$

6.0 Final preparation

Figure 1: (Top) Prototype receiver. The aerial is inductively coupled to the first of three capacitively coupled tuned circuits. The output is taken from the third stage and detected with a germanium diode in half wave mode. The meter measures micro-amps and is in series with the headphones. (Bottom) The Marconi XH-100 superheterodyne receiver used in the re-enactment.
A theoretical monopole of this length would have an impedance of
\[ Z = 36.5 + j21.25 \text{ ohms} \]  

The reactance was reduced by shortening the monopole by five percent.

A total of 9 radial wires 5 metres long were used as a ground plane. The aerial was installed by members of the MRCN and with the assistance of personnel from the University Works and Mr. J. Foley of the Department of Physics and Physical Oceanography. Dr. Zedel completed the wind stress calculations and determined the weight of lead needed at the base to keep the aerial from toppling in the wind.

Unfortunately, there was some reluctance expressed by the building custodian to permit drilling a hole for passing the transmission line into the building. Dr. Zedel suggested that we use a short section of thin line to pass through the door jamb. This worked to our satisfaction. During testing, we found that the resonant frequency of the aerial was very close to the intended operating frequency. To verify that the aerial was working, two contacts were made with Europe the first using a transmitter power output of 100 watts, the second with only 1 watt.

The day before the event, Dr. Zedel and Chris Hammond and I did some final testing and audio tests with connections between the HF transceiver and PA system in the auditorium. Dr. Zedel also made the preparations for the exchange of greetings between the Governor of Tasmania and the Lt. Governor in Newfoundland.

Unfortunately, there was some apprehension if radio conditions were satisfactory for a contact with the antipodes. Fortunately, the pre-arranged Morse code contact was established with Richard Rogers, VK7RO, who along with the ITRE were participating in a gala event organised by David Edwards in Hobart Tasmania. David had participated with us on the 12 December Radio Foundation Day since 1995. The texts to and from the Lt. Governor and the Governor of Tasmania were sent and received after a few tries: interference was a problem at times. Following this, contacts were had all over the world notably with sites of significance to the Marconi legacy. The operators included Dave Colton, VO1TK and Frank Davis. We also used internet links to various sites around the globe and sent video images of the event.

At about 9:00 AM the grade-nine student contestants in the Marconi Crystal Radio Contest brought their home built radios in to be tested. Aerials were made available for each by suspending wires with helium balloons.

After the testing for selectivity and sensitivity, the contestants and guests were assembled in the auditorium to hear speeches by dignitaries which included the IEEE Chairman, Mr. Yves Fontaine, MUN president Dr. Axel Meisen and the Lt. Governor Dr. Maxwell House. Following His Honour's address, the winners of the competition, Courtney Barbour, Alex Goncharov and Sarah Watson were announced. The spotlight then moved to the MRCN radio station VD1GM on the stage. Warm greetings on the occasion of the special centenary were transmitted by John Rule of the Poldhu Amateur Radio Club station GB100GM from Poldhu, England, the site where Marconi's signal was sent a century earlier.

The audio from the radio was fed through the PA system in the auditorium so all could hear the signals from across the Atlantic ocean. An hour later, we had the honour of listening to simulated spark transmitter sounds from the station of distinguished radio scientist Dr. John Belrose, VE2CV Director of Radio Science at the Communications Research Centre in Ottawa. We were then joined by Mr. Dave Bouzane and Mr. Rene Guerrette from Industry Canada and Mr. Jack Harris, Member of the House of Assembly for Signal Hill-Quidi Vidi. VD1GM was then called by our long time friend Carolyn Rule, M0ADA from the Poldhu station GB100GM. Official telegrams were sent from representatives of the national radio organisation Radio Amateurs of Canada and a prepared statement from Mr. Norman Doyle, Member of Parliament for St. John's East was sent to Mr. Andrew George, Member of Parliament for Cornwall, England. We were very honoured to receive a transmission recorded by Dr. Zedel of greetings from Lady Mary Holborough, the Queen's representative and to accept an invitation from Chairman Rule to formally affiliate PARC and MRCN. Mr. Harris exchanged greetings with Dennis Casley, who along with Mrs. Rule is a councillor for Mullion. Mr. Harris received transatlantic congratulations on the 11th anniversary of his seat in the House of Assembly. Mr. Bob Lewis VO1BL sent a message to Poldhu announcing that this was his 70th year as a licensed radio amateur. This was followed by an official transmission from Mr. Rene Guerrette, District Director of Industry Canada to Mr. Barry Maxwell, the director of the Radio Communications Agency in the United Kingdom. Mr. Maxwell was also greeted by Dr. Eric Gill, professor of Electrical Engineering and authority on radio propagation and antennas. At this point, MRCN requested that PARC send a succession of ‘S’s. Dr. Zedel connected the Marconi Receiver to the antenna and much to our delight, we heard what would have been heard 100 years ago from a spark transmitter – a series of three sharp

7.0 The Centenary

On the big day, MRCN members gathered on stage and activated the station. At about 7:00 AM radio contact was established with the United Kingdom, but there was some apprehension if radio conditions were satisfactory for a contact with the antipodes. Fortunately, the pre-arranged Morse code contact was established with Richard Rogers, VK7RO, who along with the ITRE were participating in a gala event organised by David Edwards in Hobart Tasmania. David had participated with us on the 12 December Radio Foundation Day since 1995. The texts to and from the Lt. Governor and the Governor of Tasmania were sent and received after a few tries: interference was a problem at times. Following this, contacts were had all over the world notably with sites of significance to the Marconi legacy. The operators included Dave Colton, VO1TK and Frank Davis. We also used internet links to various sites around the globe and sent video images of the event.

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Joe Craig did undergraduate work in Chemistry and Physics at Memorial University of Newfound-land. After working with the Physics Department at Memorial as a research assistant, he did graduate work in Physical Chemistry and received an M.Sc. degree in 2000. He is presently a Physical Scientist with the Canadian Government and is interested in the density structure of the coastal ocean and radio methods of elucidating surface dynamics.

Len Zedel received the B.Sc. and M.Sc. degrees in physics from the University of Victoria, Canada in 1982 and 1985, and the Ph.D. degree in physical oceanography from the University of British Columbia, Canada in 1991. He is currently an Associate Professor in the Department of Physics and Physical Oceanography at Memorial University of Newfoundland, St. John’s, Newfoundland, Canada. His research interests are in ocean acoustics, fisheries acoustics, near surface processes, ocean ambient sound, and suspended sediment dynamics. Dr. Zedel is a member of the American Geophysical Union.

Siu O’Young obtained his B.Eng. at the University of Saskatchewan and Master’s and Ph.D. degrees from the University of Waterloo all in Electrical Engineering and is a Professional Engineer. He has previously held faculty appointments at Oxford University and at the University of Toronto and is presently an Associate Professor at the Faculty of Engineering at Memorial University of Newfoundland. Dr. O’Young is engaged in research on mechatronics and autonomous avionics systems for unmanned airplanes (UAV) for the iceberg surveillance and environmental monitoring.